

Davis

NEWSLETTER



June 1996, Issue 06

INFRARED SIGNATURE SUPPRESSION (IRSS)

The work associated with the development of the IR suppression system and the production of the system has been one of the most important areas throughout the history of the company.

We originally became involved when we won a competitive bid out of DRE Suffield for the design of a suppressor system based on a concept that was patented by DRES.

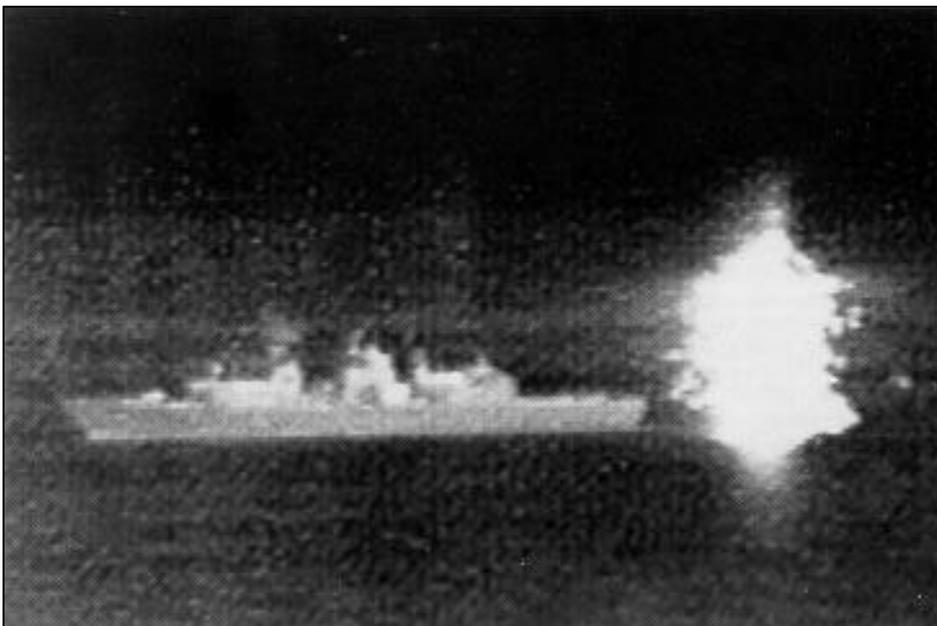
At this time (1978) DND was planning both the new CPF and the upgrade of the Tribal Class destroyers (DDH-280), and the Navy felt strongly that the IR signature of those ships would be an important aspect of their survivability by the time they were in service. As a result, as the development of the DRES Ball was being carried out, the Navy was incorporating the device into the specifications of both ships.

The DRES Ball suppressor, although a relatively complex aerothermal design, has proven to be very effective in IR signature suppression. The only other marine system that is comparable is the U.S.N. Eductor/BLISS suppressor, and sea trials carried out by the U.S. Naval Research Laboratory demonstrated that the DRES Ball was a factor of three to six times more effective. The DRES Ball is manufactured by DAVIS and has been installed on all of the CPF's.

The motivation for the development of the Eductor/Diffuser (E/D) was twofold; first, since the TRUMP program was a retrofit, weight was a critical concern and second, the Navy was willing to compromise the complete overhead protection.

As a result, the diffuser from the DRES Ball was combined with a new lobed

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"HMCS Halifax" in IR Spectrum with Flare Countermeasures

Focus

This special issue of the DAVIS Newsletter reviews our development as a company, and highlights our more significant accomplishments of the past twenty years.

Our company origins come from Carleton University and over the years a large number of us received our engineering education there. However, the technologies that have led to our success originated in government laboratories, and we maintain and value a close working relationship with them.

As can be seen from the accompanying "time-line", the company has gone through some distinct stages, including a high growth period in the early 1980's, a large volume period in the late 1980's and an export stage as our client base moved offshore. For instance, we now have projects in the following countries: U.K., U.S.A., Holland, Germany, France, Spain, Greece, Sweden, Japan, Korea, Singapore, India and Taiwan.

DAVIS is very dependent on the quality of its employees. It is clear that we have been very fortunate in this regard, and I would like to express my most sincere appreciation for all those employees, past and present, who have contributed to the well being of the company.

It has been a very exciting and satisfying twenty years, and I am confident that with your continued support the next twenty years will provide even more interesting.

Rolly Davis, P.Eng.
President

ACTIVE SHAFT GROUNDING SYSTEM

The history of this product has many similarities to the IRSS system, and it also has been and will continue to be very critical to the growth of the company.

