CESSNA 172
TRAINING MANUAL

by
Oleg Roud
and
Danielle Bruckert

Published by Red Sky Ventures, Memel CATS

Contact the Authors:

We appreciate your feedback.

D Bruckert
redskyventures@gmail.com
PO Box 11288 Windhoek, Namibia
Red Sky Ventures

O Roud
roudoleg@yahoo.com
PO Box 30421 Windhoek, Namibia
Memel CATS

CreateSpace Paperback: ISBN-13: 978-1463675448; ISBN-10: 1463675445
Lulu Paperback: ISBN 978-0-557-01472-9

More information about these books and online orders available at:
http://www.redskyventures.org
Other aircraft presently available in the Cessna Training Manual series are:
Cessna 152, Cessna 172, Cessna 182, Cessna 206.

COPYRIGHT & DISCLAIMER

This Training Manual is intended to supplement information you receive from your flight instructor during your type conversion training. It should be used for training and reference use only, and is not part of the Civil Aviation Authority or FAA approved Aircraft Operating Manual or Pilot's Operating Handbook. While every effort has been made to ensure completeness and accuracy, should any conflict arise between this training manual and other operating handbooks, the approved aircraft flight manuals or pilot's operating handbook should be used as final reference. Information in this document is subject to change without notice and does not represent a commitment on the part of the authors, nor is it a complete and accurate specification of this product. The authors cannot accept responsibility of any kind from the use of this material.

ACKNOWLEDGEMENTS:

Peter Hartmann, Aviation Center, Windhoek: Supply of technical information, maintenance manuals and CD's for authors research

Brenda Whittaker, Auckland New Zealand: Editor, Non Technical

Table of Contents

Introduction

This training manual provides a technical and operational description for most models of the Cessna 172 series aeroplane, from the C172 and C172A to the C172SP, and includes systems descriptions for the C172RG.

The information is intended for ground reference and as an instructional aid to assist with practical training for type transition or ab-initio training, provided by an approved training organisation.

The book is laid out according to a typical training syllabus progression for ease of use.
This material does not supersede, nor is it meant to substitute any of the manufacturer's operation manuals. The material presented has been prepared from the information provided in the pilots operating handbook for the model series, Cessna maintenance manuals and from operational experience.

History

The Cessna aircraft company has a long and rich history. Founder Clyde Cessna built his first aeroplane in 1911, and taught himself to fly it! He went on to build a number of innovative aeroplanes, including several race and award winning designs.

In 1934, Clyde's nephew, Dwane Wallace, fresh out of college, took over as head of the company. During the depression years Dwane acted as everything from floor sweeper to CEO, even personally flying company planes in air races (several of which he won!).
Under Wallace's leadership, the Cessna Aircraft Company eventually became the most successful general aviation company of all time.

Cessna first began production of two-seat light planes in 1946 with the model 120 which had an all aluminium fuselage and fabric covered wings. This was followed by a nearly identical model the 140, with aluminium clad wings. More than 7,000 model 120-140's were sold over four years when Cessna stopped production in order to focus on four-seat aircraft.

Development of the C172

The Cessna 172 is probably the most popular flight training aircraft in the world. The aircraft made her first flight in November 1955, the first production models were delivered in 1957, and became an overnight sales success and over 1400 aircraft were built in its first full year of production. It is still in production in 2005, more than 35 000 have been build.

The Cessna 172 started as a relatively simple tricycle undercarriage development of the taildragger Cessna 170B. The airframe was basically a 170B, including the "fastback" fuselage and effective 40º Fowler flaps. The gross weight was identical although the useful load went down 45 pounds. Later versions incorporated revised landing gear, a lowered rear deck, and an aft window. Cessna advertised this added rear visibility as “Omnivision”. The final structural development, in the mid-1960s, was the sweptback tail still used today. The airframe has remained almost unchanged since then, with updates mainly affecting avionics and engine fittings, including the most recent the Garmin 1000 glass cockpit option. Production ended in the mid-1980s, but was resumed in 1996 and continues at the time of writing.

The Cessna 172 evolved slowly over the years. The basic Cessna 172 remained in production until replaced by the 172A of early 1960. The latest model of Cessna 172 introduced a new swept back tail and rudder, a shorter undercarriage and changes of equipment. In 1961 the name "Sky Hawk" was introduced. The Cessna 172H was the last Continental powered 172. Electric flaps were introduced in 1964 with the 172E, and the 150hp Lycoming 0-320-E2D replaced the 145 hp Continental 0-300D in 1968.

In 1966 Cessna began assembly of US airframes at Reims Aviation in France. The Cessna F172 was built by Reims Cessna through to 1971. Cessna also produced a retractable version and most models are available as a seaplane version with floats.

The Cessna 172 is part of a large family of high-wing, tricycle undercarriage, single engine Cessna planes, ranging from the two-seater 150 and 152 to more advance 182 Skylane, the six-seat 206 and the turboprop Cessna 208 Caravan.

Terminology

Airspeed		
KIAS	**Knots Indicated Airspeed**	Speed in knots as indicated on the airspeed indicator.
KCAS	**Knots Calibrated Airspeed**	KIAS corrected for instrument error. Note this error is often negligible and CAS may be omitted from calculations.
KTAS	**Knots True Airspeed**	KCAS corrected for density (altitude and temperature) error.
Va	**Max Manoeuvering Speed**	The maximum speed for full or abrupt control inputs.
Vfe	**Maximum Flap Extended Speed**	The highest speed permitted with flap extended. Indicated by the top of the white arc.
Vno	**Maximum Structural Cruising Speed**	Sometimes referred to as "normal operating range". Should not be exceeded except in smooth conditions and only with caution. Indicated by the green arc.
Vne	**Never Exceed speed**	Maximum speed permitted, exceeding will cause structural damage. Indicated by the upper red line.
Vs	**Stall Speed**	The minimum speed before loss of control in the normal cruise configuration. Indicated by the bottom of the green arc. Sometimes referred to as minimum 'steady flight' speed.
Vso	**Stall Speed Landing Configuration**	The minimum speed before loss of control in the landing configuration, at the most forward C of G*. Indicated by the bottom of the white arc.
*forward centre of gravity gives a higher stall speed and so is used for certification		
Vx	**Best Angle of Climb Speed**	The speed which results in the maximum gain in altitude for a given horizontal distance.
Vy	**Best Rate of Climb Speed**	The speed which results in the maximum gain in altitude for a given time, indicated by the maximum rate of climb for the conditions on the VSI.
Vref	**Reference Speed**	The minimum safe approach speed, calculated as 1.3 x Vso.
Vbug	**Nominated Speed**	The speed nominated as indicated by the speed bug, for approach this is Vref plus a safety margin for conditions.
Vr	**Rotation Speed**	The speed which rotation should be initiated.

