MYSTERY MARVEL WARBIRD

By John Harrison

Question: What Warbird will outclimb a P-51, with an initial climb rate of over 4500 feet per minute and is available in the $70-75,000. price range??What Warbird has a service ceiling of 35000'and comes with a complete high pressure (1800 psi) diluter demand oxygen system with a six hour supply for both cockpits?

What Warbird burns 50-60 gph of fuel and will cruise at 210-265 knots TAS, depending on power setting and altitude, and range from 700-900 nautical miles? (Indicated airspeed at cruise will vary from 170-200 KIAS depending on power setting and altitude, and best cruising altitudes are from 15,000-25,000).

What Warbird comes standard with speed brakes, automatic mixture control, hydraulically operated canopy, fully defrosted canopy and windscreen, gas fired cockpit heater that will roast you on the coldest day, relief tubes in both cockpits, G-suit provisions, slaved compass system (Sperry C-4), electric non-tumbling attitude indicators, ADF,VOR, marker beacon, counter drum encoding altimeters, transponder, submerged antennaes (wing tip and vertical fin), two-speed supercharger, chip detector system, intercom, inertial reel harnesses, RMI, main and spare a/c invertor system, cockpit annunciator warning lights, external power plug, backlit, edge lit and post lit instruments, panels and switches, map lights, thunderstorm lights, upper and lower rotating beacons, retractable landing lights, airbottle to open canopy in 1/3 sec. in an emergency, sunscreens, excellent fresh air ventilation system, and a baggage compartment large enough for folding bikes and baggage for a month's vacation????

Ah, but that's not all...let's list some of the more esoteric features of THIS MYSTERY WARBIRD. It has disc brakes, built-in work lights in the baggage compartment and nose wheel well. It has a unique flip open cowling for unrestricted engine access, a fold-down nose wheel ladder for access to the rear of the engine (accessory section) and rear of the forward instrument panel. All maintenance areas are readily accessible at eye level behind large Dzeus fastener panels, the forward instrument panel,for example, slides out on rails and folds down for easy access.

All radios are ARINC compatible and the control heads are removed with four camlok fasteners. Any ARINC radio will fit in the cockpit side console rails.(If you don't understand the significance of ARINC compatible, check with a good radio shop that is familiar with Airline Quality Avionics!)...and speaking of Airline Quality..this Warbird was designed for airline style "remove and replace" maintenance. Everything is modular, and accessible: the battery slides out on rails, service points are at eye level or have fold out steps (oil and hydraulics).

One other very special feature of this Warbird is the "control shift" it comes with three: The first allows the shifting of control of all primary electrical controls, i.e. starter, primer, battery, generator, invertor, speedbrakes, external lights, etc. from one cockpit to the other. Either cockpit can run the whole show. The second shifts the VHF/UHF communication between cockpits and the third shifts the control of the VHF NAV(VOR) and gyro compass slaving control panel between cockpits. The status and position of these controls, of course,are indicated by a sophisticated annunciator system.

I could go on and on as there is more, but I think you get the idea! What is this MYSTERY MARVEL??? IT'S THE NORTH AMERICAN T-28B/C built for the U.S.Navy in the mid 50's and used by our Navy into the early 80's. The only significant difference between the B and C models is that the C has a tailhook (hydraulic) and shorter prop for carrier operations. The B and C models represent the definitive and most complete T-28's and the features listed above were standard on these aircraft, along with significant structural beef-ups and the 1425 HP Curtiss Wright R-1820-86B engine turning a three bladed Hamilton Standard hydromatic propeller.

There were 788 T-28 B and C's produced and best estimates are that 100-150 will find their way into civilian hands. Few,if any, complete airframes are left in military

storage. Most that were or will become available are now in civilian hands, having come on the market in the last two years through trades with the Navy, Air Force and Marine Corps Museums. A's produced: 1,194 B's: 489 C's: 299.

