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स्वावलंबन के पथ पर अग्रसर

Stabilized Missile Launchers & Guns for Naval Platforms

(FICCI)

Contents

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Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems



PINAKA Multi Barrel Rocket Launcher (MBRL)



Key Features

Awesome fire power - 12 rockets can be fired at intervals of 4s

The mission of this all-weather all-terrain Artillery weapon system is to deliver large volume of fire within a very short time

Reinforced chassis vehicle to provide a platform for mounting the armament system

Hydraulically actuated outriggers to level & stabilise the vehicle during firing

Special alloys are cast for the structures to keep their weight compatible with the capacity of the vehicle

TRISHUL Missile Launcher



Key Features

Integrated on BMP

Tracking & Positioning

Four missiles to be positioned in 2.5 sec

Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems



SAMYUTKA ELECTRONIC WARFARE PROGRAM

Key Features

High velocity & acceleration to achieve positions during tracking

Hydraulically controlled stages for achieving the heights upto 15m

Servo Drives incorporating BLDC and DSP controller to work in harsh Environment



Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems



ASPL I & II on BMP Crew Carrier



ASPL III on T72 Tank



Key Features

High Positional & Tracking Accuracy

Continuous 360° Operation in Azimuth

Remote-Controlled tracking of targets & launching of missiles

Auto-Leveling with four stabilizers for ground pressure up to 4kg/cm²

Battery Assisted silent Mode operation

AKASH Air Force Launcher



AKASH Army Launcher



Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems



MOBILE LAUNCHER SYSTEM - MRSAM



Key Features

2 x 25 kVA redundant on board DG power supply

UPS for Missile & control Electronics

Jet deflector for Plume management

Level Correction for $\pm 7^\circ$ combined PITCH & ROLL

Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems



Agni-5 Launcher



- Key Features**
- Strategic Missile Program
- Vertical Launch Mechanism for 50T Missile
- Transporter cum Tilting Vehicle
- All Hydraulic operation

AAD Launcher



- Key Features**
- Weapon Launch Platform for Advanced Air Defence Surface-to-Air Missiles & PRAHAR Surface-to-Surface Missiles
- Canisterised Missile Launch with missile interface mechanism
- Electro-mechanical Outrigger Jacks for Stabilisation Auto leveling of Launcher
- Brushless DC Servo Motors

Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems



FIXED-FIRING STAND



Key Features

Capable to fire Charge 9 ammunition

Pneumatic Ramming with speed of 6m/sec

105mm Field Gun



Key Features

Autonomous Operation with "shoot & scoot" capabilities

Accurate Navigation system

Hydraulic out-riggers for vehicle stabilization

Tata Power SED's Experience in Guns and Missile/Rocket Launcher systems



155mm/52 Calibre MGS



Key Features

Main Weapon

Barrel: 155mm/52 calibre auto-frettaged monobloc

Elevation: -3° to $+75^{\circ}$

Traverse: $\pm 40^{\circ}$

Range :

31 Km with Boat Tail projectile

42 Km with Base Bleed projectile

55 Km with V-LAP projectile

Automatic Ramming System. Magazine with 3 projectiles. Crane for ammunition.

Laying and Navigation-Ring Laser Gyro based Inertial sensor

L- 70 GUN UPGRADE



Key Features

Supports full remote control using communication channel from Flycatcher Radar

Thermal imaging (FLIR) with optical zoom

Switchable composite analog video outputs, one for the thermal camera and one for the day camera

Auto tracking

Indigenously developed Ballistic Algorithms

Tata Power SED's Experience on Platform stabilization



Railway Simulator-6-axis platform

Key Features

Total payload 4T Stabilized.

