CHAPTER 28D

AIR-INTAKE, CENTRE HOUSING, AND WHEELCASES RENEWALS, RECONDITIONING, REPAIR, AND SALVAGE

Contents

Illustrations

THIS CHAPTER, which is applicable to the air-intake, centre housing, and wheelcases, contains instructions for reconditioning and repairing worn or damaged components, and for replacing unserviceable parts by serviceable standard parts. Instructions for dismantling and reassembling these components are not given unless they are an essential part of the repair or renewal. Reference should be made to chapters 17, 23, 24, 33, or 34, as appropriate, for further information on dismantling or reassembling individual items before, or after, repair or renewal. The information given in chapter 32, must also be read in conjunction with all repairs dealing with the fitting of "Cross" wire inserts to damaged or worn threaded holes.

Most of the repair information contained in this chapter is based on the manufacturer's turbine repair (T.R.) schemes and process specifications, and, in each instance, the relevant drawing (T.R.) number or specification number followed by its issue number, is quoted; turbine repair schemes are introduced under the cover of a modification and this modification number is quoted also. After any repair or renewal has been completed, an entry should be made in the appropriate record book of the engine in accordance with British Air Registration Board Inspection Procedures, Section ML, Leaflet 1-1. Refer also to the instructions on page 3 of chapter 32 entitled "Repair Identification".

It should be noted that these repairs and renewals must only be carried out under the supervision of an Inspection Organisation approved for such repair work by the British Air Registration Board, or an equivalent authority, or under the supervision of an appropriately licensed engineer. It is assumed also that personnel possessing the requisite skill and experience will be employed and that the recommended tools and equipment will be used.

Normally, where special tools and equipment are available for carrying out the renewals and repairs described in this chapter, they are listed at the beginning of the relevant repair instructions and are referred to in the text as they are used. In some cases, even though no list is given, the tools are referred to in the text as they are used. Where special tools are not mentioned, reference should be made to The Service Department of The de Havilland Engine Company.

With the exception of damaged studs, no additional work, other than that required for normal assembly, is necessary to renew any standard part; the defective parts rejected by inspection being discarded and new, serviceable, or repaired parts substituted. To renew damaged studs, $\frac{1}{4}$ inch B.S.F. stud box T.70809 is required. The other components require, in addition to T.70809, the following stud boxes: top wheelcase, 2 B.A. T.70965 and $\frac{3}{8}$ inch B.S.F. T.70473; centre housing, $\frac{5}{16}$ inch B.S.F. T.71006; and air-intake, T.70473. Damaged studs may be removed, and serviceable replacements fitted, in accordance with standard practice.

STARTER GEARS CASING, THREADED HOLES

T.R.398 issue 1—Mod. 1156

Starter gears casings (Ghost 48 Mk. 1, 48 Mk. 2 or 53 Mk. 1) in which any of the 2 B.A., or $\frac{7}{16}$ inch B.S.F., threaded holes, Fig. 1, have become damaged, may be repaired by fitting Cross wire inserts in accordance with these instructions. Reference must be made also to chapter 32, page 2, which specifies the tools required, and contains general information essential to this repair.

On receipt of the component which is to be repaired, its part number and serial number should be checked against the accompanying documents.

REPAIR TO $\frac{7}{16}$ inch B.S.F. HOLES, FIG. 1, SECTION A-A

To carry out this repair proceed as follows.

1. With its lower face downwards, set the casing on the work table of a suitable radial drilling machine, and, ensuring that the casing is not distorted in any way, securely clamp it to the table.
2. Using a $\frac{29}{64}$ inch diameter drill, drill through the defective hole.
3. Use a $\frac{33}{64}$ inch diameter flat-bottom drill to counterbore the hole to a depth of 0·050 inch.
4. Blow out the hole with compressed air to remove all traces of swarf, and using the appropriate taper, and plug taps, thread the hole to 0·5107 inch diameter by 18 T.P.I. (threads per inch) Whitworth thread form, and to a depth of 0·700 inch.
5. Remove any burrs from the edge of the hole, blow out the hole and, using the appropriate inserting tool, screw in wire insert Part No. N.7433 to the bottom of the thread. Break off, and remove, the notched tang of the insert.
6. Use a John Bull Intercheck small bore gauge in conjunction with the appropriate mandrel, and ring screw gauge, to check the thread of the insert.
7. Repeat operations 2 to 6 for each damaged $\frac{7}{16}$ inch B.S.F. hole.

REPAIR TO 2 B.A. HOLES

Mount the starter gears casing on the work table of a suitable radial drilling machine, with its upper face downwards, and resting on parallel blocks. Ensuring that the casing is not distorted in any way, securely clamp it to the table. Then proceed as described for blind or through holes, as appropriate.

Blind 2 B.A. holes, Fig. 1, Section A-A

The operations described in this paragraph are applicable to the blind 2 B.A. holes marked C in Fig. 1. Having mounted the casing on a drilling machine, proceed as follows.

1. Using a 0·1935 inch diameter (No. 10) drill, drill out the defective hole to a depth of 0·650 inch.
2. Blow out the hole with compressed air to remove all traces of swarf, and using the appropriate taper, and plug taps, thread the hole to 0·2252 inch diameter by 31·300 T.P.I., B.A. thread form, and to a depth of 0·500 inch.
3. Using a suitable countersink, chamfer the hole to a 0·225 inch diameter, and to a 90 deg. included angle.
4. Remove any burrs from the edge of the hole, blow out the hole, and, using the appropriate inserting tool, screw in wire insert Part No. N.5040 to the bottom of the thread. Break off, and remove, the notched tang of the insert.
5. Repeat operations 1 to 4 for each damaged 2 B.A. blind hole.

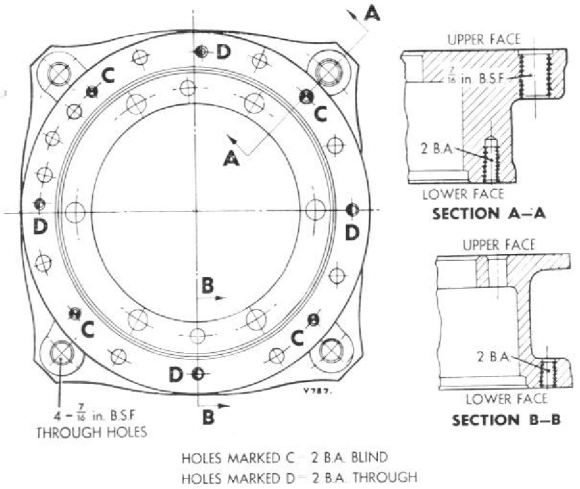


Fig. 1. Threaded holes in starter gears casing, showing blind and through 2 B.A. holes, and $\frac{7}{16}$ inch B.S.F. holes.

Through 2 B.A. holes, Fig. 1, Section B-B

The operations described in this paragraph are applicable to the through 2 B.A. holes marked D in Fig. 1. Having mounted the casing on a drilling machine, proceed as follows.

1. Using a 0·1935 inch diameter (No. 10) drill, drill through the defective hole.
2. Using the appropriate taper, and plug taps, thread the hole to 0·2252 inch diameter by 31·300 T.P.I., B.A. thread form, and to a depth of 0·400 inch.
3. Using a suitable countersink, chamfer the hole to a 0·225 inch diameter, and to a 90 deg. included angle.
4. Remove any burrs from the edge of the hole, and blow out the hole with compressed air to remove all traces of swarf. Using the appropriate inserting tool, screw in wire insert Part No. N.7417 to the bottom of the thread. Break off, and remove, the notched tang of the insert.
5. Repeat operations 1 to 4 for each damaged 2 B.A. through hole.

