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MINISTRY OF AVIATION

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT

BOSCOMBE DOWN

[illegible] T.T.2[illegible]

[illegible] OF THE [illegible] METEOR T.T.20 [U]

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5th Part of Report No. AAEE/817/6/T

1 8 JUN 1963

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT
BOSCOMBE DOWN

Meteor T.T.20 WD.767

The use of the S.A.A.B. near miss facility in conjunction with the Mk.3 Dart target towed by a Meteor T.T.20

Presented by

P. Bragg,
Performance Division

A. & A.E.E. Ref: APF/118.01

Period of Tests: March 1961 to November 1961

Summary

The installation of a S.A.A.B. near miss transmitting head in a Mk.3 Dart target towed by a Meteor T.T.20 aircraft for air to air gunnery practice necessitated the use of a special nylon launching halyard with electrical continuity.

A description of the halyard and an account of the proving trials are given in the present report.

This Report is issued with the authority of

Air Commodore,
Commandant, A. & A.E.E.

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1. Introduction

Trials of a Meteor T.T.20 towing a Mk.3 Dart Target have been fully described in the 3rd Part of this Report and the equipment and operating techniques in References 1 to 3. Further trials have been made with a S.A.A.B. "near miss" recording facility in the target and this necessitated the introduction of a special nylon launching halyard with electrical continuity. The requirement was subsequently cancelled by the service but it has been thought expedient to issue this present report to complete the record on the trials and it also may prove useful as a reference for any future requirement of a similar nature.

The nature of the problem of maintaining electrical continuity between the S.A.A.B. transmitting head on the target and the main S.A.A.B. towing cable during the period of the launch and the ensuing sortie was twofold. Firstly it was necessary to obtain a shock-absorbing halyard which would incorporate two electrical conductor wires which would not break when the halyard was stretched under load. Secondly the method of making the electrical connections between the ends of the halyard, the transmitting head and the plug on the scissor unit would have to be completely reliable and unaffected by the launch and the subsequent air loads experienced during the sortie.

2. Halyard

Several types of conducting halyard were considered and tested. The type which proved to be completely reliable is shown in Figure 1 and is now described.

2.1 Construction of halyard

The construction of the main part of the halyard is illustrated by the partially broken down sample shown in Figure 2. It consists of a nylon tape ½ inch wide of 2,000 lb. strength which is surrounded by a special form of nylon tape 1½ inches wide of 1,500 lb. strength machine stitched along one edge to form a halyard of oval cross-section. The special form of nylon tape has stitched within it two electrical conductor wires arranged sinusoidally, having each node stitched to the fabric in order that the wires would revert to their original formation after the halyard had been stretched under the shock load of the launch. The finished length of the halyard is 25 ft. and its physical properties are comparable with the normal 7/16 inch diameter treated nylon rope halyard now in use.

2.2 End fittings

One end of the halyard is terminated by a galvanised iron thimble. The electrical connection to this end of the halyard is made by using 2 feet of twin core electrical cable to specification DEF.10 type 2A. The cores of this cable are soldered to the halyard conductor wires and are whipped and taped up to the thimble while the other end of the cable terminates in a plug reference 10H/14207.

The other end of the halyard is terminated by a 1¼ inch diameter, alloy, dead eye thimble made up to take a ½ inch clevis pin. The electrical connection to this end of the halyard is made by using 9 feet of twin core, screened, electrical cable to specification DEF.10 type 2B. The cores of this cable are soldered to the halyard conductor wires and are whipped and taped up to the dead eye.

Figure 1 shows the end fittings of the halyard.

3. Fitting of halyard to target

The alloy dead eye thimble is placed between the two side plates of the towing arm. The ½ inch clevis pin is inserted and secured by means of a split pin. The screened cable is then placed between the side plates of the towing

/arm ...

arm and retained in position by the use of tape. Insulated staples spaced at regular intervals are used to secure the screened cable to the fin. In this way the cable is led back to the fibre glass parachute housing. The screened cable passes through a hole in the parachute housing where it is connected to the S.A.A.B. transmitting head. The positioning of the first insulated staple is important and just enough slack must be left in the screened cable between the staple and the towing arm to permit freedom of movement of the arm. Figures 3 and 5 illustrate the points mentioned above.

The towing arm is wire locked down and the conducting halyard is then installed in the same way as the normal rope halyard. Figures 4 and 5 show this and Figure 6 is a view of the target on its transporter ready for installation on the aircraft.