Having owned a T-28 B for the last year, I believe I am just becoming aware of what a unique, high performance airplane this is, and yet, it seems largely unknown in Warbird circles. The reasons are probably a combination of the following: It had no WWII or Korean War record and thus not a lot of history or nostalgia associated with it. Few, very few, books have yet been written on it and the early T-28A model of 800HP served a rather short, underpowered and undistinguished career bridging the prop-to-jet age in the USAF in the mid 1950's. It should be noted that the T-28D (a converted A model) did have a distinguished career as a fighter-bomber in Vietnam.However,as it was largely, though not entirely, operated by Vietnamese, Thais and Laotians during that unpopular war, its contribution has gone largely unnoticed and ignored in the West.

Like the P-51's coming of age when it was converted from Allison to Rolls Royce power, the T-28 came of age in the U.S.Navy when upgraded to the 1425 HP Wright R-1820 engine and produced, (not converted) as the B and C models. The T-28 served well in the U.S. Navy for almost 30 years and the airframe is no creampuff averaging 14,000 hrs.each (calculated to be ½ its fatigue life!!) Ask any Navy trained aviator of the past 30 years and his eyes will roll back and a big smile will come to his face as he fondly remembers his first flight in this North American built trainer or the first time he brought it aboard the boat. The T-28 was built to replace the T-6 and to provide jet age transition training, handling qualities,and systems operations to fledgling aviators and that it did admirably.

The cockpit layout and systems are very jet-like and are reminiscent of late 50's, early 60's jet cockpits. To me, I feel as though I'm back in my old F-100 as the panel layout, throttle grip/speedbrake set-up are just like the old "Hun". The bone simple on/off fuel system, coupled with the automatic mixture control make systems operation jet simple. As in a jet, fuel is measured in pounds and full is 1077 lbs or 177 US gal.

The handling qualities are outstanding and also very jet-like. The roll rate is light and quick and while the T-28 is not designed for high speed, it was designed for the quick feel of a jet and the high drag, high sink rate approaches associated with high wing loaded jets. With gear, full flaps and speedbrakes and a modest power setting of 23-25" MAP, at 110-120 KIAS in the final turn, you'll see a vertical speed down of 2500-3500FPM. **NOW,THAT'S IMPRESSIVE!** And decidedly brick-like. However, clean and at 51"MAP & 2700 RPM, which is t.o.power, you'll see a 4500-4700 FPM climb at 120-130 KIAS.That's a sheer delight. At a cruise climb of 140-150 KIAS, 2400 RPM, and 36", you'll zip skyward at 2500 FPM...not bad.

The stall is Piper Cub docile and straight ahead. The plane can land comfortably in 2500' and take off in about 1200' using flaps and a brisk rotation at 75-80 KIAS. If there is a weak point it would be the brakes, which tend to fade. I would avoid runways that are much less than 3,000' where heavy braking would be necessary. The Navy flew carrier approaches at 82 KIAS and at those speeds the landing roll would be reasonably short; but then, an 82 KIAS final is not for everyone.

The T-28 also has a very sophisticated, gap-sealed aileron system and three axis trim. The aileron feel system is ground adjustable through a swash plate which produces boost, neutral, or deboost to the aileron tabs.It can change the aileron feel of a T-28 from a nimble fighter to a stable B-52 with the twist of a socket wrench in about 5 minutes. But be very careful with one notch too many of boost, an inflight roll will take the stick right out of your hand. It's called "stick snatch" and it's a good name for it!

Pilots who have flown or have access to many types of Warbirds will frequently say that if they had one Warbird to fly, it would be the T-28 and describe it as "anxiety free".

It's safe, reliable and being tri-gear is no sweat in a crosswind. Unlike being in a high performance tail dragger, a pilot will not feel as uncomfortable in a T-28 if he is not as current and the wind is blowing briskly across the runway. Of course, there is no substitute for currency in any aircraft, particularly a high performance one.

Probably one of the best features of the T-28 is that it is a true two-place advanced trainer. Visibility from both cockpits is outstanding and, most important, both cockpits are identical and complete. With its unique "control shift" system either cockpit can operate, navigate and communicate. I would not be the least hesitant about putting my grandmother in the front cockpit and running the whole show from the rear - try that in your Mustang, T-6, T-34 or whatever!

