

SADLER AIRCRAFT CORPORATION

PRESENTS THE

SADLER PIRANHA



LIGHT ATTACK and SURVEILLANCE AIRCRAFT

LOW COST AIRBORNE
WEAPONS AND SENSOR PLATFORM
FOR
LIMITED CONFLICT



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SADLER PIRANHA

SUMMARY

This document describes a small, low cost aircraft system that has been designed specifically to provide low cost air-to-ground firepower and surveillance support in many armed conflict situations.

The design and operation of this aircraft has been kept simple to allow pilots and support crew to be taken from the ranks of local military personnel.

A sound and simple support and maintenance system is used to guarantee that aircraft in inventory have the maximum utilization factors at the lowest possible total cost of operation.

True military performance is available with this aircraft type, with a light weight but strong airframe and high power engine system, giving power-to-weight ratios higher than many military aircraft types.

Mission accomplishment and survivability are important factors that have been optimized in the aircraft design.

The SADLER PIRANHA has been designed to carry the link-feed version of the Boeing Apache Helicopter M230 30mm cannon firing at 200 rounds per minute, including capacity for carrying up to 300 rounds of ammunition.

A wide range of rack-mounted ordnance loads can be carried, using standard NATO 14-inch hard point mounts.

The very low total system cost permits large numbers of these aircraft to be utilized, providing dominance in this segment of battle.

Quantity production deliveries are available within a short turnaround time.

THE SADLER PIRANHA



PIRANHA TAXIING OUT FOR FIRST FLIGHT, APRIL 1997



PIRANHA DEMO FLIGHT TO TURKISH ARMY GENERAL STAFF, MAY 1998

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SECTION 1: TECHNICAL DESCRIPTION, SADLER PIRANHA

Sadler Aircraft's approach to solving the problem of providing a low cost, effective airborne ordnance delivery system is based on the design of a mission-specific aircraft that has been optimized for this task. The SADLER PIRANHA is shown in figure 1-1.



FIGURE 1-1: SADLER PIRANHA

1.1 DESIGN FEATURES OF THE SADLER PIRANHA

COST -A major design philosophy of the PIRANHA is the requirement to effectively deliver airborne firepower and provide a surveillance platform in the low level conflict setting at the lowest possible total cost. This low cost has been carried through the entire acquisition, training, maintenance and operation phases.

PORTABILITY - The PIRANHA is designed to be road portable, using a standard truck or small trailer. This allows the aircraft to be carried along with the patrol or unit it will support. The simple wing-fold system does not require any control system disconnects.



FIGURE 1-2: PIRANHA WING-FOLD SYSTEM

STOL - Short Takeoff and Landing allows the PIRANHA to be deployed from a small field or short stretch of road. Its rugged landing gear is designed for rough terrain.

SURVIVABILITY - The PIRANHA has been designed for maximum survivability within the constraints of its design type. Its small size makes it difficult to see at moderate ranges. Its high agility contributes significantly to its survivability. Ballistic protection can be provided in the composite fuselage pod to protect the pilot, power system and a reserve fuel supply from small arms fire. Most control systems are redundant. A ballistic parachute is available that can lower the entire aircraft and pilot to the ground if it is heavily damaged. The 4Km standoff range of the M230LF 30mm cannon outreaches most ground fire and greatly enhances aircraft survivability.

MAINTAINABILITY - The PIRANHA uses the simplest construction with standard aircraft aluminum for its main structure and skins. Service can be performed in the field using its Line Replaceable Unit (LRU) capability. High skills are not required for service.

TRAINING - A two-place trainer derivative of the PIRANHA is available that uses the same airframe with a two-place side-by-side pod. Both the Single place and two place versions are easy to fly and do not require academy graduate skills to pilot. Training from ground school to skill levels suitable for most missions can be accomplished in less than 100 hours.

FUEL AND OIL - Ordinary auto gasoline and oil can be used for the PIRANHA. Supplies can be procured from the nearest automotive filling station.

