

Road Safety

Table of Contents

Preparatory Notes to Instructor	1
Session Notes	5
Difference between 2WD and 4WD.....	6
BrakingTechniques.....	11
Learning Outcome Assessment	15
Optional Learning Activity: Practical Exercises	18

Preparatory Notes to Instructor

Background

Despite the fact that numerous administrative instructions and circulars have been issued within UN Peacekeeping Operations, the rate of vehicle accidents remains unacceptably high. These accidents typically result in major vehicle damage, serious bodily injury and/or even the loss of life. Additionally, traffic accidents involving UN personnel have a negative impact on the image of the UN within host countries.

In order to improve road safety, UN Police must be urged to be responsible drivers and to continuously review their conduct at the wheel. It is incumbent upon each and every driver of a UN vehicle to ensure that he/she drives with care, caution and respect for other road users.

Aim

To familiarize peacekeeping personnel with:

- general road safety rules
- theoretical and practical knowledge on how to operate four wheel drive vehicles in a safe and proper manner within UN Standards.

Learning Outcomes

On completion of Section Name, participants will be able to:

1. Explain the differences between 2WD and 4WD vehicles
2. Describe defensive driving
3. Indicate major causes of road accidents
4. Know the UN driving standards
5. Recognize different braking techniques
6. Recognize road conditions and terrain
7. Demonstrate driving techniques in field exercise

Training Sequence

It is suggested that the module is delivered during one to two training units, depending on participants' skills. It is crucial that additional time is allocated for practice driving 4WD vehicles.

2 ▪ Road Safety

Duration

Minimum Session Time	Lecture/Presentation	Questions/Assessment	Session Activities
60 minutes	45 min	15 min.	
Additional Options	Mission Specific	Optional Film	Optional Activity
as needed	as needed		as needed

Methodology

This module provides a basic knowledge to the participants regarding Road Safety and 4WD and contains a variety of suggested learning activities to keep adult learners engaged. The facilitation team should use as many of the learning activities as time allows and keep them tailored to the target audience. Participants should be fully involved in the learning process through practical exercises, brainstorming sessions, working in small groups on specific tasks. Practical exercise is essential for a better understanding of the topic.

The instructor should inform participants of the content, format and timing. Knowing what to expect, participants can improve their ability to focus on the subject and benefit better from the session.

- Difference between 2WD and 4WD
- Road Safety and Defensive Driving
- Driving Standards & Conduct
- Braking Techniques and Distances
- Water Crossing
- Summary
- Learning activity

* **Please Note:** It is up to the learning institution to decide whether the learning assessment questions are used informally in a group question and answer session, or if they are provided to the participants as a written quiz. In either case, it is recommended that the correct answers are provided at the end of the assessment in order to ensure participants are clear on the key messages.

Instructors are encouraged to add examples and mission-specific information related to the specific deployment of participants, if known.

Instructor Profile

This module is best presented by an instructor who has mission experience in Road Safety and Four Wheel Driving, who could share his/her experience with the group. For the practical part it is recommended that there be one instructor for every four participants.

Instructor Preparations

Required Readings

- Four Wheel Drive Operation, Whitireia Community Polytechnic, 2006.
- Guide to Four Wheel Driving, Toyota Motor Corporation, 2001
www.the-ecentre.net (e-library).
- UN Guidelines For Safe Vehicle Operation, UNLB Brindisi, 2003.
- UNPOL Handbook, 2005.

General Preparations

Equipment:











1. Computer and PowerPoint slides
2. Projector and Screen
3. Flip Chart

Materials:

1. 2WD and 4WD vehicles

4 ▪ Road Safety

Symbols Legend

-  Note to the Instructor (Some background information for consideration)
-  Speaking Points (The main points to cover on the topic. Ideally the speaking points are presented in the instructor's own words versus being read to participants)
-  Mission Specific (A point where the session will benefit from mission specific information)
-  Example (Stories that illustrate a point or key message)
-  Sample questions (A list of potential questions to pose to participants)
-  Handout (Indicates a handout is provided to participants at this point)
-  Film (A film that is recommended as a core part of the training or an option)
-  Core Learning Activity (An activity that is strongly recommended for inclusion)
-  Optional Learning Activity (An activity that can be used if there is time and it is appropriate for the participant group. Guidelines for these activities are provided at the end of the unit, section or part – as indicated in the text)
-  Key summary points (Key messages that are worth repeating at the end of the session. Alternatively, the instructor can ask participants what are the main messages they are taking from the session. Instructors can then fill in any points that have been missed.)

