

Cockpit Voice Recorder Intelligibility Evaluation

Flight and Ground Test Procedure

Preflight briefing:

- 1) It is advisable for all members of the crew to review this procedure together prior to commencement.
- 2) The test should be initiated within 15 minutes prior to landing. Once on the ground the CVR circuit breaker should be pulled to allow the remainder of the CVR test to be performed on the ground without recording over the in-flight portion of the test
- 3) The purpose of this procedure is to evaluate the performance of the cockpit voice recorder (CVR) system. The system is comprised of a number of components:
 - a) The CVR.
 - b) The Cabin Area Microphone (CAM).
 - c) The summing amplifiers.
 - d) All of the microphones (boom mic's, hand mic's, oxygen mic's).
 - e) The Public Address (PA) System.
 - f) The aircraft radio receivers.
- 4) The regulations require the test be performed in "Operational Conditions". i.e. in flight!
- 5) The condition of the CVR system, or the 'Intelligibility' will be determined by evaluation of the recording made during this flight test. The recording will be analyzed and evaluated to determine that:
 - a) All of the required inputs to the CVR are functioning.
 - b) The levels of the required inputs are balanced to one another.
 - c) No extraneous noises are being introduced that cause the recorded audio to be distorted.
 - d) The CAM is picking up the cabin noises appropriately, and without too much interference.
- 6) The evaluation is very subjective and the primary tool of the CVR intelligibility analyst is his ears. Please consider the commentary associated with this test to be critical. The analyst can only identify what is happening by the spoken dialog of the flight crew. It is also important to identify who is speaking; it must be possible to distinguish the Captain from the First Officer.
- 7) Although headsets are not normally required above 10,000 ft., they must be worn during all phases of this test. Microphone positioning is critical with the element almost touching the user's lips (except for masks which are designed differently). This is extremely important!
- 8) The logical sequence of this test can be altered providing all relevant steps are performed.
- 9) The CVR capacity is only 30 minutes. The in-flight portion should consume 15 minutes; the remainder of the test will be performed on the ground. Therefore the recorder must be stopped after landing to preserve the available recording time and to avoid writing over earlier portions of the test .
 - a) To stop the recorder:
 - i) Locate the CVR circuit breaker and pull it to stop the recorder (the summing amplifier breaker may be left in)
- 10) Check (✓) and initialize each test procedure step once completed.
- 11) Some CVR units are capable of recording 120 minutes of CVR audio. Some of these 2 hour recorders only record the area microphone audio with sufficient quality for intelligibility analysis purposes. Some 2 hour recorders record all audio inputs with high quality audio. For the purposes of this document, a 30 minute high quality recorder is assumed.
- 12) If all of the relevant procedures are not completed, the flight test may have to be re-done.**

Section I: In-Flight portion of test:

1) Test Start. Commence test 15 minutes prior to landing: (✓) init.

(a)	With the intercom ON have one crew member make the following statement: THIS IS THE BEGINNING OF THE CVR FLIGHT TEST FOR AIRCRAFT (make) _____, (model) _____, (sn) _____, (reg) _____.	
(b)	Captain identify him/herself: THIS IS THE CAPTAIN (name) _____ SPEAKING 1-2-3-4-5.	
(c)	First Officer identify him/herself: THIS IS THE FIRST OFFICER (name) _____ SPEAKING 1-2-3-4-5.	
(d)	Announce the location of the area microphone: THE AREA MICROPHONE IS LOCATED (where) _____.	

2) Bulk Erase: (✓) init.

	Canadian Air Regulations 605.34 (2) states: "No person shall erase any communications pertaining to the flight being undertaken that have been recorded by a cockpit voice recorder." This test will confirm that the CVR erase feature is <i>not</i> implemented.	
(a)	Either Pilot announce: This is going to be a test of the CVR erase feature to confirm that it is not implemented in this aircraft. Press and hold the CVR ERASE switch located on the CVR test panel for 5 seconds	

3) Area Microphone: (✓) init.

