

MIC – Monitoring and Instrument Coordination

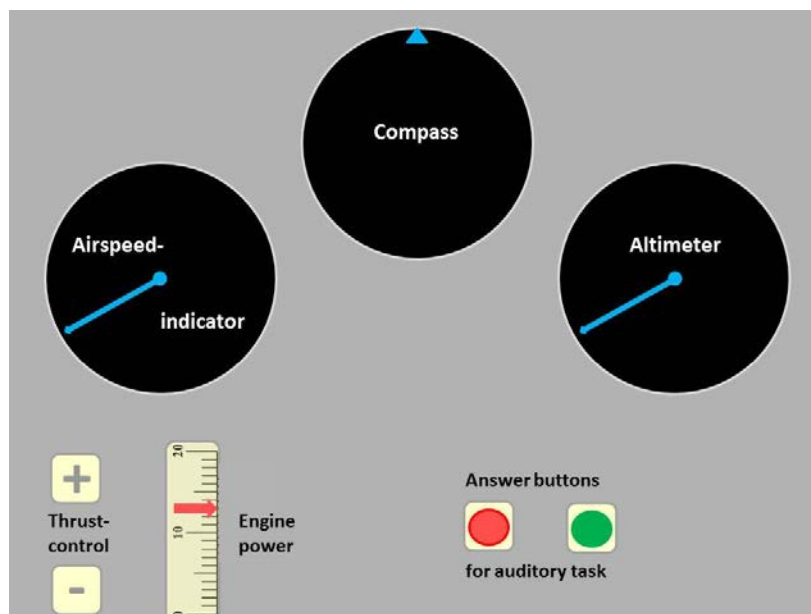
A test for the measurement of psychomotor and multitasking abilities

1 General Information

During the MIC you will encounter several instruments similar to those in an aircraft cockpit. It will be your task to monitor the instrument parameters and to adjust them as necessary. This test is *not meant to be a realistic flight simulation!* It was specifically designed to measure your psychomotor ability and your multitask capacity. Flying experience is not required. The MIC comprises an extensive instruction and practice part. Nevertheless you should acquaint yourself with the instruments beforehand.

The instruments used in this test are compass, altimeter and airspeed indicator. Compass heading (compass) and altitude (altimeter) can be controlled with the joystick. Further necessary inputs can be made by pressing buttons on the touchscreen.

This figure illustrates how the MIC-screen is laid out:



The compass, altimeter and airspeed indicator are arranged on the display following the standard set-up of a simple cockpit ("Basic T" without artificial horizon).

2 Navigation

The compass gives you directional information. N stands for North and is identical to a heading of 360°. S stands for South (180°), W for West (270°) and E stands for East (90°). An arrowhead marks your current heading. During a change of heading the arrowhead will not move but the compass scale will rotate instead: a right turn increases the indicated degrees of the heading and the compass scale turns left. In a left turn the compass scale turns right and the indicated degrees of the heading are reduced.



During the test you will operate the joystick with your right hand to control the heading. Pressing the joystick to the left or right side will lead to heading changes. The longer and stronger you press to the left or right, the faster the indicated heading will change.

If you have reached the desired turning rate, bring the joystick back into the neutral position. The aircraft will then continue its turn until you stop it by applying the corresponding counter-movement.

3 Altitude

The altimeter indicates your altitude in feet (ft) above sea level. The corresponding instrument in the MIC test has a digital and an analogous indicator (similar to the illustration of an altimeter below). While the digital indicator shows the complete altitude (in the altimeter illustration this is equal to 28 720 ft), the analogous indicator only shows the last three digits, leaving out the thousands (e.g. 720 ft). During altitude changes the analogous needle moves. For example, a climb of 500 feet will cause a half rotation to the right, clockwise. A descent of 2000 feet will cause two rotations of the scale to the left, anti-clockwise. The digital indicator will increase or decrease accordingly.



