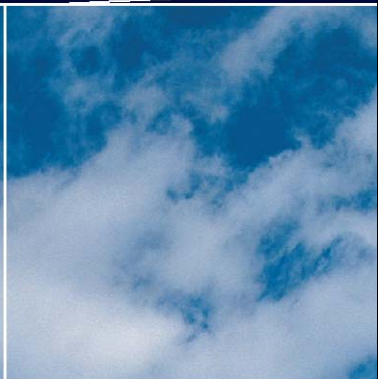


USERS MANUAL



Tron SART20



www.jotron.com



EC Declaration of Conformity, available at www.jotron.com

Abbreviations and definitions

EMC

Electromagnetic Compatibility

LED

Light Emitting Diode

PWB

Printed Wire Board

RF

Radio Frequency

SART

Search and Rescue Transponder

VHF

Very High Frequency



Amendment Record

AMENDMENT NO.	INCORP. BY	DATE	PAGE(S)	VERSION	REASON FOR CHANGE
1	ES	14.09.07	Total: 24	A	New product
2	ES	02.04.08	10, 15	B	Added text
3					
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The information in this book has been carefully checked and is believed to be accurate. However, no responsibility is assumed for inaccuracies.



This equipment contains CMOS integrated circuits. Observe handling precautions to avoid static discharge which may damage these devices. Jotron AS reserves the right to make changes without further notice to any products or modules described herein to improve reliability, function or design. Jotron AS does not assume any liability arising out of the application or use of the described product.

WARNING / IMPORTANT

Jotron AS is a prime manufacturer of safety equipment designed for rescue of human lives and their property. For safety equipment to be effective in line with the design parameters it is important that they are handled, stowed and maintained in compliance with the manufacturers instructions. Jotron AS cannot be held responsible for any damage caused due to incorrect use of the equipment or breach of laid down procedures or for failure of any specific component or other parts of the equipment.

The chapter covering battery replacement (6.2.1) is added for information only. Jotron AS does not take any responsibility for improper disassembling/assembling of the beacon. We strongly recommend all service to be done by authorized Jotron agents. In addition to normal service, Jotron agents have the necessary equipment and knowledge to test the operational functions of the beacon. Non-original maintenance and/or service parts may destroy the equipment function and performance.



TABLE OF CONTENTS

1	GENERAL DESCRIPTION	7
1.1	TRON SART20 FEATURES	8
2	TECHNICAL SPECIFICATIONS	10
2.1	ELECTRICAL SPECIFICATIONS	10
2.2	MECHANICAL SPECIFICATION	11
3	FUNCTIONAL DESCRIPTION	12
3.1	GENERAL	12
3.1.1	Tron SART20 electronic assembly	12
3.1.2	Battery module	13
3.1.3	Bottom lid	13
4	INSTALLATION	14
4.1	BRACKETS	14
4.1.1	Wall bracket	14
4.1.2	Lifeboat bracket	15
4.2	USING THE TELESCOPIC POLE	16
4.3	USING THE 10M ROPE	17
5	OPERATING INSTRUCTIONS	17
5.1	ACTIVATING TRON SART20	17
5.2	DEACTIVATING TRON SART20	17
5.3	TEST OF TRON SART20	18
6	MAINTENANCE AND TROUBLESHOOTING	20
6.1	MAINTENANCE	20
6.2	SERVICE	20
6.2.1	REPLACING THE BATTERY MODULE	21
6.2.2	BATTERY DISPOSAL	21
6.2.3	INCINERATION	21
6.2.4	LAND FILLING	21
6.2.5	RECYCLING	21
7	SERVICE AGENTS	22



BATTERY SAFETY DATA SHEET

(Form: EEC directive 91/155)

(2) SAFETY ADVICE

- S2 Keep out of reach of children.
- S8 Keep container dry.
- S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S43 In case of fire, use D type extinguishers. Never use water.
- S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

(3) FIRST AID MEASURES

In case of contact of cell contents with eyes, flush immediately with water for 15 min. With skin, wash with plenty of water and take off contaminated clothes. If inhaled, remove from exposure, give oxygen, and seek medical advice.

