

Saunders Roe S.R.45 Princess

1952

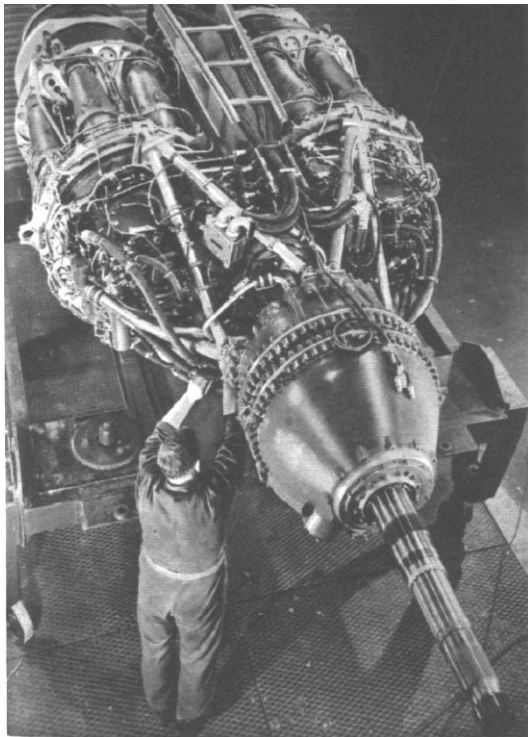
The Princess was a massive, pressurized, triple deck, 105 passenger flying boat powered by first generation turboprop engines. Two Proteus' geared together powered each of the four coaxial units, a single Proteus / single rotation prop were installed on the two outboard stations. Either of the paired Proteus could be declutched from the propeller unit. Three prototypes were constructed, but only one flew. The flying prototype was retired after approx. 46 flights and 100 flight hours. All aircraft were scrapped in 1967.

Wingspan: 219 feet 6 inches Weight (max): 345,025 lbs.

First flight: Aug. 22, 1952

Engines: 10 Proteus 600/610 turboprops; 3,320 HP + 1,200 lbs. jet thrust each engine

Propellers: de Havilland, 16.5 ft. diameter



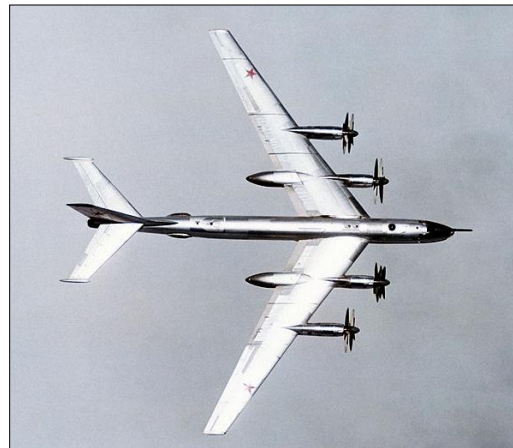
Tupolev Tu-20 / -95 / -116 /-142

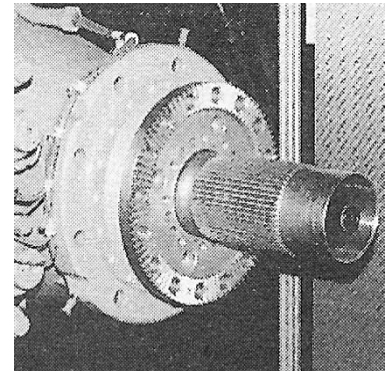
1952

The Tupolev series of NK-12 powered turboprop military aircraft have performed strategic bombing, missile platform, and long range / maritime / ASW reconnaissance functions. The Tu-116 was a personnel transport. Despite spinning at 750 to 850 rpm, the prop tips operate in the transonic range. The Tu-95 has achieved 575 mph at an altitude of 40,000 feet.



