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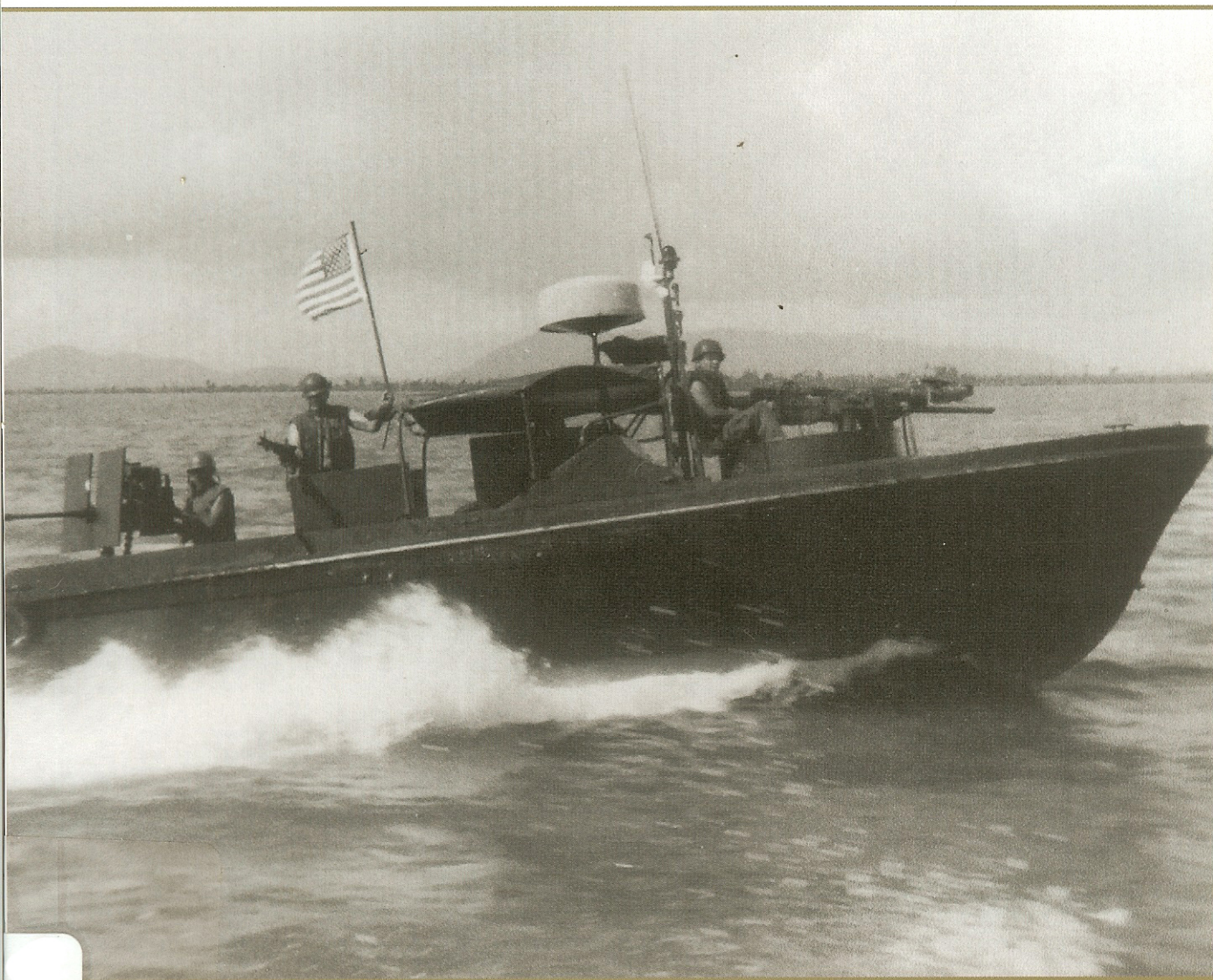
Vietnam Riverine Craft 1962–75



Gordon L Rottman • Illustrated by Hugh Johnson

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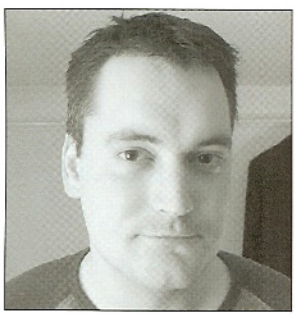

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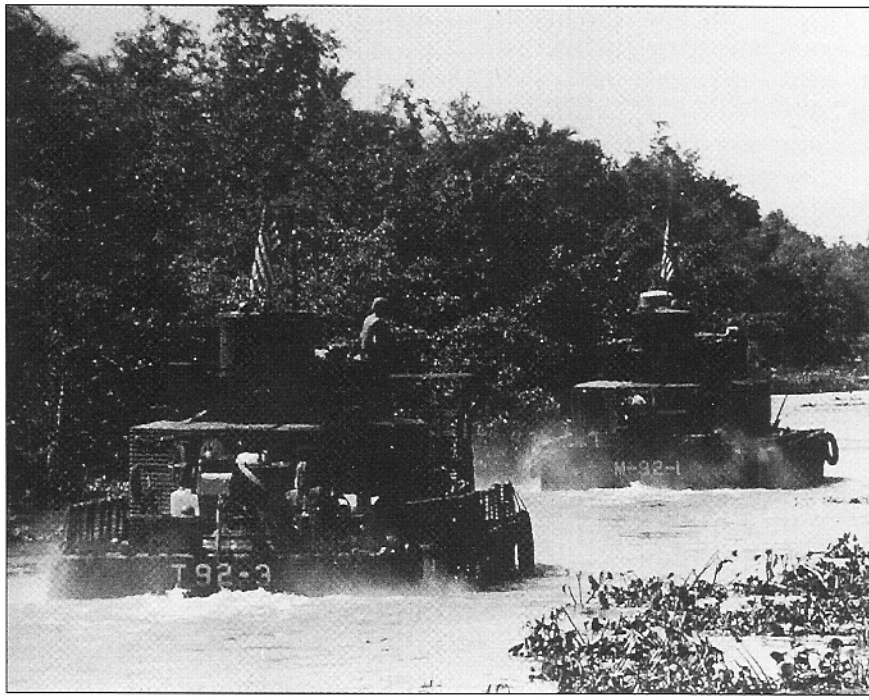

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Abbreviations

AN/	Army-Navy/ (joint equipment designation system)
ARVN	Army of the Republic of Vietnam
ASPB	Assault Support Patrol Boat (aka Alpha boat)
ATC	Armored Troop Carrier (aka Tango boat)
BuShips	Bureau of Ships
CCB	Command and Control Boat (aka Charlie boat)
HE	high explosive
hp	horsepower
LCM	Landing Craft, Mechanized (aka Mike boat)
LST	Landing Ship, Tank
MG	machine gun
MON	Monitor (aka Mike boat)
MRF	Mobile Riverine Force
MSM	Minesweeper, River (formally Landing Craft, Mechanized, Minesweeper – LCMM)
NVA	Army of North Vietnam
PBR	Patrol Boat, River (aka Bibber)
PCF	Patrol Craft, Fast/Inshore (aka Swift boat)
RAD	River Assault Division
RAS	River Assault Squadron
RPG	rocket-propelled grenade
rpm	rounds per minute
TOC	Tactical Operations Center
VC	Viet Cong

Editor's note

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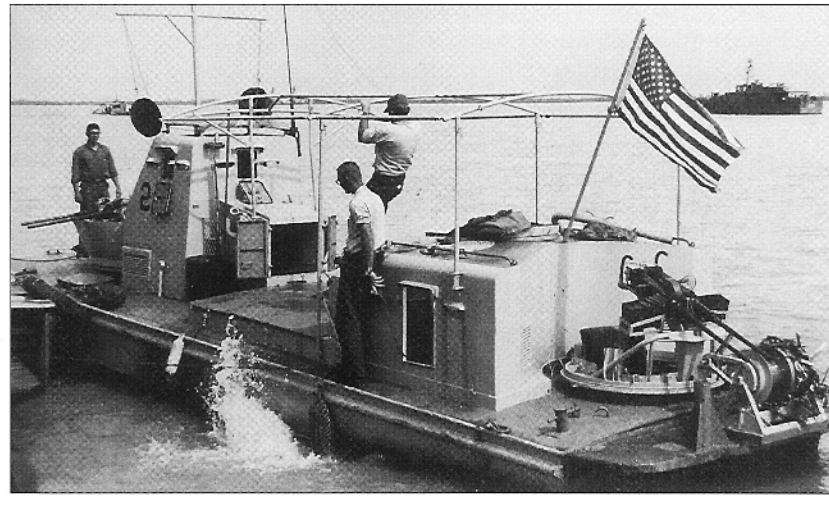
VIETNAM RIVERINE CRAFT 1962–75

INTRODUCTION

Vietnam was a unique war, and its long duration provided the time to develop many new weapons. The war's environments were unique too, ranging from low mountains to a region-encompassing river delta cut by countless waterways; and this in particular demanded a special form of warfare.

French operations in the Mekong Delta during the 1950s saw the development of riverine warfare as they attempted to maintain their hold on Indochina. To operate on the Delta's rivers and canals, the French purpose-built or converted small craft, and obtained others through US aid. Such craft required a shallow draft, maneuverability on confined waterways, protection from close-range fire, and considerable firepower. They had to transport, deliver, and support ground troops ashore. These specialized craft and the accompanying naval commandos were organized into *Divisions Navales d'Assaut* (naval assault divisions, abbreviated to *Dinassauts*). The Vietnamese continued the concept and the US provided additional craft to use alongside surviving French boats.

When the US Navy began operations in the Mekong Delta in 1965 they, too, quickly developed their own specialized craft. Alongside riverine units were coastal inshore patrol craft, employed to interdict enemy infiltration from the South China Sea. Even though past lessons were studied, some of these craft were less than ideal for the challenges they faced. They were often adapted from commercial designs to speed production, and the environment in which they were to operate was underestimated, with their design based on optimum conditions, not the extremes.



The available river patrol boats were deemed ill-suited for emerging operations and new, faster, more maneuverable craft were sought. One existing example is this 36ft (11m) River Patrol Craft (RPC). While this one displays a US flag, most were operated by the Vietnamese Navy.

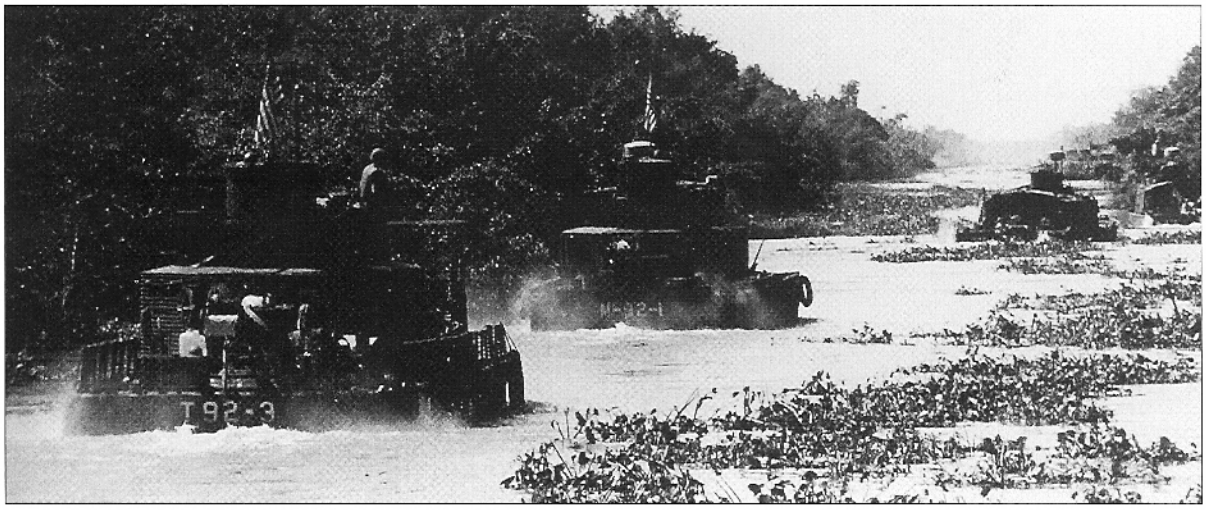
A Mobile Riverine Force (MRF) Monitor (M-112-2) cruises down a manmade canal on the Mekong Delta; this photograph shows how the narrow channels could restrict maneuver. The undisturbed water ahead of the Monitor (MON) indicates that it is leading a riverine column, a common position.

The Mekong Delta

The Delta is approximately one-fifth of the land area of the Republic of Vietnam – South Vietnam. This region, designated IV Corps Tactical Zone (CTZ) during the war, is situated in the country's south, covering 10,190 square miles (40,000 square km). Much of the Delta is a plain, which is coursed by large rivers. About a third is marshes, swamps, and forests. The Plain of Reeds spreads across the north and can flood up to 10ft (3m) during the June to October wet season of the southwest monsoon. Villages are built on stilts or earth mounds connected by earthen berm walkways. Over 80in. (2,030mm) of rain falls during this season. The November to April dry season (northeast monsoon) sees low water in the canals, and the wet season's flooded areas become high and dry, restricting traffic on streams and canals. There are some hilly areas in the northwest. Temperatures are generally 80–100°F (27–38°C), with equally high humidity.

Mosquitoes, dry land and water leeches, ants, scorpions, centipedes, snakes, and flies caused many problems during the war. Malaria, dengue fever, dysentery, diarrhea, "undiagnosed fevers," heat exhaustion, and dehydration were common ailments; added to these was immersion foot, which afflicted troops operating for as little as three days on foot. Surface water was, and is still, unsafe for drinking, and saltwater floods rivers and waterways up to 50 miles (80km) inland.

There were few roads in the Delta, and the primary mode of travel was the waterways. The main river was the Song Mekong, 2,600 miles (4,184km) long, rising in Tibet and flowing through Burma, Laos, and Cambodia. The Song Hou Giang (or Bassac) branches off and runs parallel to the Mekong to its south as it flows southeast. In the center of the Delta, the Mekong branches into three rivers; from north to south, Song My Tho, Song Ham Luong, and Song Go Chien. Another to the east defines the Delta's north edge, the Nhon Trach, flowing from the north through Saigon and on to the Rung Sat (Forest of Assassins), which was a Viet Cong-dominated mangrove swamp. To the east of the Nhon Trach is the winding Long Tau Channel, the ship route to Saigon's seaport. These rivers are hundreds of yards wide. There are scores of smaller rivers and streams – 1,500 miles (2,400km) of natural navigable



A column of Armored Troop Carriers (ATCs) and Monitors move down a slightly wider canal choked with hibiscus. The viney aquatic plants could easily foul propellers and rudders. The dense vegetation edging the canal banks both restricted observation and concealed ambushes.

waterways. Manmade canals stretch across the Delta, part of a 2,500-mile (4,000km) system begun in 800 AD and gradually expanded until 1940. They are narrow, with barely enough room to allow two small craft to pass; many are wide enough for only one boat.

At the advent of the war, about half of these waterways had deteriorated and were navigable only during high tide. They were edged with trees, bamboo, and brush, making any point a potential ambush site. Many sections had high banks, and boat crews riding low in the water were blind to everything beyond the dense vegetation. The natural and manmade waterways created a complex interrelated system. Twice-daily tides affected water levels, current speed, and the flow direction far inland. For those unfamiliar with the system it was impossible to forecast water conditions. Patrol craft on an unfamiliar canal might find it sufficiently deep to begin with, but within hours were grounded or fighting a reversed current.

The Delta's Viet Cong (VC) controlled about a quarter of the 8,000,000 population; there were no North Vietnamese Army (NVA) troops in this area. The VC destroyed many of the bridges, making the waterways even more important to the South Vietnamese. Waterways security was essential to trade, fishing, and transportation, particularly as much of South Vietnam's rice was produced in the Delta. It was just as critical for the waterways to be denied to the enemy for movement. There were 70,000 Main and Local Force VC in the Delta, plus 11,000 political cadre operating the Popular Liberation Front's shadow government. The VC was organized into three regiments, 20 battalions, and 69 companies.

Opposing this force were 40,000 troops of the 7th, 9th, and 21st Army of the Republic of Vietnam (ARVN) Divisions. Other ARVN units included five ranger battalions, three company-sized armored cavalry squadrons, and Regional Force and Popular Force companies and platoons. There were also 16 battalion-sized camp strike forces (advised by Special Forces), and the brigade-sized IV Corps Mobile Strike Force (MIKE Force). Three Vietnamese Marine battalions sometimes operated in the Delta. Initially, there were no US Army combat units. With inadequate roads, downed bridges, and limited helicopters these forces relied on the waterways for movement. The Vietnamese operated 13 river assault groups of 20 craft each.

The 20mm Mk 16 cannon-armed Mk 48 Mod 0 turret could mount a 40mm Mk 19 automatic grenade launcher, but seldom did. This is the coxswain's flat of a Program 5 Monitor. The bar-armor provided reasonable protection against rocket-propelled grenades (RPG). However, the added sandbags actually negated this protection. The 20mm ammunition cans are light gray.

By 1966 the VC were gaining the upper hand. The ARVN could retain the areas they controlled, but were unable to tip the balance. It was necessary to commit a US division. Realizing the limitations of the road network and terrain restrictions, the US forces understood that the waterways were crucial to their success.

THE BOATS

The Delta required special watercraft. The various types of craft were of very different design, but there were common characteristics essential for them to operate on the waterways. They needed to be of shallow draft in order to operate in streams and canals and close to river banks, and high-speed maneuverability in confined waterways was critical to success. While they had to be able to move at very slow speeds, the ability to achieve high speed was essential to interdict enemy watercraft, to rapidly move into an area before the enemy reacted, and for evasive action. The boats had to be lightweight to create this shallow draft, maneuverability, and speed. Riverine warfare craft were a new category of naval vessel established by the Navy on August 14, 1968, although these craft had been in use for three years. The three- and four-letter classification codes can be confusing. There were exceptions, but "PB" meant "Patrol Boat" and "PC" "Patrol Craft." "R" meant "River" and "F" "Fast." "LC" identified "Landing Craft" and "LS" "Landing Ship," followed by a third letter to identify the specific type, i.e. "M" for "Mechanized" or "T" for "Tank." ATC translated to "Armored Troop Carrier." Variations of craft were identified by a mark number, as were Navy-developed weapons. A "Mod" number following the mark signified a minor modification or variant.

Vulnerability and armor

Engagements were often at close range and the lightweight materials used in the boats' construction (fiberglass, plywood, and aluminum) offered no protection. The light plate steel used on some craft provided limited protection. In addition to the crew, boats had numerous vulnerable points: engines, fuel tanks, steering gear, and large-caliber ammunition stores. Armor raised a boat's center of gravity, reducing maneuverability, and weapons and ammunition stores caused the same problem. Weapons had to be mounted high to provide good fields of fire, aggravating the

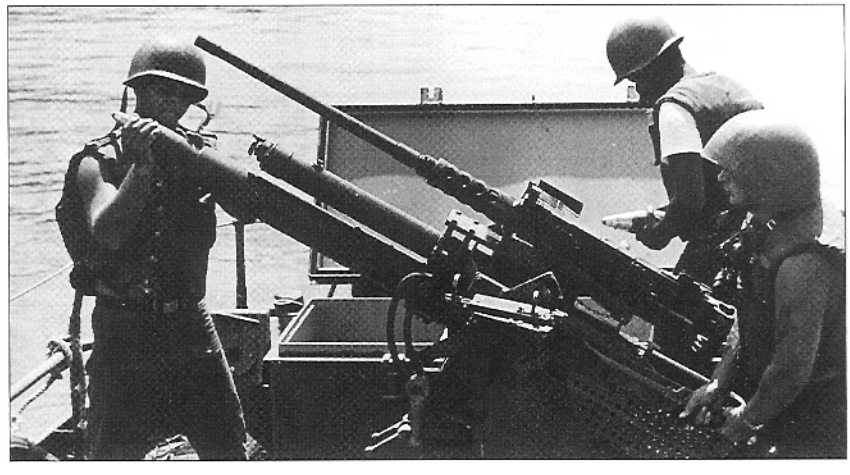
center-of-gravity problem. Gun shields were usually steel, although some were ceramic, and add-on ceramic panels were used on some craft.

