

H.M. SUBMARINES

RECLAMATION OF PISTONS BY THE FREEZING IN OF GUDGEON PIN BUSHES

The gudgeon pin bores of the pistons of submarine main engines wear more rapidly than any other part of the piston.

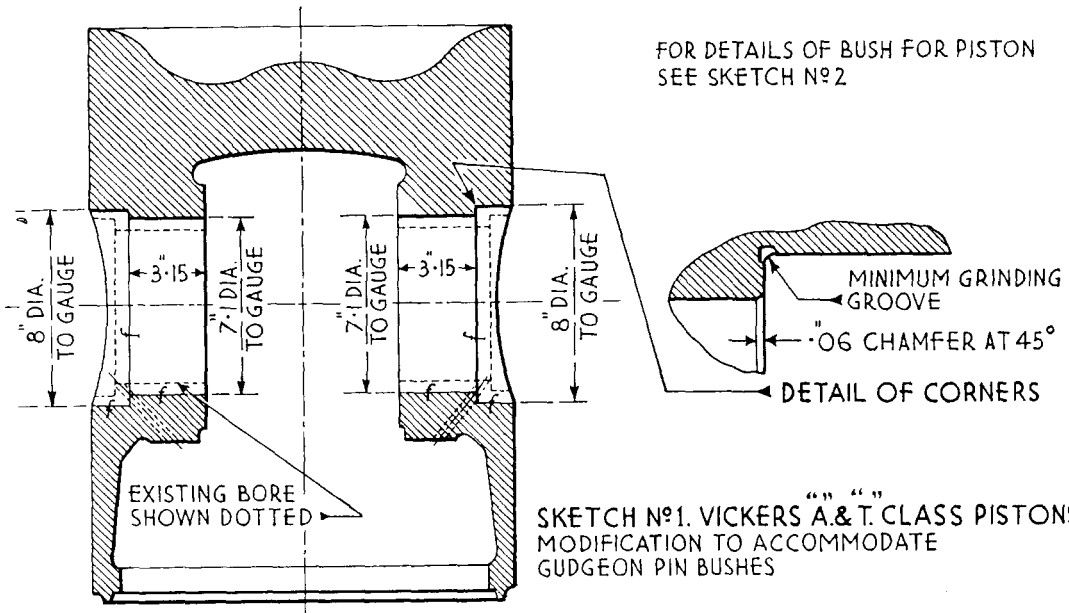
In order that the life of the pistons may be extended the following method of rebushing the gudgeon pin bores has been adopted for *Vickers design pistons* of "A" and "T" class submarines.

On completion of trials now being carried out on the reclamation of *Admiralty design pistons* further instructions will be issued.

Procedure

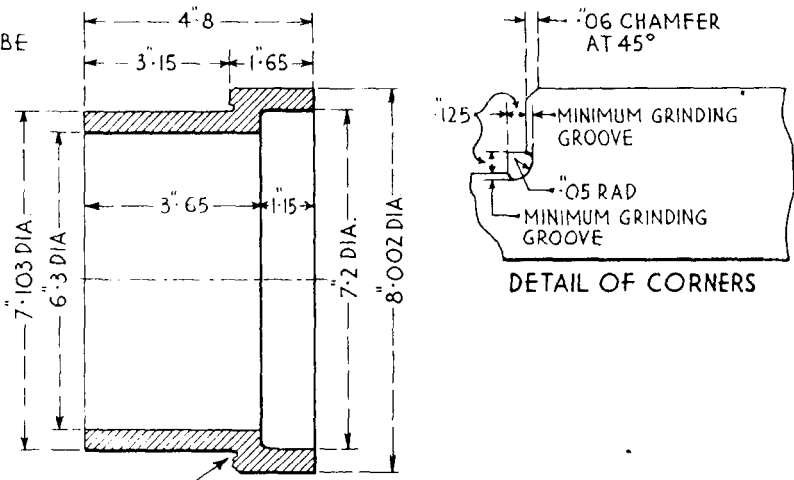
- (a) Machine gudgeon pin holes to particulars on Fig. 1.
- (b) Gauge piston on diameters, back-front, fore-aft, just above gudgeon pin holes and length.
- (c) Machine aluminium bushes (Material LO-EX, *similar to piston*) and leave external diameters .003 larger than diameter of gudgeon pin hole to particulars of Fig. 2.
- (d) Freeze first bush by immersing in freezing mixture of solid CO₂ ("Cardice") and paraffin in Freezing Box. See Fig. 3.
- (e) Heat piston by immersing in hot water.
- (f) Insert first bush into piston without delay.
- (g) Freeze second bush and insert into piston without delay.
- (h) Gauge as (b) before finish machining.
- (i) Complete final machining of bushes to drawing.

The following data obtained during treatment of a trial piston is added for information and guidance in the above operations.



