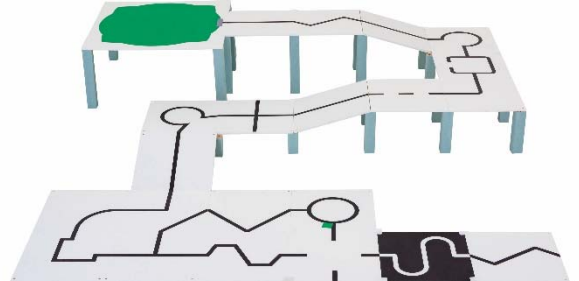


RCJA Rescue Practice Tile Kit v2

This Australian designed and manufactured modular robotics course has been created to allow schools to have an almost completely out of the box ready challenge simulating the RCJA Rescue Line Competition. The course has been designed in conjunction with the RCJA Rescue Line Technical Committee to meet the specifications of the rescue competition.

These instructions are also available on the product description on the MTA website.



Included in the Kit:

Tiles

- 1x 594 x 594mm Side A: Rescue Tile, Side B: Gridlock
- 28x 297 x 297mm tiles printed on both sides¹
- 4x 297 x 314mm ramp tiles printed on both sides

Risers – 42mm pine drilled (4 x holes).

- 8x 90mm flat
- 4x 90mm partially chamfered for incline ramp
- 2x 90mm fully chamfered.
- 8x 180mm flat
- 2x 180mm partially chamfered for incline ramp
- 2x 180mm fully chamfered
- 8x 270mm flat
- 2x 270mm partially chamfered for incline ramp

Reusable Colour Stickers (40x40mm)

- 20x Dark Green, 20x Light Green, 10x Blue, 10x Red, 10x Orange

Pins & Plugs

- 50x Xmas Tree fasteners (aka Panel Trim Fasteners)



- 10x 4 pin plugs



- 10x 2 pin plugs



- 4x 2 pin angled ramp starter plugs (two short pins)



- 4x 2 pin angled ramp mid-tier plugs (one long and one short pin)



**** To purchase additional Xmas tree pins, stickers or plugs please contact Display Solutions in Brookvale Sydney directly at gavin@displaysolutions.net.au.**

¹ Tiles intentionally left blank on one side allow users to create their own variations.

Changes between Version 1 and Version 2 RCJA Practise tile kits

At the request of the RCJA Rescue Line Technical committee the following changes have been made:

- 1) **The small tile size has been changed from 300mm to 297mm in size and the large tile has been reduced to 594x594mm.**

The reasoning behind this small change is an attempt to make the tiles to fit better (tessellate better) with the previous large 594x594 tiles cut from the Rescue Line Practise Mat.

Can the 300mm version 1 tiles be used with the 297mm version 2 tiles?

Yes, the lines on both tiles remain 16mm in width and always enter and exit the tiles in the centre. If the tiles need to be attached to avoid movement, you may need to 'attach' the 300mm tiles to the 297mm tiles using tape. Hence it would make sense to create one section of the course using the 300mm tiles and transition to a section made up of 297mm tiles.

- 2) **Some of the tiles have green squares printed on intersections by default now.**

These can always be covered over with the stickers if desired. However, most people will prefer to use the tiles with the default green squares.

- 3) **The 594mm Open Rescue Line Chemical spill tile (with an orange rectangle) has been replaced with the 'Gridlock' tile.**

This modification was made to ensure that participants could practise the most challenging tile from the larger 594mm tiles. Any robot that can complete the smaller tile set should now be able to complete the larger tile set. It is acknowledged that with a single set, to complete the gridlock and rescue tile in the one course, it may be necessary to move and flip the 594mm tile after the robot completes gridlock.

Open Rescue Line can still be completed by placing the raised orange block on the existing Chemical spill tile.

- 4) **The outside radius of the black line has been rounded on most corners.**
- 5) **There were more small tiles with one side being green in version 1.**

Many of these have been replaced with additional line tile options. More advanced and randomised chemical spill shapes can be created for practicing on at school using green paper.