	The purpose of this test is to analyze the sensitivity of the area microphone.	
(a)	Select the INTERCOM OFF. Cover each boom microphone throughout the test (put a hand completely around each boom microphone). Speaking loudly enough to be clearly understood by the other crew member make the following statements: Captain: THIS IS THE CAPTAIN SPEAKING TO THE FIRST OFFICER TO TEST THE AREA MICROPHONE. DO YOU UNDERSTAND ME? First Officer: YES I UNDERSTAND YOU. THIS IS THE FIRST OFFICER SPEAKING TO THE CAPTAIN TO TEST THE AREA MICROPHONE. DO YOU UNDERSTAND ME? Captain: YES I UNDERSTAND YOU.	

4) Uninterrupted Microphone Audio:

(✓) init.

	The purpose of this test is to confirm the uninterrupted microphone audio is recorded by the CVR. (The CVR records the audio present on the microphones regardless of whether the intercom is on or off.)	
(a)	Announce over the intercom: <i>THIS IS GOING TO BE A TEST OF THE UNINTERRUPTED MICROPHONE AUDIO. THE INTERCOM IS BEING TURNED OFF.</i>	
(b)	Select the intercom off. You must not hear yourself, or the other crew in the headphones. Captain: <i>THIS IS THE CAPTAIN SPEAKING INTO MY BOOM MICROPHONE. I CANNOT HEAR MYSELF IN THE HEADSET.</i> First Officer: <i>THIS IS THE FIRST OFFICER SPEAKING INTO MY BOOM MICROPHONE. I CANNOT HEAR MYSELF IN MY HEADSET.</i>	
(c)	Select the intercom on. Announce: <i>THAT WAS A TEST OF THE UNINTERRUPTED MICROPHONE AUDIO. THE INTERCOM IS NOW ON.</i>	

5) Transmitters (in-flight portion):

(✓) init.

	The purpose of this test is to confirm that the microphone audio and crew sidetone is recorded. Transmissions should be made to a controller or company to get a reply. <u>Allow 5 seconds between transmissions</u> (for analysis purpose).	
(a)	Captain: Make a radio call of at least 5 seconds duration with BOOM microphone <u>VHF COM 1</u> (+5 seconds) With the boom microphone, into the intercom announce: <i>THIS IS THE CAPTAIN ABOUT TO MAKE AN ANNOUNCEMENT ON THE CABIN PA.</i> Make an announcement on the cabin PA of at least 3 seconds duration.	
(b)	First Officer: Make a radio call of at least 5 seconds duration with BOOM microphone <u>VHF COM 2</u> . (+5 seconds) With the boom microphone, into the intercom announce: <i>THIS IS THE FIRST OFFICER ABOUT TO MAKE AN ANNOUNCEMENT ON THE CABIN PA.</i> Make an announcement on the cabin PA of at least 3 seconds duration.	

6) Aural Alerts:

(✓) init.

	The purpose of this test is to ensure that alerts available during flight are recorded normally.	
(a)	<u>Prior to activating an aural alert announce what alert is going to be tested. Allow the alert to sound for 2-3 seconds, or 4-5 cycles (as applicable).</u>	
(b)	Your aircraft may be configured to not allow certain alert tests while in flight. If the alert will not test while in flight please mark 'NOT AVAIL' next to the alert below.	
(c)	Announce: <i>THIS IS A TEST OF THE <u>MASTER CAUTION</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>FIRE</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>STALL</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>OVERSPEED</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>ALTITUDE ALERT</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>TCAS</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>GPWS</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>WINDSHEAR</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>GEAR UP</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>TRIM IN MOTION</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>AUTOPILOT DISCONNECT</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>SAS</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>ROTOR SPEED</u> AURAL ALERT.</i>	

7) Rotorcraft Specific: AUTOROTATION

(✓) init.

	Prepare for an autorotation with power recovery. Announce: <i>THIS IS THE BEGINNING OF THE AUTOROTATION.</i> Announce a commentary throughout the autorotation (Nr, airspeed, etc.). Announce the recovery.	
(a)	Prepare for a hover of at least 20 seconds duration. Announce: <i>WE ARE NOW IN A HOVER.</i> After 20 seconds of hover Announce: <i>WE HAVE COMPLETED THE HOVER.</i>	

8) Landing:

(✓) init.

(a)	Perform a normal approach and landing with commentary.	
(b)	Announce <i>gear selections, flap selections, engine power changes, and propeller setting changes</i> (as applicable).	

9) Post Landing:

(✓) init.

