On 28 January 1942 two Mustang Is, AG360 and AG365, were sent to the Air Fighting Development Unit at Duxford for tactical and armament trials. The resulting report, the first evaluation of the Mustang as a combat type, is given below:

TACTICAL AND ARMAMENT TRIALS—MUSTANG I AIRCRAFT

Pilot's Cockpit

The cockpit is fully enclosed and although a trifle cramped for a tall pilot [it] is otherwise roomy and comfortable. The positioning of the instruments and controls, apart from the undercarriage lever which is difficult to reach, is reasonably good. The top of the cockpit and the port side panel are hinged in order to facilitate entry and exit. Sliding clear vision panels are fitted on either side similar to those used in the Defiant. It is possible to jettison the whole enclosure in emergency.

The cockpit, although fitted with a cold air duct, is excessively hot, even whilst flying at high altitude under freezing conditions. In addition, there is a warm air duct which it has never been necessary to use. Tests are being carried out at A.S.T. Hamble with a modification prepared in conjunction with this Unit which should overcome this trouble.

TACTICAL TRIALS

General

The Mustang is considered an excellent low and medium altitude fighter and certainly the best American fighter that has so far reached this country. It is faster than the Spitfire VB at all heights up to 25,000 feet and compares favourably in manoeuvrability. It can out-dive the Spitfire with ease, but has an inferior rate of climb.

Flying Characteristics

The aircraft is pleasant to fly, being extremely stable in all planes. The take-off is rather long but with little tendency to swing, and as the engine is not fitted with an automatic boost control, care must be taken not to overboost. The landing is easy though the run is longer than that taken by a Hurricane or Spitfire. The controls are well balanced and can be made light or heavy as required by adjustment of the servo-tabs fitted to ailerons and elevators. There is little tendency to heavy-up at high speeds. With the controls lightened by the tabs, the Mustang is as light as the Spitfire but far smoother in all manoeuvres. The aircraft handles extremely well in aerobatics and gives ample warning of the stall. In particular, it was found far more difficult to effect a high speed stall than in a Spitfire.
Performance

The Mustang was compared with a Spitfire VB, both aircraft carrying full war load, and up to a height of 25,000 feet was found to be faster. Its maximum true speed is developed at a height of about 15,000 feet and is between 375 mph and 380 mph. The approximate speed advantages of the Mustang at various heights are as follows:

- At 5,000 feet—30 mph faster than the Spitfire VB
- At 15,000 feet—35 mph faster than the Spitfire VB
- At 25,000 feet—1-2 mph faster than the Spitfire VB

Climb

The rate of climb of the Mustang at all heights is not so good as that of the Spitfire VB. At low altitudes the difference is only slight, but more marked as height is increased, and from 20,000 feet it takes one minute longer than the Spitfire to climb to 25,000 feet. It is considered that the operational ceiling of the aircraft is approximately 25,000 feet, where although the level speed is slightly faster than the Spitfire VB, the rate of climb has fallen off to about 1,000 feet per minute. The Mustang was climbed on from 25,000 feet up to 30,000 feet, the climb being very slow and uncomfortable and the controls sloppy. In level flight at 30,000 feet, however, the aircraft handled quite well though accurate flying was necessary to prevent losing height in turns.

Dive

The Mustang dives very fast, its initial acceleration being particularly good, and in comparative trials was always able to dive away from the Spitfire; when diving, recovery was found to be easy even at an indicated speed of 500 mph. Instructions contained in the Pilot’s Notes state that during dives it is necessary to turn to the reserve tank to avoid starvation and to lower the deflector plate in front of the radiator to prevent the glycol temperature becoming too low, but diving tests showed that this was unnecessary. During prolonged dives, however, particularly at altitude when the radiator temperature was inclined to fall, the lowering of the deflector plate was found to be necessary. This plate, when in use, affects the trim considerably and causes vibration.

Search

The all-round view from the Mustang is fairly good in its present form, but when the proposed armour plate is fitted behind the pilot, the view directly astern will be very poor. The frames running level with the pilot’s eyes hinder the view considerably, though he can see round them by moving his head. The view is improved by opening the side panels but these cannot be opened at speeds above 250 mph, IAS, and even when open are sucked shut at higher speeds. A rear view mirror is fitted inside the cockpit and is the best internal one that this Unit has seen. It covers a wide field though it does not extend very far downwards. The field can be increased upwards by moving the mirror, which is hinged at the top of its mounting. The clarity of images in the mirror is especially good considering the very small angle at which the line of sight passes through the top perspex of the hood.

