OWNERS HANDBOOK FOR OPERATION AND MAINTENANCE OF Titan T-51D Mustang AIRPLANE

30 December 2020

NOTICE :
This handbook is not designed, nor can any handbook serve, as a substitute for adequate and competent flight instruction, or knowledge of the current airworthiness directives, the applicable air regulations and advisory circulars. It is not intended to be a guide of basic flight instruction nor a training manual.

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A68-119
VH-DQY

Contents

Part I
DESIGN FEATURES

1 Specifications

MANUFACTURER	Luis Ricardo
MANUFACTURE DATE	2020
MODEL	T-51D Mustang
SERIAL	m0xxxs0hk0085
EMPTY / GROSS WEIGHT	622 / 1020 kg (1368 / 2250 lbs)
USEFUL LOAD	398 kg
PAYLOAD (FULL FUEL)	331 kg
ENGINE	Suzuki V-6 “Mini Merlin”
RPM MAX PROP	2700 RPM ???
COOLANT TEMP MAX	105 ºC (221 ºF)
EGT MAX	600-675 ºC (1,112-1,247 ºF)
OIL CAPACITY	5 lit Valvoline Armour 15W-40
OIL PRESSURE RANGE	2.0 - 4.5 bar (29-65 PSI)
OIL TEMPERATURE	Max 110 ºC (230 ºF)
FUEL PRESSURE MIN	2.7 bar (40 PSI)
INDUCTION	<tbd>
PROPELLER	Whirlwind 100-4-84
TIRES	Pirelli SL26 120/90-10 66J, rated at 661
AIRFOIL	Riblett 35A415
WINGSPAN	7.32 m (24 ft)
WING AREA	10.96 m² (118 ft²)

WING LOADING	93.6 kg/m² (19 lbs/ft²)
POWER LOADING	? kg/hp (10 lbs/hp)
LENGTH	6.3 m (20.7 ft)
HEIGHT	2.0 m (6.8 ft)
WHEELBASE	1.6 x 2.8 m (5.19 x 9.25ft)
G LIMIT (820 KG)	+6g / -4g
FUEL CAPACITY	95 lit
TAKEOFF DISTANCE	107 m (350 ft)
LANDING DISTANCE	107 m (350 ft)
RATE OF CLIMB	2,100 fpm
RANGE	520 nm
SERVICE CEILING	18,000 ft
BAGGAGE	45 kg (100 lbs)
BAGGAGE VOLUME	340 lit (12 ft³) ???

Performance

FUEL FLOW	43 lit/hr (@ 75%)
	35 lit/hr (@ 55%)
TAKEOFF DISTANCE	107 m (350 ft)
LANDING DISTANCE	107 m (350 ft)
RATE OF CLIMB	1,200 fpm
CEILING	12,500 ft
RANGE	821 nm (55% @ 8000 ft)
	678 nm (75% @ 8000 ft)
SERVICE CEILING	18,000 ft
BAGGAGE	Fwd (max) 25 kg (55 lbs)
	Aft (max) 35 kg (77 lbs)
BAGGAGE VOLUME	Fwd 140 lit (4.9 ft³)
	Aft 212 lit (7.5 ft³)

General

The T-51D Mustang is a sport, tandem two-seat, dual control aircraft. It can be built as an amateur built experimental aircraft or as a Light Sport Aircraft.

All metal construction ensures longevity. Equipped with the Suzuki

V6 “Mini Merlin” engine, driving a 84” Whirlwind 100-4-84 four bladed constant speed propeller the T-51 delivers excellent performance.

Limitations

Operating Speeds

VREF	Flight Regime (gross weight)	kts
V_s	Stall, flap retracted	54
V_{s0}	Stall, flap extended	45
V_r	Takeoff rotate	65
V_{ref}	Final approach (~ 1.3 Vs0)	70
V_x	Best angle climb	70?
V_y	Best rate climb	75
V_z	Best cruise climb	105
V_{bg}	Best glide angle (6:1)	70
V_{fe}	Flaps extension	87
V_{le}	Gear extension	104
V_a	Maneuvering	120
V_{no}	Max structural cruise	146
V_{ne}	Never exceed	186

Engine Limitations

Max	Value
Overspeed RPM	5760
Takeoff RPM	5300
Engine RPM	5000 (5 minutes max) at 25” MAP
Continuous engine RPM	4500 @ 24” MAP
Coolant temperature	105 ºC (221 ºF)
Oil temperature	116 ºC (240 ºF)
EGT	675 ºC (1,247 ºF)

75% power is 4200 RPM @ 20.5" MAP

Coolant temperature Caution range (yellow) 95 - 105 ºC.

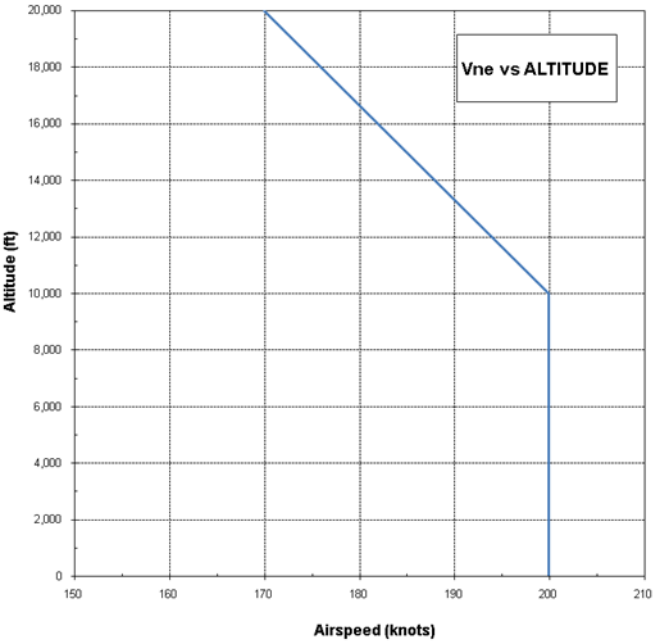


Figure 1: V_{NE} vs ALTITUDE

Airspeed Indicator markings

MARKING	ANALOG ASI (kts)	SIGNIFICANCE
White Arc	45-87	Full Flap Operating Range. Lower limit is maximum weight stall speed in landing configuration. Upper limit is maximum speed permissible with flaps fully extended.
Green Arc	54-146	Normal Operating Range. Lower limit is maximum weight stall speed with flaps retracted. Upper limit is the maximum structural cruising speed.
Yellow Arc	146-186	Operations must be conducted with caution and only in smooth air.
Red Line	186	Maximum speed for all operations.

NOTES:

1. The analog airspeed indicator markings are based on position error estimates. These markings do not account for the analog ASI instrument error.
2. The EFIS airspeed tape markings are to be revised to incorporate actual position errors once these have been determined.

Fuel Quantity data (liters)

Tanks	Usable fuel	Unusable fuel	Total fuel
Wing			96
Header			

2 Engine and Propeller

The Suzuki V6 “Mini Merlin” engine installation is based on the 2.7 lit H27A series car engine fitted to the Suzuki Grand Vitara vehicle.

A supplied the engine produces 184 BHP at 6000 RPM and 250 Nm (184 ft lb) of torque at 3,300 RPM. It is a liquid cooled V6 engine using electronic ignition and multi-port fuel injection. The H series engine was introduced in 1994 and the H27A model upon which this conversion is based remained in production until at least 2003. Titan use only 2000-2003 units for conversion. Parts for complete rebuild, where necessary, are easily available through Suzuki.

For aircraft use, Titan supply a complete firewall forward package consisting of the converted engine, all associated accessories and four blade constant speed propeller. A 2.26:1 reduction gear unit is supplied, manufactured by Autoflight in New Zealand. This gearbox bolts to the bell housing flange and is includes a rubber doughnut type coupling/shock absorber. The gearbox casing incorporates the front mounting points for the powerplant assembly. The gearbox and PSRU share the same oil supply and oil cooler, separate from the engine oil system.

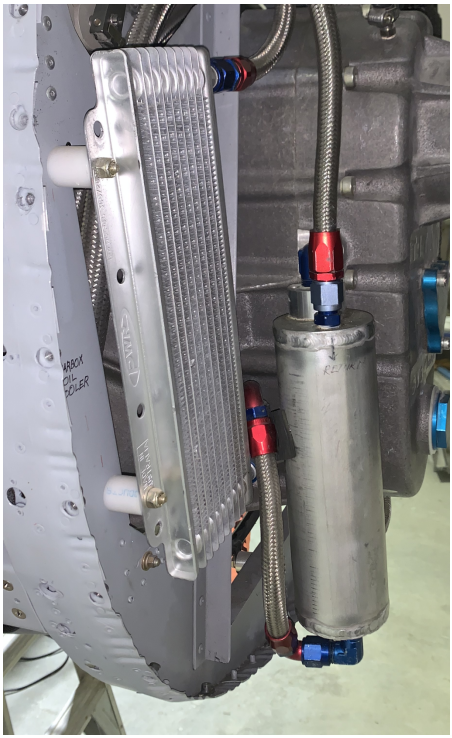
This engine has a compression ratio of 9:1 and use 98 minimum octane fuel.

Efficient aluminum oil coolers are mounted on the front of the engine, directly behind the propeller. Engine oil drainage is accomplished with two quick oil drain valves located on the left and right front

corners of the engine crankcase.

Engine air is directed through a quickly removable filter, located in the nose cowl, to the throttle body air box. Heated air for the throttle body is taken from shrouds on the exhaust manifolds through flexible tubes to the air boxes. (See Section II, Sub Section V for throttle body heat application).

The propeller on the T-51D Mustang is a 84 inch Whirlwind 100-4-84 four bladed constant speed propeller.



3 Fuselage and Wing Structures

The T-51D Mustang is of conventional riveted aluminium alloy construction except that the fuselage has a welded steel tube frame, and the

leading edges of the flying surfaces use blue polyurethane foam cores bonded to the skins and spar rather than conventional ribs.

The main wings use a Riblett 35A415 airfoil.

The wing is of single spar construction, incorporating a full depth I section spar with extrusions forming the spar caps, and a sheet aluminium web. The wing is entirely aluminium alloy covered. The ailerons and flaps are aluminium skinned. The control surfaces are operated by a conventional system of stranded steel cables, pushrods and bellcranks.

4 Landing Gear

A conventional steerable retractable tailwheel type undercarriage is fitted, the two main undercarriage units being cantilever telescopic oleo type legs. The undercarriage retraction system operates via hydraulic jacks and an electric motor and pump. The primary system pumps the gear down. The Emergency system is a 'dump' system which by-passes the valve arrangement and the gear simply drops down under gravity.

Main wheels are Matco units with disc type brakes and Pirelli SL26 120/90-10 66J tires with a four ply rating. (See Section IV, Sub Section II for tire service).

Main gear brakes are actuated by toe brake pedals on the front rudder pedals. Hydraulic brake cylinders located in front of the rudder pedals are readily accessible in the cockpit for servicing. (See Section IV, Sub Section IV for brake service).

The brake system is used for the individual actuation of the Matco calipers on the main wheels.

A hydraulic brake fluid is supplied from reservoir is located on the firewall to the two master cylinders attached to the toe-brakes. The level of hydraulic fluid should be checked regularly.

5 Hydraulic System

The hydraulic system is used for the extension and retraction of both the landing gear and flaps. The operation of these units is accomplished by the landing gear and flap selector valve unit which is

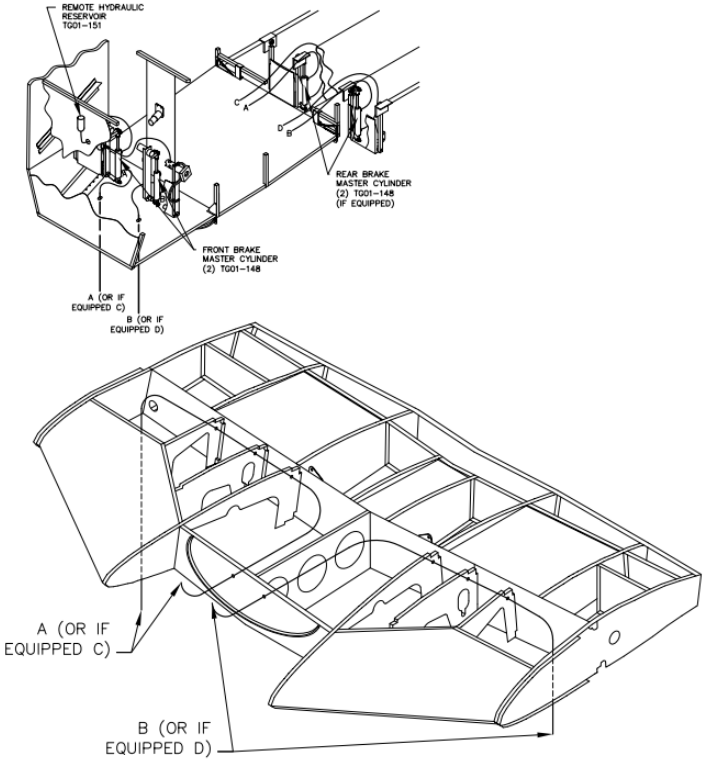


Figure 2: Brake system

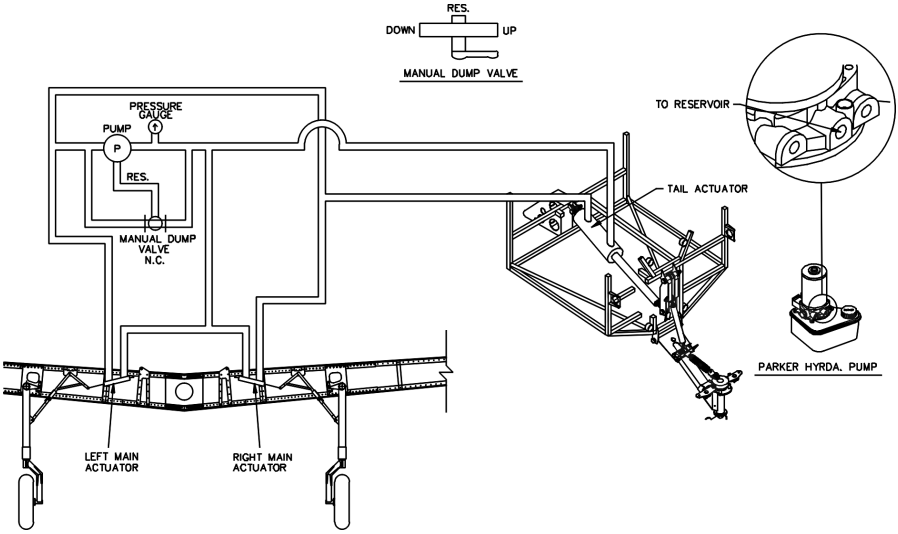


Figure 3: Hydraulic system

housed within the control pedestal under the engine controls. Pressure is supplied to the control unit from an engine driven pump mounted on the left engine.

To effect extension or retraction of the gear and flaps, the controls which protrude through the face of the pedestal are moved from the center "Off" in the desired direction. When the selected component is fully extended or retracted, hydraulic pressure within the selector valve unit forces the control back to a neutral or "Off" position, which allows the hydraulic fluid to circulate freely between the pump and the control unit. Also, it isolates the activating cylinders and associated lines from the hydraulic fluid supply. This prevents complete loss of fluid in the event of a leak in the lines between the selector valve and the component or at the actuating cylinders. The return of the control handle to the "Off" position

6 Control System and Surfaces

Dual stick and rudder flight controls are provided in the T-51D Mustang as standard equipment. All controls are light yet solid and effective in flight at all speeds down through the stalling speed. The front set of rudder pedals is equipped with toe brakes.

All control surfaces on the T-51D Mustang are either pushrod or cable controlled and are conventional sheet metal structures, fitted with aluminum hinges and needle bearings. The flaps are actuated by an electric motor located in the left side of the cabin wall. Access to this motor is obtained by the removal of the interior panel.

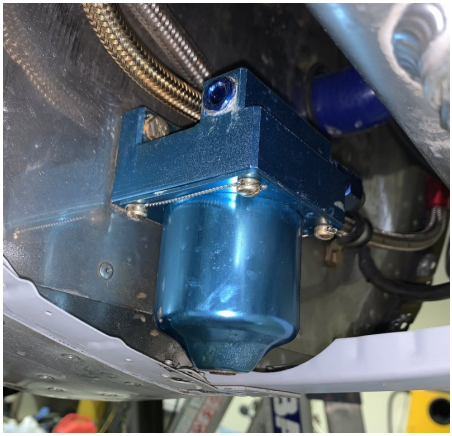
The ailerons and elevator are connected by push rods with the joysticks.

The rudder is connected by cables to the rudder pedals. The aileron is provided with a trim system which is actuated by a lever located on the left console.

