

**TOSHIBA**

**No. 2D730-148E\*O**

**SERVICE MANUAL  
FOR  
DIAGNOSTIC ULTRASOUND SYSTEM**

***Aplio***

**MODELS SSA-700A/SSA-770A  
(2D730-148E\*O)**

**TOSHIBA MEDICAL SYSTEMS CORPORATION**

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<b>REVISION RECORD</b>					
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*C	06/02	Mr. Shibanuma			
*D	11/02	Support of V3.0 Mr. Ogasawara			
*E	07/03	Support of V4.0 Mr. Nakai			
*F	08/03	Change of the AC/DC power supply etc. Mr. Fujiwara			
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*H	10/03	Change of the AC/DC power supply Mr. Fujiwara			
*I	12/03	Support of V5.0 Mr. Nakai			
*J	02/04	Addition of section 17 Mr. Nakai			
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*N	05/06	Addition of systems with the LCD monitor Mr. Nakai			
*O	02/08	Support of Doppler Measurement Preset Mr. Nakai			TM-WP2




# Safety Precautions

## 1. Meaning of Signal Words

In this manual, the signal words **DANGER**, **WARNING**, and **CAUTION** are used regarding safety and other important instructions. The signal words and their meanings are defined as follows. Please understand their meanings clearly before reading this manual.

Signal word	Meaning
 <b>DANGER</b>	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
<b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.


## 2. Meaning of Safety Symbols

Symbol	Description
	Type-B applied part * Type B when Type-B applied part is connected. The PCG sensor and pulse sensor that can be connected to this system are Type-B applied parts.
	Type-BF applied part * Type BF when Type-BF applied part is connected. All ultrasound transducers, ECG cables, and respiration sensors that can be connected to this system are Type-BF applied parts.
	"Attention" (Refer to the operation manual.)

### 3. Safety Precautions


Please observe the following precautions to ensure the safety of service engineers as well as operators when using this system.

**⚠DANGER:** Do not use flammable gases such as anesthetics, or flammable liquids such as ethanol, near this product, because there is danger of explosion.

**⚠WARNING:** 1. Information concerning the terminal to which the potential equalization conductor is to be connected (  ):

To use another medical device in combination with this system, an equipotential wire for connecting to an equipotential bus must be supplied. For more information, contact your TOSHIBA representative.

\* Be sure to connect the potential-equalization lead wire before inserting the equipment power plug into the receptacle. Also, be sure to remove the equipment power plug from the receptacle before disconnecting the wire to avoid electrical shock.

2. Information concerning the functional earth terminal (  ):

Use of the functional earth terminal as protective earth is not allowed in Europe. The system should be connected according to local requirements.

3. Do not connect this system to outlets with the same circuit breakers and fuses that control current to devices such as life-support systems. If this system malfunctions and generates an overcurrent, or when there is an instantaneous current at power ON, the circuit breakers and fuses of the building's supply circuit may be tripped.
4. Do not connect to the system transducers other than those specified by TOSHIBA, to prevent accidents such as fire.
5. Do not subject the transducers to knocks. Use of defective transducers may cause an electric shock.

**⚠CAUTION:** 1. Malfunctions due to radio waves

- (1) Use of radio-wave-emitting devices in the proximity of this kind of medical electronic system may interfere with its operation. Do not bring or use devices which generate radio waves, such as cellular telephones, transceivers, and radio controlled toys, in the room where the system is installed.
- (2) If a user brings a device which generates radio waves near the system, they must be instructed to immediately turn OFF the device. This is necessary to ensure the proper operation of the system.

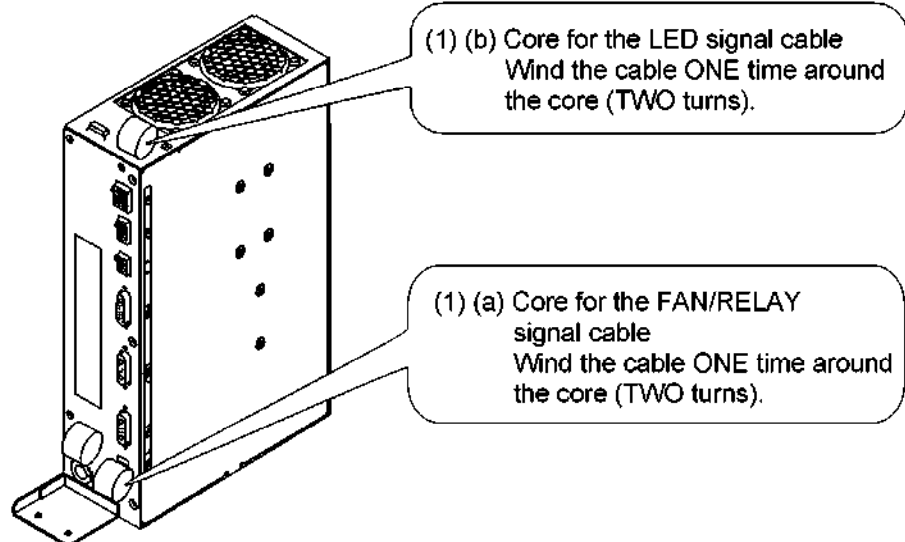
- ⚠CAUTION:**
2. Be sure to install the system on a level floor and lock the casters. If this is not done, the system may move, injuring the service personnel.
  3. Move the system forward or backward only. If the system is moved to the left or right, it may fall, causing injury. In addition, be sure to fix the moving sections such as the operating panel before moving the system. If such sections move, they may catch the hands or fingers of the persons moving the system, possibly causing injury.
  4. To prevent electric shock, do not connect the peripheral units (video printer, VCR, etc.) to an external outlet. Peripheral units should be connected to the service outlet of the system or the optional isolation transformer. For the connection procedures, contact your TOSHIBA representative.
  5. The service outlet of the main unit is intended solely for recommended peripheral units. Do not connect devices other than recommended peripheral units to the service outlet. Connecting devices other than those recommended may cause the consumption current to exceed the power capacity of the main unit, possibly resulting in malfunction.
  6. Do not place any objects on top of the monitor. They may fall, causing injury.
  7. Do not allow fluids such as water to contact the system or peripheral devices. Electric shock may result.
  8. Do not handle the system with wet or moist hands. Electric shock may result.
  9. The monitor is a heavy unit. Two persons are required when mounting or removing the monitor. If a worker mounts or removes the monitor alone, he/she may be injured.
  10. Be sure to turn OFF the power breaker and disconnect the mains plug from the outlet before removing the covers of the main unit and performing internal wiring.
  11. When discarding any part of this system, follow all applicable local regulations.
  12. Wear protective gloves to ensure safety and prevent infection when performing unit replacement, board replacement, internal wiring, or cleaning.
  13. Wait at least 30 seconds after turning OFF the power breaker and disconnecting the mains plug from the outlet before replacing the battery. Otherwise, an electric shock may result.

- CAUTION:**
1. When replacing the AC/DC tray of the SSA-770A, check the revision number of the AC/DC tray supplied for replacement and follow the appropriate procedure according to the revision number.
    - 1.1 When the new AC/DC tray is BSM31-2013E (no revision)
 

The AC/DC tray is not compatible and must not be used to replace the existing tray.

**CAUTION:** 1.2 If AC/DC tray BSM31-2013E-G or BSM31-2013E-I is supplied

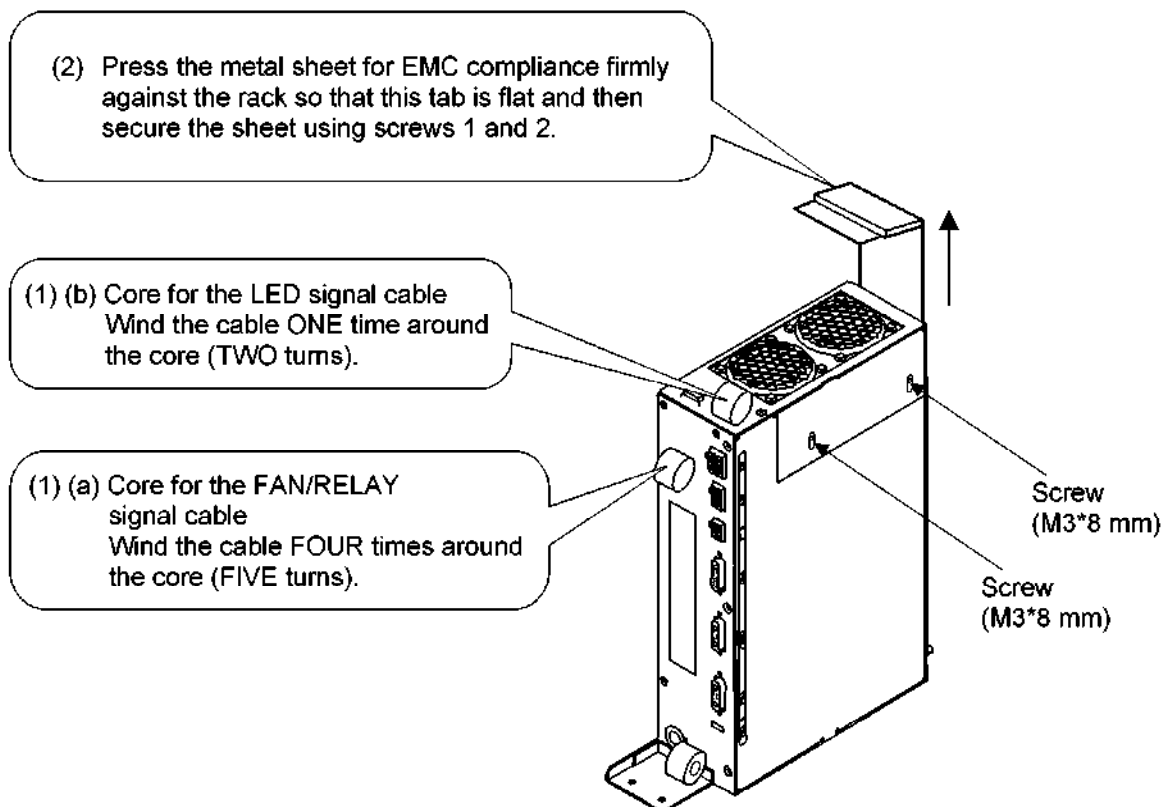
- (1) Wind the cables around the core as described below.
  - (a) Wind the FAN/RELAY signal cables (two lines) between the AC/DC tray and transformer tray ONE time around the core (TWO turns).
    - \* When the cable is passed through the core the first time it is counted as one turn. Therefore, winding of the cable one time corresponds to TWO turns.
  - (b) Wind the LED signal cable (which is connected to the top of the AC/DC tray) between the AC/DC tray and the transformer tray ONE time around the core (TWO turns).
    - \* When the cable is passed through the core the first time it is counted as one turn. Therefore, winding of the cable one time corresponds to TWO turns.
- (2) The metal sheet for EMC compliance should not be installed.



**CAUTION:** 1.3 When the new AC/DC tray is BSM31-2013E-H or -J or later (revision or later)

- (1) Wind the cables around the core as described below. Note the number of times each cable is to be wound around the core.
  - (a) Wind the FAN/RELAY signal cables (two lines) between the AC/DC tray and transformer tray FOUR times around the core (FIVE turns).
    - \* When the cable is passed through the core the first time it is counted as one turn. Therefore, winding of the cable four times corresponds to five turns.
  - (b) Wind the LED signal cable (which is connected to the top of the AC/DC tray) between the AC/DC tray and the transformer tray ONE time around the core (TWO turns).
    - \* When the cable is passed through the core the first time it is counted as one turn. Therefore, winding of the cable one time corresponds to TWO turns.
- (2) The metal sheet for EMC compliance should be installed.

Press the metal sheet firmly against the rack so that the upper tab is flat and then secure the sheet using screws 1 and 2.





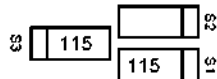
**CAUTION:** 2. Voltage setting for replacing the transformer tray and TRANS-unit

The switches used to select the output voltage according to the input voltage are installed on the transformer tray and the TRANS-unit.

When the switches of the replacement units (transformer tray and TRANS-unit) are not set correctly, the power supply may not start up correctly, or a malfunction of the connection equipment may result. Be sure to check the settings.

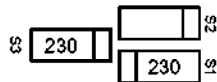
For the transformer tray

100 to 120 VAC



"115" must be displayed on S1 and S3.  
The direction of S2 must be the same as that of S1.

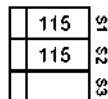
230 VAC



"230" must be displayed on S1 and S3.  
The direction of S2 must be the same as that of S3.

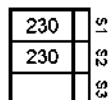
For the TRANS-unit

100 to 120 VAC



"115" must be displayed.  
"115" must be displayed.  
The direction must be the same as that of S1 and S2.

230 VAC



"230" must be displayed.  
"230" must be displayed.  
The direction must be the same as that of S1 and S2.

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## 1. INTRODUCTION

### 1.1 Outline

The SSA-700A/SSA-770A (hereinafter referred to as Aplio) functions in the 2D, M, FFT Doppler, and color blood-flow modes. The system is classified into the following five main systems depending on the combined units.

- (1) Front-end unit
- (2) Back-end unit
- (3) System-related unit
- (4) Power supply unit
- (5) Monitor

## 1.2 PWB Configuration of Each Unit

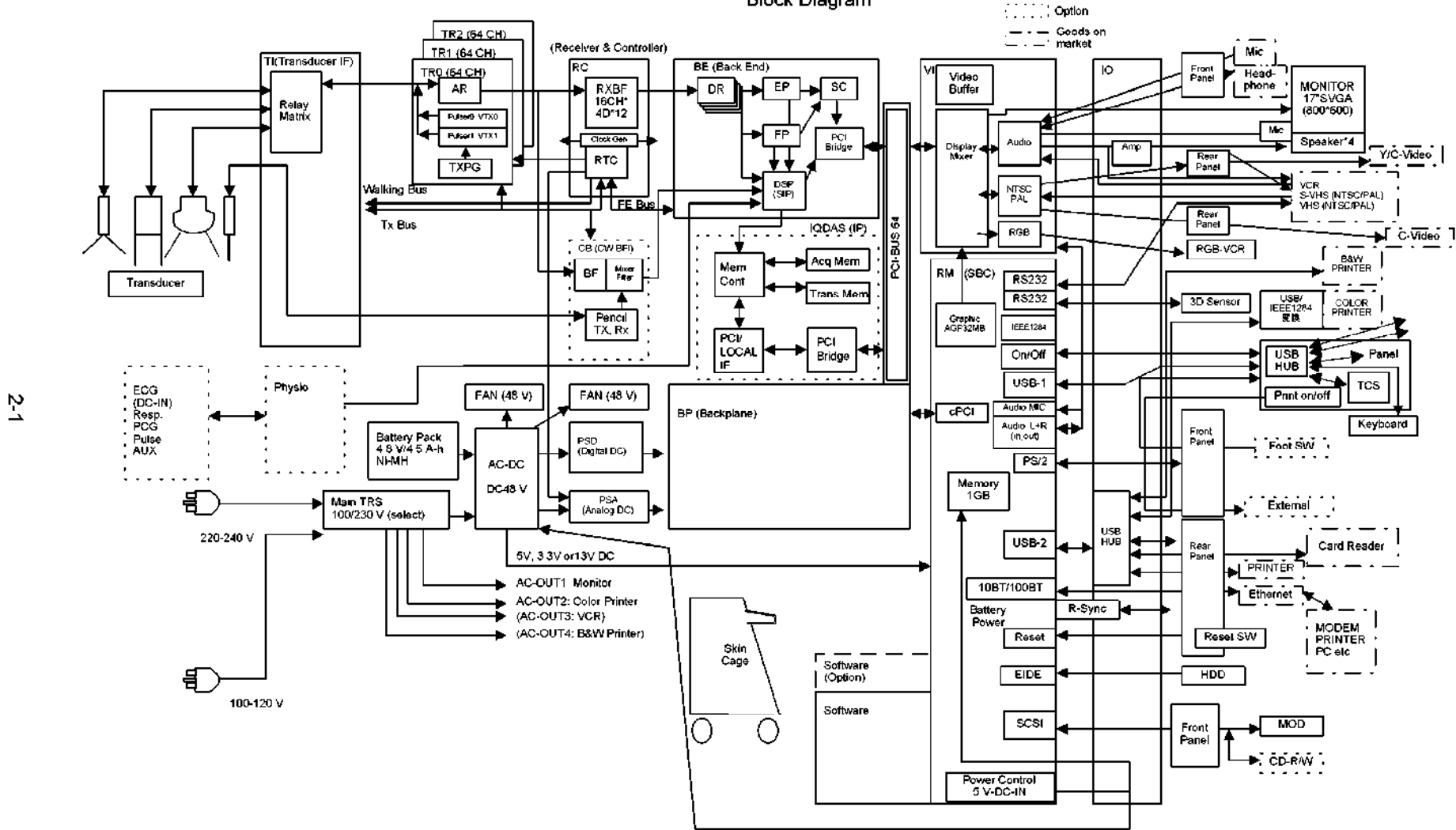
Table 1-1 PWB configuration of each unit of the Aplio

Unit	PWB name	Drawing No.	YW No.	Remarks
Front-end unit	TI	PM30-30382	YWM1030	The TI-ASSY (including PM30-29950) can be replaced during field service.
	TR0	PM30-32040	YWM1069	Compatible with PM30-32263
		PM30-32263	YWM1116	
		PM30-32469	YWM1171	
	TR1	PM30-32040	YWM1069	Compatible with PM30-32263
		PM30-32263	YWM1116	
		PM30-32469	YWM1171	
	TR2	PM30-32040	YWM1069	Compatible with PM30-32263
		PM30-32263	YWM1116	
		PM30-32469	YWM1171	
	RCB	PM30-32038	YWM1098	Compatible with PM30-32263
PM30-32088		YWM1109		
CB	PM30-30297	YWM0857	Option	
Back-end unit	BE	PM30-30385	YWM1058	This PWB is compatible with PM30-30386. BSM31-2996E Option
	VI	PM30-30386	YWM1059	
		PM30-32039	YWM1101	
	RM	PM30-29855		
IQDAS	PM30-32120	YWM1105		
System related unit	BP	PM30-30381	YWM1057	This PWB is compatible with PM30-30381.
		PM30-32036	YWM1100	
	IO	PM30-32037	YWM1099	The IO-ASSY (including PM30-30120) can be replaced during field service.
		PM30-32210	YMM1112	The service unit is the same as above. Compatible with PM30-32037
	FRONT PANEL	PM30-30357	YWM1081	The F-U-PANEL-ASSY (including PM30-30010) can be replaced during field service.
	REAR PANEL	PM30-30358	YWM0985	The REAR-PANEL-ASSY (including PM30-29990) can be replaced during field service.



2. BLOCK DIAGRAM

Block Diagram

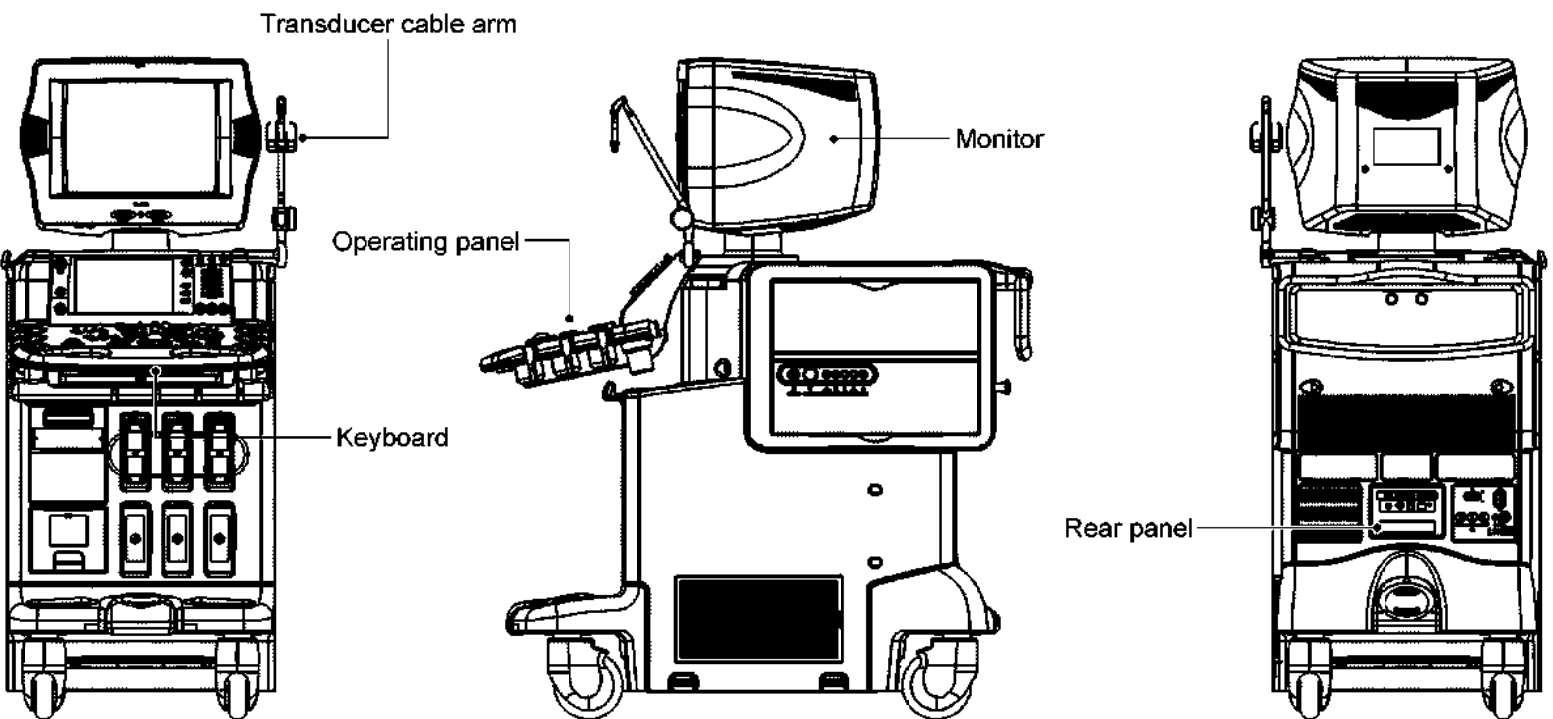


2-1

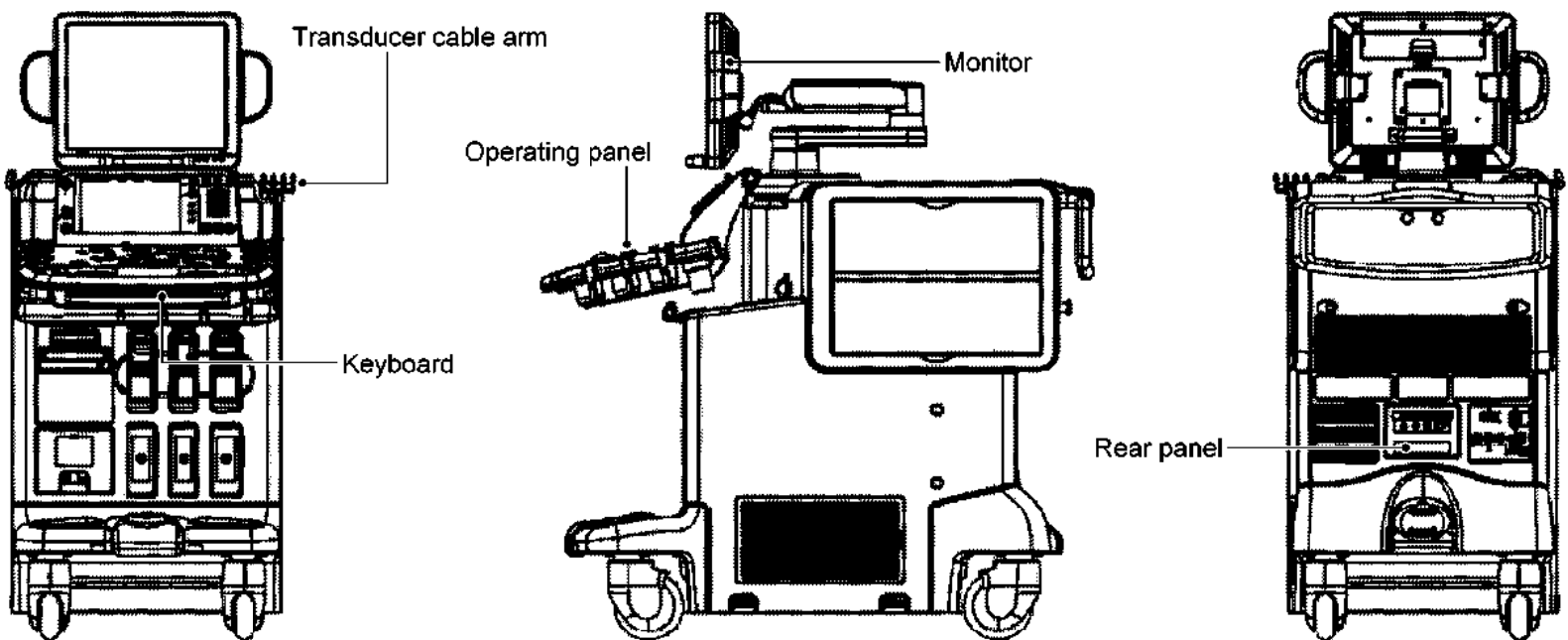
3. DISASSEMBLY AND REMOVAL PROCEDURES

3.1 Name of Each Section

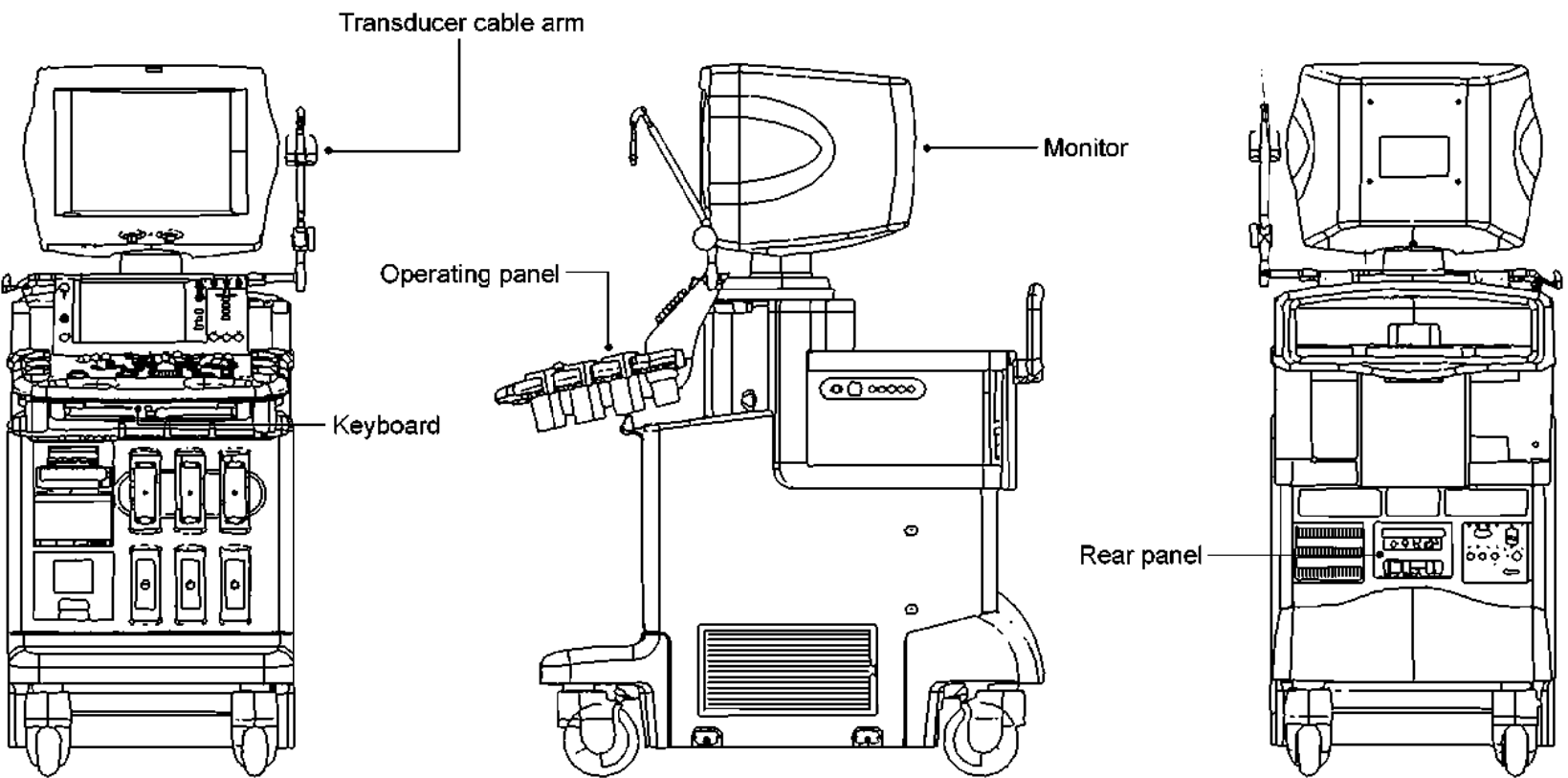
(1) SSA-770A (systems with the CRT monitor)



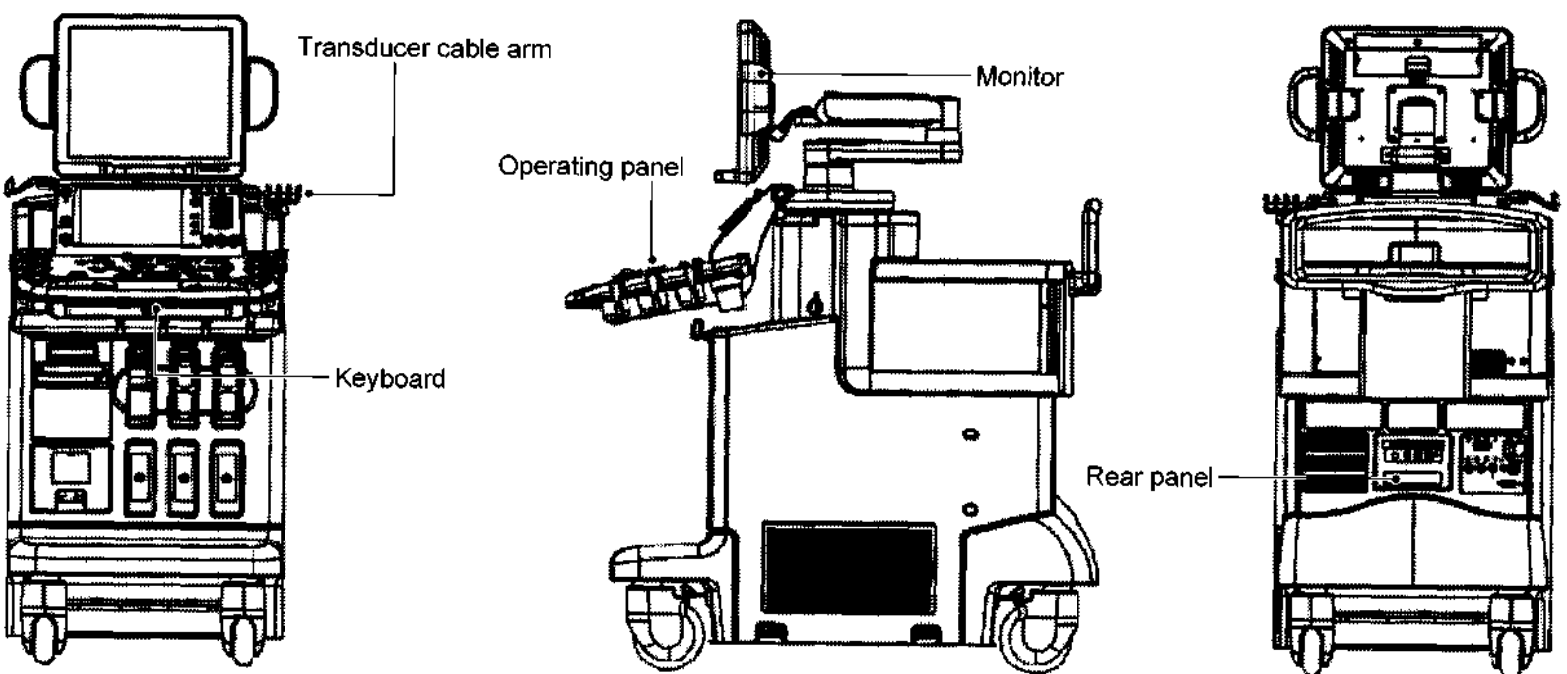
(2) SSA-770A (systems with the LCD monitor)



(3) SSA-700A (systems with the CRT monitor)



(4) SSA-700A (systems with the LCD monitor)



## 3.2 Removing the Covers

### 3.2.1 For the SSA-770A

#### (1) Removing the left side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the left side cover.

\* The cover can be removed by pulling the bottom of the cover toward you

#### (2) Removing the right side cover

Remove the right side cover in the same manner as the left side cover.

#### (3) Removing the left side cover for peripheral units

It is necessary to remove the left side cover in advance.

Remove the two M4 screws <B> to remove the left side cover for the peripheral units.

\* The cover can be removed by lifting it up and then pulling it toward you.

#### (4) Removing the right side cover for the peripheral units

It is necessary to remove the right side cover in advance.

Remove the two M4 screws <C> to remove the right side cover for the peripheral units.

\* The cover can be removed by lifting it up and then pulling it toward you.

#### (5) Removing the front cover

When the transducers are connected, remove them.

It is necessary to remove the right and left side covers in advance.

- (a) When the blank cover is installed, loosen the M3 screw <D> to remove the blank cover with the printer base installed.

- (b) Remove the four M4 screws <E> to remove the front cover.

#### (6) Removing the rear cover for the power supply

It is necessary to remove the right and left side covers in advance.

Remove the four M4 screws <F> to remove the rear cover for the power supply.

#### (7) Removing the base front cover

It is necessary to remove the right and left side covers and the front cover in advance.

- (a) Remove the two M4 screws <G>.
- (b) Loosen the two M4 screws <H> to remove the base front cover.

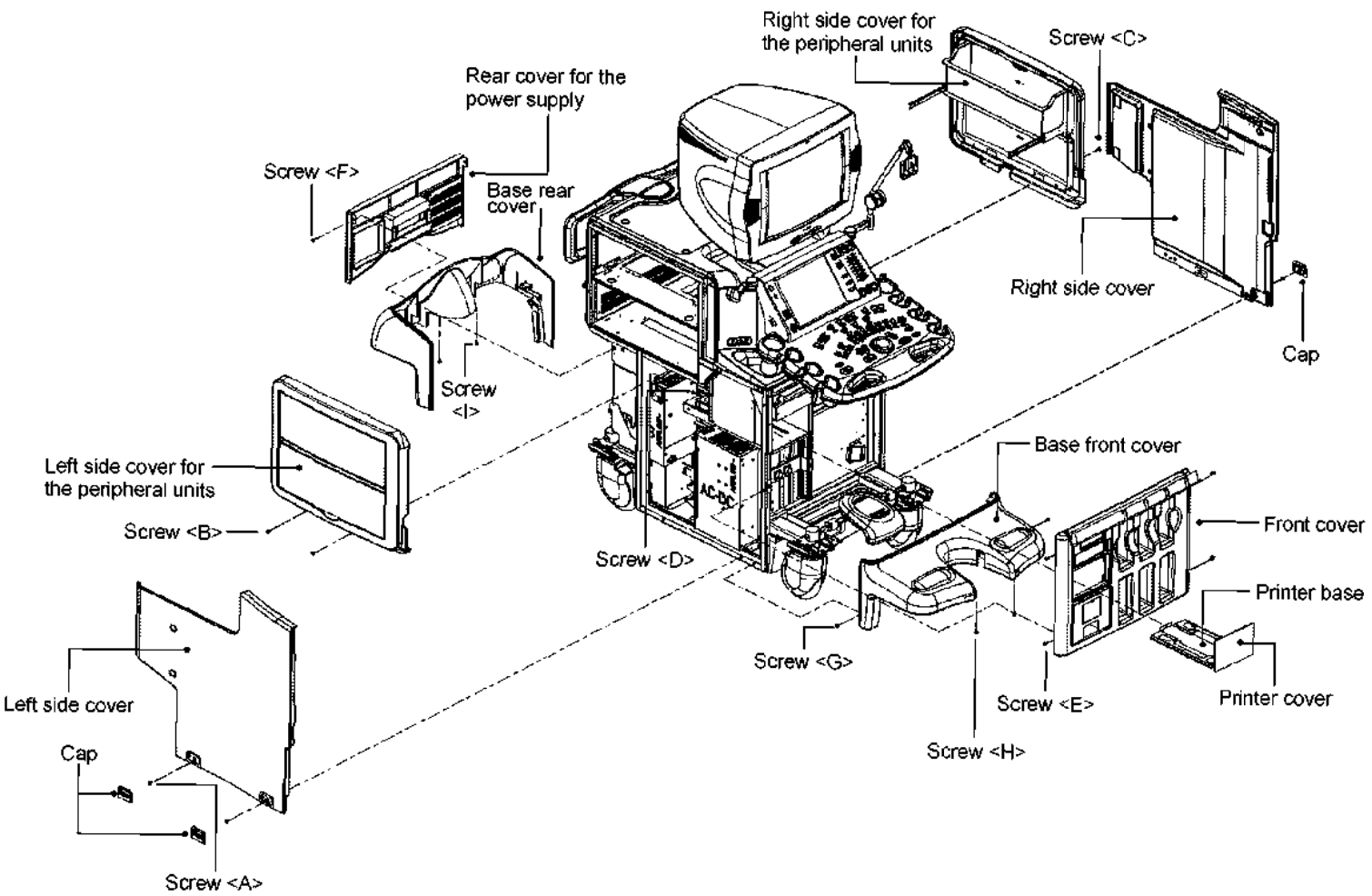
\* The cover can be removed by pulling it toward you slightly and lifting it obliquely.

(8) Removing the base rear cover

It is necessary to remove the right and left side covers and the rear cover for the power supply in advance.

Loosen the two M4 screws <I> to remove the base rear cover.

\* The cover can be removed by pulling it toward you slightly and lifting it obliquely.



### 3.2.2 For the SSA-700A

#### (1) Removing the left side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the left side cover.

\* The cover can be removed by pulling the bottom of the cover toward you

#### (2) Removing the right side cover

Remove the right side cover in the same manner as the left side cover.

#### (3) Removing the front cover

When the transducers are connected, remove them.

It is necessary to remove the right and left side covers in advance.

- (a) When the blank cover is installed, loosen the M3 screw <B> to remove the blank cover with the printer base installed.
- (b) Remove the four M4 screws <C> to remove the front cover.

#### (4) Removing the rear cover for the power supply

It is necessary to remove the right and left side covers in advance.

Remove the four M4 screws <D> to remove the rear cover for the power supply.

#### (5) Removing the base front cover

It is necessary to remove the right and left side covers and the front cover in advance.

- (a) Remove the two M4 screws <E>.
- (b) Loosen the two M4 screws <F> to remove the base front cover.

#### (6) Removing the base rear cover

It is necessary to remove the right and left side covers and the rear cover for the power supply in advance.

Loosen the two M4 screws <G> to remove the base rear cover.

\* The cover can be removed by pulling it toward you slightly and lifting it obliquely.

#### (7) Removing the peripheral unit rack

Remove the six M4 screws <H> to remove the rack.



(8) Removing the handle covers

- (a) Remove the four M4 screws <I> and the M4 screw <J> to remove the peripheral unit rack retainer.
- (b) Remove the four M4 screws <K> to remove the handle cover (A).
- (c) Remove the four M4 screws <L> to remove the handle cover (B).

(9) Removing the handle

Remove the two M6 screws <M> and loosen the two M4 screws <N> to remove the handle.

(10) Removing the top cover

Remove the two M4 screws <O> to remove the top cover.

(11) Removing the top-left side cover

Remove the M4 screws <P> and <Q> (1 each) to remove the top-left side cover.

(12) Removing the top-right side cover

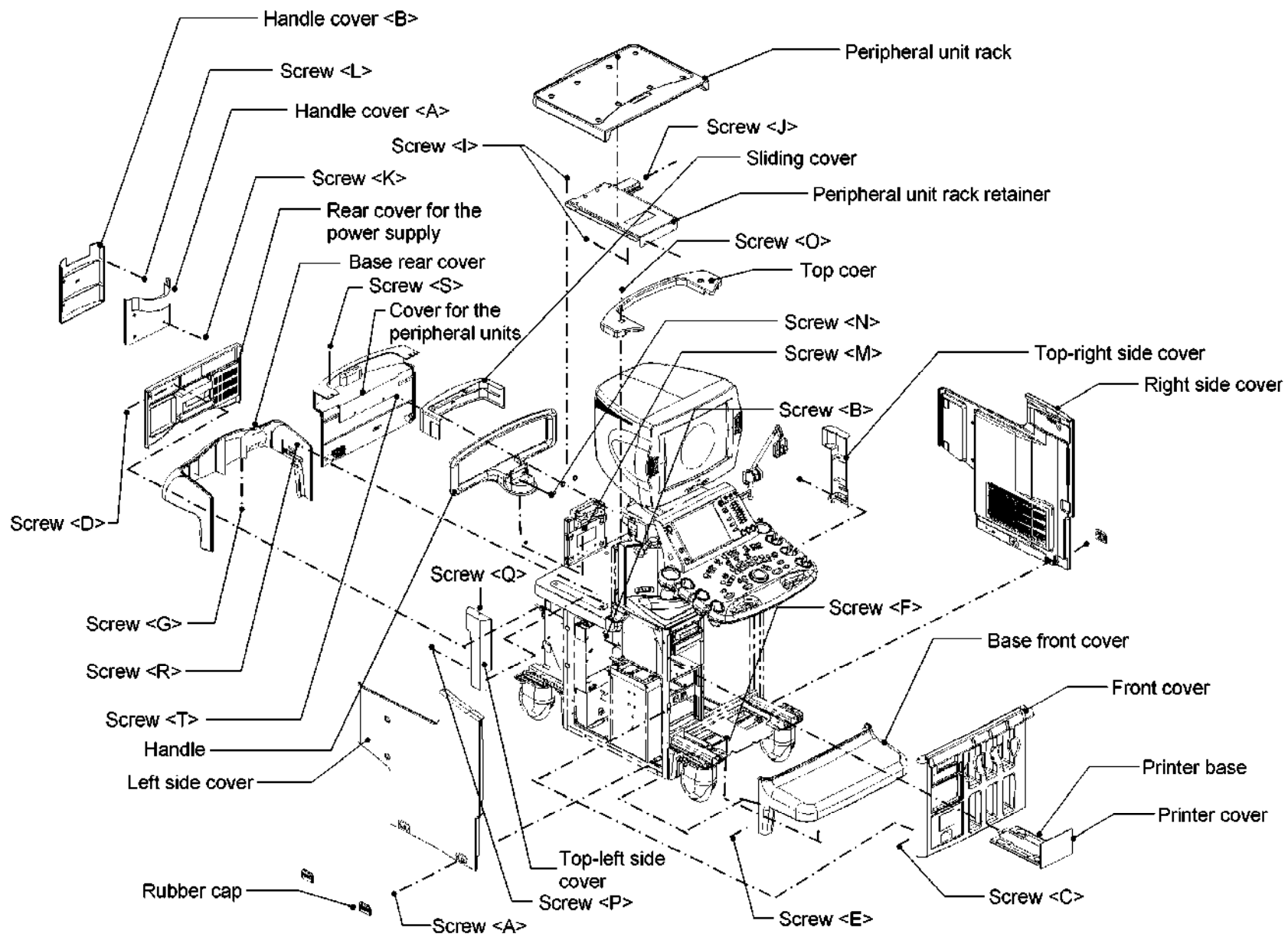
Remove the top-right side cover in the same manner as the top-left side cover.

(13) Removing the cover for the peripheral units

Remove the M4 screws <R> and <S> (2 each) to remove the cover for the peripheral units.

(14) Removing the sliding cover

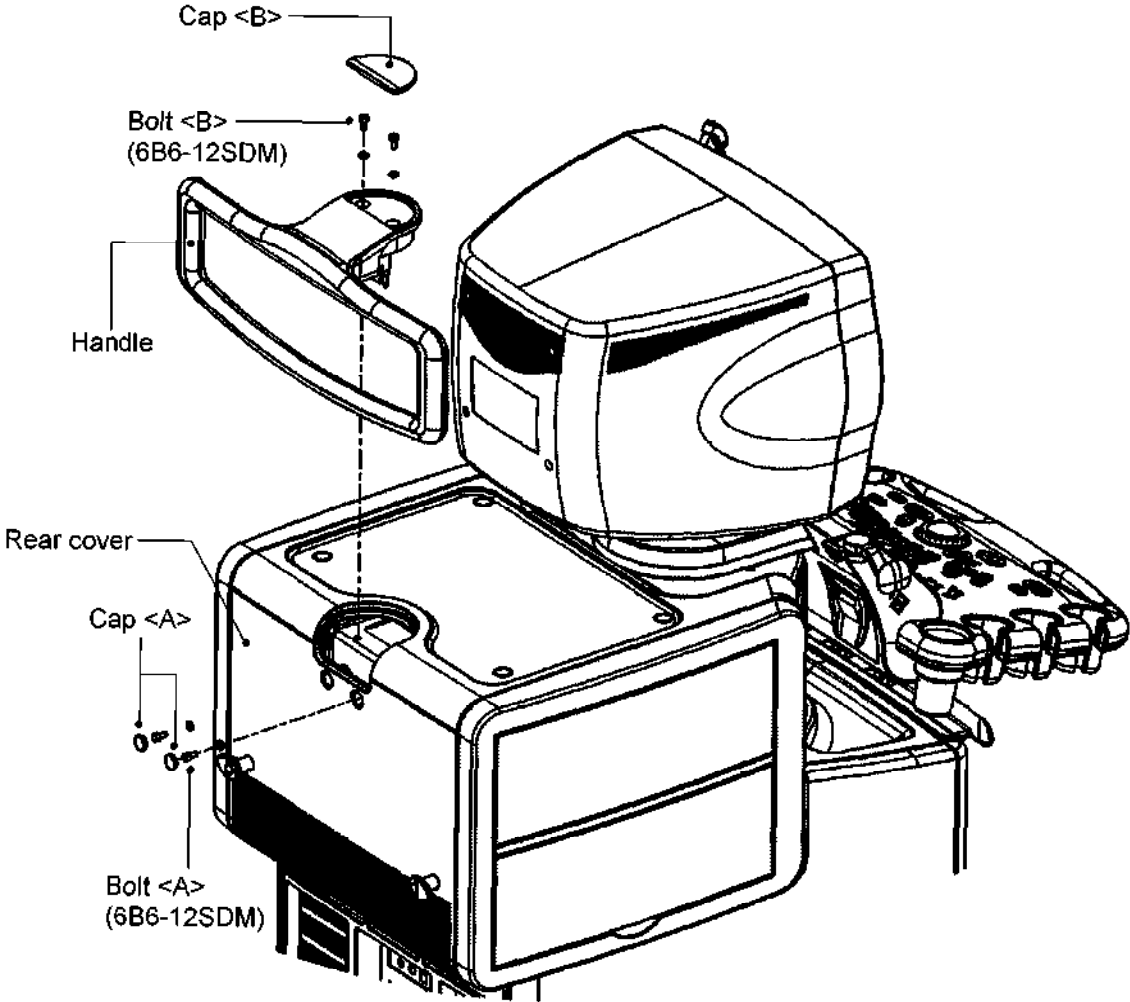
Remove the two M4 screws <T> to remove the sliding cover.



3.3 Removing the Handle

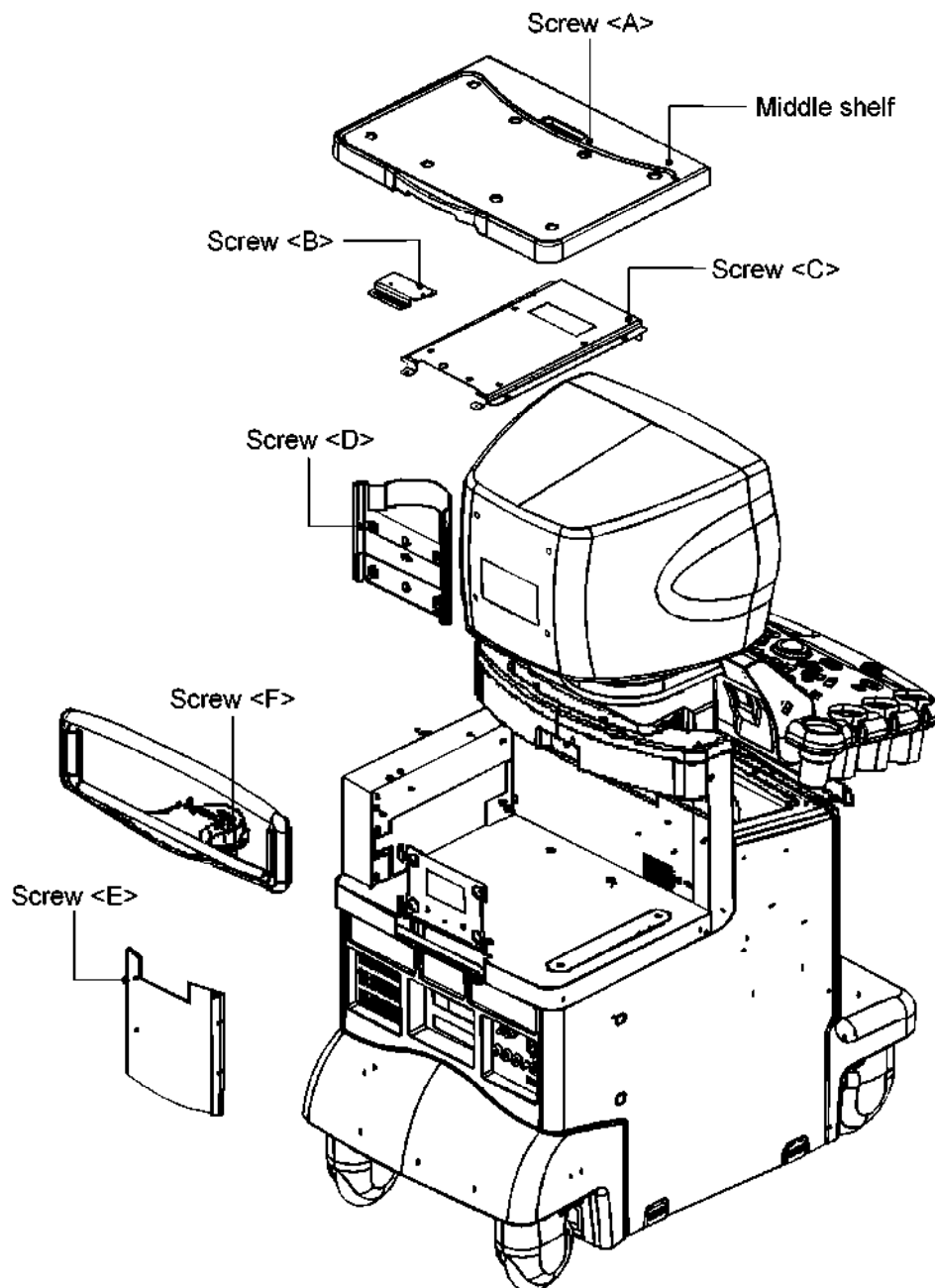
3.3.1 For the SSA-770A

- (1) Removing the handle
  - (a) Remove the caps <A> and <B> set in the handle and the rear cover.
  - (b) Remove (or loosen) the two M6 bolts <A>.
  - (c) Remove the two M6 bolts <B> to remove the handle.



## 3.3.2 For the SSA-700A

- (1) Remove the six M4 screws <A> that secure the middle shelf in order to remove it.
- (2) Remove the two M4 screws <B> to remove the reinforcement rib.
- (3) Remove the four M4 screws <C> to remove the middle shelf retaining plate.
- (4) Remove the four M4 screws <D> to remove the handle cover (front).
- (5) Remove the four M4 screws <E> to remove the handle cover (rear).
- (6) Remove the two M6 screws <F> to remove the handle.



## 3.4 Removing the Monitor Unit

**⚠CAUTION:** Two persons are required when removing the monitor unit. If a worker removes the monitor alone, he/she may be injured.

## 3.4.1 Removing the monitor unit (for systems with the CRT monitor)

## (1) Removing the monitor rear cover

Loosen the two screws <A> and four screws <B> that secure the monitor rear cover to remove the cover.

## (2) Removing the support rear cover

The support rear cover engages with the support front cover.

Disengage the upper part of the cover and remove the cover by pulling it backward.

## (3) Removing the cables (refer to the next page)

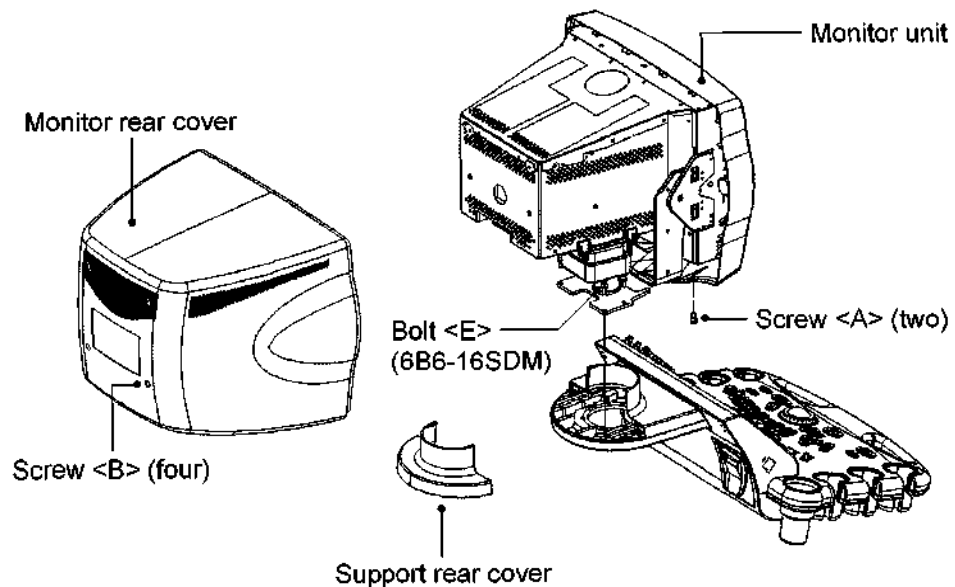
(a) Loosen the two screws <C> to remove the pinch shield cover.

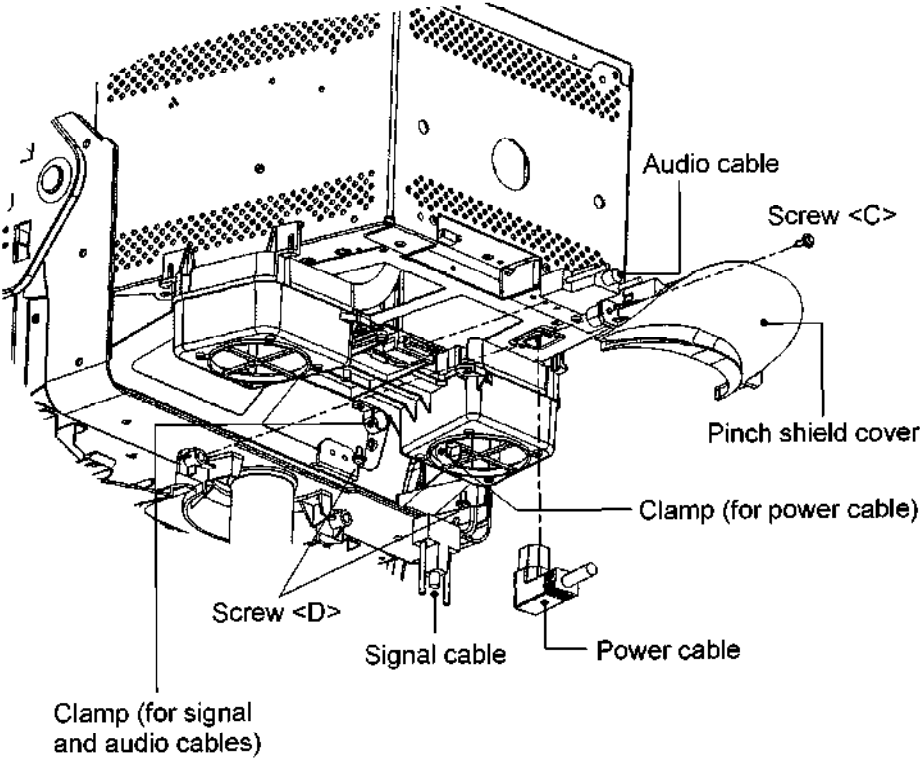
(b) Remove the two screws <D> to remove the clamps.

(c) Remove the signal, audio, and power cables that are connected to the monitor unit.

## (4) Removing the monitor unit from the system

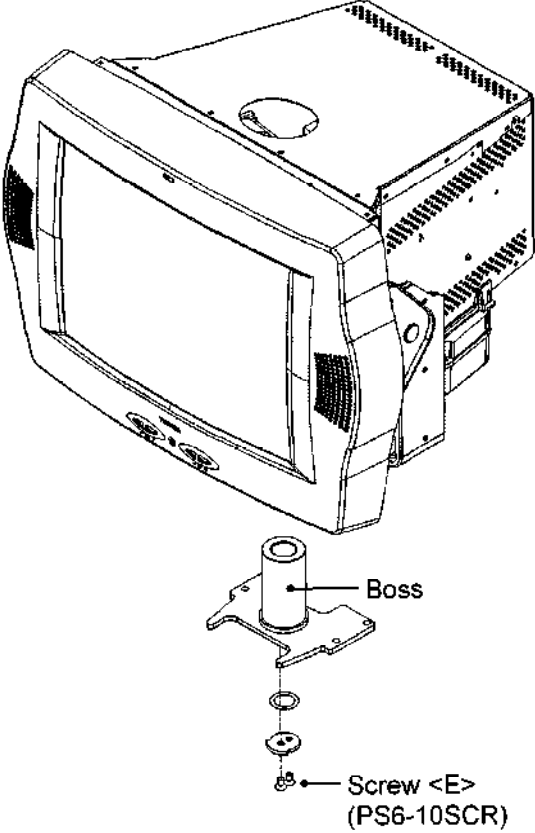
Remove the four M6 bolts <E> to remove the monitor unit with the boss installed.





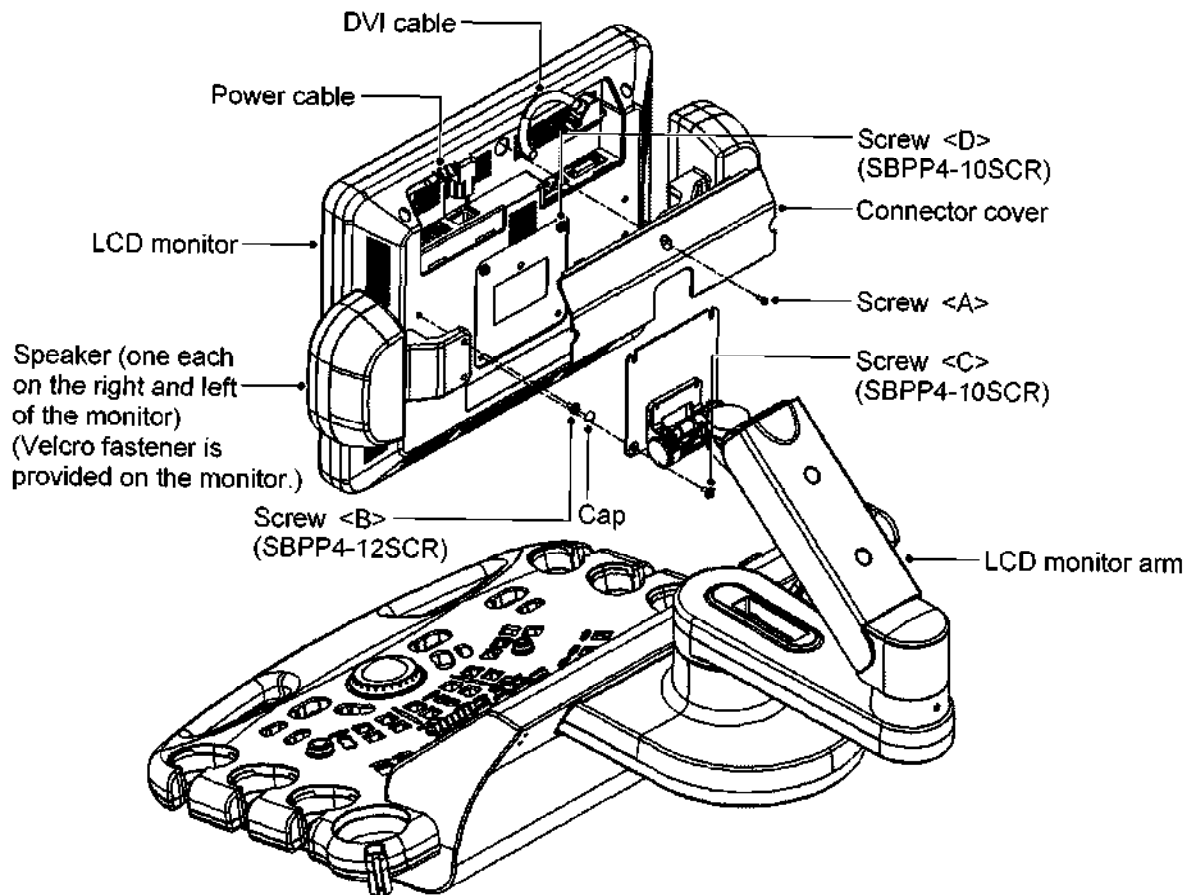
(5) Removing the monitor unit from the boss

Remove the two M6 flat head screws <E> to pull the monitor unit from the boss.



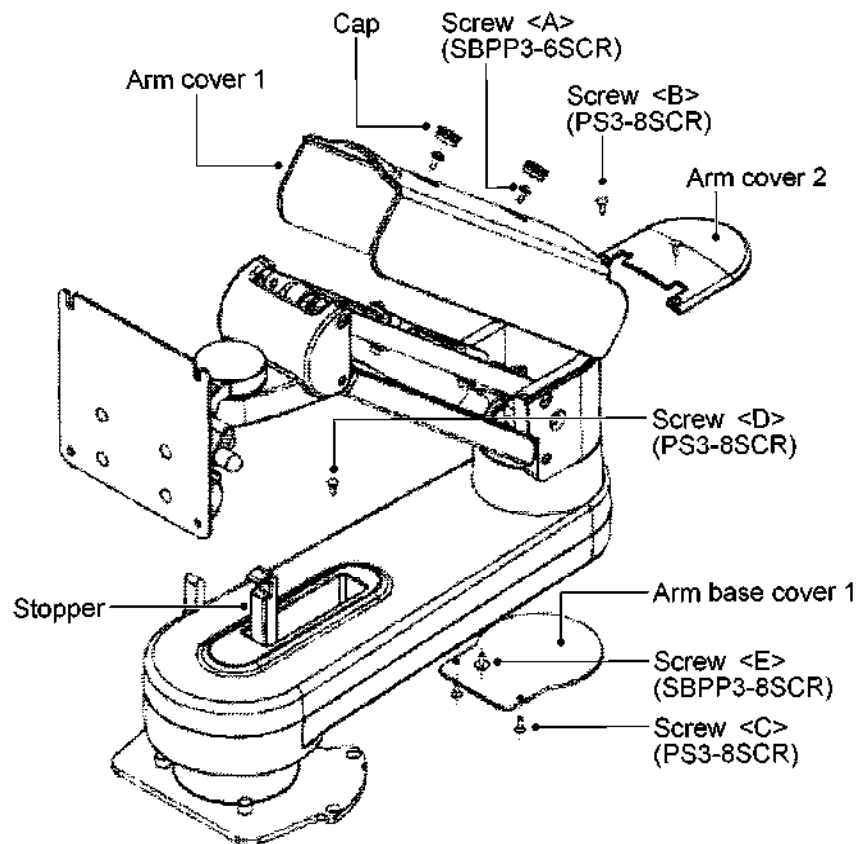
### 3.4.2 Removing the monitor unit (for systems with the LCD monitor)

- (1) Remove the screw <A> and then remove the connector cover.
- (2) Disconnect the power cable, DVI cable, and audio cable.
- (3) Attach the connector cover and secure it with the screw <A>.
  - \* The screw <A> is a self-tapping screw. Special care is required when tightening it.
- (4) Remove the four caps and the four M4 screws <B> to remove the speakers (one each on the right and left of the monitor).
- (5) Remove the two M4 screws <C>.
- (6) Loosen the two M4 screws <D> and then remove the LCD monitor from the arm.



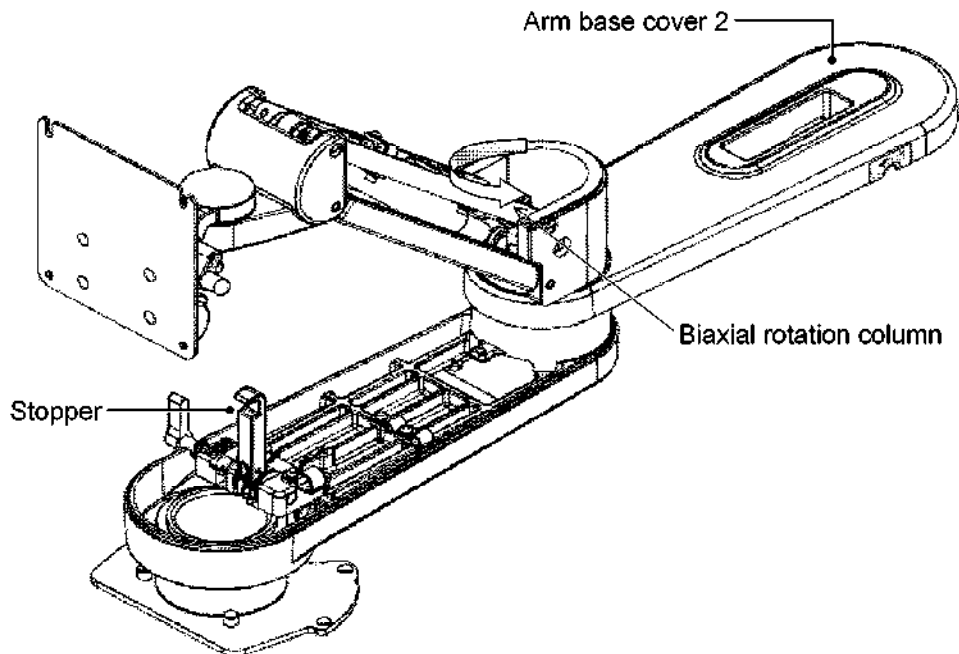
### 3.4.3 Removing the LCD monitor arm

- (1) Remove the two caps and the two M3 screws <A> to remove arm cover 1.
- (2) Remove the two M3 screws <B> to remove arm cover 2.
- (3) Remove the two M3 screws <C> to remove arm base cover 1.
- (4) Raise the stopper and remove the M3 screw <D> and the M3 screw <E>.

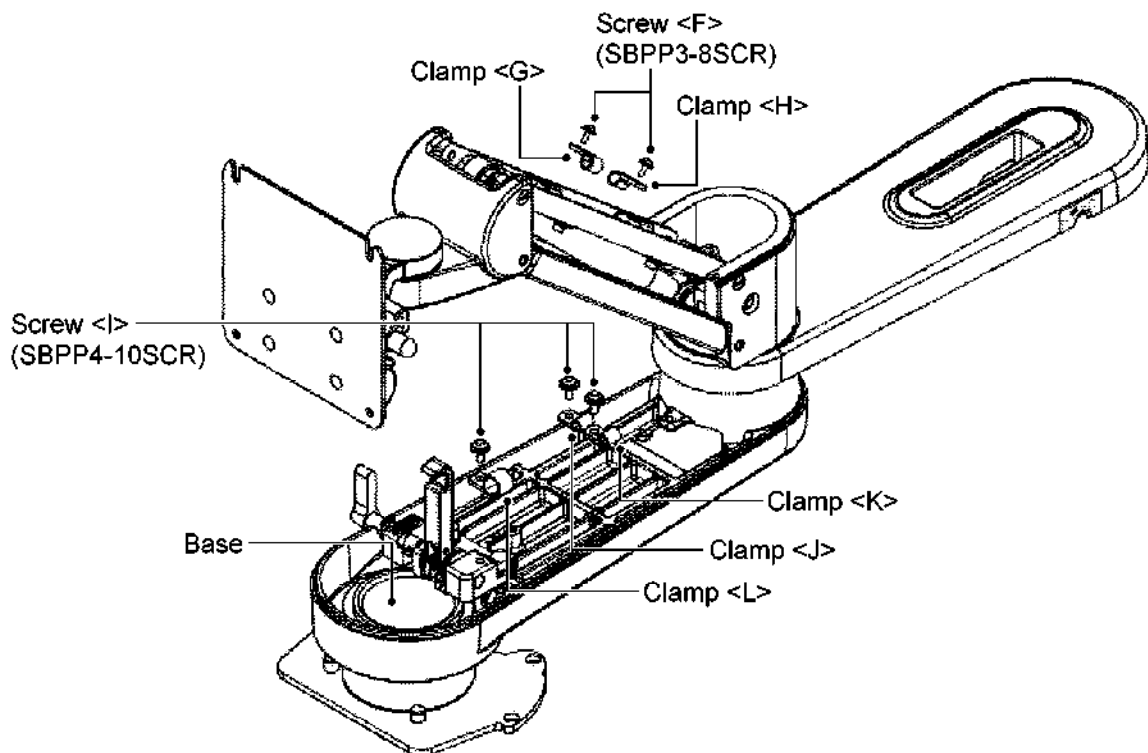




- (5) Rotate the arm biaxial rotation column in the direction indicated by the arrow in the figure below. Lift arm base cover 2 to separate it from the stopper.

