

## COMPARISON OF LOW SPEED HELICOPTER FLIGHT TRIAL TECHNIQUES

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NLR has 40 years of experience in the field of helicopter-ship qualification testing. A cost effective and safe approach has been developed in the course of time, based on a thorough understanding of the helicopter's operational properties and the ship's environment. Part of this approach are the 'shore based hover trials' in which the helicopter's low speed characteristics are investigated. Traditionally, these trials are performed by hovering in the naturally occurring wind. An alternative method is the use of a pace car.

Low speed (hover) trials can be performed with a pace car which is equipped with a calibrated wind measuring system. Instead of waiting for or flying to the required environmental conditions, the required test conditions are generated by executing a series of flights along a runway at different headings, whereby the helicopter follows a pace car. This type of flight results in a very different piloting task with respect to a steady hover in the naturally occurring wind and possibly in different flight test results. However, as the required test conditions can be generated, the trials are less dependent on the weather conditions, so significant time and cost savings can be achieved. Due to the lack of information about the quality of the results from pace car trials, NLR was contracted by the Dutch Department of Defense to set up a test campaign comparing the different methods with the Lynx SH-14D.

Besides evaluating the pace car testing method, NLR included two more testing methods in the evaluation. For the first method, a monitor is mounted in the cockpit at the instrumentation panel. At the monitor a modified flight director is displayed at which the commanded directives are visual. For the second method, the commands are displayed on a Helmet Mounted Display. The displayed information is the same but special care is taken to optimize the information of the flight directives in relation to the visibility of the symbols.

To conduct these trials efficient and effective NLR decided to instrument the helicopter, pace car and the wind anemometer array. Besides the need for data gathering an extra telemetry uplink to the helicopter was installed to support the two display methods.

The paper will describe the test preparation, including the instrumentation of the pace car, ground station and helicopter (with telemetry up and down links), test execution and test results.

The flight trials showed comparable results for all methods. The pilot found the traditional hover and pace car approaches easier to fly than the HMD and HDD. After further optimization, the HMD is considered for future flight test applications, including helicopter/ship qualification.



*Helmet Mounted Display*

*Shore-based helicopter  
flight testing*