INTERCONNECTION DIAGRAM

— Option or Shipyard Supply
---- Power
Specify power supply when ordering
*Optional transformer required

FURUNO

Antenna Unit (Specify when ordering)
For FAR-2837S · For FAR-2827W/37SW · For FAR-2817/2827

Performance Monitor PM-51
Performance Monitor PM-31 for FAR-2827W PM-51 for FAR-2837SW
Performance Monitor PM-31

Transceiver Unit
RTR-081 for FAR-2827W
RTR-082 for FAR-2837SW

RW-9600 15/30/ 40/50 m

RW-9600, 15 m

Junction Box

DPYCY x 3 (DPYCY-6 x 2 + TPYCY-2,5) + TTYCY-4 + RG-12/U, 70 - 270 m

RW-9600, 15 m

Junction Box

Display Unit MU-231CR

5 m

Power Supply Unit PSU-007

250V-DPYCY-1,5

Remote Control Unit RCU-016

Control Unit RCU-014

10/20/30 m

10/20/30 m

03S-9610 10/20/30 m

RCU-015

Processor Unit RPU-013

DVI-Analog RGB Conversion Kit

Gyro Interface GC-10

IEC 61162-1 250V-TTYC-1
IEC 61162-1 250V-TTYC-4

RGB Connector D-Sub-BNC-1

DVI

IEC 61162-1 250V-MPYC-7 AD-10

Gyro Converter AD-100

Ethernet 100Base-TX

Switching HUB HUB-100

24 VDC
115/230 VAC, 1ϕ, 50/60 Hz
440 VAC, 1ϕ, 50/60 Hz*

GP-90 (Position, SOG, COG)
SDME (STW for ARPA)

AIS FA-150

VDR

DVI Monitor

Gyrocompass

GPS Compass SC-50/110

ECDIS FEA-2107/2807

FAR-21x7/28x7

Memory Card Interface Unit CU-200

200 VAC, 3ϕ, 50 Hz*
220 VAC, 3ϕ, 60 Hz
380 VAC, 3ϕ, 50 Hz
440 VAC, 3ϕ, 60 Hz

24 VDC
100-230 VAC, 1ϕ, 50/60 Hz
440 VAC, 1ϕ, 50/60 Hz*

Antenna Unit for FAR-2817/2827/2827W
XN-12AF 33 kg 73 lb

XN-20AF 39 kg 86 lb
XN-24AF 42 kg 93 lb

XN-20AF: 2040 80.3"
XN-24AF: 2550 100.4"

Display Unit MU-231CR 15.0 kg 33.0 lb (exclude hand grips and bracket)
Bracket mount

Panel mount

Antenna Unit for FAR-2837S/2837SW
SN-36AF 133 kg 293.2 lb

SN-36AF: 3765 148.2"

Transceiver Unit for FAR-2827W
RTR-081 8.0 kg 17.6 lb

Transceiver Unit for FAR-2837SW
RTR-082 17.0 kg 37.5 lb

Processor Unit
RPU-013 10 kg 22 lb

Control Unit
Full-keyboard type
RCU-014 3.7 kg 8.2 lb

Trackball type
RCU-015 2.4 kg 5.3 lb

Remote Control Unit
RCU-016 2.4 kg 5.3 lb

RADAR/ARPA
Automatic **R**adar **P**lotting **A**id

23.1" High resolution Multi-color LCD
FAR-28x7 series

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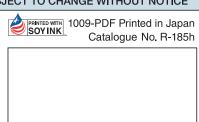
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

FURUNO has integrated leading-edge technology with a user-friendly interface, providing reliable performance and simplified installation

RADAR/ARPA
Automatic Radar Plotting Aid

The revolutionary FAR-28x7 series of X- and S-band, TR-up and -down 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) for all ships.

The display unit employs a 23.1" LCD which provides an effective picture diameter of larger than 340 mm. The high-resolution UXGA, digital flat-panel display unit provides crisp and clear radar images through a DVI interface. The DVI interface provides a pure digital video signal by using a digital signal for the entire path which maintains the image quality at the highest level, because the signal is not degraded as a result of a digital-to-analog conversion. The display has selectable color with a day and night background colors for clear presentation in all lighting conditions. Different colors are assigned for marks, symbols and text for easy observation.

Target detection is improved by sophisticated signal processing techniques featuring superb short-range detection. Two guard zones are provided as automatic acquisition zones for ARPA (TT function). One of two can be set at required ranges and any sector in any form. The FAR-28x7 series can display data about AIS-equipped ships, when connected with an AIS transponder. AIS enhances detection of other ships and AtoN (Aid to Navigation) on radar by displaying their movement and status with easy to read symbols and text.