SIMPLE & RUGGED - The PIRANHA has been designed for misuse and mishandling by inexperienced personnel. It is simple, tough and rugged - like a "jeep of the air".

ORDNANCE LOAD - The PIRANHA can normally carry 500 pounds of ordnance in addition to the pilot and fuel (or up to 1000 pounds with reduced performance) in the form of machine guns, hard point-mounted rockets, bombs, etc., or the optional MDHC M230LF 30mm automatic cannon.

1.2 PHYSICAL CHARACTERISTICS

The SADLER PIRANHA has been designed as the smallest possible aircraft that can still fulfill its intended mission. The pilot's cockpit area has been made just large enough to comfortably house the pilot, necessary flight instruments, armaments controls, sensor control systems, and radios for the mission. All unnecessary size, weight, and therefore cost has been eliminated.

SADLER PIRANHA PHYSICAL CHARACTERISTICS:

Wingspan	22 ft (6.7M)
Wing Chord (constant)	4 ft 2 in (1.27M)
Length	18 ft (5.19M)
Height	3 ft 9 in (1.14M)
Empty Weight	1450 lb (658 Kg)
Maximum Gross Weight	2800 lb (1270 Kg)
Engine Power	450 HP (336 kW) at 6000 RPM

1.3 SADLER PIRANHA ENGINE

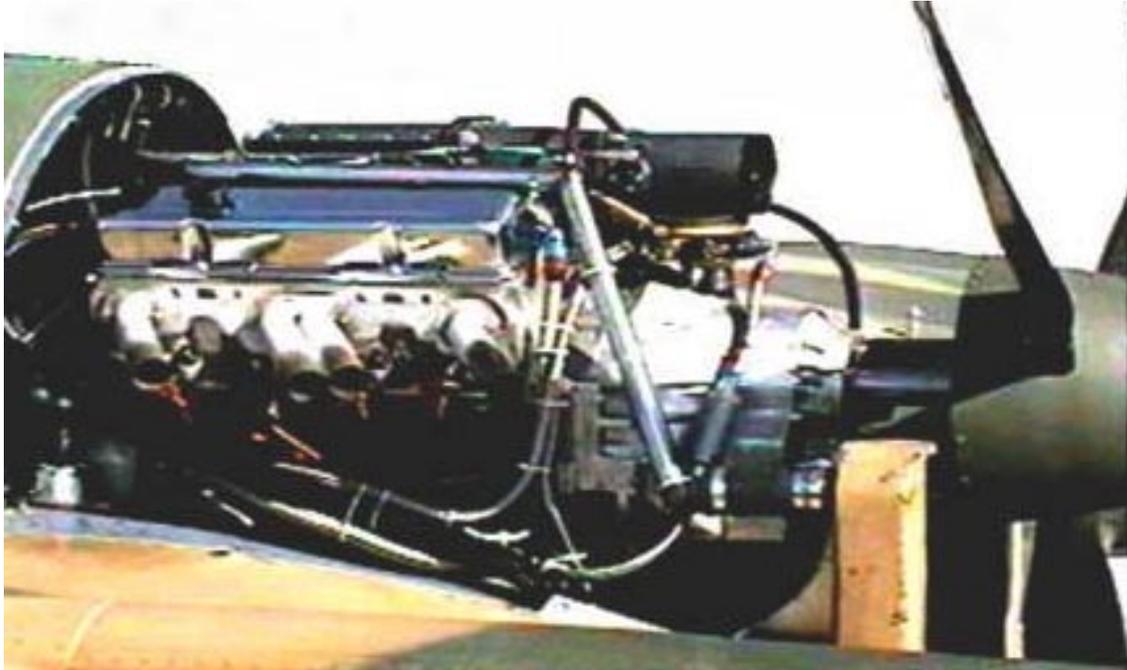


FIGURE 1-3: PIRANHA ENGINE AND DRIVE SYSTEM

The engine system for the PIRANHA was engineered to provide the following features:

