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Chapter 1

STRAIGHT STICK CONTROL HANDLES, DUNLOP TYPES

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Introduction

1. The typical Dunlop Type, straight stick control handle shown in fig. 1 is a self contained unit capable of being readily mounted on to the control column. The body is shaped and flared outwards to the right hand side to provide a convenient hand grip and support; the hand grip portion of the body is covered with hardened strippled rubber sheeting.

2. There are many variants of the basic handle, the main difference being that different switch arrangements are embodied in the handle to cater for the specific requirements of the aircraft in which the handle is to be installed. Several of the handles are fitted with a brake lever mechanism whereby the aircraft's undercarriage wheel brakes are applied. Specific information on each handle is contained in the Appendices to this Chapter

DESCRIPTION

General

3. The body of the handle is a light alloy die-casting provided with recesses to accommodate the switches, most of which are located at the top of the handle. Some of the

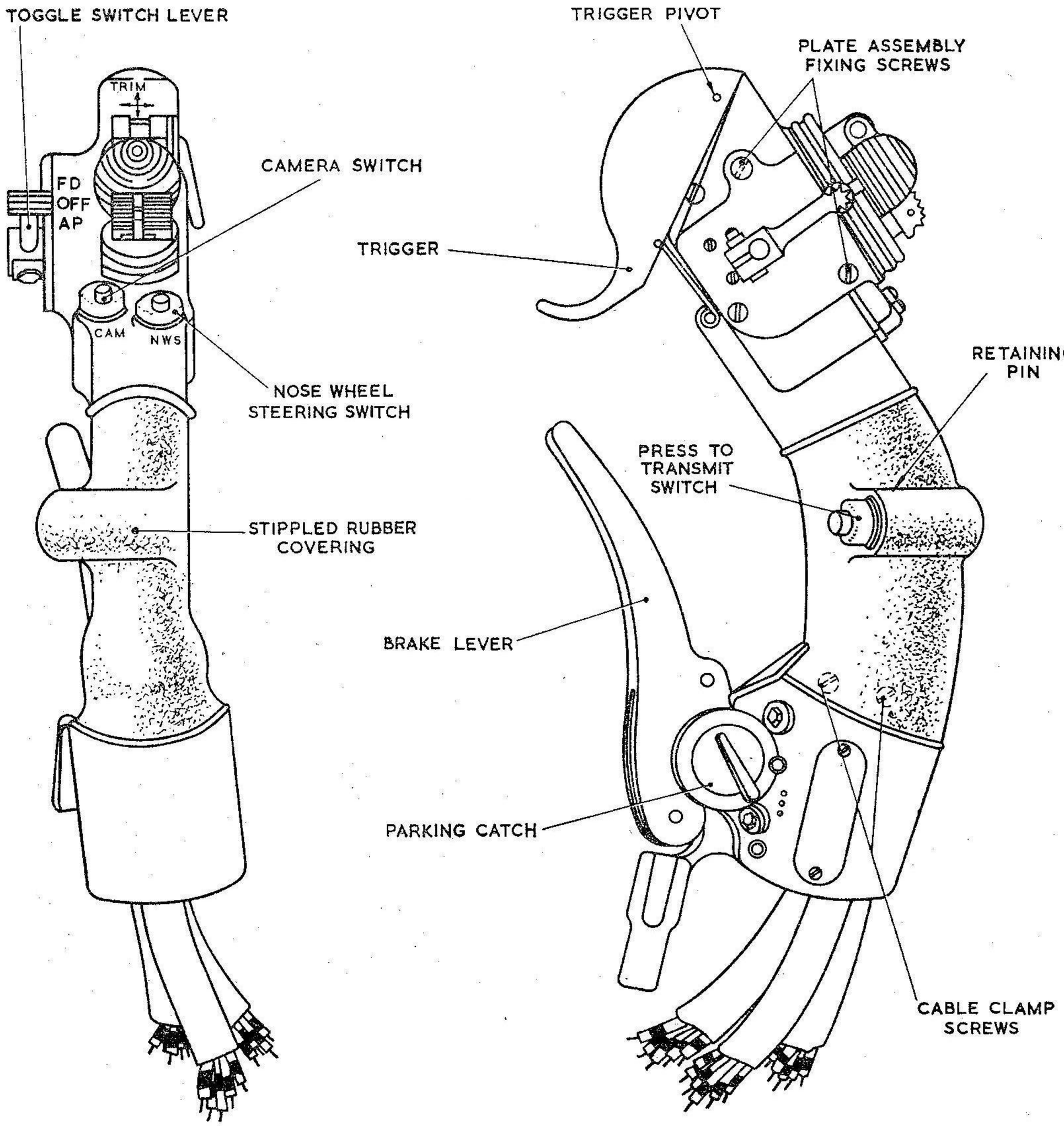

Fig. 1. Typical handle

handles are fitted with safety flaps or catches to prevent the inadvertent operation of certain switches, gun trigger, bomb switches, etc. The lower end of the handle has an internal cylindrical cavity machined to fit over the end of the control column.

4. The electrical leads to the switches are segregated into groups by protective sleeving and attached to the handle by a cable clamp, secured by two rubber sleeve protected screws. Several handles have a plug housed in the lower end of the handle through which the electrical connections are made.

Brake lever

5. The brake lever, when fitted, is mechanical in operation and exerts a straight line pull for the operation of the aircraft's undercarriage brakes. A parking catch at the side of the handle allows the lever to be maintained in the "pressed position" keeping the undercarriage brakes "on" when the aircraft is parked.

6. The mechanism consists essentially of a non-magnetic steel guide plate, a light alloy brake lever and a rotary parking catch. The guide plate is secured in a slot, in the front