This technology originated at DRE Pacific as an outgrowth of their work in electromagnetics and corrosion. Their research into the mechanisms

of corrosion showed that there was a very strong and distinctive signal that they designated the Extra Low Frequency Electromagnetic (ELFE) signal.

In the late 1970's, DAVIS began to work with DREP in the development of a device which would attenuate the ELF signal, since it had become

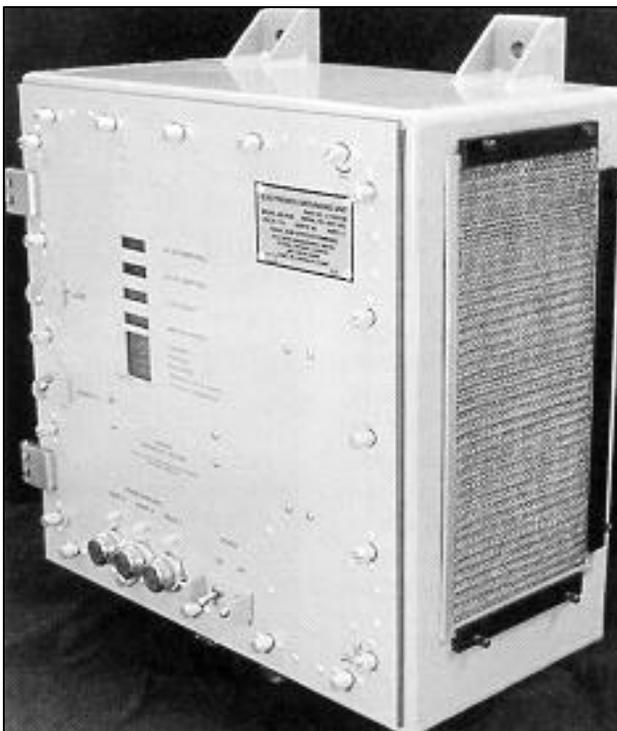
apparent that this signal could be used for identification/surveillance and as an influence mine trigger. Canada took the lead in this development and kept the U.K. and U.S.A. informed of our progress through a tripartite memorandum of understanding.

After several design iterations, a very effective device, designated the Active Shaft Grounding Device, was developed. Using both government (DIPP) and company funds, a fully military qualified production unit was designed and produced in 1986.

This unit then underwent extensive and successful Operational Evaluations in the U.S., U.K. and Canada on both surface ships and submarines.

By the end of 1995, the U.K. had completed installation on their submarines, Canada had almost completed their procurement and the U.S. was just starting to fit the unit on all new warship construction, beginning with the DDG-51, Flight IIA.

Recently, DAVIS has received permission to market this unit to other allied nations and due to developments with influence mines the interest level is very high.



ASG System (200 Amp)

DAVIS TIMELINE (1975 - 1995)

Davis Engineering was founded by Rolly Davis in June 1975, and incorporated in June 1976.

The first official government contract was in the field of energy conservation with the National Research Council, which continues to be a client and partner today.

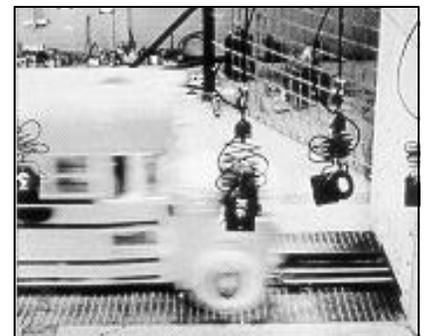
1975-1978

The first few years were dominated by projects in the transportation field and the primary client was Transport Canada. This was a period during which energy conservation was at the forefront, and the

projects reflected that. For example, "Evaluation of the Effectiveness of Aerodynamic Drag Reducing Devices on Trucks", involved over-the-road testing on tractor-trailers.

During this period, we also became heavily involved in developing test equipment and in testing vehicles for compliance to the Federal Motor Vehicle Safety Standards.

A notable and influential project for the company in the transportation area was the Crash Barrier Facility installed at the Motor Vehicle Test Centre near Mirabel, Quebec.



Crash Barrier Facility

WAVE GENERATORS

DAVIS became involved in the field of wave generation as a result of being able to provide engineering design and build services in a short response time. Our initial client was the Hydraulics Laboratory of the National Research Council, and we continue to work very closely with them today, now as a partner in supplying wave generators and the wave generation capabilities to countries around the world.