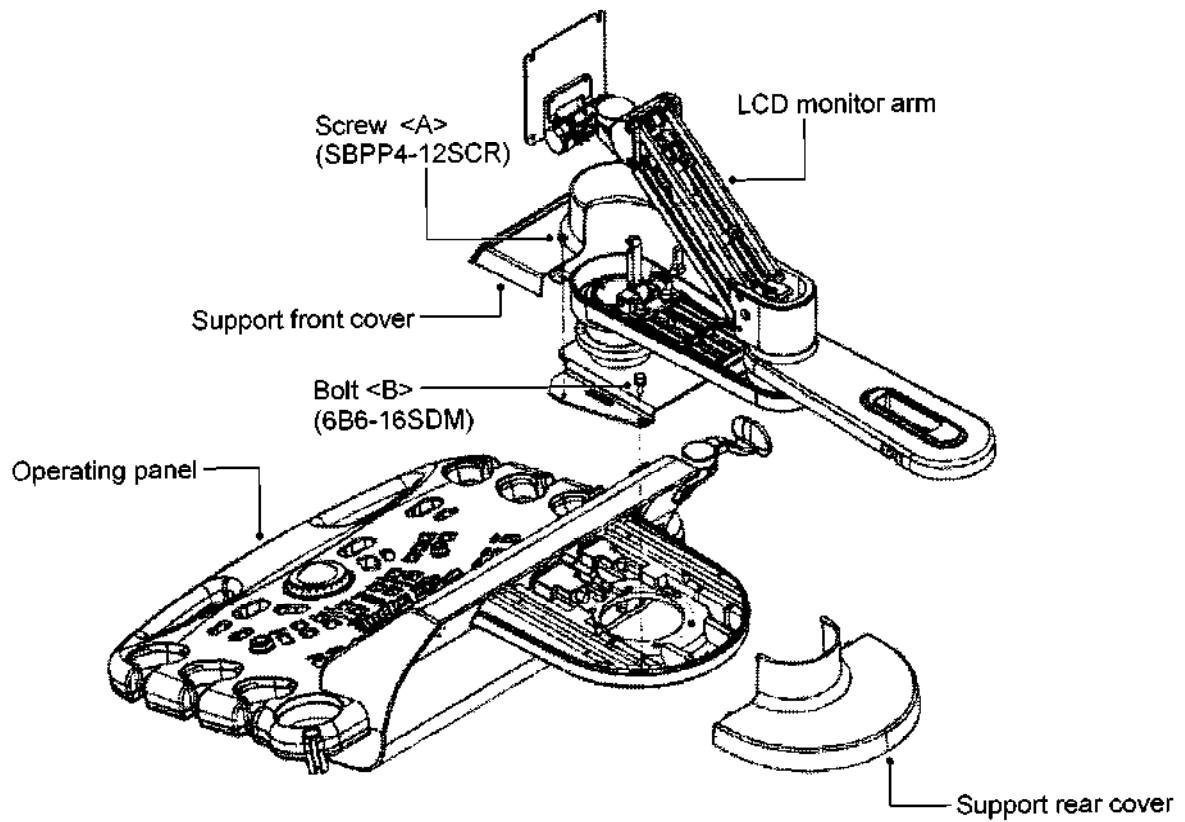


- (6) Remove the two M3 screws <F> and the clamps <G> and <H>.
- (7) Remove the three M4 screws <I> and the clamps <J>, <K>, and <L>.



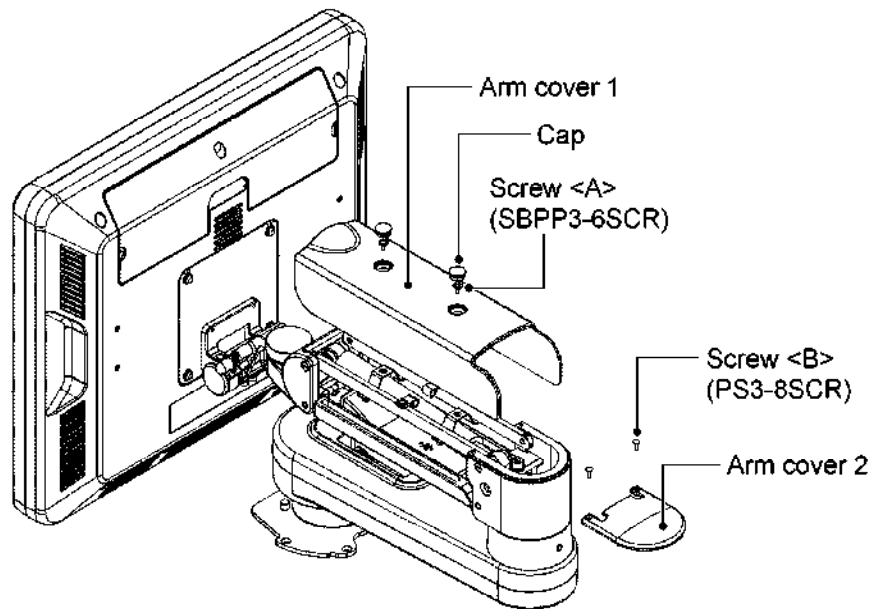
- (8) Remove the cables one by one from the LCD monitor arm to the base.

- (9) Push in the neck of the support rear cover to disengage it from the support front cover and remove it.
- (10) Remove the two M4 screws <A> to remove the support front cover.
- (11) Remove the four M6 bolts <B> to remove the LCD monitor arm.
- (12) Lift the LCD monitor arm and remove the three monitor cables from the arm.

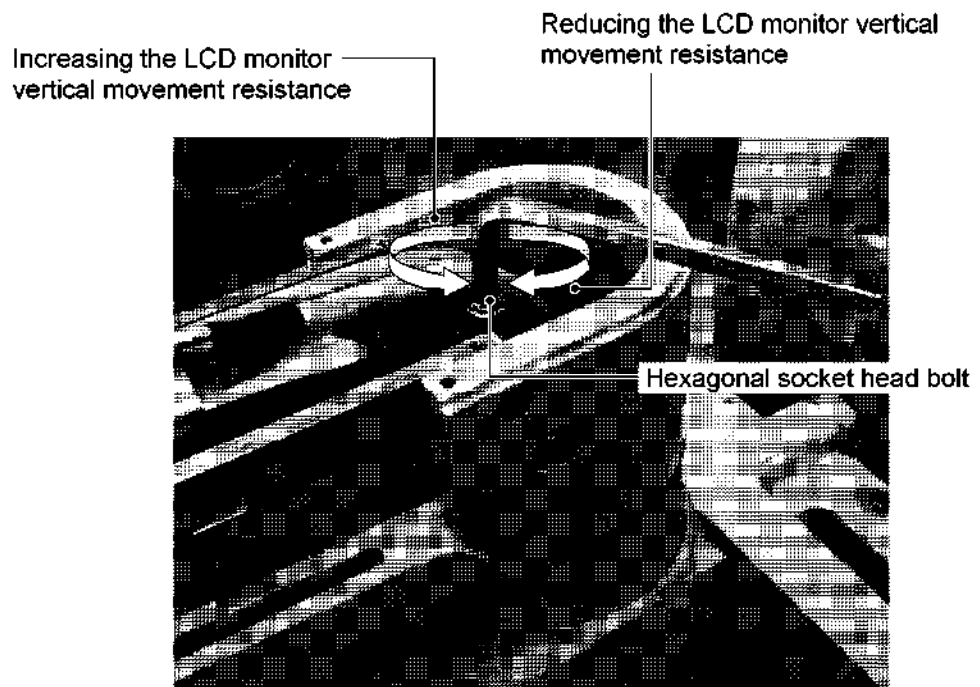


### 3.4.4 Adjusting the LCD monitor arm vertical movement resistance

- (1) Remove the two caps and the two M3 screws <A> to remove arm cover 1.
- (2) Remove the two M3 screws <B> to remove arm cover 2.



- (3) Using the M6 hex key, rotate the hexagonal socket head bolt to adjust the vertical movement resistance of the LCD monitor arm.



### 3.5 Removing the Operating Panel

#### 3.5.1 For the SSA-770A

The operating panel must be raised using the up/down slide lever in advance.

(1) Removing the handle

Refer to subsection 3.3.

(2) Removing the monitor unit

Refer to subsection 3.4.

(3) Removing the right side cover

(a) Remove the two rubber caps at the bottom of the cover.

(b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

(4) Removing the left side cover

(a) Remove the two rubber caps at the bottom of the cover.

(b) Remove the two M4 screws <B> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

(5) Removing the right side cover for the peripheral units

Remove the two M4 screws <C> to remove the cover.

\* The cover can be removed by lifting it and pulling it toward you.

(6) Removing the left side cover for the peripheral units

Remove the two M4 screws <D> to remove the cover.

\* The cover can be removed by lifting it and pulling it toward you.

(7) Removing the transducer cable arm

Remove the two M4 bolts <E> to remove the transducer cable arm.

(8) Removing the transducer cable hook

Remove the two M4 bolts <F> to remove the transducer cable hook.

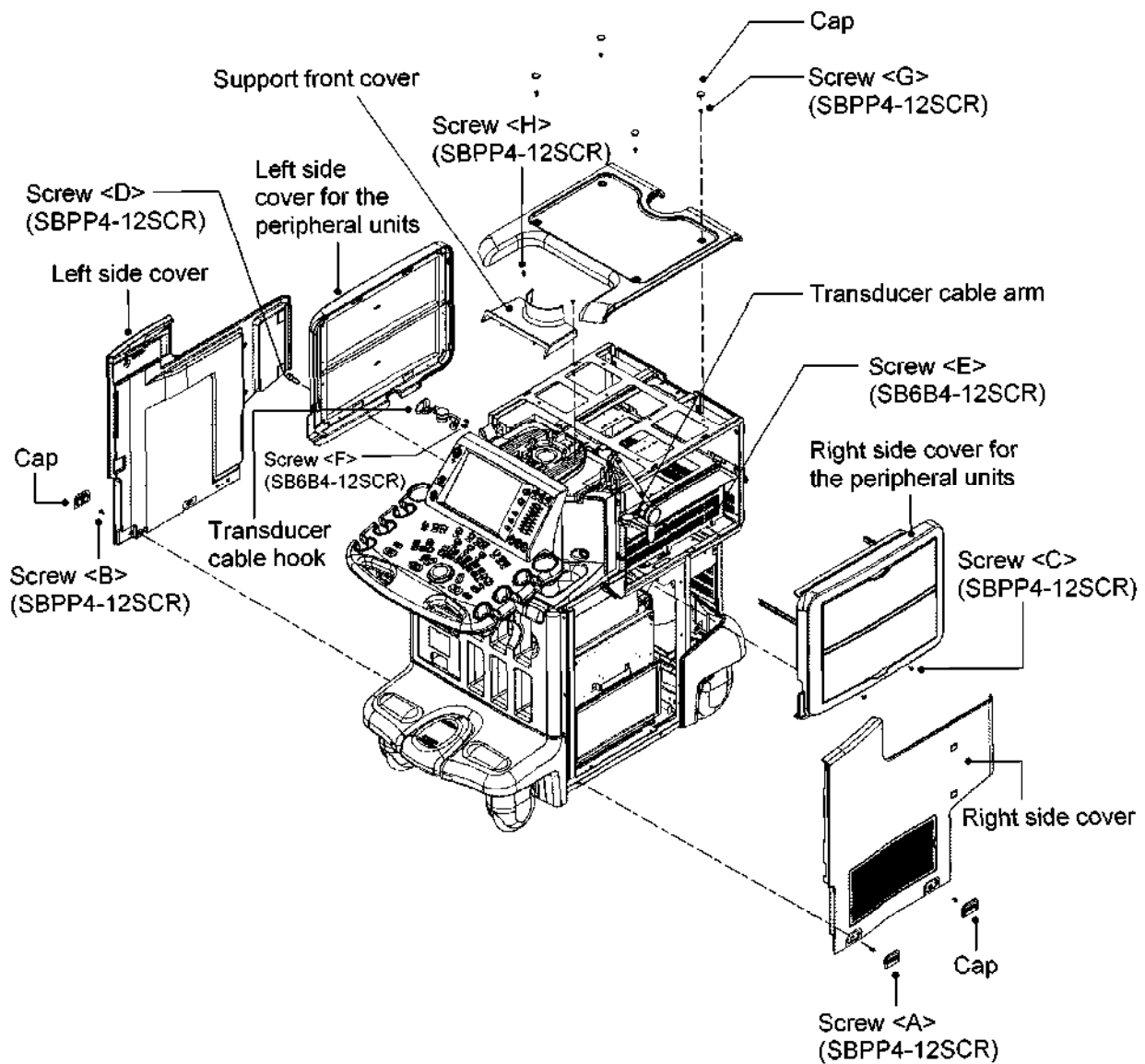
(9) Removing the top cover

(a) Remove the four caps.

(b) Remove the four M4 screws <G> to remove the cover.

(10) Removing the support front cover

Remove the two M4 screws <H> to remove the cover.



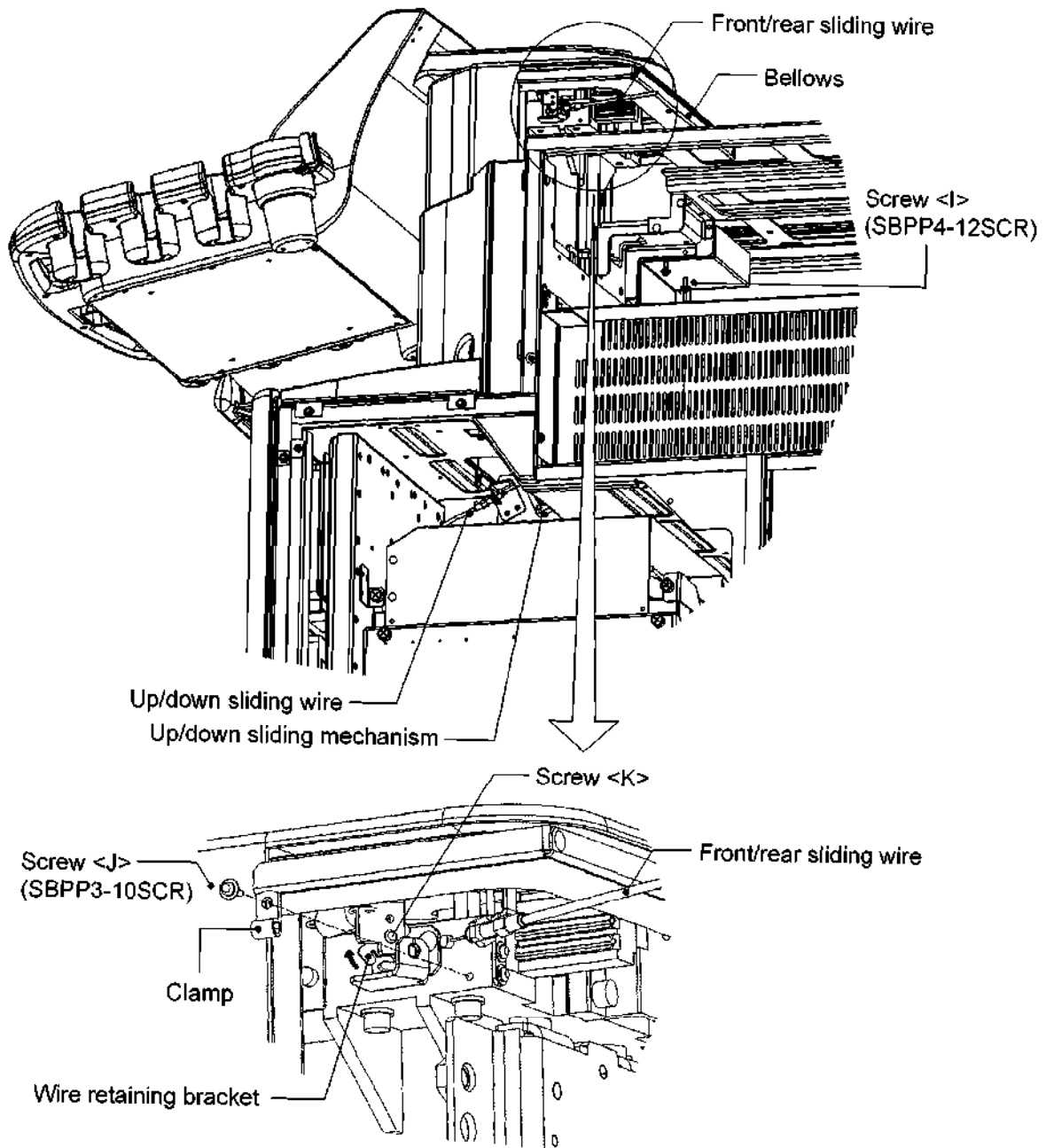
(11) Removing the bellows

Remove the two M4 screws <I>.

(12) Removing the front/rear sliding wire

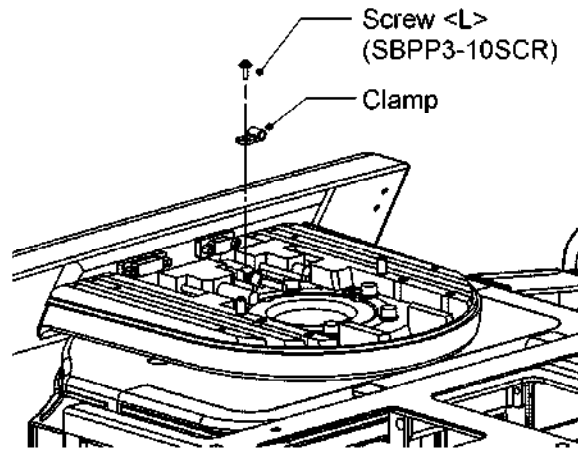
- (a) Remove the M3 screw <J> to remove the retaining clamp for the front/rear sliding wire.
- (b) Loosen the screw <K> and rotate the wire retaining bracket to remove the end of the wire.
- (c) Rotate the wire to remove it from the up/down mechanism.

- (13) Removing the up/down sliding wire
  - (a) Remove the end of the wire from the lever.
  - (b) Rotate the wire to remove it from the up/down mechanism.



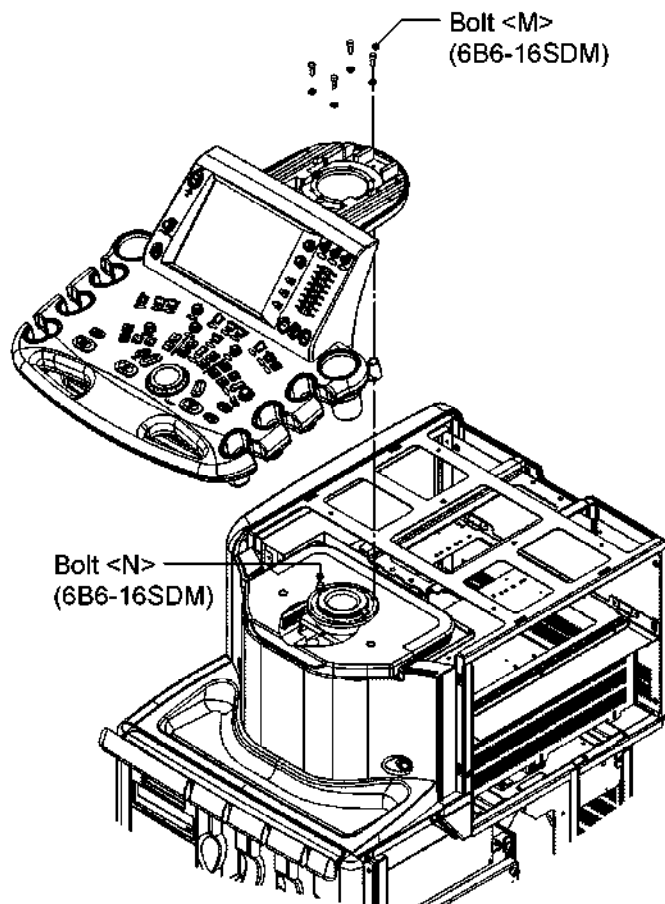
(14) Removing the cables

Remove the connected cables and the M3 screw <L> to remove the USB fitting clamp.



(15) Remove the operating panel from the system

- (a) Remove the four M6 bolts <M>.
- (b) Loosen the two M6 screws <N>. Rotate the operating panel clockwise and lift it to remove it.



## 3.5.2 For the SSA-700A

## (1) Removing the handle

Refer to subsection 3.3.1.

## (2) Removing the monitor unit

Refer to subsection 3.4.

## (3) Removing the right side cover

Same as for the SSA-770A.

## (4) Removing the left side cover

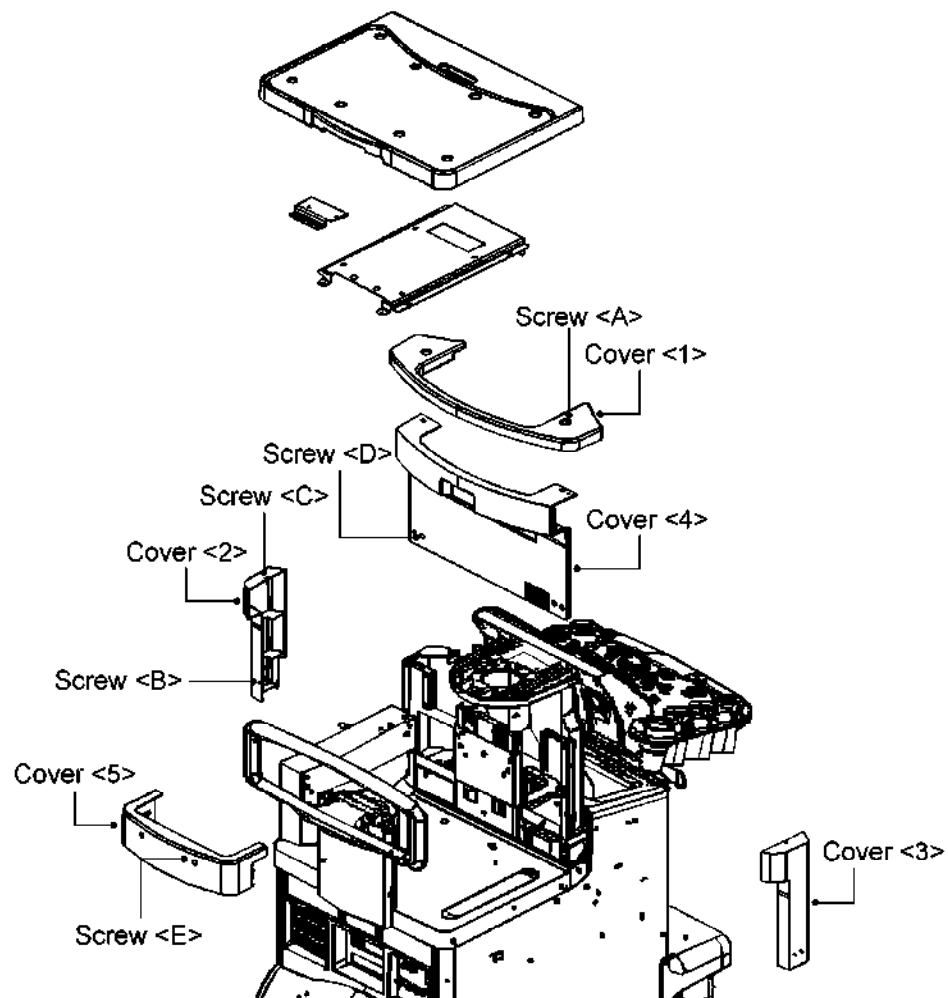
Same as for the SSA-770A.

## (5) Remove the screw &lt;A&gt; to remove the cover &lt;1&gt;.

## (6) Remove the screws &lt;B&gt; and &lt;C&gt; to remove the covers &lt;2&gt; and &lt;3&gt;.

## (7) Remove the screw &lt;D&gt; to remove the cover &lt;4&gt;.

## (8) Remove the screw &lt;E&gt; to remove the cover &lt;5&gt;.

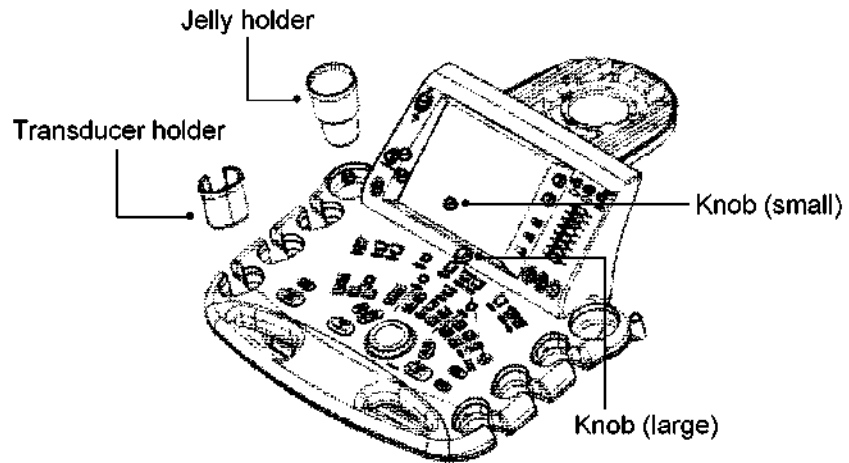




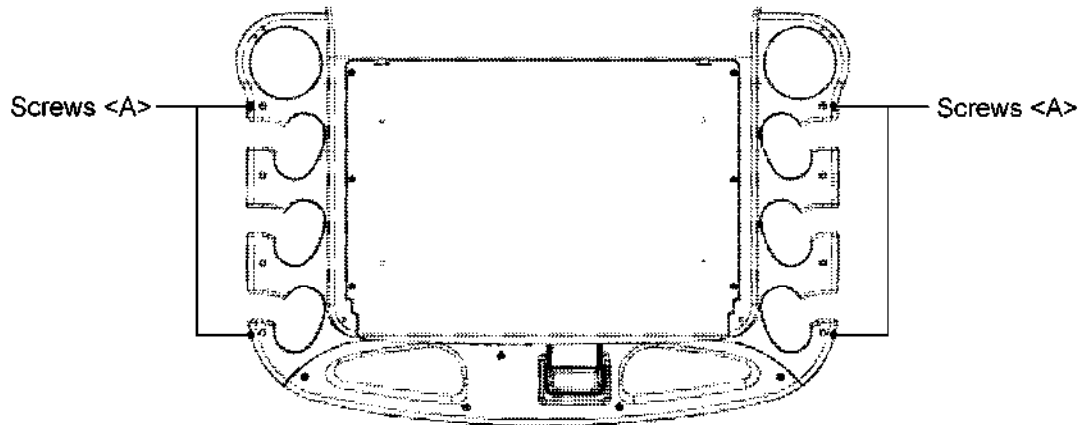
### 3.6 Disassembling the Operating Panel

#### 3.6.1 Removing the lower cover

- (1) Remove the transducer holders (six), jelly holders (two), and knobs (four small and one large).

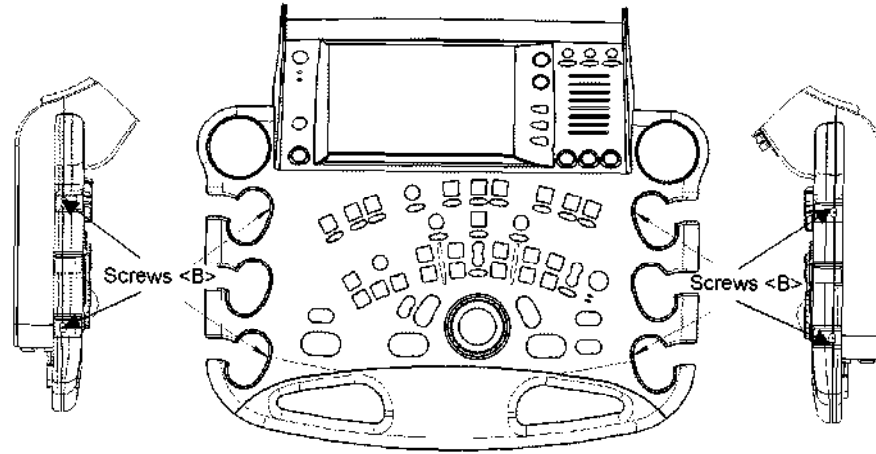


- (2) Remove the four screws <A> from the right and left of the holder mounting base secured on the back of the panel.



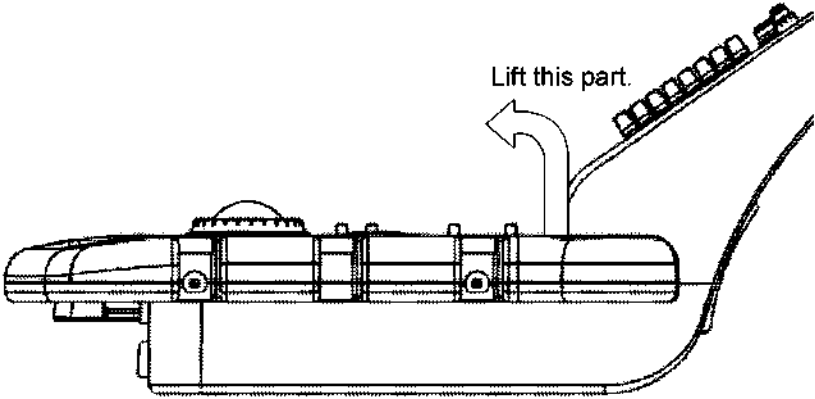
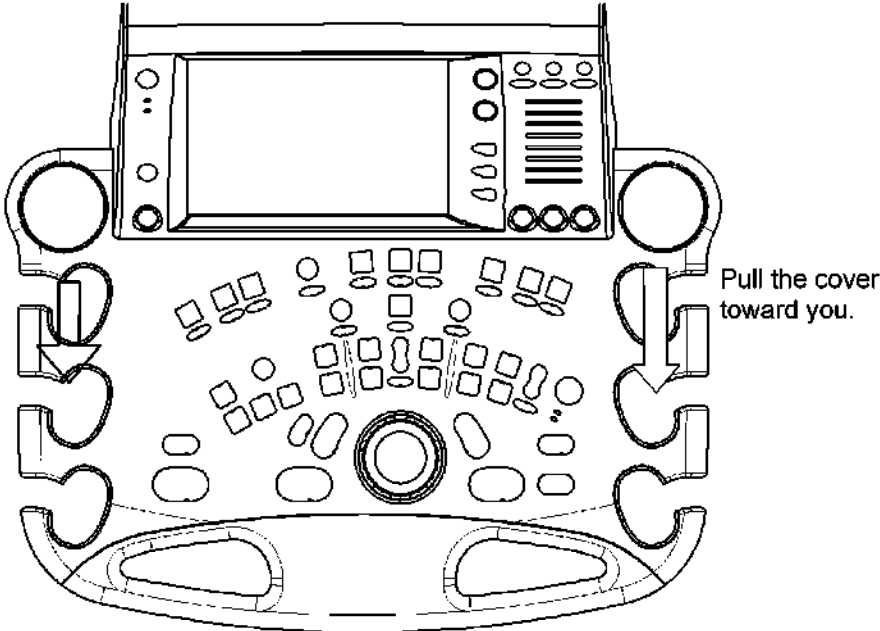
(3) Loosen the four screws <B> at the right and left of the holder mounting base.

\* The screws B include springs and cannot be removed. Loosen the screws so that they turn freely and protrude from the base.



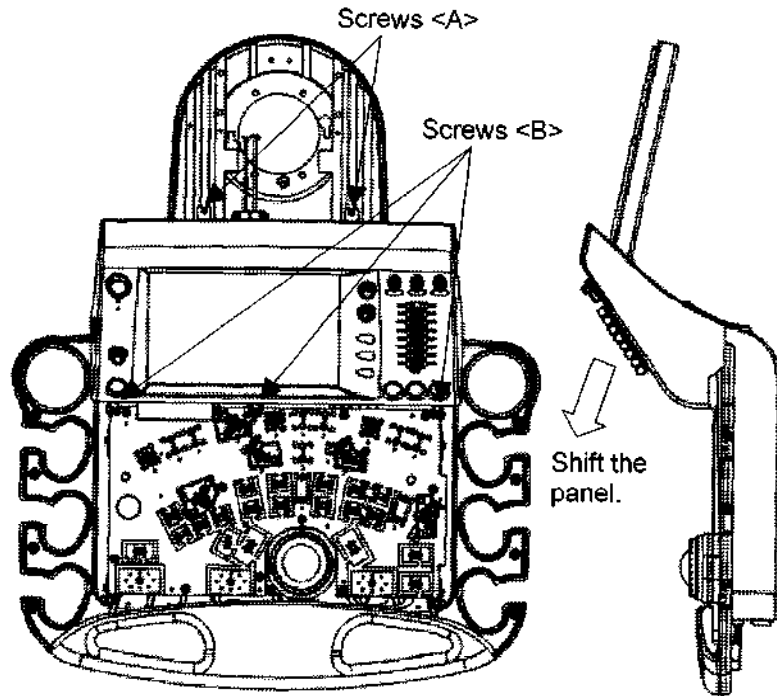
- (4) Hold the cover at the jelly holder mounting holes, apply a force so as to pull the cover toward you, and lift the cover to remove it.

**CAUTION:** The cover is mounted by engaging the indentations in its front part with the tabs in the handle section. Therefore, do not attempt to remove the cover by lifting it from the front. Doing so may damage the cover.

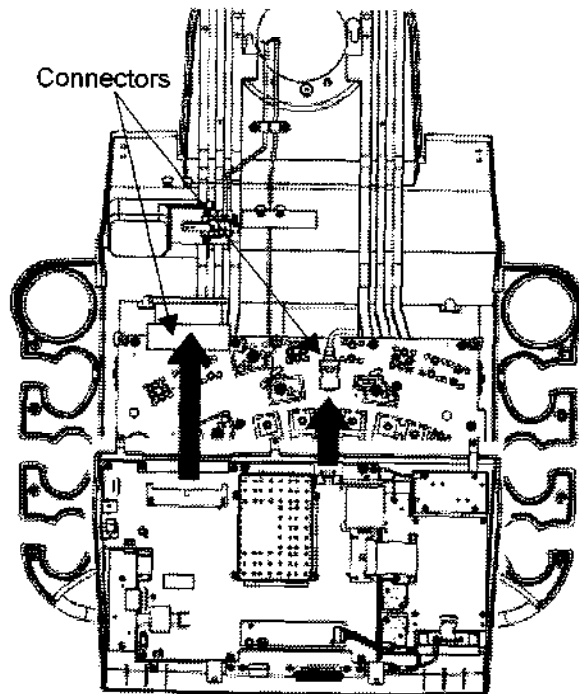


3.6.2 Removing the upper panel

- (1) Remove the two screws <A> and the three screws <B> and shift the panel in the direction indicated by the arrow.

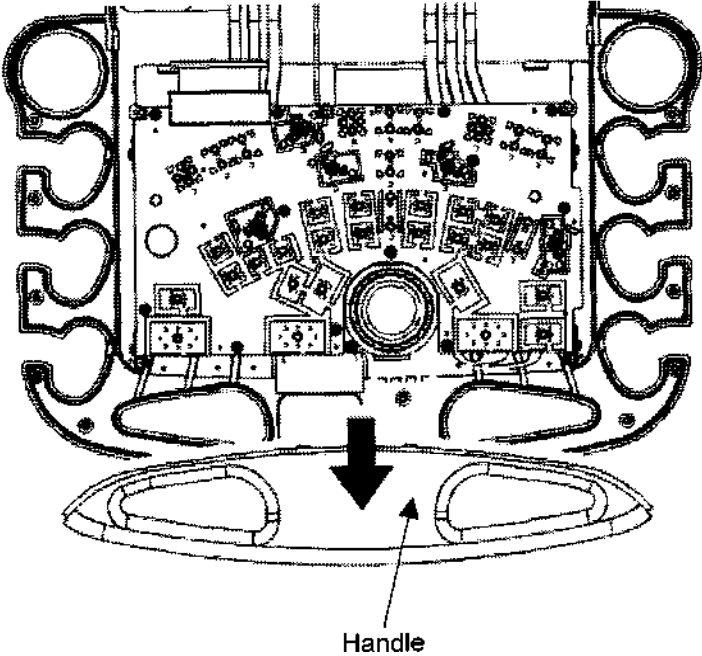
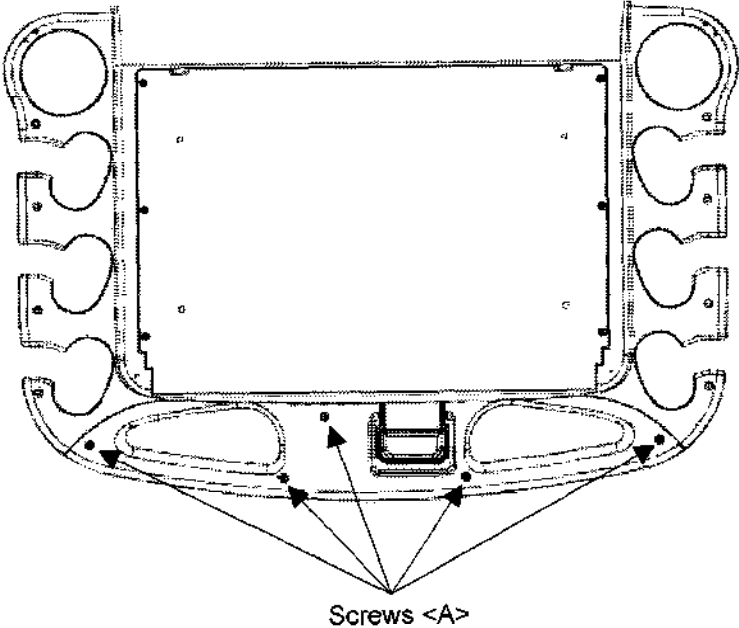


- (2) Remove the two connectors.



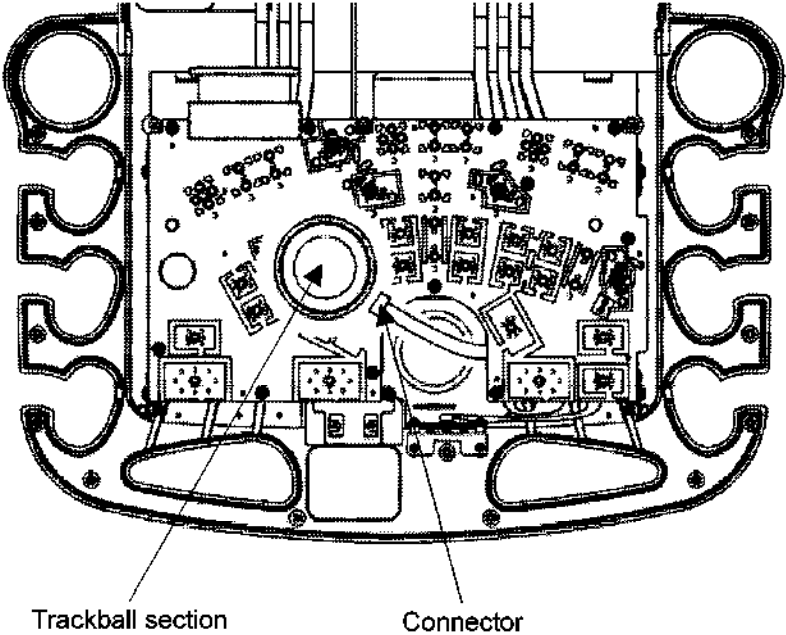
3.6.3 Removing the handle

- (1) Remove the five screws <A> on the back of the panel and remove the handle.



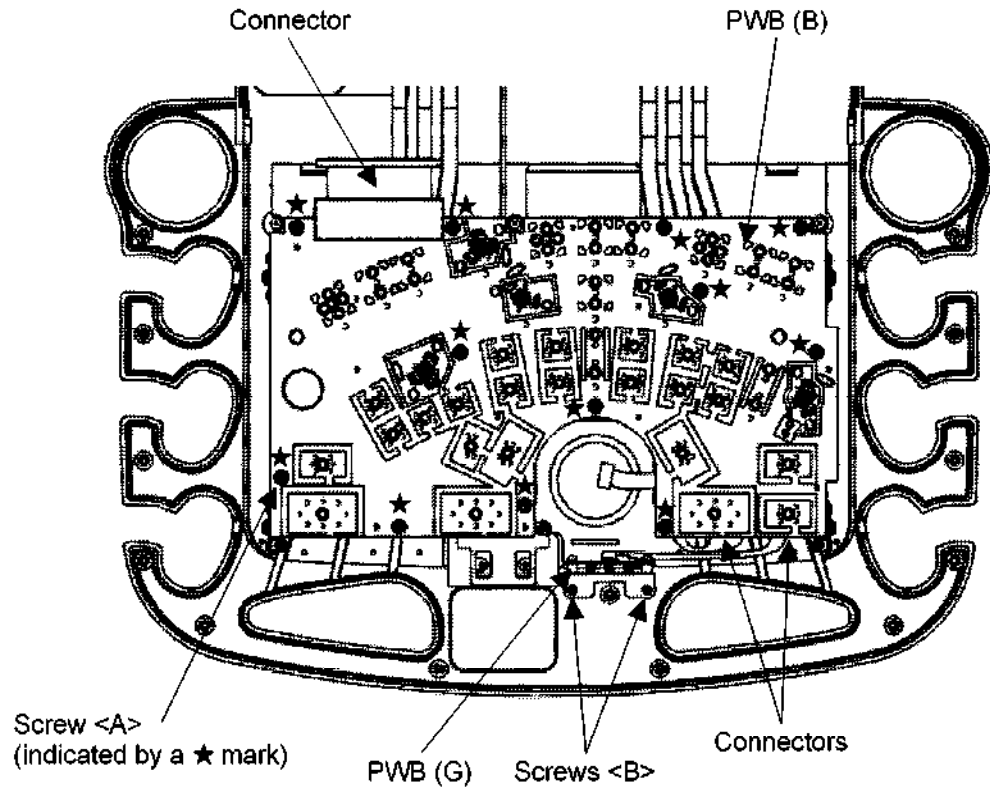
3.6.4 Removing the trackball section

- (1) Remove the connector connected to the trackball section and remove the trackball section.



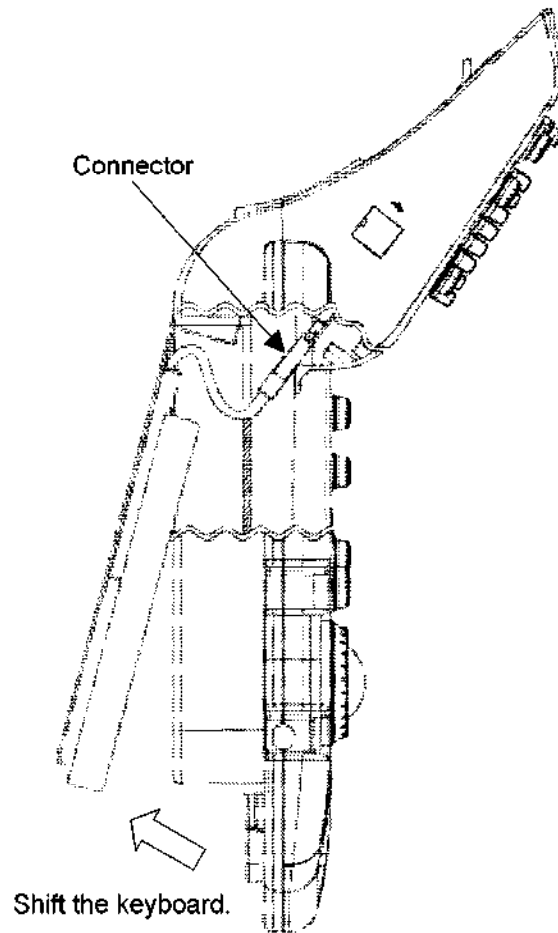
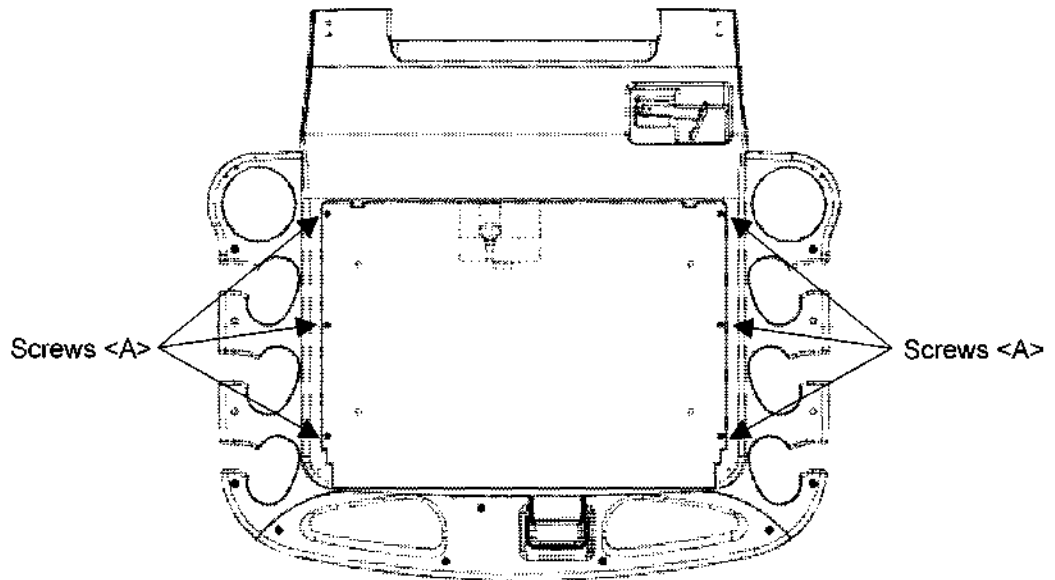
3.6.5 Removing the PWBs (B) and (G)

- (1) Remove the three connectors connected to the PWB (B).
- (2) Remove the twelve screws <A> and remove the PWB (B).
- (3) Remove the two screws <B> and remove the PWB (G).



### 3.6.6 Removing the keyboard

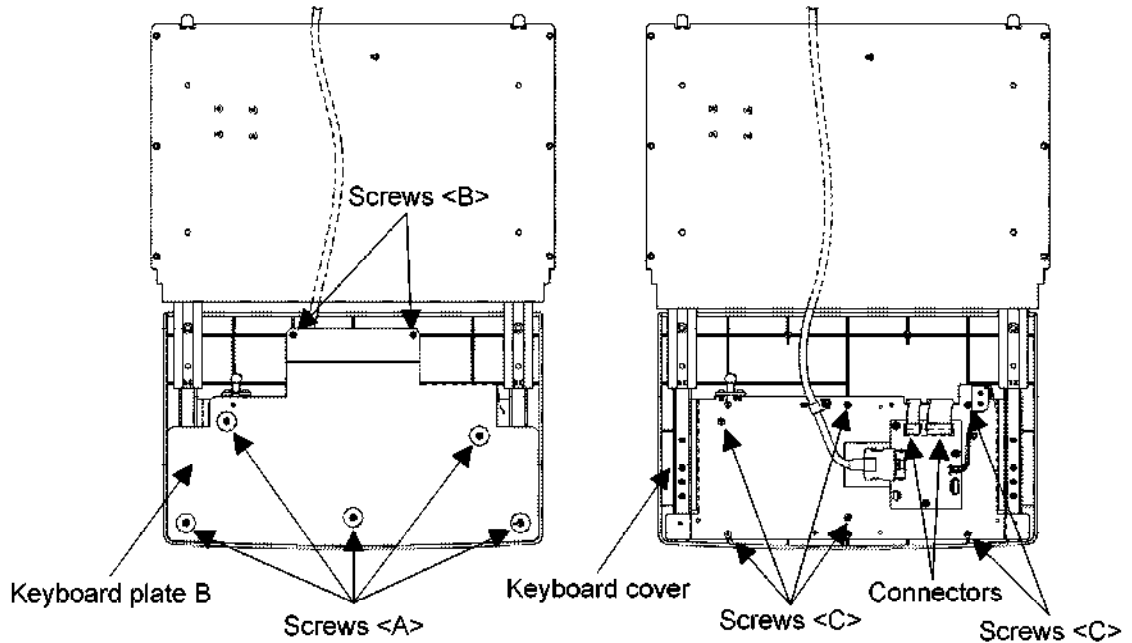
- (1) Remove the six flat head screws <A> and shift the keyboard.
- (2) Remove the connector.



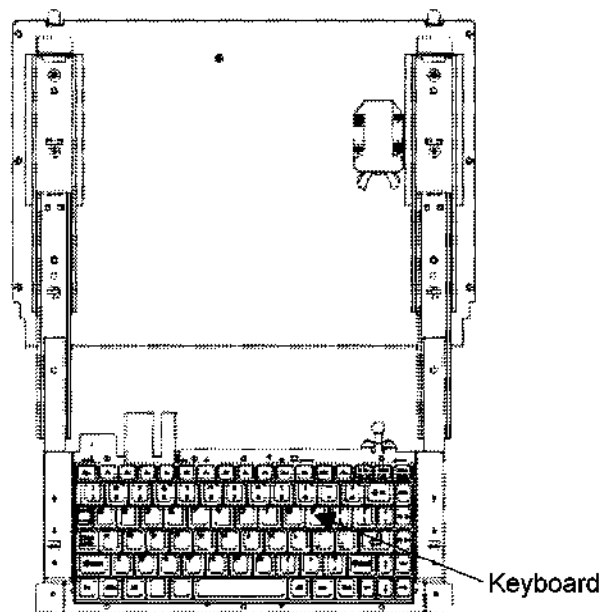


### 3.6.7 Removing the keyboard

- (1) Remove the five screws <A> and the two screws <B> and remove the keyboard plate B.
- (2) Remove the connectors from the FPC.
- (3) Remove the six screws <C> and remove the keyboard cover.

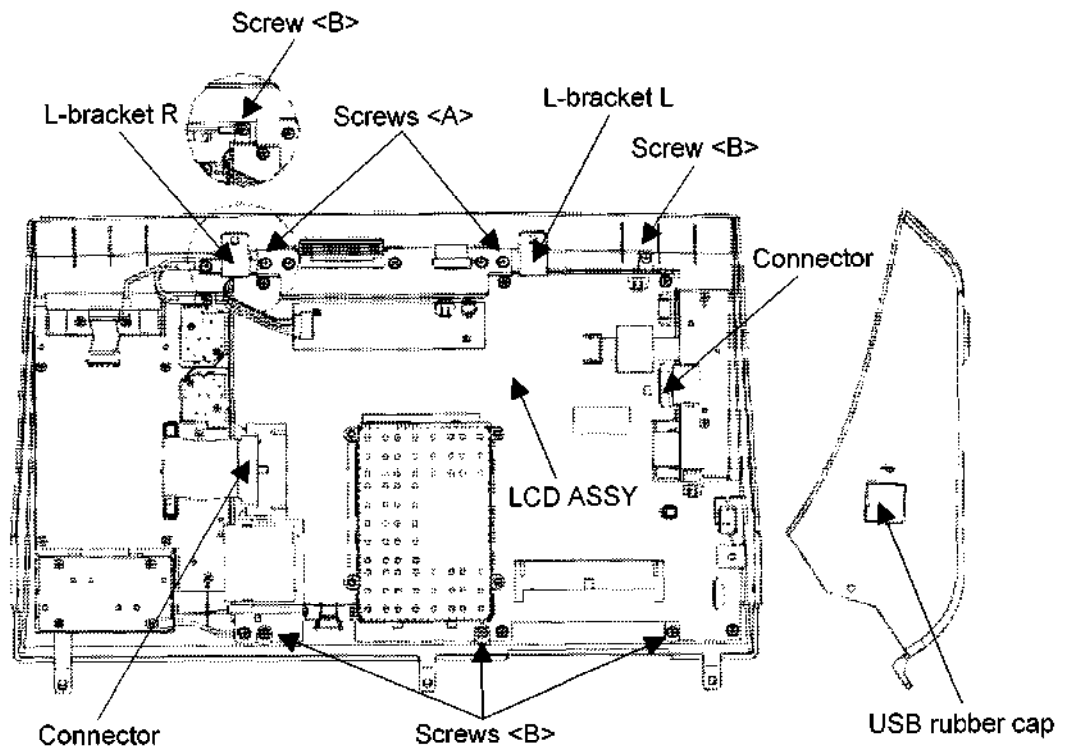


- (4) Remove the keyboard.



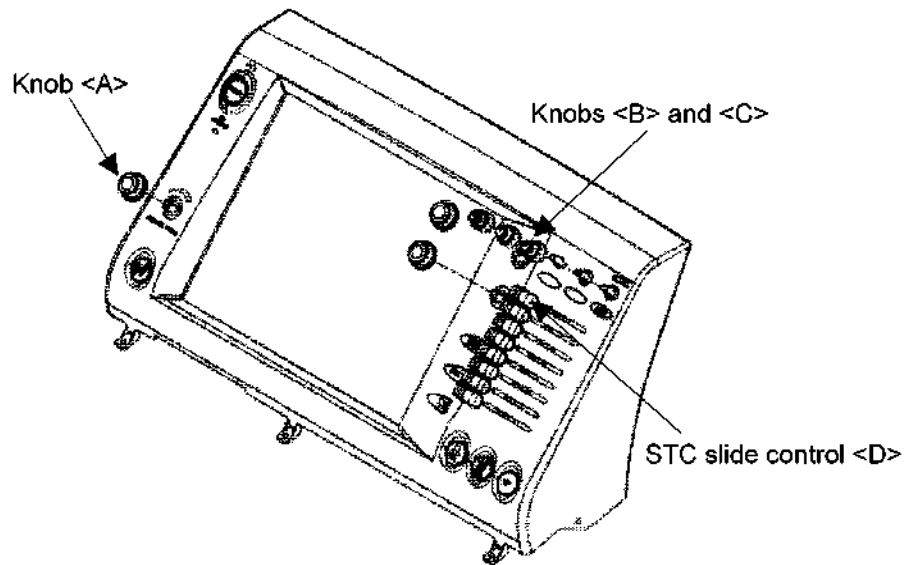
### 3.6.8 Removing the LCD ASSY

- (1) Remove the USB rubber cap.
- (2) Remove the two connectors.
- (3) Remove the two screws <A> and remove the L-bracket L and the L-bracket R.
- (4) Remove the five screws <B> and remove the LCD ASSY.

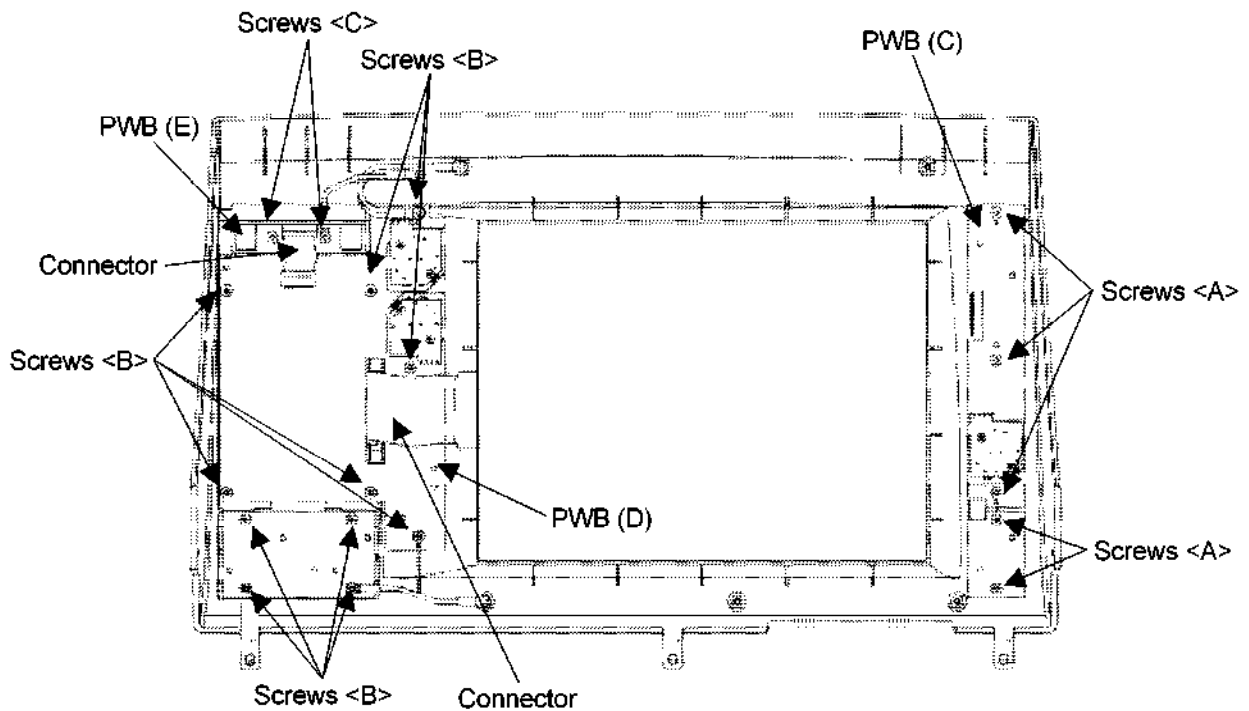


3.6.9 Removing the PWBs (C), (D), and (E)

- (1) Remove the six knobs <A>, <B>, and <C> and the eight STC slide controls <D>.

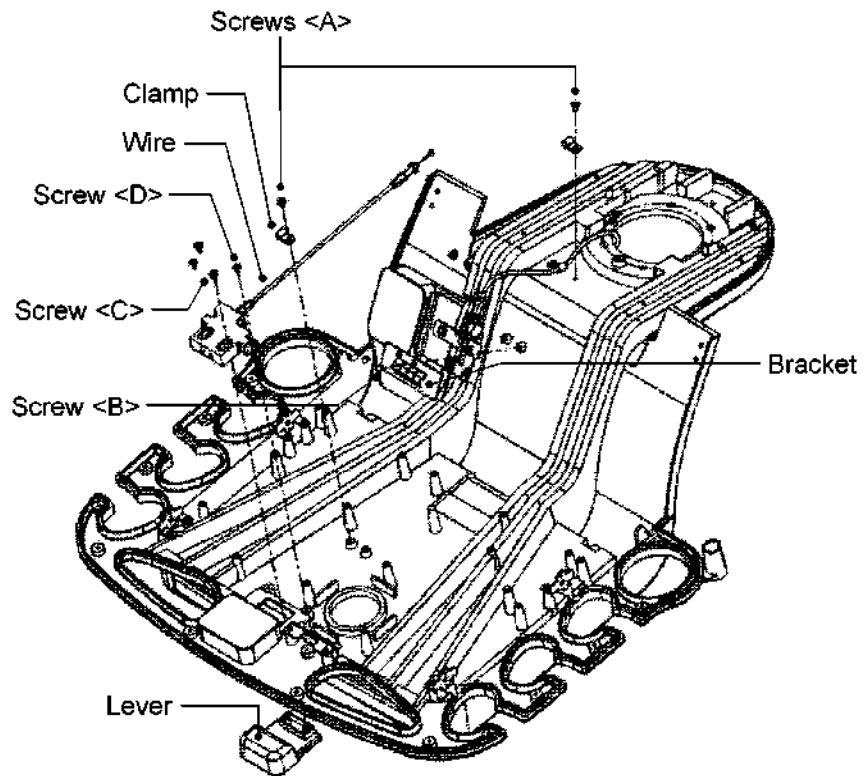


- (2) Remove the two connectors.
- (3) Remove the five screws <A> and remove the PWB (C).
- (4) Remove the eleven screws <B> and remove the PWB (D).
- (5) Remove the two screws <C> and remove the PWB (E).



3.6.10 Removing the near/away slide lever

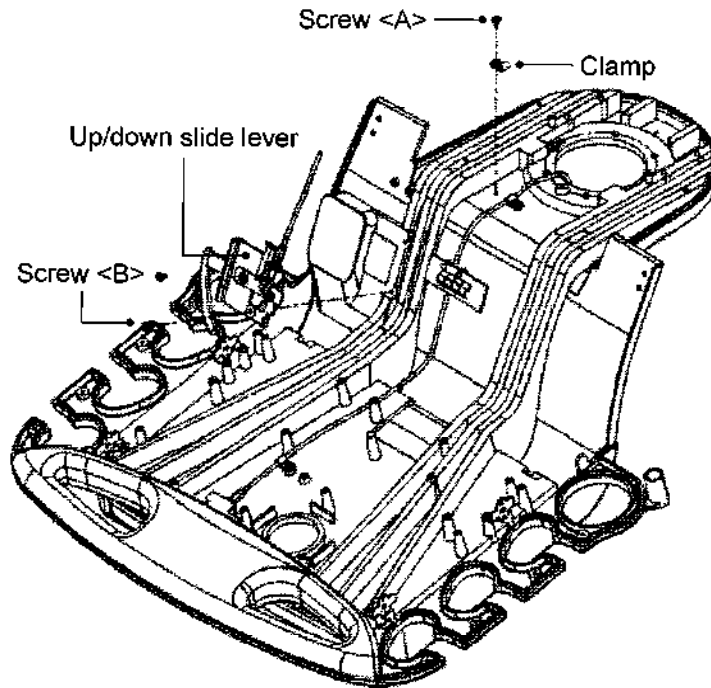
- (1) Remove the two screws <A> and remove the clamp.
- (2) Remove the two screws <B> and remove the bracket.
- (3) Remove the two screws <C> and remove the lever.
- (4) Remove the two screws <D> and remove the wire.



3.6.11 Removing the up/down slide lever

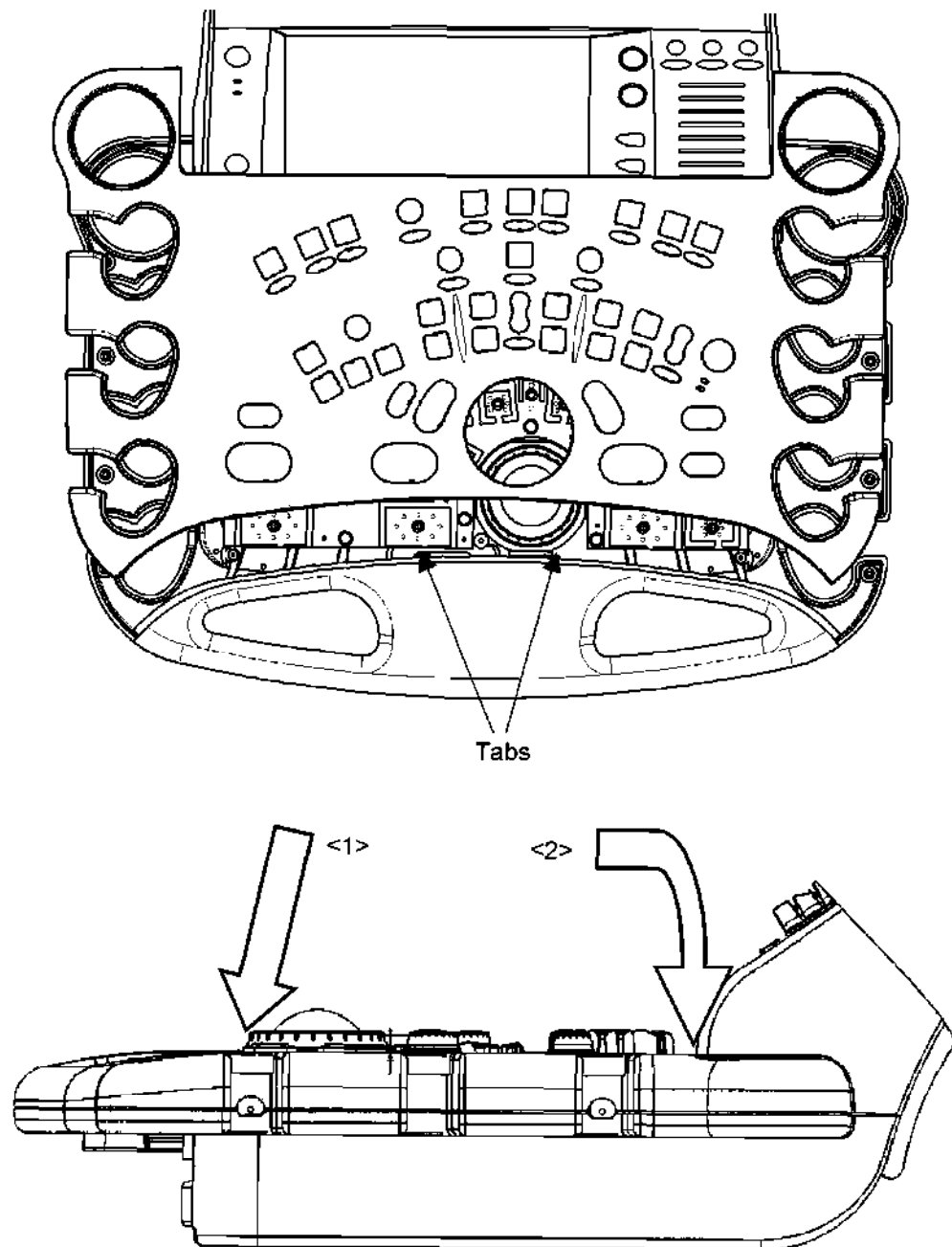
\* Only for the SSA-770A

- (1) Remove the screw <A> and remove the clamp.
- (2) Remove the two screws <B> and remove the up/down slide lever.



## 3.6.12 Mounting the switch cover

- (1) Mount the cover (starting with the front section) by reversing the steps for removal. Engage the tabs in the handle section with the indentations in the cover <1> and then mount the cover <2>.
- (2) Secure the four screws <B> while pressing the cover from above.
- (3) Secure the four screws <A> at right and left of the holder mounting base on the back of the panel.
- (4) Install the four small rotary encoder knobs and the large rotary encoder knob.



## 3.7 Removing the PWB Rack

**CAUTION:** Two persons are required when removing the PWB rack.

Confirm that the transducers have been removed.

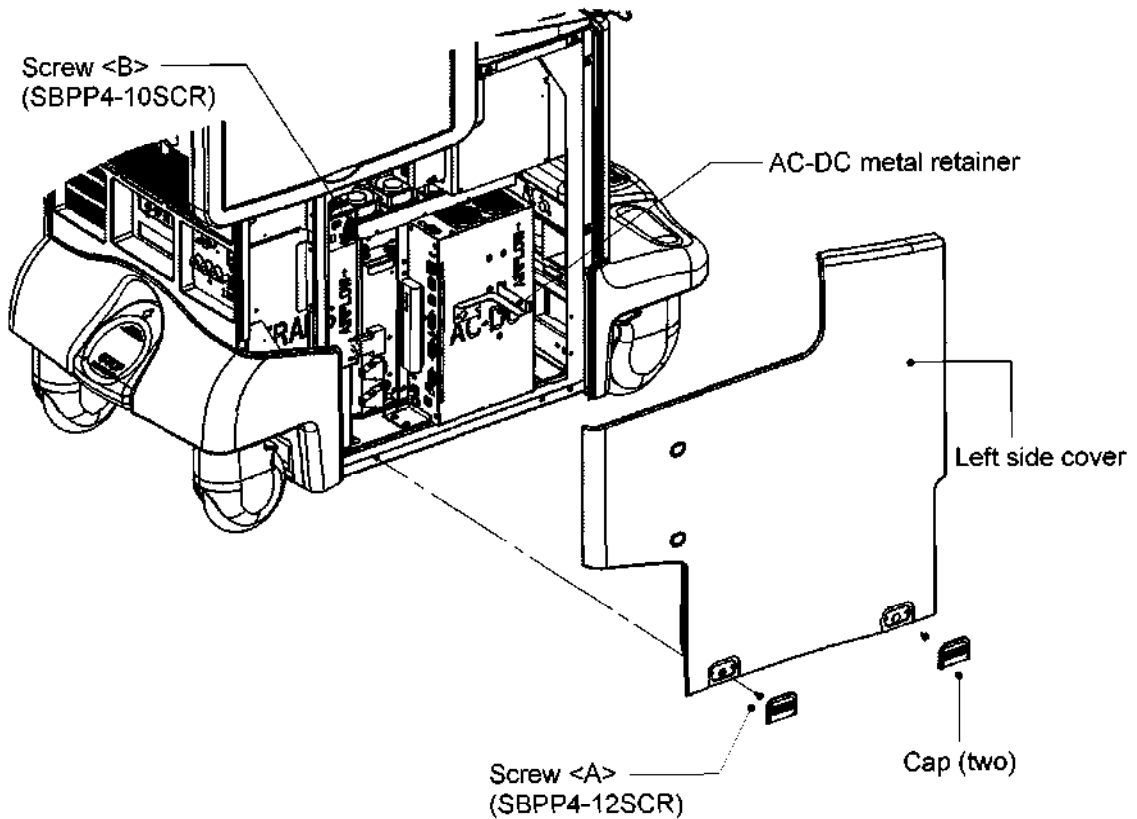
## (1) Removing the left side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

## (2) Removing the AC-DC metal retainer

- (a) Loosen the two M4 screws <B> to remove the AC-DC metal retainer.



