

21" High resolution Multi-color LCD **MARINE RADAR** WITH ARPA AND AIS DISPLAY

Models **FAR-2117/2127/2137S**

- Advanced signal processing for improved detection in rough sea
- LCD display providing crisp radar images
- Designed to comply with SOLAS carriage requirements for ships below 10,000 GT
- Up to four radars can be interswitched in the network without an extra device
- Automatic plotting/tracking of 100 targets manually or automatically acquired
- Easy operation by customizable function keys, trackball/wheel palm module and rotary controls
- Low spurious magnetrons meeting ITU-R unwanted emission standards
- Displays 1000 AIS symbols



Improved target detection capabilities give the best and reliable performance



Full-keyboard Control Unit

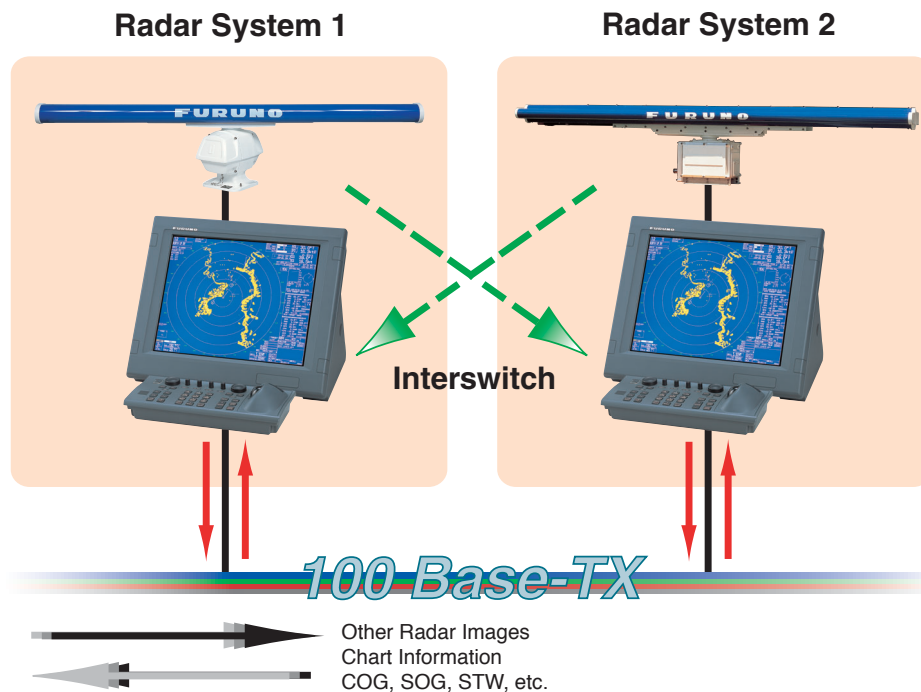
The control head has logically arranged controls in a combination of push keys and trackball. Well organized menu ensures that all operations can be done by trackball.



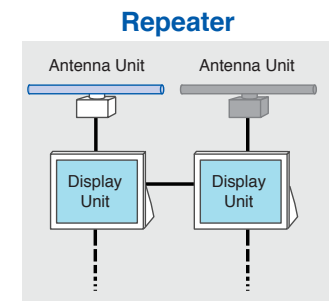
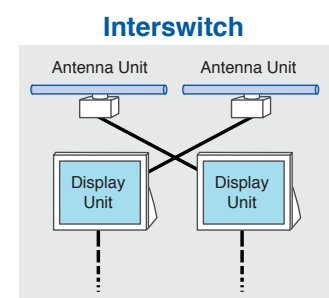
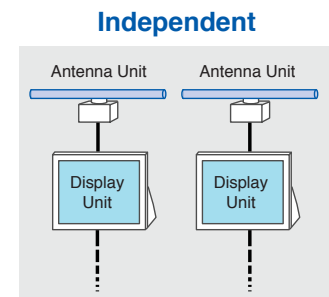
Palm Control Unit

Alternative to the Full-keyboard Control Unit or additional as a remote operation.

System and user interface



The radars can be connected to an Ethernet network for a variety of user requirements. SOLAS Chapter V as amended requires X- and S-band radars for ships 3000 GT and over. Each of X- and S-band radars can be interswitched without using an extra option. Up to four radars can be interchanged in the network. In addition, the essential navigational information including the electronic chart, L/L, COG, SOG, STW, etc. can be shared in the network.