Vat	**Barrier Speed**	The speed to maintain at the 50ft barrier or on reaching 50ft above the runway.
	Maximum Demonstrated Crosswind	The maximum demonstrated crosswind during testing.
Meteorological Terms		
OAT	**Outside Air Temperature**	Free outside air temperature, or indicated outside air temperature corrected for gauge, position and ram air errors.
IOAT	**Indicated Outside Air Temperature**	Temperature indicated on the temperature gauge.
ISA	**International Standard Atmosphere**	The ICAO international atmosphere, as defined in document 7488. Approximate conditions are a sea level temperature of 15 degrees with a lapse rate of 1.98 degrees per 1000ft, and a sea level pressure of 1013mb with a lapse rate of 1mb per 30ft.
	Standard Temperature	The temperature in the International Standard atmosphere for the associated level, and is 15 degrees Celsius at sea level decreased by two degrees every 1000ft.
	Pressure Altitude	The altitude in the International Standard Atmosphere with a sea level pressure of 1013 and a standard reduction of 1mb per 30ft. Pressure Altitude would be observed with the altimeter subscale set to 1013.
	Density Altitude	The altitude that the prevailing density would occur in the International Standard Atmosphere, and can be found by correcting Pressure Altitude for temperature deviations.
Engine Terms		
BHP	**Brake Horse Power**	The power developed by the engine (actual power available will have some transmission losses).
RPM	**Revolutions per Minute**	Engine drive and propeller speed.
	Static RPM	The maximum RPM obtained during stationery full throttle operation
Weight and Balance Terms		
	Moment Arm	The horizontal distance in inches from reference datum line to the centre of gravity of the item concerned, or from the datum to the item 'station'.

C of G	**Centre of Gravity**	The point about which an aeroplane would balance if it were possible to suspend it at that point. It is the mass centre of the aeroplane, or the theoretical point at which entire weight of the aeroplane is assumed to be concentrated. It may be expressed in percent of MAC (mean aerodynamic chord) or in inches from the reference datum.
	Centre of Gravity Limit	The specified forward and aft points beyond which the CG must not be located. Typically, the forward limit primarily effects the controllability of aircraft and aft limits stability of the aircraft.
	Datum (reference datum)	An imaginary vertical plane or line from which all measurements of arm are taken. The datum is established by the manufacturer.
	Moment	The product of the weight of an item multiplied by its arm and expressed in inch-pounds. The total moment is the weight of the aeroplane multiplied by distance between the datum and the CG.
MZFW	**Maximum Zero Fuel Weight**	The maximum permissible weight to prevent exceeding the wing bending limits. This limit is not always applicable for aircraft with small fuel loads.
BEW	**Basic Empty Weight**	The weight of an empty aeroplane, including permanently installed equipment, fixed ballast, full oil and unusable fuel, and is that specified on the aircraft mass and balance documentation for each individual aircraft.
SEW	**Standard Empty Weight**	The basic empty weight of a standard aeroplane, specified in the POH, and is an average weight given for performance considerations and calculations.
OEW	**Operating Empty Weight**	The weight of the aircraft with crew, unusable fuel, and operational items (galley etc.).
	Payload	The weight the aircraft can carry with the pilot and fuel on board.
MRW	**Maximum Ramp Weight**	The maximum weight for ramp manoeuvring, the maximum takeoff weight plus additional fuel for start taxi and runup.
MTOW	**Maximum Takeoff Weight**	The maximum permissible takeoff weight and sometimes called the maximum all up weight, landing weight is normally lower as allows for burn off and carries shock loads on touchdown.
MLW	**Maximum Landing Weight**	Maximum permissible weight for landing. Sometimes this is the same as the takeoff weight for smaller aircraft.

Note: The correct technical is 'mass' instead of 'weight' in all of these terms, however in everyday language and in many aircraft operating manuals the term weight remains in common use. Used in this context there is no difference in meaning and the terms may be interchanged.		
Other		
AFM	**Aircraft Flight Manual**	These terms are inter-changeable and refer to the approved manufacturer's handbook. General Aviation manufacturers from 1976 began using the term 'Pilot's Operating Handbook', early manuals were called Owner's Manual and most legal texts use the term AFM.
POH	**Pilot's Operating Handbook**	
PIM	**Pilot Information Manual**	A Pilot Information Manual is a new term, coined to refer to a POH or AFM which is not issued to a specific aircraft.

Useful Factors and Formulas

Conversion Factors			
Lbs to kg	1kg =2.204lbs	kgs to lbs	1lb = .454kgs
USG to Lt	1USG = 3.785Lt	lt to USG	1lt = 0.264USG
Lt to Imp Gal	1lt = 0.22 Imp G	Imp.Gal to lt	1Imp G = 4.55lt
NM to KM	1nm = 1.852km	km to nm	1km = 0.54nm
NM to StM to ft	1nm = 1.15stm 1nm = 6080ft	Stm to nm to ft	1 stm = 0.87nm 5280ft
FT to Meters	1 FT = 0.3048 m	meters to ft	1 m = 3.281 FT
Inches to Cm	1 inch = 2.54cm	cm to inches	1cm = 0.394”
Hpa(mb) to “Hg	1mb = .029536”	“ Hg to Hpa (mb)	1” = 33.8mb

AVGAS FUEL Volume / Weight SG = 0.72					
Litres	Lt/kg	kgs	Litres	lbs/lts	Lbs
1.39	1	0.72	0.631	1	1.58

Crosswind Component per 10kts of Wind								
Deg	10	20	30	40	50	60	70	80
Kts	2	3	5	6	8	9	9	10

Formulas

Celsius (C) to Fahrenheit (F)	C = 5/9 x(F-32), F = Cx9/5+32
Pressure altitude (PA)	PA = Altitude AMSL + 30 x (1013-QNH) Memory aid – Subscale up/down altitude up/down
Standard Temperature (ST)	ST = 15 – 2 x PA/1000 ie. 2 degrees cooler per 1000ft altitude
Density altitude (DA)	DA = PA +(-) 120ft/deg above (below) ST i.e. 120ft higher for every degree hotter than standard
Specific Gravity	SG x volume in litres = weight in kgs
One in 60 rule	1 degree of arc ≈ 1nm at a radius of 60nm i.e degrees of arc approximately equal length of arc at a radius of 60nm
Rate 1 Turn Radius	R = TAS per hour/60/π or TAS per minute/π R ≈ TAS per hour/180 (Where π (pi) ≈3.14)
Radius of Turn Rule of Thumb	Radius of Turn lead allowance ≈ 1% of ground speed (This rule can be used for turning on to an arc – eg at 100kts GS, start turn 1nm before the arc limit)
Rate 1 Turn Bank Angle Rule of Thumb	degrees of bank in a rate one turn ≈ GS/10+7

Pilot's Operating Handbook Information

The approved manufacturer's operating handbook, which may be commonly referred to as a Pilot's Operating Handbook (POH), an Aircraft Flight Manual (AFM), or an Owners Manual, is issued for the specific model and serial number, and includes all applicable supplements and modifications. It is legally required to be on board the aircraft during flight, and is the master document for all flight information.

In 1975, the US General Aviation Manufacturer's Association introduced the 'GAMA Specification No. 1' format for the 'Pilot's Operating Handbook' (POH). This format was later adopted by ICAO in their Guidance Document 9516 in 1991, and is now required for all newly certified aircraft by ICAO member states. Most light aircraft listed as built in 1976 or later, have provided Pilot's Operating Handbooks (POHs) in this format.

GAMMA standardised the term 'Pilot's Operating Handbook' as the preferred term for a manufacturer's handbook on light aircraft, however some manufacturers still use different terms (see further explanation above under definitions).

This format aimed to enhance safety by not only standardising layouts but also by creating an ergonomic format for use in flight. For this reason the emergency and normal operating sections are found at the front of the manual, while reference and ground planning sections are at the rear.