AFTER ANY REPAIR

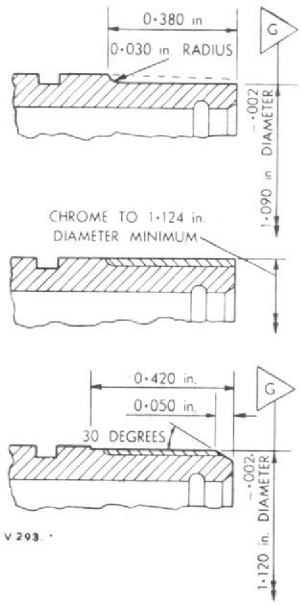
When all the damaged holes have been repaired, and if this is the first time that this repair has been applied, lightly stamp T.R.398 adjacent to the existing part number on the casing. Make the appropriate entry in the engine log book.

ALTERNATOR AND GENERATOR GEARS, OIL LEAKS
T.R. 350 issue 1—Mod. 1043

This repair may be applied to:—

DRIVING GEAR, Part No. 48928 (Pre-mod. 776).

Alternator and generator gears which have developed oil leaks past the contact face of the drive shaft and the gaco oil seal, may be rectified in accordance with these instructions..



(Refer to chapter 32 for interpretation of symbols)

SEQUENCE OF OPERATIONS

1. Grind the contact face of the drive shaft to a diameter of 1·090 – ·002 inch and width of 0·380 inch, leaving a 0·030 inch radius in the corner.

2. Build up by chrome plating in accordance with D.H. Process Specification No. 132, to a minimum diameter of 1·124 inch.

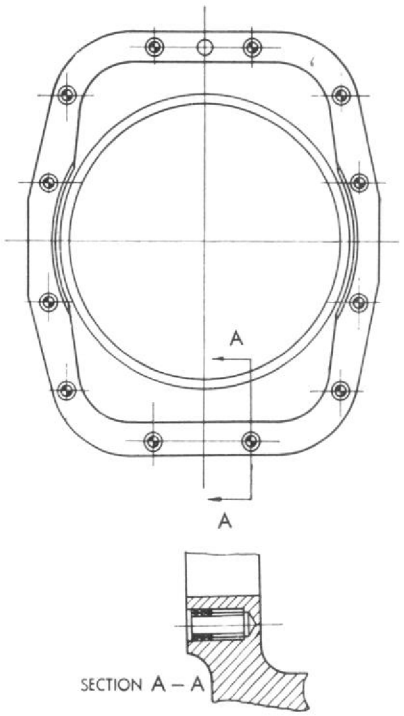
3. Grind to a diameter of 1·120 – ·002 inch and width of 0·420 inch; chamfer the edge to 0·050 inch at 30 deg.

4. Etch T.R.350 adjacent to the existing part number and make an entry in the appropriate record book of the engine.

AIR-INTAKE, STUD HOLES
T.R. 284 issue 3—Mod. 311

This repair may be applied to all Ghost Forty-eight air-intakes.

Air-intakes in which any of the $\frac{1}{4}$ in. B.S.F. threaded holes (shown ⊕ in the illustration) have become damaged may be rectified in accordance with these instructions.



SEQUENCE OF OPERATIONS

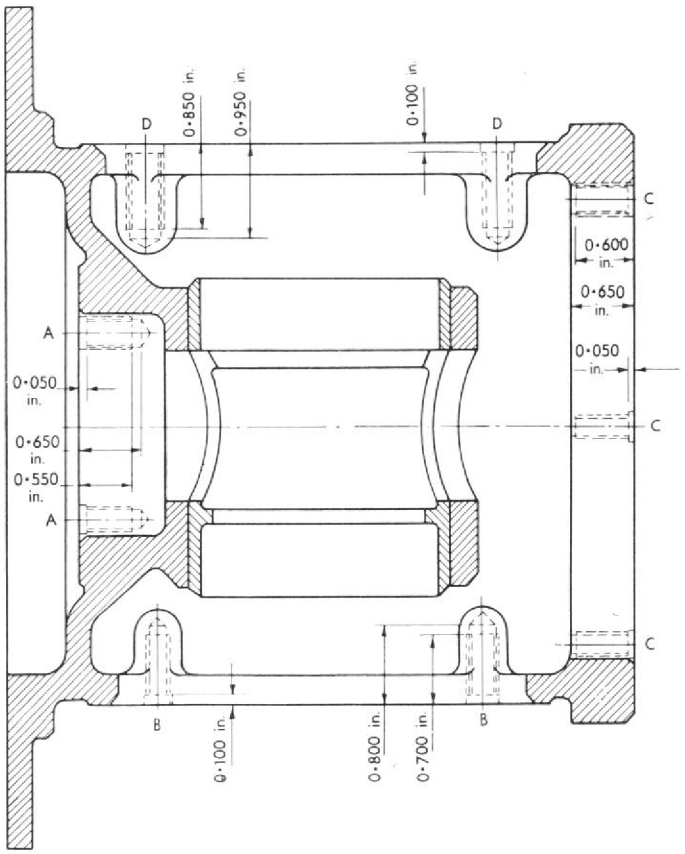
1. Drill the damaged hole to a diameter of 0·2570 inch (letter F drill) by 0·650 inch deep.

2. Thread the hole to a diameter of 0·3012 inch by 26 T.P.I. Whitworth thread form to a depth of 0·600 inch. The effective diameter is to be 0·2766 + ·0020 inch, and the minor diameter 0·2520 + ·0117 inch. Counterbore the hole to a diameter of $\frac{5}{16}$ inch by 0·050 inch deep.

3. Screw in wire insert Part No. N.4972 and break off and remove the tang.

4. Fit existing stud if serviceable, or, a new stud if unserviceable.

5. Lightly stamp T.R.284 adjacent to the existing part number and make an entry in the appropriate record book of the engine.



CENTRE HOUSING, STUD HOLES
T.R. 270 issue 4—Mod. 311

This repair may be applied to all Ghost Forty-eight and Fifty-three Mk. 1 centre housings.

Centre housings in which any of the $\frac{1}{4}$ or $\frac{5}{16}$ in. B.S.F. holes have become damaged may be rectified in accordance with these instructions.

SEQUENCE OF OPERATIONS

$\frac{1}{4}$ in. B.S.F. holes

1. Remove the existing stud from damaged hole A, B or C.
2. Drill the hole to a diameter of 0·2570 inch (letter F drill), the depth to be as indicated in the sketch.
3. Thread to a diameter of 0·3012 inch by 26 T.P.I. Whitworth thread form to the depth indicated. The effective diameter of the thread is to be 0·2766 + ·0020 inch and the minor diameter 0·2520 + ·0117 inch. Counterbore the hole to a diameter of $\frac{5}{16}$ inch to the depth indicated.
4. Screw in wire insert Part No. N.4968 (hole A), N.4978 (hole B) or N.4972 (hole C), and break off and remove the tang.
5. Fit existing stud if serviceable, or new stud if unserviceable.

