James Cook & new Discovery Compared

<table>
<thead>
<tr>
<th></th>
<th>Cook</th>
<th>Discovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length Overall:</td>
<td>89.50 m</td>
<td>99.70m</td>
</tr>
<tr>
<td>Breadth:</td>
<td>18.60 m</td>
<td>18.0m</td>
</tr>
<tr>
<td>Draft:</td>
<td>5.50-5.70 m</td>
<td>6.50 m</td>
</tr>
<tr>
<td>Displacement:</td>
<td>5368t GRT</td>
<td>6075T GRT</td>
</tr>
<tr>
<td>Class:</td>
<td>Lloyds +100A1, Ice 1C, FS, +LMC, UMS, DP(AM) Research Vessel</td>
<td>Lloyds +100A1, Ice 1D, +LMC, UMS, IWS, EP, DP(AM), NAV1, IBS, Research Vessel</td>
</tr>
<tr>
<td>Maximum Speed:</td>
<td>15 kts SS4</td>
<td>15kts SS2</td>
</tr>
<tr>
<td>Cruising Speed:</td>
<td>12 kts SS4</td>
<td>12kts SS4</td>
</tr>
<tr>
<td>Maximum Endurance:</td>
<td>50 days</td>
<td>50 days</td>
</tr>
<tr>
<td>Science &amp; Stores DW:</td>
<td>385T</td>
<td>380T</td>
</tr>
<tr>
<td>Scientific Berths:</td>
<td>32 singles</td>
<td>28 singles</td>
</tr>
<tr>
<td>Officers:</td>
<td>9 singles</td>
<td>12 singles</td>
</tr>
<tr>
<td>Crew &amp; Technicians:</td>
<td>13 singles</td>
<td>12 singles</td>
</tr>
<tr>
<td>Open Deck Spaces (Afterdeck &amp; Stbd Amidships):</td>
<td>446 m²</td>
<td>432 m²</td>
</tr>
<tr>
<td>Total Lab Areas:</td>
<td>277.5 m²</td>
<td>388.8 m²</td>
</tr>
</tbody>
</table>

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RRS James Cook / Discovery Replacement Comparison

James Cook:
L 89.5m; B 18.6m; D 5.5 – 5.7m; Displacement 5800 T

Discovery:
L 99.7m; B 18.0m; 6.5m; Displacement 6075 T
External
Plug in Laboratories
Winch Suite

Internal
Labs

Greening – EP notation
Exhaust
Particulate Emissions
Ballast Water Treatment
Bilge Water Treatment
Garbage Disposal

Sampling
Platform
Fwd

Communications V-Sat C
Band 512kbps minimum

Enclosed
Lifeboats

Overside Handling Systems
Cranes & Gantries

Large Aft & Stbd Decks

Azimuth Thruster Propulsion

Drop Keels
Swath Transducers

Retractable Azimuth
Thruster

Jet Thruster

Hull/Bow designed to minimise aeration and URN

LR 100 A1, Ice 1D  LMC, UMS, IWS, EP, DP (AM), NAV1, IBS, “Research Vessel”

30 knots, gusting 40 knots on beam
SS 6/7 on beam

Performance
Survey & Slow speed operations
Transit 12 kts
Max Speed 15 kts
Over side handling
RRS Discovery