1. Reasonably low initial cost
2. Low stress and high reliability
3. High power, and high power-to-weight ratio
4. Ease of maintainability by local personnel
5. Line Replaceable Unit (LRU) capability
6. Capability of using regular automobile fuel
7. High service life to maintenance ratio
8. No carburetor ice considerations
9. Multiple sources for all component parts

The 5.7 L V-8 water cooled aluminum block engine is based on the proven Chevrolet automobile engine design. The parts used in the engine are special high performance units designed primarily for continuous duty at high rpm for professional racing. The fuel induction system is a mechanical constant-flow port fuel injection system designed for aircraft use. These parts are stressed to only a fraction of their capability at the 6000 normal rpm of the PIRANHA. The engine produces 450 horsepower at 6000 RPM.

1.4 REDUCTION DRIVE AND PROPELLER

The reduction drive system for the PIRANHA, also shown in figure 1-3, is a proven oil bath gear reduction unit. A ratio of 1.7 to 1 is used to reduce the engine RPM range to that suitable for the propeller. The propeller used variable-pitch 3-blade carbon fiber unit of 60 inches (152 cm) diameter. This multi-bladed variable-pitch prop can satisfy the special requirements of low noise and increased thrust over the wide speed range.

1.5 PIRANHA PERFORMANCE

The PIRANHA has a weight-to-power ratio ranging from 4.0 pounds/horsepower with pilot and fuel, 5.0 lb/hp at mid-ordnance weight of 500 lbs and 6.5 lb/hp at maximum ordnance weight of 1000 lbs. This is better than the OV-10 Bronco that has a 9.7 lb/hp ratio at its maximum gross weight.

Climb rates at sea level are up to 4000 feet/minute with pilot and fuel, 2500 ft/min at 500 lb ordnance load and 1500 ft/min at 1000 lb ordnance load. Takeoff ground roll is as low as 350 ft. with pilot and fuel, 500 ft with 500 lb ordnance load and 800 ft with 1000 lb ordnance load.

Maximum level speeds are approximately 285 mph (457 Km/hr) with pilot and fuel, 230 mph (370 Km/hr) with two external hard points loaded and 200 mph (322 Km/hr) with four external hard points loaded. Maximum dive speed is approximately 325 mph (523 Km/hr).

Range with standard fuel is approximately 690 miles (1110 Km). On-station loiter time at reduced power setting is up to 5 hours. Safe loiter speeds are between 65-75 mph (105-121 Km/hr) depending on payload weight. Additional fuel for increased loiter time can be provided in exchange for reduced ordnance load. Limit G loads are 8 with pilot and fuel, 5 with 500 lb ordnance load and 4 with 1000 lb ordnance load.

1.6 ELECTRICAL, COMMUNICATION & NAVIGATION SYSTEMS

A 1000 watt 28 volt electrical generating system is installed on the Piranha. This system has sufficient capacity to operate all ordnance systems, most sensor systems, radios, aircraft lights and electrical systems.

A basic airborne navigation system can be installed when travel from a forward operating base to the point of action is required. Communication systems can be installed to talk directly with ground troops and air traffic control. Additional downlink data and telemetry transmitters can be installed for sending data received by airborne sensors.

SECTION 2: PIRANHA ORDNANCE CAPABILITY

The PIRANHA will normally carry up to 500 pounds (227 Kg) total weight of various ordnance and sensor loads. Up to 1000 pounds (454 Kg) total loads can be carried with tradeoffs of reduced fuel load and aircraft performance.

2.1 MCDONNELL DOUGLAS M230LF CANNON INSTALLATION

The PIRANHA aircraft has been structurally designed to accept the installation of the McDonnell Douglas/Boeing (MDHC) M230LF 30mm cannon. In a cooperative venture with MDHC, the PIRANHA has been strengthened where necessary to accept the peak and average recoil forces of this gun. Space has been provided at the aircraft center of gravity to carry up to 300 rounds of 30mm shells for the gun.