Wingspan: 167 feet 6 inches
Weight (max.): 370,000 to 390,00 lbs.
First flight: November 12, 1952 (Tu-95). July 18, 1968 (Tu-142)
Engines: Four Kuznetsov NK-12 series turboprops of 14,800 HP each
Props: AV-68 series: 18 feet 4 inches to AV-90: 20 feet 4 inches in diameter





Kuznetsov NK-12 series turboshaft

14 stage compressor, 5 stage turbine

Pressure ratio: 9.5 to 13.1

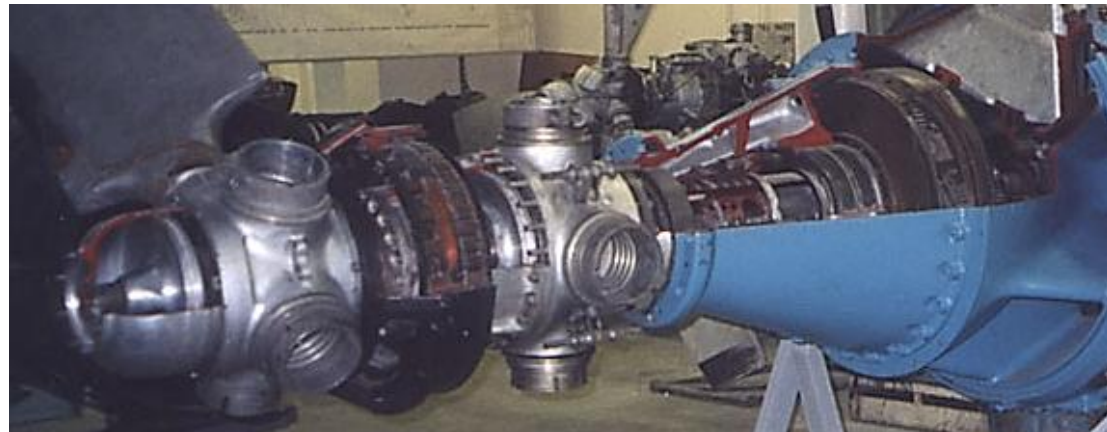
Mass airflow: 142 lbs./sec

Horsepower: 14,800

Sfc: 0.36

Reduction Ratio: 0.094 (10.6 to 1)

Weight: 6,393 lbs. (dry)



Convair XFY-1 Pogo

1954

Experimental turboprop-powered vertical take-off aircraft flown by James "Skeets" Coleman. Extensive testing of T40 engines and props utilized pivoting Allison test stand and tethered flight training both in the Moffett Field blimp hanger and outdoors at Brown Field. Difficulties in judging vertical rates of descent complicated landing. Program terminated Aug. 1, 1956.

Wingspan: 22 feet 11 inches

Weight (takeoff): 16,250 lbs. (max.)

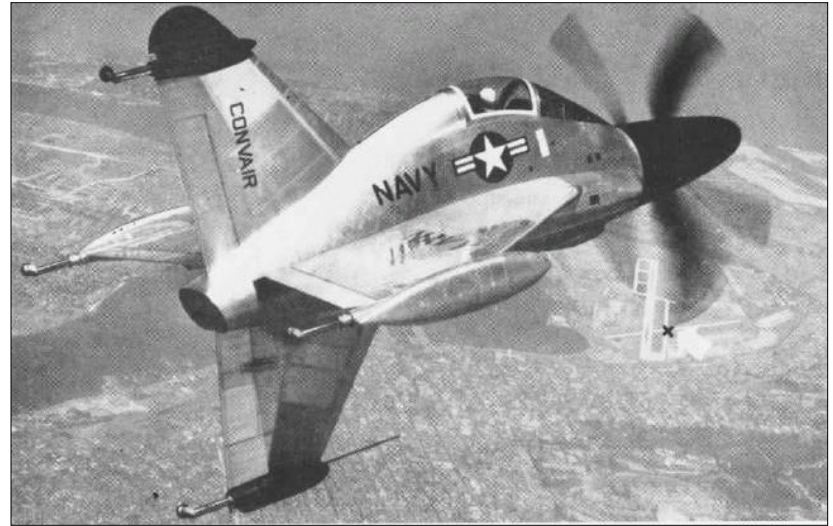
First flight: Tethered: April 14, 1954. Full

transition flight: Nov. 2, 1954

Engine: Allison T40/YT-40-A-14, 5,332 SHP +

1,296 lbs jet thrust

Props: Curtiss-Electric 16 foot diameter



Lockheed XFV-1

1954

The XFV-1 was Lockheed's entry into the 1949 vertical takeoff proposal. Two prototypes were made, only one flew, both survive today. The special engines dedicated to true vertical takeoff were granted to the Convair XFY-1, so the XFV-1 used a makeshift landing gear to allow rolling horizontal takeoff and landing. Hovering to 80° was achieved in some of the 32 flights and 23 total flight hours.