- 6) **The holes in all tiles have now been drilled through completely.**

Instructions for connecting the tiles

1. Attaching tiles on the floor:

Tiles on the ground can be connected to each other by inserting the 2 and 4 pin plugs into the holes in the corners of the tiles. The plugs can be inserted from the top or underneath the tiles.

2. Creating ramps²:

Use one of the 4 longer 297x314mm tiles as the ramp. As per below, use the appropriate angled plug to start the ramp:

- i. From the Floor → Raised Platform: Attach the ramp tile to a tile on the floor using the angled starter plug with two short pins.
- ii. From Raised Platform → Raised Platform: Use the angled plugs with one long and one short pin to transition. The longer pin should extend through the tile at the bottom and secure into the holes in the riser.

At the top of the ramp attach the tile to a partially chamfered riser using the Xmas Tree pins.

Disassembling the tiles and removing Xmas pins:

The two and four pin plugs can be lifted out using finger-nails.

To remove the Risers attached to the tiles using Xmas Tree Pins, turn the tiles upside down so the risers extends into the air. Place one hand firmly on the tile next to the base of the riser. With your other hand simultaneously twisted and pull the riser to detach it from the tile. (See Photo 1)

To remove the Xmas Tree pins for reuse, gently tap the pins out using a hammer or mallet. As per Photo 2, with the Xmas Tree pin pointing upwards, place two risers on either side of the pin head to support the tile. Brace the tile using one hand to minimise any flex in the tile itself and gently but firmly tap out the Xmas pin. (MTA recommends this is done by a teacher.)

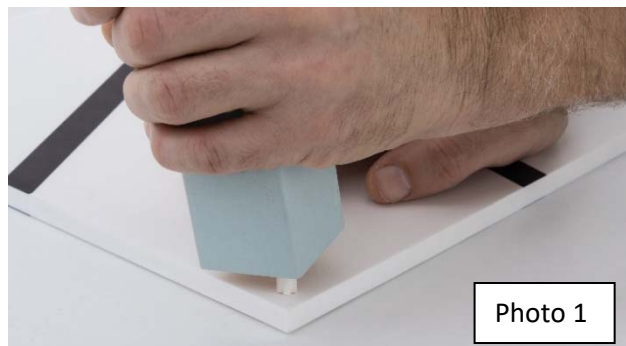


Photo 1

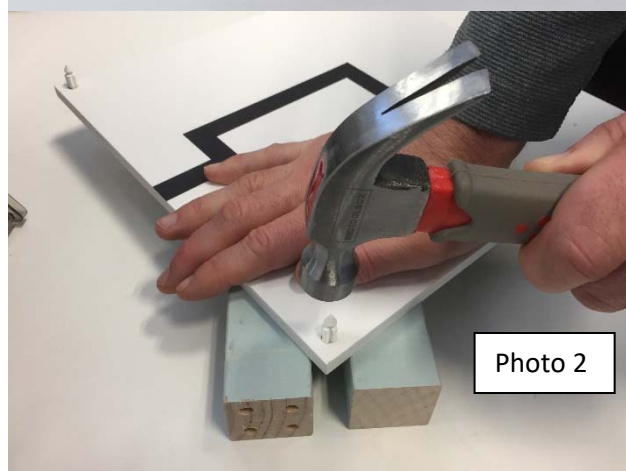


Photo 2

² Please note these are suggested ways to attach tiles. Some customers may prefer to use tape and/or Velcro to attach the tiles to the risers.

Additional modifications³:






Silver Foil: On the 594x594mm Rescue Tile is a grey rectangle which indicates where the silver foil needs to be applied. Some schools simply glue or tape aluminium foil over that section. If purchasing an adhesive silver foil tape⁴ please ensure it is as reflective as kitchen grade aluminium foil.

Recommended painting of the risers: The risers come with a blue undercoating on them. This undercoat does have an odour which will be removed if you choose to paint the risers.⁵ The RCJA committee's official colour recommendation for the risers is Dulux Raw Sunset (Colour: P07H8). However, it is not necessary to paint them that colour for practise purposes. Do not paint the cut surfaces or get paint into the drilled holes.