**30mm
M230LF**



**AUTOMATIC
CANNON**



THE MDHC M230LF AUTOMATIC CANNON is the same gun that is fitted under the nose of the Apache helicopter, but has been modified to use simplified link feed rounds instead of the complex linkless feed system used in the helicopter installation. The linked shells are stored on a circular drum holding up to 300 rounds in the PIRANHA to provide reliable feed under all aircraft attitudes. The gun has the externally powered motor driven firing action of the popular MDHC chain gun family of guns. This action can fire single rounds or continuous fire up to 200 rounds per minute.

The MDHC 30mm cannon represents the latest technology for this class of weapon as fitted to light aircraft and helicopters. The gun installed weight is approximately 160 pounds (73 Kg) with the longer 60 inch barrel. The peak recoil for each round is less than 2000 pounds (909 Kg) and the average recoil at the maximum firing rate is less than 200 pounds (90 Kg). These loads are well within the capability of the PIRANHA structure and flight characteristics.

The M230LF gun is mounted on the right side of the PIRANHA aircraft at the high strength junction of the main wing spar, tail boom, motor mount and landing gear. The concentration of strength at this point is several times stronger than that required by the gun reactions. A special guide plate extends below the wing to guide the spent casings and clips past the rear-mounted propeller. Torque moments on the aircraft produced by the gun average recoil are relatively small and easily corrected by small movements of the aircraft's control surfaces.

The lightweight, aluminum cased, medium recoil 30mm ammunition includes three types of rounds: M 789 High Explosive Dual Purpose (HEDP), M 799 High Explosive Incendiary (HEI) and M 788 Target Practice (TP). The gun is also interoperable with the English ADEN and French DEFA 30mm rounds that can be found in the inventory of 37 countries around the world.

The M230LF firing M 789 HEDP rounds provides an order of magnitude improvement in firepower over .50 caliber and 20mm weapons. Due to the ammunition's shaped charge design,

the armor penetration of up to 4 inches (10cm) is independent of range. The M 789 round has demonstrated outstanding capabilities out to 4,000 meters. In addition, it has a lethality radius of 23 square meters when engaging personnel in the open. With this multi-mission capability, the M 789 enhances survivability by providing a longer and safer standoff range than comparable combat support weapons.

The M 799 HEI round is ballistically matched to the M 789 and has demonstrated live explosive firings out to 2,000 meters. Terminal Ballistic Tests against armored personnel carriers have exhibited excellent after-armor results. Similarly, tests against soft truck targets, aircraft structures, and reinforced brick wall bunkers have displayed the same excellent effects.

A typical installation of the M230 gun on the PIRANHA consists of the gun and mounting system, electronics control system and cables, and ammunition drum and feed guides. With 200 rounds of ammunition, the total installed weight is approximately 390 pounds (177 Kg). The 200 rounds are adequate for most typical short range missions of the PIRANHA. This leaves more than 100 pounds (45 Kg) available for additional forms of ordnance if needed and still remain within the optimum performance 500 pound (227 Kg) ordnance load limit of the PIRANHA.

2.2 HARD-POINT MOUNTS

Normally, two standard NATO 14 inch hard points can be installed on inner wing stations on the PIRANHA aircraft. Without the M230LF cannon installation, they are capable of carrying up to 500 pounds (227 Kg) of ordnance. For heavier loads, such as free fall bombs, etc., and additional two hard points can be fitted on outboard wing stations. At total of 1000 pounds (454 Kg) of ordnance loads can be carried on these four hard points with reduced aircraft performance.

2.3 7.62mm MACHINE GUN INSTALLATION

7.62 mm machine guns of the M60 type can be installed on the leading edge of each wing just inboard of the wing fold point on each side of the pilot's pod. Ammunition storage is in each wing forward of the main wing spar. Provision is made for catching spent casings to prevent them from going into the rear propeller. Because of the short mission time of the PIRANHA, 500 to 1000 total rounds would normally be carried. The 7.62 machine gun installation can be supplied in a custom inner wing assembly that can be interchanged and replace the normal inner wing assembly.

