FURUNO

OPERATOR'S MANUAL

AUTO PLOTTER

MODEL A R P – 3

WARNING

This auto plotter is, when used properly, a very effective anti-collision aid for marine vessels. If, however, it is operated incorrectly or used indiscriminately, for example, placing absolute faith in data obtained, the consequences could be life endangering.

1. VESSEL SAFETY

This auto plotter is not designed to replace the human eye nor make decisions for the navigator. It is intended for use as an aid to navigation. Always maintain a watch while underway. Data obtained from this auto plotter should always be double checked against other sources to verify the reliability of the data.

2. TARGET TRACKING CAPABILITY

This auto plotter automatically tracks a manually acquired radar target and calculates its course and speed, indicating them by a vector. Since the data generated by this unit are based on what radar targets are selected, the radar must always be optimally tuned for use with it to ensure that required targets will not be lost or unwanted targets such as sea returns and noise will not be acquired and tracked.

Operating Range

3 to 24 nm radar range is commonly used for auto plotting although targets may be acquired/tracked in a wider range.

Returns from Sea Surface and Precipitation

A target echo does not always mean a landmass, reef, ships or other surface objects but can imply returns from sea surface or precipitaion. As the level of these returns varies with environment, the operator is required to properly adjust the STC (ant-clutter sea), FTC (anti-clutter rain) and GAIN controls to ensure that target echoes within the affected area are not eliminated from the radar screen. The optimum settings of these controls may slightly differ between the normal radar operation and plotting, and it is recommended to readjust them in accordance with the operating mode selected.

3. CALCULATION ACCURACY

The following items affect calculation accuracy.

1) echo intensity
2) radar transmission pulsewidth
3) radar bearing error
4) gyrocompass error
5) own vessel or other vessel course change

Data for CPA, TCPA, etc. are approximations only. Always use data obtained prudently.

How to mount ARP-3
in a narrow space
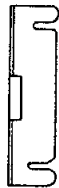* * * * * * * * * * * * * * * * * *

An L-shaped fixing plate is provided on the rear-bottom of the ARP-3 unit.

If the space around the unit is narrow and fixing work can not be conducted, take the following measures:

① Loosen the two screws shown below, and remove the L-shaped plate from the ARP-3 body.

× 2
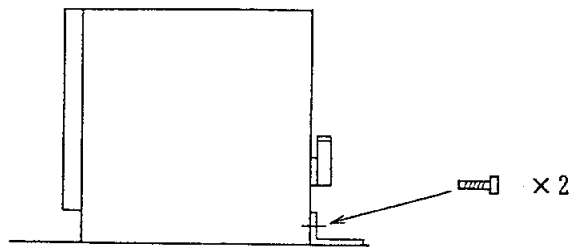
② Fix the plate onto the floor.

③ Insert the rear-bottom edge of the ARP-3 body into the slot on the L-shaped plate.

④ Fix the front-bottom edge of the ARP-3 body onto the floor.

Note on Power Supply
* * * * * * * * * * * * * * * * * * *

The power supply for the Radar and ARP-3 must be common. If different rectifiers are used for both units, for example, ARP-3 can not be turned on.
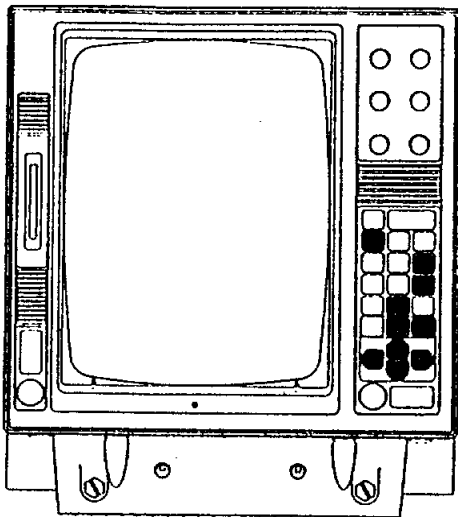
C O N T E N T S
* * * * * * * * * * * * * * * * * * *

O P E R A T I O N

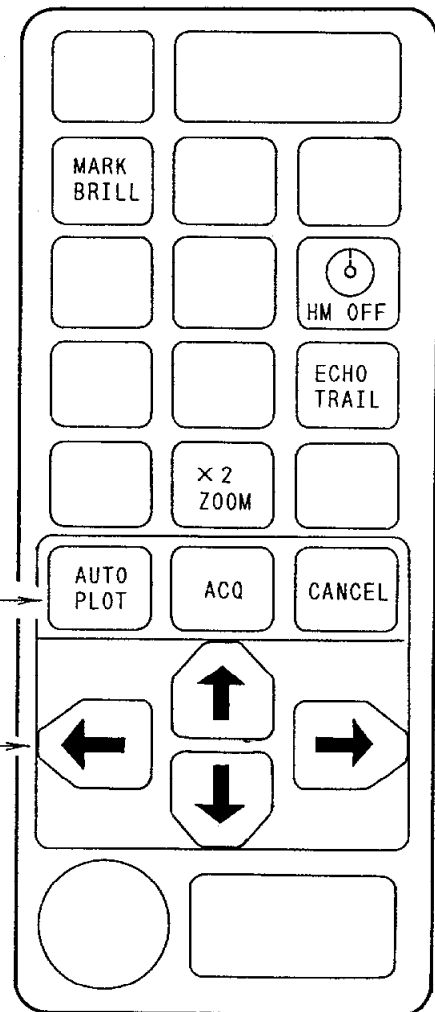## Auto Plotter Function Keys

- FR-8000 Series   • FMD-8000
  (except FR-8030)
- FR-1531DS

Put the "AUTO PLOT" sticker (supplied) here. ———————→

arrow keys ———————→

Auto plotter operation is conducted by using the keys shown right.

In the auto plotter mode these keys (except the arrow keys) lose their inherent functions for radar operation.

Summary
of
Auto Plotter Functions & Key Strokes
* *

NOTE 1. [   ] + [   ] ---- Press the two keys simultaneously.
      2. [   ] (3 sec) ---- Press and hold down the key for more than 3 seconds.
                       Unless noted, release the key within 3 seconds.

Functions	Key Strokes
Turns on/off auto plotter function.	[AUTO PLOT]
Measures own ship speed relative to a fixed target.	1. [arrow keys] --- Move the "+" cursor onto a target. 2. [ACQ] (3 sec) --- Speed Measurement enabled. 3. [CANCEL] -------- Speed Measurement disabled.
Acquires a target, and presents a vector.	1. [arrow keys] --- Move the "+" cursor onto a target. 2. [ACQ]
Ceases tracking of a specific target.	1. [arrow keys] --- Move the "+" cursor onto a target. 2. [CANCEL]
Ceases tracking of all targets.	[CANCEL] (3 sec)
Turns on/off target information presentation.	[×2 ZOOM]
Selects a target for target information presentation.	1. [arrow keys] --- Move the "+" cursor onto a target. 2. [HM OFF] + [MARK BRILL]
Turns on/off history presentation.	[HM OFF] + [ECHO TRAIL]

Operating Procedure

Select a range from 1.5 to 48nm, and adjust the GAIN, STC, FTC controls, etc. for best target presentation.
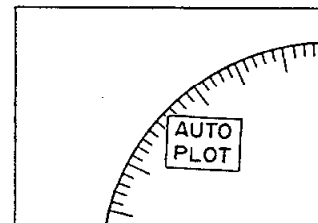
> NOTE: If you select a range outside the above limits during the following steps, the "AUTO PLOT" indication (shown below) will blink to alert you.

Hit the [AUTO PLOT] key. — — — — — — — — — — — — — ——>

> NOTE: When the radar picture is zoomed up with the [×2 ZOOM] key, the auto plot mode can not be called up.

AUTO PLOT

How to measure OWN SHIP SPEED (when SPEED LOG is not available)

(1) Find a small(isolated) fixed target in 0.3 to 32nm range, such as a small island, a lighthouse, the tip of a cape,etc.

> NOTE : The auto plotter calculates the own ship speed from the own ship's movement relative to the center of the target. Unless the target presentation is stable or if its contour changes easily, correct speed can not be measured. For this reason do not select a large ground mass or a long coast line as a target.

