

MILITARY EMERGENCY BOAT SERVICE
TECHNICAL MANUAL
BOOK 01

PATROL BOAT 220 CLASS

MILBOATSTECHMAN/BK-01
PB 220 CLASS

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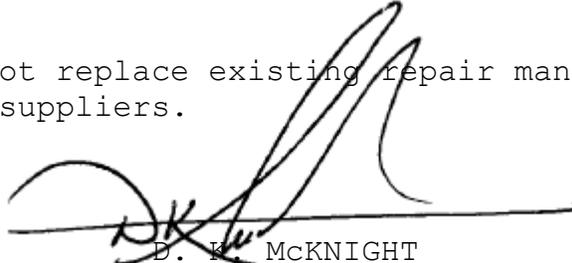
From: Commander, New York State Military Emergency Boat Service

Subj: PROMULGATION OF MILITARY BOATS TECHNICAL MANUAL SERIES
BOOK 1; PB 220 CLASS PATROL BOAT

1. The New York State Military Emergency Boat Service Technical Manuals (MILBOATSTECHMAN) are consolidated information for each class of patrol boat in the boat service. They are intended to provide basic information regarding each class, with an overview on operational parameters, missions, equipment layout, and some basic troubleshooting guides if not provided by commercial owner's manuals.

2. Book 1 of the MILBOATSTECHMAN covers the PB 220 Class patrol boat.

3. This manual does not replace existing repair manuals provided by equipment suppliers.

A handwritten signature in black ink, appearing to read 'D. E. McKnight', is written over a horizontal line. The signature is stylized and cursive.

D. E. McKNIGHT
CDR NYSM



PB 221 at Lake George

**PB 220 CLASS PATROL BOAT
INFORMATION AND OPERATIONAL CAPABILITIES**

A. General.

The PB 220 Class patrol boat is a 22 foot boat with a single outboard engine, and includes an accompanying trailer.

The class consists of two boats, purchased COTS from MetalCraft Marine, of Kingston, Ontario. The boats were received in 2003. Engines were upgraded in 2013. The Mercury 135 HP Two-Stroke engine was replaced with a Mercury 150 HP Four-Stroke engine. The external oil reservoir was eliminated.

1. The model of boat is: KingFisher 20/22 Hardtop
2. Length over all: 26 feet 11 inches
3. Beam: 8 feet
4. Draft: Hull-17 inches, Motor-32 inch when in lowered position
5. Air draft: 9 feet 1 inch (from waterline)
6. Average weight: 3690 lbs. (1300 LBS light load, 455 lbs engine)
7. Fuel capacity: 80 gallons (gasoline)
8. Crew size: 2 (Maximum 8 persons)
9. Propulsion: One Mercury 150 hp EFi Four-Stroke outboard motor
 - a. Maximum speed: 43 MPH at 5200 RPMs
 - b. Cruise speed: 20 knots for 17 hours
10. Bottom-dead rise aft in degrees: 14
11. Bottom-dead rise forward in degrees: 50
12. Hull type: "Moderate V" hull
13. Navigation and electronic equipment:
 - a. Magnetic compass

- b. Depth sounder
- c. VHF Radio
- d. Loud hailer

14. The hull, decking, superstructure, and tubing are constructed of marine-grade aluminum.

15. The boat and trailer are capable of being air lifted in either C-17 or C-5 military aircraft.

B. Operational Parameters.

The boat capabilities fall within the following parameters:

1. Capable of operating with a wind speed of 30 knots with a sea height of 4 feet.
2. Capable of surviving with a wind speed of 50 knots with a sea height of 6 feet.
3. Capable of operating in air temperatures of 0 - 100 degrees Fahrenheit.
4. Capable of operating in water temperatures of 28 - 95 degrees Fahrenheit.
5. Capable of operating in ice up to 1 inch thick.
6. Capable of operating in fog, snow or heavy rain.