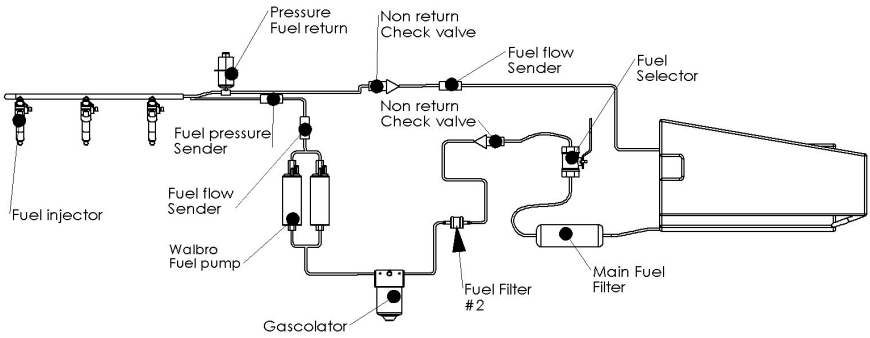
The horizontal tail is a stabilizer and elevator with an anti-servo tab which also acts as longitudinal trim tab, actuated by rocker switch on the left console. The trim functions are also available on the joystick. The stabilizer provides excellent stability and controllability throughout the entire speed envelope of the aircraft.

7 Fuel System

The fuel system incorporates dual electric high pressure pumps. The electronic fuel injection system is a programmable unit supplied by Simple Digital Systems, the SDS EM-4-F, initially developed for rally cars but now common on auto engine conversions for aircraft. The EM-4-F includes a mixture control knob facility, of limited authority allowing approximately 50% leaning from the baseline mixture setting.

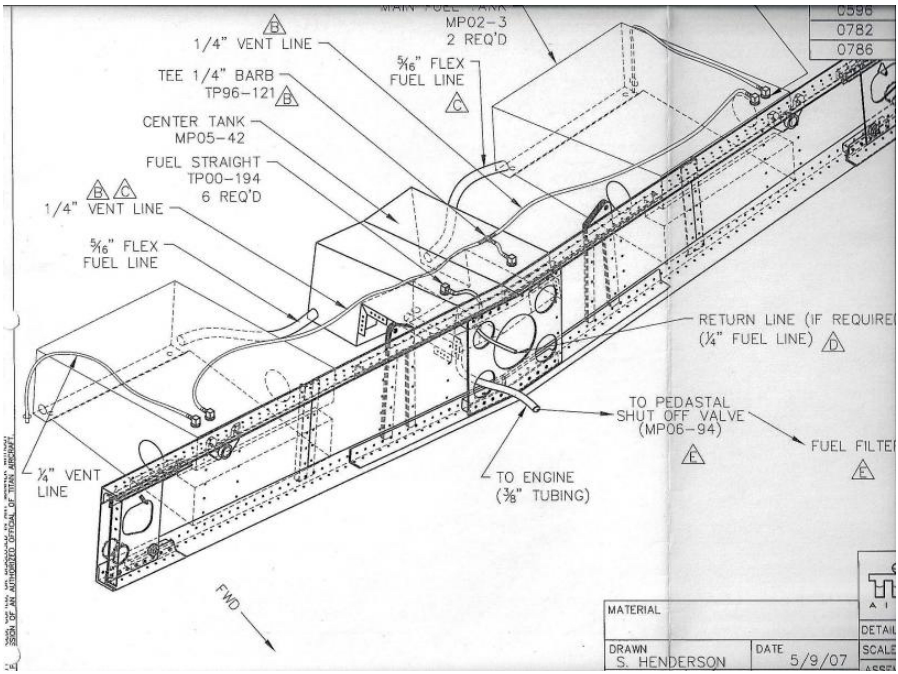


Two 47 liter fuel tanks located inboard in the wings provide fuel storage in the T-51D Mustang. The tanks should be kept full of fuel during storage of the airplane to prevent accumulation of moisture and to prevent deterioration of the seals. For long term storage without fuel, the seals should be coated with light engine oil to keep from drying out. The fuel system in the T-51D Mustang is simple, but completely effective. The two wing tanks feed directly into the belly tank.

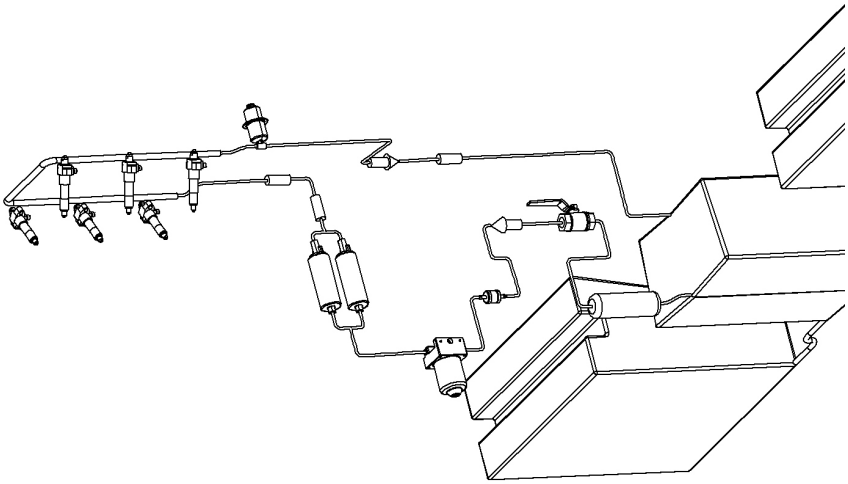


There is only one fuel valve which can be left on at all times. The fuel valve control is located on the lower right side of the center section.

Two electric fuel gauges left of the fuel valve control indicate the fuel quantity in each tank.



A fuel strainer is located on the left bottom side of the firewall. It is fitted with a quick drain and should be drained regularly through the access ports. In order to check the fuel system for possible moisture content, the quick drain valve on the fuel strainer should be opened and drained. This procedure should be conducted prior to every flight. Fuel screens are provided at the tank outlets, in the throttle body and in the fuel pumps.



8 Electrical System

The electrical system incorporates dual alternators and a Fullriver HC28 12 volt 28 AH battery. Either alternator is capable of supplying all essential electrical loads. T-51D Mustang's primary electrical system consists of a modern forced air-cooled 50 Amp automotive alternator providing the main ships power and providing charge to the battery.

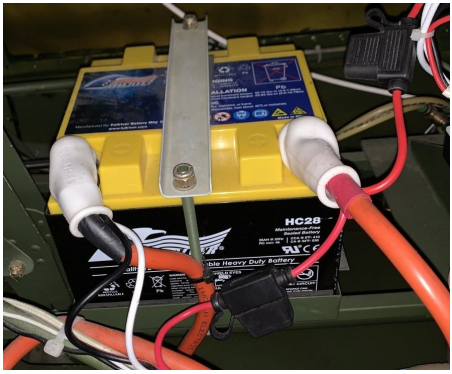
The master switch for the electrical system is located on the center of the control panel, along with the engine and starting switch. Other electrical switches and circuit breakers are grouped to the right on the instrument panel.

The starter switch is incorporated into the center console located immediately above the master switch on the right side of the panel. This switch is push button spring loaded and is depressed to engage the starter motor. To operate, turn on ignition switches. After starting, release the key and it will return to the BOTH position.

Automatic circuit breakers are provided for all electrical circuits. These units automatically break the electrical circuit if an overload is applied

to the system, preventing damage to the wires. To reset the circuit breakers, simply push in the buttons. Continual popping out of a circuit button indicates trouble in the electrical system and should be investigated.

The battery is mounted in the tail section, directly behind the baggage compartment.

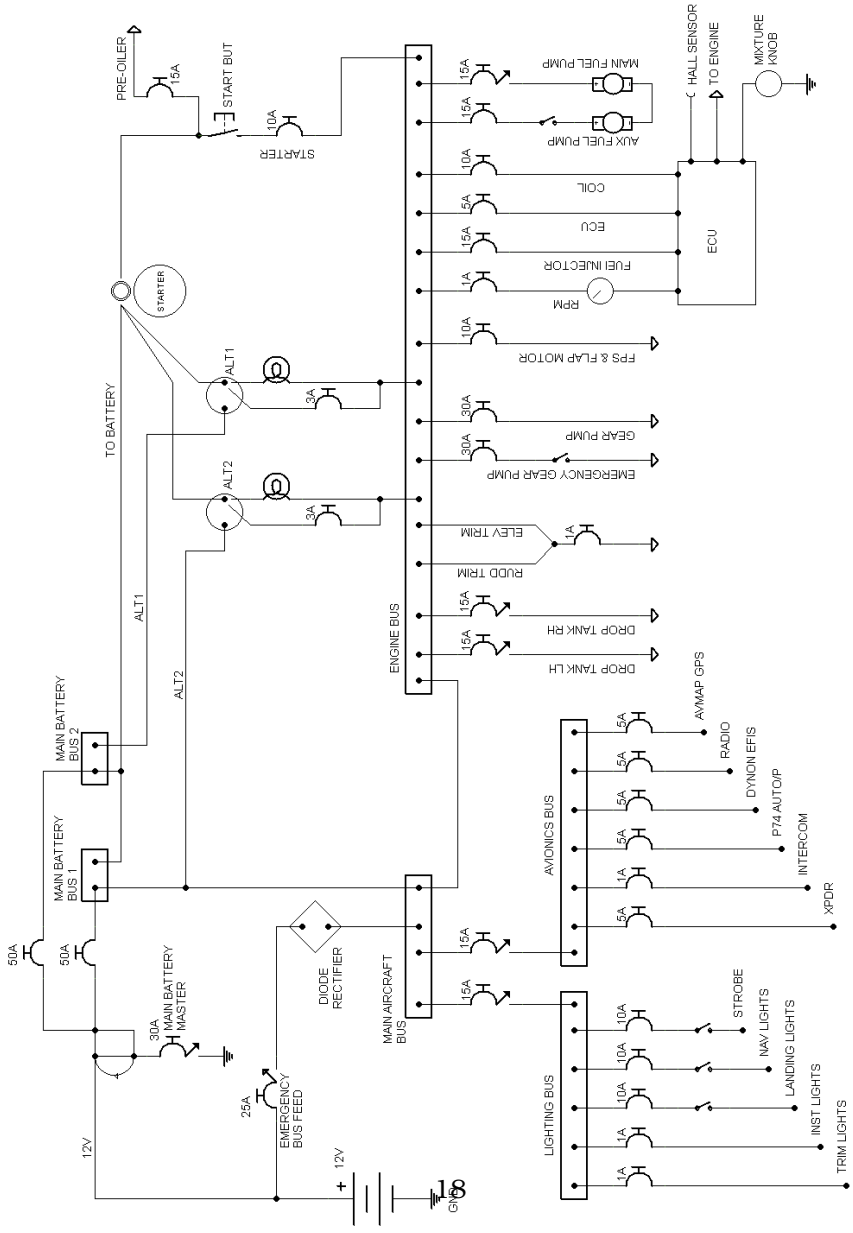


The Alternator switch is mechanically linked with the split master switch located on the lower right side of the instrument panel. A voltage regulator is included into the alternator itself. The alternator provides charging current for both batteries. As standard equipment an external power receptacle is available on the left tail section.

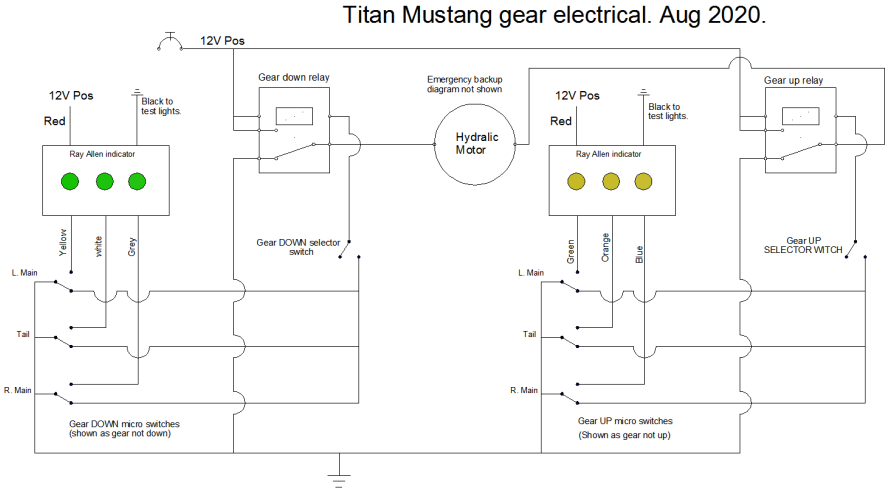
> *CAUTION - When connecting to an external power source, airplane master switch must be in the OFF position.*

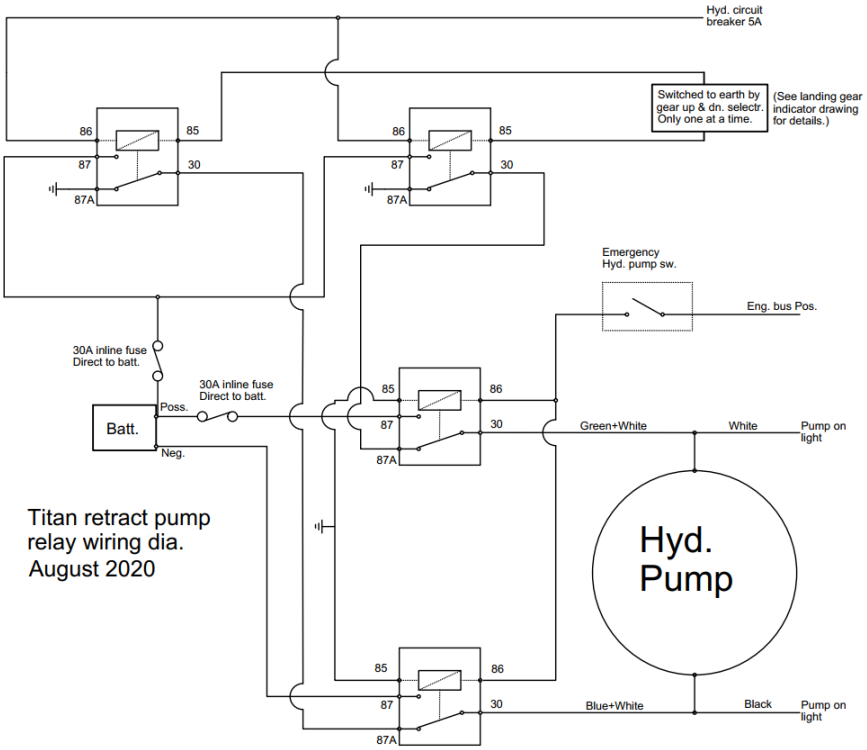
ELECTRICAL DIAGRAMS

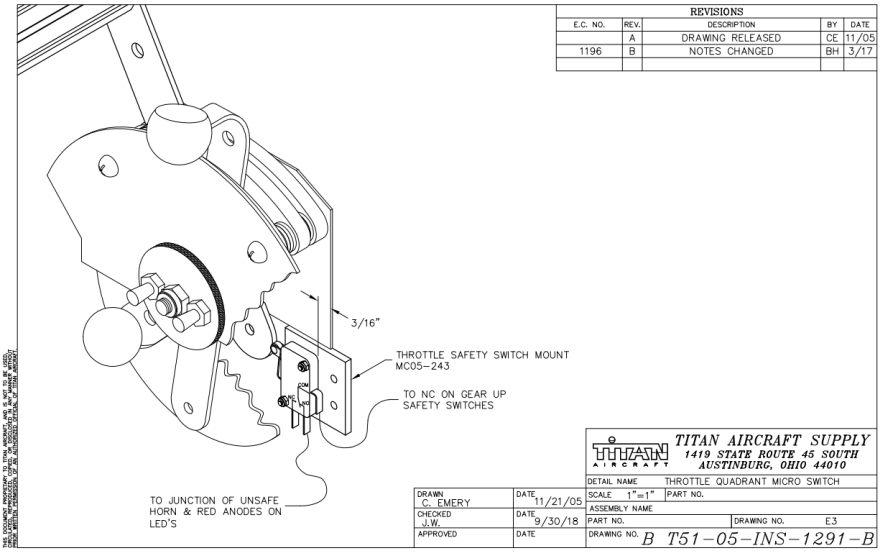
Power Distribution



Landing Gear




Hyd. circuit breaker 5A
Switched to earth by gear up & dn. selectr. Only one at a time.
(See landing gear indicator drawing for details.)
86
85
87
30
87A
Emergency Hyd. pump sw.
Eng. bus Pos.
30A inline fuse Direct to batt.
30A inline fuse Direct to batt.
Batt.
Poss.
Neg.
Green+White
White
Pump on light
Hyd. Pump
Blue+White
Black
Pump on light
Titan retract pump relay wiring dia. August 2020



ELECTRICAL LOAD ANALYSIS T-51D Mustang - 12 VOLT

A. MAXIMUM PROBABLE CONTINUOUS LOAD - (less radio equipment):

ITEM	NUMBER USED in T-51D Mustang	TOTAL CURRENT 12.0 Volts	14.3 Volts
Flap Gauge Fuel Contents Gauge Fuel Pressure Gauge	1		
Alternator Contactor	1	0.6	0.7
Master Contactor	1	0.6	0.7
Navigation Lights Landing Lights Instrument Flood Lights		4.6	5.5
Strobe		5.0	5.9

B. INTERMITTENT LOADS

- Landing Lights

- Fuel Pump
- Starter Solenoids
- Cigar Lighters

PRIMARY EFIS FLIGHT INSTRUMENTS

The T-51D Mustang is fitted with a Dynon Avionics EFIS-D100 Electronic Flight Information System.

The EFIS-D100 provides a 7" wide-screen display featuring a large, easy to read text and graphics capable of displaying multiple pages side by side in a split-screen format. The instrument integrates multiple flight instruments, including airspeed, altitude, gyro-stabilized magnetic compass, turn rate, slip/skid ball, bank angle, and vertical speed.