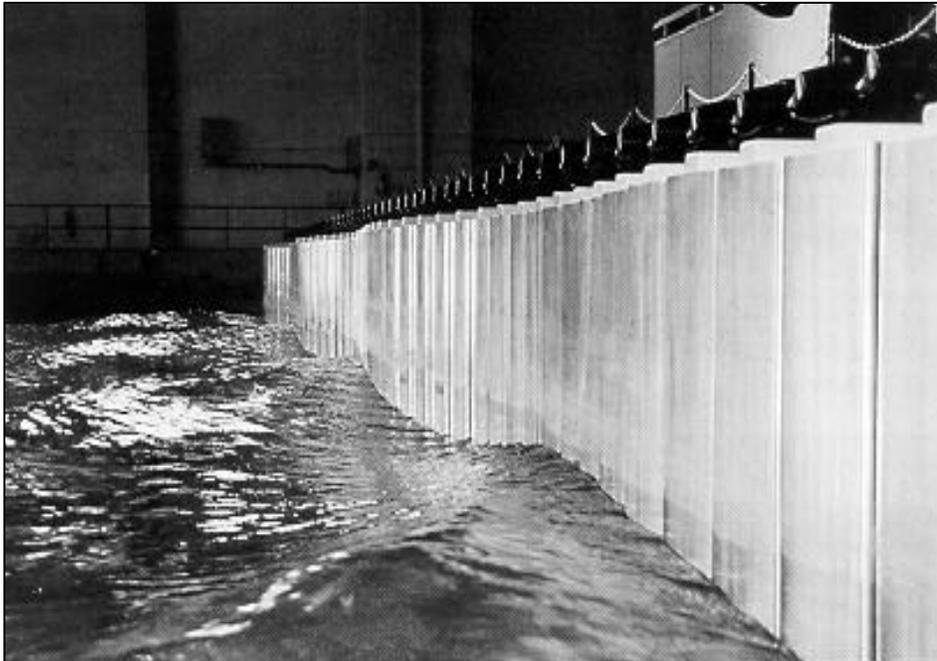
Our first wave generator was supplied under a very accelerated schedule in order to permit NRC to carry out an investigation into the capsizing of the Ocean Ranger off-shore platform.

At about this time (early 1980's), NRC had been developing a requirement for a wave machine to generate 3-D irregular waves and our new relationship let to a joint development

project for a dual mode segmented machine.

This development work led to the segmented wave generator that was installed at the Hydraulics Laboratory (64 segments in 1985) and at the Institute for Marine Dynamics (192 segments in 1990). These two installations provided a showcase for this very sophisticated machine and

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LNH Segmented Wave Generator in Operation

1978 - 1980

By this time, it was apparent that there was a market for engineering and test services with the Department of National Defence (DND). A new company, DEW Engineering, was incorporated to concentrate on DND projects, and for two years it made good progress in this area.

Due to rapid expansion, DAVIS divested DEW in 1980. As a result of the experience gained with DND, DAVIS continued to develop business in the military field.

As part of the energy conservation initiative, DAVIS was involved in several large solar heating projects, including a domestic hot water solar heating system for the Ottawa Athletic Club.

1981 - 1984

This was a period of high growth rate (40% per year) and saw the origin and development of the products that sustained the company for the next ten years.

This period also saw a change in the type of projects, with energy conservation being

phased out, and defence projects beginning to dominate.

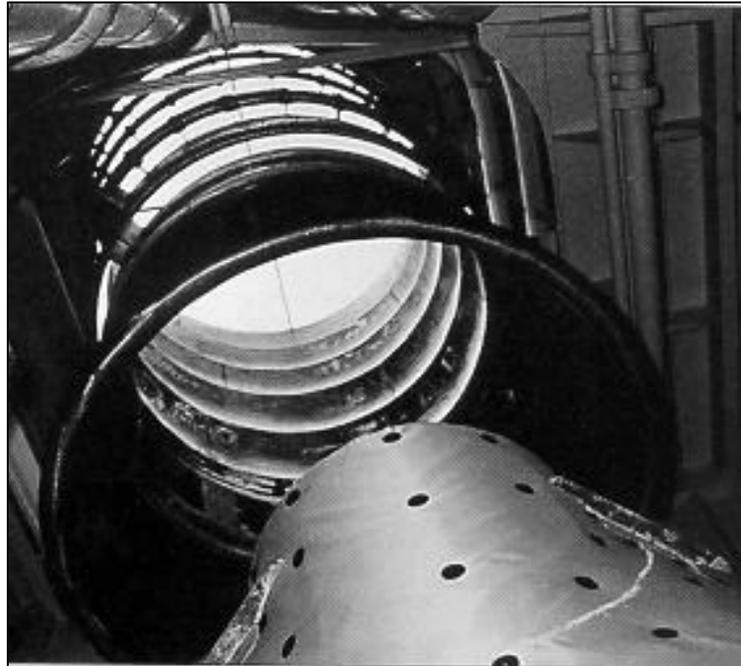
- DRES Ball and Eductor/Diffuser IRSS system.
- Active Shaft Grounding (ASG) System.

