

*Anexo II-1*

*Especificaciones técnicas de los  
buques típicos*



Buque: B/M de Apoyo "MISTER BIG"  
 Mat PNA: 0534

### PROPULSION

#### MOTORES PROPULSORES

Cantidad: 2 (dos)  
 Marca: CATERPILLAR  
 Modelo: D-399  
 Nro. de serie: 91B 960(Eb) y 91B 942 (Bb)  
 Potencia: 1125 hp ( 838.125 kW) c/u  
 RPM: 1225  
 Lugar de construcción: Estados Unidos  
 Fabricante: Caterpillar Inc.  
 Año de construcción: 19...  
 Tipo: Diesel.  
 Tiempos: 4 (cuatro)  
 Cantidad de pistones y cilindros de cada uno: 16(dieciseis)  
 Simple o doble efecto: Simple  
 Posición de cilindros: en "V"  
 Reversible: No  
 Arranque: con aire comprimido  
 Enfriamiento: Circuito cerrado de agua dulce, con enfriador de quilla.  
 Diámetro de cilindros: 159 mm.  
 Carrera de pistón: 203 mm.  
 Bombas acopladas:  
     1 A engranajes de circulación de Ac. Lub.  
     1 Centrífuga de circ. de Agua Dulce Refrigeración  
     1 Booster de combustible  
 Alimentación de combustible: por gravedad  
 Aceite lubricante: común base mineral SAE 30/40  
 Consumo de aceite lubricante: 1,5 Kgr./h. (a régimen nominal)  
 Combustible: Gas-Oil  
 Consumo de combustible: 229.5 Lts/h. (a régimen nominal)  
 Servicio: Exclusivamente propulsión, acoplados a ejes propulsores a través de una caja reductora.

### CAJA REDUCTORA

Cantidad: 2 (dos)  
 Marca: Twin-Disc  
 Modelo: 7271  
 Accionamiento: Hidráulico  
 Relación de reducción Marcha Adelante : 5.09:1  
 Relación de reducción Marcha Atras: 6:1

### LINEA DE EJES

1.-Ejes intermediarios:

Cantidad: no tiene  
2.-Eje portahélice  
Cantidad: 2 (dos)  
Tipo: macizo  
Diámetro:177,8mm  
Material: Acero forjado grado II  $\sigma=42\text{Kgr/mm}^2$   
Sellos bocina: tipo prensaestopa común  
Refrigeración: agua salada

Para mayores detalles ver planos de "Eje Portahélice"

### HELICE

Tipo: Paso Fijo  
Tipo: TROOST B-4-70  
Cantidad de palas: 4 (cuatro)  
RPM: 300  
Diámetro: 54"( 1371.6 mm)  
Paso : 54"( 1371.6 mm)  
Relación Fa/F: 0,70  
Material: Acero Inoxidable

### MOTOGENERADORES AUXILIARES

Cantidad: 2 (dos)  
Marca: Caterpillar (dos)  
Modelo: 3406-B (dos)  
Nros. de serie: Br popa: 4TB3308  
Eb popa.: 2WB06072  
Tipo: Diésel  
Número de cilindros y pistones: 6(seis),  
Tiempos: 4 (cuatro)  
Simple o doble efecto: Simple  
Posición de cilindros: en línea  
Reversible o no: No reversible  
Sobrealimentado: si  
Potencia:349 hp ( 260 kW).  
RPM: 1500 rpm c/u  
Diámetro de cilindros:137mm  
Carrera de pistones: 165mm  
Bombas acopladas:  
1 de lubricación a Engranajes  
1 de circulación de AD de ref. Centrífuga  
1 Booster de GO a engranajes  
Arranque: electricos  
Aceite lubricante: común base mineral SAE 30/40  
Enfriador Ac.Lubricante: tipo tubo y envuelta  
Consumo de aceite:0.05 Kgr/h.  
Combustible: Gas-Oil  
Consumo de combustible: 68.5 Lts/h los de popa y  
35,15 Lts/h el de proa  
Servicio: accionamiento generadores electricos

### **GENERADOR DE ESTRIBOR**

Marca de generador: Delco Remi  
Modelo: E 7085  
Potencia: 438 KVA (350 kW).  
Tensión y corriente: 3 x 416/480 VCA; 507/526 A  
Frecuencia: 50 Hz  
Rpm: 1500  
Nro. de serie: 27-K-75

### **GENERADOR DE BABOR**

Marca de generador: Delco Remi  
Modelo: E 7352  
Potencia: 375 KVA (300 kW).  
Tensión y corriente: 3 x 416/480 VCA; 507/526 A  
Frecuencia: 50 Hz  
Rpm: 1500  
Nro. de serie: 14F78

### **SISTEMA DE ACHIQUE**

#### **BBA DE ACHIQUE, CONTRAINCENDIO Y SERV. GRALES**

Cantidad: 2 (dos)  
Tipo: Centrífuga  
Caudal y Presión: 30 m<sup>3</sup>/h a 20 mca, acc. ME 7.5 Kw  
45 m<sup>3</sup>/h a 20 mca . acc. ME 18.5 Kw  
Diámetro de salida: 75 mm. y 50 mm.