Other functions include a clock/timer, g-meter, voltmeter and density altitude/true airspeed calculator.

User interaction takes place via the EFIS-D100 main display and the six buttons beneath.

Layout

All normal operation of the EFIS-D100 happens via the front panel. The front panel contains buttons and a display.

- Buttons – There are six buttons on the front panel of the EFIS-D100. The buttons are used to turn the instrument on and off, cycle between screens, scroll through menus, and adjust instrument parameters.
- Display – The display shows EFIS information, menus, and data obtained from other connected products

There are two methods for cycling between pre-defined screens:

Screen Cycling Using Hotkeys

With no menu displayed, press button one to cycle to the previous screen in your rotation. Likewise, press button six to cycle to the next screen in your rotation (see the figure on the next page).

Cycling via hotkeys only allows you to display screens that are in your screen rotation. They are meant to give you quick access to the screen configurations that are most important to you. If you wish to access screens that are not in your rotation, use the SCREEN LIST as described below.

Screen Cycling Using the SCREEN LIST

Navigate to the SCREEN LIST menu by holding button six for at least two seconds when no menu is present (see the figure to the right).

> NOTE - If you only press button six momentarily, the display cycles to the next screen in your screen rotation.

Use the DOWN▼/UP▲ buttons to move the caret (>). The caret denotes the selected screen.

Press GOTO► to remove the SCREEN LIST and display the selected screen. If you wish to stay on the same screen, you may either select your currently displayed screen with the caret and press GOTO►, or press CANCEL.

EFIS Menus

Menus

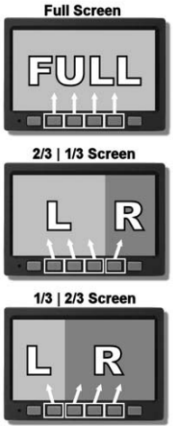
All interaction with the EFIS-D100 is accomplished through the use of its menu system. The menu system is accessed and navigated via the six buttons located on the front of the unit.

PAGE-SENSITIVE MENUS

On a screen where no menu is already present, buttons two through five are used to display a menu. With no menu displayed, pressing any one of these buttons causes the menu for the page above it to show at the bottom of the screen. For example, if a screen is divided into two pages with the left page occupying 2/3 of the screen and the right page occupying 1/3 of the screen, then pressing EFIS-D100 buttons two, three, or four (all below the left 2/3 of the screen) displays the main menu for the left page and pressing button five (below the right 1/3 of the screen) displays the main menu for the right page (see the figure to the right).

FUNCTIONALITY

A menu consists of two rows of gray boxes containing text. The upper row contains one tab that denotes the currently displayed menu. The lower row contains six labels that denote the function of the button below it. Many of the onscreen elements move up to avoid the menu. This prevents the menu from obscuring useful data while it is up. Upon exiting the menu, the screen returns to its normal appearance.



The configuration of the pages on the screen determines which buttons are used to display a page's menu.

9 Finish

All aluminum sheet components of the T-51D Mustang are carefully finished inside and outside to assure maximum service life. Both sides of all pieces are Alodine treated and/or sprayed with zinc chromate primer. External surfaces are coated with durable synthetic enamels in attractive high gloss colors.

10 Instrument Panel

The instrument panel of the T-51D Mustang has been designed to accommodate all of the customary conventional flight instruments in front of the pilot. All required engine instruments are available on the EFIS and an additional tachometer is provided as part of the analog cluster. The flight instrument group is in an easily visible sub panel. All instruments are accessible for maintenance by removing the instrument panel.

The Electronic Flight Information System (EFIS) in the flight group is provided with a fully redundant power system via the auxiliary battery. This will allow the EFIS system to remain operational in the event of a main battery failure. A switch for EFIS backup power from the auxiliary battery is included in the switch grouping on the right console. A Hobbs meter is provided to eliminate the need for constant reference to aircraft and engine log books. Two small instrument clusters, below the instrument panel, include fuel quantity gauges on the left, oil and fuel pressure on the right. This information is also available on the multifunction display of the EFIS.

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Radio units are installed in the center of the main panel. Radio circuit breakers are mounted in the circuit breaker panel on the right side

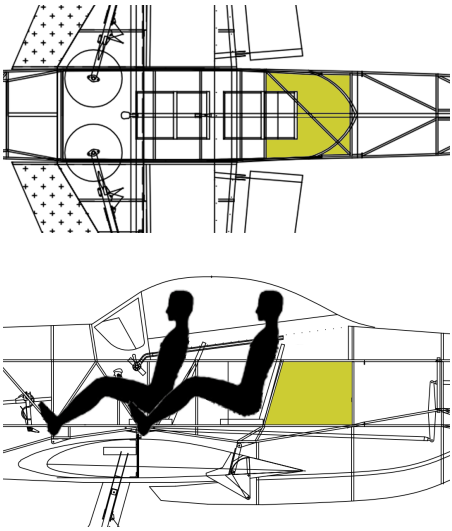
of the fuselage.

11 Seats

The T-51D Mustang has two fixed seats provided with impact absorbing high density foam cushions. The seats are constructed of aluminium extrusions and formed sheeting.

The distance from the front seat to the rudder pedals can be adjusted by moving the rudder pedal assembly fore and aft.

The crew are provided with four point harnesses. A one-piece rearward sliding canopy is fitted, operated by a chain and winding handle as on the full size Mustang. A fixed windscreen is fitted. The canopy is retained by a catch on the winding handle and a secondary catch.



Arm rests for both seats, headset jacks, auxiliary power points and storage compartments are all standard on the T-51D Mustang. The sliding canopy and baggage doors are equipped with locks operated by the same key. A tow bar is provided with each airplane and, when not in use, is stowed in the baggage compartment.

12 Radio Equipment

In the standard model of the T-51D Mustang, provisions for radio installations include dual microphone and headset jacks, a microphone and headset mounting bracket, wiring to these units and panel space for at least two radio sets. Radios, in different combinations, are available and are specifically chosen to provide in the T-51D Mustang, all of the most recent radio developments normally desired in this type of aircraft.

13 Ventilation

The flow of air for cooling the T-51D Mustang cabin may be controlled by the ball valve on instrument panel. Air is exhausted through an outlet on the rear of the cabin.

Part II

OPERATING INSTRUCTIONS

1 Preflight

Be sure that you have been thoroughly checked out before operating this aircraft. The following safety procedure instructions must become an integral part of the pilot's operational routine and/or preflight inspection. Before each flight, visually inspect the airplane and/or determine that:

1. The tires are satisfactorily inflated and not excessively worn.
2. The propeller is free of detrimental nicks.
3. The ground area under propeller is free of loose stones, cinders, etc.
4. The cowling and inspection opening covers are secure.
5. There is no external damage or operational interference to the control surfaces, wings or fuselage.
6. The windshield is clean and free of defects.
7. There is no snow, ice or frost on the wings or control surfaces.
8. The tow-bar and control locks are detached and properly stowed.
9. The fuel tanks are full or are at a safe level of proper fuel.
10. The fuel tank caps are tight.
11. The fuel system vents are open.
12. The fuel strainers and fuel lines are free of water and sediment by draining once a day.
13. The fuel tanks and throttle body is free of water and sediment by draining sumps once a week.

14. There are no obvious fuel or oil leaks.
15. The engine oil is at proper level.
16. The brakes are working properly.
17. The radio equipment is in order.
18. The weather is satisfactory for the type of flying you expect to do
19. All required papers are in order and in the airplane.
20. Upon entering the plane, ascertain that all controls operate normally, that the flaps and other controls are in proper positions and that the canopy is locked

2 Starting

Before starting the engine, the pilot should double check that the landing gear selector is in the DOWN position. Then set the parking brake and turn on the master switch and the electric fuel pump.

After making sure that the propeller is clear, turn the ignition on and engage the starter. As the engine fires, advance the mixture control. Continue to load cylinders by priming or unload by turning the engine over with the throttle open. If the engine still doesn't start, check for malfunctioning of ignition or fuel system.

Starter manufacturers recommend that cranking periods be limited to ten seconds with a two minute rest between cranking periods. Longer cranking periods will shorten the life of the starter.

- Battery master ON
- Set throttle set mixture for start
- Fuel on
- Primary fuel pump ON
- Prop clear
- Start

- After starting
- Auxiliary fuel pump ON
- Direct battery feed ON

3 Warm-Up and Ground Check

As soon as the engine starts, the oil pressure should be checked. If no pressure is indicated within thirty seconds, stop the engine and determine the trouble. (If a very cold temperature exists (-12 °C or below) a little longer period of time may be necessary).

Warm-up the engines at 1000 to 1400 RPM for not more than two minutes in warm weather, four minutes in cold weather. Avoid prolonged idling at low RPM as this practice may result in fouled spark plugs. If electrical power is needed from the alternator, the engines can be warmed at 2000 RPM at which point the alternator is putting out full charge. The engines are warm enough for take-off when the throttles can be opened without engine faltering.

The electric fuel pumps should be turned off one at a time after starting or during warm-up to make sure that both the pumps are operating. Prior to take-off both of the electric pumps should be turned on again to prevent loss of power during take-off due to fuel pump failure.

4 Take-Offs Climbs and Stalls

A Normal takeoff is performed with flaps retracted. A Short field takeoff is performed with one-third flap, which is set by deflecting the ailerons fully and extending the flaps so that the flap angle matches the angle of the down aileron (12 degrees).

After the take-off has proceeded to the point where a landing can no longer be made wheels-down in event of power failure, the flap, if used, can be retracted. The throttle should be brought back to climbing power, 24" MP and the RPM reduced to 5500. The best rate of climb is obtained at 90 kts, but to give a high forward speed as well as a good rate of climb, a cruising climb speed of 100 kts is recommended. All controls are effective at speeds down through the stalling speed and stalls are gentle and easily controlled.

STALL SPEED TABLE

Configuration	Power Off
Flaps Extended	45
Flaps Retracted	54

These figures are at gross weight (816 kg) in knots (kts).

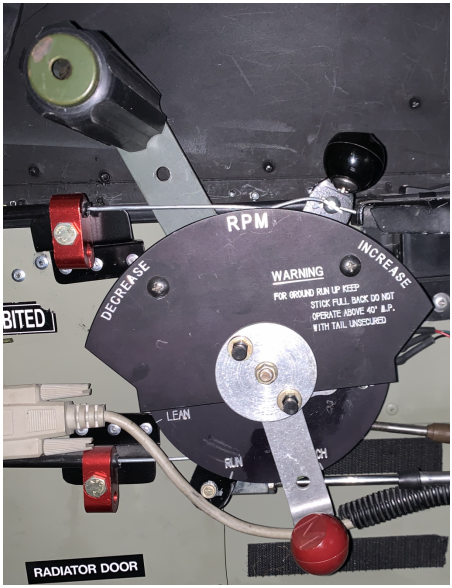
5 Cruising

The cruising speed of the T-51D Mustang is determined by many factors including power setting, altitude, temperature, load and equipment installed on the airplane.

The normal recommended economy cruising power setting of the T-51D Mustang is at 65% power. At 10,000 feet this gives a True Air Speed of 155 kts. This power setting is obtained under standard conditions at 4000 RPM and 22" MP. Fuel consumption is about ??? liters per hour.

The optimum cruising speed of the T-51D Mustang at 7000 ft is ??? kts. (See Power and Performance charts for power settings and performance under various conditions.)

The Suzuki V6 “Mini Merlin” engine on the T-51D Mustang can be cruised at any percent of power from 75% down. 4500 RPM is recommended for maximum cruise performance and lower RPM’s, down to 4000, for more economical cruising conditions. Ordinarily an RPM setting should be selected which will give maximum smoothness. To avoid undesirable stresses on the propeller and the possibility of detonation in the engine, no Manifold Pressure settings over 25" should be used with an RPM of less than ???.



The mixture is automatically controlled in cruising flight reduces fuel consumption at least 10% according to altitude. The fuel consumption data in this manual is for cruising with the mixture leaned.

There is no problem in overheating the engine cylinders on the T-51D Mustang

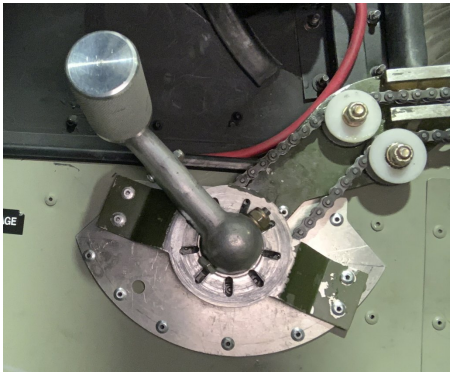
Detailed cylinder head temperature information is provided by the EFIS. The engines run very rich at the full rich mixture position and leaning is essential to achieve satisfactory economy of operation.

To lean, pull back the mixture control to the farthest aft point at which a rapid forward movement of the control does not produce a

momentary surge in RPM, indicating that the mixture has been too lean for maximum power. To get optimum leaning, the control must be within 3 mm forward of this point, which may be established by using a thumbnail as a temporary marker, or adding a pencil reference line on the quadrant placard.

6 Approach and Landing

During the approach, the first stage of flap (10°) can be lowered at speeds under 87 kts, preferably on the downwind leg. Flaps should be lowered in final approach at an airspeed under 85 kts and the airplane trimmed to a gliding speed of 70 kts. Normally about 12" MP should be maintained to give a reasonable approach angle. For aircraft with a constant speed propeller, RPM should be left at high cruising RPM or approximately 5500. This propeller setting gives ample power for an emergency go-around and will prevent over-speeding of the engines if the throttle is advanced sharply.



The mixture control should be kept in full rich position to insure maximum acceleration if it should be necessary to open throttle again.

The amount of flap used during landings and the speed of the airplane at contact should be varied according to the wind, the landing surface and other factors. It is always best to contact the ground at the minimum practicable speed consistent with landing conditions.

Normally, the best technique for short and slow landings is to use full flap and a small amount of power, holding the nose up as long as possible before and after ground contact. In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds, with half or no flaps.

Landing Check List:

1. Landing gear down and locked.
2. Mixture rich.
3. Propeller at high cruising RPM.
4. Both electric fuel pumps on.
5. Flaps full down or as desired (under 87 kts).

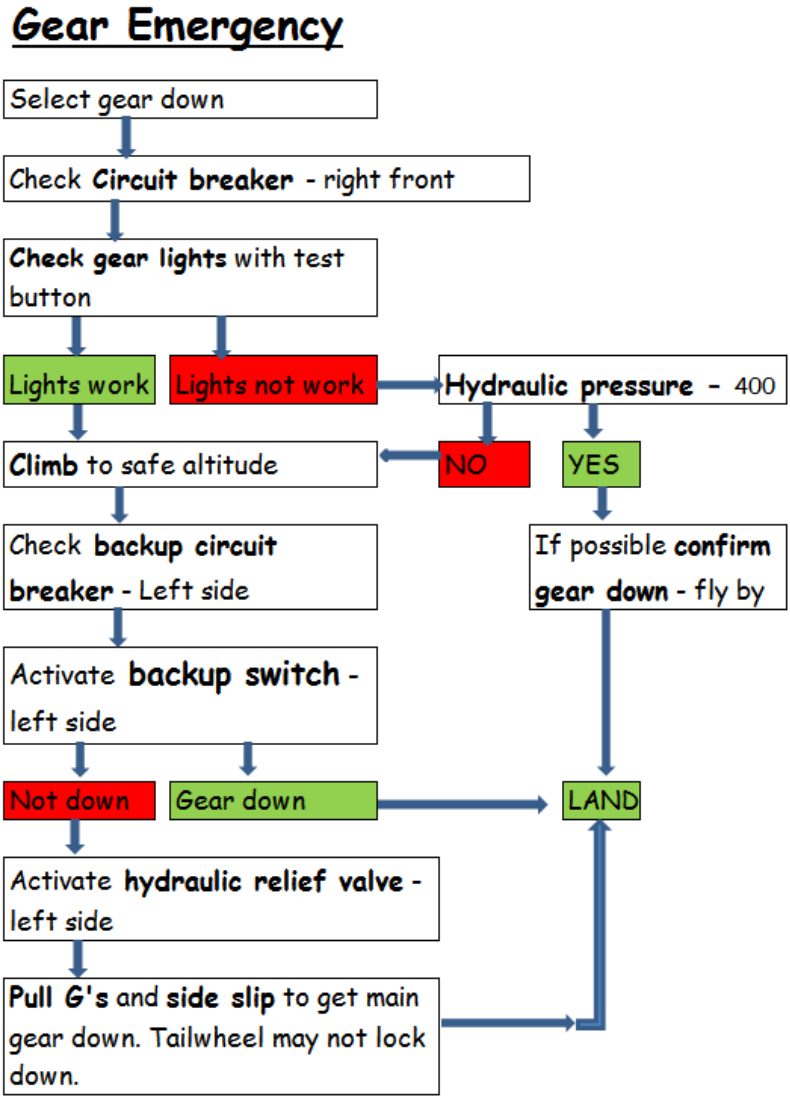
If it is necessary to "go around" apply full power and retract the flaps.

7 Stopping the Engine

After the landing roll, the flaps should be retracted and the electric fuel pump switched off. After parking, the radios should also be turned off and the engine stopped by pulling the mixture control aft to idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping. Then the ignition and all master switches must be turned off and the aircraft secured with chocks.