- (3) Removing the right side cover
  - (a) Remove the two rubber caps at the bottom of the cover.
  - (b) Remove the two M4 screws <C> to remove the cover.

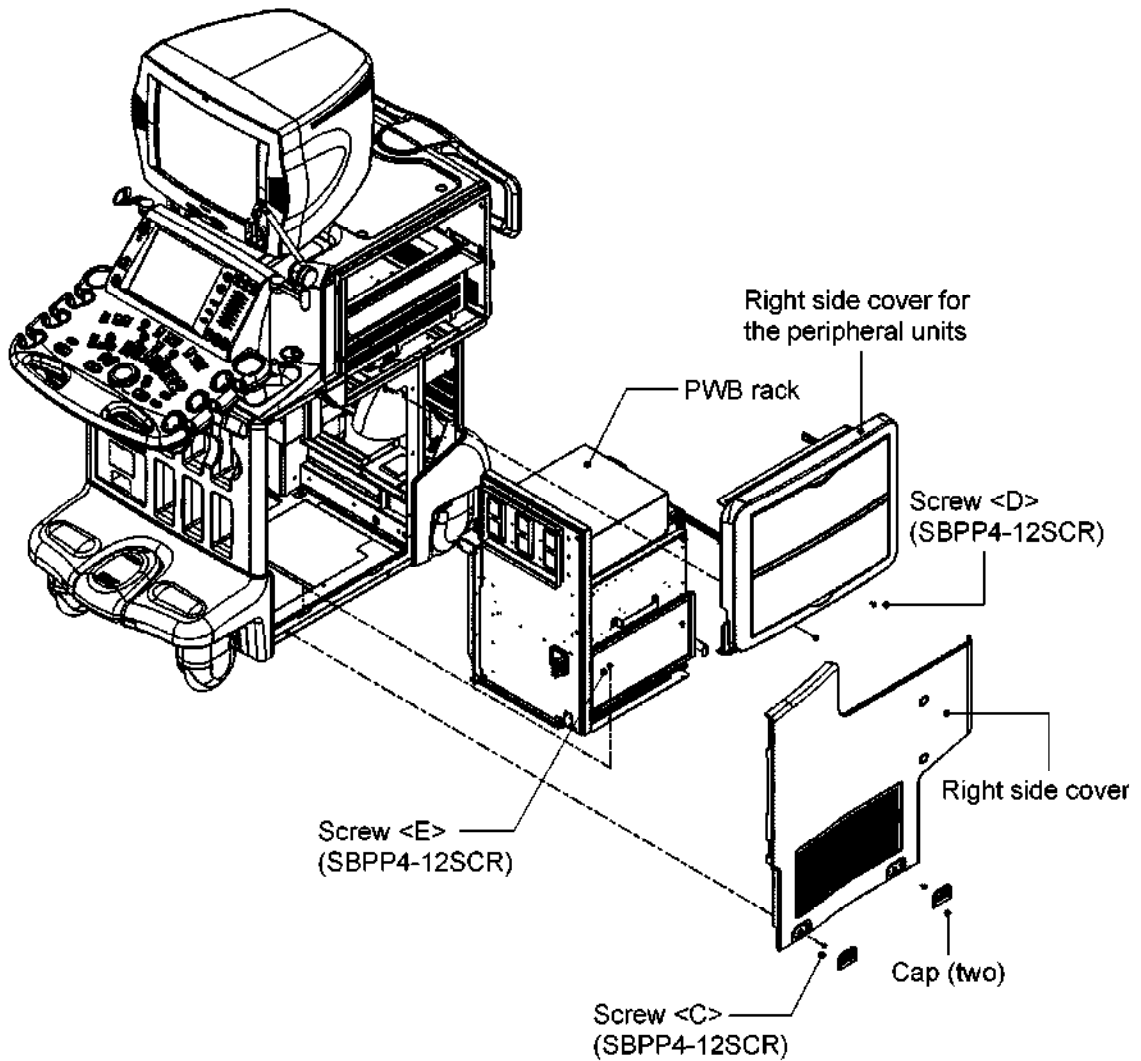
\* The cover can be removed by pulling its bottom toward you.

- (4) Removing the right side cover for the peripheral units
 

Remove the two M4 screws <D> to remove the cover.

\* The cover can be removed by lifting it and pulling it toward you.

- (5) Removing the PWB rack
  - (a) Remove all the cables connected to the PWB rack.
  - (b) Remove the two M4 screws <E> and extract the PWB rack.





### 3.8 Removing the PWBs

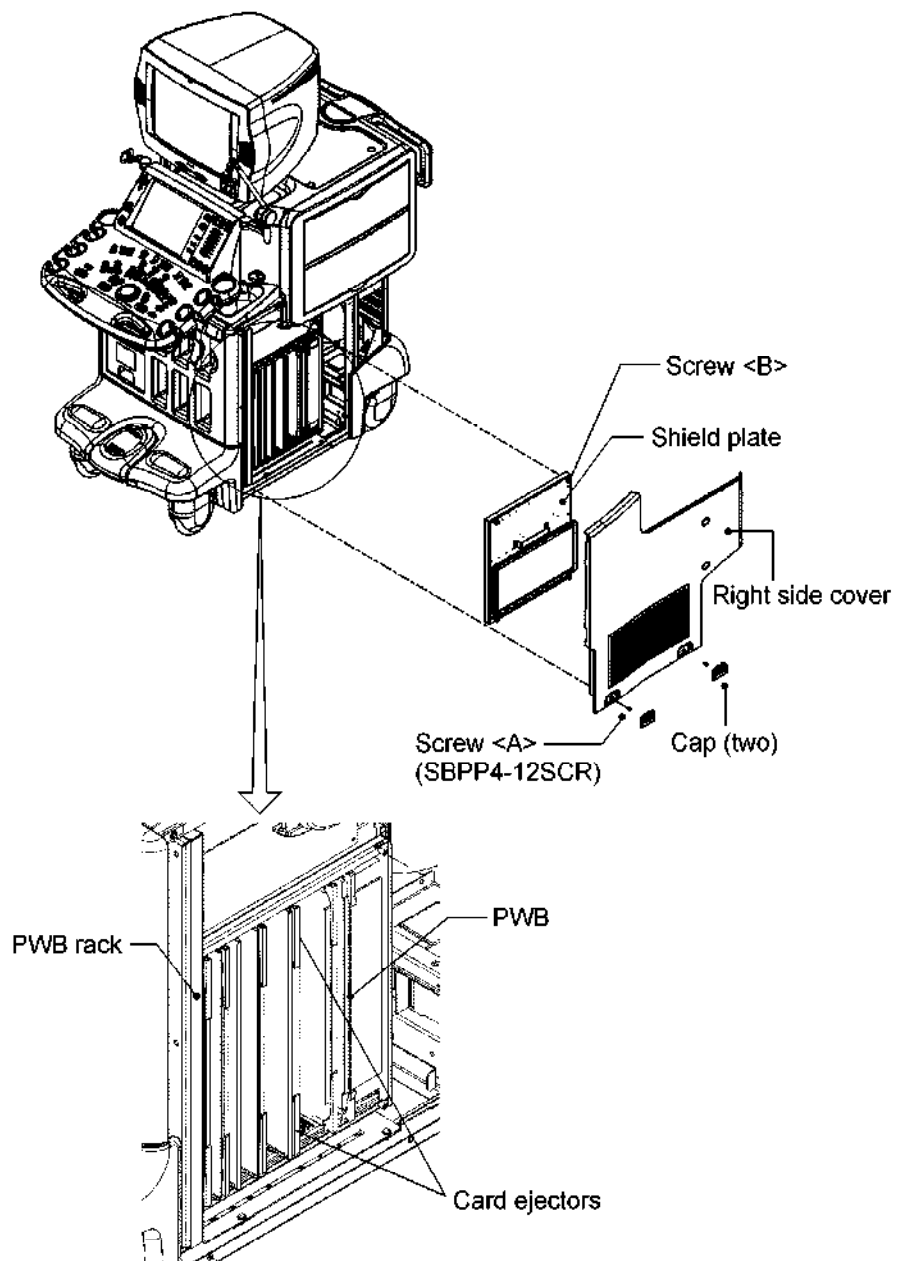
#### (1) Removing the right side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (2) Removing the PWBs

- (a) Loosen the four screws <B> to remove the PWB rack shield plate.
- (b) Release the card ejectors at the upper and lower ends of the PWB and extract the PWB.



### 3.9 Removing the TI

Confirm that the transducers have been removed.

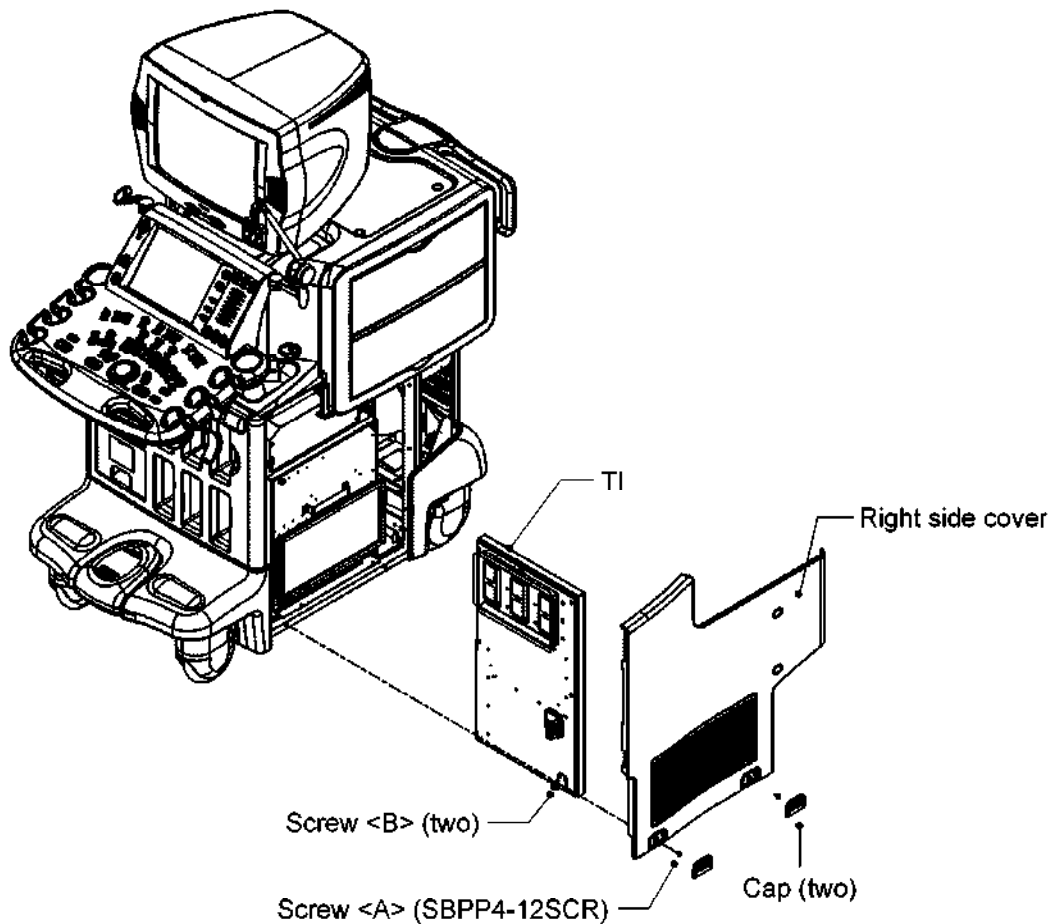
#### (1) Removing the right side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (2) Removing the TI

- (a) Remove the cable for the pencil transducer (PP) connected to the TI.
- (b) Loosen the two screws <B> to extract the TI.



### 3.10 Removing the IO

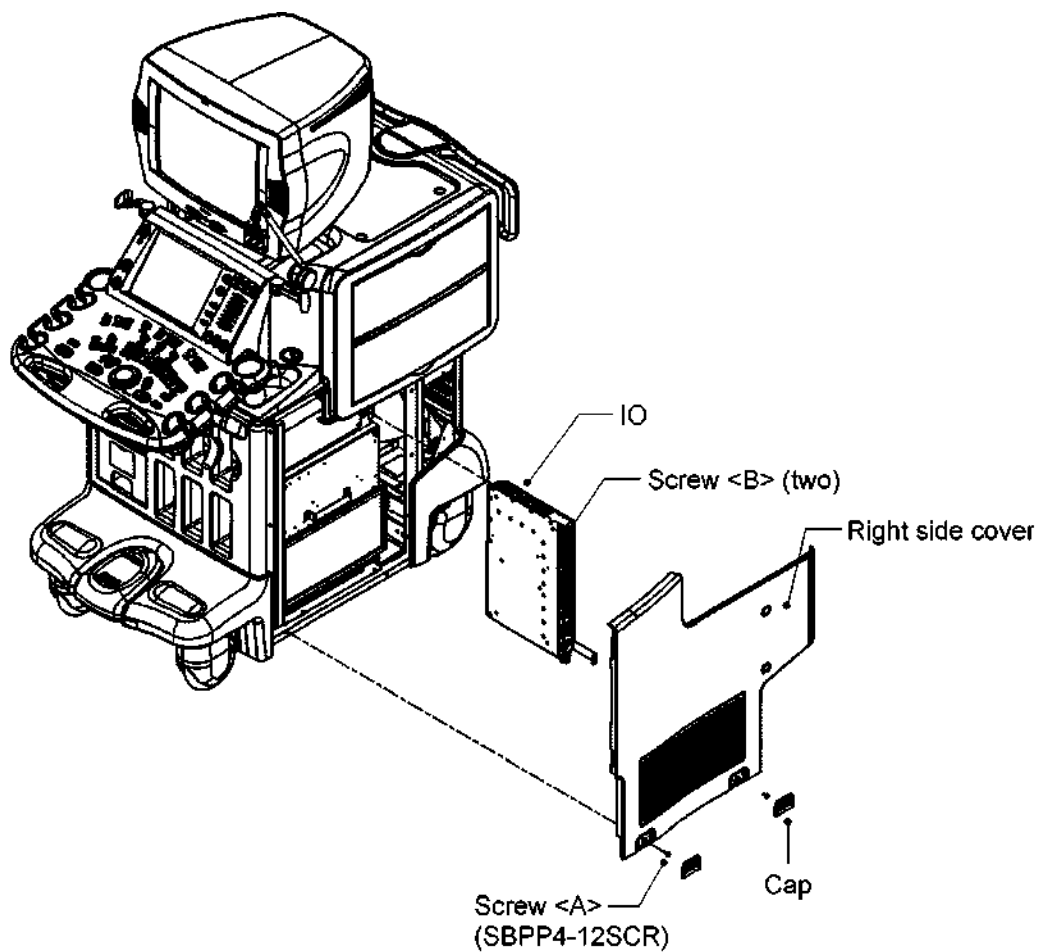
#### (1) Removing the right side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (2) Removing the IO

- (a) Remove all the cables connected to the IO.
- (b) Loosen the two screws <B> to extract the IO.



### 3.11 Removing the HDD Unit

#### (1) Removing the left side cover

- (a) Remove the two rubber caps <A> at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (2) Removing the right side cover

- (a) Remove the two rubber caps <B> at the bottom of the cover.
- (b) Remove the two M4 screws <B> to remove the cover.

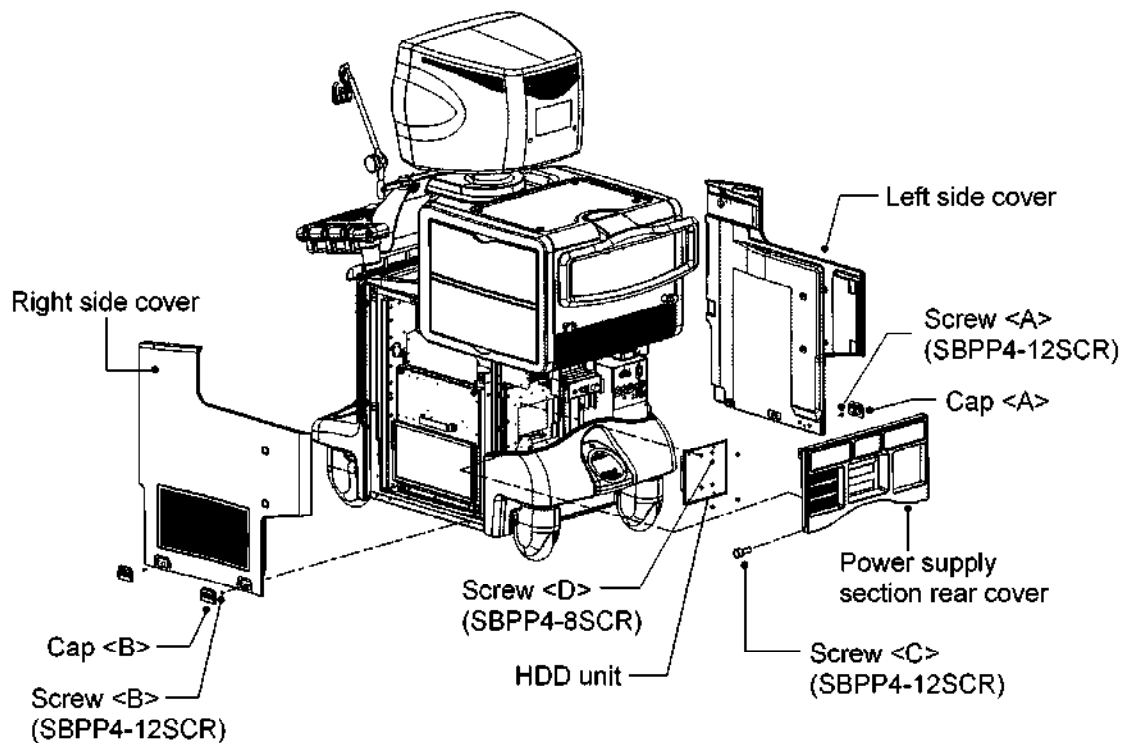
\* The cover can be removed by pulling its bottom toward you.

#### (3) Remove the power supply section rear cover

Remove the four M4 screws <C> to remove the cover.

#### (4) Removing the HDD unit

Remove the four M4 screws <D> to remove the HDD unit.



### 3.12 Removing the Battery

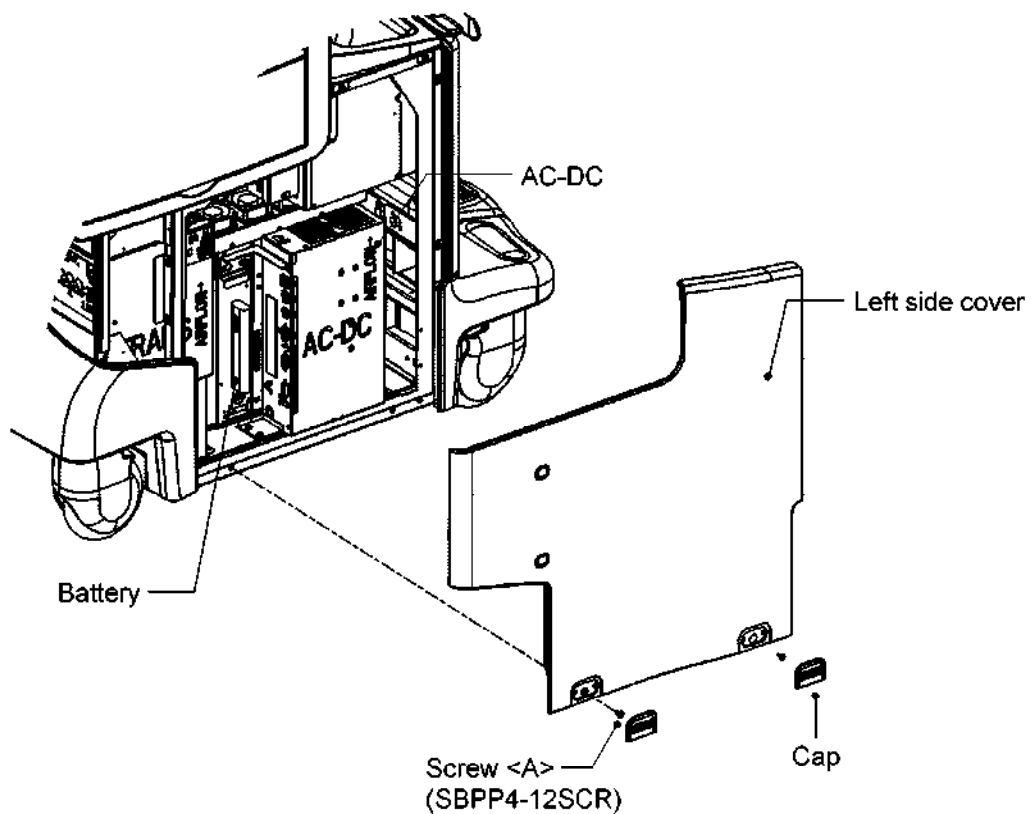
#### (1) Removing the left side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (2) Removing the battery

- (a) Remove the battery connector that is connected to the AC-DC unit.
- (b) Remove the battery of the AC-DC unit.



### 3.13 Removing the AC-DC Unit

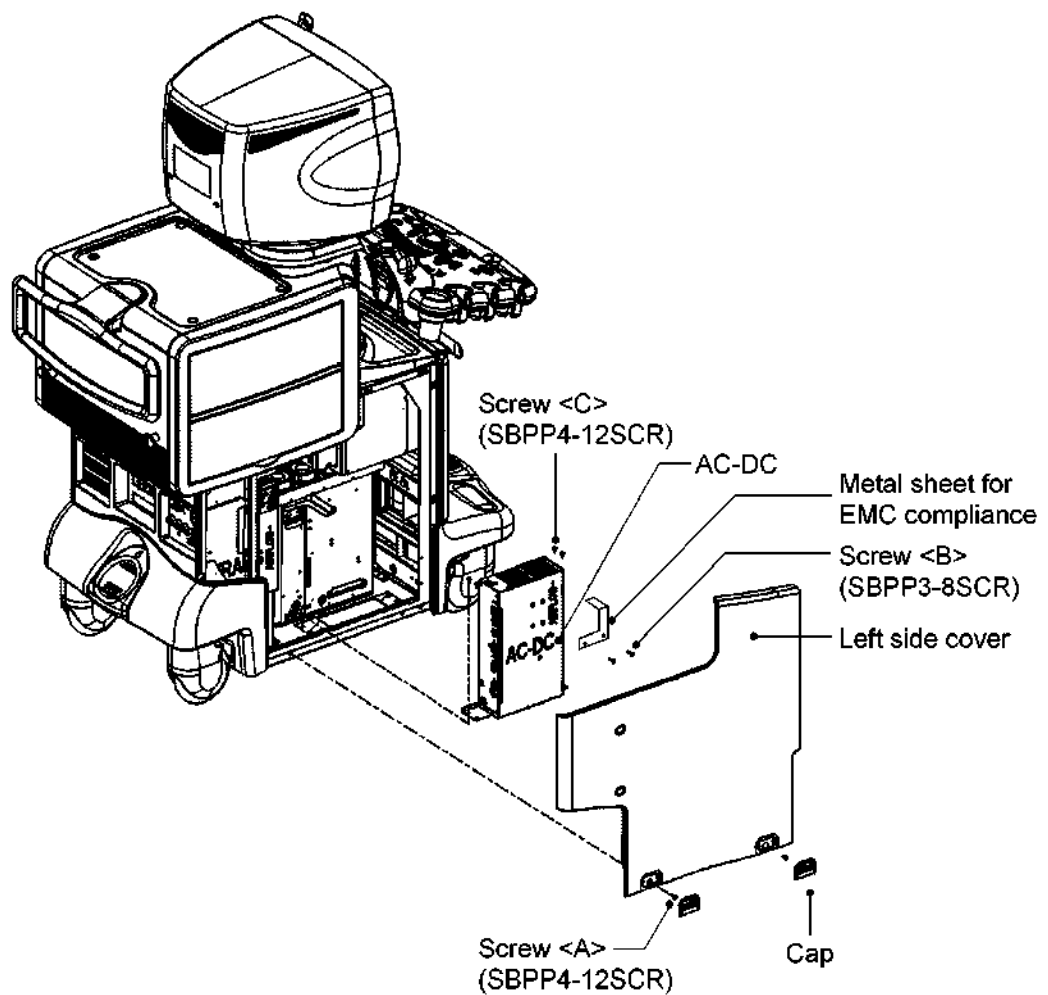
#### (1) Removing the left side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (2) Removing the AC-DC unit

- (a) Remove all the cables connected to the AC-DC unit.
- (b) If the metal sheet for EMC compliance is installed, remove it by removing screws <B>.
- (c) Remove the four M4 screws <C> to remove the AC-DC unit.



**CAUTION:** When replacing the AC/DC tray of the SSA-770A, check the revision number of the AC/DC tray supplied for replacement and follow the appropriate procedure according to the revision number.

1. When the new AC/DC tray is BSM31-2013E (no revision)

The AC/DC tray is not compatible and must not be used to replace the existing tray.

2. If AC/DC tray BSM31-2013E-G or BSM31-2013E-I is supplied

- (1) Wind the cables around the core as described below.

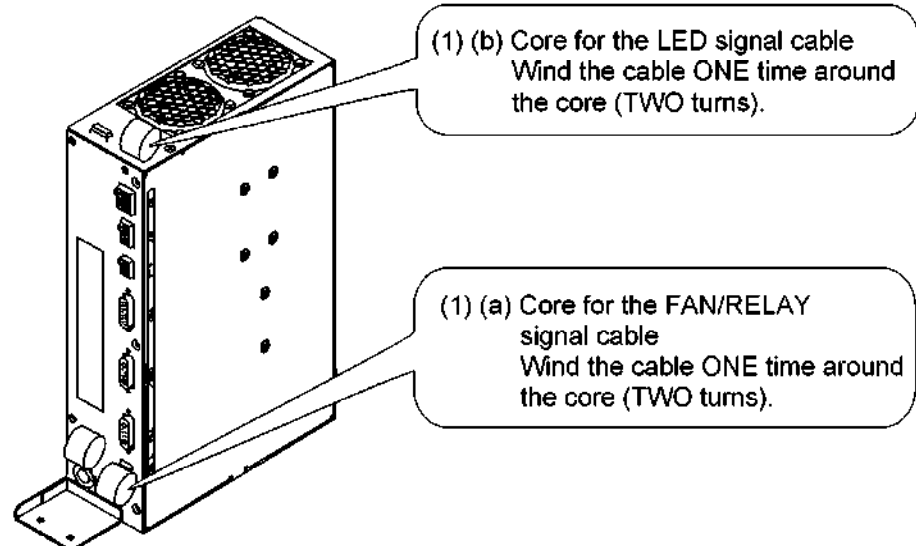
- (a) Wind the FAN/RELAY signal cables (two lines) between the AC/DC tray and transformer tray ONE time around the core (TWO turns).

\* When the cable is passed through the core the first time it is counted as one turn. Therefore, winding of the cable one time corresponds to TWO turns.

- (b) Wind the LED signal cable (which is connected to the top of the AC/DC tray) between the AC/DC tray and the transformer tray ONE time around the core (TWO turns).

\* When the cable is passed through the core the first time it is counted as one turn. Therefore, winding of the cable one time corresponds to TWO turns.

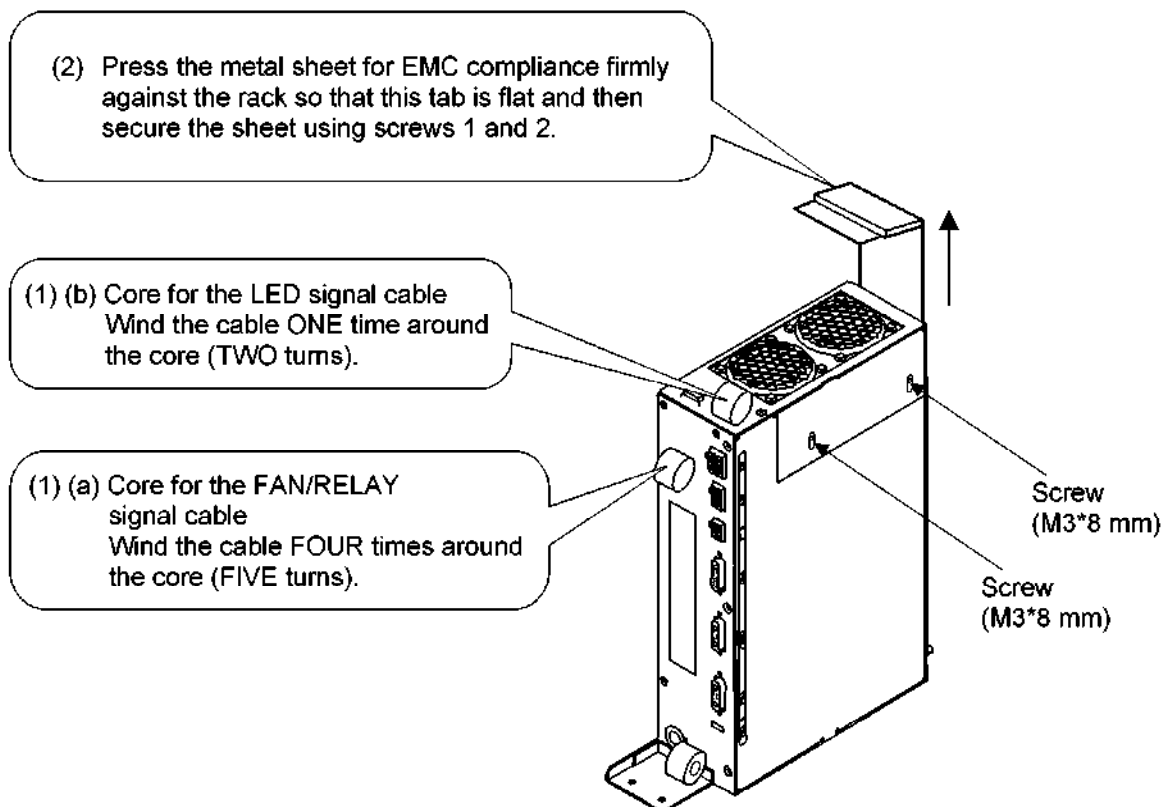
- (2) The metal sheet for EMC compliance should not be installed.



**CAUTION:** 3. When the new AC/DC tray is BSM31-2013E-H or -J or later (revision or later)

- (1) Wind the cables around the core as described below. Note the number of times each cable is to be wound around the core.
  - (a) Wind the FAN/RELAY signal cables (two lines) between the AC/DC tray and transformer tray FOUR times around the core (FIVE turns).
    - \* When the cable is passed through the core the first time it is counted as one turn. Therefore, winding of the cable four times corresponds to five turns.
  - (b) Wind the LED signal cable (which is connected to the top of the AC/DC tray) between the AC/DC tray and the transformer tray ONE time around the core (TWO turns).
    - \* When the cable is passed through the core the first time it is counted as one turn. Therefore, winding of the cable one time corresponds to TWO turns.
- (2) The metal sheet for EMC compliance should be installed.

Press the metal sheet firmly against the rack so that the upper tab is flat and then secure the sheet using screws 1 and 2.





### 3.14 Removing the PSA and PSD

- (1) Removing the left side cover and AC-DC unit

Refer to subsection 3.13.

- (2) Removing the FAN-BOX

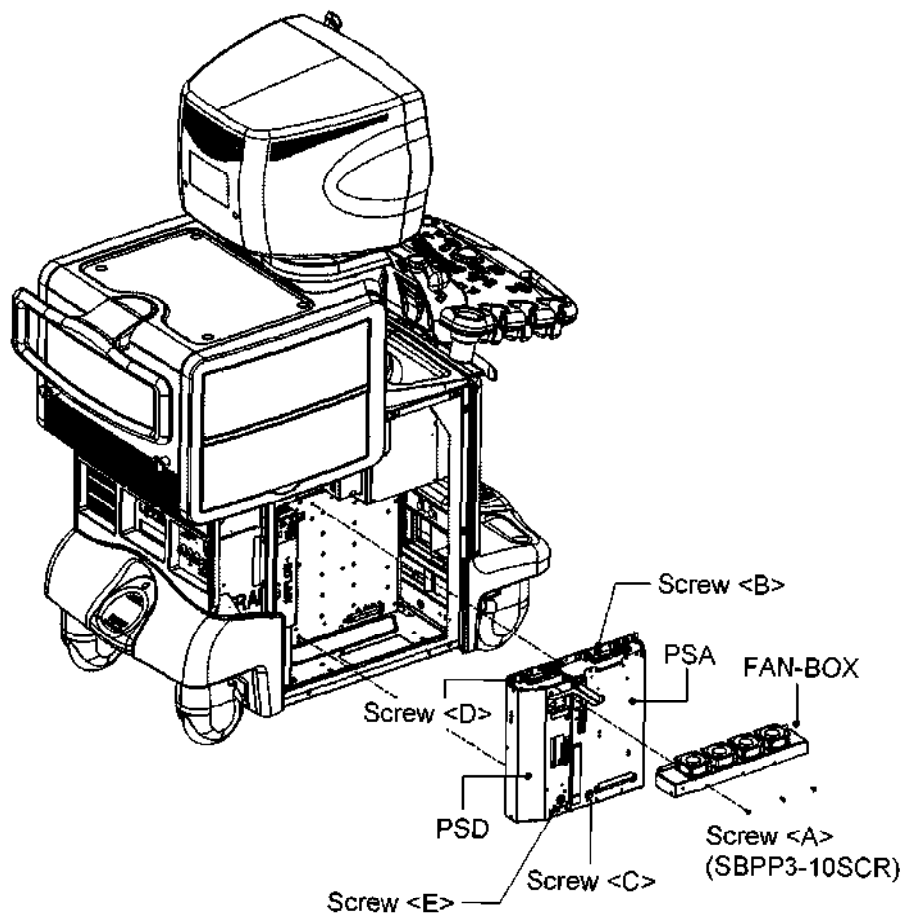
- (a) Remove the cable of the FAN-BOX (P95).
- (b) Loosen the three M3 FAN-BOX mounting screws <A> that secure the PSA and PSD to remove the FAN-BOX.

- (3) Removing the PSA

Loosen the three screws <B> and two screws <C> that secure the PWB rack, hold the handles at the upper and lower ends, and extract the PSA.

- (4) Removing the PSD

Loosen the two screws <D> and the screw <E> that secure the PWB rack, hold the handles at the upper and lower ends, and extract the PSD.



### 3.15 Removing the Transformer

#### (1) Removing the left side cover

- (a) Remove the two rubber caps <A> at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (2) Removing the right side cover

- (a) Remove the two rubber caps <B> at the bottom of the cover.
- (b) Remove the two M4 screws <B> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (3) Removing the power supply section rear cover

Remove the four M4 screws <C> to remove the cover.

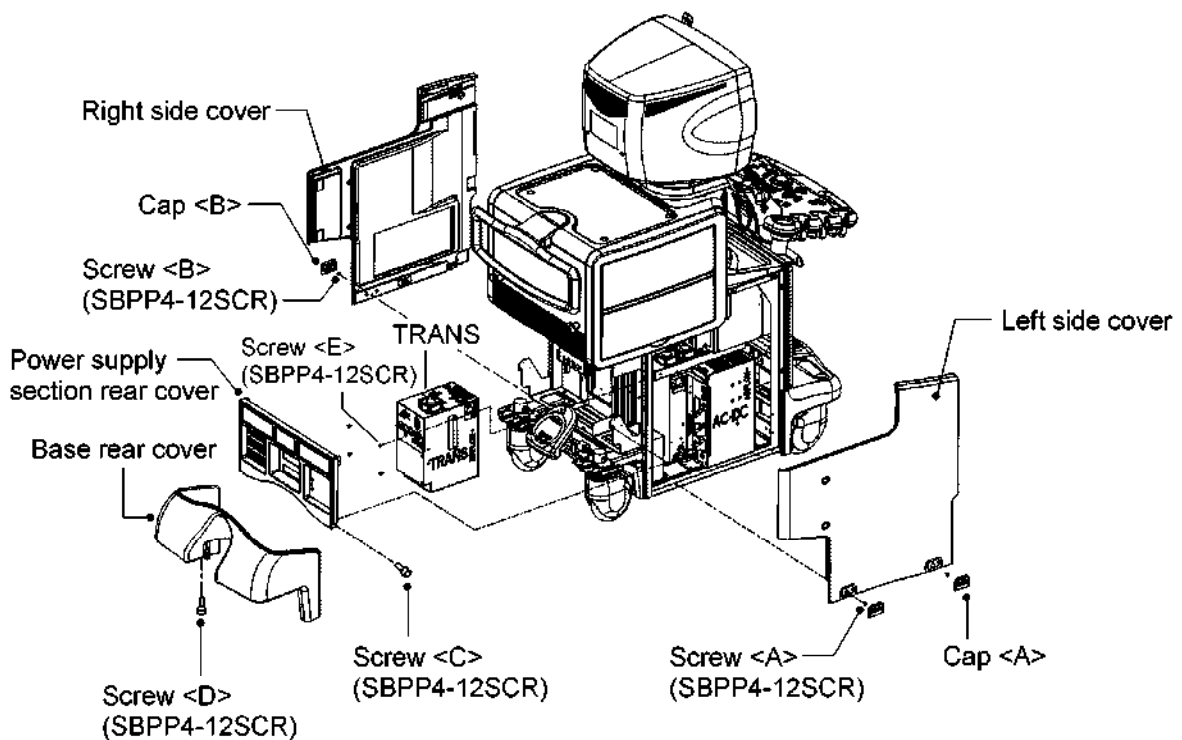
#### (4) Removing the base rear cover

Loosen the two M4 screws <D> to remove the cover.

\* The cover can be removed by pulling it toward you slightly and lifting it obliquely.

#### (5) Removing the transformer

- (a) Remove all the cables connected to the transformer.
- (b) Remove the four M4 screws <E> to extract the transformer.



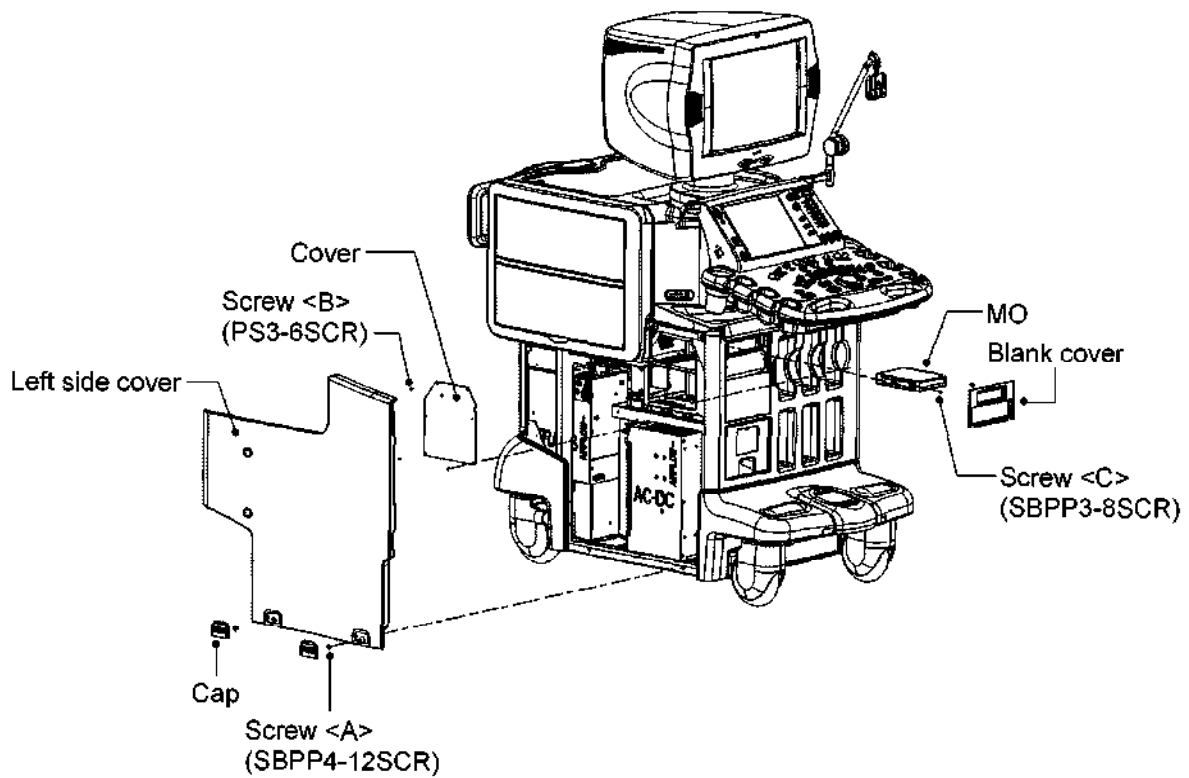
## 3.16 Removing the MO

## (1) Removing the cables

- (a) Remove the two rubber caps at the bottom of the left side cover.
- (b) Remove the two M4 screws <A> to remove the left side cover.
- (c) Remove the four M3 screws <B> to remove the internal cover.
- (d) Remove the internal SCSI cable (J505) and power cable (J502 or J503) that are connected to the MO.

## (2) Removing the MO

- (a) Remove the blank cover.
- (b) Remove the two M3 screws <C> to extract the MO.



### 3.17 Removing the Front Panel

#### 3.17.1 For the SSA-770A

(1) Removing the left side cover

(a) Remove the two rubber caps <A> at the bottom of the cover.

(b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

(2) Removing the right side cover

(a) Remove the two rubber caps <B> at the bottom of the cover.

(b) Remove the two M4 screws <B> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

(3) Removing the left side cover for the peripheral units

Remove the two M4 screws <C> to remove the cover.

\* The cover can be removed by lifting it and pulling it toward you.

(4) Removing the left side cover for the peripheral units

Remove the two M4 screws <D> to remove the cover.

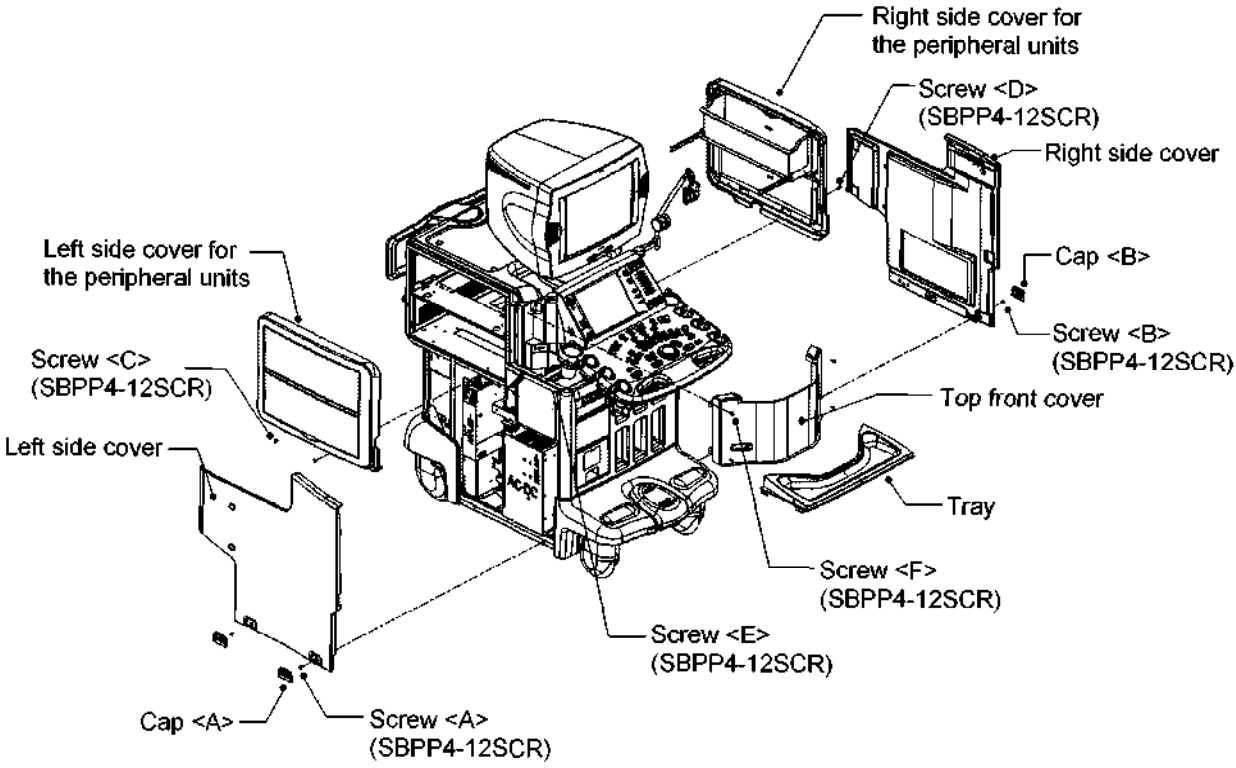
\* The cover can be removed by lifting it and pulling it toward you.

(5) Removing the tray

Loosen the four M4 screws <E> to remove the tray.

(6) Removing the top front cover

Remove the four M4 screws <F> to remove the cover.



(7) Removing the cables connected to the MO

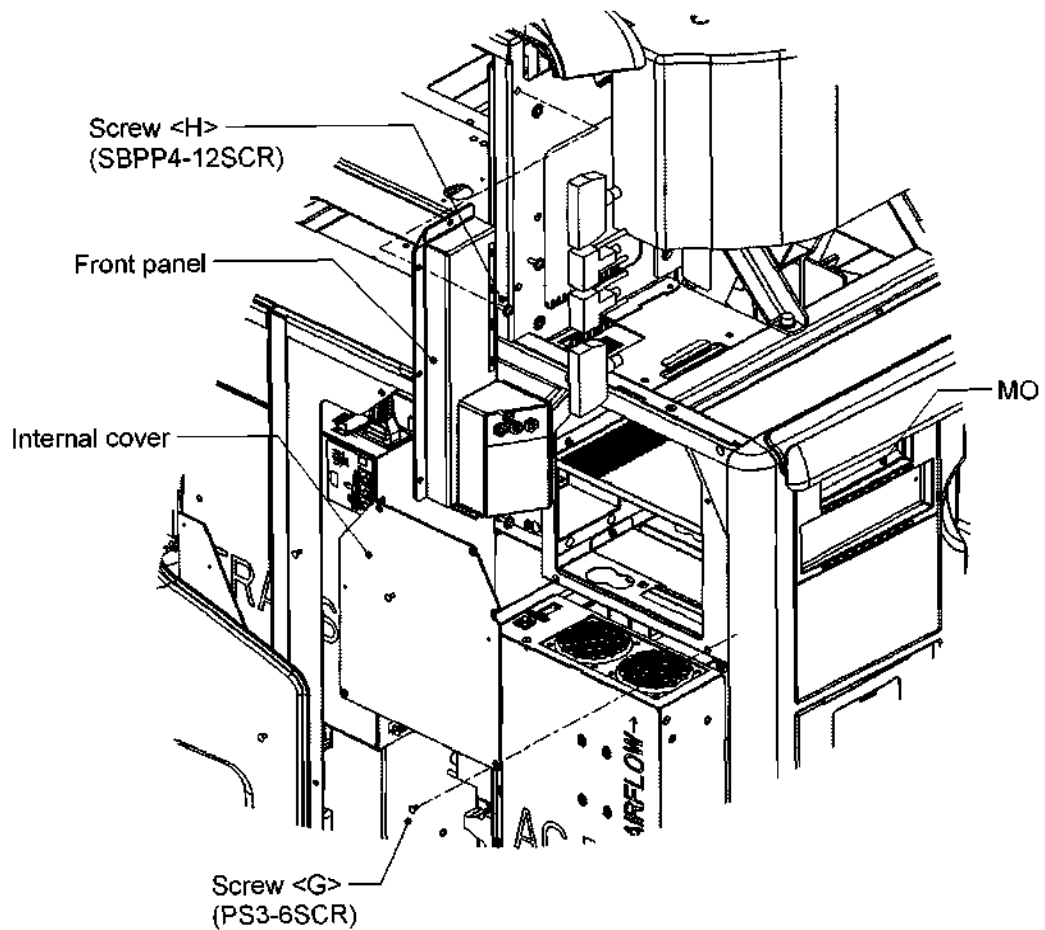
Remove the four M3 screws <G> to remove the internal cover.

Remove the internal SCSI cable (J505) and power cable (J502 or J503) that are connected to the MO.

Remove the cables (J67, J68, J400, and J132) connected to the front panel.

(8) Removing the front panel

Remove the four M4 screws <H> to remove the front panel.



## 3.17.2 For the SSA-700A

- (1) Removing the right side cover

Same as for the SSA-770A.

- (2) Removing the left side cover

Same as for the SSA-770A.

- (3) Removing the tray

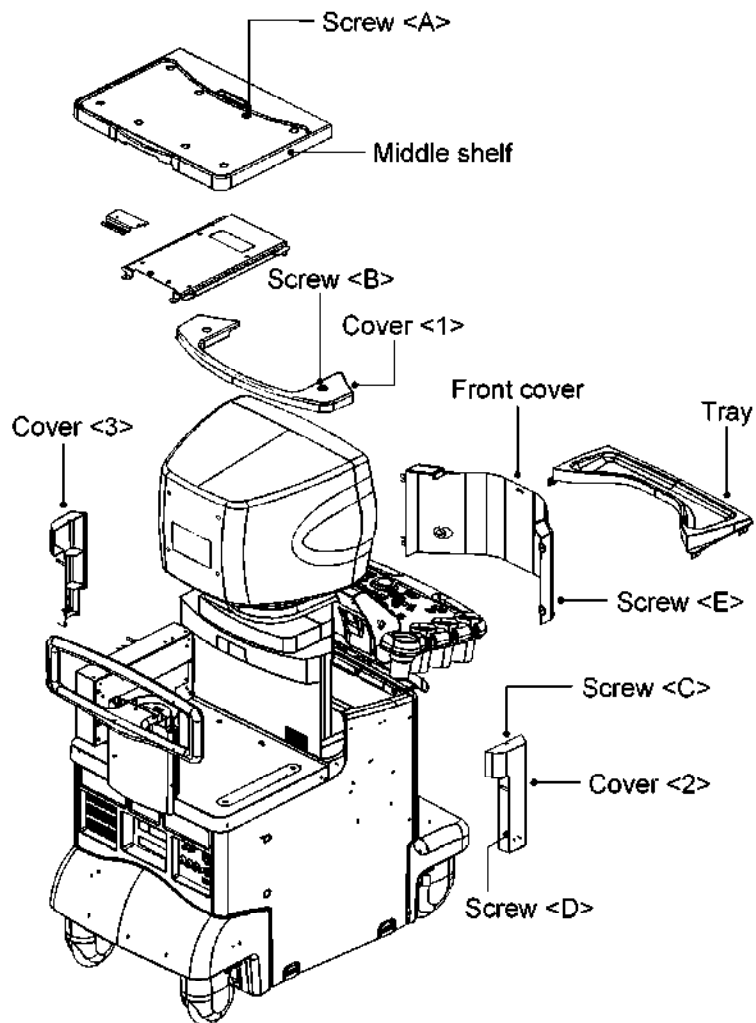
Same as for the SSA-770A.

- (4) Remove the screw <A> to remove the middle shelf.

- (5) Remove the screw <B> to remove the cover <1>.

- (6) Remove the screws <C> and <D> to remove the covers <2> and <3>.

- (7) Remove the screw <E> to remove the front cover.



## 3.18 Removing the Rear Panel

## (1) Removing the left side cover

(a) Remove the two rubber caps <A> at the bottom of the cover.

(b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

## (2) Removing the right side cover

(a) Remove the two rubber caps <B> at the bottom of the cover.

(b) Remove the two M4 screws <B> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

## (3) Removing the power supply section rear cover

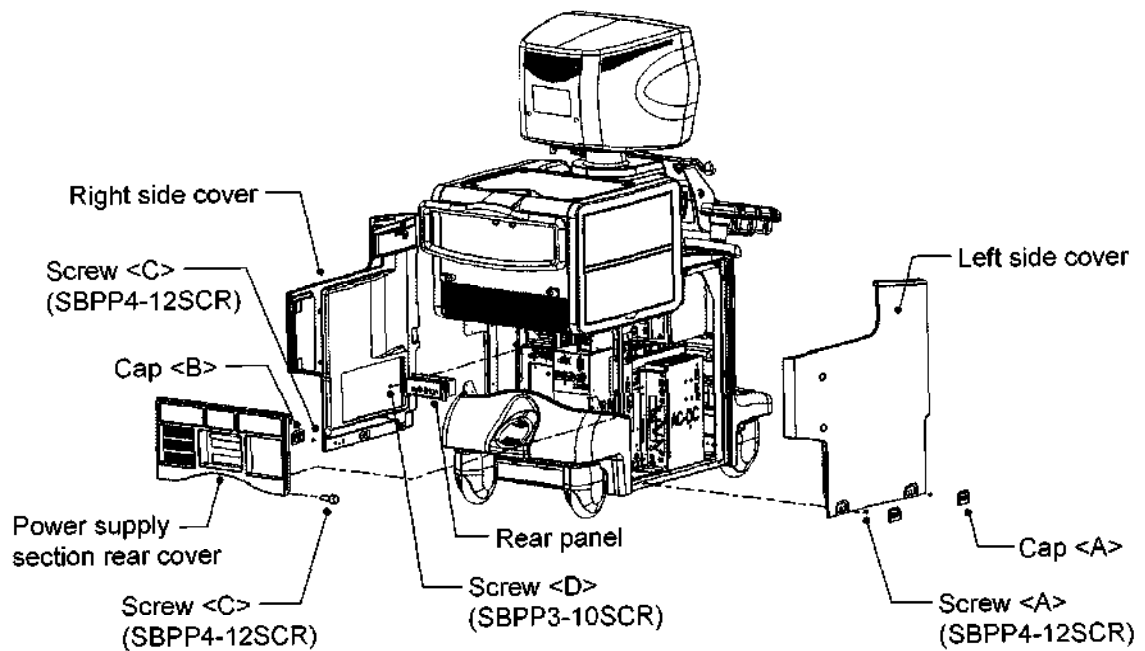
Remove the four M4 screws <C> to remove the cover.

## (4) Removing the cables

Remove all the cables connected to the rear panel.

## (5) Removing the rear panel

Remove the two M3 screws <D> to remove the rear panel.





### 3.19 Removing the PHYSIO Unit

#### 3.19.1 For the SSA-770A

(1) Removing the right side cover

- (a) Remove the two rubber caps at the bottom of the cover.
- (b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

(2) Removing the right side cover for the peripheral units

Remove the two M4 screws <B> to remove the cover.

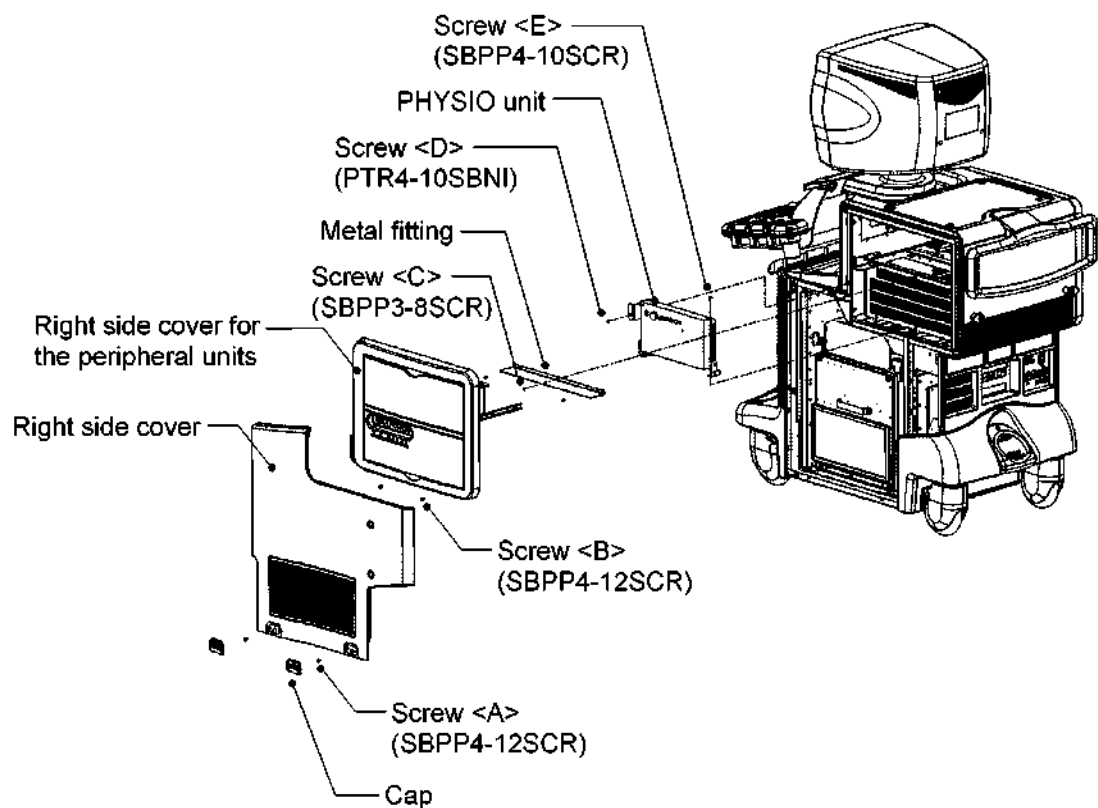
\* The cover can be removed by lifting it and pulling it toward you.

(3) Removing the metal fitting

Remove the three M3 screws <C> to remove the metal fitting.

(4) Removing the PHYSIO unit

- (a) Remove all the cables connected to the PHYSIO unit.
- (b) Remove the M4 screw <D> and M4 screw <E> to remove the PHYSIO unit.



3.19.2 For the SSA-700A

(1) Removing the right side cover

Same as for the SSA-770A.

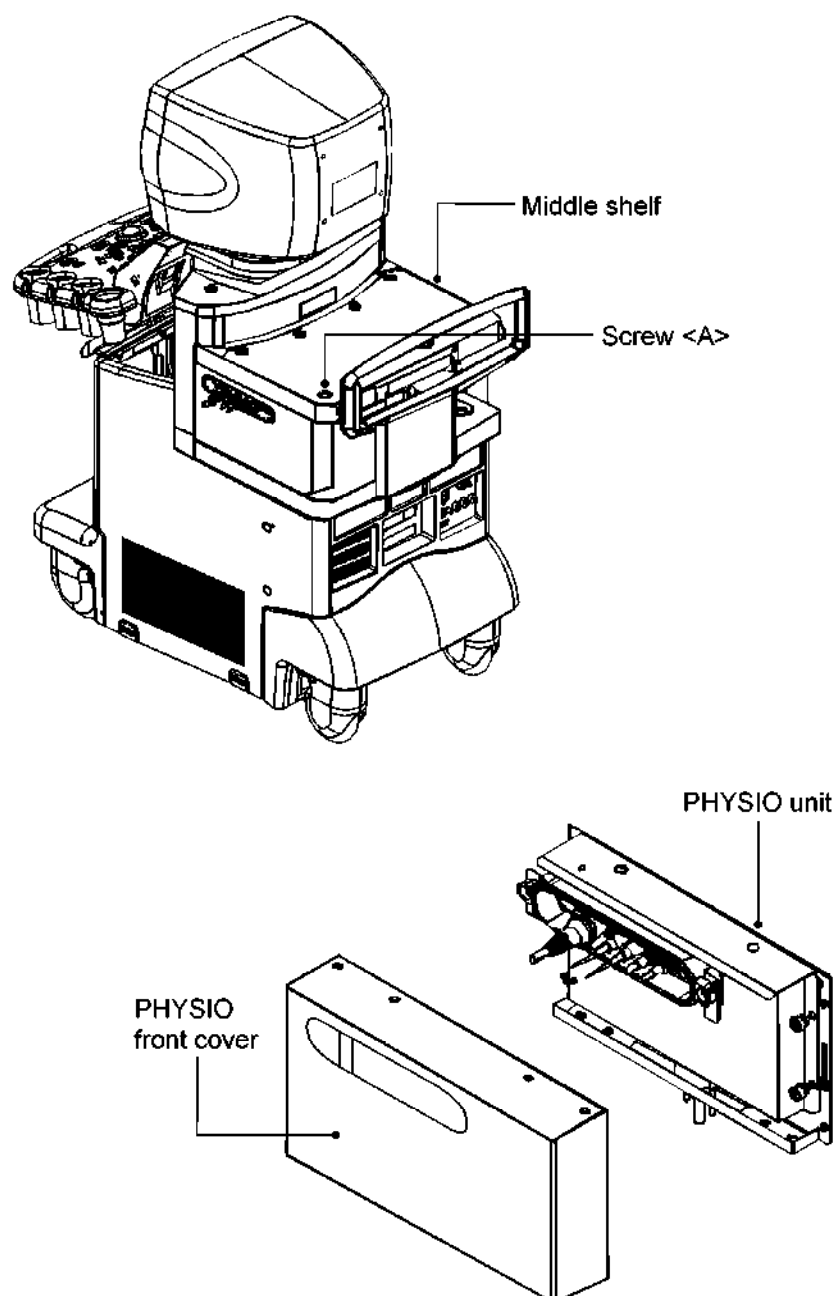
(2) Removing the PHYSIO unit

(a) Disconnect all cables that are connected to the PHYSIO unit.

(b) Remove the screw <A> to remove the middle shelf.

(c) Remove the screw <B> at the PHYSIO unit to remove the PHYSIO front cover.

(d) Remove the PHYSIO unit.



## 3.20 Removing the Caster Units

### 3.20.1 For the SSA-770A

#### (1) Removing the left side cover

(a) Remove the two rubber caps <A> at the bottom of the cover.

(b) Remove the two M4 screws <A> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (2) Removing the right side cover

(a) Remove the two rubber caps <B> at the bottom of the cover.

(b) Remove the two M4 screws <B> to remove the cover.

\* The cover can be removed by pulling its bottom toward you.

#### (3) Removing the front cover (required to remove the front caster unit)

(a) When the blank cover has been mounted, loosen the M3 screw <C> and remove the blank cover with the printer base.

(b) Remove the four M4 screws <D> to remove the cover.

#### (4) Removing the power supply section rear cover (required to remove the rear caster unit)

Remove the four M4 screws <D> to remove the cover.

#### (5) Removing the base front cover (required to remove the front caster unit)

(a) Remove the two M4 screws <F>.

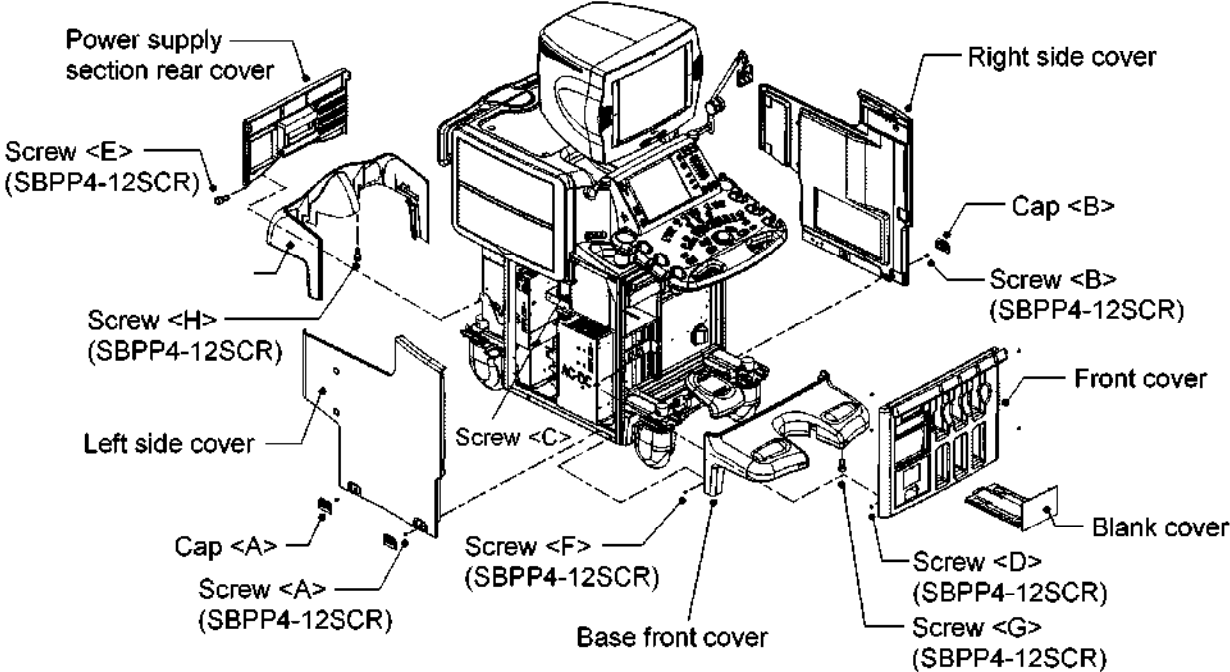
(b) Loosen the two M4 screws <G> to remove the cover.

\* The cover can be removed by pulling it toward you slightly and lifting it obliquely.

#### (6) Removing the base rear cover (required to remove the rear caster unit)

Loosen the two M4 screws <H> to remove the cover.

\* The cover can be removed by pulling it toward you slightly and lifting it obliquely.



(7) Removing the blocks

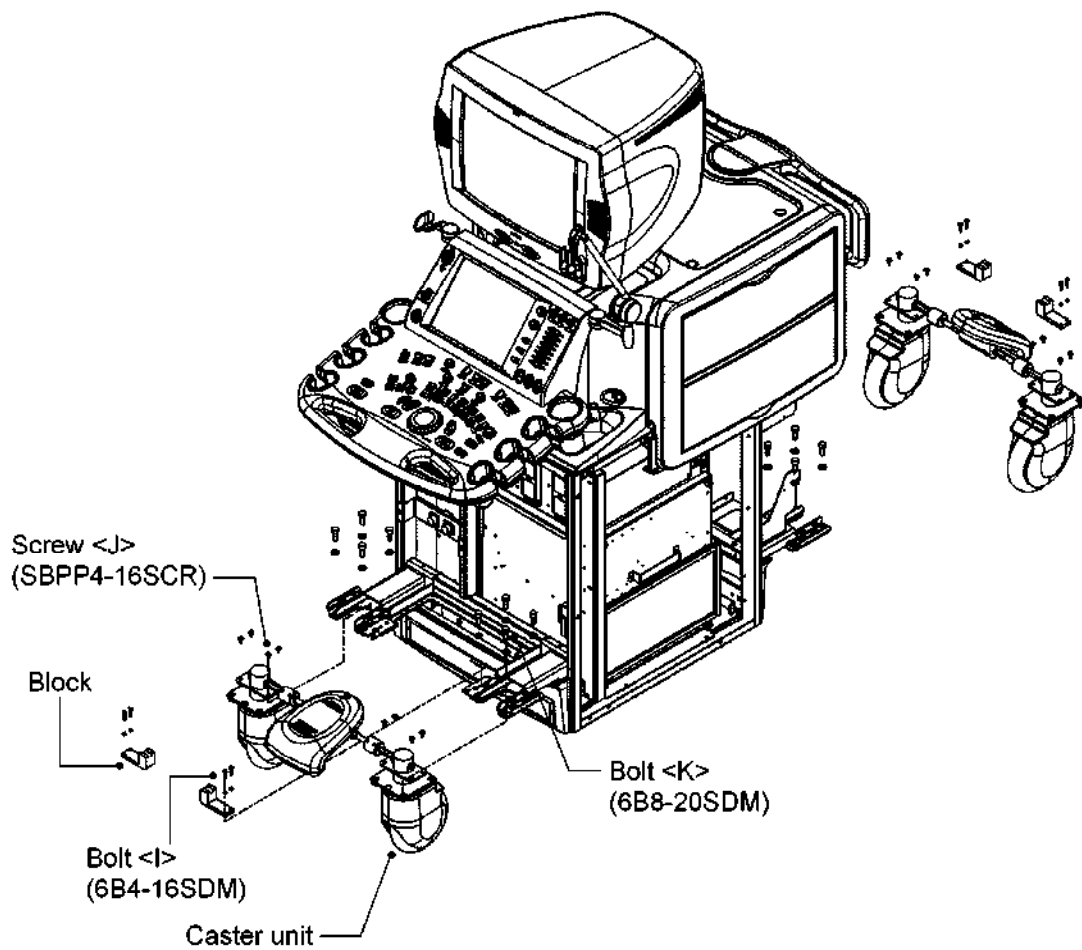
Remove the four M4 bolts <I> to remove the two blocks supporting the shaft of the caster unit.