C. Missions.

The boat is an open-weather patrol boat best suited to operations on lakes, rivers, and other relatively calm bodies of water. It is designed to withstand tough conditions, and the manufacturer touts that the class (Kingfisher line) was designed for use in the frigid conditions of the Canadian Arctic. As such it is capable of operating on any of the state's waterway's including the Great Lakes, Long Island Sound, and coastal waters of the Atlantic Ocean. However, due to the configuration of PB 220 class, it is not particularly suited to cold-weather operations. The Kingfisher line was primarily designed as a workboat. For the purposes of the NYNM, the PB 220 class is considered an all around workboat and patrol boat.

D. Features.

The boat includes the following features and components:

1. Hull:
 - a. Aluminum construction, with 3/16 inch bottom plate, and 3/16 in side plate.
 - b. There is a stem bar/hull grounding strake. There are two trim tabs.
 - c. Inboard grab rails the length of the hull.
2. Deck:
 - a. 3/16 inch thick sealed deck with double bottom.
 - b. Aft scuppers for self-bailing are included.
 - c. Welded bow eye and shackle
 - d. Outboard hull extension bracket w/ full swim platform
 - e. Two 12-inch stainless steel grab handles on each side of console
 - f. (4) 8-inch bolted cleats
 - g. Soft patch for below deck tanks
 - h. Lifting eyes
 - i. Foredeck steps and locker
 - j. (4) bench seats with lockable storage
3. Shelter:
 - a. "T" top aluminum/glass windshield/radar arch
 - b. (1) Windshield wiper, AFI 2-speed
 - c. Console, double-wide w/ forward seat
 - d. Seat box forward, lockable, w/ cushion

- e. Double seat with hinged back and cushion
- f. Console includes magnetic compass, marine VHF Radio, depth sounder gauge, 12V Connection

4. Engine: (Ref: Mercury Marine publication 90-8M0062182, *150 Four Stroke Maintenance*)

- a. Single outboard; 150 HP Mercury XL4S EFI w/ 3-blade stainless steel propeller
- b. Shaft: 25-inch
- c. Inline 4 cylinder, 4-stroke, 3.0L displacement
 - (1) Full rpm: 5000-5800
- d. Engine weight: 455 lbs.
- e. Bore and Stroke (in / mm): 4.0 x 3.6in
102 x 92mm
- f. Fuel Induction System: Computer controlled Sequential Multi-Port Electronic Fuel Injection (EFI)
- g. Ignition: SmartCraft ECM 07 Digital Inductive
- h. Fuel System: Electronic Fuel Injection (EFI)
- i. Alternator Amp: 60 amp / 756 watt (Belt-Driven)
- j. Cooling System: Water-cooled with thermostat
- k. Starting: Electric (turn-key)
- l. Gear-case Ratio: 1.92:1
- m. Gear Shift: F-N-R
- n. Recommended Oil: Mercury 4-Stroke Outboard Oil
- o. Recommended Fuel: Unleaded Regular 87 Octane Minimum (R+M/2)

5. Steering:

- a. Hydraulic single installation - Sea Star Teleflex
6. Throttle:
 - a. Single lever control
 - b. Includes switch for raising/lowering motor
7. Fuel system:
 - a. Single 80 gallon tank
 - b. Access on right side of console
 - c. Tank is located just forward of console
8. Electrical system:
 - a. Two Batteries (24 series) w/ hardware cables
 - b. Battery boxes
 - c. 7-breaker electrical panel and wiring
 - d. 12VDC receptacle on dash
 - e. Battery isolator/selector switch - Guest brand
9. Navigation, electronics and lighting:
 - a. Binnacle compass - Ritchie
 - b. Navigation lights fore (Perko) and aft (Aqua Signal)
 - c. Single blue strobe light on roof
 - d. Hailer/Marine PA - Standard Horizon model 240 SW
 - e. West Marine VHF 650 Marine VHF Radio (PB 220) and Standard Horizon GX1150 VHF radio (PB 221)
10. Gauges:
 - a. Fuel gauge - Tempo