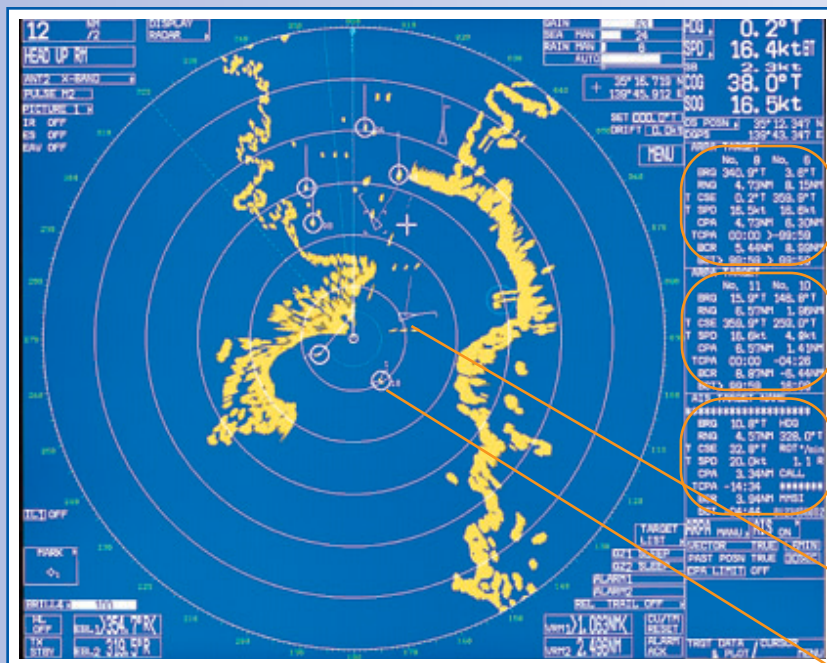


The revolutionary FAR-21x7 series of X- and S-band radars are the result of FURUNO's 50 years of experience in marine electronics and advanced computer technology. This series is designed to meet the exacting standards of the International Maritime Organization (IMO) below 10,000 GT.

The display unit employs a 20.1" LCD which provides an effective picture diameter of larger than 250 mm. The SXGA monitor provides crisp radar images, which are presented in a selectable color with a day and night background color for easy observation in all lighting conditions. Different colors are assigned for marks, symbols and texts for user-friendly operations.

Target detection is enhanced by sophisticated signal processing techniques. Two guard zones can be set at required ranges in any sector. Other ship's movements are assessed by advanced target tracking software and alerted by CPA/TCPA data readouts. The FAR-21x7 series can display AIS-equipped ships, when connected with an AIS transponder.

The radar antenna is available with 4, 6.5, or 8 foot radiator. For the X-band, the rotation speed is selectable from 24 rpm for standard radars or 42 rpm for HSC. The S-band radar is also available with the antenna radiator of 10 or 12 feet. The S-band radar assures target detection in adverse weather where an X-band is heavily affected by sea or rain clutter.



Own ship data cell

Water temp, Anemometer

DATA Cell 1
ARPA data

Magnify

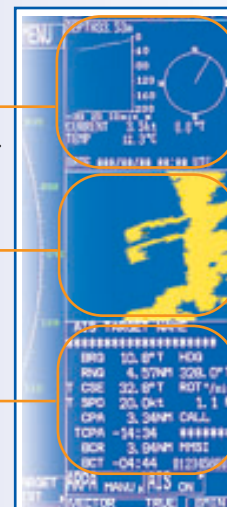
DATA Cell 2
ARPA data

AIS Information

DATA Cell 3
ARPA data

AIS-equipped target selected for data reading.

Targets automatically acquired



DATA DISPLAY

A variety of navigational information, own ship status, radar plotting data, wind, water temperature and information from other shipborne sensors are displayed on the cells. These selected targets are marked with a square symbol on the radar display. Magnify is a special feature of the FURUNO radars FAR-21x7 series. This looks like a delayed sweep zone that the IMO strictly prohibits, but it helps observe two symbols, AIS and ARPA, from the same physical target should be merged.