The radar antenna is available with 4, 6.5, or 8 feet radiator. For the X-band, the rotation speed is selectable from 24 rpm for standard radar or 42 rpm for HSC. The S-band radar is also available with the antenna radiator of 12 feet, and the rotation speed is selectable from 21/26 rpm for standard radar or 45 rpm for HSC application. The S-band radar assures target detection in adverse weather where an X-band is heavily affected by sea or rain clutter.

X-band antenna for FAR-2817/2827/2827W

8 ft antenna
(4 or 6.5 ft also available)

S-band antenna for FAR-2837S/2837SW

12 ft antenna

FAR-2817:	X-band, 12 kW, TR up
FAR-2827:	X-band, 25 kW, TR up
FAR-2827W:	X-band, 25 kW, TR down
FAR-2837S:	S-band, 30 kW, TR up
FAR-2837SW:	S-band, 30 kW, TR down

With optional mounting bracket and connection stand

With optional white, slim pedestal

- ▶ **Advanced signal processing for improved target detection**
- ▶ **High resolution UXGA LCD provides crisp radar images**
- ▶ **Complies with the exsisting IMO standards for all ships**
- ▶ **Low spurious magnetrons meeting ITU-R unwanted emission standards**
- ▶ **Up to four radars can be interswitched in the network without an extra device**
- ▶ **Automatic plotting/tracking of 100 targets manually or automatically acquired**
- ▶ **Displays 1000 AIS-equipped targets**
- ▶ **Easy operation by customizable function keys, trackball/wheel palm module and rotary controls**
- ▶ **Stylish streamlined design**

This series of radar complies with the latest IMO and IEC regulations:

- • IEC 60945
- • IEC 61162
- • IEC 62288
- • IEC 62388
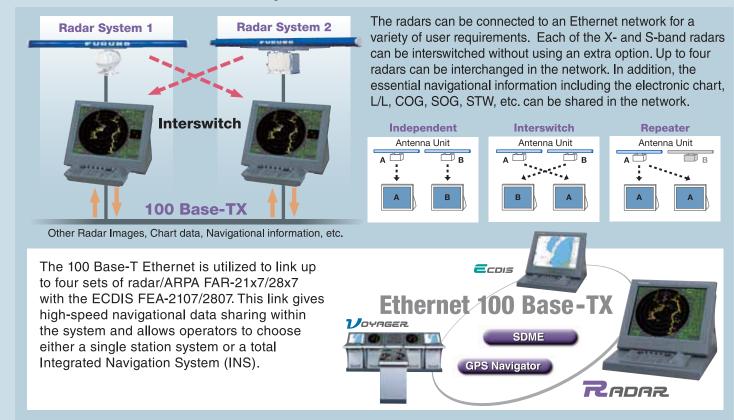- • IMO MSC.191(79)
- • IMO MSC.192(79)
- • IMO A.694(17)
- • IMO A.813(19)
- • IMO SN/Circ.217

**Utilizing a high speed Ethernet network,
the FAR-28x7 series brings flexible system expansion
and consolidation to onboard navigation systems**

▶ 100 Base-TX Ethernet Network System

The radars can be connected to an Ethernet network for a variety of user requirements. Each of the 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.

Radar System 1   Radar System 2

Interswitch

100 Base-TX

Other Radar Images, Chart data, Navigational information, etc.

Independent   **Interswitch**   **Repeater**

Antenna Unit

The 100 Base-T Ethernet is utilized to link up to four sets of radar/ARPA FAR-21x7/28x7 with the ECDIS FEA-2107/2807. This link gives high-speed navigational data sharing within the system and allows operators to choose either a single station system or a total Integrated Navigation System (INS).

Ethernet 100 Base-TX

VOYAGER

SDME

GPS Navigator

RADAR

▶ Stress-free operation with versatile control units

EBL controls   VRM controls

User Customizable Function Keys   Trackball   Menu Item Selector (wheel and enter keys)

Full-keyboard type
The control head has logically arranged controls in a combination of push keys and trackball. Well organized menus ensure that all operations can be done by trackball.

Trackball type
Alternative to the Full-keyboard type or additional as a remote operation.

▶ ARPA (TT)/AIS

Targets automatically acquired

AIS-equipped target selected for data reading.

Own ship data cell

DATA Cell 1   Tracking data   Water temp, Depth, Wind

DATA Cell 2   Tracking data   Zoom

DATA Cell 3   Tracking data   AIS Information

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. The FAR-28x7 series has an unique zoom function, which enlarges a part of the radar image twice or three times in size.