2.4 2.75 INCH (70 mm) ROCKET INSTALLATION

A very effective hard-point mounted ordnance for the PIRANHA are 70mm rockets carried in 7-shot rocket launching pods. These rockets, and other similar rockets, provide heavy firepower to ground targets at reasonable aircraft standoff ranges. A typical installation would have two 7-shot rocket pods mounted on the two inner wing-mounted hardpoints, still allowing for excellent aircraft flight performance.

The total system includes fourteen MK66 rocket motors with warheads, two 7-tube Universal Launchers, and an Armament Management System, plus wiring and connectors. The total installed system weight with rockets, ready to fire, is approximately 425 pounds. This is an ideal ordnance load weight for the PIRANHA, providing high firepower with high aircraft performance. MK4 or MK40 rockets can also be used.

2.5 OTHER HARD POINT MOUNTED ORDNANCE

The PIRANHA can carry most standard rack-mounted ordnance, as long as the ordnance weight is within the limits specified. Examples of ordnance that can be carried are: LAU-32 Rocket Pods, SUU-11 7.62mm Minigun Pod, MK81 General Purpose Low Drag Bombs, XM13 Grenade Launcher, MK122 Fireeye Fire Bombs, etc.

2.6 SADLER PIRANHA PERFORMANCE VERSUS ORDNANCE LOAD

The PIRANHA normally carries up to 500 pounds (227 kG) total weight of various ordnance and sensor loads. Tradeoffs can be made with higher total loads and reduced aircraft performance, as shown in table 2-1.

TOTAL ORDNANCE LOAD, POUNDS:	0	500	1000
TAKEOFF ROLL, FEET:	350	500	800
RATE OF CLIMB, FT/MINUTE:	4000	2500	1500
MAXIMUM SPEED, MILES/HOUR:	285	230	200
MINIMUM LOITER SPEED, M/H:	64	68	75
LANDING ROLL, FEET:	600	875	950

TABLE 2-1

2.7 ORDNANCE AIMING AND ACTIVATION

ORDNANCE AIMING

Ordnance boresight aiming is by the use of a simple optical compensating gun sight system. This standard gun sight is focussed at infinity and can be adjusted for pilot height and elevation angle.

ORDNANCE CONTROL PANEL

An ordnance control panel can be installed in the cockpit that allows for selection of ordnance to be fired, such as machine guns and/or hard-point stores. Selection is provided for the firing or dropping of rack-mounted ordnance as desired. A guarded arming system and a mechanical override release system is used.

SECTION 3: SADLER PIRANHA SURVIVABILITY

3.1 PIRANHA COUNTERFIRE SURVIVABILITY FACTORS

The PIRANHA has the capability of providing excellent protection against return small arms fire. The Kevlar/glass composite pod can optionally be reinforced with additional Kevlar material to absorb the energy from small arms hits, in the same way as a military personnel flack jacket. Similarly, a thicker lexan windshield can be used to deflect return fire as does a riot police shield made of the same material.

Should sufficient damage be done to the rest of the plane to destroy its flying ability, a ballistically deployed parachute is optionally available that can lower the entire plane to the ground safely. Ballistic parachutes of this type are currently available for aircraft of this weight and speed. Because of its rocket deployment, the ballistic parachute is effective a quite low altitudes.

Protection against in-flight fire is obtained by the use of a centrally operated Halon fire extinguisher system. This can suppress most fires generated in the engine compartment. Because of the rear engine configuration, most fire and smoke will not reach the pilot. The aircraft can be controlled safely up to the point when major structural damage occurs from the fire, usually in time for a safe emergency landing. In the event that pilot bailout is required, immediate propeller stoppage is achieved by switching the engine off at full throttle, so that engine compression can load the propeller to stop.

Mission survivability is enhanced by the construction nature of the PIRANHA. The plane can be flown controllably with the entire rudder or aileron system disabled. The dual boom tubes retain sufficient structural strength with one boom tube almost completely severed. The method of control system connection uses push-pull cables in wound steel jackets that are highly resistant to damage from small arms fire. These are doubled up in the elevator control system so that partial damage will not result in control loss.