(2) Move the "+" cursor onto the selected target by pressing the [arrow] keys. — — — — — —>

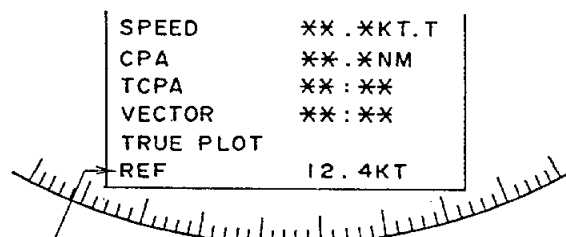(3) Press and hold down the [ACQ] key — —>• A base target mark appears on the for more than three seconds. cursor crossing.

NOTE

When the unit fails to acquire the target, the buzzer sounds. Do the operation from (1) again. —>• Own ship speed is presented.

SPEED	✱✱.✱KT.T
CPA	✱✱.✱NM
TCPA	✱✱:✱✱
VECTOR	✱✱:✱✱
TRUE PLOT	
REF	12.4KT

Own ship speed relative to the target

3

After a target is acquired, it is tracked and the relative speed is continually calculated/indicated. When a target is lost or it goes out of 0.2 to 32nm range, it can not be tracked, which is signalized by blinking its base target mark. Do the operation from (1) again.

How to cease speed measurement

Shift the "+" cursor onto the base target mark, and hit the [CANCEL] key. The base target mark will disappear and the ship's speed information will be taken from the speed log if connected.

How to acquire a target and display vector

(Up to 10 targets may be acquired and tracked concurrently.)

(1) Move the "+" cursor onto the center of the
    intended target by pressing the [arrow] keys. ─ ─ ─ ─ ─>

NOTE

    Select a target within the 0.3 to 32nm range. The target must be
    distinctly presented without being masked by sea or rain clutter.

(2) Hit the [ACQ] key. ─ ─ (a few seconds later) ─ ─ > The track mark appears
                                                       on the target.

    NOTE
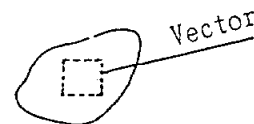
        • When acquisition fails ([ ] mark does
          not appear), do the operation from
          (1) again.

        • In the following cases a beep is
          generated.

            a. The target is within 0.3nm or out of
               32nm range.
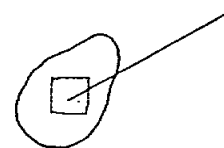
            b. 10 targets are already being tracked.

(1min.)

(2min.)

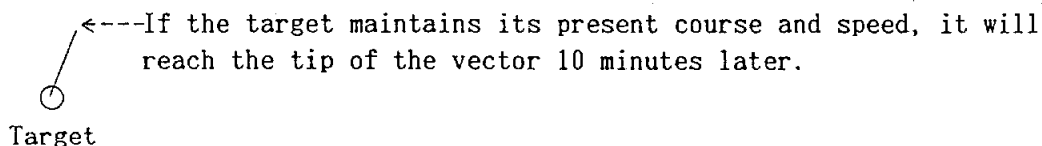Vector appears, but is
not reliable.

Vector

• Vector is reliable.
  (The track mark is
  unbroken.)

4

• The direction of the vector indicates the target's moving direction,
  and its length is the trip distance per a fixed period (e.g. speed).
  The "fixed period"(called VECTOR TIME) may be chosen among the following
  eight by the internal switch. See page AP2-6.

    30 sec, 1, 2, 3, 6, 10, 15, 30 min

(EXAMPLE) Vector Time = 10min

        ┌←---If the target maintains its present course and speed, it will
        /   reach the tip of the vector 10 minutes later.
      ⊙
    Target

When the target is acquired completely, target information is presented :

PLOT.T	＊＊:＊＊	──History plotting interval (page 7)
RANGE	2.37NM	┐
BEARING	195.1° T	├─ From own ship to target ("T" = True)
COURSE	359.2° T	┐
SPEED	12.7KT.T	├─ Target velocity ("T" = True)
CPA	2.4NM	──Mileage from own ship to CPA＊
TCPA	01:23	── Time to CPA (min : sec)
VECTOR	3:00	
TRUE PLOT		＊ CPA = CLOSEST POINT OF APPROACH of
LOG	12.4KT	the own ship and the target

＊ CPA = CLOSEST POINT OF APPROACH of
  the own ship and the target
  is based on the assumption
  that both maintain their
  present courses and speeds.

└─Own ship speed

└─VECTOR TIME (min : sec)

└─ "RELative PLOT" mode is available. See page AP2-6.

In this mode the vector indicates the target's velocity relative to the
own ship velocity. If the target is navigating exactly at the same speed
and on the same course as the own ship, a vector is not presented and
the ship's track line (dots) does not extend.

5

The track mark/vector moves on the screen, tracking the target's movement, and the vector length and direction change accordingly.

NOTE   When the target goes out of the 0.2 to 32 nm range or the target is lost, the unit stops tracking it after blinking the tracking mark indication. Though the target is not tracked, the track line (history) will remain on the screen until the following operation is done.

          • Ceasing the history presentation ---- [HM OFF] + [ECHO TRAIL]
          • Quitting the auto plotter mode ------ [AUTO PLOT]
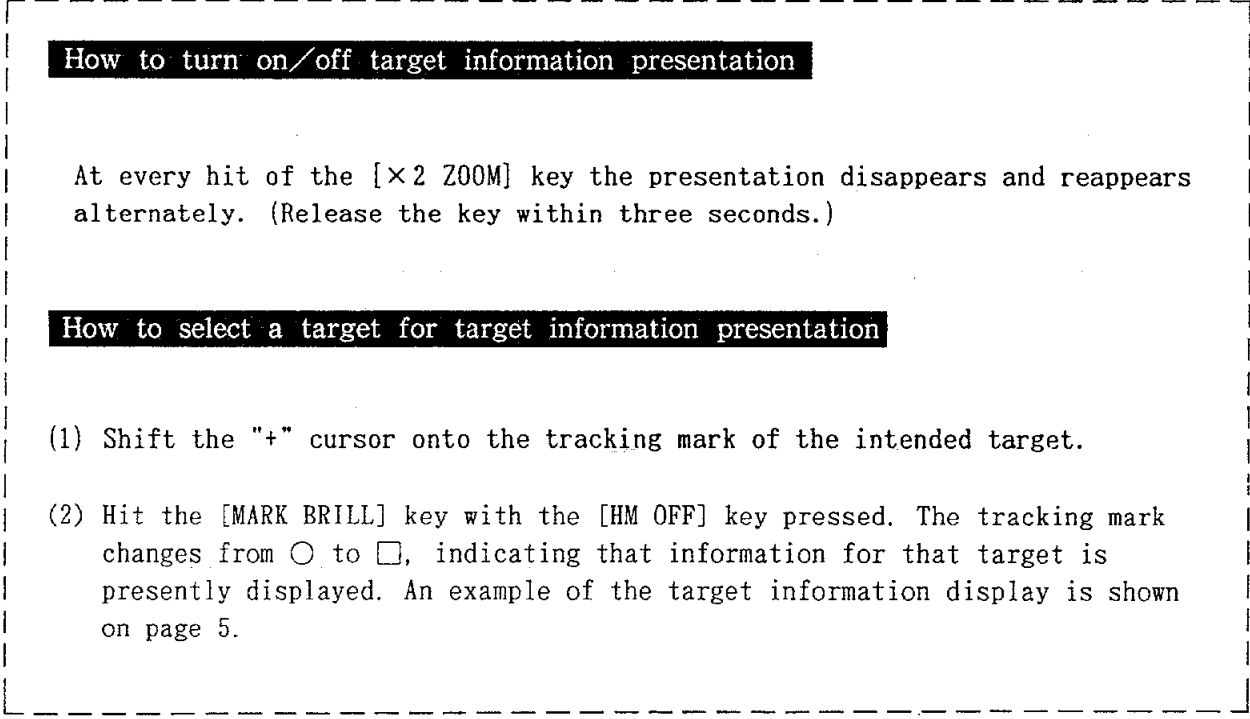
How to cease tracking

• To delete a specific target from tracking, (1) move the "+" cursor onto its track mark by pressing the [arrow] keys, and (2) hit the [CANCEL] key. (Release the [CANCEL] key within three seconds.)

• To cease tracking all targets, press the [CANCEL] key for more than three seconds.

How to turn on/off target information presentation

At every hit of the [×2 ZOOM] key the presentation disappears and reappears alternately. (Release the key within three seconds.)

How to select a target for target information presentation

(1) Shift the "+" cursor onto the tracking mark of the intended target.

(2) Hit the [MARK BRILL] key with the [HM OFF] key pressed. The tracking mark changes from ◯ to ▢, indicating that information for that target is presently displayed. An example of the target information display is shown on page 5.