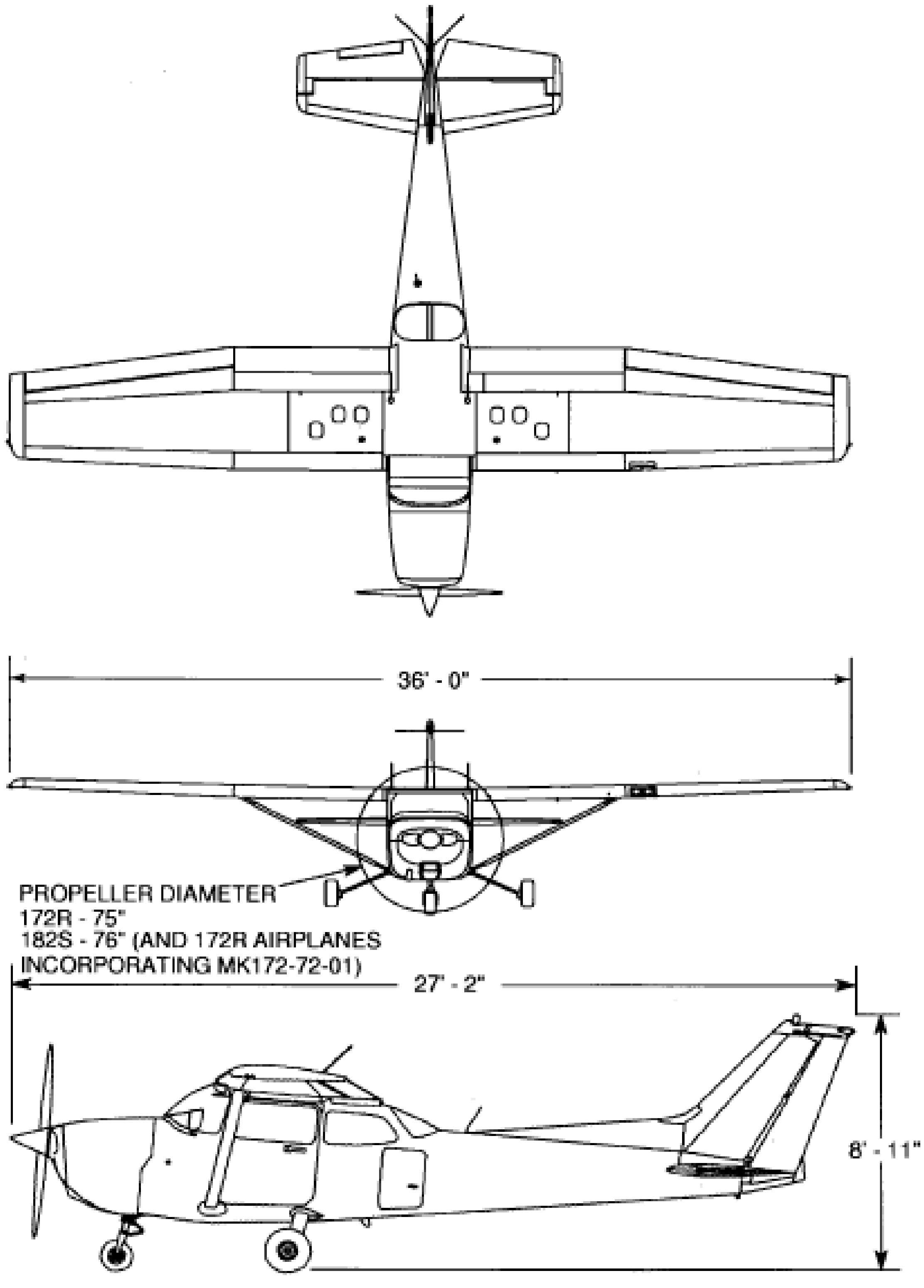
It is recommended that pilots become familiar with the order and contents of each section, as summarised in the table below.

Section 1	General	Definitions and abbreviations
Section 2	Limitations	Specific operating limits, placards and specifications
Section 3	Emergencies	Complete descriptions of action in the event of any emergency or non-normal situation
Section 4	Normal Operations	Complete descriptions of required actions for all normal situations
Section 5	Performance	Performance graphs, typically for stall speeds, airspeed calibration, cross wind calculation, takeoff, climb, cruise, and landing
Section 6	Weight and Balance	Loading specifications, limitations and loading graphs or tables
Section 7	Systems Descriptions	Technical descriptions of aircraft systems, airframe, controls, fuel, engine, instruments, avionics and lights etc.
Section 8	Servicing and maintenance	Maintenance requirements, inspections, stowing, oil requirements etc.
Section 9	Supplements	Supplement sections follow the format above for additional equipment or modification.
Section 10	Safety Information	General safety information and helpful operational recommendations which the manufacturer feels are pertinent to the operation of the aircraft

For use in ground training, or reference prior to flight, this text should be read in conjunction with the POH from on board the aircraft you are going to be flying. Even if you have a copy of a POH for the same model C182, the aircraft you are flying may have supplements for modifications and optional equipment which affect the operational performance.

AIRCRAFT TECHNICAL INFORMATION

The Cessna 172 aeroplane is an all-metal, single engine, four-seat, high-wing monoplane aircraft, equipped with tricycle landing gear and designed for general utility purposes.



Models and Differences

The Cessna 172 had a number of type variants during its production history. Additionally there are a number of modifications provided for the airframe, instruments/avionics equipment and electrics.

Speeds often vary between models by one or two knots, sometimes more for significant type variants. For simplification the speeds have been provided for the C172 Skyhawk, which was produced in the largest numbers. All speeds have been converted to knots and rounded up to the nearest 5kts. Generally multiple provision of figures can lead to confusion for memory items and this application is safer for practical use during conversion training.

Whenever maximum performance is required, as speeds also vary with weight, and density altitude the Aircraft Operating Handbook must be consulted for the correct figure.

During practical training reference should be made to the flight manual of the aeroplane you will be flying to ensure that the limitations applicable for that aeroplane are adhered to. Likewise when flying different models it should always be remembered that MAUW, flap limitations, engine limitations and speeds may vary from model to model.

Before flying different models, the Aircraft Operating Handbook should be consulted to verify differences.

Main Differences in year of manufacturing

The following modification of Cessna 172 were made during years of production of the aircraft:

- The 1957 model has a 145hp Continental engine;
- Model's after 1960 have a swept tail;
- In 1963 a rear window appeared as well as a single piece windshield and longer elevator;
- 1964 model were equipped with electric flaps instead of the "Johnson Bar";
- 1968 models switched to Lycoming 150hp engines.
- In 1971 the spring steel main landing gear was changed to tubular steel.
- In 1981 Cessna switched to a 160-hp engine and gross weight of 2400lbs but reduced flap travel of 30 degrees.
- 1996 and later models feature the Lycoming IO-360-L2A four cylinder, fuel injected engine, an annunciator panel or optional Garmin G1000 EFIS avionics suit.

A more comprehensive summary combined with serial numbers and model numbers is contained in the table on the following pages.

Naming Terminology

The C172 series manufactured by Cessna in Wichita, like most Cessna models, started with the C172 followed by the C172A and continued sequentially up until the C172 R and S, with the exception of the models J and O which never completed certification. Each new model release superseding the previous, with the exception of model variants (such as the 172RG and R172K).

