Standard Aircraft Characteristics

NAVY MODEL
MV-22
AIRCRAFT

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STANDARD AIRCRAFT CHARACTERISTICS

MV-22 "OSPREY"
BELL-BOEING

All inquiries concerning data in these charts should be directed to NAVAR, code AIR-53012
### Power Plant

| No. & Model: | 2 T406-AD-400 |
| Manufacturer: | Allison Gas Turbine Division |
| Engine Spec No.: | 937 (Fourth Draft) 22 July 85 |
| Type: | Turboshaft |

#### Ratings
- **SHP**: RPM | ALT
  - Maximum: 6150* 15,000 Sea Level, 59°F
  - Intermediate: 6150 15,000 Sea Level, 59°F
- **Maximum Continuous**: 5890 15,000 Sea Level, 59°F
- **Transmission Limits**: 3521** 12,575 Cruise rpm
  - 4200** 15,000 USMCI
  - 4570** 15,578 USN, USAF
  - 5920 15,578 QEI

- Exhaust Nozzle Area 500 in²
  - *Engine Torque Limit 2,153 ft-lb
  - **RHP

### Electronics
- **VHF/UHF Radio**: AN/ARC 182 APX 78
- **VHF/UHF Encryption**: KY 58
- **VHF/UHF Control Head**: C-10319A
- **Radar Beacon**: Chaff Flare/ Jammer Dispenser
- **RF**: Ancillary
  - **ARC 190**: ALE 39
  - **ARC 190**: SAHRS
- **HF Encryption**: USN-2
- **ANDVT**: Tacan ARN-118
- **IFF**: ARN-144
- **IFF Security**: VOR/ILS MB
- **Kit 3A TSEC**: Doppler APN-217
- **FM Homing (CFE)**: Radar Attenuator APN 194
- **Digital Message Device**: VHF/UHF ADF OA-8990

### Mission and Description
The V-22 is a multimission aircraft designed for use by all services. The unique ability of the tiltrotor to combine VTOL operations with high altitude and high airspeed flight permits such multimission applications.

The U.S. Marine Corp will use the V-22 for Vertical Assault Transport of troops, equipment and supplies from amphibious assault ships and land bases.

The U.S. Navy will use the V-22 for combat search and rescue, delivery and retrieval of special warfare teams, and logistics transportation in support of the fleet.

The U.S. Air Force will use the V-22 for long range special operations missions, delivering and retrieving U.S. Army special forces troops and equipment at mission radius in excess of 500 NM.

The U.S. Army will use the V-22 for aero medical evacuation, special forces infiltration and exfiltration and long range assault logistics support.

The V-22 Osprey is a tiltrotor aircraft with two 36 foot rotor systems and engine/transmission nacelles that are mounted on each wing tip. These rotor systems are powered by two T406-AD 400 engines. The aircraft operates as a helicopter when taking off and landing vertically. Once airborne the nacelles are rotated 90 degrees forward thus converting the aircraft into a turboprop airplane for high-speed, fuel-efficient flight. The rotors are synchronized by means of an interconnect transmission shaft that runs through the wing between the two nacelle mounted transmissions. This shaft also provides power transmission from one rotor system to the other in case of an engine failure.

The aircraft folds up compactly for storage aboard ship. This is accomplished by folding the rotor blades inboard in front of the wing then swiveling the wing to be parallel to the fuselage.

The V-22 airframe is almost completely composite construction. It has crushworthy seating for combat troops, two external cargo hooks for carriage of outsized equipment, a rescue hoist, a cargo winch and pulley system of loading and unloading heavy internal cargo loads and an aft loading ramp which permits quick egress and exit of both troops and cargo.

The Osprey is capable of all weather instrument flight, day or night, and continuous operation in moderate icing conditions. The Navy and Air Force aircraft are equipped to fly in these same conditions at very low level.

