Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

***Air Accident Investigation Unit***
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# FINAL REPORT ON THE ACCIDENT TO RYAN ST3KR REGISTERED N 56028 AT EBDT ON 15 AUGUST 2009

Ref. AAIU-2009-13-EBDT-N 56028
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Status: FINAL

## FOREWORD

This report is a technical document that reflects the views of the investigation team on the circumstances that led to the accident.

In accordance with Annex 13 of the Convention on International Civil Aviation, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the determination of the causes, and define recommendations in order to prevent future accidents and incidents.

In particular, Article 16 of the EU regulation EU 996/2010 stipulates that the safety recommendations made in this report do not constitute any suspicion of guilt or responsibility in the accident.

Unless otherwise indicated, recommendations in this report are addressed to the Regulatory Authorities of the State having responsibility for the matters with which the recommendation is concerned. It is for those Authorities to decide what action is taken.

The investigation was conducted by L. Blendeman.
The report was compiled by H. Metillon

NOTE:
For the purpose of this report, time will be indicated in UTC, unless otherwise specified.

Figure 1

## SYNOPSIS

| | |
|---|---|
| **Date and hour of the accident:** | 15 August 2009 at 10:25 UTC |
| **Aircraft:** | RYAN ST3KR |
| **Accident location:** | Diest Airfield, EBDT |
| **Aircraft owner:** | BOGGO AVIATION ING<br>2711 CENTERVILLE RD STE 400<br>WILMINGTON DE 19808-1645<br>(The passenger was the owner) |
| **Type of flight:** | Private Flight |
| **Persons on board:** | 2 |

**Abstract:**

At the end of a flight from Seppe Airport – EHSE (Netherlands) to the Diest airfield EBDT, the airplane was on finals to land on runway 24 when suddenly the engine started to cough and lost power.

The pilot tried to reach the runway but could not maintain sufficient altitude on the glide path.

The airplane made a forced landing in the axis of runway 24 just before the fence of the airfield.

It touched down on the shoulder behind the ditch along the road bordering the airfield. This action was brutally slowed down when the main wheels came in contact with the shoulder of the ditch. Subsequently it hit the fence with concrete poles. The airplane fuselage rotated in a nose down movement which caused the propeller to hit the ground and the airplane to flip over.

The airplane stopped upside down leaving the entire airplane severely damaged.

The pilot and the passenger were slightly injured.

# 1 Factual information.

## 1.1 History of flight.

The aircraft was normally stationed on the Seppe Airfield (EHSE), the Netherlands.

The two pilots, including the current owner, decided to fly to EBDT and to participate in the fly-in event organised by the aeroclub of Diest.

Upon departure, the pilots determined, based on the fuel gauge indication that there was at least 1 hour of fuel on board for the 30 min flight. Their intention was to re-fuel in EBDT.

The entire flight was done with the fuel tank selector positioned on “Reserve”.

They were part of a formation of 4 airplanes, including 2 Tiger Moth biplanes.

After about 35 minutes of flight, they were the last airplane to land in the formation of four.

Reportedly, the four airplanes made a direct approach to land.

During the final approach the pilot, who sat on the rear seat, felt the engine was sputtering and losing power and subsequently stopped.

He decided to lower the nose in order to keep sufficient speed, and reach the grass he saw on the front end of the airfield, behind the road.

He ended up coming in very low, between 2 lighting poles and touched down on the shoulder behind the ditch along the road bordering the airfield.

The main wheels hit the shoulder behind the ditch located along the road and immediately after, a fence and one meter high concrete poles.

The airplane followed this track on the grass of the airfield and flipped over. It stopped upside down leaving the entire airplane severely damaged.

The occupants of the aircraft climbed out with minor injuries.

Figure 2

Figure 3

Figure 4

## 1.2 Injuries persons.

| Injuries | Pilot | Passenger | Others | Total |
|---|---|---|---|---|
| Fatal | 0 | 0 | 0 | 0 |
| Serious | 0 | 0 | 0 | 0 |
| Minor | 1 | 1 | 0 | 2 |
| None | 0 | 0 | 0 | 0 |
| Total | 1 | 1 | 0 | 2 |

## 1.3 Damage to aircraft.

The entire airplane was substantially damaged.