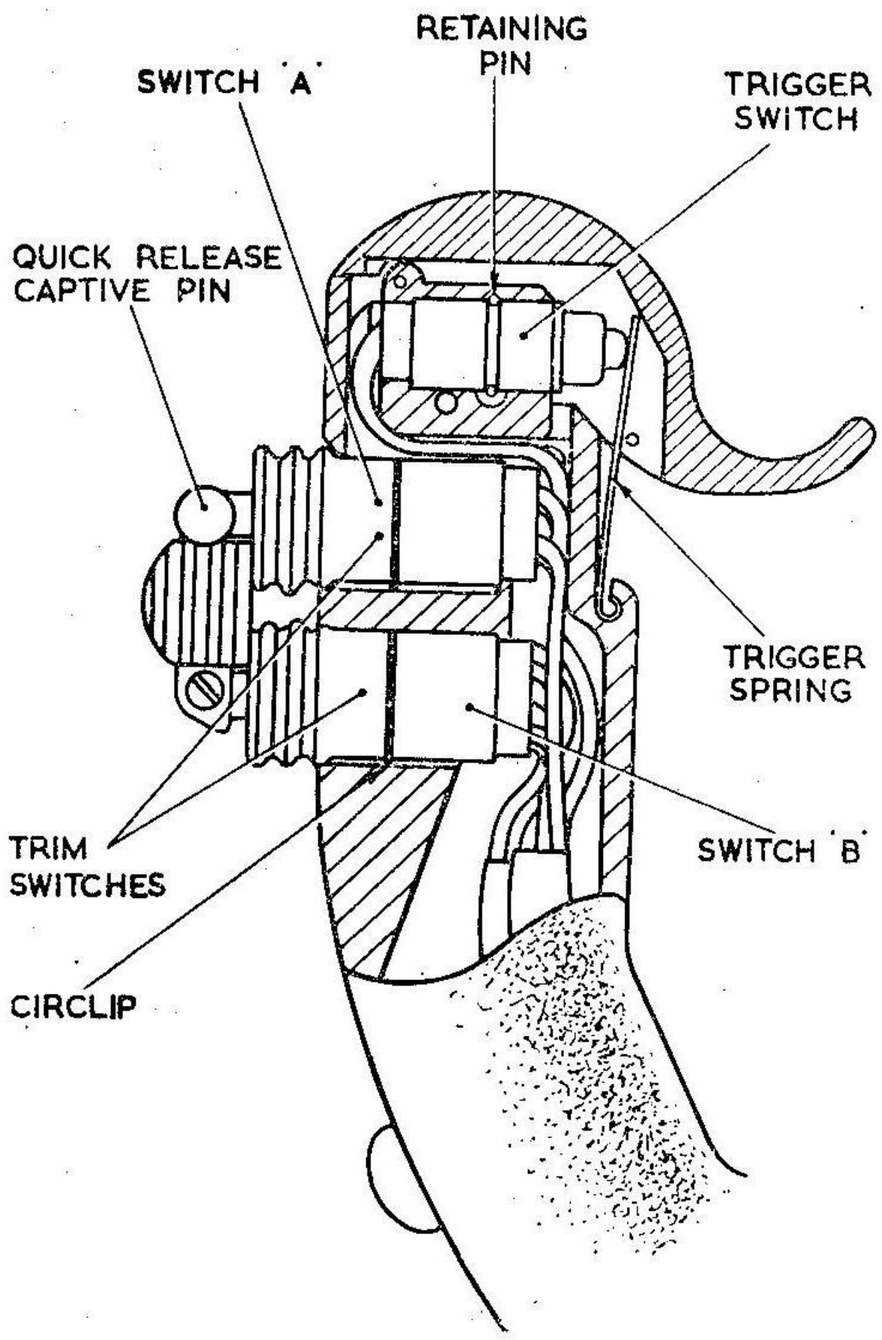

Fig. 2. Typical handle (sectional view)

of the handle, by two Unbrako socket headed screws entered from the port side and locked by spring washers.

Switches

7. The location, type of switches and safety flaps or catches are different for each handle. Some of the switches are retained by pegs or dowels and spring loaded plungers and can be removed only by following a definite sequence of operation, others can be removed separately.

8. Details of each switch will be found in A.P.4343C, Vol. 1, Book 1, Sect. 1.

Electrical plug

9. The plug used to make the electrical connections to the handle is retained inside the handle by an internal circlip. The plug consists of a Bakelite plug body locating the connections or pins and a Bakelite plug end. The plug end is a spacer for the connecting leads from the various switches, the leads being crimped into their appropriate connectors. The plug body, together with the connectors and plug end, are retained in a metal sheath by a circlip, a groove in the side of the plug body engages with an internal projection of the plug sheath. The leads from the switches are coloured for identification purposes and correspond with coloured dots on the top of the plug body and the plug end adjacent to the holes through which the leads and connectors pass.

SERVICING

Note . . .

Care must be taken when servicing to ensure that the safety flap is not forced home when the trigger is depressed. It is also essential to ensure that the trigger, or safety flap when open, cannot foul any part of the aircraft structure or equipment.

General

