

9.6 After-installation Adjustments

9.6.1 Installation-time check

- (a) After completing the installation procedure, it is necessary to check the radar unit to verify that all installation steps have been conducted as instructed. In particular, check for correct cabling, for normal component operating state, for water leakage in the scanner unit, and for proper grounding of braided shielding cable.

9.6.2 Functional checks

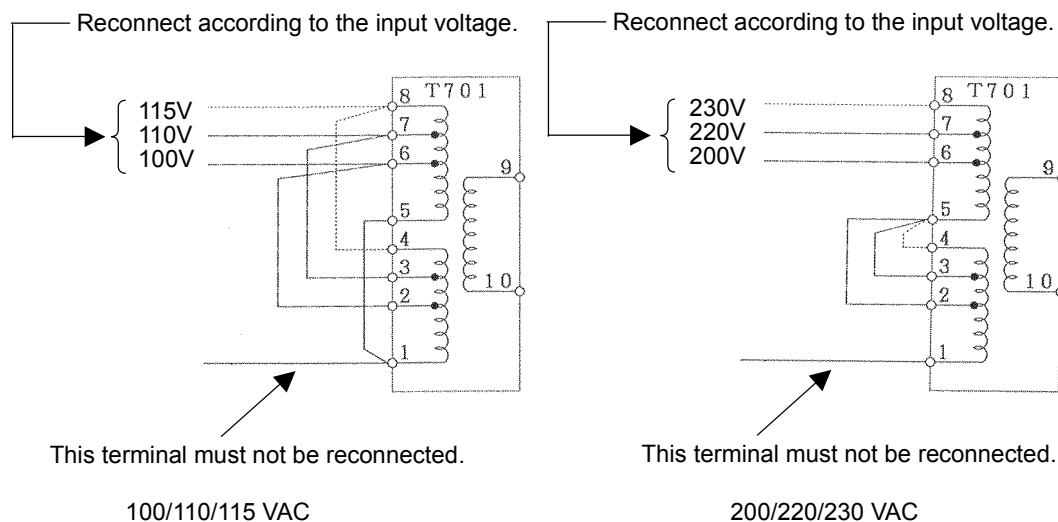
- (a) After completing the installation-time check and before checking the operation of the radar, make sure that the output voltages of the inboard power supply fall within their permissible range.
- (b) Read "3 Basic Operation" carefully and thoroughly and make sure that the radar functions normally. Then, manipulate all controls and menu functions to ensure that they function normally.
- (c) If it becomes necessary to make an adjustment though the radar unit is normal, read "9.7 Adjustment Procedures" carefully and follow the instructions given in that section.

9.6.3 Adjustment items

- (a) Radar's bearing adjustment is mandatory.
- (b) If the control is not positioned near the center of the scale during tuning or if tuning fails, make a coarse tuning from the "TUNE PRESET" menu.
- (c) If there is a difference between the range displayed on the radar's PPI screen and the actual range, adjust the range from the "DISPLAY TIMING" menu.
- (d) The "BUZZER" menu can be used to adjust the volume of the alarming buzzer.
- (e) The "STC PRESET" menu can be used to adjust the STC.

9.6.4 Rectifier unit

- The rectifier unit can run on inboard voltages of 100/110/115 VAC and 200/220/230 VAC provided that connections at the input terminals on the NBA-797A T701 are changed. The figures below show how to change the connections at the input terminals.



[Reconnecting the NBA-797A input terminals]

9.7 Adjustment Procedures

9.7.1 General adjustments

1. Adjustments to be made when a part is replaced

Adjustments need to be performed when major parts of the radar unit. are replaced.

- (a) When the V101 magnetron is replaced —————> Tuning
- (b) When the E101 front end is replaced —————> Tuning
- (c) When the V901 Cathod-ray tube is replaced*
 - When the CRT monitor PCB is replaced
 - > Off center adjustment
 - > Brilliance level adjustment
 - > Focus adjustment

*: When exchanging V901 (CRT), the Direction coil implement in the stuck condition.
Incidentally, It is possible to arrange in cathode-ray tube monitor chassis (CKJ-159)

2. CRT monitor off center adjustment

- (a) This adjustment must be performed on the centering magnet (permanent magnet) located immediately behind the deflection coil. This permanent magnet is made up of two doughnut-like disks.
- (b) Turn the centering knob so that the neck of the Cathod-ray tube is in alignment with the center of the PPI screen.