6

How to display the history presentation

Hit the [ECHO TRAIL] key with
the [HM OFF] key pressed. ─ ─ ─ ─ ─ ┬ ─ ≫ • Plotting interval is indicated.

NOTE

1. Max. number of dots per target
   may be chosen among the
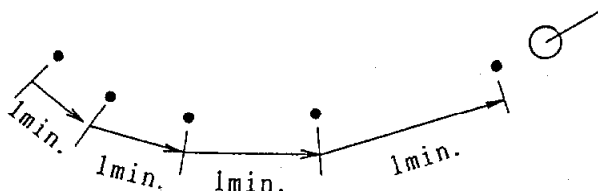   following four by the internal
   switch. See page AP2-7.

   5, 10 points

┌──────────(min : sec)
│   ┌────────────────┐
└─────▶   │ PLOT T   0:30   │
          │ RANGE   2.73NM │
          └────────────────┘

└ ─ ≫ • Track lines of all the targets
        being tracked are presented by
        dots.

2. Dot interval may be chosen
   among the following eight
   by the internal switch.
   See page AP2-7.

   15, 30 sec
   1, 2, 3, 6, 10, 12 min

(EXAMPLE) Plot Interval = 1 min

You can know from the above picture that the target is moving faster and
faster as the dot spacing is becoming longer. On the contrary, if the
spacing is becoming shorter, the target is decreasing its speed.

How to cease the history presentation

Hit the [ECHO TRAIL] key with the [HM OFF] key pressed. ─ ▶ ┌─────────────────┐
                                                              │ PLOT T **:** │
                                                              └─────────────────┘

NOTE: Targets' track lines (dots) are not presented, but plotting is continued
      internally.

To return to the normal radar mode operation, hit the [AUTO PLOT] key.

NOTE: Target tracking is continued internally in order to omit reacquiring
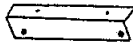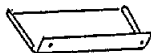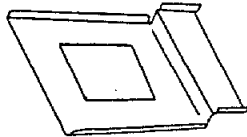   operation next time.

SPECIFICATIONS OF ARP-3
* *

1. Functions
   - Measurement/Indication of Own Ship Speed relative to a fixed target (when a speed log is not available)

   - Automatic Ship's Speed Entry (when a speed log is available)

   - Manual Target Acquisition & Automatic Tracking/Vector Presentation

   - Presentation of Target Information

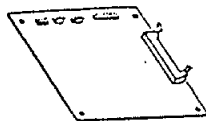   Distance/bearing from own ship
       Moving direction/speed
       Distance/time to CPA (Closest Point of Approach)

   - History Presentation

2. Acquisition & Tracking
   - Manual Acquisition by using the arrow keys/cursor

   - Max. Target Number : 10

   - Acquisition Range : 0.3 to 32 nm

   - Tracking Range   : 0.2 to 32 nm

3. Vector
   - Vector Length   : 30 sec,
                       1, 2, 3, 6, 10, 15, 30 min

   - Mode : True Velocity or Relative Velocity

4. History
   - Plotting Interval : 15, 30 sec,
                        1, 2, 3, 6, 10, 12 min

   - No. of History Points : 5 or 10 per target

5. Compatible Radar
   - FR-8000 Series (except FR-8030) and FR-1531DS
     (ARP-3 may be used with the range setting of 1.5 to 48 nm.)

6. Power Supply
   - 10.2 to 40Vdc, 40W

7. Comprising
   - ARP-3 Unit   ×1
   - Incorporation Materials   ×1 set
   - Installation Materials   ×1 set
   - Spare Parts   ×1 set

[NOTE]   Specify the following points when ordering:

1. Tabletop or bulkhead mount radar display
2. N(Dutch)-type or Regular Type

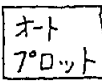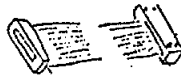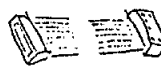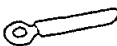| 組 込 材 料 表 INCORPORATION MATERIALS	ARP-3	オートプロッタ AUTO PLOTTER		

番号 No.	名　称 N A M E	略　図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 R E M A R K S
1	ＧＳＣ取付板（Ｒ） GSC FIXING BED (R)		03-034-9501 CODE No.	1	
2	ＧＳＣ取付板（Ｌ） GSC FIXING BED (L)		03-034-9502 CODE No.	1	
3	ＧＳＣ基板取付板 GSC BOARD FIXING BED		03-034-9503 CODE No.	1	
4	±ナベセムスネジB PAN HEAD SCREW		M4x8 CODE No.	8	
5	±ナベセムスネジA PAN HEAD SCREW		M3x15 CODE No.	7	
6	ス ペ ー サ ー（2） SPACER (2)		HSA-3006 CODE No.	7	
7	平　座　金 FLAT WASHER		M3 CODE No.	8	1ヶはスペア 1:SPARE
8	バ ネ 座 金 SPRING WASHER		M3 CODE No.	8	1ヶはスペア 1:SPARE
9	六 角 ナ ッ ト HEX. NUT		M3 CODE No.	8	1ヶはスペア 1:SPARE
10	プリント基板組品 PC BOARD ASSY.		03P7694 CODE No.	1	
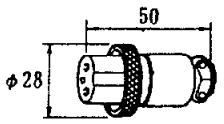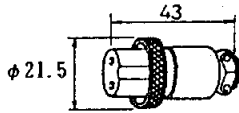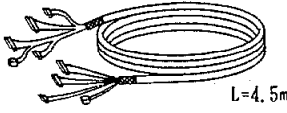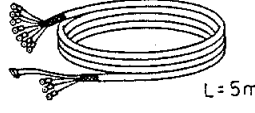
		図 番 DWG. No.		
		検 図 CHECKED		

FURUNO ELECTRIC CO., LTD.

FURUNO

組 込 材 料 表 INCORPORATION MATERIALS	ARP-3	オートプロッタ AUTO PLOTTER	

番号 No.	名 称 N A M E	略 図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 R E M A R K S
11	メ モ リ ー CMOS ROM		MBM27C512-25		1	N-TYPE(オランダ仕様) または or Regular (標準)
			CODE No.			
12	キートップシール KEYTOP STICKER	オート プロット			1	国内仕様 JAPAN
			CODE No.			
		AUTO PLOT			1	輸出仕様 EXPORT
			CODE No.			
13	VHコネクター組品 VH CONNECTOR ASSY.		03-1129 (3P)		1	
			CODE No.			
14	コネクター組品 CONNECTOR ASSY. （卓上用） (TABLETOP)		FRC-1916 (ARP-3 + RP-3)		1	
			CODE No.			
			FRC-1917 (ARP-3)		1	どちらか 選択 ALTERNATIVE
			CODE No.			
* 15	コネクター組品 CONNECTOR ASSY. （壁掛用） (BULKHEAD)		FRC-1873 (ARP-3 + RP-3)		1	
			CODE No.			
			FRC-1874 (ARP-3)		1	
			CODE No.			
16	コーチングクリップ CABLE CLIP		VJR-3		6	
			CODE No.			
** 17	±ナベセムスネジB PAN HEAD SCREW		M3x8		8	
			CODE No.			

* FR-1531DSは壁掛型のみ。
  FOR FR-1531DS, USE BULKHEAD TYPE ONLY.

** FR-8000 SERIES … 7本スペア 7 PCS=SPARE
   FR-1531DS………… 3本スペア 3 PCS=SPARE

図 番 DWG. No.	
検 図 CHECKED	

FURUNO ELECTRIC CO., LTD.
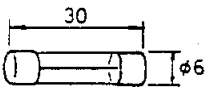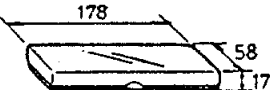
FURUNO			CODE No.	008-302-190		AP1 - 4
			TYPE	CP03-06110		
工 事 材 料 表 INSTALLATION MATERIALS		ARP-1/3	オートプロッタ AUTO PLOTTER			

番号 No.	名 称 N A M E	略 図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 R E M A R K S
1	コ ネ ク タ CONNECTOR	50 φ28	21P3B		1	
			CODE No.	000-115-146		
2	コ ネ ク タ CONNECTOR	43 φ21.5	16P2B		1	
			CODE No.	000-500-346		
3	ケ ー ブ ル 組 品 CABLE ASSY.	L=4.5m	03S7813 (RW-7734 *4.5M*)		1	
			CODE No.	008-302-200		
4	ケ ー ブ ル 組 品 CABLE ASSY.	L=5m	03S7863 (EV-S 0.2SQX5P *5M*)		1	
			CODE No.	000-115-076		
			CODE No.			
			CODE No.			
			CODE No.			
			CODE No.			
			CODE No.			
			CODE No.			