Upon being introduced to the T-28, my first reaction was that it must be a maintenance nightmare as it was easily ten times as complicated systems-wise and electrically as my T-6. Well, after flying mine for over 60 hours in an essentially stock configuration the answer is simply not so. No squawks..none. We flew it from Pensacola to Reno when we brought it out of mothballs.. no squawks. We flew our big summer trip from California to Oshkosh and back..no squawks. People who know me and knew my T-6 know I am fussy about maintenance. All I can say about the T-28 is : I'm delighted. Even when I want to tinker (just can't resist), it's much easier and more accessible to work on than a T-6. There's just a lot more of it (emphasis on "a lot") and at a higher level of sophistication. Apparently, North American Aviation did their homework and 30 years of Naval Service got all the bugs out. We are left with a well worn, but reliable and de-bugged airplane which was able to stand up to years of student abuse.

Now that I hopefully have your attention and interest, why did I write this article? First, I am not a T-28 salesman and there are a few T-28 B/C's left in stock configuration in the military. If you didn't get one stock and early and cheap it's almost too late. However, I am a very satisfied owner who realizes from conversations with other T-28 owners and Warbird members that there are a lot of questions to be answered about the T-28. I would like to try to answer some of these. To most it's just a big "?" mark that sounds funny when flying by (the T-28 sort of flunks "sound" from the outside but inside it sounds beautiful and is very smooth and surprisingly quiet). Quite the opposite of a P-51 which sounds exquisite outside but inside the noise level borders on the threshold of pain and sounds nothing like its lovely external moan.

More important, as a member of the Warbirds of America Board of Directors, I have been asked to act as a focal point for T-28 activities, formation flying, maintenance information, and exchange of useful information. The Warbird Newsletter, by its nature, and the EAA, because of the liability aspects, cannot become the clearinghouse, arbitrator and teacher of T-28 matters, etc. I believe it is necessary to form an Association for T-28's as the T-34's have done so successfully with Charlie Nogle and the T-6's with Stoney Stonich. An organization of this sort can better serve the needs of the owners and provide an exchange of ideas and information pertinent to T-28's. The bottom line, of course, is to make them safer and more enjoyable to fly.

Along those lines, I would like to propose several ideas. First, that at Sun-N-Fun and Oshkosh 1987 we should have more complete T-28 formation and maintenance forums. There is obviously a lot of maintenance info we need to know to operate and fly our birds safely. For those involved in T-28 formation flying at OSH '86, you know we need lots of formation work, I encourage those of you who didn't get a free copy of the Warbird Formation Manual at Osh '86 to get a copy through WOA Merchandise Mart. The Manual has been adopted as the standard Warbird manual and was produced and utilized very successfully by the T-34 Association. It is not the position of the Warbirds or any Association to teach formation. You've got to get that experience on your own - you definately cannot come to OSH or Sun-N-FUN and expect to learn to fly formation and then participate in an airshow. What I do encourage is a Formation Qualification/Wingman Checkride (note.not instruction) identical to that successfully employed by the T-34 Association. If you T-28 owners think this is a good idea, Sun-N-Fun would be a good place to start - it took the T-34's several years to refine their act.

Mystery Marvel, cont'

That leads me to my second point, the T-6's and the T-6 Association. It is no secret that the P-51's and T-34's have been stealing the formation thunder from the T-6's in recent years. They too need to get organized. I have discussed with Stoney Stonich of the T-6 Association the possibility of combining the T-6's and T-28's into a North American Trainer Association. There is a great advantage to strength in numbers and one of the problems with Warbirds is finding someone to fly, play and practice with. By combining T-6's and T-28's for formation qualification (the planes are not incompatible) you could probably find someone in your area with whom to fly. Obviously joining the T-6 Association would give the T-28 owners a ready made vehicle to exchange ideas. Many T-28 owners are former T-6 owners and as such have much to bring to the group.

My third and last point concerns the T-28 maintenance, parts availability, common misconceptions, etc. When I restored my T-6 to Grand Champion Form, I found much of my time was devoted to locating parts and materials. The same has held true with my T-28. With that in mind I would like to include a list of sources I found helpful in working on my T-28. These are not the only sources and it has a definite West Coast tilt as I live in California. This is not an ad. These people have delivered good service and work. If they did poor work, I would pass that on, too.