Wingspan: 27 feet , 4.7 inches

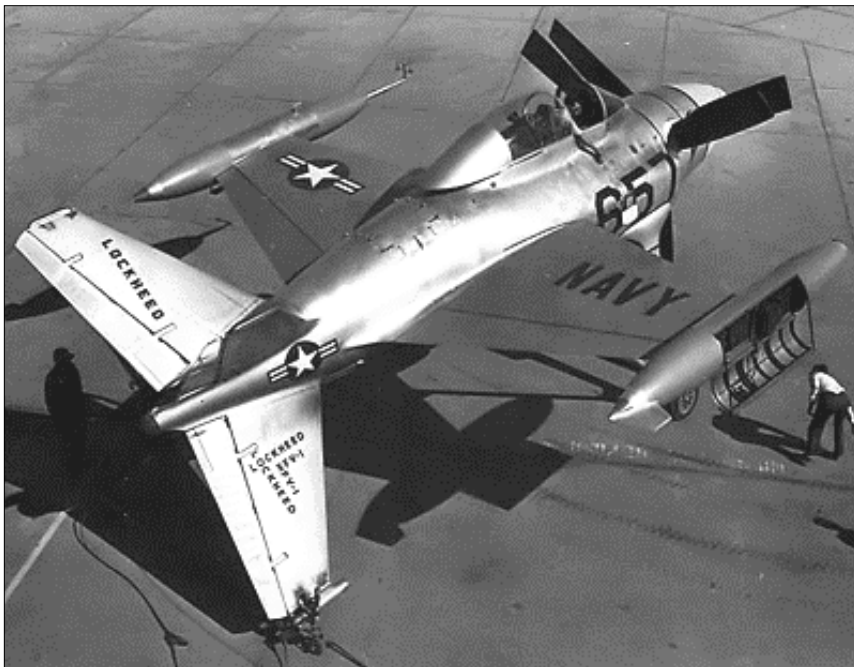
Weight (max): 16,221 lbs.

First flight: 1.5 mile hop: Dec. 23, 1953.

