

H.M.S. TORQUAY'S GEARBOX

A NOTE FROM SEA

BY

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During the 1984 summer leave and AMP period H.M.S. *Torquay* had been tasked to carry out a lubricating oil trial using OEP 80 in the gearboxes in place of the former and widely used OEP 69. This trial required both gearboxes to be examined for signs of wear within one month of operation with the new oil. Friday 28 September was the only suitable date for this inspection and it was midday when it was learned that three teeth had broken off the outboard secondary pinion of the starboard gearbox. In addition severe pitting was evident.

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The ideal engineering solution for the gearbox would have been to replace both primary wheels, the input pinion, both secondary pinions, and the mating main wheel. However, work in wake of the main wheel replacement would not have been completed until the end of the year or later, and thus was deemed impracticable. Instead, after a series of meetings with representatives of C-in-C Fleet, MOD, NBC Portsmouth, and David Browns (the gearbox designers), it was decided that repair would be effected by replacing both primary wheels and secondary pinions with new ones which would be removed from a spare gearbox at RNSD Llangennech. The Naval Base were unable to begin the repair proper before 15 October but this became insignificant because two weeks delay ensued in raising the starboard gear casing as the engine room deckhead lifting eyes were out of date for test and embedded in asbestos lining.

On 23 October the helices of the new gear wheels which had been delivered from Llangennech were found to be opposite handed to, and therefore incompatible with, those of the old main wheel. On 24 October the second spare gearbox was sighted at Llangennech, observed to be appropriately handed, and assessed as suitable for H.M.S. *Torquay*. NBC Portsmouth staff were commendably prompt in removing the wheels and pinions on site for early transport to Portsmouth. However when the attempt was made to install this second set of spares it was discovered that they did not fit because, besides having a significantly different profile, the new secondary pinion outside diameter was greater than that of the old pinion and the tooth depth greater than that of the main wheel teeth. NBC Portsmouth immediately investigated gearing in H.M.S. *Sultan*, R.N.E.C. Manadon, H.M.S. *Rhyl*, and in other non-operational Type 12 and 14 frigates. Ship's staff also made enquiries through Reserve Ships Advisory Group to see if any gearboxes might be available in scrapped ships, even going so far as to enquire of the Italian ship breakers of H.M.S. *Whitby*. It was concluded that *Torquay* had a unique main wheel which was probably incorrectly manufactured with short teeth in the late 1950s and that the associated secondary pinions were then made to fit it. Consequently, on 31 October after discussions between MOD and NBC Portsmouth, the old damaged pinion and the new oversized spare were despatched to David Brown Gearing International in Huddersfield, who recommended reinstallation of the former after its broken teeth had been ground back. On 8 November afloat fitting work and retorquing of the gearbox had been completed and ship's staff began flushing, lub oil system tuning and setting to work routines. MOD Navy agreed that to reduce unknowns the main gearbox oil should revert from OEP 80 to OEP 69.

A basin trial was conducted on 14 November 1984. On 15 November the ship, gratefully and hopefully, proceeded for sea trials at up to 50% full power torque. However, despite an optimistic preliminary assessment, detailed examination and discussion on 16 November of the high vibration levels exhibited plus the evidence of severe scuffing and pitting all combined to indicate an unacceptable risk of further tooth failure. Accordingly, it was decided that the next (and nearly last) available option was to remove the affected secondary pinion and rely on the remaining one (now in the outboard position) as the sole remaining connection between the input pinion and the main wheel. After a further successful basin trial on 24 November with ship proceeded to sea on Sunday 25 November for comprehensive trials with representatives of MOD, David Browns, NBC Portsmouth and the C-in-C Fleet VA team embarked. After a subsequent examination when cold and dry the gearbox was deemed proved for continued operation, subject to satisfactory results at regular daily hot and weekly cold inspections.