In addition to the foregoing the normal pre-flight checks laid down in Section 5 Chapter 16 of Reference 3 apply.

4. Installation of target on aircraft

The procedure for installing the target on the aircraft is as laid down in Section 5, Chapter 16 of Reference 3 with the following additions:-

(a) The conducting core of the main S.A.A.B. cable is connected to the winch slip ring assembly and at the target end to the scissor linkage.

(b) Electrical connection is achieved between the halyard and the scissor linkage by connecting the plug and socket. It is vital that the plug and socket be securely wire locked using 20 S.W.G. soft iron wire. Figure 7 shows a view of the fuselage hook at this stage and Figure 9 illustrates the method of locking.

(c) The spare cable is secured into small loops by rubber bands as shown in Figure 8.

(d) A final continuity check should be made.

5. Tests made

5.1 Laboratory tests

Laboratory tests showed that electrical continuity was maintained until the halyard itself failed.

When subjected to progressively increasing loads the end of the halyard terminated by the galvanised iron thimble failed at 2,240 lb. and the end terminated by the alloy dead eye failed at 2,160 lb. Thus the overall strength of the halyard was reduced by 30% due to the method of finishing the ends.

5.2 Flight tests

Twelve sorties were flown using the launching procedure recommended in Reference 2. In eight of these sorties the target was launched at an altitude of 1,000 feet and in four of these the launching altitude was 10,000 feet. In every sortie the aircraft was flown in steady level flight up to 300 K.I.A.S., no electrical continuity failures were experienced. The final sortie was flown on the 3rd November, 1961 in co-operation with Naval Units in which firing took place and the entire system proved satisfactory. The result of this sortie is covered fully in Reference 4.

6. Conclusions

The type of electrical conducting halyard described has been found to be completely satisfactory for the air launching of Dart targets from the Meteor T.T.20. The limitations which apply to using this facility are identical to those for normal Dart target towing.

/References ...

References

1. Meteor T.T. Mk.20 aircraft. A.P.2210V Volume 1.

2. Pilots' Notes Meteor Night Fighters. Marks 11, 12, 13 and 14 and T.T.20, Target Tower. A.P.2210L, M, N, P and V - P.N.

3. Airborne Towed Targets, Winches, and Ancillary Equipment. A.P.1492A Volume 1.

4. Flag Officer Air (Home) 1394/F.657/1095

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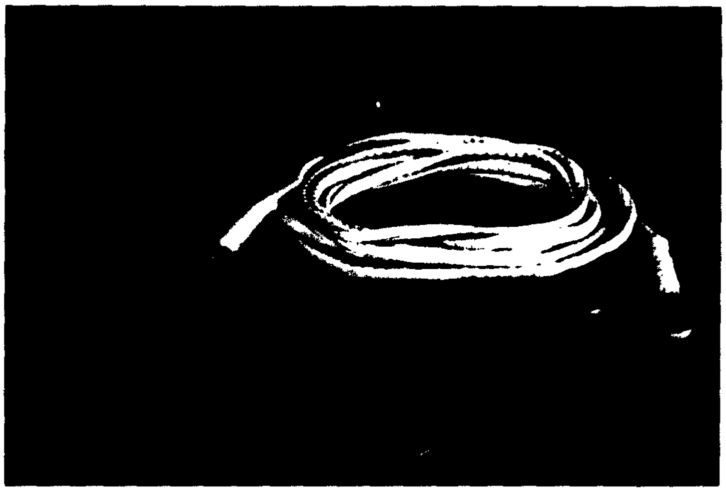

FIG. 1. CONDUCTING NYLON HALYARD.

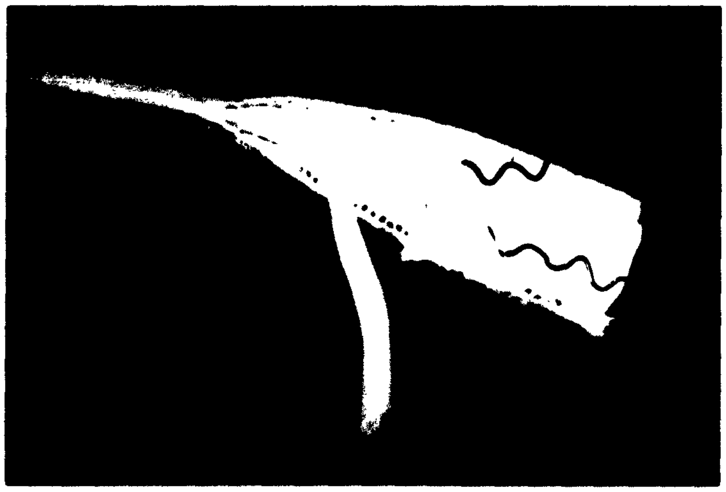

FIG. 2. CONSTRUCTION OF HALYARD.