(4) FIRE-FIGHTING MEASURES

Extinguishing media

- Suitable: Type D fire extinguishers
- Not to be used: Water - CO₂ - Halon, dry chemical or foam extinguishers

Special exposure hazards

Generation of chlorine, sulphur dioxide, disulphur dichloride during thermal decomposition.

Special protective equipment

Use protective working boots, rubber apron and safety glasses with side shields.



1 GENERAL DESCRIPTION

Tron SART20 is emergency equipment consisting of:

1. Tron SART20 radar transponder.
2. Mounting rope for life rafts / life boats.

The 9 GHz radar transponder type Tron SART20 is developed by Jotron AS to meet the rules and regulations for use on vessels and life rafts in the maritime service. Tron SART20 meets the specifications for 9 GHz radar transponders for use in search and rescue operations at sea.

The operating range of the Tron SART20 is up to 30 nautical miles, depending on the height of the electronic unit and the radar height of the search and rescue unit (sea or airborne).

With a radar height of 20m and the Tron SART20 placed at 1m above sea level, the range will be up to 10 nautical miles.

Tron SART20 is buoyant, however to obtain maximum performance the transponder should be placed in a vertical position and as high up as possible in order to achieve maximum coverage.

Several mounting brackets and mounting aids are available to ensure correct mounting and use of the radar transponder.

The purpose of the Tron SART20 is to perform a secondary alarm when search and rescue units are searching for a life raft / lifeboat in distress. The Tron SART20 will help the units to pinpoint exactly where the distressed boat is located in a larger area. This is done with the help of the radar on the searching ship or helicopter.

When the Tron SART20 is interrogated (hit) by a radar signal, it will immediately start to transmit a number of sweeps covering the complete maritime 3 cm radar band.

These sweeps are detected on the radar screen and are used to navigate directly towards the distressed life raft, for details on radar display see chapter **Feil! Fant ikke referansekinden..**



Maximum distance to a ship will normally be about 10 nm and approximately 30nm to a helicopter, dependent on the helicopters altitude. The transponder will not give any alarms further away than this.

The primary alarm will usually be an Emergency Position Indicating Radio Beacon (EPIRB) or distress call on VHF / HF - manual or via digital selcall.

The Tron SART20 should be activated immediately after activation of the EPIRB or by instruction from the rescue control centre.

The batteries of the Tron SART20 will last at least 96 hours in standby after activation and then minimum 8 hours of continuous operation.

Although the transponder does not send any alarm via satellite, VHF or other radio communication, the use should be limited to short tests and emergency situations. This is to save battery capacity in case of a situation where the transponder is needed.

1.1 Tron SART20 features

Watertight:

Tron SART20 is watertight to a depth of minimum 1 meter.

Buoyant:

Tron SART20 is buoyant in case the transponder is accidentally dropped into the water. To increase coverage the SART20 should always be held or mounted as high as possible.

Rugged design:

The Tron SART20 will withstand a drop from 20 meters into the water. It is resistant to seawater, oil and sunlight.

Handling:

Tron SART20 is designed for easy operation, with a brief operating instruction printed on the unit. It comes standard with a 10 meter rope and a shackle hook to be used for hanging the SART20 on the inside of a life raft.

**Indicators:**

Tron SART20 is equipped with an LED and a built in buzzer to indicate operation. The LED will normally flash with a frequency of 1 per second to show that the Tron SART20 is activated.

When a search and rescue unit is approaching the internal speaker will sound each time the SART20 is hit by the radar. A continuous sound from the buzzer means that the ship or helicopter is close to the Tron SART20 and the radar is hitting the Tron SART20 continuously.

Battery unit.

The battery module is to be replaced every 5 year. A label on the battery module and Tron SART20 housing displays the expiry date.

A new battery comes complete with cable and connector.