Model Variants
Some models carried an alternate prefix or suffix to designate a specific difference, or model variant as detailed below.

Reims 172
The F172 for models D through M, was made by Reims in France, and according to Cessna there are no significant differences apart from the engines on models prior to 1971 (F172K and earlier), however there are some differences in manufacturing processes.

Cessna 175 Certified Aircraft
Although marketed as a C172, the P172D, F172/FR172 and C172RG were all designated under the C175 type data certification sheet by the FAA.

The P172D, where the 'P' indicated the geared engine referred to as “Powermatic” by Cessna. The different type designator also reflected a larger distinction, the aircraft is nearly identical to the C175C and treated as such for certification, it has little in common with the C172D except the year of manufacture (1963).

The C172 RG – where the 'RG' designated a retractable Cessna as with other models of Cessna. Produced between 1981 and 1985, the RG option was not reintroduced when production commenced in 1996.

The prefix 'R' was originally given to the 210hp military version C172, made specifically for the US Air Force, and should not be confused with the Reims ('F') models or the retractable ('RG') models. The original military R172 was produced for models R172E through to R172H, between 1964 and 1973, called by the USAF a T41-B, C or D, depending on options (the C172H, originally made for the USAF was called the T41-A). Most models retired into USAF aeroclubs, a few are in civilian use, and some still remain in US and other air force operations. These models led to the development of a civilian version, the R172K given the name Hawk XP and the FR172K, Reims Hawk XP or Reims Rocket, with the same engine de-rated to 195hp, produced between 1977 and 1981.

Model History Table

The table below summarises the model history versus serial number compiled from the type data certification summaries (TDC) and from the technical information in the Cessna maintenance manuals.

Model	Name	Year	Serial Numbers	Significant Changes and Features
C172		1956	28000-29174	The first model C172, which was basically a Cessna 170B with tricycle gear, distinctive straight windowless back, square vertical tail, and manual flap, the Continental 6 cylinder O-300-A or B engine producing 145hp at 2700hp 42USG fuel tank (37USG usable), maximum weight of 2200lbs for the lad plane, the seaplane was increased to 2220lbs where it remained through the C172 model history.
		1957	29175-29999, 36000-36215	
		1958	36216-36965	
		1959	36966-36999, 46001-46754	Engine cowling changed for improved cooling, instrument panel modified, moving main flight control instruments from central to left side of panel, in a more direct line of sight of the pilot.
C172A		1960	46755 - 47746	The same as the basic 172 with a swept vertical tail, and the first float plane version was available. The 0-300 Continental engine was available as a C or D type.
C172B	C172 in standard version and Skyhawk or Skyhawk II for luxury version.	1961	17247747-17248734	A deeper fuselage (shorter undercarriage), new windshield, revised cowling and pointed propeller spinner as well as external baggage door and another new instrument panel was introduced with the artificial horizon centrally located. Usable fuel 39USG.
C172C		1962	17248735-17249544	Maximum weight increased to 2250lbs, optional key starter on deluxe version (replaces standard pull starter), auxiliary child seat available. Usable fuel 36 USG.
C172D		1963	17249545-17250572	Cut-down rear fuselage and “Omnivision” rear windows replaced the original 'straight-back' look, landplane weight increased to 2300lbs, and new full rudder and brake pedals fitted.

Model	Name	Year	Serial Numbers	Significant Changes and Features
F172D	Reims or French 172	1963	F1720001-F1720018	Made by Reims in France, some differences in manufacturing. Continental O-300-D engine manufactured by Rolls Royce.
C172E		1964	17250573-17251822	Electrical fuses were replaced by circuit breakers.
F172E	Reims or French 172	1964	F1720019-F1720085	Made by Reims in France, some differences in manufacturing.
C172F		1965	17251823-17253392	Electric flaps were introduced, with a three position toggle switch. This model, along with the C172H was also produced by the USAF as a T41-A.
F172F	Reims or French 172		F172-0086-F172-0179	Made by Reims in France, some differences in manufacturing.
C172G		1966	17253393-17254892	Minor modifications to propeller shaft and spinner.
F172G	Reims or French 172	1966	F1720180-F1720319	Made by Reims in France, some differences in manufacturing.
C172H		1967	17254893-17256512	Nose strut shortened for reduced drag and appearance. A modified engine cowling and mountings reduced noise in the cockpit and cowl cracking. The generator is replaced with an alternator for electrical power supply. This model was also produced by the USAF as a T41-A.
F172H	Reims French 172	1967	F1720320-F1720446	Made by Reims in France, some differences in manufacturing.
F172H	Reims or French 172	1968	F17200655-F17200754	Made by Reims in France, some differences in manufacturing.
Note: The type certifier “F172” designates a Reims C172, that is if the type indicator has F in the front, it was built in Reims factory in France. Reims built C172s, between 1963 and 1976. They are reported by Cessna maintenance manuals, for maintenance purposes as being nearly identical to the C172 produced in Wichita except for the engines on some models.				

Model	Name	Year	Serial Numbers	Significant Changes and Features
C172I		1968	17256513-17257161	Engine changed to 150hp Lycoming O-320 E2D (“Blue Streak”) with higher 2000 hour overhaul time, 38USG usable fuel.
C172K		1969	17257162-17258486	Rear side windows enlarged, redesigned fin, optional 52USG tanks. Split bus bar now on all models.
F172K	Reims or French 172		F17200755-F17200804	Made by Reims in France, some differences in manufacturing.
C172K		1970	17258487-17259223	Fiberglass drooping wing-tip
C172L		1971	17259224-17259903	Landing light shifted from wing to nose. Flat steel replaced by tubular steel undercarriage.
		1972	17259904-17260758	
F172L	Reims or French 172	1972	F17200805-F17200904	Continental Rolls Royce engine changed to standard C172 Lycoming O-320-E2D engine.
C172M		1973	17260759-17261898	Drooped leading edge wing introduced for better low speed handling. Seaplane flap reduced to 30 degrees.
F172M	Reims or French 172	1973	F17200905-F17201034	
C172M		1974	17261899-17263458	Baggage compartment increased in size
			F17201035-F17201234	
C172M		1975	17263459-17265684	
			F17201235-F17201384	

Model	Name	Year	Serial Numbers	Significant Changes and Features
C172M		1976	17265685-17267584	Airspeed changed from miles to knots, instrument panel redesigned to include more avionics, engine and fuel gauges shifted to the more ergonomic position on the left side of the instrument panel above the master switch.
F172M		1976	F17201385 on	This was the last standard model F172 made by Reims, see also FR172 under Type Variants.
C172N		1977	17261445, 17267585-17269309	160hp Lycoming O-320-H2AD engine* Flap selector changed to the safer and more ergonomic 'preselector' arm (replacing the 3 position toggle switch). Adjustable rudder trim available, notched lever. Usable fuel 40USG, optional 54USG long range fuel tanks (50USG useable).
		1978	17261578, 17269310-17270049 17270051-17271034	14V electrical system changed to 28V. Air conditioning now available as an option. HIGH VOLTAGE warning light changed to LOW VOLTAGE, with sensors incorporated in alternator control unit.
		1979	17271035-17272884	Limiting speed on first 10 degrees of flap increased from 85kts to 110kts.
		1980	17270050, 17272885-17274009	
*This engine was the first engine (excluding the 210hp military version) designed to operate on 100/130 Octane fuel, previous engines were designed for 80/87 Octane. Most aircraft engines have now been modified to operate on 100/130 or 100 Low Lead Aviation Gasoline (Avgas 100 and Avgas 100LL) with 80/87 (Avgas 80) now having only very limited availability.				
C172P	Skyhawk	1981	17274010-17275034	Lycoming O-320 engine changed from H2AD to D2J to address some design issues. Flap reduced from 40 degrees to 30 degrees. Landplane weight increased from 2300 to 2400lbs. Optional 66USG, 62USG usable long range tanks with wet wing available.
		1982	17275035-17275759	
		1983	17275760-17276079	
		1984	17276080-17276259	