Only one propeller blade was broken by impact.

The right hand wing was separated, the right hand main wheel was torn away and the fuselage and both wings were distorted.

The fuel system was thoroughly inspected and despite the fuselage resting upside down, there was no significant sign of fuel spillage.

The fuel gauge was broken by impact.


Figure 5

## 1.4 Other damage.

The fence and some of its one meter high concrete poles were destroyed.

## 1.5 Personnel information.

**Pilot**

Sex: Male
Age: 65 years old
Nationality: Dutch

Licenses:

- Joint Aviation Authorities Flight Crew License Commercial Airplane Transport License CPL(A) delivered on 21 February 1974, valid not later than 22 September 2013.
  SEP Aircraft Rating (Land) and "L-39 Airplane" valid until 1 September 2010.
  Rating:
  FI(A) valid for CR-ME(A) instruction.
  FI(A) valid for FI instruction.
  FI(A) valid for IR instruction.
  FI(A) valid for PPL and CPL instruction.
  FI(A) valid for VFR Night instruction.
- Federal Aviation Administration (USA) Airline Transport Pilot License issued on 6 February 2009.
  Rating:
  Airplane Multi Engine Land Commercial Privileges.
  Airplane Single Engine Land & Sea.
  Limitations:
  - English Proficient.
  - Authorized Experimental Aircraft: AV-L39.
- United Kingdom Civil Aviation Authority display authorization for Single-Engined Piston Aircraft and Single Jet Aeroplane L-39 valid until 6 July 2010.

Medical:

- Federal Aviation Administration (USA). Medical Certificate Third Class. Examination complied with on 10 October 2008.
- Civil Aviation Authority Netherlands Medical Certificate Class 1 & 2. Class 1 (CPL/ATPL) valid until 1 November 2009. Class 2 (PPL) valid until 1 May 2010.

Experience: Extensive experience as military and commercial aviation pilot. Additionally, 468H experience in private aviation from which:
- 431H on Single Engine Land
- 336H as Pilot In Command
- 205H as Pilot In Command of complex A/C
- 37H of Flight Simulator
- Total time Thousands of hours on many types of airplanes.

**Passenger**

Sex: Male
Age: 69 years old
Nationality: Dutch

License:
Federal Aviation Administration (USA) Private Pilot License.
- Rating: Airplane Single Engine Land.
- Limitations: English Proficient.

Medical Certificate: Medical Class 3 (May 2008)

Experience: Adequate experience to fly a RYAN ST3KR airplane (the passenger was the airplane owner).
468H experience in private aviation from which:
- 431H on Single Engine Land
- 336H as Pilot In Command
- 205H as Pilot In Command of complex A/C
- 37H of Flight Simulator

## 1.6 Aircraft information.

Airframe:
- Manufacturer: RYAN AERONAUTICAL
- Type: ST3KR
- Serial number: 2014
- Built year: 1942
- Registration: N 56028
- Total flight hours: 2955H

Engine:
- Manufacturer: KINNER
- Type: R540-3
- Total flight hours: 2238H
- Serial number: 12820

Propeller:
- Manufacturer: FAHLIN
- Type: D-738
- Total flight hours: 195H
- Serial number: 71-005

Certificate of registration: FAA “Certificate of Aircraft registration” issued on 12 October 2005.

Certificate of airworthiness: FAA “Standard Certificate of Airworthiness” issued 3 October 1956.

Type Certification: FAA Aircraft Specification NO. A-749

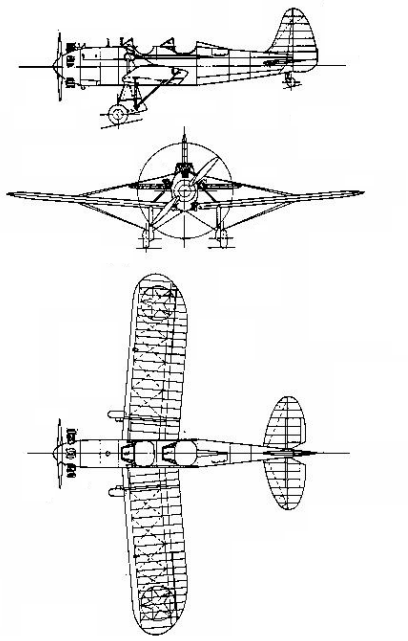


Figure 6

The RYAN ST3KR is an American Primary Training Airplane developed for the USAAC and for the Navy during the World War Two. ST3KR is the civilian name of the “Army PT-22 and PT-22A” airplanes.