Program in collaboration with a foreign partner



Tata Power SED's Ongoing Programs

UNIVERSAL LAUNCHER-AD PROGRAM

Key Features

Can accommodate 6- AD missiles

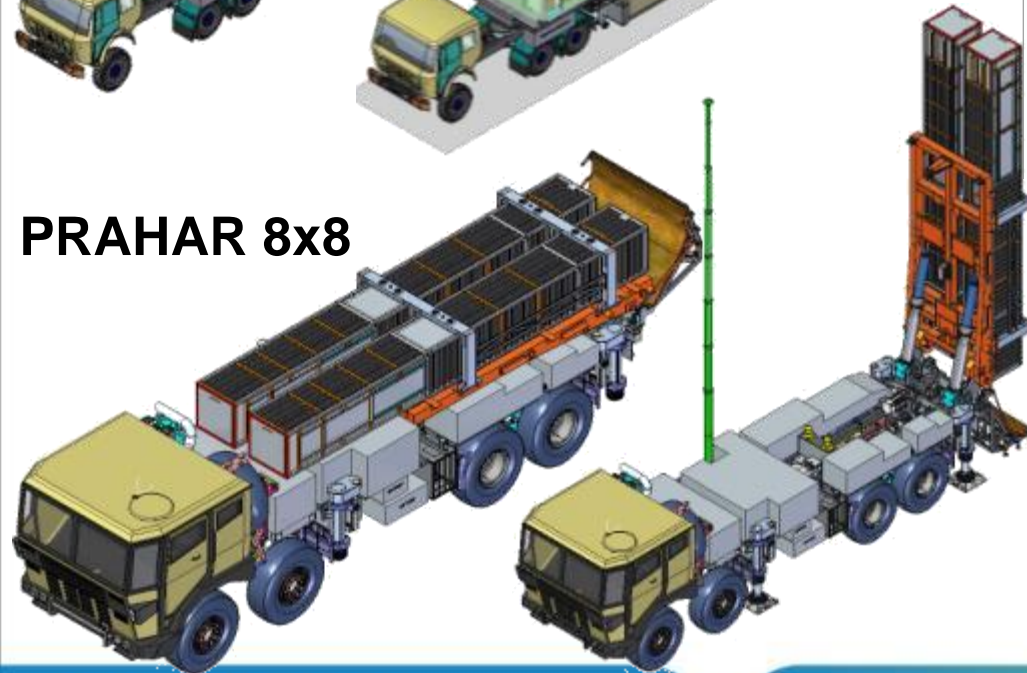
Hydraulically controlled Positioning & stabilization system

Integrated on a Trailer without super structure

Jet deflector for Plume management



PRAHAR 8x8



Key Features

Can accommodate 2- AD & 8- MRSAM missile

Electromechanical Positioning & stabilization system

Integrated on a TATRA 8x8

Jet deflector for Plume management

Antenna Mast for Communication

Tata Power SED's Ongoing Programs

ADVANCED TOWED ARTILERY GUN SYSTEM



Key Features

Electro-Mechanical weapon system

Hydraulic automotive system

Burst - 5 rounds in 30 seconds

Intense - 15 rounds in 3 minutes

Sustained - 75 rounds in 60 minutes

Naval EW Sub-systems

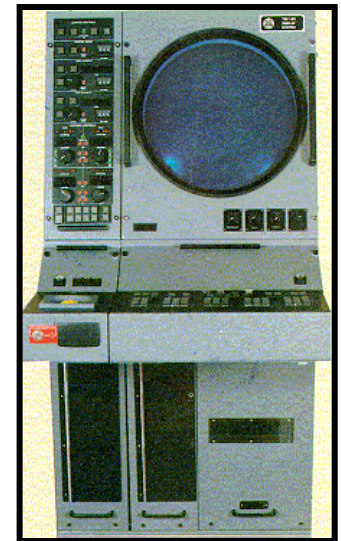


Ruggedized Computer for EW system for Navy

- Emulates a DEC PDP 11/34 computer
- Based on bit-slice processor technology with built-in MMU
- Used for performing search & auxiliary functions in EW system

Auxiliary Display Console for EW system for Navy

- 16" Random Scan Display with support for Tactical & F Alpha Modes
- Provision for control of jammers and associated servos
- Display of Tracks on the screen from data obtained through its DR 11 interface
- Interfaces available for external systems such as Radars, Sensors & other Data Acquisition Systems



Naval Combat System

- **Computer Complex**
 - Main computing centre
 - Processes data from ESI, DMFCs & other sources to generate a coherent tactical picture for display on the DMFC screen
- **External System Interface**
 - Single-point interface to on-board sensors, weapon control systems, Navigation Complex etc.
- **Dual Multi-function Consoles**
 - Man-Machine Interface
 - Real-time graphical / tabular display of Tactical Scenario
 - Sensor management, Navigation, Record / Replay, Alert Indications
- **DMFC Interface Unit**
 - Connectivity to other Segments thro' dual-redundant FO ETX link