In 1981, DAVIS began working with the NRC Hydraulic Laboratory on the design and build of wave generators which eventually would lead to sales of more than \$20 million over a ten year period.

In 1984, DAVIS and Bill MacSween incorporated **DEMAC Software Ltd.** as a

BRIEF UPDATES

- DAVIS was awarded a contract in May for a new wave generator for Taiwan, our first contract in that country.
- DAVIS recently negotiated a contract with Bath Iron Works (U.S.A.) for four shipsets of our ASG system for the DDG-51.
- Ian Jeffrey will present a paper entitled "ELF Signature Control" in London (U.K.) at the UTD Conference on July 4, 1996.
- David Vaitekunas will present a paper entitled "An Integrated Computer Model for Naval Target, Countermeasure and Threat Analysis" at the 2nd NATO IRIS Joint Symposium on June 25 - 28, 1996 in London (U.K.).
- The first review meeting on our IR Studies contract was held in New Delhi on May 1 - 2, 1996 with the Indian Navy.
- The heat pump technologies business unit, announced in the last newsletter, began operation in January 1996, with the addition of Jim Bowen as Sales Manager. Initial activity has involved finalizing machine designs and building a Distribution Network, but sixteen units have been shipped as of May 1996.



Eductor/Diffuser Installed on MEKO 200

Infrared Signature Suppression *continued from page 1*

nozzle and mixing tube to provide IR suppression similar to the DRES Ball up to angles of 60° - 70° above horizontal.

These devices have become recognized worldwide as the best suppression technology available and are being built into new ship programs around the world. In order to remain the world leader, DAVIS is continuing development of new and more effective systems.

Helicopter IRSS

As a result of our experience and expertise in this field, when DND began to plan for new helicopter purchases (new shipboard and utility helicopters), DAVIS began to consider the feasibility of applying similar technology to the air environment. The technology proved to be applicable and we have now developed a very effective suppressor for the new utility helicopter, the CH-146/ BELL 412.

joint venture company to provide software services and support for DAVIS, and to develop software products for the VAX. This proved to be quite a successful venture, and was eventually sold to a large U.S. firm in 1989.

1985

Our tenth year in operation was marked by several high profile events:

- We moved into a new 40,000 sq. ft. facility designed specifically for our requirements which continues to serve us well.

- We won the contract to design and build the interactive exhibits for the CN Pavilion at Expo '86.
- We introduced our new corporate image with the DAVIS logo.
- We delivered the first segmented wave generator (64 segments) to the NRC.

1986 - 1987

This was a period of consolidation after the rapid growth from 1981-85, and a change in emphasis from service to product sales.

- We were awarded three major

- contracts: CPF, TRUMP and the Institute of Marine Dynamics (IMD) which totalled over \$20 million to be completed over a three year period.
- Completion of the development of a fully qualified ASG system.

1988 - 1990

As a result of the coincidence of several large projects, these were years of intense production activity resulting in record revenue levels.

- Twelve CPF shipsets were delivered between January 1988 and September 1990.

Davis

EMPLOYEE PROFILE ERIC POIRIER, MANAGER, MANUFACTURING

This issue incorporates a new feature, that we will continue, of providing a brief profile on DAVIS employees. It is quite appropriate that we start with the employee who has been with the company the longest (nineteen years on July 13, 1996), Eric Poirier.

Eric's initial work involved a variety of tasks, including driving an eighteen wheeler for fuel economy studies.

Eric's versatility and ability to adapt to new requirements has led him to become an expert in fabrication and

manufacturing techniques which probably would not have been predicted when he joined us in 1977.

In addition, he demonstrated a management capability which led fairly quickly to his present position and has at times seen him responsible for more than thirty people.

Recently, Eric built a beautiful cottage in the Gatineau's, which he enjoys most weekends with his wife Kaye, and their children Steve (22) and Erica (19), as well as drop-ins from both of their relatively large families.