- b. Mercury Smartcraft
 - c. Speedometer (MPH) - Mercury
 - d. Depthsounder - Tempo
11. Ground tackle:
- a. Anchor - 15 lb. Danforth
 - b. Anchor rode, ½-inch, 150 feet
12. Safety equipment:
- a. Fire extinguisher - 5 lb., ABC
 - b. PDFs (Type 1)
 - c. Emergency flare
 - d. Ring buoy
 - e. Horn, 14-inch single trumpet
 - f. Paddle mounting bracket
13. Trailer:
- a. 2,900 lb painted Connor Industries single-axle trailer w/ hand winch
 - b. 2 inch ball
 - c. No brakes
 - d. Trailer measures 24feet 5 inches in length, 8 feet 6 inches in width
 - e. Trailer and boat measure 30 feet 3 inches in length,
 - f. Height of boat on trailer is 11 feet 9 inches to top of anchor light
 - g. 32 feet in length, 9 feet in width; when combined with boat and truck

h. Requires F-250 (or compatible) truck for towing

E. General Maintenance Requirements.

1. Mercury Outboard Engines:

a. BEFORE EACH USE:

(1) Check engine oil level. See Fuel and Oil Checking and Adding Engine Oil.

(2) Check that lanyard stop switch stops the engine.

(3) Inspect the outboard for tightness to the boat transom. If any looseness of the outboard or mounting fasteners exist, re-torque the outboard mounting fasteners to the specified torque. When looking for signs of looseness, look for loss of outboard transom bracket material or paint caused by movement between the outboard mounting fasteners and the outboard transom brackets. Also look for signs of movement between the outboard transom brackets and the boat transom (lift plate/setback bracket).

(4) Visually inspect the fuel system for deterioration or leaks.

(5) Check steering system for binding or loose components.

(6) Check propeller blades for damage.

b. AFTER EACH USE:

(1) Flush out the outboard cooling system if operating in salt, polluted, or muddy water.

(2) Wash off all salt deposits and flush out the exhaust outlet of the propeller and gear-case with fresh water if operating in saltwater.

(3) If operating in saltwater, inspect the power-head and power-head components for salt buildup.

c. EVERY 100 HOURS OF USE OR ONCE YEARLY, WHICHEVER OCCURS FIRST

(1) Change engine oil and replace the oil filter. The oil should be changed more often when the engine is operated under adverse conditions, such as extended trolling.

(2) Inspect the thermostat visually for corrosion or a broken spring. Ensure the thermostat closes completely at room temperature.

(3) Check low pressure fuel filter for contaminants. Replace filter if required.

(4) Re-torque the outboard mounting fasteners that fasten the outboard to the boat transom. Tighten the fasteners to the specified torque.

(5) Check corrosion control anodes. Check more frequently when used in saltwater.

(6) Drain and replace gear-case lubricant.

(7) Inspect battery.

(8) In saltwater usage, remove spark plugs and apply a thin coating of Anti-Seize Compound only on the threads of the spark plugs. Reinstall spark plugs.

(9) Check wiring and connectors.

(10) Check tightness of bolts, nuts, and other fasteners.

(11) Check cowl seals to ensure seals are intact and not damaged.

(12) Check internal cowl sound reduction foam (if equipped) to ensure foam is intact and not damaged.

(13) Check that the intake silencer (if equipped) is in place.

(14) Check that the idle relief muffler (if equipped) is in place.

(15) Check for loose hose clamps and rubber boots (if equipped) on the air intake assembly.

d. EVERY 300 HOURS OF USE OR THREE YEARS

(1) Check power trim fluid.

(2) Replace water pump impeller (more often if overheating occurs or reduced water pressure is noted).

(3) Lubricate the splines on the upper driveshaft.

(4) Replace alternator drive belt.

2. VHF Antenna:

a. Every 3 - 6 months:

Check antenna unit cover for cracks. If crack is found, it should be temporarily repaired using a small amount of sealing compound or adhesive. The unit should be brought to an authorized dealer for permanent repairs.

b. Every 6 -12 months:

Check display unit connectors for tightness and corrosion. If connectors are corroded, contact dealer for replacement.