(8) Removing the caster units

(a) Remove the eight M4 screws <J>.

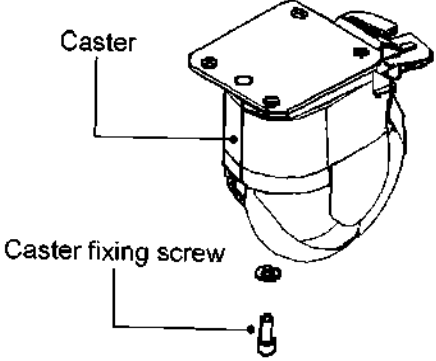
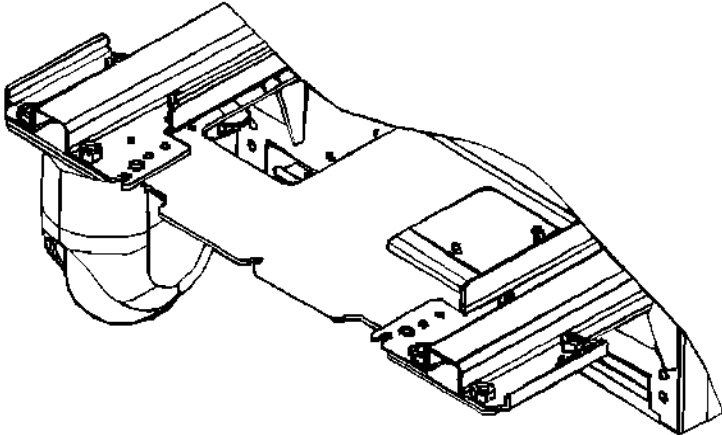
(b) Remove the eight M8 screws <K> and remove the caster unit by sliding it toward the front of the system.

\* Remove the caster unit at the rear of the system using the same procedure.



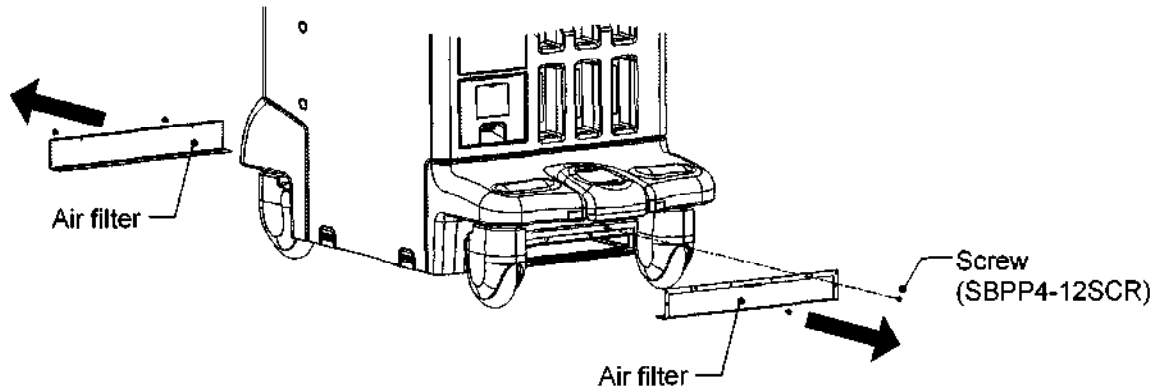
3.20.2 For the SSA-700A

- (1) Follow the same procedures as for the SSA-770A until the base covers are removed.
- (2) Remove the eight caster fixing screws (four each on the right and left casters, M8).

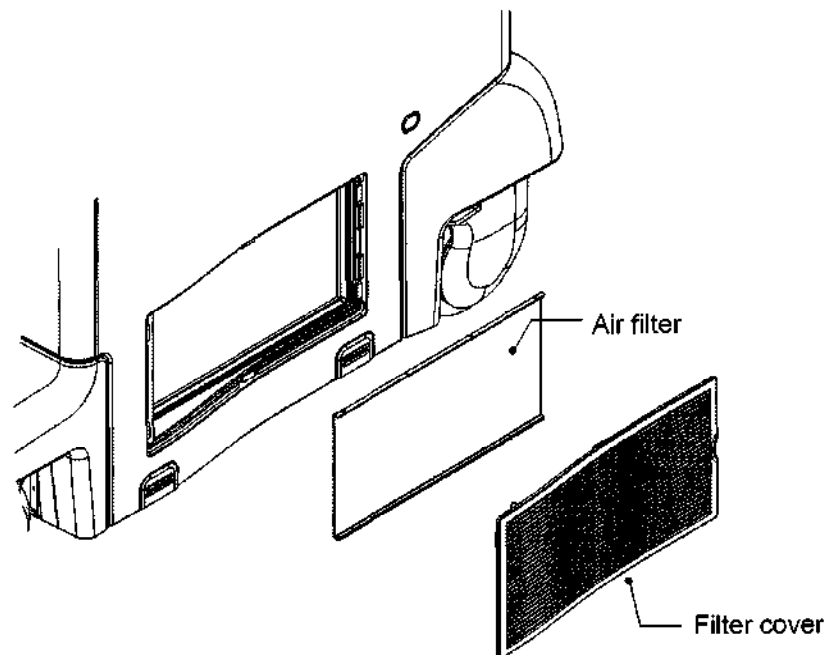


### 3.21 Cleaning the Air Filters

- (1) Removing and cleaning the air filters (for service engineers)
  - (a) Remove the two M4 screws to extract both the front and rear filters.
  - (b) Remove the dust from the meshes using a vacuum cleaner.
  - (c) Reinstall the filters by reversing the steps for removal.



- (2) Removing and cleaning the air filters (for the user and service engineers)
  - (a) Remove the filter cover and then remove the air filter.
  - (b) Remove the dust from the mesh using a vacuum cleaner.
  - (c) Reinstall the air filters by reversing the steps for removal.



**CAUTION:** Do not start the system with the filters removed.

### 3.22 Cleaning the Panel

#### 3.22.1 Cleaning of key tops

- (1) Remove dirty key tops by pressing them downward from the surface of the panel.
- (2) Clean the removed key tops.
- (3) After cleaning, insert the removed key tops from the back of the panel.

<p><b>CAUTION:</b> Use water or mild detergent to clean the key tops. Completely wipe off the water from the key tops before reinstalling them. Do not use chlorine-based cleansers, acids, or organic solvents. Also, be sure to reinsert the key tops at their original positions with correct orientations. There is a possibility of reinserting the key tops incorrectly.</p>
--

#### 3.22.2 Cleaning procedures for parts other than key tops

Use a clean dry cloth for cleaning other parts. If dirt is difficult to remove, use a cloth that has been moistened with water or mild detergent and then tightly wrung out.

<p><b>CAUTION:</b> Do not pour water or mild detergent directly on any parts. Do not use volatile organic solvents such as benzine or paint thinner or rags impregnated with chemicals.</p>
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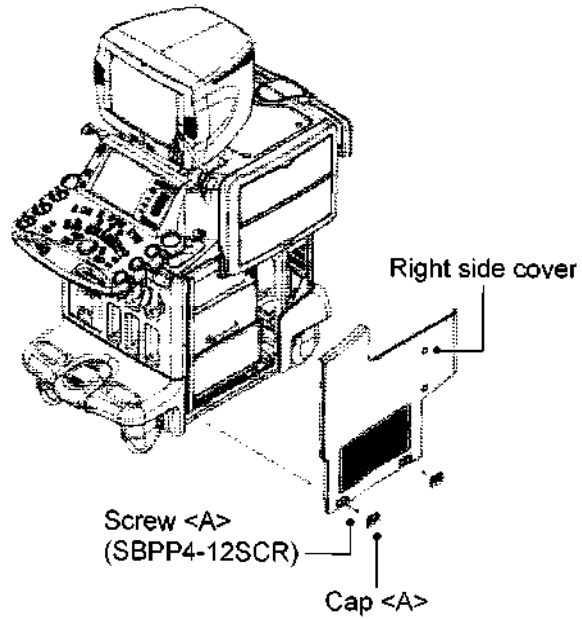


### 3.23 Adjusting the Operating Panel Locking Wire

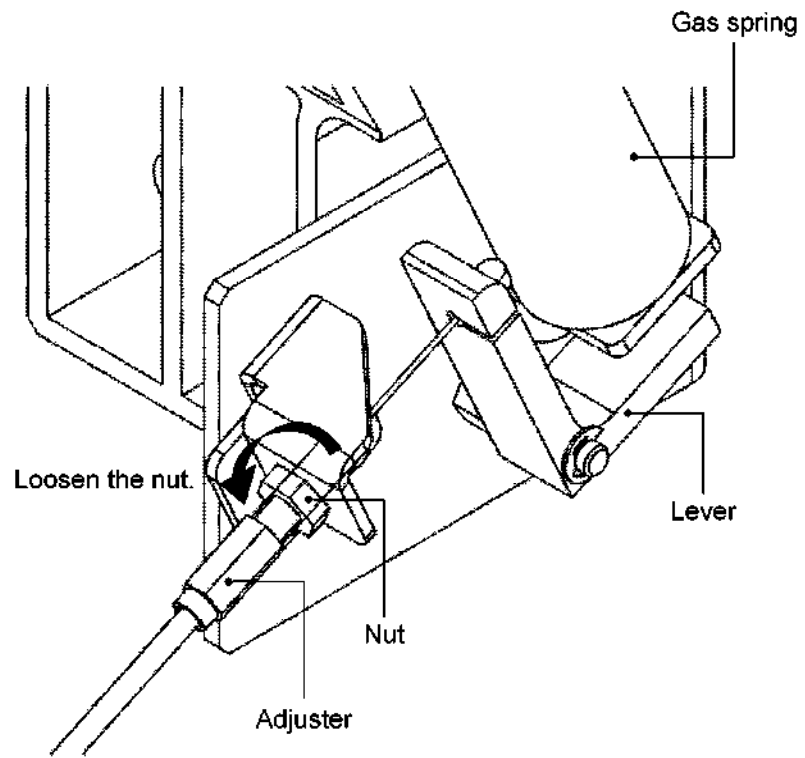
#### 3.23.1 Adjusting the up/down slide wire

\* Only for the SSA-770A

- (1) Remove the two caps <A>.
- (2) Remove the two screws <A> (M4) and remove the right side cover.

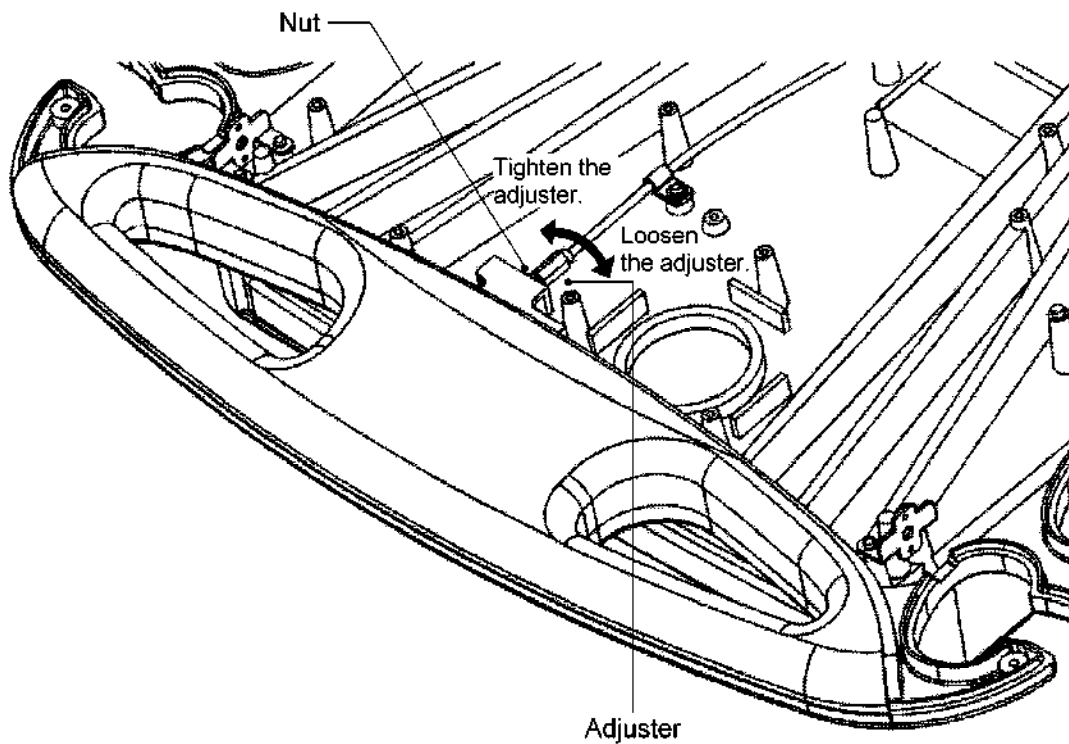


- (3) Loosen the nut.
- (4) Rotate the adjuster until the lever contacts the gas spring.
- (5) After adjustment, tighten the nut.



### 3.23.2 Adjusting the near/away slide wire

- (1) Perform the procedures in subsections 3.6.1 and 3.6.4, and the steps (1) and (2) in subsection 3.6.5 of subsection 3.6 "Disassembling the Operating Panel".
- (2) Loosen the nut.
- (3) When locking cannot be released, loosen the adjuster to adjust the wire.
- (4) When locking cannot be performed, tighten the adjuster to adjust the wire.
- (5) After adjustment, tighten the nut.



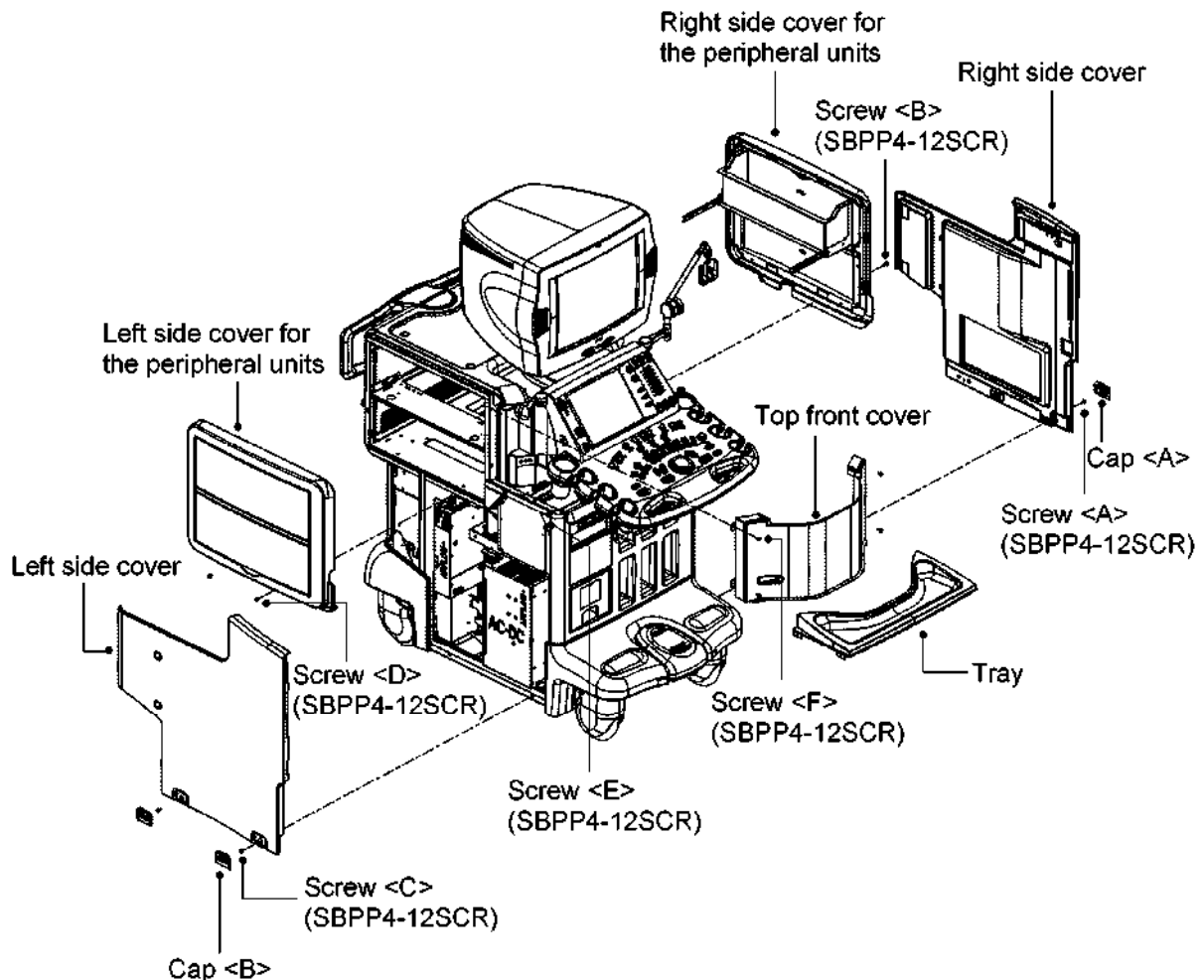
### 3.24 Replacing the Operating Panel Locking Wire

#### 3.24.1 Replacing the up/down slide wire

\* Only for the SSA-770A

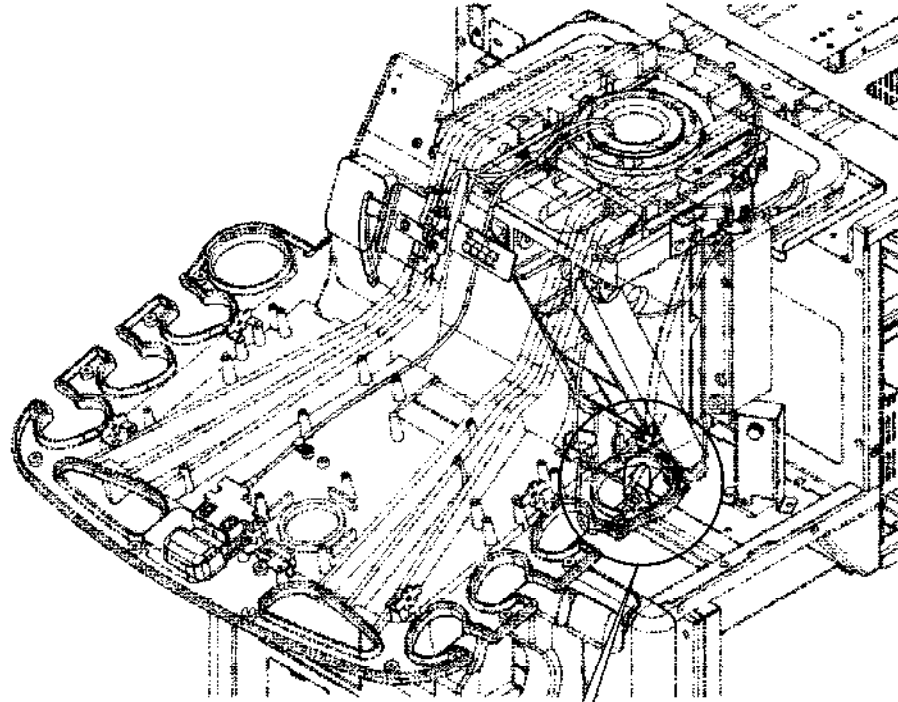
##### (1) Removing the covers

- (a) Remove the two caps <A>.
- (b) Remove the two screws <A> (M4) and remove the right side cover.
- (c) Remove the two screws <B> (M4) and remove the right side cover for the peripheral units.
- (d) Remove the two caps <B>.
- (e) Remove the two screws <C> (M4) and remove the left side cover.
- (f) Remove the two screws <D> (M4) and remove the left side cover for the peripheral units.
- (g) Remove the four screws <E> (M4) and remove the tray.
- (h) Remove the four screws <F> (M4) and remove the top front cover.

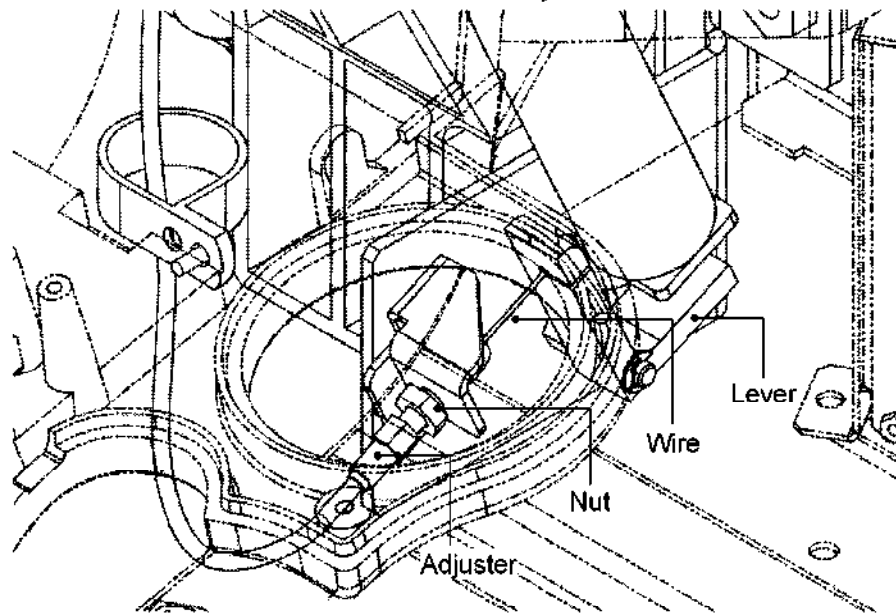


(2) Removing the up/down slide wire (at the support unit side)

- (a) Loosen the nut.
- (b) Remove the wire from the lever.
- (c) Rotate the adjuster and remove it from the bracket.



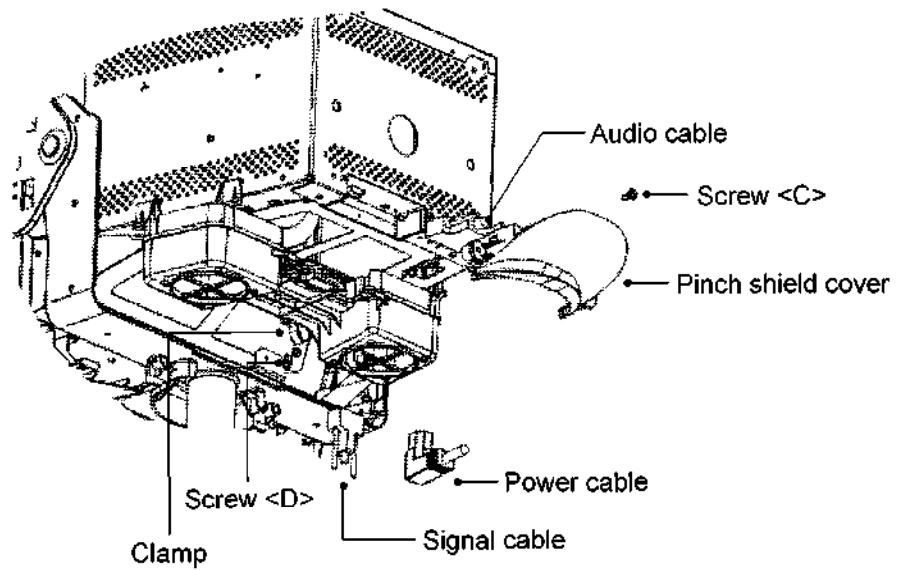
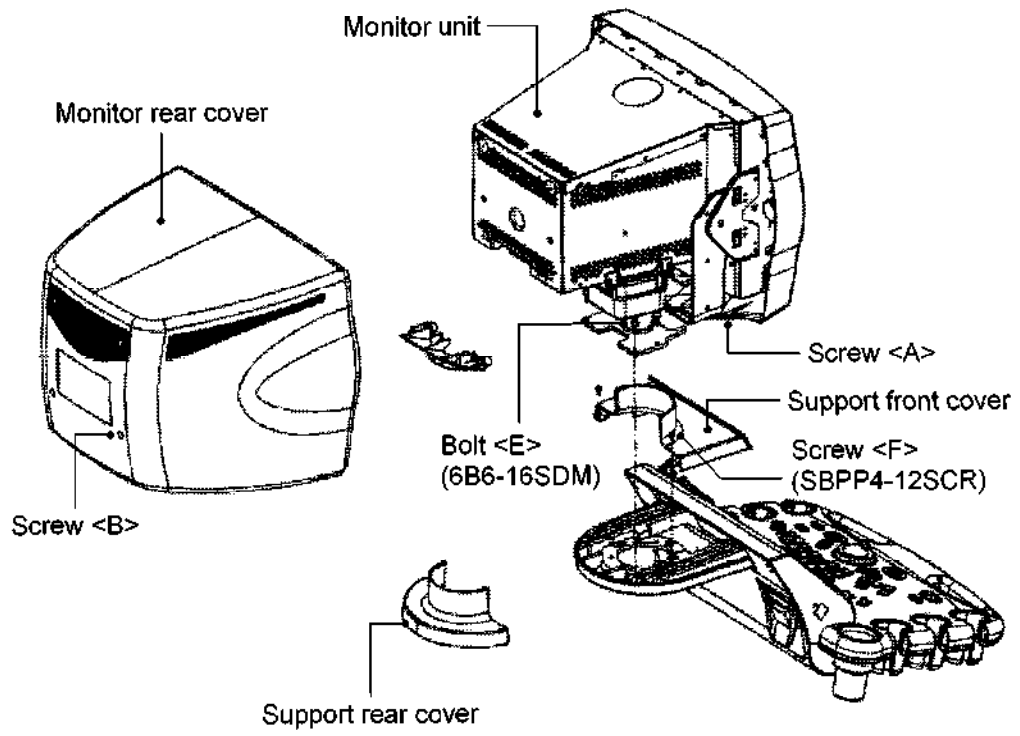
(The monitor and covers are omitted from figure.)



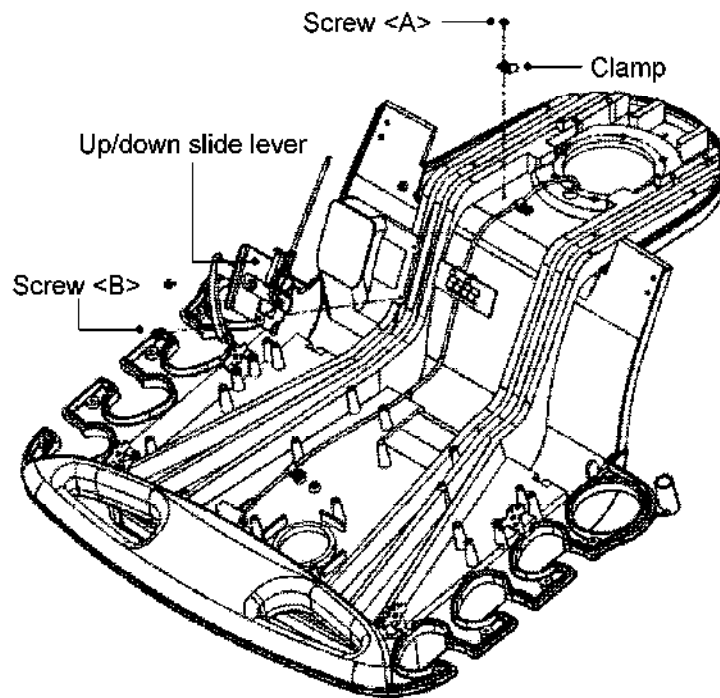
(3) Removing the monitor unit

**⚠CAUTION: Two persons are required when removing the monitor unit.**

- (a) Loosen the two screws <A> and four screws <B> to remove the monitor rear cover.
- (b) Remove the support rear cover at the rear of the operating panel.  
  
To remove the support rear cover, slide it backward with holding and pushing the center part.
- (c) Loosen the two screws <C> to remove the pinch shield cover.
- (d) Remove the two screws <D> to remove the clamps.
- (e) Remove the signal, audio, and power cables that are connected to the monitor unit.
- (f) Remove the four M6 bolts <E> to remove the monitor unit with the boss installed.
- (g) Remove the two M4 screws <F> to remove the support front cover.



- (4) Perform the procedures in subsections 3.6.1 and 3.6.2 of subsection 3.6 "Disassembling the Operating Panel".
- (5) Removing the up/down slide lever
  - (a) Remove the screw <A> (M3) and remove the clamp.
  - (b) Remove the two screws <B> and remove the up/down slide lever.



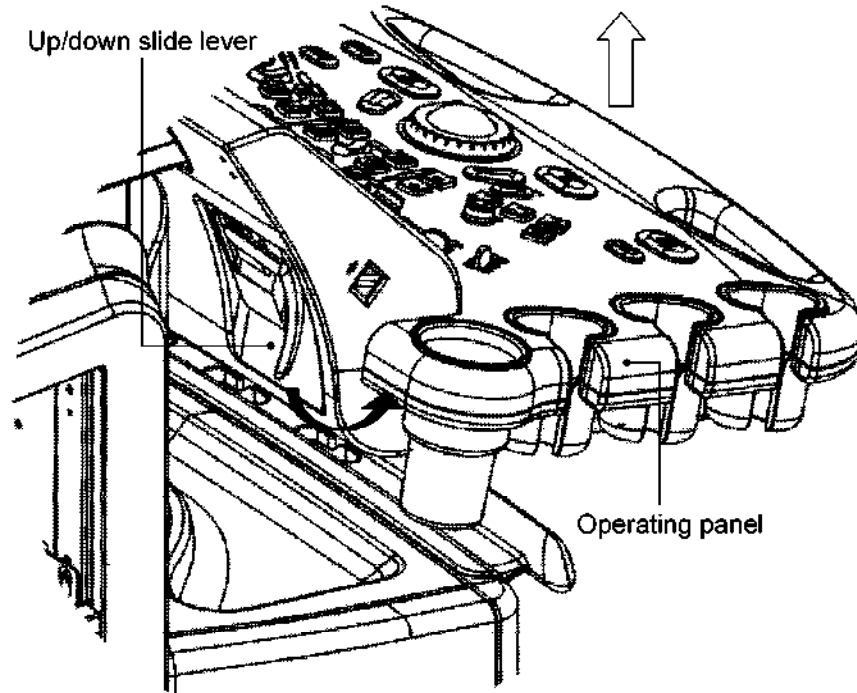
- (6) Replacing the up/down slide wire  
Install the new up/down slide lever in the operating panel.
- (7) Reinstalling the covers  
Reinstalling the removed monitor and covers by reversing the steps for removal.



3.24.2 Replacing the near/away slide wire

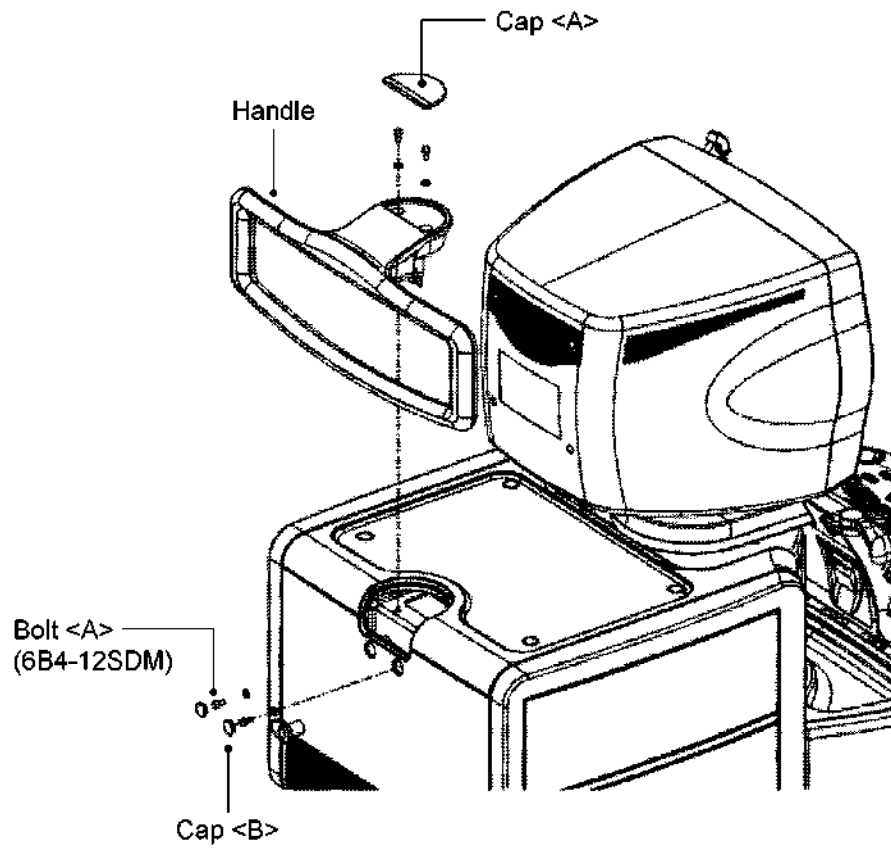
3.24.2.1 For the SSA-770A

- (1) Pull the near/away slide lever of the operating panel toward you to slide the operating panel and the monitor upward.



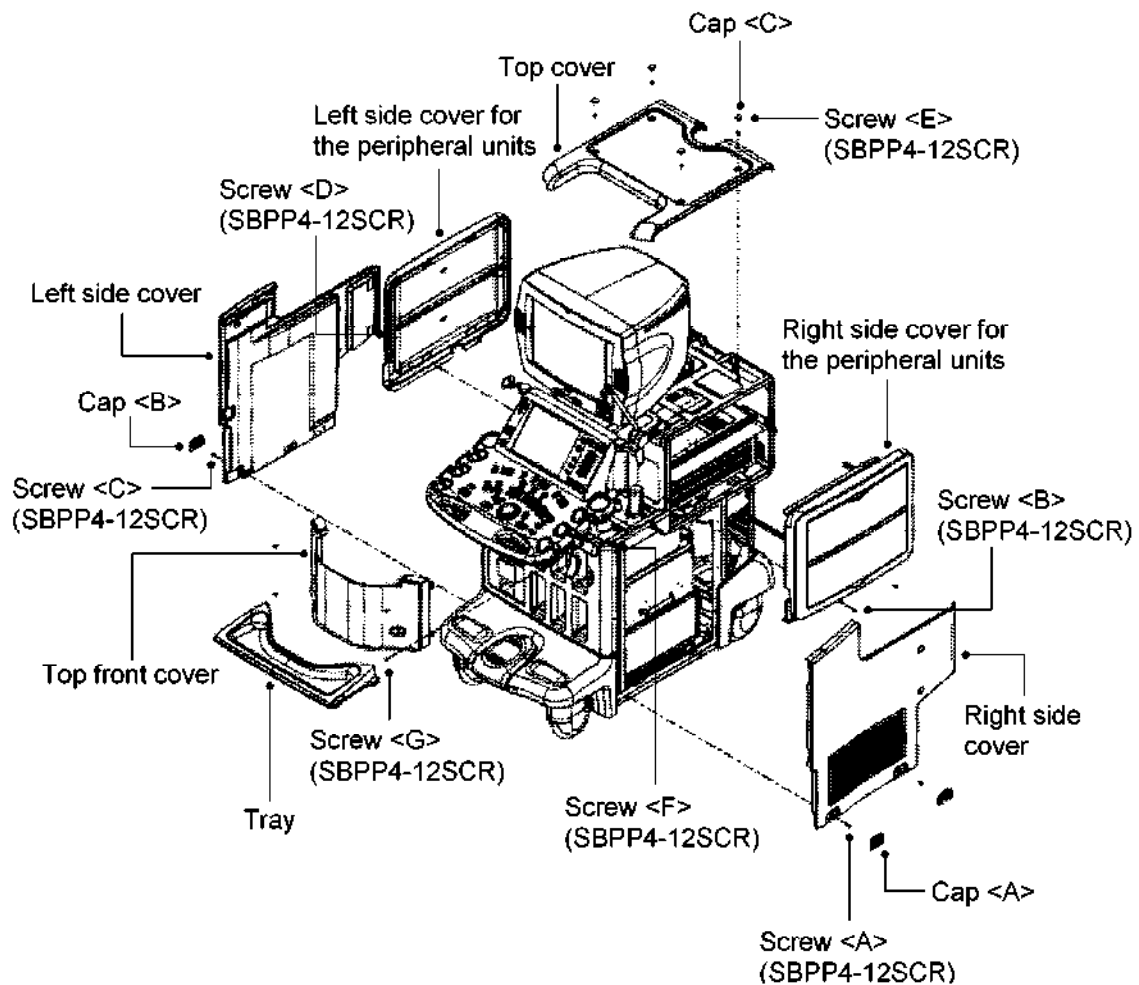
(2) Removing the handle

- (a) Remove the caps <A> and <B>.
- (b) Remove the four bolts <A> (M4) and remove the handle.



## (3) Removing the covers

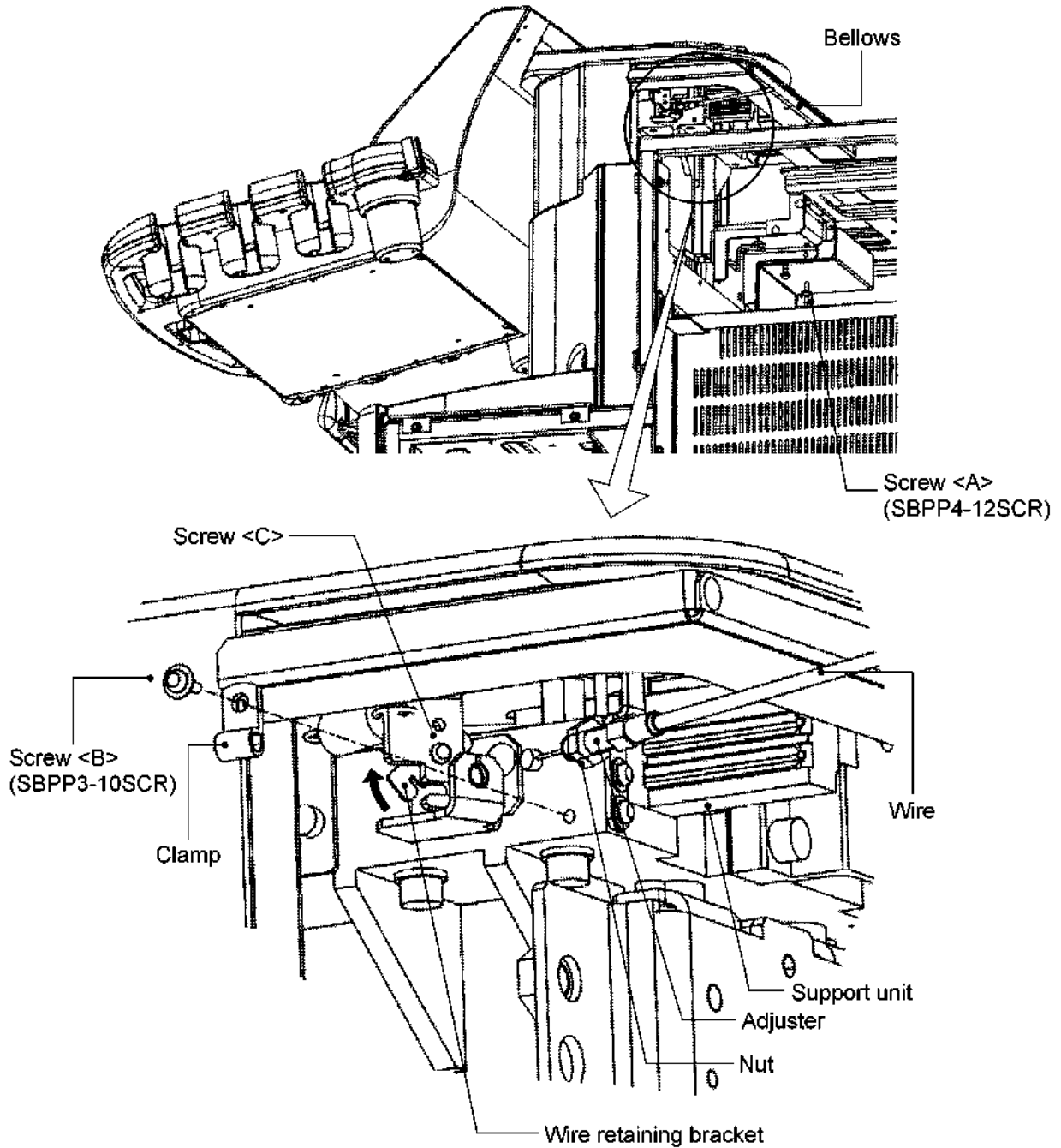
- (a) Remove the two caps <A>.
- (b) Remove the two screws <A> (M4) and remove the right side cover.
- (c) Remove the two screws <B> (M4) and remove the right side cover for the peripheral units.
- (d) Remove the two caps <B>.
- (e) Remove the two screws <C> (M4) and remove the left side cover.
- (f) Remove the two screws <D> (M4) and remove the left side cover for the peripheral units.
- (g) Remove the four caps <C>.
- (h) Remove the four screws <E> (M4) and remove the top cover.
- (i) Remove the four screws <F> (M4) and remove the tray.
- (j) Remove the four screws <G> (M4) and remove the top front cover.



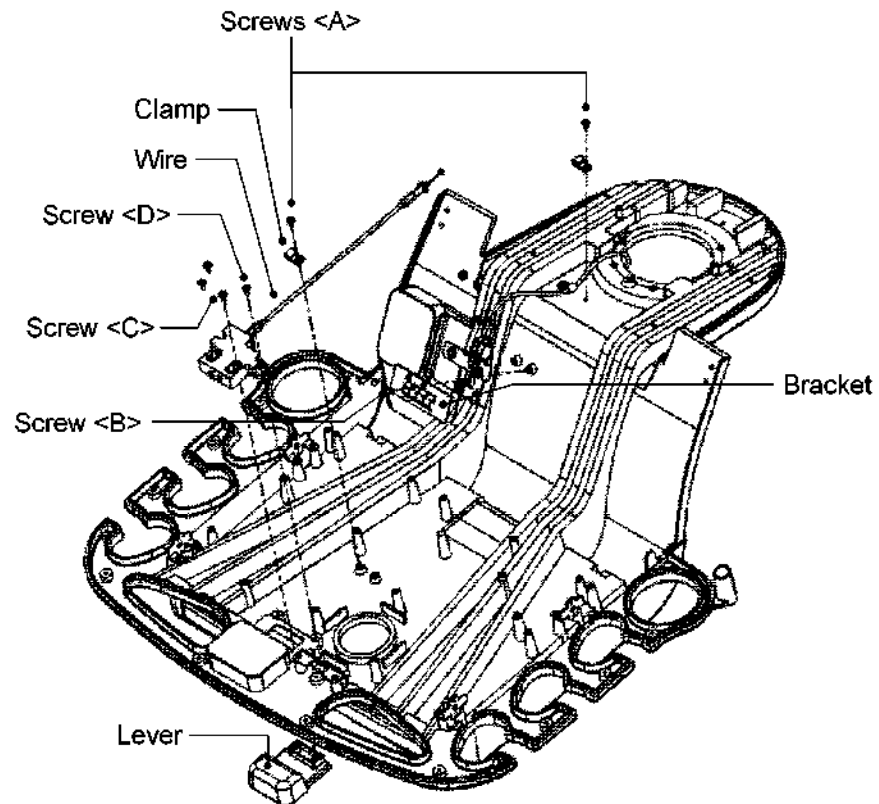
- (4) Perform the procedures in subsection 3.4 "Removing the Monitor Unit".

**CAUTION:** Two persons are required when removing the monitor unit.

- (5) Removing the near/away slide wire (at the support unit side)
  - (a) Remove the two screws <A> (M4) and lift the bellows.
  - (b) Remove the screw <B> (M3) and remove the clamp.
  - (c) Loosen the screw <C> and rotate the wire retaining bracket to remove the tip of the wire.
  - (d) Loosen the nut and rotate the adjuster to remove the wire from the support unit.



- (6) Perform the procedures in subsections 3.6.1, 3.6.2, 3.6.3, and 3.6.4 and steps (1) and (2) in subsection 3.6.5 of subsection 3.6 "Disassembling the Operating Panel".
- (7) **Removing the near/away slide lever**
  - (a) Remove the two screws <A> and remove the clamp.
  - (b) Remove the two screws <B> and remove the bracket.
  - (c) Remove the two screws <C> and remove the lever.
  - (d) Remove the two screws <D> and remove the wire.



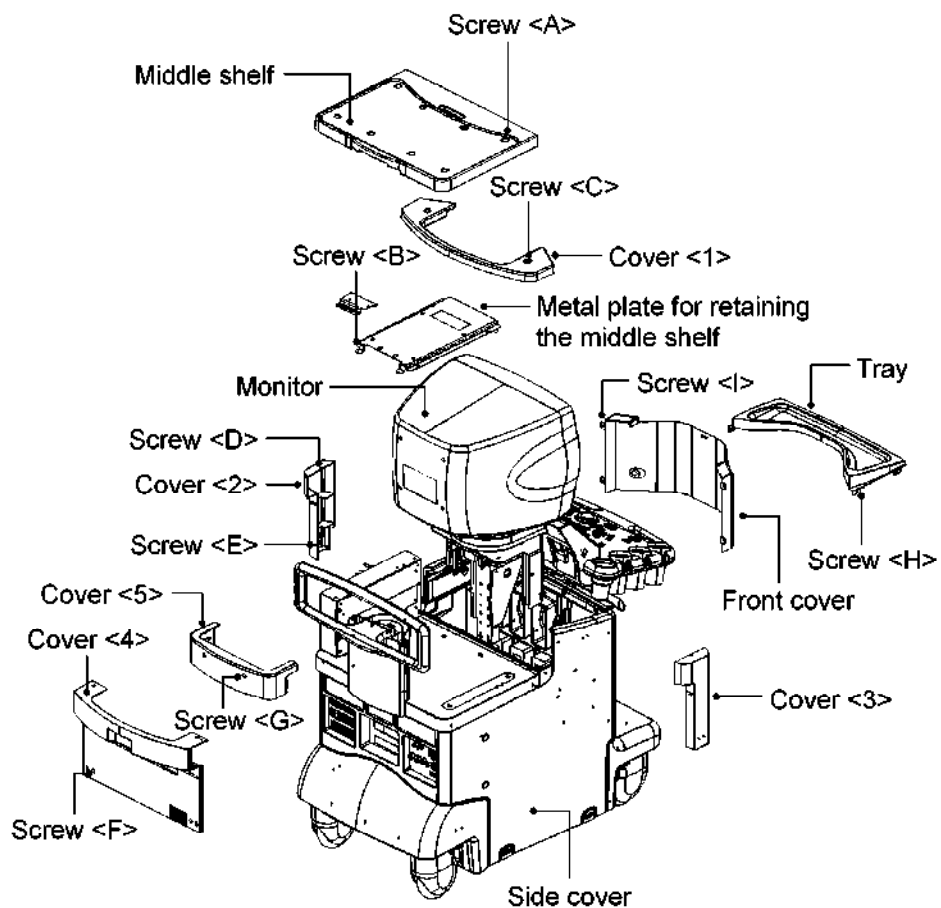
- (8) **Replacing the near/away slide wire**

Install the new near/away slide lever in the operating panel.
- (9) **Reinstalling the covers**

Reinstall the removed monitor and covers by reversing the steps for removal.

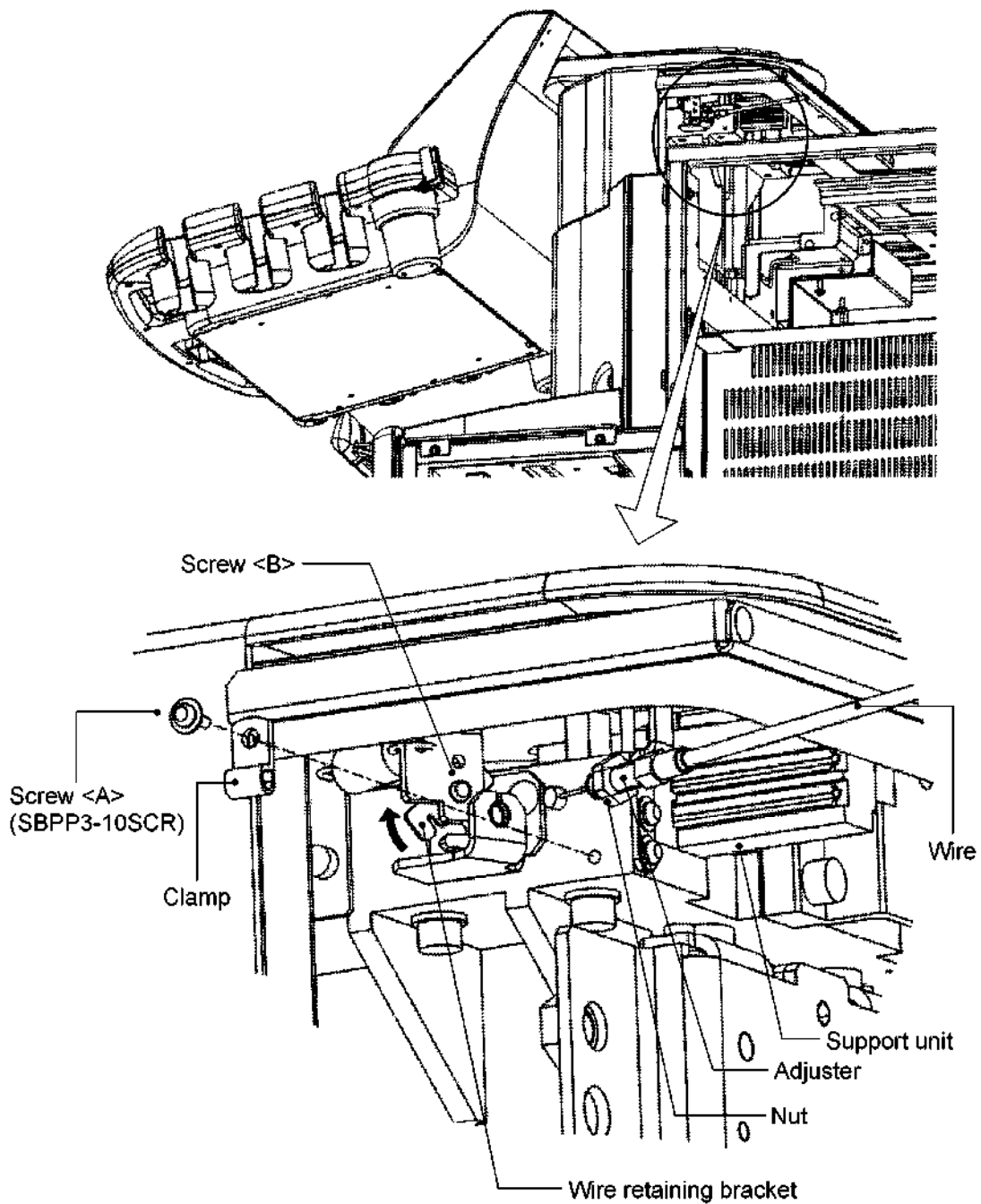
## 3.24.2.2 For the SSA-700A

- (1) Removing the monitor unit  
Refer to subsection 3.4.
- (2) Removing the right side cover  
Same as for the SSA-770A.
- (3) Removing the left side cover  
Same as for the SSA-770A.
- (4) Remove the screws <A> and <B> to remove the middle shelf and the metal plate for retaining the middle shelf.
- (5) Remove the screw <C> to remove the cover <1>.
- (6) Remove the screws <D> and <E> to remove the covers <2> and <3>.
- (7) Remove the screw <F> to remove the cover <4>.
- (8) Remove the screw <G> to remove the cover <5>.
- (9) Remove the screw <H> to remove the tray.
- (10) Remove the screw <I> to remove the front cover.



(11) Removing the near/away slide wire (at the support unit side)

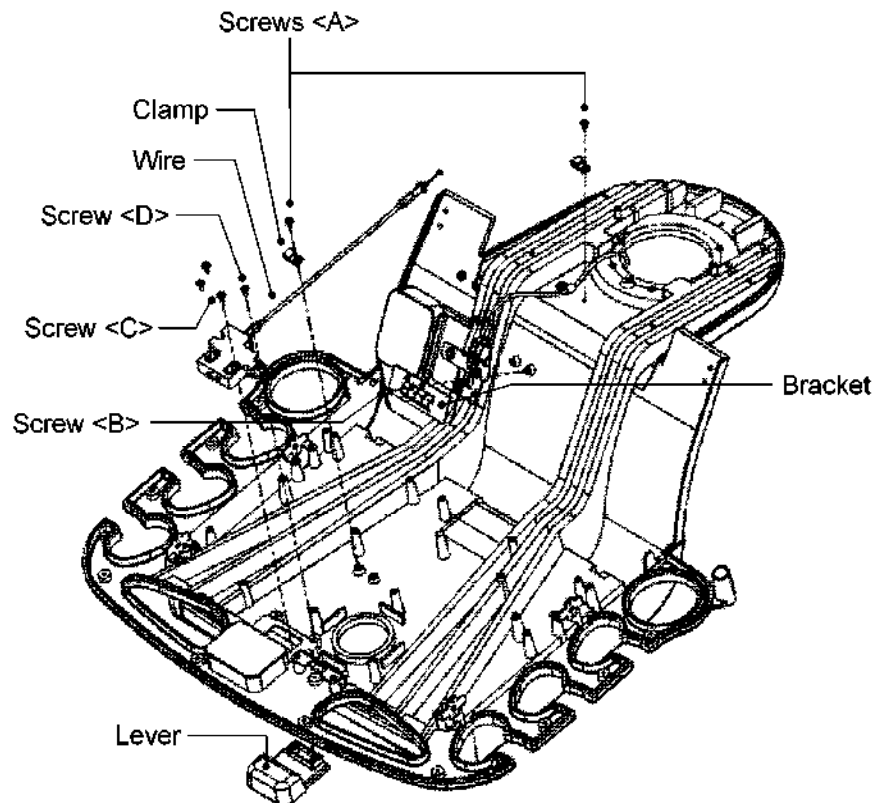
- (a) Remove the screw <A> (M3) and remove the clamp.
- (b) Loosen the screw <B> and rotate the wire retaining bracket to remove the tip of the wire.
- (c) Loosen the nut and rotate the adjuster to remove the wire from the support unit.



(12) Perform the procedures in subsections 3.6.1, 3.6.2, 3.6.3, and 3.6.4 and steps (1) and (2) in subsection 3.6.5 of subsection 3.6 "Disassembling the Operating Panel".

(13) Removing the near/away slide lever

- (a) Remove the two screws <A> and remove the clamp.
- (b) Remove the two screws <B> and remove the bracket.
- (c) Remove the two screws <C> and remove the lever.
- (d) Remove the two screws <D> and remove the wire.



(14) Replacing the near/away slide wire

Install the new near/away slide lever in the operating panel.

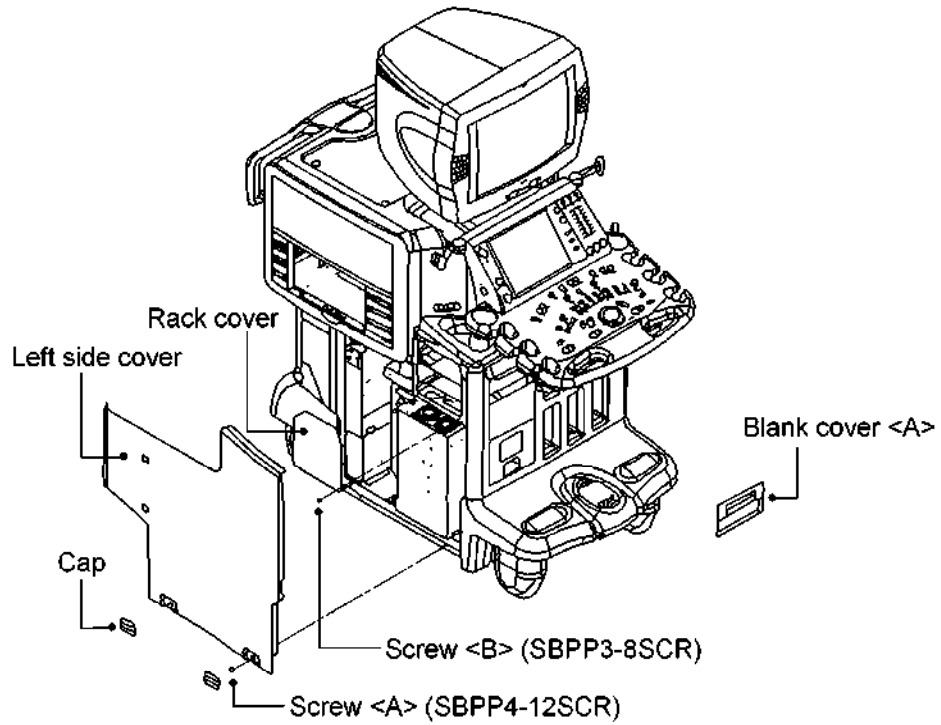
(15) Reinstalling the covers

Reinstall the removed monitor and covers by reversing the steps for removal.

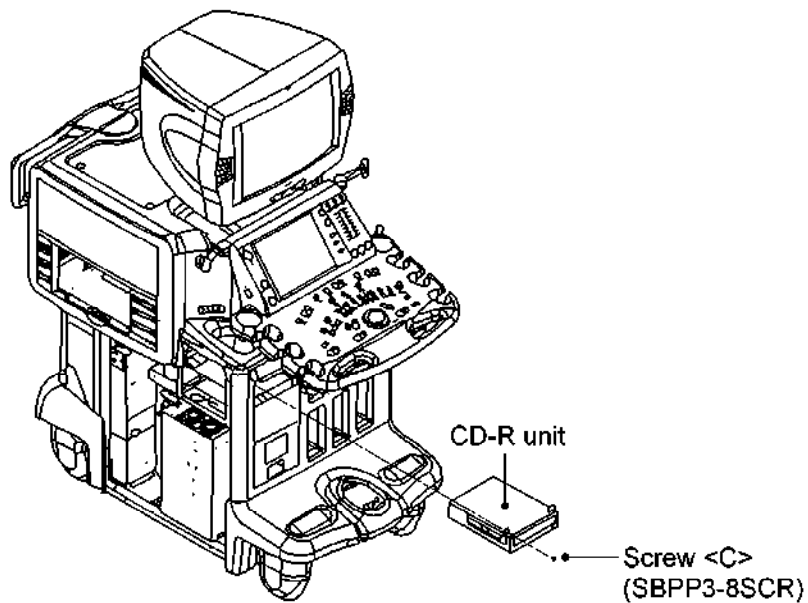


### 3.25 Removing the CD-R Unit

- (1) Remove the cap and the two M4 screws <A> and remove the left side cover.
- (2) Remove the blank cover <A>.
- (3) Remove the four M3 screws <B> and remove the rack cover.



- (4) Secure the CD-R unit in place using the two M3 screws <C>.



- (5) Connect the power cable and the SCSI50P cable to the CD-R unit.

**NOTE:** Command entry

Execute the following program after the CD-R unit is installed or uninstalled.

- (1) Display the Service menu.
- (2) Select [Utility] - [Command Line], enter the appropriate command, below and press [Go].
  - (a) After the CD-R is installed  
D:\Aplio\TusSetupScript\EnableCD.cmd
  - (b) After the CD-R is uninstalled  
D:\Aplio\TusSetupScript\DisableCD.cmd
- (3) Restart the system.

### 3.26 Cleaning the MO Drive

When dust or foreign matter in the air adheres to the lens actuator of the MO drive, the performance of the MO drive may be degraded. Clean the lens actuator periodically using the lens cleaner specified below.

**Note:** Use the dedicated lens cleaner specified below.

Product name	Fujitsu product number	Product number for ordering
Lens cleaner	0240470	CA90002-C980

Open the shutter of the lens cleaner before use and check the condition of the brushes. When the bristles of the brush have spread, the lens cleaner cannot remove stains or dirt from the lens completely. In such cases, replace the lens cleaner.

Clean the MO drive using the lens cleaner as outlined below. The cleaning procedure takes approximately 15 seconds.

- (1) Start up the system.
- (2) Insert the lens cleaner. The lens cleaner is automatically loaded. Once the lens cleaner is loaded, the positioner moves forward and backward and the lens is cleaned by the cleaning brush of the lens cleaner.
- (3) After cleaning, the lens cleaner is automatically ejected.

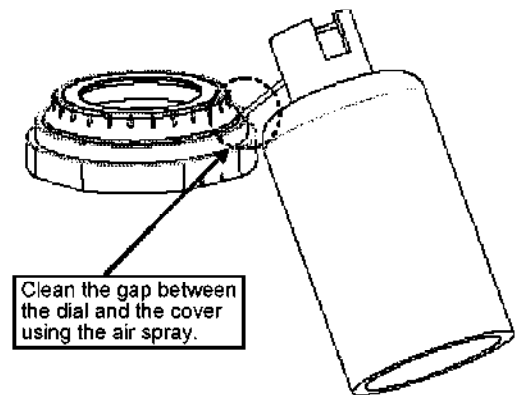
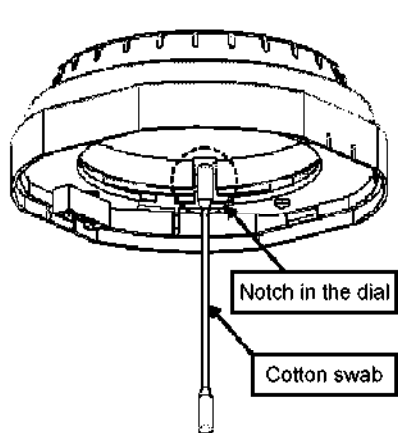
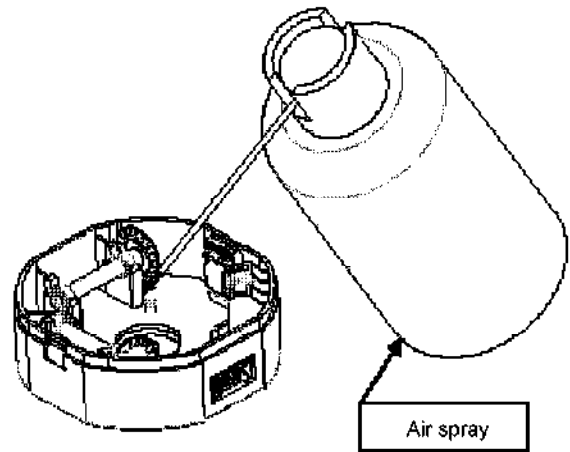
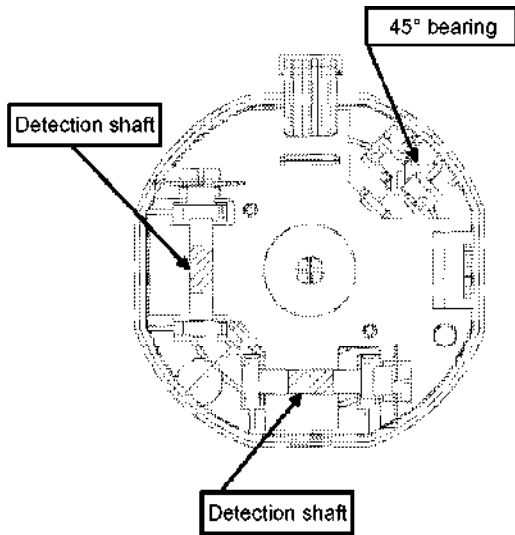
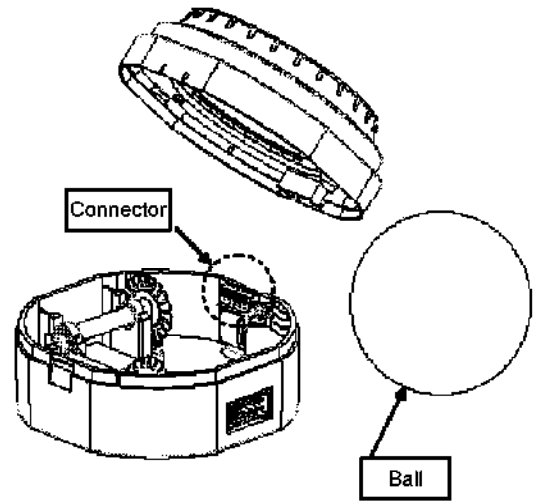
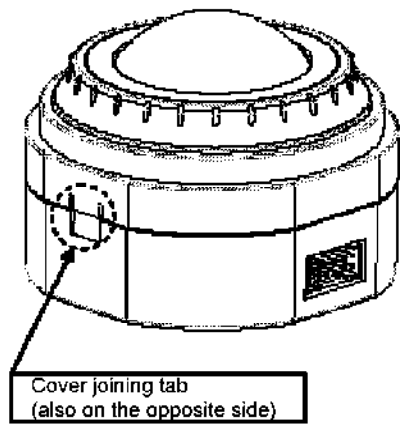
### 3.27 Cleaning the Palm Switch

<<Items required for cleaning>>

- Gauze
- Air spray
- Tweezers

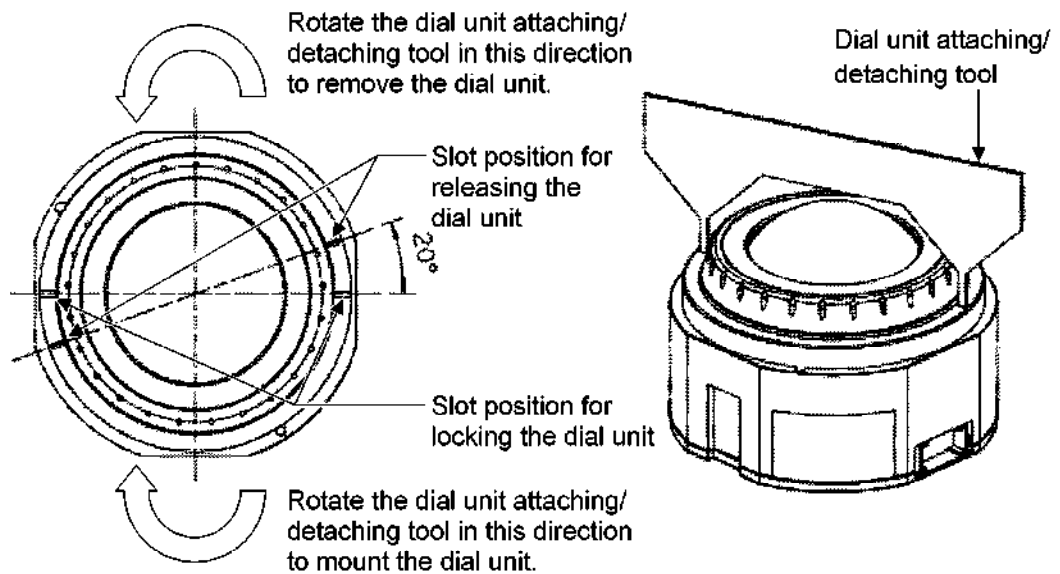
#### 3.27.1 Cleaning procedures for the old-type palm switch

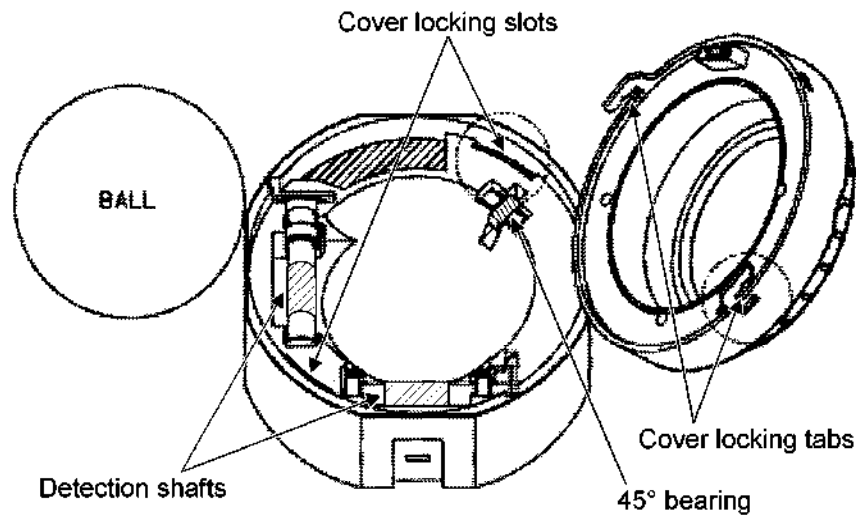
- (1) Remove the connector from the panel and remove the palm switch.
- (2) Press the two tabs on the sides of the palm switch and remove the top cover of the palm switch. Then, remove the ball.
- (3) Disconnect the connection cable between the dial board and the main board.  
Do not forcibly disconnect the cable connector.
- (4) Clean the detection shafts and 45° bearing (shaded sections in the figure) with a piece of gauze.
- (5) Clean out the inside of the case using an air spray.  
Take appropriate measures to prevent dust from flying out. Check for foreign matter inside the case.
- (6) Clean the dial rotation surface using a cotton swab.
- (7) Clean the gap between the dial and the cover (circumference) using the air spray.
- (8) Clean the inside of the dial unit using the air spray.
- (9) Connect the cable between the dial board and the main board.  
Bend the cable so that it does not interfere with the ball.
- (10) After cleaning the ball, place it back into the palm switch and reinsert the top cover.
- (11) Confirm that there are no abnormalities in ball rotation and dial rotation.
- (12) Reconnect the connector to the palm switch and reinstall the palm switch at its original position on the panel.