Bar-armor was used on the already heavy and slow-moving ATCs to provide protection from rocket-propelled grenades (RPGs); it was also lighter than conventional armor plating, which would have required 12–14in. (30–35cm). Bar-armor was a system of spaced horizontal concrete reinforcing bars with gaps between them of 2–3in. (5–7.6cm), attached to mounting brackets on the sides of hulls and superstructures. On the hull the standoff space was filled with Styrofoam blocks covered in sheet metal, which aided flotation. The space between the bars and deckhouse was sometimes used to stow C-ration cases, which defeated the bar-armor's standoff effect. If an RPG shaped-charge warhead struck one of the bars, it detonated a sufficient distance (12–18in./30–46cm), from the hull/superstructure to prevent penetration. A warhead that hit between two bars would short out its piezoelectric-detonating system and break up without exploding. Crewmen were equipped with steel helmets and armor vests. Extra vests were sometimes hung over side rails and gunwales adjacent to gun mounts, and add-on ceramic armor panels were sometimes retrofitted, along with ballistic nylon "flak curtains." The vinyl-coated canopies fitted on Patrol Boats, River (PBRs), ATCs, Assault Support Patrol Boats (ASPBs), and other craft offered protection from the sun and rain, but they were made of ballistic nylon and also offered protection from fragments and long-range small arms.

Machinery

Most craft were equipped with short-range surface search radar to aid navigation along the twisting waterways at night and to detect enemy craft. Electronic equipment also included depth gauges and FM radios capable of communicating with other craft, Army ground units and helicopters and Air Force forward air controllers. Most radar had a 2,000–3,000yd range (1,800–2,700m), but they could not detect small obstructions, nor were they very reliable, with about half inoperable at any one time.

The majority of the craft were powered by geared diesels, mostly made by the Detroit Diesel Division of General Motors Corporation (henceforth General Motors). Diesel was used because it is less flammable than gasoline



The 81mm mortar could be fired indirect with variable accuracy. Ammunition is stowed in the after ready locker. The circular device on the box's end is a time fuse setter. The gunner wears a Mk 2 talker's helmet and the others the M1 steel helmet.

and provides greater endurance per gallon; JP5 aircraft fuel could be used if diesel was not available. The engines had to be reasonably quiet. The PCF, ASPB, and ATCs had twin propeller shafts and two rudders protected by skegs (guards), which prevented fouling with vegetation and snags. The PBR used twin water jets for propulsion and steering.

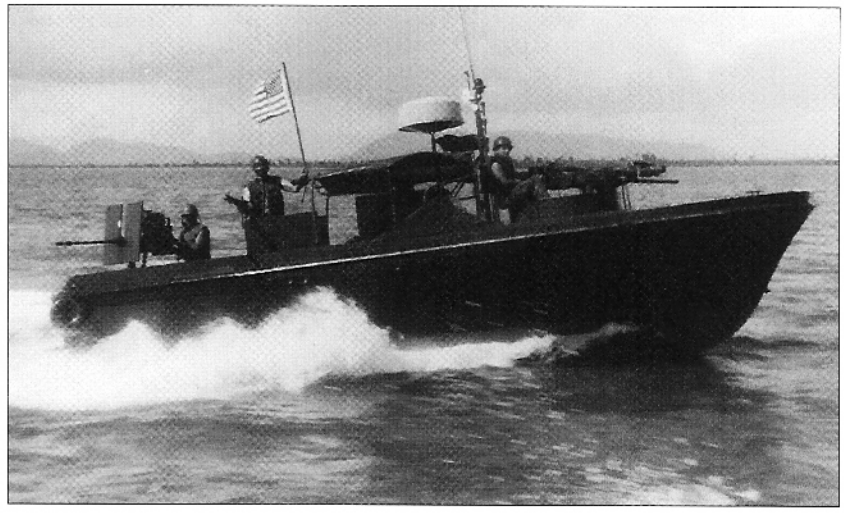
Armament

Weapons mounted on riverine craft were, by necessity, lightweight. High speed was essential for the boats, and heavier weapons, their mounts, and ammunition hampered this. Automatic firepower was desired for its destructive effect and ability to suppress the enemy. Both point and area targets would be engaged, ashore and on the water's surface.

One of the most unusual weapons was the direct-fire 81mm mortar developed by the Navy in the early 1960s to provide patrol boats with a lightweight, direct, and high-angle fire weapon capable of engaging watercraft and targets ashore. The Coast Guard were first to adopt it in 1962. One of their missions was to fire illumination flares to aid ditching commercial and military aircraft, and they had experienced difficulties with worn-out 20mm cannons. In 1964 a .50-cal. machine gun was "piggyback" mounted on the mortar as an experiment. A prototype provided a more flexible "over-and-under" mounting, so that the two dissimilar weapons required only one weapon station and crew. The mortar and its mount provided a stable mounting for the machine gun and thus allowed a high degree of control, so the piggyback system was tested and adopted for small craft use.

The direct-fire mortar could provide both direct and indirect (high-angle) fire. The muzzle-loaded mortar consisted of a smoothbore 81mm barrel and a recoil cylinder. The rate of fire was 10 rpm trigger-fired and 18 rpm drop-fired. Direct-fire range was 1,000+yd and was 3,940yd indirect (914m and 3,602m respectively). The minimum safe range was 50yd (45m). This entire assembly was mounted on a Mk 1 Mod 0 tripod. A .50-cal. M2 machine gun was mounted atop the Mk 2 Mod 1 mortar. The Mod 0 lacked the machine gun.

Most riverine and patrol craft were heavily armed. On the fantail of this Patrol Craft, Fast/Inshore (PCF) or Swift Boat is an 81mm Mk 2 Mod 1 direct-fire mortar with a .50-cal. M2 machine gun "piggy-backed." The sailor in the foreground is firing a 40mm M79 single-shot grenade launcher, while another mans a 7.62mm M60 machine gun.



This Patrol Boat, River (PBR) Mk 1 mounts the standard .50-cal. machine guns forward, with its circular armored shield. A 7.62mm M60 machine gun is mounted on the engine compartment side shield, and the aft .50-cal. has a Mk 18 grenade launcher fitted on top.

Point-detonating high-explosive (HE) rounds were used for engaging point and area targets, the proximity-fused round provided an airburst deadly to troops in the open and in open-topped positions. The white phosphorus (WP) rounds were used for the same purpose, showering burning particles into uncovered positions. WP also provided dense white smoke screens to blind enemy positions, screen the craft's withdrawal, and mark targets. Parachute-suspended illumination rounds lit up targets on the water or ashore. A Navy-developed anti-personnel round containing 1,300 flechettes (fin-stabilized darts) for direct-fire on close-range targets was also deployed. It had a maximum effective range of 180yd (165m) to defend against near ambushes and strip away concealing vegetation along banks to reveal enemy positions. It activated within 10ft (3m) of the muzzle to spray the flechettes in a shotgun-like blast.

The Browning .50-cal. M2 machine gun was the real automatic firepower of riverine craft. The "fifty-cal" had a rate of fire of 450–550 rpm. The belt-fed weapon was served by a 100-round box or a 200-round magazine. This reliable weapon was fitted as a flexible gun on many craft. The PCF and PBR were fitted with manually operated twin scarf-ring mounts. Maximum effective range was 1,200yd (1,000m), but from a boat in motion 600–800yd (548–732m) was more realistic. Although the rounds could not penetrate bunkers, spider-holes, or canal dykes, they were excellent for suppressive fire.

Two 7.62mm machine guns were employed. The M60 was used by the infantry, but for boat use it was fitted on a pedestal mount; its cyclic rate was 600 rpm. The Navy Mk 21 Mod 0 saw less use. This was a Browning .30-cal. M1919A4 machine gun modified in 1967. It was re-barreled with a 7.62mm barrel, fitted with a 6-in. (15.2cm) long prong-type flash suppressor; the bolt and other modifications were also made at this time. It used the M60's disintegrating metallic-link belt. The Mk 21 was fitted to pedestal mounts on ATCs and other craft; its cyclic rate was 400–550 rpm. The 7.62mm machine gun was mainly used for suppressive fire and was deadly to exposed enemy or those behind light cover. It had fairly good penetration through brush, light bamboo, and earth parapets, as well as single-layer sandbags protecting fighting positions. It had an effective range of 500–600yd (457–548m), even less in a moving boat.

Here a 7.62mm M60 machine gun is mounted atop a 20mm Mk 48 turret. The three night running lights on the mast met international standards, with white lights on the bow and stern, and three white lights on the mast, one to be lit and the others illuminated when towing or under tow. Lights were not used during combat operations.

A variety of small arms were also employed by riverine craft crews, with a Mk 2 or M16 rifle and one Smith and Wesson .38-cal. revolver per crewman, plus an Ithaca Model 37 shotgun and usually an M79 grenade launcher:

WEAPONS

Official issue	Unofficial issue
7.62mm Mk 2 Mod 1 rifle*	.30-cal. M2 carbine
5.56mm M16/M16A1 rifle	7.62mm M14 rifle
12-gauge Model 37 shotgun	.45-cal. M3A1 submachine gun ("grease gun")
40mm M79 grenade launcher	.45-cal. M1911A1 pistol
37mm AN/M8 pyrotechnic pistol	
.38-cal. Model 15 revolver	

* .30-cal. M1 Garand re-barreled by the Navy in 1965–66.

Two types of the 40mm automatic grenade launchers, or what the Navy called 40mm machine guns, were also in common use. They were good suppressive fire weapons as their HE rounds had a 5yd (4.57m) casualty radius. The fragments traveled much farther, and during near-shore ambushes fragments endangered exposed crewmen. They were also used for harassing area fire. While extremely deadly to exposed troops, they had little effect on dug-in and bunkered personnel.

The first grenade launcher, mostly found on PBRs, ATCs, and ASPBs was the Honeywell-designed Mk 18 Mod 0. This was a relatively simple hand-cranked weapon fed by a 24-round fabric/fiberglass belt. Rate of fire depended on the operator, but 250 rpm could be achieved. Its accuracy suffered because of erratic play as it was hand-cranked. It used the same low-velocity rounds as the M79 grenade launcher and its effective range was no more than 330yd (301m).

The Mk 19 Mod 0 and Mod 1 were fully automatic, using the high-velocity round as fired from helicopter grenade launchers with a metallic-link belt. The cyclic rate was 325–375 rpm with a practical rate of 60 rpm. Maximum effective range was 1,780yd (1,628m), but practical range was 1,000yd (914m).

This PBR Mk 1 is being outfitted stateside. The tubular framework, which normally supported the canopy, is stowed aft. A .30-cal. M1919A4 machine gun is mounted there, but in Vietnam it was usually replaced by a .50-cal. The sailor behind the helmsman's cockpit has removed the engine cover hatch from between the two side shields, on which other weapons could be mounted.

The 20mm Mk 16 Mod 4 Colt automatic cannon evolved from the Swiss Hispano-Suiza World War II AN/M3 aircraft gun. It was prone to stoppages and required lubricated ammunition, and its heavy 200-round belt was fed by an electric motor, and could jam while firing at an unnecessarily high 650–800 rpm. The "twenty mike-mike" was mounted on ASPBs, ATCs, and Monitors.

Mk 48 Mod 0	1 x 20mm Mk 16 cannon
Mk 48 Mod 1	2 x .30-cal. M1919A4 MGs
Mk 48 Mod 2	2 x .50-cal. M2 MGs (often only one)
Mk 48 Mod 4	2 x 3.5-in. 4-tube Mk 47 rocket launchers* & 1 x .50-cal. MG

* Externally mounted. Fired the 3.5-in. M20A1 bazooka rockets.

The Mk 26 tripod mounted .50-cal. and 7.62mm machine guns, as well as 40mm grenade launchers. It was provided with a shield, which was sometimes removed. Three marks of manually operated scarf-ring mounts for twin .50-cals were used: Mk 36 on the PBR Mk 1, Mk 17 on the PCF Mk 1, and the Mk 56 on the PBR Mk 2 and PCF Mk 2/3.

Mk 50	1 x .50-cal. M2 MG
Mk 51	1 x 20mm Mk 16 cannon
Mk 63	1 x 40mm Mk 19 MG

The Mk 48 mount was a fully enclosed armored, manually operated turret for a 40mm Mk 19 Mod 1 grenade launcher and other weapons. Often the 40mm was not mounted. It was fitted with a periscope day sight and a light-amplification starlight scope. Two Mk 48 turrets were mounted on ASPBs and Program 5 Monitors.

ATCs, Monitors, and Command and Control Boats (CCBs) were fitted with three turrets with a ¾-in. (19mm) steel shell resistant to 12.7mm rounds, a 1-in. (25.4mm) Styrofoam liner, and a removable plastic weather cover.

The early Monitor boats mounted a 40mm Mk 3 Mod 0 automatic cannon in a manually traversed Mk 52 turret. A coaxial .50-cal. machine gun was mounted on the starboard side for spotting and ranging. This was

the Swedish-designed Bofors gun and the Navy version of the Army's M1. The gun was capable of semi- and full-automatic fire at 120 rpm fed by four-round clips. Maximum effective range was 5,000yd (3,658m), far more than was usually necessary and could pose a hazard to friendly troops and villages.

These weapons could deliver massive automatic firepower to suppress enemy positions, destroy troops, and neutralize bunkers. However, bunkers were repairable and could be reoccupied. Ultimately a bunker-destroyer was needed. The Program 5 Monitor mounted the 105mm M49 howitzer fitted in a Mk 4 turret on the T172 mount developed for the Marine Corps' Landing Vehicle, Tracked, Howitzer, Mk 6 – LVTH(6). The howitzer was developed for the Army's M52 self-propelled howitzer. Its rate of fire was 4 rpm. The turret had 1-in. (25.4mm) frontal, ¾-in. (19mm) sides and rear, and ¼-in. (6.5mm) top armor. The indirect-fire range was 11,400yd (10,424m), but the weapon was seldom used in this role. Ammunition included HE, WP, HEAT, HE-plastic-tracer, anti-personnel-tracer (flechettes), smoke, and illumination.

This PBR Mk 1's Jacuzzi water jets can be seen as the boat is hoisted aboard a Landing Craft Repair Ship (ARL). Water intake ports are on the hull's underside. The PBR's pennant number can be seen on the stern plate.

Flamethrowers were mounted on some Monitors, known as "Zippos"; two M8 cupolas with M10-8 flameguns – what the Navy called the Mk 1 Mod 0 flame system – were positioned on the bow or aft of the 40mm gun. This was the cupola from the Army's M132A1 armored flamethrower. The cupola mounted a 7.62mm Mk 21. In the former mortar well, armored 1,350-gallon (5,140-liter) tanks held thickened napalm fuel, along with compressed air propellant tanks. The flamegun had a 150–200yd range (137–183m), with a burn duration of 225 seconds. While Zippos would engage enemy shore emplacements, they were more commonly used to burn off camouflaging vegetation, and were excellent in psychological warfare.

Regardless of the weapon, because of the craft's speed, course changes, and roll action, they were not very accurate other than when spraying rounds at very short ranges. Most engagements were carried out in areas of less than 50ft (15m).

VARIANTS

Patrol Boat, River

With increasing emphasis on operations in the Delta, the Navy found it had no small patrol boats suitable for river operations. The ideal boat had to be small, fast, maneuverable, able to operate in shallow water, well armed, and easily maintainable. The Bureau of Ships (BuShips) began a search for an existing candidate boat which could be easily modified as a combatant. After considering several sport boats, BuShips selected the Uniflite 31 Sport Sedan cruiser.

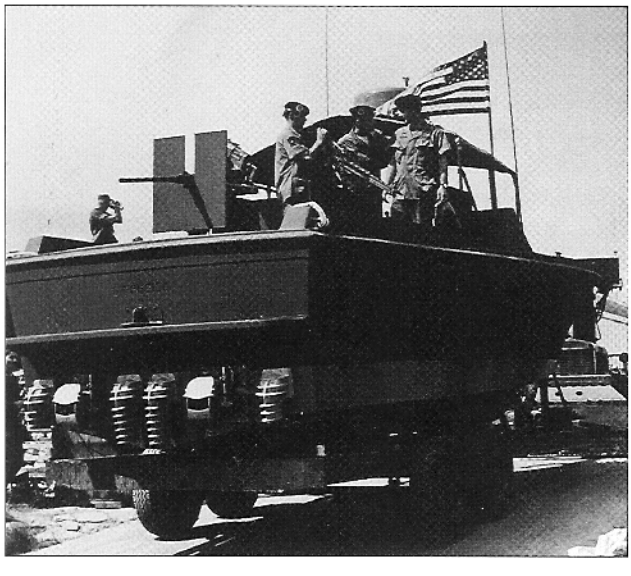
Uniflite (United Boatbuilders of Bellingham, Washington) were pioneers in the field of small fiberglass pleasure craft. The Uniflite 31

was extensively redesigned to become the Patrol Boat, River Mk 1 (PBR) beginning in November 1965. The 7-ton (6.3-tonne) PBR's most notable features were its fiberglass hull and the twin water jet engines. The high-speed Jacuzzi Corporation 14YJ water jet pumps propelled the boat by jetting pressurized water through stern nozzles at 96,000 gallons (363,400 liters) a minute. The boat was steered by changing the nozzles' aspects. This allowed the boat to make very sharp high-speed turns and operate in as little as one foot of water. If it actually halted in such shallow water it would ground, as it drew almost two feet. It could make a 360-degree turn in 110ft at 25 knots (35m at 46km/h), and actually turn in its own length at slower speeds. Fitted with little armor, the PBR relied on speed and nimbleness.

PATROL BOAT, RIVER MK 1 CHARACTERISTICS

Length	31ft (9.5m)
Beam	10ft 7in. (3.2m)
Draft	1ft 10½in. (0.6m)
Displacement	14,600lb (6.6 tonnes)
Speed	25 knots (46km/h)
Engine	General Motors V6-53N 216hp diesel
Fuel capacity	160 gallons (605 liters), 2 tanks
Radar	Raytheon 1900/W
Radios	2 x AN/PRC-25 backpack
Armament	2 x .50-cal. M2 MGs forward
	1 x 7.62mm Mk 21 or M60 or .50-cal. M2 MG fantail
	1 x 40mm Mk 18 MG amidships

The much-improved PBR Mk 2 used a different form of water intake to reduce fouling from vegetation debris. Trailers were available to move boats by land to otherwise inaccessible waterways.



The forward twin .50-cal. machine guns were set in a 4ft (1.2m) diameter tub surrounded by a 12-in. (30cm) high armored ring-shield on a Mk 36 scarf-ring mount. Ammunition storage was forward of the guns. The cockpit had a low fiberglass fairing. The helm was on the cockpit's port side surrounded by an armored compartment. The forward portion of the cockpit was covered by a canopy. Forward of the cockpit was a small compartment for radar and radios. The batteries and fuel tanks were beneath the forward end of the cockpit. The two engines were amidships, over which was the two-sided gunner's shelter. A weapon mounting was on either side of the shelter for a 40mm Mk 18 grenade launcher that could be switched to either side. The water jet pumps and exhaust silencer were beneath the fantail. Here a .30-cal. M1919A4 machine gun was initially mounted on a Mk 26 tripod. The crew consisted of a boson's mate 1st or 2d class boat captain, a petty officer 2d or 3d class engineman, a 2d or 3d class gunner's mate, and a seaman. The gunner's mate manned the forward guns, the engineman the amidships weapons, and the seaman the aft weapon. The craft was commonly known simply as a "PBR" although the nicknames "Bibber" and "plastics" were used.

