

# P2-Experiment Procedure “Navigation and radio etiquette”

## GENERAL INFORMATION

Principal Investigator  
Author(s) Dr. Seda Özdemir-Fritz and OeWF education team  
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## SHORT EXPERIMENT DESCRIPTION

In this procedure, students guide each other between waypoints, only using verbal communication via walkie talkies. Additionally, students learn basic map reading skills, discussing contour lines, map scales and legends. Furthermore, students gain an insight into the communication structure during Analog Missions and practice the use of Radio Etiquette, learning the do’s and don’ts and important principles of communicating via radio.

## HARDWARE CHECKLIST

	Local map (to be supplied individually)
	Phonetic Alphabet
	Walkie-Talkie (x2) (including charger doc, charging cables, batteries, headphones and microphone)
	Electronic device (computer, laptop or similar)

### References:

Communication in space:

<https://www.nasa.gov/missions/tech-demonstration/space-communications-7-things-you-need-to-know/>

Navigating in space (more complex article):

<https://science.nasa.gov/learn/basics-of-space-flight/chapter13-1/>

Watzlawick’s axioms:

<https://www.encora.com/insights/5-axioms-to-improve-your-team-communication-and-collaboration>

Communication model:

[https://cdn.botpenguin.com/assets/website/Interaction\\_Model\\_of\\_Communication\\_1024x576\\_bb0beb60d4.webp](https://cdn.botpenguin.com/assets/website/Interaction_Model_of_Communication_1024x576_bb0beb60d4.webp)

Sender and receiver (after Watzlawick):




<https://i.pinimg.com/736x/ee/31/ea/ee31ea115060c2e5d24ce294c2d9f14e--final-presentation.jpg>

Phonetic alphabet (to be projected at the front of the classroom):



<https://military-alphabet.net/wp-content/uploads/2021/06/nato-phonetic-alphabet.jpg>

## PROCEDURE “NAVIGATION AND RADIO ETIQUETTE”

### SETUP

Step	Action	NOTES	Duration	Check
1	Assemble receiver with batteries	<p>Use sliding mechanism on the backside of the walkie talkie</p> 	1 min.	
2	Confirm battery is charged, if not use either charging station or USB charging cord to charge battery		?	
3	Connect antennas to walkie talkies		30 sec.	
4	Turn on walkie talkies by turning the knob on top of the walkie talkies clockwise		30 sec.	
5	To adjust volume, turn the knob on top of the walkie talkies clockwise or counterclockwise as needed		30 sec.	

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6	To select frequency, ensure walkie talkies are on the same setting by adjusting +/- button on right side of the walkie talkies		30 sec.	
7	To use communication, speak while pressing and holding large button on the right side of the walkie talkie above the aforementioned frequency buttons	Release to end speaking	?	

## PROCEDURE

### NAVIGATION AND RADIO ETIQUETTE




























Step	Action	NOTES	Duration	Check
1	Educate students on navigating and communicating on Earth versus in space (you may use the references listed above), including radio etiquette <input type="checkbox"/> <u>physics and geology</u> focus: introduce students to basic concepts of radiocommunication and map reading; <input type="checkbox"/> <u>psychology</u> focus: introduce students to communication principles (e.g. Watzlawick's axioms)	Ask students questions such as “How do astronauts navigate in space?”, “Which equipment do they use?” Also inquire students about possible problems astronauts face concerning communication and navigation in space <input type="checkbox"/> What could be done to minimize miscommunication? <input type="checkbox"/> Exercise should include names/orders	30-40 min.	

## PROCEDURE “NAVIGATION AND RADIO ETIQUETTE”

<p>Show students phonetic alphabet (see link provided under “references”) by projecting it onto whiteboard / classroom wall</p> <p>In pairs or groups of three, let students practice speaking to each other using the phonetic alphabet only</p>			
<p>2 Divide class into groups and equip each group with a local map, phonetic alphabet and walkie talkie</p>		<p>2 min.</p>	
<p>3 Now, let students guide each other using one of the navigation / communication tools listed above</p> <p>To enhance motivation, let students do a scavenger hunt for which they need to implement the tools given (local map), communicating with the other group members / groups via walkie talkies and phonetic alphabet</p>	<p>Ensure students use “affirmative” in place of “yes”</p>	<p>30 min.</p>	
<p>4 Let students give feedback on which navigation and communication techniques were efficient, especially challenging, etc.</p>		<p>15 min.</p>	
<p>5 Optionally, you can let students work out their own communication scheme (10 min preparation time) and present it to the rest of the class (5 min per group)</p> <p>After each group has presented their communication technique, let students discuss pros and cons</p> <p>Also, when everyone is done, you can let students vote for which out of the presented communication techniques they think would be the most</p>	<p>Students should give reasons for their votes</p>	<p>1 – 1.5 h.</p>	

PROCEDURE "NAVIGATION AND RADIO ETIQUETTE"

beneficial / least error-prone one in space			
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Military Phonetic Alphabet (1957-Present)						
Alpha 	Bravo 	Charlie 	Delta 	Echo 	Foxtrot 	Golf 
Hotel 	India 	Juliett 	Kilo 	Lima 	Mike 	November 
Oscar 	Papa 	Quebec 	Romeo 	Sierra 	Tango 	Uniform 
	Victor 	Whiskey 	X-ray 	Yankee 	Zulu 	
 the balance						

### Common phrases

AFFIRMATIVE	yes
NEGATIVE	no
COPY	confirmation, that the message was understood; it does not imply, that the receiver agrees to it.
ACK	acknowledged (pronounced “Aye-See-Kay”)
CONFIRMED	indicated the called party has understood and agrees
GO AHEAD	send you transmission, but should not be used for other purposes (i.e. does not mean “move forward”)
ETA	Estimated Time of Arrival
STANDBY	wait a minute; I am busy, but I will come back to you.
CHECKING	essentially means “standby”, but just need a few seconds to formulate an answer
CORRECTION	the last thing I said was incorrect, correct words follow
DISREGARD	ignore my last transmission
SAY AGAIN	repeat your last transmission

### Radio Check

#### Report of Signal Strength

LOUD	Your signal is very strong.
GOOD	Your signal strength is good.
WEAK	Your signal strength is weak.
VERY WEAK	Your signal strength is very weak.
FADING	At times your signal strength fades to such an extent that continuous reception cannot be relied upon.

#### Report of Readability

CLEAR	The quality of your transmission is excellent.
READABLE	The quality of your transmission is satisfactory.
UNREADABLE	The quality of your transmission is so bad that I cannot read you.
DISTORTED	Having trouble reading you due to signal distortion.
WITH INTERFERENCE	Having trouble reading you due to interference.
INTERMITTENT	Having trouble reading you because your signal is intermittent.

### Examples

SAFETY for OPS – RADIO CHECK

SAFETY – LOUD AND CLEAR *[Excellent copy with no noise; may be abbreviated with ROGER]*

SAFETY – GOOD AND READABLE *[Good copy with slight noise]*

SAFETY – WEAK BUT READABLE *[Weak copy, frequent fills are needed]*

OPS – LOUD BUT DISTORTED *[signal strength is very strong, but the audio is distorted]*

### Phonetic alphabet

A	Alfa	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliett	W	Whiskey
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

.	FULL STOP <i>or</i> PERIOD
.	DECIMAL
,	COMMA
/	SLANT <i>or</i> SLASH
-	HYPHEN
(	BRACKETS ON
)	BRACKETS OFF
:	COLON
;	SEMI-COLON
?	QUESTION MARK
!	EXCLAMATION MARK
"	QUOTATION MARK
+	PLUS
-	MINUS