2 TECHNICAL SPECIFICATIONS

2.1 ELECTRICAL SPECIFICATIONS

Frequency:	X-band (3 cm) (9.2 - 9.5 GHz)
Temperature range:	Operating: -20 to +55°C
Storage:	-30 to +65°C
Radiated power:	> 400 mW e.i.r.p (+26 dBm)
Sweep type:	12 sweep sawtooth type Forward 7.5 us \pm 1 ms Return 0.4 us \pm 0.1 ms Starts with return sweep.
Receive sensitivity:	Better than -50 dBm e.r.s.
Response delay:	Max 0.5 ms
Antenna pattern:	Horizontal polarization. Omni directional radiation in the horizontal plane. Greater than \pm 12.5 degrees elevation angle in the vertical plane.
Battery:	Two C-size SAFT LSH 14 light Lithium batteries, 5 years service life.
Battery capacity:	96 hours standby +8 hours continuous operation when activated by a radar with 1 kHz prf at -20°C. 5 years storage.



2.2 MECHANICAL SPECIFICATION

Materials used:

Transponder housing: Polycarbonate with 10% fibreglass.

Bracket: Anodized aluminum.

Transponder dimensions:

Max diameter: 89 mm

Length: 251 mm

Weight: 465 g

Transponder with standard storage bracket:

Max diameter: 90 mm

Length: 251 mm



3 FUNCTIONAL DESCRIPTION

3.1 GENERAL

Tron SART20 consists of a housing sealed at the lower end with a bottom lid and may be split into the following main parts:

1. Bottom lid.
2. Housing with Tron SART20 electronic assembly and battery module.

The housing is made of polycarbonate.

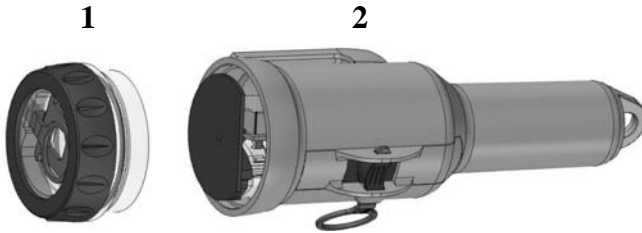


Figure 3.1, Tron SART20 disassembled

3.1.1 Tron SART20 electronic assembly

Tron SART20 electronic assembly is inserted into the Tron SART20 housing. It consists of the transceiver module and antenna.

1. Transceiver Board in metal box
2. Antenna (9GHz).

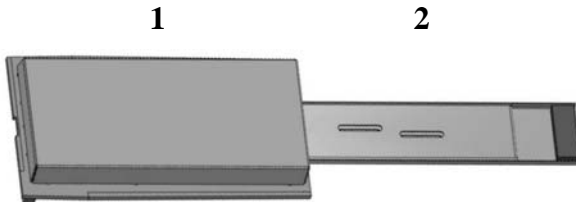


Figure 3.1.1 Tron SART20 electronic assembly

3.1.2 Battery module

The battery module is inserted into the Tron SART20 housing.

The markings on the battery module and the Tron SART20 housing display the battery expiry date. A new battery module comes complete with cable and connector and can be changed by opening the bottom lid at of the Tron SART20.

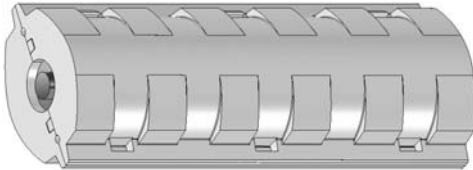


Figure 3.1.2 Tron SART20 Battery module without cable and connector

3.1.3 Bottom lid

The Bottom lid includes four items:

1. The winder hook
2. The screw ring
3. The light tower
4. The O-ring

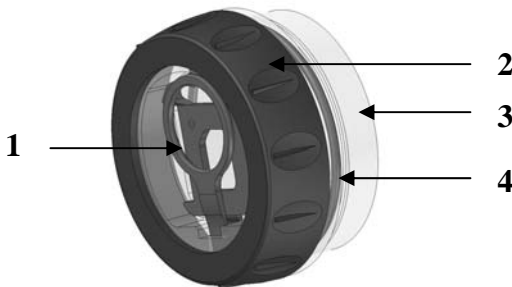


Figure 3.1.1 Bottom lid



4 INSTALLATION

Tron SART20 can be mounted several ways, depending on the options available.