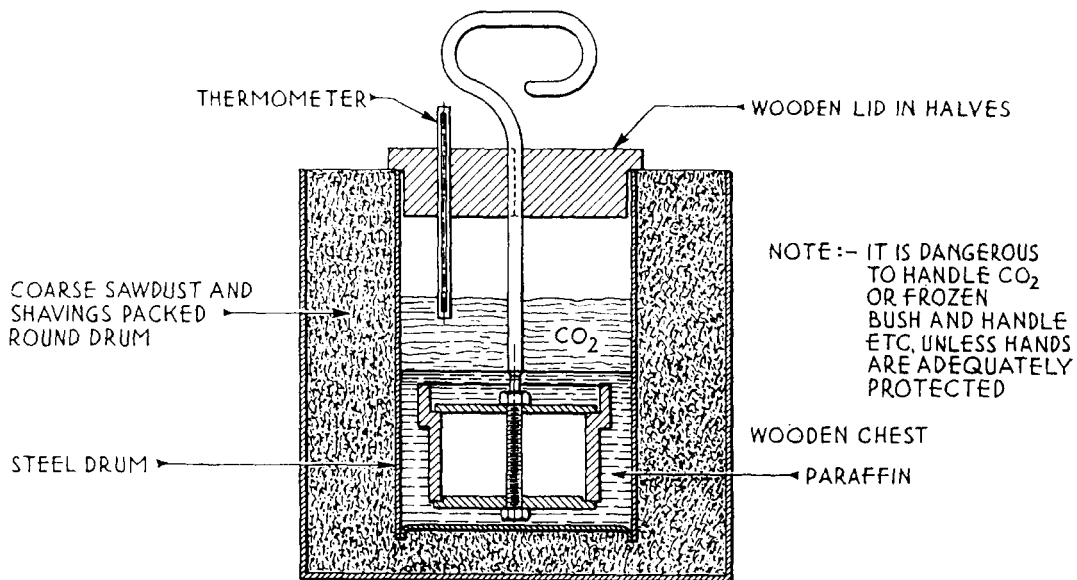
FINISHED SIZES GIVEN AN ALLOWANCE TO BE LEFT ON LENGTHS AND BORES FOR FINISH MACHINING

FOR DETAILS OF MACHINING FOR PISTON SEE SKETCH N^o 1

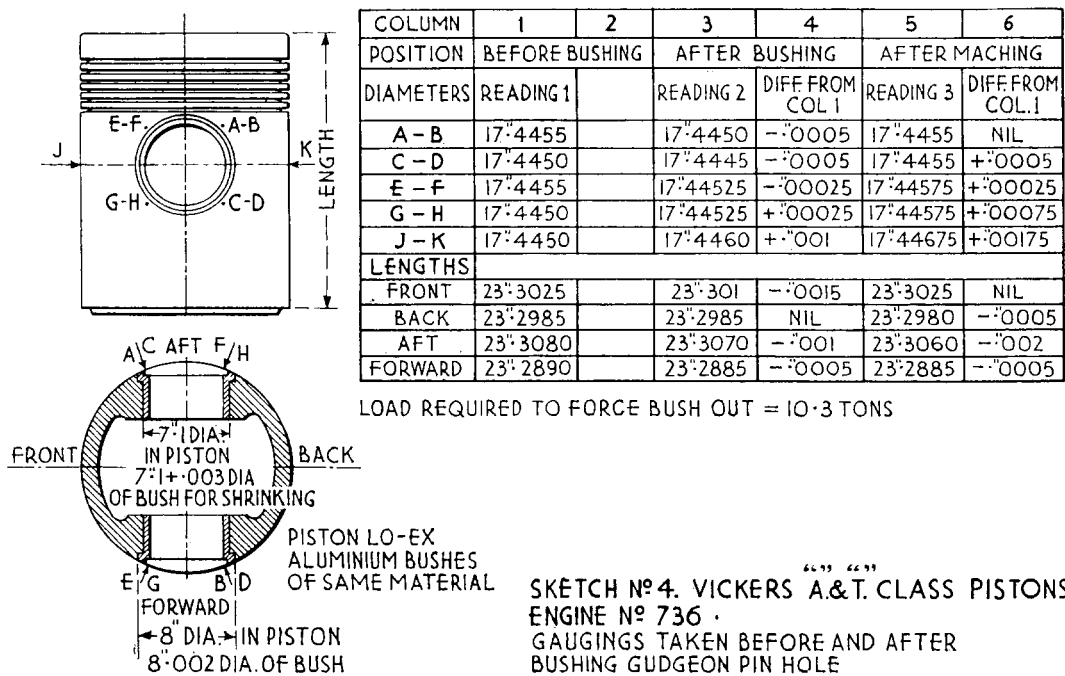


SEE ENLARGED VIEW FOR DETAILS OF CORNERS

SKETCH N^o 2. VICKERS "A" & "T" CLASS PISTONS
LO-EX BUSH FOR PISTON



SKETCH N^o 3. ARRANGEMENT OF FREEZING BOX



1st bush

- 9.00 a.m. Bush immersed in freezing mixture (25 lb Cardice—8 gallons paraffin) which has been mixed overnight—Temperature—30°C. More Cardice added.
- 9.30 a.m. Piston immersed in hot water. Final temperature +65°C.
- 10.00 a.m. Temperature of bush—50°C—.005 in smaller in diameter. Temperature of piston +65°C—.004 in larger in bore. Bush inserted into piston—entered easily. Time taken for removal of bush from freezing mixture, wiping and fitting in piston—20 seconds.

2nd bush

- 10.10 a.m. Bush immersed in freezing mixture—Temperature—45°C. More Cardice added.
- 10.20 a.m. Temperature of piston had dropped slowly to +55°C. Temperature of bush—50°C—.005 in smaller in diameter. Temperature of piston +55°C—.003 in larger in bore. Bush inserted in piston—20 seconds.

Five days later both bushes were forced from piston separately, load 9 tons each. Metal in both gudgeon holes of piston was found to be badly scored after removal of bushes.

Gaugings taken before and after bushing of the gudgeon pin holes of a further trial piston are shown on Fig. 4.

Note :—

“Cardice” is supplied by Carbon Dioxide Co. Ltd., Hammersmith.

Hands must be adequately protected when handling Cardice and frozen components—rubber gloves have been found suitable.

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