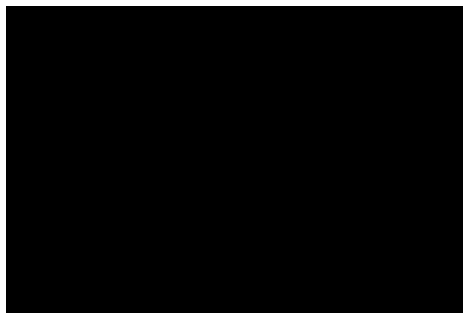
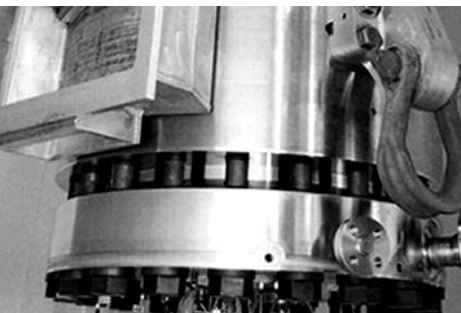


**CURTISS -
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MANTIS-RAM MK1-3

INDAL Technologies



INDAL Technologies

- **At INDAL Technologies we believe that our aircraft handling systems are the best available in the world today.**
- **We develop our systems at our cost and our corporate risk.**
- **By this unique means we can provide units that are genuinely Commercial Off The Shelf (COTS) solutions. ready to go with minimal end user changes.**
- **Of course, as the market leading supplier in our niche market we can also produce specially designed products exactly tailored to our clients specific requirements.**
- **INDAL Technologies units such as MANTIS offer absolute cutting edge, digital, computerised control technology that dramatically reduces servicing times and ensures tremendous endurance between battery charges, even at maximum payloads and high sortie rates. At the same time the units utilise the latest material technology to minimise weight and ensure that the aircraft handling GSE 'mass above water line' is always the absolute lowest technically possible.**

MANTIS: All-Electric Pedestrian-Operated Vehicle

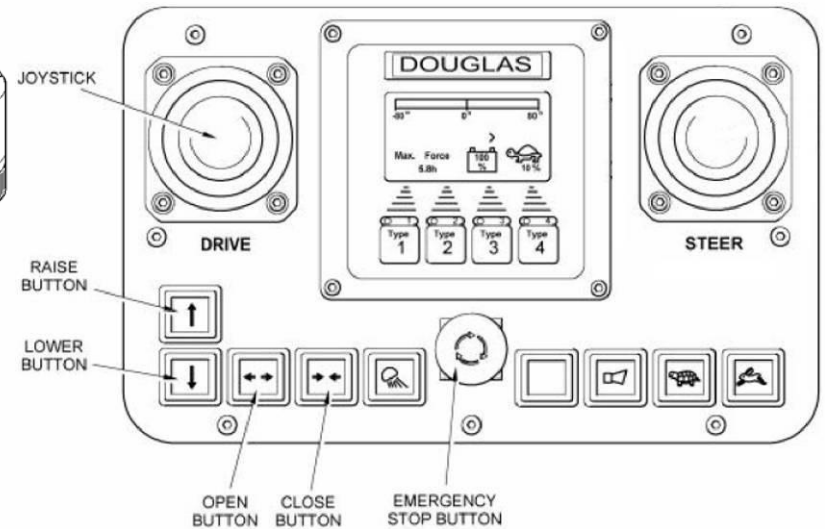
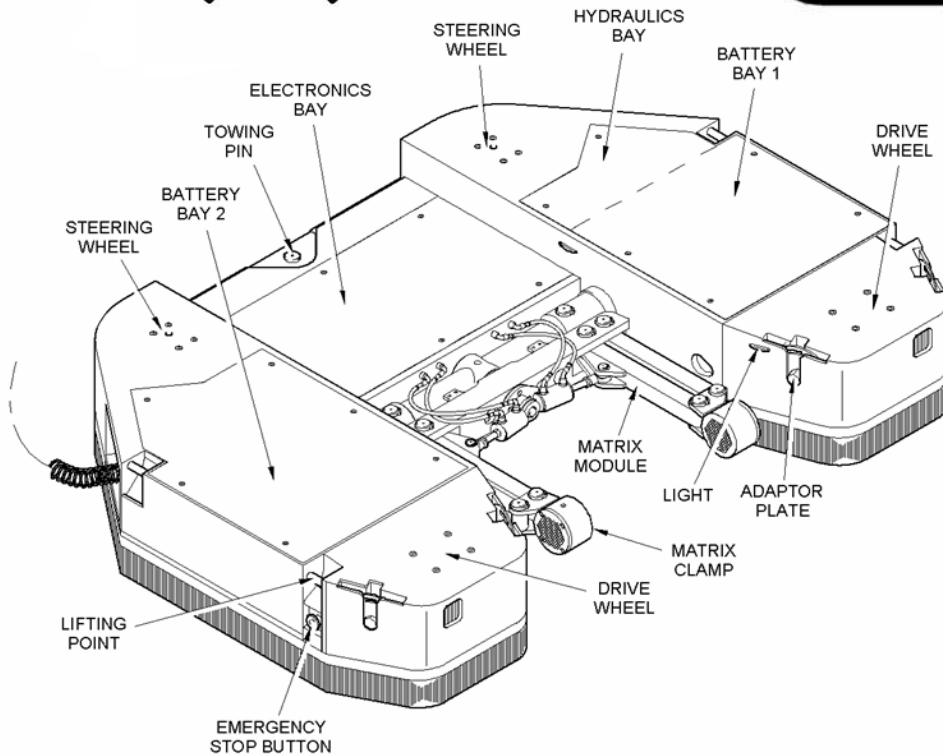
KEY POINTS