Target Association (Fusion)
An AIS-equipped ship may be displayed by both AIS and ARPA (TT) symbols. This is because the AIS position is measured by a GPS navigator in L/L while the ARPA (TT) target blip and data are measured by range and bearing from own ship. When the symbols are within an operator-set criteria, the ARPA (TT) symbol is merged with the AIS symbol. The criteria is determined by the differences in range, bearing, course, speed, etc.
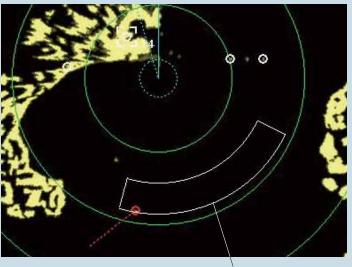
Symbols for AIS
AIS COG/SOG vector changes its length with speed. ROT mark is viewable at the COG/SOG vector tip when a target ship is equipped with a FURUNO satellite compass SC-50/110 or gyrocompass which can talk ROT serial sentence.
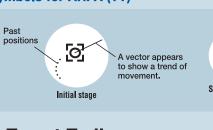
SOG (Speed over Ground) and COG (Course over Ground) vector *1

Turning direction (ROT)

Past positions

Heading line#

*1 = Vector shows STW (speed thru water) and CSE (course) when water tracking mode is selected at the radar.

= If there is no heading data, the line points in direction of COG.

Activated Target

Sleeping AIS Target   Selected Target

Lost Target   Dangerous Target

RADAR/ARPA

▶ Guard Zones

Guard Zones

Symbols for ARPA (TT)

Past positions

A vector appears to show a trend of movement.

Initial stage

Steady tracking

CPA alarm

Lost target (Flashing)

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. Targets in an automatic acquisition zone are shown with an inverse triangle. The operator can manually acquire important targets without restriction.

Guard Zones and Anchor Watch Zone
Guard Zones generate visual and audible alarms when targets enter the operator set zones. One of the Guard Zones may be used as an anchor watch to alert the operator when own ship or targets drift away from the set zone.

CPA Alarm
The 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 the target movement trend.

Past Position Display
The ARPA (TT) displays equally time-spaced dots marking the past positions of any targets being tracked. A new dot is added during preset time intervals until the preset number is reached. AIS also displays past position dots.
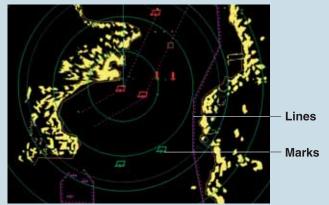
▶ Target Trails

The target trails feature generates a monotone or gradual shading afterglow on all objects on the display. The trails are useful in showing own ship movement and other ship tracks in a specific fishing operation. The unique feature in this radar is a choice of True or Relative mode in Relative Motion (only True in TM). When changing modes, trails remain on the screen.

▶ Radar Map

Lines

Marks

A radar map is a combination of lines and marks whereby the user can define and input the navigation area, route planning and monitoring data. The radar map can include up to 20,000 points for lines and marks. The map data can be saved to facilitate repeated use on a routine navigation area. Planned routes created on ECDIS can be transferred onto a radar display when interfaced with ECDIS.
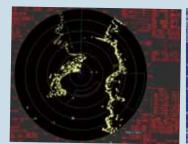
▶ Chart Overlay

This radar incorporates a VideoPlotter that displays electronic charts, plots own and other ship's track, enables entry of waypoints/routes, and makes a radar map. The Radar targets are overlayed on the chart. (For non-SOLAS ships only)

▶ Presentation Colors

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-36AF
Length	4 ft	6.5 ft	8 ft	12 ft
Beamwidth(H)	1.9	1.23	0.95	1.8
Beamwidth(W)	20	20	20	25
Sidelobe (within 10)	-24 dB	-28 dB	-28 dB	-24 dB
Sidelobe (outside 10)	-30 dB	-32 dB	-32 dB	-30 dB

3. **Rotation**

X-Band		
Rotation	24 rpm	42 rpm
Gear Box	RSB-096/103	RSB-097
S-Band		
Rotation	21/26 rpm	45 rpm
Gear Box	RSB-098/099/104/105	RSB-100/101/102

RF Transceiver
1. **Frequency**
   X-band: 9410 MHz 30 MHz
   S-band: 3050 MHz 30 MHz
2. **Output power**

	FAR-2817	FAR-2827	FAR-2827W	FAR-2837S	FAR-2837W
Output Power	12 kW	25 kW	25 kW	30 kW	30 kW
Transceiver	RTR-078	RTR-079	RTR-081	RTR-080	RTR-082