008-302-220
CP03-06111

GC (ジャイロコンバータ) 無し
WHEN BEARING SIGNAL IS APPLIED FROM AD-10S.

図 番
DWG. No. C3024-003-C

検 図
CHECKED

FURUNO ELECTRIC CO., LTD.

FURUNO

CODE No.	008-302-170	BOX No.	P AP1 - 5
TYPE	SP03-04500		

SHIP No.	SPARE PARTS LIST FOR		U S E	SETS PER VESSEL
	ARP-1/3	オートプロッタ AUTO PLOTTER		

ITEM No.	NAME OF PART	O U T L I N E	DWG. No. OR TYPE No.	QUANTITY			REMARKS/CODE No.
				WORKING		SPARE	
				PER SET	PER VES.		
1	管入りヒューズ FUSE	30 ⌀6	JSO 10A or FGBO 10A 125V	1		1	000-549-065
	予 備 品 箱 SPARE PARTS BOX	178 58 17	F710用		1		000-831-610

MFR'S NAME	FURUNO ELECTRIC CO., LTD.	DWG. No.	C3024-001-A

I N S T A L L A T I O N

Modification/Incorporation/Connection in
Display Unit

Modifying signal processor board 03P7529

Display Unit (Right Side)
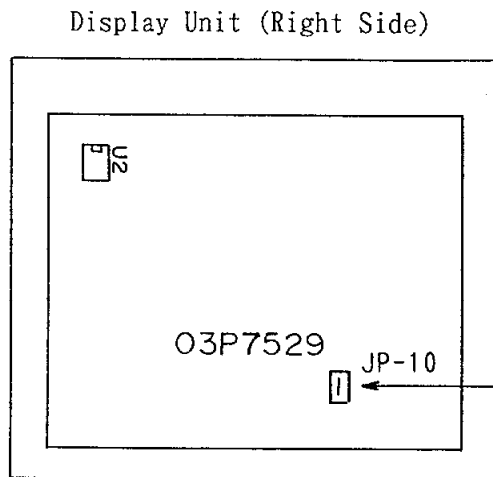
In case of FMD-8000

1. Use 03P7529 Version 3 (03P7529-3)
   or later.
2. Cut jumper JP-10.

Replace ROM chip U2 with the one supplied.

Program No. 03575731**   (FOR REGULAR TYPE ONLY)

└── Version No. 05-up

(1) Assemble the GSC fixing bed (R), GSC fixing bed (L), GSC board fixing bed and 03P7694 board as illustrated below. (The materials are supplied.)

NUT
M3 7

CABLE CLIP
VJR-3   1

SPRING WASHER
M3 7

FLAT WASHER
M3 7

PC BOARD
03P7694

PAN HEAD SCREW
M3×8 2

SPACER (2)
HSA-3006 7

PAN HEAD SCREW
M4×8 2

GSC BOARD FIXING BED
03-034-9503

PAN HEAD SCREW
M3×15 7

GSC FIXING BED(L)
03-034-9502

GSC FIXING BED(R)
03-034-9501
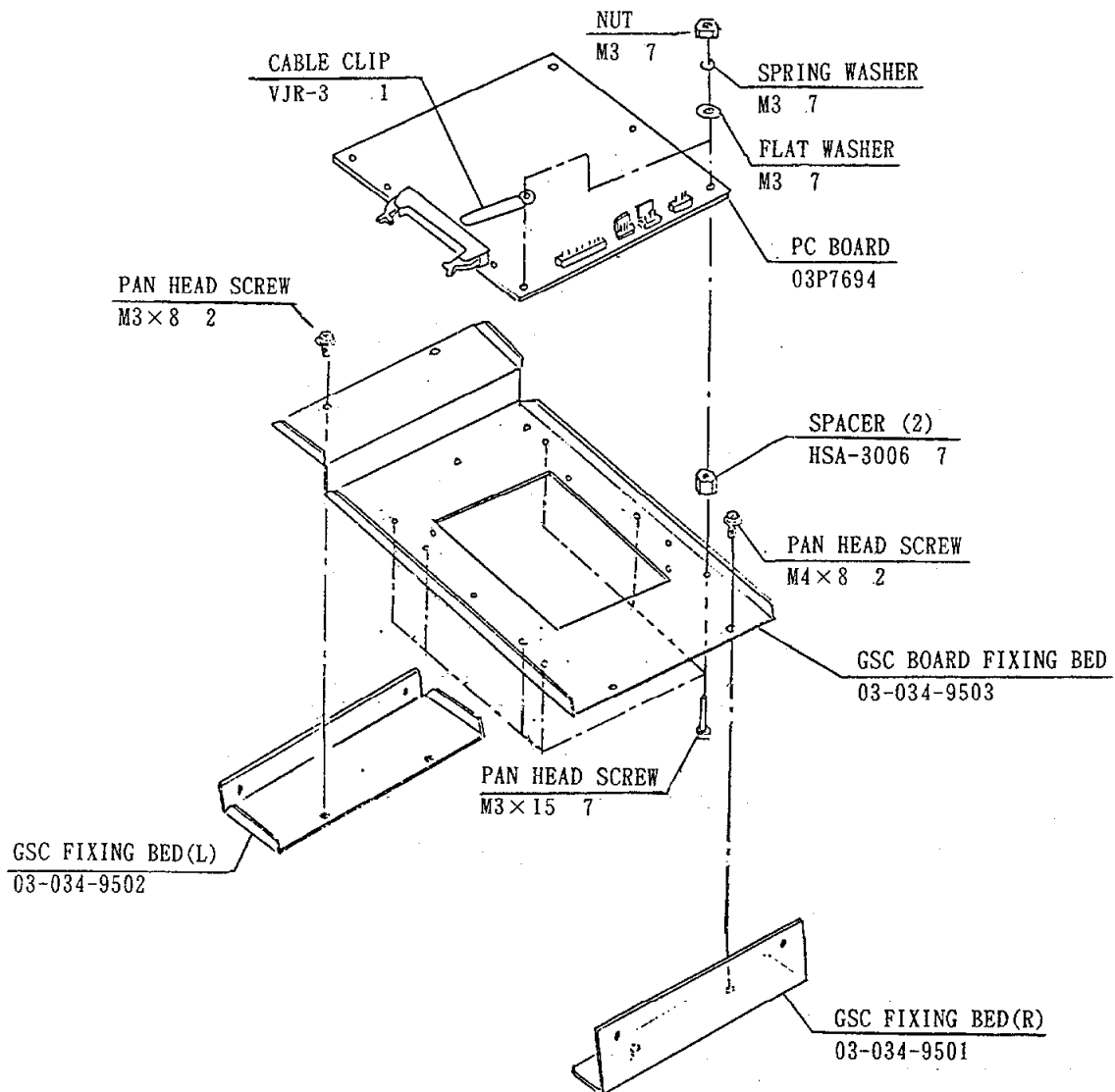
Incorporate the assembly into the radar display:

M4x8

M4x8

J4

JI

AP2 - 2
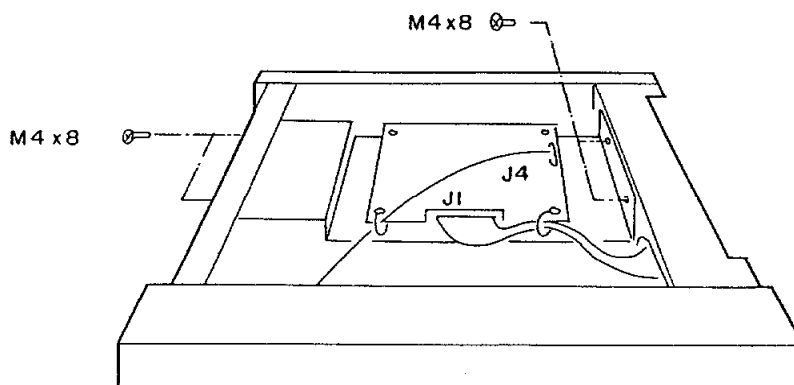
NOTE 1. In case of bulkhead mounting, install the assembly on the bottom of the radar display. (Fixing threads are factory-arranged.)

2. In case of the FR-1531DS the pc board fixing bed is factry-installed. The 03P7694 board should be mounted on it with its flat cable connector (J1) end directed aftward.