- **Low-Profile: 350mm [13.8"] in height (only 215mm [8.5"] in the midsection) with 70mm [2.75"] of ground clearance**
- **Capable of lifting 3,200 Kgs [7,055 Lbs]**
- **Capable of towing an aircraft with AUM of 16,000 Kgs [35,274 Lbs]**
- **Fully configurable to customer requirements (includes all drive power curves and hydraulic systems)**
- **Multi-aircraft compatibility with the use of aircraft-specific adaptors**

ROTARY & FIXED WING AIRCRAFT



MANTIS



DIMENSIONS

Specification	Inches	Millimeters
Length (overall)	70"	1780 mm
Width (overall)	100.8"	2560 mm
Height (over drive wheels)	13.8"	350 mm
Height at Center	8.5"	215 mm
Wheelbase	53.6"	1362 mm
Wheel Track – Steer	55"	1400 mm
Wheel Track – Drive	67.6"	1718 mm
Ground Clearance	2.8"	70 mm

PERFORMANCE

Specification	Measurement
Maximum Towing Force	15 kN (3,372 Lbf)
Speed	0-4.5 kph (0-2.8 mph)
Turning Circle-Drive	2400 mm (116.9")
Turning Circle-Center Point	0 mm
Duration	5 hours continuous movement pulling a 11,000 Kg (24,250 lb) aircraft

MANTIS



Matrix Arms – Fully Lowered Height: 6" (150mm)
Fully Raised Height: 31" (785mm)



Adaptors in stowage locations



Adaptors in clamp area

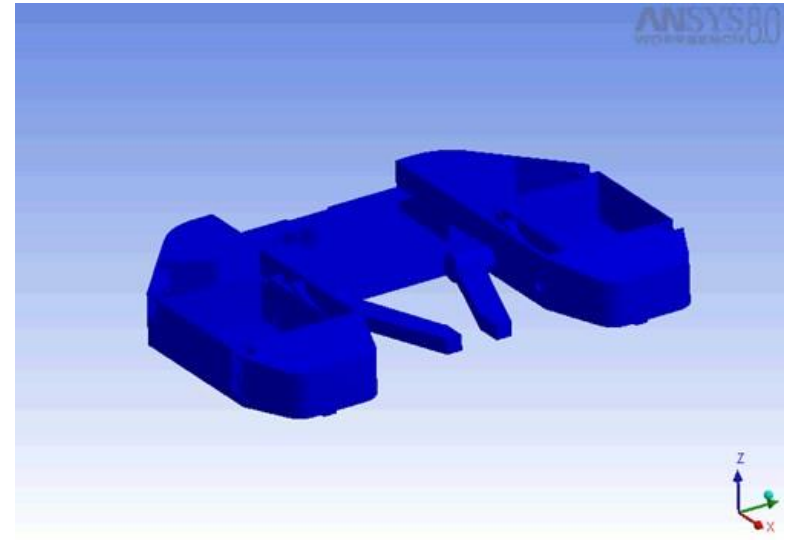


Vehicle Features

MANTIS-RAM MK1-3 with Matrix Acquisition System

Chassis

- Monocoque chassis made from S275 (43a) mild steel plate
- Integrated tow attachment, adaptor disk stowage and lift/lashing points
- Ready for optional extras
- Flat underside with no obstructions
- All wheel assemblies housed in a self contained areas for protection