AIS information

Static Data

MMSI (Maritime Mobile Service Identity)
IMO number (Where available)
Call sign & name
Length and beam
Type of ship
Location of position-fixing antenna on the ship

Voyage related data

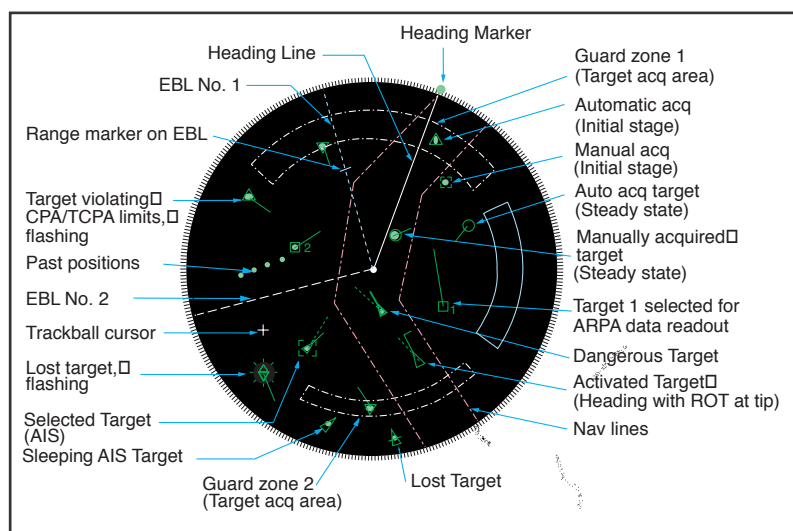
Ship's draught
Hazardous cargo (type)
Destination and ETA (at masters discretion)

Dynamic data

Ship's position with accuracy indication and integrity status
UTC
Course over ground (COG)
Speed over ground (SOG)
Heading
Navigation status (manual input)
Rate of turn (where available)
Update rates Dependent on speed and course alternation (2 s – 3 min)

Short safety-related messages

Free messages



TARGET ASSOCIATION (Fusion)

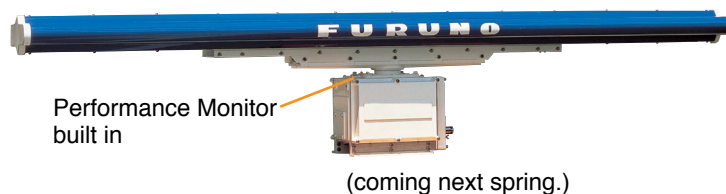
An AIS-equipped ship may be displayed by both AIS and ARPA symbols. This is because the AIS position is measured by a GPS in L/L while the ARPA target is measured by range and bearing from own ship and located on the radar PPI. When the symbols are within an operator-set criteria, the ARPA symbol is merged in the AIS symbol. The criteria are determined by the differences in range, bearing, course, speed, etc.

X-band antenna for FAR-2117, 2127

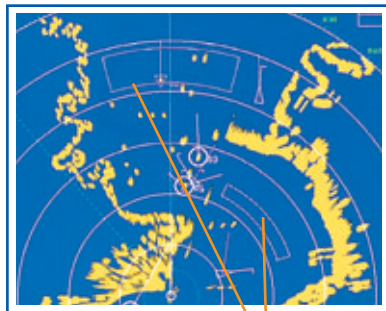


FAR-2117	X-band, 12 kW, TR up
FAR-2127	X-band, 25 kW, TR up
FAR-2137S	S-band, 30 kW, TR up

S-band antenna for FAR-2137S



ALARM ZONES



Guard Zones

Automatic Acquisition Zone

Two Automatic acquisition zones may be set in a sector or any form. They also act as suppression zones, avoiding unnecessary overloading to the processor and clutter by disabling automatic acquisition and tracking outside them. The operator can manually acquire important targets without restriction.

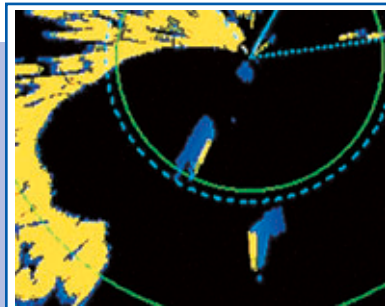
Guard Alarm Zone and Anchor Watch Zone

Targets that enter one of the Guard Alarm Zones change their symbols from a circle to an inverse triangle. Audible alarm is also released. One of Guard Alarm Zones may be used as an anchor watch where own ship or targets drift away from the set zone.