(2) Connect 03P7694 J4 and the display power supply with the VH connector assembly (supplied):

FR-8000 Series/FMD-8000 (left side)   FR-1531DS (left side)
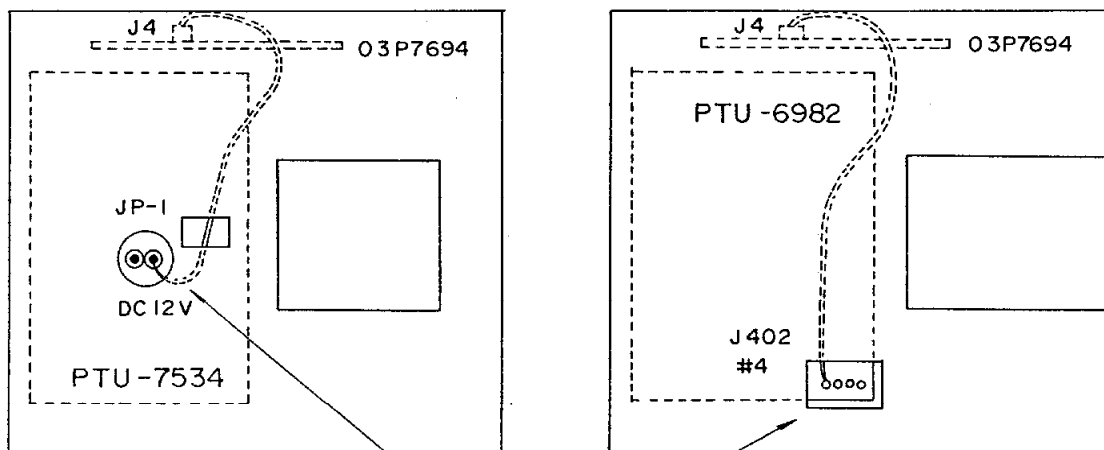
Soldering

(3) Connect 03P7694 J1 and 03P7529 J101 with the connector assembly (for tabletop mounting or bulkhead mounting) supplied :

Display Unit (right side)
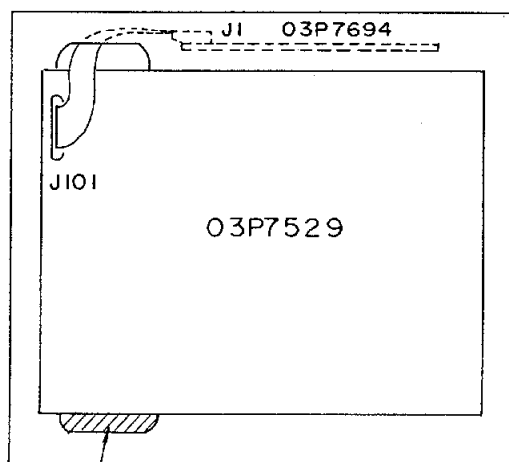
└ In case of bulkhead mounting, draw out the flat cable through this cutout.

Cable Connection

Pass the 03S7813 cable (supplied) through the cable clamp, and plug the cable-end connectors as illustrated below.

Display Unit (rear side)

to ARP-3 Unit

M3×8   PAN HEAD SCREW ⎱ (supplied.)
VJR-3   CABLE CLIP   ⎰
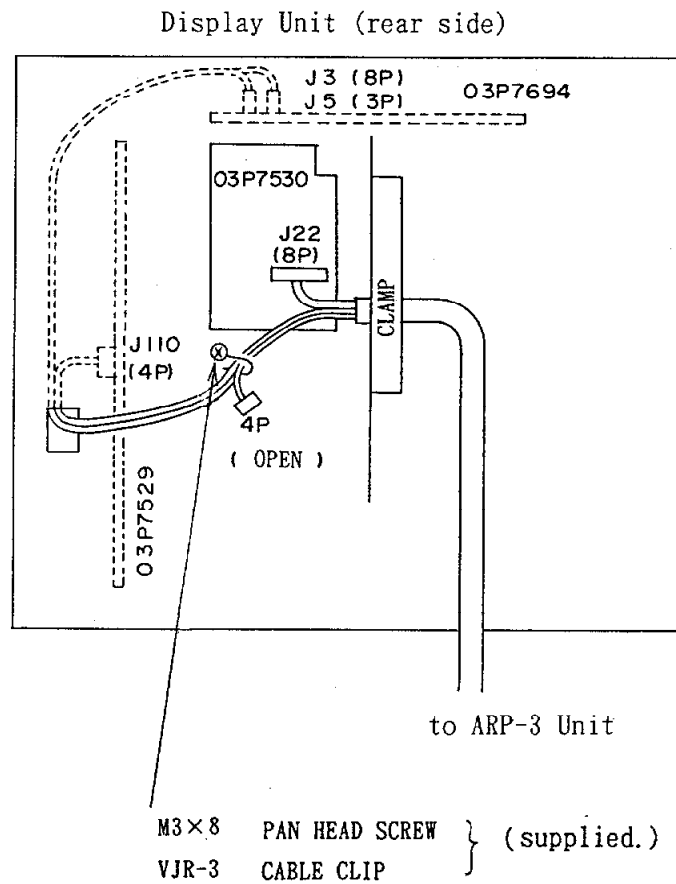
Connections in ARP-3 Unit

- Connections for power supply and a speed log should be carried out as per the interconnection diagram on page S-1.

- The 03S7813 cable from the display unit should be led into the ARP-3 unit through the cable clamp, and the cable-end connectors should be plugged as illustrated below.

ARP-3 (rear side)　　　　　　　　　　ARP-3 (front side)

Tie the unused
leads to the wing nut.

F3151 10A　　LOG　Cable Clamp

J1351
10.2－40V DC

RW 7863　　　　03S7813

　　　　to: Radar Display

to: AD-10S

┌03P7695

J2
(8P)

J3(10P)

J468
(4P)

P468

J4
(3P)

ACPU 03P7611
AFE 03P7610
03P7759

NOTE
Do not disconnect the
speed log cable (P467)
from J467 on the ACPU
board.
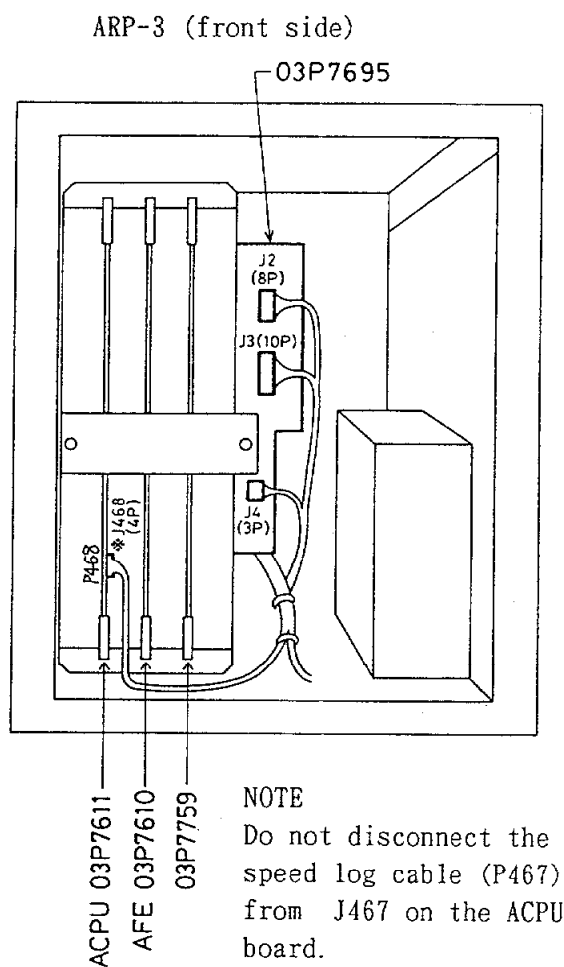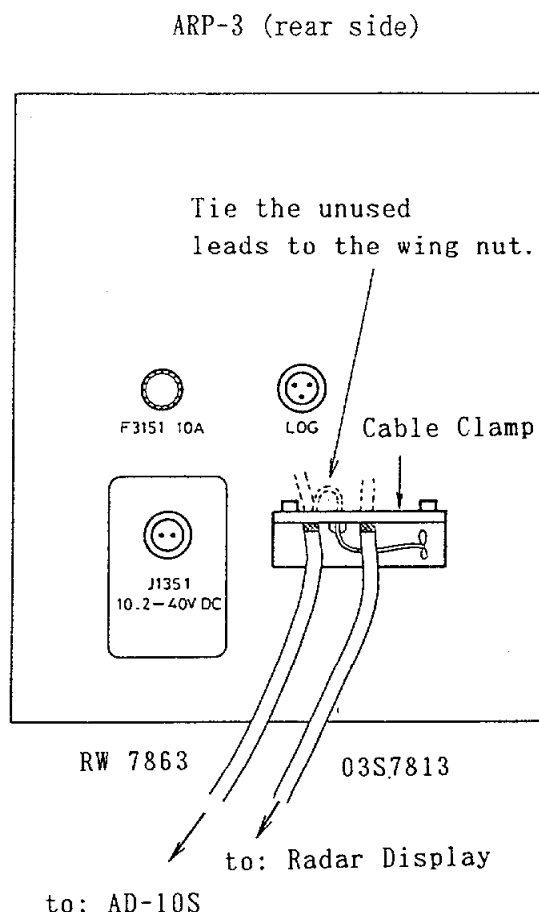
※　J468 (03P7611) Connection