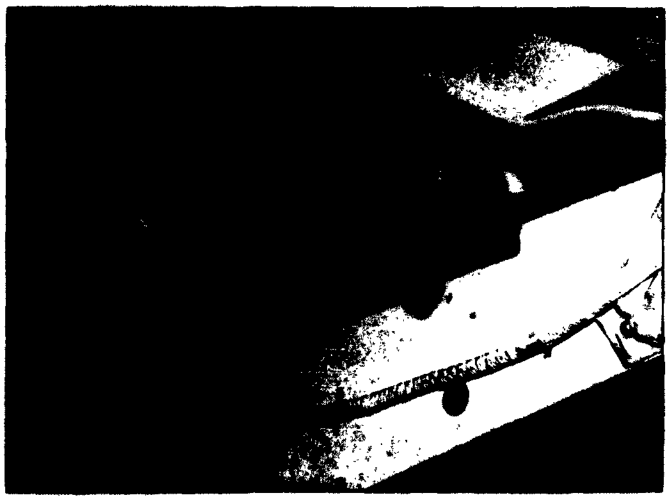

FIG. 3. TARGET SHOWING DETAILS OF SCREENED CABLE INSTALLATION.

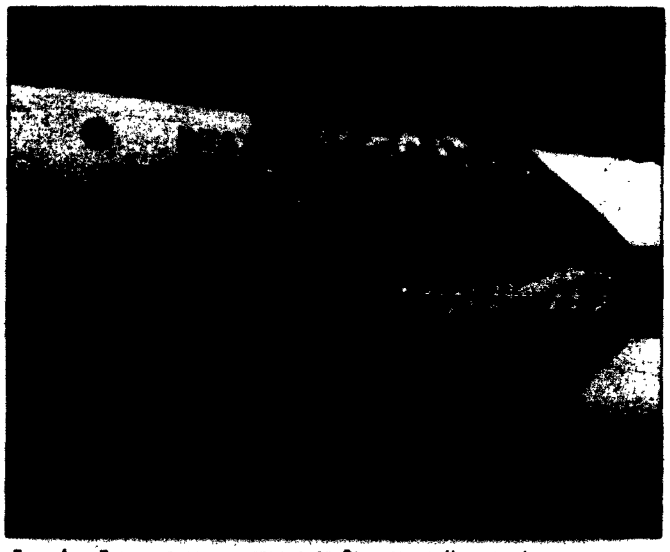

FIG. 4. TARGET SHOWING DETAILS OF CONDUCTING HALYARD INSTALLATION.

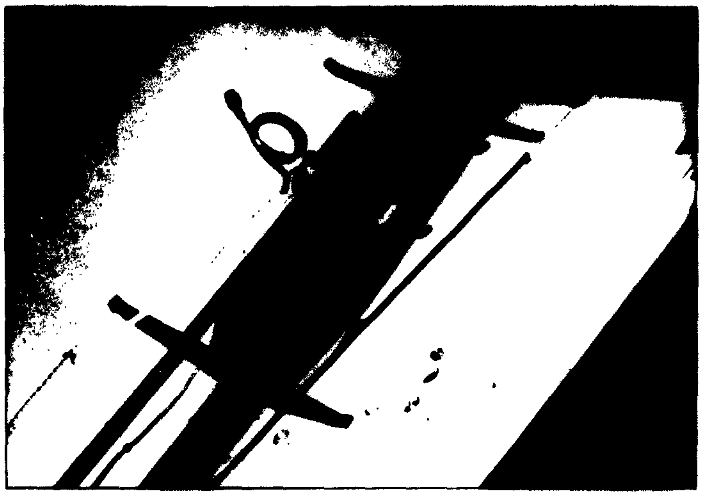

Fig. 5.
View of Tail of Target showing details of Conducting Halyard Installation.