### **EQUIPO SEPARADOR DE SENTINAS**

Cantidad: 1 (uno)  
Marca: Turbulo  
Fabricante: Blohm+Voss AG  
Modelo: TCS IND  
Nº: 15503  
Capacidad: 0.92/1.4 m<sup>3</sup>/h.  
Eficiencia: 15 ppm

#### **BBA DE ACHIQUE DEL SEPARADOR DE SENTINAS**

Cantidad: 1 (una)  
Tipo: rotativa autocebante  
Caudal y Presión: 12 m<sup>3</sup>/h a 1 bar  
Accionamiento: Motor eléctrico 4.0 Kw  
RPM Bba: 3450  
Diámetro de salida: 50 mm.

### **SISTEMA DE AGUA SALADA DE ENFRIAMIENTO**

El enfriamiento de motores se realiza por medio de enfriador de quilla, con bombas incorporadas a los motores

## **SISTEMA DE AGUA SANIDAD**

Todos los baños son alimentados por intermedio de tanque hidrofóro de AD

### **FILTROS**

Cantidad: 2 (dos)

Tipo: Canasto grueso, simples

Ubicación: en aspiraciones de tomas de mar.

**Nota:** Todo el sistema de AS, se encuentra interconectado entre sí, de modo tal que cada Bba. puede ser utilizada para cualquier servicio .-

### **SISTEMA DE AGUA DULCE DE REFRIGERACION DE MOTORES**

Sistema circuito cerrado en cada motor, con enfriamiento de quilla, con bbas. acopladas de circulación.

### **TANQUES HIDROFORO DE AD**

Cantidad: 1 (uno)

Capacidad: 100 Lts.

Máxima presión de trabajo: 4 Kgr/cm<sup>2</sup>

Ubicación: sobre cubierta ppal.

### **BBA AD SANITARIA**

Cantidad: 2( dos)

Tipo: Centrífuga

Caudal y presión: 1,5 m<sup>3</sup>/h. a 25 mca.

Accionamiento: Motor eléctrico de 1.50 kW.

Diámetro de salida: 32 mm.

### **SISTEMA DE SERVICIO DE GAS OIL**

Cantidad: 1 (una)

Tipo: centrífuga

Caudal y Presión: 11 m<sup>3</sup>/h. a 20 mca.

Accionamiento: Motor eléctrico de 18.5 Kw

Diámetro de salida: 39 mm.

### **SISTEMA DE TRASVASE DE GAS OIL**

Cantidad: 3 (tres)

Tipo: centrífuga

Caudal y Presión: 50 m<sup>3</sup>/h. a 20 mca.

Accionamiento: Motor eléctrico de 18.5 Kw

Diámetro de salida: 75 mm.

### **PURIFICADORA DE GO**

Cantidad: 1 (una)

Tipo: Centrífuga

Marca: ALFA LAVAL

Modelo: MAB 103

Cap: 500 Lts/h  
Accionamiento: Motor eléctrico, de 0,5 kW.

### FILTROS

Cantidad: 2 (dos) ,solo para los motores principales  
Tipo: Canasto simple doble conmutable  
Ubicación: Bb y Eb de sala de maquinas.

Cantidad: 2(dos), incorporados de fabrica a cada motor, 1 (uno) doble, tipo record , para ambos motores auxiliares  
Tipo: Canasto fino, simple (los incorporados), grueso el record  
Ubicación: sala de maquinas

### SISTEMA DE SERVICIO DE ACEITE LUBRICANTE

No posee, el recambio de ac. Lubr. a motores se realiza manualmente

### SISTEMA DE AIRE COMPRIMIDO

#### COMPRESORES DE AIRE

Cantidad: 2 (dos)  
Marca: QUINCY  
Modelo: D-325  
Tipo: a pistones, en linea.  
Diámetro pistón baja: 114,3 mm.  
Diámetro pistón de alta: 63,5 mm.  
Carrera: 76,2 mm  
Cantidad de pistones: 2 (dos)  
Cantidad de etapas: 2 (dos)  
Caudal y Presión: 50 m<sup>3</sup>./h. a 14,3 Kgr/cm<sup>2</sup> (200 psi).  
Enfriamiento: aire  
Accionamiento: Motor eléctrico de 5,5 kW.  
rpm: 400/900

#### BOTELLONES DE AIRE COMPRIMIDO

Cantidad: 2 (dos)  
Capacidad: 450 Lts.  
Presión de trabajo: 17,85 Kgr/cm<sup>2</sup>. (250 psi)  
Presión de prueba: 26.77 Kgr/cm<sup>2</sup> (375 psi)  
Válvula de seguridad: 1 (una) cada botellon  
Diámetro: 600 mm.  
Longitud: 1500 mm.  
Servicio: arranque de motores ppales, auxiliares y general.

**NOTA:** Para mayores detalles, ver esquema de tuberías correspondiente.

### VENTILACION

#### VENTILADORES DE SALA DE MAQUINAS

Cantidad: 3 (tres)  
Tipo: Flujo Axial

RPM: 3550  
Accionamiento: Motor eléctrico 3,7 kW.