CPA Alarm Zone

Target tracking symbol changes to a triangle when its predicted course (vector) violates the operator set CPA/TCPA. The operator can readily change the vector lengths to evaluate target movement trend.

TARGET TRAILS



The target trails feature generates monotone or gradual shading afterglow on all objects on the display. The shading afterglow paints the display just like on an analog PPI. The monotone trails are useful to show own ship movement and other ship tracks in a specific fishing operation. The trail time is adjustable for 15, 30 s, 1, 3, 6, 15, 30 min or continuous. The target trails are indicated in a different color from background. The unique feature in this radar is a choice of True or Relative mode in Relative Motion (only True in TM).

NIGHT VIEW

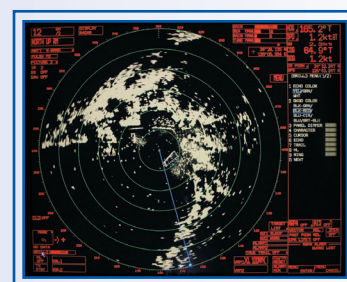
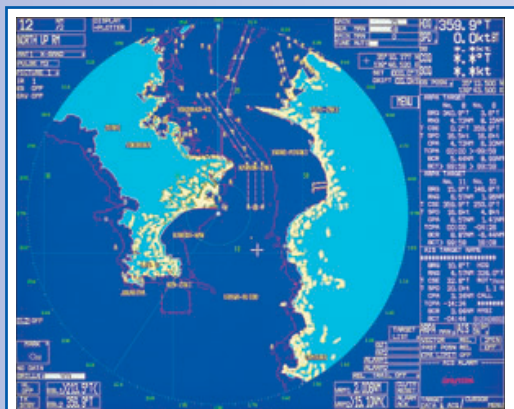
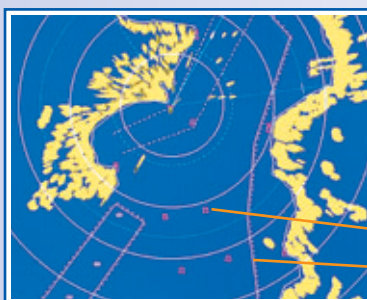


CHART OVERLAY



This radar incorporates a VideoPlotter that allows to display electronic charts (C-MAP NT+, Navionics NavCharts), plot own and other ship's track, enable entry of waypoints/routes, and make a radar map. Chart is displayed in combination of radar images (overlaid with radar images).

RADAR MAP



Map Marks
Map Lines

Up to 200 waypoints and up to 30 routes can be stored. Each route may contain up to 30 waypoints. A radar map is a combination of map lines and marks whereby the user can define and input the navigation area, route planning and monitoring data. The radar map has the capacity of 3,000 points for lines and marks. The map data can be memorized to facilitate repeated use on a routine navigation area.

Specifications of FAR-2117/2127/2137S

Antenna Radiators

1. **Type** Slotted waveguide array
2. **Beamwidth and sidelobe attenuation**

	X-Band			S-Band	
Radiator Type	XN-12AF	XN-20AF	XN-24AF	SN-30AF	SN-36AF
Length	4 ft	6.5 ft	8 ft	10 ft	12 ft
Beamwidth(H)	1.9°	1.23°	0.95°	2.3°	1.8°
Beamwidth(W)	20°	20°	20°	25°	25°
Sidelobe (within ± 10°)	-24 dB	-28 dB	-28 dB	-24 dB	-24 dB
Sidelobe (outside ± 10°)	-30 dB	-32 dB	-32 dB	-30 dB	-30 dB

3. **Rotation** X band: 24 rpm or 42 rpm
S band: 21 rpm (50Hz), 26 rpm (60Hz) or 45 rpm

RF Transceiver

1. **Frequency**
X-band: 9410 MHz ± 30 MHz
S-band: 3050 MHz ± 30 MHz
2. **Output power**
FAR-2117: 12 kW
FAR-2127: 25 kW
FAR-2137S: 30 kW
3. **Pulselength/PRR**