Official Flight #1: June 16, 1954

Engine: Allison T40/YT-40-A-14, 5,332 SHP +
1,296 lbs. jet thrust

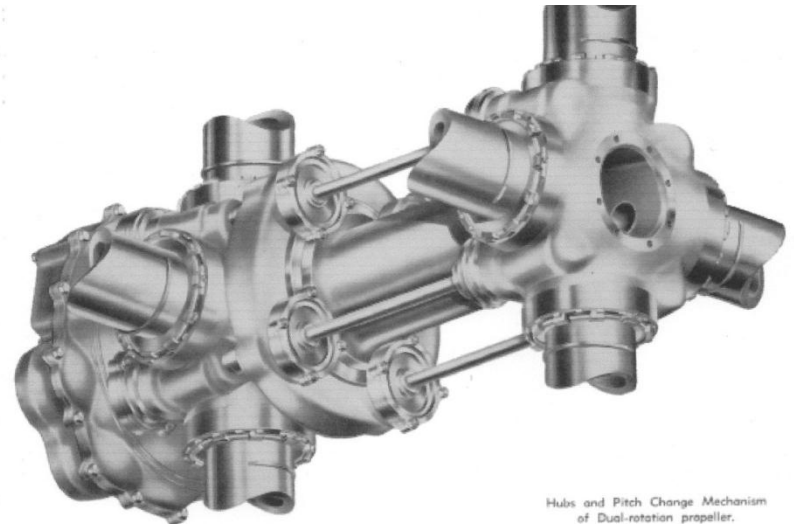
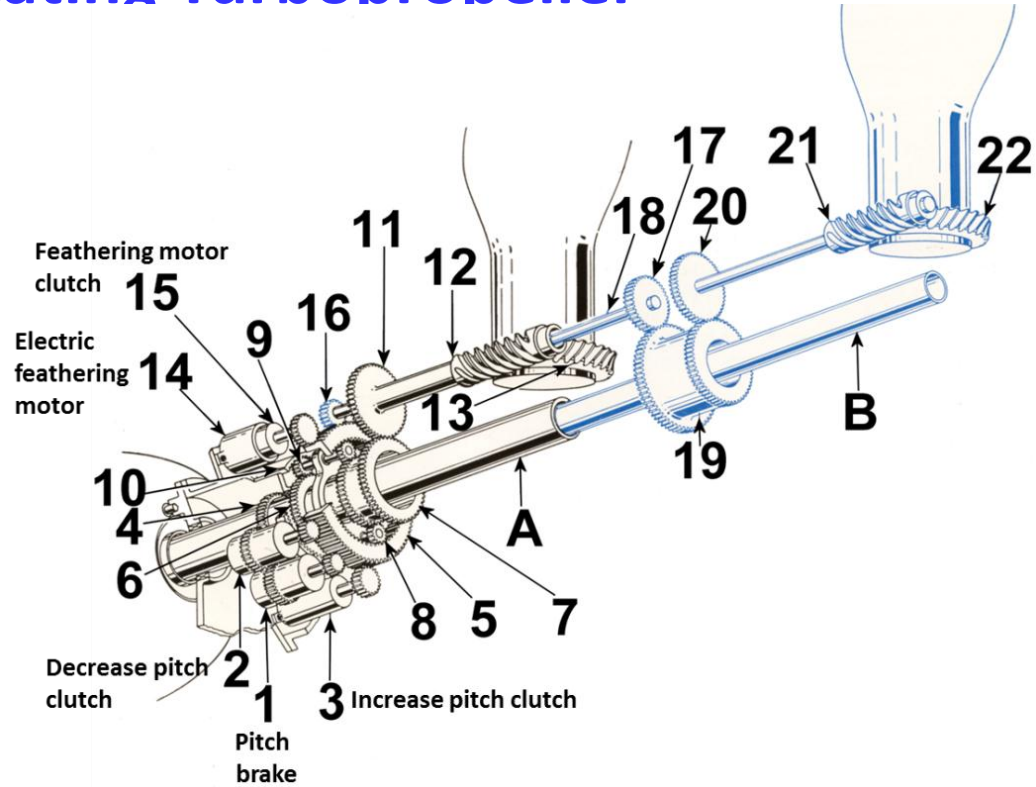
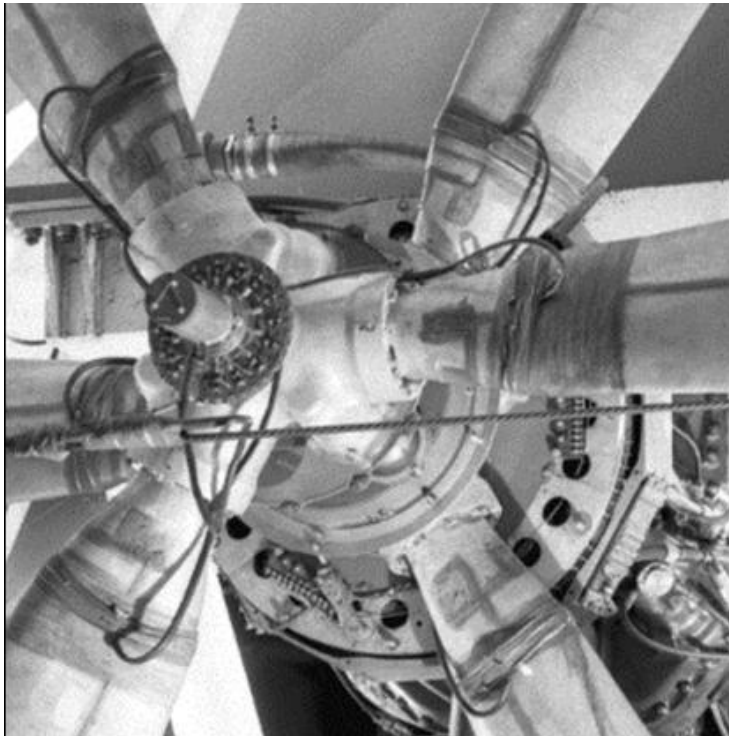
Props: Curtiss-Electric 16 foot diameter



Curtiss Electric Contra-Rotating Turbopropeller



Allison
tilting
test cell at
Plant 2,
Indianapolis
Indiana



Hubs and Pitch Change Mechanism
of Dual-rotation propeller.

Tupolev Tu-114 / Tu-126

1957 / 1962

The Tu-114 was a remarkable 120 to 220 seat, long range airliner utilizing the most powerful turboprop engines available, then or now. It operated at jet-like speeds in the range of 540 mph. Thirty two aircraft were built, placed into service in 1961 including international routes, and all were withdrawn by 1975. Some were remanufactured to military Airborne Early Warning use (Tu-126)

Wingspan: 167 feet 6 inches (Tu-114)

Weight (max.): 376,990 lbs.

