



# MV-22 Fire Fighting



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**VMX-22 Operational Test Director**



# Agenda



- Overview
- Equipment
- Flight Operations
- Other Emergency Response Considerations
- Questions



# OVERVIEW



# Overview



- **VMX-22 Operational Test of the Bambi Bucket Fire Fighting System for use with the MV-22B**
  - **Test Completion: March of 2011**
  - **Flight Clearance published in MV-22B Naval Aviation Technical Information Product (NATIP)**
- **Flight test of:**
  - **7590 Bambi Bucket (SEI industries)**
  - **BB997 Remote Power Supply**
  - **LL050-12-P 50 ft Plasma 3/4" diameter long line**
  - **LL0100-12-P 100 ft Plasma 3/4" diameter long line**



# Overview (cont)



- **Flight Profiles**

- All profiles tested with 50ft and 100ft extensions
- Bucket Capacity: empty, 50%, and 100%
- 0-90 Kts, 30 AOB, 0-1000 FPM
- Take off and Landing with bucket deployed
- Bucket fill techniques
- Water drop techniques (accuracy/spread/downwash effects)





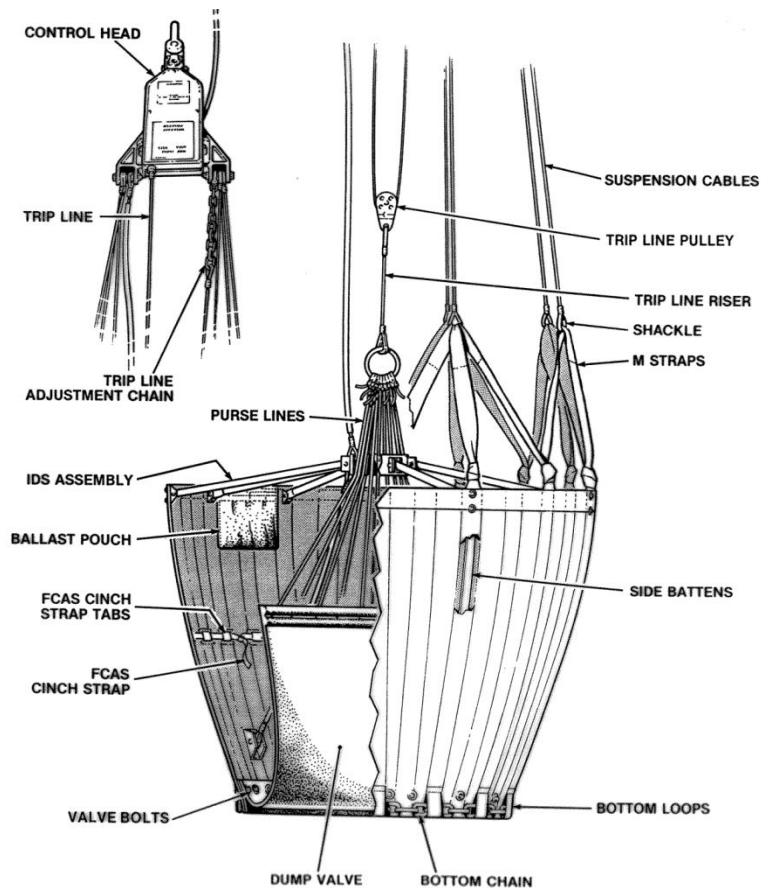
# EQUIPMENT



# Bambi Bucket



| Model | Empty Weight (lb) | Gross Weight (lb) | Capacity (US Gal) | Length     |
|-------|-------------------|-------------------|-------------------|------------|
| 7590  | 360               | 7900              | 900               | 30 ft 6 in |





# BB997 Remote Power Supply with Charger Bambi 110V AC Complete Kit



Table 7-4. Remote Power Supply Kit.



| ITEM | DESCRIPTION   | QTY. |
|------|---|------|
| 1    | Harness, Bucket, Bambi Remote Power Supply                | 1    |
| 2    | Fuse, 5 A, (Extra found inside battery box) ¼" X 1 ¼"     | 2    |
| 3    | Harness, Remote Dump Switch, Bambi Remote Power Supply    | 1    |
| 4    | Cord, 220 VAC, CEE7/16 Euro Plug*                         | 1    |
| 5    | Adapter, 220 VAC, CEE7/17 Schuko X CEE7/16 Euro Plug*     | 1    |
| 6    | Cord, 110 VAC NEMA 5-15, Bambi Remote Power Supply*       | 1    |
| 7    | Charger, 24 VDC, Bambi Remote Power Supply*               | 1    |
| 8    | Battery Pack, 24 VDC, NIMH 3AH, Bambi Remote Power Supply | 1    |

\* Not authorized for use on MV-22B aircraft.





