

# DIVERS COMMUNICATION TEST PROCEDURE

## Test Procedure CE-300MRT



Some nineteen years ago Chalco Eleven invested in a full studio recording facility to capture high quality helium speech from 0-450 metres with various microphones in the Chambers dry and in the water. CE created a Griffiths Modified Rhyme Test which consists of fifty random words that a Diver reads out. It is recorded on to high quality DV tape then played through the system to be tested via the Unscrambler. It is played to a group of people who mark a sheet that has possible 200 similar sounding words. A formula calculates the intelligibility of the Communication System.

The following depths are used to establish an overall performance of a particular Communication System :

Air  
75 MSW  
100 MSW  
180 MSW

If the Communication System has Topside Channels ie to the crane, Sat Control, Air Dive Control and Bridge these do not need to be tested for helium speech. They must still be tested on air.

If the System is going to be dived at greater than 200M then 250M and 300M tests are carried out. Six lay persons are normally required for scoring the intelligibility results. These tests are normally carried out on each of the Communication Channels and in the manner that they are to be used ie if in the Chamber a Bunk Box is used, then the output from the recorded speech is played less than 2 inches away from the headset microphone at approximate level of -48dB and must be compared to what the appropriate microphone is capable of producing. The sound delivered to the microphone must be clear and adequate to drive either moving coil or electrolect mic by at least 50% of microphones capability which is normal for most microphones in the region between 75mV – 100mV. If this is not achieved the microphone will not respond in the way that it is designed to pick up Divers' voice. A random check must be performed on microphones and on talk-back speakers in the manner that they are to be used. It is pointless trying to deliver an intelligible speech at very low volume to a talk-back speaker from a great distance. The talk-back speaker will produce insufficient audio signal transmitted to the Communication Unit and likewise if there is too much audio signal delivered to the talk-back speaker then the sound will be distorted and the speaker will oscillate and intelligibility will be lost.

If the Diver is sitting in his bunk and wants to communicate with Sat Control via a talk-back speaker that's placed several metres away, then it is obvious that this is not what the System is designed to do. A poor intelligibility will be recorded. This Test is to establish how well the Unscrambler unscrambles the helium speech and normal speech (air) along with its associated components.

When testing the Divers' Helmet it must be noted that the speakers are designed to be exposed to very large signals ie in excess of 80-130dB, therefore, it is pointless trying to test this type of microphone with a 15dB signal or less than 50-80mV.

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We carried out our test on this System, first by looking at all the channels and how they were designed to be used not how they are being used. (Nobody uses a hand held telephone from 1 metre away; the telephone is designed to be used a few inches away from where the speech is being delivered).

We have applied the same principle when testing this Communication System. All the microphones in each of the Chamber compartments were tested in accordance with the manufacturer's specification so that they were not over driven or under driven. The talk-back speakers were tested likewise along with the Divers' Helmet Microphones.

When testing the System, all efforts were made to keep the surrounding area in its normal environment. This is how the System will be used. A high quality speaker is to be used that can adequately deliver 20Hz to 150KHz of audible speech with at least 10 watts of RMS (capable of accepting direct digital input) without any losses of any of the frequencies; low, mid and high ranges. This is to reproduce the original speech that was recorded. The original sound must not be enhanced or degraded in any way as when we recorded it the Diver was sitting in the Chamber at depth working in a real environment. This speech already has various sounds in the environment it is being tested in ie it is pointless to play recorded sound that is distorted or has greater than 35dB noise added to it. That is why we use the original tapes to carry out these tests that are recorded at the right levels. The speaker would be placed approximately 6 inches away depending on the channel input, just like the Diver would go to a talk-back speaker or headset in order to communicate with Sat Control from the Chamber Complex or from the Bell to Dive Control. However, the talk-back speaker or the chamber microphone should be able to pick up sound from several metres away so that if Sat Control is monitoring a particular Chamber they will hear the environmental sounds along with the Divers' voice.

## **TEST PROCEDURE**


Check each compartment of the Chamber where communication is to take place between Saturation and Divers or Bell and Dive Control via the talk-back speakers or specially allocated microphones or diving helmets. If more than one communication is used, then all communication should be tested along with all individual channels.

Place the play back speaker as described above in front of the relevant microphone with the output set to a minimum of 1.5mW. The speaker must be capable of producing a minimum of 5 watts RMS.

Play the Divers' speech (air) and adjust the Communication Unit for clear output.

If this is to be scored on the vessel and it is being worked on, have six headsets with independent volume controls and a minimum output of 1.5 watts per channel RMS. The input to this amplification must be directly from the output of the Communication System. The Unit must not have any high or low frequency enhancement capabilities.

Allow the scorers to comfortably adjust their volume. They must be seated adequately so that they can concentrate on the spoken words. The scorers must write the channel, the chamber and the location of the test being carried out at the top of the page. They will mark a score sheet which will have four possible answers per word. They will circle the word that is being pronounced.

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The Test can be stopped at any time and restarted from the same point ie if there are any alarms or interruptions.

Results will be calculated by using a formula which takes in to account the possible chance but the scorer must pay attention. For each channel there will be four x fifty word lists carried out by six individual scorers. The result will be an overall percentage along with individual percentages shown for each channel tested.

The Test will be disregarded and restarted if there are more than three interruptions or if the scorers were distracted for this would give a false result.

Estimated time to carry out a single channel test after set-up is 35 to 40 minutes. For a 3 Chamber Complex and two Bells it normally takes between 12 to 14 hours. This does not include breaks in between for the scorers.

Requirement from the vessel :

Access to all testing compartments

240 Supply for equipment (equipment will come with earth leakage circuit breakers)

6 x personnel for scoring

A clear area where 6 x scorers can sit in Dive Control and Sat Control

If tests are to be carried out while System is being used then we will require 1 x single twisted pair in each compartment, minimum size 0.5mm<sup>2</sup>

1 x of your personnel who is familiar with complete Communication System

We will bring on Board all necessary equipment to carry out Test which will consist of the following :

1 off U6 Flight Case containing :

1 x CD Player

1 x 8 Channel Headset Amplifier

1 x Power Amplifier

1 x 4 Channel Pre-Amplifier


1 off Pre-Recorded Helium Speech CDs at various depths

1 off Power Monitor Speaker

1 set Interconnecting Cable, Power and Audio

200 off each Depth Scoring Sheets

At the end of the Test you will be given a minimum 5 page Report containing all the scoring. There will be approximately 1,000 sheets scored which can be viewed on request.

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