One of the most important survivability factors results from the use of the McDonnell Douglas M230LF 30mm cannon or equivalent long range standoff firepower. This weapon has a maximum range of 4000 yards and is accurate enough at 3000 yards to provide almost total area suppression of return fire. At this range, most return fire from the ground is ineffective.

3.2 SURVIVABILITY ANALYSIS

A preliminary Survivability Analysis of the PIRANHA has been performed by computer simulation and examination by experienced personnel, with the following comments:

3.3 THREAT DESCRIPTION

The PIRANHA's mission is to provide indirect fire support for Counter Insurgency, Special Operations, Low Intensity Conflict, and Anti-Drug Operations. In most of these situations, the aircraft can be expected to encounter small arms, 30/50 caliber AAA guns, and MAN-Portable Air Defense Systems (MANPADS), such as the SA-7/14 or even the U.S. Stinger. Afghanistan is a relevant example of the lethality of these cheap but effective air defense systems. The PIRANHA may also encounter helicopters armed with IR air-to-air missiles.

3.4 EXPECTED SURVIVABILITY

Survivability is a function of susceptibility - the degree with which the vehicle can avoid an engagement (missile launch or AAA fire), and vulnerability - the ability of the vehicle to withstand an engagement given a missile or AAA firing.

Aircraft factors affecting susceptibility include: signatures (Radio Frequency, Visual, Infrared, and Acoustic), speed, altitude, and maneuverability. Susceptibility reduction versus the expected threats is designed into the PIRANHA:

- * The PIRANHA's small size increases the difficulty to visually acquire and engage it.
- * The expected low IR signatures reduce its susceptibility to MANPADS. The IR signature can be reduced even more by routing the exhaust through the tail booms and adding an air dilution system.
- * Exhaust baffling and a wide chord, low speed variable pitch propeller can enhance the aircraft's acoustic signature, increasing surprise and reducing threat reaction time.
- * The PIRANHA's agility, relatively low speed, and good visibility allows for Nap Of the Earth (NOE) tactics, reducing its exposure to all threats.
- * The range of the MDHC M230LF cannon (when fitted) will allow the PIRANHA to engage targets outside the effective range of small arms fire.
- * When Appropriate, the PIRANHA can use its high rate-of-climb to quickly get above the effective altitude (1500 feet) of small arms.

Factors affecting physical vulnerability include: vulnerable area (engine, fuel, controls and pilot), maneuverability, and countermeasures (flares). Here too, the PIRANHA has designed-in features to improve survivability in those cases where it is susceptible:

- * The PIRANHA's engine, pilot, and critical components (fuel, oil and cooling systems, electrical, etc.) are all contained within the optionally available ballistic protected fuselage pod.
- * Flight controls have large control surfaces and redundant control cables.
- * Available acceleration in all flight regimes has the potential to induce large missile miss distances.
- * If necessary, there is sufficient space on the aircraft to install a simple flare dispenser system.
- * The ballistically deployable parachute can lower the entire aircraft safely to the ground, ensuring that the pilot, and in many cases the aircraft, will survive to fly another day.

SECTION 4: TYPICAL MISSION

4.1 FIELD DEPLOYMENT

The PIRANHA has the capability of being deployed in the field, along with the fighting unit it will support. It can be transported along ordinary roads inside a military truck or custom trailer. Importantly, the trucks carrying these aircraft can be enclosed or fully covered with a tarpaulin, completely hiding the aircraft from casual view by unauthorized personnel.

Set-up of the PIRANHA from its folded position can be done by a single person in less than ten minutes. No loose parts are required for the plane's assembly, preventing the loss of critical parts when the aircraft is needed most. Aileron and flap controls are permanently connected during folding and are ready for flight immediately. Takeoffs and landings can be made from the roadway, or a nearby field. The short takeoff distance allows takeoffs and landings in confined places.

4.2 OPERATIONAL FIELD SUPPORT

A small service truck van can support several PIRANHA aircraft. This vehicle can be equipped with fuel, emergency spares, and ordnance supplies for its aircraft. This service vehicle is manned by a single support technician, whose job it is to keep his aircraft flying and equipped. This field service capability is described in more detail in the next section.