$\frac{5}{16}$ in. B.S.F. holes

1. Remove the existing stud from damaged hole D.
2. Drill the hole to a diameter of 0·3230 inch (letter P drill) the depth to be as indicated in the sketch.
3. Thread to a diameter of 0·3727 inch by 22 T.P.I. Whitworth thread form to the depth indicated. The effective diameter of the thread is to be 0·3436 + ·0023 inch and the minor diameter 0·3145 + ·0141 inch. Counterbore the hole to a diameter of $\frac{3}{8}$ inch to the depth indicated.
4. Screw in wire insert Part No. N.5041 and break off and remove the tang.
5. Fit existing stud if serviceable, or, a new stud if unserviceable.
6. After either repair, lightly stamp T.R.270 adjacent to the existing part number and make an entry in the appropriate record book of the engine.

Revised by Amendment No. 132
April, 1957

AIR-INTAKE AND CENTRE HOUSING, OVERSIZE CENTRE-HOUSING DOWEL
T.R.123 issue 5—Mod. 311

Any air-intake (Ghost 48 Mk. 1, 48 Mk. 2, or 53 Mk. 1) in which the centre-housing dowel has become loose or damaged may be repaired by fitting an oversize dowel. This repair may also be employed to rectify damage to the dowel hole in the centre housing.

The following tools will be required.

Tool No.	*Description*
T70454	Two lifting slings
T72381	Build stand
T78514	Location mandrel
T78515	Reaming jig. Ghost 48 Mk. 1 to locate the dowel hole relative to the horizontal gear location.
T78516	Air-intake top bush. Ghost 48 Mk. 1
T78517	Air-intake bottom bush
T78518	Centre housing bottom bush
T78519	Centre housing top bush
T78520	Locating pin, standard
T78521	Reamer, diameter 'A', 0·010 in. oversize
T78522	Reamer, diameter 'B', 0·010 in. oversize
T78523	Locating pin, 0·010 in. oversize
T78524	Reamer, diameter 'A', 0·020 in. oversize
T78525	Reamer, diameter 'B', 0·020 in. oversize
T78526	Locating pin, 0·020 in. oversize
T78527	Reamer, diameter 'A' 0·030 in. oversize
T78528	Reamer, diameter 'B', 0·030 in. oversize
T78604	Setting ring, 0·320 in. dia.
T78605	Setting ring, 0·330 in. dia.
T78606	Setting ring, 0·340 in. dia.
T79255	Air-intake top bush. Ghost 48 Mk. 2 and 53 Mk. 1
T79256	Reaming jig. Ghost 48 Mk. 2 and 53 Mk. 1 to locate the dowel hole relative to the horizontal gear location
T79323	Dowel punch, 0·010 in. oversize
T79324	Dowel punch, 0·020 in. oversize
T79325	Dowel punch, 0·030 in. oversize
Standard	Tap wrench
Standard	John Bull Intercheck small bore gauge
Standard	Eight $\frac{5}{16}$ in. B.S.F. bolts
Standard	Ten $\frac{5}{16}$ in. B.S.F. nuts
Standard	Thirteen $\frac{1}{4}$ in. B.S.F. nuts
Standard	Two $\frac{1}{4}$ in. plain washers

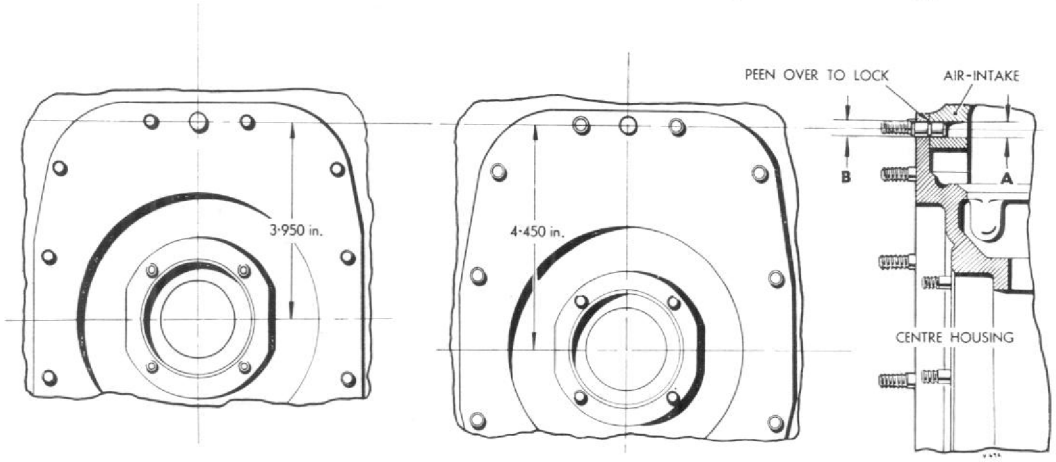
On receipt of the components which are to be repaired, their part numbers and serial numbers should be checked against the accompanying documents.

To carry out this repair proceed as follows.

1. Use two lifting slings T.70454, chapter 23 Fig. 24, to transfer the air-intake to build stand T.72381, chapter 24B Fig. 3, and secure it with eight equally spaced slave $\frac{5}{16}$ inch B.S.F. bolts and nuts. Alternatively, this repair can be carried out with the air-intake standing, with the two air-intake openings uppermost, on a suitable low bench.

2. Remove the defective dowel from the centre-housing mounting face on the front of the air-intake thus. To prevent damage to the joint face place a piece of sheet metal on the face adjacent to the dowel. Grip the dowel with a pair of pliers, and, allowing the tips of the plier jaws to bear on the sheet metal, lever out the defective dowel.

3. Using a John Bull Intercheck small bore gauge in conjunction with the setting rings, as described in chapter 27, check the diameter of the dowel hole in both the air-intake and the centre housing to estimate the oversize to which they must be enlarged. If the holes have been enlarged already to the third oversize, or if they are so damaged that they cannot be repaired within that limit, reference should be made to the appropriate inspection authority. Where this repair has been applied already,



GHOST 48 Mk. 1 **GHOST 48 Mk. 2 AND 53 Mk. 1**

Table Showing Sizes of Dowel Holes with Relevant Reamers, Setting Rings and Dowels

Diameter 'A' in inches	*Reamer for Dia. 'A'*	*Diameter 'B' in inches*	*Reamer for Dia. 'B'*	*Setting Ring*	*Oversize Dowel Part No.*	*Ident. No.*
0·3209 + ·0008	T.78521	0·3225 + ·0008	T.78522	T.78604	MR.60009-10	T.R.123-1
0·3309 + ·0008	T.78524	0·3325 + ·0008	T.78525	T.78605	MR.60009-20	T.R.123-2
0·3409 + ·0008	T.78527	0·3425 + ·0008	T.78528	T.78606	MR.60009-30	T.R.123-3

Fig. 2. Centre-housing dowel in air-intake.