3. Adjusting the brilliance level of the CRT monitor screen.

- (a) Set the brilliance level of the CRT monitor screen to its maximum from the menu.

● Please refer to "3.2.1 Changing the brightness of the screen" for the method of adjustment.



- (b) Turn potentiometer R451 on the CRT monitor PCB so that no raster appears in the non-displayable area. (Turn the potentiometer slowly since the circuit's sensitivity is very high.)

4. Adjusting the focus of the CRT monitor screen

- (a) Turn potentiometer R951 on the neck PCB in the display unit so that the range rings and video images appear most clearly.

9.7.2 Adjusting the scanner unit

The scanner unit has several locations that need adjustment. They are factory set and normally need not be adjusted by the user. If it is necessary to make functional checks during inspection or repair, make the adjustments that are explained below.

 WARNING	
	<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">Hi-voltage Caution</div> <p>High-tension voltages of 4,000 volts or higher are present at the modulator units (CME-307 or CME-308). The modulator unit must be accessed only by qualified service engineers.</p> <p>Inadvertent manipulation may result in severe electric shock.</p>

1. Adjusting the AVR output voltage from the modulator

- (a) Place the radar unit into the transmission state (the range scale set to 12NM), connect a VOM across J203-14PIN on the CME-307 or CME-308 and the GND terminal, and adjust RV2 so that the output voltage reads +8 volts.

2. Adjusting the tuning indicator level of the receiver

- (a) If the tuning mode is set to "AUTO", reset it to "MANUAL".
- (b) Tune the receiver with the range scale set to 12 NM.

9.7.3 Adjusting the display unit

The display unit has several locations that need adjustment. They are factory set and normally need not be adjusted by the user. If it is necessary to make functional checks during inspection or repair, make the adjustments that are explained below.

1. Adjusting the brilliance level

- (a) Set the brilliance level of the screen to its maximum from the [BRIL] key.
- (b) Turn potentiometer R451 on the CRT monitor PCB so that no raster appears in the non-displayable area. (Turn the potentiometer slowly since the circuit's sensitivity is very high.)

2. Adjusting the focus of the CRT monitor screen

- (a) Turn potentiometer R951 on the neck PCB in the display unit so that the range rings and video images appear most clearly.

3. Adjusting the tilt angle of the display unit

- (a) The angle of the screen can be adjusted by loosening the lock screw on the deflection coil assembly at the neck of the CRT tube and turning the entire screen. The user can also adjust the screen position using the centering magnet.

4. Adjusting the CRT display

In addition to adjustment steps 1. to 3. explained above, CRT monitor adjustments include the following:

- | | |
|---------------------------------|-------------------------|
| (a) Horizontal level adjustment | CCN-366, L400 |
| (b) Vertical size adjustment | CCN-366, R353 (V. SIZE) |
| (c) Contrast adjustment | CCN-366, R451 (CONT) |
| (d) Focus adjustment | CCN-366, R951 |

WARNING

Hi-voltage Caution



The CRT monitor (CCN-366) generates high electric voltage about 10kV and on service personnel should touch parts inside the display.
Inadvertent manipulation may result in severe electric shock.

5. Adjusting the AVR output voltage

- (a) Connect a high-precision voltmeter across pin TP1+3.3V on the CBD-1596 power supply and the chassis, adjust potentiometer +3.3ADJ so that the output voltage reads $+3.3 \pm 0.02\text{V}$.

Attention

- Be sure to connect the scanner unit when making this adjustment.

9.8 Initial Settings

This section will explain the method of initial setting of the radar unit. Initial setting needs to be undertaken prior to initial use.