8 Emergency Procedures

8.1 LANDING GEAR



LANDING GEAR WILL NOT COME DOWN

- Double check hydraulic circuit breaker - ON
- Make sure pump is running

1. Indicated by amber gear-in-motion light illuminated
2. And by hydraulic pressure, usually varying.

FLASHING RED OVER-PRESSURE WARNING LIGHT and THE PRESSURE GAUGE IS BOUNCING AROUND 400 PSI

- It is likely that one of the gear limit switches is not activated
- If this is the case, one of the green down and locked lights will *not* be illuminated

If it is the tail wheel. Land as soon as practical and hold the tail off until the plane is stopped. If it is one of the mains, it is recommended (if possible) to request a visual verification of the gear's position from someone on the ground or another aircraft. If it appears that the gear is down, it is likely that at least the secondary lock is engaged, in which case, a gentle landing should be attempted. Make every effort not to put any side loads out the gear until sure that the over center lock is engaged.

- Look for indication of three green down-lock lights
- Land as soon as possible

AMBER LIGHT and NO PRESSURE

Probable cause:

1. Defective hydraulic pump motor
2. No fluid in the system

Action:

- Open dump valve
- Skid or slip as necessary to pull gear into lock position
- Check for green down-lock lights
- Tail wheel may not lock. Hold tail off until stopped or nearly stopped

8.2 ENGINE FAILURE

Engine failures fall into two main categories: those occurring instantly and those giving ample warning. The instant failure is rare and usually occurs only if ignition or fuel flow completely fails. Most engine failures are gradual and afford the alert pilot ample indication that he may expect a failure. An extremely rough-running engine, loss of oil pressure, excessive coolant temperature under normal flight conditions, loss of manifold pressure, and fluctuating rpm are indications that a failure may occur. When indications point to an engine failure, the pilot should land immediately.

Engine Air Restart

If the engine fails in flight and you have sufficient altitude, you may attempt a restart, provided the engine did not fail for obvious mechanical reasons.

- Airspeed 70 kts.
- Ignition switch ON.
- Master switch ON.
- Fuel selector ON.
- Both Fuel boost pumps ON.
- Ignition switch START if propeller is stopped.

Engine Failure During Take-off Run

The chances of engine failure during take-off can be greatly reduced if the engine is run up carefully and checked thoroughly beforehand. If engine failure occurs during take-off run before the airplane leaves the ground, proceed as follows:

- Close the throttle completely.
- Apply brakes as necessary to effect a quick stop.
- If doubt exists as to whether airplane can be brought to a safe stop on runway, ignition switch OFF and fuel shutoff lever OFF.
- Roll canopy back.
- Shoulder harness tight.
- After stopping, get out of airplane as soon as possible, and remain outside.

Engine Failure During Take-off (Airplane airborne).

Move mixture control to RICH if engine begins to fail. If engine fails completely immediately after take-off, act as follows:

- Lower nose at once, so that airspeed does not drop below stalling speed.
- Roll canopy back.
- If time permits, place the wing flaps full DOWN.
- Turn ignition switch OFF.
- Move fuel shutoff lever to OFF.
- Turn master switch OFF.
- Shoulder harness tight.
- Land straight ahead, changing direction only enough to miss obstructions.

- After landing, get out of airplane as quickly as possible and remain outside.

Engine Failure During Flight

If the engine begins to fail during flight, immediately move the mixture control to RICH. If the engine fails during flight, the airplane may be abandoned, ditched, or brought in for a dead stick landing. To land with the engine dead, follow these instructions:

- Lower nose at once so that airspeed does not drop below stalling speed. Keep IAS well above stalling speed.
- Turn OFF fuel shutoff lever.
- Turn OFF master switch, except when electrical power is desired for lights or avionics.
- Choose an area for landing. If near a landing field, make a radio call. Judge your turns carefully and plan to land into the wind.
- Roll canopy back.
- If a runway is available or if a moderately rough surface is available, landing gear handle DOWN. If landing in rough terrain, keep the gear up.

Figure 4: Best glide

- Wing flaps up, save flaps to overcome possible mistakes in judgment. Lower flaps fully when proper landing is ensured.
- Land into wind, changing direction only as necessary to miss obstructions.
- After landing, get out as quickly as possible and remain outside.

Maximum Glide

Maximum glide distance in event of a dead engine may be attained by gliding at an airspeed of 70 kts with gear and flaps up. If conditions permit, propeller control should be placed in full DECREASE in order to reduce drag as much as possible and to minimize windmilling. (See figure 4)

As this is an experimental airplane and all airplanes are different, the Best Glide speed will vary. Know the airplane you are flying.

NOTE - Best glide speed for the T-51D Mustang is going to be approximately 70 kts, although at different loading and aerodynamic conditions, this may change. Know your airplane, practice best glide speed with zero thrust and record it.

Best Glide Speed =_____

8.3 PROPELLER GOVERNOR FAILURE

Failure of the governor to operate may result in a runaway propeller. A runaway propeller goes to low pitch and may result in an engine speed that exceeds maximum rpm (red line). When such a failure occurs, the only method of reducing rpm is to pull the throttle back and decrease airspeed.

- Pull throttle back to obtain rpm within limits.
- Monitor engine oil pressure.
- Maintain level flight.
- Land as soon as practical.
- When over a landing area, lower the gear and make approach at normal landing speed.

8.4 FIRE

Engine Fire During Start

- Throttle closed
- Fuel shutoff lever OFF
- Master switch OFF
- Leave airplane as quickly as possible
- Extinguish fire

Engine Fire After Starting

- Throttle closed
- Fuel shutoff lever OFF
- Master switch OFF
- Leave airplane as quickly as possible
- Extinguish fire

Engine Fire During Flight

- Throttle closed
- Fuel shutoff lever OFF
- Master switch OFF
- Land immediately
- Exit the airplane as quickly as possible

Fuselage Fire

- Master switch OFF
- Activate fire extinguisher (if applicable)
- Land immediately
- Exit the airplane as quickly as possible

Wing Fire

- Turn OFF all wing lighting (position, strobe, etc.)
- Attempt to keep the fire away from the fuselage and fuel tank by side slipping the airplane.
- Land immediately.
- Leave the airplane as quickly as possible.

Electrical Fire

Circuit breakers protect most electrical circuits and automatically interrupt power to prevent fire when a short occurs.

> *NOTE - Closing a circuit breaker that has opened in flight should be attempted only in case of emergency, and then only with full knowledge of the potential hazards involved and after careful evaluation of the advantages and the disadvantages.*

If the defective circuit can be identified, the circuit breaker for that circuit should be turned off. If the fire still persists, turn the master switch OFF.

Land as soon as possible.

8.5 HYDRAULIC FAILURE

Later Hydraulic Systems

The diagram in figure 3 shows a simplified hydraulics system using the Parker Hannifin hydraulic pump. Which has check valves and over-pressure switches built in. This is a much simpler system and simplifies the emergency gear down procedure considerably. First double check, make sure the pump is running. If the pump is running the gear "in transit" light will be illuminated. If it is not, double check the landing gear lever position, and proper lever engagement, also double check that the circuit breaker is on. If all fails, it is recommended to open the emergency dump valve. This will allow the gear to extend under gravity. If the land gear circuit breaker switch is on the green "down and lock" lights will illuminate, when the gear is down and locked. If you do not have a green light, it is likely that the gear is not down and locked. Both main gear lights should be on (indication down and locked), before attempting a landing. It's likely that the tailwheel will not come down under gravity, because the air loads usually hold the doors closed. If this is the case, it is recommended to perform a wheel landing and hold the tail in the air until the airplane comes to a complete stop. This should result in little to no damage to your plane.

8.6 ALTERNATOR FAILURE

The alternator indicator warning light will illuminate indicating that the alternator is producing insufficient energy to run accessories and/or charge the battery. Also the Low Volt warning will be issued when main bus voltage drops below 13V.

Cycle the alternator field switch to see if the alternator will come back online. Pull and reset the 70A alternator B lead circuit breaker.

If alternator output is not able to be restored, the remaining battery power will need to be rationed for the remainder of the flight.

Switch OFF the alternator relay to shed all alternator loads and isolate the auxiliary battery. All non-essential equipment should be switched OFF to conserve power.

If needed, switch ON the EFIS backup to provide the EFIS with backup power from the auxiliary battery.

> *NOTE - The transponder cycle time can be as long as 5 minutes and the EFIS startup pages each need to be acknowledged (using ENT key) following restoration of radio power.*

8.7 EMERGENCY LANDINGS

An engine failure on the T-51D Mustang during flight will require an emergency landing to be performed. Trim the aircraft for the best glide speed of 70 kts. Locate a suitable landing area within the gliding range and establish an approach.

If the landing gear has been retracted, keep it retracted, unless you are assured of returning to the runway or another hard surface landing area. A belly landing on the runway is acceptable if it guarantees making it to the runway. Soft surface forced landings should always be made with the gear up to minimize airframe damage and to reduce the possibility of flipping over the nose.

If altitude permits, an engine re-start should be attempted. If the engine does not start, close the throttle and set the mixture to cutoff. Switch off the fuel pump, close the fuel valve and continue with the emergency landing. Care should be taken to maintain the best gliding speed by using the elevator and control the descent by maneuvering and using the flaps.

8.8 EMERGENCY DESCENT

If an immediate, rapid descent is required from altitude, roll the airplane into 45 degrees of bank or more (60-70 degrees desired) and apply 2-3 G's while simultaneously reducing the power to idle. Maintain a maximum of maneuvering speed (120 kts) during the

spiral descent. The propeller will provide some drag at idle power. Operating at or near Cl_{max} will increase induced drag and assist with increasing descent rate and controlling airspeed. If practical, slow below 87 kts, lower full flaps and maintain 2 to 2.5 g maximum, or buffet onset, whichever occurs first.

8.9 IN-FLIGHT CANOPY CLOSING PROCEDURE

Assuming adequate altitude has been attained:

1. Retard throttle
2. Reduce airspeed to 90 kts or less
3. Open air vent
4. Close canopy using crank handle
5. Recover power and airspeed

Other conditions, take-off, landing approach and general low altitude flight, will require action at the discretion of the pilot.

9 Ground Handling and Mooring

The T-51D Mustang should be moved on the ground with the aid of the tail wheel steering bar provided with each plane and installed in the baggage compartment.

Tie down ropes for mooring the airplane can be fastened to the wing tie down rings and at the tail skid.

The aileron and elevator controls should be secured by means of a safety belt or control locks to prevent control surface damage. The rudder is held in position by its connections with the rudder pedals and does not need to be secured except under unusually high wind conditions.

10 Weight and Balance

For weight and balance data, see the Weight and Balance Form, which gives the exact weight of the airplane and permissible center of gravity conditions.

11 Operation Tips

In the operation of the T-51D Mustang, as in that of any other type of aircraft, there are a few points of technique and information that apply particularly to this model. The following Operating Tips may be helpful in the operation of the T-51D Mustang:

1. Learn to trim the airplane for take-off so that only a very light back pressure on the wheel is required to lift the ship off the ground.
2. The best speed for take-off is at about 65 kts under normal conditions. Trying to pull the airplane off the ground at too low an airspeed decreases the controllability of the airplane in event of engine failure.
3. The flaps may be lowered at airspeeds up to 87 kts. To reduce flap operating loads, however, it is desirable to have the airplane at a slower speed before extending the flaps.
4. Before attempting to reset any circuit breaker, allow a two to five minute cooling off period.
5. Before starting the engine ascertain that all radio switches, light switches and the pitot heat switch are in the off position so as not to create an overloaded condition when the starter is engaged.
6. The trim tab on the T-51D Mustang is very responsive and a small adjustment in trim control gives a rapid trim change attitude.

12 Radio Operation

Communication and Transponder equipment controls are located in the center of the instrument panel. Associated auxiliary switches are located on a separate panel on the right side console. Circuit breakers are located on the same panel as the other circuit breakers.

All sets may be turned ON by the switch located on the control head of each particular unit, with the exception of the EFIS which has its switch located on the right hand console panel.

After power is supplied, the pilot may wish to operate the transmitter by moving the transmitter selector switch to the proper position. The switch is located on the selector switch panel.

A PS Engineering PM1000 II intercom provides audio cockpit communicatio to both occupants. The intercom is a monaural unit compatible with most aviation headsets and provides two station radio transmit capability.

13 Fuel Injection

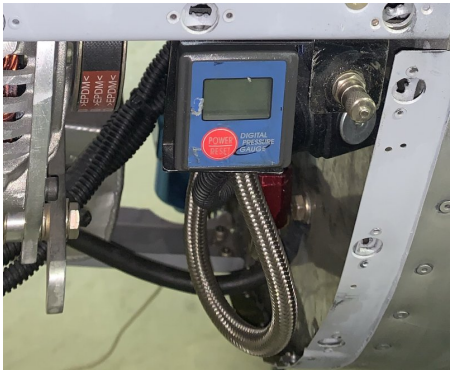
The H25A engine is equipped with Sequential Multiport Fuel Injection and electronic ignition system with individual ignition coil for each spark plug.

14 Low Power Low RPM Cruise

The high price of aviation fuel is causing aircraft owners and pilots to review their operations in search of ways to keep operating costs down. Those operating aircraft with controllable propellers have been requesting information on cruise operation in the low RPM range - ??? or ??? RPM for example. The number of queries received indicates great deal of interest and therefore it seems appropriate to share the information on this subject with all of our readers.

The Suzuki H27A Engine Operator's Manual has performance curves applicable to each engine series. The curve for the H27A 2.7L V6, series, 185 horsepower engine imprinted here as a reference for this

article. The curve does provide data on the maximum manifold pressure (MP), which may be used with any particular RPM at sea level and at altitude. The limiting manifold pressure line clearly restricts high manifold pressures with low RPM settings. There is a good reason for this; high manifold pressure and low RPM is similar to allowing your automobile to lug uphill in fourth gear. The pinging you hear in your automobile tells you that detonation is occurring and you should shift down to a lower gear. In an aircraft, detonation is not likely to be heard as damage occurs in the engine and it is then too late for preventive measures. For this reason, engine operation should be within the limitations established in the Pilot's Operating Handbook (POH).



15 Flight Operations

Operation	RPM	Power (HP)	Speed (kts)	Fuel flow (l/hr)
Normal max rated	2700	180		47
Performance cruise @ 75% pwr	2450	135	175	43
Economy cruise @ 65% pwr	2350	117	155	33
Cruise @ 55% power		99		29
Approach flaps up			72	
Approach flaps down			65	

15.1 STALLS

Stall characteristics of the T-51D Mustang are straightforward and predictable. They occur with relatively little pre-stall buffet warning, but at an obviously high angle of attack and slow speed. The break is gentle and control may be regained instantly with normal recovery procedures, often by simply relaxing back-pressure on the stick. The usual altitude loss is 25-50 ft and can be held to zero by a quick application of power. There is little tendency to drop a wing unless provoked with a skid or slip.

15.2 SPINS

Spin resistance of the T-51D Mustang is very good. Very definite pro-spin control inputs are necessary to provoke spin entry. Usually spin recovery can be achieved within the first revolution just by relaxing pro-spin control pressures. From fully developed spins, recovery is achieved by application of normal anti-spin control inputs.

15.3 AEROBATICS

It is recommended that the T-51D Mustang be limited to sport aerobatics; aerobatic maneuvers done solely for the enjoyment to the pilot rather than of spectators or judges. These maneuvers can be tailored to be gentle to both the airplane and the pilot. The T-51D Mustang can perform all the usual aerobatic maneuvers (see below) easily and gracefully at low g loads. It is rarely necessary to dive to attain entry speeds.

Maneuvering speed is 120 kts; maximum aerobatic weight is 768 kg and maximum aft CG is 200 cm when contemplating aerobatics.

The maneuvering speed is highest speed at which full and abrupt control can be applied without exceeding design loads. This is not highest permissible aerobatic entry speed, but control inputs must be limited to less than full at any speed above maneuvering speed.

The entry speeds for some maneuvers can vary over a wide range due to the large ratio of maximum speed to stall speed. For vertical maneuvers, Loops, Immelmann turns and Cuban eights, entry speed

has an inverse relationship to g forces required to complete the maneuver. An entry speed at lower speeds will require a higher G pull up than for entry near top end of speed range.

> *WARNING: Airspeed builds up very quickly, particularly in a dive. The T-51D Mustang is a pilot limited aircraft due to the light control - it is the pilot's responsibility not to overstress the aircraft. Control forces vary considerably with CG position - control forces at aft CG are much lighter than stick forces at forward CG.*

Limits: +6G -4G

Flight Regime	Entry Speed (kts)
Loop / Cuban-8	122 - 165
Immelmann	130 - 165
Aileron rolls / barrel rolls	104 - 156
Snap rolls	70 - 96
Vertical rolls	156 - 165
Split-S	87 - 96

Part III
CHARTS

1 Performance Charts

CRUISE SPEED

CONDITIONS:
Standard atmosphere
Mixture set to best power for 75% power.