4.3 FORWARD OPERATING BASE DEPLOYMENT

In some situations where distances are not great, a more efficient use of the PIRANHA resources can be achieved by deploying many aircraft from a single forward operating base. The PIRANHA can remain on standby, ready for action, fully armed and ready for flight. Extra fuel tankage can be provided for allow for the greater flight distances involved. The PIRANHA's relatively high speed capability compared to other small aircraft reduces the flight time from the forward operating base to the point of action.

4.4 PIRANHA LOITER CAPABILITY

The PIRANHA has excellent specific fuel consumption at part and low throttle settings. At relatively light ordnance loads the plane can remain airborne at very low horsepower settings. Fuel burn rates of less than 7 gallons (26 liters) per hour are possible at loiter.

With a normal fuel load of 50 gallons, loiter times of up to 7 hours are possible. This capability can be used for patrolling a sector, or standing by for a call from the ground troops for support. This loiter capability retains control of the local airspace and has the effect of inhibiting many types of offensive ground actions by the enemy.

4.5 SADLER PIRANHA MISSION SPECTRUM

The PIRANHA is designed to fit into missions that are between those of a helicopter and those of a turboprop airplane, as shown in fig. 4-1. Missions ideal for the PIRANHA include small military actions, counter insurgency activities, border patrol and interdiction, and counter narcotic activities.



FIGURE 4-1: SADLER PIRANHA MISSION SPECTRUM

SECTION 5: PRODUCT SUPPORT AND MAINTENANCE

5.1 LINE REPLACEABLE UNIT SYSTEM

All of the sub-assemblies used on the PIRANHA are of the line replaceable unit (LRU) type. Subassemblies can be removed quickly for field replacement and later repair at the depot level. This provides for speedy field replacement of defective units by semi-skilled personnel. All field replaceable sub-assemblies of the PIRANHA are interchangeable. Spare parts, such as wings and landing gear, can be taken from a disabled plane to repair a currently active plane.

5.2 FIELD SERVICE VEHICLE

A maintenance/operations trailer or van is available that provides for full field logistics support and maintenance for several PIRANHA aircraft. This vehicle is staffed by a trained technician with the task of keeping his PIRANHAS flying. This technician has a supply of spare parts of the Line Replaceable Unit (LRU) class, along with the specialized knowledge and tools to make most repairs.

Many field repairs of damage can be made because of the simple construction of the PIRANHA. For example wing skin repairs can be made using simple sheet metal tools and an easy to use pop-riveting fastening system. A portable crane, mounted on this service vehicle, is available to lift heavy parts such as engines for LRU replacement.

5.3 DEPOT MAINTENANCE

The field support vehicle is backed up by a depot maintenance system. This depot carries a larger inventory of spare parts and has the capability of overhaul of each LRU item to return it to service at the field service vehicle level. Training of depot and field service personnel can be done during the production phase of the aircraft at the Sadler factory. Alternatively, factory trained technicians can be provided to support PIRANHA aircraft.

5.4 FACTORY SPARE PARTS AND SERVICE SUPPORT

The spare parts requirements for the PIRANHA are minimized because of the simple construction of the airplane. Sadler Aircraft Corporation is committed to providing the parts and service required to keep the maximum number of PIRANHA aircraft flying. Adequate depot maintenance stocks, plus quick turnaround of factory parts orders will assure adequate spare parts availability.

SECTION 6: PILOTS AND TRAINING

6.1 SADLER PIRANHA FLYING QUALITIES

The PIRANHA, even with its higher horsepower and speed, has been derived from a simple easy-to-fly low horsepower sport aircraft. The stall is straightforward and the spin is easily recovered after many turns. Landings and takeoffs are uneventful, with good control in high crosswinds. The control response is immediate, with excellent acceleration rates in all axes, but with docile response for beginning pilots.

6.2 CURRENT PILOT TRANSITION

Current pilots can transition easily to the PIRANHA. Pilots from all backgrounds, including general aviation private pilots, transport pilots and military jet pilots can fly the PIRANHA with only a short briefing. Self checkout is easily done with experienced pilots if a two-place trainer derived from the PIRANHA is unavailable.