Initial setting includes:

(a) INITIAL SETTING 1

- Tuning preset (TUNE PRESET)
- Bearing adjustment (BEARING)
- 0 NM adjustment (DISPLAY TIMING)
- Main bang suppression level (MBS LEVEL)
- Main bang suppression range (MBS RANGE)
- Sensitivity preset (GAIN PRESET)
- Comparator preset (COMPARATOR PRESET)
- Sea surface clutter preset (STC PRESET)
- Antenna height preset (ANTENNA HEIGHT)
- GPS preset (GPS PRESET)

(b) INITIAL SETTING 2

- Setting the TD reception number (SET TD NUMBER)
- Simulator image display (SIMULATOR)

Attention

- Be sure to undertake initial setting prior to initial use.
- Unless initial setting has been undertaken, it is not possible to display the target or measure the distance or bearing of a target correctly.

- INITIAL SETTING 1, the initial setting menu that is used here, is displayed by pushing the ENTER key and MENU key simultaneously.

9.8.1 Adjustment of the receiver

- This adjustment need not be changed in general as the equipment is adjusted ex-factory.
- If the adjustment is changed inadvertently, it will not be possible to obtain the optimum tuning even when the TUNE control is operated.

1. Tune preset

Here, rough adjustment of the tune will be undertaken.

- Set the range to 12NM pushing the "▲(up)" or "▼ (down)" on the **RANGE** key.
- Push the soft key **PROCESS** .
- Push the soft key 3 and select **M-TUNE** .
The method of tuning has been set to "manual".
(If the mode is already in manual tuning, this operation is not required.)
- Push the **MENU** key and close the soft key menu.
- Push the **X-MIT/OFF** switch and wait for 10 minutes or more.
Transmission will begin.
After about 10 minutes, the transmission frequency will stabilize.
- Turn the [TUNE] control to the mid position.
- Select "TUNE PRESET" in the line "RECEIVER ADJUST" - the menu "INITIAL SETTING 1".
- Pushing the "▲ (up)" or "▼ (down)" on the **RANGE** key, adjust so that the PPI image becomes the maximum size.
- Push the **ENTER** key.
The adjustment has been completed.

2. Adjusting the central frequency

Adjustment is undertaken so that the image is largest when the deflection of the tune level indicator is at the maximum.

- (a) Undertake operations (a) through (e) of "1.Tune Preset".
- (b) Adjust the image to the maximum using the [TUNE] control.
- (c) Select "TUNE FREQUENCY" in the line "RECEIVER ADJUST" - the menu "INITIAL SETTING 1".
- (d) Adjust to maximize the deflection of the tune level indicator pushing the "▲ (up)" or "▼ (down)" on the R A N G E key.
- (e) Push the E N T E R key.
The adjustment has been completed.

3. Adjusting the level of the tune level indicator

Adjust the scale to correspond to the maximum deflection of the tune level indicator bar.

- (a) Undertake operations (a) through (e) of "1.Tune Preset".
- (b) Using the [TUNE] control, adjust to maximize the deflection of the tune level indicator.
- (c) Select "TUNE LEVEL IND" in the line "RECEIVER ADJUST" - the menu "INITIAL SETTING 1".
- (d) Adjust so that the deflection of the tune level indicator is 80% to 90% of the indicator area pushing the "▲ (up)" or "▼ (down)" on the R A N G E key.
- (e) Push the E N T E R key.
The adjustment has been completed.

9.8.2 Adjusting the noise level

This operation adjusts the basic level of the echo that is displayed on the PPI screen.

Attention

- This adjustment need not be changed in general as the equipment is adjusted ex factory.
- If the adjustment is changed inadvertently, it will not be possible to obtain optimum images as a phenomenon causing reduction in sensitivity may be generated.

- Select "COMPARATOR PRESET" in the menu "INITIAL SETTING 1".
- Adjust the noise level pushing the "▲ (up)" or "▼ (down)" on the **RANGE** key.
- Push the **ENTER** key.
The noise level adjustment has been completed.

9.8.3 Adjusting the bearing

This operation adjusts the bearing on the PPI screen.

- Select "RM" in the line "TM/RM" - the menu "FUNCTION".
If the mode is already in RM, this operation is not required.
- Select "H-UP" in the line "HDG MODE" - the menu "FUNCTION".
If the mode is already in H-UP, this operation is not required.
- Determine the target.
Select an image of a target within 1NM to 2NM that can be seen with the naked eye and that is not moving.
- Measure the bearing of the target from the ship's bow using the ship's compass.
For example, assume the target is stationary at a bearing of 25 degrees from the ship's bow.
- Select "BEARING" in the menu "INITIAL SETTING 1".
The EBL for bearing adjustment will be displayed.
This EBL is different from #1EBL or #2EBL.