TAKEOFF DISTANCE

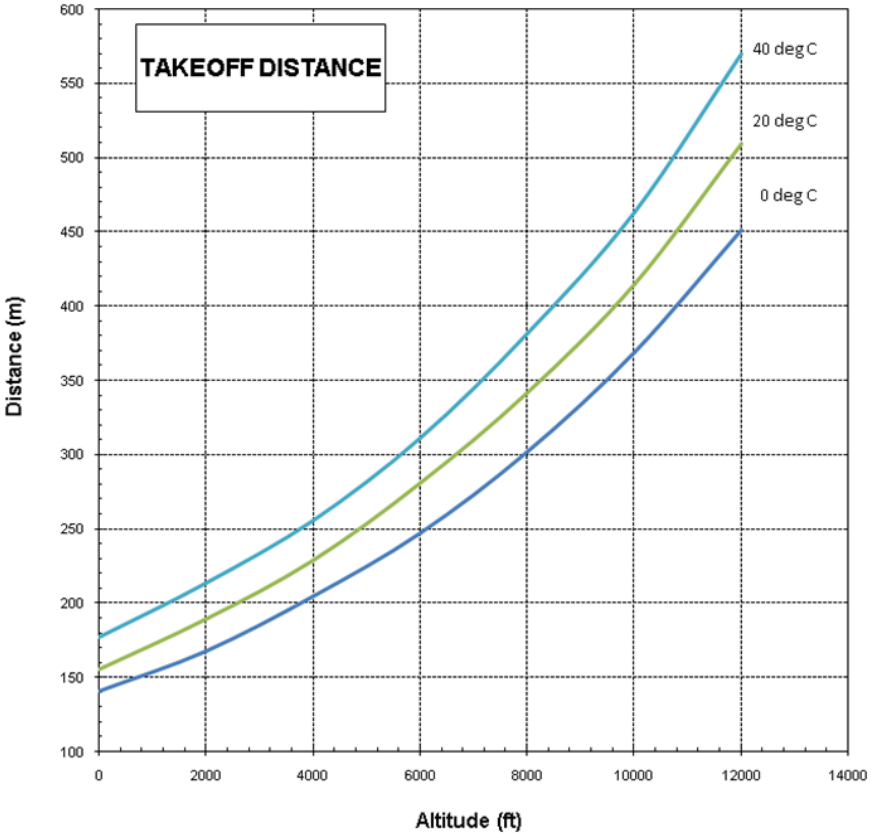
CONDITIONS:

Flaps 17° (set flap angle to match down aileron angle at full aileron)

2700 RPM, Full Throttle and Mixture Set prior to Brake Release

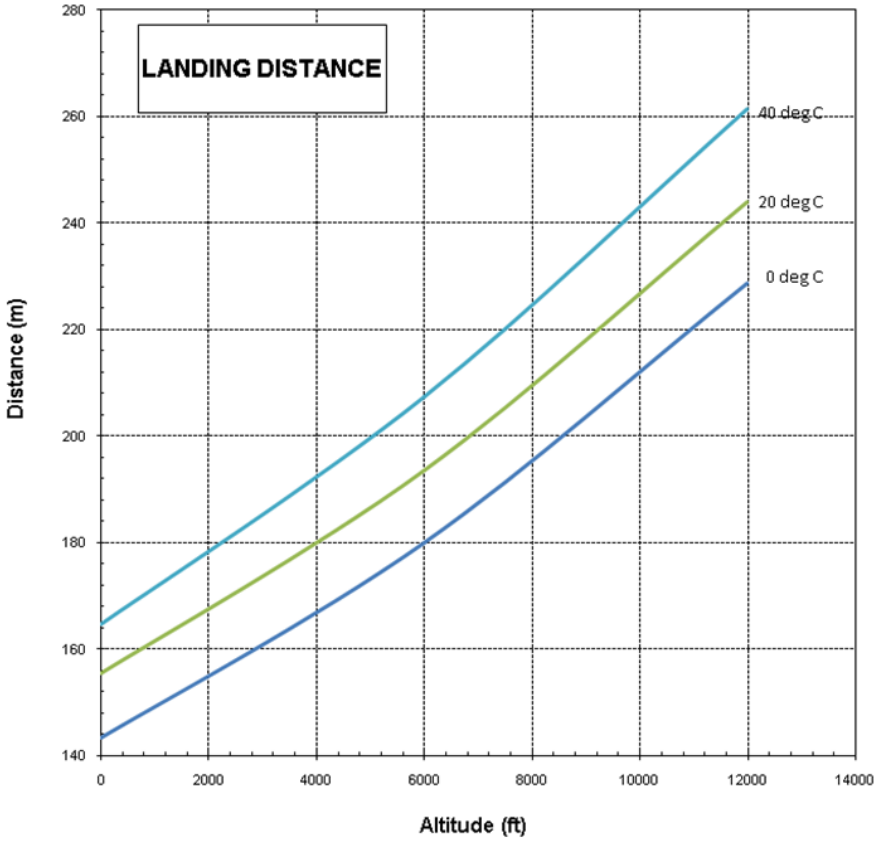
Paved, Level, Dry Runway

Zero Wind



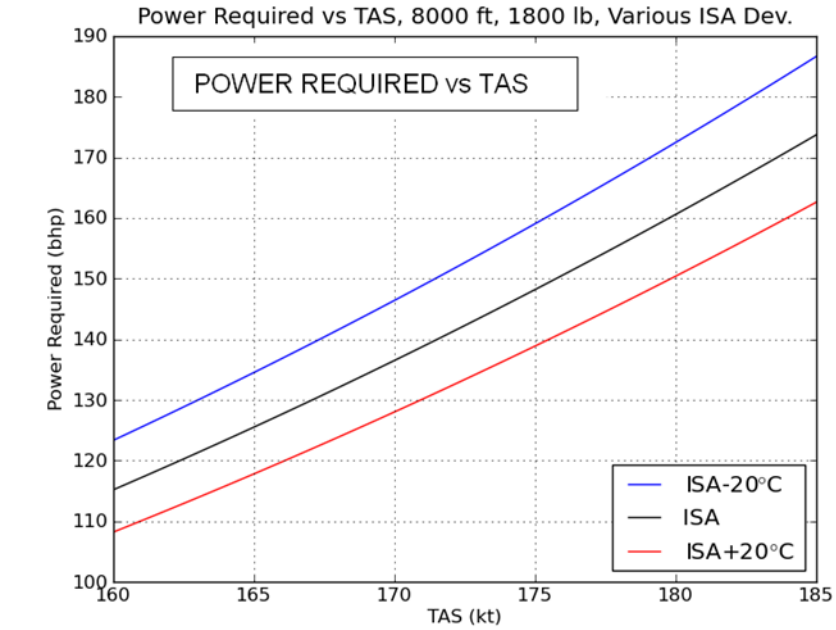
LANDING DISTANCE

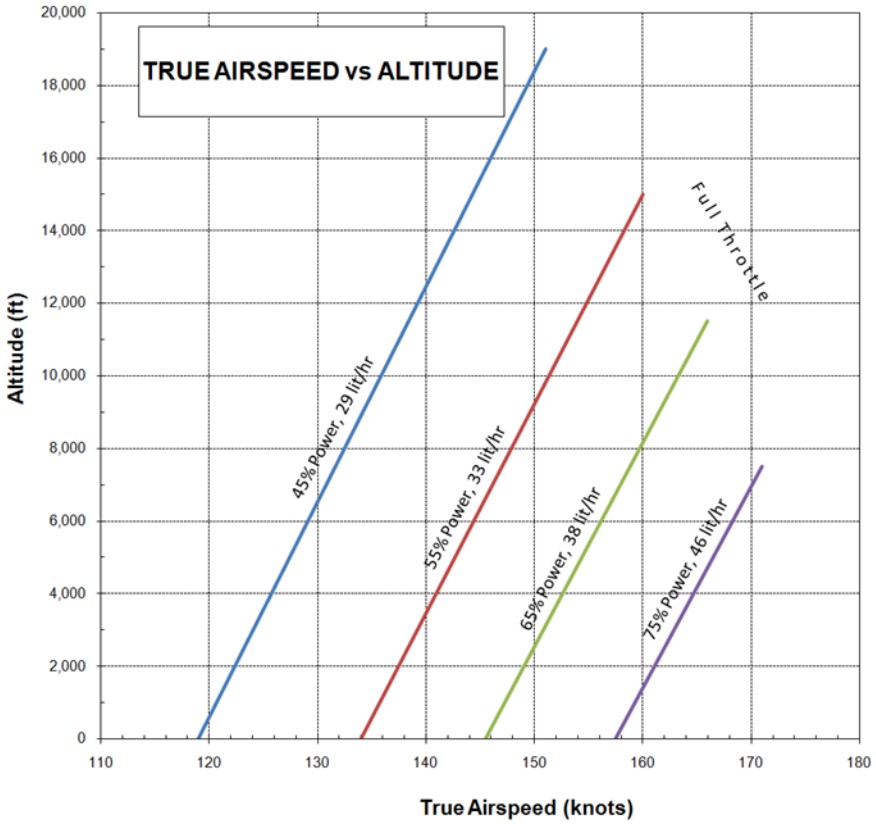
CONDITIONS:
Full Flaps
Power OFF
Maximum Braking
Paved, Level, Dry Runway
Zero Wind