(a)	After landing and roll out, pull the CVR Circuit Breaker to stop the CVR	
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10) Rotorcraft Specific: ROTOR RPM DURING SHUTDOWN

(✓) init.

(a)	Reset the CVR circuit breaker (if previously pulled).	
(b)	<p>The CVR system records the Rotor RPM. As the engine(s) is(are) being shut down announce the rotor rpm.</p> <p>With the rotor rpm at 100%</p> <p>Announce: THE ROTOR RPM IS CURRENTLY 100%. THE ENGINE SHUT DOWN IS COMMENCING.</p> <p>When the rotor rpm reaches 90%</p> <p>Announce: THE ROTOR RPM IS CURRENTLY 90%</p> <p>When the rotor rpm reaches 80%</p> <p>Announce: THE ROTOR RPM IS CURRENTLY 80%</p> <p>When the rotor rpm reaches 70%</p> <p>Announce: THE ROTOR RPM IS CURRENTLY 70%</p> <p>When the rotor rpm reaches 60%</p> <p>Announce: THE ROTOR RPM IS CURRENTLY 60%</p> <p>When the rotor rpm reaches 50%</p> <p>Announce: THE ROTOR RPM IS CURRENTLY 50%</p> <p>Test complete.</p>	
(c)	Pull the CVR Circuit Breaker.	

Section II: Ground portion of test:

NOTE: Only 15 minutes of recording time remains. If necessary pull the CVR circuit breaker between tests to preserve recording time. If the time is exceeded the In-Flight portion of the test may be recorded over and may have to be redone

11) Transmitters (ground portion, some tests are repeated for comparison purposes): (✓) init.

	The purpose of this test is to confirm that the microphone audio and crew sidetone is recorded. Transmissions should be made to a controller or company to get a reply. <u>Allow 5 seconds between transmissions</u> (for analysis purpose).	
(a)	Captain: Make a radio call of at least 5 seconds duration with BOOM microphone <u>VHF COM 1</u> (+5 seconds) Make a radio call of at least 5 seconds duration with HAND microphone <u>VHF COM 2</u> . (+5 seconds) With the boom microphone, into the intercom announce: <i>THIS IS THE CAPTAIN ABOUT TO MAKE AN ANNOUNCEMENT ON THE CABIN PA.</i> Make an announcement on the cabin PA of at least 3 seconds duration.	
(b)	First Officer: Make a radio call of at least 5 seconds duration with HAND microphone <u>VHF COM 1</u> . (+5 seconds) Make a radio call of at least 5 seconds duration with BOOM microphone <u>VHF COM 2</u> . (+5 seconds) With the boom microphone, into the intercom announce: <i>THIS IS THE FIRST OFFICER ABOUT TO MAKE AN ANNOUNCEMENT ON THE CABIN PA.</i> Make an announcement on the cabin PA of at least 3 seconds duration.	
(c)	Cabin Attendant PA function: Announce over the intercom: <i>THE CABIN ATTENDANT IS ABOUT TO MAKE A PA ANNOUNCEMENT</i> Have a cabin attendant make a PA announcement of at least 5-second duration.	
(d)	If necessary to preserve CVR recording time pull the CVR circuit breaker.	

12) Oxygen Mask: (✓) init.

	The purpose of this test is to confirm that the microphone in the oxygen mask is being recorded during intercom, radio communication, and that uninterrupted microphone audio is recorded.	
(a)	Captain: With intercom selected <u>on</u> : Announce: <i>THIS IS THE CAPTAIN SPEAKING INTO THE OXYGEN MASK MICROPHONE WITH THE INTERCOM ON AND NOT TRANSMITTING.</i> With intercom selected <u>off</u> : Announce: <i>THIS IS THE CAPTAIN SPEAKING INTO THE OXYGEN MASK MICROPHONE WITH THE INTERCOM OFF AND NOT TRANSMITTING.</i> Before keying the radio announce: <i>THIS IS THE CAPTAIN ABOUT TO MAKE A RADIO CALL FROM MY OXYGEN MASK.</i> Make a radio call from either VHF Comm. This may be a blind call on an unused or company frequency.	
(b)	First Officer: With intercom selected ON: Announce: <i>THIS IS THE FIRST OFFICER SPEAKING INTO THE</i>	

	OXYGEN MASK MICROPHONE WITH THE INTERCOM <u>ON</u> AND NOT TRANSMITTING.	
	With intercom selected OFF: Announce: THIS IS THE FIRST OFFICER SPEAKING INTO THE OXYGEN MASK MICROPHONE WITH THE INTERCOM <u>OFF</u> AND NOT TRANSMITTING.	
	THIS IS THE FIRST OFFICER ABOUT TO MAKE A RADIO CALL FROM MY OXYGEN MASK.	
	Make a radio call from either VHF Comm. This may be a blind call on an unused or company frequency.	
(c)	If necessary to preserve CVR recording time pull the CVR circuit breaker.	