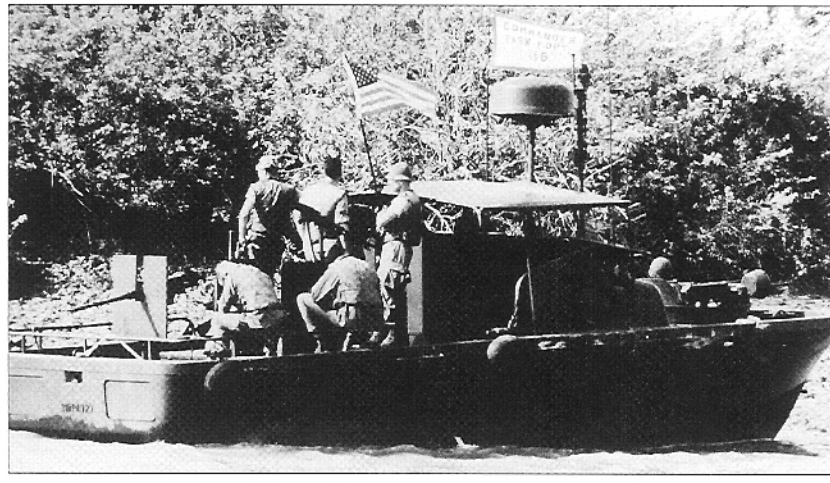
Here a PBR Mk 2 noses ashore, as Army scouts disembark to check out the berm edging the canal. Such spoil banks provided cover and concealment to the enemy. The American flag was flown from all craft as a means of surface and aerial identification.

The first 11 PBRs were deployed to Vietnam in March 1966, assigned to River Patrol Force. They conducted 12-hour two-boat patrols on the Long Tau River. Problems were soon encountered. The gunwales of the fiberglass hull were easily damaged when boarding boats and docking. The forward gun shield was removed as it obstructed the coxswain's visibility. Mud, weeds, and vegetation debris sometimes clogged the water jet pumps, and corrosive components of the pumps required frequent replacement. Most of these problems were remedied on the 161 Mk 1s (pennant numbers 31RP 66001–66161[1]). The fiberglass hauls became waterlogged, but were later dried out and sealed. Often the aft .30-cal. was replaced by a .50-cal. to increase firepower and provide common ammunition for both guns. A 7.62mm M60 machine gun was sometimes fitted aft. Occasionally, a 40mm Mk 18 was piggyback-mounted atop the aft .50-cal. machine gun.

Development of an improved Mk 2 commenced in 1966. They began to arrive in Vietnam in September 1967. The Mk 1s remained in use with upgrades. The Mk 2A had electrically fired forward .50-cals and Styrofoam-filled voids to keep it afloat even when holed. Styrofoam was also added to the earlier Mk 2s. The Mk 2 was slightly larger than the Mk 1, some 1,400lb (635kg) heavier, and three knots faster. Its more powerful Jacuzzi Mk 4 water jet pumps reduced the number of corrosive parts. Mk 4 pumps were retrofitted in Mk 1s. An aluminum fender protected the gunwales and was added to Mk 1s. The Mk 2, though, turned out to have a lower operational speed, and its sea-keeping abilities were not as good.

The Mk 2's forward cockpit fairing was larger and higher, with an armored compartment in the cockpit's port three-quarters. To starboard was the access hatch to the forward compartment. The new forward twin .50-cal. scarf-ring mount was the Mk 56. Weapon mounts on either side of the amidships shelter were fitted with an M60 on one side and a 40mm Mk 18 on the other. These could be switched. The fantail mount had a .50-cal. machine gun. Occasionally a Mk 18 or M60 was mounted there. In some instances a 60mm Mk 4 Mod 0 direct-fire mortar was mounted aft. Eighty-one Mk 2s were built in 1967 and delivered through 1968 (pennant numbers 31RP 67001–67081).

1 Small craft pennant numbers identified the type of craft with two letters (different from its classification code) and its length in feet followed by a five-digit number, the first two digits being the year of construction and the next three the sequence number. The number was embossed in 3-in. (7.6cm) figures on the stern.



The PBR Mk 2 is differentiated from the Mk 1 by its larger and higher cockpit fairing. The red-on-white pennant indicates that Commander, Task Force 116, River Patrol Force, is aboard.

PATROL BOAT, RIVER MK 2 CHARACTERISTICS

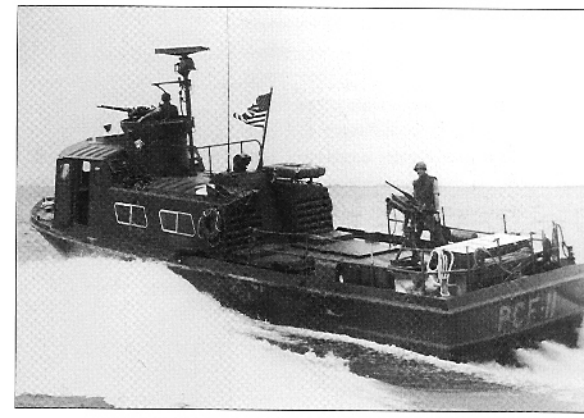
Length	31ft 11½in. (9.8m)
Beam	11ft 7½in. (3.5m)
Draft	2ft (0.6m)
Height, keel to deck	4ft (1.2m)
Height, keel to cockpit	7ft 10in. (2.4m)
Height, keel to canopy	9ft 9in. (3m)
Displacement	16,000lb (7.25 tonnes)
Speed	28 knots (52km/h)
Engine	General Motors V6-53N 216hp diesel
Fuel capacity	160 gallons (605 liters), 2 tanks
Radar	Raytheon 1900/W
Radios	2 x AN/PRC-25 backpack
Armament	2 x .50-cal. M2 MGs forward
	1 x .50-cal. M2 MG fantail
	1 x 40mm Mk 18 MG amidships
	1 x 7.62mm M60 MG amidships

Patrol Craft, Fast/Inshore

In 1964 Naval Advisory Group, Vietnam, undertook a study of naval craft requirements in a counterinsurgency environment. Released in February 1965, the report called for a patrol craft suitable for inshore and river patrols. Key features were to include:

Reliabiliy and sturdiness
Non-wooden hull with screw and rudder protection against groundings
Approximately 50ft (15.2m) in length
Self-sufficiency for 400–500-mile (643–805km) patrols
20–25-knot (37–46km/h) speed
Long-range communications compatible with Army and Air Force
Quiet operation
Armament for limited offensive action and self-defense
Sparse berthing, no messing
Fathometer
Searchlight

BuShips representatives began searching for a suitable boat design on which to base the craft. A BuShips' employee recalled an offshore oilrig service boat used in the Gulf of Mexico, the Swift Boat. Within days a BuShips group visited the Sewart Seacraft Corporation in Morgan City, Louisiana, in June 1965. The rights to the plans of what would become the PCF were purchased by the Navy on the spot and the firm prepared preliminary drawings. Modifications included a gun tub atop the pilothouse, ammunition lockers, bunks, and a galley; the plans were delivered in a week. Sewart Seacraft was awarded a contract for 20 PCFs in May (pennant numbers 50NS 6501–6520).



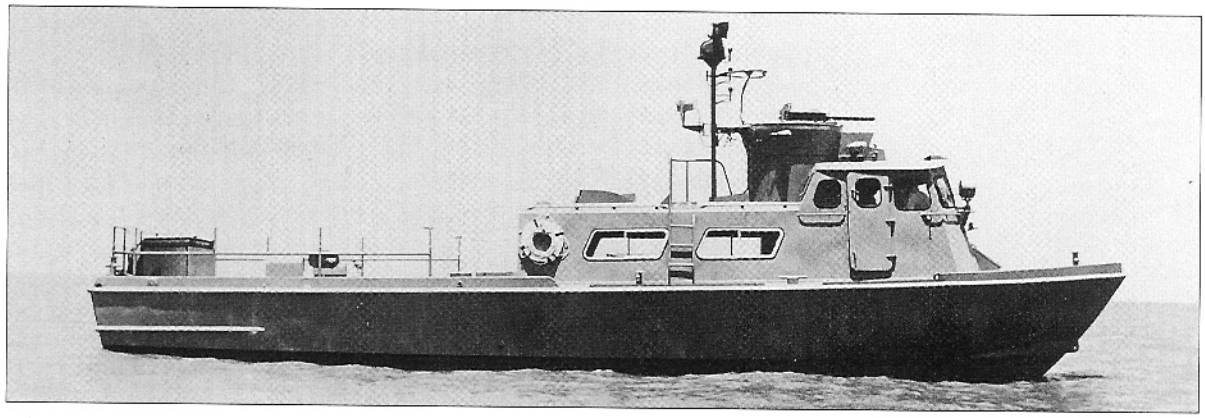
PCFs were identified by the hull number on the bows, stern plate, and the 81mm ammunition locker. The short stripes atop the wheelhouse and deckhouse are dark gray, non-slip surfaces. The after conn wheel on the after port side of the deckhouse was used when docking or coming alongside a boat to be boarded.

The first four 20-ton (18-tonne) PCF Mk 1s, commonly known as Swift Boats, were delivered in 40 days. Two (PCF-1 and 2) were assigned to Naval Amphibious Base, Coronado, as training boats. PCF-3 and 4 were shipped to Subic Bay, Philippines, where squadron personnel began readying them for Vietnam. The first boats arrived in Vietnam in October 1965. An order for 38 additional boats was placed (pennant numbers 50NS 6601–6638), followed by another 50 (50NS 6639–6688). PCFs 7, 8, 29, 30, and 104 were also assigned to training. On August 14, 1968 the designation was changed from "Patrol Craft, Fast" to "Patrol Craft, Inshore" with the classification code remaining PCF. While "off-the-shelf" procurement sped up the process, there were problems; the Swift was simply not robust enough for its missions.

The 108 PCF Mk 1s possessed welded ¼-in. (6.5mm) aluminum alloy hulls, decks, and deckhouses. The deckhouse was positioned well forward. The deck space between the bow and the deckhouse provided only 7ft (2.1m) of space on the forecastle, partly obstructed by an access hatch, ventilators, and the anchor stowage compartment. No weapon could be mounted forward.

The pilothouse was about 6ft (1.8m) high and provided good visibility, with three windscreens forward, small windows on either side, and two windows aft on either side of the gun tub. A chart table was on the port side of the pilothouse, with engine controls, remote radio consoles, fathometer, and the helm on the centerline. A radar screen was starboard of the helmsman's seat with an AN/PRC-25 radio. Atop the pilothouse was a

A newly commissioned 50ft (15m) PCF Mk 1 without the 81mm mortar mounted. Swift Boats were painted gray until they arrived in Vietnam, where they were painted olive drab.



While not intended for river operations, PCFs were nonetheless so employed. A crewman or passenger was stationed in the anchor compartment with an M60 machine gun. Some crews painted unit insignia on the inside of the pilothouse side hatches to display it when the hatch was secured open.

gun tub mounting twin .50-cals on a Mk 17 scarf-ring mount. At 11ft 6in. (3.5m) above the waterline, the mount was valuable as a lookout position. The scarf-ring was capable of 360-degree traverse. The crew compartment was beneath the pilothouse and forecastle and contained four bunks, storage shelves, and a head (toilet).

The main cabin extended aft of the pilothouse. A small rigid life raft was stowed atop it. The main cabin contained the radios, refrigerator, freezer, hotplate/grill, and sink on the starboard side, with two bunks and a small-arms locker on the other. There were two sets of sliding windows on both sides of the main cabin. Two ammunition lockers and a fuel tank were located beneath the cabin deck. On the port side of the cabin's exterior aft bulkhead was the aft steering station, which was used for maneuvering alongside other vessels or docking.

Aft of the cabin were engine compartment hatches over the two engines, a diesel power generator, and 24-volt batteries. Aft of the engine compartment were two fuel tanks, a 51-gallon (193-liter) fresh water tank, and the lazarette with steering gear and emergency tiller. These were accessible from above by removing the fantail decking on either side of the mortar mount.

An 81mm Mk 1 Mod 1 mortar with a .50-cal. gun was mounted on top of the fantail. Aft of the weapons station was an 81mm ammunition locker. A typical ammunition load in the main cabin storage consisted of 80 rounds of HE with point-detonating fuses, eight rounds of HE with proximity fuses, 15 rounds of WP, 20 rounds of illumination, and 20,000–25,000 rounds of .50-cal.

While capable of 32 knots (59km/h), cruising speed was 25 knots (46km/h), at which the PCF could make a 360-degree turn in 75yd (69m). The 23-ton (21-tonne) PCF was propelled by two 28-in. (71cm) diameter screws, counter-rotating outboard.

PATROL CRAFT, FAST/INSHORE MK 1 CHARACTERISTICS

Length	50ft 1½in. (15m)
Beam	13ft 1in. (4m)
Draft	3ft 10in. (1.1m)
Displacement	42,500lb (19.3 tonnes)
Speed	32 knots (50km/h)
Engines	General Motors 12V-71N 475hp diesels: Starboard: Model 7122–7000 Port: Model 7122–3000
Fuel capacity	828 gallons (3,115 liters), 3 tanks
Radar	Decca Transtar D202 or Raytheon Pathfinder 1900ND
Radios	1 x AN/VRC-46 tactical 1 x AN/URC-58 ship-to-ship 1 x AN/URC-4 survival/emergency 1 x AN/PRC-25 backpack
Armament	2 x .50-cal. M2 MGs atop pilothouse 1 x 81mm mortar & .50-cal. M2 MG fantail

The PCF was intended for inshore operations interdicting enemy infiltration of supplies. It was also used to patrol inland waterways. It was ill-suited for this role because of its almost 5ft (1.5m) draft and necessarily wide turning radius. It could not always make use of its high speed and it lacked armor for close-range engagements. There was absolutely no protection from RPGs or other heavy weapons. The PCF could not accept rough handling, which riverine operations demanded. There were also hull corrosion problems. The six-man crew consisted of the boat captain (lieutenant [junior grade] or lieutenant), coxswain, radarman or radioman, gunner's mate, engineman, and seaman.

PCF-9 cuts through the water at top speed. The black hull number was displayed on the white-painted cover of the 81mm mortar ammunition ready locker. The white star atop the wheelhouse was on a blue disc.

In 1968 the PCF Mk 2 was developed with improved sea-keeping abilities and accommodation for longer patrol endurance. The bow was raised 1ft (30cm), as was the deck from the aft end of the deckhouse forward, making it easier to handle in rough seas. The deckhouse's large parabolic side ports were replaced by small portholes. The improved pilothouse design was moved 3ft (1m) aft. The increased clearance in the crew quarters allowed for six bunks, three to a side. The space formerly occupied by the two deckhouse bunks was now taken up by a mess table and bench seats. An improved Mk 56 twin machine gun scarf-ring mount was fitted. The boat's length was now 51ft 3in. (16m) with a beam of 13ft 7in. (4m). Displacement was 45,094lb (21 tonnes). Only three Mk 2s (PCF-137–139) served in Vietnam of the 30 built (50NS 6801–6830).

Assault Support Patrol Boat

The French employed small patrol boats known as the STCAN (*Services Technique des Constructions et Armes Navales*, the government organization responsible for ship construction) and the FOM (*France Outre Mer*, which refers to its being built overseas). The lightly armored 36ft (11m) "stay-can" was used as a river patrol and escort craft and was armed with a .50-cal. and three .30-cals. The Naval Advisory Group, Vietnam, realized that a similar boat was needed for US operations in Vietnam. The US Navy's larger Assault Support Patrol Boat (ASPB) was regarded as a multi-purpose vessel for river patrols, escort, fire support, and minesweeping. This mission required a well-armed, well-armored, and relatively fast vessel. It would become known as the "destroyer" of the riverine force. The design requirements were:

Speed in excess of the ATC
Sufficient firepower for fire support and self-defense
Crew and vital equipment have armor protection
Mine-resistant hull
Quiet operation
Minimum draft
Maximum maneuverability

The ASPB Mk 1 (no Mk 2) was designed by BuShips in 1966 as the only purpose-designed riverine craft. The first 37 were ordered from Gunderson Brothers Engineering Corporation, Portland, Oregon in

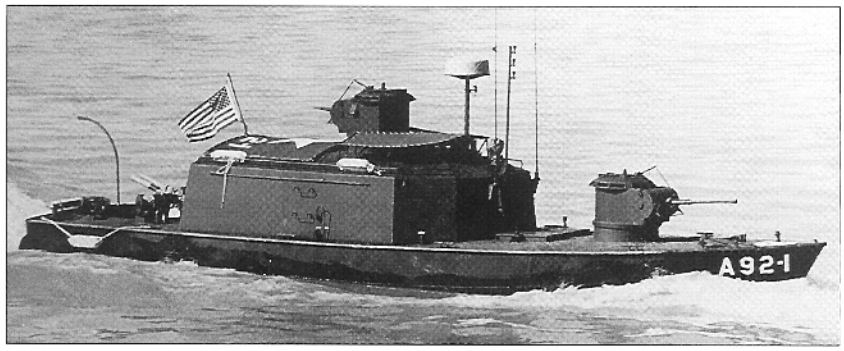
An early production Program 5 ASPB Mk 1. Here, A92-1 still had an open fantail cockpit with an 81mm mortar and .50-cal. machine guns like the Program 4 boats. Note the large hatch abaft the forward twin .50-cal. turret.

October 1966 (50AB 6701–6737), and the first boats arrived in Vietnam in late September 1967. The 29-ton (26-tonne) boats became known simply as "Alpha boats" owing to the "A" prefixing their hull numbers.

With the emphasis on armor protection and speed, the ASPB used unique design features, which unfortunately resulted in a less-than-effective craft. The ASPB was intended to operate with river assault forces alongside ATCs and was to be faster and more maneuverable than the craft it escorted. It needed the same degree of protection as ATCs, but the weighty bar-armor was too heavy. Instead, a double-bulkhead design was used. The 7/32-in. (5.5mm) aluminum alloy hull detonated shaped-charge warheads. The double-walled deckhouse had an outer bulkhead of 1/4-in. (6.5mm) aluminum with a 22-in. (56cm) standoff around the wheelhouse, backed by a 5/8-in. (16mm) dual-hardness steel bulkhead. Besides detonating RPGs it was supposed to protect from 12.7mm rounds at a 20yd (18m) range. A 1/4-in. (6mm) special treatment steel plate defended the engine compartment, and crew stations were protected from 7.62mm rounds at a 75yd (69m) range. Styrofoam filled the hull voids for flotation and mine-blast cushioning. The hull was supposed to resist a 121lb (55kg) TNT near-miss mine blast. However, in July 1968 a delay-fused HE projectile penetrated the outer bulkhead of an ASPB and detonated on the inner. Large pieces of the brittle inner plating were blasted through the craft with terrible effect. A year later a fragmentation-reducing lining was added. Regardless of the double-bulkhead standoff, the ASPB was vulnerable to RPGs and several were lost. Crew casualties were high, with many being inflicted by small arms: the boat was less than popular with crews. There were other problems. The hydraulic steering system was especially vulnerable to battle damage. The low freeboard (about 2ft, less at the stern when underway) also caused problems, as did its 3 1/2ft draft. The low freeboard was a problem in the rough swells encountered at river mouths, and several ASPBs were swamped by passing boats and even their own washes when they came to a sudden stop as water flooded into the fantail cockpit.

