

CIS Magnetic Sweeps
Clip-on sweeps
requiring no external
power source





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Thales magnetic sweeps consist of a linear array of positively buoyant permanent magnets called Dyads. Dyads are mild steel cylinders driven into magnetic saturation by permanent magnet disc stacks to form a large dipolar magnet.

Dyads were developed by the Australian Defence Science & Technology Group (DST Group). A number of Dyads configured in a linear array can produce a similar magnetic field as that of a selected class of ship, acceptable as a valid target by the most modern mines. The modular nature of the sweep provides the capacity to emulate different ship classes since the sweep signature can be modified by varying the number of Dyads in the array, the polarity (positive or negative pole in the direction of tow) and the distance separating each Dyad.

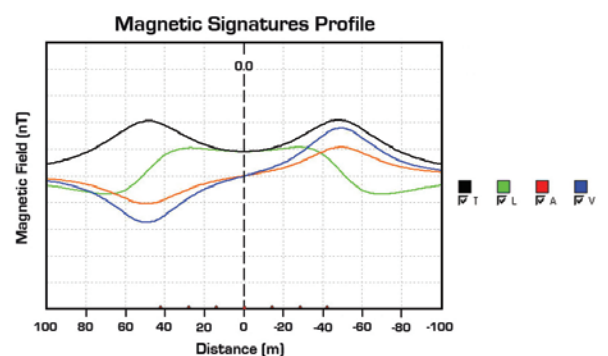
The ability to manipulate sweep signatures means that the sweep can be used in either Target Setting Mode (TSM) (ship emulation) or Mine Setting Mode (MSM), and the resultant signature structure can be optimised to reflect the requirements of most geographic locations.

The Dyads are manufactured in two sizes: mini and maxi.

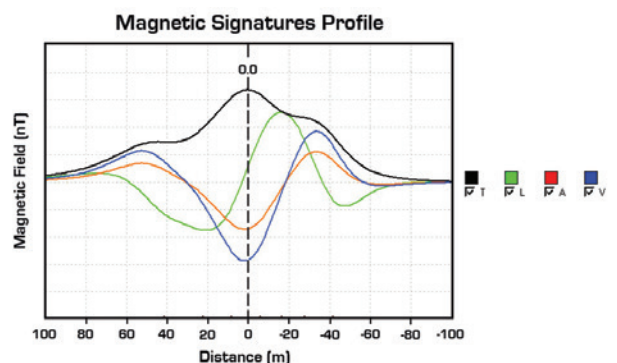
Mini Dyads provide the capability to sweep mines targeted against degaussed warships up to medium sized destroyers (depending on degaussing coil settings and efficiency), and smaller merchant ships.

Maxi Dyads provide the capability to sweep mines targeted against degaussed warships up to CVA size, and large merchant ships.

The Dyads provide magnetic influences in all three axes and are configured to provide a signature which has the same length as the vessel class being emulated, providing a similar spatial and temporal signature.



Seven Dyads with the same polarity and spacing



Seven Dyads with different polarity and spacing



Mini Dyads

Length: 7,722 mm nominal

Diameter of Mini Dyad body: 563 mm nominal

Weight in air: 1,600 kg nominal

Positive buoyancy in sea water: 150 kg nominal

Shock testing: Tested to a Metric Shock Factor >2

Construction: Steel and ferrite permanent magnets

Maxi Dyads

Length: 9,830 mm nominal

Diameter of Maxi Dyad body: 1,336 mm nominal

Weight in air: 10,600 kg nominal

Positive buoyancy in sea water: 923 kg nominal

Shock testing: Tested to a Metric Shock Factor >2

Construction: Steel and ferrite permanent magnets

Mini Dyads

Each Mini Dyad is a positively buoyant steel cylinder consisting of mild steel tubes and stainless steel sleeves incorporating ferrite permanent magnet discs which provide the magnetising force (the word 'dyad' is a mathematical term meaning a couple or pair of magnetic monopoles, which is how the Dyads appear when viewed at a distance).

Mild steel will lose magnetism as a function of time, due to ambient temperature changes, exterior magnetic field induced changes and the effects of vibration or shock. However, since the magnetising force from the disc stacks of ferrite permanent magnets is always present, the mild steel is constantly being magnetised and maintained in a state of magnetic saturation.

While the ferrite magnet stacks retain their integrity there will be no reduction in magnetic moment. Mechanical energy such as shock or vibration does not degrade the magnetic characteristics of the high energy magnets used and the demagnetisation experienced with in-service Dyads after 100,000 hours is essentially zero.

Thus, the magnetising force necessary to maintain the magnetic moment of the Dyad will be present during the life of the Dyad, which is estimated to be in excess of 15 years.



Mini Dyad Shorting Band Kit

Mini Dyads may be fitted with a Shorting Band Kit to reduce their magnetic signature by up to approximately 45% for use when low magnetic signatures are required.

Transportation

During transport Dyads are arranged in alternating polarity to minimise the overall magnetic field, and are provided with cradles for rail, road and sea transport.

Micro Dyads

The Micro Dyad is of similar construction, dimension, weight, towload and shock resistance to the Mini Dyad but with a magnetic moment of approximately 50% of a Mini Dyad to allow closer emulation of smaller vessels and modern warships fitted with high efficiency degaussing systems.

Maxi Dyads

The Maxi Dyad is of similar construction to the Mini Dyad but with a greater circumference and much larger magnet discs to provide a substantially higher magnetic moment.

Shock testing

The Dyad influence sweep, both Mini Dyads and Maxi Dyads, has been extensively shock tested and has demonstrated exceptional shock resistance.

As an example, during shock trials conducted by the Royal Australian Navy (RAN), a charge weight of some 1,500 kg Torpex was detonated directly beneath sweeps in 18 metres of water. All Dyads survived in an operational condition and there was no reduction in magnetic moment.

The detonation of such a large charge in such close proximity to the sweeps provided a level of shock far exceeding that which could be expected in an operational environment. The sweep has been accepted into the RAN as completely shock proof.

Magnetic Mine Jammer (MMJ)

Recently developed and tested by DSTO and Thales Australia, the MMJ provides the ability to vary the athwartships and vertical fields at different positions along a sweep to produce a more ship-like signature.

The MMJ is designed to be used with Mini Dyads, Micro Dyads or other MMJs to sweep the latest generation mines fitted with advanced mine logic.

The MMJ can also be fitted with fins to produce a rotating magnetic field when towed through water that will be rejected by most mines as an un-ship-like signature and "jam" the mine.

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