The airplane is a two place, tandem, open cockpit, low wing monoplane.

The propeller is two blade fixed pitch wood and is driven by Kinner five cylinder radial 160hp engine.

The airplane is equipped with a classic landing gear.

A “Pilot’s Flight Operating Instruction” reference T.O. NO.01-100GC-1 dated 10 March 1943 (Revised 5 August 1943) was available.

This document is divided into five Sections:

- Section I: Description
- Section II: Pilot Operation Instructions
- Section III: Flight operation Data
- Section IV: Operation of Communication Equipment
- Appendix: British Glossary of Nomenclature

NB: The Section II “Pilot Operation Instructions” is enclosed at the end of this report.

**Fuel System.**

The single 24 GAL capacity fuel tank is located between the front cockpit and the engine firewall.

The tank is equipped with a float type direct reading fuel capacity gauge located on the top of the fuel tank, forward of front windshield (figure 7).

Figure 7

The “Pilot Operating Instructions” mention the following:

Chapter 6. “Take Off”:

| | |
|---|---|
| a) | Safety belt “FASTENED” |
| b) | Set elevator trim tab “NEUTRAL” |
| c) | Mixture control “FULL RICH” |
| d) | Fuel selector valve “RES” (reserve) |
| e) | Flap are not necessary; however, 10° flaps will shorten take-off run in emergency |
| f) | Control “FREE” |
| g) | Brakes “OFF” |
| h) | Advance throttle to “FULL” position slowly |
| i) | Fuel selector to “MAIN” in flight |
| j) | Refer to Section III for all flight operating data |

Chapter 11. “Engine Failure during Flight”:

| |
|---|
| a. Check fuel<br>b. Drop nose of airplane and trim elevator tab to maintain an indicated air speed of 85 mph<br>c. Ignition switch “OFF”<br>d. Fuel selector valve “OFF” |

The fuel system, as described on the schematic hereunder (Figure 8) consists of a single fuel tank feeding the engine carburetor through a 3 way selector valve, a filter (strainer) and two different feeding lines (Main and Reserve).