Eric Poirier, Manager, Manufacturing



48 Segment Wave Generator at OTRC

Wave Generators

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direct digital control system, and this in turn has led to several sales of similar machines around the world.

To date DAVIS has supplied the following:

- Offshore Technology Research Centre (Texas A&M University), 48 segments.
- Laboratoire National d'Hydraulique (LNH) of the Electricite de France (EDF), 56 segments.

- Centro de Estudios y Experimentacion de Obras Publicas (CEPYC), 72 segments (Spain).
- Korea Research Institute of Ships and Ocean Engineering (KRISO), 88 segments.

At this time, DAVIS/NRC is recognized as being the world leader in the field of segmented wave generators, with over 500 operational segments to our credit.

- Four TRUMP shipsets were delivered between August 1988 and May 1989.
- The IMD wave generator was commissioned in May 1990.

1991 - 1995

With deliveries complete on the CPF, TRUMP, and IMD programs, the Canadian market for these products had been exhausted. In anticipation of this, the international marketing thrust had been increased, and during this period DAVIS became a

predominantly export oriented product based firm.

The major activity during this period was:

- Segmented wave generators supplied to Texas A&M, Paris, Madrid and South Korea.
- Three shipsets of DRES Balls for Ingalls SA'AR 5 Corvette (USA, Israel).
- Four shipsets of IRSS for the Blohm & Voss MEKO 200 Frigate (Germany, Greece).

- ASG systems for the USN Seawolf (USA).
- IRSS for the Japanese ASE04 (Japan).
- ASG systems for the U.K. submarine fleet (U.K.).

There was also new product development during this period:

- IR ship/threat simulation code (NTCS).
- Helicopter IR suppressor.
- Hailstorm simulator for aircraft as turbine engines.

INNOVATION

As described elsewhere, the company has spent considerable time and effort to develop new technology/products that would generate ongoing business. At the same time, we have on many occasions become involved in innovative “one-off” projects, that have proved to be both interesting and challenging. Two of these are described below.

EXPO '86

In 1985, DAVIS was selected by CN to design and build the exhibits for their pavilion at Expo '86 in Vancouver. The challenge was to design large interactive exhibits which would represent the four different types of motion: uniform, accelerating, circular and oscillatory.

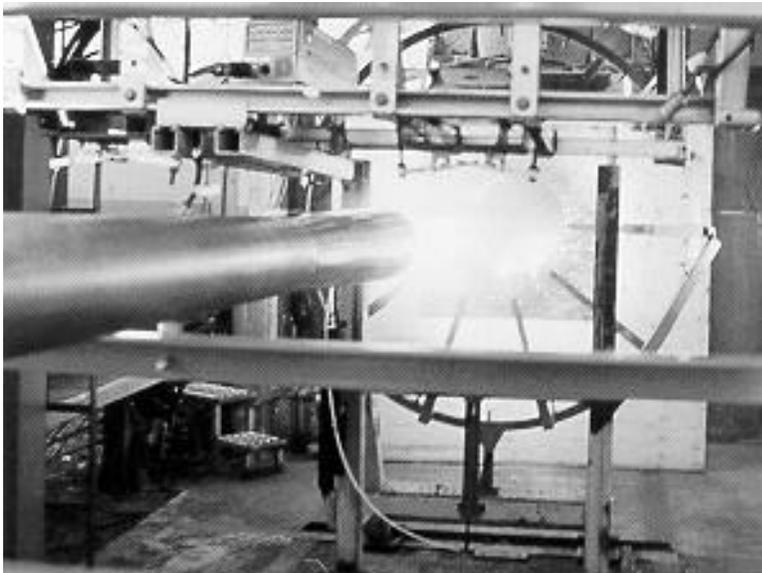
The resulting structures were attractive, durable and very popular with young people as they were able



“Hula-Hoop”, Expo '86

to cause the large exhibits to operate through their physical efforts. The most

unusual was a large 3 m diameter “hula-hoop” which would climb a pole in response to the operators pedalling bicycles.



Test Firing of the Hailgun

HAILSTORM SIMULATOR

In 1995, DAVIS delivered a “hailgun” to Pratt & Whitney Canada (P&WC), designed to simulate a hailstorm which could be encountered by an aircraft engine.

To achieve this simulation of an engine flying through a hailstorm, DAVIS engineers designed a hailgun which has the capacity of delivering a stream of 16 mm diameter “hailstones” to the engine inlet at speeds ranging from 180 knots (330 kph) to 400 knots (740 kph). The density of the stream can vary from 500 to 1400 hailstones per second.

For further information please contact:

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