Session Notes

Road Safety and Four Wheel driving	Slide 1
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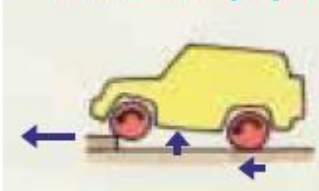



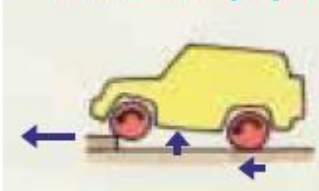



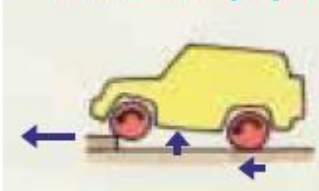



Note to Instructor: Give the participants a brief explanation why they should pay special attention to this module. Refer to: Background in the Preparatory Notes to the Instructor.


Aim	Slide 2
<p>To familiarize peacekeeping personnel with:</p> <ul style="list-style-type: none"> • general road safety rules • theoretical and practical knowledge on how to operate four wheel drive vehicles in a safe and proper manner within UN Standards. 	

Learning Outcome	Slide 3
<p>On completion of this module participants will be able to:</p> <ul style="list-style-type: none"> • Explain the differences between 2WD and 4WD • Describe defensive driving • Indicate major causes of road accidents • List the UN driving standards • Recognize different braking techniques • Recognize road conditions and terrain • Demonstrate driving techniques in field exercise 	

6 ▪ Road Safety

Structure of Presentation	Slide 4
<ul style="list-style-type: none">• Difference between 2WD and 4WD• Road Safety and Defensive Driving• Driving Standards & Conduct• Braking Techniques and Distances• Water Crossing• Summary• Learning activity/practical exercises	

Difference between 2WD and 4WD	Slide 5				
<p>The Difference between 4WD and 2WD</p> <table border="1"><thead><tr><th>4WD</th><th>2WD</th></tr></thead><tbody><tr><td><p>The vehicle utilizes all four-wheels to propel it.</p></td><td><p>The vehicle loses momentum.</p><p>The front wheels cannot climb the gap</p><p>The front wheels (drive) slip</p><p>The rear wheels (drive) get caught in the gap</p></td></tr></tbody></table>	4WD	2WD	<p>The vehicle utilizes all four-wheels to propel it.</p> 	<p>The vehicle loses momentum.</p>  <p>The front wheels cannot climb the gap</p>  <p>The front wheels (drive) slip</p>  <p>The rear wheels (drive) get caught in the gap</p>	
4WD	2WD				
<p>The vehicle utilizes all four-wheels to propel it.</p> 	<p>The vehicle loses momentum.</p>  <p>The front wheels cannot climb the gap</p>  <p>The front wheels (drive) slip</p>  <p>The rear wheels (drive) get caught in the gap</p>				

 **Note to Instructor:** Brainstorm with the group in order to list some characteristics and differences between a 2WD and a 4WD. Collect the results of the participants on a flipchart and complement it with the expected outcome.

 **Expected Outcome:**

- Two wheel drive means only two wheels are powered; there are two types of 2WD: front wheel drive, and rear wheel drive.
- Four wheel drive means all four wheels are powered
- There are two main types of 4WD: AWD (all wheel drive) and old-fashioned 4WD
- Trucks tend to have rugged, mechanical differentials (gears which control how much torque goes to each side of the car, or between

the front and back of the car), which can be set up to make sure all wheels always have power (locking differentials) and solid axles (where both wheels are connected together as a single rigid unit, as opposed to being able to bounce up and down independently of each other)

- Depending on the make of the car, shifts from 2WD to 4WD are done in different processes.