Misconceptions: I have found a lot of T-28 owners who don't realize how good their T-28 is electronically and they have disregarded, disconnected or otherwise destroyed the avionics/control shift system in their T-28. You should know the following:

1) your control shift relay box is easily repairable - see Martin Avionics
2) don't eliminate any original wiring..it will cost a fortune to duplicate and is compatible with modern avionics
3) do not eliminate the control shift
4) although the radios are tube type they are easily repairable (VOR & ADF) and you can test tubes at a drug store tube tester. That goes for the compass system amplifier also. Replacement boxes for the VOR etc, are available cheaper than you can fix them - like $50 for a VOR.
5) glide slope can be added to your ARN-14 VOR for $50-500. and it will work through your existing ID 249 indicator head and can be channelized by the ARN-14 head -see Martin Avionics.
6) modern Lorans will work through your ID249 VOR indicator.
7) all your radio rails in both cockpits will accept ARINC remote radio control heads.
8) do not eliminate the control shift or destroy original wiring - a good avionics shop can use the very complete T-28 electrical manuals to tap into your system. If you destroy the original wiring you're out there solo by yourself in left field!
9) use your ARC-27UHF receiver for a boat anchor and eliminate 100 lbs.
10) a very simple mod will make the course indicator on your ID 249 VOR respond in a snappy modern manner by changing the dampening of the movement. See Martin Avionics.
11) a fibreglass fin cap is available under which you can mound a modern hidden VHF comm and/or Loran antennae - see Geo. Rivera
12) a very snappy VHF comm conversion is available utilizing the existing interphone panels and control shift employing Gables channelizing heads (airline style) front and rear and a King Gold Crown KTR 900A remote receiver. Installation and harness are easy - see Randy Kiesz Airborne Electronics and for the radios see A.C.E. Jim Shelton. It's a great system!
13) a Sony Walkman plays nicely through the existing interphone amplifier-add one wire!
14) use silver burglar alarm pressure sensitive tape for ADF sense antenna in rear canopy - should work for some Lorans also. Tape available at Radio Shack. Remove old tape and glue from canopy plexiglas with deodorized kerosene.

Mystery Marvel, cont'd.

15) a modern transponder will drive the existing encoding altimeter in the T-28 B/C but try for the original APX 72 which was in many T-28's when surplused and if not the wiring is already there - just find a unit and plug it in. See Gyro House Emery Oxley for wiring diagram for civilian transponder to military encoding altimeter. Also Gyro House is great for refacing and overhauling instruments and they can also overhaul the C-4 gyro in the compass system. The slaved compass system is important and good- preserve it.

16) for military radio repair check with Martin Avionics at Stead Field, Reno, NV.

17) for accessory overhaul: Orcutt Bros at Renton Field, Seattle, WA - boost pumps, starter, generator, mags, etc.

18) the VOR antennae in the left wing tip is great - use it and it will also work as a glide slope antenna through a coupler.

19) a neat, sophisticated Halon fire extinguisher system is available which readily adapts to the T-28 for under $200. It's the Phoenix Mark I.

20) the only drawback I've found to operating the T-28 is the oil mess it makes, particularly on startup. Oil burn is reasonable - about 1-2 qt/hour - and most ofthat blasts out and over everything at startup. Fortunately a system exists that totally eliminates the mess and reduces consumption. It's not cheap, it's very sophisticated, comes as four individual kits and is well engineered and complete. See Dave Clinton, Darton Industries. I have seen copies of this system - they don't hack it. When I saw the original installation on Dave's airplane I realized that I couldn't copy it, it was a very involved installation, that half-way imitations won't hack it, and that the original complete system "clean kit" is worth every penny. Before you invest in any oil clean-up kit do yourself a favor and look at Dave's installation. With a clean kit, operating a T-28 is like operating your car or your Bonanza - no oil mess..no exhaust trail.

I know I've forgotten some of the sources and tricks I've learned - please forgive any oversights - I'll have lots of material for a future article.