Although all services use a common aircraft, the Marine Corps and Army designation is MV-22A, the Air Force designation is CV-22A and the Navy designation is HV-22A.

### Development
- **First Flight** (estimated): 1988
- **Service Use** (estimated): 1991

### Dimensions
| Main Rotor Diameter | 38 ft |
| Disk Area | 2,268 ft² |
| Blade Area | 261.52 ft² |
| No. of Blades | 3 per rotor |

<table>
<thead>
<tr>
<th>Length</th>
<th>Height</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>668 inches</td>
<td>261 inches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Folded</th>
<th>751 inches</th>
<th>217 inches</th>
<th>221 inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tread</td>
<td>182.6 inches</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Weights
<table>
<thead>
<tr>
<th>Preservice</th>
<th>(USMCI)</th>
<th>Load Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading Weight (lb)</td>
<td>31,818</td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td>32,623</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>39,500</td>
<td></td>
</tr>
<tr>
<td>Combat</td>
<td>42,712</td>
<td></td>
</tr>
<tr>
<td>Max Takeoff (VTO)</td>
<td>47,500</td>
<td></td>
</tr>
<tr>
<td>Max Takeoff (STO)</td>
<td>56,000</td>
<td></td>
</tr>
<tr>
<td>Self-Deployment (STO)</td>
<td>60,500</td>
<td></td>
</tr>
</tbody>
</table>

### Fuel and Oil
- **Fuel Gal.**: 1,930
- **Transmission (gal)**: 25,375

### Ordinance
- Provisions for Two (2) .50 Caliber Cabin Guns.
- Additional Provision for Ramp Mounted Gun (USAF only).

### Accommodations
- **Crew (mission)**: 3
- **Cabin Size Clearance**: 290 inches
- **Width**: 71 inches
- **Height**: 72 inches
- **Usable Volume**: 858 ft³
- **Rescue Hatch Dimensions**: 40 inches x 29 inches
- **Provision for Troop Seats**: 24
- **Provision for Litters**: 12
- **Rescue Hoist Capacity**: 600 lb
- **Cargo Hook Capacity**: 15,000 lb
- **Cargo Floor Limit**: 300 psf
- **Max Cargo Weight**: 20,000 lb