Different 4WD Systems	Slide 6
<ul style="list-style-type: none"> • Part Time 4WD • Full Time 4WD • Automatic 4WD • Shift on the fly • All-Wheel Drive 	

Different 4WD Systems

- **Part-Time 4WD**
Refers to a four-wheel drive system that operates on demand and drives all four wheels by locking front and rear axles together via a shift lever. It usually includes two speed ranges (Hi and Lo). Part-time 4WD systems must be operated in 2WD mode on dry pavement, as they are designed to be used only in specific situations when extra traction is required.
- **Full-Time 4WD**
Describes a four-wheel-drive system that can be operated continuously on all surfaces. A full-time four-wheel-drive system may include the option of part-time operation (allowing you to shift into 2WD on dry pavement for example), and may or may not have Hi and Lo speed ranges.
- **Automatic Four-Wheel Drive (A4WD)**
This type of drive system automatically engages 4WD as needed. When internal monitors sense differences in individual wheel speeds, indicating that a tyre is slipping, then 4WD is automatically engaged.
- **Shift on the Fly**
This type of system allows manual shifting from 2WD to 4WD Hi without coming to a stop. Most systems have a speed limit at which the system can be engaged, typically under 60 mph.
- **All-Wheel Drive (AWD)**
A full-time single-speed system designed to supply drive power to all

four wheels. The percentage of front/rear power delivery varies from system to system.

Road Safety and Defensive Driving	Slide 7
<ul style="list-style-type: none">• Effective observation, good anticipation and control• Awareness, planning, anticipation• Responsibility, care, consideration and courtesy• Good example for others• Putting safety above all else	

 **Note to Instructor:** *Generate a discussion on the participants' views on what defensive driving implies as well as what responsibilities they see when driving a UN vehicle. Collect the results of the participants on a flipchart and complement it with the expected outcome.*


 **Expected Outcome:**

Any road safety or accident prevention strategy must encourage the use of defensive driving techniques if it is to succeed.

Defensive driving is based on effective observation, good anticipation and control. It encourages drivers to question the actions of other road users in order to be prepared for the unexpected.


- Awareness, planning, anticipation and the maintenance of control
- Responsibility, care, consideration and courtesy
- Expect other people to make mistakes
- Be ready to slow down or stop – even when having the right of way
- Good level of control over the vehicle and road space
- Drivers are ambassadors
- Set a good example to others through defensive driving
- Reduced hostility at the wheel to avoid dangerous situations
- Competitive driving is the antithesis of defensive behaviour
- Park in accordance with local traffic laws

Major Causes of Car Accidents	Slide 8
<ul style="list-style-type: none"> • Alcohol & drugs • Inexperience • Tiredness & illness • Unpredictable pedestrians • Vehicle speed & fatal pedestrian collisions • Other human – error causes • Non human – error causes 	

 **Note to Instructor:** Ask the participants to mention from their own experience the major causes of road accidents and compare them to the ones in the missions. Complement the results with the expected outcome.

 **Expected Outcome:**

- Alcohol & drugs
- Inexperience
- Tiredness & illness
- Unpredictable pedestrians
- Vehicle speed & fatal pedestrian collisions
- Other human – error causes
- Non human – error causes


 Statistics indicate that up to 95 percent of all road accidents involve some human error. In 76 percent of road accidents, human error alone is to blame.

In UN operations, common causes of accidents include: the use of inappropriate speed for the prevailing conditions; failure to maintain a safe distance between vehicles; driving while fatigued or under the influence of alcohol; and assumptions and confusion regarding priority/right-of-way; driving without due care and attention, particularly when overtaking or reversing.

From this, we can conclude that most road accidents could be prevented by the application of reasonable care and common sense and by drivers ensuring that:

- They do not overestimate their driving capabilities, or that of others.
- They do not underestimate their personal vulnerability, or that of others.