"AD-10S AD-Converter" is required. Lead the cable from AD-10S through
the cable clamp, and plug the cable-end connector (4P) into J468.
The ground lead (terminated with a crimp-on lug) of the cable should
be fixed to the screw on the cable clamp. You may leave the 4P plug
(P468) of the display connection cable (03S7813) open.

Adjustments

Tailoring DIP switches

03P7694 Board

Display Unit (top side)
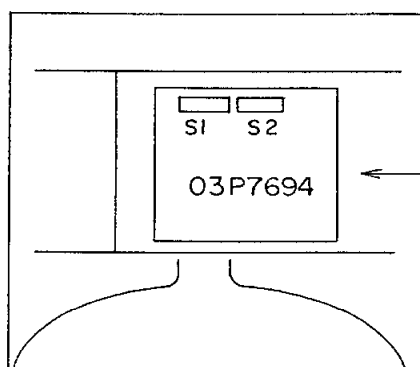
NOTE   The asterisks(*) in the following
descriptions indicate factory settings.

The 03P7694 board is mounted
front-side back in FR-1531DS.

S1   # 1   * off: Not used.

2   * off: True Speed Vector

The vector of a target indicates the absolute velocity
(relative to ground). It is not influenced by the own
ship velocity.

ON : Relative Speed Vector

The vector of a target indicates the velocity relative to
the own ship velocity. It is influenced by the own ship
velocity. If a target is navigating exactly at the same
speed and on the same course as the own ship, the vector
length is zero.

3   # 4   # 5   * all bits off: Not used

# 6	# 7	# 8	Vector Time
ON	ON	ON	30 min
off	ON	ON	15 min
ON	off	ON	10 min
* off	off	ON	6 min
ON	ON	off	3 min
off	ON	off	2 min
ON	off	off	1 min
off	off	off	30 sec

S2 [♯ 1] * off: Normal Mode Operation.

               ON : Self-check Mode Operation.

[♯ 2] * off: Not used.

[♯ 3] <u>History Points per Target</u>

  * off   5 dots
    ON   10 dots

(When many dots are present on the screen, it takes longer for the unit to repaint the picture.)

[♯ 4] [♯ 5] * off: Not used.

[♯ 6] [♯ 7] [♯ 8] <u>History Plotting Interval</u>

♯ 6	♯ 7	♯ 8	
ON	ON	ON	12 min
off	ON	ON	10 min
ON	off	ON	6 min
off	off	ON	3 min
ON	ON	off	2 min
* off	ON	off	1 min
ON	off	off	30 sec
off	off	off	15 sec

<u>03P7611 Board</u>

ARP-3 Unit
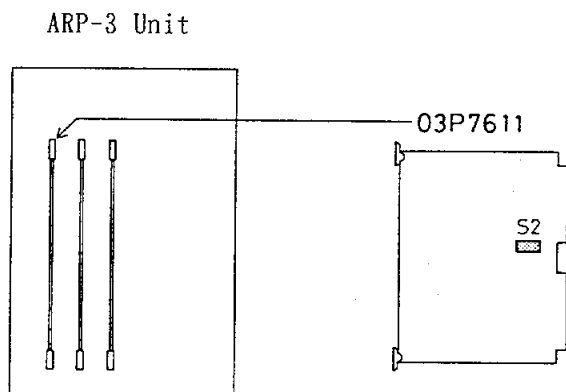
S2 [♯ 1] to [♯ 6] ------ Not used.

[♯ 7] [♯ 8] <u>Speed Log</u>

♯ 7	♯ 8	
ON	ON	400 pulses/mile
* off	ON	200 pulses/mile

The following adjustment should be done with the 12-mile range selected.

ARP-3 Unit

AFE 03P7610
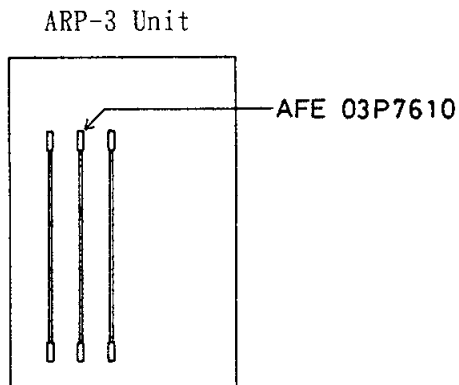
Threshold Level with Minimum Gain

    Conditions : [A/C RAIN] ----- fully ccw
                  [A/C SEA] ------ fully ccw
                  [GAIN] --------- fully ccw

    Adjustment : Connect a digital multimeter to TP6 and TP7 as shown below, and
                 adjust VR2 for ±0.1Vdc readout.
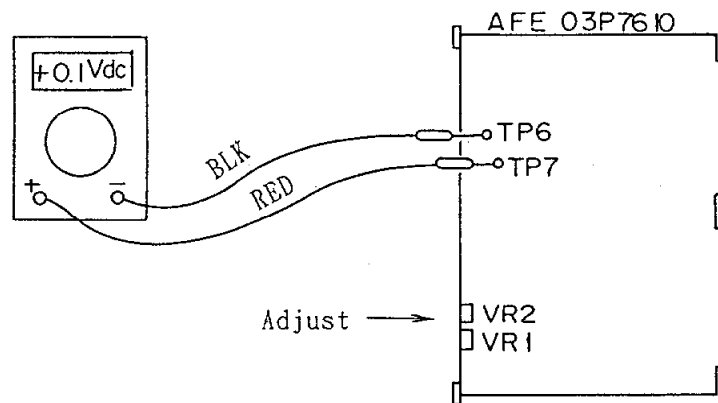
Threshold Level with Maximum Gain

    Conditions : [A/C RAIN] ----- fully ccw
                  [A/C SEA] ------ fully ccw
                  [GAIN] --------- fully cw
                  [INT REJECT] --- off

(1) Slide switch S2 on the 03P7529 board to the "QV" (QUANTIZED VIDEO) side.

Display Unit (right side)

```
O3P7529




              QV
               ↑
               | ▣ S2
               ↓
            RAW-V
```
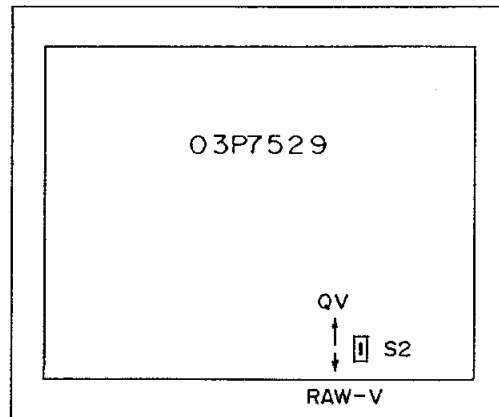
(2) Adjust VR1 on the 03P7610 board so that random noise somewhat appears on the screen.