ASSAULT SUPPORT PATROL BOAT MK 1 (EARLY) CHARACTERISTICS

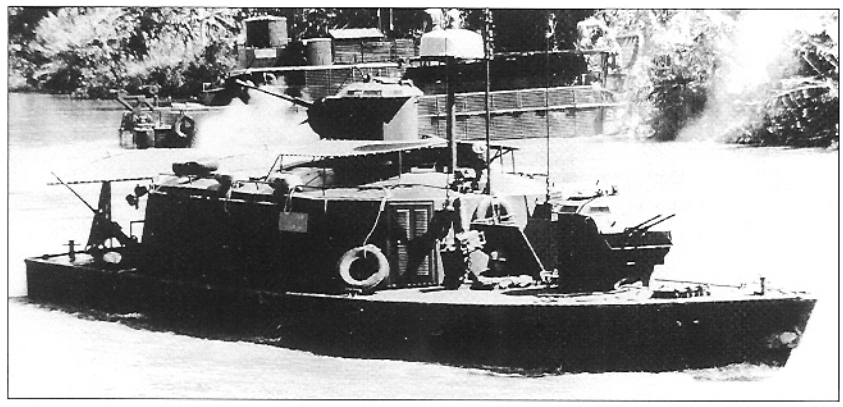
Length	50ft 1½in. (15m)
Beam	15ft 2½in. (4.6m)
Draft	3ft 6in. (1m)
Displacement	58,500lb (26.5 tonnes)
Speed	16 knots (30km/h)
Engines	General Motors 12V-71N 475hp diesels:
	Starboard: Model 7122–7000
	Port: Model 7122–3000
Fuel capacity	620 gallons (2,347 liters), 3 tanks
Radar	Raytheon 1900N
Radios	2 x AN/VRC-46 tactical
	1 x AN/PRC-25 backpack
Armament	2 x .50-cal. M2 MGs Mk 48 Mod 2 turret forward
	1 x 20mm Mk 16 cannon Mk 48 Mod 0 turret atop deckhouse
	1 x 81mm mortar fantail



Another view of A92-1 with the fantail machine guns removed to reduce weight aft and improve freeboard. The positions of the 20mm and .50-cal. turrets have been switched, a common practice. The ASPB's low freeboard is evident here, and was one of the main complaints about the boat.

The 16-knot (30km/h) speed was useful for maneuvering to react to enemy fire directed at the craft it was escorting, but more often it only cruised at 6 knots (11km/h) alongside ATCs. It was driven by two 30-in. (76.2cm) screws and could make a 6-knot (11km/h) 360-degree turn in 50ft (15.2m). The ASPB's draft hampered mine-dragging, although this was a primary mission.

The long forecastle provided stowage for the anchor, an escape hatch for the forward compartment, and a Mk 48 Mod 2 turret with two .50-cals. Early ASPBs had the turret immediately forward of the deckhouse, which was amidships. It sacrificed ports for armor protection and had two small hatches in the forward bulkhead and one aft. A crawlspace with a folding bunk, was on both sides of the armored coxswain's flat inside the deckhouse. In the forward portion was a hatch to below deck and the forward turret. This compartment held two bunks, ammunition lockers, and a head. The coxswain's flat was an open cockpit in the deckhouse, holding radios, radar, and fathometer. The cockpit was covered by a low canopy. Aft of the cockpit was a Mk 48 Mod 0 turret with a 20mm cannon. The aft half of the deckhouse, open overhead, had the option of being covered by a canopy, and contained two folding bunks. A SEAL or reconnaissance team could be carried. There were two deck-hatches providing access to the engine compartment. The fantail cockpit had three hatches accessing ammunition lockers and storage. An 81mm Mk 1 Mod 0 mortar (without .50-cal.) was mounted here. Sometimes 7.62mm Mk 21s or .50-cal. M2s were mounted on Mk 26 tripods on one or both sides of the cockpit. A canopy was available for the fantail cockpit, but was often removed to provide clearance for the mortar.



This ASPB has been fitted with a two-piece hatch opening outboard and 40mm Mk 18 grenade launchers mounted on both sides, a common practice. A canopy is installed over the fantail. This was more often removed. In the background an ATC beaches to deliver troops.

A91-4 has a decked-over fantail and apparently no weapons mounted there. Tripod-mounted .50-cal. machine guns could be mounted on one or both sides. 40mm grenade launchers can be seen on the outboard ends of the hatch abaft the forward turret. Ambushes at such close range were deadly.

The six-man crew included the boat captain, coxswain, and radioman manning the helm cockpit; forward and deckhouse turret gunners, and the engineman in the fantail cockpit manning the 81mm or other weapon.

The first 37 ASPBs possessed an open fantail cockpit with the 81mm mortar and/or other weapons. Most of the 50 Program 5 ASPBs (AB50 6801–6850) ordered in January 1968 had the fantail cockpits decked over, some armor removed astern, and other modifications. The helm cockpit was provided with a low armored shield with vision blocks rimming it. The mortar was removed, but machine gun tripods were fitted on the sides of the fantail. Photographic evidence shows the 20mm turret forward and the twin .50-cal. turret atop the deckhouse or 20mm in both. It was not uncommon to rearrange the weapons. The Program 5 ASPBs had the forward turret moved closer to the bow and a large double-hatch was fitted between the turret and the deckhouse on some. A layer of Styrofoam was added inside the hull, and the design changed to provide a slightly higher freeboard. A small number of Alpha boats were fitted with multiple rocket launchers for direct-fire support. A four-tube 3.5-in. Mk 47 rocket launcher was mounted on either side of the forward turret.

Armored Troop Carrier

To transport and support Mobile Riverine Force (MRF) soldiers, an existing landing craft was modified into several types of combatant craft under Program 4. The Landing Craft, Mechanized Mk 6 Mod 1 – LCM(6) was selected for conversion to the ATC. The Mod 1 was developed in 1951 and was an improved version of the 1943 LCM(6). The "Mike boat" Mod 1 had narrower gunwales, allowing it to carry wider loads, and the bow ramp was 11ft (3.3m), longer than the original's to provide a shallower incline for debarking vehicles. The ramp was retained on the ATC. This 58-ton (52-tonne) craft could carry either a medium tank, a 155mm howitzer, 70,000lb (39 tonnes) of cargo, or 75 troops. The basic LCM was a robust vessel of double ¼-in. (6.5mm) steel hull construction. The coxswain's position, a steel box, was centered atop the fantail. The cargo well was 11ft wide and 33ft long (3.3m by 10m). The 24-in. (61cm) screws

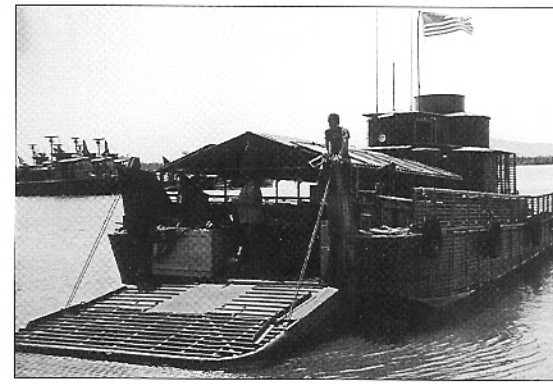
A112-2 has its armament mounted in the standard configuration, with the twin .50-cal. turret forward, the 20mm atop the deckhouse. The following A112-3 has switched the turrets. A hyphen (-) sometimes followed the type letter of the hull number.

and rudders were additionally protected by skegs. The LCM(6) Mod 1 remained in use as a cargo and utility craft, as did the LCM(8), a Mk 6 with an 8ft (2.4m) section added to the hull.

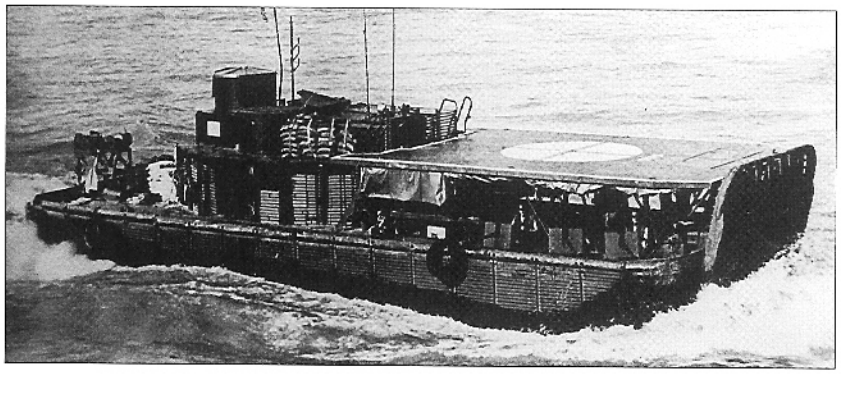
In 1966 Naval Ship Yard, Long Beach, California, with the help of the Ordnance Engineering Division of FMC Corporation, San Jose, was given 120 days to develop plans and convert two LCM(6)s into an ATC and a Monitor. They accomplished this in 90 days. Mass conversion was undertaken at commercial yards in California, Oregon, and Washington.

In late 1968 second-generation ATCs, Monitors, and CCBs appeared, being built under Program 5; a total of 88 boats of all types were completed in 14 weeks. Lessons learned in combat were incorporated into the new designs to improve accommodation, survivability, and firepower. Design specifications were developed in January 1966. River Assault Squadrons (RASs) 9 and 11 were assigned the earlier craft, and Squadrons 13 and 15 received the new boats.

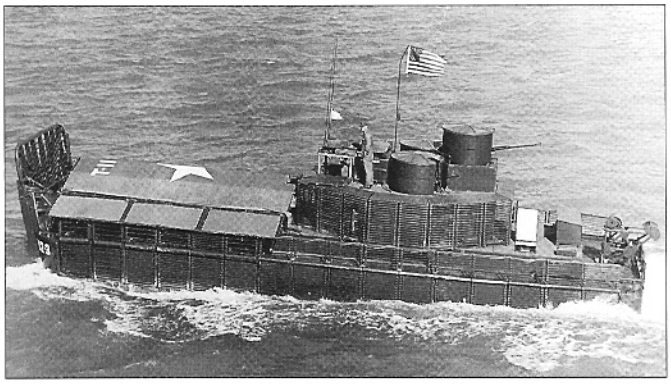
The ATC was called the "Tango boat" because of the "T" prefixing its hull number. Bar-armor backed by Styrofoam panels for flotation were fitted to the hull sides. In all there was 6,800lb (3 tonnes) of armor. The bow was completely unarmored and vulnerable to small-arms fire. The fantail deck was extended forward to just over half the craft's length, providing a covered compartment. The forward end of the troop compartment was open, but covered by a canopy. The open troop compartment was 22ft 6in. (7m) long with another 9ft (3m) of space under the overhead deck. Each ATC could carry a full-strength rifle platoon (40 troops), or the equivalent weight as a 105mm howitzer, M113 APC, a ¾-ton truck, or 24,000lb (11 tonnes) of cargo. Four ATCs were required to transport a rifle company. In the troop compartment's aft portion were four bunks on each side. Stacked double-tier, they were folded when not in use. Aft of the bunks were ammunition lockers on both sides, and a 200-gallon (757-liter) freshwater tank starboard. There was no head; a bucket on the fantail was the only sanitation "facility." Aft of the locker compartment was access to the engine compartment. Two fuel tanks were aft of the engines. Fitted high to the bulkheads on each side of the troop compartment were two folding ammunition-can shelves, running from the forward bunks almost to the ramp. In the after part of the open troop compartment were two folding gunner platforms on



This ATC's bow ramp is lowered as the crew services their boat. Heavily loaded troops embarking from an AMMI (American Merchant Marine Institute) barge had to be assisted aboard. If one stumbled on the rungs, a fall into the water could be fatal. Note that the three side-awning panels have been raised to improve ventilation.



A Program 5 ATC with a helio deck. The single gunwale-mounted .50-cal. and two 7.62mm machine guns are evident. As well as sandbags between the wheelhouse and bar-armor, there are C-ration cases stowed between the bar-armor and sides of the lower deckhouse.



ATC T-112-3 displays its 20mm and .50-cal. turrets atop the deckhouse. The engine room hatch is open, revealing its white inside. Often the inside surface of hatches opening to the exterior were painted the same color as the hull/superstructure.

the side bulkheads, about 8in. (20cm) off the deck. A chain hoist was available for emergency ramp retraction. There were no troop seats: passengers stood, sat, or more often, laid on the deck. Although protected from small-arms fire, an underwater mine detonation could lead to leg and back injuries caused by hydrostatic shock transmitted through the hull. Troops could disembark in about two minutes – they sometimes went over the sides depending on how the ATC beached – and took about five minutes to embark.

The forward two-thirds of the new upper deck was occupied by an eight-sided armored deckhouse atop a longer 18-in. (46cm) raised rectangular housing. Bar-armor protected all sides. The forward portion of the "coxswain's flat" was open-topped, but covered by a canopy. Bar-armor protected its front and sides, which were hinged to allow them to be lowered for better visibility, and there were also hinged shutters with vision slits. Access to the wheelhouse was by a ladder from the troop compartment. The radios were mounted in the wheelhouse. Immediately aft of the wheelhouse were two Mk 50 turrets with .50-cals. Their arc of fire was from straight forward to slightly aft. Aft of these on the centerline was a low, five-sided structure, atop which was a Mk 51 turret with a 20mm capable of 360-degree rotation. Four 7.62mm Mk 21s were mounted, two each on the gunwales and wheelhouse, with two Mk 18s on the gunwales. The machine guns and 40mms were not always mounted and other weapons could be substituted, such as M60s for Mk 21s, and Mk 19 grenade launchers for Mk 18s. Besides on-board armament, the infantry passengers would add their own firepower by firing over the gunwales. A small engine-room hatch, storage locker, and a bottom-drag minesweeping chain winch-stand were also on the fantail. The ATC had a seven-man crew: boat captain, coxswain, radioman, three gunners, and one engineman.

ARMORED TROOP CARRIER CHARACTERISTICS

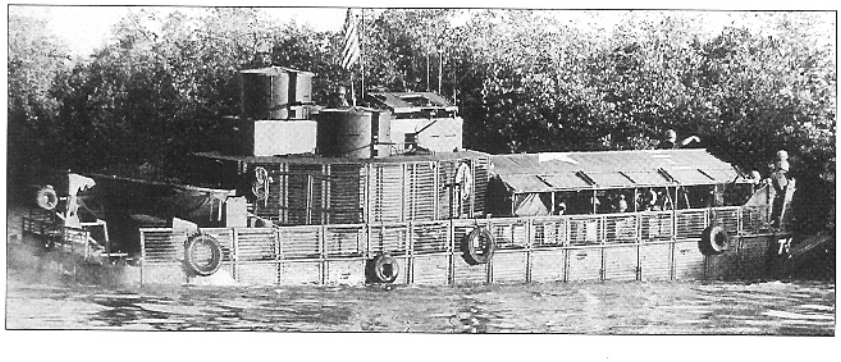
Length	56ft 1½in. (17m)
Beam	17ft 6in. (5.3m)
Draft	3ft 6in. (1m)
Displacement	155,000lb (70 tonnes)
Speed	8.5 knots max, 6 knots sustained (16km/h max; 11km/h)
Engines	2 x General Motors 64HND or 64HN9 225hp diesels
Fuel capacity	450 gallons (1,703 liters), 2 tanks
Radios	2 x AN/VRC-46 tactical
	1 x AN/PRC-25 backpack
Armament	
Program 4:	2 x .50-cal. M2 MGs side turrets
	1 x 20mm Mk 16 cannon aft turret
	4 x 7.62mm Mk 21 MGs gunwales/wheelhouse
	2 x 40mm Mk 18 MGs gunwales
Program 5:	2 x 20mm Mk 16 cannons side turrets
	40mm Mk 19 MG aft turret (.50-cal. in some)
	4 x 7.62mm Mk 21 & 2 x .50-cal. M2 MGs gunwales

Program 4 ATCs were retrofitted with a removable helicopter landing platform over the troop compartment, which stretched from the wheelhouse to the bow; there were one or two per RAS. They were known as Armored Troop Carriers, Helicopter (ATCH), "medical aid boats," or simply "aid boats." They usually carried a surgeon and a medical corpsman, or two Army medical personnel. Wounded from other craft or the ground force would be stabilized aboard them before they were helicopter "medevaced." Called the "world's smallest aircraft carriers," a UH-1 Huey could (precariously) land for resupply, liaison, and medevac.

A section (usually four) of ATCs embark on an operation. Note that the 20mm turrets are oriented to alternating opposite sides. T-91-1 has a 16ft (5m) "plastic" (actually fiberglass) assault boat tied up alongside.

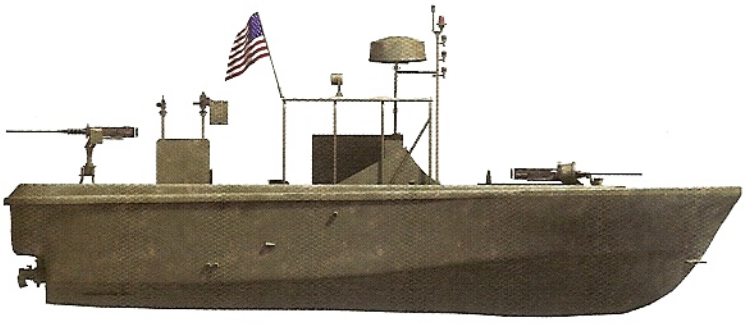
About three-quarters of the 1968 Program 5 ATCs had an armored helicopter platform doubling as an overhead cover which was resistant to 82mm mortars. The platform was accessible via angled ladders on both sides of the aft end. A third ladder with an access hatch was in the forward end of the platform, just aft of the ramp.

Program 5 ATCs had other modifications. The wheelhouse was provided with an armored overhead cover, with the aft third being a two-piece hatch. Armament was rearranged with 20mm cannons in the two side Mk 51 turrets, and a 40mm Mk 19 grenade launcher in the aft Mk 63 turret. A .50-cal. and two 7.62mms with shields on Mk 58 and Mk 57 pintles, respectively, were mounted on each side of the gunwale, the .50-cal. being aft-most. A small head compartment was added to the starboard side of the locker room. The toilet was usually removed as it seldom operated properly. Two folding crew bunks were fitted on either side forward of the existing bunks. Against the forward bulkhead of the locker room on the port side were radio racks, which were remotely operated from the wheelhouse. Forty individual troop seats, ten rows of four, were fitted in the troop compartment, with a wide walkway on both sides. The seats were mounted on shock-absorbing expanded steel-mesh columns. Two seats were fitted to a modular aluminum platform supported by an "X" beam framework designed to collapse with a mine detonation. The seats were commonly removed, as the troops preferred to lie on the deck, placing them below the waterline for fragmentation protection. In January 1969 ballistic nylon blanket fragmentation shielding – "flak curtains" – was hung from the overhead landing platform, fore to aft, 18in. (46cm) from the inside of the side bulkhead. The 30-ply 3x5ft (0.9x1.5m) and 3.5x5ft (1x1.5m) blankets weighed 3lb

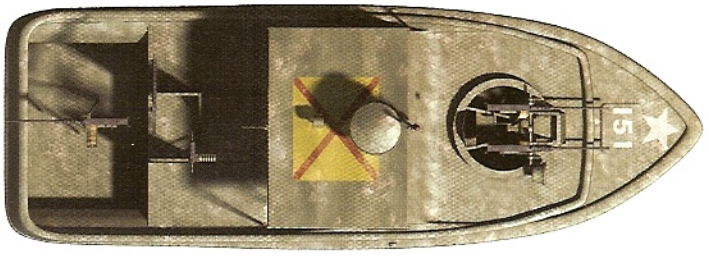


T-93-1 debarks troops on to a riverbank. A 7.62mm Mk 21 machine gun can be seen in the side of the wheelhouse. The three awning panels are raised to improve visibility and employ weapons. They were often lowered to provide shade from the blistering sun.