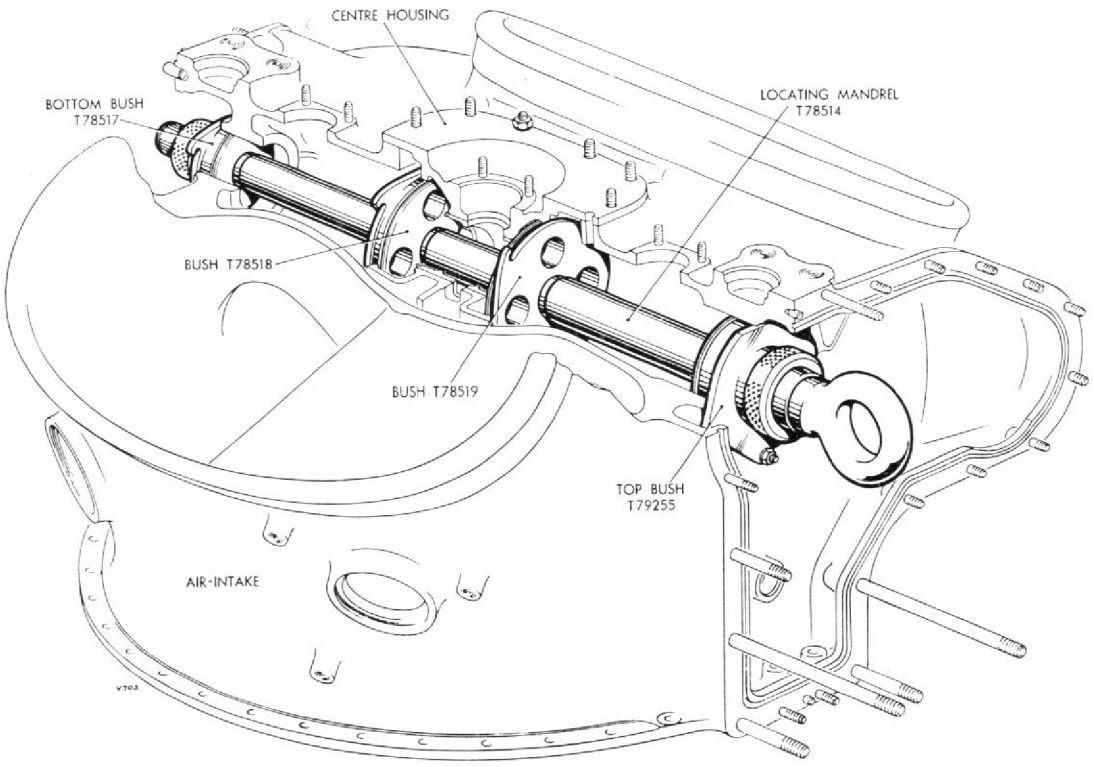


Fig. 3. Bushes and locating mandrel fitted to Ghost 48 Mk. 2 or 53 Mk. 1 components.

this fact and the degree of oversize will be indicated by the existence of the repair and identification number, which will be found adjacent to the component's part number; refer also to the table below Fig. 2.

4. Ensure that all joint faces are clean and free from burrs or other damage which might prevent the components fitting together correctly; burrs should be removed as necessary. Similarly ensure that the locating surfaces of each of the locating bushes, and of the reaming jig and all other tools, are perfectly clean and free from any damage which might prevent their accurate seating.

5. *Ghost 48 Mk. 1.* Insert the ground spigot of top bush T.78516 into the top vertical drive bearing housing in the air-intake, engage the two lugs on the bush with two of the studs and secure the bush by fitting two slave $\frac{1}{4}$ inch B.S.F. nuts.

   Ghost 48 Mk. 2 and 53 Mk. 1. Insert the ground spigot of top bush T.79255 into the top vertical drive bearing housing in the air-intake, engage the three lugs on the bush with three of the studs and secure the bush by fitting three slave $\frac{1}{4}$ inch B.S.F. nuts.

6. Insert the larger ground spigot of bottom bush T.78517 into the bottom vertical drive bearing housing.

   Ghost 48 Mk. 1. Engage the two lugs on the bush with two of the studs and secure the bush by fitting two slave $\frac{1}{4}$ inch B.S.F. nuts.

   Ghost 48 Mk. 2 and 53 Mk. 1. Engage one of the lugs on the bush with one of the studs and secure the bush by fitting a slave $\frac{1}{4}$ inch B.S.F. nut.

   The small ground spigot is not used for this repair.

7. Fit bush T.78519 into the top of the centre housing, engage the two lugs on the bush with two of the studs and secure the bush by fitting two slave $\frac{5}{16}$ inch B.S.F. nuts. The top of the centre housing can be identified by the dowel hole in the front flange.

8. Fit bush T.78518 into the bottom of the centre housing, engage the two lugs on the bush with two of the studs and secure the bush by fitting two slave $\frac{1}{4}$ inch B.S.F. nuts.

9. Fit the centre housing into the air-intake, aligning the dowel hole in its front flange with the corresponding hole in the air-intake.

10. Pass the small end of location mandrel T.78514 through the bush in the top vertical drive bearing housing on the air-intake, and the bushes in the centre housing, until it locates in the bush in the bottom vertical drive bearing housing. The four bushes should then be located on the four ground diameters on the mandrel, Fig 3. Gently rotate the mandrel

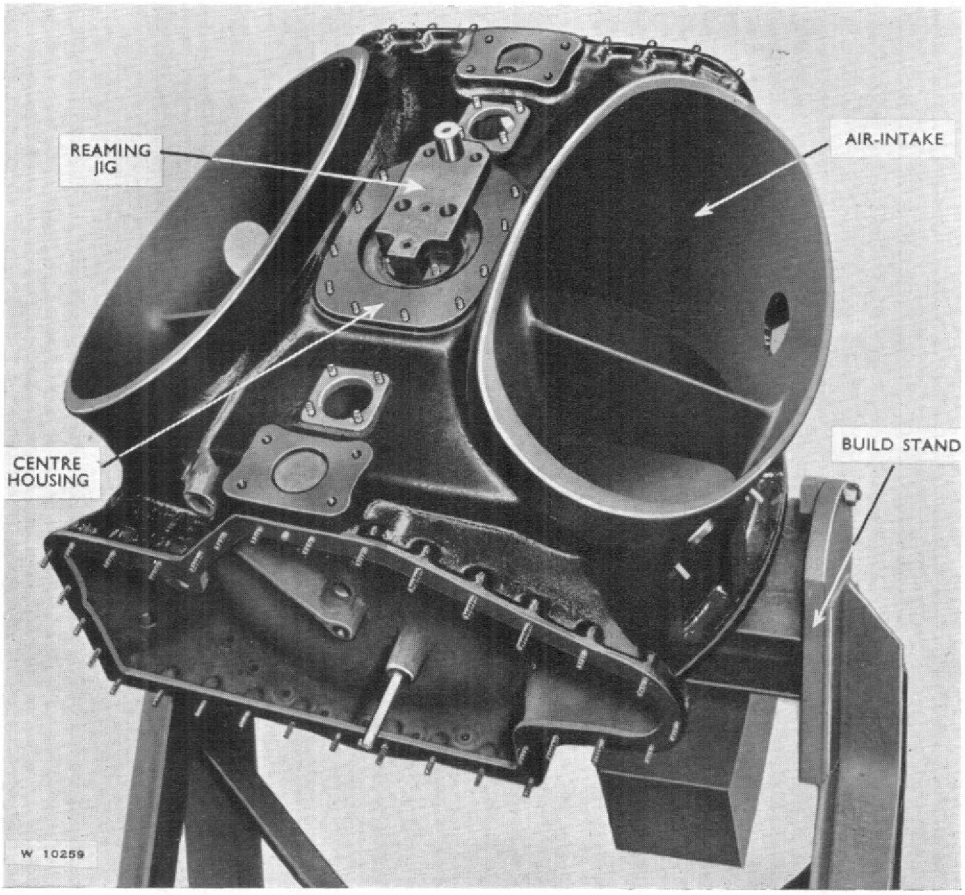


Fig. 4. Reaming jig T.78515 in position on centre housing.

to ensure that all the parts are correctly aligned.