No noise at all   Appropriate   Too much noise

AFE 03P7610

Adjust ——→ VR1
VR2
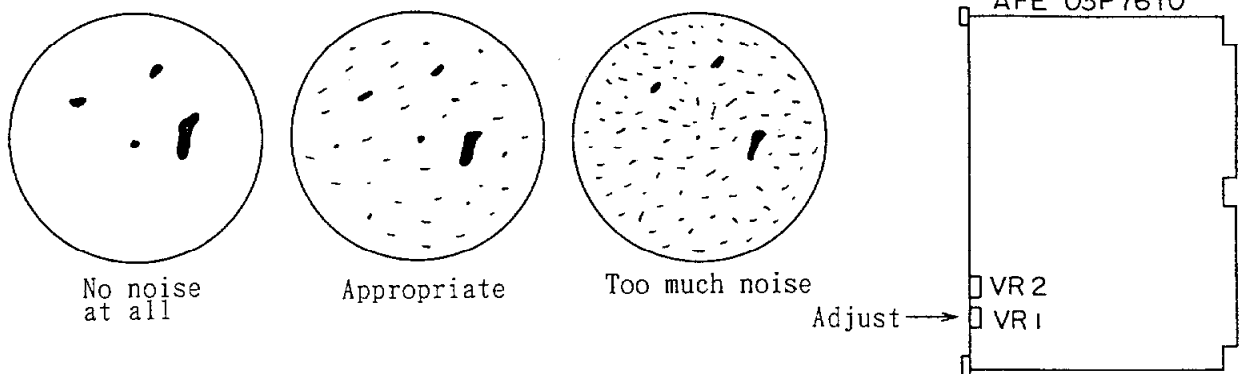
NOTE: Do not reduce noise excessively.
      A slight amount of noise is preferable.

(3) Return the slide switch setting from "QV" to "RAW VIDEO".

Adjusting Track—Mark/Vector Presentation Timing

Position the track mark on the center of a target echo:

(1) Select the 6-mile range, and find a target in 3 to 5 mile range of which the size is similar or smaller than the track mark.

(2) Adjust the mark/vector position by S1 and S2 of the AFE 03P7610 board.

NOTE

1. S2 and S1 are for coarse and fine adjustments, respectively. When S2 or S1 is turned cw, mark/vector move toward the own ship position v.v. The mark/vector can not be moved outward of the target echo.
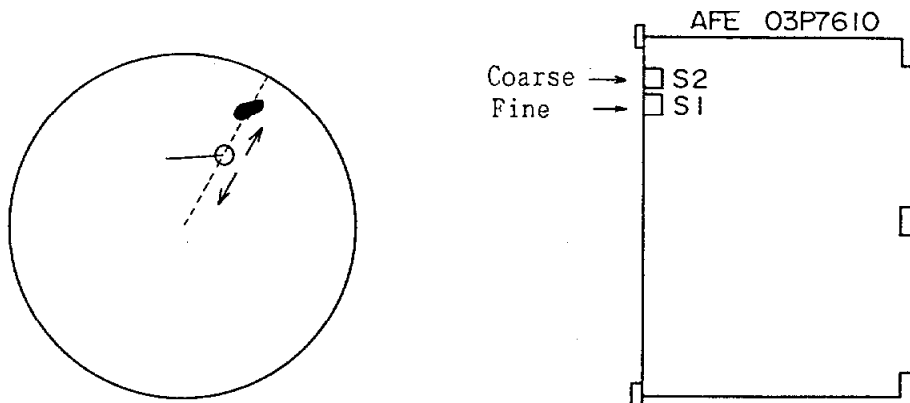
2. Response to S2/S1 adjustment is slow due to smoothing processing by software. The mark/vector will change their positions about 30 seconds later after adjusting the switches.

3. Do not set both S2 and S1 fully ccw.

Checking Gyro Data Entry and Log Signal Input into ARP-3

Turn on the radar, and confirm that the "ARP GYRO" readout is correct while the radar is in standby condition.
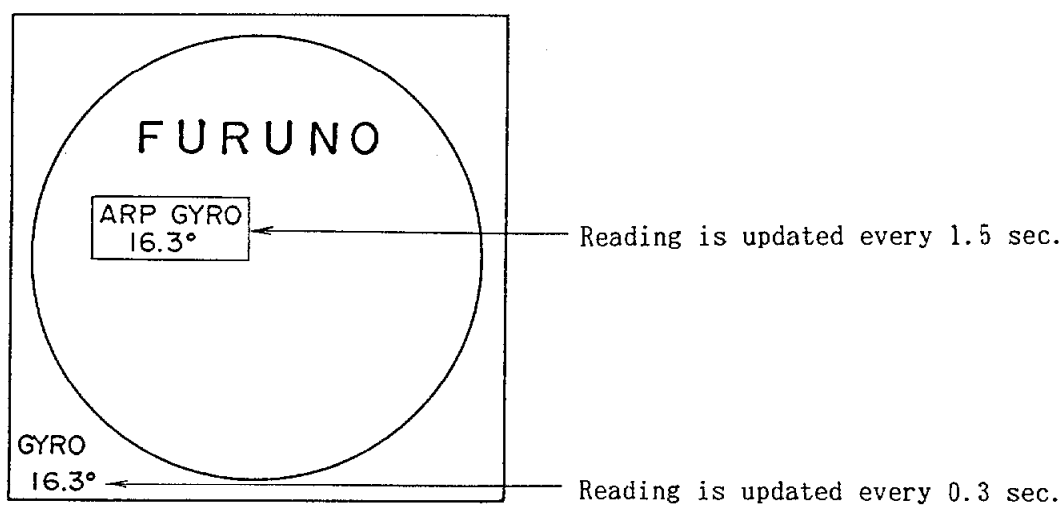
Acquire any target as mentioned on page 4, and the target information is presented as shown on page 5. Confirm that the LOG readout is showing reasonable information.

SERVICE SPACE
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100　40.5　220　100

118

420

400

10

301

400

4-M8
取付ボルト
FIXING BOLT
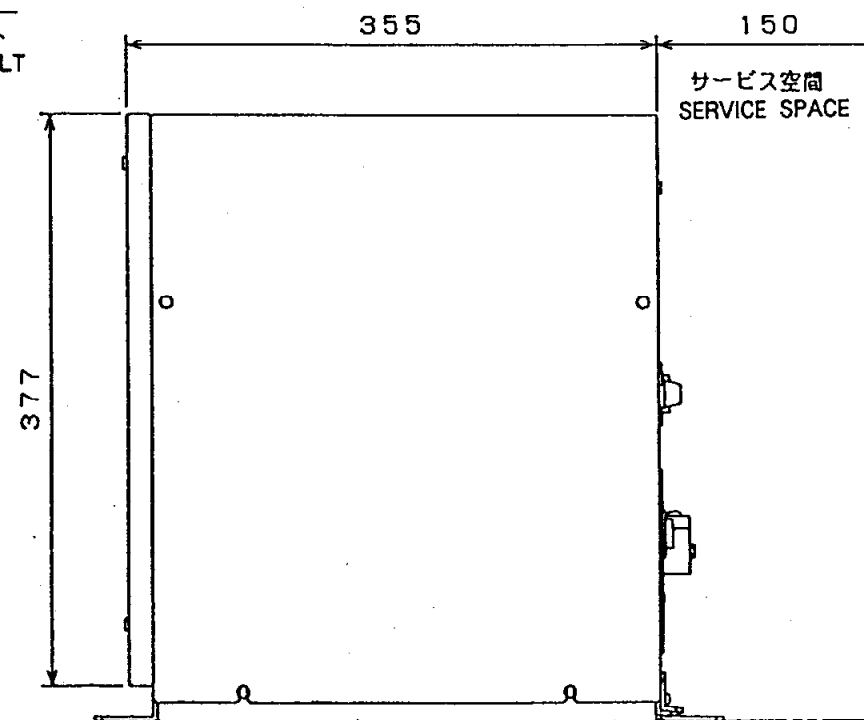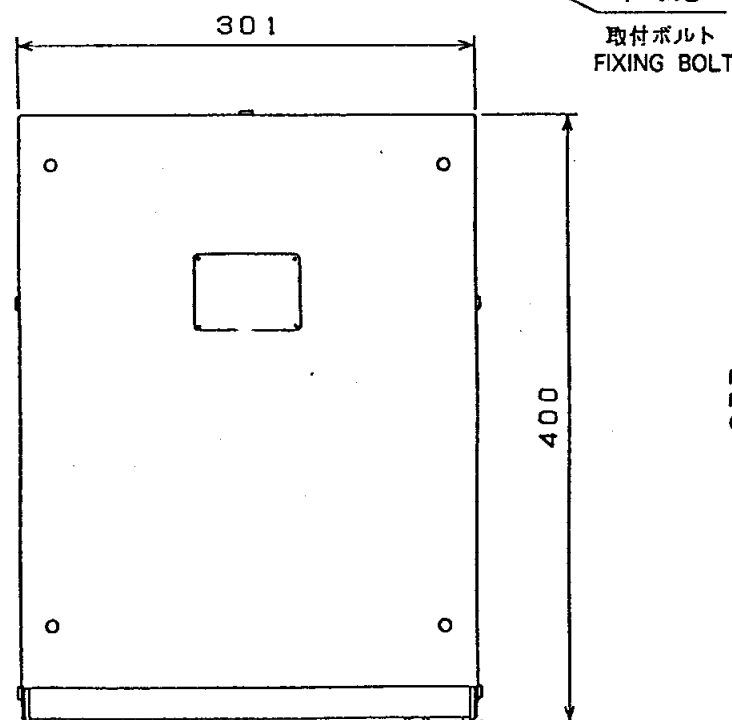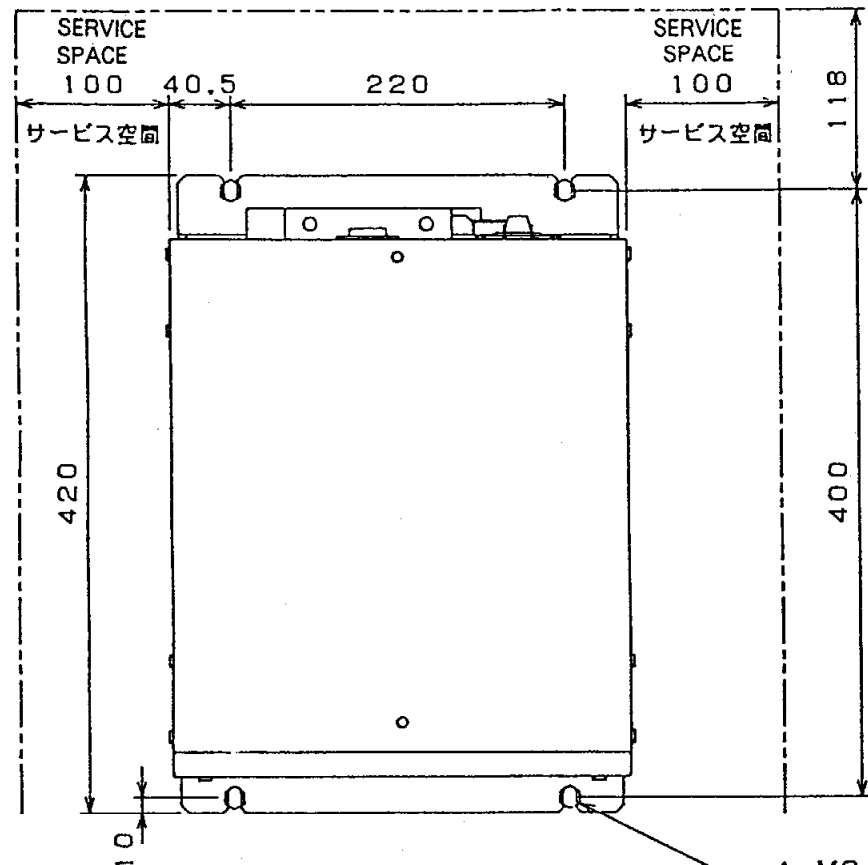
ヒューズホルダ
FUSE HOLDER