### OTROS EQUIPOS EN SALA DE MAQUINAS

#### BBAS HIDRAULICAS SERVOTIMON

Cantidad 2 (dos)  
Tipo de Bombas: A Engranajes  
Presión de trabajo: 150 Kgr/cm<sup>2</sup>  
Caudal: 25 Lts/Min.  
Accionamiento: Motor Eléctrico de 2,2 kW

### EQUIPOS FUERA DE SALA DE MAQUINAS

#### MOTOR DIESEL EN CUBIERTA BABOR

Cantidad: 1 (uno)  
Marca: DEUTZ  
Modelo: BF 61913  
Nros. de serie:  
Tipo: Diésel  
Número de cilindros y pistones: 6(seis)  
Tiempos: 4 (timpos)  
Simple o doble efecto: Simple  
Posición de cilindros: en línea  
Reversible o no: No reversible  
Sobrealimentado: si  
Potencia: 110 Kw  
RPM: 1500  
Diámetro de cilindros: mm.  
Carrera de pistones: mm.  
Bombas acopladas:  
1 de lubricación a Engranajes

Arranque: electrico  
Aceite lubricante: común base mineral SAE 15/40  
Consumo de aceite:0,009 Kgr/h.  
Combustible: Gas-Oil  
Consumo de combustible: 18 Lts/h  
Servicio: accionamiento generador de puerto

### HELICE DE PROA

Cantidad: 1 (una)  
Nr. Palas: 4 (Cuatro)  
Tipo: Kaplan  
Diámetro: 0.80 m.  
Paso: 0,75 m.  
Accionamiento: Motor Diesel

### MOTOR DIESEL ACCIONAMIENTO HELICE PROA

Cantidad: 1 (uno)  
Marca: DETROIT DIESEL



Modelo: 6 A  
Nros. de serie: 395131A-1064-7002  
Tipo: Diésel  
Número de cilindros y pistones: 6(seis)  
Tiempos: 2 (dos)  
Simple o doble efecto: Simple  
Posición de cilindros: en línea  
Reversible o no: No reversible  
Sobrealimentado: no (Aspiración natural)  
Potencia: 185 hp (137.8 kW).  
RPM: 1500  
Diámetro de cilindros: 107.95 mm.  
Carrera de pistones: 127.00 mm.  
Bombas acopladas:  
    1 de lubricación a Engranajes  
    1 de circulación de AD de ref. Centrífuga  
    1 Booster de GO a engranajes  
Arranque: por aire comprimido  
Aceite lubricante: común base mineral SAE 30/40  
Enfriador Ac.Lubricante: tipo tubo y envuelta  
Consumo de aceite: 0,18 Kgr/h.  
Combustible: Gas-Oil  
Consumo de combustible: 38.7 Lts/h  
Servicio: accionamiento helice de proa

#### **EQUIPO DE AIRE ACONDICIONADO DE ALOJAMIENTOS**

Cantidad: 1 (uno)  
Ventilador Tipo: Centrífugo  
Accionamiento: Motor eléctrico de 2 kW.  
RPM: 1440

#### **EXTRACTOR/VENTILADOR DE COCINA**

Cantidad: 1 (uno)  
Tipo: Flujo axial  
Accionamiento: Motor eléctrico de 1,1 KW.  
RPM: 2850

#### **MAQUINA DEL TIMON**

Cantidad: 2 (dos)  
Tipo: 2 pistones opuestos, simple efecto  
Accionamiento: hidráulico  
Control: Eléctrico  
Máxima velocidad: 70° en 25 seg.  
Máxima presión de trabajo: 100 Kgr/cm<sup>2</sup>  
Accionamiento: Bba electrohidráulica en Sala de Máquinas  
Maniobra de emergencia: Manual, con poleas

#### **CAPACIDADES DE TANQUES**

Tanque Nro 1 (Pique de proa).....16.1 m<sup>3</sup>.  
Tanque Nro 2 Br Agua potable.....13.15 m<sup>3</sup>.  
Tanque Nro 2 Er Agua potable.....13.15 m<sup>3</sup>.

Tanque Nro 3 Br Aguas servidas.....	9.00 m <sup>3</sup> .
Tanque Nro 3 Er Cofferdam.....	9.00 m <sup>3</sup> .
Tanque Nro 4 Br. Agua sanidad.....	75.20 m <sup>3</sup> .
Tanque Nro 4Eb. Agua sanidad.....	75.20 m <sup>3</sup> .
Tanque Nro 5 Br gas-oil.....	19.80 m <sup>3</sup> .
Tanque Nro 5 Eb gas-oil.....	19.80 m <sup>3</sup> .
Tanque Nro 6 Br Gas-Oil.....	29.90 m <sup>3</sup> .
Tanque Nro 6 Eb Gas-Oil.....	29.90 m <sup>3</sup> .
Tanque Nro 7 Br. Agua sanidad.....	68.30 m <sup>3</sup> .
Tanque Nro 7 Eb Agua Sanidad .....	68.30 m <sup>3</sup> .
Tanque Nro 8.Br. Aceite sucio Bb.....	3.30 m <sup>3</sup> .
Tanque Nro 8 Eb. Aceite Lubricante Bb.....	2.80 m <sup>3</sup>
Tanque Nro 9 Br. Aceite Lubricante Bb.....	2.80 m <sup>3</sup>
Tanque Nro 9 . Aceite sucio Eb.....	3.30 m <sup>3</sup>
Tanque Nro 10 Aceite sucio Eb.....	2.80 m <sup>3</sup>
Tanque Nro 10 Aceite sucio Eb.....	2.80 m <sup>3</sup>
Tanque Nro 11 Bb gas-oil.....	11.00 m <sup>3</sup>
Tanque Nro 11 Eb Gas-oil.....	11.00 m <sup>3</sup>
Tanque Nro 12 Bb gas-oil diario.....	5.30 m <sup>3</sup>
Tanque Nro 12 Eb gas-oil diario.....	5.30 m <sup>3</sup>
Tanque Nro 13 Bb Agua sanidad.....	59.95 m <sup>3</sup>
Tanque Nro 13 Eb Agua sanidad.....	59.95 m <sup>3</sup>
Tanque Nro 14 Bb gas-oil.....	37.30m <sup>3</sup>
Tanque Nro 14 Eb gas-oil.....	37.30m <sup>3</sup>
Tanque Nro 15 Bb gas-oil.....	12.70m <sup>3</sup>
Tanque Nro 15 Eb gas-oil.....	12.70m <sup>3</sup>