### June 1986

**MV-22/CV-22/HV-22**
### PERFORMANCE SUMMARY (STANDARD DAY CONDITIONS)

<table>
<thead>
<tr>
<th>TAKE-OFF LOADING CONDITION</th>
<th>Amphibious Assault (Troops)</th>
<th>Amphibious Assault (Cargo)</th>
<th>Land Assault (Troops)</th>
<th>Land Assault (Cargo)</th>
<th>Combat Operations</th>
<th>USMC Self-Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAKE-OFF WEIGHT (E)</td>
<td>45,021 lb.</td>
<td>44,259 lb.</td>
<td>44,767 lb.</td>
<td>44,061 lb.</td>
<td>47,921 lb.</td>
<td>53,556 lb.</td>
</tr>
<tr>
<td>*Fuel internal/external (JP-5) (6.8 lb/gal) lb./lb.</td>
<td>6,838 lb./lb.</td>
<td>6,356 lb./lb.</td>
<td>6,584 lb./lb.</td>
<td>3,368 lb./lb.</td>
<td>13,368 lb./lb.</td>
<td>15,367 lb./lb.</td>
</tr>
<tr>
<td>Payload</td>
<td>5,760 lb.</td>
<td>8,300 lb.</td>
<td>5,760 lb.</td>
<td>8,300 lb.</td>
<td>880 lb.</td>
<td>2,880 lb.</td>
</tr>
<tr>
<td>Disc loading</td>
<td>19.8 lb./sq. ft.</td>
<td>19.5 lb./sq. ft.</td>
<td>19.7 lb./sq. ft.</td>
<td>19.4 lb./sq. ft.</td>
<td>21.1 lb./sq. ft.</td>
<td>23.6 lb./sq. ft.</td>
</tr>
<tr>
<td>Vertical rate of climb at SL/Std fpm.</td>
<td>1,090 fpm.</td>
<td>1,340 fpm.</td>
<td>1,140 fpm.</td>
<td>1,410 fpm.</td>
<td>1,000 fpm.</td>
<td>NA</td>
</tr>
<tr>
<td>Absolute hovering ceiling (OGE Std) ft.</td>
<td>5,000 ft.</td>
<td>6,500 ft.</td>
<td>5,500 ft.</td>
<td>6,800 ft.</td>
<td>4,400 ft.</td>
<td>NA</td>
</tr>
<tr>
<td>Max. rate of climb at SL/Std (H) fpm.</td>
<td>2,320 fpm.</td>
<td>2,400 fpm.</td>
<td>2,350 fpm.</td>
<td>2,420 fpm.</td>
<td>2,030 fpm.</td>
<td>1,490 fpm.</td>
</tr>
<tr>
<td>Service ceiling (G)</td>
<td>24,560 ft.</td>
<td>24,930 ft.</td>
<td>24,680 ft.</td>
<td>25,020 ft.</td>
<td>23,110 ft.</td>
<td>20,180 ft.</td>
</tr>
<tr>
<td>Speed at S.L. (H)</td>
<td>273 kn./ft.</td>
<td>274 kn./ft.</td>
<td>274 kn./ft.</td>
<td>272 kn./ft.</td>
<td>268 kn./ft.</td>
<td>264 kn./ft.</td>
</tr>
<tr>
<td>Max. speed/altitude (Std Day) (H) kn./ft.</td>
<td>315/18,000</td>
<td>315/18,000</td>
<td>315/18,000</td>
<td>315/18,000</td>
<td>314/17,000</td>
<td>305/16,500</td>
</tr>
<tr>
<td>O.E.I. Service ceiling (G)</td>
<td>11,300 ft.</td>
<td>11,800 ft.</td>
<td>11,450 ft.</td>
<td>11,900 ft.</td>
<td>9,350 ft.</td>
<td>5,750 ft.</td>
</tr>
<tr>
<td>Min. speed (O.E.I.) (B) (C)</td>
<td>38 kn./ft.</td>
<td>38 kn./ft.</td>
<td>37 kn./ft.</td>
<td>37 kn./ft.</td>
<td>45 kn./ft.</td>
<td>63 kn./ft.</td>
</tr>
<tr>
<td>Max. speed (O.E.I.) (B) (C)</td>
<td>231 kn./ft.</td>
<td>232 kn./ft.</td>
<td>231 kn./ft.</td>
<td>233 kn./ft.</td>
<td>228 kn./ft.</td>
<td>221 kn./ft.</td>
</tr>
<tr>
<td>Combat radius</td>
<td>2 x 50 n. mi.</td>
<td>50 kn.</td>
<td>200 kn.</td>
<td>50 kn.</td>
<td>460 kn.</td>
<td>520 kn.</td>
</tr>
<tr>
<td>Mission time (I)</td>
<td>1.99 hrs.</td>
<td>0.73 hrs.</td>
<td>1.90 hrs.</td>
<td>0.73 hrs.</td>
<td>4.04 hrs.</td>
<td>4.25 hrs.</td>
</tr>
<tr>
<td>Average cruising speed</td>
<td>271 kn./ft.</td>
<td>180 kn./ft.</td>
<td>240 kn./ft.</td>
<td>180 kn./ft.</td>
<td>244 kn./ft.</td>
<td>250 kn./ft.</td>