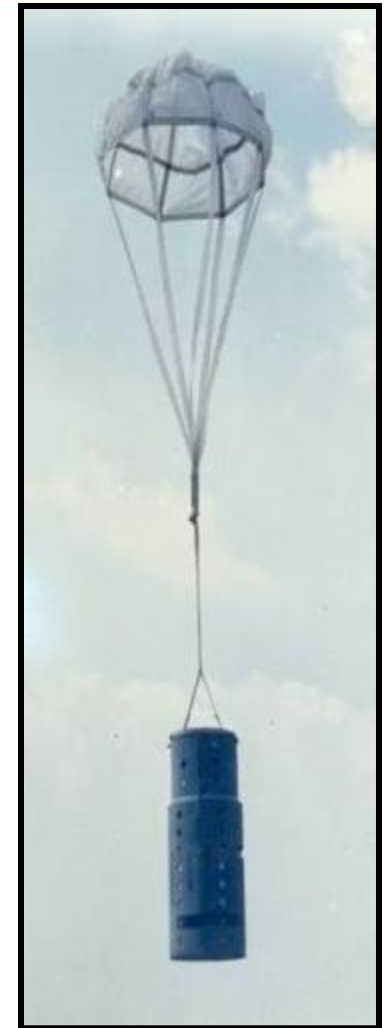


NAVAL
COMBAT
DISPLAYS



Tadpole Sonobuoys

- F size, passive omni directional expendable Sonobuoy
- Designed for launching from an aircraft flying at any altitude between 50 meters and 3000 meters and at air speeds between 60 knots and 90 knots
- Operating depth (Selectable before launch)
 - Shallow - 20 meters
 - Deep - 110 meters
- Descent time: Typically 30 sec. to 20 meters depth and 100 sec. to 110 meters depth
- Activation time: Max. 3 minutes after splash down
- Operating life: Selectable before launch from 2, 4 and 8 hours
- Floatation period: Automatically scuttling takes place in not less than 12 hours after activation



Very Low Frequency Receiver

- Customised engineering for mounting on ship and submarines
- Digital Signal processing
- Micro-processor based keyboard entry of front panel controls
- CW / FSK / MSK modes of reception
- Tele-printer interface
- Built-in loud speaker for CW reception
- Facility for connecting headphone / ext. loud speaker / Tape recorder
- Satisfactory reception when submarine is submerged
- 4-channel reception at 50-baud each
- High Sensitivity (0.05micro volt)
- Covers VLF Band 10KHz – 30KHz
- Local oscillator – Digital synthesizer
- Reference oscillator for high stability
- Frequency tuning with 10Hz steps
- Frequency Stability: 3×10^{-7} after 10 min. warm up



CMS for Indian Aircraft Carrier P-71

- Hardware
 - Dual Multi Function Console (DMFC)
 - Vertical Remote Display
 - Radar Data Distribution System (RDDU)
 - Camera Video Distribution System (CVDU)
 - Computing Nodes – Data Servers
 - Power Supply Units with UPS
 - Simulator
 - Portable Work Stations
- Software
 - Operating System and Drivers
 - Online & Offline Diagnostics
 - Record and Replay
 - DDS Middleware
 - Fault Tolerance
 - Video Distribution



DMFC – Designed for P-71

Critical Requirement captured for Naval Platforms

The weapon System shall have following :

- Stabilization feature which enables precise firings against stationary or moving targets while the platform is on-the-move or stationary.
- In-built accurate & precise Inertial Navigation System
- Capable of year-round operations in a marine environment.
- Silent mode of operation
- Compact, lightweight, easily installed and simple to maintain
- If possible, a modular structure, enabling easy installation on various naval platforms.

