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4th Part of Report No. AAE/909/3



MINISTRY OF AVIATION

# AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT

BOSCOMBE DOWN

LIGHTNING MK.3 XP 694

PHOTOGRAPHIC TRIALS OF STANDARD G.90 CAMERA INSTALLATION

**U**

PRESENTED BY

FLT. LT. D. F. J. MCDERMOTT, R.A.F.  
PHOTOGRAPHIC SECTION

  
MINISTRY OF AVIATION

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/1. Introduction

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1. Introduction

Trials were required to assess the G.90 camera for use as a standard cine camera gun training camera installation, fitted in the nose of Lightning aircraft.

2. General Description

2.1 Two standard G.90 cameras, the details of which are contained in A.P.1355 D. Vol.1. Chapter 9, were used separately to test the installation as follows:-

(a) Camera G.90 Mk.1 (14A/4929) with a 1½" lens was used on two flights with Kodak XX 16mm x 50 ft. films.

(b) Camera G.90 Mk.1 (14A/4981) with a 3" lens was used on three flights with Anscochrome 16mm x 50 ft. films.

2.2 A standard G.90 mounting (14A/4936) was fitted with a forward probing, locating pin and two socket lugs attached to the underside of the base plate. (Figure 3). These are used to secure the mounting to the aircraft using two quick release pip-pins. (Figure 2). The camera being secured to the mounting in the normal way by four self locking nuts. The mounting was adjustable to enable the camera to be moved in the azimuth and vertical fields for the purpose of harmonization with the light fighter sight used by the pilot. Once harmonised the movements are locked in position. A G.90 camera sighting unit is supplied with the camera for this purpose.

2.3 The camera, when installed in the aircraft, faces forward through an optically flat glass window which is situated in the bottom bullet support in the air intake. (Figure 5). No heating is required other than that supplied by the camera body heater, which is thermostatically controlled to operate in low ambient temperatures.

2.4 A camera master switch is situated on the pilot's right knee consol in the cockpit. When energised, it supplies power to the firing button, the DULL/BRIGHT switch and through a thermostat to the camera body heater. There is no film indicator light in the cockpit, instead, it is fitted adjacent to a test firing button which is located on the inside port wall of the nose wheel bay. In this position it is convenient for the photographer to carry out "Before flight testing". The DULL/BRIGHT switch in the cockpit enables the pilot to select any one of two pre-selected aperture settings, by remote control.

2.5 The shutter is a non-adjustable dish type. It can operate at any one of the following speeds, which must be set on the ground by the photographer during the before flight inspection:-

(a) 8 frames per second: Giving a total of four minutes film running time and an exposure of 1/200th sec.

(b) 16 frames per second: Giving a total of two minutes running time and an exposure of 1/400th sec.

(c) 32 frames per second: Giving a total of one minute film running time and an exposure of 1/800th sec.

3. Tests Made

3.1 Ground Tests

- (i) General appraisal of the equipment.
- (ii) Appraisal of the installation of the camera and method of magazine changing.

/3.2

### 3.2 Air Tests

- (i) Simulated Air to Air attacks.
- (ii) Simulated Air to Ground attacks.

## 4. Results of Tests

### 4.1 Ground Tests

The ground testing of the camera was at all times carried out using the test button and its associate film indicator light. All tests were completely satisfactory. The camera and the associated aircraft equipments were serviceable and functioned successfully during the period of the trials. There was, however, a tendency for optically flat nose window to become pitted, thus reducing its efficiency. (Figure 6).

Tests were carried out to assess the best method for fitting and removing the film magazine as follows:-

- (a) By removing the camera, complete with mounting, into the nose wheel bay where the function of removing and fitting the magazine was effected. (Figures 3 & 4).
- (b) By removing and fitting the magazine with the camera in situ. (Figure 2).

Both these methods were possible, but the incidence of faulty mating of the magazine to the camera with resultant film jamming was high with the camera in situ. When the camera was removed into the nose wheel bay the incidence of faulty mating was extremely low.

The time taken when removing the camera to change the magazine was only fractionally longer than that taken to change the magazine with the camera in situ. This was compensated for by the ease of access and less likelihood of faulty mating. The total average turn round time, including the camera testing and cleaning the optically flat window, was less than ten minutes. The location of the camera mounting on to its bed in the aircraft was positive. There was no evidence of harmonisation shift due to repeated removal and replacement of the camera using this method.