Endurance

The total fuel capacity is 140 gallons, which allows an endurance of approximately 4 hours at economical cruising (1,800 rpm and 25° mercury). At maximum continuous cruising (2,600 rpm and 37° mercury) the endurance is reduced to about 1 hour 40 minutes.

Instrument Flying

The aircraft, being extremely stable, is very easy to fly on instruments and it can be trimmed to fly “hands and feet off” in level flight or when climbing or diving.

Low Flying

The pilot’s view forwards and downwards is better than from a Spitfire and this makes it far better for low flying and ground strafing. As the cockpit hood cannot be opened in flight, however, and there is no forward clear vision panel, low flying in bad visibility is unpleasant.

Formation Flying

The aircraft is pleasant to fly in formation. It has a wide speed range, but owing to its clean lines, Deceleration is slow.
Engine Starting and Quick Take-Offs

The Allison engine is very easy to start even under the severest winter conditions, but some minutes are necessary for warming up after a cold start, as the minimum oil temperature that is safe for take-off is far higher than for Merlin engines. A warm engine offers no difficulty and a quick take-off was effected in six minutes from time of the order being given to the aircraft being airborne.

Manoeuvrability

The Mustang was compared with a Spitfire VB, both aircraft carrying full war load, for turning circles and dog-fighting at all heights up to 25,000 feet. At that height there was nothing to choose between the aircraft, but at lower altitudes the Spitfire had the advantage over the Mustang, being able to turn a little tighter.

The use of flap for tightening the Mustang’s turn was tried and found to be quite effective but even so it could not out-manoeuvre the Spitfire. Up to 15° of flap can be used and usually results in a gain of height when applied but the advantage is only momentary and can become a serious disadvantage if the Mustang wants to break away in a fast dive.

The Mustang can easily out-dive the Spitfire and owing to the cleanness of its design and its weight can retain the high speed obtained in a dive for a long time after levelling out. Its superior speed below about 25,000 feet and the ability to dive with full power from straight and level flight by applying negative ‘G’, ie like the Me 109, allow it to break off combat or re-engage at any time.

The rate of climb being inferior to that of the Spitfire, it cannot make use of climbing turns to obtain an advantage unless it has already dived down from a superior height, its best tactics being to attempt to engage from above and then to use the speed gained in the dive to zoom up out of range for a second attack.

One difficulty encountered during dog-fighting and diving is that having no automatic boost fitted, the pilot must constantly check his boost gauge below 15,000 feet, as the limitations can easily be exceeded during the heat of combat.

Short trials were also carried out against the Typhoon between 10,000 and 15,000 feet, in which the Mustang proved to be the more manoeuvrable though outclimb by the Typhoon. When either attempted to break off the engagement by diving away it was found that the Mustang could accelerate away at the beginning of the dive but was soon caught up by the Typhoon and conversely the Mustang might get a chance of a shot at the beginning of the Typhoon’s dive but in the end the latter drew away.

ARMAMENT CHARACTERISTICS

Gun Installation

The armament consists of two .5’s and four .30’s in the wings, and two .5’s in the lower part of the fuselage below the engine. The guns are fired by electric solenoids operated by a trigger on the front of the control column, and a switch is fitted on the port side of the dashboard allowing the pilot to select as follows:- “Wings”, “Fuselage”, “All” . . . . The absence of vibration during the firing trials was remarked upon by all pilots.

EQUIPMENT REQUIRED AT FORWARD BASES

It is thought that little extra equipment would be required for operating the Mustang from a forward base. The radiator, however, picks up mud easily on a muddy aerodrome and water under pressure is required for removing it successfully . . . . It has the benefit of having three good methods of starting—by external battery, by internal battery, and by hand inertia. It must be noted that the size of the forward base must be greater than the minimum necessary for contemporary types.

(signed)
Ian Campbell-Orde
Wing Commander,
Commanding, A.F.D.U.

AFDU/3/20
5th May 1942