POWER REQUIRED - TAS

Standard atmosphere





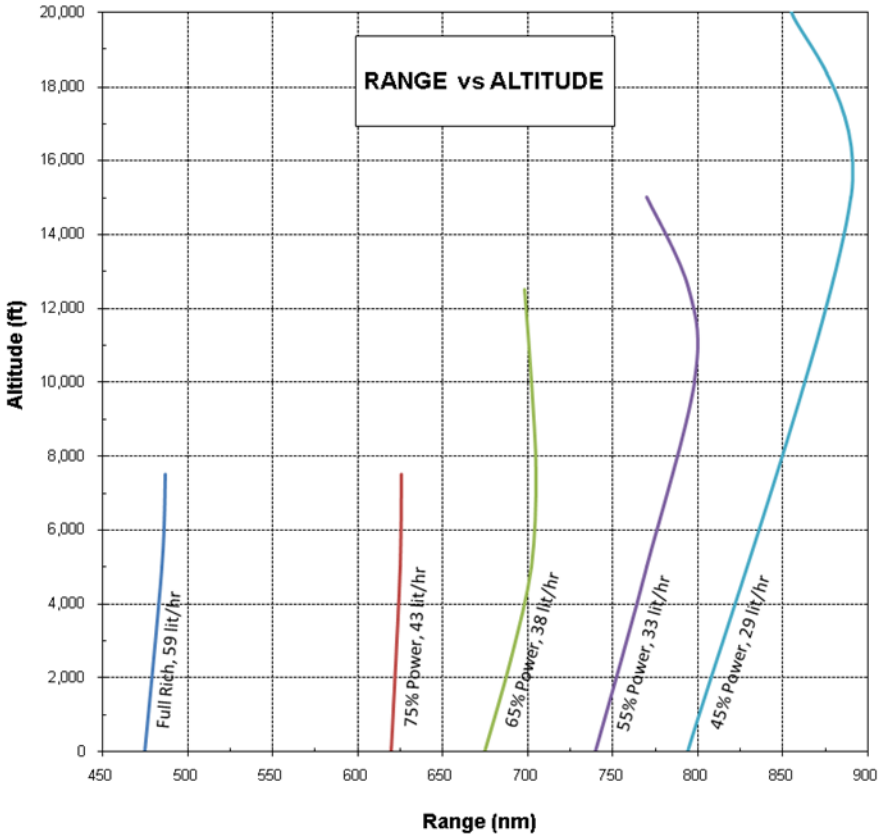
STALL SPEED GROSS WEIGHT

CONDITIONS:
Idle power
Deceleration 1 kt/s

CRUISE RANGE

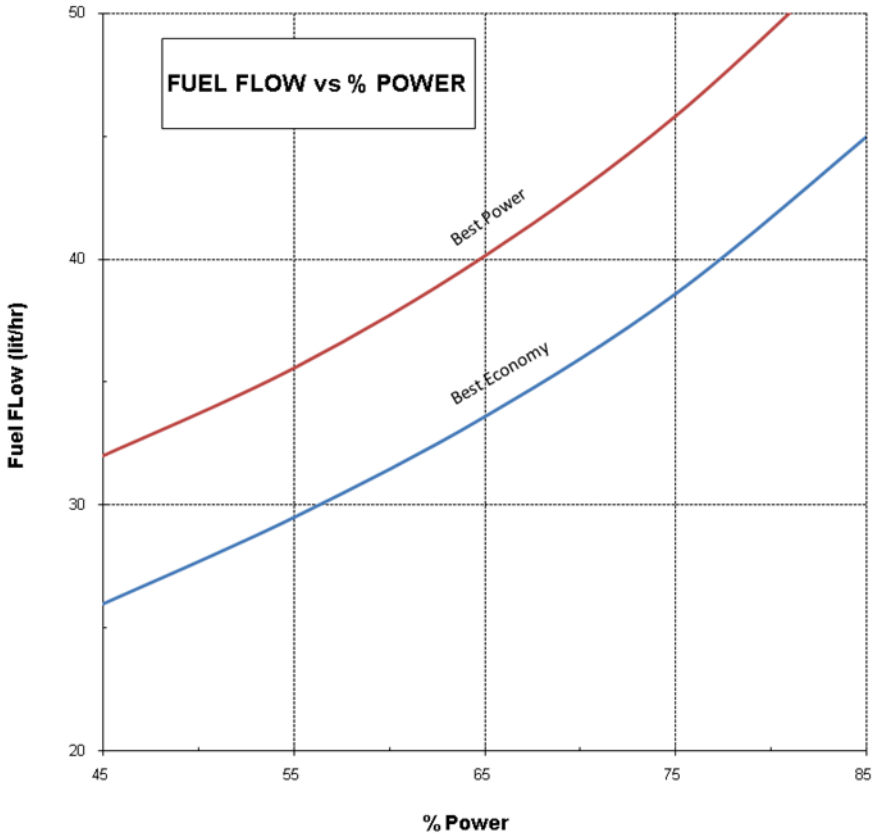
CONDITIONS:
Standard atmosphere

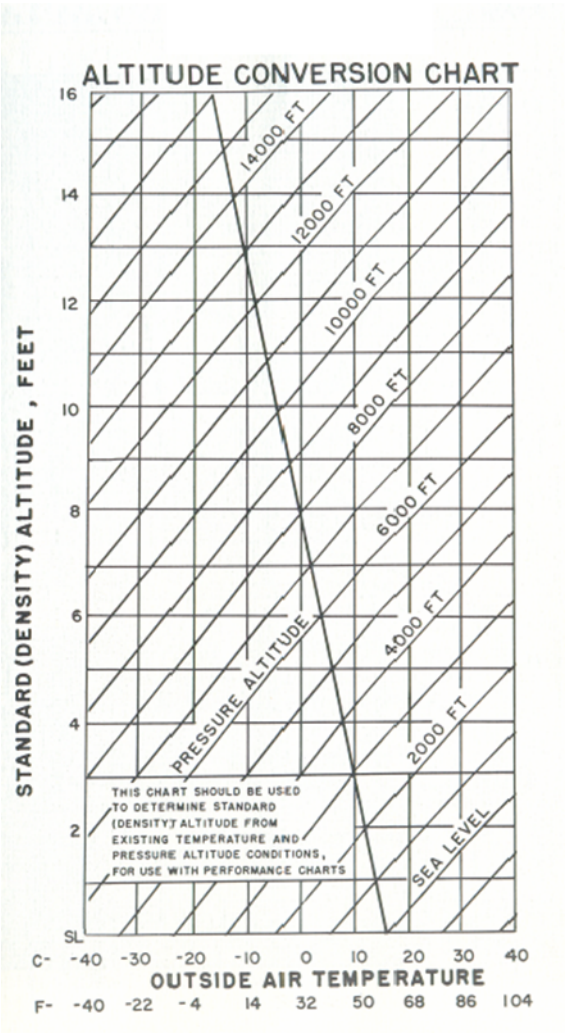
Mixture leaned

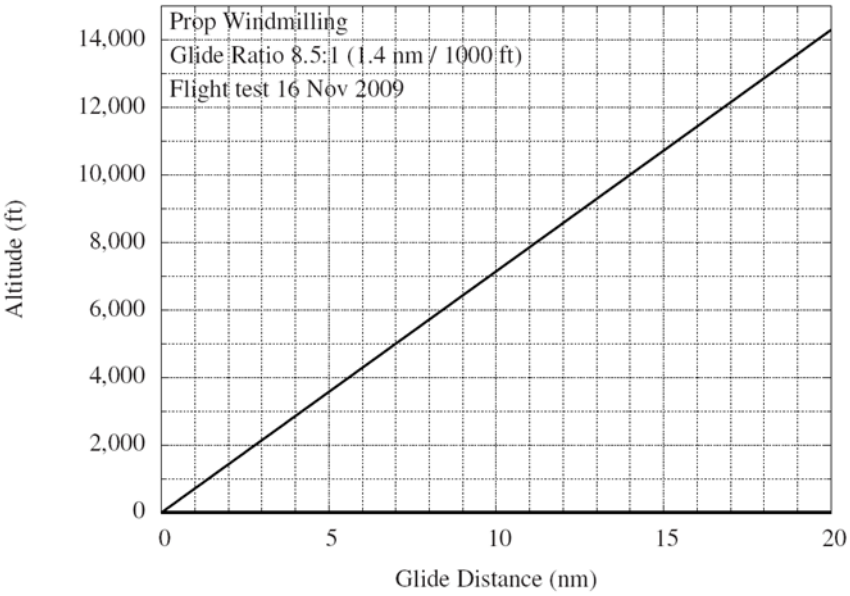


FUEL FLOW

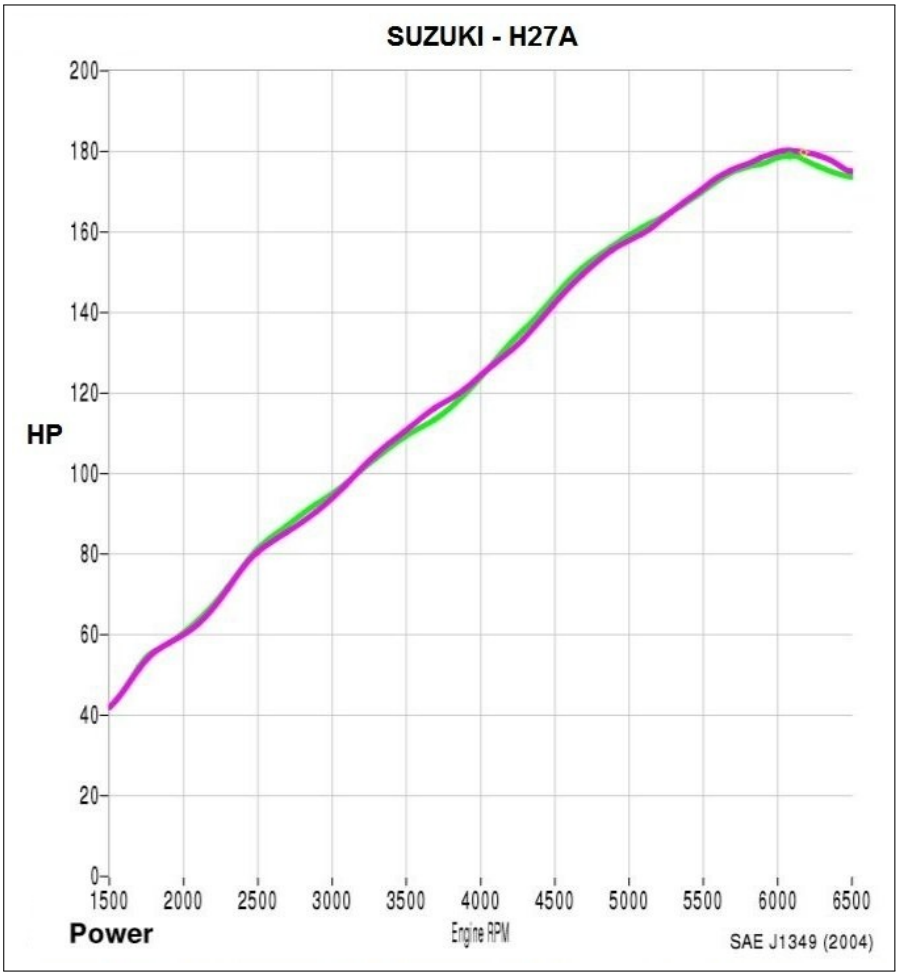
Standard atmosphere

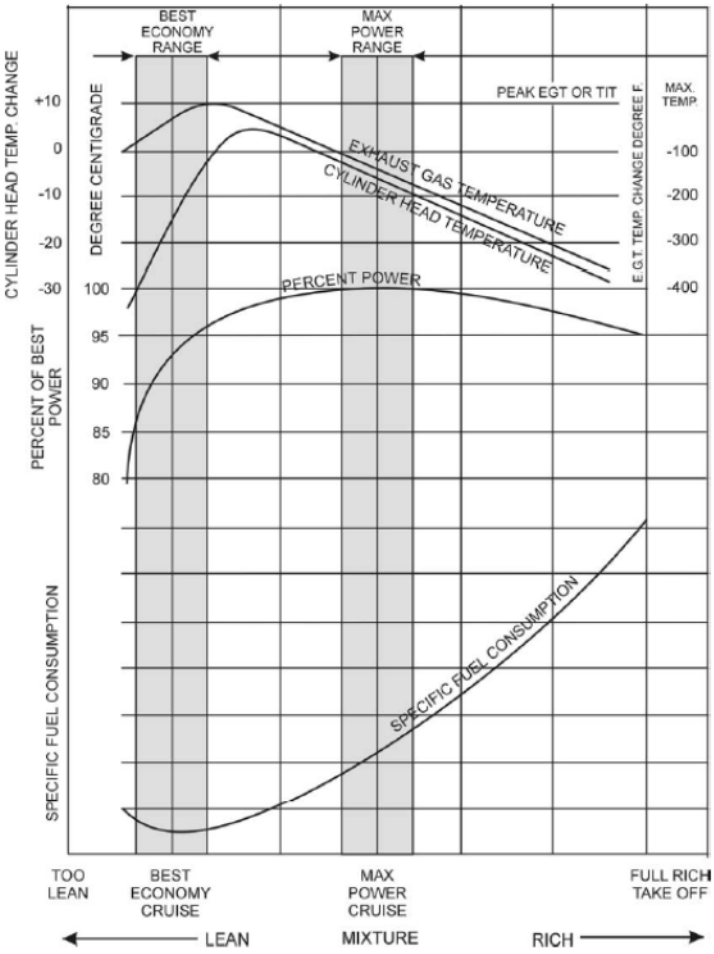

FUEL FLOW vs % POWER
Best Power
Best Economy
Fuel FLow (lit/hr)
50
40
30
20
45
55
65
75
85
% Power


ALTITUDE CONVERSION CHART
STANDARD (DENSITY) ALTITUDE , FEET
16
14
12
10
8
6
4
2
SL
14000 FT
12000 FT
10000 FT
8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
PRESSURE ALTITUDE
THIS CHART SHOULD BE USED TO DETERMINE STANDARD (DENSITY) ALTITUDE FROM EXISTING TEMPERATURE AND PRESSURE ALTITUDE CONDITIONS, FOR USE WITH PERFORMANCE CHARTS
C- -40 -30 -20 -10 0 10 20 30 40
OUTSIDE AIR TEMPERATURE
F- -40 -22 -4 14 32 50 68 86 104


Prop Windmilling
Glide Ratio 8.5:1 (1.4 nm / 1000 ft)
Flight test 16 Nov 2009
Altitude (ft)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
5
10
15
20
Glide Distance (nm)

2 II. Power Charts




BEST ECONOMY RANGE
MAX POWER RANGE
PEAK EGT OR TIT
MAX. TEMP.
CYLINDER HEAD TEMP. CHANGE
DEGREE CENTIGRADE
+10
0
-10
-20
-30
EXHAUST GAS TEMPERATURE
CYLINDER HEAD TEMPERATURE
E.G.T. TEMP. CHANGE DEGREE F.
-100
-200
-300
-400
PERCENT POWER
PERCENT OF BEST POWER
100
95
90
85
80
SPECIFIC FUEL CONSUMPTION
SPECIFIC FUEL CONSUMPTION
TOO LEAN
BEST ECONOMY CRUISE
MAX POWER CRUISE
FULL RICH TAKE OFF
LEAN
MIXTURE
RICH

Part IV

GENERAL MAINTENANCE

1 Leveling and Rigging

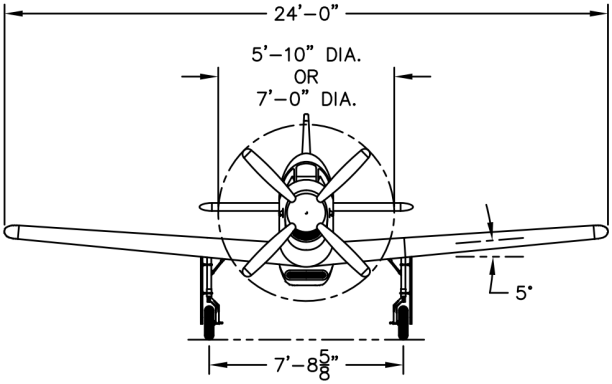
Leveling the T-51D Mustang for purposes of re-weighing or rigging is accomplished as follows:

1. Put the airplane on jacks to obtain the longitudinally level position.
2. To level the airplane laterally, place a bubble-protractor on a straight-edge held along the front spar on the under surface of the wing. Raise or lower the wing by pushing up or down on the tip until five degrees of dihedral is indicated on the protractor. The smooth, easy action of the landing gear makes it possible to position the wing laterally with very little effort. After checking the first wing at 5° dihedral, the opposite wing should also be checked to make sure it has equal dihedral.

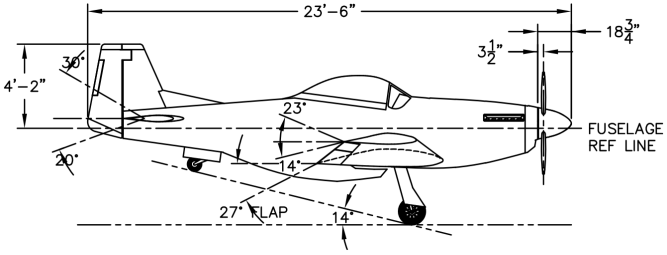
RIGGING INSTRUCTION:

Although the fixed flight surfaces on the T-51D Mustang obviously cannot be adjusted in position for rigging purposes, it may be necessary on occasion to check the positions of these surfaces. The movable control surfaces, with the exception of the flaps, all have adjustable stops, as well as adjustments on their cables or push-pull connections, so that their range of movement can be altered. The positions and travels of the various surfaces are as follows:

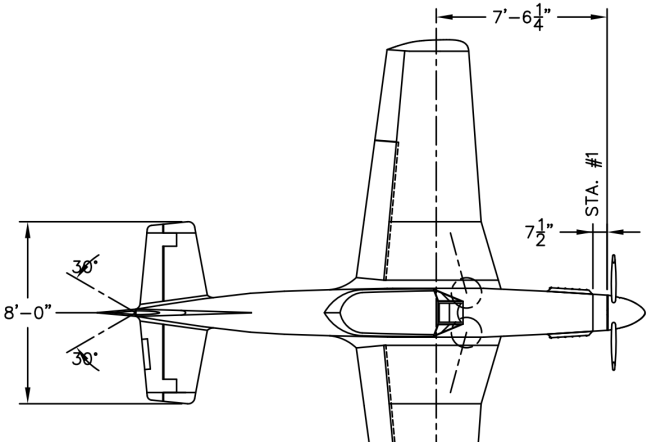
1. Wings: 5° dihedral, washout 0°.



2. Stabilizer: No dihedral. Incidence is 0° in relation to horizontal.
3. Fin: Should be vertical and in line with centerline of fuselage.
4. Ailerons: Travel -23° up, 14° down.
5. Flaps: Travel 27° down.
6. Elevator: -30° up and 20° down.



7. Rudder: Travel -30° left and 30° right.



For the purpose of adjusting the lateral trim on the T-51D Mustang, aileron tabs are incorporated on both ailerons. These tabs can be bent to position the aileron in flight, changing the lateral trim as desired.

2 Tire Inflation

For maximum service from the tires, keep the T-51D Mustang main wheels inflated to 3 bar and the nose wheel to 2 bar. Reverse the tires on the wheels, if necessary, to produce even wear. All T-51D Mustang wheels and tires are balanced before original installation and the relationship of tire, tube and wheel should be maintained upon reinstallation. Out-of-balance wheels can cause extreme vibration in the landing gear during take-off and landing. In the installation of new components, it may be necessary to rebalance the wheels with the tires mounted.

3 Battery Service

Access to the 12 volt, 18 ampere hour (Fullriver HC28) main battery is obtained by removing the rear access panel. The battery is installed on an aluminium and wood tray and secured with a clamp. The battery is of sealed gel type and requires no routine maintenance.

If the battery is not up to proper charge, recharge starting with a charging rate of 4 amps and finishing with 2 amps. Quick charges are not recommended.

4 Brake Service

The brake system is filled with MIL-PRF-5606 (petroleum base red) hydraulic fluid. This should be checked at every 100 hours inspection and replenished when necessary.

Do not use vegetable base brake fluids (blue) when refilling the system. When it is necessary to add fluid, remove the upper engine cowl, exposing the brake reservoir located on the firewall. Then add fluid to the reservoir, bringing the fluid to the indicated level.

If it is necessary to bleed the brake system to get air out of the lines, fluid should be added under pressure at the bleeder attachment on the brake unit.

No adjustment of brake clearances is necessary on the T-51D Mustang brakes. If after extended service, braking action requires too much movement of the toe pedal, new brake linings can easily be installed by removing the four bolts which attach the brake units, then replac¬ing the brake linings held in place by brass rivets.

Main wheels are quickly removed by first cutting the safety wire and removing eight bolts to drop the brake lining. Remove the dust cover, cotter pin and axle nut. The wheel will slip off the axle. The nose wheel is removed by taking off the hub nut and withdrawing the axle bolt, the axle retainer cups and the axle from the nose wheel fork.

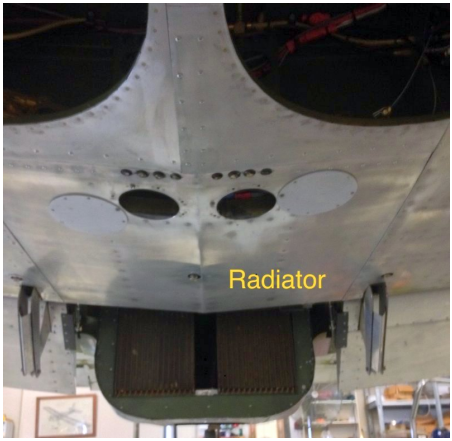
Tires are dismounted from the wheels by deflating the tube, then removing the wheel through bolts, allowing the wheel halves to be separated. In reassembling the wheels, care should be taken to torque the bolts properly, according to instruction on the wheels.

5 Landing Gear Service

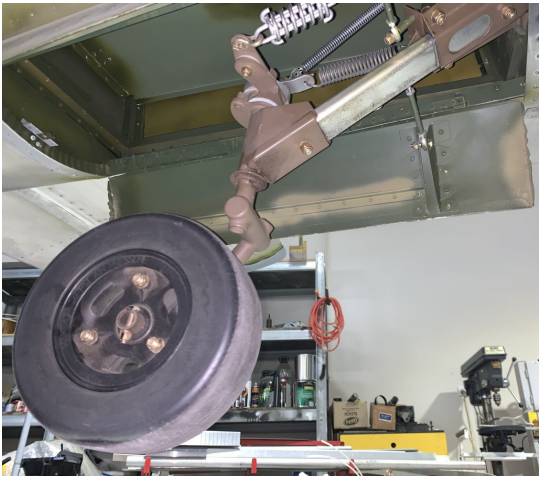
In jacking the T-51D Mustang up for landing gear and other service, the Jack Kit should be used. This kit includes two hydraulic jacks and a tail support; the jacks are placed under <where???> and the tail support attached to the tail skid.

Approximately 100 kg of ballast should be placed on the base of the tail support to hold the tail down. Then the jacks should be raised until all three wheels are clear of the floor.

The right and left landing gear units on the T-51D Mustang are completely interchangeable.



1. Main tires should also be inflated to between 1.7-2.4 bar.
2. Ensure that the wheel and tire assemblies are properly balanced.
3. Check for uneven tire wear.
4. Check the engine mount and gear leg for any cracks or play. The gear leg attach bolt, at the top of the leg, may be loose allowing movement of the leg in the mount socket.



Removal of the landing gear wheels is done as follows:

1. Remove the split pin from the castellated nut on the axle and then remove the nut

2. Pull out the axle and remove the wheel from the fork. Care should be taken not to drop the wheel bearings.

3. Remove the upper bearing retainer pins and slide both upper and lower bearings from the strut. The O-rings and wiper strips are then exposed for inspection.

To refit the landing gear wheel, reverse the above procedure, being very careful to see that the snap ring and the upper bearing retainer pins are properly reinstalled.

In the event that a wheel slowly loses pressure, the most probable source of trouble is a wheel puncture or faulty air valve. These parts should be checked first to determine whether or not air leaks are occurring. In the case of a puncture, it is recommended that the inner tube be replaced.

6 Hydraulic System Service

The hydraulic system is filled by adding fluid to the reservoir, located on the firewall. Only petroleum base hydraulic fluid, MIL-PRF-5606, should be used.

To add fluid to the system, remove the cap from the filler neck and fill the system completely while holding the filler tube extension level. Then turn the elbow on the filler tube down until the excess oil has drained out. (See separate instructions for filling, cleaning and bleeding the complete hydraulic system).

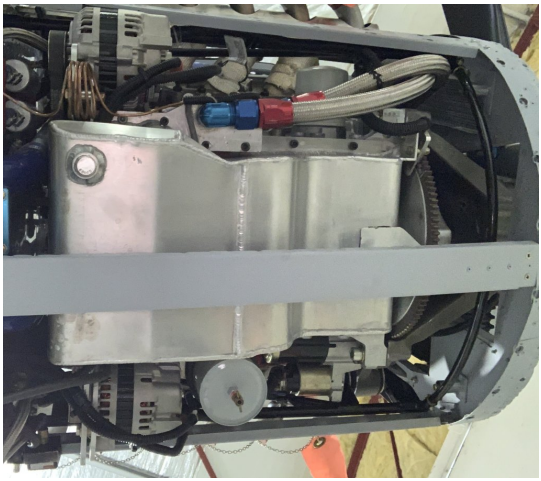
7 Fuel Requirements

Unleaded Mogas (RON 98) should be used in the T-51D Mustang.