2

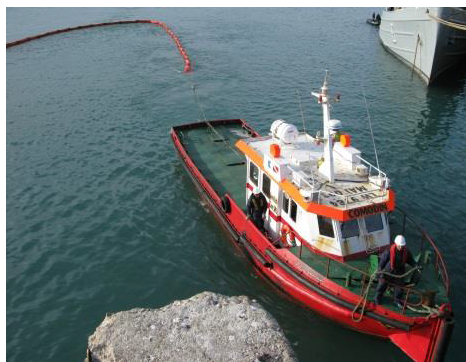
**LANCHA "TITAN"**

Armador: SERVISUB – Comodoro Rivadavia  
 Eslora: 14.75 m  
 Manga: 4.5m  
 Material Casco: Acero Naval  
 Plantas Propulsoras: Diésel (GM DETROIT)  
 Potencia Total: 2 motores x 375 HP  
 Pasajeros: 12  
 Generador: 17 KVA  
 Cap. Combustible: 3200 litros  
 Nariz de Empuje: Omega de goma  
 Perímetro: Defensa Omega de goma  
 Equipamiento Electrónico: 2VHF, GPS, Navegador, Sonda, Radar, Tel  
 Gancho disparador p/remolque  
 Cubierta playa en popa  
 Bodega  
 Equipamiento de buceo a bordo



### 3 *LANCHA "COMODIN"*

Armador: SERVISUB – Comodoro Rivadavia  
Eslora: 16 m  
Manga: 4.00m  
Puntal: 2.10 m  
Material Casco: Acero Naval  
Plantas Propulsoras: Diesel (Mercedes Benz)  
Potencia Total: 2 motores x 170 HP  
Pasajeros: 10  
Generador: 10 KVA  
Cap. Combustible: 3200 litros  
Nariz de Empuje: Omega de goma  
Perímetro: Defensa Omega de goma  
Equipamiento Electrónico: 2VHF, GPS, Navegador, Sonda, Radar, Tel  
Gancho disparador p/remolque  
Cubierta playa en popa  
Bodega  
Equipamiento de buceo a bordo



4 **LANCHA "ESDRAS"**

Armador: SERVISUB – Comodoro Rivadavia  
Eslora: 12 m  
Manga: 3.80m  
Puntal: 2.20 m  
Material Casco: Acero Naval  
Plantas Propulsoras: Diésel  
Potencia Total: 174 HP  
Pasajeros: 5  
Cap. Combustible: 19000 litros  
Nariz de Empuje: Omega de goma  
Perímetro: Defensa Omega de goma  
Equipamiento Electrónico: VHF, GPS, Sonda, Radar, Cel  
Gancho disparador p/remolque  
Cubierta playa en popa  
Bodega  
Equipamiento de buceo a bordo



*Anexo II-2*

*Especificaciones técnicas de los  
camiones Vibro*



## AHV-IV™ RENEGADE

### FEATURES

- Up to 80,000 lbs of peak force and frequency limit of 1 Hz to 250 Hz\*
- Fully integrated with INOVA's Vib Pro® source controller for greater control, timing and QC
- Durable, rectangular baseplate reinforced to support long term field use in comparison with I-Beam structured baseplates.
- The AHV-IV Renegade is produced using an advanced reaction mass assembly which makes it easier to detect and repair failures in the field.
- INOVA's Patented Pre-Loaded Stilt Structure prolongs the life of parts
- Simplified Operator Controls
- Improved Operator Visibility
- Certified Roll-Over Protection
- Simplified Hydraulics
- Fewer Hoses & Components
- Articulated, Oscillated Steering
- High Capacity Hydraulic Cooling

### TECHNICAL SPECIFICATIONS - PLS-380 ACTUATOR

Shaker Model:	P-Wave Vibrator; PLS-380
Peak Force:	356 kN (80,000 lb)
Piston Area:	167.2 sq cm (25.92 sq in)
Mass Weight:	5,910 kg (13,029 lb)
Driven Weight:	1,985 kg (4,377 lb)
Useable Stroke:	10.16 cm (4.0 in p-p)
Frequency Limit:	1 Hz to 250 Hz*
Mass Accumulators:	2 x 1 L (0.26 gal.); in-line
Lift Stroke:	114.3 cm (45 in)
Balance Method:	Airbags
Isolation Method:	Airbags
Hydraulic System:	Closed-loop
Hydraulic System Pumps:	2 x 119 cc (7.25 in <sup>3</sup> ); Denison P-7
Servo Valve:	Atlas 240H (with DR modification)