First flight: Tu-114: Oct. 3, 1957

Tu-126: Jan. 23, 1962

Engines: Kuznetsov NK-12MV, 14,800 HP

Props: AV-68H of 18 feet 4 inches dia.



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Hiller X-18

1959

The Hiller X-18 was a pure research aircraft combining the T40 engines and propeller sets from the abandoned XFV-1 & XFY-1 programs, the fuselage of a transport glider (Chase C-122C), a new-build tilting wing, and a small jet engine that was ducted to provide pitch in hover mode. At full power, 45,000 lbs. of thrust could be generated to lift the aircraft vertically. It flew 13 flights, mostly in airplane mode, with wing tilts up to 45°. Untethered hover flight, which would require 87° of wing tilt, was never attempted.

Wingspan: 42 feet

Weight (max): 33,000 lbs.

First flight: Nov. 24, 1959

Engine: Dual Allison YT-40-A-14 turboprops,
5,850 SHP + 1,295 jet thrust each +

Westinghouse J-34 (3,000 lbs. thrust) in fuselage
for vectored thrust

Props: Curtiss-Electric, 16 foot diameter



Antonov An-22 “Antei”

1965

Russian strategic heavy transport which set several range and payload records. Largest and heaviest production aircraft until Lockheed C5A Galaxy. Sixty eight aircraft were produced.

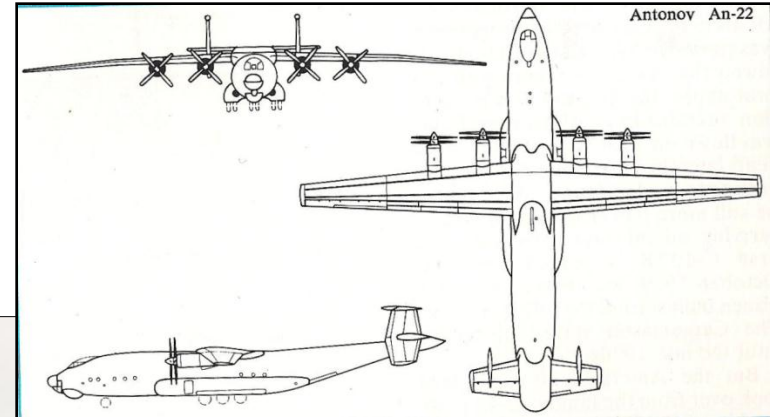
Wingspan: 211 feet, 4 inches

Weight (max): 551,160 lbs.

First flight: February 27, 1965

Engine: Kuznetsov NK-12MA turboprops, 15,000 HP each

Props: AV-68 series, diameter approx. 18 feet



A-90 Orlyonok Ekranoplan

1972

Soviet wing-in-ground effect (WIG) transport was designed and built by the Central Hydrofoil Research Bureau. The Orlyonok cruised on the NK-12@ 224 mph at the optimal 6 feet above the surface and had retractable wheels for beaching. One prototype and 3 production aircraft were built, began service in 1979, and all were retired in 1993.

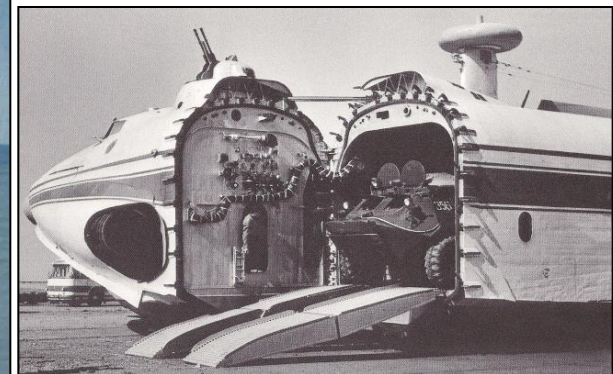
Wingspan: 103 ft., 4 inches

Weight (takeoff): 308,647 lbs. (max)

First flight: 1972

Engines: Marine-ized Kuznetsov NK-12MK turboprop, 12,000 HP “cruise engine”; Two Kuznetsov NK-8-4 “booster” turbojets, approx. 23,148 lbs. thrust each.