# LONG LINES



- **LL0100-12-P 100 ft Plasma 3/4" diameter long line**
  - Constructed using Plasma synthetic rope, with #4 Orange Nylite Spool
- **LL050-12-P 50 ft Plasma 3/4" diameter long line**
  - Constructed using Plasma synthetic rope, with #4 Orange Nylite Spool
- **Shield and Shackle kit (2).** Supply and Install Cordura protective cover attached with high strength Velcro allowing easy removal for inspection purposes. Longlines are pre-stretched.
- **Either the 50' or 100' long lone attached directly to the rear cargo hook.**
  - **Caution:** Use caution with cabling less than 50'.

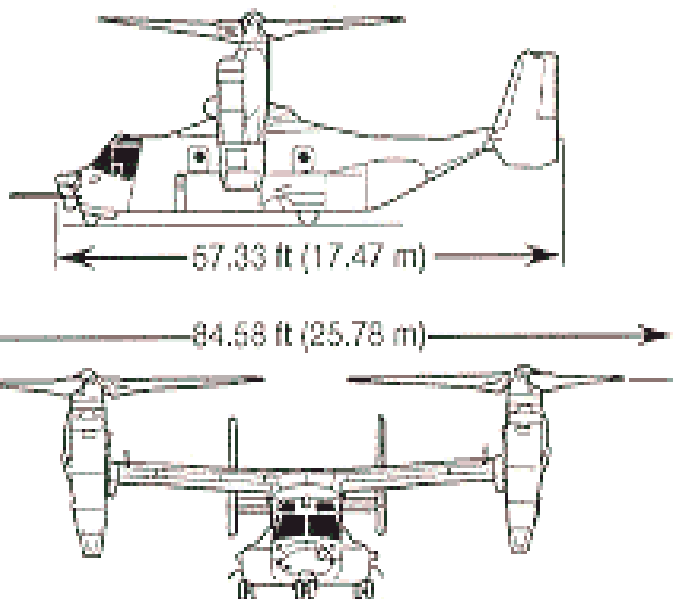


# MV-22

## Size & Design Characteristics



MV-22



|                              |   |
|------------------------------|---|
| ENGINE POWER                 | 2 x 6,150 SHP (4586 kW)                           |
| EMPTY WEIGHT                 | 33,140 Lbs (15,032 kg)                            |
| MAX VTO WEIGHT (SL/STD)      | 52,600 Lbs (23,982 kg)                            |
| SHORT TAKEOFF WEIGHT         | 57,000 Lbs (25,855 kg)                            |
| SELF-DEPLOY WEIGHT           | 60,500 Lbs (27,443 kg)                            |
| MAX FUEL CAPACITY**          | 2,037 Gal/13,850 Lbs<br>(7710 Liters/6282 kg)     |
| CABIN DIMENSIONS             | 290 in x 72 in x 72 in<br>(7.37m x 1.83m x 1.83m) |
| CABIN PROVISIONS             | 24 Troops/12 Litters                              |
| RESCUE HOIST CAPACITY        | 600 Lbs (272 kg)                                  |
| CARGO FLOOR LIMIT            | 300 PSF (1465 kg/m <sup>2</sup> )                 |
| CRUISE SPEED (3000'/91.5°F)  | 250 KCAS (510 km/h)                               |
| MAX SPEED (V <sub>ne</sub> ) | 280 KCAS (565 km/h)                               |
| MAX ALTITUDE                 | 25,000 Ft 10                                      |



# FLIGHT OPERATIONS



# Flight Operations



- The bucket, battery box, and long line are all loaded in the rear of the aircraft for transport to a zone near the water source to be used. Once safely in the zone, the bucket is unloaded and the long line and bucket are deployed to the 6 o'clock position relative to the aircraft, leaving just enough slack in the line so the bucket is not dragged forward across the deck as the aircraft takes off.





# Flight Operations



- On take off the aircraft should increase altitude while slowly moving aft to position itself over the bucket as the bucket lifts off the deck.
- For landing, the aircraft should descend and move forward after the bucket comes into to contact with the deck, taking caution not to drag the bucket across the deck.







# Flight Operations



- **Techniques:** When filling the bucket, the coupler was used due to relative low ground reference by the pilots. Some down wash may affect the empty bucket when in a hover over the water using the 50' long line. If the bucket begins to float above the water, flying the aircraft 3-5kts forward airspeed will cause the bucket to sink and fill. Once the bucket sinks, stop forward and lift straight up when the bucket is full.