### 4.2 Air Tests

A total of five successful sorties were flown for photography, although the aircraft made a total of ten flights during the period of the test on other trials with the camera installed. Three of the photographic flights were made with the 3" lens, using colour film on simulated air to air attacks. The other two flights were made using the 1½" lens and Kodak XX Pan-chromatic film. One on a simulated air to air attack and the other on a simulated air to ground attack. All the films produced negatives/positives of acceptable quality and the cameras operated without fault. There was no indication of condensation on any of the films.

## 5. Conclusions

Because of the position of the optical flat window in the engine air intake (fig.5), there is a tendency, even in this country, for the glass to become badly pitted. The pitting is worse when flying in dry dusty conditions. It is thought that in theatres where these characteristics are predominant, i.e. the Middle and Near East, this could become a serious liability. In all other aspects the camera functioned most satisfactorily.

## /6. Recommendations

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6. Recommendations

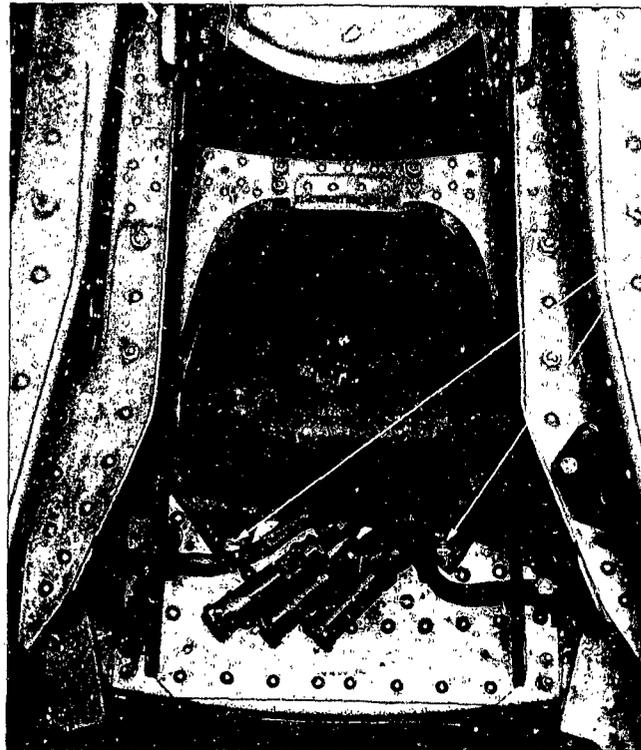
It is recommended that C.A. release be granted for the installation of the standard G.90 cine camera as a standard fit in the nose position of the Lightning aircraft.

It is recommended that magazine changing be effected by the removal of the camera, complete with it's mounting, into the nose wheel bay and that it is tested in this position prior to re-installation. (Figure 4).

For the protection of the camera, it is recommended that a magazine be kept fitted to the camera at all times. The film to be introduced to the camera magazine by means of the daylight loading cassettes during the before flight inspection.

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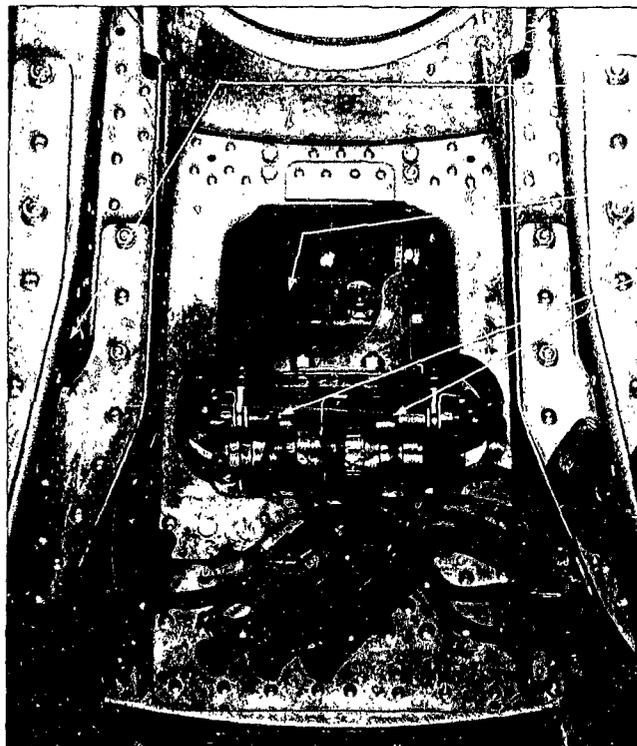
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PANEL RETAINING  
SCREWS.