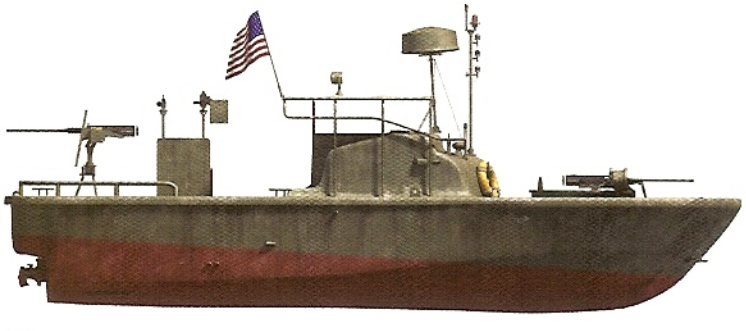
A1: Patrol Boat, River (PBR) Mk 1



A3

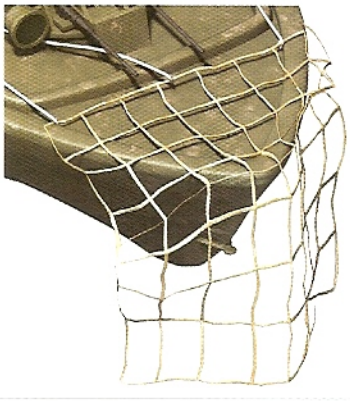


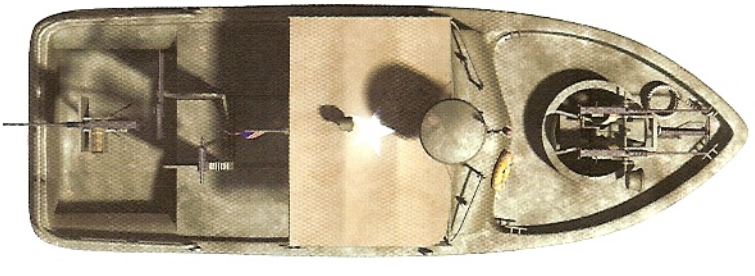
A2: Patrol Boat, River (PBR) Mk 2



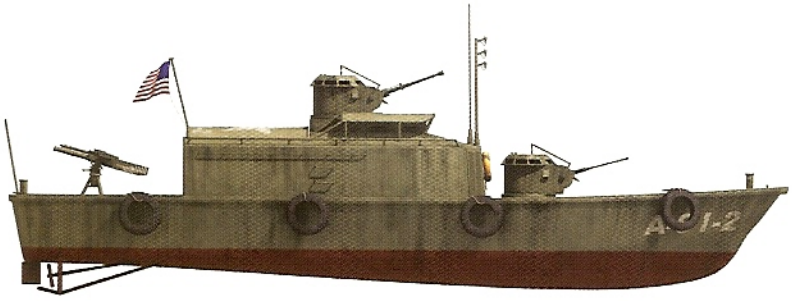
A4

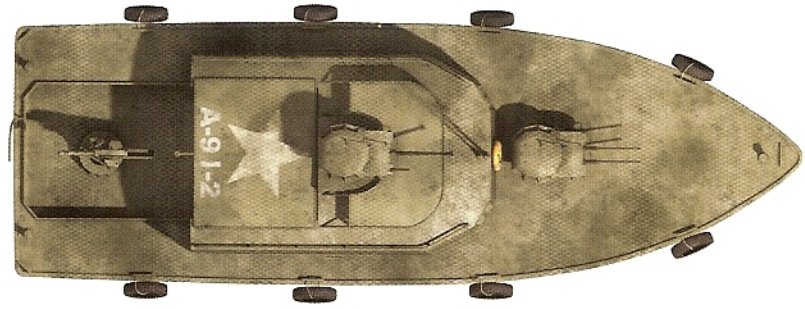
A5

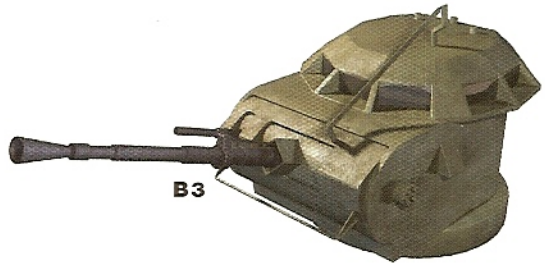




B1: Early Assault Support Patrol Boat (ASPB)

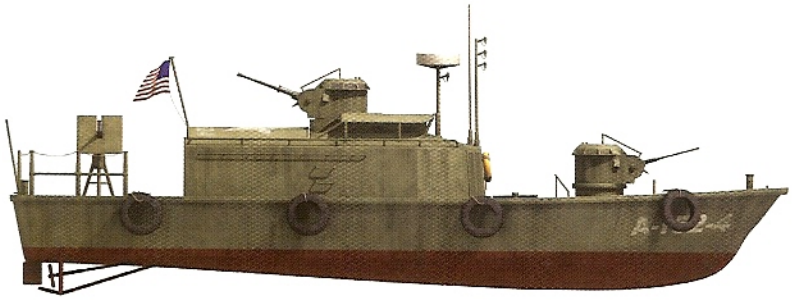


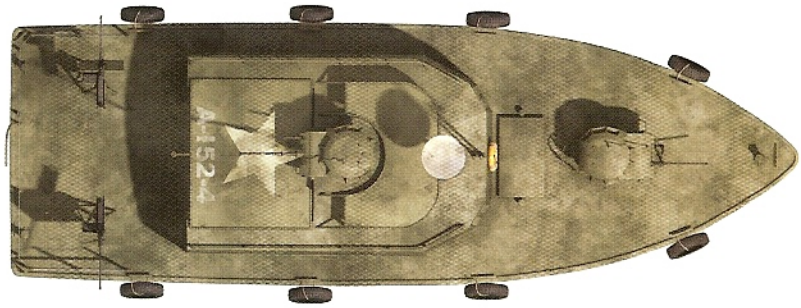




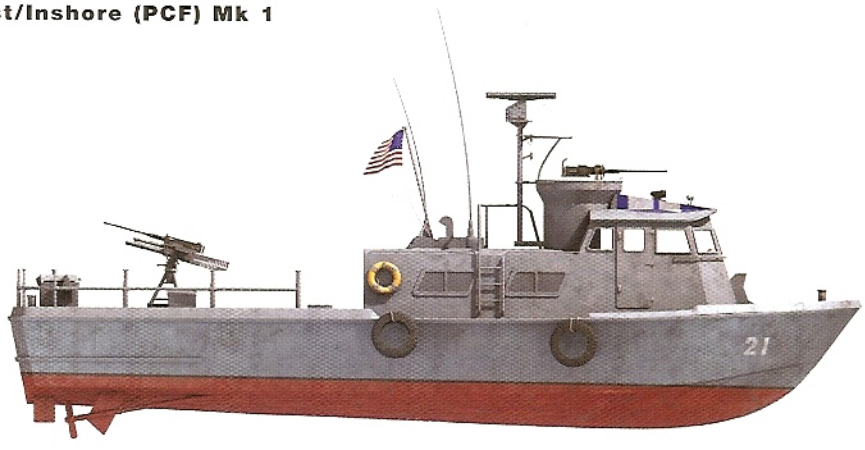
B3

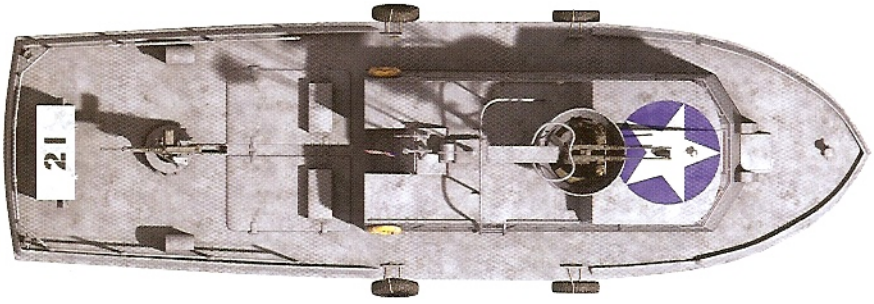
B2: Program 5 Assault Support Patrol Boat (ASPB)



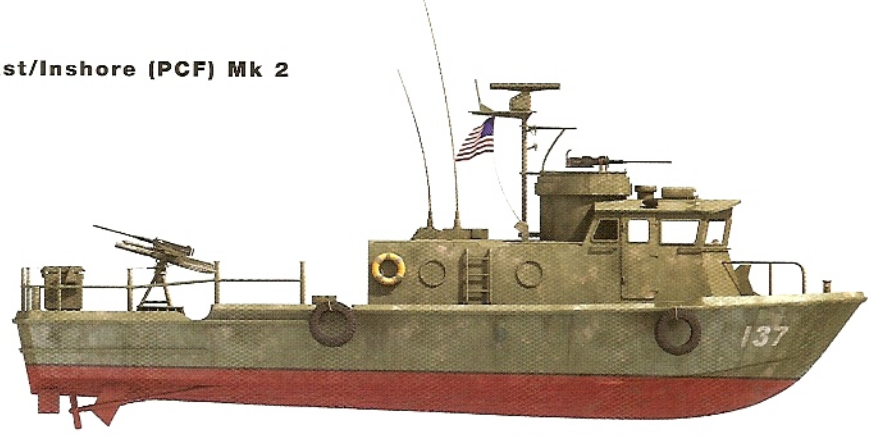


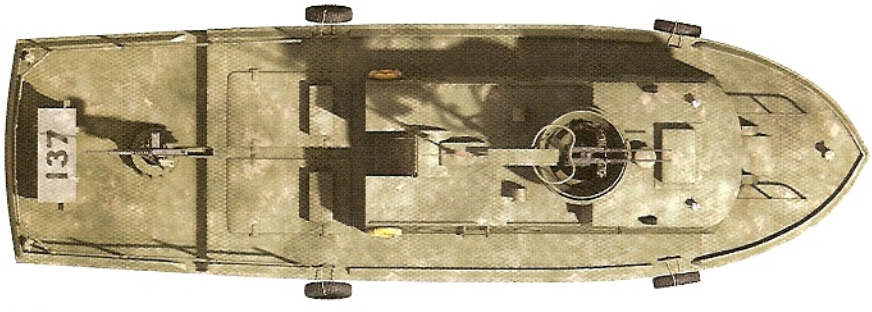
C1: Patrol Craft, Fast/Inshore (PCF) Mk 1