## 3.27.2 Cleaning procedures for the new-type palm switch

- (1) Fit the dial unit attaching/detaching tool (service part) into the groove on the top of the dial unit. Rotate the tool counterclockwise to remove the dial unit.
- (2) Remove the ball from the palm switch.
- (3) Clean the detection shafts and 45° bearing (shaded sections in the figure) with a piece of gauze.
- (4) Clean out the inside of the case using the air spray. Take appropriate measures to prevent dust from flying out. Check for foreign matter inside the case.
- (5) Clean the gap between the dial and the cover (circumference) using the air spray.
- (6) Clean the ball and place it back into the palm switch. Fit the cover locking tabs into the slots taking care not to allow the ball to interfere with the cable.
- (7) Fit the dial unit attaching/detaching tool into the groove on the top of the dial unit. Rotate the tool clockwise to securely mount the dial unit. (Rotate the dial unit attaching/detaching tool until it locks into place with an audible click.)
- (8) Confirm that there are no abnormalities in ball rotation and dial rotation.





**CAUTION:** When removing the top cover of the palm switch, take care not to damage the cable inside.  
Be sure to reinstall the palm switch on the panel in the correct orientation.  
Use water or mild detergent to clean the ball. Completely wipe off the water from the ball before reinstalling it. Do not use chlorine-based cleansers, acids, or organic solvents.

#### 4. OPERATION OF EACH PWB

##### 4.1 Front-End Unit

###### (1) Outline

The front-end unit consists of the Transducer Interface board (TI), the three Transmit/Receive boards (TR), the Receive Control board (RC), and the Continuous Beamformer board (CB).

###### (2) Composition

###### (a) Transducer Interface board (TI)

The TI board includes the three array transducer connectors and the CW pencil transducer connector. This board enables switching between the transducers.

###### (b) Transmit/Receive boards (TR)

Simultaneous transmission/reception for a maximum of 192 channels is performed on the three TR boards. In addition, the transmission delay control and reception gain control functions are provided.

###### (c) Receive Control board (RC)

This board performs reception phasing/addition in quad signal processing (up to 192 channels). In addition, the Real Time Control circuit (RTC), which controls the front-end unit, is provided.

###### (d) Continuous Beamformer board (CB)

This board performs reception phasing/addition control and quadrature detection for the SCW by inputting 64 channels. This board includes the signal processing circuit, ADC, and dedicated transmission/reception circuit for the Pencil CW.



(3) Flow of signals in the front-end unit

(a) Transmission system

Transmission data from the RTC in the RC board is transferred to the TXPG in the TR board. The transmission delay and transmission waveform data are set. The TXPG has a transmission reference clock (40 MHz, four-phase) and outputs the trigger signals HOUT/LOUT to the PULSER based on the clock. The PULSER outputs a bipolar transmission signal based on the trigger signal. The transmission signal is output to the transducer connector port that is selected in the transducer port selector of the TI board.

(b) Reception system

The reception echo signal flows in the direction opposite to the flow of the transmission drive signal via the same route and is input to the reception circuit in the TR board. The reception signal is input to the RXAR-ASIC (PREAMP-IC). The signal is amplified by the specified amount and is input to the RXBF-ASIC in the RC board. The input signals are AD-converted in the RXBF-ASIC and reception beam forming is performed. Beam forming is performed simultaneously in a maximum of four directions and the beams are output to the BE board.

(c) SCW transmission/reception system

The SCW transmission system is the same as that described in (a) above. The 64-ch reception signal output from the TR board is input to the CB board that is connected to the RC board in parallel. In the CB board, quadrature detection is performed in the demodulator after reception analog beam forming. Then baseband signal processing is performed and the signals are AD-converted. The I/Q signals that have undergone AD conversion are converted to serial data and are then output to the BE board.

(d) Pencil CW transmission/reception system

The CB board includes the pencil CW transmission/reception circuit. The transmission output signals in the CB board are passed through the pencil transducer connector connected to the TI board using the cable and are then output to the pencil transducer transmission elements. The echo signals received in the pencil transducer are also passed through the TI and are input to the reception system in the CB board. After the signals are amplified in the pencil CW receiver circuit in the CB board, they are passed through the demodulator or later blocks and are AD-converted.

## (4) Differences in the PWBs in the PV series

APLIO		PV8000 SSA-390A	Major differences		
Transducer Interface (TI board)	1	PBCNN260 HVSU PWB ECHOENN PBSELMB PBCONT	} PBSEL BOX	3	A 360-pin transducer connector is used (not compatible with PV7000). A relay for switching the transducer is used. High-density PWB
				6	
				2	
				1	
				1	
Transmit Receive (TR board)	3	PULSER		4	The line voltage can be switched between two values for every rate in the dual pulser. High-density PWB (64 chs per PWB) A total of 192-ch signals can be transmitted and received simultaneously with the three PWBs.
Continuous Beam former (CB board)	1	CW RECEIVER		1	Elimination of the granddaughter board. Reduction of mirror artifacts
Receive Control (RC board)	1	DBF T&R-CONT RPG		8 1 1	The 192 chs x four beams can be received in the 12 beamformer ASICs. 160-MHz crystal oscillator High-density PWB (nine → one)
Total	6 PWBs	Total	PBSELBOX + 15 PWBs		

## (5) Calibration and tests required when the board is repaired/replaced

The outlines of repair and replacement of the board are described below. For details, refer to the service manual (maintenance volume: 2D730-149E).

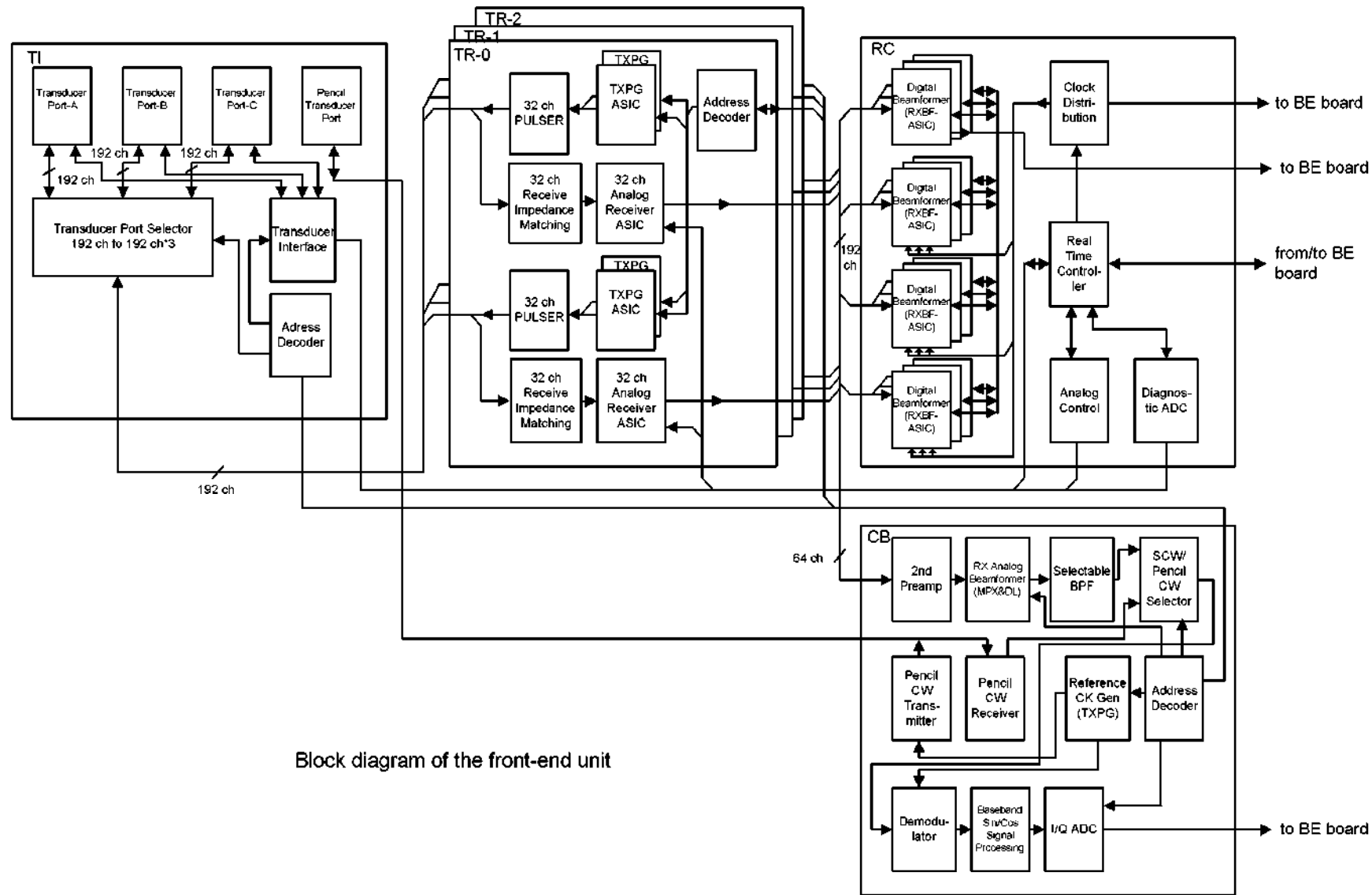
## (a) When the TI board is replaced

Calibration is not required. Execute the test program from the service menu and confirm that no errors occur.

## (b) When the TR/RC/CB board is replaced

The calibrations given below are required. For the procedure for each calibration, refer to the service manual (maintenance volume). After calibration, execute the test program from the service menu and confirm that no errors occur.

- ADC offset calibration : Required when the TR, RC, or HDD board is replaced.
- SCW TX power calibration : Required when the TR board, RC board, or power-supply unit (PSA) is replaced.



Block diagram of the front-end unit

## 4.1.1 TI

## (1) Outline

The TI board (Transducer Interface board) includes the three array transducer connectors and enables switching of the transducers to be connected to the pulser/preamplifier.

## (2) Description of functions and operation

## (a) Array transducer switching

This board contains the three 360-pin ZIF connectors for the array transducers and switches between the 192-ch echo line and the required control line using a relay. The transmission/reception signals are transferred to the pulser/preamplifier mounted on the TR board through the BackPlane board.

## (b) Pencil transducer transmission/reception signal connection

The connector box for the pencil transducer is installed in the cabinet and is thus connected to the TI board via a cable. The transmission/reception signals coming from the pencil transducer are transferred to the pencil pulser/pencil preamplifier mounted on the CB board through the TI and BackPlane boards.

## (c) Support of the M-TEE transducer

## • Thermistor line

Transfers signals coming from the temperature detection thermistor embedded in the M-TEE transducer to the ADC mounted on the RC board. (Up to two thermistors are supported.)

## • Angle detection line

Transfers signals coming from the angle detection potentiometer embedded in the M-TEE transducer to the ADC mounted on the RC board.

## (d) Support of transducer with impedance converter

This board supplies power for collector bias of the impedance converter. An over-current detection circuit is provided. The emitter bias power supply is provided from the TR board.

## (e) Support of 1.5 D transducer including a HVSW

- This board receives the control data for the HVSW embedded in the transducer (walking bus) from the RC board and transfers it to the transducer.

- This board supplies  $\pm 100$  V for the HVSW embedded in the transducer.

## (f) Power supply for circuit inside the transducer

This board supplies + 5 V for the circuit inside the transducer. An over-current detection circuit is provided.

## (g) Error detection

The TI board includes detection circuits for the following errors.

## a. HV fault error

This error occurs if the voltage for the HVSW embedded in the transducer is not correct.

## b. HV detection fault error

This error occurs under the following conditions. If this error occurs, the crowbar circuit operates and stops supplying  $\pm 100$  V.

- The  $\pm 100$ -V power for the HVSW embedded in the transducer is applied to a connector where no transducer is connected.
- The  $\pm 100$ -V power for the HVSW embedded in the transducer is applied to a connector where a transducer that does not require a high voltage is connected.

## c. HV diode fault error

The diode is set on the echo channel in order to clamp the echo channel to prevent application of the  $\pm 100$  V.  
This error occurs if the diode is broken and a current resulting from the high voltage flows in the echo channel.

## d. Relay fault error

This error occurs if a relay for switching the transducer has values that are different from those of the relay control register.

## e. Over-current fault error

This error occurs if an over-current occurs in the power (+ 5 V for Zconv) supplied to the transducer.

## (h) Transmission disable signal generation

The TI board transfers the transmission disable signal (TXDIS) to the TR boards under the following conditions.

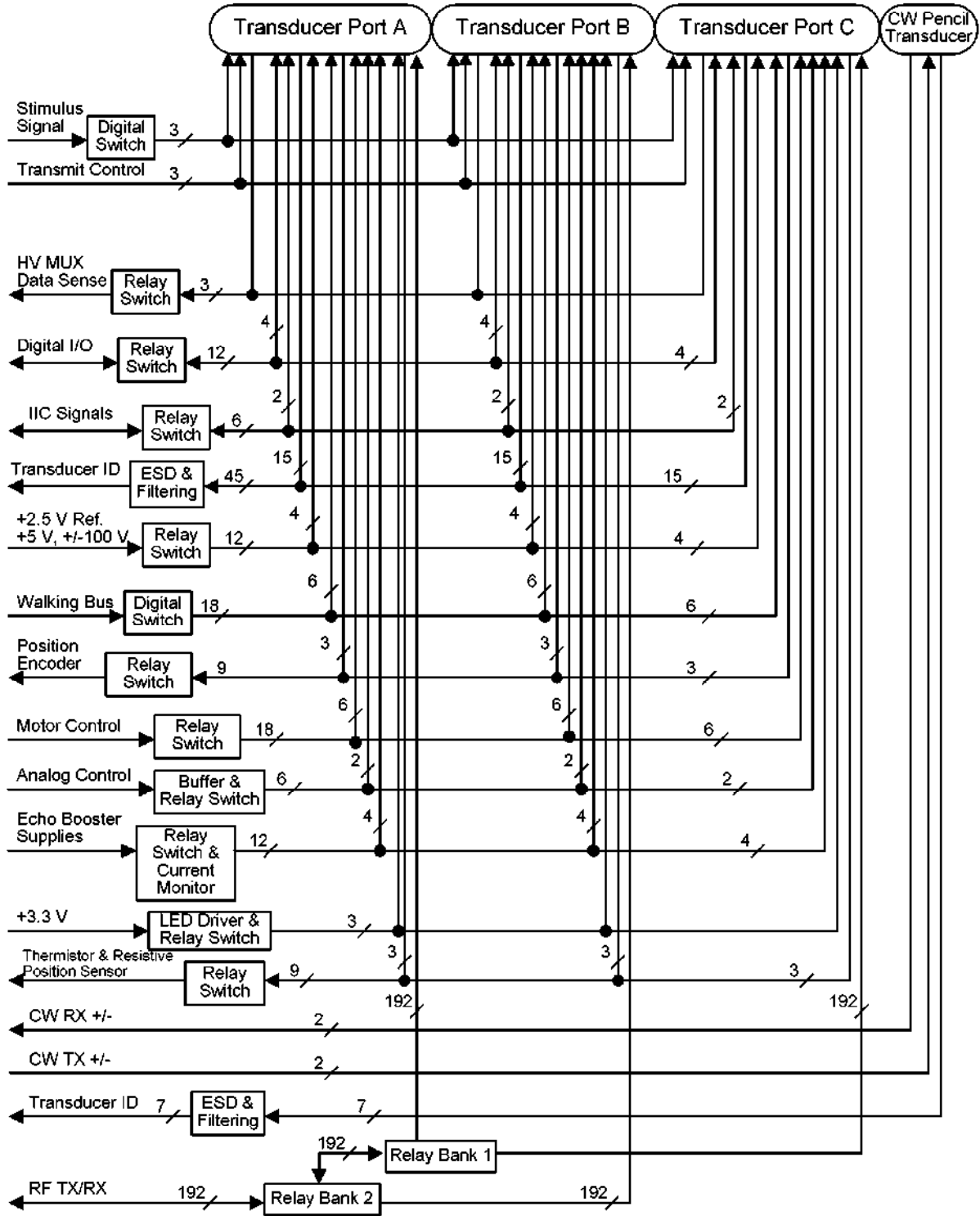
- An HV fault error is detected (a in (g))
- An HV detection fault error is detected (b in (g))
- An HV diode fault error is detected (c in (g))
- A relay fault error is detected (d in (g))
- An over-current fault error is detected (e in (g))
- The HVSW in the 1.5 D transducer is in transition
- The transducer selection relay is in transition
- The transducer ID of the selected transducer is changed
- An empty transducer connector is selected

## (3) Equivalent boards in PV8000

The TI board includes the functions of five boards: PBCONT, PBSELMB, HVSW, PBCNN260, and ECHOCNN.

## (4) Differences relative to PV8000

Item	Aplio	PV8000
Transducer selection switch	Mechanical relay	Semiconductor high-voltage switch
Transducer connector	360-pin ZIF connector	260-pin ZIF connector
Number of echo channels	192 ch	128 ch



Transducer interface block diagram

## 4.1.2 TR

## (1) Outline

The two primary functions of this board are first, to generate and deliver the transmit signals to the TI board, and second, to receive, amplify, and deliver the echo signals to the RC board.

## (2) Description of functions and operation

## (a) Transmit pulser

This is the circuit which drives the piezoelectric elements inside the transducer electrically. The number of transmission waves and the pulse duration are controlled by the TXPG.

The transmission pulse (bipolar transmission waveform) is generated in the circuit by increasing the low-voltage power supply in the transformer.

In addition, this pulser has the two blocks in the transformer primary-winding side. Transmission voltage switching for each rate is achieved by applying different voltages to each of the blocks (dual pulser).

## (b) Transmit pulse generation

The transmit pulse generation section is comprised of the following subsections: transmit control bus (TC bus), /TXCL and /TCWR signals, digital control, PECL clocks (four blocks), PECL synchronize signals (two blocks), power supply, 64 pairs of transmit control signals (Hout and Lout), and a transmit pulse generation ASIC (TXPG).

## (c) Preamp and variable gain amplifier (functions in RXAR ASIC)

They amplify the echo signals from the piezoelectric element.

The gain in the preamp is fixed to +14 dB. The variable gain amplifier sets the gain from 0 to +75 dB by changing the control voltage (VTGC) from 0 to 1 V.

## (d) Antialiasing filter (functions in RXAR ASIC)

This filter prevents the aliasing that occurs when the analog echo signals are converted to digital signals in the RC board.

The cutoff frequency can be changed from 4 to 16 MHz by changing the control voltage (VAAC) from 0 to 1 V.

The RXAR ASIC is set as given below in the SCW mode.

The gain is fixed to 20 dB and the antialiasing filter is bypassed.



## (e) T/R switch

The T/R switch is used to switch the impedance of the echo signal channel between the transmit event and the receive event.

During the receive event, this switch short-circuits the secondary transformer to provide a low echo signal channel impedance.

## (f) Address decoder (EPLD) and TC bus

The address decoder uses digital control lines to perform the required control for the TR board. The address decoder serves as the "brains" of the TR board and communicates with the RC board via the TC bus.

The TC bus serves as a bidirectional interface with the RC board. This bus is the digital communication hub for the TR board, which is used to access the memory in the TR address decoder, ID EEPROM, and TXPGs. The TC bus is comprised of two data buses and one address bus. The data bits are broken down into two 16-bit buses, TC0D[15:0] and TC1D[15:0], where each data bus is then connected to two TXPGs. TC0D[15:0] is sent to TXPG ASIC 0, TXPG ASIC 2, and the ID EEPROM, while TC1D[15:0] is sent to TXPG ASIC 1 and TXPG ASIC 3.

## (g) Reception resonance

Reception resonance has been achieved by inputting inductance into echo signal lines in parallel.

A coil is connected between the echo signal line and GND. There are four other inductance coils that can be selected. The resonance can be changed by using these inductance coils in various combinations.

## (h) Fault detection and protection circuit

The TR board generates two types of interrupts: transmission interrupts and clock detection interrupts.

## a. Transmission interrupt

A transmission interrupt is generated when TXEN0 and TXEN1 are both "H" simultaneously. This occurs only if there is a hardware fault or if the address decoder test bit is set. The address decoder EPLD always monitors the TXEN0 and TXEN1 lines and sets the interrupt status bit when it senses that both signals become "H" simultaneously. When this bit is set, the TR board stops transmission by making TXEN0 and TXEN1 "L" and transfers the transmission inhibit signal and the interrupt signal to the system simultaneously to indicate that a system malfunction has occurred. This disables transmission to all three TR boards, not just the TR board where the error occurred.

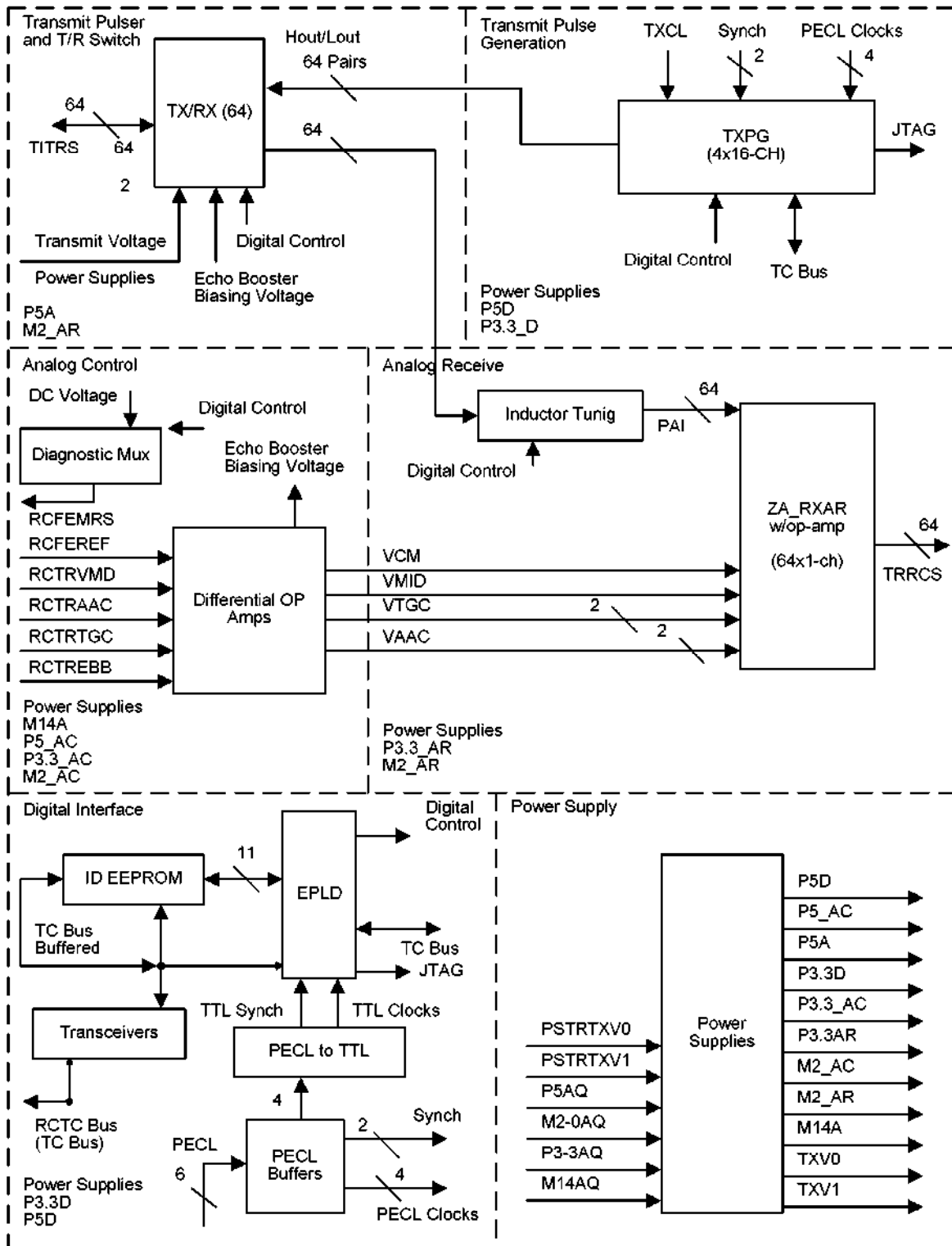
## b. Clock detection interrupt

A clock detection interrupt is generated when the PECL clock in the front-end unit stops before the TXPG completes transmission and the transmission for all three TR boards stops. This is extremely dangerous for the TR board because it leaves the TXPG output signals which drive the FET of the transmission circuit in an unknown state. If the TXPG output signals are fixed to "H", the FET of the transmission circuit may be broken.

## (3) Comparison with PV8000

The TR board is equivalent to the PULSER-H in the PV8000, except for the following items.

	Aplio	PV8000
(1) Number of transmission/reception circuit channels per TR board	64 CH	32 CH
(2) Transmission waveform	Bipolar transmission can be performed.	Only unipolar transmission can be performed. (Bipolar transmission cannot be performed.)
(3) Transmission voltage switching	The transmission voltage can be switched for every rate. (A dual pulser circuit is mounted.)	The transmission voltage cannot be switched for every rate. (Only PW and CW transmission voltage switching can be performed.)
(4) Transmission pulse generation method	The transmission pulse is generated by using a transformer to raise the low voltage.	The transmission pulse is generated by switching the high-voltage power supply in the FET.
(5) Reception preamplifier	A new amplifier (RXAR ASIC) is used. This unit includes a preamplifier, a variable gain amplifier, and an antialiasing filter in a single package. The variable gain range is 75 dB.	An antialiasing filter, which is an individual part, is mounted on the DBF. The variable gain range is 48 dB.



TR functional block diagram for transmit pulse generation

## 4.1.3 RCB

## (1) Outline

The RCB (Receive Control Board) controls the front-end section, AD-converts the reception signals, and performs receive beam forming.

## (2) Descriptions of functions and operations

The RCB includes the following functions.

## (a) Front-end section scan control: RTC (Real Time Controller) block

The transmission/reception in the front-end section is controlled according to control information from the RM. The RTC block consists of an FPGA (Field Programmable Gate Array, programmable IC) and SRAM. The sequencer set in the FPGA transmits data to each block of the front-end section according to the scan control information to be stored in the register in the FPGA and SRAM.

## (b) AD conversion and receive beam forming: RXBF (Receive Beam Former) block

The reception signals obtained for every ch are AD-converted with a sampling frequency of 40 MHz and a quantification precision of 10 bits. The required reception delay is applied to each converted signal and addition is performed. This block consists of 12 ASICs (RXBF ASICs).

## (c) Analog control signal generation: Analog Control block

The analog control signals required in the front-end section (listed below) are generated. They are obtained by performing DA conversion for the digital codes output from the RTC.

## • VTGC (time gain compensation)

This signal controls the preamplifier gain depending on the depth of reception. This signal is input to the RXAR ASIC (preamplifier IC) in the TR board.

## • VAAC (antialias control)

This signal is used to control the signal bandwidth before the AD conversion. This signal controls the cutoff frequency of the low-pass filter (antialias filter) in the RXAR ASIC.

## • TXV (transmit voltage control)

This signal controls the transmission pulse voltage. The signal is input to the TR PWB via the power supply unit.

## • VMD (voltage for midpoint bias)

This signal controls the bias point of the reception echo signal line between the TR board and RC board (between the RXAR ASIC and RXBF ASIC). The signal is input to the RXAR ASIC.

## (d) System clock generation: Clock Generation block

The clock to be used in the system is generated. A 40-MHz clock is generated by dividing the 160-MHz crystal-oscillator frequency.

## (e) Self-diagnosis: Diagnostic Circuit block

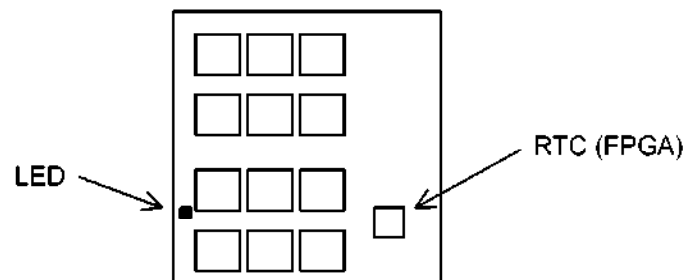
The line voltage and standard voltage in the front-end section are measured for self-diagnosis of the system.

This block also includes the function for detecting the temperature of the TEE transducer head and angle of the piezoelectric element surface.

The signals to be measured are selected by the multiplexer and are input to the AD converter. The converted data is transmitted to the RM via the RTC. A circuit which stops transmission forcibly when a certain regulation value is reached is provided for the transmission voltage and TEE transducer head temperature detection signals.

## (3) LED

An LED (DS1) is set at the free edge on the RCB. If this LED lights, the FPGA of the RTC is configured (programmed). The FPGA is automatically configured when the power supply is input. Therefore, if the LED does not light even when the power supply is input, the RTC circuit is not configured and therefore the system does not operate. This problem may occur as a result of contact failure of the FPGA terminal, device failure, or damage to the ROM that stores the program.



## (4) Error detection

The RCB detects the errors described below.

## (a) Excessive transmission voltage detection

The RCB monitors the transmission voltage output from the power supply unit to the TR board by the TXV as described before. If this control signal exceeds a certain set value, the RCB generates an error and stops transmission. The value is set by the register in the RTC.

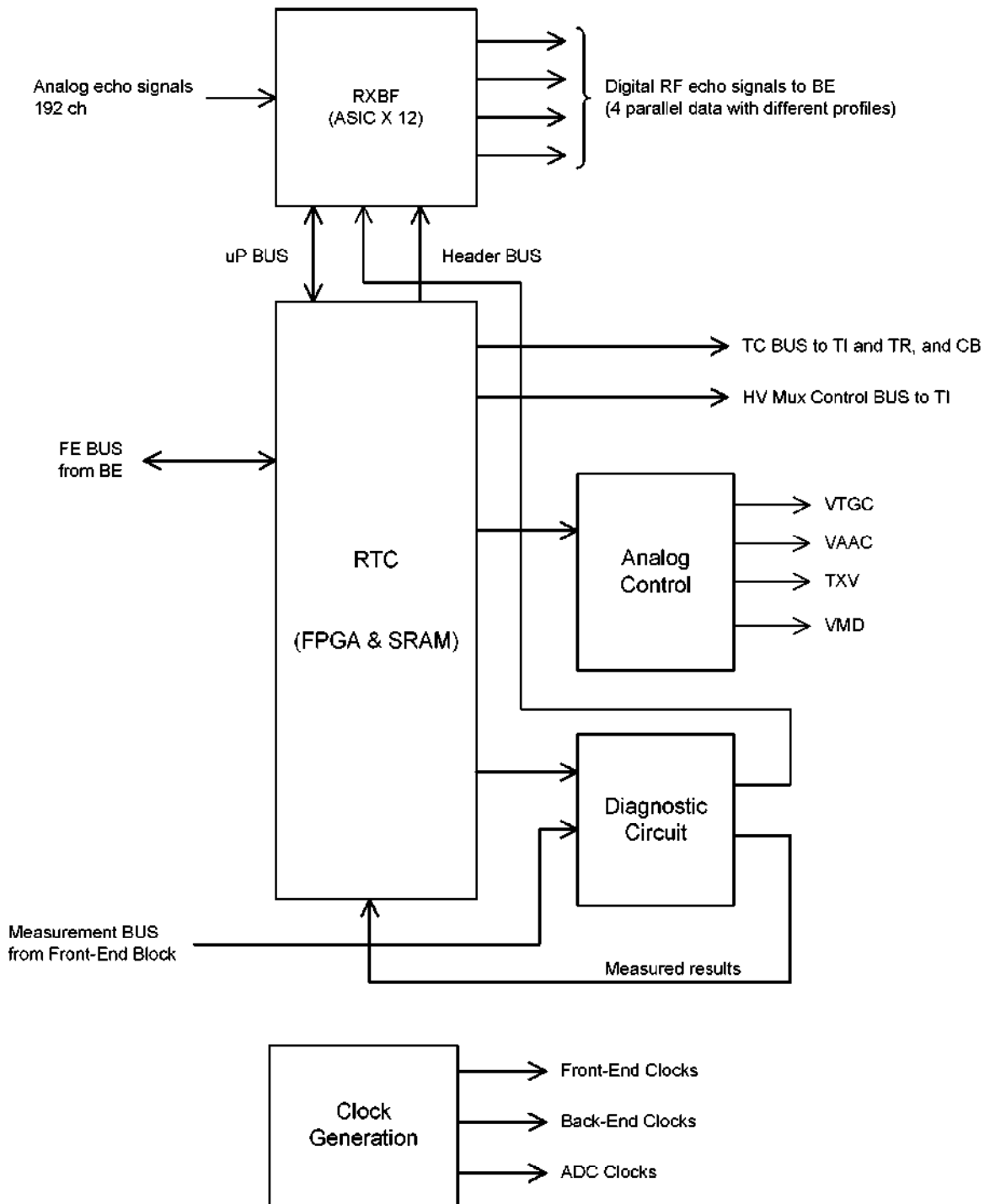
## (b) TEE transducer head high-temperature detection

The RCB is provided with a function that detects the temperature of the TEE transducer head. If the temperature exceeds 43°C, the RCB generates an error and stops transmission.

In addition, since the RCB mainly controls the front-end unit, when an error occurs in the TI, TR, and CB boards, the RCB receives it temporarily. The RCB then outputs an interrupt request to the RM.

## (5) Comparison with the PV series

Circuit block in the RCB	Corresponding board in the PV series	Main differences
RXBF	DBF	<p>[Number of chs] 128 (SSA-390A) → 192</p> <p>[Hardware size] Eight DBFs (maximum) → one RCB</p> <p>[Data output method for parallel simultaneous reception] Time-sharing output is performed in the DBF. However, parallel output is performed in the RCB and thus the signal band width does not decrease.</p>
RTC	RPG T&R-CONT	<p>[Hardware size] Only two types of ICs (FPGA and SRAM) are used in the Aplio</p>
Diagnostic Circuit	T&R-CONT	<p>[Measurement of voltages] A measurement system is not provided with the PV series. In the Aplio, various voltages can be measured.</p>
Analog Control	T&R-CONT Part of DEMOD	<p>[Bias point control] The bias between the preamplifier and AD converter is fixed in the PV series. In the Aplio it can be controlled by the VMD.</p>
Clock Generation	Clock generation section of DEMOD	<p>[Crystal oscillator frequency] 240 MHz → 160 MHz</p> <p>[System clock frequency] 20 MHz → 40 MHz</p> <p>(The sampling frequency is the same in both systems (40 MHz).)</p>



Block diagram for RCB

## 4.1.4 CB

## (1) General description

The CB board consists of the SCW channel adding circuit (summation), SCW/CW quadrature detection circuit, pencil CW transducer transmission/reception circuit, clock generation circuit, bus interface circuit, and self-diagnosis circuit.

## (2) Functions

## (a) SCW summation

This function applies a delay of less than one period of the carrier waveform to the reception signals output from the preamplifier of the TR board and performs algebraic summation.

## (b) Quadrature demodulation circuit

The band-pass filter (BPF) removes the higher harmonic elements. The mixer performs quadrature demodulation with the carrier frequency.

The BPF and high-pass filter (HPF) located behind the mixer removes clutter elements. The selectable gain AMP circuit adjusts the levels of the Doppler signals, which differ depending on the type of transducer.

The ADC converts the Doppler signals that have undergone quadrature demodulation to digital signals. These digital signals are then sent to the BE board.

The phase and gain difference information in the sin/cos circuit is sent to IDPROM (5. Interface Section) and is corrected automatically in the BE board.

If the correction is performed incorrectly, mirror artifacts increase.

## (c) Pencil CW TX/RX circuit

The pencil CW TX/RX circuit is connected to the pencil transducer via the TI board.

Bipolar transmission is used. For reception, Pencil CW mode is switched to SCW mode after the preamplifier.

If switching is performed incorrectly, echoes from the pencil transducer cannot pass.

## (d) Clock generation circuit (pluse generator/LO)

This circuit generates the clock which drives the pencil transmission circuit in the pencil CW TX/RX circuit, and also generates the reference clocks for the two mixers. These clocks are derived from the TXPG ASIC.

If the TXPG ASIC is broken, images cannot be displayed in Pencil CW mode and SCW mode.

## (e) Interface

The interface circuitry includes an address decoder EPLD, an ID EEPROM, a JTAG controller PLD, clock drivers, and buffers.



## (3) Description of operation

## (a) SCW summation

The SCW reception signals from the transducer are amplified to 20 dB (fixed gain of the preamplifier in the TR board) and are input to the 2nd preamplifier in the CB.

The CB has a 64-ch reception signal line. When the sampling marker is moved in the SCW, the delay tap is selected accordingly from among the 16 taps on the delay line in the eight 8 x 16 multiplexers including 8 chs. Then algebraic summation is performed and reception beam forming is implemented.

The delay time within one cycle of the carrier waveform is sufficient because the pulsed wave is periodic and a minimum quantification step of 20 ns is implemented with a maximum delay of 500 ns.

The reception signals after algebraic summation differ depending on the type of transducer. Therefore the signal levels are matched using the variable attenuator RF gain and an appropriate dynamic range is allocated.

The reception signals of the pencil (CW) and summation output of the SCW are switched by the multiplexer.

Control of the 8 x 16 multiplexer, selection of the RF Gain, and output switching control between the pencil and SCW are performed by the address decoder (EPLD) based on the code of the TC bus from the RC.

## (b) Quadrature demodulation section

## 1) Selectable BPF

The address decoder selects an appropriate band-pass filter (BPF) depending on the carrier frequency.

## 2) Quadrature demodulator

A clock with a 90-degree phase difference in carrier frequency is input to the two diode mixers and quadrature demodulation is performed for reception signals passed through the selectable BPF.

The clock is generated by the TXPG based on the system clock (four-phase, 40 MHz) from the RC and is supplied to the mixer by shifting the level using the driver.

## 3) Baseband filter

The DC (carrier elements) and added elements are eliminated by the BPF behind the mixer. The HPF behind the BPF is a fourth-order active filter and allows clutter elements to be removed.

The required Doppler elements can be extracted.

The LPF is an antialiasing filter for the ADC and the cutoff is fixed to 156 kHz. This filter is a fourth-order active filter.

## 4) Selectable gain amp

The Doppler signal level differs for each transducer. Therefore, the signal level can be selected from 0 to 16 dB in 2-dB steps.

Selection is performed by the address decoder (EPLD) based on code of the TC bus (BBGAIN).

## 5) ADC

After performing 10-MHz sampling in  $\Sigma$ - $\Delta$  type ADCs, the frequency element 156.25 kHz or more is eliminated in the digital filter and decimation is performed at the 312.5 kHz. The signals are output as serial data.

The signals in the two ADCs (in-phase/quadrature-phase) are synchronized with the system clock via the EPLD and are output to the BE board.

The I/Q signals in the two ADCs are combined into one synchronization signal with the serial data and they are then transferred in the differential format.

## (c) Clock generation circuit (plus generator/LO)

In order to generate the reference clocks for mixers and the pencil CW transmission clock, the TXPG is configured to operate in infinite number of pulses mode (INPM). The PECL clock (four-phase, 40 MHz) is input to the TXPG and the frequency is set based on the TC bus data.

## (d) Pencil CW transmitter/receiver

## 1) Pencil CW transmitter

The pencil CW transmission circuit drives the pencil transducer piezoelectric elements. The TXPG outputs the clocks Hout1 and Lout1 to the ACT08. This is controlled by the transmission enable signal (TXEN1). The ACT08 drives the MOSFET and performs bipolar transmission by driving the transformer alternately.

The transmission signal is transferred to the pencil transducer via the TI board.

## 2) Pencil CW receiver

The reception signal returned from the pencil transducer is input to the preamplifier of the CB board via the TI board. After the weak signal from the transducer is amplified in the preamplifier, the CW receiver is connected to the selectable BPF and quadrature demodulation circuit by switching the multiplexer. The signal sent via the same route as for SCW summation and is processed.

(e) Interface

1) CB address decoder (EPLD)

The CB address decoder (EPLD) decodes data from the TC bus and generates all the control signals required for the TXPG, ID EEPROM interfacing, control of buffer direction, and CB board. The TC bus is a bidirectional bus and consists of an 18-bit address, 16-bit data, an enable signal, and a handshaking signal.

2) PECL clocks

The clocks for the CB board are derived from the PECL clock (four-phase, 40 MHz) RCFECK [0:3] output from the RC and the sync signal RCFECKE.

The PECL clock is used in the TXPG. The clock converted from RCFECK0 and RCFECK2 to TLL is used in the CB board.

3) ID EEPROM

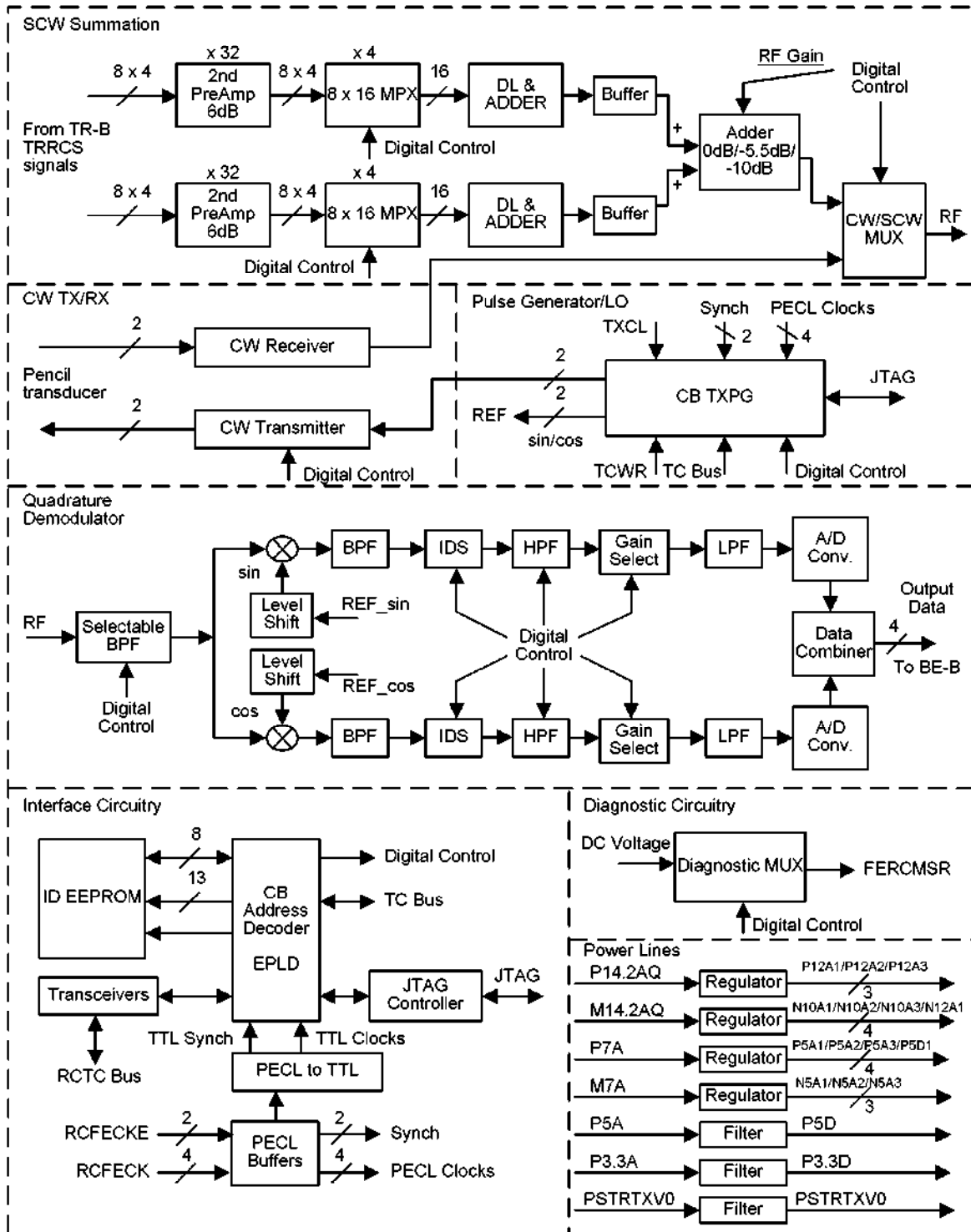
The ID EEPROM stores information related to the serial number, hardware revision, firmware revision, board ID, and drawing number. This device also stores the IQ calibration data that is used to correct the gain and phase differences between the in-phase and quadrature-phase circuits in the quadrature demodulator (quadrature demodulator circuit) on the BE board.

The capacity is  $8\text{ k} \times 8$  bits and this device is accessed via the CB address decoder EPLD and the TC bus.

- (4) Adjustment points
- (5) Differences relative to PV8000

The CB is equivalent to the CW-RECEIVER in PV8000. However, there are the following differences.

	Aplio	PV8000
(1) Reception PREAMP	The PREAMP (20 dB) is set in the TR-B.	The PREAMP is set in the CWRECEIVER.
(2) Reception route	The signals are transmitted via the backplane (no cables).	The coaxial flat cable is connected. PULECHO and CWECHO64 are connected.
(3) I/Q adjustment	No adjustment The BE reads the IDPROM data and corrects it automatically.	The two VRs are adjusted on board.
(4) ADC output	Serial differential output	Parallel output
(5) PWB configuration	64 chs, one board	32 chs + granddaughter 32 chs
(6) Pencil pulser	Provided	Not provided (but provided with the pulser)
(7) Clock	40 MHz pecl, four phases	60 MHz, one phase; the logic circuit is operated at 10 MHz.
(8) Diagnostic cir.	Provided	Not provided



CB Board functional block diagram

## 4.2 BE Unit

### (1) Outline

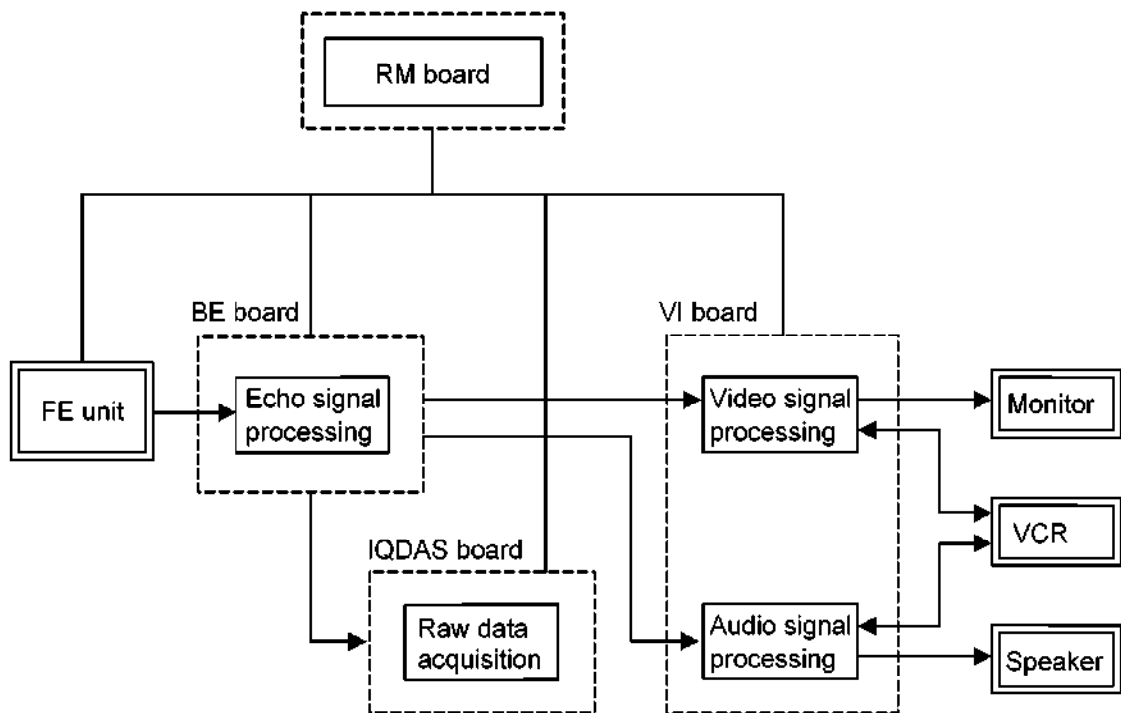
This unit consists of the FE unit echo signal processing system, the video signal processing system, the audio signal processing system, and the real time manager that controls the system.

### (2) Composition

This unit includes the following boards.

- RM board
- BE board
- VI board
- IQDAS board (option)

### (3) Flow of signals



Flow of signals in the BE unit

### (4) Equivalent units in the PV series

This unit is equivalent to the following parts in the PV series.

- Receiver of the T&R digital unit
- Doppler unit
- DSC unit
- System unit

## 4.2.1 BE

## (1) Outline

The BE board consists of the following blocks and performs data processing in all image modes after performing phasing/addition.

- DR (Digital Receiver)
- EP (Echo Processor)
- FP (Flow Processor)
- SIP (Signal & Image Processor)
- SC (Scan Converter)
- PCI I/F

The features of the architecture of this board are the miniaturization of circuits using an ASIC with a high level of integration and the provision of a buffer memory for each block to enable independent data processing.

## (2) Functions

The composition and functions of each block in the BE board are described below.

## (a) DR

This consists of four DR-ASICs for quad signal processing (QSP). The following functions are performed in all modes.

- DC filtering  
Removes the DC components.
- Digital TGC (time gain control)  
Controls the STC.
- Baseband conversion  
Performs orthogonal detection depending on the reception center frequency data and converts the frequency to the baseband signal to obtain real and imaginary signals.
- Decimation filter  
Performs decimation for input data with 1024 samples or less per vector.
- Dynamic filter  
Sets the LPF to the echo signal depending on depth.

In addition to the functions shown above, the following function is also performed in the PWD mode.

- Range gating  
Range gating integration is performed for the sample volume.

## (b) EP

This consists of one EP-ASIC and a persistence memory. EP operates in 2D-mode and M-mode and performs echo signal processing as outlined below.

- Magnitude calculation

Power operations are performed for real and imaginary input data.

- Log compression

Log compression is performed for the echo signal.

- Blending

Combination focus and other vector combination operations are performed.

- Edge enhancement

Edge enhancement is performed for the echo signal.

- AGC

Feedback processing and echo enhancement are performed for the echo signal.

- Black hole and noise spike filtering

Noise appearing as black and white points is eliminated.

- Persistence

Frame correlation processing is performed.

## (c) FP

This consists of one FP-ASIC, a buffer memory, two FPGAs, a filter coefficient memory, and a persistence memory. FP operates in CDI mode and MCDI mode and performs color Doppler processing.

- Corner turning

Real and imaginary data input from the DR is stored in the buffer memory and the data is rearranged when processing is performed by the MTI filter.

- Wall filtering

MTI filtering is performed. FIO, which reduces motion artifacts, is also performed.

- Autocorrelation

Auto-correlation is performed.

- Spatial averaging

The filter to be used in spatial averaging (smoothing) is set.



- Hole filtering

Processing for the filter and blanking, which remove clutter and noise, are performed.

- Persistence

Frame correlation processing is performed for the color Doppler data.

- Clutter processor

Analysis is performed for the removal of clutter components by FIO.

(d) SIP

This consists of one DSP, one FPGA, and a buffer memory. SIP operates in trace image display modes (PWD, CWD, M, and MCDI) and at the time of waveform (such as ECG) display. In PWD and CWD modes, the following processing operations are performed.

- Spectrum generation (FFT)

Signal analysis is performed by the FFT and a spectrum is generated.

- Audio left/right signal generation

Separate left and right Doppler signals are generated.

- Display column generation

The space to be used for spectrum display is generated.

- Derived parameter calculations

Real-time calculation such as auto-trace are performed.

In the M and MCDI modes and at the time of waveform display, the following processing operations are performed.

- Display column generation

The space to be used for waveform display (such as M, MCDI, and ECG) is generated.

- Tissue/flow decision (only for MCDI mode)

Whether the pixels displayed in MCDI mode represent tissue or blood flow is determined.

## (e) SC

This consists of the one SC-ASIC, a CINE memory, and a buffer memory. SC operates in the 2D and CDI modes and performs the following 2D image system processing operations.

- Scan conversion

Ultrasound data is converted to TV format data.

- Tissue/flow decision

Whether the pixels displayed in CDI mode represent tissue or blood flow is determined.

- Peak hold (only for CDI mode)

A maximum value is displayed for each pixel in CDI mode.

- Frame interpolation (only for CDI mode)

Frame interpolation processing is performed in CDI mode.

- 2D cine storage

Holds the 256 MB cine memory.

- Cine replay (under CPU control)

Cine display is performed. Operations such as playback speed are controlled by the CPU.

## (f) PCI I/F

This function interfaces the HOST bus (PCI bus) and the following buses.

- Imaging bus

Data bus to be sent to the VI board. The imaging bus includes the 32-bit bus from the SC and the 16-bit bus from the SIP. The bus clock for both buses is 40 MHz.

- BE internal local bus

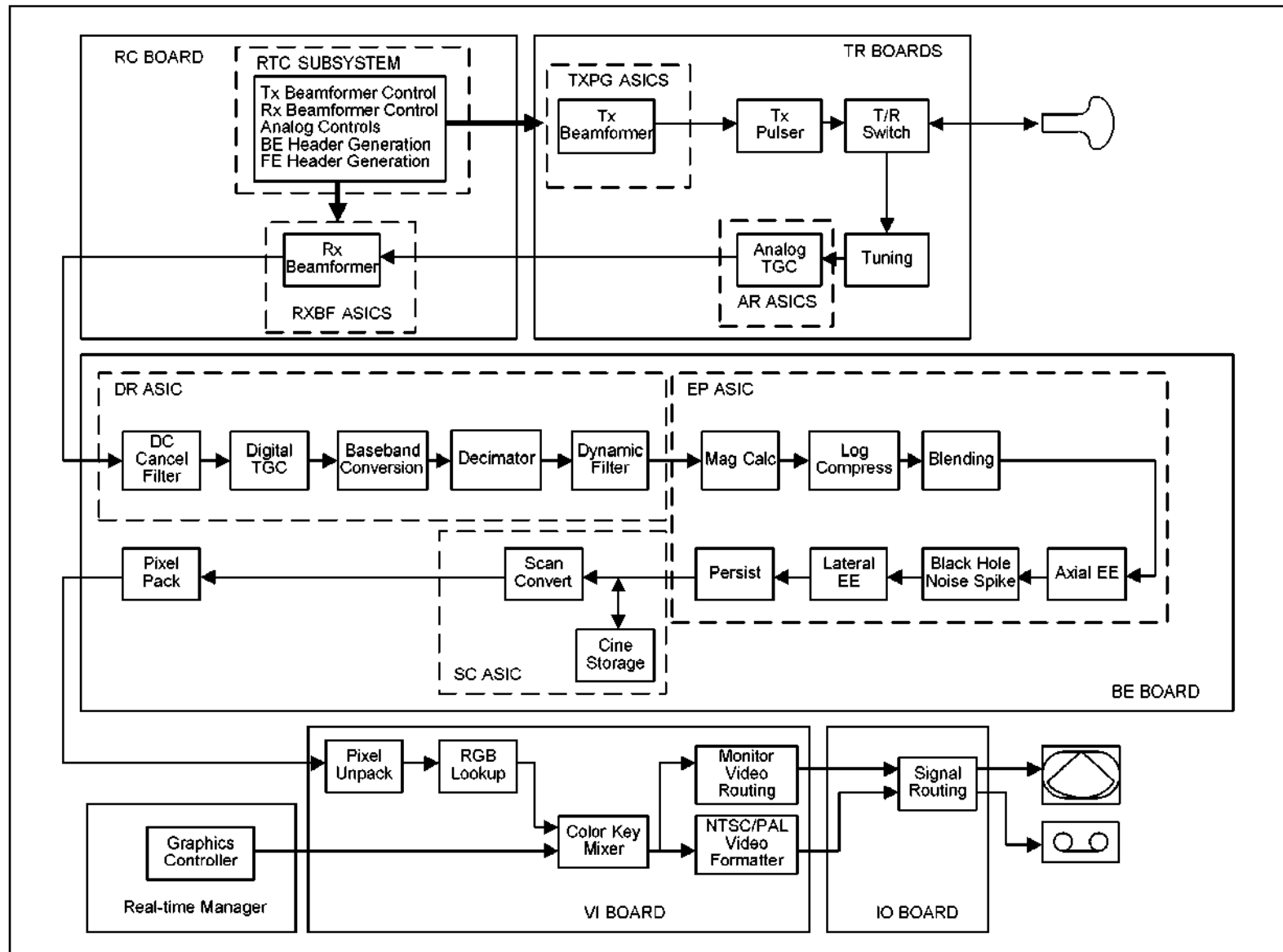
Internal local bus used for controlling each ASIC. This bus operates at 40 MHz with a 32-bit width.

- FE bus

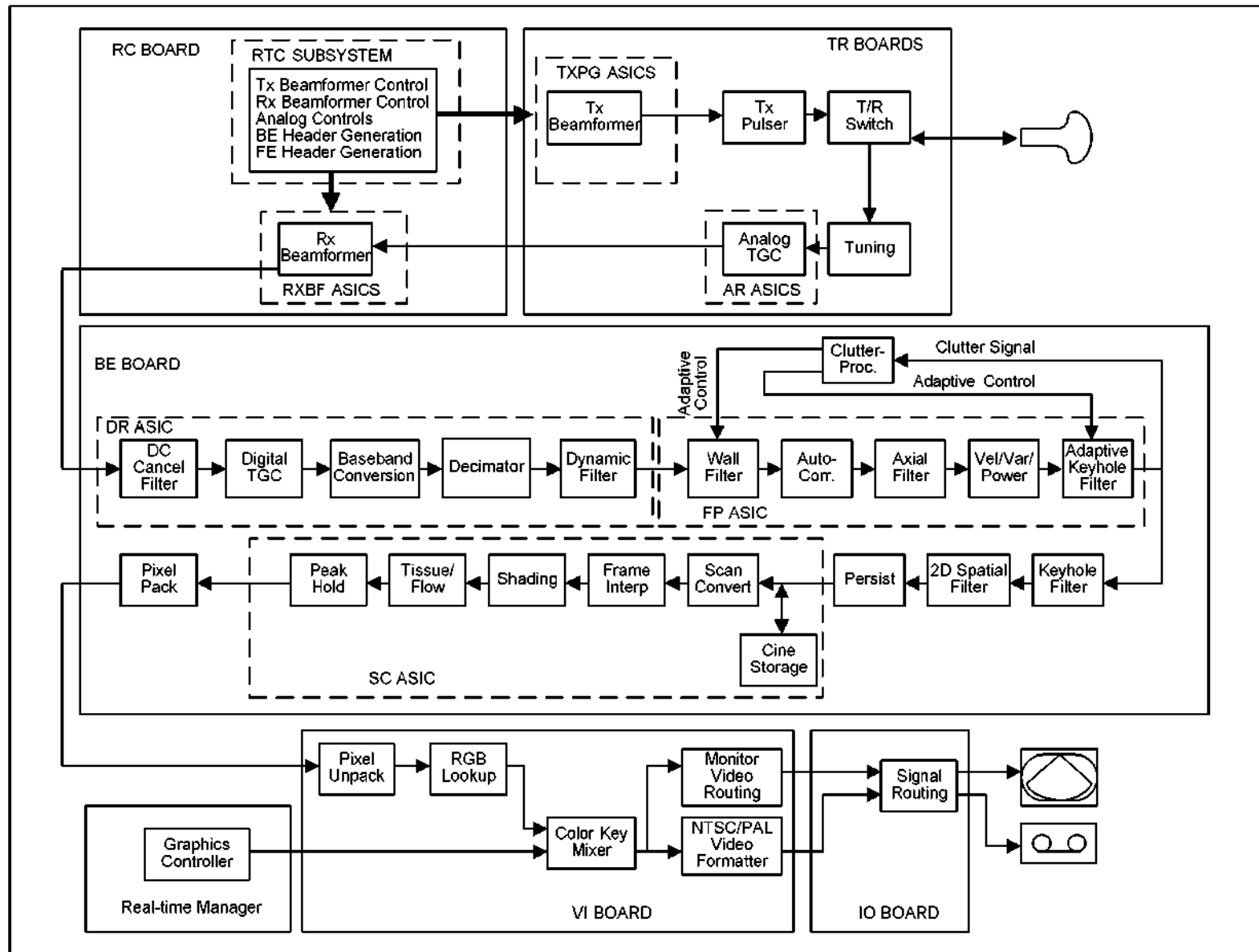
The FE bus is used by the CPU to access boards in the FE unit. This bus operates at 40 MHz with a 32-bit width.

## (3) Flow of signals

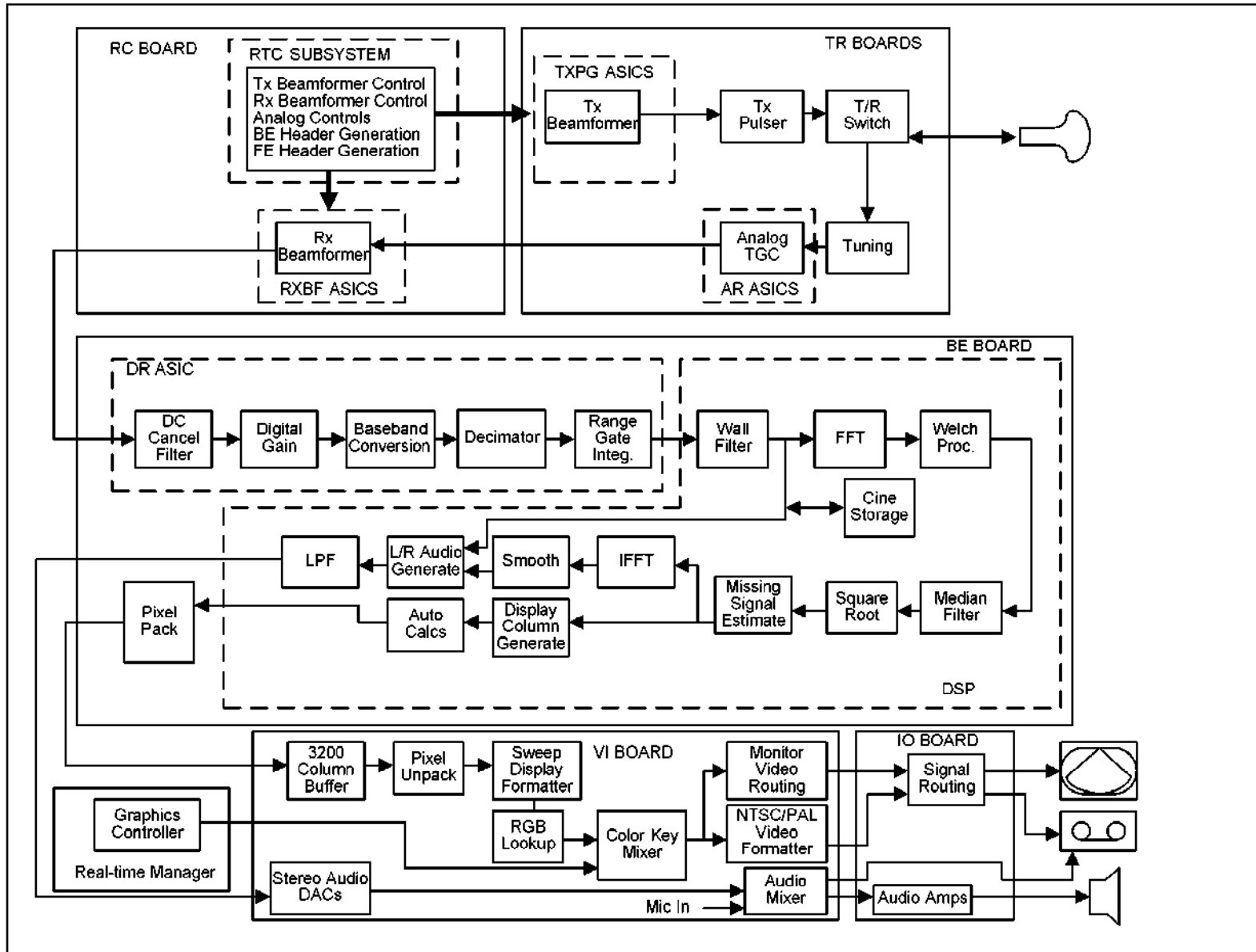
The flow of signals for each mode is shown on the next and subsequent pages.