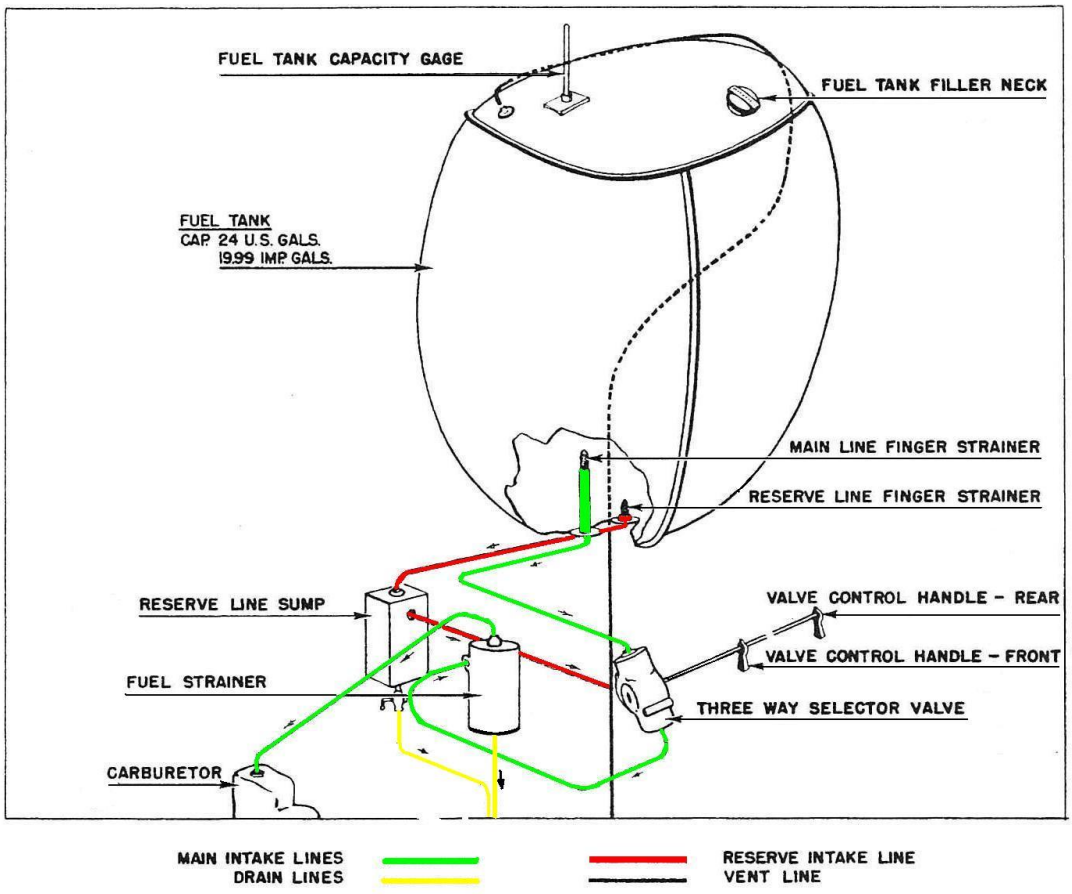



Figure 8.

As seen on the above schematic, the reserve line allows fuel to feed the carburetor when the fuel tank is almost empty.

By contrast, the main line does not allow the use of the full tanks capacity. It should warn the pilot is running out of fuel when the engine starts to sputter.

The pilot should then select the “Reserve” position to continue his flight for a short, but unknown period of time.

However, ”Pilot’s Flight Operating Instructions” don’t indicate the amount of fuel for reserve and no information was available to determine the remaining fuel quantity and consequently the range.

Reportedly, the pilot and the passenger (Owner) of N56028 considered using the main/reserve selector to be inadequate and they always flew the airplane on the reserve position.

Other pilots had advised to fly on reserve because after switching to reserve it could take to much time before fuel reached the engine. The experience of those pilots was that the reserve fuel barely reached the sputtering engine in time.

## 1.7 Meteorological conditions.

Surface observations from the weather observation station of EBDT on 15 August at 10:25 showed a wind coming from 200° with a speed of 15 kt.
Visibility was more than 10 kilometers. No cloud was reported.
Temperature was 26° C and the dew point was 12° C.
QNH was 1016 hPa.

## 1.8 Aids to navigation.

Not applicable.

## 1.9 Communication.

No radio communication was established between the airplane and the airfield EBDT Flight Information Service. Therefore, the responsible person at the “Fly-In” event assumed that the airplane radio was out of use.

## 1.10 Aerodrome information.

The airfield of EBDT is a military airfield of the Belgian Land Component. The airfield is located 505957N - 0050356E, North East of the city of Diest.

The elevation is 100 ft and it is equipped with a 700 m long – 30 m wide grass runway oriented 060° / 240°.

The North and East sides of the airfield are bordered by roads. The distance measured in the axis of the runway between the threshold of runway 24 and the East road (Nieuwe Dijkstraat) is around 150 meter.

The airfield is operated by a civilian company “Diest Aeroclub” when it is not operated by the military.

The use of the airfield is subject to prior permission from the operator.

A 40m wide runway is limited to 600 m for the civilian use.

The circuits are left hand for 06 runway and right hand for 24 runway.

The aerodrome is provided with a Flight Information Service (AFIS) called “Schaffen radio” on the frequency 118,925 MHz (Information only, no ATC).

On the day of the accident the runway 24 was in use.
The distance between EHSE and EBDT is approximately 71km.


## 1.11 Flight recorders.

Not applicable

## 1.12 Wreckage and impact information.

The airplane flipped over in the axis of runway 24, and ended on its back 5 meters from the fence and around 100 meters from the runway threshold.