10. (1) Examine the handle for corrosion and external damage.

(2) Examine the plug in the base of the handle for signs of tracking, this is sometimes caused by burrs of metal from inside the handle owing to the handle being a tight fit on the control column.

11. The switches cannot be repaired and unserviceable switches will normally have to be removed. To remove the handle from the control column it is necessary to disconnect the brake assembly from the handle, taking care to support the brake assembly to prevent kinking of the cable.

Removal of handle

12. (1) With an Allen key or Unbrako wrench remove the brake asembly fixing screws on the port side of the handle and remove the brake assembly.

(2) Loosen the handle retaining screws and carefully withdraw the handle from the control column taking care not to strain the cables.

(3) If it is of the plug type grasp the wire loop, which may be seen in the recess at the base of the handle, and exert a steady pull. This will remove the socket on the end of the electric cable from the plug in the handle. The handle will now be free from the control column.

Removal of plug

13. (1) Remove the circlip from inside the lower part of the handle using circlip pliers. If the circlip grip holes are not opposite the cut-away portion on the flange of the plug sheath, ease the circlip into that position to enable the circlip pliers to pass through the grip holes and obtain a firm hold.

(2) Pull down the plug assembly until it is exposed outside the handle. It will be necessary to twist the plug in order to straighten the leads so that the plug may be extracted to its fullest extent.