Model	Name	Year	Serial Numbers	Significant Changes and Features
		1985	17276260-17276516	From 1982, landing lights shifted from cowl back to wing with standard dual light fitting.
		1986	17276517-17276654	
C172Q	Cutlass	1983	17275869-17276054	Lycoming O-360 engine, developing 180hp at 2700rpm, maximum gross weight 2550lbs. Although marketed as a Cutlass, having the same engine is just about the only the resemblance this models shares with the C172RG.
		1984	17276101-17276211	
C172R	Skyhawk	1996	17280001 on	160hp Lycoming fuel injected IO360 engine, optional G1000 avionics, maximum weight increased to 2450lbs, optional 2550 maximum weight kit, 53USG usable fuel.
C172S	Skyhawk SP		172S8001 on	Engine power increased to 180hp with maximum rpm increasing from 2400 to 2700 rpm, maximum weight 2550lbs.
At the time of publication, only the C172S is still in production.				

Type Variants

The following aircraft, although marketed as Cessna 172s, are all certified under the FAA Type Data Certificate of the Cessna 175. All contain significant differences in power available, and airframe.

Model	Name	Year	Serial Numbers	Significant Changes
P172D				
P172D	Powermatic	1963	P17257120-P17257188	175hp Continental GO-300-E Powermatic geared engine and revised cowling with dorsal gearbox fairing. This model was essentially a C175 Sklark, renamed in a failed attempt to fix poor sales performance of the C175.
FP172D	French or Reims Powermatic	1963	FP1720001 FP1720003	Reims version of P172D, made in France , some differences in manufacturing.
Note – many Cessna types have adopted the prefix of 'P' for a pressurised aircraft, this model demonstrates one of the common exceptions.				

Model	Name	Year	Serial Numbers	Significant Changes
US Air Force Models				
R172E	USAF T41B,C,D	1964	R1720001-R1720335	Fitted with Continental IO360 engine, producing 210hp at 2800rpm, maximum weight 2500lbs, Certified on C175 type certification sheet.
R172F	USAF T41B,C,D		R1720336-R1720409	
R172G	USAF T41B,C,D		R1720336-R1720409	2550 maximum weight
R172H	USAF T41B,C,D	1971	R1720445-R1720494	
		1972	R1720495-R1720546	
		1973	R1720547-R1720620	
Retractable Gear Model				
C172RG	Cutlass RG	1980	172RG0001 172RG0570	Retractable undercarriage, Lycoming O-360 engine developing 180hp, with three blade constant speed propeller, gross weight 2650lbs. Total usable fuel 62USG. Mainly popular with flight schools as a complex trainer. Certified on C175 type certification sheet.
		1981	172RG0571 172RG0890	
		1982	172RG0891 172RG1099	
		1983	172RG1100 172RG1144	
		1984	172RG1145 172RG1177	
		1985	172RG1178 172RG1191	
R172K - Hawk XP Models				
R172K	Hawk XP	1977	R1722000-R172272	1977 had 14V electrical system, otherwise similar to other Hawk XP's described below.
		1978	R1722725 R1722929	Called the Hawk XP with a Continental IO-360K fuel injected engine and constant speed propeller, de-rated to 195hp at 2600rpm. Maximum weight
		1979	R1720680,R 1722930 R1723199	

Model	Name	Year	Serial Numbers	Significant Changes
		1980	R1723200 R1723399 (except R1723398)	increased to 2550lbs. Also certified as C175. 1978 models on had 28V electrical system. Certified on C175 type certification sheet.
		1981	R1723400 R1723454	Flap reduced from 40 to 30 degrees as with other models of C172.
FR172K	Reims Hawk XP	1977	FR1720591 FR1720620	The Hawk XP model made by Reims in France, some differences in manufacturing.
		1978	FR1720621 FR1720630	
		1979	FR1720631 FR1720655	
		1980	FR1720656 FR1720665	
		1981	FR1720666 FR1720675	

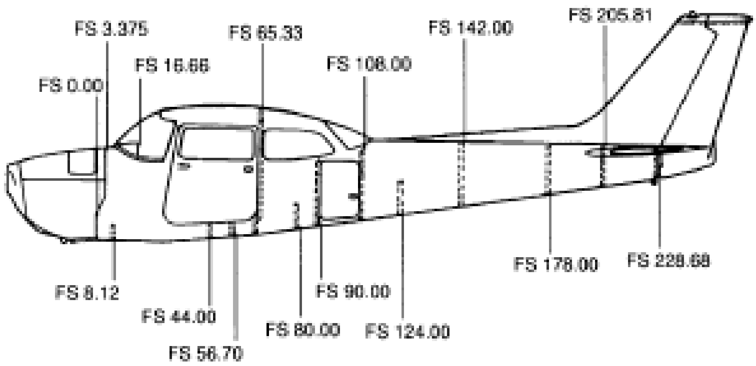
Airframe

The airframe is a conventional semi-monocoque type consisting of formed sheet metal bulkheads, stringers and stressed skin.

Semi-monocoque construction is a light framework covered by skin that carries much of the stress. It is a combination of the best features of a strut-type structure, in which the internal framework carries almost all of the stress, and the pure monocoque where all stress is carried by the skin.

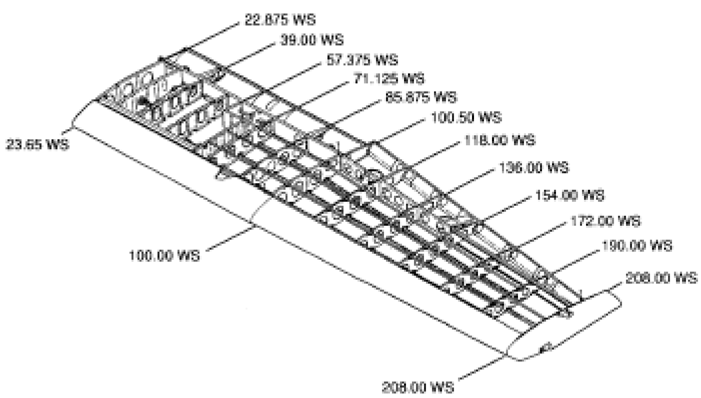
The fuselage forms the main body of the aircraft to which the wings, tail section and undercarriage are attached. The main structural features are:

- front and rear carry through spars for wing attachment;
- a bulkhead and forgings for landing gear attachment at the base of the rear door posts;
- a bulkhead and attaching plates for strut mounting;
- four stringers for engine mounting attached to the forward door posts.



The construction of the wing and empennage sections consists of:

- a front (vertical stabilizer) or front and rear spar (wings/horizontal stabilizer);
- formed sheet metal ribs;
- doublers and stringers;
- wrap around and formed sheet metal/aluminium skin panels;
- control surfaces, flap and trim assembly and associated linkages.