11. Place reaming jig T.78515 (Ghost 48 Mk. 1) or T.79256 (Ghost 48 Mk. 2 and 53 Mk. 1) in position on centre housing, Fig. 4, and locate it with the appropriate locating pin in the dowel hole; three locating pins T.78520, T.78523, and T.78526 are available to suit standard, 0·010 inch, and 0·020 inch oversize holes respectively. Secure the jig in position by fitting four slave $\frac{1}{4}$ inch B.S.F. nuts to the centre housing studs which pass through holes in the jig.

12. Use two slave $\frac{1}{4}$ inch washers and B.S.F. nuts on two diametrically opposite studs on the air-intake which pass through the front flange of the centre housing to secure the centre housing to the air-intake. Check that the location mandrel is free to rotate. Remove the locating pin.

13. Using a tap wrench and the appropriate reamer, of those listed in the table, hand ream the dowel hole to the smallest diameter 'A' which will rectify the damage.

14. Blow out the hole to remove all traces of swarf, and check the diameter of the hole with the John Bull Intercheck small bore gauge in conjunction with the setting ring specified in the table.

15. Remove the location mandrel. Remove the centre housing together with the reaming jig from the air-intake, and remove the bushes from the centre housing and from the air-intake.

16. Refer to the table, and use the appropriate reamer to ream the dowel hole in the centre housing to the diameter ' B ' which corresponds with the size of the reamed hole in the air-intake (diameter 'A'). Remove the reaming jig from the centre housing. Remove all sharp edges after reaming and check the diameter of the hole.

17. Refer to the table and select the oversize dowel suitable for the reamed hole in the air-intake. Drive the dowel into the hole so that

For oversize dowel Part No.	*Use dowel punch*
MR.60009-10	T.79323
MR.60009-20	T.79324
MR.60009-30	T.79325

0·010 inch (by sight only) of the groove of the dowel is above the joint face. Peen over the

edge of the air-intake into the groove of the dowel, using the appropriate dowel punch, from those listed below. Great care must be taken to ensure that the metal is not forced above the level of the surrounding surface, and any burrs created must be removed.

If the appropriate punch is not available, a suitable tool may be made up from local resources, by using a length of $\frac{5}{8}$ inch diameter silver steel bar formed to the dimensions shown in Fig. 5.

Oversize dowel

Part No.	*Dia. X*	*Dia. Y*
MR.60009-10	0·332 inch (drill letter Q)	$\frac{13}{32}$ inch
MR.60009-20	0·339 inch (drill letter R)	$\frac{13}{32}$ inch
MR.60009-30	0·348 inch (drill letter S)	$\frac{27}{64}$ inch

18. Lightly stamp T.R.123 and the appropriate suffix, as indicated in table, adjacent to the existing part number on the air-intake and on the centre housing. Make the appropriate entry in the engine log book.

AIR-INTAKE AND TOP WHEELCASE, OVERSIZE TOP-WHEELCASE DOWELS

T.R.124 issue 4—Mod. 311

Any air-intake (Ghost 48 Mk. 1, 48 Mk. 2, or 53 Mk. 1) in which the top-wheelcase dowels have become loose or damaged may be repaired by fitting oversize dowels. This repair may also be employed to rectify damage to the dowel holes in the top wheelcase.

The following tools will be required. Three reaming jigs which enable either dowel hole to be located correctly are available, two of which are required for the Ghost 48 Mk. 1, whilst the other one is suitable for both the 48 Mk. 2 and the 53 Mk. 1.

Tool No.	*Description*
T70454	Two lifting slings
T72381	Build stand
T78541	Reaming jig. Ghost 48 Mk. 1
T78542	Reaming jig. Ghost 48 Mk. 1
T78543	Locating mandrel. Ghost 48 Mk. 1
T78544	Reamer, diameter 'A', 0·010 in. oversize
T78545	Reamer, diameter 'B', 0·010 in. oversize
T78546	Locating pin, standard
T78548	Reamer, diameter 'A', 0·020 in. oversize
T78549	Reamer, diameter 'B', 0·020 in. oversize
T78550	Locating pin, 0·010 in. oversize
T78552	Reamer, diameter 'A', 0·030 in. oversize
T78553	Reamer, diameter 'B', 0·030 in. oversize
T78554	Locating pin, 0·020 in. oversize
T78591	Setting ring, 0·260 in. diameter
T78592	Setting ring, 0·270 in. diameter
T78593	Setting ring, 0·280 in. diameter
T79267	Locating mandrel. Ghost 48 Mk. 2 and 53 Mk. 1
T79268	Reaming jig. Ghost 48 Mk. 2 and 53 Mk. 1
T79320	Dowel punch, 0·010 in. oversize
T79321	Dowel punch, 0·020 in. oversize
T79322	Dowel punch, 0·030 in. oversize
Standard	Tap wrench
Standard	John Bull Intercheck small bore gauge
Standard	Two $\frac{3}{8}$ in. B.S.F. nuts
Standard	Eight $\frac{5}{16}$ in. B.S.F. bolts
Standard	Eight $\frac{5}{16}$ in. B.S.F. nuts
Standard	Eight $\frac{1}{4}$ in. B.S.F. nuts

On receipt of the components which are to be repaired, their part numbers and serial numbers should be checked against the accompanying documents.

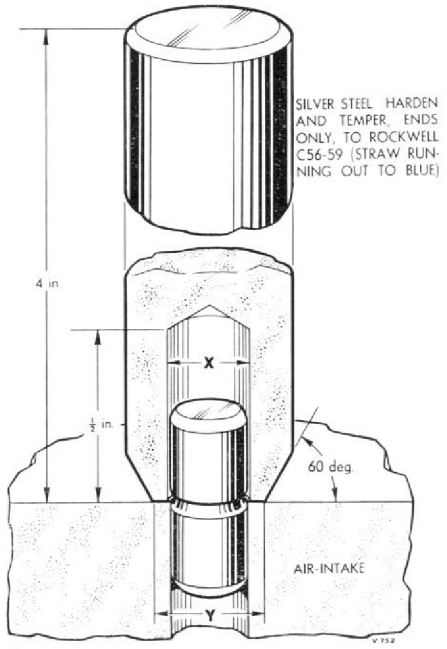


Fig. 5. Details of punch used for peening.

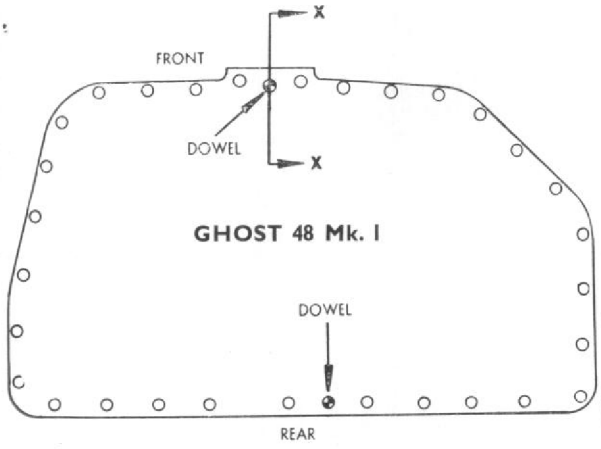
To carry out this repair proceed as described according to the Mark number of the engine being repaired.

