FIELD SERVICE NEWS

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Aircraft Division

FA-200: Landing Gear

1. Foreword

The Fuji FA-200 Aero Subaru has been designed under idea "Light and Rigid". The landing gear, however, has been designed with emphasis placed on its rigidity rather than reduction of weight so that the airplane withstands rapid load applied during touch-and-go primary training and hard landing on a rough runway. The landing gear of the FA-200 looks slender because if is thin and long. However, in spite of its external view, the inside structure is very rigid.

To provide you with a knowledge about the rigidity of this landing gear, this Field Service News presents the description of the construction and the results of the tests conducted since the very first proto-type.

2. Construction and function of the landing gear

The construction of the landing gear is as illustrated in Fig. 1.

For shock absorbing of the landing gear, the orifice shown in the Fig. 1 is the most important part. When the aircraft lands, the drop down

energy is converted to a heat since the landing gear is contracted and hydraulic oil is rapidly passed thrcugh the small orifice. With the piston stroke increased, the landing gear contracting speed delays and the effect of orifice is reduced. Instead, however, pneumatic pressure increases and its spring effect actuates as a shock-absorber. Tires work as auxiliary parts for both of those functions.

Fig. 2 is a diagram which shows drop-down performance of the landing gear.

3. Design values of the landing gear

3.1 Both FA-200-160 and 200-180 use the landing gear of the same design. The design is based on the FA-200-180 because landing load of the FA-200-180 is greater than that of the FA-200-160.

The design specifications of the landing gear for the FA-200-180 are as follows:

	Load distribution	Speed	Rate of descend	Free fall height	Multiple of limited ground reaction load
Main landing gear	575 kg	70 mph	2.7 m/sec	375 mm	2.80
Nose landing gear	350 kg	70 mph	2.7 m/sec	375 mm	3.09

3.2 The landing gears have been tested not only for the above listed limited specifications but also for the safety factors and rigidity. With the test for safety factor, it has been proved that the shock absorbing system has extra energy absorbing capacity even at a 540 mm drop-down (rate of descend 1.2 times as great as the limited rate of descend).

The rigidity test is conducted to find out maximum ground reaction which the landing gear structure withstands. For this landing gear, drop down test was conducted up to such an extent that the following reactions occurred:

Main landing gear: 2,015 kg

Nose landing gear: 1,325 kg

As the result, no damage was sustained at any part of the landing gear.

3.3 The landing gear receives a great rearward load in the moment when the landing gear comes into contact with the ground due to friction resistance between the ground and tire. This phenomenon is called spin-up. The landing gear is of elastic structure, and therefore, it is bent rearward due to spin-up, and in the subsequent moment, it returns forward due to its spring effect. This phenomenon is called spring-back.

Strength of a landing gear is rated mostly by bending load due to these spin-up and spring-back.

As long as the FA-200 is concerned, the landing gear is more rigid to the bending load rather than to the side load due to side slip.

4. Precautions for pilot control

When landing, pay attention on the airplane speed and settlement speed, and make landing smoothly under a slow speed. Actually, however, it is safe because ground reaction factor is at most 1.7 to 2.0G, even if a hard landing is made.

When side slip of structure is applied to a hard landing, condition becomes more severe. Hence, when landing, be sure to maintain the axis of structure in parallel to the runway and face the airplane axis straight along the runway.

When landing in a cross wind, this operation becomes difficult. However, you can make landing safely through the following operating procedure. Although you may be familiar with these procedures, we will describe it for your referece.

(1) Upon completion of the final turn, make sure that the nose is correctly faced to the runway, and bank the wing toward windward by properly operating aileron. Under this condition, the nose intends to turn toward windward. Depress rudder to the opposite side and adjust the direction properly.

(2) When corss wind is high, raise the flap one more step to 25°.

(3) While approaching, adjust direction and position properly against functuation of cross wind so that the structure axis and flying direction are not changed. Moreover, as the aircraft speed reduces, increase corrections of aileron and rudder.

(4) Maintain the above conditions until the landing completes. To be more specifically, touch the wheel in the windward first, and touch the opposite side wheel subsequently as the lift reduces.