ケーブルクランプ
CABLE GLAND

アース端子
GND TERMINAL

背面図
REAR VIEW

355　150

サービス空間
SERVICE SPACE

377

承　認 APPROVED	NOV・28・88 T. NAKAJO	三　角　法 THIRD ANGLE PROJECTION		名　称 TITLE	ARP-1　ARP-3 制　御　部 CONTROL UNIT
検　図 CHECKED	NOV・28・88 N. S417C	尺　度 SCALE	1／5		
製　図 DRAWN	NOV・7・88	重　量 WEIGHT	10　kg	図　番 DWG. NO.	C3024-005-A

FURUNO ELECTRIC CO., LTD.

FURUNO

1   2   3   4   5   6

FR-8000 SERIES シリーズ
FMD-8000
FR-1531DS

ARP-3 オートプロッタ AUTO PLOTTER

SIG PROCESS
03P7529

J110
ARP VIDEO > 1
GND > 2
Q-VIDEO > 3
GND > 4   P607

(FRC2-C40S13-OL)
(B4P-SHF
-IAA-K)
J101   1 2 ----39 40

P101

P601
1 2 ----39 40

AIF2
03P7694   (FRC2-C40L13-OL) J1 J3   P605
TD2H > 1
TD2C > 2
RD2H > 3
RD2C > 4
DTRH > 5
DTRC > 6
DSRH > 7
DSRC > 8
(B8P-SHF
-IAA-K)

(B3P-VH)   GND > 1
(B3P-VH)   POWER   POWER   > 2
GND   ON/OFF   ON/OFF   > 3
J4   1 2 3   P604   J5

P602

POWER
PTU-7534   JP1 DC12V   POWER
PTU-6982   J402 #4
(FR-8000/FMD-8000)   (FR-1531DS)

INTERFACE
03P7530   J22   P608
GND > 1
HEADING > 2
GND > 3
BEARING > 4
GND > 5
ARPA TRIG > 6
GND > 7
VIDEO > 8
(B8P-SHF
-IAA-K)

MOTHER
03P7695   J560
(128D-096S3A
-S11A)   ACPU
03P7611   P560
(128D-096P3A
-L11A)   (B4P-SHF
-IAA-K)   J468 P468
SC > 1
SH > 2
DC > 3
DH > 4

> A1a >
> A1b >
>A32b>
>A32c>

(B3P-SHF
-IAA-K)   J559
(128D-096S3A
-S11A)   P559
(128D-096P3A
-L11A)   (B3P-SHF
-IAA-K)   J467 P467
LOG C > 1
> 2
LOG H > 3   J101 P101
> 1
> 2
> 3   SPEED
LOG

P7 J7
1 < MOTOR ⊕
2
3 < MOTOR ⊖
MD625B-24-FII   > B1a >
> B1b >
>B32b>
>B32c>

(21R3A)   (21P3B)

接点信号
CONTACT CLOSURE SIG.
200/400 PULSES/MILE

P12 J2   (B8P-SHF-IAA-K)
1 < TD2H
2 < TD2C
3 < RD2H
4 < RD2C
5 < DTRH
6 < DTRC
7 < DSRH
8 < DSRC

AFE
03P7610
J558
(128D-096S3A
-S11A)   P558
(128D-096P3A-L11A)
> A1a >
> A1b >
>A32b>
>A32c>

P13 J3   (B10P-SHF-IAA-K)
1 < GND
2 < HEADING
3 < GND
4 < BEARING
5 < GND
6 < ARPA TRIG
7 < GND
8 < ARP VIDEO
9 < GND
10 < Q-VIDEO

J557
(128D-096S3A
-S11A)   P557
(128D-096P3A-L11A)
> B1a >
> B1b >
>B32b>
>B32c>

P14 J4   (B3P-VH)
1 < GND
2
3 < POWER
ON/OFF

F1351 10A

FIL
FIL-7673
(16R2A)
J1351
2
P1351
(16P28)

D.C.10.2~40V
SHIP'S MAINS
船内電源

AIF1
03P7759
J564
(128D-096S3A-S11A)   P564
(128D-096P3A-L11A)
> A1a >
> A1b >
>A32b>
>A32c>

P1 J1   J2 P2   P5 J5 (B3P-VH)
4 3 2 1
⊖ ⊕ GND > 1
(B4P-VH)   > 2
POWER
ON/OFF > 3   1 < GND
2 < POWER
3 < ON/OFF

J563
(128D-096S3A
-S11A)   P563
(128D-096P3A-L11A)
> B1a >
> B1b >
>B32b>
>B32c>

(B6P-VH) J3 P3   P6 J6 (B6P-VH)
+12 > 1
+5 > 2
+5 > 3
GND > 4
GND > 5
-12 > 6   1 < +12
2 < +5
3 < +5
4 < GND
5 < GND
6 < -12

PTU
PTU-7471

J20
DATA-H > 4   キ   YEL
DATA-C > 3   シロ   WHT
CLK-H > 2   キ   YEL
CLK-C > 1   ミドリ   GRN

J7~J12
DATA-H   YEL
DATA-C   RED
SHIFT-H   YEL
SHIFT-C   WHT
(25msec)

J7~J12
1 < DATA-H
2 < DATA-C
3 < SHIFT-H
4 < SHIFT-C
(25msec)   AD-100

承認 APPROVED	APR.13.'89 T.NAKANO	名称 TITLE	ARP-3 オートプロッタ AUTO PLOTTER
検図 CHECKED	APR.12.'89 N.SAITO		
製図 DRAWN	MAR.24.'89 T.YUYAMA	図番 DWG.NO.	C3026-C01-B