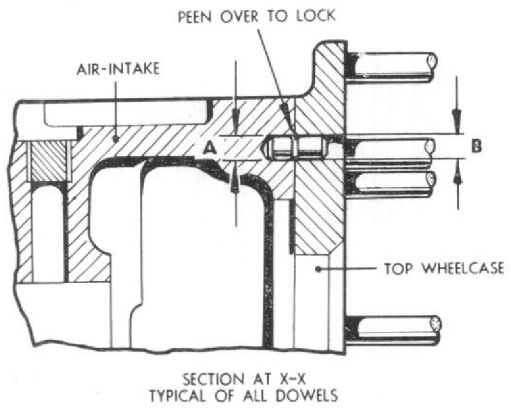
All Marks

1. Use two lifting slings T.70454 to transfer the air-intake to build stand T.72381, as illustrated in chapter 23 Fig. 24 and 24B Fig. 3, and secure it with eight equally spaced slave $\frac{5}{16}$ inch B.S.F. bolts and nuts. Alternatively, this repair can be carried out with the air-intake standing, with the two air-intake openings uppermost, on a suitable bench.

2. Remove the defective dowel from the top wheelcase mounting face on the top of the air-intake thus. Grip the dowel with a pair of pliers and, using a piece of sheet metal to prevent the tips of the jaws of the pliers from damaging the joint face, lever out the defective dowel.

3. Using a John Bull Intercheck small bore gauge in conjunction with the settings rings, as described in chapter 27, check the diameter of the dowel hole in both the air-intake and the top wheelcase to estimate the oversize to which they must be enlarged. If the holes have been enlarged already to the third oversize, or if they are so damaged that they cannot be repaired within that limit, reference should be made to the appropriate inspection authority. Where this repair has been applied already, this fact and the degree of oversize will be indicated by the existence of the repair and identification number, which will be found





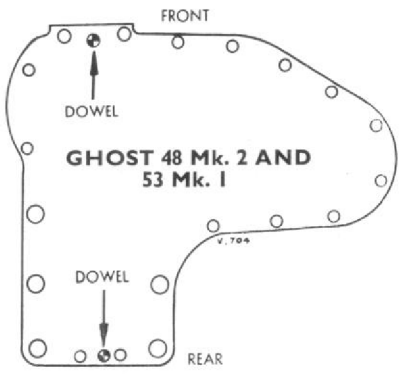


Fig. 6. Top wheelcase dowels in air-intake.

adjacent to the component's part number; refer also to the table below Fig. 6.

4. Ensure that all joint faces are clean and free from burrs or other damage which might prevent the components fitting together correctly; burrs should be removed as necessary. Similarly, ensure that the locating surfaces of each of the reaming jigs, and all other tools, are perfectly clean and free from any damage which might prevent their accurate seating.

Ghost 48 Mk. 1

The operations described in this paragraph are applicable to the Ghost 48 Mk. 1 ; the procedure for the 48 Mk. 2 and the 53 Mk. 1 is described in the next paragraph.

1. Fit the top wheelcase on to the air-intake and secure it with four slave $\frac{1}{4}$ inch B.S.F. nuts which should be approximately equally spaced, and fitted finger-tight only.

2. Insert locating mandrel T.78543 into the vertical drive bore of the top wheelcase and the air-intake, and gently rotate the mandrel to ensure that the components are aligned correctly. Tighten the four nuts holding the top wheelcase to the air-intake. Check that the mandrel is free to rotate.

3. Using reaming jig T.78541 for the dowel hole in the front flange, Fig. 6, or reaming jig T.78542 for the dowel hole in the rear flange, place the jig in position on the top wheelcase, Fig. 7, and locate it with the appropriate locating pin in the dowel hole; three locating pins T.78546, T.78550, and T.78554 are available to suit standard, 0·010 inch, and 0·020 inch oversize holes respectively. Secure the jig in position by fitting a slave $\frac{1}{4}$ inch B.S.F. nut to the short stud which passes through jig T.78541, or two slave $\frac{3}{8}$ inch B.S.F. nuts to the two studs which pass through jig T.78542. Remove the locating pin.

Ghost 48 Mk. 2 and 53 Mk. 1

The operations described in this paragraph are applicable to the Ghost 48 Mk. 2 and 53 Mk. 1. Having completed operation 4 of the paragraph headed "All Marks", proceed as follows.

1. Insert the larger end of locating mandrel T.79267 into the vertical drive bore of the air-intake, and gently rotate the mandrel to

Table Showing Sizes of Dowel Holes with Relevant Reamers, Setting Rings and Dowels

Diameter 'A' in inches	*Reamer for Dia. 'A'*	*Diameter 'B' in inches*	*Reamer for Dia. 'B'*	*Setting Ring*	*Oversize Dowel Part No.*	*Ident. No.*
0·2588 + ·0006	T.78544	0·2600 + ·0006	T.78545	T.78591	MR.60006-10	T.R.124-1
0·2688 + ·0006	T.78548	0·2700 + ·0006	T.78549	T.78592	MR.60006-20	T.R.124-2
0·2788 + ·0006	T.78552	0·2800 + ·0006	T.78553	T.78593	MR.60006-30	T.R.124-3