As a general rule, the transponder should be mounted as high as possible to increase line of sight to the search and rescue units.

Metal objects close to the transponder should be avoided, these will limit the performance in the directions they are located.

4.1 BRACKETS

There are three different mounting brackets available.

1. Wall bracket.
2. Lifeboat bracket.
3. Pole bracket.

4.1.1 Wall bracket

A wall bracket is delivered with the Tron SART20 and should be used for storage of the transponder. The bracket should preferably be mounted in a vertical position and in a place where the Tron SART20 is easily available in case of an emergency.

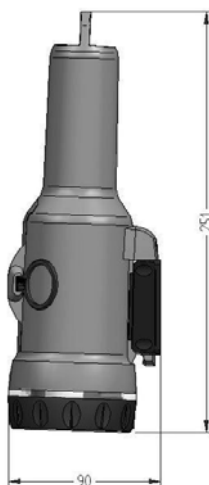
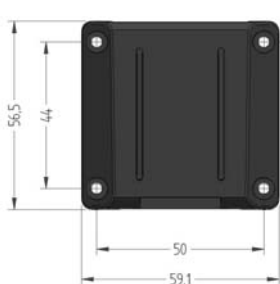


Figure 4.1.1a, wall bracket.

Figure 4.1.1b, Tron SART20 mounted in wall bracket.

The bracket should be mounted with four screws (\varnothing 4 mm).

4.1.2 Lifeboat bracket

The outdoor lifeboat bracket should be mounted vertically on the roof of the lifeboat (as high as possible). Activate the transponder and put it into the bracket. Secure the transponder to the bracket. The bracket will fit a pipe with a maximum diameter of 50mm.