Changes of the altitude can be initiated with the joystick as well. Pull the joystick towards you in order to start a climb. The analogous indicator will rotate clockwise and the altitude will increase. To descend, push the joystick forward (away from you): the indicator will rotate anti-clockwise and the altitude will decrease. The longer and stronger you push or pull, the faster you will change the altitude.

If you have reached a desired rate of climb or descent, bring the joystick back into the neutral position. The aircraft will continue to climb or descend until you apply the corresponding counter-movement.

Normally, combined inputs of direction and altitude will be necessary. For instance, if you want to climb while turning right you have to pull the joystick backwards and move it to the right side. If you want to descend in a left turn you have to push the joystick forward and move it to the left.

4 Speed

The airspeed indicator shows your airspeed in knots (kt), meaning nautical miles per hour. The speed is influenced by the engine power and by the aircraft's pitch.



The engine power can be adjusted by the +/- buttons on the touchscreen. During a level flight (at constant altitude) an increase of thrust will increase the speed. Vice versa the speed will be decreased by a reduction of thrust.

The speed does not only depend on the engine power but also on the pitch of the aircraft. (This is similar to a car: The speedometer reacts to the accelerator and to whether you are driving uphill or downhill). When you climb to a greater altitude your speed will go down although you have the same engine power. On the other hand your speed will increase when you descend. So if you want to cruise at a constant speed you have to increase thrust during a climb and to reduce it during a descent. The amount of thrust changes depends on *how fast* you are climbing or descending.

5 Auditory Task

The task is to monitor sequences of numbers presented via headphones, and to respond by pressing buttons after hearing either three even numbers in succession (\Rightarrow green button) or three odd numbers in succession (\Rightarrow red button).

Example: “2 – 10 – 1 – 9 – 10 – 4 – 8 – 3 – 6 – 4 – 7 – 9 – 5 – 6 – 10 – 1 – 7”. The correct responses should have been carried out between 8 and 3 (\Rightarrow green button) and between 5 and 6 (\Rightarrow red button).

6 Test

During the MIC test you will have to perform certain “maneuvers”, for instance:

- fly a heading of 300°
- maintain an altitude of 5200 ft
- fly a right turn
- descend, etc.

It will not be necessary for you to memorize or calculate any headings, altitudes, or the turn, climb and descent rates. The target values will always be visible during the tasks.

In the course of the test you will have to manage several tasks at the same time. This begins for example with executing the above mentioned tasks simultaneously:

- fly a right turn while descending
- climb at a heading of 300°
- fly a left turn at an altitude of 3250 ft
- maintain a heading of 140° and an altitude of 6500 ft

In addition you will have to correct any deviations from maintaining a constant speed by adjusting the engine power. Finally, you have to deal with the acoustic tasks in addition to monitoring the instruments.

Any deviations from the target values of the parameters (altitude, heading, speed) as well as mistakes and omissions in the auditory task will be relevant for the assessment of your performance.

7 Recommendations

When preparing for this test you should familiarize yourself with how the indicators on the instruments will change when you fly a certain maneuver. This can be done for example by looking at different illustrations (e.g. as those shown above). Also try to visualize the required control inputs for different maneuvers.

In case you want to practice the above mentioned maneuvers by using a flight simulator on your home computer, there are basically no objections. But please keep in mind that neither the display nor the control dynamics (sensitivity, turbulences, inertia) of the test will be equal to the features of a commercial simulator! If you practice *excessively* with a flight simulator you might risk losing flexibility when it comes to changes in the flight dynamics during the test.

Therefore we recommend the following to adequately prepare yourself for the MIC:

1. Think thoroughly about the described instruments, the movements and changes of the displays during different maneuvers as well as the necessary control inputs.
2. Do not over-practice with a PC-based flight simulator. You will be familiarized with handling the system during an extensive practice phase prior to the MIC-test. Flying experience is not required.
3. Do not put yourself under pressure. This means for the MIC and also for the other DLR-tests: An intensive preparation will be helpful but it alone will not guarantee success!