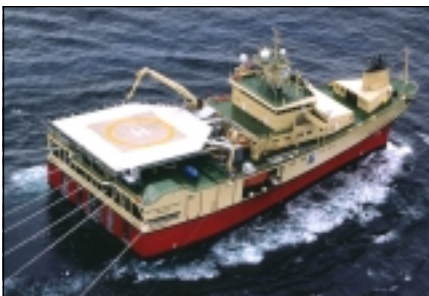


RAMFORM SEISMIC SURVEY SHIPS

RAMFORM EXPLORER, CHALLENGER, VALIANT, VIKING, VICTORY and VANGUARD



RAMFORM VALIANT, 4th of the series.



Stern view of the RAMFORM EXPLORER showing the characteristic broad transom ideal for multi-streamer towing.



RAMFORM CHALLENGER towing two groups of seismic streamers.

Brush Electrical Machines Ltd has supplied the main electrical propulsion equipment for all six vessels of a fleet of new generation diesel-electric survey ships designed for marine surveying and oil exploration.

The 8380 tonne Ramform class vessels employ a special wedge-shaped hull with a large aft deck area, designed by Norwegian naval architect Roar Ramde to provide the exceptional stability needed for seismic surveying. The vessels were constructed by the Langsten Shipbuilding Group for PGS Exploration, also of Norway. They are operated by Rieber Shipping on a world-wide basis.

A contract for the first vessel was placed in 1993 with the Norwegian Aukra shipyard, part of the Langsten Group. Following this first vessel, the RAMFORM EXPLORER with a 660V system powered by four Brush 2800kVA generators, the capacity and power outputs have increased as the vessel designs have evolved.

The four latest vessels utilise a 4160V generating system, which supplies both the propulsion, bow thruster and auxiliary loads via a common switchboard, the one-line diagram being shown overleaf. The major power system components were supplied by Brush and companies within the FKI Electric Power Group.



(Above): RAMFORMs VIKING and VALIANT at their inauguration ceremony.



One of the three "Synchrosil" air-cooled variable-frequency drives for each vessel.



The first two vertical-shaft, water-cooled stern-thruster motors.

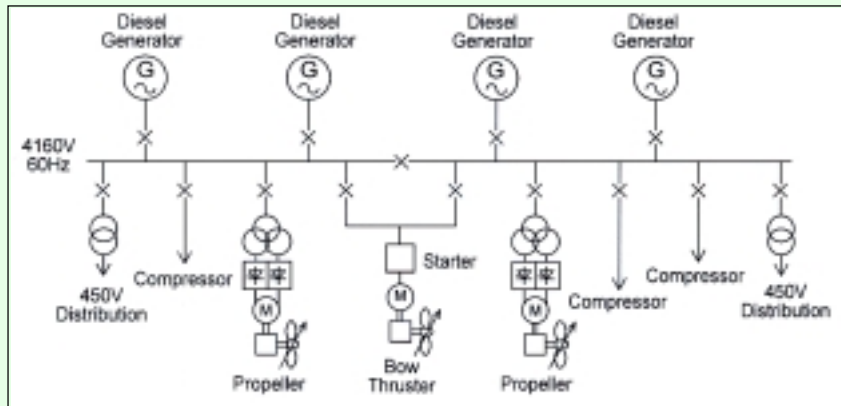
The main propulsion plant comprises two synchro-converter variable-speed drives from FKI Industrial Drives Ltd., together with BEM synchronous motors of the vertical-shaft, brushless type. Each motor is rated 4000kW, 0-600 rev/min and is directly coupled to an Ulstein controllable-pitch azimuth thruster. The drives and motors employ closed air circuit ventilation with air/water heat exchangers extracting heat to the ship's freshwater cooling system. The vessel's high degree of manoeuvrability is demonstrated by its ability to turn round through 180 degrees at full speed in only 90 seconds.

The propulsion drives are equipped with parallel converter bridges and phase shifting supply transformers which attenuate harmonics so that the DNV classification requirements are met without the need for filters.

A powerful 2000kW thruster is installed at the bow, this being of the controllable-pitch type driven by a fixed-speed cage motor from Laurence, Scott & Electromotors Ltd. Starting is initiated via an auto-transformer starter in order to minimise resultant voltage dips on the 4160V busbars.

The main generating plant consists of four Ulstein Bergen BRG-6 diesel engines operating at 720 rev/min. Each is coupled to a 3200kW BEM generator which was mounted onto the engine underbase at the Bergen works for combined load testing, a single sleeve bearing arrangement being used. Power is distributed by vacuum circuit breakers from Hawker Siddeley Switchgear Ltd., the switchboard being designed for fully automatic remote control by the Power Systems Department of BEM.

One-line diagram of main power system



Liaison was undertaken with:

Langsten Slip & Batbyggeri AS
 PGS Exploration AS
 Reiber Shipping AS
 Ulstein Bergen AS for engines
 Ulstein Propeller AS for thrusters

Summary of equipment supplied by BEM for each vessel:

- 4 BS45 water-cooled diesel generators, 2800kVA rising to 4266kVA
- 2 BS100 vertical-shaft water-cooled stern thruster motors 2530kW rising to 4000kW
- 1 BJS10 vertical-shaft water-cooled bow thruster motor 2000kW rising to 4000kW
- 3 "Synchrosil" variable-frequency air-cooled synchroconverter type thruster drives