</tr>
<tr>
<td>Cruising altitude</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>2,000 ft.</td>
<td>1,000 ft.</td>
</tr>
<tr>
<td>Range/Mission Time nmi/hours</td>
<td>515/2.21</td>
<td>108/83 ft.</td>
<td>495/2.20</td>
<td>101.78 fpm.</td>
<td>1,020 fpm.</td>
<td>1,115 fpm.</td>
</tr>
<tr>
<td>Average cruising speed</td>
<td>233 kn.</td>
<td>130 kn.</td>
<td>225 kn.</td>
<td>130 kn.</td>
<td>241 kn.</td>
<td>249 kn.</td>
</tr>
<tr>
<td>Cruising altitude</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>2,000 ft.</td>
<td>1,000 ft.</td>
</tr>
<tr>
<td>Maximum endurance</td>
<td>2.60 hrs.</td>
<td>0.83 hrs.</td>
<td>2.50 hrs.</td>
<td>0.78 hrs.</td>
<td>5.20 hrs.</td>
<td>5.60 hrs.</td>
</tr>
<tr>
<td>Endurance speed</td>
<td>175 kn./ft.</td>
<td>130 kn./ft.</td>
<td>174 kn./ft.</td>
<td>130 kn./ft.</td>
<td>171 kn./ft.</td>
<td>179 kn./ft.</td>
</tr>
<tr>
<td>Endurance altitude</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>3,000 ft.</td>
<td>2,000 ft.</td>
<td>1,000 ft.</td>
</tr>
<tr>
<td>Combat Loading Condition</td>
<td>60% fuel</td>
<td>60% fuel</td>
<td>60% fuel</td>
<td>60% fuel</td>
<td>60% fuel</td>
<td>60% fuel</td>
</tr>
<tr>
<td>Combat Weight</td>
<td>42,486 lb.</td>
<td>42,333 lb.</td>
<td>42,773 lb.</td>
<td>47,609 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine Power</td>
<td>MCP</td>
<td>MCP</td>
<td>MCP</td>
<td>MCP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel</td>
<td>4,103 lb.</td>
<td>3,950 lb.</td>
<td>8,021 lb.</td>
<td>9,220 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combat Speed/Cruise Altitude (D) (H) kn./ft.</td>
<td>284/3,000</td>
<td>284/3,000</td>
<td>280/2,000</td>
<td>275/1,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate of Climb/Cruise Altitude (D) (H) fpm./ft.</td>
<td>2,570/3,000</td>
<td>2,590/3,000</td>
<td>2,580/2,000</td>
<td>2,020/1,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combat Ceiling (500 fpm) (G) ft.</td>
<td>22,200 ft.</td>
<td>22,400 ft.</td>
<td>23,700 ft.</td>
<td>20,800 ft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate of Climb at SL/STD (H) fpm.</td>
<td>2,600 fpm.</td>
<td>2,620 fpm.</td>
<td>2,600 fpm.</td>
<td>2,030 fpm.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. speed at SL/STD (H)</td>
<td>275 kn./ft.</td>
<td>275 kn./ft.</td>
<td>275 kn./ft.</td>
<td>272 kn./ft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max speed/altitude-time airspeed (H) kn./ft.</td>
<td>319/18,000</td>
<td>319/18,000</td>
<td>319/18,000</td>
<td>314/17,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landing Weight</td>
<td>33,615 lb.</td>
<td>33,584 lb.</td>
<td>36,090 lb.</td>
<td>39,926 lb.</td>
<td>37,193 lb.</td>
<td></td>
</tr>
<tr>
<td>Fuel</td>
<td>992 lb.</td>
<td>961 lb.</td>
<td>1,337 lb.</td>
<td>1,537 lb.</td>
<td>2,612 lb.</td>
<td></td>
</tr>
<tr>
<td>Absolute hovering ceiling (OGE) ft.</td>
<td>14,200 (F)</td>
<td>14,240 (F)</td>
<td>12,800 (B)</td>
<td>10,200 (B)</td>
<td>11,900 (F)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