6.3 SADLER PIRANHA TRAINER

Using the same airframe, the PIRANHA 2-place trainer has a side-by-side pod with dual controls. With exactly the same airframe as the PIRANHA, the trainer provides the same flight characteristics and power-to-weight ratio as the PIRANHA.

6.4 NEW PILOT TRAINING

New pilots can be recruited from the upper ranks of enlisted personnel. Academy graduate skill levels are not required. Skill levels sufficient to graduate from a simple non-technical pilot's ground school are adequate. Initial flight training can begin directly in the 2-place PIRANHA trainer version by using reduced maximum power settings and not retracting the landing gear (or the trainer can be procured with fixed landing gear).

Transition from the trainer version to PIRANHA aircraft can be accomplished soon after solo flight to build applicable flight time in type. Total flight time required for PIRANHA flight proficiency will vary with the individual and the performance level of service required of the PIRANHA. Typically, a student pilot will require 50 hours of total time for PIRANHA flight proficiency, 20-30 hours of additional aerobatic training, and 20-30 hours of additional mission-specific training. Combat-ready pilots can be typically produced within 100 hours or so of ground school graduation, representing a significant training cost saving over other aircraft types.

SECTION 7: FUNCTIONAL CERTIFICATION

7.1 CERTIFICATION BASIS

The PIRANHA has been derived from a line of aircraft that has been in continuous production for more than 8 years. Some of these aircraft have been manufactured in the U.S.A. and others, under license, in Australia. Several of models of these aircraft have been certified to a type-certification standard called BCAR (British Civil Air Regulation), Section S for light aircraft. This certification standard, or similar JAR22 standard, examines and proof tests for aircraft structural strength in all areas and demonstrates aircraft flight safety and stability.

7.2 CERTIFICATION PLAN

A certification standard and test plan for acceptance will be submitted for approval. Unless otherwise specified, the plan submitted will closely parallel the above-mentioned BCAR or JAR22 standard. Upon approval of this standard, along with the accompanying test plan, the plan will be used for acceptance of the first article test aircraft.

7.3 FIRST ARTICLE TESTS

The first production aircraft to be delivered to the customer will be subject to an acceptance test according to the standard and test plan agreed as per section 8.2 above. This will generally include tests of wing, tail, fuselage, control system, motor, propeller and all other critical structures. In addition, flight tests will be conducted to verify flying qualities, stability in all axis and stall and spin characteristics. Finally, all performance parameters such as takeoff distances, climb rates, stall and top speeds, and maximum dive speeds versus load carried will be verified and recorded. The first article test data will serve to prove the total airworthiness of the PIRANHA and provide a baseline for less inclusive production acceptance tests.

SECTION 8: PRODUCTION AND DELIVERY

8.1 PRODUCTION FACILITIES

Sadler Aircraft Corporation has been involved, either with associated companies or under license agreements, in the production of Sadler Aircraft similar to the PIRANHA for more than eight years. These aircraft have been manufactured in Scottsdale, Arizona, USA (figure 8-1) or in Sydney, Australia continuously during that period of time. Our current prototype facilities in Arizona can be expanded instantly to accommodate a production rate of up to 20 units per month. Skilled engineering and assembly personnel are standing by to join in the production effort on short notice.

Because the Sadler Piranha has been designed for the simplest "cut, bend and rivet" production methods, our tooling needs are greatly simplified. All subcontract tooling for items such as wing ribs and the Kevlar fuselage pod are in place and subcontractors are ready to supply parts immediately.



FIGURE 8-1: PRIOR SADLER PRODUCTION FACILITIES

8.2 DELIVERY SCHEDULE

Initial completion of the first article test aircraft can be achieved within six to nine months after go-ahead. Manufacture of production deliverable aircraft will begin immediately at go-ahead, with first production deliveries beginning within 9 to 12 months. Production rates can be accelerated up to 20 units per month within the first year after initial deliveries.