- (f) Push the cross key, and align the EBL to the image of target's echo.
- (g) Push the ENTER key.
- (h) Using the cross key, align the EBL to the bearing of the target measured in (d).
The PPI screen also rotates with the EBL.

- (i) Push the ENTER key.
The bearing adjustment has been completed.

9.8.4 0 NM adjustment (Initial setting of distance)

This operation is for calibrating distance on the PPL screen.

- (a) Select "RM" in the line "TM/RM" - the menu "FUNCTION".
If the mode is already in RM, this operation is not required.
- (b) Select "H-UP" in the line "HDG MODE" - the menu "FUNCTION".
If the mode is already in H-UP, this operation is not required.
- (c) Adjust the range to 0.125NM pushing the "▲ (up)" or "▼ (down)" on the RANGE key.
- (d) Determine the target.
Select a target from among echo image on the PPI with respect to which the distance from the ship is known.
In this case, it is assumed that a stationary target 0.08NM from the ship has been selected.
- (e) Push the VRM key.
#1VRM/#2VRM will be displayed.
In the event #1VRM is to be used, select "FIX" in the line "EBL1/VRM1" - the menu "FUNCTION".
- (f) Using the up and down functions of the cross key, adjust the VRM to the distance to the target.
Adjust to the actual distance to the target.
- (g) Push the ENTER key.
- (h) Select "DISPLAY TUNING" in the menu "INITIAL SETTING 1".

(i) Adjust the proximate perimeter of the target to the distance to the VRM pushing the "▲ (up)" or "▼ (down)" on the **RANGE** key.

(j) Push the **ENTER** key.

The 0 NM adjustment has been completed.

Reference: When there is no target with known distance from the ship.

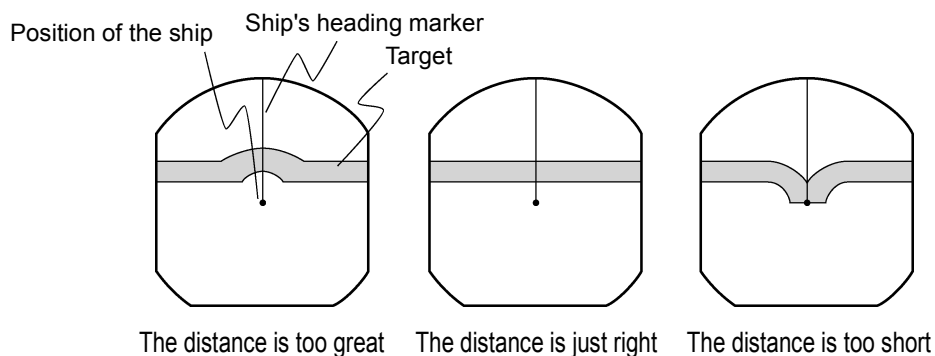
If there is no target with known distance from the ship, it is possible to undertake 0 NM adjustment using the following simplified method.

(A) Steps (a) through (c) are the same as with a target of known distance.

(B) Select a target that represents a long linear line such as the shoreline or embankment.

(C) Same as in (h) with a target of known distance.

(D) Adjust so that the target becomes a straight line on the PPI screen pushing the "▲ (up)" or "▼ (down)" on the **RANGE** key.



(E) Push the **ENTER** key.

The 0 NM adjustment has been completed.

9.8.5 Setting the antenna height

This operation sets the height of the antenna from the sea surface.

(a) Select "ANTENNA HEIGHT" in the menu "INITIAL SETTING 1".

- (b) Select the height of the radar antenna among "UNDER 5m", "5m TO 10m", and "MORE THAN 10m".

9.8.6 Presetting the sensitivity

This operation sets the maximum sensitivity when [GAIN] control is turned.

This adjustment should not be undertaken without reason.

When undertaking this adjustment, also undertake "9.8.2. Adjustment of the Noise Level".