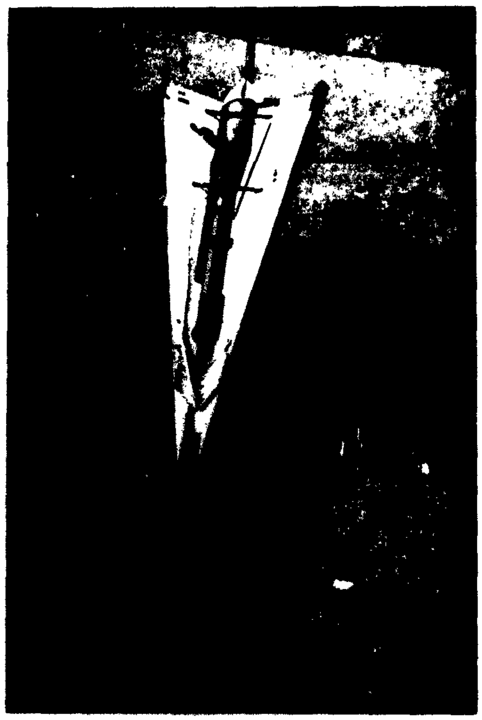

Fig. 6.
View of Target ready for installation on Aircraft.

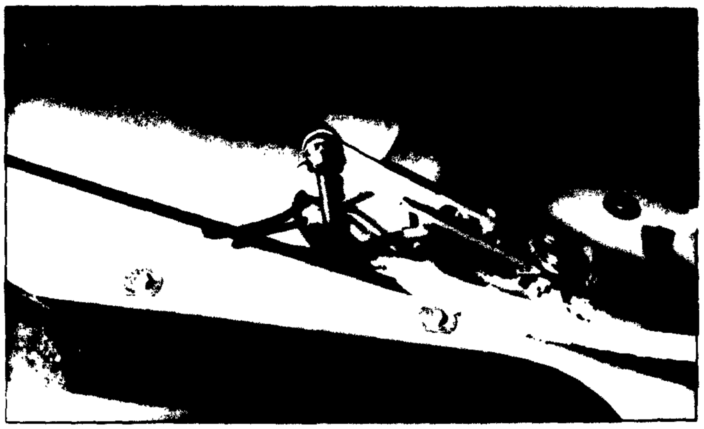

FIG. 7. VIEW OF FUSELAGE HOOK SHOWING ELECTRICAL CONNECTION MADE.

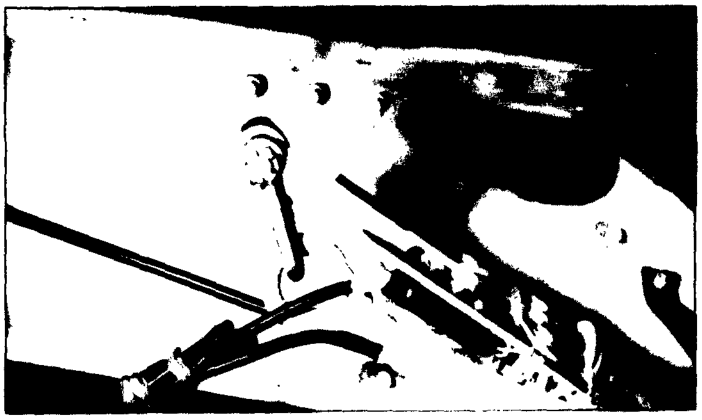

FIG. 8.
FUSELAGE HOOK, SCISSOR LINKAGE AND ELECTRICAL CONNECTIONS MADE FOR FLIGHT.

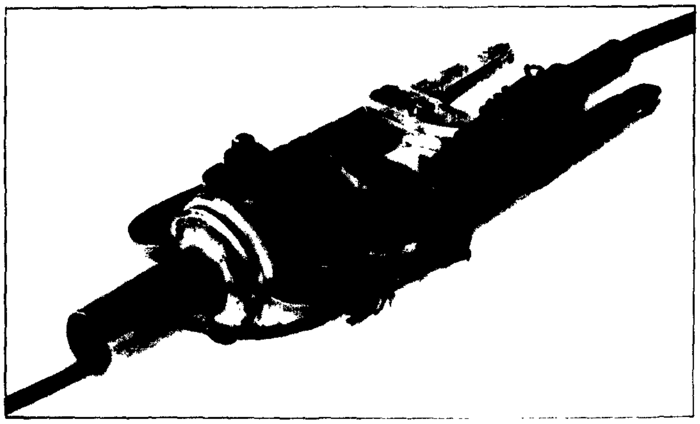

FIG. 9. VIEW OF SCISSOR LINKAGE SHOWING DETAILS OF WIRE LOCKING.

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