The Rescue Platform: For teams entering the Open Rescue Line competition, you will need to practise with a Rescue Platform block (with dimensions 70mm(H)x70mm(W)x200mm(L) painted Dulux Raw Sunset (Colour: P07H8)) on the opposite side of the green 'chemical spill' to the silver foil on the 597x597mm Rescue Tile. The block can either be stuck down using Velcro, double sided tape or more permanently using glue (which would make the gridlock tile on the other side only usable as a raised platform.)

Modifying the Width of the holes in the Risers: The width of the holes in the risers have been specifically selected to create a tight fit when using the Xmas pins. The benefit of this is that it creates a rigid structure when used. If you feel extracting the Xmas pins is too difficult, then you can use Velcro to attach the risers to the tiles, or widen the holes slightly using a 7.5mm drill bit. However, this will compromise the rigidity of the structure when using the tiles as raised platforms.

Reusable Colour Stickers (40x40mm)

Dark Green	Light Green	Light Blue	Red	Orange
				
22%	32%	43%	67%	55%

The stickers are used on the course to give directions at black line intersections. For more information regarding this see the Rescue Line rules on the RCJA website. The colours of the stickers have been selected to allow for differentiation when detected by common light, colour and vision sensors. For example, depending on the sensitivity and height of an EV3 Colour Sensor⁶ each colour should be detectable in 'reflected light mode' with a graduated percentage variation of between 3%

³ In an attempt to keep the price down some finishing touches must be completed by the end user.

⁴ The RCJA website includes recommendations of which adhesive tape they use. A possible solution available from Bunnings is to use the Ametalin 48mm x 50m Insulation and Ducting Tape (Product code 0810227) Note **do not** purchase the reinforced version (Product Code: 0029077).

⁵ The risers were not painted in order to keep the cost of the field as affordable as possible.

⁶ The sensors used in the EV3 Colour Sensor vary in sensitivity which can give different readings off the same surface. As a rough guide, set your light sensors so that the size of the red light is between 10 and 12mm in diameter. That can equate to the Light Sensor being between 5-10mm off the surface underneath.

to 10% difference. **Please also note, are not intended to be detected as LEGO colours using the EV3 Colour Sensors or the SPIKE Prime Colour Sensors.**

Tip: Try to minimise the number of times you remove and re-apply the colour stickers as they will become less adhesive as they are reused over and over and dirt, dust or grime sticks to the adhesive side of the stickers.

Care, Maintenance and Repairs:

1. **Do not** use any chemical cleaners etc such as Spray and Wipe to clean the tiles.
2. **Do not** leave or store the tiles in direct sunlight.
3. **Do not** set up the tiles on an abrasive surface such as concrete. If this cannot be avoided, please ensure you use a protective layer of plastic or carpet underneath to avoid scratching the unused side of the tile.
4. **Do not** step on the tiles as this will leave footprints and marks on the tiles.
5. **Do not** insert Xmas Pins directly into the risers without putting them through a tile first. If this occurs and they are pushed too deep to be able to extract using fingers, you may need to use pliers or cut the head of the Xmas Pin off with a Stanley knife and drill the remainder of the pin out to remove it.

To clean footprints and marks from the tiles use soap and water. You can also use a non-abrasive pencil eraser to remove marks.

If the black line is scratched off, use a permanent marker pen to fill in or re-apply the black.

Storage:

The kit will be delivered in a cardboard box that has not been designed as a long-term storage solution. It will deteriorate over time with continued use. You may opt to purchase a durable storage tub store the kit in order to make it more transportable noting that the 594x594mm Rescue tile will not fit inside a standard large storage tub.

Additional Notes:

1. If you find the Xmas pin locking system difficult to use, please use Velcro to attach the tiles to the risers.
2. Optional items you may choose to purchase:
 - a. A small hammer (<https://www.teaching.com.au/product/IND012>)
 - b. A 250ml sample tin of Dulux Raw Sunset paint (Colour: P07H8)
 - c. A durable storage tub with a lid
 - d. Ametalin 48mm x 50m Insulation and Ducting Tape (Bunnings Product code 0810227)