Electrical Systems

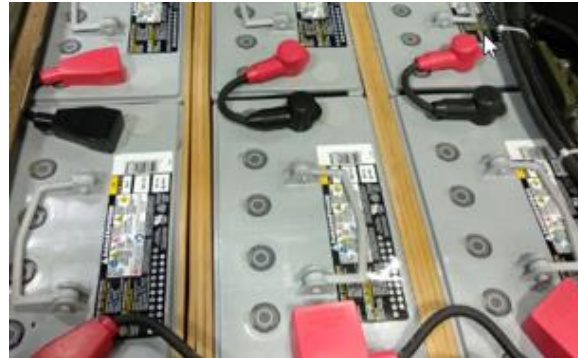
BATTERY CHARGER

- World-wide charging 96V to 264V @ 50-60 Hz
- Intelligent 3-stage charger with boost, constant and trickle charge



BATTERIES

- 12off – 12Volt Cells – (280Ah @ 48V)
- Arranged in 2 bays, 6 batteries in each with built-in lifting handle



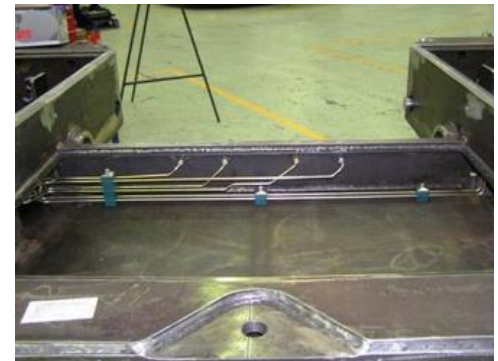
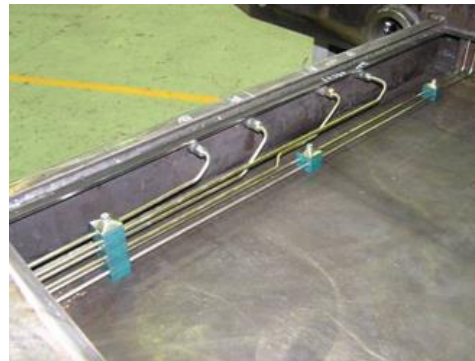
MAIN CONTACTOR

- 4 Position break-then-make switch
 - Prevents different modes being selected at the same time
- Switches: ON / OFF / CHARGE / EBR



Hydraulics

- Fully-integrated modular hydraulic pack
- Contains tank, manifolds, valves and on board pressure gauge which can be attached to any test point for hydraulic checks
- Manual release valves for emergencies
- All metal pipe work is stainless steel
- All hydraulic hoses are the same length to minimize stock inventory



Matrix

- The key to the matrix is a clamp head consisting of a steel housing into which a cartridge assembly of pins is mounted
- All 140 pins are individually mounted on springs through a back plate which forms the cartridge assembly
- In the event of a pin being damaged the cartridge can be removed from the vehicle and repaired – stock cartridges can be carried to minimize vehicle down time.
- The entire matrix assembly oscillates 7° about the center to allow for castor angle



Operating Procedures

- 1. The operator identifies the aircraft type to be moved and selects the aircraft type on the remote chest pack console (this sets the maximum tractive effort within strict parameters laid down by the aircraft manufacturer for the particular aircraft)**
- 2. Select an appropriate set of adaptors from their stowage location on the handler and insert into the towing attachment points on the aircraft**



Operating Procedures (continued)

- 3. Raise or lower the arms to the required height and move the handler to approximately encompass the aircraft nose or tail wheel**
- 4. Using the chest pack controls, clamp the arms until they come into contact with the adaptor disks – continue to clamp until the matrix head is in full contact with the disk and the pins deflected**



5. Towing Operation

- Nose Wheel Weight < 3200 Kg [7,055 Lbs]: Use the chest pack controls to raise the arms until aircraft nose wheel is approximately 50mm clear of the floor – aircraft is now ready to be maneuvered
- Nose Wheel Weight > 3200 Kg [7,055 Lbs]: Use the chest pack controls to raise the arms – the nose wheel weight of the aircraft will be translated into the handler (the aircraft will not be raised) – the aircraft will be towed in the same manner as if a tow bar were attached (i.e. wheels in contact with the ground) – aircraft is now ready to be maneuvered
- **NOTE:** As the lift pressure increases a locking mechanism will automatically prevent the matrix arms from opening



In-Service Examples

MANTIS-RAM MK1-3 with Matrix Acquisition System

Universal



Lynx Mk8: Approaching Chin Dome



Lynx Mk8: Matrix Connected

Universal



Lynx Mk8: Radar Dome Clearance



Lynx Mk8: Radar Dome Clearance

Universal



Lynx Mk8: Turn with Weapons



Lynx Mk3

Universal



Sea King



Merlin EH101

Universal



Apache



Harrier



Unique Features

MANTIS-RAM MK1-3 with Matrix Acquisition System

Towing Applications

- The tow pin adaptor can be utilized for towing trailers, weapon loading trolleys, or any tow bar adapted unit



Thank You



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