UN Driving Standards & Conduct	Slide 9
<ul style="list-style-type: none">• Fasten seatbelt• Keep a safe distance• Obey all mandatory road signs• Obey local police traffic signals/instructions• Obey all speed limits• Don't drink and drive• Do not smoke in any UN vehicle• Do not use a mobile phone while driving• Drive defensively at all times	

 **Note to Instructor:** Before putting up the slide, ask the participants to mention from their experience the minimum driving standards. Complement the outcome with the slide above and the expected outcome.

 **Expected Outcome:**


- Fasten seatbelt
- Keep a safe distance
- Obey all mandatory road signs
- Obey local police traffic signals/instructions
- Obey all speed limits
- Do not smoke in any UN vehicle
- Do not use a mobile phone while driving
- Drive defensively at all times
- Considerate vehicle parking
- Do not drive whilst under the influence of alcohol or drugs, including any medication that induces drowsiness
- Ascertain the effects before driving
- Approach any Vehicle Check-Point (VCP) or other military installation with the utmost caution
- Be aware of pedestrians and watch out for people on or near the roadway

Braking Techniques	Slide 10
<p>What is the fastest method of slowing down?</p> <ul style="list-style-type: none"> • Threshold braking • Locked wheel braking • Avoidance braking • Cadence braking 	

 A note on ABS

By rapidly applying the brakes in pulses when wheel lock is detected, it allows you to both slow down and steer, automatically. All you have to do is hit the brakes hard and watch as you come to a halt. In cars with ABS, many of the techniques listed here will not be relevant (anything that mentions wheels locking).

However, ABS is not necessarily the quickest method of coming to a halt.

 Braking techniques:

- Threshold braking (ABS and non-ABS cars)

Threshold braking is the best strategy to adopt in order to gain maximum braking performance on tarmac. The maximum deceleration is found just before the point of wheel lock, so it makes sense to try and keep the braking pressure just before this point. Practically, it's often very difficult to know exactly the point at which wheels will lock as many factors are at play such as tarmac conditions, tyre choice, brake temperature etc. The best strategy to adopt is to brake hard, and if you find some wheels are locking, slightly releasing the brakes and then reapplying with marginally less pressure.

- Locked wheel braking (non-ABS cars)

Locked wheels aren't quite as good at slowing you down as the threshold braking technique. However there are situations when it's very difficult to maintain braking without locking wheels, such as on icy roads.

In case of icy and slippery roads, sustained wheel lock can be used as long as you are heading in the right direction as you'll be unable to steer.

This leads onto the next technique.

- Avoidance braking (non-ABS cars)

12 ▪ Road Safety

This technique should be used when going too fast on an icy or slippery road and despite braking hard you continue to slide. Keep the wheels locked for as long as possible to scrub off speed, and while you're doing this, apply a small amount of steering lock (quarter of a turn is a good starting point). Now, release the brakes smoothly and you should find that steering starts to work again. Keep applying and releasing the brakes at points where it is suitable, using small steering movements, or you'll risk under steer or over steer. This technique works equally well in good conditions at speed, but really should only be used as an emergency procedure.

- Cadence braking (non-ABS cars)

Cadence braking is a braking technique for very low grip surfaces such as an icy road - essentially applying and releasing the brakes rhythmically in order to get a compromise between steering and braking performance. As you apply the brakes, the wheels will tend to lock up, slowing the car but preventing you from steering. As you release the brakes you regain steering control and can keep the car pointing in the right direction.

Attempting to use cadence braking on a good grip surface at speed will result in weight transfers which can unsettle the car, possibly resulting in over steer – the last thing you need when trying to turn a corner. This is not a technique to adopt for fast driving on good grip surfaces.

Braking distances

Drivers must maintain a safe distance between vehicles at all times. In good weather conditions, on well-maintained paved roads, the minimum safe gap to leave is at least two seconds. In bad conditions, this gap should be doubled to at least four seconds or more.

See chart below as indication for required braking distances in good driving conditions.