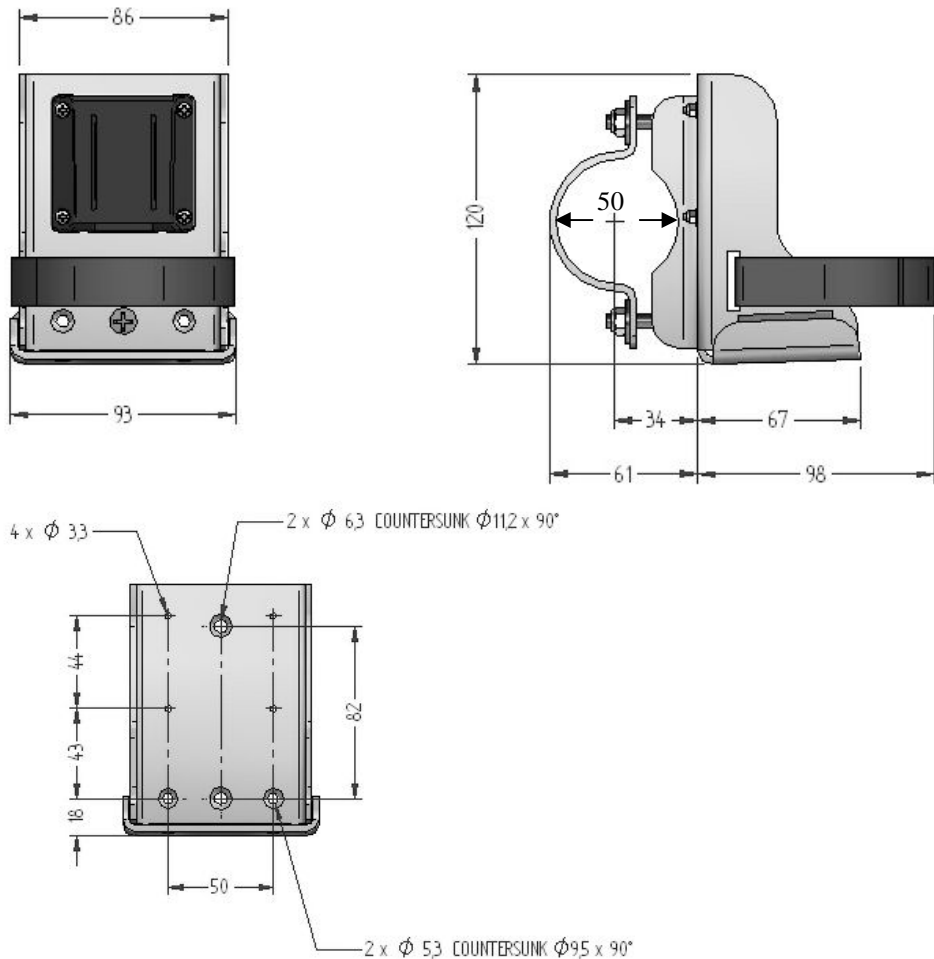


Figure 4.1.2a, Tron SART20 lifeboat bracket.



Figure 4.1.2b, Tron SART20 mounted in lifeboat bracket.

4.2 Using the telescopic pole



Figure 4.2, Tron SART20 with telescopic pole attached.

A telescopic pole can be used to extend the height of the Tron SART20, inside or outside the life raft/boat. Simply extend the attached pole to the full length (app. 1,2m from the top of the Tron SART20). Make sure that the rod is locked by pulling hard when it is fully extended. The rod can now be fastened or held by a person. Ensure the rod is held as vertical as possible when activating the Tron SART20.



4.3 Using the 10m rope

The 10m. rope is meant to hang the Tron SART20 inside a life raft. Any objects that the rope can be attached to can be used. As long as the transponder is kept away from any metal objects, the performance will not be notably degraded because of the canvas of the life raft.



Figure 4.3, Tron SART20 with 10m rope attached.

5 OPERATING INSTRUCTIONS

5.1 ACTIVATING TRON SART20

1. Break seal at switch.
2. Pull locking pin and make sure that the switch enters the “ON” position. An audible “BEEP” will be heard and the indicator led will start to flash.
3. Place (or hold) the transponder in a vertical position as high as possible. When the Tron SART20 is within range of an active 3 cm radar, the internal loudspeaker will be activated. A handheld VHF radio should now be used to establish contact with the approaching boat or helicopter.

5.2 DEACTIVATING TRON SART20

1. Move the switch to the “OFF” position.
2. Replace the locking pin.



5.3 TEST OF TRON SART20

Test of the Tron SART20 is done using the ships own 3 cm radar. The radar display will show different patterns depending on the range to the transponder.

See Figure 5.3a, b and c for details of the radar display. Note that the examples shown are typical and will vary with the radar performance (height, power output and sensitivity).

With the transponder located close to the radar the signals will appear as rings on the radar display.

The rings may be broken in some sectors, depending on ship construction and other obstacles, and does not indicate an error in the transponder.

Placing it further away will reduce the signals to 12 dots on the radar display, showing the direction to the transponder.

1. Hold the switch on the Tron SART20 in the "TEST" position.
2. Simultaneously a person should observe the radar display to check for correct pattern. The radar should be set for a 10 nm range.
3. The test should preferably be done in open sea to avoid interference on the radar display from land echoes.
4. Alternatively, a radar of a nearby ship can be used to test the transponder. A ship to ship vhf channel should then be used to confirm operation.

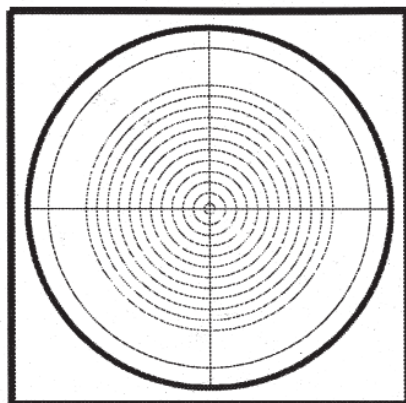


Figure Feil! Fant ikke referansebildene.a

Typical display when Tron SART20 is located near (<0.2 nm) the radar.