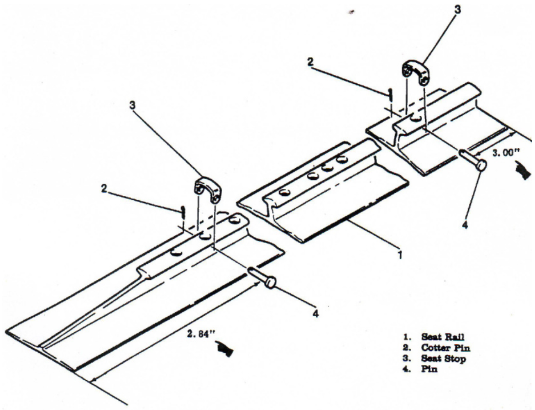


The front spars are equipped with wing-to-fuselage and wing-to-strut attach fittings. The aft spars are equipped with wing-to-fuselage attach fitting, and are partial-span spars. The wings contain the integral ie. non bladder type fuel tanks.
The empennage or tail assembly consists of the vertical stabilizer and rudder, horizontal stabilizer and elevator.

Seats and Seat Adjustment

The seating arrangement consists of two separate adjustable seats for the pilot and front passenger, a split-back fixed seat in the rear, and a child's seat (if installed) aft of the rear seat.

The pilot and copilot seats are adjustable in forward and aft position, and in most models also for seat height and back inclination. When adjusting the seats forward and aft care should be taken to ensure the position is locked. Seat locks are available and installed on many aircraft following accidents involving slipping of seat position during critical phases of flight. Seat back and height should be adjusted to ensure adequate visibility and control before start-up.



Doors

There are two entrance doors provided, one on the left and one on the fight, and a baggage door at the rear left side of the aircraft.

The door latch on early models was not locked, however on later models rotation of the inside handle 90 degrees provided a latched and locked position. To open the doors from outside the aeroplane, utilize the recessed door handle by grasping the forward edge of the handle and pulling outboard. If the door is locked from the inside, it will be impossible to grasp the door handle.

Engine and Propeller

The C172 is powered by a Continental or Lycoming horizontally opposed, air-cooled, engine.

Early models of 172 (before 1967 models) are powered with Lycoming 0-300, six cylinder engine, in later models was replaced with Lycoming 0-320, four cylinder engine. The O-320 engine had three versions before being replaced by the O-360 engine. The O-360 had two variations before introduction of the fuel injected IO-360 engine in the "restart" models (1996 and later)
The Cessna R172K, like it's predecessor, the R172E to H is powered by a six cylinder Continental IO-360, de-rated with lower maximum rpm to 195hp.

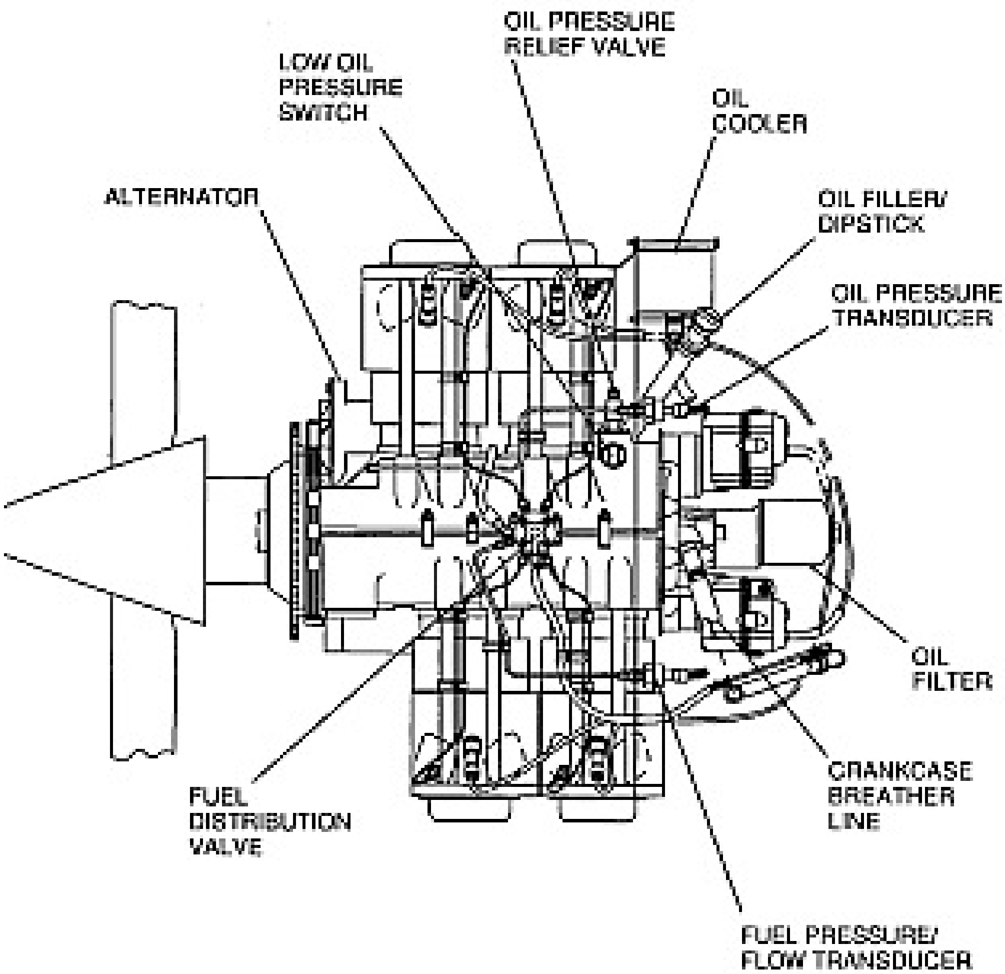
The engine designator O means the engine is normally aspirated, and I indicates fuel injection. The numbers (300, 320, 360) indicate the cubic capacity of the engine. The horsepower developed varies with a number of factors including the engine design, performance, and maximum rpm.

The engines develop the following power at sea level:

- ✈ Continental O-300 – 145 horsepower at 2700 rpm, 6 cylinder (C172 to C172H);

- ✈ Continental O-300-D – 145 horsepower at 2700 rpm, 6 cylinder (F172E to F172M);
- ✈ Continental GO-300-D – 175 horsepower at 3200 rpm, 6 cylinder, constant speed propeller (P172);
- ✈ Continental IO-360-H and HB – 210 horsepower at 2800 rpm, 6 cylinder, (R172E to R172H);
- ✈ Lycoming O-320 E2D – 150 horsepower at 2700 rpm, 4 cylinder (C172L to C172M);
- ✈ Lycoming O-320-H2AD – 160 horsepower at 2700 rpm, 4 cylinder (C172N);
- ✈ Lycoming O-320-D2J – 160 horsepower at 2700 rpm, 4 cylinder (C172P);
- ✈ Lycoming O-360-A4N – 180 horsepower at 2700 rpm, 4 cylinder (C172Q);
- ✈ Continental IO-360-K and KB – 195 horsepower at 2600 rpm, 6 cylinder (R172K);
- ✈ Lycoming O-360-FIA6 – 180 horsepower at 2700 rpm, 4 cylinder (C172RG);
- ✈ Lycoming IO-360-L2A – 160 horsepower at 2400 rpm (may be modified to 2700rpm, 4 cylinder (C172R);
- ✈ Lycoming IO-360-L2A – 180 horsepower at 2700 rpm, 4 cylinder (C172S).