The following is the list of sources, etc. that were helpful for me:

PARTS: George Rivera "Jet Dynamics" (408) 358-3134 Donny Anglin (315)685-7737
ACCESSORY OVERHAUL: Cliff Orcutt (206)228-5038
WELDING-EXHAUST SYSTEMS: Knisley Welding (916)652-5891
VHF RADIO SYSTEM COMPONENTS: A.C.E. Jim Shelton (800)527-3722
SCHEMATIC FOR AND INSTALLATION OF ABOVE RADIO SYSTEMS, VOR, MOD, LORAN ADAPTATIONS: Airborne Electronics, Randy Kiesz (916) 428-3392.
MILITARY RADIO REPAIR, GLIDE SLOPE ADAPTATION TO ID249/ARN14, REPAIR OF CONTROL SHIFT RELAY BOX - Martin Avionics, Larry Martin (702) 677-1131
RESTORATION OF BACKLIT SWITCH PANELS, RADIO FACES, KNOBS, ETC (there are 22 panels in the T-28) Victory Silkscreen (818) 842-8787.
METAL PLACARDS: Mark Clark (815) 229-5112
HELMETS, HEADSETS, COMM ADAPTERS, ETC: Flight Suits, Jim Wegge (619)440-6976
INSTRUMENT, C-4 GYRO OVERHAUL: Gyro House, Emery Oxley (916)823-6204
OXYGEN SYSTEM COMPONENTS OVERHAUL, MASKS, ETC: AVOX (818) 787-3852
"CLEAN KIT" OIL CLEAN UP: Dave Clinton (619)438-1190

T-28 LICENSING, MAINTENANCE, SALES: C.I.A. Aviation, Al Redick (702)972-5540 Reno,NV Stead
American Warbirds, Dennis Buehn (702) 972-3070,Reno,Steac
INSURANCE: Don May Insurance Co, Harlingen,TX (512)423-6986 USAA
Glen Travers,Travers & Assoc. P.O.Box 26651, St Louis, MO 83122 (314)966-0558.

If you have any questions, please call. I enjoy talking, but am a poor correspondant.
John Harrison (916) 392-8545.

Hope this article has whet your appetites for the T-28 and is helpful to you owners looking for parts and services. I'm sure there are many other good sources out there.

Mystery Marvel, conclusion.

I don't claim to know all of the angles - what I have reported is what has worked for me. There is more than one way to skin a cat - let's hear from you!!!!

P.S. A word about the T-28A and converted A's like Nomads and Fennecs - carefully worded so as not to offend my good friends that own them! The T-28A has a Curtis Wright R1300 Engine of 800HP and a two bladed non-overhaulable Aeroproducts prop. Having a little more than half the horsepower of a B or C it has correspondingly less (significantly actually) vertical performance but lags only 15-20 KIAS at cruise (at lower altitudes only as it has only a one speed blower). They burn a thrifty 30-40 GPH vs 50-60 GPH in the B and C's - their handling characteristics and overall dimensions are the same. They were surplused with much less time- 2,000-3,000 hours having served only a few years. With the exception of a very few Late A-models other features they don't have are: 177 gal fuel tanks, low profile canopy, speedbrakes, beefed up nose gear and wing spar, modern avionics with associated shift, C-4 compass system and many small features.

Fennecs (French), Nomads (North American) and T-28D's (USAF) are converted T-28 A's- they may have some but not all (and in various combinations) of the features of the B and C's and probably not the R1820-86B engine. These conversions will have the R1820 but a different dash number and some of lesser horsepower. The T-28 B and C's were purpose built airplanes and not conversions and represent the definitive T-28 trainer. Fennecs were built for the French, T-28 D's as fighter bombers for the USAF and the Nomad as a civilian conversion by North American Aviation.

I guess a better analogy (and here comes the flak from my A-model friends)..comparing a B or C model to an A model is like comparing a Rolls to a Bently or a Beech Bonanza to a Beech Debonair or possibly your favorite Detroit Street Iron with a Full Race V-8 engine with all the goodies, step-up features fully loaded with the lower priced 6 cylinder stripped-down version used to lure you into the show room floor.