Radar range is 10 nm. Rings are off.

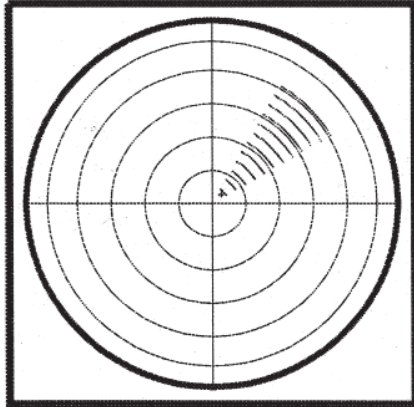


Figure Feil! Fant ikke referanseskilden.b

Typical display when Tron SART20 is located close (1nm) to the radar.
Radar range is 10 nm. Rings are at 2 nm.

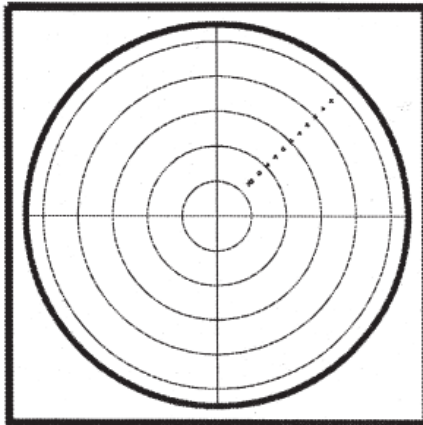


Figure Feil! Fant ikke referanseskilden.c

Typical display when Tron SART20 is located away (>2 nm) from the radar.
Radar range is 10 nm. Rings are at 2 nm.



CAUTION!

While the Tron SART20 is activated it will respond to any 3 cm radars within range. Tests must be made as short as possible (5 min) to avoid interference and to avoid wasting battery capacity.

6 MAINTENANCE AND TROUBLESHOOTING

6.1 MAINTENANCE

Tron SART20 requires the following maintenance:

Every 6. month.

The transponder should be taken out of its bracket and tested against a radar, using the procedure in chapter **Feil! Fant ikke referanseilden.** Either the ships own radar could be used or the radar of a nearby ship.

Every 5. year.

The battery unit must be replaced every 5 year. Storage of batteries over a long period of time will reduce their capacity. To ensure long and reliable operation the battery unit must be replaced every 5 year. The battery replacement can be performed on board using the procedure in chapter 6.2.1.

6.2 SERVICE

Warranty Service

The warranty of the equipment is void if the customer has tried to repair, modify or rebuild the unit, deliberate or accidental damage, failure to follow Jotron instructions with respect to approved service agents or if the unit has been exposed to environmental conditions outside the specifications of the unit. As standard Jotron AS warrants that this product will be free from defects in materials and workmanship for a period of 12 months from the date received by end user, limited to 18 months from purchase from Jotron AS.

If the unit is in need of repair, please return it carriage paid to the agent that you purchased it from.

Provided that the unit(s) returned for repair is found to be under warranty, man-hour cost and material cost will be covered by Jotron AS.

Additional costs not related to repair/replacement of the unit will not be covered.

Out of Warranty Service

For defects arising from normal wear and tear after 12 months of operation, limited to 18 months from Jotron AS, normal service conditions will apply. For details see: www.jotron.com



6.2.1 REPLACING THE BATTERY MODULE

Refer to Figure 3.1 and do the following steps:

1. Open the transponder by turning the screw ring counter clockwise.
2. Remove the rubber gasket.
3. Slide out the battery module and disconnect the battery connector.
4. Ensure the silicagel bag and anti corrosion tape supplied with the battery are fitted to inside of Tron SART20.
5. Connect the new battery module and slide it into the Tron SART20 housing.
6. Insert rubber gasket.
7. Tighten the screw ring by turning it clockwise.
8. Test the transponder according to procedure in chapter **Feil! Fant ikke referansekinden..**

6.2.2 BATTERY DISPOSAL

Dispose in accordance with applicable regulations, which vary from country to country.(In most countries, the disposal of used batteries is regulated and end-users are invited to dispose of them correctly, through non-profit organizations, mandated by local governments or organized on a voluntary basis by professionals).Lithium batteries should have their terminals insulated prior to disposal.