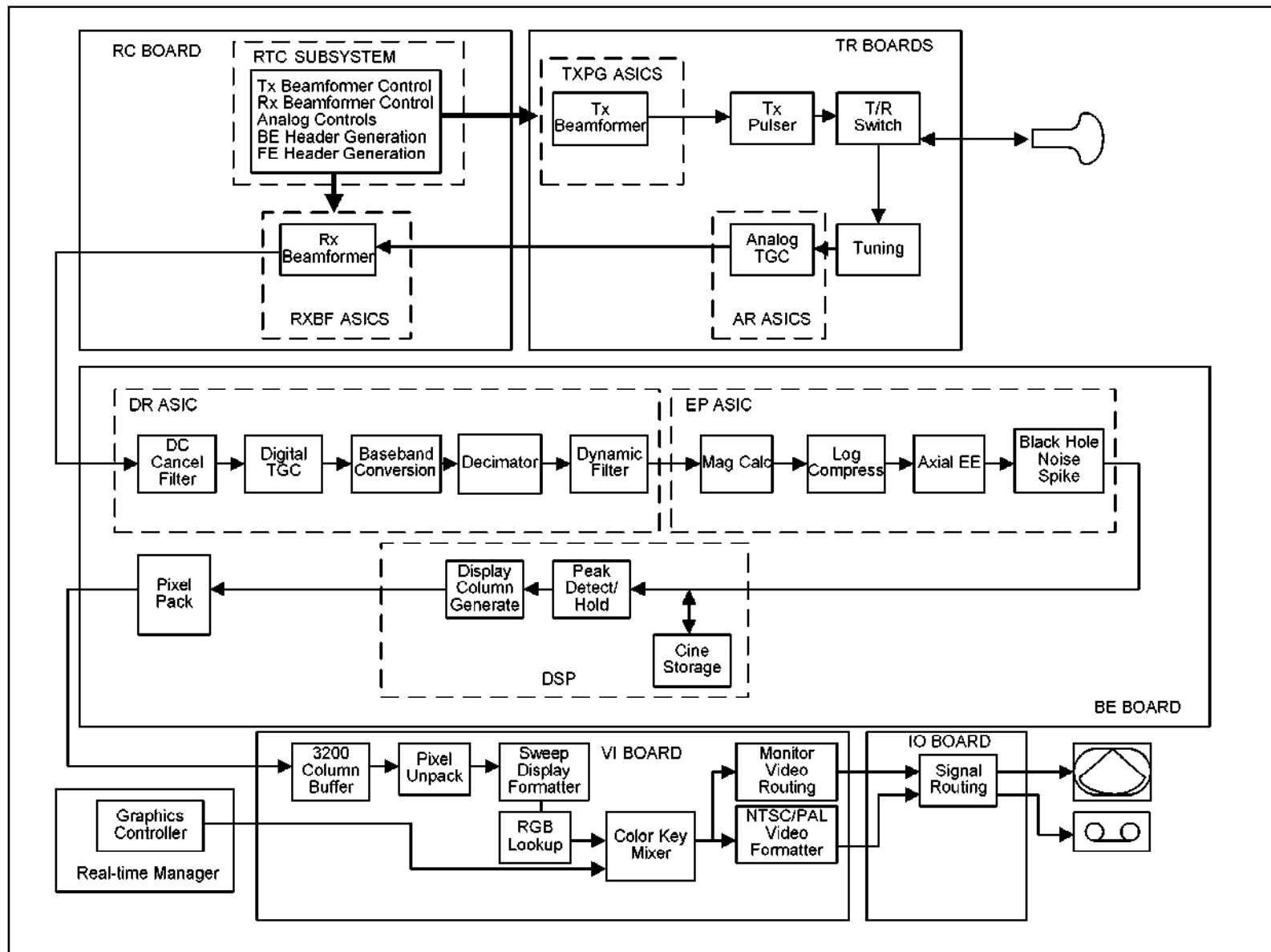
Flow of signals in 2D mode



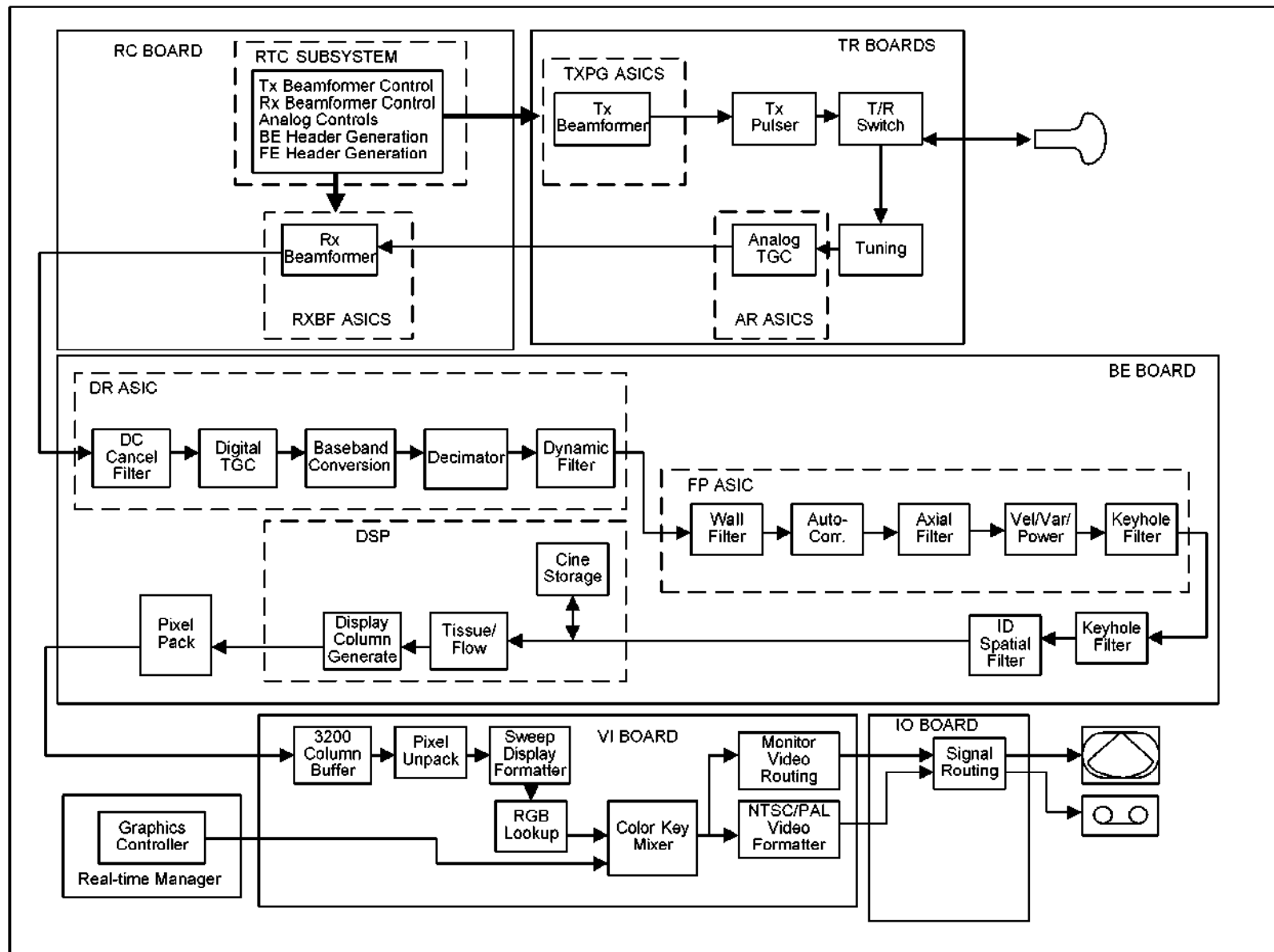
Flow of signals in CDI (B) mode



Flow of signals in PWD mode



Flow of signals in M mode



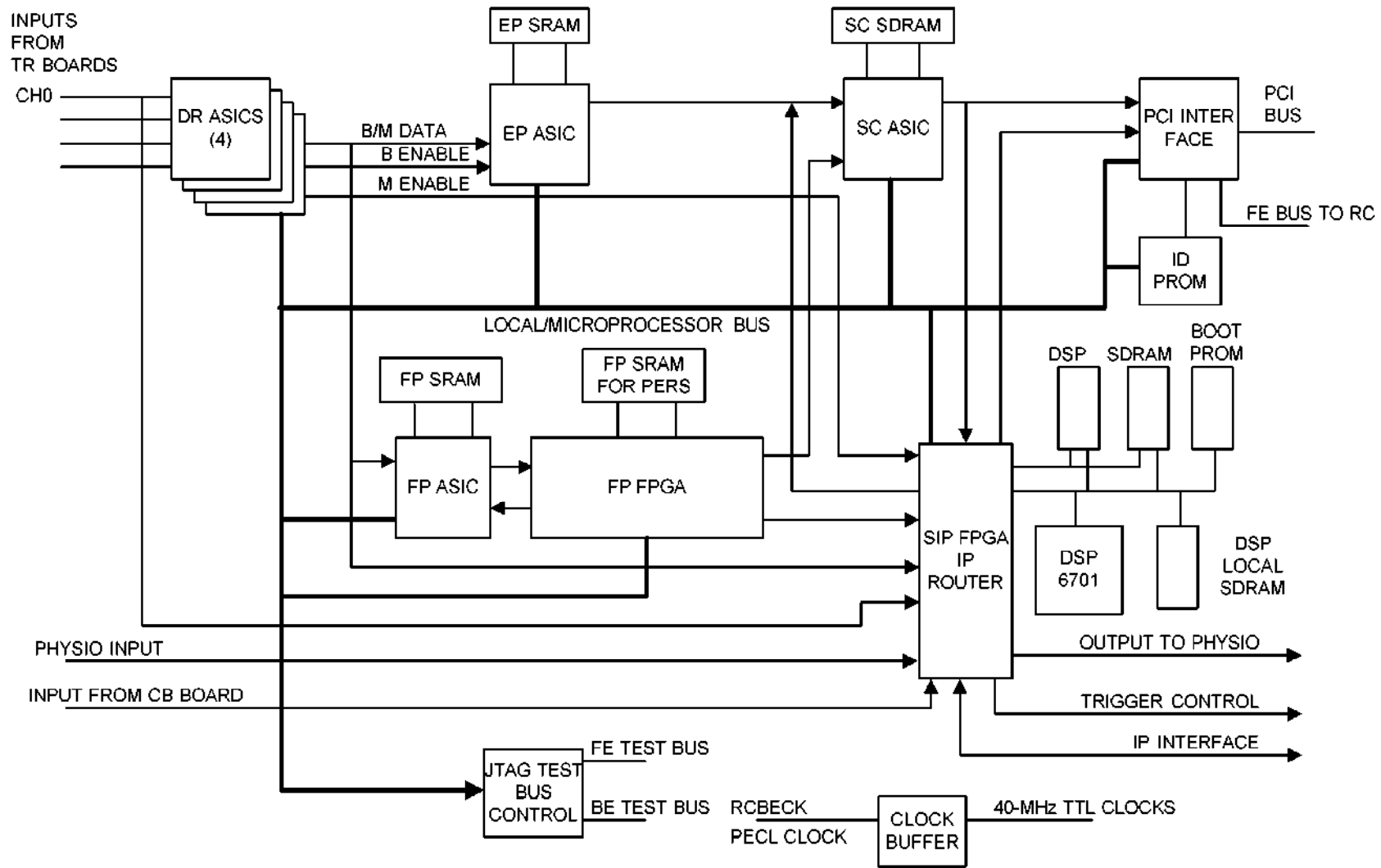
Flow of signals in MCDI mode

(4) Equivalent units in the PV series

This board is equivalent to the following boards in the PV series.

- RECEIVER board in the T&R digital unit
- DOP-IO board in the Doppler unit
- DOP-PROC board in the Doppler unit
- DOP-CONT board in the Doppler unit
- DOP-ADAP board in the Doppler unit
- BDSC board in the DSC unit
- IM board in the DSC unit
- CDSC board in the DSC unit





Block diagram of the BE board

(5) Block diagram

#### 4.2.2 VI (Video Interface)

##### (1) Outline

The VI (Video Interface) board manages the system images from the BackEnd (BE) board, overlay graphics from the Realtime Manager (RM) board, and routes the system monitor video signal to the IO board. The VI also processes the NTSC/PAL video signals in order to support external OEM devices. The VI manages the system audio and controls audio I/O to external devices.

##### (2) Functions

The functions implemented by the VI are outlined below:

- Video processor display manager (ASIC)
- Video processor image formatter (FPGA)
- System video display mode control
- Variable video resolution control
- Bidirectional scaling engine for NTSC/PAL
- SVGA RGB encoding for system monitor
- NTSC/PAL video decoding
- NTSC/PAL video encoding
- Simultaneous S-video, composite, and RGB analog output for NTSC/PAL
- System audio control (I/O select, volume/tone control, LPF, HPF, etc.)
- Doppler audio D/A conversion
- System power supply control and status check
- 64 bit, PCI bus interface
- JTAG boundary scan interface

## (3) Explanation of the block diagram

The figure on the next page shows the top-level functional block diagram of the VI board.

There are two separate PCI master/target devices on the VI board. One is the VPDM (video processor display manager) ASIC and the other is the VPIF (video processor image formatter) decoder FPGA. Each PCI master/target interface in the devices supports 64-bit address/data transactions at a 33-MHz bus speed. The PCI bus allows the VPDM to receive image data (e.g. 2D images, Doppler traces, ECG waveforms, etc.) from the BE board. It also allows both the VPDM ASIC and the decoder FPGA to communicate with each other.

The digital SVGA link from the graphics subsystem of the RM to the VI carries 24-bit RGB data for the CPU overlay graphics and horizontal and vertical synchronization signals. The RM also sends the pixel clock signal to the VI, which is synchronized with the RGB data.

The VPDM drives the system monitor through a triple 8-bit video DAC to display ultrasound images with superimposed overlay graphics. The maximum resolution supported will be 800x600 at a non-interlaced vertical refresh rate of 60 Hz for NTSC systems and 75 Hz for PAL systems.

The 16-bit data bus from the VPDM to the VPIF encoder FPGA carries 16-bit YCbCr (4:2:2) non-interlaced video data with a resolution of 800x600 pixels. The VPDM sends video data that contains the video information displayed on the system monitor to the VPIF, where the data is converted to the NTSC/PAL image size and format and is then routed to the IO board.

The NTSC/PAL video encoder receives image data in the 4:2:2 YCbCr format from the VPIF encoder FPGA and converts it to analog signals for an external monitor or a VCR. The output analog signals are Y and C, color composite and RGB components.

The NTSC/PAL video decoder converts analog Y/C signals from an external video device to image data in the 4:2:2 YCbCr format. Hsync, Vsync, field ID, and blanking information are included in the data stream. In VCR playback mode, the decoded VCR video data is scaled up and converted to non-interlaced video data in the VPIF decoder FPGA and is then sent to the VPDM via the PCI bus.

The system audio control block provides input/output audio source select, volume and tone control, test tone generation, crossover networks, and audio D/A conversion.

## (4) Equivalent units in the PV series

The functions of this PWB are equivalent to those performed by the RGB-CONV and TV-PROC in the PV series.

## (5) NTSC/PAL encoder interface

The "encoder" interface block refers to the external digital video encoder part used to generate NTSC/PAL analog video signals. The 16 bit YCbCr data is converted into the CCIR-601 4:2:2 8-bit digital video format, including synchronization codes. This block also outputs discrete blanking, hsync, and vsync signal for diagnostics. The digital video output from the encoder FPGA includes additional blank lines and pixels in order to avoid problems with overscan in playback monitors. The NTSC timing is shown in the following table.

Table: External NTSC

Parameter	Pixel clock cycles	Time
Pixel clock	1	74.07 ns (13.5 MHz)
Line active	692	63.556 $\mu$ s 81%
Line FP	28	2.074 $\mu$ s
Line sync	64	4.74 $\mu$ s
Line BP	74	5.48 $\mu$ s
Line blanking	166	12.296 $\mu$ s
Line time	858 (H)	63.556 $\mu$ s 15.7 kHz
Line average data rate	0.53 Bytes/(40.5 MHz cycles)	
Vertical active	234.5 H	14.904 ms 89% active
Vertical FP	10 H	0.635 ms
Vertical sync	3 H	0.190 ms
Vertical BP	15 H	0.953 ms
Vertical blanking	28 H	2.22 ms
Field time	262.5 H (225,225 13.5 MHz clocks)	16.683 ms 59.94 Hz 72% active
Frame time	525 H (450,450 13.5 MHz clocks)	33.36 ms 29.97 Hz 72% active
Image size	324,548 pixels	

Detailed vertical timing for NTSC mode is defined in the following table, with the 525 total lines numbered from 0 to 524. This format included more blanked lines than the NTSC specification in order to avoid problems with overscan in external monitors.

Table: NTSC vertical line timing

First line	Last line	Line count	Function
523	20	23	Blanked lines per PAL specification.
21	23	3	Extra blanked lines.
24	258	235	<b>Active lines, even field</b>
259	260	2	Extra blanked lines.
261	282	22	Blanked lines per PAL specification.
283	286	4	Extra blanked lines.
287	520	234	<b>Active lines, odd field</b>
521	522	2	Extra blanked lines.

Timing for PAL signal generation is shown in the following table.

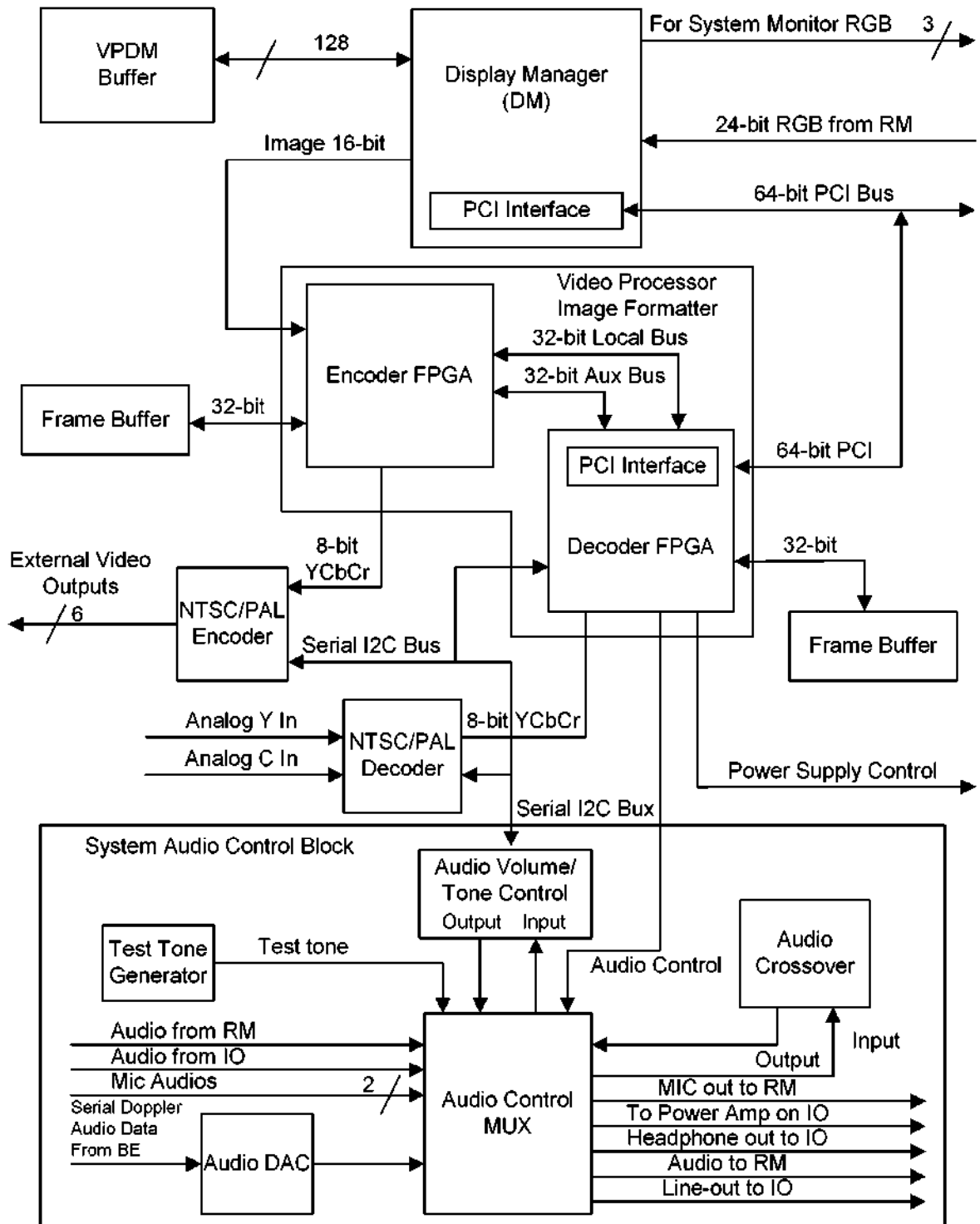
Table: External PAL

Parameter	Pixel clock cycles	Time
Pixel clock	1	74.07 $\mu$ s (13.5 MHz)
Line active	688	50.963 $\mu$ s 80% active
Line FP	34	2.519 $\mu$ s
Line sync	64	4.74 $\mu$ s
Line BP	78	5.78 $\mu$ s
Line blanking	176	13.037 $\mu$ s
Line time	864 (H)	64 $\mu$ s 15.625 kHz
Vertical active	282.5 H	18.08 ms 90% active
Vertical FP	6 H	0.384 ms
Vertical sync	2.5 H	0.160 ms
Vertical BP	21.5 H	1.376 ms
Vertical blanking	30 H	1.92 ms
Field time	312.5 H (270,000 13.5 MHz clocks)	20 ms 50 Hz 72% active
Frame time	525 H (540,000 13.5 MHz clocks)	40 ms 25 Hz 72% active
Image size	388,720 pixels	

Detailed vertical timing for PAL mode is defined in the following table, with the 625 total lines numbered from 0 to 624. This format included more blanked lines than the PAL specification in order to avoid problems with overscan in external monitors.

Table: PAL vertical line timing

First line	Last line	Line count	Function
623	21	24	Blanked lines per PAL specification.
22	24	3	Extra blanked lines.
25	307	283	<b>Active lines, even field</b>
308	309	2	Extra blanked lines.
310	334	25	Blanked lines per PAL specification.
335	338	4	Extra blanked lines.
339	620	282	<b>Active lines, odd field</b>
621	622	2	Extra blanked lines.



VI board functional block diagram

### 4.2.3 RM (Realtime Manager)

#### (1) Outline

This PWB contains the host CPU whose main function is to activate the software. This PWB also includes the external memory unit I/F such as that for the HDD and the input/output I/Fs such as those for SCSI, Ethernet, and USB.

#### (2) Composition

##### (a) CPU and chip set

The two Intel Pentium III processors are mounted. The CPU functions as a dual-CPU board. The Intel840 chip set is used to control this PWB.

##### (b) Main memory

Up to four Rambus memory modules can be mounted.

##### (c) Graphics card

The graphics card connected by the 4X AGP I/F outputs various graphics and characters as 24-bit digital RGB signals. These graphics and characters are combined with the ultrasound image in the VI board and then displayed on the monitor.

##### (d) Audio card

This performs recording and playback for various audio signals.

##### (e) I/Fs

The I/F controller functions listed below are provided. The I/Fs are connected to each device via the BP board.

- PCI : Connected to the BE and VI boards in the 64-bit PCI bus through the PCI bridge. (A 32-bit PCI bus is connected internally.)
- IDE : Supports the UltraDMA66 and is used for connection to the HDD.
- SCSI : Supports the Ultra Wide SCSI and is used for connection to the CD-R and MO drives.
- USB : Used for connection to the control panel and external USB devices.
- Ethernet : Supports 10/100 Base-T Ethernet.



### (3) LEDs

The following five LEDs are provided at the free edge of the PWB in order to indicate the PWB status.

- PWR (green) : Monitors the power supply status and lights when the power is ON.
- BOOT OK (green) : Lights when the boot process is completed normally after the self-test function (POST function) when the power is turned ON.
- BIOS ERR (amber) : Lights when an error is detected by the POST function.
- IDE ACT (amber) : Lights when an IDE device (HDD) is accessed.
- SCSI ACT (amber) : Lights when the SCSI device is accessed.

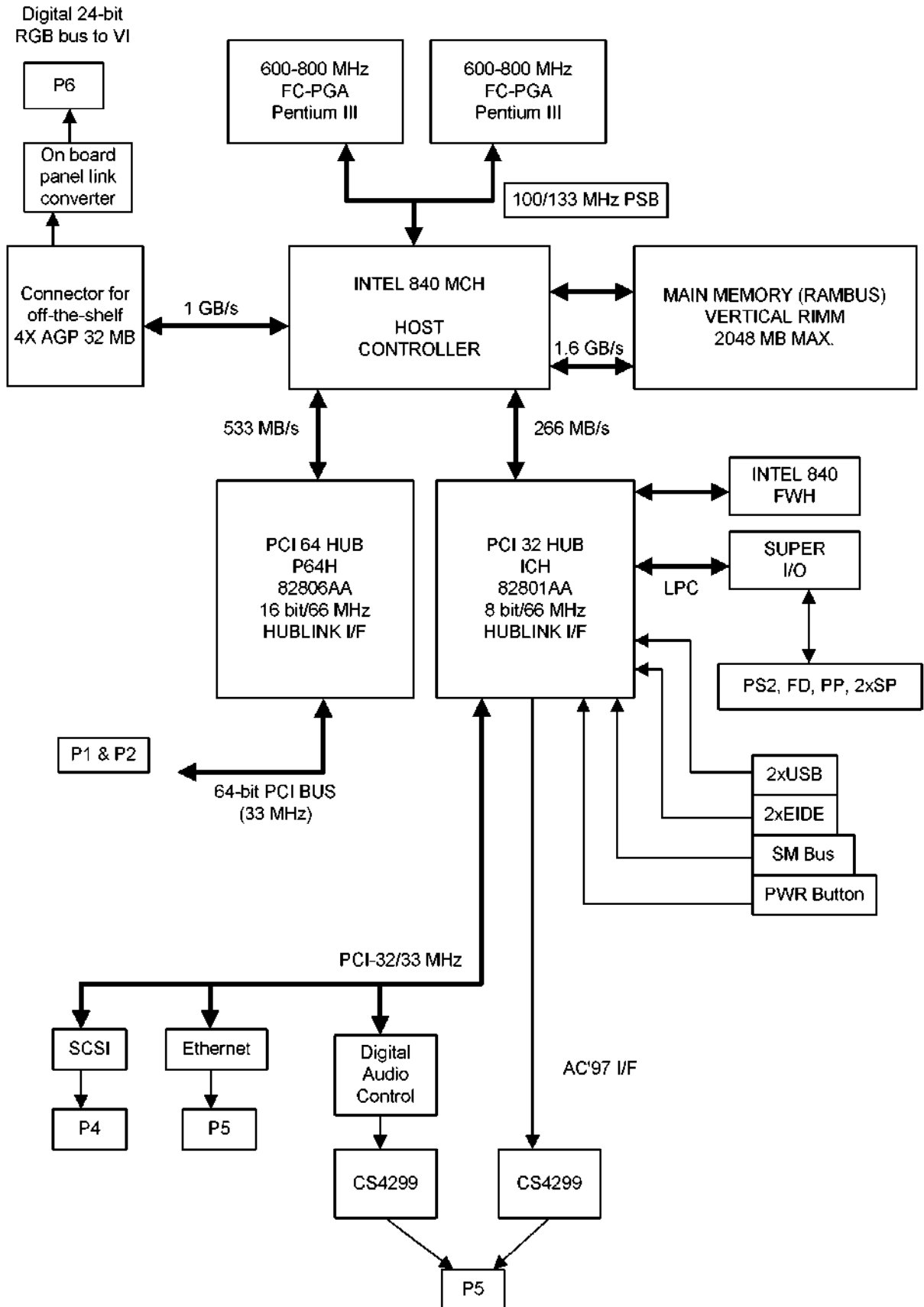
### (4) Jumper setting

When this PWB is used, the following three jumpers are set.

- WE\_BB : BIOS boot block write enable jumper (No jumper installed.)
- FRC\_REC : BIOS force recovery jumper (No jumper installed.)
- SPL\_SCR : BIOS boot logo select jumper (Jumper always installed.)

### (5) Equivalent units in the PV series

This PWB is equivalent to the CPU board in the PV series.



Block diagram of the RM

4.2.4 IQDAS (IP)

<introduction>

IP PWB is included in UIIP-770A

Part No. : PM30-32120-1

Part Name : IQDAS PWB (IQDAS stands for IQ Data Acquisition)

Requirements : Aplio on & after V4.00

<Circuit blocks>

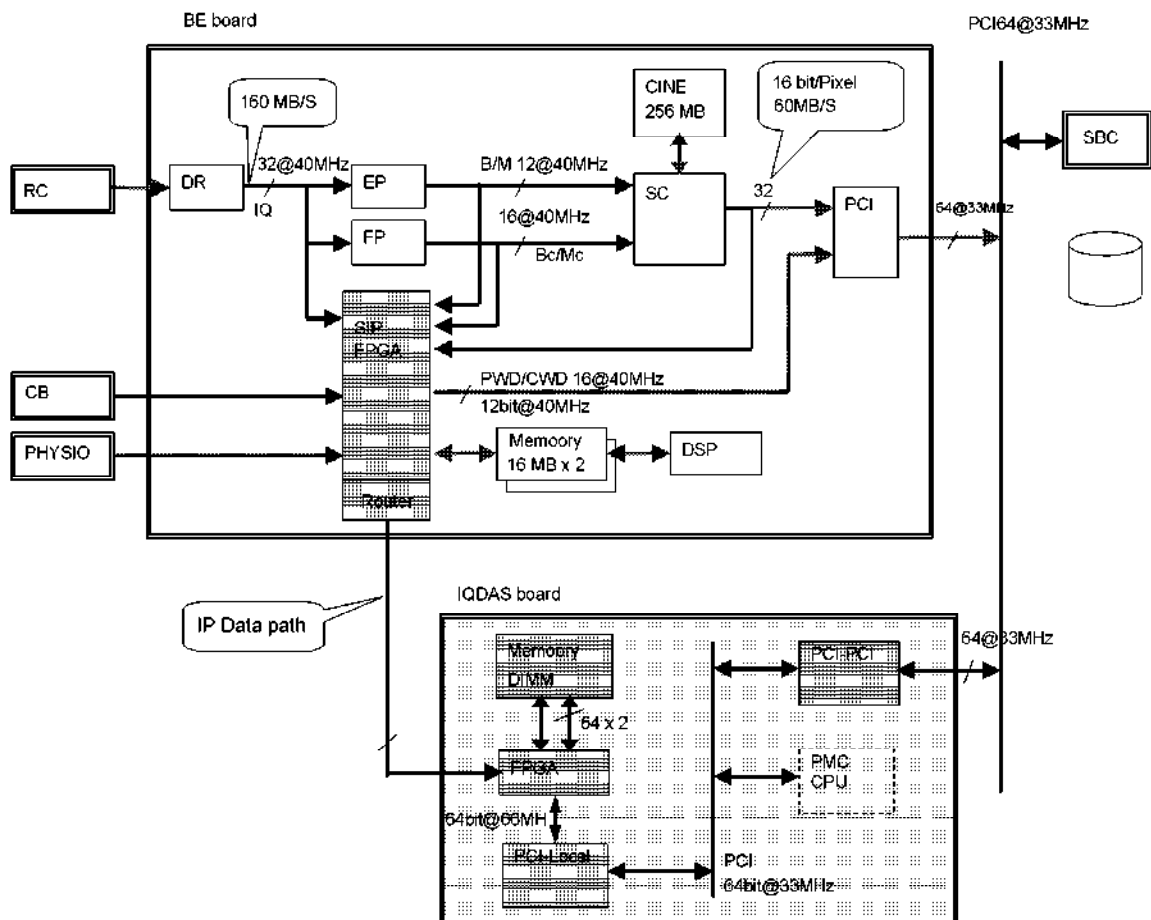
- 1) Data-IF section (between BE PWB)
- 2) Capture memory section
- 3) Temporary storage memory section
- 4) DMA Controller section
- 5) PCI-IF section

<Outline of circuit functions>

This board takes IQ (In Phase, Quadrature Phase) data or IM (Image Memory) data output from BE PWB SIP section into capture memory with real time by memory R/W control FPGA.

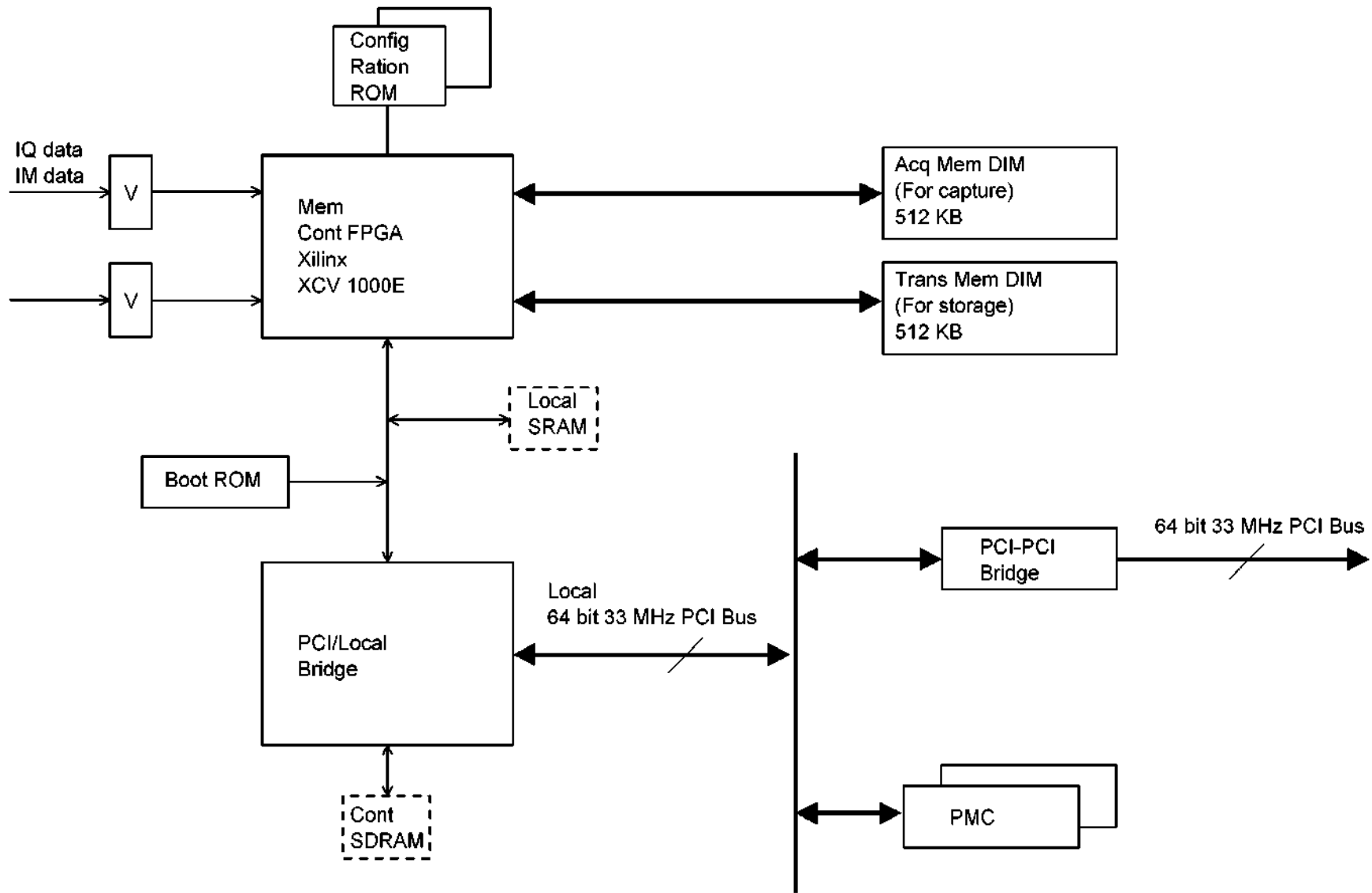
It is possible to store the particular part of taken data into the temporary storage memory. Because of this temporary storage memory, it is possible to continue capturing data without stopping examination finished, several captured data in the temporary storage memory is transferred to the system memory by DMA via PCI bus.

<Block diagram>



## &lt;&lt;Circuit functions&gt;&gt;

Functional Block	Major Function
Back Plane CNN	Connector with APLIO main unit
PCI-PCI Bridge	IP board is connected with Aplio via PCI bus. There is PCI-PCI Bridge on IP board for separate PCI bus inside IP board.
PCI-LOCAL Bridge	The Interface device between IP board internal PCI bus and Local bus.
LOCAL SRAM	The working RAM for PCI-Local bridge device.
BOOT ROM	IP board information is stored in this ROM.
DIMM memory for data capture	The memory to capture IQ data or IM data in real time 512 MB DIMM memory
Temporary data storage memory (DIMM)	Temporary data memory; data taken from the above DIMM memory 512 MB DIMM memory
DATA INPUT	IQ data/IM data input buffer (only Buffer)
FPGA	Capture memory, Temporary storage memory Read/Write control, DIMM initialization, Refresh function, Interrupt function
CONFIG ROM	Configuration ROM for FPGA
CLOCK DRIVER	IP board basic clock generator (33 MHz oscillator) Making 66 MHz from 33 MHz (40 MHz from BE)
PWB RESET	IP board local reset
DIP SW	Several hardware settings: Do not change the original settings S10 : for PCI-Local Bridge device IC initial setting S4 : for PMC interrupt S5 : for PCI/PMC (future use) settings S7 : for FPGA settings S9 : for FPGA ROM/SDRAM settings S6 : for PROM_FPGA JTAG settings S2/S3 : for Clock driver settings S1 : board Reset UXS11 : FPGA configuration switch
Power supply circuit	3.3 V 2.5 V 5 V



IQDAS Board Function Block Diagram

## 4.3 System-Related Boards

### 4.3.1 I/O

#### (1) Outline

The I/O board connects with various I/O devices (VCR, HDD, etc.) located both inside and outside the system and the BP (Back Plane board) and transmits signals and power between them. In addition, appropriate cable connections are provided using the required shields and decoupling in order to meet EMI, RFI, and ESD requirements.

#### (2) Functions

The following functions are provided.

##### (a) Power

Power is supplied to external units such as the control panel, Physio module, microphone, EIDE unit (HDD), and USB port.

##### (b) Video

System monitor output, S-Video input/output, RGB output, and C-Video output from the VI board are performed.

##### (c) Audio

The following signals are output from the VI board.

- Speaker audio output and headphone audio output.
- Microphone audio output.

##### (d) Speakers

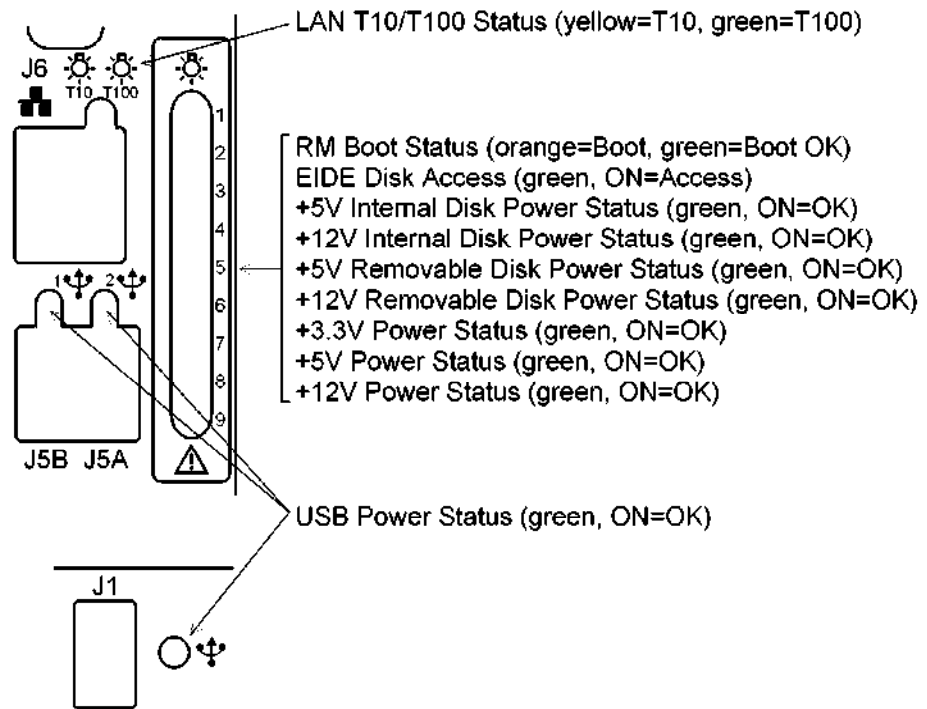
The system speaker signals from the VI board in the audio power amplifier are output to the system speakers (one pair of tweeters and one pair of woofers).

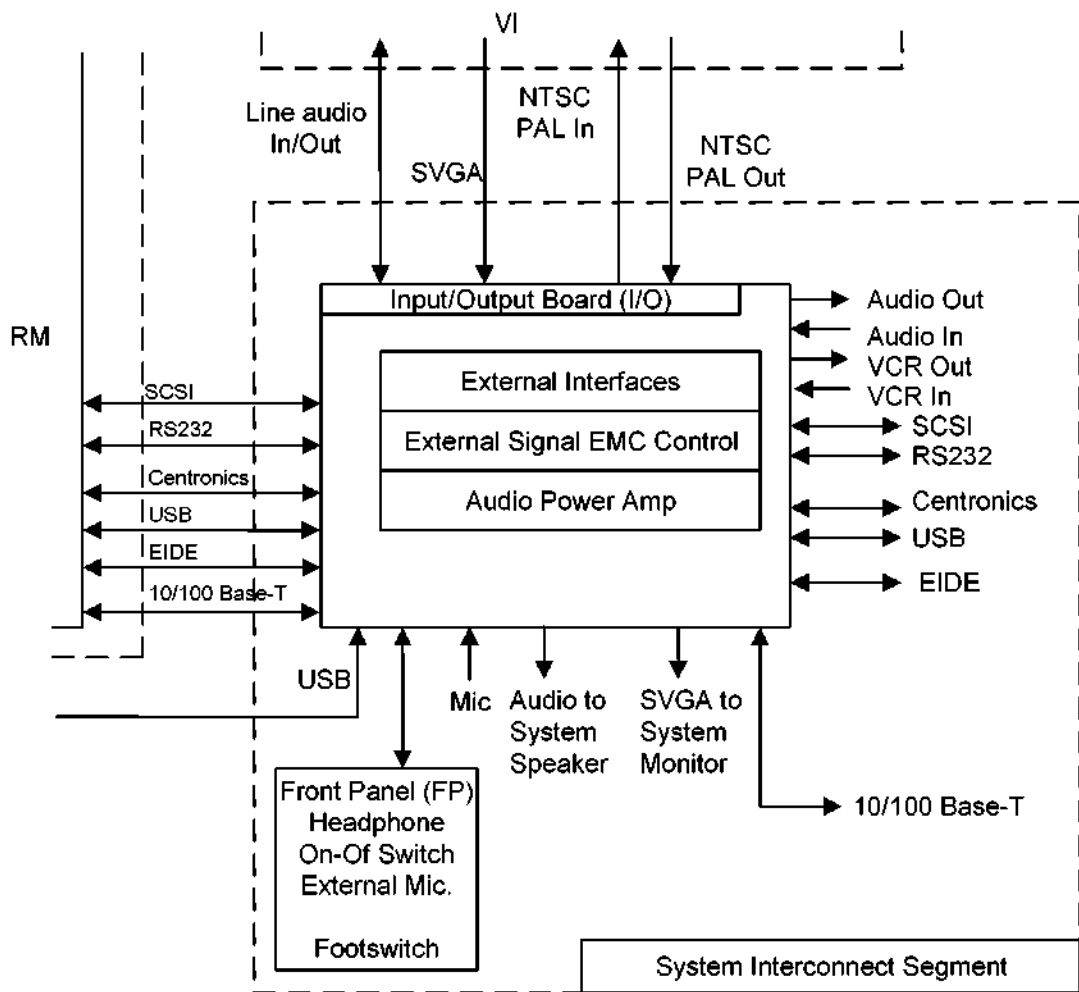
##### (e) Communication/control

The following interface functions are provided.

- USB hub and ports
- System reset signal input
- Front panel (for the user) and rear panel interfaces
- EIDE hard drive
- SCSI/RDD
- EthernetT10/100
- Serial port (COM1)
- Parallel port (IEEE1284)
- Status LEDs

(3) Statuses indicated by the status LEDs





IO board block diagram



#### 4.3.2 Front panel

##### (1) Outline and functions

The signals and power (+12 V/+5 V) from the IO board are transmitted to this panel and are output to the operating panel, CNN for the footswitch, and removable disk drive. Also, headphone, microphone, and shutter input terminals are mounted.

For details of the connections, refer to section 9.

#### 4.3.3 Rear panel

##### (1) Outline and functions

The output signals for the external devices from the I/O board are transmitted to this panel. Also, an Ethernet terminal, a USB terminal (2CH), a C-Video output terminal, an S-Video output terminal, and a RESET switch are mounted.

For details of the connections, refer to section 9.

## 5. OPERATING PANEL

### (1) Outline

Data communication with the main unit is performed using several signal lines and one USB cable. The USB-HUB is inside the control panel. The functions of this panel are executed independently via this HUB. +3.3-V, +5-V, and +12-V power supplies are used.

### (2) Descriptions of functions and operation

The functions related to USB connection are described below.

#### (a) CARD-PC section (RS-232C connection to the USB via a USB/serial conversion chip)

- Displays menus on the TCS display by transmitting data from the main unit.
- Converts information input by touch keys to information for switches on the TCS menu and transfers them to the main unit.

#### (b) SUB-CPU section (RS-232C connection to the USB via a USB/serial conversion chip)

- Transfers information input by various switches (other than the POWER switch) to the main unit.
- Transfers information via the rotary encoder.
- A/D-converts the rotary VR and STC sliding VR analog data and transfers them as digital information to the main unit.
- Transfers information input by the footswitch to the main unit.
- Lights and extinguishes various LEDs by transmitting data from the main unit.
- Sounds the buzzer when the switch is pressed by transmitting data from the main unit.

#### (c) Keyboard section (USB connection)

- Transfers the data input by the keys on the keyboard.

#### (d) Trackball section (USB connection)

- Transfers the information input by the trackball to the main unit. Note, however, that LED lighting and the dial section (encoder) are controlled by the sub CPU.

The following operations are implemented and controlled using signal lines. They cannot be performed inside the panel.

#### (e) Control of the POWER switch and LED lighting

#### (f) Control of STANDBY LED lighting

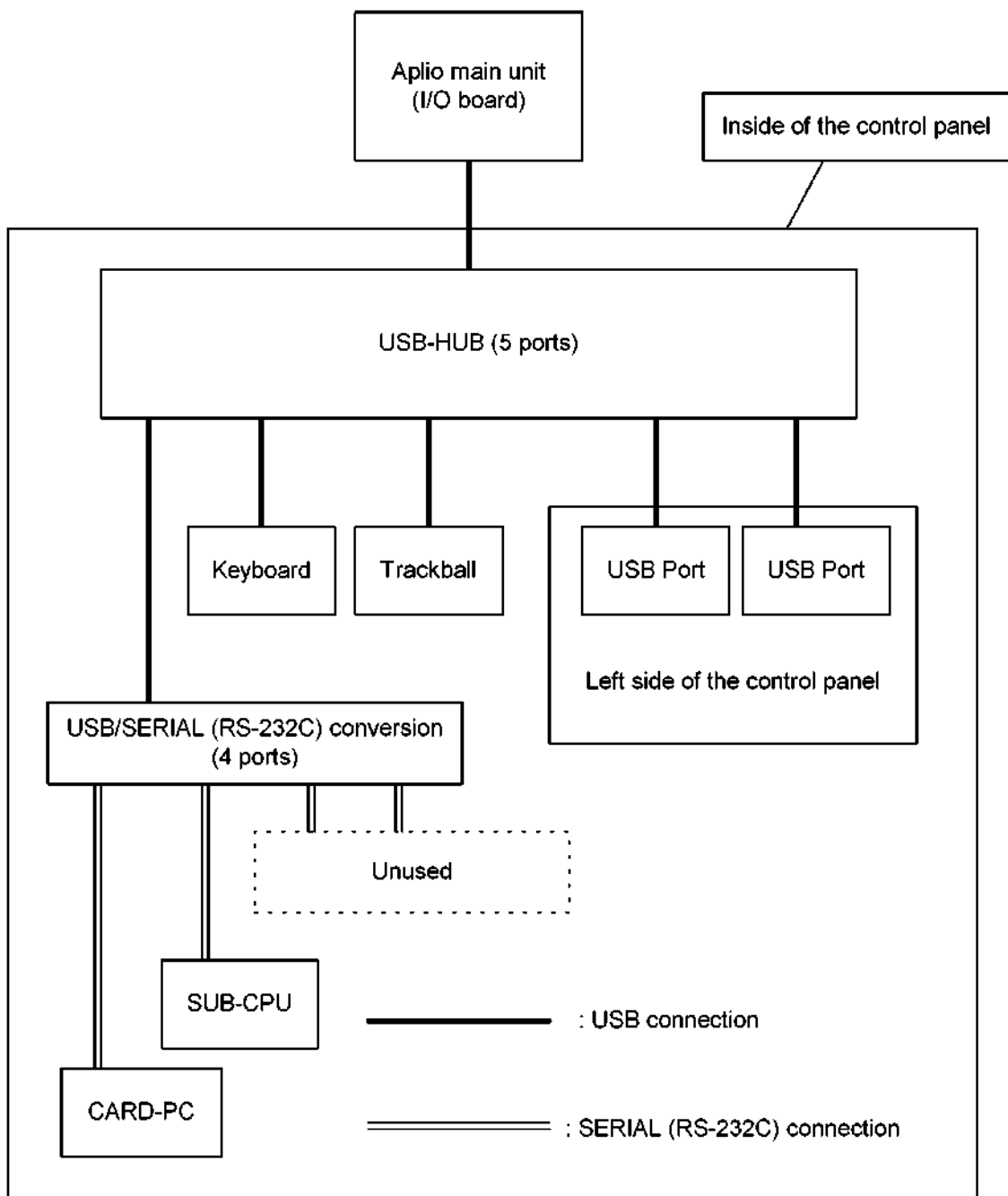
(3) Additional terms

**TCS** : Touch Command Screen. This module integrates the touch keyboard with the LED screen. The 10.4-inch LED has 640 x 480 pixels.

**CARD-PC** : This module integrates the CPU, RAM, and video controller functions.

**USB-HUB** : There is one USB cable from the main unit. However, the USB-HUB inside the control panel has five ports. Two of these are connected to the USB ports in the left side of the control panel. These USB ports can be used for connecting external USB devices. However, if the USB devices do not have external power sources, the total consumption currents for the devices connected to the two ports must not exceed 150 mA.

(4) USB connection diagram

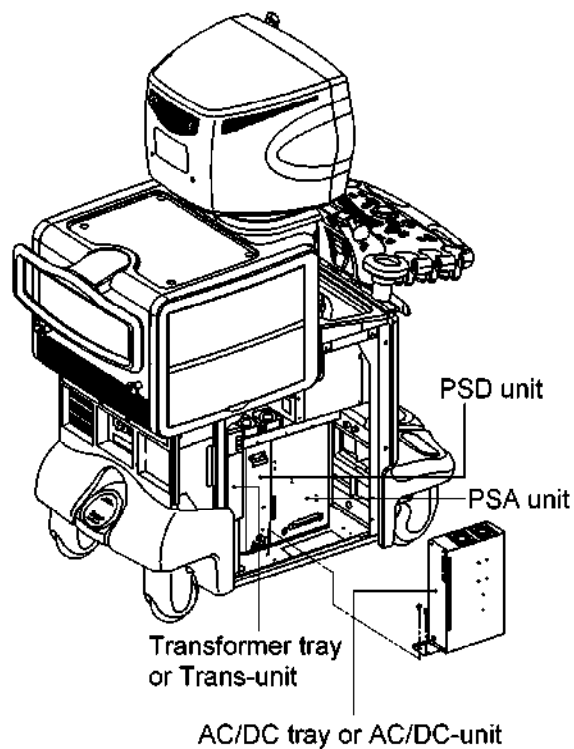


## 6. POWER SUPPLY UNIT

### 6.1 Power Supply Unit Configuration

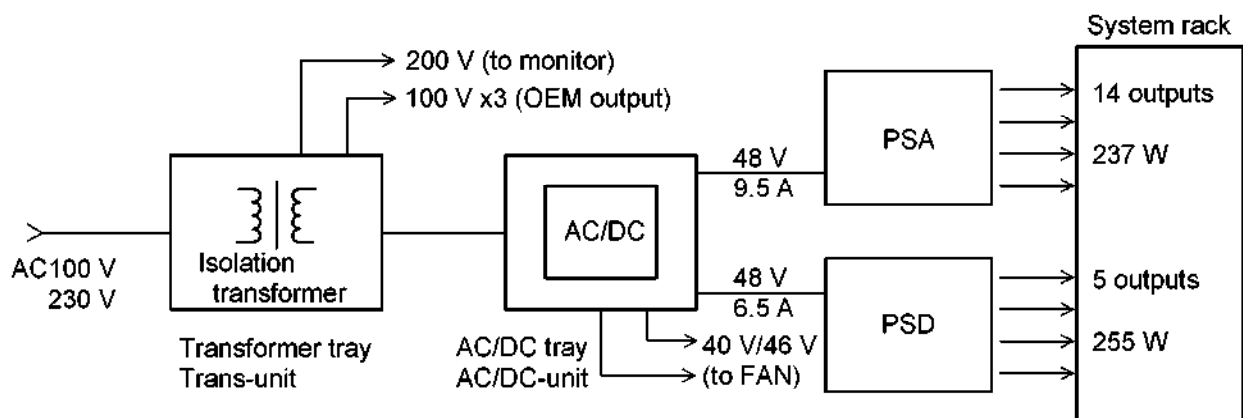
The power supply unit of this system consists of the following four units.

- (1) Transformer tray (SSA-770A)  
Trans-unit (SSA-700A)
- (2) AC/DC tray (SSA-770A)  
AC/DC-unit (SSA-700A)
- (3) PSA unit
- (4) PSD unit



### 6.2 Block Diagram of the Power Supply Unit

The block diagram of the power supply unit of this system is shown below.



## 6.3 Unit Specifications

## (1) Line voltage

100-V system 90 to 132 VAC : 49 to 61 Hz  
 230-V system 198 to 264 VAC: 49 to 61 Hz

## (2) Power consumption

1500 VA max

## (3) Output voltage

Transformer tray Trans-unit	OEM output	Output voltage 1:1	
		Total 250 VA (when 100 VAC is input)	
		360 VA (when 120 to 230 VAC is input)	
	MONITOR output	200 VAC	
AC/DC tray (SSA-770A)	PSA	+48 ±1 VDC	9.5 A
	PSD	+48 ±1 VDC	7.2 A
	FAN	+46 ±1 VDC	0.8 A (for high-speed rotation)
		+40 ±2 VDC	1 A (for low-speed rotation)
	Battery charging	+5.6 ±0.3 VDC	1 A
	ACRMVRS	+5.0 ±0.2 VDC	0.35 A
	ACRMMSV	+5.0 ±0.2 VDC	0.05 A (AC on)/0.70A (AC off)
AC/DC-unit (SSA-700A)	PSA	+48 ±1 VDC	11 A max
	PSD	+48 ±1 VDC	8 A max
	FAN	+48 ±1 VDC	1.2 A
	Battery charged	+5.6 ±0.3 VDC	1 A
	ACRMVRS	+5.0 ±0.2 VDC	0.35 A
	ACRMMSV	+5.0 ±0.2 VDC	0.05 A (AC on)/0.70A (AC off)
PSA unit	M2.0AQ	-2.10 VDC	20.0 A
	P3.3A	+3.30 VDC	6.5 A
	P3.3AQ	+3.45 VDC	23.0 A
	P5A	+5.00 VDC	0.60 A
	P5AQ	-5.00 VDC	5.20 A
	P7A	+7.00 VDC	1.10 A
	M9.6A	-9.60 VDC	0.94 A
	P14AQ	+14.2 VDC	1.50 A
	M14AQ	-14.2 VDC	1.50 A
	P100HV	+100 VDC	0.05 A
	M100HV	-100 VDC	0.05 A
	EBN	-3.00 VDC	1.50 A
		Variable control voltage	
	VTX0	+0.125 to 18.0 VDC	20 A/40 W
	VTX1	+0.125 to 18.0 VDC	20 A/40 W
PSD unit	P2.5D	+2.575 VDC	24.2 A
	P3.3D	+3.40 VDC	18.1 A
	P5D	+5.10 VDC	15.7 A
	P12D	+12.0 VDC	5.00 A
	M12D	-12.0 VDC	3.30 A

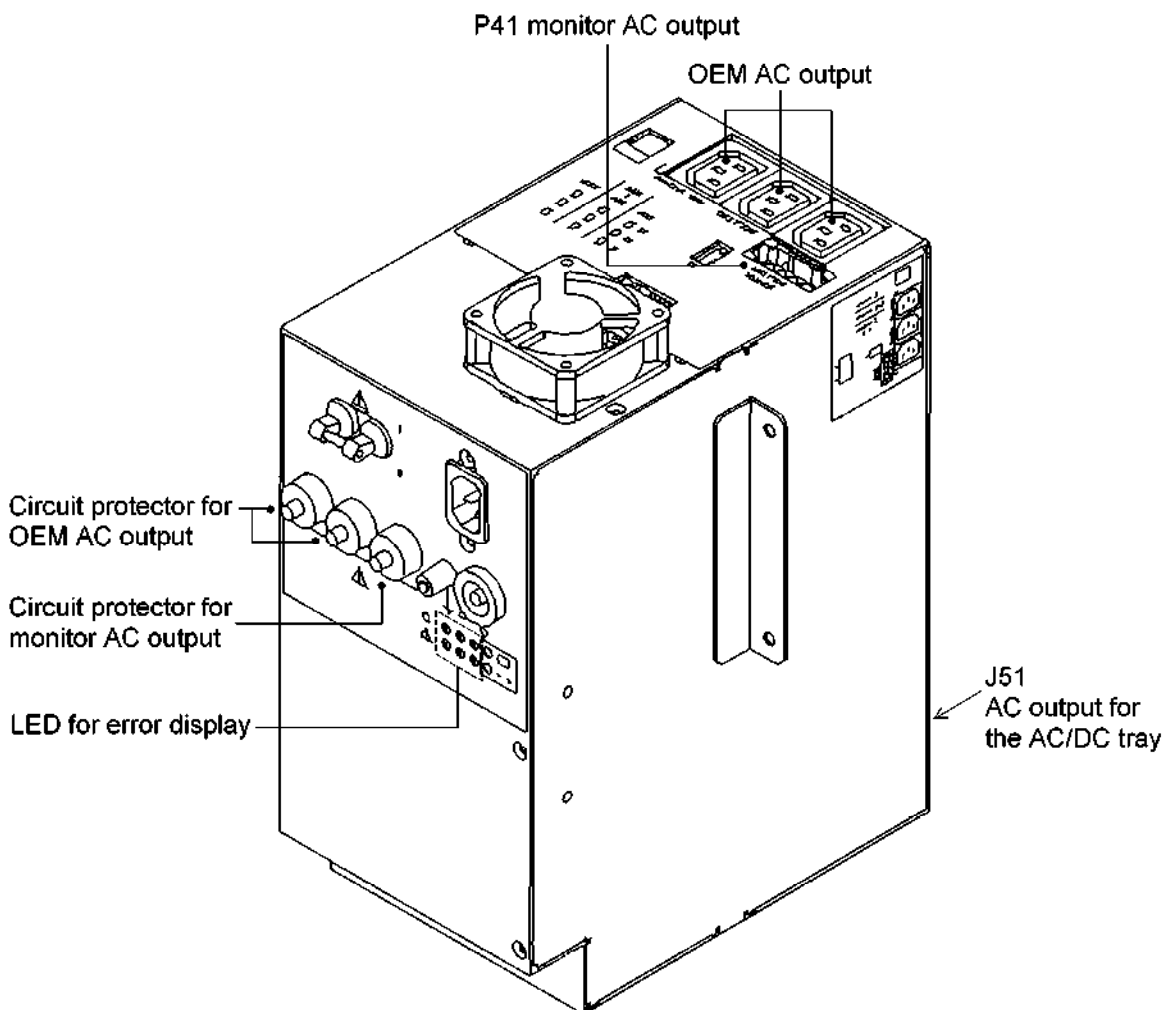
## 6.4 Transformer Tray

### (1) Outline

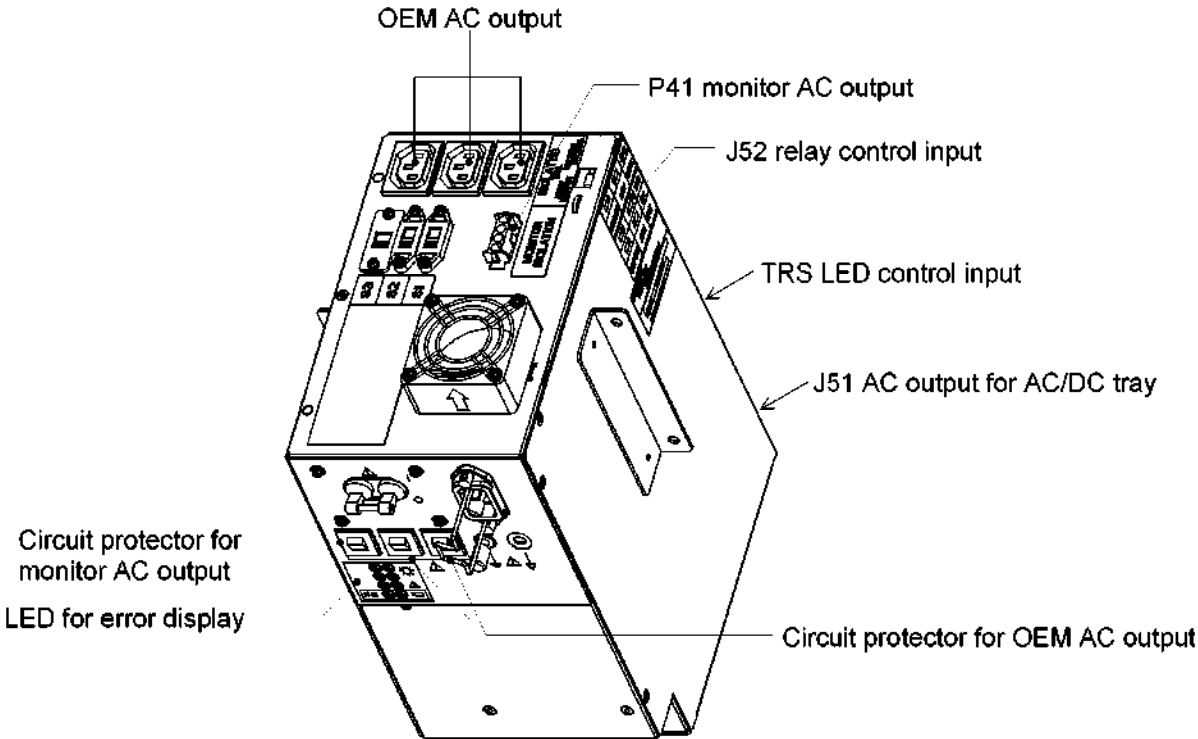
This unit has the following functions.

- (a) Isolation from the commercial power supply (isolation transformer)
  - (b) Input voltage switching (transformer tap changer)
  - (c) Power supply output to the optional units (OEM AC output)
  - (d) Power supply output to the monitor (P41)
  - (e) Power supply output to the AC/DC tray (J51)
  - (f) LED for error display
- (2) The figure shown below is the drawing of the transformer tray (SSA-770A) and Trans-unit (SSA-700A).

<<Transformer tray>>



<<Trans-unit>>

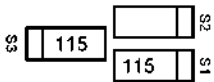


**CAUTION:** Voltage setting for replacing the transformer tray and TRANS-unit

The switches used to select the output voltage according to the input voltage are installed on the transformer tray and the TRANS-unit. When the switches of the replacement units (transformer tray and TRANS-unit) are not set correctly, the power supply may not start up correctly, or a malfunction of the connection equipment may result. Be sure to check the settings.

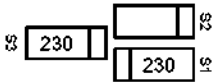
**For the transformer tray**

100 to 120 VAC



"115" must be displayed on S1 and S3.  
The direction of S2 must be the same as that of S1.

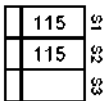
230 VAC



"230" must be displayed on S1 and S3.  
The direction of S2 must be the same as that of S3.

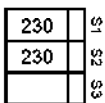
**For the TRANS-unit**

100 to 120 VAC



"115" must be displayed.  
"115" must be displayed.  
The direction must be the same as that of S1 and S2.

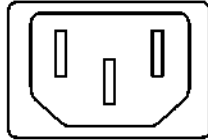
230 VAC



"230" must be displayed.  
"230" must be displayed.  
The direction must be the same as that of S1 and S2.

(3) Description of each connector

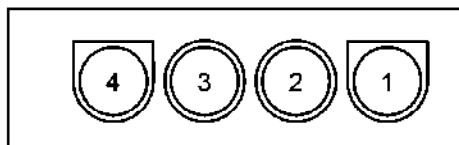
(a) OEM AC output



Output voltage: Total of the three connectors 250 V (when 100 VAC is input)  
360 V (when 120 to 230 VAC is input)

**NOTE:** When the power supply of the system is turned ON, the relay in the transformer tray is turned ON by the relay control signal coming from the AC/DC tray and the AC output is also set to ON.

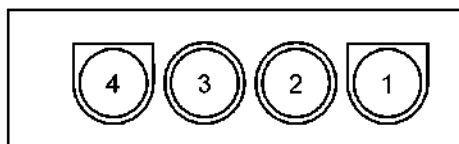
(b) P41 monitor AC output



PIN No.	Signal
1	180 VAC to 220 VAC
2	180 VAC to 220 VAC
3	Protective grounding (GND)
4	—

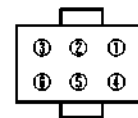
(c) J51 AC output for the AC/DC tray

<In the case of the transformer tray>



PIN No.	Signal
1	180 VAC to 220 VAC
2	180 VAC to 220 VAC
3	—
4	Protective grounding (GND)

<In the case of the Trans-unit>



PIN No.	Signal
1	78 VAC to 121 VAC
2	78 VAC to 121 VAC
3	78 VAC to 121 VAC
4	78 VAC to 121 VAC
5	Protective grounding (GND)
6	Protective grounding (GND)

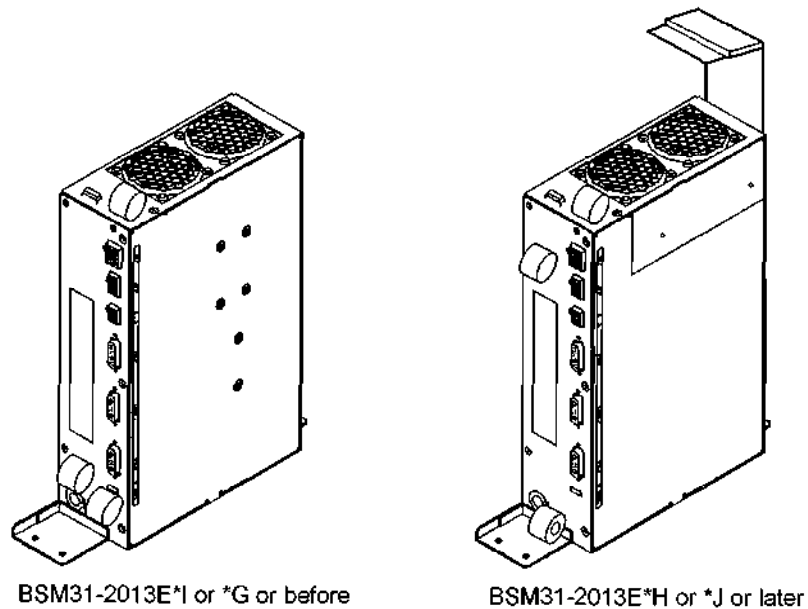


## 6.5 AC/DC Tray

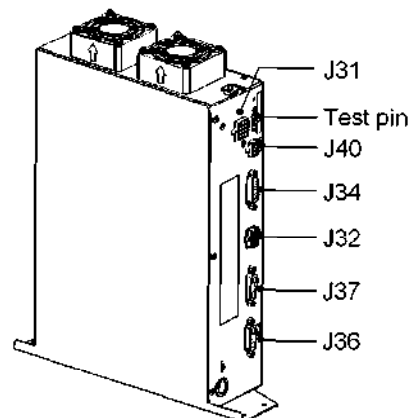
### (1) Outline

This unit has the following functions.

- (a) Power supply output to the PSA unit (J36)
  - (b) Power supply output to the PSD unit (J37)
  - (c) Power supply output to each unit fan (J31 and J32)
  - (d) Processing of error signals from each of the following units and error signal output to the system (J34)
    - PSA unit
    - PSD unit
    - Each fan sensor circuit
  - (e) Backup battery input for the memory of the RM board (J40)
- (2) The figure shown below is the drawing of the AC/DC tray. (SSA-770A)



- (3) The figure shown below is the drawing of the AC/DC-unit.



## 6.6 PSA/PSD Unit

## (1) Outline

The PSA/PSD unit is a DC/DC conversion-type multiple output power supply unit. This unit generates and supplies the DC power used to operate the system and the peripheral devices such as the system E/M (Electrical Module: electronic circuit board module), main panel, HDD, and FDD using the 48 VDC output from the AC/DC tray.

The PSA/PSD unit consists of two modules: the analog power supply unit PSA (Power Supply Analog), which supplies power to the analog front-end circuitry, and the digital power supply unit PSD (Power Supply Digital), which supplies power to the digital back-end circuitry and the peripheral devices.

## (2) Specifications

## (a) PSA

This is a multiple output power supply, including 12 fixed voltage outputs and 2 variable voltage outputs (14 outputs in total).

The output power (with the suffix "AQ") is supplied to the circuit handling echo signals in the system (such as the preamplifier) and therefore must have as low noise as possible. The variable output powers VTX0 and VTX1 (voltages for transmission) are used for transmission driving of transducers in the Aplio system and control the acoustic power emitted from the transducer directly. The Aplio system uses the dual pulser method and has two similar transmission drive pulsers. The two variable output powers VTX0 and VTX1, which have the same output characteristics, are supplied to the drive pulsers.

Output power name	Output voltage	Supply direction circuit	Output power name	Output voltage	Supply direction circuit
M2.0AQ	-2.10 V	Reception amplifier etc.	P14AQ	-2.10 V	Relay drive power supply
P3.3A	+3.30 V	F/E 3.3-V logic circuit etc.	M14AQ	+3.30 V	CB board -12-V circuit etc.
P3.3AQ	+3.45 V	Reception amplifier etc.	P100HV	+100 V	HVSW plus power supply
P5A	+5.00 V	F/E D/A circuit etc.	M100HV	-100 V	HVSW minus power supply
P5AQ	+5.00 V	Transmission predriver circuit etc.	EBN	-3.00 V	EchoBooster power supply
P7A	+7.00 V	CB board +5-V circuit	VTX0	+0.125 to 18.0 V	Pulser drive power supply
M9.6A	-9.60 V	CB board -5-V circuit	VTX1	+0.125 to 18.0 V	Pulser drive power supply

## (b) PSD

This is a multiple output power supply, including 5 fixed voltage outputs.

Some voltages are supplied to the digital circuit of the system back-end and others are supplied to the audio amplifier circuit and main panel.

Output power name	Output voltage	Supply direction circuit	Output power name	Output voltage	Supply direction circuit
P2.5D	+2.65 V	Rambus, BE-FPGA circuit etc.	P12D	+12.0 V	Main panel and audio Audio amplifier power supply
P3.3D	+3.40 V	AGP card, BE system I/F, FPGA etc.	M12D	-12.0 V	
P5D	+5.10 V	CPU, video DAC circuit etc.			

## (c) Control I/F

The analog differential signal CVTX for controlling the VTX voltage is supplied to the PSA through the BackPlane board from the RC board. Also, the ON/OFF control signal is supplied to the PSX from the AC tray and the PSX status signal I/F is supplied to the AC tray from the PSX.