## 1.13 Medical and pathological information.

The pilot was slightly injured and the passenger was more seriously injured.

## 1.14 Fire

There was no fire

### 1.15 Survival aspects.

As the airplane flipped over, the occupants could have been crushed by contact with the ground if the vertical stabilizer had not withstood the shock.

### 1.16 Tests and research.

Not applicable.

### 1.17 Organizational and management information.

Not applicable.

### 1.18 Additional information.

Not applicable.

### 1.19 Useful or effective investigation techniques.

Not applicable.

# 2 Analysis.

## 2.1 The engine loss of power

Witnesses and the pilot reported the engine loss of power when the airplane was on final approach.

Moreover, as only one blade of the propeller was broken, it is evident that the engine was stopped or delivered no power at the moment of the crash.

The wreckage was thoroughly examined and it was established that the fuel tank was virtually empty when the engine shut down.

## 2.2 The position of the fuel tank selector.

The fuel tank selector was found set on “Reserve” after the crash.

This “Reserve” position of the fuel tank selector was confirmed by the pilot who reported that the whole flight was done using this fuel tank selector position.

The pilot and the airplane’s owner specified that they systematically set the fuel tank selector on “Reserve”, not only for the take-off as recommended by the “Pilot’s flight Operating Instruction”, but also in cruise.

The decision to systematically use the “Reserve” position was taken regarding their lack of confidence in the “Main” position and further to the operational implications of its use.

It is likely that the aircraft manufacturer’s intention was to incite the pilots to take enough fuel to perform the whole flight using the main fuel tank position. The purpose of the “reserve” position would have been only to get an extra safety during take-off and to make it possible to restore the fuel feeding after a possible fuel starvation on the main fuel tank position.

However, the fuel management is not clearly explained in the “Pilot Operating Instructions” and the fuel tank capacity ratio between the “Reserve” and the “Main” position is unknown.

Finally, by using systematically the “Reserve” position, the pilot managed the fuel system as a normal fuel tank without reserve, as found in most private airplanes.

## 2.3 The fuel gauge.

The fuel gauge was broken by impact.

However, as seen on the following picture, the fuel gauge indicates around 3 gal fuel remaining when the fuel tank is empty and it was established that it was already inaccurate before the crash.


## 2.4 The fuel consumption.

The Ryan N56028 was part of a formation of four airplanes, including two “Tiger Moth” biplanes and was the last of them to land.

The flight from EHSE to EBDT was made at low speed and low engine settings to accommodate to the cruise speed of the two “Tiger Moth” biplanes which is about 7 Knots slower.

The fuel consumption at sea level cruise speed (86,8 Knots and 1560 RPM) is 9,3 G.P.H. at full rich mixture and 8 G.P.H. at best power mixture.

It is known that the specific consumption of the old-timer radial engines increases when they are not used at the best setting. That means that the range of the Ryan N56028 can decrease when the airplane is flown at lower speed than the cruise speed.

The distance between EHSE and EBDT was around 38 Nautical Miles and the flight path was about 150°.

The wind was coming from 200° with a speed of 15 Kt which means a calculated equivalent nose wind of 9,8 Knots.

Taking into account the reduced airspeed and the nose wind, the 35 minutes of flight from EHSE and EBDT should not have been a surprise for the pilot.

As the crash happened after a 35 minutes flight, we can consider that the available fuel quantity at departure was not more than 5,4 Gal. if the consumption was 9,3 G.P.H. (Full rich mixture).

In conclusion, it is likely that part of the flight was done by using the remaining fuel of the reserve position although the reserve fuel amount is unknown.

## 2.5 The available fuel quantity before the flight.

The pilot checked the remaining fuel during the pre flight inspection and determined based on the fuel gauge indication that there was at least one hour fuel on board, sufficient for the intended flight.

However, the available fuel quantity was not in any alternative way precisely measured such as, for example by using a calibrated dip stick.