Speed	Thinking Distance	Braking Distance	Overall Stopping Distance
20 mph / 32 kph	6 metres	6 metres	12 metres / 40 ft
30 mph / 48 kph	9 metres	14 metres	23 metres / 75 ft
40 mph / 64 kph	12 metres	24 metres	36 metres / 120 ft
50 mph / 80 kph	15 metres	38 metres	53 metres / 175 ft
60 mph / 96 kph	18 metres	55 metres	73 metres / 240 ft

The prevailing road and weather conditions in many field environments increase braking distances because of reduced traction between tyre and road. This is particularly true in areas where ice and snow are encountered, or where rains wash mud and debris onto the road. Steep or broken surfaces are often particularly slippery when wet or icy.

Water Crossing	Slide 11
<ul style="list-style-type: none"> • River Crossing • Flooded Roads • Deep Water Crossing 	

- Four wheel drive vehicles are not amphibious vehicles. They have a limited ability to cope with water and may be adversely affected by water in many ways. As water depth and water flow rate (speed) increases the stress on the vehicle increases rapidly and the chances of becoming immobilised, damaging the engine or being swept away are significant.
- A safe rule is to assume that if the water is up to your knees (approx 400 mm deep) then the limit is being approached.
 - River crossing
 - Stop and assess how deep the water is
 - Check the depth keep checking as you drive through
 - Drive in first gear as slowly as possible but keep the engine speed high and steady by riding the clutch
 - Low engine speed may result in a stalled engine
 - Driving too fast may create a wave that floods the engine and drowns it
 - Test the brakes immediately after leaving the water
 - Flooded roads or ford shallow rivers
 - Never attempt to drive through fast moving water if it is more than a few centimetres deep.
 - Always check the depth of the water you are about to enter on foot (by probing with a stick) before proceeding. This will also forewarn you of any hidden obstacles such as large rocks or any abrupt changes in depth.
 - Do not attempt to cross water if it is deeper than two-thirds the height of the road wheels or if you are unable to ascertain the depth of the water.
 - Always make sure that you can complete your crossing without stopping. Use a low gear and keep engine revs high. Do not attempt to reverse as water may be forced into the exhaust, causing the engine to stall.
 - Test the brakes immediately after leaving the water.

14 ▪ Road Safety

- Deep water crossing
 - All above mentioned bullet points apply for deep water crossing as well
 - If the water seems too deep for your vehicle, turn back and find a more suitable crossing site. It might take a little longer, but it is safer than getting stranded or swept away in deep water.

Summary of Key Messages	Slide 13
<ul style="list-style-type: none">• Difference between 2WD and a 4WD vehicle• Precautions defensive driving imply• Different braking techniques• Major causes of road accidents• UN driving standards	



Note to Instructor: *If time allows divide class in groups and hand out the exercises in the Optional Learning Activity.*

Learning Outcome Assessment

It is up to the learning institution to decide whether the learning assessment questions are used informally in a group question and answer session, or if they are provided to the participants as a written quiz. In either case, it is recommended that the correct answers are provided at the end of the assessment in order to ensure participants are clear on the key messages.

At the end of the entire unit and/or the conclusion of the STMs, instructors may want to choose some of the following questions for review.

Questions

1. What is the main difference between a 2WD and a 4WD vehicle?
2. Name the main 4WD systems
3. Name at least four precautions defensive driving imply
4. List at least four major causes of road accident
5. List the main UN driving standards
6. Name the different braking techniques



Expected Outcome:

1. What is the main difference between a 2WD and a 4WD vehicle
 - Two wheel drive means only two wheels are powered.
There are two types of 2WD: front wheel drive, and rear wheel drive
 - Four wheel drive means all four wheels are powered
2. Name the main 4WD systems
 - Part Time 4WD
 - Full Time 4WD
 - Automatic 4WD
 - Shift on the fly
 - All-Wheel Drive
3. Name at least four precautions defensive driving imply

Defensive driving is based on effective observation, good anticipation and control. It encourages drivers to question the actions of other road users in order to be prepared for the unexpected.