# Current Parameters



## 10.1.4 Parameters recommended are as follows:

- Maximum airspeed with bucket empty – 90 KIAS
- Maximum airspeed with bucket full – 90 KIAS
- Maximum airspeed when dumping – 50 KIAS
- Max angle of bank- 30 degrees AOB
- Use of Automatic Release Mode is prohibited.
- Bambi bucket should be positioned to the 6 o'clock position of the aircraft prior to takeoff or landing.
- Aircrew shall continuously monitor load for oscillations or unusual load movement.



# **OTHER MV-22B FIRE FIGHTING AND EMERGENCY RESPONSE CONSIDERATIONS**





# Speed



## APLN

|               |          |
|---------------|----------|
| Vne           | 280 KCAS |
| Max Cruise    | 250 KCAS |
| Max Range     | 215 KCAS |
| Loiter        | 170 KCAS |
| Max Endurance | 135 KCAS |

## CONV

110 KCAS

## VTOL

0-80 KCAS



# Emergency Response



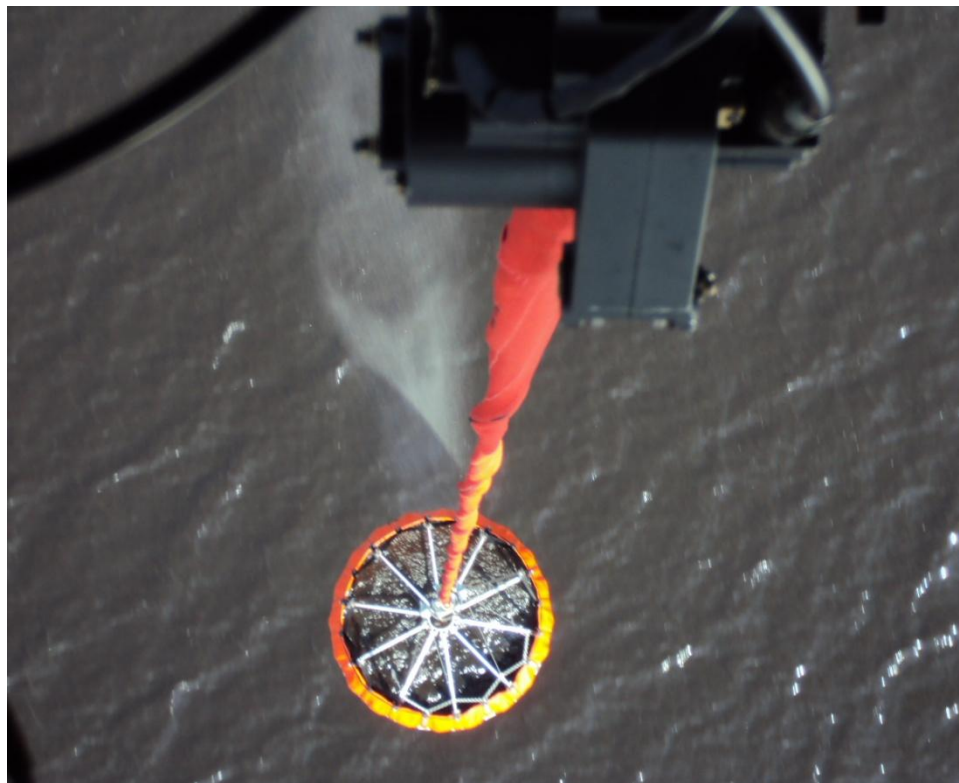




# Payload



- Passengers
  - 24 Personnel w/ gear
    - 24 x 250 lbs/ea = 6000 lbs
- Cargo
  - Internal
    - Demonstrated 13,000 lbs.
  - External
    - Single hook
      - 10,000 lbs
    - Dual hook
      - 2,000 – 12,500 lbs





# Aerial Refueling Retractable Probe





# Hoist



- Mounted in cabin
- Ramp Operations
- Adjustable Rate:  
0-250 fpm
- 600 lbs max limit







# Personnel delivery Operations



## Parachute Operations

- Static Line
- Freefall



# Personnel delivery Operations



## • Confined Area Landing

## • Night Operations/ NVG Compatibility

## • Low Visibility Landing

- Automated
- Inertial Navigation Guidance





# Distribute Supplies



- **Aerial Delivery**
  - Container Delivery System
  - Door Bundles
- **FARP Support**
  - Ground Refueling of other aircraft and vehicles





# QUESTIONS?