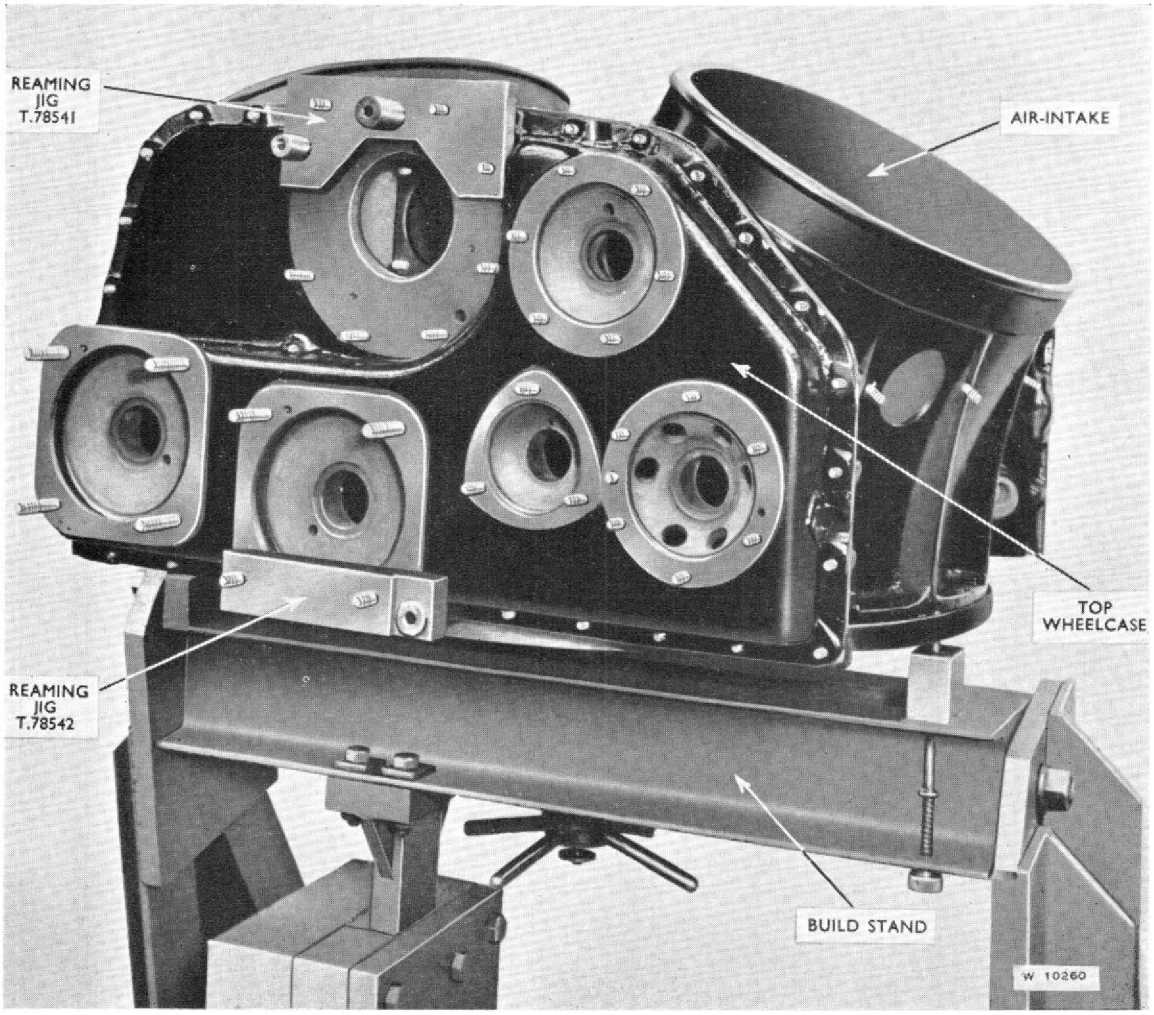


Fig. 7. Reaming jigs in position on Ghost 48 Mk. 1 top wheelcase.

the position which will allow the five studs on the vertical drive bore joint face of the air-intake to pass through the five holes in the flange of the mandrel; one of the studs is offset 10 deg. and therefore there is only one position in which all five studs will pass through the five holes in the mandrel. Secure the mandrel in position by fitting two slave $\frac{1}{4}$ inch B.S.F. nuts to two of the studs which are approximately diametrically opposite.

2. Fit the top wheelcase on to the air-intake and secure it with four slave $\frac{1}{4}$ inch B.S.F. nuts, which should be approximately equally spaced.

3. Place reaming jig T.79268 in position on the top wheelcase so that the locating hole in the jig passes over the small end of the locating mandrel, and the locating bushes on the jig are aligned with the dowel holes, Fig. 8. Locate the jig with the appropriate locating pin in the dowel hole which is to be rectified; three locating pins T.78546, T.78550, and T.78554 are available to suit standard, 0·010 inch, and 0·020 inch oversize holes respectively. Secure the jig in position by fitting two slave $\frac{1}{4}$ inch B.S.F. nuts to the two studs which pass through the jig. Remove the locating pin.

All Marks continued

The operations described in this paragraph are applicable to all engine Marks.

1. Using a standard tap wrench and the appropriate reamer, of those listed in the table below, Fig. 6, hand ream to the bottom of the dowel hole in the air-intake, selecting the smallest diameter 'A' which will rectify the damage.

2. Blow out the hole to remove all traces of swarf and check the diameter of the hole using the John Bull Intercheck small bore gauge in conjunction with the setting ring specified in the table.

3. *Ghost 48 Mk. 1.* Remove the locating mandrel. Remove the top wheelcase, together with the reaming jig, from the air-intake.

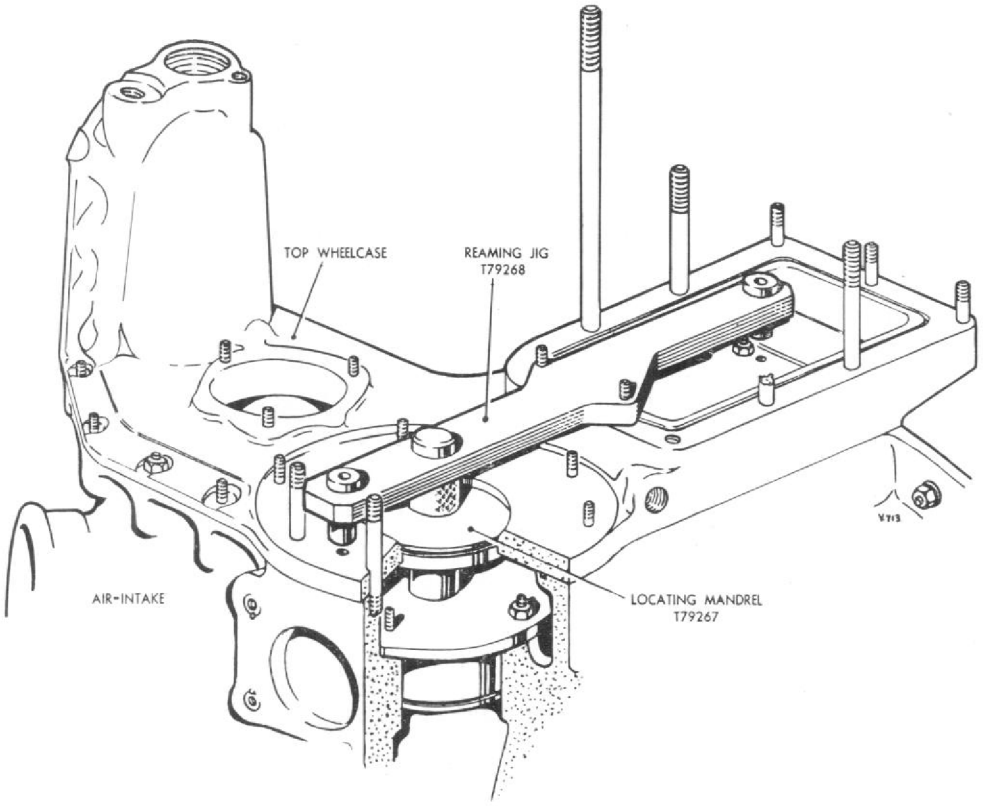


Fig. 8. Reaming jig in position on Ghost 48 Mk. 2 or 53 Mk. 1 top wheelcase.

Ghost 48 Mk. 2 and 53 Mk. 1. Remove the top wheelcase, together with the reaming jig, from the air-intake. Remove the locating mandrel.

4. Refer to the table, and use the appropriate reamer to ream the dowel hole in the top wheelcase to the diameter 'B' which corresponds with the size of the reamed hole in the air-intake (diameter 'A'). Remove the reaming jig from the top wheelcase. Remove all sharp edges after reaming and check the diameter of the hole.

5. Refer to the table, and select the oversize dowel suitable for the reamed hole in the air-intake. Drive the dowel into the hole so that 0·010 inch (by sight only) of the groove of the dowel is above the joint face. Peen over the edge of the air-intake into the groove of the dowel, using the appropriate dowel punch, from those listed below. Great care must be taken to ensure that the metal is not forced above the level of the surrounding surface, and any burrs created must be removed.