(3) Remove and dispose of the wire circlip from the top of the plug sheath and dismantle the plug assembly. Remove the twine around the top of the plug end which holds the outer leads in position.

(4) Identify the plug connections engaging the leads from the defective switch. On some handles a common positive plug connector secures all the leads from the various switches which are required to be connected to the positive supply. These common leads are red and must be removed from the connector without damaging them since only the red lead from the defective switch is replaced. The larger positive plug connector is also used wherever more than one lead has to be secured in the same connector even though it may not be connected to the positive supply. Where only one lead in a positive connector is to be replaced, carefully file away the metal of the connector in the vicinity of the crimping until the leads can be withdrawn.

Removal of switches

14. (1) Loosen the cable clamp screws (fig. 1) and pull back the protective sleeving to give slack on the cables.

(2) Dismantle the handle until the defective switch is removed from its housing. Before a push switch can be removed it is necessary to remove its retaining peg, then by engaging a screwdriver under the lip at the top of the switch body, the switch can be levered from its recess in the handle. Care must be taken not to damage the switch when levering it from its recess.

(3) Identify the leads of the defective switch and disconnect them at the plug or connector block where they terminate.

(4) Remove the cable ends or pins and manually withdraw the switch complete with leads.

Replacement of switches

15. (1) Enter the new switch complete with leads into its housing in the control handle. The leads may be pulled through the handle with a piece of stiff copper or brass locking wire attached to their ends. As the switches are pushed into their recess, ensure that the leads are not pinched or damaged between the switch and its recess, if necessary by gently pulling downwards.

(2) Replace the retaining pegs and any other switches which have been removed.

(3) Remove the pull-through wire and cut off the leads to the required length.

(4) Make off new ends and, after testing the circuit, connect the cables to their appropriate terminals or plug pins.

(5) The recess above all screw heads and retaining pin heads, except the screws securing the handle to the control column, should be filled with Composition, Impression Tray, Black, Ash (Ref. No. 33H/307).

Replacement of plug

16. (1) Thread the new leads through their appropriate hole in the plug end and push them into new plug connectors ensuring they pass the sighting hole in the side of the connector and securely crimp with crimpling pliers (Ref. No. 27VA/3733). Test all crimped connections by tugging on the wires.

(2) With all the crimped connectors pushed back hard on to the face of the plug end, securely bind the outer leads around the recess at the back of the plug end with Thread Linen No. 18 (Ref. No. 32B/644). Paint the binding with shellac varnish (Ref. No. 33A/512 or 513) and allow it to dry.

(3) Position the connectors in the plug body, checking the colour of the leads with the coloured spots beside the holes on the plug body. Place the sheath over the plug body and the plug end and secure the assembly in position with a new inner circlip.

(4) Gradually feed the leads into the handle by twisting and pushing the assembled plug. When the plug is finally housed, retain it in position with the circlip using the circlip pliers.

Fitting handle to control column

17. Assuming that the brake assembly has been detached from the handle, proceed as follows:—

(1) Mount the handle on the control column so that the trigger lever is forward. When doing this look in the slot in the handle, which accommodates the brake lever mechanism, to see that the locating hole in the control column is in a position to be engaged by the locating peg of the lever mechanism. If any difficulty is experienced in fitting the handle to the control column, make sure that the handle retaining screws are loose and that the base of the handle is not distorted; do not force the handle on to the control column.

(2) With the guide plate in the slot in the base of the handle, fit the brake lever assembly engaging the projecting peg into the hole in the column.

(3) Secure the brake assembly with the two Unbrako screws and spring washers.

(4) Secure the handle by tightening the two Unbrako screws on the starboard side.

Testing

18. Using the circuit shown in the Appendix for the handle as a guide test the various circuits for continuity whilst operating the switches. Check that all switches have a snappy action and that they make unfaltering contact when operated slowly. When the handle has been installed on the aircraft control column, test the various electrical circuits controlled by the handle switches in accordance with the instructions in the relevant Aircraft Handbook.