Range scale (nm)	Pulselength (μs)	PRR (Hz)
0.125, 0.25	0.07 3000	
0.5	0.07, 0.15	3000
0.75, 1.5	0.07, 0.15, 0.3	3000, 1500
3	0.15, 0.3, 0.5, 0.7	3000, 1500, 1000
6	0.3, 0.5, 0.7, 1.2	1500, 1000, 600
12, 24	0.5, 0.7, 1.2	1000, 600
48, 96	1.2	600
4. **I.F.** 60 MHz, Logarithmic
5. **Bandwidth** Short pulse: 40 MHz
Middle pulse: 10 MHz
Long pulse: 3 MHz

Radar Display

1. **Picture tube**
21" color LCD (SXGA 1280 x 1024 pixels),
400 (H) x 320 (V) mm,
Effective display diameter 308 mm
Echo Color: Yellow, green or white in 32 levels
2. **Minimum range:** 20 m on 0.25 nm range scale
3. **Range scales and ring intervals (nm)**
Range: .125, .25, .5, .75, 1.5, 3, 6, 12, 24, 48, 96
Ring: .025, .05, .1, .25, .5, 1, 2, 4, 8, 16
4. **Range ring accuracy**
0.2 % of range in use or 2 m whichever is the greater
5. **Range discrimination**
20 m on 0.25 nm range scale
6. **Presentation modes**
Head-Up, Course-Up, North-Up, North-Up TM
7. **Parallel index lines**
1, 2, 3 or 6 lines (menu selectable)
8. **Radar map**
1500 points to create coastlines, own ship safety contour,
isolated underwater dangers, buoys, traffic routing systems,
prohibited areas, fairways as required by IMO.

Automatic Plotting

1. **Acquisition**
100 targets (e.g. manually 50, automatically 50)
2. **Tracking**
Automatic tracking of all acquired targets in 0.1 to 32 nm
3. **Guard zone (Target Acquisition Area)**
Two guard zone, one of them 0.5 nm depth
4. **Vector**
True or relative 30 s, 1, 3, 6, 15, 30 min for prediction of target motion
5. **Past positions**
5 or 10 past positions at intervals of 30 s, 1, 2, 3, 6 min.
6. **Collision warning**
CPA limit: 0.2 - 10 nm, TCPA limit: 0 - 99 min.
7. **Trial maneuver**
Dynamic or static, with selected delay time.

AIS Display (Data input from AIS is required)

1. **Symbols**
Sleeping, Activated, Dangerous, Selected, Lost targets
2. **Number of targets**
1,000 targets max.
3. **Data indication**
Basic and expanded data

Power Supply (specify when ordering)

1. **Processor Unit**
24 VDC or 115/230 VAC, 1ø, 50/60 Hz
440 VAC, 1ø, 50/60 Hz with optional transformer RU-1803
2. **Display Unit**
24 VDC or 115/230 VAC, 1ø, 50/60 Hz
440 VAC, 1ø, 50/60 Hz with optional transformer RU-1803
3. **Antenna Unit**
FAR-2137S:
230 VAC, 3ø, 60 Hz; 380 VAC, 3ø, 50 Hz; 440 VAC, 3ø, 60 Hz
115 VAC, 3ø, 60 Hz with optional transformer RU-5693
230 VAC, 3ø, 50 Hz with optional transformer RU-6522
440 VAC, 3ø, 50 Hz with optional transformer RU-5466-1

This series of radar comply with the following IMO and IEC regulation:

- IEC 60936-1 shipborne radar
- IEC 60936-2 HSC radar
- IEC 60872-1 ARPA
- IEC 60872-2 ATA
- IEC 60837-3 EPA
- IEC 60945 General requirements
- IMO MSC.64(67) Annex 4
- IMO A.823(19)