## (3) Operational check

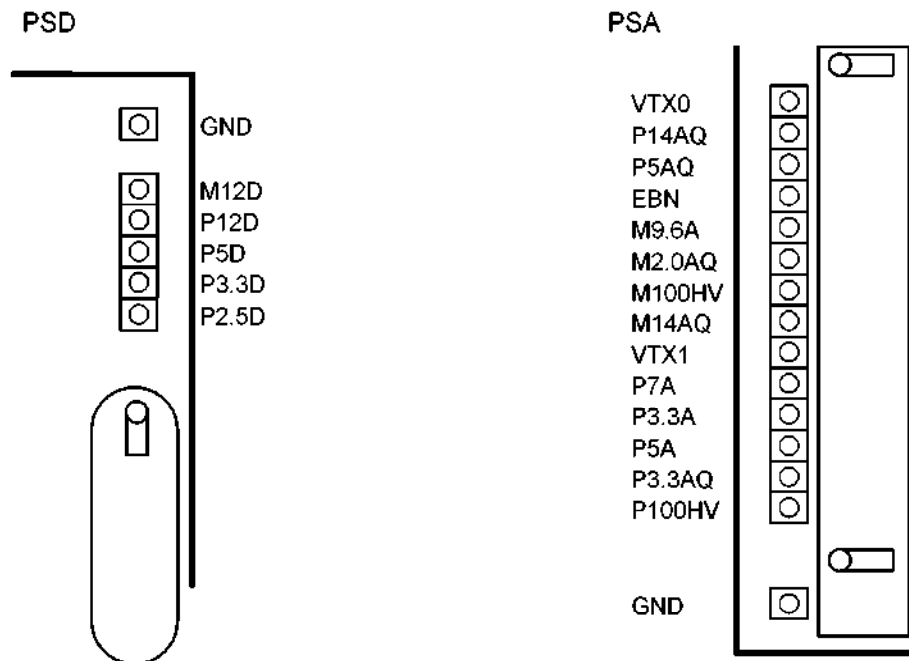
## (a) Precautions for operational checks

Perform the operational check paying attention to the following points.

- a. Do not touch the input 48-V line. An electric shock may result. (The PSA/PSD operates with 48 V/800 W.)
- b. Do not touch the output connectors during operation. An electric shock may result. (The PSA has outputs of  $\pm 100$  V.)
- c. Be careful when handling parts that may have a residual charge even after the power supply is turned OFF. An electric shock may result. (The residual charge in the output capacitors cannot be discharged immediately.)
- d. Do not disassemble units such as the PSX box by removing the cover etc. (The PSX is replaced as a unit.)

(b) Test point location

Confirm the voltage at each output test point/GND test point using the tester. Be careful not allow the tester probe to cause a short circuit by creating a connection between the live line of the output and the metal cover, because the cover plate is connected to GND. (Even if the tester probe on the live line of the output comes into contact with the grounded metal cover, the output will not be short-circuited to the ground because an in-line high resistance of 4.7 k ohm is placed in series (with the live line of the output) inside the PSX.)

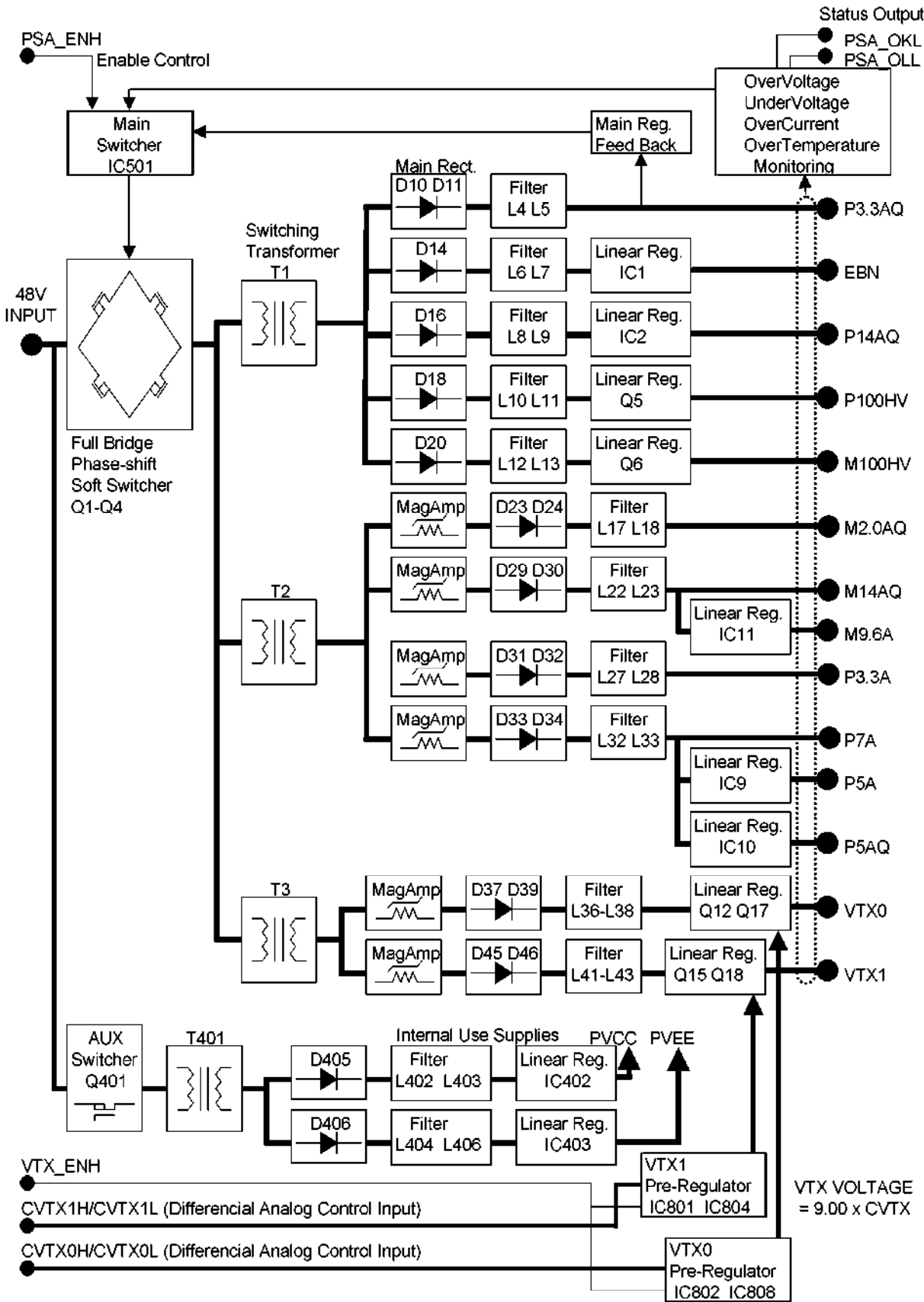


(4) Test point voltage in the normal status

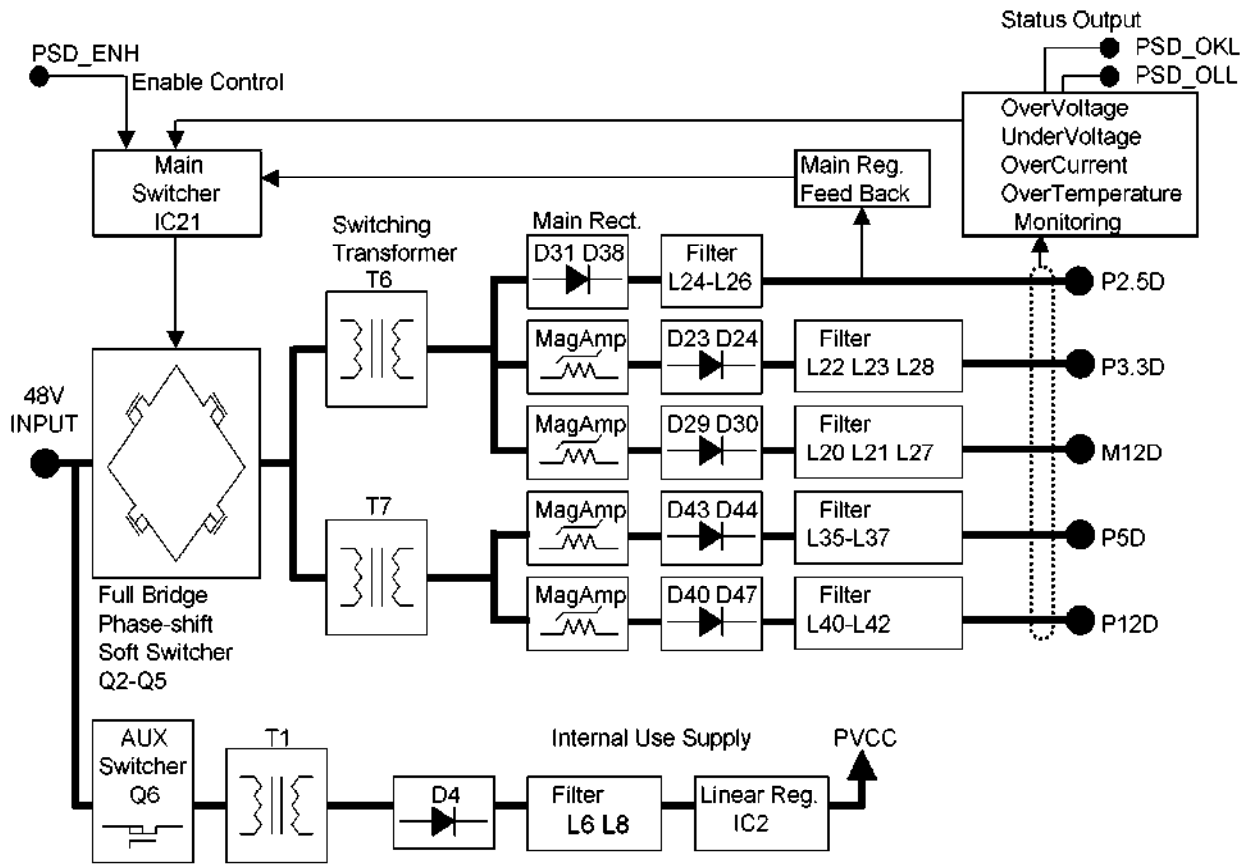
Output power name in the PSA	When the unit is mounted on the system [rating ± (5% + total fluctuation)]	Output power name in the PSA	When the unit is mounted on the system [rating ± (5% + total fluctuation)]
M2.0AQ	-1.99 to -2.61 V	P14AQ	+12.7 to +15.7 V
P3.3A	+2.93 to +3.67 V	M14AQ	-12.7 to -15.7 V
P3.3AQ	+3.17 to +3.78 V	P100HV	+3.59 to +4.15 V
P5A	+4.50 to +5.50 V	M100HV	+6.97 to +8.03 V
P5AQ	+4.50 to +5.50 V	EBN	+2.65 to +3.35 V
P7A	+6.30 to +7.70 V	VTX0	Confirm that they change according to the AOP setting.
M9.6A	-8.64 to +10.6 V	VTX1	
P2.5D	+2.34 to +2.91 V	P12D	+10.9 to +13.1 V
P3.3D	+3.13 to +3.87 V	M12D	-10.9 to to -13.1 V
P5D	+4.69 to +5.61 V		

(5) Block diagram

(a) PSA block diagram

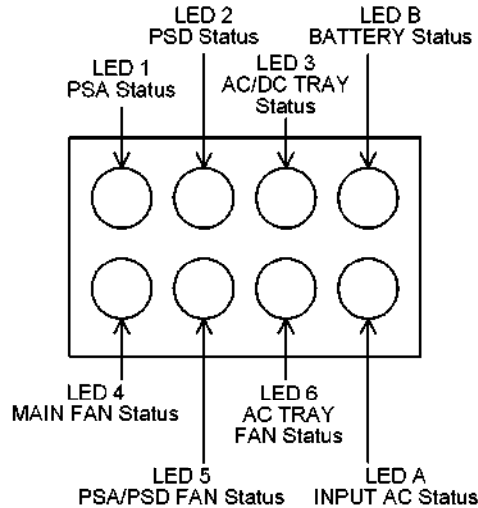


(b) PSD block diagram



## 6.7 LEDs for Error Display

The eight LEDs on the back of the transfer tray are used to indicate abnormalities and errors as shown below. For the procedure for identifying faults in the power system, refer to the service manual (maintenance volume).



Status	LED							
	LED1	LED2	LED3	LED4	LED5	LED6	BATTERY	AC-OK
System power OFF (breaker ON)	OFF	OFF	OFF	OFF	OFF	OFF	–	Green ON
Fan stuck or failed	Blinking (yellow)	Blinking (yellow)	Blinking (yellow)	Blinking (green)	Blinking (green)	Green ON	–	Green ON
PSA-Internal Fault (PSA abnormality)	Blinking (yellow)	OFF	OFF	Blinking (green)	Blinking (green)	Green ON	–	Green ON
PSD-Internal Fault (PSD abnormality)	OFF	Blinking (yellow)	OFF	Blinking (green)	Blinking (green)	Green ON	–	Green ON
PSA-Cardcage overload	Yellow ON	OFF	OFF	Blinking (green)	Blinking (green)	Green ON	–	Green ON
PSD-Cardcage overload	OFF	Yellow ON	OFF	Blinking (green)	Blinking (green)	Green ON	–	Green ON
PSA-Overloading 48 V (AC/DC output overload)	Yellow ON	OFF	Yellow ON	Blinking (green)	Blinking (green)	Green ON	–	Green ON
PSD-Overloading 48 V (AC/DC output overload)	OFF	Yellow ON	Yellow ON	Blinking (green)	Blinking (green)	Green ON	–	Green ON
48 V-Internal Fault (AC/DC power supply abnormality)	OFF	OFF	Blinking (yellow)	Blinking (green)	Blinking (green)	Green ON	–	Green ON
AC failed or missing (AC/DC output voltage drop)	OFF	OFF	OFF	Blinking (green)	Blinking (green)	OFF	–	OFF
Battery disconnection	–	–	–	–	–	–	OFF	–
Battery charging	–	–	–	–	–	–	Blinking (green)	–
Battery charging completed	–	–	–	–	–	–	Green ON	–

## 7. MONITOR

### 7.1 CRT Monitor

#### (1) Specification

Line voltage	: 90 V to 264 V
Power consumption	: 1.2 A to 0.6 A
Monitor size	: 17-inch (300 mm × 225 mm)
Dot pitch	: 0.25 mm
Input video signal	: R, G, and B separated signals, 0.714 Vp-p, 75 Ω
Input synchronization signal	: H-SYNC, V-SYNC separation, TTL level
Display resolution	: 800 × 600, 60 Hz/75 Hz
Speaker	: 2 tweeters, 2 woofers (no audio signal processing in the monitor)
Mass	: Approximately 24 kg

<p><b>⚠CAUTION:</b> The monitor is a heavy unit (20 kg or more). Two persons are required for removing and replacing the monitor. Otherwise, personal injury may result or the monitor may be damaged.</p>
--

#### (2) Monitor adjustment

The brightness and contrast can be adjusted using the corresponding buttons on the front of the monitor.

#### (3) Self-test pattern and degaussing function

Pinhole buttons for test pattern display and degaussing are provided in the front part of the bottom of the monitor. (An implement with a sharp tip is required to press these buttons.)

Left: Test button    Right: Degaussing button

Test pattern display is selected when the Test button is pressed and the pattern changes when the Degaussing button is pressed. It is possible to return to the original pattern by pressing the Degaussing button several times.



## (4) OSD adjustment menu

## (a) Starting and terminating the menu

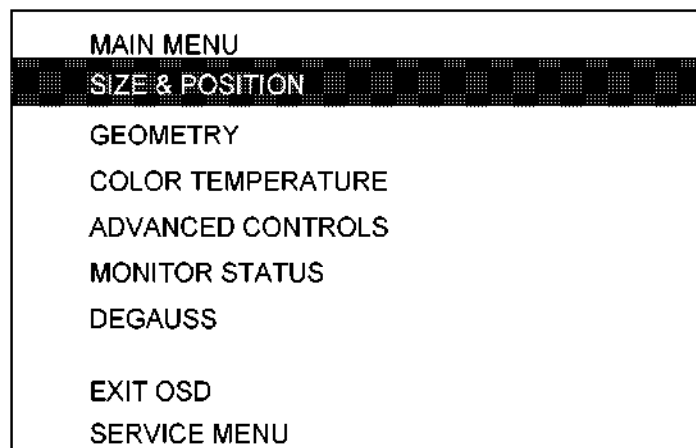
Hold down the Test button on the bottom of the monitor and turn ON the breaker. Press the POWER switch to startup the system and then release the Test button. When the Degaussing button is pressed in this status, the adjustment menu shown below is displayed. The menu can be closed by selecting "EXIT OSD" from MAIN MENU. The menu can be displayed again by pressing the Degaussing button again.

When setting is completed, press the POWER switch of the system and then turn OFF the breaker.

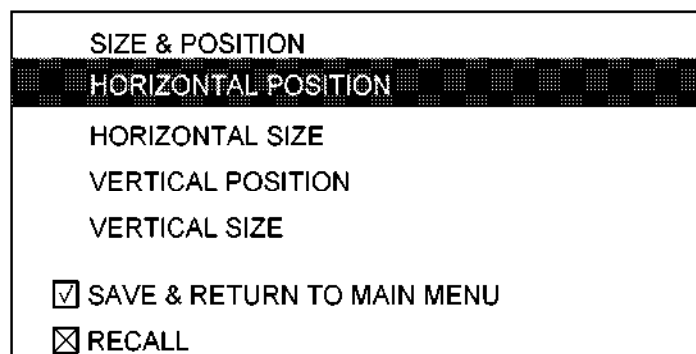
## (b) Operating the menu

The Degaussing button and the + and – switches for contrast and brightness are used for menu operation.

The selection cursor is moved by pressing the + and – switches, and submenus are displayed by pressing the Degaussing button.



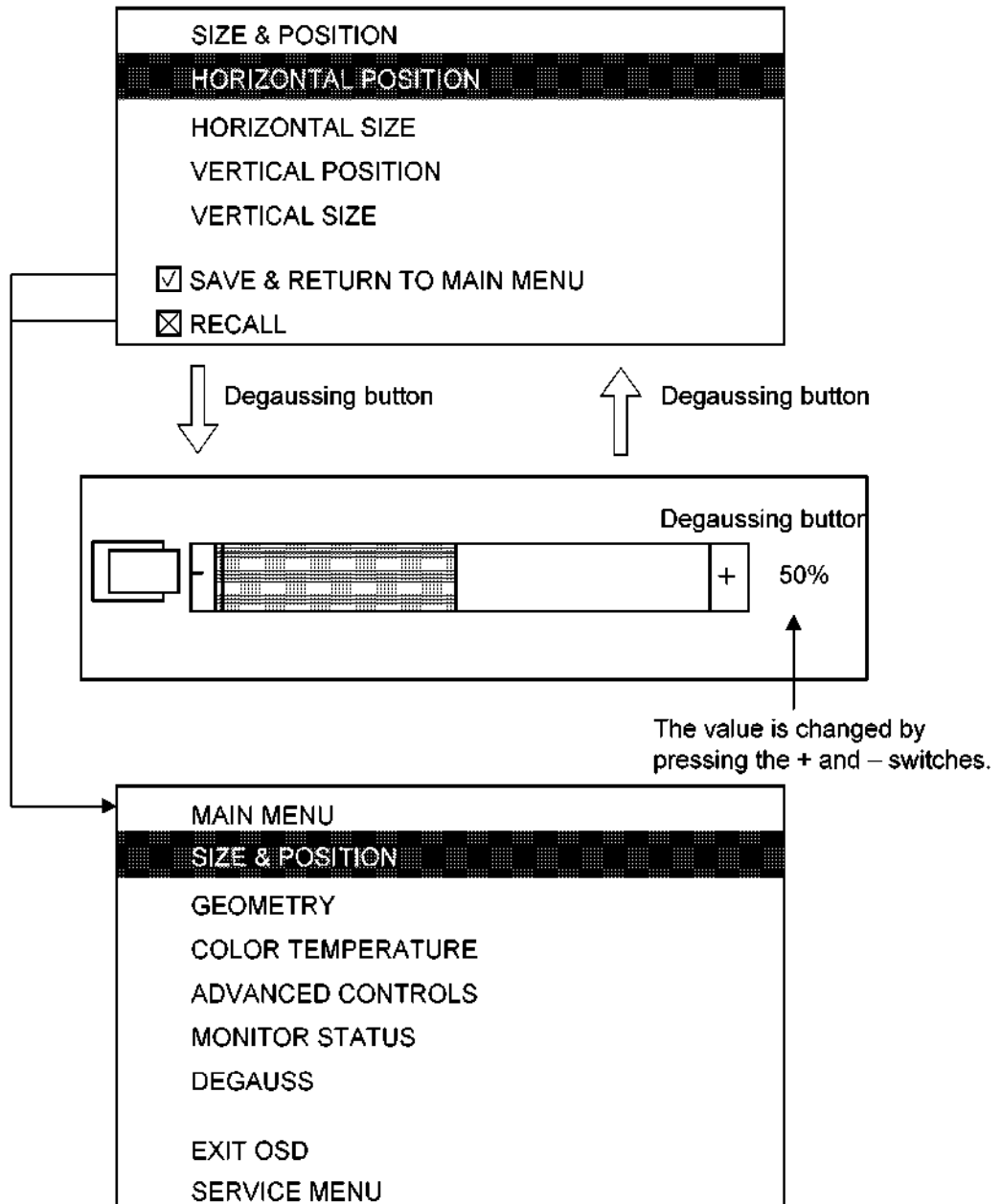
Degaussing button ON



The detailed functions are displayed in submenu. The selection cursor is moved by pressing the + and – switches, and the adjustment menu for the functions are displayed by pressing the Degaussing button. The values in the adjustment menu are changed by pressing the + and – switches. To set a value, press the Degaussing button.

After a value is set, the submenu closes and the next adjustment can be performed.

When "SAVE & RETURN TO MAIN MENU" is selected, the changes are set and the MAIN MENU is displayed. Note that when "RECALL" is selected, the changes are deleted and the MAIN MENU is displayed.



## (c) Detailed explanation of each submenu

The functions in each submenu are described below.

## 1) SIZE &amp; POSITION

The display position and range are adjusted.

HORIZONTAL POSITION	Adjustment of the display position in the horizontal direction
HORIZONTAL SIZE	Adjustment of the display range in the horizontal direction
VERTICAL POSITION	Adjustment of the display position in the vertical direction
VERTICAL SIZE	Adjustment of the display range in the vertical direction

## 2) GEOMETRY

The display distortion and skewing are adjusted.

ROTATION	Adjustment of skew in the display
PINCUSHION	Adjustment of barrel and pincushion distortions
TRAPEZOID	Adjustment of the trapezoidal distortion
BALANCED PINCUSHION	Adjustment of the balance of barrel and pincushion distortions
PARALLELOGRAM	Adjustment of parallelogram distortion

## 3) COLOR TEMPERATURE

The color temperature is set.

9300	Setting of the temperature to 9300 K
11000	Setting of the temperature to 11000 K
13000	Setting of the temperature to 13000 K
SERVICE	The R, G, and B values can be set.

<p><b>CAUTION:</b> The image quality adjustment for each transducer is performed at 13000 K. Therefore, make sure that the color temperature is not changed inadvertently.</p>
--

## 4) ADVANCED CONTROLS Special functions of the monitor

POWER SAVING ON	Setting power saving mode to ON or OFF
LANGUAGE	Selecting the language to be used in the menus
OSD TIMER	This function is not available for this monitor.
MOIRE	Moire adjustment

5) **MONITOR STATUS**

The monitor status, such as the synchronization mode, is displayed.

6) **DEGAUSS**

Degaussing is performed.

7) **EXIT OSD**

The adjustment menu is terminated.

8) **SERVICE**

The basic setting screen is displayed.

**CAUTION:** Do not change items in **SERVICE**. Doing so may change basic settings such as the color temperature.


## 7.2 LCD Monitor

### (1) Specification

Line voltage	: 90 V to 264 V
Power consumption	: 45 W or less
Monitor size	: 17-inch
Dot pitch	: 0.264 mm × 0.264 mm
Input signal	: R, G, and B separated signals, 0.714 Vp-p, 75 Ω H-SYNC, V-SYNC separation, TTL level
Maximum resolution	: 1280 × 1024, 60 Hz/75 Hz
Speaker	: × 2 (no audio signal processing in the monitor)
Mass	: Approximately 4.2 kg

## (2) Adjustment menu

## (a) User mode

The menu switches  on the front of the LCD monitor are used to display the user menu and to select menu items.


The [-] switch and [+] switch are used to select the brightness, contrast, screen size, and  $\gamma$  curve.

User menu		
Menu item	Default value	Adjustment range
Brightness	30%	0% to 100%
Contrast	100%	0% to 100%
Size	1	1/2/3
$\gamma$	2	1/2/3/4

\* To reset the setting to the default value, press the [-] switch while holding down the [+] switch.

## (b) Service mode

## 1) Opening and closing the service mode menu

Hold down both the [▼] switch and the [+] switch on the front of the LCD monitor for 3 seconds to display the service mode menu (main menu). To close the service mode menu, select the exit key  and press the [▼] switch.

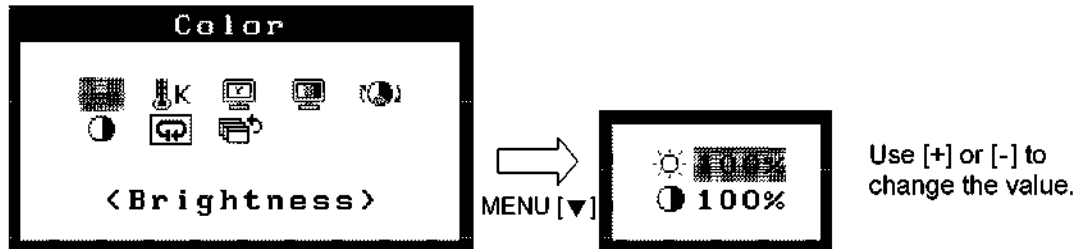
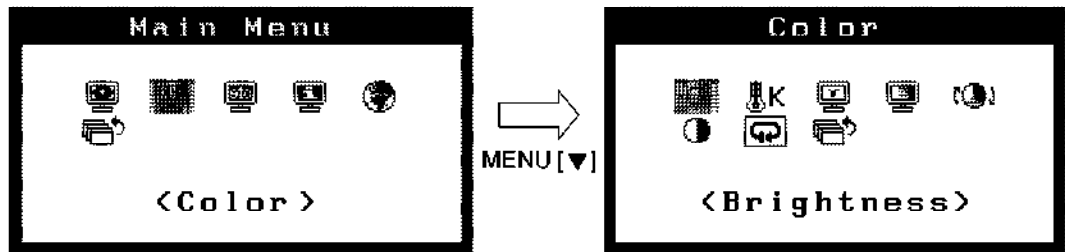


## 2) Menu operation

Use the [+] and [-] switches for menu operation.



Press the [+] or [-] switch to move the selection cursor to the desired function and then press the [▼] switch to set the selection.

The submenu for the selected function is displayed to show more detailed functions. Use [+] or [-] to select the desired function and then press [▼]. The adjustment menu with an icon is displayed. Change the value using [+] or [-] and then press [▼] to set the new value.



## 3) List of functions available in the service mode menu

## Menu list

Main menu				
Function	Sub-function		Default value	Adjustment range
Screen	Auto Adjustment		—	—
	Clock		—	320 to 2048
	Phase		—	0 to 63
	Position		—	—
	Resolution		—	H: 320 to 1280, V: 200 to 1024
	Range		—	0 to 255
	Smoothing		3	1 to 5
	Signal Filter		—	1 to 4
	Return		—	—
Color	Brightness	Brightness 	30%	0% to 100%
		Contrast 	100%	0% to 100%
	Temperature		1	1, 2, Off
	Gamma		2	1/2/3/4/Fixed
	Saturation		0	-100 to 100
	Hue		0	-100 to 100
	Gain	Red	—%	0% to 100%
		Green	—%	0% to 100%
		Blue	—%	0% to 100%
	Reset		—	—
	Return		—	—
Other	Screen Size		1	1/2/3
	Border Intensity		Black (0)	Black (0) to white (255)
	Menu Position		Bottom left	Top left to bottom right
	Menu Off Timer		5 sec	5/10/25/50 sec
	Reset		—	—
	Return		—	—
Information	Information (1/2)		—	—
	Information (2/2)		—	—
Language			English	English/German/French/ Spanish/Italian/Swedish/ Japanese
Exit			—	—

## 4) Details of the service mode menu

## • Screen

**Auto Adjustment:** Used to automatically adjust flickering, bleeding, the image display position, and other screen conditions.

\* Be sure to use the adjustment guide program (loadadj.exe) for automatic adjustment. If automatic adjustment is not successful, use the following individual menu items.

**Clock** : Used to eliminate vertical stripes on the image.

**Phase** : Used to eliminate bleeding, flickering, or horizontal stripes if necessary after clock adjustment.

**Position** : Used to adjust the image position.

**Resolution** : Used to adjust the resolution when a part of the image is not displayed or unnecessary parts are displayed.

**Range** : Used to adjust the signal output level so that all color levels are displayed. (0 to 255).

**Smoothing** : Used to adjust smoothness of the characters and lines of the image. (5 steps, soft to sharp)

**Signal Filter** : Used to eliminate image overlap or a bright vertical line on the right of the image.

**CAUTION:** When the LCD monitor, RM PWB, VI PWB, or IO PWB has been replaced, be sure to run the Auto Adjustment program and the Range program to tune the signals for the diagnostic ultrasound system (only in the case of analog signal input).  
Be sure to quit service mode after the service mode menu is used.  
Otherwise, automatic power save mode is not started.

## • Color

**Brightness** : Used to adjust the screen brightness. (0% to 100%)

**Contrast** : Used to adjust the image contrast. (0% to 100%)

**Temperature** : Used to select the color temperature. (1, 2, Off)  
Color temperature 1 is higher than 2.

\* The value is set to OFF automatically when the gain value is changed.

**Gamma** : Used to set the  $\gamma$  value. (1, 2, 3, 4, Fixed)

**Saturation** : Used to adjust the saturation (vividness of colors). (-100 to 100)

\* The entire color scale may not be displayed when this function is used.

**Hue** : Used to adjust the hue (coloring). (-100 to 100)

\* The entire color scale may not be displayed when this function is used.

**Gain** : Used to adjust red, green, and blue individually to obtain the desired color. (0% to 100%)

\* Gain adjustment is disabled when the Temperature value is changed.

**Reset** : Used to reset all color settings to the default values.



- Other

- Screen Size** : Used to change the image display size. (1, 2, 3)
- 1: 17 inches (full-size)
  - 2: 16 inches
  - 3: 15 inches (equivalent to the display size of the 17-inch CRT monitor)
- Border Intensity** : Used to adjust the brightness of the borders (areas where no image is displayed). (0 (black) to 255 (white))
- Menu Position** : Used to adjust the menu display position. (Any position on the screen)  
Use the [+] or [-] switch to adjust the position.  
The adjustment direction (horizontal or vertical) can be selected using the [▲] switch.
- Menu Off Timer** : Used to adjust the time for which the menu is displayed. (5 s, 10 s, 25 s, 50 s)
- Reset** : Used to reset all settings to the default values.

- Information

- Information (1/2)**: Displays the currently selected input signal, resolution, horizontal frequency, and vertical frequency.
- Information (2/2)**: Displays the serial number, hours of use, and firmware version of the LCD monitor.

- Language

- Language** : Used to select the language for menus.

(c) Power save mode

1) Forced power save mode

Hold down both the [▲] switch and the [-] switch for approximately 1 second to forcibly set the monitor to power save mode (backlight off). To cancel power save mode, hold down both the [▲] switch and the [-] switch for approximately 3 seconds.

Forced power save mode remains set after the power switch on the operating panel is turned OFF unless it is canceled as described above.

2) Automatic power save mode

The monitor is set to power save mode (backlight off) automatically when no signal is input for 5 seconds or more.

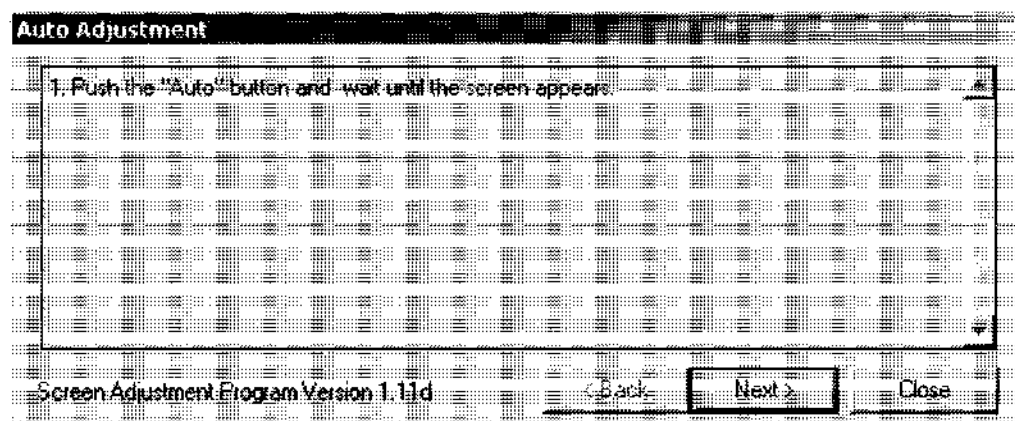
## (3) Status LED

The LED at the lower front of the LCD monitor indicates the monitor status.

LED indication	Status
OFF	AC power OFF
Blinking green (ON/OFF at 2-s intervals)	Forced power save mode
Lights green	Startup, display ON
Lights orange	Automatic power save mode (No signal)
Blinking orange (ON/OFF at 2-s intervals)	Signal error
Blinking orange (ON/OFF at 1-s intervals)	Automatic power save mode (Abnormal temperature inside the LCD monitor)

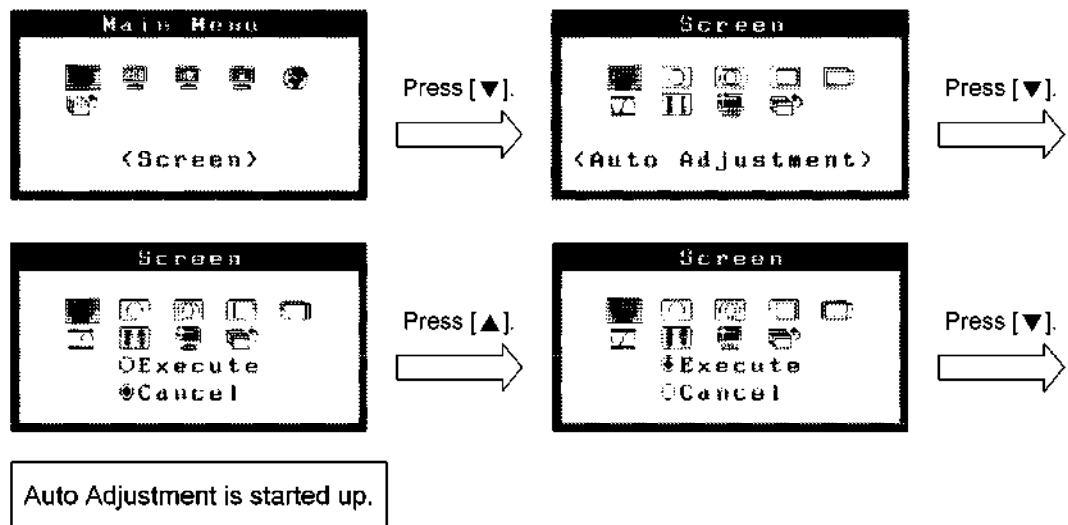
## (4) Starting up the adjustment guide file and adjusting image quality

- (a) Double-click "C:\LCD\Loadadj.exe".
- (b) Confirm that the Auto Adjustment guide screen is started up.

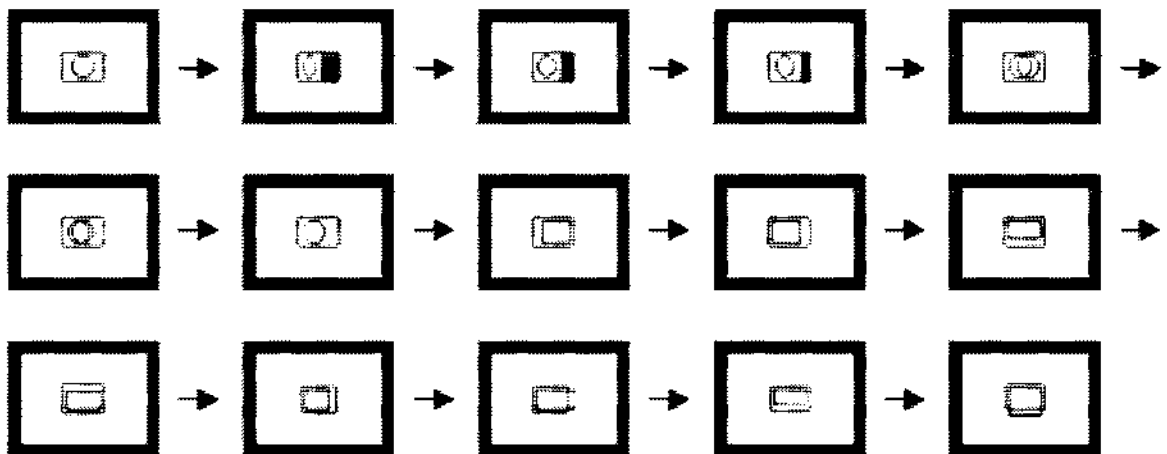


- (c) Hold down both the [▼] switch and the [+] switch on the front of the LCD monitor for 3 seconds to display the service mode menu (main menu).

- (d) Follow the instructions on the Auto Adjustment guide screen to start up the Auto Adjustment program.

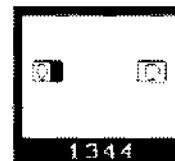
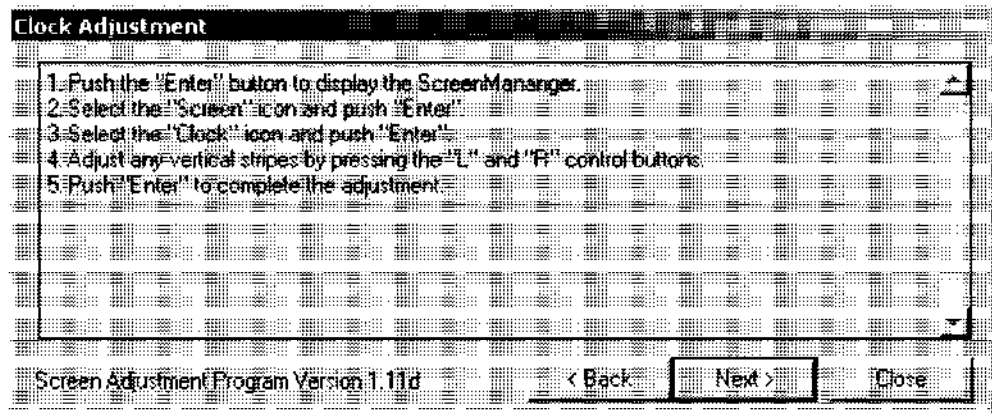


After the Auto Adjustment program is started up, the OSD menu icons are displayed in the following order. When adjustment is completed, the display returns to the Screen menu.



- (e) To eliminate vertical stripes on the screen

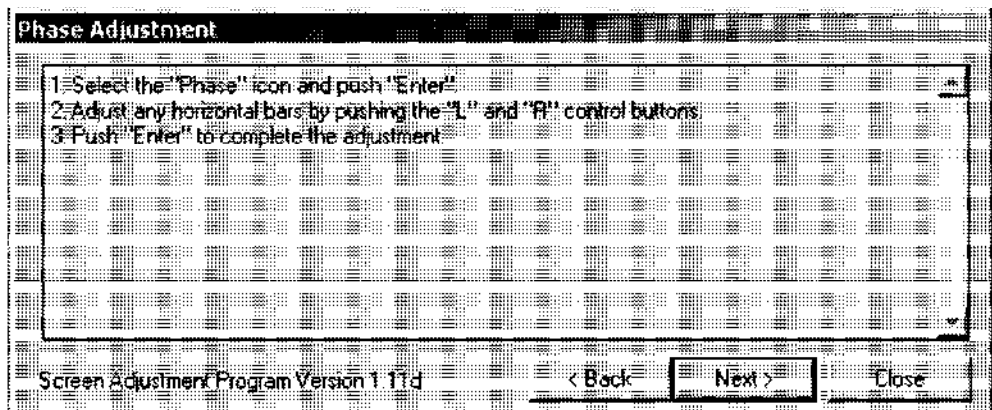
Click the [Next] button on the Auto Adjustment guide screen. If vertical stripes are not displayed on the screen, proceed to step (f). Following the instructions on the Clock Adjustment guide screen, select the "Clock" icon using the [▲], [▼], [-], and [+] switches and then press the [▼] switch to display the clock adjustment menu. Adjust the sampling clock rate so that the vertical stripes disappear. When adjustment is completed, press the [▼] switch to save the new value and return to the Screen menu.

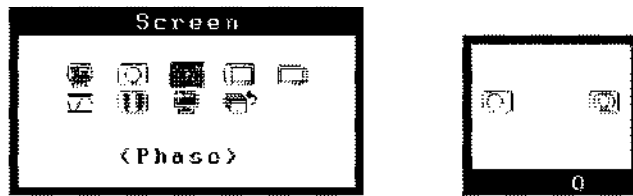


Clock adjustment menu

- (f) To eliminate flickering or bleeding

Click the [Next] button in the Clock Adjustment guide screen shown in (e). If there is no screen flickering or bleeding, proceed to step (g). Following the instructions on the Phase Adjustment guide screen, select the "Phase" icon using the [▲], [▼], [-], and [+] switches and then press the [▼] switch to display the phase adjustment menu. Adjust the phase until flickering or bleeding is eliminated. When adjustment is completed, press the [▼] switch to save the new value and return to the Screen menu.

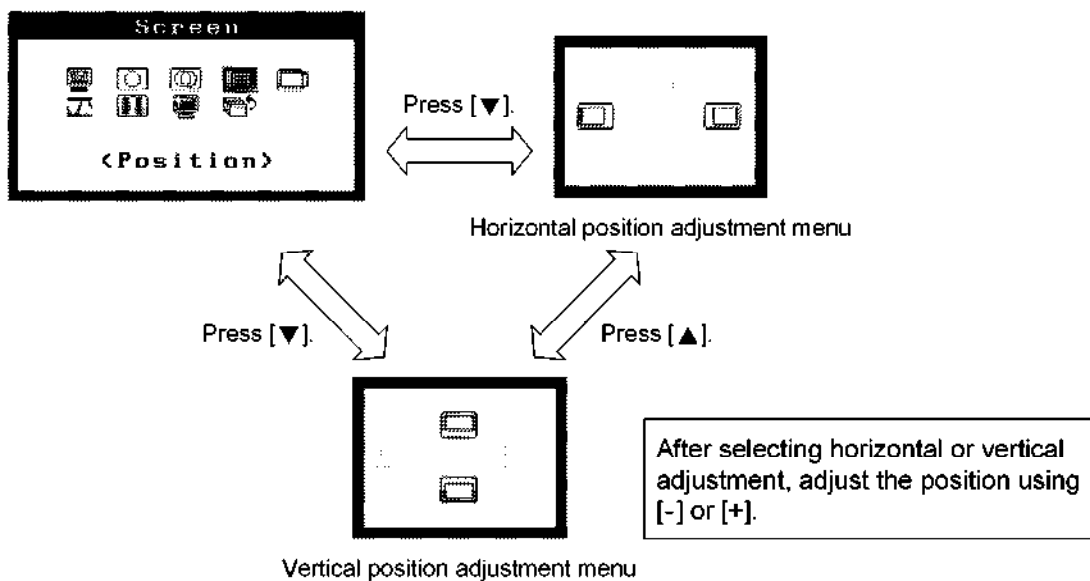
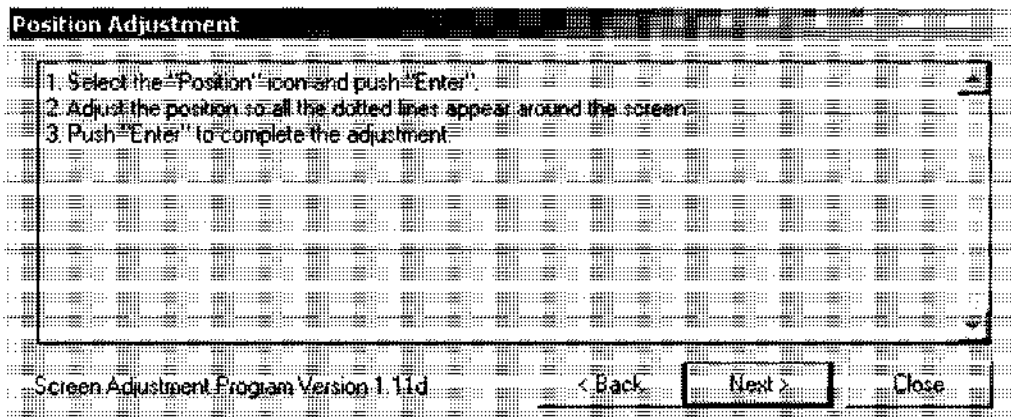




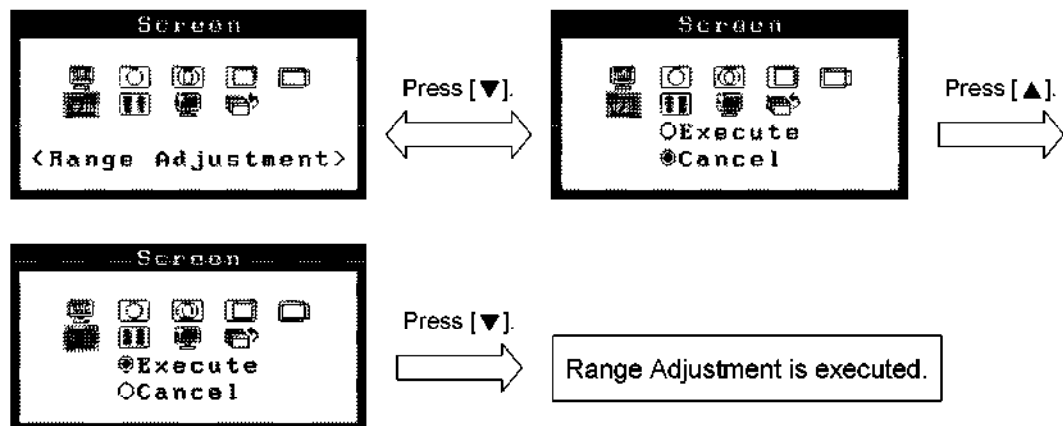
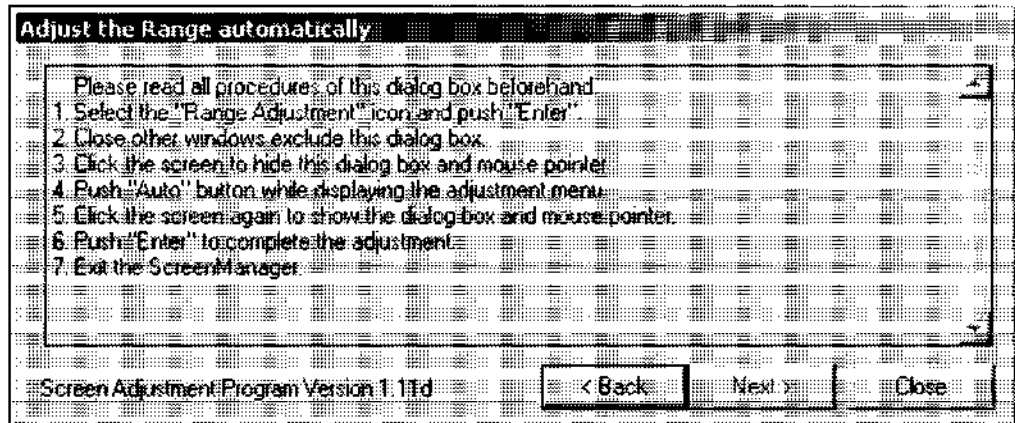
Phase adjustment menu

(g) To adjust the display position

Click the [Next] button in the Phase Adjustment guide screen shown in (f). If there is no problem with the display position, proceed to step (h). Following the instructions on the Position Adjustment guide screen, select the "Position" icon using the [▲], [▼], [-], and [+] switches and then press the [▼] switch to display the position adjustment menu. Use the [▲] switch to select vertical adjustment or horizontal adjustment, and then move the display position using the [-] or [+] switch. When adjustment is completed, press the [▼] switch to save the new setting and return to the Screen menu.



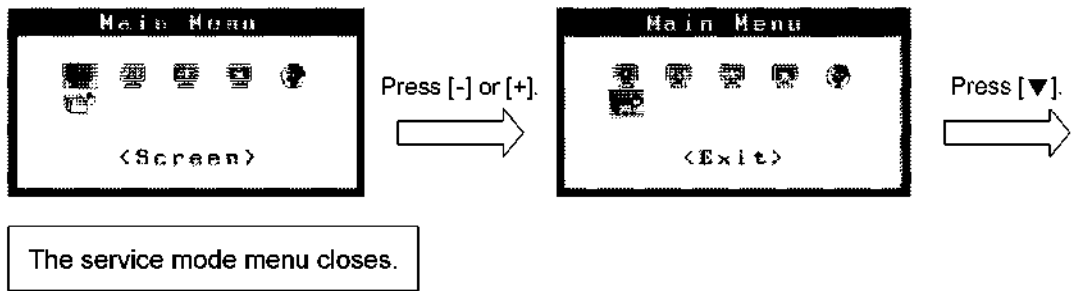
- (h) Click the [Next] button in the Position Adjustment guide screen shown in (g). Following the instructions on the Adjust the Range automatically screen, select the "Range Adjustment" icon using the [▲], [▼], [-], and [+] switches and then press the [▼] switch to display the range adjustment menu. Use the [-] or [+] switch to select "Execute" and then press [▼] to start up the Range Adjustment function. The OSD menu icons are displayed in the order shown below. When adjustment is completed, the display returns to the Screen menu.



After Range Adjustment is started up, the OSD menu icons are displayed in the order shown below. When adjustment is completed, the display returns to the Screen menu.



- (i) Close the service mode menu.



Click the [Close] button on the Adjust the Range Automatically screen shown in (h).

- (j) Select [Start] → [Shutdown...] → [Shutdown] to shut down the system.
- (k) Restart the system and confirm that there are no abnormalities in LCD monitor display.

**CAUTION:** This image quality adjustment procedure is applicable only to the UILM-770A/700A. Auto Adjustment and Range adjustment must be performed without fail.

## 8. PHYSIO MODULE

### (1) Outline

This module detects physiological signals (ECG, respiration, PCG, and pulse) using the ECG cable and sensors and transfers the data to the diagnostic ultrasound system (hereinafter referred to as "system").

Line voltage	ECG (electrocardiogram)	1CH (IM RESP (respiration) 1CH)
	RESP (respiration)	1CH
	DC IN (external input/ECG)	1CH (line voltage: $\pm 2.5$ V)
	PCG (phonocardiogram)	1CH
	Pulse (pulse)	1CH
	AUX (external input)	1CH (line voltage: $\pm 2.5$ V)

### (2) Functions

The following functions are provided.

- (a) Amplification of the electronic potential induced by the R and F electrodes of the ECG cable attached on the body surface and transfer of the data to the system in order to display the ECG on the monitor. Detection of the QRS waveforms and transfer of the signals to the system. Measurement of the electrical resistance in the chest with an alternating current (between electrodes R and F) and transfer of the data to the system in order to monitor the respiration cycle.
- (b) Transfer of respiration data from the thermistor sensor attached to the nasal cavity to the system in order to display the respiration cycle on the monitor.
- (c) Transfer of data from the PCG sensor attached to the chest to the system in order to display PCG waveforms on the monitor.
- (d) Transfer of data from the waveform sensor attached to the carotid artery and apex of the heart to the system in order to display pulse waveforms on the monitor.
- (e) Transfer of input signals (physiological signals) from two external medical devices to the system.

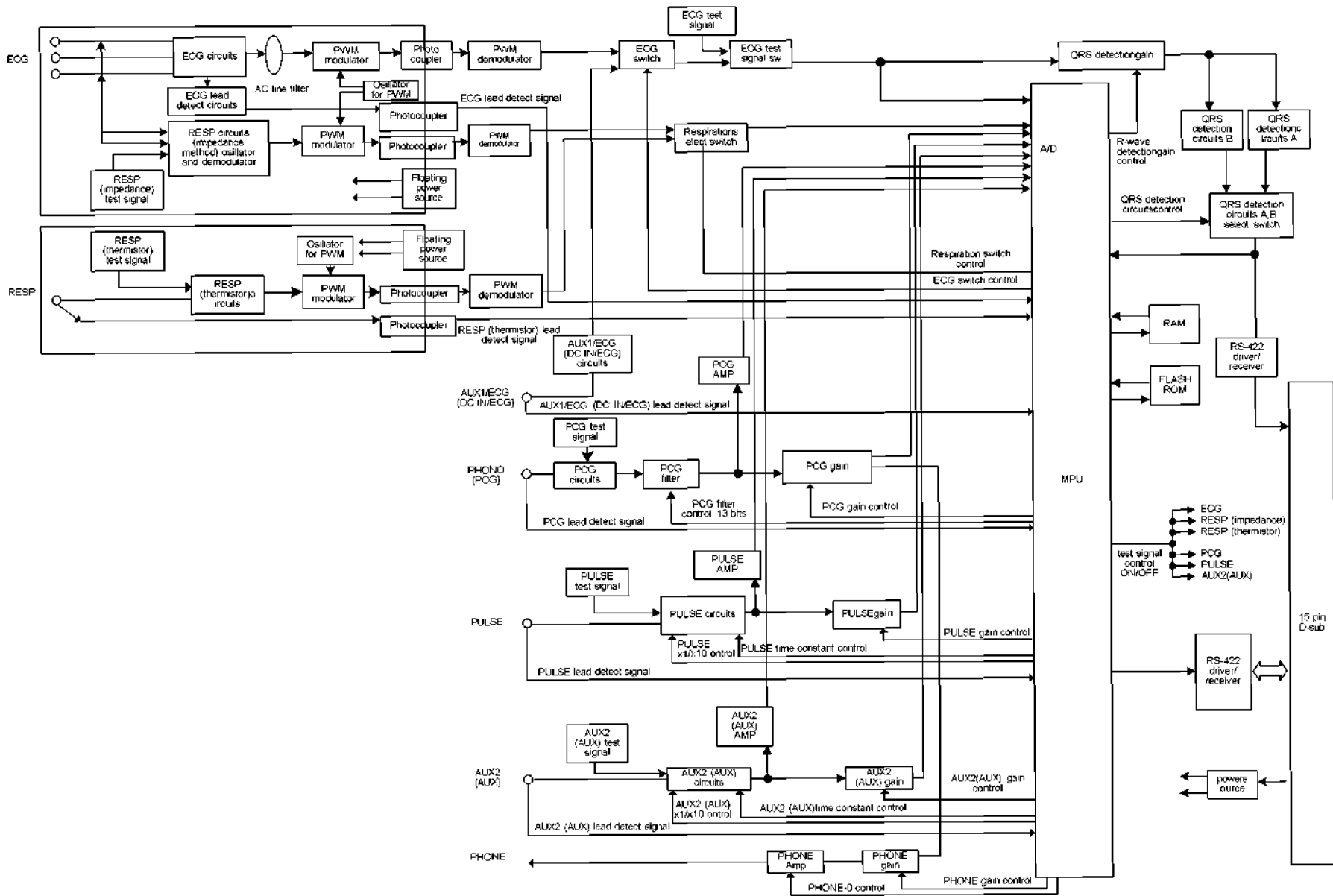
The input signal from the one of the external medical devices can be output to the system as a trigger signal for imaging.

### (3) Operations

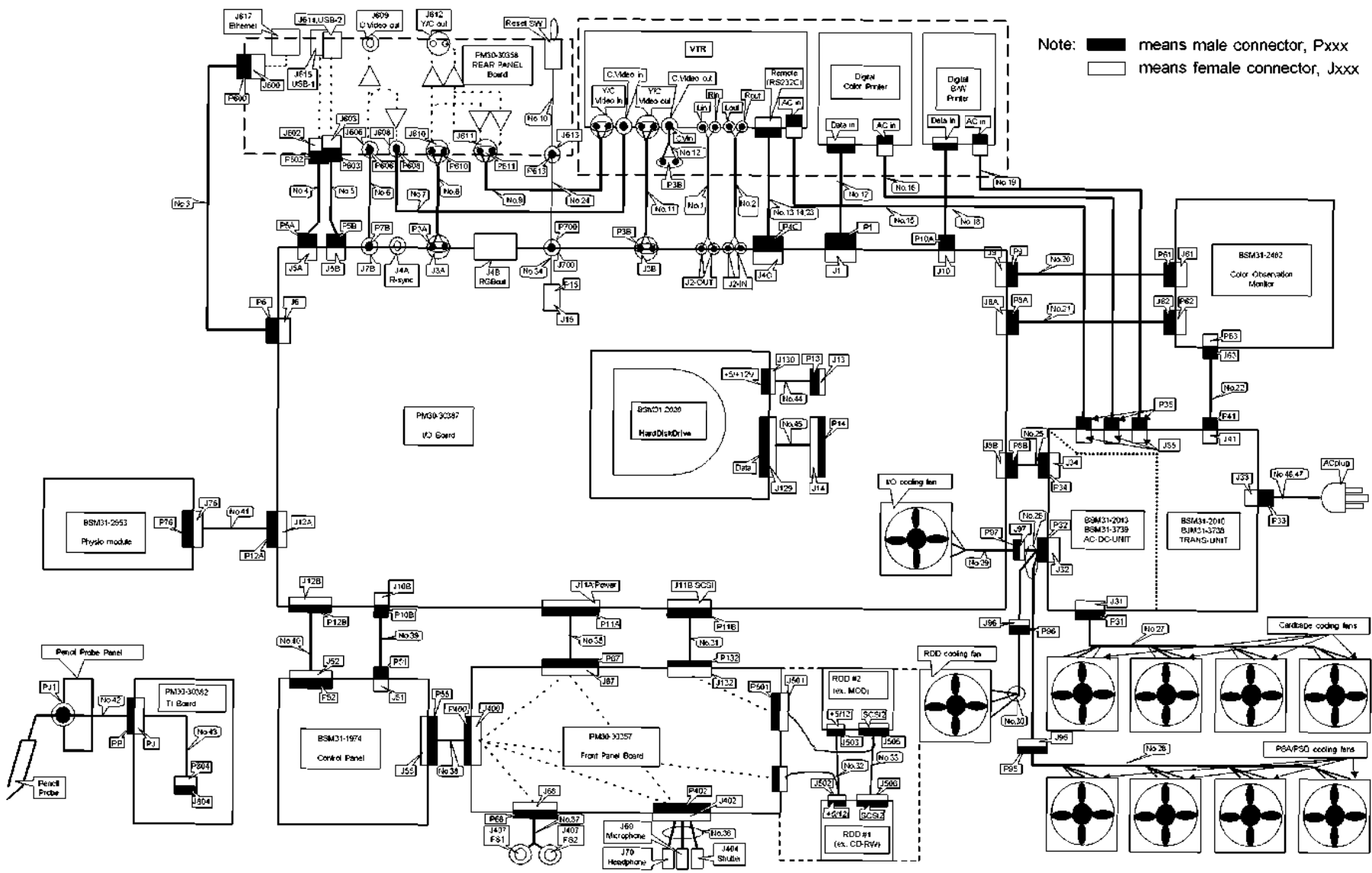
This module consists of the amplifier section, power supply section, and digital section. The module is connected to the system via a cable and a 15-pin D-sub connector. The module receives a 12-V power supply and waveform request command from the system and performs waveform (such as ECG and PCG) output to the system.

The amplifier which amplifies the ECG, respiration, PCG, pulse, and external device signals is set inside this module. After importing the A/D values, the module calculates the sensitivity and position using the single-chip CPU inside the A/D converter and stores them in the RAM as digital values. QRS detection is performed by the hardware. The waveform data is output via a serial interface at a transmission rate of 312.5 Kbaud when a waveform request command is received from the system. QRS detection signals are output by setting QRS flags in the detection signals and waveform data (two series). Also, sensor connector insertion/removal information is transferred to the system. For the ECG connector, lead ON/OFF information, which indicates whether or not the three electrodes are attached to the patient properly, is output.





9. CONNECTION DRAWING FOR UNITS



No.	Drawing number for SSA-770A	Drawing number for SSA-700A	Connection points
1	CM30-30335	CM30-32448	Audio IO to VCR
2	CM30-30372	CM30-32449	Audio VCR to IO
3	CM30-30340	CM30-30340	Ethernet IO to Rear
4	CM30-30337	CM30-30337	USB IO to Rear
5	CM30-30363	CM30-30363	USB IO to Rear
6	CM30-30338	CM30-30338	C.Video OUT IO (BNC) → Rear (BNC)
7	CM30-30333	CM30-32452	C.Video OUT Rear (BNC) to VCRin (Pin Plug)
8	CM30-30334	CM30-30334	Y/C OUT: IO to Rear
9	CM30-30392	CM30-32446	Y/C OUT: Rear to VCRin
10	CM30-30347	CM30-30347	Rear Panel Reset SW
11	CM30-30373	CM30-32447	Y/C PlayBack: VCRout to IO
12	BSM31-2541	BSM31-3931	C.VideoPlayBack: VCRout-IO Yin
13	CM30-30336	CM30-32450	VCR RemoteControl: Panasonic AG-MD835:9pin-25pin Straight
14	CM30-30415	CM30-32451	VCR RemoteControl: SONY SVO-9500 :9pin-25pin Cross
15	BSM31-0671	BSM31-1907	OEM AC Cable (VCR)
16	BSM31-0671	BSM31-0671	OEM AC Cable (Color Printer)
17	BSM31-3757	BSM31-3757	ColorPrinter Data (USB-USB)
18	CM30-30925	CM30-30925	B&W Printer Data (USB-USB)
19	CM30-30927	CM30-30927	OEM AC Cable (B&W Printer)
20	CM30-30304	CM30-30304	MonitorVideo
21	CM30-30303	CM30-30303	MonitorAudio
22	CM30-30302	CM30-30302	MonitorPower
23	CM30-30354	CM30-30354	VCR RemoteControl: SONY DSR-20:9pin-9pin Cross
24	CM30-30413	CM30-30413	Reset IO to Rear
25	CM30-30311	CM30-30311	AC-DC to IO control
26	CM30-30309	CM30-30309	AC-DC to PSA/PSD, RDD, IO Fan Connection Cable
27	CM30-30316	CM30-30316	Cardcage Cooling Fan
28	PM30-29870	PM30-29870	PSA/PSD Cooling Fan
29	CM30-30314	CM30-30314	IO Cooling Fan
30	CM30-30312	CM30-30312	RDD Cooling Fan
31	CM30-30328	CM30-30328	SCSI (White)
32	CM30-30327	CM30-30327	+5/12V Power Cable in FrontPanelBoard
33	CM30-30342	CM30-30342	SCSI Cable in FrontPanelBoard
34	CM30-30414	CM30-30414	Reset Signal Cable in IO Board
35	CM30-30330	CM30-30330	SCSI POWER CABLE (Black)
36	CM30-30394	CM30-30394	Mic., Shutter, Headphone cable in Front Panel Board
37	PM30-29980	PM30-29980	FOOT-SW CABLE
38	CM30-30306	CM30-30306	ControlPanel-FrontPanel
39	CM30-30317	CM30-30317	ControlPanel-IO USB DATA CABLE
40	CM30-30305	CM30-30305	ControlPanel-IO Power D-Sub CABLE
41	CM30-30331	CM30-30331	PHYSIO to IO
42	PM30-30000	PM30-30000	Pencil Probe Panel - TI Board
43	CM30-30351	CM30-30351	Pencil Probe Signal Cable in TI Board
44	CM30-30308	CM30-30308	HDD Power Cable
45	CM30-30307	CM30-30307	HDD Data Cable
46	BSM31-2587	BSM31-2587	AC POWER CABLE (100 V)
47	BSM31-2588	BSM31-2588	AC POWER CABLE (200 V)

## 10. SOFTWARE ORGANIZATION

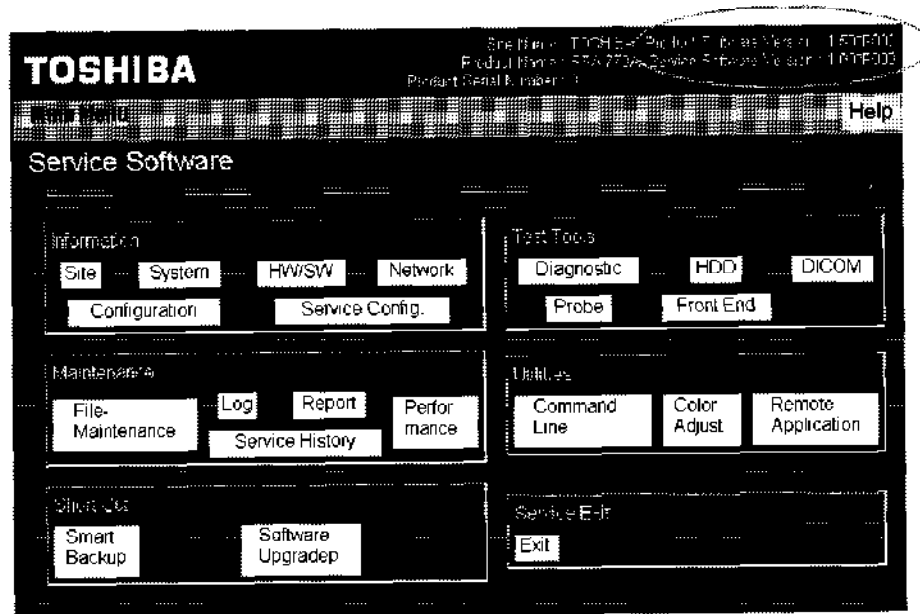
### 10.1 Overall Folder Configuration

C:	
WINNT etc.	Windows2000 standard folders
Zdt	Zdt installation destination Note that zdt.exe is located in WINNT\system32.
Temp	Used as a work area for database system etc. A minimum of 1 GB or more is required. Maintenance including defragmentation of the C drive etc. is important.
D:	
aplio	Destination for Aplio system/application software
aplio\bin	Destination for executable binary files such as dll, ocx, and exe files
aplio\config	Configuration at the time of shipment and destination for activated options
aplio\user\login name)	Destination for files defined by the user
aplio\TUSService	Destination for the service software The InnerVision contract file is located in aplio\TUSService\IVLicence. The service contract file is located in aplio\TUSService\ServiceLicence.
aplio\TUSLog database	Destination for log file for application software Database
E:	
Image	Destination for actual image files
PIMS	PIMS work area
DDGW	DDGW (option) work area

## 10.2 Version Information

The Aplio software version and the service software version are always displayed on the upper right of the service screen as shown below.

For details, refer to the service manual (maintenance volume).



### 10.3 Error Handling

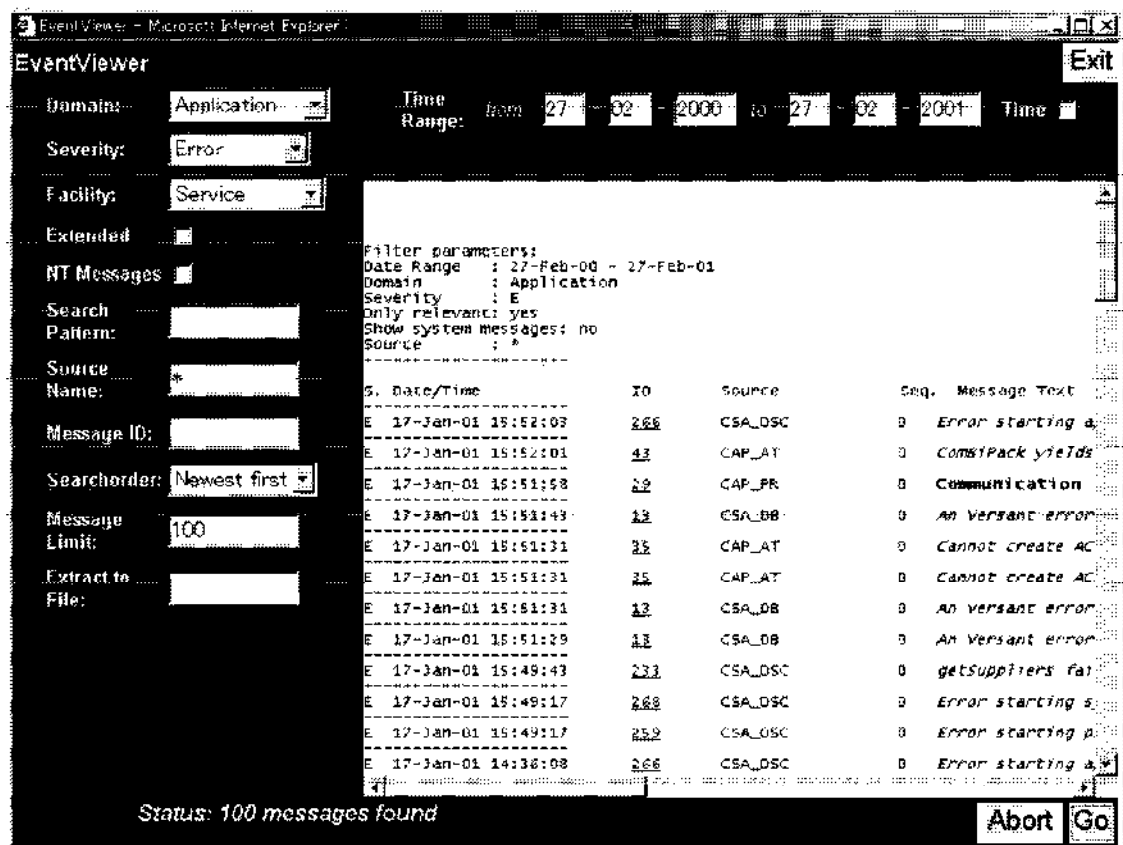
#### 10.3.1 Error log operation

Error log operation (error registration) is performed in the background as required.