13) Other Audio Receivers:

(✓) init.

	The purpose of this test is to confirm that the other receiver audio's are being recorded. Allow the audio to remain for at least 5 seconds.	
(a)	Tune in a local station with intelligible audio on each receiver.	
(b)	Captain: Announce: CAPTAINS SIDE <u>ADF 1</u> AUDIO. (+5 seconds) Announce: CAPTAINS SIDE <u>ADF 2</u> AUDIO. (+5 seconds) Announce: CAPTAINS SIDE <u>NAV 1</u> AUDIO. (+5 seconds) Announce: CAPTAINS SIDE <u>NAV 2</u> AUDIO. (+5 seconds) Announce: CAPTAINS SIDE <u>DME 1</u> AUDIO. (+5 seconds) Announce: CAPTAINS SIDE <u>DME 2</u> AUDIO. (+5 seconds)	
(c)	First Officer: Announce: FIRST OFFICER SIDE <u>ADF 1</u> AUDIO. (+5 seconds) Announce: FIRST OFFICER SIDE <u>ADF 2</u> AUDIO. (+5 seconds) Announce: FIRST OFFICER SIDE <u>NAV 1</u> AUDIO. (+5 seconds) Announce: FIRST OFFICER SIDE <u>NAV 2</u> AUDIO. (+5 seconds) Announce: FIRST OFFICER SIDE <u>DME 1</u> AUDIO. (+5 seconds) Announce: FIRST OFFICER SIDE <u>DME 2</u> AUDIO. (+5 seconds)	
(d)	If necessary to preserve CVR recording time pull the CVR circuit breaker.	

14) Aural Alerts:

(✓) init.

	The purpose of this test is to ensure that all aural alerts are audible.	
(a)	Reset the CVR circuit breaker (if previously pulled).	
(b)	<u>Prior</u> to activating an aural alert <u>announce what alert is going to be tested.</u> Allow the alert to <u>sound for 2-3 seconds, or 4-5 cycles</u> (as applicable).	
(c)	Announce: THIS IS A TEST OF THE <u>MASTER CAUTION</u> AURAL ALERT. THIS IS A TEST OF THE <u>FIRE</u> AURAL ALERT. THIS IS A TEST OF THE <u>STALL</u> AURAL ALERT. THIS IS A TEST OF THE <u>OVERSPEED</u> AURAL ALERT. THIS IS A TEST OF THE <u>ALTITUDE ALERT</u> AURAL ALERT. THIS IS A TEST OF THE <u>TCAS</u> AURAL ALERT. THIS IS A TEST OF THE <u>GPWS</u> AURAL ALERT. THIS IS A TEST OF THE <u>WINDSHEAR</u> AURAL ALERT.	

	<i>THIS IS A TEST OF THE <u>GEAR UP</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>TRIM IN MOTION</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>AUTOPILOT DISCONNECT</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>SAS</u> AURAL ALERT.</i>	
	<i>THIS IS A TEST OF THE <u>ROTOR SPEED</u> AURAL ALERT.</i>	
(d)	If necessary to preserve CVR recording time pull the CVR circuit breaker.	

15) Post Test:

(✓) init.

(a)	Remove the Cockpit Voice recorder from the aircraft.	
(b)	Forward the Cockpit Voice recorder along with this report to Pacific Avionics & Instruments for the Cockpit Voice Recorder Intelligibility evaluation.	

Certification:

I certify that the tests detailed on this report have been checked and initialized, and have been conducted as indicated.

_____ Captain (please print)	_____ Signature	_____ Organization	_____ Date
_____ First Officer (please print)	_____ Signature	_____ Organization	_____ Date