# 3 Conclusions.

## 3.1 Findings.

- No pre impact anomalies could be found that would explain the loss of power of the engine.
- It was established that virtually no fuel was available on board at the time of the engine loss of power.
- The pilot held a FAA valid Pilot license and he had a large flight experience.
- The fuel gauge was not reliable and indicated a small amount of fuel when the fuel tank was empty.
- It was standard practice for the pilots to fly the whole flights with the fuel selector set on “Reserve”.
- The actual available fuel quantity was not positively checked by the pilot before the flight, but was based on the fuel gauge indication.

## 3.2 Causes.

The cause of the accident is an engine shut down on final approach due to fuel starvation.
The fuel starvation was caused by an obviously inadequate determination of the remaining fuel quantity before take-off.

**Contribution factors**

- The unreliable fuel quantity indicating system.
- The practice of the pilots not using the fuel tank selector as recommended by the “Pilot’s Flight Operating Instructions”
- The amount of available fuel when “Reserve” is selected after the Main supply is depleted is not mentioned in the “Pilot Operating Instructions”.
- The fuel management is not specifically explained in the “Pilot’s Flight Operating Instructions”.

# 4 Safety recommendations.

There is no recommendation.

## Enclosure: “Pilot Operating Instructions”



SECTION II

PILOT OPERATING INSTRUCTIONS

**1. ON ENTERING THE PILOTS COMPARTMENT**

a. Adjust seat to a convenient height.
b. Adjust rudder pedals to suitable length (figures 3 and 4).
c. Ignition switch "OFF" (figures 5 and 6).
d. Flaps "UP" (figures 5 and 6).
e. Parking brake "SET" (figure 4).
f. Controls are "FREE".
g. Fuel supply and selector (figures 5 and 6) on "RES" (reserve).
h. Throttle "CLOSED" (figures 5 and 6).
i. Mixture control "FULL RICH" (figures 5 and 6).
j. Carburetor heat "COLD" (figures 7 and 8).

**2. STARTING ENGINE**

a. Cold Engine—With ignition switch "OFF", pull propeller through about five revolutions, and at the same time pump throttle from two to six strokes.

b. Throttle "SLIGHTLY OPEN".

c. Ignition to "L" (Left Magneto).

NOTE: A hand turning gear for starting the engine is provided and is not operable from the cockpit.

OPERATIONS NOTE: If engine tends to cut out immediately after starting, pumping the throttle slightly will overcome the condition. If, due to over-prime, the engine will not start, turn ignition switch to "OFF" and with throttle wide "OPEN" turn propeller backward by hand at least six revolutions, then reset throttle and repeat starting procedure omitting further prime.

d. If engine is cold, do not run above 900 rpm immediately after starting (figures 9 and 10).

**3. ENGINE WARM-UP**

a. Ignition to "BOTH" (figures 5 and 6).
b. Operate engine at between 700 and 900 rpm until oil temperature reaches at least 27° C (80° F) and oil pressure is normal (figures 9 and 10).
c. Set carburetor heat (figures 7 and 8) "COLD" unless icing conditions prevail.

CAUTION: Do not attempt take-off with the carburetor heat control "HOT".

**4. ENGINE AND ACCESSORIES GROUND TEST**

a. Open throttle slowly to obtain between 1200 and 1500 rpm and briefly make the following checks:

(1) Check ignition on each magneto. A drop of 50 rpm on either magneto is permissible.

(2) Oil pressure 80 to 100 pounds per square inch.

b. Slowly decelerate engine and check smoothness and speed of idling.

NOTE: The above procedure can usually be accomplished in approximately 10 sec.

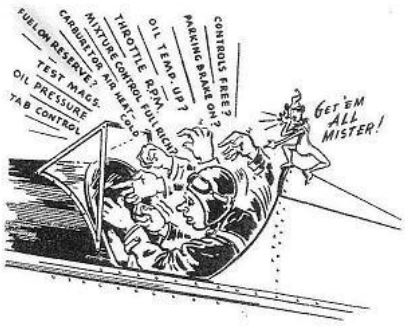
This ten seconds is good insurance.

**5. TAXIING INSTRUCTIONS**

The area directly ahead of the airplane can be better observed by swinging the tail of the airplane from side to side while taxiing.