Pilot Valve:	MOOG
Filtration:	3-micron absolute servo filter; 3.5-micron absolute, high and low pressure, triple element
Accumulators:	2 x 19 L (5 gal); bladder-type
Heat Exchanger:	Steel core; multi-wing fan; hydraulically-driven
Reservoir:	170 L (45 gal)
Baseplate Type:	Reinforced rectangular
Baseplate Area:	2.5 m <sup>2</sup> (3,864 in <sup>2</sup> )
Baseplate Clearance:	46 cm (18 in) - Tires 58 cm (23 in) - Tracks
Winch Capacity:	13,608 kg (30,000 lb)

### TECHNICAL SPECIFICATIONS - CHASSIS

Engine:	Detroit Diesel – Series 60, 14 L (425 BHP @ 1,900 RPM) Optional Engine: 500 BHP @ 1,900 RPM
Air Cleaner:	Dry-type, 3-stage with pre-cleaner
Cooling:	Water-cooled radiator to +50 °C (+122 °F) for hot climate and -50 °C (-58 °F) for cold climate
Air Compressor:	13 CFM
System Warning Device:	Engine shutdown system for low oil pressure, high engine water temperature, and low coolant level

## AHV-IV™ RENEGADE

### TECHNICAL SPECIFICATIONS - CHASSIS (CON'T)

Fuel Capacity:	757.08 L (200 gal)
Drive Pumps:	100 cc (6.1 in <sup>3</sup> ) with electric displacement control
Drive Motors:	250 cc (15.25 in <sup>3</sup> ) variable volume with electronic control for 6 forward and 2 reverse speeds
Frame:	Solid-steel frame for maximum strength and reliability; 35 articulated; hydraulic power steering; 16.5 oscillation center joint
Axles:	Inboard planetary axle with enclosed wet disc brakes and differential lock
Gearboxes:	1.7 to 1 ratio reduction
Cab:	Fabricated-steel construction; high visibility with adjustable driver and passenger seat; two, 3-point shoulder belts; air-conditioning; heater; defroster; wiper; dome light; and side-mounted mirrors
Electrical:	+24 V start; +12 V run with 110-amp alternator and two, heavy-duty, +12 V, 8D batteries; battery - disconnect switch
Tire Options:	Sand Tire: 167 cm x 112 cm x 64 cm (66 in x 44 in x 25 in) ; 20 ply minimum Tracks: 91.44 cm (36 in) wide rubber track

### PHYSICAL SPECIFICATIONS

Buggy Length:	10.01 m (400 in)
Buggy Width:	3.4 m (134 in) for 66 x 44 tires on standard axle 4.0 m (157 in) for 66 x 44 tires on heavy axle 3.0 m (118 in) for tracks on standard axle 3.58 m (141 in) for tracks on heavy axle
Height (maximum):	3.50 m (138 in) for tires 3.68 m (145 in) for tracks
Wheelbase:	4.77 m (188 in) N/A for tracks
Turning radius – inside:	6.93 m (273 in) N/A for tracks
Speed:	20.4 km/hr (12.7 mph) tires, heavy axle 20.9 km/hr (13 mph) tracks, standard axle
Gradeability:	Tires: 60% (31 degrees) heavy axle Tracks: 51% (27 degrees) standard axle
Gross Vehicle Weight:	Tires: 37,300 kg (82,300 lb) Tracks: 41,855 kg (92,080 lb)
Hold-down Weight:	Tires: 36,287 kg (80,000 lb) at 2,850 psi Tracks: 36,287 kg (80,000 lb) at 2,850 psi
Front axle Weight:	Tires: 18,750 kg (41,350 lb) Tracks: 20,245 kg (44,540 lb)
Rear axle Weight:	Tires: 18,585 kg (40,950 lb) Tracks: 21,609 kg (47,540 lb)

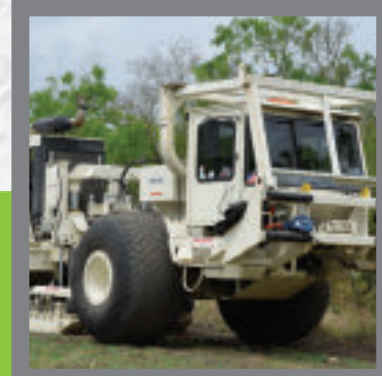
\* Max peak force from 5.5 Hz



TOGETHER, WE GET THE JOB DONE.



:: SOURCE PRODUCTS





## SOURCE PRODUCTS

Utilizing the industry-leading AHV-IV or XVib vibrators ensures improved productivity, reduced mechanical-related downtime and better coupling.