5. Inspection when hard landing is made

When hard landing has been made inspect the landing gear visually for bending, damage on tire, deformation of main wing outer panel, etc., and further, carry out the special inspections described in the Service Manual.

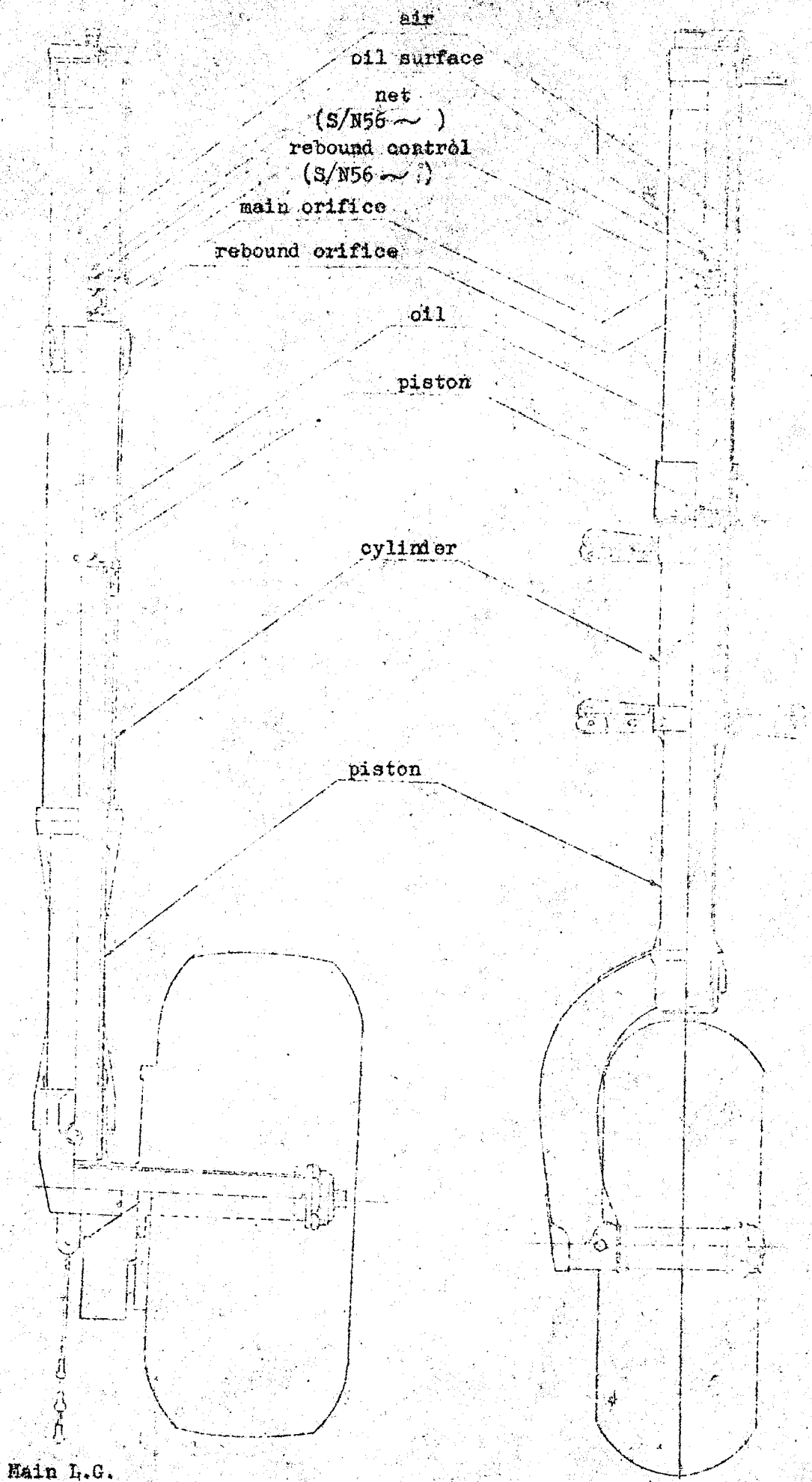
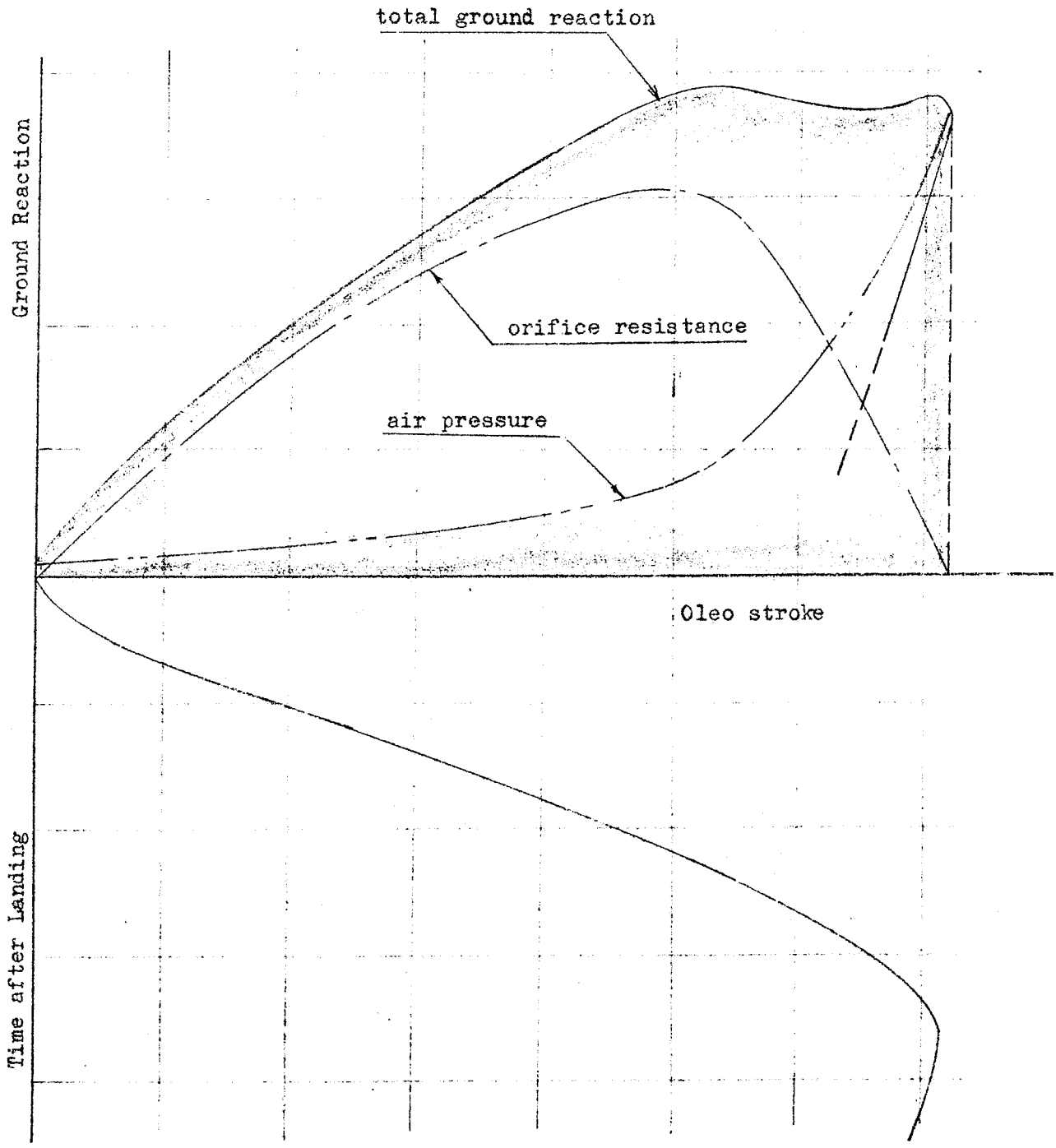


Fig 1. FA-200 Landing Gear Structure



means energy absorbed by oleo.

Fig 2. Performance of Landing Gear