CAUTION: Avoid taxiing through mud-holes and tall grass as the propeller can easily be damaged by small stones, mud clots, or foreign objects. DO NOT TAXI WITH FLAPS EXTENDED.

**6. TAKE-OFF**




*Before us behold a young man in a muddle,*
*With his signals all crossed in his first pre-flight huddle.*
*It seems pretty tough, but if he would look,*
*He could find all the answers right here in this book.*

a. Safety belt "FASTENED".
b. Set elevator trim tab "NEUTRAL" (figures 5 and 6).
c. Mixture control "FULL RICH" (figures 5 and 6).
d. Fuel selector valve "RES" (reserve) (figures 5 and 6).
e. Flaps are not necessary; however, 10° flaps will shorten take-off run in emergency.
f. Controls "FREE".
g. Brakes "OFF".
h. Advance throttle to "FULL" position slowly (figures 5 and 6).
i. Fuel selector valve to "MAIN" in flight (figures 5 and 6).
j. Refer to Section III for all flight operating data.

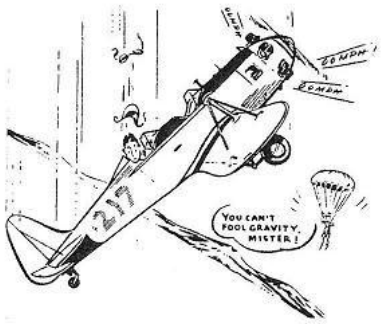
7. ENGINE FAILURE DURING TAKE-OFF

a. Ignition switch "OFF" (figures 5 and 6).
b. Put nose of airplane well down and maintain an indicated air speed of 85 mph STRAIGHT AHEAD.

A Golden Rule — "Don't turn back into the field."

8. CLIMB

a. The use of flaps during climb is of no special benefit.
b. The best indicated air speed for climbing, at sea level, is 79 mph.




*An impetuous pilot was John Peter McClick,*
*Who, on take-offs, was inclined to horse back on the stick,*
*And this time, with the grace of a top-heavy brick,*
*He got up off the ground but returned to it quick.*

9. FLIGHT OPERATION

a. Flight operation instruction charts are located in Section III.

b. Icing Conditions

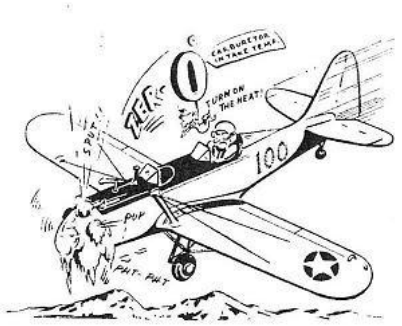
(1) Icing of carburetor will be noted by misfiring of the engine and will parallel the performance of an engine being depleted of fuel.

(2) At the first indication of these conditions rotate carburetor heat control handle (figures 7 and 8) toward the "HOT" position.

(3) Adjust carburetor heat the amount necessary to eliminate the ice formation in the carburetor.

(4) Return carburetor heat control to "COLD" position as soon as engine performance is normal unless icing conditions are prevalent.

(5) A slight drop in engine rpm will be experienced when carburetor heat is employed for continuous operation.




*Pilot Maginess ran into some icicles,*
*Which he never encountered when piloting bicycles.*
*For the proper solution of what to do next*
*He applied the instructions he'd read in the text.*

10. GENERAL FLYING CHARACTERISTICS

a. Stability—With normal and full loads the airplane is stable.

NOTE: Airplane should be flown "Solo" from rear cockpit only (figure 9).

b. Trim—When engine is throttled back, a nose-heavy condition will be noted and a flight correction should be made either with control stick or elevator tab control.

11. ENGINE FAILURE DURING FLIGHT

A grim determination to make the forced landing is an assist which may avoid grim consequences.

a. Check fuel.

b. Drop nose of airplane and trim elevator tab to maintain an indicated air speed of 85 mph.

c. Ignition switch "OFF" (figures 5 and 6).

d. Fuel selector valve "OFF" (figures 5 and 6).