Lycoming Engine Top Profile



Fuel System

Fuel systems for the different models are shown in the schematic diagrams on the following pages. Details of three different systems are shown for the standard system, the C172RG and the fuel injected model. The C172 fuel system is gravity-fed from fuel tanks located in the high wings.
In standard fuel system, fuel is supplied to the engine from two wing tanks (one in each wing).

The following summarises the approximate* total and usable fuel on the various models of C172:

- ✈ C172 - 42 total, 37 usable US gallons (159/140 litres) standard fuel tanks;
- ✈ C172A, B - 42 total, 39 usable US gallons (159/147 litres) standard fuel tanks;
- ✈ C172C to H - 39 total, 36 usable US gallons (147/136 litres) standard fuel tanks;
- ✈ C172I, K, L, M - 42 total, 38 usable US gallons (159/144 litres) standard fuel tanks;
- ✈ C172I, K, L, M - 52 total, 48 usable US gallons (201/186 litres) long range fuel tanks;
- ✈ C172N,P - 43 total, 40 usable US gallons (163/151 litres) standard fuel tanks;
- ✈ C172N,P - 42 total, 40 usable US gallons (159/151 litres) long range fuel tanks;
- ✈ C172P - 68 total, 62 usable US gallons (257/234 litres) wet wing fuel tanks;
- ✈ C172Q - 54 total, 50 usable US gallons (204/189 litres) standard fuel tanks;
- ✈ C172R,S - 56 total, 53 usable US gallons (212/200 litres) standard fuel tanks;
- ✈ P172 - 52 total, 41.5 usable US gallons (197/158 litres) standard fuel tanks;
  FR172,R172K - 52 total, 49 usable US gallons (197/185 litres) standard fuel tanks;
- ✈ FR172,R172K - 68 total, 66 usable US gallons (257/250 litres) long range tanks;
  C172RG - 66 total, 62 usable US gallons (250/235 litres) standard fuel tanks;

**these figures are approximate as variations exist between type certification information, and maintenance manuals, and more importantly, it should be remembered, individual manufacturing tolerances, tanks can be modified by STCs, and density changes will give rise to slight variations in tank capacity. The usable tank capacity should be placarded on the fuel selector of the model you are flying. Check the POH for fuel system on particular aircraft you are going to fly for the correct quantities and operational requirements.*

The amount of fuel we can put into fuel tanks is limited by the volume of the tanks, and therefore usable fuel is always provided in volume, such as gallons and litres.

Electrical System

Electrical energy for the aircraft is supplied by a 14 or 28 volt, direct-current, single wire, negative ground electrical system.

The system is either:

For models before 1967:

- ✈ 14 Volt system;
- ✈ 20, 35, or 50 amp generator;
- ✈ 12 volt battery with 25 or 33 amp-hours capacity.

For models after 1967, and before 1978:

- ✈ 14 Volt system;
- ✈ 52 or 60 amp alternator;
- ✈ 12 volt battery with a 25 or 33 amp-hours capacity.

For models 1979 and later:

- ✈ 28 volt system;
- ✈ 60 amp alternator;
- ✈ 24 volt battery with 17, 12.75 or optional 15.5 amp-hour capacity.

Additionally for models equipped with G1000 avionics:

- ✈ 24 volt standby battery (for operation of the G1000 essential bus only).

Battery

The 12 volt for models 1978 or earlier, or 24 volt lead-acid battery supplies power for starting and furnishes a reserve source of power in the event of alternator failure. The battery is mounted on the left forward side of the firewall (see picture on the next page). Only the P172, C172RG, and R172 models. which are based on the C175 airframe, have the battery mounted on the left hand side of the aft fuselage behind the baggage compartment wall.

Battery capacity in amp-hours provides a measure of the amount of load the battery is capable of supplying. This capacity provides a certain level of current for a certain time. A 17 amp-hour battery is capable of steadily supplying a current of 1 amp for 17 hours and 2 amp for 8.5 hours and so on.

Standby Battery (G1000 Equipped Aircraft)

With G1000 equipped aircraft, a small standby battery is installed for the purpose of maintaining electrical power to the G1000 essential bus. This powers the primary flight display (PFD) and essential avionics and engine instruments in back up mode only, in case of an electrical supply fault or failure of the main battery circuit.
The G1000 essential bus provides power to the PFD, AHRS, ADC, COM1, NAV1, Engine and Airframe Unit, and standby instrument lights.

Exterior Inspection

Visually check the airplane for general condition during the walk-around inspection, ensuring all surfaces are sound and no signs of structural damage, worked rivets, missing screws, lock wires or loose connections.

Tail Section

Check top, bottom, and side surfaces for any damage, ensure balance weights and fairings secure.

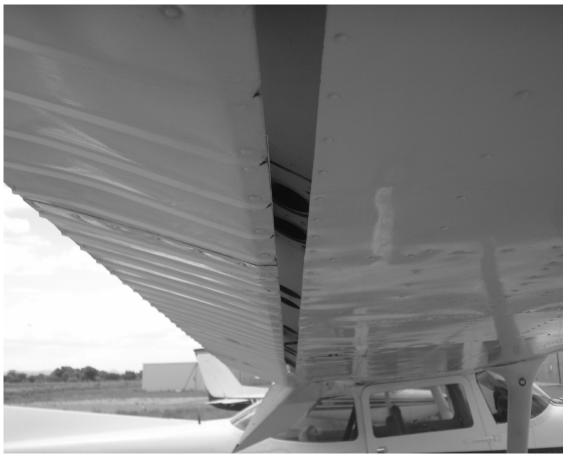
Ensure elevator and trim secure and undamaged, linkages free and unobstructed, check full and free movement of elevator.

Check rudder linkages and turn-buckles secure, unobstructed, and elevator has free movement (do not check full movement with nose wheel on the ground).
Check lower tail and tie down for any sign of tail strike.

Check beacon, aerials and rear navigation light undamaged and secure.

Right Wing

Ensure aerials undamaged and secure. Check flap does not retract if pushed and flap rollers allow small amount of play in down position.



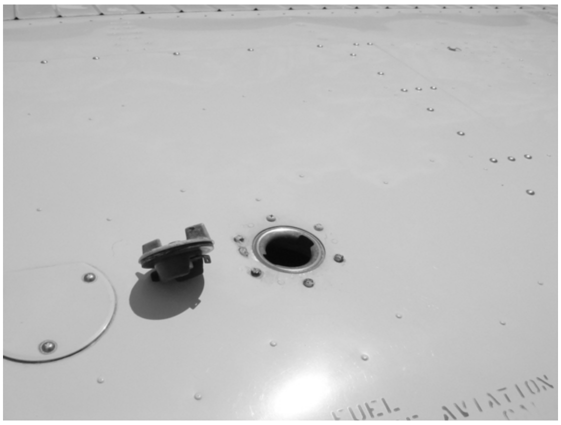
Check top, bottom, and side surfaces for any damage.

Check for damage to surfaces or flap tracks, ensure rollers are free and in good condition, and all fastenings secure.

Check for damage to surface and security of all hinges, control connections, and flutter weights.

Check condition, security and colour of navigation light.