3. Hydraulic Steering:

a. Monthly:

Inspect hydraulic fluid reservoir (at top of helm pump) to make certain that fluid level is at full.

b. Annually:

Remove, clean and grease the support rod with quality marine grease
Replace any hoses showing signs of wear.
Check fittings and seals for leaks and damage.
Service as necessary.

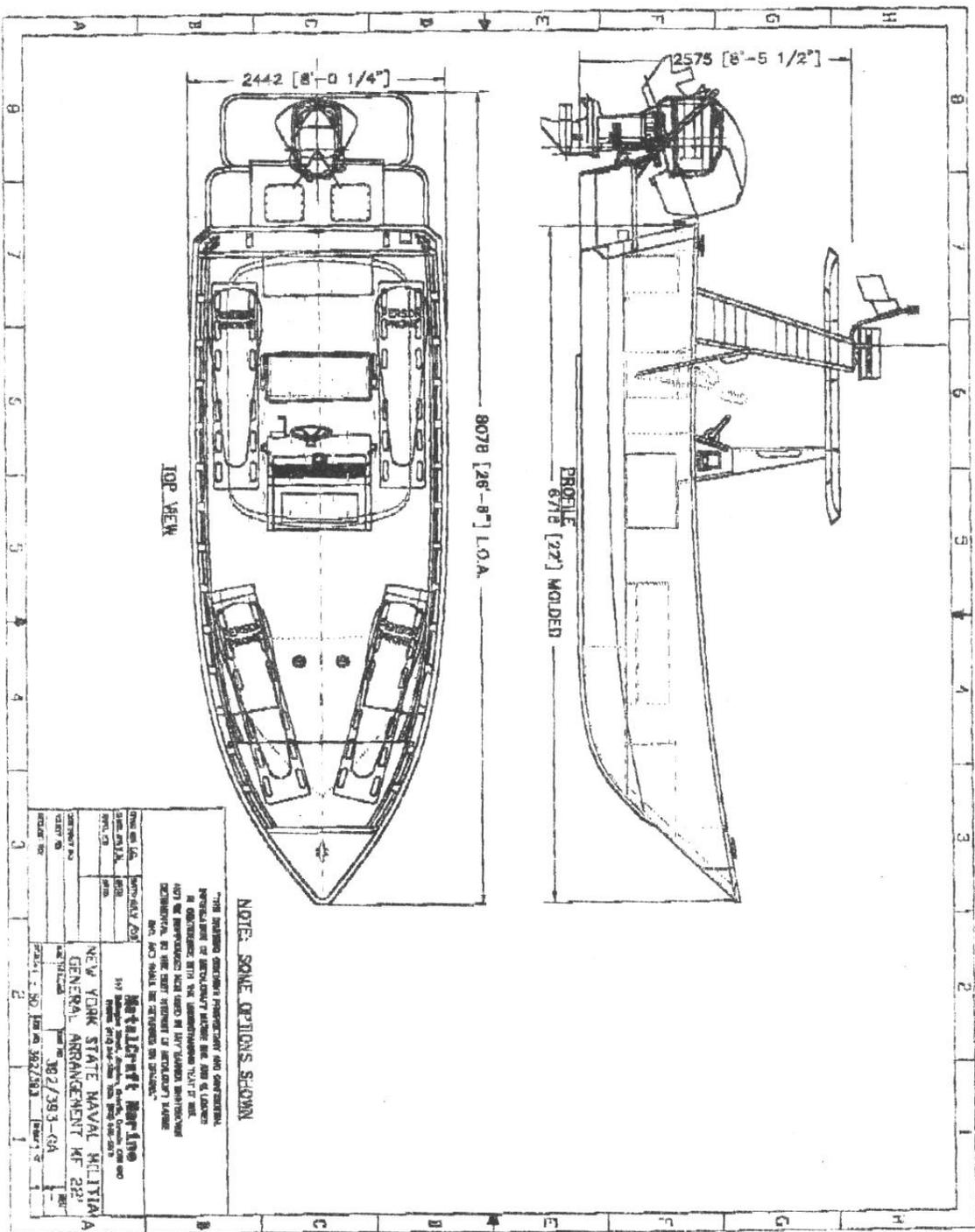
4. Trim Tabs:

a. As needed:

Check all connections and keep reservoirs full.