Props: AV-90, 19 feet, 8 inches diameter



North American RB-51 "Red Baron"

1975

The airframe that became the RB-51 was a Reno Champion racer with Merlin power before the Griffon-contra-prop transformation was completed in 1975. Flown by legendary air racing pilots, it took a few years to refine the systems and aerodynamics. The RB-51 set the 3 km world speed record for piston-prop aircraft at 499.018 mph in 1979 and won Reno twice. A series of component failures at Reno in 1979 caused the props going flat, the drag stifling forward airspeed, resulting in a controlled crash into the desert. Pilot Steve Hinton survived.

Wingspan: 32 feet, 3 inches

Weight (race): approx. 10,360 lbs

First flight: 1975

Engine: Rolls-Royce Griffon 59 + -74

wheelcase, V-2240, 3,800 HP, wet

Props: de Havilland, 10 foot 4 inch dia.



ParaPlane P-2 Powered Parachute

1983

Aeronautical engineer Steve Snyder, machinist Adrian Vandenberg, and small engine specialist Daniel Thompson combined their expertise to make a series of prototype ParaPlane powered parachutes starting in 1981. Controllability issues due to the engine/prop torque was corrected by using contra-rotating propellers. Further development of the parachute and airframe components eventually allowed the successful use of single rotation props and two-place aircraft.

First flight: P-1: 1981 P-2, P-3: 1983

Engines: Dual Chrysler or Solo 215 cu. in, 2-stroke, 15 to 19 HP each with belt drive



Sunflight Coax-P Gearbox for use with single engine

North American P-51 "Precious Metal"

1988

Precious Metal is the second Griffon-powered P-51 hybrid, built in 1987/1988 by Don Whittington. It has gone through several iterations of tail, coolant scoop / doghouse, prop, owner, and engine modifications. A prop governor failure resulted in a belly landing at Reno in 1988, but the aircraft returned to flight within 3 years. Best official speed on the Reno course was 452 mph.

Wingspan: 32 feet, 3 inches

Weight (race): approx. 10,400 lbs

First flight: Early 1988

Engine: Rolls-Royce Griffon 58 with -74 wheelcase, V-2240, approx. 3,600 HP, wet

Props: de Havilland. Fore prop: 10 foot 4 inch diameter. Aft prop: 9 foot 8 inch diameter.



2011



Cozy MK IV YV-22X

1996

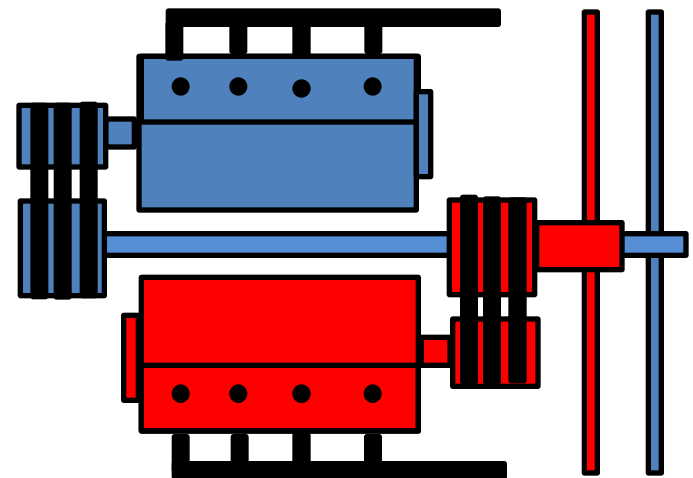
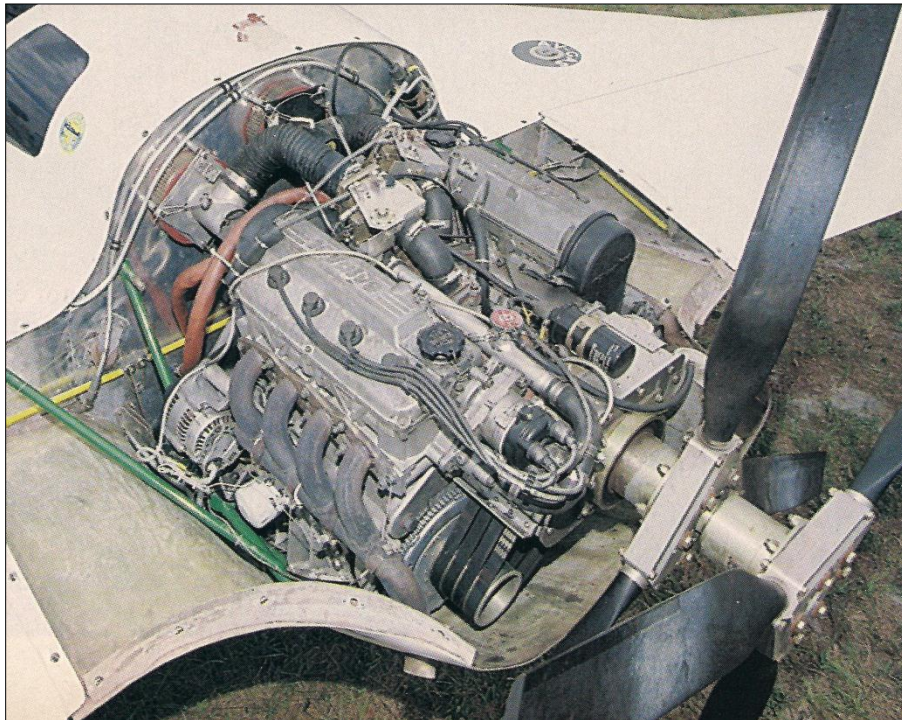
Four place Homebuilt aircraft constructed by engineer brothers Ruben and Carlos Leon of Valencia, Venezuela and modified to dual engine / contra-prop configuration. One engine faces forward, the other aft, each driving their own independent prop through a 2:1, three-lane micro v-belt reduction drive.