### Source Products Portfolio

INOVA offers a complete portfolio of vibrators and source controllers that have been used worldwide for more than forty years and are compatible with all acquisition systems on the market today. Utilizing the INOVA line of source technology ensures accurate force, sweep amplitude, phase, and timing. Our source products are designed to operate efficiently in all environments while reducing maintenance related downtime in the field. INOVA continues to invest in research and development of new technology to support tomorrow's acquisition challenges, today. To further improve field productivity, INOVA's controllers, Vib Pro™ and Shot Pro™ II, have been seamlessly integrated with our recording systems, Scorpion®, ARIES® II, and Hawk®.

### Vibrators

Providing a variety of configurations and a comprehensive selection of vibrators to accommodate any terrain or environment, our high quality vehicles are manufactured to support low maintenance, high productivity vibroseis operations. INOVA offers several options to meet imaging and operational requirements in the form of four different actuators (PLS-326, PLS-362, PLS-364, and PLS-380).

Our complete line of vibrators includes:

- **UNIVIB™ (PLS-326)** – INOVA's newest 26,000 lb (12t) peak force small vibrator with the new PLS actuator is engineered with a smaller frame for easier mobility through environmentally sensitive areas
- **AHV-IV™ Commander (PLS-364)** – INOVA's most advanced 61,800 lb (28t) peak force vibroseis technology complete with a newly designed stiffer baseplate and re-engineered hydraulic system delivering a greater, more consistent and predictable force over a broader bandwidth
- **AHV-IV™ Renegade (PLS-380)** – INOVA's 80,000 lb (34t) peak force vibrator is ideal for single-source fleet configurations - such as Distance Separated Simultaneous Sweeping - or when surveys require greater peak force output
- **AHV-IV™ (PLS-362)** – the industry workhorse widely recognized and utilized on most surveys today available in 61,800 lb (28t) peak force capacity
- **XVib® (PLS-362 or PLS-380)** – A heavy-duty, articulated track chassis vibrator utilized in extremely icy conditions such as in the Arctic, or in loose impediment desert sand environments where traction is the key to productivity

INOVA's AHV-IV series of vibrators includes a variety of customizable features to accommodate any imaging target or terrain objective.

## AHV-IV Series

INOVA proudly represents the durable, low-maintenance AHV-IV family of vibrators with the latest advances in source technology implemented in the industry standard Articulated Hydrostatic Vehicle (AHV) design. We offer a variety of configurations and a comprehensive selection of customizable options on our AHV-IV product line to accommodate variations in terrain, environment or imaging requirements. Each AHV-IV model includes:

- Interchangeable tire or track capacity on PLS-362 and PLS-380 models
- Articulated steering for superior maneuverability ensuring higher productivity
- Reinforced rectangular baseplate for improved ground coupling in comparison with I-beam configurations
- A patented Pre-Loaded Stilt Structure (PLS) design to create a stronger, more reliable actuator that dramatically prolongs the life of parts
- Advanced reaction mass assembly and limited hoses and fittings for simplified infield maintenance and troubleshooting
- Certified roll-over protection and a lower center of gravity
- Variable/variable transmission for faster move-up times between VPs

## UNIVIB

The new UNIVIB by INOVA was specifically designed for source operations in environmentally restricted or heavily urbanized areas generating lower ground pressure while still outputting frequencies down to 1 Hz. This lighter, smaller, and mobile vibrator is built with the same quality and reliability of our traditional, full-size AHV-IV vehicles. With a smaller vehicle footprint, the UNIVIB can navigate more freely through natural and man-made surroundings than larger vibrators. Furthermore, obtaining permitting access becomes less difficult for service contractors since the environmental impact is reduced.

## Optimizing Productivity for High-Density Acquisitions

AHV-IV Renegade Delivers 80,000 Pounds of Efficiency

### Challenge:

Mobilizing and maintaining a vibroseis fleet to cover high-density, 3D acquisitions can be labor and time intensive. A Global Geophysical crew operating in Oman conducted a 2,793 sq km survey in a continuous recording environment.

### The Solution:

A source-driven acquisition utilizing seventeen AHV-IV Renegade vibroseis vehicles with 80,000 pounds of peak force in a single source fleet configuration. The AHV-IV Renegades enabled the crew to conduct the industry's first-ever Distance Separated Simultaneous Shooting (DS<sup>3</sup>) operation.

### The Results:

Improved field productivity with minimal downtime and simplified infield maintenance. The crew successfully acquired over 842,324 VPs with a record production day of 12,200 VPs recorded. The program was conducted over 151 days with 95% vibrator uptime in 24-hour operations.



"With over 87 AHV-IV vibrators in our fleet, field maintenance and durability are of extreme importance to our crews."

– Pat Ryan, Equipment Manager  
Global Geophysical Services



The new UNIVIB vibrator shown with the PLS-326 actuator and tire-based options.