6.2.3 INCINERATION

Incineration should never be performed by battery users but by trained professionals in authorized facilities with proper gas and fumes treatment.

6.2.4 LAND FILLING

Leachability regulations (mg/l)

Component	Leachability	EC limit	EPA	Other*
Iron	100			5
Nickel	100	500	2	0,5

* Applicable to France

6.2.5 RECYCLING

Send to authorized recycling facilities, through a licensed waste carrier.



7 SERVICE AGENTS

Please look at www.jotron.com for Marine Service Agents.

Jotron Group subsidiary companies:

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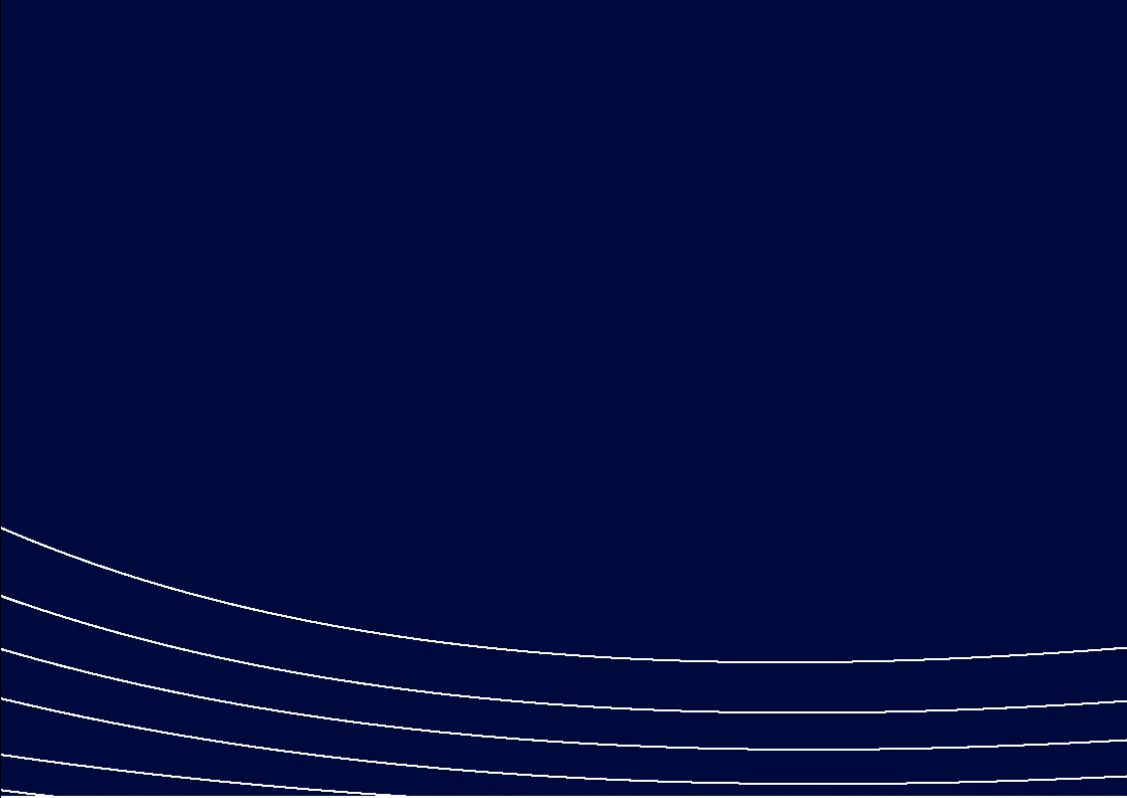
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