Wingspan: 28 feet, 1 inch Weight (takeoff): 2,050 lbs.

First flight: Feb. 1, 1996

Engine: Two 1.6L Suzuki Swift 4 cylinder inline, aluminum block, water cooled, engines, 100 HP each,

Props: WARP drive composite; ground adjustable



North American P-51R “Miss Ashley II”

1997

Bill Rogers combined a new-build fuselage and P-51H tail, Lear Jet 23 wing and horizontal stabilizer, custom landing gear, and a Griffon V-12 to go racing. MAII displayed immaculate workmanship and continuing aerodynamic improvements over 2.5 years. While racing at Reno in 1999, the tail failed, followed by the wings, and co-owner/pilot Gary Levitz lost his life in the break up and crash.

Wingspan: 33 feet 6 inches

Weight (race): Approx. 9,600 lbs.

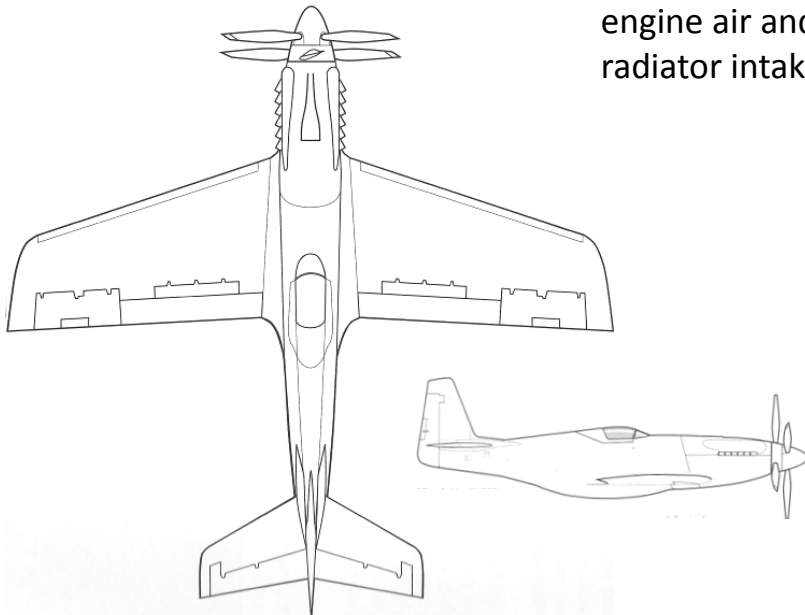
First flight: June 6, 1997

Engine: Rolls-Royce Griffon 58, V-2240, approx.
3,600 HP, wet + N₂O

Props: de Havilland with Howard feathering
system, approx. 10.5 feet diameter



Note NACA duct
engine air and
radiator intakes



Rose RP-4

2006

This aircraft is being built by David Rose, La Jolla, CA, specifically for setting speed records. It is powered by 2 mechanically supercharged V-8's turning contra-rotating props with composite blades of advanced design. The thin wing is extensively plumbed to allow surface cooling. The cockpit location rivals the Gee Bee R1/R2 and in its current form, the RP-4 sprouts the smallest vertical stabilizer of probably any high-horsepower contra-prop aircraft.