Midship/aft Crane 250T.m

Starboard Bull-horn Boom
Capacity – 20T
Max. Height – 4.5m

Stern ‘A’ Frame
Capacity – 20t
Max. Height – 8m

Starboard ‘A’ Frame
Capacity – 20t
Max. Height – 5m

Aft Cranes
40T.m
## RRS Discovery hydro graphic suite

<table>
<thead>
<tr>
<th></th>
<th>RRS Discovery</th>
<th>Comment on installation Issue</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Blister</td>
<td>Port drop keel</td>
</tr>
<tr>
<td>EM122 1° x 1° 12kHz MBES</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>SBP120 3° x 3° sub-bottom profiler</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>EM710 2° x 2° 70-100kHz MBES</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>75kHz ADCP</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>150kHz ADCP</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Hydrophone – (Acoustic background &amp; system performance)</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>EA600 12kHz single beam sounder</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>10kHz single beam echo sounder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCTV underwater camera</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EK60 Bio echo sounder; 18kHz, 38kHz 70kHz, 120kHz, 200kHz, 333kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scanmar S-1004/S-1007 hydrophone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrophone – (background flow noise monitoring/system performance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultra Short Base line (USBL)</td>
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<td></td>
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</table>
Main Discovery over side handling systems – 20T starboard P-Frame

The starboard parallelogram handling system (P-Frame) is positioned fwd of the starboard 20T beam system. The P-Frame is designed to handle all the ships wires, cables and ropes. The P-Frame geometry allows a package to be lifted off the starboard deck, over the bulwark with out using the winch.
Main Discovery over side handling systems – 20T Starboard beam

The starboard 20T beam handling system is positioned Aft of the starboard P-Frame system. The beam is designed to handle all the ships wires, cables and ropes. The beam can be fitted with a ROV handling frame with locking head.
Main Discovery over side handling systems – 20T stern A-Frame

Stern 20Te A Frame:
- Main central 20Te deployment block
- 4 auxiliary deployment points.
- 2 5Te auxiliary winches

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Ship fitted winch systems
Ship fitted winch systems, wires, cables & ropes:

1. ROV / deep tow winch:
   • Traction winch
   • 12.5 Te maximum line pull
   • 2m/sec line speed
   • 10,000m steel armoured Electro-Optical cable (Rochester triple armoured, triple optic fibres, 3 copper core cable); MBL 20.9 Te

2. Standard steel CTD winch 1 & 2 –
   • Traction winch with 2 storage drums
   • 5 Te maximum line pull
   • 2m/sec line speed
   • 8,000m steel armoured Electro Mechanical 11.43mm cable; MBL 8.61 Te

3. General Purpose winch –
   • Direct pull winch
   • 11 Te at mid layer line pull
   • 2m/sec line speed at mid layer
   • 7,000m 3x25 RHO steel rope; MBL 18.56 Te
4. Trawl winch -
   • Traction winch
   • 12.5Te maximum line pull
   • 2m/sec line speed
   • 15,000m tapered steel rope; MBL 13 Te / 18.1 Te / 20.9 Te

5. Coring winch –
   • Traction winch
   • 20 Te maximum line pull
   • 2m/sec line speed
   • 8,000m synthetic Mechanical cable (Cortland 28mm ‘Plasma’ Dyneema); MBL 66.5 Te

6. Clean CTD winch –
   • Direct pull winch
   • SWL 4 Te at mid layer, 3.7 Te outer layer
   • 2m/sec line speed
   • 2.4 m/sec with AHC (6m@8sec)
   • 8,000m synthetic rope (Cortland Vectran braided rope); MBL 9.9 Te / WL 1.32 Te
Acceptance trials

- A range of marine acceptance trials and shallow winch trials were carried out locally to Vigo between March and July 2013.

- Following these acceptance trials the ship was officially handed over to NERC but a number of issues still remained outstanding.

- Deep sea winch trials carried out in the N Atlantic in September 2013
  - Tests were carried out to prove:
    - General operation of the winches
    - 24 hour operational capability of the winches
    - Effectiveness of cable and rope runs, routes and sheaves
    - Effectiveness of spooling systems
    - Reliability of control systems and user interface

- Following these trials modification and repair work was identified.

- A further deep sea winch trials is planned for January 2014.

- Hydrographic trials were carried out in the N Atlantic in October 2013 which proved to be very successful!
Future trials and science activities

• 2nd deep sea winch trials planned for January 2014 in the N Atlantic; sailing from Southampton to Lisbon.

• Dry dock planned for Vigo in February 2014 to carry out modification work.

• 1st science cruise planned for March 2013

• Guaranteed dry dock planned for the summer of 2014