- (a) Push the soft key D I S P L A Y .
- (b) Push the soft key 1 and select E X P O F F .
- (c) Turn the [RAIN] control to the minimum (turn to maximum counterclockwise).
- (d) Turn the [SEA] control to the minimum (turn to maximum counterclockwise).
- (e) Turn the [GAIN] control to the maximum (turn to maximum clockwise).
This maximizes the strength of the echo on the PPI screen.
- (f) Select "GAIN PRESET" in the menu "INITIAL SETTING 1".
- (g) Adjust the sensitivity level pushing the "▲ (up)" or "▼ (down)" on the R A N G E key.
- (h) Push the E N T E R key.
The maximum level of gain has been set.

9.8.7 Presetting the sea clutter

This operation sets the maximum level of suppression when the [SEA] control is turned.

This adjustment should not be undertaken without reason.

- (a) Set the range to 0.125NM pushing the "▼ (down)" on the R A N G E key.
- (b) Undertake tuning adjustment using the [TUNE] control.
- (c) Push the soft key D I S P L A Y .

- (d) Push the soft key 1 and select **EXP OFF** .
- (e) Turn the [GAIN] control to the maximum (turn to maximum clockwise).
- (f) Turn the [RAIN] control to the minimum (turn to maximum counterclockwise).
- (g) Turn the [SEA] control to the maximum (turn to maximum clockwise).
The strength of the echo on the PPI screen is maximized with sea surface clutter suppression maximized.
- (h) Select "STC PRESET" in the menu "INITIAL SETTING 1".
- (i) Adjust the level of suppression pushing the "▲ (up)" or "▼ (down)" on the **RANGE** key.
The PPI screen near the center adjusts to the grade projected slightly.
- (j) Push the **ENTER** key.
Suppression of sea surface clutter has been set at the maximum level.

9.8.8 Suppression of main bang

This adjustment is undertaken to suppress main bang that is the reflected signal from three dimensional circuits such as the wave guide that normally appears at the center of the radar display as a circle.

Optimum adjustment is achieved when the main bang image remains lightly on the screen.

Attention

- This adjustment should not be undertaken without reason. Erroneous adjustment may cause targets that are proximate to be erased from the screen.

- (a) Set the range to 0.125NM pushing the "▼ (down)" on the the **RANGE** key.
- (b) Select "OFF" in the line "PROCESS" - the menu "FUNCTION".
- (c) Push the soft key **DISPLAY** .

- (d) Push the soft key 1 and select EXP OFF .
- (e) Push the the soft key PROCESS .
- (f) Push the soft key 1 and select AUTO OFF .
- (g) Turn the [GAIN] control to the maximum (turn to maximum clockwise).
- (h) Turn the [SEA] control to the mid position.
- (i) Turn the [RAIN] control to the minimum (turn to maximum counterclockwise).
- (j) Select "MBS LEVEL" in the menu "INITIAL SETTING 1".
- (k) Adjust the suppression level pushing the "▲ (up)" or "▼ (down)" on the RANGE key.
- (l) Push the ENTER key.
The suppression level of the main bang has been determined.
- (m) Select "MBS RANGE" in the menu "INITIAL SETTING 1".
- (n) Adjust the suppression range pushing the "▲ (up)" or "▼ (down)" on the RANGE key.
- (o) Push the ENTER key.
Adjustment of the suppression range of the main bang has been completed.

9.8.9 Display of simulator image

By activating this function, it is possible to display a demonstration screen on the PPI screen.

- To make the setting of this function effective, the power must be once switched off.

- (a) Push the STBY/OFF key.
The display will enter the standby mode.

- (b) Select "INITIAL SETTING 2" in the menu "INITIAL SETTING 1".
- (c) Select "ON" in the line "SIMULATOR" - the menu "INITIAL SETTING 2".

9.8.10 Setting the TD reception number

This operation is for selecting the number of the TD (LORAN C time difference) to be received.

- (a) Select "INITIAL SETTING 2" in the menu "INITIAL SETTING 1".
- (b) Move the cursor to the extent of the value shown in the "SET TB NUMBER" - the menu "INITIAL SETTING 2".
- (c) Move the location for input by operating the left and right keys of the cross key.
- (d) Select the TD number to be received pushing the "▲ (up)" or "▼ (down)" on the

 key.