- PERFORMANCE BASIS: ESTIMATED DATA GUARANTEES LEVELS OF PERFORMANCE (SD 572.1) AND ENGINE SPECIFICATION FUEL FLOWS.
- *WING AUXILIARY FUEL TANKS ARE USMC MISSION ROLE EQUIPMENT.
- (A) JP-4 FUEL (6.8 LB/GAL)
- (B) MAX POWER
- (C) SEA LEVEL
- (D) MISSION CRUISE ALTITUDE
- (F) IRP
- (H) XRSN LIMIT: 3521 RHP/ENG CRUISE RPM (V<sub>1</sub> = 661.9 FPM)
- (I) DOES NOT INCLUDE 10 MIN. TAXI/WARM-UP TIME
- (E) ADD 200 LB OF TAXI/WARM-UP FUEL TO OBTAIN RAMP WT

**JUNE 1986**
### NOTES

#### MISSION DEFINITIONS

1. **AMPHIBIOUS ASSAULT, TROOP LIFT (USMC)**

   **Takeoff:** Warmup/idle 10 minutes, VTO @ SL/103°F (1 minute @ IRP)
   **Loiter:** Loiter 40 minutes @ V\_BE
   **Climb:** Climb to 3,000 ft @ IRP
   **Cruise:** Cruise to mission radius @ V\_BR
   **Maneuver:** 5 minutes @ IRP
   **Hover:** HOGE/land @ 3,000 ft/91.5°F (2 minutes @ IRP), drop P/L, VTO @ 3,000 ft/91.5°F (1 minute @ IRP)
   **Maneuver:** 5 minutes @ IRP
   **Cruise:** Cruise back @ V\_MCP
   **Descent:** Descend to sea level (no fuel used, no distance credit)
   **Loiter:** Loiter 15 minutes @ V\_BE
   **Hover:** HOGE/land @ SL/103°F (2 minutes @ IRP), pick up P/L, VTO @ SL/103°F (1 minute @ IRP)
   **Climb:** Climb to 3,000 ft @ IRP
   **Cruise:** Cruise to mission radius @ VMCP
   **Hover:** HOGE/land @ 3,000 ft/91.5°F (2 minutes @ IRP), drop P/L, VTO @ 3,000 ft/91.5°F (1 minute @ IRP)
   **Cruise:** Cruise back @ V\_BR
   **Descent:** Descend to sea level (no fuel used, no distance credit)
   **Reserve:** 30 minute sea level loiter @ V\_BE or 10% initial fuel, whichever is greater

2. **AMPHIBIOUS ASSAULT, EXTERNAL CARGO LIFT (USMC)**

   **Takeoff:** Warmup/idle 10 minutes, VTO @ SL/103°F (1 minute @ IRP)
   **Climb:** Climb to 3,000 ft @ IRP
   **Cruise:** Cruise to mission radius (speed not to exceed 130 kts)
   **Hover:** HOGE @ 3,000 ft/91.5°F (2 minutes @ IRP), drop P/L
   **Maneuver:** 5 minutes @ IRP
   **Cruise:** Cruise back @ V\_BR
   **Descent:** Descend to sea level (no fuel used, no distance credit)
   **Reserve:** 30 minute sea level loiter @ V\_BE or 10% initial fuel, whichever is greater

3. **LAND ASSAULT, TROOP LIFT (USMC)**

   **Takeoff:** Warmup/idle 10 minutes, VTO @ 3,000 ft/91.5°F (1 minute @ IRP)
   **Cruise:** Cruise to mission radius @ V\_BR
   **Hover:** HOGE/land @ 3,000 ft/91.5°F (2 minutes @ IRP), drop P/L, VTO @ 3,000 ft/91.5°F (1 minute @ IRP)
   **Maneuver:** 10 minutes @ IRP
   **Cruise:** Cruise back @ V\_BR
   **Reserve:** 30 minute sea level loiter @ V\_BE or 10% initial fuel, whichever is greater