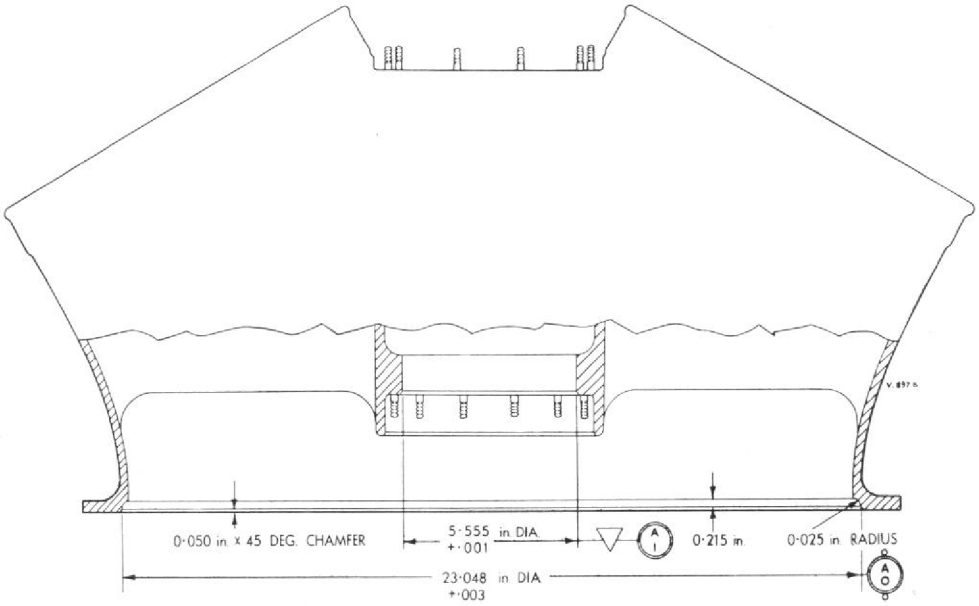
For oversize dowel Part No.	*Use dowel punch*
MR.60006-10	T.79320
MR.60006-20	T.79321
MR.60006-30	T.79322

If the appropriate punch is not available, a suitable tool may be made up from local resources, by using a length of $\frac{1}{2}$ inch diameter silver steel bar formed to the dimensions shown in Fig. 5, and in the table below.

Oversize dowel Part No.	*Dia. X*	*Dia. Y*
MR.60006-10	0·266 inch (drill letter H)	$\frac{11}{32}$ inch
MR.60006-20	0·277 inch (drill letter J)	$\frac{11}{32}$ inch
MR.60006-30	0·290 inch (drill letter L)	$\frac{23}{64}$ inch

6. Lightly stamp T.R.124 and the appropriate suffix, as indicated in table, adjacent to the existing part number on the air-intake, and on the top wheelcase. Make the appropriate entry in the engine log book.

Issued by Amendment No. 131
February, 1957



T.R.213. Air-intake, bearing housing bore.

AIR-INTAKE, OVERSIZE BEARING HOUSING BORE

T.R.213 issue 5—Mod. 1259

For Information Only

If the number T.R.213 is found on a Ghost 48 Mk. 1, 48 Mk. 2, or 53 Mk. 1, air-intake, adjacent to the existing part number, this indicates that the front bearing housing bore has been machined to 0·005 in. oversize.

Such air-intakes must be fitted with oversize bearing housing Part No. M.R.605856-5.

This does not affect dismantling, inspection, repair, or reassembly.

Where sufficiently skilled personnel and adequate workshop facilities are available, this repair can be employed as a means of rectifying damage to the bearing housing bore in an air-intake, provided that this repair has not been applied previously.

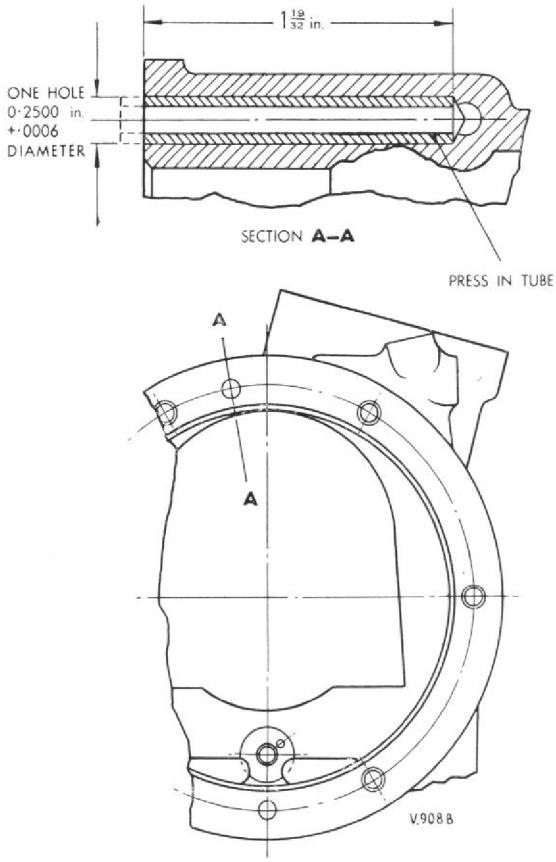
AIR COMPRESSOR HOUSING: OIL FEED HOLE

T.R.364 issue 3—Mod. 817

For Information Only

If the number T.R.364 is found on a Ghost 48 Mk. 1 air compressor housing, adjacent to the existing part number, this indicates that the top oil gallery has been lined with a tube, Part No. 603562.

This does not affect dismantling, inspection, repair or reassembly.



T.R.364. Air compressor housing, oil hole.

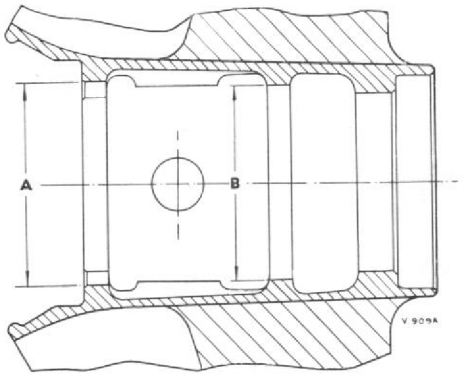
Issued by Amendment No. 135
November, 1957

AIR-INTAKE, OVERSIZE CENTRE-HOUSING BORE
T.R.260 issue 3—Mod. 820

For Information Only

If the number T.R.260 is found on a Ghost 48 Mk. 1 air-intake, adjacent to the existing part number, this indicates that the centre-housing bore has been machined oversize.

The degree of oversize is indicated by the suffix 1, 2, or 3 following the T.R. number. Such air-intakes may only be assembled in conjunction with the appropriate oversize centre-housing, see table and drawing.



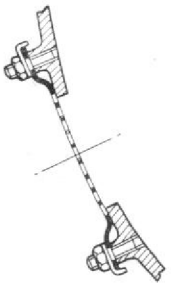
Oversize centre-housing bore in air-intake. Diameter in inches.		*Identification No.*	*O/S centre-housing*
A	B		
6·255 + ·001	6·005 + ·001	T.R.260-1	M.R.94750-5
6·260 + ·001	6·010 + ·001	T.R.260-2	M.R.94750-10
6·265 + ·001	6·015 + ·001	T.R.260-3	M.R.94750-15

PROTECTION PLATES FOR ANTI-RESONANCE HOLES IN MODIFIED AIR-INTAKES
T.R.320 issue 1—Mod. 812

For Information Only

If the number T.R.320 is found on a Ghost 48 Mk. 1 air-intake, adjacent to the existing part number, this indicates that the air-intake has been fitted with protection plates Part No. 601665.

To obtain a good fit, plain washers, Part No. 60713, may have been fitted between the offset flange of the plate, and the boss.


SECTION **A–A**