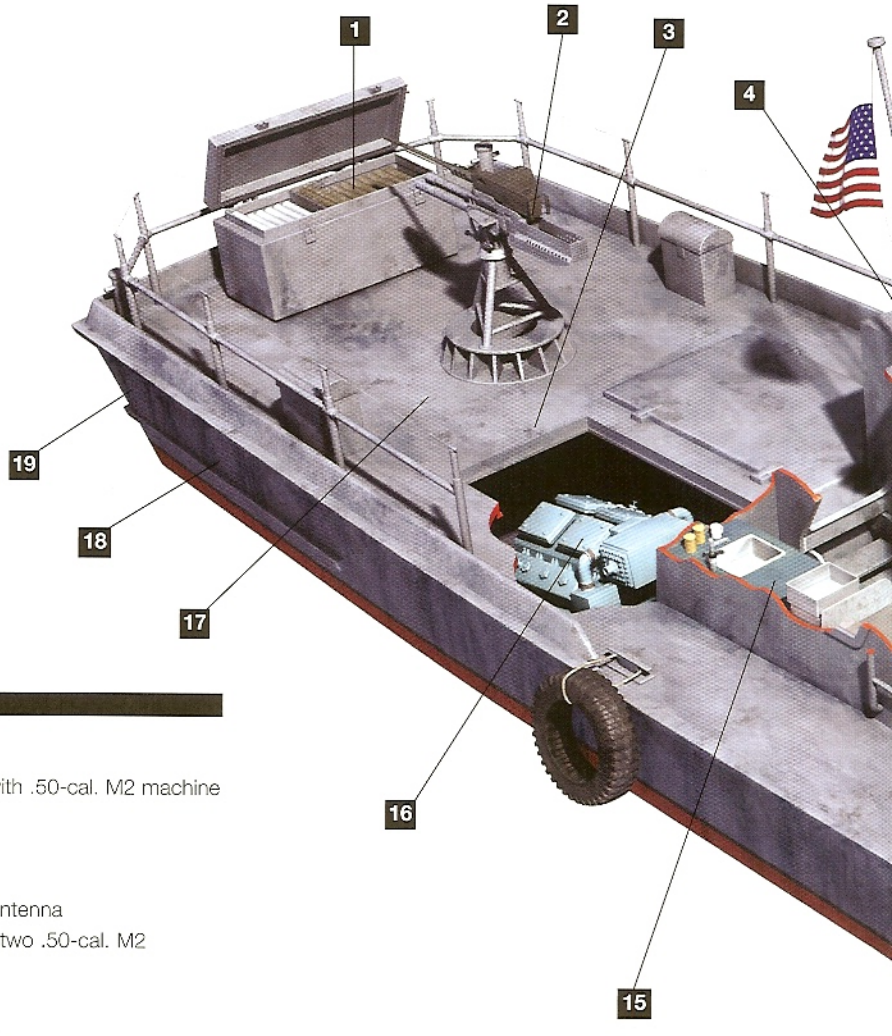


C2: Patrol Craft, Fast/Inshore (PCF) Mk 2



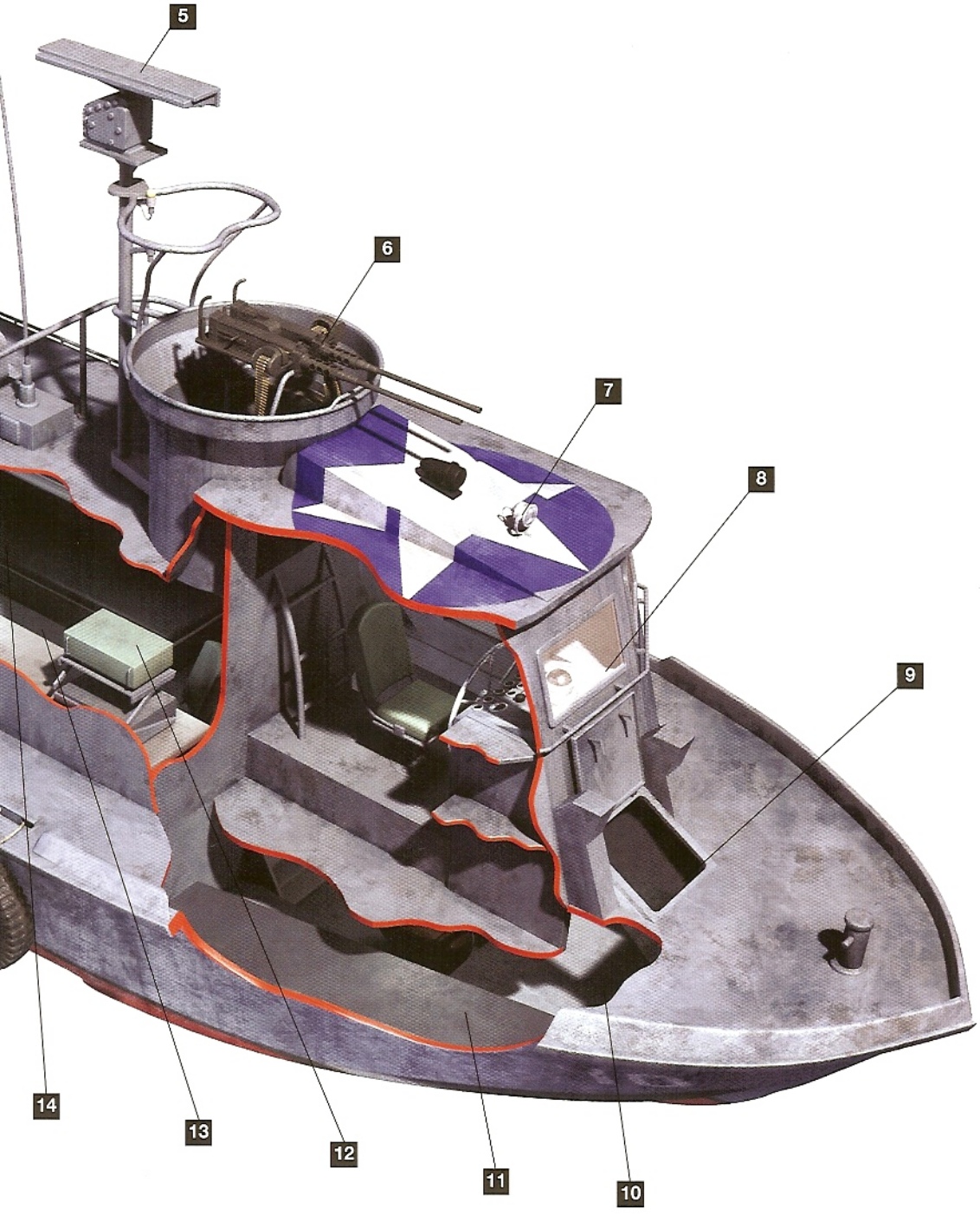


D: SWIFT BOAT (PCF) MK 1



KEY

1 81mm ready locker
2 81mm Mk 2 Mod 1 mortar with .50-cal. M2 machine gun
3 Forward fuel tank
4 After conn wheel
5 Decca Transtar D202 radar antenna
6 Mk 17 scarf-ring mount with two .50-cal. M2 machine guns
7 Spotlight
8 Pilothouse with radar screen
9 Escape hatch
10 Forepeak locker
11 Crew quarters with four bunks and head
12 Radios
13 .50-cal. ammunition lockers
14 Two bunks
15 Galley with refrigerator, freezer, hotplate/grill, and sink
16 Two General Motors 12V-71N 475hp diesel engines
17 Onan 120-volt 6MDJB-3 power generator
18 Two after fuel tanks
19 Fresh water tank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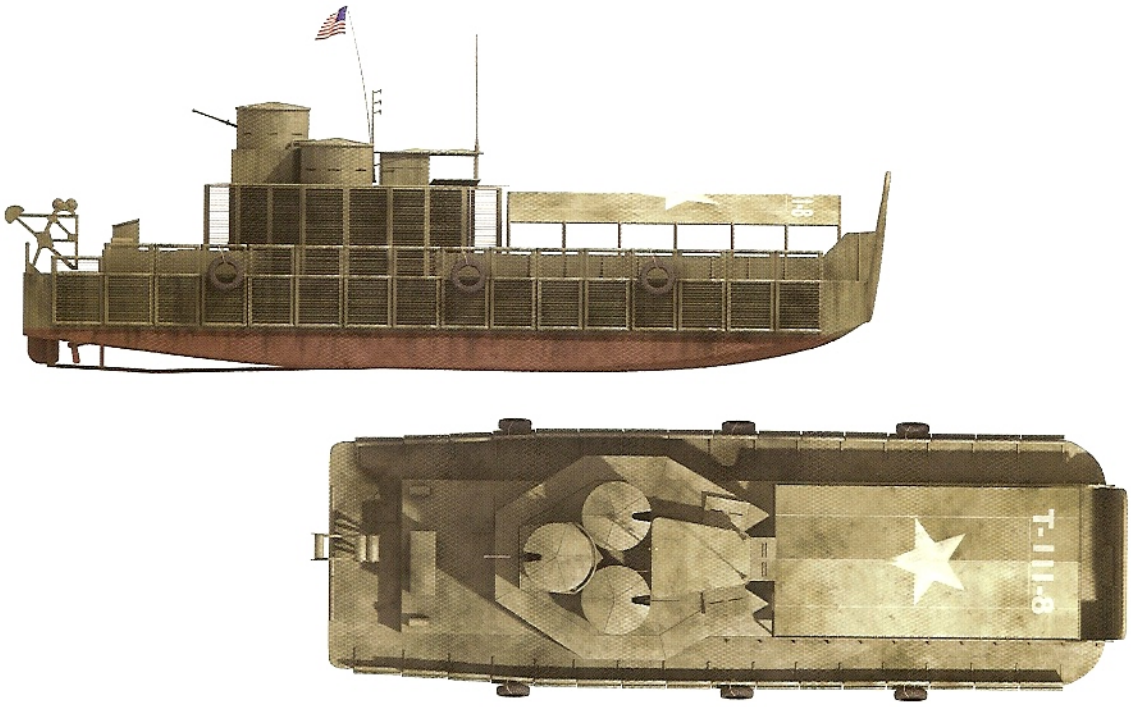
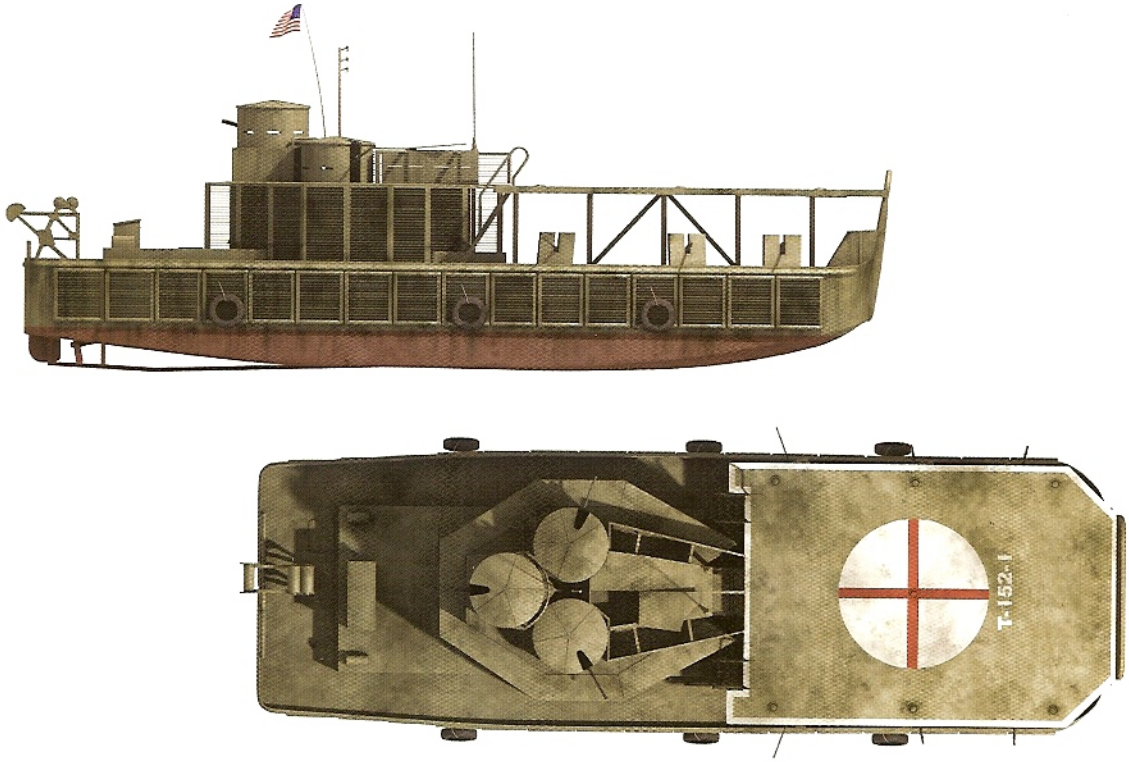
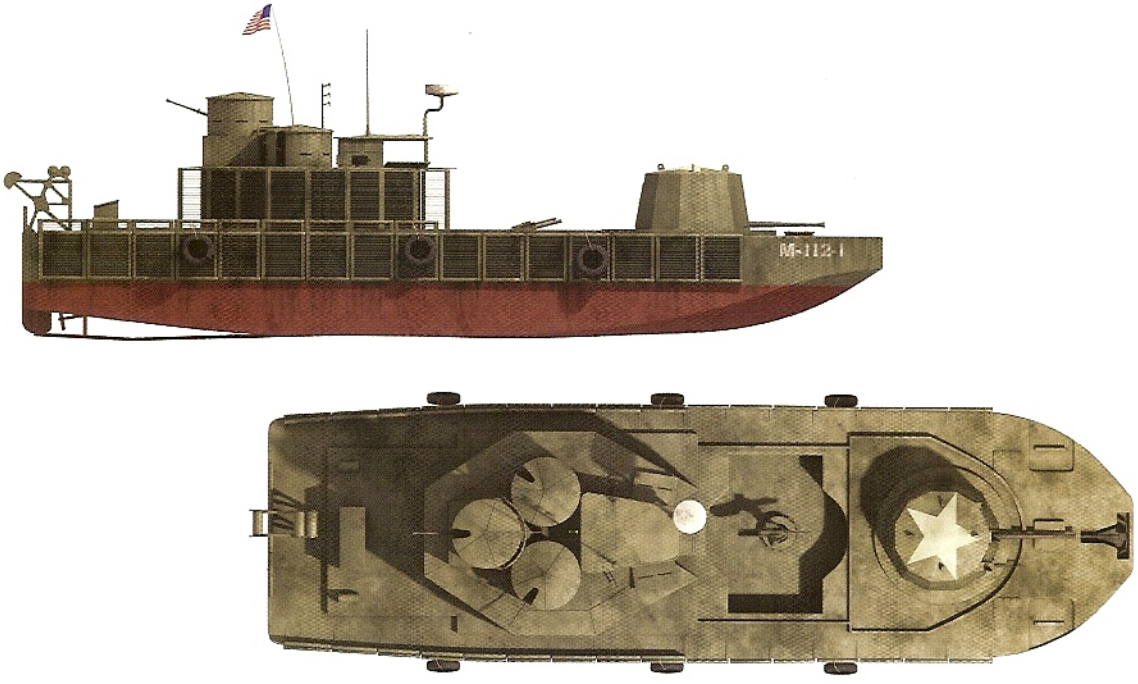
E1: Program 4 Armored Troop Carrier (ATC)



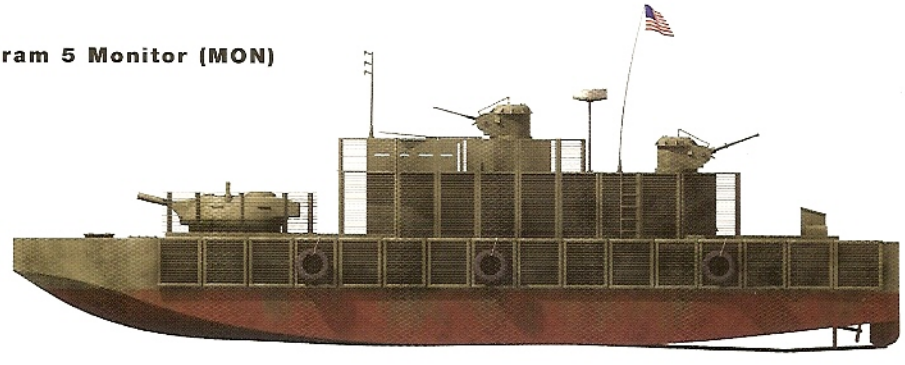
E2: Program 5 Armored Troop Carrier (ATC)



F1: Program 4 Monitor (MON)

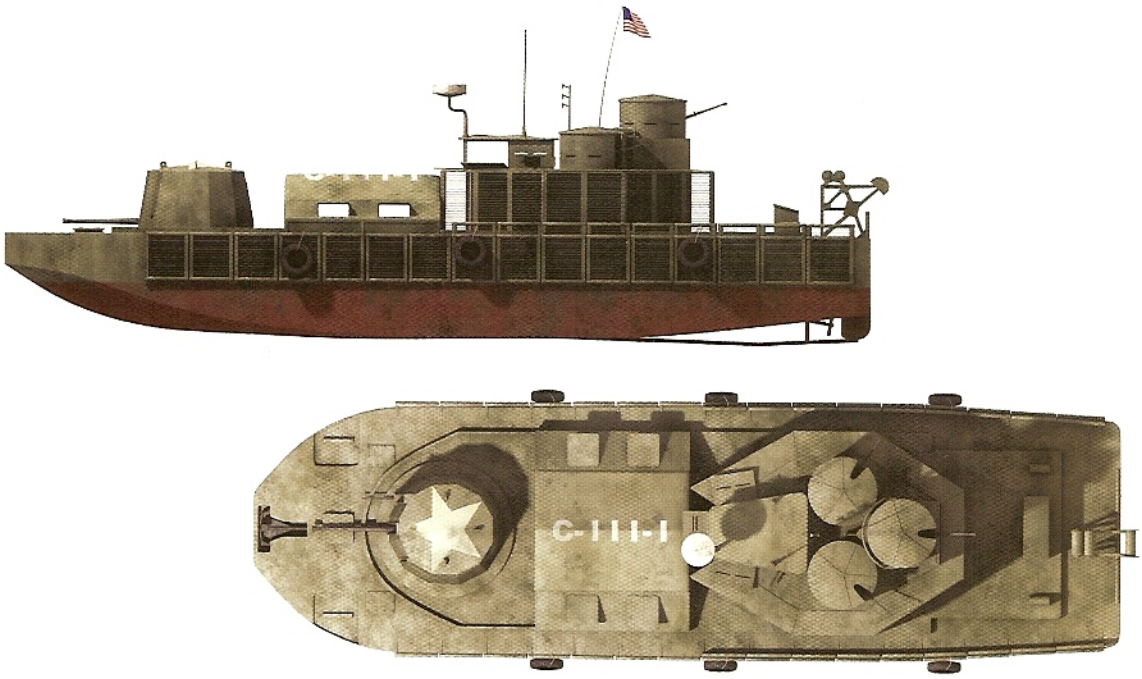


F2: Program 5 Monitor (MON)

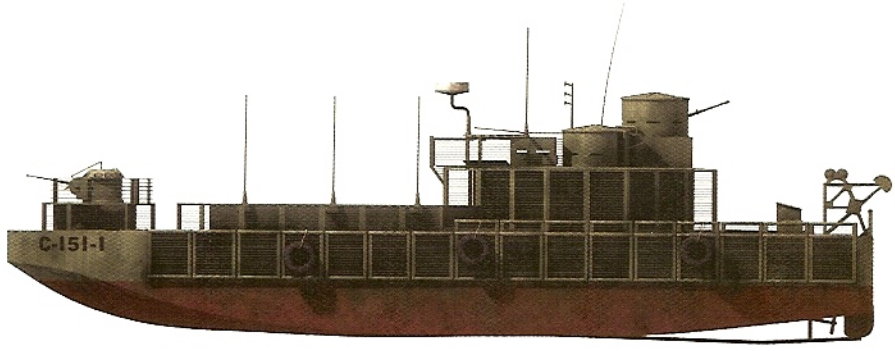


F3: Program 5 Flamethrower Monitor (MON)

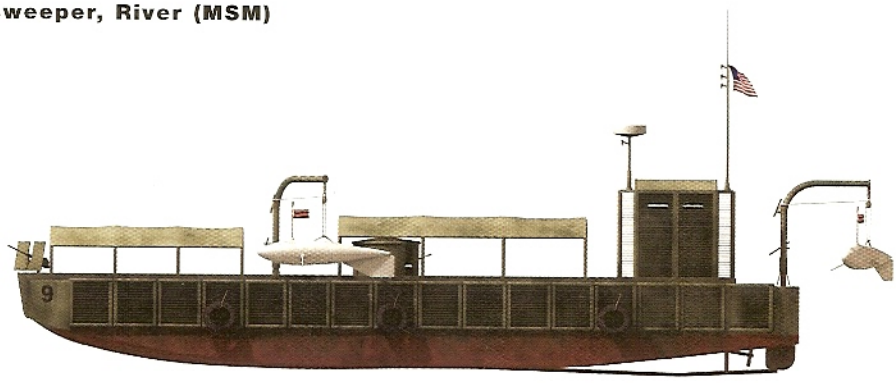
G1: Program 4 Command and Control Boat (CCB)

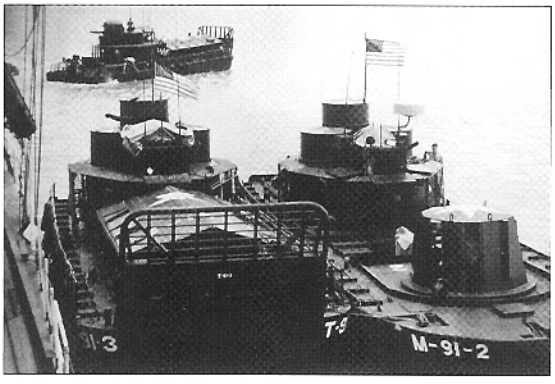


G2: Program 5 Command and Control Boat (CCB)



G3: Minesweeper, River (MSM)





An ATC and Monitor tied up alongside their self-propelled barracks ship (APB). ATCs did not possess radar, relying on Monitors and Command and Control Boats (CCBs) for night navigation when necessary.

(1.4kg) per square foot. On one occasion an RPG-2 struck one, causing three dead and 39 wounded. They also prevented air circulation in the stifling compartment and were removed.

Another ATC variant was the refueler. This was a standard ATC carrying a 1,200-gallon (4,500-liter) diesel fuel bladder, 500-gallon (1,900-liter) mixing tank, and transfer pump and hose, along with stowage for 300 gallons (1,135 liters) of oil and lubricants. On the exterior it appeared no different from a standard ATC and was often identified by a "T" hull number like other ATCs to prevent it being singled out, but "R" was used by some units.

Two ATCs were fitted with high-pressure firefighting water cannons under Project Douche. "Douche boats" had two water cannons that operated at 3,000lb per square inch, and were fed by centrifugal pumps powered by a General Motors 12V-71 diesel engine, pumping 1,000 gallons (3,785 liters) per minute through each cannon – over four tons of water a minute. With a range of up to 300yd (274m), they were usually employed much closer, and literally blew away shoreline bunkers and concealing vegetation, and flooded spider-holes. They were also used to fight fires on other boats.

Ten LCM(6)s were refitted as LCM, Minesweepers (LCMM) under Program 5 and assigned to Mine Division 13, where they were redesignated Minesweepers, River (MSM). They were provided with enlarged wheelhouses protected by bar-armor, as well as bar-armor on the side sponsons. The bow ramp was cut down to gunwale height and sealed. The MSM had 20mm Mk 51 turrets amidships and a .50-cal. in the bow. It proved to be vulnerable to fire and too slow.

The main complaints about the ATC were insufficient forward armament, lack of armored bows (the winch could not raise an armored ramp), limited forward visibility from the wheelhouse, and slow speed. The Army insisted on retaining the ability to embark vehicles, which was seldom done. Favorable marks were given for its ability to resist near-miss mine detonations and its good firepower; it was more maneuverable than expected, and its design allowed it to be used in many roles.

Monitors

The "battleship" of the MRF was the Monitor (MON), sometimes called a "Mike boat." The Program 4 Monitor was a much-modified ATC. The bow

T-92-10 cruises down a river during high water. "BM1 THOMAS" is painted on the deckhouse's bulkhead, referring to the boat's captain (boson's mate 1st class). The two- or three-number sequence following the type letter identifies the River Assault Division (RAD) to which the boat is assigned. The last number is the boat's number within the RAD.

ramp was removed and replaced by a rounded barge-like bow with a forecastle deck extending over most of the well deck. A small well deck was left open for the direct-fire mortar. A Mk 52 turret was mounted forward with a 40mm and coaxial .50-cal. with 48 rounds of 40mm and 250 of .50-cal. In the mortar well was an 81mm Mk 1 Mod 0 mortar with 7.62mms on the gunwales. The mortar was mounted just high enough to fire over the gunwales to the sides. The deckhouse and its armament arrangement were the same as the ATC's. Monitors were fitted with radar to aid target acquisition. The crew consisted of a boat captain, coxswain, radioman, three 40mm crewmen, one mortar crewman, three 20mm gunners, and an engineman.

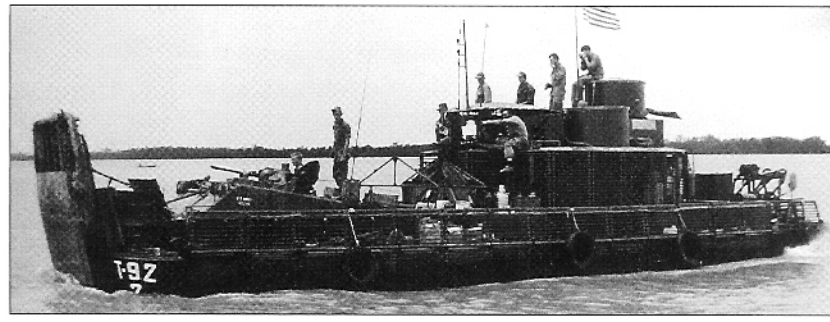
Monitor M-92-1 approaches a downed bridge. Most bridges in the Delta had been destroyed by the Viet Cong (VC). Only around major population centers where security could be provided were bridges rebuilt. The lack of rural bridges made the waterways even more important for commercial transportation.

MONITOR CHARACTERISTICS

Length	61ft (18.5m) Program 4; 60ft 6in. (18.4m) Program 5
Beam	17ft 6in. (5.3m)
Draft	3ft 6in. (1m)
Displacement	169,000lb (76 tonnes)
Speed	8.5 knots (15.7km/h) max, 6 knots (11km/h) sustained
Engines	2 x General Motor 64HK9 220hp diesels
Fuel capacity	450 gallons (1,703 liters), 2 tanks
Radar	Raytheon 1900N
Radios	2 x AN/VRC-46 tactical
	1 x AN/PRC-25 backpack
Armament	
Program 4:	3 x 20mm Mk 16 cannon side & aft turrets*
	1 x 40mm Mk 3 cannon & .50-cal. M2 MG forward turret
	1 x 81mm Mk 1 Mod 0 mortar well deck
	4 x 7.62mm Mk 21 MGs mortar well/wheelhouse
	2 x 40mm Mk 18 MGs mortar well
Program 5 howitzer-type:	2 x .50-cal. M2 MGs side mounts
	2 x 20mm Mk 16 cannons fore & aft turrets
	1 x 40mm Mk 19 MG aft turret
	2 x 7.62mm M60 MGs
	1 x 105mm M49 howitzer forward turret
Program 5 flamethrower-type:	2 x .50-cal. M2 MG side mounts
	2 x 20mm Mk 16 cannons fore & aft turrets
	1 x 40mm Mk 19 MG aft turret
	2 x 7.62mm M60 MGs
	2 x M10-8 flameguns & 7.62mm Mk 21 MGs forward

* Some had 2 x .50-cal. MGs on the sides and 1 x 20mm aft or 2 x 20mm on the sides and 1 x 40mm MG aft.

The 1968 Program 5 Monitor saw the rearrangement of the 20mm and .50-cal. weapons, the 81mm mortar was removed and its well decked over, and the 40mm was replaced by the 105mm M49 howitzer turret mounted further aft. Ammunition storage allowed for 350 rounds. A bar-armor screen encircled the turret. The smaller boxy deckhouse was protected by bar-armor. Atop the wheelhouse was a Mk 48 Mod 0 turret with a 20mm and another on the aft of the deckhouse. A .50-cal. was on either side of the deckhouse in open-topped positions. The crew comprised a boat captain, coxswain, radioman, four 105mm crewmen, three .50-cal./20mm gunners, and an engineman. Both types of Monitors were overloaded,



The first flame boats or "Zippos" were simply an ATC with an Army M132A1 armored flamethrower experimentally embarked. The vehicle's front end was chocked up to elevate it sufficiently for the flame gun to clear the side bulkheads. It was this vehicle's M18-8 flame gun in an M8 cupola that was used on the later purpose-built Zippos.

with the Program 4 carrying almost 18,000lb (8 tonnes) of armor and the Program 5 almost 20,000lb (9 tonnes).

The first flamethrower boats (Zippos, identified by a "Z" hull number) were Program 4 Monitors with the mortar well decked over and two M10-8 flameguns in M8 cupolas mounted aft of the 40mm. The Program 5 "flame boat" was the new type Monitor, but with two M10-8 flameguns mounted on the forecastle. The Navy had not wanted these, but sufficient 105mm turrets were unavailable, so four of the 14 new Monitors were Zippos.

The Program 4 CCB, or "Charlie boat," was a slightly modified Monitor with the mortar well deck converted to a Tactical Operations Center (TOC) and covered by a steel-sided, peaked vinyl-canvas housing. There were two large shuttered ports on either side. These provided space for three additional AN/VRC-46 radios, encryption device, work tables, map boards, etc. Radar was also fitted. Crew quarters were provided beneath the deckhouse, and two bunks for the four-man Army TOC crew were in the TOC. The TOC crew was provided by the Army battalion headquarters and consisted of a staff officer, artillery officer, and two enlisted men. With the exception of the removal of the 81mm mortar and gunwale machine guns, armament was unchanged from the Monitor, to include retaining the forward 40mm. The CCB tended to attract VC fire because of its numerous radio antennae and the fact that it would charge into the thick of the action for control purposes and to lend its fire support. Characteristics were the same as for the Monitor, except that it was lighter at 167,000lb (76 tonnes).