3. **Pulselength/PRR**

Range scale (nm)	Pulselength (s)	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. **Display**
   23.1" color LCD (UXGA 1600 x 1280 pixels),
   470 (H) x 353 (V) mm,
   Effective display diameter: 340 mm
   Echo Color: Yellow, green or white in 32 levels
2. **Range scales and ring intervals (nm)**

Range	.125, .25, .5, .75, 1.5, 3, 6, 12, 24, 48, 96
Ring	.025, .05, .1, .25, .25, .5, 1, 2, 4, 8, 16

3. **Minimum range**
   22 m
4. **Range discrimination**
   26 m
5. **Range ring accuracy**
   Within ±1 % of the current range scale or 10 m, whichever the greater
6. **Presentation modes**
   Head-Up, Cursor-gyro, North-Up, Course-Up, True Motion (sea or ground stabilization)
7. **Heading information**
   GPS compass SC-50/110 is a recommended heading sensor as a backup for a gyrocompass. Confirm if your Administrations permit its use.
8. **Parallel index lines**
   1, 2, 3 or 6 lines (menu selectable)
9. **Radar map**
   20,000 points to create coastlines, own ship safety contour, isolated underwater dangers, buoys, traffic routing systems, prohibited areas and fairways as required by IMO.

Target Tracking
1. **Acquisition**
   Auto or manual acquisition: 100 targets in 0.2-24 (32) nm
2. **Tracking**
   Auto tracking on all acquired targets
3. **Guard zone (Target Acquisition Area)**
   0.5 nm width sector, within 3-6 nm, desired bearing
   1 nm width sector or polygon, desired range and bearing
4. **Past positions**
   5 or 10 past positions on all targets
5. **Collision warning**
   CPA Limit: 0.1-20 nm, TCPA Limit: 1-60 minutes
6. **Trial maneuver**
   Dynamic or static, with selected delay time.

AIS FUNCTIONS (Data input from AIS is required)
1. **Number of Targets**
   1,000 targets max.
2. **Past Position Plot Intervals**
   OFF, 30 s, 1-60 minutes

POWER SUPPLY (specify when ordering)
1. **Processor Unit**
   FAR-2817
   24 VDC: 7.6 A (8.5 A for HSC) or less
   100-115 VAC: 2.6 A (3.0 A for HSC), 220-230 VAC: 1.6 A (1.7 A for HSC), 1 ø, 50/60 Hz
   FAR-2827
   24 VDC: 8.8 A (9.7 A for HSC) or less
   100-115 VAC: 3.0 A (3.4 A for HSC), 220-230 VAC: 1.8 A (1.9 A for HSC), 1 ø, 50/60 Hz
   FAR-2827W
   100-115 VAC: 3.2 A, 220-230 VAC: 1.6 A, 1 ø, 50/60 Hz
   FAR-2837S/2837SW
   100-115 VAC: 3.0 A, 220-230 VAC: 1.5 A, 1 ø, 50/60 Hz
2. **Display Unit**
   24 VDC, 3.2 A or 100-230 VAC, 0.9 A, 1 ø, 50/60 Hz
   440 VAC, 1 ø, 50/60 Hz with optional transformer RU-1803
3. **Antenna Unit**
   FAR-2837S/2837SW:
   200 VAC, 3.0 A, 3ø, 50 Hz; 220 VAC, 3.0 A (3.5 A for HSC*), 3ø, 60 Hz; 380 VAC, 1.5 A, 3ø, 50 Hz; 440 VAC, 1.5 A (1.7 A for HSC*), 3ø, 60 Hz
   * for FAR-2837S only
   110 VAC, 3ø, 60 Hz with RU-5693; 220 VAC, 3ø, 50 Hz with RU-6522; 440 VAC, 3ø, 50 Hz with RU-5466-1

EQUIPMENT LIST
Standard
1. Display Unit MU-231CR
2. Processor Unit RPU-013
3. Full-keyboard Control Unit RCU-014
   Trackball Control Unit RCU-015
   (Specify when ordering)
4. Antenna Unit with cable (15/30/40/50 m)
5. Power Supply Unit PSU-007 for FAR-2837S
6. Standard Spare Parts and Installation Materials

Option
1. Performance Monitor PM-31 for X-band, PM-51 for S-band
2. Remote Control Unit RCU-016
3. Gyro Interface GC-10
4. DVI-Analog RGB Conversion Kit OP03-180 (SXGA output)
5. RGB Connector DSUB-BNC-1 (for VDR)
6. Memory Card Interface Unit CU-200
7. Transformer RU-1803/5466-1/5693/6522
8. Rectifier RU-3424/1746B
9. Junction Box RJB-001
10. Antenna Cable RW-9600
11. Hand Grip FP03-09840
12. Bracket FP03-09820
13. Switching Hub HUB-100