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Mission Radius = 200 nmi

Mission Radius = 50 nmi

Hover symbol (HOGE, VTO/land, maneuver)

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**LOADING CONDITION COLUMN NUMBER**

JUNE 1986

MV-22/CV-22/HV-22
NOTES

MISSION DEFINITIONS

(4) LAND ASSAULT, EXTERNAL CARGO LIFT (USMC)
Takeoff: Warmup/idle 10 minutes, VTO @ 3,000 ft/91.5°F (1 minute @ IRP)
Cruise: Cruise to mission radius (speed not to exceed 130 ktas)
Hover: HOGE @ 3,000 ft/91.5°F (2 minutes @ IRP), drop P/L
Maneuver: 5 minutes @ IRP
Cruise: Cruise back @ VBR
Reserve: 30 minutes sea level loiter @ VBE or 10% initial fuel, whichever is greater

Mission Radius = 50 nmi

(5) COMBAT SEARCH AND RESCUE (USN)
Takeoff: Warmup/idle 10 minutes, VTO @ SL/103°F (1 minute @ max power)
Cruise: Cruise @ VBR (500 ft AGL)
Climb: Climb to 2,000 ft @ IRP
Cruise: Cruise @ VBR to mission radius
Climb: Climb to 3,000 ft @ IRP
Hover: HOGE @ 3,000 ft/91.5°F (7.5 minutes @ max power)
Pick up P/L, HOGE (7.5 minutes @ max power)
Descent: Descend to 2,000 ft (no fuel used, no distance credit)
Cruise: Cruise back @ VBR
Descent: Descend to 500 ft AGL (no fuel used, no distance credit)
Cruise: Cruise back @ VBR
Reserve: 30 minutes sea level loiter @ VBE or 10% initial fuel, whichever is greater

Mission Radius = 460 nmi

(6) LONG RANGE SPECIAL OPERATIONS (USAF)
Takeoff: Warmup/idle 10 minutes, STO* @ SL/103°F
Cruise: Cruise @ VBR
Climb: Climb to 4,000 ft @ IRP
Cruise: Cruise to mission radius @ VBR
Climb: Climb to 4,000 ft @ IRP
Hover: HOGE @ 4,000 ft/95°F (5 minutes @ max Power)
Descent: Descend to 1,000 ft (no fuel used, no distance credit)
Cruise: Cruise back @ VBR
Descent: Descend to sea level (no fuel used, no distance credit)
Cruise: Cruise back @ VBR
Reserve: 30 minutes sea level loiter @ VBE or 10% initial fuel, whichever is greater

*STO is 2,000 ft maximum distance to clear 50 ft obstacle
JP-4 fuel shall be used for the USAF LRSOF mission
NOTES

MISSION DEFINITIONS

(7) SELF-DEPLOYMENT
Takeoff: Warmup/idle 10 minutes, STO @ SL/90°F at max power
Climb: Climb to best cruise altitude @ IRP
Cruise: Cruise/climb to 25,000 ft @ VBR
Reserve: 10% of initial fuel

(8) RANGE MISSION
Takeoff: Warmup/idle 10 minutes, VTO (STO for USAF) @ mission altitude/ambient (2 minutes @ IRP)
Climb: Climb to mission cruise altitude @ IRP (no climb for land assault missions)
Cruise: Cruise @ VBR
Reserve: 20 minute sea level loiter @ VBE or 10% initial fuel, whichever is greater

(9) ENDURANCE MISSION
Takeoff: Warmup/idle 10 minutes, VTO (STO for USAF) @ mission altitude/ambient (2 minutes @ IRP)
Climb: Climb to mission cruise altitude (no climb for land assault missions)
Loiter: Loiter @ VBE
Reserve: 20 minute sea level loiter @ VBE or 10% initial fuel whichever is greater

Mission Range = 2,100 nmi

Max Range

Max Loiter Time

LOADING CONDITION COLUMN NUMBER

JUNE 1986