Petrol/Mogas (RON 95) and Avgas 100LL can be used, but only for short periods. The system must be completely flushed with Unleaded Mogas (RON 98) and run through the engine afterward.

The use of lower grades of fuel is not advised.

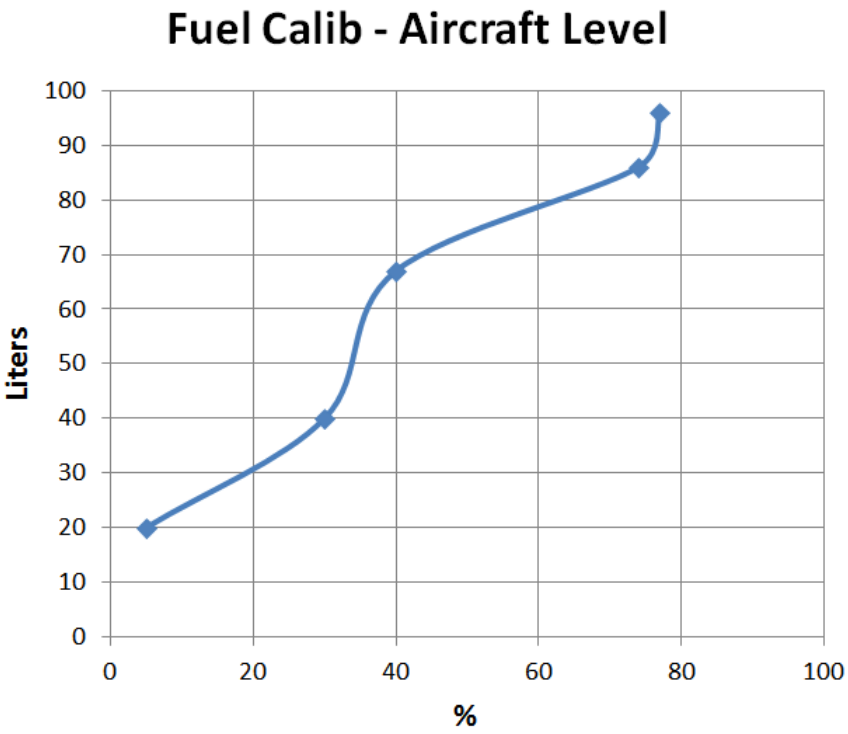
The oil capacity of the Suzuki V6 “Mini Merlin” engine is 5.5 liters. It is recommended that engine oil be changed every 25 flying hours or sooner under unfavorable conditions. The normal safe quantity of oil required is 4.8 liters. The following grades are recommended 5W-30, 10W-30.



8 Fuel Calibration

Fuel gauge calibration

Aircraft in level flight.



Gauge %	Liters
5	20
30	40
40	67
75	86
75	*96*

Fuel dipstick calibration

Dipping the wing tank with the tail on the ground.

Dipstick (mm)	Liters
40	40
100	67
230	86

9 Care of Air Filter

The throttle body air filters must be cleaned at least once every fifty hours and depending on the type of condition existing, it may be necessary to clean the filters daily or every five hours. Extra filters are inexpensive and should be kept on hand and used for rapid replacement.

The following cleaning procedure is recommended by the manufacturer of the filter:

1. Remove filter, inspect and clean by tapping it against a hard surface to remove grit, sand and dirt. (Do not blow out with an air hose, soak in oil, or cleaning fluid).
2. If the filter is found to be in good condition and is not obstructed after being properly cleaned, reinstall filter.

10 Care of Windshield and Canopy

The windshield and canopy are made of Plexiglas and a certain amount of care is required to keep them clean and clear. The following procedure is suggested:

1. Flush with clean water and dislodge excess dirt, mud, etc. with your hand.
2. Wash with mild soap and warm water. Use a soft cloth or sponge. (Do not rub)
3. Remove oil, grease or sealing compounds with a cloth soaked in kerosene.
   CAUTION - Do not use gasoline, alcohol, benzene, carbon tetrachloride, lacquer thinner or window cleaning sprays.

4. After cleaning, apply a thin coat of hard polishing wax. Rub lightly with a soft dry cloth.
5. A severe scratch or mar can be removed by using jewelers rouge to rub out scratch, smooth on both sides and apply wax.

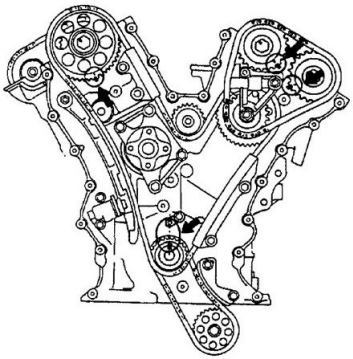
11 Serial Number Plate

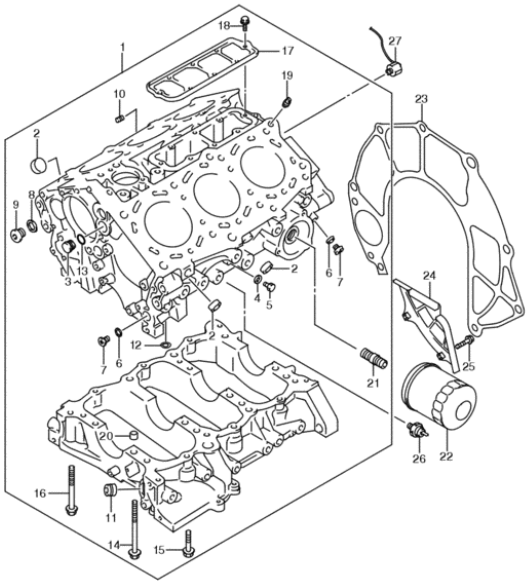
The serial number plate on the T-51D Mustang is located against the aft baggage compartment wall below the hat rack. The serial number of the plane should always be used in referring to the airplane in service or warranty matters.

12 Suzuki V6 “Mini Merlin” Engine

Specifications

TYPE	V-6, 4-stroke, liquid-cooled
MODEL	H27A
DISPLACEMENT	167 cu in (2,736 cc)
BORE	3.465 in (88 mm)
STROKE	2.953 in (75 mm)
COMPRESSION RATIO	9:1
INDUCTION	Multi-port fuel injection
IGNITION	Coil pack
GEARBOX REDUCTION	2.26:1
RAMP WEIGHT	307 lbs (139 kg)
POWER RATING	183 hp (136 kw) @ 6,000 rpm





Maintenance Data

Compression pressure

Standard	16.0-14.0 kg/cm2 / 250 rpm
Minimun	13.0 kg/cm2 / 250 rpm
Compression differential limit between cylinders	1.0 kg/cm2 / 250 rpm

Oil system

Recommended engine oil	Valvoline Armour synthetic 15W-40
Oil type	API SG, SH, SJ, SL or SM
Engine oil capacity (Refill capacity)	4.8 lit (5.5-6.2)
Oil change interval	50-100 hours
Oil pressure	390-470 kPa (55.5-66.8 psi) at 4,000 rpm
Oil Filter	Ryco Z418
Reduction drive gearbox	Synthetic Universal plus 75W-90

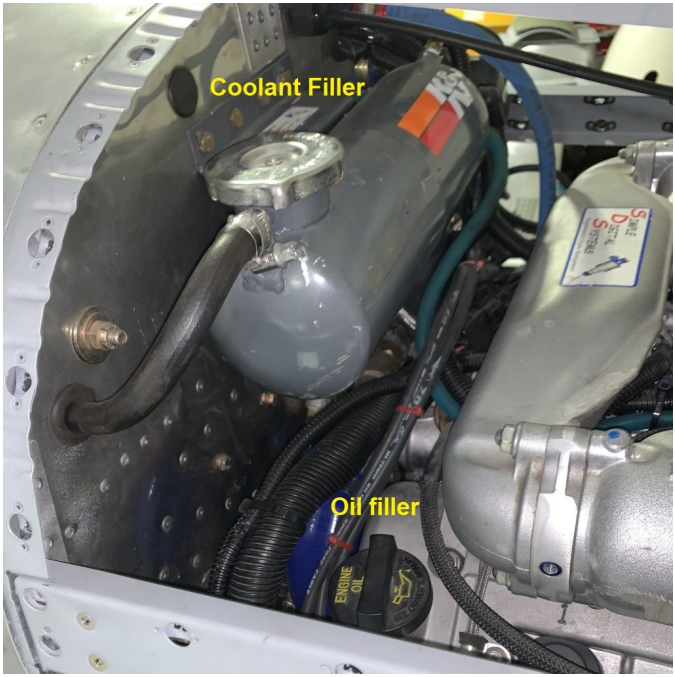
Ignition system

Spark plug	NGK: BKR6E-11; DENSO: K20PR-U11 or SK16PR11
Spark plug gap	1.0-1.1 mm
Spark plug tightening torque	25 N·m

Every 25 hours

With Aircraft at the level position:

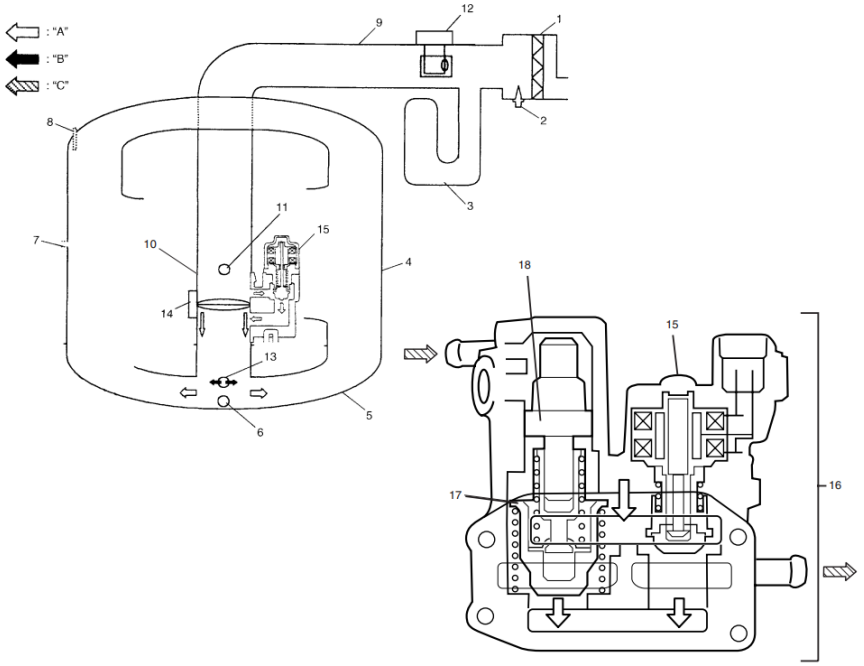
- Replace Engine oil (4.8 lit).
- Fill reduction drive gearbox fill to top of viewing port.



Air Intake System

The main components of the air intake system are air cleaner, mass air flow sensor, air cleaner, intake air pipe, throttle body, intake collector, idle air control valve and intake manifold. The air (by the amount corresponding to the throttle valve opening and engine speed) is filtered by the air cleaner, passes through the throttle body, is distributed by the intake manifold and finally drawn into each combustion chamber.

When the idle air control valve is opened according to the signal from ECM (PCM), the air bypasses the throttle valve through bypass passage and is finally drawn into the intake manifold.



"A" : Air	1. Air cleaner	6. PCV hose	11. Breather hose	16. IAC valve and fast idle control system
"B" : EGR	2. IAT sensor	7. Brake booster	12. MAF sensor	17. FIA valve
"C" : Engine coolant	3. Resonator	8. Fuel pressure regulator hose	13. EGR valve	18. Thermo - WAX
	4. Intake manifold	9. Intake air pipe	14. TP sensor	
	5. Intake collector	10. Throttle body	15. IAC valve	

Part V
WEIGHT AND BALANCE DATA

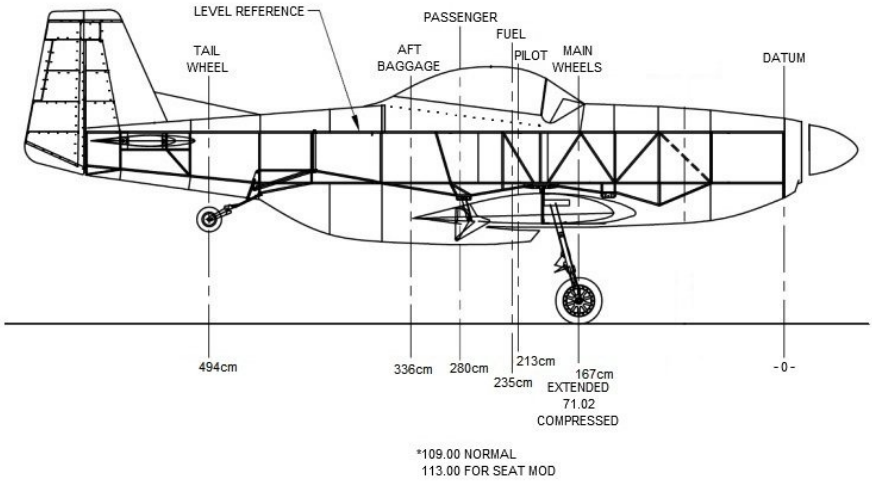
1 Loading Sheet

Make: Titan

Model: T-51D Mustang

Serial Number: m0xxxs0hk0085

Datum:	Front bulkhead
Design CG Range:	15% to 29% of wing cord (182.9 to 205.7 cm aft of datum)
Wing LE:	154.3 cm aft of datum
Main wheel left:	167.9 cm aft of datum
Main wheel right:	166.2 cm aft of datum
Tail Wheel:	494.4 cm aft of datum
Fuel:	235.7 cm aft of datum
Pilot:	213.2 cm aft of datum
Passenger:	279.5 cm aft of datum
Aft Baggage:	336.0 cm aft of datum



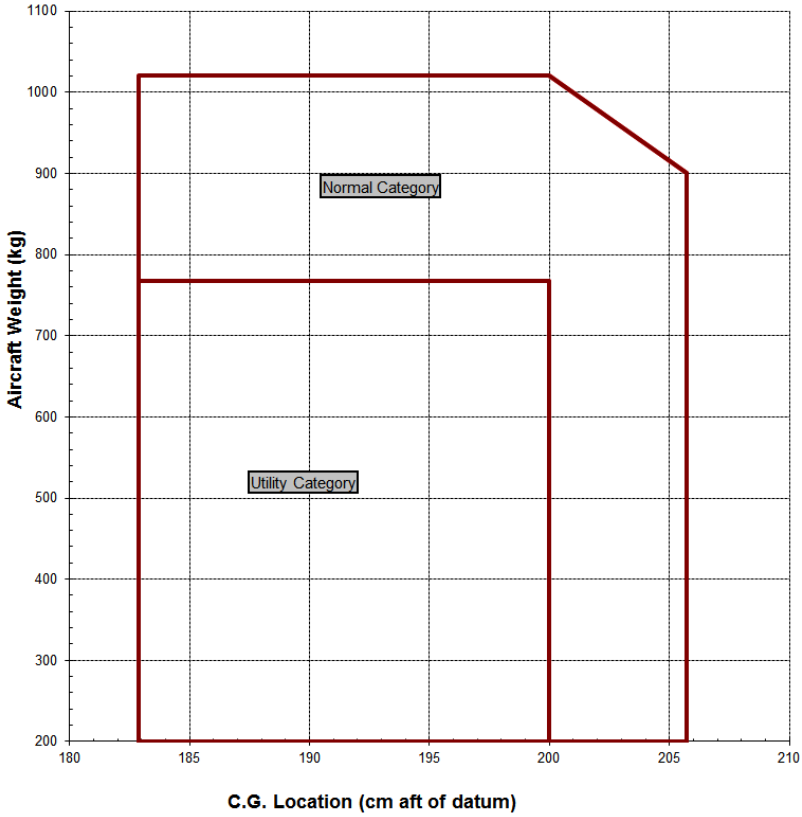
Aircraft weighed empty in level attitude. (Includes 5 lit of oil plus unusable fuel)

	Weight (kg)	Arm (cm)	Moment
Left Wheel	305.5	167.9	51293
Right Wheel	297.5	166.2	49445
Tail Wheel	18.8	494.4	9295

Total:	621.8 kg
Empty CG:	177.0 cm

2 W&B Envelope

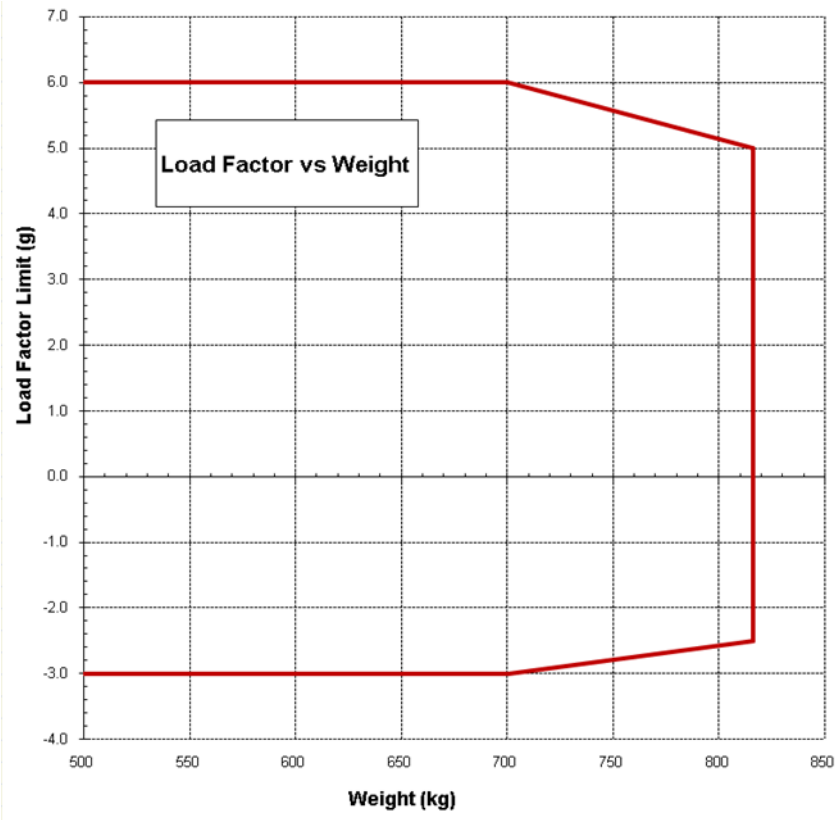
Datum: Front bulkhead.