Wingspan: Estimated 25 feet

Weight (max): 5,600 lbs.

First flight: Unflown as of May 2012

Engines: Dual mechanically supercharged V-8, stated as 5,000 HP

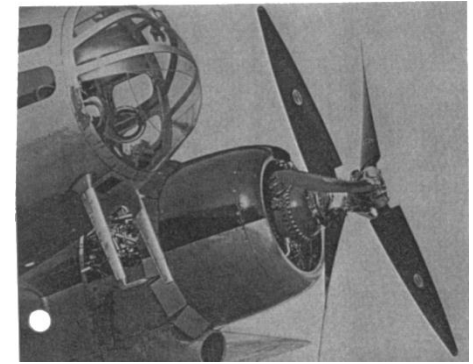
Propellers: NASA derived prop-fan technology composite lay-ups, looks like fixed pitch, approx. 58 inches in diameter



Contra-prop Testbeds



Tupolev Tu-4 with TV-2



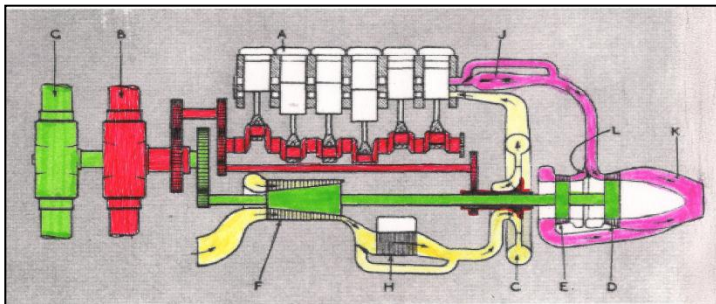
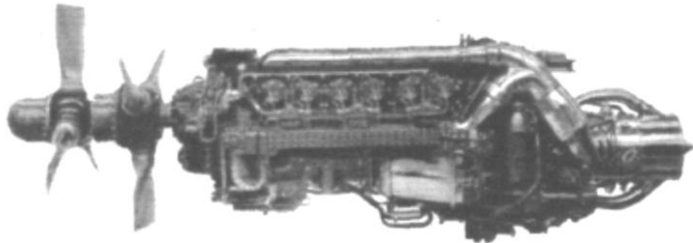
Douglas B-23 with Hamilton Standard Super Hydromatic



Lincoln SX793 with Napier Nomad I



Lancastrian VM704 with Griffon C-props inboard, Merlin 100 series engines for Avro Tudor outboard



Yellow: Intake air Green: Fore prop drive
Purple: Exhaust Red: Aft prop drive



Lancaster with Armstrong-Siddeley Pythons outboard

The Final Tally:



67+ designs

15 of 67 (22%) went into production (Shiun, P-75A Eagle, F.47 Seafire, Seafang, VB-10, Shackleton, A2D, Tradewind, Wyvern, Gannet, Tu-114, Tu-126, Tu-95, An-22, A-90)

3 served in a shooting war:

Shiun -WWII

Seafire F.47 – Malaya and Korea, 1950

Wyvern - Suez Crisis, 1956

Still flying:

Tu-95

An-22?

Precious Metal (modified P-51)

F.47 Seafire

ParaPlane?

Cozy Mk IV?

May eventually fly:

Replica M.B.5, Rose RP-4, replica Bugatti R-100

Manufacturers of Contra-Rotating Propeller Units

Aeroproducts (USA)

AV (USSR)

Chauviere (France)

Curtiss-Electric (USA)

de Havilland (UK)

Fairey (UK)

Hamilton-Standard (USA)

Ratier (France)

Rotol (UK)

Sumitomo (Japan)

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Propfans: Somebody want to tackle this for next year?



General Electric GE36



Pratt & Whitney / Allison 578-DX



Yak-42E-LL with D-236



Progress D-27's on An-70

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AC-35

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