Program 5 CCBs were based on the new ATC, but had a Monitor-type bow and an air-conditioned bar-armor-protected, raised steel housing over the TOC. A raised bar-armor-protected Mk 48 Mod 0 turret was on the bow. The TOC compartment was lengthened forward and held an AN/PRC-125, AN/PRC-25, and four AN/VRC-46 radios. The radios were on the brigade, battalion tactical (on which the companies communicated), battalion logistics, fire support, and utility nets, with one spare. Deckhouse armament was as a Program 5 ATC.

TOTAL LCM(6)-BASED RIVERINE CRAFT

Type	Program 4	Program 5
ATC	52	64
MON	10 (4 Zippos)	14 (4 Zippos)
CCB	4	8
Refueler	2	2
LCMM	—	10

C-131-1 was a Program 5 CCB. Rather than being based on a Monitor, as were Program 4 CCBs, the Program 5 Charlie boats combined an ATC deckhouse and Monitor hull. The bow armament is a mystery, as it mounts a Mk 48 with a 20mm, but apparently a much larger weapon is fitted. A 40mm would not fit and the barrel is not tapered. It is suspected that this is a merely a length of pipe, fitted to deceive the enemy.

THE RIVERINE WAR

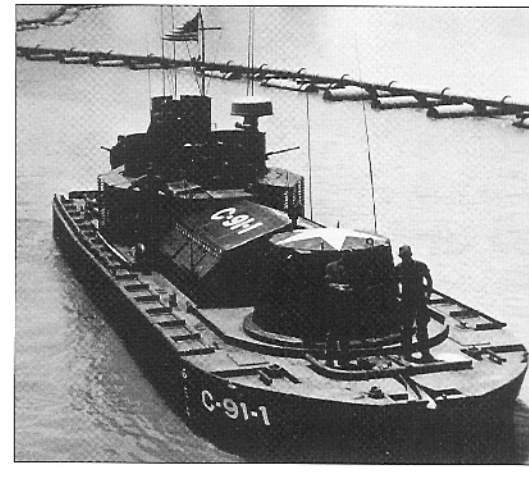
The Viet Cong threat

The Viet Cong was a highly motivated, well-trained, and moderately well-equipped force.[2] Their advantage was that they knew the territory, people, and waterways. They too moved by boat, mainly sampans, usually disguised as local merchant and fishing craft. Regular civilians volunteered or were coerced into carrying material for the VC.

The VC used a wide variety of weapons, including those supplied by China and the USSR, equipment captured from Free World Forces, and even French weapons. They had a difficult time marshaling forces and executing large-scale operations, due to the rugged terrain, and because weapons had to be man-packed and carried in sampans. Therefore, engagements were at short ranges, seldom over 200ft (61m) except on the widest rivers. Narrow river and canal engagements might be as close as 20ft (6.1m).

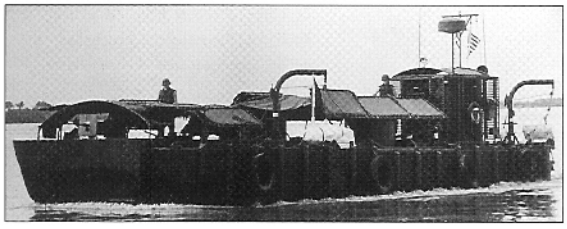
The most commonly used small arms had only limited effect on steel-hulled vessels and their armor. These included the 7.62mm AK-47 assault rifle and SKS carbine, 5.56mm M16 rifle, and .30-cal. carbine. The latter two rounds had poor penetration. Communist Bloc 7.62mm (a more powerful round than the shorter AK/SKS cartridge) and US 7.62mm and .30-cal. machine guns could penetrate steel hulls. The 12.7mm and .50-cal. machine guns were deadly weapons against boats, but their weight limited their use.

C-91-1 was a Program 4 CCB based on the Monitor. The Tactical Operations Center (TOC) replaced the Monitor's 81mm mortar well deck. The many radio antennae are apparent.



The same constraint applied to the 57mm M18A1 and 75mm M20 recoilless rifles and their Chinese-made copies (Types 36 and 52). They were only used to a limited extent, and were considered deadly by boat crews. The most effective antiboat weapons were the Soviet-designed RPG-2 and RPG-7 antitank rocket launchers, which the VC called the B-40 and B-41. These shoulder-fired weapons were compact, accurate, and lightweight, and their shaped-charge high-explosive antitank (HEAT) warheads were extremely effective against riverine craft. Mortars, on the other hand, were of little use against moving riverine craft, but could fire on troop debarkation sites.

2 Osprey Warrior 116, *Viet Cong Fighter, 1965–72*.



The Minesweeper, River (MSM) was initially designated LCM, Minesweeper (LCMM). The .50-cal. machine gun can be seen in the bow, while the port 20mm turret is aft of a Type O minesweeping float.

Underwater command-detonated mines were a serious threat. These were made from various containers, such as oil drums, packed with explosives, and had air-filled buoyancy compartments. Mines were moored a few feet below the surface and connected to shore by electrical firing wires. The firer hid in a spider-hole and battery-detonated the mine. Since riverine craft had light steel, fiberglass, or aluminum hulls, the hydrostatic shock was considerable and direct contact with the hull was unnecessary to inflict injury and damage. A 100lb (4.5kg) charge within 10ft (3m) was devastating. However, thanks to Styrofoam flotation aids, multiple compartments, and the proximity of the shore, it was seldom that a craft completely sank. They usually were able to ground themselves. Even if sunk, the boats were easily recovered because of their small size and the shallow waters.

ATCs, ASPBs, and various river minesweeper craft were employed to counter mines, which were a particular problem on the Long Tau Channel in the Rung Sat, where the VC attempted to mine Saigon-bound ships. Since the easiest way to detonate mines was by remote-control the most effective way to neutralize them was to cut the wires. This only required the use of a bottom-drag chain, a heavy chain with short welded prongs dragged astern, although the minesweeper had to run close to shore, making it vulnerable to attack. The chain was dragged aft, so the VC began emplacing mines to attack the minesweepers. Claymore mines were employed, and captured American M18A1 or Soviet MON-50 and MON-100 were emplaced on shores and command-detonated to blast ball bearings into boats.

On smaller canals and streams the VC erected frame-like log barricades. These might be ambush sites, covered by snipers, or booby-trapped. They were easily destroyed with demolitions, but they slowed a riverine force's advance, and blowing them warned the VC of the force's approach. Snipers were more of a nuisance than a serious threat. It was difficult to hit a man-sized target on even a slow boat.

Ambushes consisted of 10–20 spider-holes and bunkers[3] along 100–300yd (91–274m) of shore with four to five shoulder weapons and machine guns to one RPG. Ambushes were set-up at narrows 30–100yd (27–91m) across. Of course on narrow waterways the initiation range was a matter of feet not yards. Ambushers were seldom positioned on both banks of a waterway.

Ambushes were risky. The VC knew riverine forces carried a great deal of automatic weapons and high-explosive firepower and Free World Forces could call down artillery fire, which only took minutes to deliver. Riverine forces always operated under an artillery umbrella. They could call in helicopter gunships and fighter-bombers, which could be on-station within 20 minutes. When the VC withdrew they were often exposed on the open plains and had to abandon their heavy weapons. Riverine operations often inserted blocking forces on other waterways and the withdrawing VC could easily run into them. Another danger was helicopter-delivered reaction forces inserted on their retreat route.[4]

3 Osprey Fortress 48, *Viet Cong and NVA Tunnels and Fortifications of the Vietnam War.*
4 Osprey Elite 154, *Vietnam Airmobile Warfare Tactics.*

Boat units and combat operations

Sailors assigned to the MRF and River Patrol Force had first undertaken their specialty training in Navy service schools as seamen, radiomen, radarmen, enginemen, coxswains, gunners, electricians, etc. They then attended the Naval Inshore Operations Training Center at Vallejo, California, where they learned to operate as crews in the 11-week River Assault Craft Training Course on the Sacramento River Delta. Training also took place at Mare Island Naval Shipyard, California (small boat training); Camp Roberts, California (an Army base for gunnery training); and Whidbey Island Naval Air Station, Washington (survival, evasion, resistance, and escape training). PBR crews undertook similar training in the River Patrol Boat Course at Vallejo and Mare Island. PCF crews were trained at Naval Base, Coronado, California by Boat Support Unit 1. Once the PCF crews were trained they moved to Subic Bay, Philippines, where they received their boats and proceeded to Vietnam. Newly arriving Swift Boat crews in Vietnam were typically broken up, with each man detailed to a different boat to gain experience. When ready the crew was reassembled and took over their boat. Survival training was also provided at Subic Bay, where some sailors laid over en route to Vietnam. Some personnel were given basic Vietnamese language training to aid them when boarding Vietnamese watercraft. This was routine and dangerous work for PBR and PCF sailors.

USS *Mercer* (APB-39) was one of the MRF's mother ships. Two AMMI barges are moored alongside. The ship was olive drab, but the helio-landing deck was white with red markings. Others had a light gray deck with white markings in the same pattern.

The brown water sailors were highly trained and motivated. Many volunteered for the duty and served one-year tours in Vietnam. Casualties were high. The numbers of wounded were proportionally higher than in other types of unit, and were the highest within the Navy. This was especially true for the MRF. The brown water sailors called their Army counterparts "grunts" and were likewise called "squids," but there was a real mutual respect. In the boats it made no difference what color of uniform one wore: it was a shared danger.

The organization of boat units and the number of assigned craft depended on the type. The hierarchy of naval small craft units, from highest to lowest, was flotilla, squadron, division, and section. These were administrative organizations in large ship categories, but for small craft they served as tactical units as well, although they would be internally task-organized for combat. Flexibility was the key to naval task organization.

River Patrol Force

PBR Mk 1s were assigned to the River Patrol Force, aka Task Force 116, commissioned on December 18, 1965. Its mission was to conduct Operation *Game Warden*, the patrol and security of the Delta waterways. On March 15, 1966 the force received an additional designation, River Patrol Squadron 5. It was first organized into Task Group 116.1 with 80 PBRs to operate in the Delta at large, and Task Group 116.2 for the Rung Sat Special Zone, with 40 boats. It grew to four task groups in January 1968, each with two 10-boat sections. Each group operated on a specific river. A fifth task group was added in June to operate far upriver on the Mekong near the Cambodian border.

RIVER PATROL SQUADRON 5, JANUARY 1968

Task Group	River	Base
116.1	Song Bassac	Can Tho
116.2	Song Co Chien	Sa Dec
116.3	Song My Tho	My Tho
116.4	Song Nha Be	Cat Lo
116.5	Upper Song Mekong	Chau Doc

PBR sections operating at the mouths of the river, had re-stationed themselves further upriver to avoid sea swells, although this limited their operations by 50 percent. The supporting mobile bases would relocate each night as the VC positioned mortar-aiming stakes during the day. Two-boat patrols typically lasted 12–14 hours.

In September and October 1967 a PBR section was sent to the opposite end of Vietnam to test the feasibility of conducting operations on the Song Huong Giang (Perfume River) and Song Cua Dai near the Demilitarized Zone. In January 1968 the new River Division 55 was sent north to patrol these rivers under Operation *Clearwater*. River Patrol Squadron 5 was redesignated River Flotilla Five in September 1968 and reorganized into five river divisions with the addition of 130 PBR Mk 2s. River divisions consisted of four or five 10-boat sections designated by three-digit numbers reflecting the parent division, e.g. River Division 51 with River Sections 511–514.

RIVER FLOTILLA FIVE, SEPTEMBER 1968

River Division	River	Bases
51	Song Bassac	Can Tho/Chau Doc*
52	Song Co Chien	Sa Dec/Vinh Long/Tan Chau†*
53	Song My Tho	My Tho*
54	Song Nha Be	Cat Lo
55	Song Huong Giang & Cua Dai	Danang

* Additionally a floating LST base at the river's mouth with two attached UH-1Bs.
† Rest stop, no permanently assigned units.

The main mission of the 12–14-hour PBR patrols was to inspect Vietnamese boats and check identification papers. The radar was not especially effective for detecting small craft, but was useful for night navigation.

The flotilla was supported by Detachment *Golf* (two or three SEAL Team 1 platoons), Helicopter Attack Squadron (Light) 3 with 25 UH-1B Huey gunships, and Light Attack Squadron 4 with 15 OV-10A Bronco observation/attack airplanes. The helicopter attack squadron had replaced Helicopter Combat Support Squadron 1 in April 1967. Other attached units were Mine Division 112 with 12 minesweeping boats (MSBs), Patrol Air Cushion Vehicle Division 107 with three PACVs, and Strike Assault Boat Squadron 20 with 22 STABs supporting the SEALs. The flotilla's strength in 1968 was 2,000 men. By 1970 the flotilla possessed 258 craft. Decommissioned in December 1970, most assets were turned over to the Vietnamese. The *Clearwater* mission in the north had been terminated in June.

Coastal Surveillance Force

Swift Boats were assigned to Task Force 115, the Coastal Surveillance Force for Operation *Market Time*. The North Vietnamese were infiltrating supplies south on a massive scale. They used junks and other small craft, which were difficult to distinguish from the 64,000 licensed junks, sampans, and fishing boats. Most supplies and troops from North Vietnam came south via the Ho Chi Minh Trail, but a significant amount was delivered by boat. This was easier and faster than man-packing it over the trail network and delivering it directly to units in the coastal areas rather than hauling it overland. The Task Force was commissioned in July 1965, although elements had begun operations earlier in the year. Boat Squadron 1 was organized with five boat divisions (101–105), each with 14–19 PCFs. Crews typically conducted 24-hour patrols and were relieved by another boat. It was redesignated Coastal Squadron 1 in January 1967, with six coastal divisions (11–16) of 16–22 boats each. The coastal divisions were responsible for specific patrol areas from north to south along the 1,200-mile (1,931km) coast:

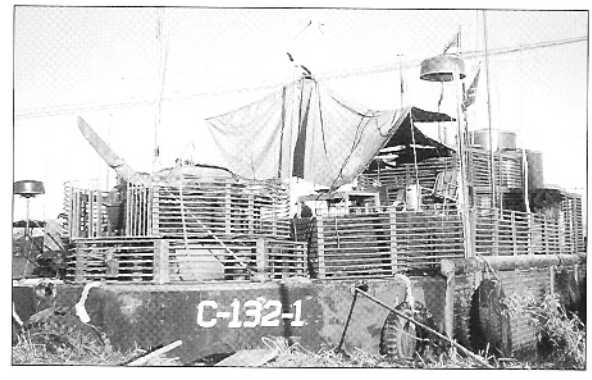
An Army UH-1H medevac Huey lands on A-92-4 with a retrofitted helio deck. The decks were fabricated from M8A1 aluminum airfield matting (1ft 7in.x11ft 9in./0.5x3.6m). The deck markings are in white with a red cross. Note that the troop compartment canopy remains in place.

COASTAL SQUADRON 1, 1967

Division	Base
Coastal Division 12	Da Nang
Coastal Division 16	Chu Lai
Coastal Division 15	Qui Nohn
Coastal Division 14	Cam Ranh Bay
Coastal Division 13	Cat Lo
Coastal Division 11	An Thoi

Coastal Squadron 1, with the addition of Coast Guard Squadron 1, with 28 WPB 82ft (25m) all-weather patrol cutters, and Coastal Patrol Squadron 3 with five PG patrol gunboats, was assigned to the new Coastal Flotilla One. Its 1968 strength was 1,050 men. *Market Time* was also responsible for Operation *Stable Door* – the harbor defense of Vung Tau, Cam Ranh Bay, Qui Nhon, and Nha Trang. Inshore Underwater Warfare Group One, with Units 1–5 performed this mission using various types of small patrol boats. It is estimated that Coastal Flotilla One reduced enemy boat infiltration by at least one-tenth. Besides extended two-boat inshore patrols, they also conducted river patrols with River Patrol Force PBRs and the MRF. The unit was decommissioned at the beginning of 1970, and most of the craft, except the Coast Guard cutters and patrol gunboats, were turned over to the Vietnamese.

C-132-1 moored ashore. A tarp has been hastily erected as protection from the sun. The dark colored steel boats became ovens during the day. Coupled with the high humidity generated by the water, they were quite uncomfortable.



Mobile Riverine Force

The Mobile Riverine Force was established as a joint force to conduct offensive operations in the Delta. Considered the most viable method

Four recently arrived ATCs are moored to an AMMI pontoon barge. The two craft forward of them are loaned Vietnamese Navy riverine craft that RAD 91 used for training prior to the arrival of their own craft. The cylindrical fittings on either side of the fantail lockers are engine air intakes.

of regaining the initiative from the VC, it would take advantage of the region's natural means of communication. The Navy component of the MRF was River Assault Flotilla One (Task Force 117), commissioned at Coronado on September 1, 1966. It immediately commenced assembling crews and undertaking training. The Flotilla staff was 75 men and the advance elements arrived in Vietnam in early January 1967.

The first support elements arrived in April and May. In June they moved to Dong Tam ("united hearts and minds") where a base was constructed for 2d Brigade, 9th Infantry Division, the MRF's Army component. This base was 3 miles (4.8km) west of the town of My Tho on the Song My Tho 20 miles (32km) southwest of Saigon. The MRF's main operating base, though, would be afloat, as adequate land space was scarce, required significant security forces, and the Vietnamese were not too keen on the idea of introducing American troops into the Delta as it would escalate the war. A floating base would serve to separate the Americans from the population and could also be moved to different areas, making the MRF truly mobile, not just its boat-borne combat elements. The mobile riverine base was operated by River Support Squadron 7 (Task Group 117.3).

RIVER SUPPORT SQUADRON 7, 1967

2 x Barracks Ships, Self-Propelled (APB)*
1 x Barracks Ship, Non-Self-Propelled (APL)
1 x Landing Craft Repair Ship (ARL)*
2 x Landing Ships, Tank (LST)
1 x Net Laying Ship (AN)
1 x Repair, Berthing, and Messing Barge (YRBM)
2 x Heavy Salvage Craft (LHC)
2 x Light Salvage Craft (LLC)
2 x Harbor Tugs, Light (YTB)

* The APB and ARL were much modified LSTs. See Osprey New Vanguard 115, *Landing Ship, Tank (LST) 1942–2002.*

RASs 9 and 11 were the MRF's combatant units. The RAS was subdivided into two river assault divisions (RADs), each capable of transporting and supporting an infantry battalion. RASs 9 and 11 consisted of two RADs each (drawn from RADs 91, 92, 111, and 112). Attachments included an Underwater Demolition Team (UDT) detachment, explosive ordnance disposal detachment, and a riverine survey team.

The original concept called for the floating barracks to operate upriver, but it was felt they were too vulnerable to swimmers and stand-off attacks, as well as being too deep-draught to travel far. Instead, they would be based seaward of the river mouth where the RAS units would operate.

The first craft assigned to the new unit were borrowed US-made Vietnamese vessels. These under-armed and under-armored craft, simple LCM(6) modifications, were sufficient to train and familiarize the US crewmen who operated them triple-crewed. The first 9th Infantry Division elements reported for training in mid-January and additional Vietnamese craft were borrowed. New US craft began arriving in March and the

Vietnamese craft were turned over to RAS 11 in April so it could commence training.

The US craft were split unevenly between the two RADs of an RAS, as demonstrated in the table below, with two officers and 175 and 171 enlisted men, respectively. A RAD was commanded by a lieutenant, assisted by a chief staff officer (later a material officer), plus petty officers for training, personnel, boat maintenance, supplies, welfare and recreation, work details, pontoon chief, and pontoon watch. The demands on the boats were heavy, and a 75–80 percent availability was typical.

RIVER ASSAULT SQUADRON 9, ASSIGNED CRAFT, 1967

RAD 91	RAD 92
2 x CCBs	1 x CCB
3 x MONs	2 x MONs
13 x ATCs	13 x ATCs
8 x ASPBs	8 x ASPBs
	1 x refueler

In 1968 River Support Squadron 7 received two additional APBs, along with one more Barracks Ship, Non-Self-Propelled (APL) and an LST to support two additional RASs. RASs 13 and 15 were assigned in June 1968, with RADs 131, 132, 151, 152, and 153 (RAS 15 had three RADs; 153 had only 16 ASPBs) with new Program 5 boats. In July, Task Force 117 was split into two task groups, Alfa (TG 117.1) with RASs 9 and 11 to operate in the eastern Delta, and Bravo (TG 117.2) with RASs 13 and 15 working the western Delta. TF 117's Navy strength in 1968 was 3,700 men.