EQUIPMENT LIST

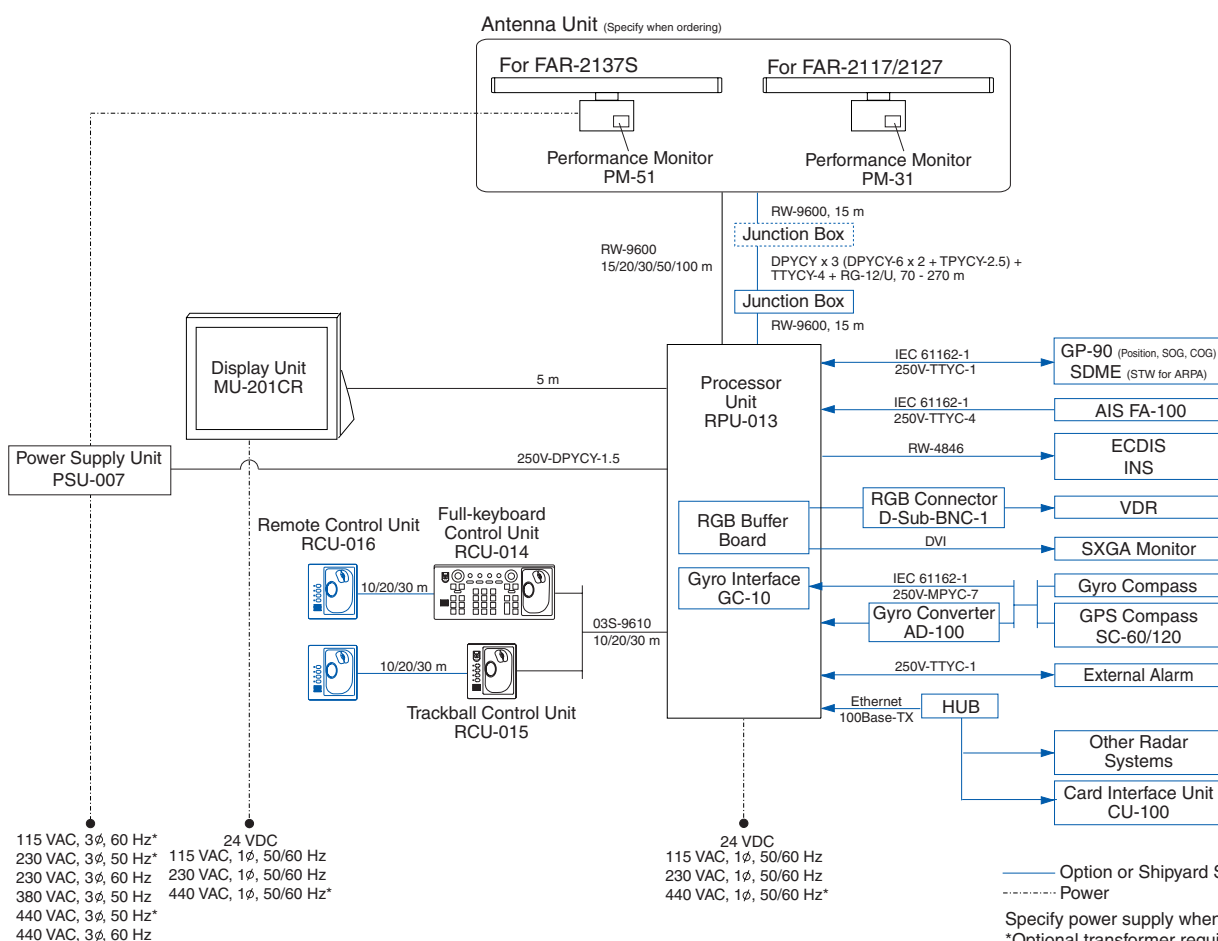
Standard

1. Display Unit MU-201CR
2. Processor Unit RPU-013
3. Full-keyboard Control Unit RCU-014
Trackball Control Unit (Palm Control Unit) RCU-015 (Specify when ordering)
4. Antenna Unit with cable (15/20/30/50/100 m)
5. Power Supply unit PSU-007 for FAR-2137S
6. Standard Spare Parts and Installation Materials

Option

1. Remote Control Unit RCU-016
2. Gyro Interface GC-10 (built in Processor Unit)
3. RGB Buffer Board (built in Processor Unit)
4. RGB Connector DSUB-BNC-1 (for VDR)
5. Card Interface Unit CU-100
6. Transformer RU-1803/5466-1/5693/6522
7. Rectifier RU-3424/1746B
8. Junction Box for Antenna Cable
9. External Alert Buzzer
10. MINI Chart Card
11. Hand Grip FP03-09840
12. Bracket FP03-09820

INTERCONNECTION DIAGRAM



03115Y Printed in Japan