5. Fire Extinguisher:

- a. Annually:
Check and either refill or replace.
Check brackets for corrosion, and repair or
replace as needed.



NOTE: SOME OPTIONS SHOWN

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DATE	10/2/83
BY	102/393-0A
CHECKED BY	
APPROVED BY	
SCALE	AS SHOWN
PROJECT NO.	102/393-0A
CLIENT	NEW YORK STATE NAVAL RESERVE GENERAL ARRANGEMENT KF 221
DESIGNER	102/393-0A



(PB 220 Class looking view aft from bow)



(PB 220 Class console)



(battery compartment)



(electrical panel)



(battery switch)

Operations Checklist/ PB 220 Class

1) Pre-operations

- a) Read and understand training or operational letter of instruction.
- b) Ensure at least one life-jacket is available for each person embarked.
- c) Complete Float Plan and Crew Manifest. Leave in designated location.
- d) Ensure the following items are available:
 - (1) boat fuel log and credit card is available.
 - (2) first aid kit
 - (3) lines and fenders
 - (4) Extra POL
 - (5) flags
 - (6) area charts
 - (7) boat keys
 - (8) boat hook
 - (9) life ring
 - (10) tool kit
- e) Ensure adequate fuel. This boat may be fueled on the trailer at a truck stop.
- f) Check engine oil level to ensure adequate lubrication is available.
- g) Visually inspect boat and trailer for any deficiencies, including trailer lights.

2) Trailer and dock-side Launching

- a) Prior to entering ramp area, remove all tie-downs and bow safety chain, with the exception of the bow strap.
- b) Inspect water cooling indicator discharge for dirt and clogging. Clean with small piece of wire if necessary.
- c) Raise antenna and light pole.
- d) Rig flag, life ring, fenders, and lines.
- e) Using a safety observer, back the trailer into the water. The trailer wheels should be just submerged, and the boat will float slightly off the rub rails.
- f) Turn battery selector switch to "BOTH".

- g) Lower engine into water, using the trim button on either the throttle or side of engine. Do not lower the engine so far that the propeller will strike the bottom.
- h) Turn ignition key and start engine. For cold starts, push the high-idle button on the left side and at the base of the throttle handle.
- i) Observe cooling water discharge to ensure adequate engine cooling. If no water discharge is seen after 30 seconds, shut down the engine and determine/fix the cause.
- j) Lower engine completely when there is adequate water under the keel.
- k) Energize appropriate equipment on electrical panel.
- l) Slip the boat strap, and with at least two members embarked, back the boat off the trailer and proceed on mission.
- m) Notify the JFHQ-NY JOC at 518-786-6104.

3) Vessel recovery on trailer

- a) Back trailer straight into the water, as close to parallel with the ramp dock. Trailer wheels should be submerged.
- b) Taking into account the wind and current, drive the vessel straight onto the trailer as close to the bow stopper as possible. Do not ram the bow stopper.
- c) The boat must be in alignment with the trailer and the rub rails before securing it.
- d) Connect bow strap and winch it in. Use boat power if necessary to get the bow as close to the bow stopper as possible.
- e) Stop and raise engine.
- f) When boat is in alignment with trailer, pull the trailer out of the water. The boat will settle on the rails as it emerges from the water.
- g) When you have cleared the ramp area, complete the securing of the boat to the trailer. Attach all tie-down straps and safety chain.
- h) Stow all gear.
- i) Lower antenna and light pole.
- j) Turn battery selector switch to "OFF"
- k) Notify JFHQ-NY JOC at 518-786-6104.
- l) Visually inspect boat and trailer for deficiencies, including trailer lights.

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PB 220 CLASS

NEW YORK NAVAL MILITIA
MILITARY EMERGENCY BOAT SERVICE