In April 1969 the RADs were organized into sections led by boatswain's mates 1st class for better control and maintenance. The boats could be commanded by boatswain's mates 3d through 1st class.

RIVER ASSAULT DIVISION 152, APRIL 1969

Section A	Section B	Section C	Section D	Section E
A-152-1	T-152-1	T-152-4	T-152-7	T-152-10
A-152-2	T-152-2	T-152-5	T-152-8	T-152-11
A-152-3	T-152-3	T-152-6	T-152-9	T-152-12
A-152-4				T-152-13
				C-152-1
				M-152-1
				R-152-1
				Z-152-1

The Program 4 boats of RASs 9 and 11 were turned over to the Vietnamese and both squadrons were decommissioned in June 1969. That same month the 9th Infantry Division was notified of its departure, with 2d Brigade the first to depart at the end of July. RASs 13 and 15 received the remaining 94 boats.

Some ATCs were assigned to carry 81mm mortars, artillery fire direction centers, aid stations, ammunition, and supplies. They undertook patrols, blocked escape routes, and protected floating howitzer batteries. The later arrival of ASPBs relieved them of some of these tasks. MRF watercraft supported the ground force by:

Z-132-1 was a Program 5 flame boat mounting two flame guns plus two Mk 48 Mod 0 turrets with 20mm cannons. The crewman in the center against the flame fuel tank compartment hatch holds an M60 machine gun.

Transporting and supporting assault troops
Acting as, or in support of, blocking forces
Conducting reconnaissance, security, and combat patrols
Transporting and landing raid forces
Displacing crew-served weapons
Transporting and positioning reserves
Performing resupply and evacuation tasks
Serving as command or utility vessels
Serving as mobile aid stations
Providing direct and indirect fire support
Withdrawing or redeploying troops
Acting as 105mm howitzer or 81mm mortar firing platforms
Evacuating prisoners of war, defectors, and detainees
Acting as minesweepers
Performing damage control and salvage
Providing maintenance and repair of watercraft

As for the MRF's ground element, the Navy originally proposed that amphibious-trained marines be assigned, but they were totally committed far north and no other Marine units could be deployed to Vietnam. It was recognized that the ground force would have to be specifically trained for riverine operations rather than simply rotating just any unit. The 9th Infantry Division was reactivated at Ft Riley, Kansas on February 1, 1966.

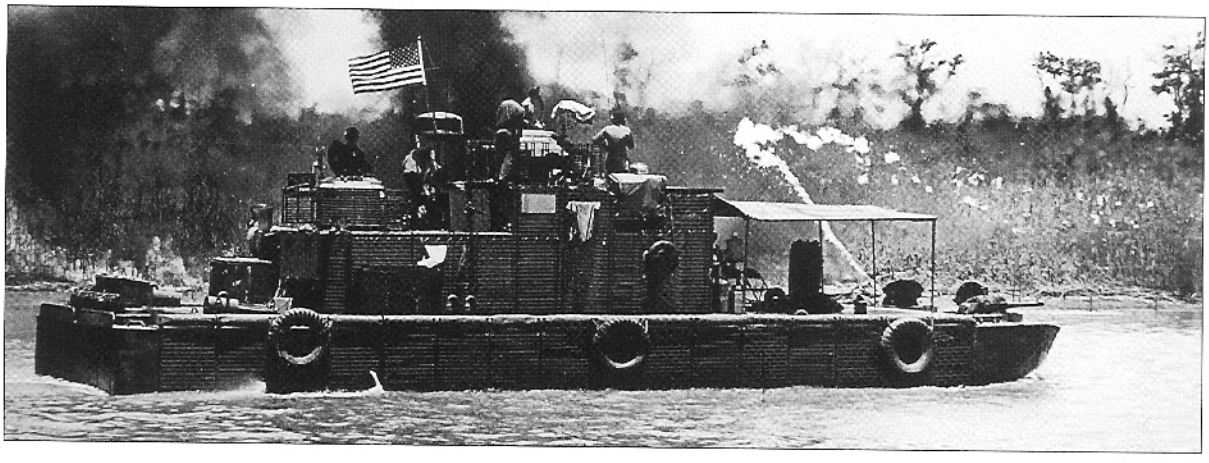
The 2d Brigade, 9th Infantry Division, consisted of three infantry battalions with a headquarters company, combat support company, and three rifle companies. Unneeded vehicles and equipment were stored at Dong Tam. Some support personnel were used to form two additional rifle platoons, and with the existing scout platoon from the former combat support company, provided a fourth rifle company. This provided a company for base security and still allowed three rifle companies to be committed to operations.

2D BRIGADE, 9TH INFANTRY DIVISION, 1966–69

HQ & HQ Company, 2d Brigade, 9th Infantry Division
2d Battalion, 47th Infantry
4th Battalion, 47th Infantry
3d Battalion, 60th Infantry
3d Battalion (105mm Howitzer), 34th Artillery
Company C, 15th Engineer Combat Battalion

The ground troops[5] transported and supported by riverine craft spent much of their time merely as passengers. When ambushed, though, they would return fire with their own weapons and prepare to debark. When engaged, the riverine force might fight its way through the ambush and continue on its primary mission; the ambush was most likely a delaying tactic. It might disembark a small element to engage and pursue the ambushers, or units might be landed to the flanks in an effort to entrap the ambushers. A helicopter-delivered reaction force might be inserted to cut off the withdrawing ambushers.

5 See Osprey Warrior 98, *US Army Infantryman in Vietnam 1965–73*.



A Program 5 Zippo flames the shoreline to burn off concealment. Flamethrower fuel was a mixture of gasoline and napalm powder to make a thickened fuel, increasing its range and allowing it to burn longer.

Typically, the ground force would be landed in a specific area where intelligence had identified enemy activity. They would sweep through the area, often with blocking forces inserted from parallel streams and/or by helicopter. If the sweep turned up nothing, combat patrols might be conducted through the area and ambushes established at night on trails and waterways. The ground force might be withdrawn the same day it was inserted, or remain in the area for up to three days. Immersion foot became a problem from that point. One of the three battalions would remain at the floating base to dry out and operations were rotated.

SURVIVING RIVERINE AND PATROL CRAFT

Of the hundreds of riverine and patrol craft built, few remain today. Most were left in Vietnam and have been scrapped, as were most of those retained in the USA in training, operational, and reserve units. Insofar as can be determined, no PBR Mk 1s or ASPBs survive. PBR Mk 2s are exhibited at:

New Jersey Naval Museum, USS *Ling* Submarine Memorial Association, Hackensack
USS *Alabama* Battleship Commission, Mobile, Alabama
National Vietnam War Memorial Museum, Orlando, Florida
Mare Island Historical Park Association, Vallejo, California
Naval Amphibious Base, Coronado, California

The PBR at Coronado commemorates Task Force 116. Also on display are PCF-104 (Mk 1) honoring Task Force 115, and CCB-18 commemorating Task Force 117. CCB-18 is a Program 5 version assigned to a reserve unit at Mare Island and never saw Vietnam service. No ATCs or other variants remain. One other PCF Mk 1 is on display at Navy Yard, Washington, DC. Three or four former PCF Mk 1s are said to have been converted to civilian use. One of these, PCF-2, is now the research vessel *Matthew F. Maury* operated by Tidewater Community College, Norfolk, Virginia.

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9th Infantry Division e-Association
http://9thinfantrydivision.bravepages.com/

9th Infantry Octifoil Division Association
http://www.oldreliable.org/

River Vet
http://www.rivervet.com

Mobile Riverine Force Association
http://www.mrfa.org/

PBR Forces Veterans Association
http://www.pbr-fva.org/

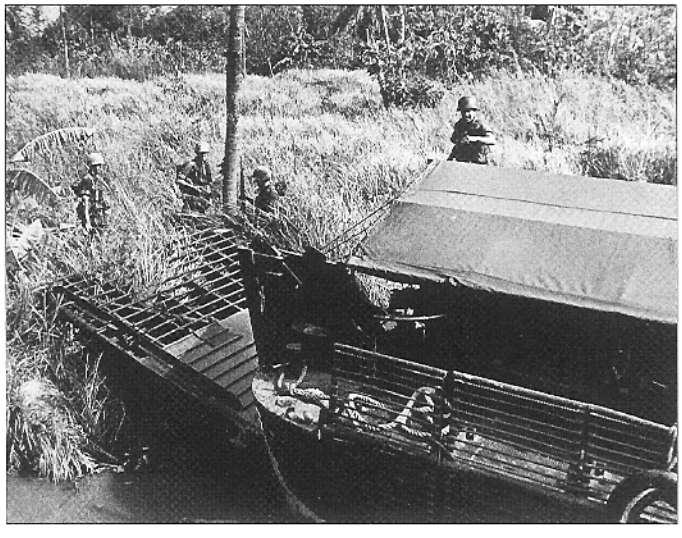
Swift Boat Sailor's Association
http://www.swiftboats.org/

Gamewardens of Vietnam Association
http://www.tf116.org/index.html

Mobile Riverine Force
http://www.riverinesailor.com/

Warboats of America
http://warboats.org/

Infantrymen provide security as the platoon moves inland for a sweep. This armored LCM(6) was a loaned Vietnamese Navy riverine craft on which RAS 9 conducted its initial in-country training and first operations.



COLOR PLATE COMMENTARY

A: PATROL BOATS, RIVER (PBR)

These PBRs are depicted with the cockpit canopy attached in both the side view and the overhead view. The 31ft (9.5m) PBR Mk 1 (**A1**) is armed with twin .50-cal. M2 machine guns on the Mk 36 scarf-ring mount, a 40mm Mk 18 grenade launcher on the starboard amidships engine compartment shield, and a .50-cal. on the fantail on a Mk 26 tripod. Some units applied the US white star on the forecastle rather than on the canopy as was more common. In this instance the hull number is marked on the forepeak access hatch. The 32ft (9.75m) PBR Mk 2 (**A2**) has its twin .50-cal. machine guns on the Mk 46 mount, a Mk 18 grenade launcher on the port side, a 7.62mm M60 machine gun on the starboard side of the amidships shield, and a .50-cal. aft. The Mk 1 and 2 can be diferentiated by the Mk 2's larger and higher cockpit fairing and the wider separation of the forward machine guns. National identification was important to prevent friendly air attack. The US star (**A4**) was commonly marked on the cockpit canopy, while Vietnamese Navy craft applied a yellow rectangle with a red cross (**A3**). Likewise, national flags were flown for surface identification. Boats were often required to extract small reconaissance teams such as SEALs and long-range reconaissance patrols (LRRPs). The high bow made it difficult to board, so nylon webbing cargo nets (**A5**) were secured to assist heavily burdened troops.

B: ASSAULT SUPPORT PATROL BOATS (ASPB)

The 37 early ASPBs (**B1**) had a fantail cockpit in which an 81mm Mk 2 Mod 1 mortar was mounted. One or two .50-cal. machine guns might be mounted on the sides of the cockpit similar to those seen on B2. The forward Mk 48 Mod 2 turret mounts two .50-cal. machine guns. The top Mk 48 Mod 0 turret mounted a 20mm cannon. Both turrets could also mount a 40mm Mk 19 grenade launcher. Most of the 50 Program 5 ASPBs (**B2**) had a decked-over fantail and the mortar was removed. Two .50-cal. machine guns on Mk 26 tripods may have been mounted on the fantail. The forward turret was relocated closer to the bow and a large access hatch may have been fitted between the turret and deckhouse. Turret armament was sometimes switched between the two turrets. Here, though, the forward turret is a Mk 48 Mod 4 with a .50-cal. machine gun and a four-tube 3.5-in. Mk 47 rocket launcher fitted on either side. Hull numbers were normally white, with the "A" indicting an ASPB or "Alpha boat," a two- or three-digit number for the RAD, and a single digit designating the ASPB within the RAD. The Mk 48 Mod 0 turret (**B3**) mounts a 20mm Mk 16 cannon and a 40mm Mk 19 Mod 0 grenade launcher.

Only two PCF Mk 1s are on public display. This is PCF-1, used during the Vietnam War as a training boat, now on display at Navy Yard, Washington, DC.

C: PATROL CRAFT, FAST/INSHORE (PCF)

The Patrol Boat, Fast or Patrol Boat Inshore (from August 1967) was better known as the Swift Boat. The most widely used was the PCF Mk 1 (**C1**) of which 84 were deployed to Vietnam. This mounts the standard armament of twin .50-cal. M2 machine guns on a Mk 17 scarf-ring mount, and an 81mm Mk 2 Mod 1 mortar with a .50-cal. machine gun. This early PCF still bears the haze gray ocean color, but all were soon painted olive drab, as the light gray was detectable at night. Hull numbers were white (seldom highlighted in black) and numbered in sequence through all PCF series. The number did not indicate the assigned unit. Only three PCF Mk 2s (**C2**) and five externally similar Mk 3s served in Vietnam. Accommodation was much improved over the Mk 1. Armament remained the same, other than the topside twin .50-cals which were on a Mk 56 mount. The lid of the 81mm ammunition locker was painted white with the hull number in black. "PCF" and the hull number were painted in white on the boat's stern.

D: SWIFT BOAT (PCF) MK 1

Given its 50ft (15m) length, the PCF Mk 1 provided its six-man crew with adequate, if Spartan, accommodation. Four bunks and the head were in the forward crew compartment. The pilothouse was the duty station for the boat captain and coxswain. The gunner manned the twin .50-cals in the topside tub. The radioman's position was in the aft deckhouse compartment, where two more bunks were located on the port side, with the compact galley on the starboard. The engineman and a seaman manned the 81mm mortar.

E: ARMORED TROOP CARRIERS (ATC)

The Armored Troop Carrier or "Tango boat" was the most widely used of the riverine craft. Its spacious troop compartment allowed it to be used for other purposes, including water cannon-armed Douche boats, refuelers, and simply hauling ammunition and supplies. The Program 4 ATC (**E1**) of 1966 was armed with a formidable array of weapons including a 20mm cannon and two .50-cal. machine guns in turrets, two 7.62mm machine guns in the wheelhouse and two more on the troop compartment gunwales along with two 40mm automatic grenade launchers. The machine guns and grenade launchers were not always mounted. ATC hull numbers might be white or black on the bow and stern, preceded by a "T," followed by the RAD's two- or three-digit number and the boat's number within the division. The canopy star was often reversed on later boats. The 1968 Program 5 ATC (**E2**) was outwardly similar to the Program 4, but there were numerous internal improvements and armament changes. Over three-quarters of the new ATCs had helicopter decks – RAS 13's RAD 131 had 13 without, and RAD 132 had 13 with. All 26 of RAS 15's ATCs had helio decks. Armament was much increased, to two 20mm cannons and a 40mm grenade launcher in turrets, as well as a .50-cal. and two 7.62mm machine guns on both sides of the troop compartment. Helio decks, including those retrofitted to some early ATC aid boats, were marked by a red cross.

F: MONITORS (MON)

The MRF's heavy firepower was provided by the Monitor. The Program 4 Monitor (**F1**) mounted a 40mm Mk 3 cannon in the forward turret, weighing 3,148lb (1,428kg) without the gun, and was mounted along with a .50-cal. machine gun for ranging. An 81mm direct-fire mortar was in the amidships well deck, and the deckhouse armament was the same as the Program 4 ATC's. A few Monitors were fitted with two flame gun cupolas just abaft the 40mm turret. The armament and deckhouse design of the Program 5 Monitor (**F2**) were very different. The main armament was a turreted 105mm howitzer, and two Mk 48 turrets with 20mm cannons were atop the smaller deckhouse with .50-cal. machine guns on the sides. The 81mm was omitted. A .50-cal. was sometimes mounted atop the 105mm turret. Four of the ten new Program 5 Monitors (**F3**) substituted two M10-8 flame guns in M8 cupolas for the 105mm to become Zippo boats. Monitors were identified by an "M" hull number and flame boats by a "Z."

G: COMMAND AND CONTROL BOATS (CCB) AND MINESWEEPER, RIVER (MSM)

Program 4 CCB Charlie boats (**G1**) were modified Monitors which were still capable of providing significant fire support by retaining the 40mm cannon and standard deckhouse weapons. The well deck for the deleted 81mm mortar was converted to a Tactical Operations Center (TOC) for a small Army staff and extra radios. This was covered by a steel-sided, canopy-topped housing. The Program 5 CCB (**G2**) was also based on its Monitor counterpart, but it lacked the forward 105mm howitzer turret, which was replaced by a 20mm cannon-armed Mk 48 Mod 0 turret as found on the deckhouse of both the Program 5 CCB and Monitor. The larger, flat-topped TOC housing was air-conditioned. CCBs were identified by a "C" hull number. The Minesweeper, River (MSM) (formerly Landing Craft, Mechanized, Mine – LCMM) (**G3**) was a modified LCM(6) with an enlarged bar-armored wheelhouse, side-mounted amidships Mk 51 turrets with 20mm cannons, and a shield-protected .50-cal. on the sealed bow ramp. The ramp was cut down to gunwale level to improve the helmsman's view. Two davits were provided with two mounting brackets mounted on the stern and amidships on both sides in the well deck. The davits could be shipped to where needed for Type O Size 5 (5ft 6in./1.7m) minesweep floats, which were stowed on racks in the well deck.

ABOVE **An Army CH-54 Tarhe, better known as a "Skycrane," prepares to lift a grounded PBR Mk 2. Skycranes were also used to transfer PBRs from one waterway to another. The canopy was removed and the radar mast taken down when airlifted.**

BELOW **An Army UH-1H Huey helicopter settles aboard R-92-1, a refueler retrofitted with a helicopter landing deck. The radio antennae had to be taken down for a chopper to land.**

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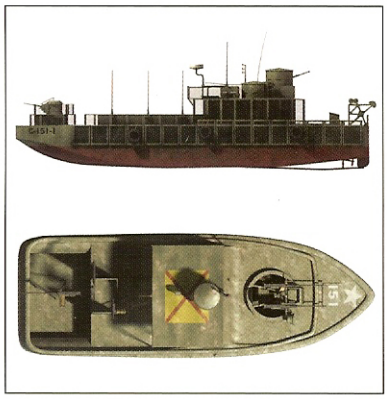

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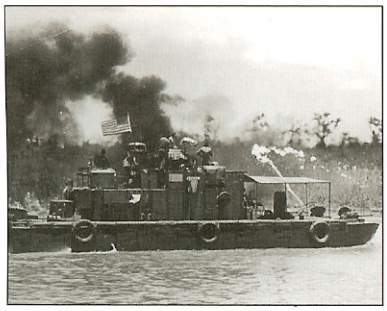

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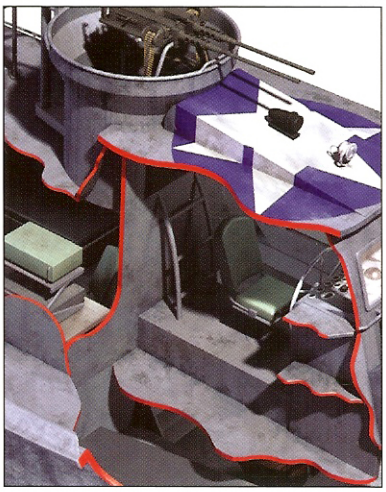

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In 1965 the military situation in the Mekong River Delta of southern Vietnam had deteriorated to such a degree that the decision was made to commit a joint US Army and Navy Mobile Riverine Force to the area. This force was unique in its composition, mission, and the means by which it operated – riverine craft. A variety of watercraft were deployed, including heavily modified landing craft, purpose-built patrol boats, and a whole host of auxiliary and support craft. This book explores those craft in detail and offers an insight into their performance in combat.

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