# ::SOURCES & SOURCE CONTROLLERS

## XVib Heavy-Duty Track Chassis Vibrator

INOVA's XVib vibrator is a heavy-duty, articulated track chassis vibrator with a low-impact drive system and fully suspended cushioned undercarriage ideal for rough terrain, desert and Arctic environments. Field-proven in a variety of loose impediment conditions including sand dunes, gravel and ice, the XVib has the ability to maneuver safely and quickly to ensure high productivity in challenging landscapes. The XVib includes a comprehensive selection of features including:

- 61,800 or 80,000 pound peak force capacities
- Articulated steering for superior maneuverability ensuring higher productivity
- Reinforced rectangular baseplate for improved ground coupling in comparison with I-beam configurations
- A patented Pre-Loaded Stilt Structure (PLS) design to create a stronger, more reliable actuator that dramatically prolongs the life of parts
- Advanced reaction mass assembly and limited hoses and fittings for simplified infield maintenance and troubleshooting
- Certified roll-over protection and a lower center of gravity

## Source Controllers


INOVA supports vibroseis and dynamite operations with rugged encoders and decoders equipped with GPS positioning and timing and improved crew safety features. Vib Pro and Shot Pro II controllers are seamlessly integrated with our acquisition systems Hawk, ARIES II and Scorpion, streamlining QC and enabling the observer to focus on one display for system and source productivity and quality. In addition, Vib Pro and Shot Pro II are available and compatible with all acquisition systems, vibrators and detonators on the market.

## Vib Pro


With its field-proven reliability and the capacity to generate accurate sweeps, whether operating in sand or hard surface environments, Vib Pro sets the industry standard for vibrator source controllers and remains the most commonly utilized controller in the industry today. In addition, Vib Pro enables seismic contractors to generate highly accurate source signatures demanded by oil & gas companies in order to deliver seismic images of the highest quality.

Vib Pro's system architecture supports reliable, highly productive operations. Specific features of the system's architecture and telemetry system enable:

- Patented Harmonic Distortion Reduction (HDR™) technology
- Accurate fundamental ground force control
- Redundant storage of QC data eliminating missed sweep information
- Management of multiple vibrator fleet operations
- Parameters to be configured from the recording truck
- Optional integrated GPS



INOVA's AHV-IV Renegade has a V/V transmission that improves move-up time between VPs thereby increasing field productivity.



INOVA's XVib is ideal for Arctic acquisition where icy conditions require improved traction and durability.  
(Winter Housing Option Shown)

### The Power of HDR

For several years, the Research and Development team at INOVA has diligently been developing and testing advanced vibroseis technology designed to bring unsurpassed reduction in harmonic distortion associated with vibroseis operations. The latest advances include the introduction of the AHV-IV Commander and the Vib Pro with patented HDR Technology.

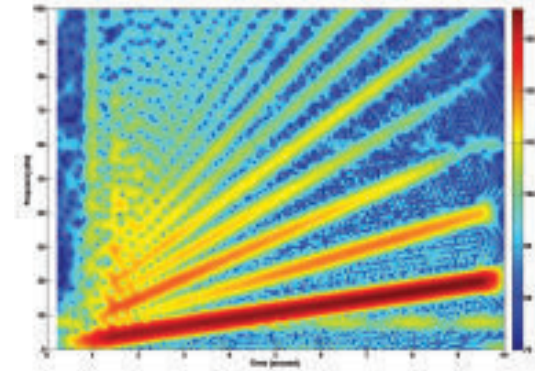
The AHV-IV Commander is engineered with a new baseplate and hydraulic system design that delivers greater, more consistent and predictable force over a broader bandwidth with improved coupling. The new vibrator design continues to bring the standard durability and simplified maintenance that have made the AHV-IV a household name in the seismic industry.

When utilized in combination with the Harmonic Distortion Reduction Technology (HDR) implemented in the Vib Pro control electronics, observers will obtain further benefits that include improved vibrator control, additional reductions in harmonic distortion, and enhanced signal-to-noise ratio. HDR Technology is a proprietary set of algorithms designed to reduce harmonics caused by nonlinearities in the main-stage servovalve mechanism of the vibrator hydraulic system.



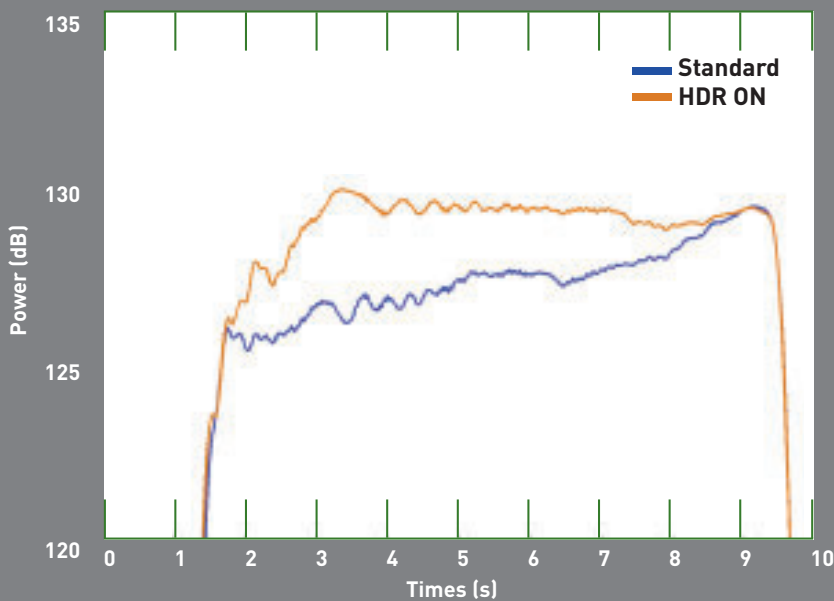
Vib Pro's HDR Technology is the newest enhancement to improve vibrator control while reducing harmonic distortion on any vibrator on the market.