When the numbers are selected, the following field data of NMEA is displayed.

- 1: TD1 field of the GTD/GLC sentence.
- 2: TD2 field of the GTD/GLC sentence.
- 3: TD3 field of the GTD/GLC sentence.
- 4: TD4 field of the GTD/GLC sentence.
- 5: TD5 field of the GTD/GLC sentence.
- A: A field of the RMA sentence
- B: B field of the RMA sentence

9.8.11 GPS/DGPS

1. Initial setting of GPS

This operation is for undertaking initial setting of GPS. The GPS receiver measures position without initial setting but 10 or more minutes may be required after initial setting.

● Content of settings

- Ship position : Approximate latitude and longitude is sufficient
- Exclusion satellite : When unhealth satellite is used, precision may deteriorate. The satellite number input here is not used for measuring the position.
- Geodetic system : Japan is "02"
- Antenna height : Input the height of the antenna from the sea surface.
- Fix mode : Since the height of the antenna is fix in the case of an ocean going vessel, greater stability in position is obtained in 2D (two dimensions).
- DOP level : If only position results with high precision are intended to be used, designate 10 or less or 5 or less.
- Position average : When variance in position needs to be minimized, select LONG . When response needs to be maximized select NONE . However, with this latter setting, variance will increase.

(a) Select "GPS" in the line "GPS PRESET" - the menu "INITIAL SETTING 1".

The menu "GPS" will be displayed.

(b) Select the items in the cross key and change the set value using the RANGE key.

In order to change the ship's "N/S" or "E/W" position using the left and right keys of the cross key.

(c) Push the ENTER key.

The setting has been determined.

(d) Select "SEND DATA" in the menu "GPS".

The GPS setting will be implemented.

2. Initial setting of DGPS

In the event high precision position determination is intended using DGPS, it is necessary to set the beacon receiver.

- Setting mode

MANUAL : This operation sets the frequency and baud rate of the beacon receiver. This allows receipt of DGPS at an early stage but receipt is not possible unless the ship is in the beacon receipt area that is set.

AUTO : Automatic search of the beacon transmission station is undertaken for receipt. Time is required for this search.

(a) Select "DGPS" in the line "GPS PRESET" - the menu "INITIAL SETTING 1".

The menu "DGPS PRESET" will appear.

(b) Select the items in the cross key and change the set value using the RANGE key.

Changing "N/S" and "E/W" of the ship's position is also set pushing the "▲ (up)" or "▼ (down)" on the RANGE key.

(c) Push the ENTER key.

The setting has been determined.

(d) Select "SEND DATA" in the menu "DGPS PRESET".

The DGPS setting will be implemented.

3. Status of reception of GPS and DGPS

This operation displays the status of reception of the GPS receiver and DGPS receiver.

(a) Select "CONDITION" in the line "GPS PRESET" - the menu "INITIAL SETTING 1".

The status of reception of the GPS receiver and DGPS receiver will be displayed.

The display of the reception status of GPS will display the conditions of the following items only when the sensor type receiver such as JLR-4310 is connected and operating normally.

- Items

Ship position : When the ship's position is determined, the latitude and longitude of the position will be displayed.

GPS internal time : The world time as measured by the GPS receiver will be displayed.

Altitude : The altitude of the ship will be displayed. However, when the fix mode is 2D (two dimension), the height of the antenna that was input at initial setting will be displayed.

DOP : The precision of the results of the measurement will be displayed. If the value is 20 or above, the precision is poor.

- Reception satellite : The number of the satellite used for the measurement will be displayed.
- Bearing, elevation angle : The bearing and elevation angle of the satellite will be displayed.
- Signal strength : The strength of the signal of the satellite from which signals are being received will be displayed. If the value is 20 or less, the satellite may not be usable for measurements.

The following items will be displayed only when a beacon receiver is connected and operating normally.

● Items

- Frequency : The frequency of the beacon station from which signals are being received will be displayed.
- Baud rate : The baud rate of the beacon station from which signals are being received will be displayed.
- RSSI : The reception strength of the beacon station from which signals are being received will be displayed. If the value is 100 or less, the beacon may be not possible to receive signals.