Check top and bottom wing surfaces for any damage or accumulations. *Ice or excessive dirt must be removed before flight.*



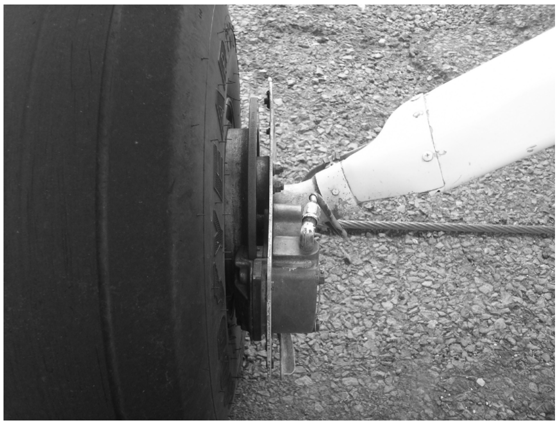
Check visually for desired fuel level using a suitable calibrated dipstick.

Check that fuel cap is secure again after checking the fuel level.

Use sampler cup and drain a small quantity of fuel from wing tank quick-drain valve to check for water, sediment and proper fuel grade.

Check the condition and security of fairing (if fitted), strut and wheel.

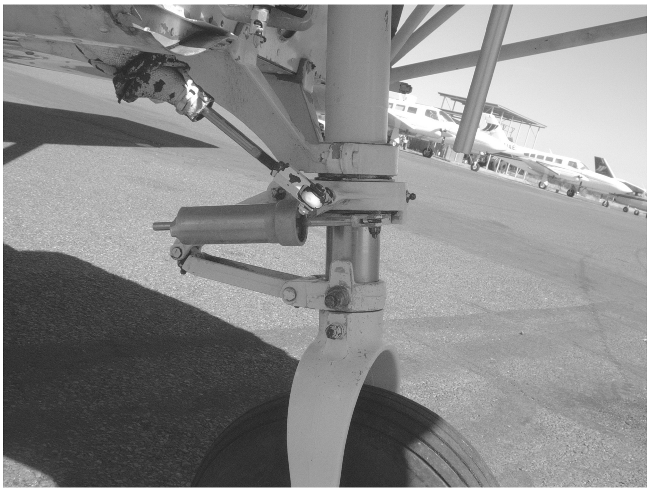
Check the tyre for wear, cuts, bruises, slippage and recommended tyre pressure. Remember, any drop in temperature of air inside a tyre causes a corresponding drop in air pressure.



Check the security and condition of hydraulic lines, disc brake assembly and all fastenings.

Note, wherever possible roll aircraft forward, as any tyre damage or flat spots will tend to come to rest on the point of contact with the ground where they cannot be seen.

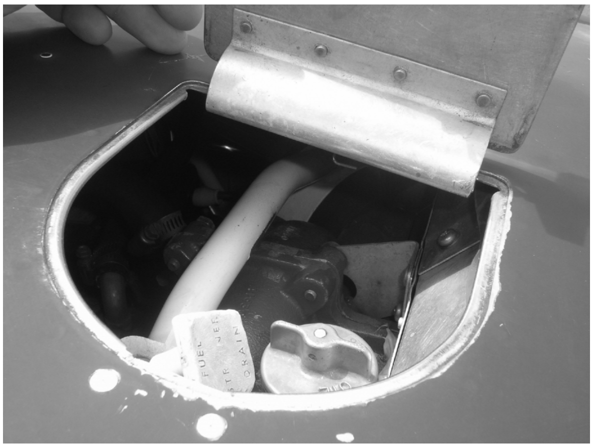
Nose



Check security of nuts and split pins, state of tyre

Check freedom of operating linkage, and security and state of shimmy damper.

Check condition and security of air filter. Air filter should be clear of any dust or other foreign matter. Visually check exhaust for signs of wear, if engine is cool check exhaust is secure.
Check landing light and taxi lights for condition and security (if cowl mounted).



Check oil level above minimum.
Before first flight of the day and after each refuelling, take a fuel sample.
Check strainer drain valve, oil cap and inspection cover are properly closed once inspection complete.

PERFORMANCE

The following figures are given as an overview of the Cessna 172 performance. The figures provided are an average and will not match every model of C172. Some variations have been noted.

It is important to refer to the approved flight manual for the aircraft you are flying for the correct performance information before and during flight.

Specifications and Limitations

Performance figures given at 2300lbs (MAUW) and speeds in KIAS unless specified otherwise.

Structural Limitations

Gross weight (take-off and landing)	
C172, C172A, C172B	2200lbs
C172D through C172N	2250lbs normal, 1950lbs utility
C172P	2300lbs normal, 2000lbs utility
C172Q	2400lbs normal, 2100lbs utility
C172R, C172S	2550lbs normal, 1950lbs utility
C172RG	2650lbs
R172K	2550lbs
Seaplane models (All)	2220lbs
Baggage allowance (tforward area)	120 lbs (54kgs)
Baggage allowance (aft area if applicable)	50 lbs (23kgs)
Baggage allowance (max. area 1 and 2)	120 lbs (54kgs)
Flight load factor (flaps up)	-1.52g to +3.8g
Flight load factor (flaps down)	0 to +3.0g

Speeds

Never Exceed Speed (Vne)	151 to 160kts (red line)
Maximum structural speed (Vno)	122 to 128kts (top of green arc)
Maximum flap speed (Vfe)	85 kts (top of white arc)
Maximum flap speed 0 to 10 degrees	110 kts (-1979 and later)
Stall speed clean/cruise configuration (Vs)	47 kts (bottom of green arc)
Stall speed in landing configuration (Vso)	41 kts
Maximum demonstrated crosswind component	15 kts
Maximum maneuvering speed (Va)	2300lbs 97 kts
	1950lbs 89 kts
	1600lbs 80 kts

Speeds for normal operation

Normal take-off climb out speed	60-70 kts
Short field take off	lift off 50ft, 50ft 59kts
Best rate of climb speed (Vx)	60kts flaps up

Best rate of climb speed (Vy)	73-67 kts, sea level to 10,000ft
Normal approach flaps 30°	55-65 kts
Normal approach flaps up	60-70 kts
Short field landing (Vref)	60 kts

Speeds for emergency operation

Engine Failure after take-off	65 kts flap up, 60 flap down
Forced landing	65 kts flap up, 60 flap down
Precautionary landing	60 kts full flap

Cruise Performance*

Cruise at 2000ft pressure altitude	2300 rpm 105 KTAS, 6.3 gph
Cruise at 10,000ft pressure altitude	2300 rpm 101 KTAS, 5.6 gph

**Cruise figures provided from the pilots operating handbook should be used with a contingency factor, a block cruises speed and fuel flow that allows for contingency and climb and descent are normally applied.*

Ground Planning

Provided below is an example for completion of your ground planning. Blank forms can be obtained from C172 POH and a flying school.

In this example, the airplane needs to carry two pilots, 20 pounds of baggage, and sufficient fuel to fly 1.5 hours en route at 8000ft on a private flight under visual flight rules.

Route Planning

The first step in any flight planning is to determine the route, this is normally carried out on a Nav. Worksheet, then transferred to the Flight Log for use in flight. An example of a Nav. Worksheet is shown below.

FM	TO	Alt	Temp	W/V	IAS	TAS	Trk T	V	Trk M	G/S	Dist	EET
TOTALS												