### The HDR Advantage

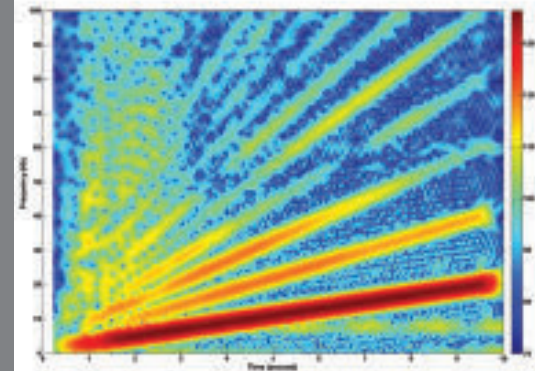


F-T plot from load cell testing of the AHV-IV Commander without HDR Technology implemented. (1-21Hz sweep, 10 seconds)

### Fundamental Force Standard vs HDR Technology - 1-21HZ, 10s (AHV-IV 362)



The Vib Pro HDR Technology reduces harmonic distortion and increases fundamental force on any vibrator available on the market. When utilized with INOVA's DR Valve, HDR Technology is further optimized by dampening the earth/baseplate resonance which further improves the linearity and bandwidth of the vibrator's servo-valve.



When coupled with Vib Pro's HDR Technology, the AHV-IV Commander delivers even greater harmonic distortion reduction. (F-T plot from load cell testing of 1-21Hz sweep, 10 seconds)

# ::SOURCES & SOURCE CONTROLLERS



“Deploying equipment that minimizes downtime is critical to success. We were extremely pleased with the performance of the recording system and INOVA’s Shot Pro II controllers utilized in this acquisition.”

– Yang Jiyou, Chief Geophysicist  
Sinopec Second Geo

## Shot Pro II

The Shot Pro II system provides reliable control over dynamite operations for seismic crews. The compact design is highly portable and easy to handle. The Shot Pro II system consists of a source controller (decoder) unit for each shooter, an encoder unit in the recording truck and proprietary software.

- Operational modes: encoder, decoder, master/slave repeater/air gun
- Supports wire-line shooting
- Compatible with RTI system architecture to ensure close coupling between shot timing and data recording
- Interfaces with most commercial VHF/UHF radios
- Contains an integrated GPS for simplified infield navigation
- Supports airgun operations for transition zone acquisition
- Incorporates common mode protection from electrical impulses on the firing and uphole lines
- Provides encrypted fire commands to prevent the firing of unselected units even when armed

## Connex Vib

The new user-friendly standalone system, Connex Vib provides navigation and positioning of vibroseis vehicles with capabilities for integrated stakeless operations. The navigation system can record GPS coordinates, sweep start times, post sweep (PSS) attributes such as force, phase, distortion, stiffness, viscosity and vibrator source signature (VSS) data. Utilizing this system greatly increases HSE awareness due to clear visualization of hazards, slopes and exclusions located in survey areas. The Connex Vib system can also be used in high productivity vibroseis operations and is an integral component for some techniques such as Independent Simultaneous Sweeping (ISS).



The Connex Vib navigation system’s user-friendly touch-screen interface graphically displays real-time vibrator positioning data, fully integrated with hazards, topographical data and sweep status information.

## Customer Care

At INOVA, we understand that downtime can be extremely costly during seismic operations. This is why we implemented customer care centers all around the world with field service engineers on staff in each region. Service calls are answered 24 hours a day, seven days a week to provide timely responses to our clients. Contact our **Customer Care Hotline** at +1.281.568.2002 or via email at [customer.support@inovageo.com](mailto:customer.support@inovageo.com).

## INOVA – Together, We Get the Job Done

INOVA provides a complete portfolio of land acquisition equipment and services, including:

- Hawk® – cableless seismic acquisition platform
- G3i® and ARIES® II – cable-based seismic acquisition systems
- AHV-IV™ series, UNIVIB® and XVib® – vibroseis source vehicles
- Vib Pro™ and Shot Pro™ II – vibroseis and dynamite source controllers
- AccuSeis™, VectorSeis® and geophones – digital sensors and analog geophones
- Rental equipment services
- Training facilities and customer support worldwide

## TOGETHER, WE GET THE JOB DONE.

It's not just a slogan: it's what we do. INOVA has evolved as a leader in the land seismic technology industry. We build the world's most flexible, rugged and reliable land seismic acquisition equipment. Our experienced engineering and customer support teams are empowered to develop solutions that ensure the quality and reliability of our equipment and the satisfaction of our customers. And now our unparalleled product reliability, innovation and field support allows the world's leading seismic crews to acquire high-quality data with equipment that is as hard working as they are and as tough as the operating environments they work in. At INOVA, we work hard and we work for your success. TOGETHER, WE GET THE JOB DONE.



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*Anexo II-3*

*Política de Calidad, Medio  
Ambiente, Seguridad y Salud de  
YPF S.A.*



*Anexo II-4*

*Procedimiento YPF sobre manejo  
de residuos en operaciones  
geofísicas*



*Anexo II-5*

*Norma Interna YPF de uso de  
vehículos livianos y  
Procedimiento YPF de  
conducción invernal*