A carefully worded footnote to this article.
Although definately not intended, and while most response to the article has been very positive, some of our members have felt I was promoting the T-28 B/C at the expense of the A. For that I sincerely apologize as that was not what I was attempting to convey at all. The numbers of Warbirds,and of T-28's in particular, are too small to promote one at the expense of another. L-19's, T-28A, P-51's, and B-25's are all Warbirds and we all share common goals and needs - we need harmony and cooperation - nuff said!

One last comment..the article was about the T-28 B/C because that is what I own and my only frame of experience. I felt that the T-28 (A&B) has been an underrated and unknown Warbird and I was attempting to give it a boost. Furthermore, I wanted to communicate what sources and tips I found helpful on my aircraft - so obviously it was slanted towards California and B models. Our organization will only succeed if we successfully promote, maintain and safely fly our aircraft.

We need articles of historical items, maintenance tips, etc..so..If you have any information, parts, source, good maintenance shops, paint shops, etc, SEND IT IN!!!
Also..for you A model people..we would like any and all information that you can contribute that would be useful to A model owners.

Ed. note: At least we know several of you have read John's extensive article!! Keep up the sharing, the taking time to care, JOHN!! NOW LET'S HEAR FROM THE REST OF YOU!!!!!

SAFETY

PROCEDURES EXAMINATION FOR NORTH AMERICAN T-28 AIRCRAFT with Wright R1820 Engine .

This exam is provided by John Harrison. Questions are from NATOP.There are a total of 102 questions. We will present them in a series. Questions are chosen randomly from exam.

1) What is the purpose of the external flap handle?

2) Why is it necessary to check the baggage compartment door seal for wear and cracks?

3) With hydraulic pump failure, which of the hydraulically operated systems can still be us

4) What happens when the canopy handle is placed in the emergency position? Can canopy normal operation be resumed after selection of the emergency position?

5) The engine-driven fuel pump supplies fuel at a pressure of _____.

6) In the shutdown procedures, why is it necessary to let the cylinder head temperatures stabilize at 150 degrees or less?

7) What are the reasons for operating the engine at 1200rpm when taxiing is delayed?

8) What access route is used to extinguish a fuselage fire on the ground?

9) Best power-off glide speed to obtain maximum distance with gear and flaps retracted is:
(a) 100 knots (b) 110 knots (c) 120 knots (d) 130 knots

10) In flight with gear and flaps retracted, a hydraulic pressure indication of 0-100psi:
(a) is normal (b) indicates impending failure of the hydraulic system
(c) indicates a complete loss of hydraulic fluid (d) should be reported after the flight

11) The landing gear will not be lowered at speeds in excess of:
(a) 140 mph (b) 125 knots (c) 130 knots (d) 140 knots

12) The wing flaps will not be lowered at speeds in excess of:
(a) 115 knots (b) 120 knots (c) 130 knots (d) 140 knots

PETERSEN AVIATION, INC. MINDEN, NE SENT A REPORT TO AUTO FUEL STC HOLDERS RECENTLY. LAST ISSUE WE MENTIONED THE REDUCTION OF LEAD IN AUTO FUEL. HERE IS PART OF PETERSEN'S REPORT: (PETERSEN GIVES THE STC FOR T6'S FOR AUTO FUEL)

> **Radial engines must use leaded fuel at all times. A mixture of 25% 100LL and 75% unleaded auto fuel would provide a lead content equivalent to 80/87 octane avgas.**

THEIR NEW AUTO FUEL DIRECTORY WILL BE AVAILABLE AROUND MAY 1. (308)832-2200,352-3232.

AND...JAMIE MACKAY SENT US INFO ABOUT TWO T6'S IN THE LAX AREA: TWO INSTANCES OF THE HEAT SHROUD AT #5 CYLINDER RUBBING A HOLE IN THE INTAKE MANIFOLD AND CAUSING A LOSS OF POWER. NEXT TIME YOU HAVE YOUR COWLING OFF, CHECK THE WHOLE HEAT SHIELD FOR AREAS OF WEAR.

AND ANOTHER ITEM FOR RACERS: WING SPAR BOLTS (NOT WING ANGLE BOLTS) LOOSEN UP - TIGHTEN EVERY 50 HOURS. THIS ITEM FROM ROBERT MITCHELL, CREW CHIEF ON RACE 4 FLOWN BY DAVID BRUCE.