- Awareness, planning, anticipation and the maintenance of control
- Responsibility, care, consideration and courtesy
- Expect other people to make mistakes

16 ▪ Road Safety

- Be ready to slow down or stop – even when having the right of way
 - Good level of control over the vehicle and road space
 - Drivers are ambassadors
 - Set a good example to others through defensive driving
 - Reduced hostility at the wheel as hostility can create dangerous situations
 - Competitive driving is the antithesis of defensive behaviour
 - Park in accordance with local traffic laws
4. List at least four major causes of road accident
- Alcohol & drugs
 - Inexperience
 - Tiredness & illness
 - Unpredictable pedestrians
 - Vehicle speed & fatal pedestrian collisions
 - Other human – error causes
 - Non human – error causes
5. List the main UN driving standards
- Fasten seatbelt
 - Keep a safe distance
 - Obey all mandatory road signs
 - Obey local police traffic signals/instructions
 - Obey all speed limits
 - Do not smoke in any UN vehicle
 - Drive defensively at all times
 - Considerate vehicle parking
 - Be aware of pedestrians
 - Do not drive whilst under the influence of alcohol or drugs, including any medication that induces drowsiness
 - Ascertain the effects before driving
 - Approach any Vehicle Check-Point (VCP) or other military installation with the utmost caution
 - Drive defensively at all times
 - Be aware of pedestrians and watch out for people on or near the roadway

6. Name the different braking techniques
 - Threshold braking (ABS and non-ABS cars)
 - Locked wheel braking (Non-ABS cars)
 - Avoidance braking (Non-ABS cars)
 - Cadence braking (Non-ABS cars)

TRUE/FALSE QUESTIONS (Circle either T or F)

1. The weather conditions do not matter the driving distance between vehicles T/F
2. On slippery roads less power in braking and steering should be applied to retain a tyre grip on the road. T/F
3. When river crossing you should drive in first gear as slowly as possible but keeping the engine speed high and steady by riding the clutch T/F
4. The 4WD are made to drive in all kind of conditions, it does not matter how deep a water crossing is as long as it does not cover ½ of the vehicles T/F
5. Driving a UN Vehicles has the same responsibilities of Driving a personal vehicles T/F
6. You should only wear the fasten seatbelt when on duty T/F



Expected Outcome:

1. The weather conditions do not matter the driving distance between vehicles T/F (F)
2. On slippery roads less power in braking and steering should be applied to retain a tire grip on the road. T/F (T)
3. When river crossing you should drive in first gear as slowly as possible but keeping the engine speed high and steady by riding the clutch. T/F (T)
4. The 4WD are made to drive in all kind of conditions, it does not matter how deep a water crossing is as long as it does not cover ½ of the vehicles. T/F (F)
5. Driving a UN Vehicles has the same responsibilities of Driving a personal vehicles T/F (F)
6. You should only wear the fasten seatbelt when on duty T/F (F)



Optional Learning Activity: Practical Exercises

The purpose of this activity is to raise participants' awareness of advanced driving skills.

Learning Activity Time Required:

	10 minutes	for activity introduction and instructions
	15 minutes	for practical exercise 1
	as needed	for practical exercise 2*
	as needed	for practical exercise 3*
	as needed	for practical exercise 4*
Total time:	as needed	*total time dependent number of participants, number of cars, number of instructors etc.

Practical Exercise 1: Participants should walk around the vehicle and look at it with a trained eye.



Expected Outcome:

- Scan for obvious signs of impact damage to sills, bumpers, valances bash plates and the exhaust system
- Check for foreign material (e.g. sticks and bits of wire) tangled in the suspension or steering
- Look for fresh oil leaks (a new oil puddle on the ground is a warning of trouble)
- Check tyres; look for signs of under inflation
- Do the lights, indicators and wipers work?
- Are the mirrors intact?
- Check engine oil level and fuel level
- Check the level of water in the radiator
- Check the presence and condition of the spare tyre

Practical Exercise 2: Emergency Breaking



Note to Instructor: *This practical exercise will be conducted on the driving track with a series of cones.*

Practical Exercise 3: Off Road Driving

 **Note to Instructor:** *If applicable incl. Water Crossing.*

Practical Exercise 4: Driving on a Track

 **Note to Instructor:** *Including UN Driving Track test.*