Category	Description	Maneuver	Load factors
Normal	Non aerobatic	Stall from level flight Steep turn of 60 deg	+3.8g and -1.5g
Utility	Limited aerobatics	Wingover / Lazy-8 / Chandelle	+4.4g and -1.8g
Acrobatic	None permitted		

3 Load Factor Limits

Flaps Retracted weight 700 kg (1550 lb) and below: reducing linearly to 820 kg (1800 lb):	+6g to -3g +5g to -2.5g
Flaps Extended:	+2g to 0g

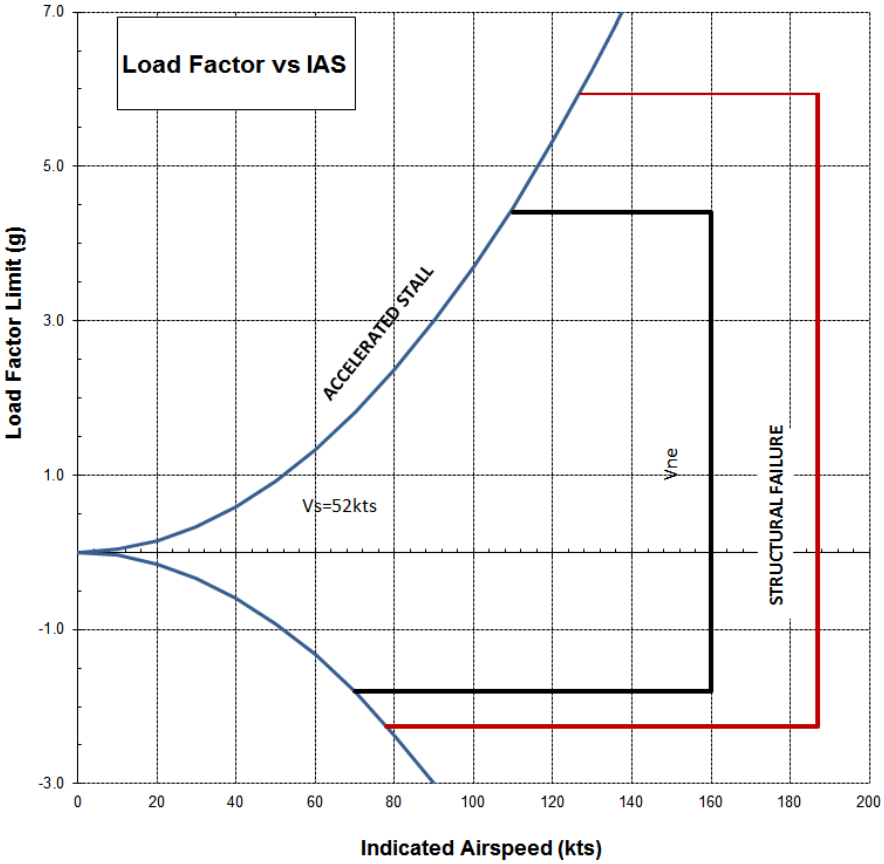


The load factor limit varies linearly between 820 kg and 700 kg.
NOTES:

1. The load factor limits for weights above 703 kg (1550 lb) are not published by Titan Aircraft, but are established based on conservative engineering analysis of wing bending moment vs load factor.

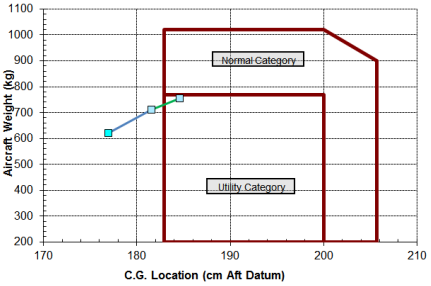
2. The load factor limits for flaps extended are based on FAR 23 structural design criteria, which the T-51D Mustang aircraft is designed to.

4 Flight Envelope



4.1 Worked Examples

Utility loading - Solo

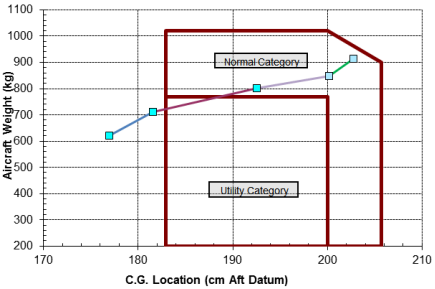


Titan T51 Mustang

	Qty	kg Weight	cm Arm	Moment
Basic Empty Weight	622 kg	622	177.0	110,034
Pilot	90 kg	90 kg	213.2	19,185
Pax	0 kg	0 kg	279.5	0
Aft Baggage (45 kg Max)	0 kg	0 kg	336.0	0
Fuel Lit. (95 Lit Max)	60 lit	42	235.7	9,901
Total		753.8	184.6	139,120

Note: Max Landing Wt 1020 kg

Cross country loading - Full up



Titan T51 Mustang

	Qty	kg Weight	cm Arm	Moment
Basic Empty Weight	622 kg	622	177.0	110,034
Pilot	90 kg	90 kg	213.2	19,185
Pax	90 kg	90 kg	279.5	25,158
Aft Baggage (45 kg Max)	45 kg	45 kg	336.0	15,121
Fuel Lit. (95 Lit Max)	95 lit	66.5	235.7	15,677
Total		913.3	202.8	185,175

Note: Max Landing Wt 1020 kg

Part VI

APPENDIX

1 DOCUMENTATION

Recreational Aviation Australia Ltd
ACN 070 931 645

Unit 3/1 Pirie Street
PO Box 1265
Fyshwick ACT 2609
Tel: 02 6280 4700
Fax: 02 6280 4775
www.raaus.com.au
Facebook: facebook.com/RecAviation

AIRCRAFT REGISTRATION NUMBER ASSIGNMENT NOTIFICATION

18 March 2020

Mr Michel Van Der Sluis
15 Toledo Circuit
Port Kennedy, WA, 6172

Re: Assignment of RAAus Registration Number for your aircraft:

Make:	**Team HiMax**
Model:	**1400Z**
Serial Number:	**662**

Registration Number: 19-1683

This registration number has been assigned to the above aircraft for one year only. Assignment of this number will lapse at the end of that period unless:

- The aircraft is completed and registered; or
- You advise that the number is no longer required; or
- You renew the assignment of the number and pay the appropriate fee at that time.

Please note that there are severe penalties under the Civil Aviation Regulations for flying an unregistered aircraft.

*******WARNING*******

The assignment of a registration number by RAAus **does not register** the aircraft with RAAus. Registration must be accomplished by completing the relevant forms as set out in the Technical Manual. Approval for flight is achieved on receipt of a registration certificate and/or permit to fly.

Yours sincerely,
Recreational Aviation Australia Technical Team

Michel van der Sluis
15 Toledo Circuit Port Kennedy WA 6172

25 Constitution Ave
GPO Box 367
Canberra ACT 2601

Phone: 02 6268 4111

www.airservicesaustralia.com

ABN 59 698 720 886

Record Number: 200046

Dear Michel van der Sluis

AIR NAVIGATION (AIRCRAFT NOISE) REGULATIONS 2018 – PERMISSION TO OPERATE WITHOUT A NOISE CERTIFICATE

I refer to your application for permission to operate a TEAM HiMAX - HiMAX 1400R, Registration No: 19-1683, Serial No: 662 without a noise certificate.

Permission is hereby given under Section 14(3)(a) of the Air Navigation (Aircraft Noise) Regulations 2018 for that aircraft to engage in air navigation without a noise certificate. That is, the extent to which the aircraft exceeds the aircraft noise standards is not significant.

Operational Conditions
The permission is subject to the following operational conditions.

The aircraft must comply with any noise abatement procedures that apply at any airport or aerodrome where the aircraft is operated. The operator of the aircraft is accountable for compliance with those procedures.

This permission does not extend to operation of the aircraft at a curfewed airport during curfew hours.

Related Links: http://www.infrastructure.gov.au/aviation/environmental/curfews/

Compliance with Safety and Air Traffic Directions
Nothing in this approval authorises the owner/operator to operate this aircraft in contravention of other applicable statutory requirements, such as the Civil Aviation Regulations, Civil Aviation Safety Regulations or any other statutory instruments.

A copy of this approval must be carried in the aircraft at all times and included in Operational Documentation (either attached to the Certificate of Airworthiness, the Flight Manual, or the Operations Manual).

Other Legal Requirements
The permit holder is responsible for complying with all applicable commonwealth and state legislation. It is advisable that the holder should seek advice from the airport owner /operator as to whether noise related restrictions apply (Including local noise abatement procedures or fly neighbourly agreements)

Time Period for Permit
This permit is valid until:

- There is a change of owner or operator of the aircraft, or
- Any modification that may affect the noise characteristics of the aircraft is made.

In this situation the relevant applicant should contact Airservices Australia for further advice.

COMPLIANCE WITH AIR NAVIGATION (AIRCRAFT ENGINE EMISSION) REGULATIONS 1995
As your aircraft has a piston engine installed, there are no requirements under Regulation 4 of the Air Navigation (Aircraft Engine Emissions) Regulations 1995.

Establishing Compliance
Not required.

Yours sincerely

Mark Latimore
Senior Environment and Noise Specialist
24 April 2020

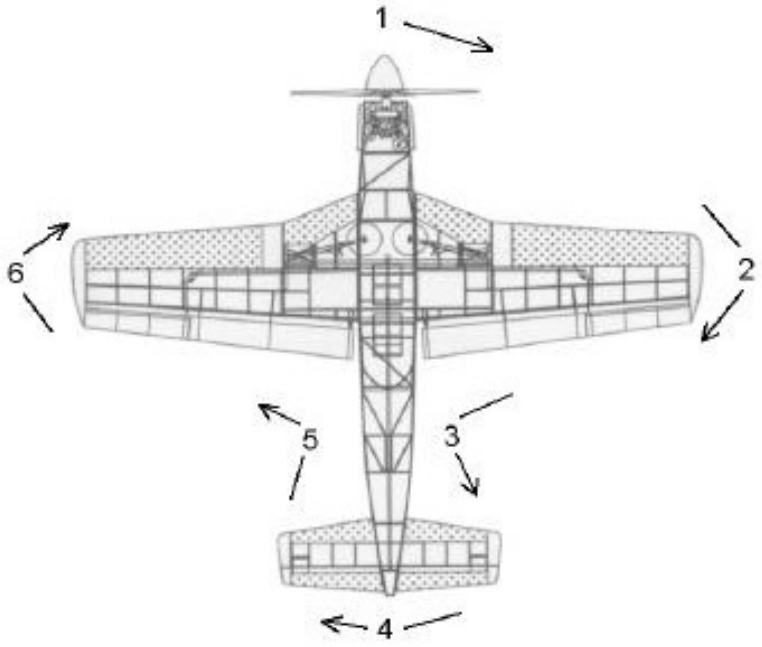
Aircraft Configuration for 19-1683

ICAO Type Designation	ULAC	***Engine Manufacturer***	ROTAX	***Propeller Manufacturer***	Bolly Props
Serial #	662	***Engine Model including Engine Type***	503DCDI Piston	***Propeller Model***	BOS3 62 x 52
Year of Manufacture	2020	***Number of Engines***	1	***- Number of Blades*** ***- Diameter***	2 62"
Other notes:					

Part VII

CHECKLISTS

PREFLIGHT INSPECTION



ENGINE

- Cowl for security
- Exhaust stacks for security
- Propeller for nicks and blade security
- Check oil level, coolant level

RIGHT WING

- Tire for proper inflation and wear
- Wheel and brake for wear
- Wheel well for fluid leaks
- Check gear assembly and down lock
- Check strut inflation
- Sample fuel for contamination
- Inspect wing leading edge
- Pitot tube cover- remove
- Wing tip condition
- Wing surface for general condition
- Inspect control system linkage
- Control surface for condition and freedom of movement
- Trailing edge and flaps for condition

FUSELAGE SECTION

- General condition
- Static source - clean
- Canopy checked for security
- Coolant door for cracks, leaks, position

TAIL SECTION

- Surfaces for condition and movement
- Trim tabs for condition and position
- Tail wheel tire, position, steering springs and proper inflation
- Tail wheel doors for security

FUSELAGE, LEFT SIDE

- General condition
- Compartment doors secure

LEFT WING

- Tire for proper inflation and wear
- Wheel and brake for wear
- Wheel well for fluid leaks
- Check gear assembly and down lock
- Check strut inflation
- Sample fuel for contamination
- Inspect wing leading edge
- Wing tip condition
- Wing surface for general condition
- Control system linkage
- Control surface for condition and freedom of movement
- Trailing edge and flaps for condition

BEFORE STARTING ENGINE

- Ballast CHECK
- Baggage SECURE
- Mass & balance CHECK
- Performance CHECK
- Documentation CHECK

- Maps & charts CHECK
- Cabin door LOCKED
- Seat belts SECURE
- Seats LOCKED and SECURE
- Park brake ON
- Altimeter SET
- Landing gear selector DOWN
- Coolant door OPEN; winter ops CLOSED
- Controls FREE
- Fuel ON
- Circuit breakers CHECK
- Avionics OFF

STARTING ENGINES

COLD START

- Check landing gear selector DOWN
- Master ON
- Ignition ON
- Cowl flaps SET
- Throttle FULL OPEN
- Pitch FULL FINE
- Mixture FULL RICH
- Fuel pump ON (until flow indication)

- Fuel pump ON
- Throttle 1/4 OPEN
- Propeller CLEAR
- Starter ENGAGE
- Oil pressure CHECK

HOT START

- Master ON
- Ignition ON
- Cowl flaps SET
- Throttle 1/4 OPEN
- Pitch FULL FINE
- Propeller CLEAR
- Starter ENGAGE
- Oil pressure CHECK

FLOODED START

- Master ON
- Ignition ON
- Cowl flaps SET
- Throttle FULL OPEN
- Pitch FULL FINE
- Fuel pump OFF
- Propeller CLEAR

- Starter ENGAGE
- Throttle RETARD
- Oil pressure CHECK

TAXI

- Radio SET
- Park brake OFF
- Brakes TEST
- Lights AS REQUIRED
- Flight Instruments CHECK

PRE-TAKEOFF

- Park brake ON
- Fuel CHECK
- Hatches and Harnesses SECURE
- Engine - RUN-UP
  - Pitch FULL FINE
  - Throttle 4000 RPM
  - Fuel Pump 1, 2 and Both CHECK
- Trim SET
- Test Controls
- Magnetos BOTH
- Fuel pump ON
- Flaps SET 15 to 25 deg

- Gear CHECK
- Instruments CHECK
- Attitude Indicator SET
- Altimeter SET
- Autopilot OFF

Engine failure after takeoff briefing:
Speed - 70 kts (70 kts for full flap)
Field - 30 degree of nose
Fault - Fuel-Air-Mags-Engine
Flap - As required
Final - Fuel off, Mayday call

TAKEOFF

- Transponder and Radar ON
- Power FULL POWER
- Lift tail ASAP
- Rotate 65 kts (Vr)
- Accelerate to 70? kts (Vx)
- Positive ROC Toe brakes
- Undercarriage RETRACT
- Flaps RETRACT
- Accelerate to 75 kts (Vy)
- Power CLIMB POWER
  - Throttle - 6800 RPM
- Fuel pump OFF

AIRFIELD JOINING

- Fuel SELECT
- Radio's SET
- Engine SET
- DI ALIGN
- Altimeter SET
- Approach REVIEW
- Security Harnesses SECURE
- Speeds REVIEW

CIRCUIT

- Brakes ON and OFF
- Undercarriage DOWN and LOCKED
- Mixture SET
- Pitch SET
- Throttle 3000 RPM
- Both fuel pumps ON
- Flaps SET
  - 1/4 Flap 87 kts
  - 1/2 Flap 87 kts
  - Full Flap 87 kts

FINAL APPROACH

- Pitch FULL FINE
- Undercarriage DOWN and LOCKED
- Flaps FULL

POST LANDING

- Flaps IDENTIFY LEVER and RETRACT

PARKING

- Electrics OFF
- Magneto's CHECK DEAD CUT
- Mixture IDLE CUTOFF
- Magneto's OFF
- Master OFF
- Fuel OFF