FIG. 1.

ACCESS PANEL TO G.90 CAMERA COMPARTMENT INSIDE NOSE WHEEL BAY.  
(LOOKING FORWARD).



POSITION OF TEST  
SWITCH AND LIGHT.

FILM MAGAZINE.

QUICK RELEASE  
PIP-PINS.

FIG. 2.

G.90 CAMERA IN SITU, - (ACCESS PANEL REMOVED).



FIG. 3.

SOCKET LUGS  
FOR PIP-PINS.

LOCATING PIN.

C. 90° CAMERA WITH MOUNTING REMOVED FOR MAGAZINE CHANGING.



FIG. 4.

FITTING THE MAGAZINE ILLUSTRATING THE ANGLE OF RELATIONSHIP  
WITH THE CAMERA.

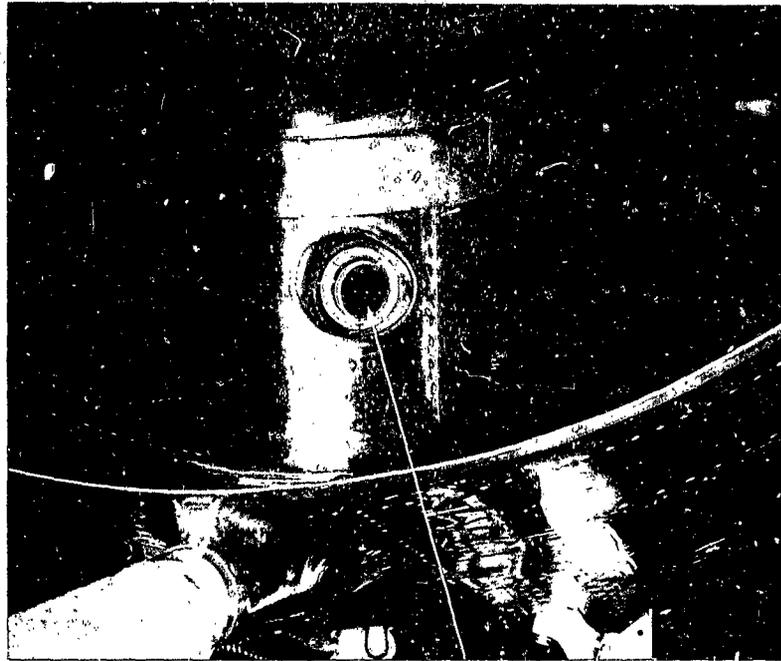


FIG. 5. VIEW SHOWING POSITION OF CAMERA WINDOW IN AIR INTAKE.

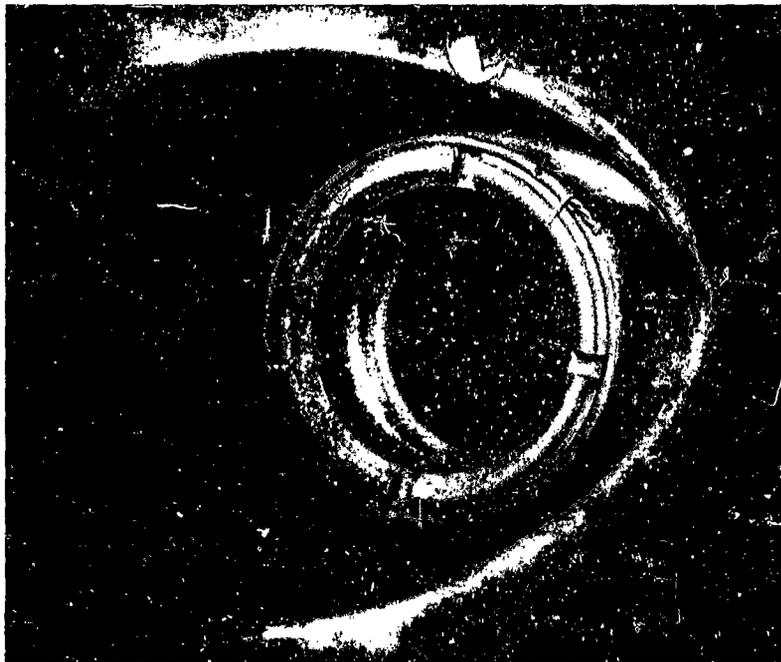


FIG. 6. ILLUSTRATION OF A TYPICAL PITTED CAMERA WINDOW.



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