12. STALLS

a. Stalling Speeds

Flaps Down—62 mph true air speed.
Flaps Up—64 mph true air speed.

b. The airplane is stable in a stall and has no tendency to spin.

13. SPINS

If a spin develops, throttle back, apply opposite rudder and ease control stick forward. Recovery is immediate and positive.

14. AEROBATICS

All normal aerobatics may be executed in this airplane with the exception of those listed in paragraph 19.

15. DIVING

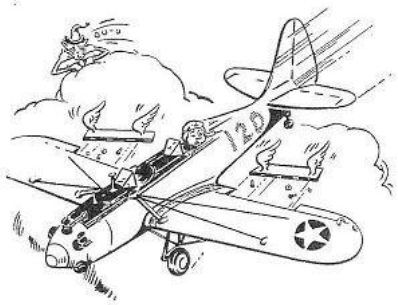
Do not exceed an indicated air speed of 190 mph (figures 9 and 10).

16. APPROACH, LANDING AND CROSS WIND LANDING

a. Approach at indicated air speed of 85 mph.

b. Use of flaps permits a steeper gliding angle without gain in forward speed.

c. Do not lower flaps at indicated air speed in excess of 100 mph (figures 9 and 10).



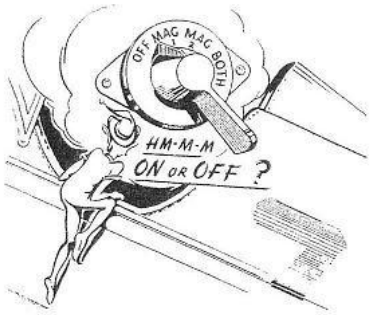
*With his air speed a hundred, Casey Jones Bole*
*Pushed her nose over and poured on the coal,*
*The idea never struck him of dumping his flaps*
*Which came out by the roots, leaving nothing but gaps.*

d. Avoid cross wind landing wherever practicable.

e. At conclusion of landing run, raise flaps.

f. For emergency take-off if landing is not completed, open throttle and initiate gradual climb. Do not raise flaps until sufficient speed has been gained.

17. STOPPING ENGINE




*Peering into the cockpit, this wise little widget*
*Can see the switch on, 'cause someone didn't switch it.*
*Full off he can't turn it and feels sorta blue*
*About the first mech who pulls the prop through.*

a. Set parking brake (figure 4).

b. Hold the flight control stick back and allow engine to run up to 600 or 700 rpm.

c. Cut switch and advance throttle (figures 5 and 6).

d. Close throttle when propeller stops turning.

18. BEFORE LEAVING PILOT'S COMPARTMENT

a. Fuel selector "OFF" (figures 5 and 6).

b. Parking brake "SET" (figure 4).

c. If windy, lock flight controls (figure 11) to prevent damage to the control surfaces.

19. MANEUVERS PROHIBITED

a. Inverted flight.

b. Inverted spin.

c. Outside loop.

Remember these — they are important.

d. Snap roll in excess of 105 mph indicated air speed.

e. Slow roll in excess of 135 mph indicated air speed.

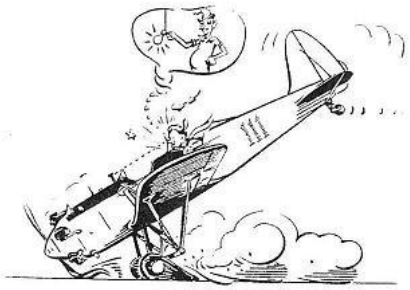
f. Spin of more than 3 revolutions.

g. Indicated air speed in excess of 190 mph (figures 9 and 10).

h. Indicated air speed in excess of 100 mph with flaps down (figures 9 and 10).

i. DO NOT SET PARKING BRAKE WHILE AIRPLANE IS IN FLIGHT.


*This is a picture of Jonas M. Flynn,*
*Who broke all the rules and stayed in a spin.*
*Failing to emerge from his spin 'til too late,*
*Explains the condition of Flynn and his crate.*



*The pilot above, who is scorching his tires,*
*Is known to his mates as "Inertia" McMyers.*
*He suffered contusions, had his dignity shocked*
*When he landed one day with his parking brakes locked.*