Key environmental compliances captured for Naval Platforms

#	Test	Applicable Severities under N1 Category	Applicable Severities under N2 Category	Remark
1	High Temp (Test No 17)	Procedure 6, Test Condition K Indoor : Operating Temp: +55°C , Storage Temp: +70°C Outdoor : Operating Temp: +55°C , Storage Temp: +85°C		
2	Low Temp (Test No 20)	Indoor / Outdoor Operating / Storage Temperature: -10°C		
3	Shock (Test No 24)	NSS Grade II : 50g (11m sec vertical) and 22g (11m sec lateral)	NSS Grade I : 120g (8m sec vertical) and 70g (8m sec lateral)	Three shocks on each face
4	Vibration (Test No 28)	Initial resonance search and Endurance test for 40 minutes in each axis at fixed frequencies (14Hz, 22Hz and 33Hz) or at resonant frequencies for period of not exceeding two hours. Final resonance search. <u>Severities</u> 14 Hz : ±1.25mm , 22 Hz : ±0.45mm , 33 Hz : ±1.25mm Subsystem as a whole at rack level with shock mounts (Identical to the configuration for mounting in the Ship) will be subjected to vibration tests. In case subsystems are heavy & unwieldy for vibration test, FEA results will be provided.		
5	Damp Heat (Test No 10)	93±5% at 40°C		
6	Drip Proof (Test No 11)	One hour duration as per JSS 55555, 2012 procedure	NA	

Key environmental compliances captured for Naval Platforms

#	Test	Applicable Severities under N1 Category	Applicable Severities under N2 Category	Remark
7	Driving Rain (Test No 12)	NA	Test Condition C one hour	
8	Tropical Exposure (Test No 27)	7 Cycles (7 days)	7 Cycles (7 days)	
9	Mould Growth (Test No 21)	28 Days		Test to be carried out on parts susceptible for Fungus growth viz. Web parts, plastics, rubber, glass epoxy, etc.
10	Solar radiation (Test No 25)	NA	Procedure II	
11	Corrosion (salt) (Test No 9)	Procedure 1	Procedure 1	Test to be carried out on metal parts susceptible for corrosion

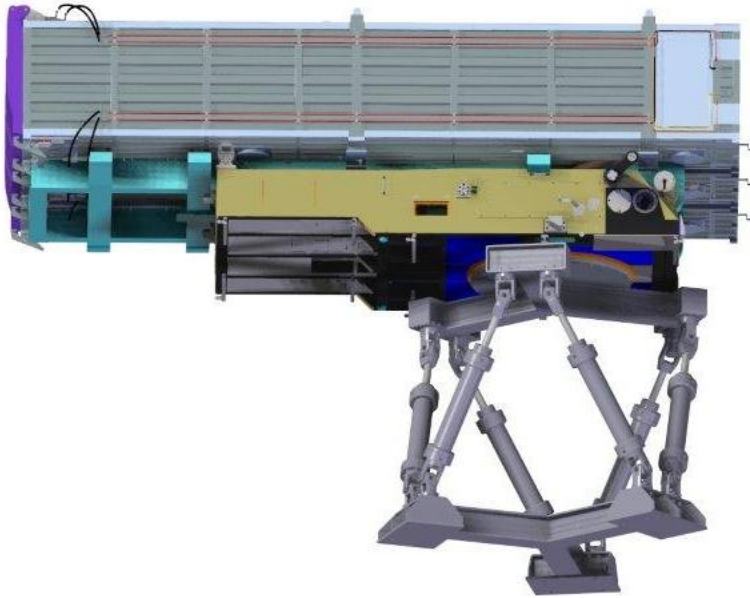
Critical Parameters of Launchers & Guns

- To maintain the positional accuracy
- Minimum backlash & structural deflections
- To take care for plume sustenance & deflection
- To sustain the firing loads
- Minimum settling time
- Controlled acceleration & deceleration in the motion of azimuth and elevation
- EMI / EMC compliant as per MIL STD 461E/F

Payload Stabilization

- Operational flexibility to meet demanding requirements
 - Fast reaction time
 - Roll, Pitch and rate gyro sensors
 - Quick reaction Servo actuators
 - Wind & Ship velocity sensors
 - Controller to withstand disturbances due to firing thrust, sea states, EMI/EMC compliant

Payload Stabilization for Canisterised Missiles



Thank You



We take pride in...

Engineering Strategic Systems for Substantive Self-Reliance

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