The recording destination is the same as for the application log of Windows.

The data is located in C:\WINNT\system32\config\AppEvent.Evt.

The logged information can be checked using the log display function in the service menu (service menu main screen → Log).



The user is notified of 5 types of errors as explained in subsection 10.3.4 "Error log operation (facility)". The errors are registered and error messages are displayed in the dialog box or status bar.

### 10.3.2 Error messages

Each error message consists of the elements shown in table below.

Item	Contents
Symbol	Symbol name to be referred to from applications
Severity	Importance of error
MessageText	Simple description of error (title)
Facility	Error log and operation
Explanation	Detailed description of error. Referred to from the Syngo error viewer.
Action	Corrective action for error. Referred to from the Syngo error viewer.
Information	Additional information. Referred to from the Syngo error viewer

### 10.3.3 Error levels (severity)

There are four error levels (same as Windows Native errors).

Severity	Meaning
Error (STATUS_SEVIRITY_ERROR)	An unrecoverable error has occurred.
Warning (STATUS_SEVIRITY_WARNING)	A recoverable error has occurred.
Information (STATUS_SEVIRITY_INFORMATION)	Processing has been completed. However, there is additional information.
Success (STATUS_SEVIRITY_SUCCESS)	Processing has been completed.

## 10.3.4 Error log operation (facility)

Facility	Target to be notified	Operation
FACILITY_MESSAGEBOX_DANGER	Service engineer and user	After an error message is displayed in the danger message box, the contents of the error are registered in the log.
FACILITY_MESSAGEBOX_WARNING	Service engineer and user	After an error message is displayed in the warning message box, the contents of the error are registered in the log.
FACILITY_MESSAGEBOX_CAUTION	Service engineer and user	After an error message is displayed in the caution message box, the contents of the error are registered in the log.
FACILITY_MESSAGEBOX_NORMAL	Service engineer and user	After a message is displayed in the message box, the contents of the error are registered in the log.
FACILITY_STATUSBAR	Service engineer and user	After a message is displayed in the status bar, the contents of the error are registered in the log.
FACILITY_RELEVANT	Service engineer	The contents of the error are registered in the log.
FACILITY_CSA	Engineer	—



## 11. SETTING THE PRESET MENU

### 11.1 Outline of Each Preset

#### (1) Basic preset architecture

This system contains the following presets.

- System Preset
- Exam Type (This is actually a system preset. However, it is important and is therefore included here also.)
- Application Preset
- Imaging Preset
- 3D Preset

#### (2) System preset

System Preset includes a group of parameters to be set in the system. Some of the parameters included in System Preset are available only to the service engineer, but the parameters are generally available to the user. The user can change the parameters using the system preset editor.

#### (3) Exam Type (a system preset)

Exam Type is used to set the transducer, imaging preset, and application preset automatically.

In this system, the Exam Type can be completely matched with the imaging preset name.

When the Exam Type is selected on the Patient Information screen and the examination is started, the selected Exam Type is registered in the DICOM format.

Using the Editor screen, the item (transducer, imaging preset, or application preset) to be activated when Exam Type is selected on the Patient Information screen can be set.

#### (4) Application preset

The application preset includes parameters such as Measurement, Body Mark, Annotation, and Report that are available to the user. The user can change the settings using the application preset editor.

The application preset values at the time of shipment can be returned to those at the time of shipment at any time even if the values have been changed. Note, however, that if the values are returned to those at the time of shipment, the settings specified by the user are deleted. In order to prevent this information from being deleted, save it to external storage media.

(5) Imaging preset

The imaging preset includes a group of parameters related to imaging. They are available to the user. However, there is no preset editor. User setting can be performed using the Save function after selecting the imaging parameter. Up to seven imaging presets can be registered for each Exam Type by the user and can be deleted and overwritten. Note, however, that the factory setting that is contained in each Exam Type cannot be deleted or overwritten.

Imaging parameters can be preset independently for Fund., THI, CHI, Color, Power, etc.

The 2D-IP is equivalent to B-IP in the previous system. There are five IP Types (A to E) and eight IP Indexes (1 to 8). Parameters such as the dynamic range value in 2D-IP are stored separately (in a separate file) from the imaging preset parameters.

(6) 3D preset

The 3D Preset consists of the following three presets. Although these presets have been set at the factory, they can be changed by the user. These presets can be set for each Exam Type and each Volume Type.

- Initial display preset
- Operation preset
- Reconstruction preset

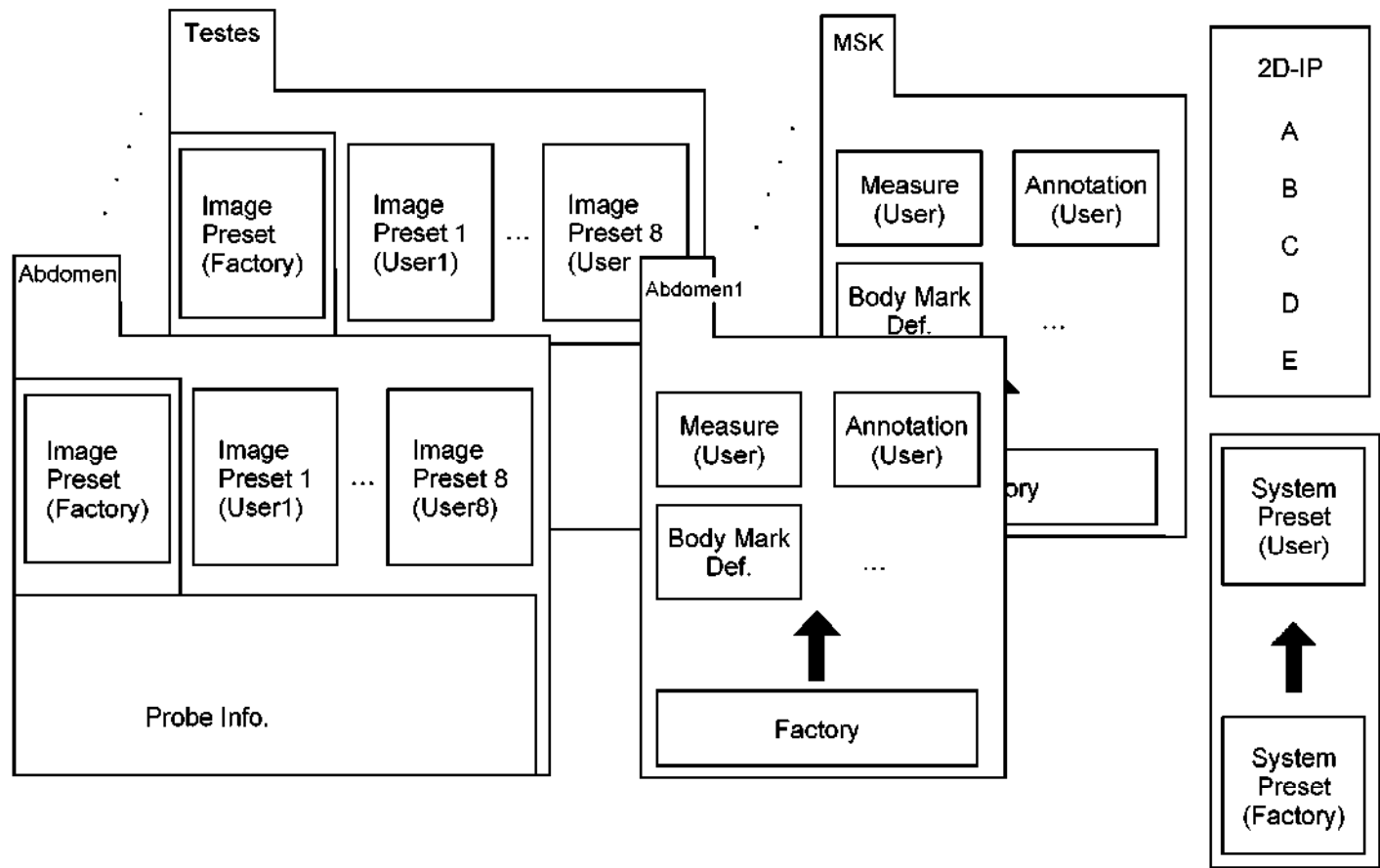
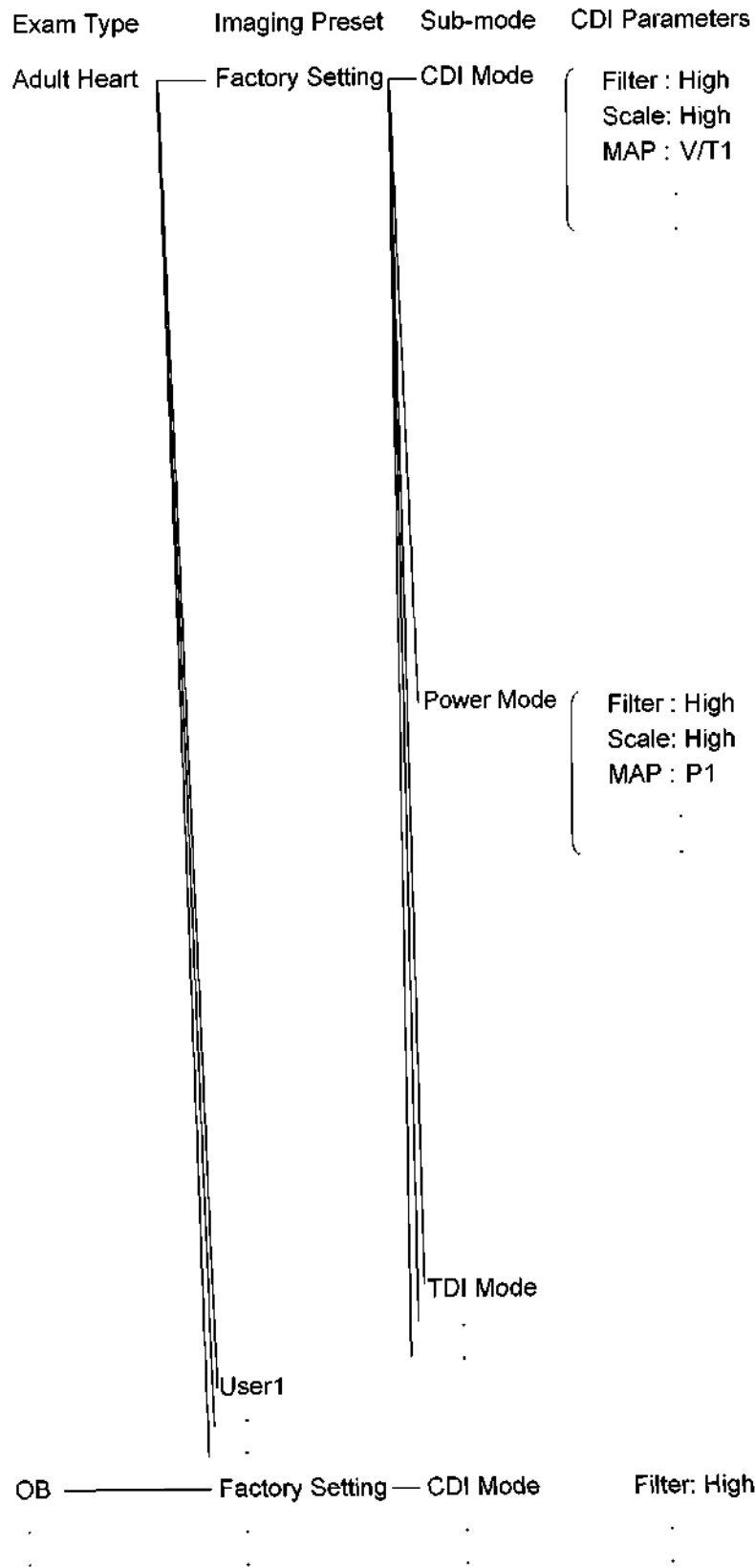


Figure 11-1 Preset structure



(Note that the CDI parameters are only examples and not recommended values.)

Figure 11-2 Imaging preset structure

## 11.2 Setting and Changing Presets

- (1) Preset selection on the Patient Information screen

### **Exam Type**

Adult Heart	▽
-------------	---

The user selects an Exam Type on the Patient Information screen.

Usually, the Exam Type used for the previous patient is displayed initially on the Patient Information screen. However, if an Exam Type has been saved using Application Preset Editor, the saved Exam Type is displayed as the default.

If the displayed Exam Type is acceptable, click the [CONFIRM Start] button.

To change the displayed Exam Type, select the desired Exam Type from the drop-down menu and click the [CONFIRM Start] button.

The transducer, imaging preset, and application preset are set automatically according to the selected Exam Type.

Note that the Exam Type selected on the Patient Information screen is also set as the DICOM Exam Type.

- Exam Type Preset Setting

When an Exam Type is selected, the corresponding Transducer, Imaging Preset, and Application Preset are set automatically.

No.	Exam Type	Transducer (General Used)	Imaging Preset	Application Preset.
1	Abdomen	PVT-375AT	Abdomen	Abdomen1
2	Carotid	PLT-704AT	Carotid	Carotid
3	Thyroid	PLT-805AT	Thyroid	Thyroid
4	Breast	PLT-805AT	Breast	Breast
5	OB	PVT-375AT	OB	OB
6	GYN	PVT-375AT	GYN	OB
7	Endovaginal	PVT-661VT	Endo-Vaginal	OB
8	Fetal Heart	PVT-375AT	Fetal Heart	OB
9	Adult Heart	PST-25AT	Adult Heart	Adult Heart1
10	Pediatric Heart	PST-50AT	Pediatric Heart	Pediatric Heart
11	Coronary	PST-50AT	Coronary	Adult Heart1
12	TCD	PST-20CT	TCD	TCD
13	Neo-Head	PST-65AT	Neo-Head	TCD
14	Neo-General	PVT-375AT	Neo-General	Abdomen1
15	Neo-Hip	PLT-704AT	Neo-Hip	Neo-Hip
16	PV Venous	PLT-704AT	PV Venous	PV Upper
17	PV Arterial	PLT-704AT	PV Arterial	PV Lower
18	Digits	PLT-1204AT	Digits	PV Upper
19	MSK	PLT-1204AT	MSK	MSK
20	Prostate	PVT-770RT_E	Prostate	Prostate
21	Kidney	PVT-375AT	Kidney	Abdomen1
22	Testes	PLT-704AT	Tests	Tests
23	OTHER	PVT-375AT	Other	Abdominal
24	M-TEE	PET-510MA	M-TEE	Adult Heart1

Note: This table may be modified in the future without prior notice.

The meaning of each Exam Type (24 total) is given below for reference.

1) Abdomen	General abdomen
2) Carotid	Carotid artery
3) Thyroid	Thyroid gland
4) Breast	Mammary gland
5) OB	Obstetrics
6) GYN	Gynecology
7) Endo-vaginal	Endovaginal
8) Fetal Heart	Fetal circulatory system
9) Adult Heart	General circulatory system
10) Pediatric Heart	Pediatric circulatory system
11) Coronary	Coronary
12) TCD	Transcranial region
13) Neo-Head	Neonatal head
14) Neo-General	General neonatal abdomen
15) Neo-Hip	Neonatal hip
16) PV-Venous	PV vein
17) PV-Arterial	PV artery
18) Digits	Peripheral vessels (fingers)
19) MSK	Orthopedics
20) Prostate	Prostate
21) Kidney	Kidney
22) Testes	Testes
23) OTHER	Other
24) M-TEE	Transesophageal

- Application Preset Setting

The measurements, body marks, and annotations that can be selected in each application preset are given below.

No.	Application Preset	Applicable region	Annotation	Default Anno. Menu	Body Mark	Default Body. Menu	Meas.
1	Abdomen1	Abdomen (for Japan)	Abdomen	Abdomen1	General	Abdomen	Abdomen
2	Abdomen2	Abdomen (for overseas)	Abdomen	Abdomen1	General	Abdomen	Abdomen
3	Adult Heart1	Adult heart	Cardiac	Heart	Cardiac	Cardiac	Cardiac
4	Adult Heart2	Adult heart	Cardiac	Heart	Cardiac	Cardiac	Cardiac
5	Carotid	Cerebral blood vessels	Vascular	Carotid	Other	Carotid	(*2)
6	TCD	Transcranial Doppler	(*1)default	–	Other	Head	(*2)
7	PV Upper	Peripheral blood vessels (upper)	(*1)default	–	Orthop	Shoulder/Arms	(*2)
8	PV Lower	Peripheral blood vessels (lower)	(*1)default	–	Orthop	Body/Legs	(*2)
9	Thyroid	Thyroid	Small Parts	Thyroid	Other	Neck/Mammo	(*2)
10	Breast	Chest	Small Parts	Breast	Other	Neck/Mammo	(*2)
11	Testes	Testes	(*1)default	–	Urology	Testes/Prostate	(*2)
12	OB/Gyn1	Obstetrics /gynecology	OB/Gyn	OB	OB/Gyn	OB	OB/Gyn
13	Prostate	Prostate	(*1)default	–	Urology	Testes/Prostate	(*2)
14	Pelvis	Pelvis	(*1)default	–	Orthop	Body/Legs	(*2)
15	Penile	Penis	(*1)default	–	Urology	Testes/Prostate	(*2)
16	Pediatric Heart	Pediatrics (heart)	Cardiac	P-Heart	Cardiac	Cardiac	(*2)
17	Neo-Hip	Pediatrics (orthopedics)	(*1)default	–	Orthop	Body/Legs	(*2)
18	MSK	Musculoskeletal system	(*1)default	–	Orthop	Shoulder/Arms	(*2)
19	CHI	Contrast medium	CHI	CHI	CHI	Abdomen	TIC

Note: This table may be modified in the future without prior notice.

(\*1): Only the arrow annotation is displayed on the touch panel.

(\*2): No measurement items are displayed on the touch panel.



(2) Changing the imaging preset or application preset during an examination

To change the imaging preset or application preset after clicking the [Start] button on the Patient Information screen, press the [Preset] switch on the touch panel, select the Imaging Preset page or Application Preset page by pressing the corresponding tab, and select the desired preset.

- When the imaging preset is changed

A dialog is displayed. The application preset and the transducer are not affected by the change of the imaging preset.

- When the application preset is changed

No dialog is displayed. The preset is changed directly. The imaging preset and the transducer are not affected by the change of the application preset.

- \* If previous patient information is loaded on the Patient Information screen and the Exam Type is changed before the [Start] button is clicked, the imaging preset, application preset, and transducer setting are changed together accordingly.

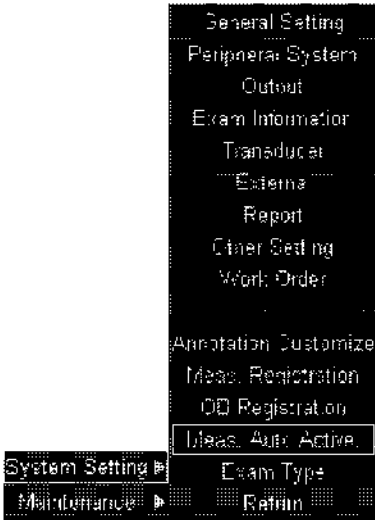
11.3 Preset Editors

The system preset and application preset editors are described in this subsection.  
(There is no imaging preset editor because saving is performed on the touch panel.)

(1) System Preset editor (not applicable to Exam Type)

The system preset editor is opened by clicking "System Setting" in the popup menu. The submenu shown below is displayed on the monitor. Select an item in this submenu to open the editor.

<<Popup menu>>



<<Example of the System Preset editor: "General Setting">>

The screenshot shows the 'General Setting' window with the following details:

- Organization:** Organization Name: TOSHIBA (with a Remove button), System Location: JAPAN, Date: 2017 / 07 / 10, Time: 18 : 16 : 22.
- Format:** Height: cm (selected) / in, Weight: kg (selected) / lb, Date Format: yyyy/MM/dd, Time Format: h:mm:ss tt.
- Trackball:** Trackball Sensitivity: Slow (selected) / Fast.

Buttons at the bottom right: Save, Quit.

- Functions and locations of the Save and Quit buttons  
(Common to all the pages of the System Preset Editor)

**Save :** Saves the current settings. No confirmation message is displayed. To enable all of the settings, restart the system (restarting is not required for some setting items, however be sure to restart the system).

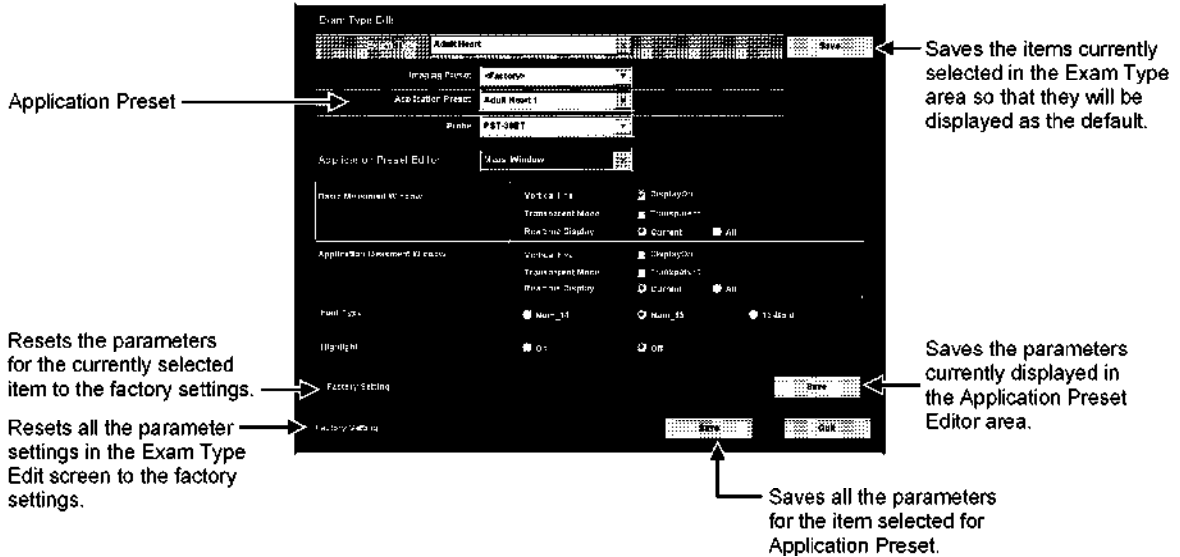
**Quit :** Closes the editor screen.

- Addition of preset items for service engineers  
(Common to all the pages of the System Preset Editor)

When the service key ([Shift] + [<]) is pressed with the System Preset Editor screen displayed, the preset items for service engineers are displayed additionally. The preset items for service engineers disappear when the Editor screen is closed by pressing [Quit]. To display the preset items for service engineers on a different page of the System Preset Editor, press the service key ([Shift] + [<]) again.

(2) Exam Type editor

The Exam Type editor starts up when the Exam Type button in the popup menu is clicked. The following screen is displayed on the monitor.



At the time of shipment, each Exam type has only one Factory Setting. (The user can create presets.)

Select the imaging preset, application preset, and transducer that correspond to the selected Exam Type and click [Save] at the right of the Exam Type field to set them.

- Exam Type : Can be selected from the items set at the time of shipment.
- Imaging Preset : The imaging preset related to the Exam Type can be selected. Presets defined by the user are also displayed here. If the Exam Type is changed, the imaging preset is also changed correspondingly.
- Application Preset: Can be selected from the list of all application presets. If the Exam Type is changed, the application preset is also changed accordingly.
- Probe : Can be selected from all transducers. If the Exam Type is changed, the setting for Probe is also changed correspondingly.

### (3) Application Preset editor

This editor is started up in the same manner as the Exam Type editor in (2). Refer to the figure.

To edit an application preset, select the desired application preset and also select the item group such as 2D-Meas. etc. Then set the parameters.

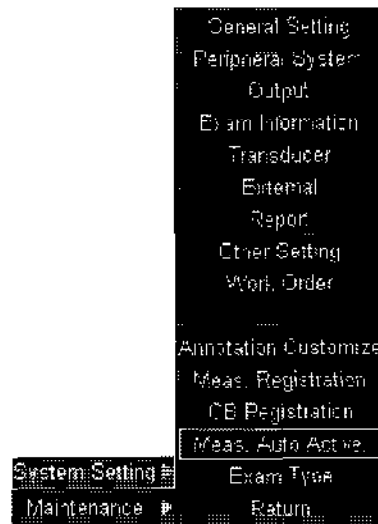
Depending on the application preset, some item groups are not displayed (for example, OB Calc is displayed only when the OB application preset is selected).

- [Save]  
(located in the middle) : Saves the parameters for each item group.
- [Save]  
(located at the bottom) : Saves all of the parameters for all item groups (in particular, all of the parameters for the application presets) at one time.
- [Factory Setting]  
(located at the second position from the bottom) : Returns the parameter settings to those at the time of shipment.
- [Factory Setting]  
(located at the bottom) : Returns the parameter settings for all item groups to those at the time of shipment.

#### 11.4 Description of Preset Parameters

The menu shown below is displayed in the popup menu.

Example screens of each editor are shown.



## (1) General settings

General Setting

Organization

Organization Name TOSHIBA Remove

System Location JAPAN

Date 2004 / 09 / 07 Time 21 : 02 : 01

Format

Language English

KeyBoard English

Height  cm  in Weight  kg  lb

Date Format yyyy/MM/dd Time Format h:mm:ss tt

Trackball

Trackball Sensitivity Slow Fast

Save Quit

Title	Setting
Organization Name	The name set here is displayed in the ID area. The user can add items.
Remove	Used to delete an organization name from the list.
System Location	The hospital address etc. is entered here. (This is used in the maintenance menu.)
Date	The date is entered here.
Time	The time is entered here.
Language (servicing)	The language can be selected here (when multiple languages are supported). However, the type keyboard is not set here.
KeyBoard (servicing)	The keyboard-supported language can be selected.
Height	The unit used for the patient height on the Patient Information screen is set here.
Weight	The unit used for the patient weight on the Patient Information screen is set here.
Data Format	The format for the date displayed in the ID area is set here.
Time Format	The format of the time displayed in the ID area is set here.
Trackball Sensitivity	The sensitivity of the trackball is set here.

## (2) Peripheral System

Peripheral System

Freeze at VIDEO PLAY	<input checked="" type="radio"/> With VIDEO Pause	<input type="radio"/> Without VIDEO Pause	
Freeze at VIDEO REC	<input checked="" type="radio"/> With VIDEO Pause	<input type="radio"/> Without VIDEO Pause	
VIDEO Counter Display	<input checked="" type="radio"/> On	<input type="radio"/> Off	
VIDEO Maker	<input checked="" type="radio"/> Panasonic	<input type="radio"/> Panasonic(DVD)	<input type="radio"/> SONY
	<input type="radio"/> Minolta	<input type="radio"/> Other	

Title	Setting
Freeze at VIDEO PLAY	Used to set whether or not the VCR is paused by pressing Freeze during VCR playback.
Freeze at VIDEO REC	Used to set whether or not the VCR is paused by pressing Freeze during VCR recording.
VIDEO Counter Display	Used to set whether or not the VCR counter is displayed.
VIDEO Maker	Used to set the VCR manufacturer.



## (3) OUTPUT



Title	Setting
Clip Store Format	The dynamic image recording format (AVI or DICOM) can be selected here.
Sono Printer (B/W) (servicing)	A B/W printer can be set here. The list includes the printers recommended by Toshiba.
Sono Printer (Color) (servicing)	A color printer can be set here. The list includes the printers recommended by Toshiba.
DICOM Printer (servicing)	A DICOM printer can be set here. The list includes the DICOM printers set in the maintenance. The output is performed to the DICOM printer set here by operating the switches on the touch panel.
DICOM Server (servicing)	The DICOM server can be set here. The list includes the DICOM servers set in the maintenance. The output is performed to the DICOM server set here by operating the switches on the operating panel.
Report Server (servicing)	The server for DICOM SR can be set. This item is displayed only for the systems in which the DICOM option is installed.

The parameters other than Clip Store Format are provided for use by service engineers only.

## (4) Exam Information (System Preset)

The screenshot displays the 'Exam Information' system preset editor. It features a list of six fields, each with a text input area and a 'Remove' button:

- Operator Name
- Perform Physician
- Refer Physician
- Request Department
- Emergency ID
- Emergency Name

At the bottom of the screen, there are three buttons: 'Back to Setting', 'Save', and 'Quit'.

Title	Setting
Operator Name	Name of the operator. This is displayed on the Patient Information screen. The user can add items using the preset editor.
Perform Physician	Name of the physician who reads the ultrasound images. This is displayed on the Patient Information screen. The user can add items.
Refer Physician	Referring doctor (in the same hospital or satellite hospital). This is displayed on the Patient Information screen. The user can add items using the preset editor.
Request Department	Department requesting the examination. This is displayed on the Patient Information screen. The user can add items using the preset editor.
Remove	Used to delete items from the list using the preset editor.
Emergency ID (servicing)	<p>A special character can be set as the end character of the ID for emergency patients.</p> <p>Unique character string : An arbitrary character can be set in the preset.</p> <p>Arbitrary character string : An arbitrary character can be set in the preset.</p>
Emergency Name (servicing)	<p>A special character can be set as the end character of the name for emergency patients.</p> <p>Unique character string : An arbitrary character can be set in the preset.</p> <p>Arbitrary character string : An arbitrary character can be set in the preset.</p>



## (6) External

External				
Alpha-Protocol	COM Port	<input type="radio"/> Net	<input checked="" type="radio"/> COM1	<input type="radio"/> COM2
Card Reader	Search ID	<input checked="" type="radio"/> On	<input type="radio"/> Off	
3D	Positioning Sensor	<input checked="" type="radio"/> On	<input type="radio"/> Off	
		<input type="button" value="Save"/> <input type="button" value="Quit"/>		

Title		Setting
Alpha-Protocol	COM Port	Used to select the COM port for the Alpha protocol.
Card Reader	Search ID	Used to select whether or not to search the examination schedule acquired from the MWM for the data items that match the card reader information and to load them as patient information.
3D	Positioning Sensor	Used to select whether or not the 3D position sensor is used.

(7) Report

The 'Report' window is divided into several sections. The top section has 'Button', 'Save to', 'MO', 'ED', and 'Hide' options. Below this is a section with 'Send', 'Send[DCOM]', and 'Hide' options. The middle section contains input fields for 'IP Address', 'Computer Name', 'Shared folder name', 'Domain Name', 'User Name', 'Password', and 'Confirm password'. The bottom section is labeled 'Destination' and includes 'Send[DCOM]', 'MO', 'Server', and 'ED-F' options. 'Save' and 'Quit' buttons are located at the bottom right.

Refer to the installation manual for the USDI-772C (2C708-709EN).

(8) Work Order

The 'Work Order' window is organized into three main columns. The left column is 'Exam Type Linking'. The middle column is 'Work Order Description' and contains a list of exam types: Abdomen, Carotid, Thyroid, Breast, OB, GYN, Endo-Vaginal, Fetal Heart, Adult Heart, and Pediatric Heart. The right column is 'Exam Type' and contains dropdown menus for each of these exam types. On the far right, there are navigation buttons: 'Top Page', 'Previous', 'Next', 'Last Data', and 'Last Page'. 'Save' and 'Quit' buttons are at the bottom right.

Refer to the installation manual for the USDI-772C (2C708-709EN).

## (9) Other Setting



Title	Item	Description
2D Mode Change Method	Simple Single	When the 2D mode switch is pressed, Dual display or PW display is returned to Single display with the color mode and zoom settings retained. Example: Dual display for CDI → Single display for CDI
	2D Single	When the 2D mode switch is pressed, the display is returned to 2D Single display with color mode and zoom set to OFF.
ANGLE COR	0 degree	The angle display of the Doppler marker is switched alternately to 0° and the current angle value every time the Angle Cor dial is pressed.
	60 degree	The angle display of the Doppler marker is switched in the order 0° → 60° → 120° every time the Angle Cor dial is pressed.
Auto Refresh on Unfreeze	Enable	The [QuickScan Update] function is executed automatically when the freeze status is canceled.
	Disable	The [QuickScan Update] function is not executed automatically when the freeze status is canceled.
SH Display	This item must be set to Disable at all times.	
Gain Comp w/o CHI	Enable	When the acoustic power is changed, the 2D gain is also corrected automatically.
	Disable	When the acoustic power is changed, the 2D gain remains as is.
Security Mode*	Enable	The security function (HIPAA) for protecting the patient information is set to ON.
	Disable	The security function (HIPAA) for protecting the patient information is set to OFF.

\* The settings take effect when the system is restarted after [Save] is pressed.

## (10) Appl Meas.

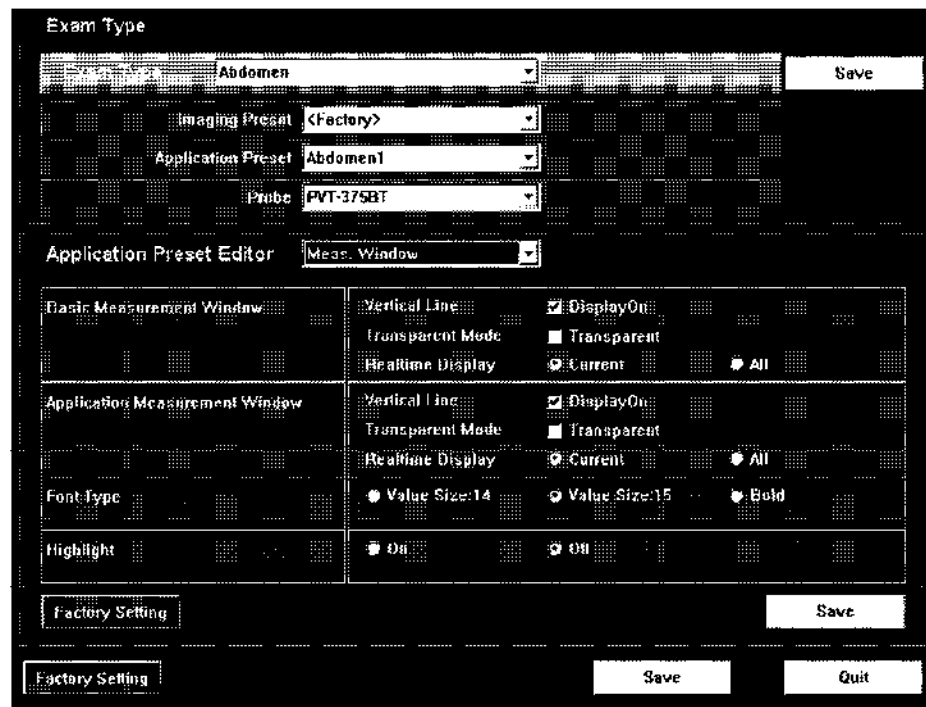
The screenshot shows a software interface titled "Exam Type". At the top, there is a dropdown menu for "Exam Type" set to "Adult Heart" and a "Save" button. Below this are three more dropdown menus: "Imaging Preset" set to "<Factory>", "Application Preset" set to "Adult Heart1", and "Probe" set to "PST-30BT". A section titled "Application Preset Editor" has a dropdown menu set to "Appl Meas.". Below this are three rows of settings:

- "Number of Heart Cycles for Heart Rate Measurement" with a numeric input field set to "1".
- "Erase in Cine" with a checked checkbox labeled "Erase On".
- "Background Color" with two radio buttons: "Black" (selected) and "Gray".

At the bottom of the window, there are several buttons: "Factory Setting" (two instances), "Save" (two instances), and "Quit".

Title	Item	Description
Number of Heart Cycles for Heart Rate Measurement	1, 2, 3, 4, 5, 6, 7, 8	Specify the number of cardiac cycles in the measurement range for the heart rate measurement.
Erase in Cine	Erase On	Select whether the measurement marker is displayed or not during frame-advance or scroll playback. <input checked="" type="checkbox"/> : Not displayed <input type="checkbox"/> : Displayed
Background Color	Black Gray	Specify the background color (black or gray) of the measurement display window.

## (11) Meas. Window



Title	Description	
Basic Measurement Window	Vertical Line	Specify whether or not vertical lines are to be displayed in the measurement display window. <input checked="" type="checkbox"/> : Displayed <input type="checkbox"/> : Not displayed
	Transparent Mode	Specify whether the background of the measurement display window is transparent or not. <input checked="" type="checkbox"/> : Transparent <input type="checkbox"/> : Not transparent
	Realtime Display	Specify the display mode of the measurement display window. Current: All the acquired data is displayed in the measurement display window only after the measurement data is fixed. All : All the currently available data is displayed in the measurement display window.



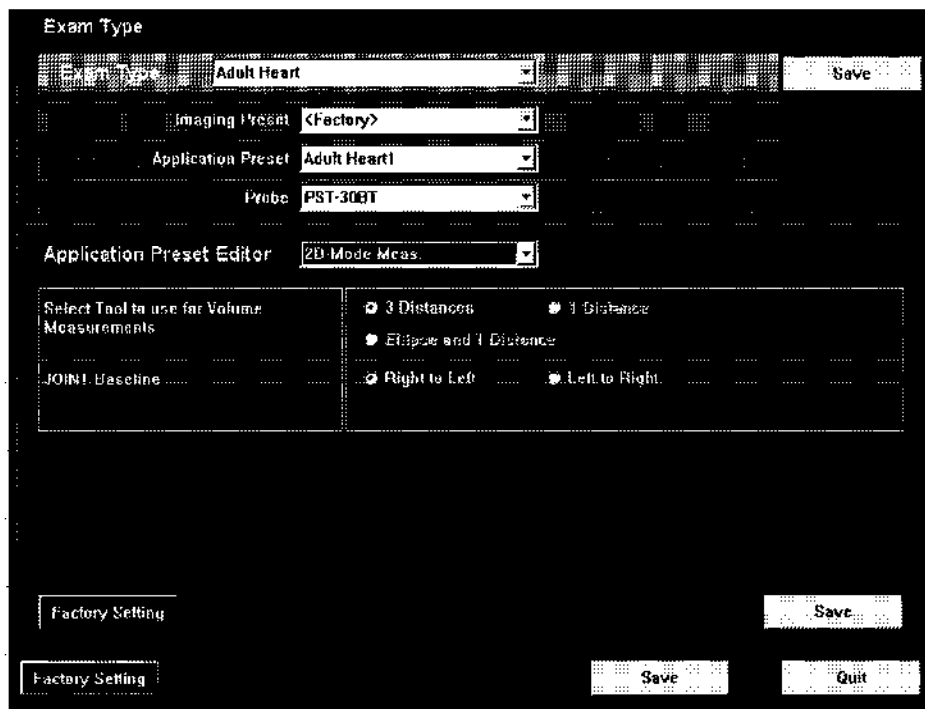
Title	Description
Application Measurement Window	Vertical Line Specify whether or not vertical lines are to be displayed in the measurement display window <sup>1</sup> . <input checked="" type="checkbox"/> : Displayed <input type="checkbox"/> : Not displayed
	Transparent Mode Specify whether the background of the measurement display window is transparent or not. <input checked="" type="checkbox"/> : Transparent <input type="checkbox"/> : Not transparent
	Realtime Display Specify the display mode of the measurement display window. Current: All the acquired data is displayed in the measurement display window only after the measurement data is fixed <sup>2</sup> . All : All the currently available data is displayed in the measurement display window <sup>3</sup> .
Font Type	Specify the font size used in the measurement display window. <sup>1</sup> Value Size:14: The measurement item and unit are 13 pixels and the data is 14 pixels. Value Size:15: The measurement item and unit are 13 pixels and the data is 15 pixels. Bold: All the measurement items, units, and data are 13 pixels in bold.
Highlight	Specify whether or not the measurement result for the last measured item (the item for which the measurement mark is displayed in the window) is highlighted. (The ACT and TIC measurement displays are not highlighted.)* <sup>1</sup>

\*1: This can be set for each Application Preset.

\*2: In vascular measurement, the system operates in "All" mode even when "Current" is selected.

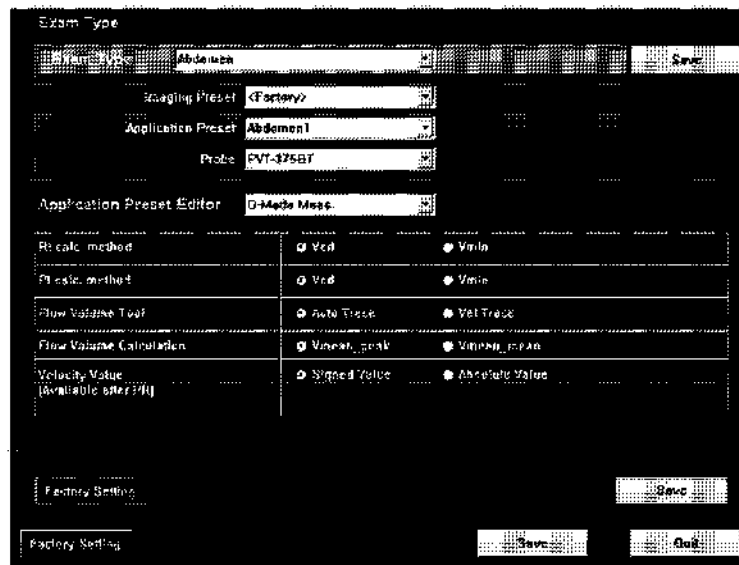
\*3: For OB measurement, the system operates with the "Current" setting even when "All" is selected.

(12) 2D-Mode Meas.



Title	Item	Description
Select Tool to use for Volume Measurements	3 Distances (fixed)	—
JOINT Baseline	Right to Left	The osseous acetabular angle ( $\alpha$ ) is displayed as viewed from the right with respect to the baseline, while the cartilaginous acetabular angle ( $\beta$ ) is displayed as viewed from the left.
	Left to Right	The osseous acetabular angle ( $\alpha$ ) is displayed as viewed from the left with respect to the baseline, while the cartilaginous acetabular angle ( $\beta$ ) is displayed as viewed from the right.

## (13) D-Mode Meas.



Title	Item	Description
RI calc. method <sup>*1</sup>	Ved	RI is calculated using the Ved value.
	Vmin	RI is calculated using the Vmin value.
PI calc. method <sup>*2</sup>	Ved	PI is calculated using the Ved value.
	Vmin	PI is calculated using the Vmin value.
Flow Volume Tool	Auto Trace	[Range] (Auto Trace) is set as the default when the Flow Volume, Vel Trace, or PI measurement is started.
	Vel Trace	[Continuous Trace] (Freehand Trace) is set as the default when the Flow Volume, Vel Trace, or PI measurement is started.
Flow Volume Calculation	Vmean-peak	The flow volume is calculated using the time-average value obtained by tracing the peak points (border) of the Doppler waveform.
	Vmean-mean	The flow volume is calculated using the time-average value obtained by tracing the mean points (center of gravity) of the Doppler waveform.
Velocity Value [Available after PR] <sup>*3</sup>	Signed Value	The measured velocity values are output with plus/minus signs.
	Absolute Value	The measured velocity values are output as absolute values.

\*1: This setting is common to RI calculations in the velocity trace, RI trace, and flow volume measurements in the basic measurement mode.

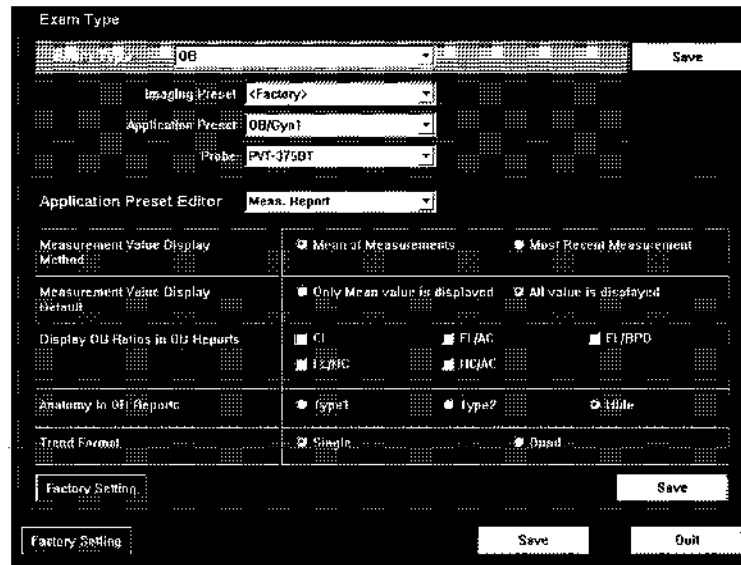
\*2: This setting is common to PI calculations in the velocity trace, PI trace, and flow volume measurements in the basic measurement mode.

\*3: Measurement tool available for Velocity Value

Measurement Tool	Preset Setting Signed value	Preset Setting Absolute value	
Velocity (DvelocityTool)	Vel PG	Vel PG	= abs (Vel)
Accel measurement (DaccelerationTool)	Accel	Accel	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
	Time	Time	
	PG1 PG2	PG1 PG2	
VelocityTrace (DsplineTool), (DtraceTool), (DlineTool), (DheartCycleTool)	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
	Vm	Vm	= abs (Vm)
	Vm_peak	Vm_peak	= abs (Vm_peak)
	Vm_mean	Vm_mean	= abs (Vm_mean)
	PI	PI	
	RI S/D	RI S/D	
VelocityTrace (Cardiac) (DsplineTool), (DtraceTool), (DlineTool), (DheartCycleTool)	VP (Vmax)	VP (Vmax)	= abs (Vmax)
	VM	VM	= abs (VM)
	VTI	VTI	= abs (VTI)
	PPG	PPG	
	MPG	MPG	
	HR (ECG)	HR (ECG)	
RI (DRITool)	RI	RI	
	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)

Measurement Tool	Preset Setting Signed value	Preset Setting Absolute value	
PI	PI	PI	
	Vmax	Vmax	= abs (Vmax)
	Vmin	Vmin	= abs (Vmin)
	Ved	Ved	= abs (Ved)
	Vm	Vm	= abs (Vm)
	Vm_peak	Vm_peak	= abs (Vm_peak)
S/D (DSDTool)	S/D	S/D	
	Vmax	Vmax	= abs (Vmax)
	Ved	Ved	= abs (Ved)
dP/dt measurement Tool	dP/dt	dP/dt	
	dt	dt	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
dP/dt (-1,-3) measurement Tool	dP/dt	dP/dt	
	dt	dt	
	Vel1	Vel1	= abs (Vel1)
	Vel2	Vel2	= abs (Vel2)
DcT measurement Tool	Vel	Vel	= abs (Vel)
	DcT	DcT	
	PHT	PHT	
Velocity Trace with DcT measurement Tool	VP	VP	= abs (VP)
	VM	VM	= abs (VM)
	PPG	PPG	
	MPG	MPG	
	DcT	DcT	
	PHT	PHT	

## (14) Meas Report

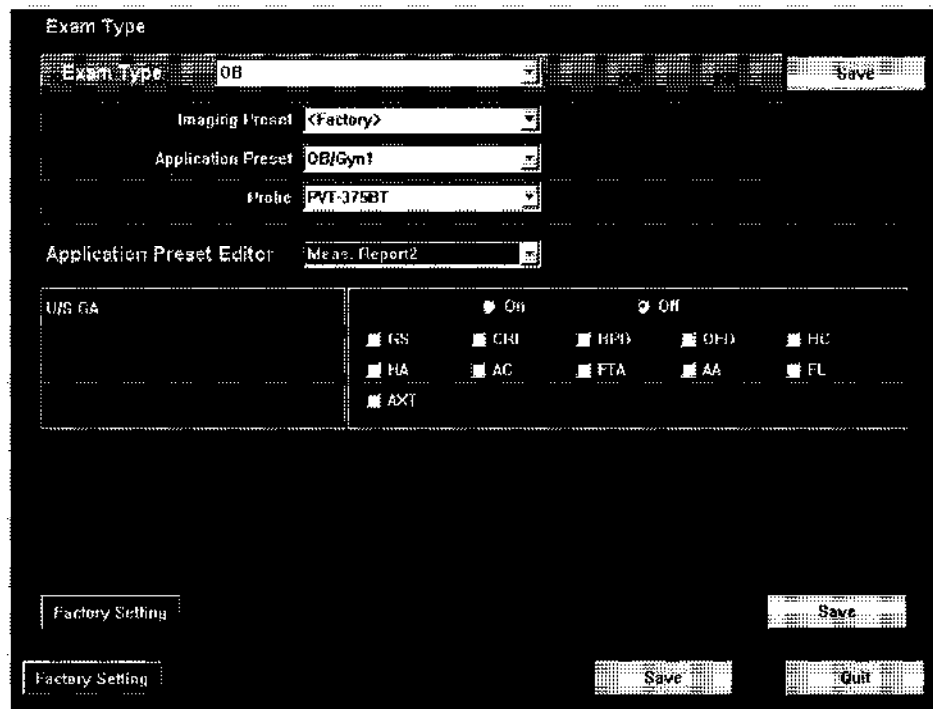


Title	Item	Description
Measurement Value Display Method	Mean of Measurements	The mean of the measurements is displayed as the result in the Report screen.
	Most Recent Measurement	The most recent measurement is displayed as the result in the Report screen.
Measurement Value Display Default	Only Mean value is displayed <sup>*1</sup>	Only the mean of the measurements is displayed when the Report screen is started.
	All value is displayed	All the measured values and their mean are displayed when the Report screen is started.
Display OB Ratios in OB Reports	CI	Specify whether the CI result is displayed or not on the Report screen.
	FL/AC	Specify whether the FL/AC result is displayed or not on the Report screen.
	FL/BPD	Specify whether the FL/BPD result is displayed or not on the Report screen.
	FL/HC	Specify whether the FL/HC result is displayed or not on the Report screen.
	HC/AC	Specify whether the HC/AC result is displayed or not on the Report screen.
Anatomy in OB Reports	Type 1	The anatomy button is displayed on the Report screen in the Type1 format. <sup>*2</sup>
	Type 2	The anatomy button is displayed on the Report screen in the Type2 format. <sup>*2</sup>
	Hide	The anatomy button is not displayed on the Report screen.
Trend Format	Single	The trend graph is displayed in the Single format.
	Quad	The trend graph is displayed in the Quad format.

\*1: When Carotid 1 or Carotid 2 is selected for Application Preset, "Measurement Value Display Default" is fixed to "Only Mean value is displayed".

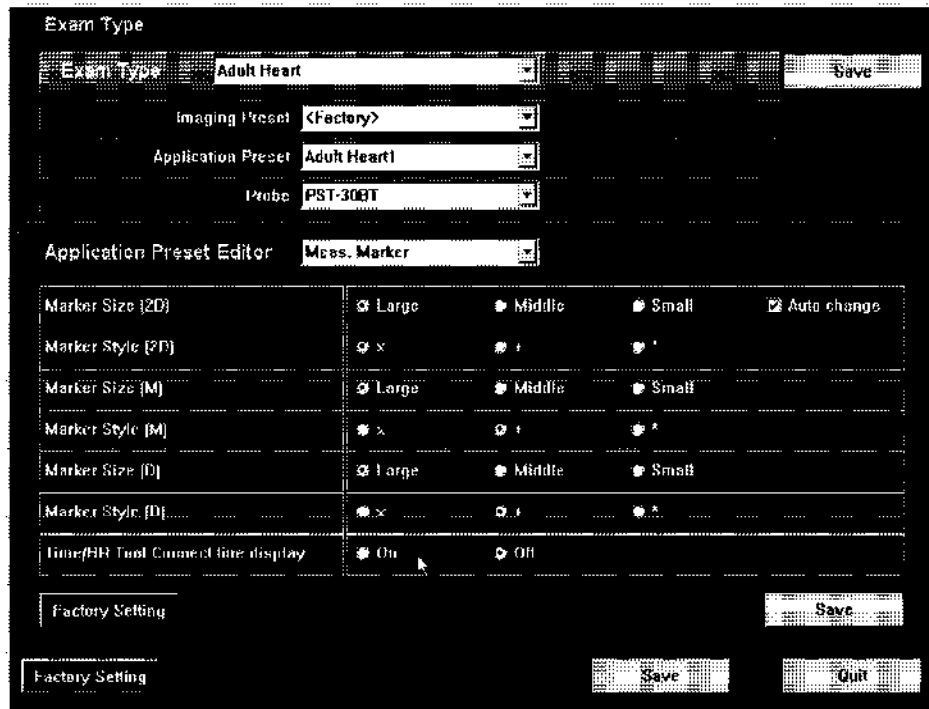
\*2: For display of Type 1 and Type 2, refer to subsection 12.9.5 "Anatomy function" of the operation manual <measurement volume>.

(15) Meas. Report2



Title	Item	Description
U/S GA	On	U/S GA is calculated.
	Off	U/S GA is not calculated.
	GS	Select the items to be used for calculating U/S GA.
	CRL	
	BPD	
	OFD	
	HC	
	HA	
	AC	
	FTA	
	AA	
	FL	
	AXT	

(16) Meas. Marker



Title	Item	Description
Marker Size [2D]	Large, Middle, Small	Specify the default size of the marker for 2D measurement.
	Auto-change	Specify whether the marker is enlarged or not when the distance between the start point and end point exceeds a certain distance.
Marker Style [2D]	x, +, *	Specify the shape of the marker for 2D measurement.
Marker Size [M]	Large, Middle, Small	Specify the default size of the marker for M-mode measurement.
Marker Style [M]	x, +, *	Specify the shape of the marker for M-mode measurement.
Marker Size [Doppler]	Large, Middle, Small	Specify the default size of the marker for Doppler measurement.
Marker Style [Doppler]	x, +, *	Specify the shape of the marker for Doppler measurement.
Time/HR Tool Connect line display	On, Off	Specify whether or not the horizontal line connecting the paired vertical lines in time measurement or HR measurement is to be displayed.



## (17) Body Mark



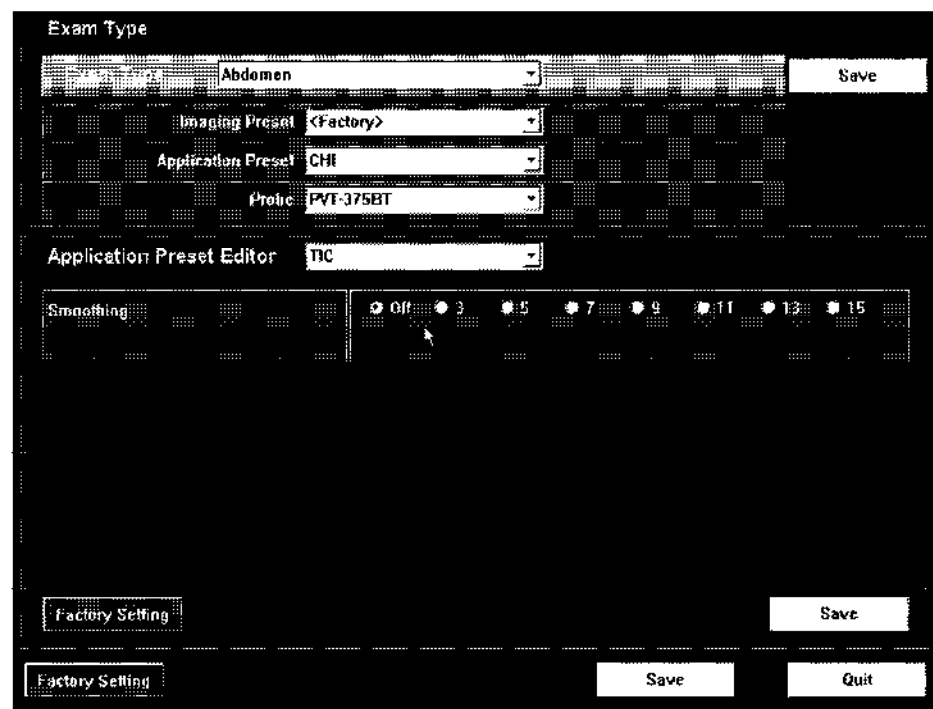
Title	Item	Description
BodyMark Size	Regular	Regular size
	Extended	1.5-times as large as the regular size
Inherit	Inherit ON	Select this check box to cause the body mark to remain displayed when another image mode is selected.
Erase in Freeze Off	Erase	Specify whether the body mark is erased or not when the image is unfrozen. <input checked="" type="checkbox"/> : The body mark is erased. <input type="checkbox"/> : The body mark is not erased.

## (18) Annotation



Title	Item	Description
Erase in Mode change	Erase	The annotation is erased when another image mode is selected.
	Not Erase	The annotation is not erased when another image mode is selected.
	Inherit	When image mode is changed from 2D to 2D+PW, the annotation is displayed at the default position on the 2D+PW image.
Erase in Freeze off	Erase	Specify whether or not the annotation is erased when image freezing is released. <input checked="" type="checkbox"/> : The annotation is erased. <input type="checkbox"/> : The annotation is displayed.
Cursor Type	Arrow	The arrow cursor is displayed when the annotation function is started.
	I Cursor	The I-beam cursor is displayed when the annotation function is started.

(19) TIC



Title	Item	Description
Smoothing	Off, 3, 5, 7, 9, 11, 13, 15	Specify the smoothing of the graph line. Off : Smoothing is not performed. 3 to 15 : Smoothing is performed based on the specified number of points.

## (20) OB Calc.

For the OB measurement items for which two or more authors are registered, the author to be used can be selected from a drop-down menu.

The screenshot shows the 'Exam Type' dialog box for 'OB Calc.'. The 'Exam Type' is set to 'OB'. The 'Imaging Preset' is '<Factory>', 'Application Preset' is 'OB/Gyn1', and 'Probe' is 'PVT-375BT'. The 'Application Preset Editor' is 'OB Calc.'. The 'Gestational Age' section contains a grid of dropdown menus for various measurements: GS (Tokyo), CRL (Tokyo), BPD (JSUM), OFD (Chitty), HC (Hadlock), HA (Chitty), THD (Hansmann), AC (JSUM), APTD (Tokyo), FTD (Tokyo), FTA (Osaka), AA (Chitty), APAD (Merz), TAB (Merz), FL (JSUM), OOD (Jeanty), Humerus (Jeanty), Clavicle (Yarkoni), Kidney (Bertagnoli), Radius (Merz), Ulna (Jeanty), Tibia (Jeanty), Fibula (Merz), C-Fl (Goldstein), and Foot (Mercer), AXI (Tokyo). The 'Default Graph' is 'EFW'. The 'EFW' dropdown is set to 'JSUM [BPD,AC,FL.]' and the 'Extrapolated on' checkbox is checked. There are 'Factory Setting', 'Save', and 'Quit' buttons at the bottom.

**Gestational Age :** Specify the author of the formula to be used for calculating the gestational age. The specified author is also used as the default for generating the trend graph.

**Default Graph :** Specify the item to be displayed as the default for trend graph creation.

**EFW :** Specify the author of the formula to be used for calculating the estimated fetal weight.

**Extrapolated on :** Check this to extend the EFW display range.

Title	Item	Formal nomenclature	Author
Gestational Age	GS	Gestational sac diameter	Hellman Rempen Tokyo
	CRL	Crown-rump length	ASUM-V1 ASUM-V2 Hadlock Hansmann JSUM Jeanty Nelson Osaka Rempen Robinson Tokyo

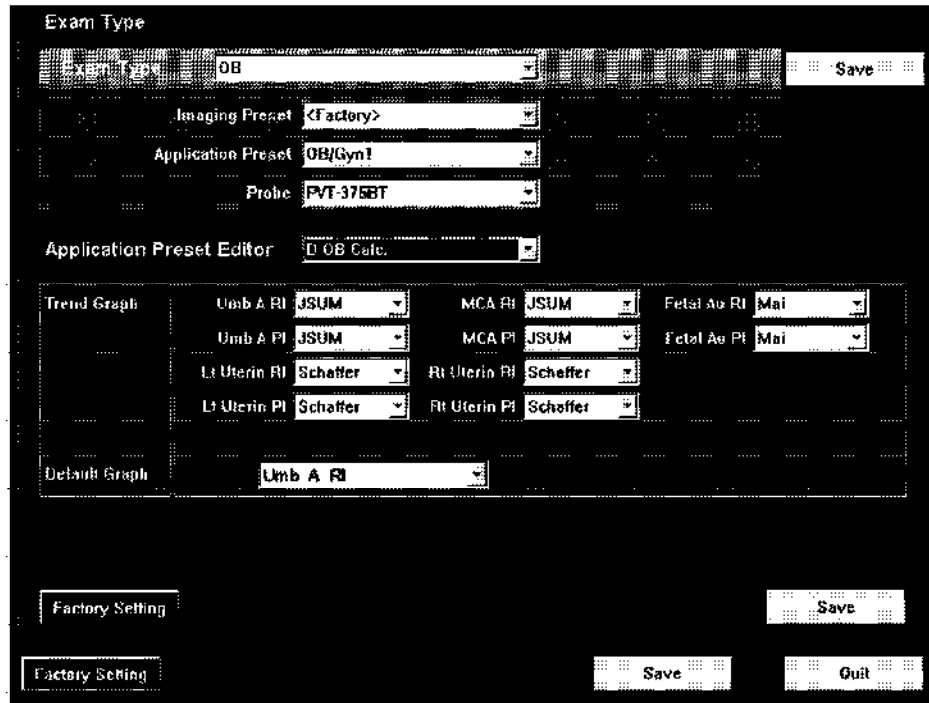
Title	Item	Formal nomenclature	Author
Gestational Age	BPD	Biparietal diameter	ASUM-V1 ASUM-V2 CFEF Chitty (0-0) Chitty (0-1) Hadlock Hansmann JSUM Jeanty Kurtz Merz Nicolaides Osaka Rempen Sabbagh Shepard Tokyo
	OFD	Occipitofrontal diameter	ASUM-V2 Chitty Hansmann Merz Nicolaides
	HC	Head circumference	ASUM-V1 ASUM-V2 CFEF Chitty (pltd) Chitty (drvd) Hadlock Hansmann Jeanty Merz
	HA	Head area	Chitty
	THD	Thoracic diameter	Hansmann
	AC	Abdominal circumference	ASUM-V1 ASUM-V2 CFEF Campbell Chitty (pltd) Chitty (drvd) Deter Hadlock JSUM Jeanty Merz Nicolaides Shepard Tokyo
	APTD	Anteroposterior trunk diameter	Tokyo
	TTD	Transverse trunk diameter	Tokyo
	FTA	Fetal trunk cross-sectional area	Osaka
	AA	Abdominal area	Chitty
APAD	Anteroposterior abdominal diameter	Merz	

Title	Item	Formal nomenclature	Author
Gestational Age	TAD	Transverse abdominal diameter	Merz CFEF
	FL	Femur length	ASUM-V1 ASUM-V2 CFEF Chitty Hadlock Hansmann Hohler JSUM Jeanty Merz Nicolaidis O'Brien Osaka Tokyo Warda
	OOD	Outer orbital diameter	Jeanty Mayden
	Humerus	Humerus	ASUM-V2 Jeanty Merz
	Clavicle	Clavicle length	Yarkoni
	Kidney	Kidney length	Bertagnoli
	Radius	Radius	Merz
	Ulna	Ulna	Jeanty Merz
	Tibia	Tibia	Jeanty Merz
	Fibula	Fibula	Merz
	CER	Cerebellum	Goldstein Hill Nicolaidis
	Foot	Foot length	Mercer
	AXT	APTD*TTD	Tokyo

Title	Item	Formal nomenclature	Author
Gestational Age	Default Graph	Measurement items of the default graph	AA AC APAD AXT BPD CER CRL Clavicle EFW FL FTA Fibula Foot GS HA HC HC (BPD, OFD) Humerus Kidney OFD Radius TAD THD Tibia Ulna
EFW	EFW	Estimated fetal weight	Campbell [AC] Hadlock1 [AC, FL] Hadlock2 [BPD, AC, FL] Hadlock3 [HC, AC, FL] Hadlock4 [BPD, HC, AC, FL] Hansman [BPD, THD] Merz1 [BPD, AC] Merz2 [AC] JSUM [BPD, AC, FL] Shepard [BPD, AC] Tokyo [BPD, APTD, TTD, FL] Osaka [BPD, FTA, FL]

(21) D-OB Calc.

This menu is used to specify the default author data to be displayed on the trend graph for Doppler OB measurement.



Trend Graph : Specify the author to be displayed as the default for trend graph creation.

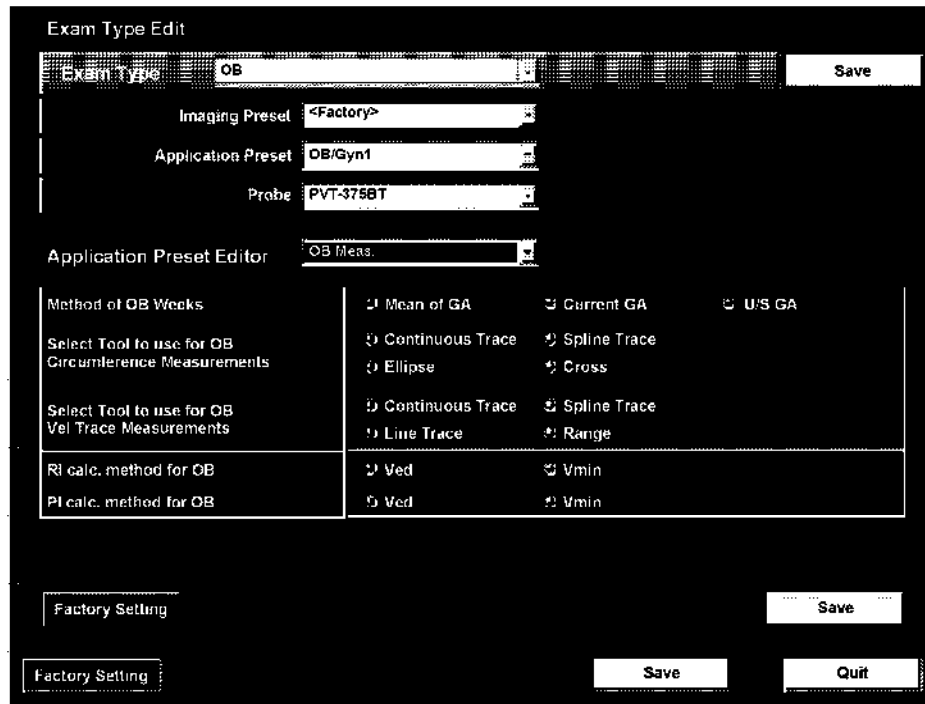
Default Graph : Specify the item to be displayed as the default for trend graph creation.

Title	Item	Formal nomenclature	Author
Trend Graph	Umb A RI	Umbilical artery RI	Mai JSUM Schaffer
	Umb A PI	Umbilical artery PI	Mai Harrington JSUM Schaffer
	MCA RI	Middle cerebral artery RI	Mai JSUM Schaffer
	MCA PI	Middle cerebral artery PI	Mai Harrington JSUM Schaffer



Title	Item	Formal nomenclature	Author
Trend Graph	Fetal Ao RI	Fetal aorta RI	Mai Schaffer
	Fetal Ao PI	Fetal aorta PI	Mai Harrington Schaffer
	Lt Uterin RI	Left uterine artery RI	Schaffer
	Lt Uterin PI	Left uterine artery PI	Schaffer
	Rt Uterin RI	Right uterine artery RI	Schaffer
	Rt Uterin PI	Right uterine artery PI	Schaffer
Default Graph	Default Graph	Measurement items of the default graph	Fetal Ao RI Fetal Ao PI Lt Uterin RI Lt Uterin PI MCA RI MCA PI Rt Uterin RI Rt Uterin PI Umb A RI Umb A PI

(22) OB Meas.



Title	Item	Description
Method of OB weeks	Mean of GA	The mean of the GA measurement results is used to calculate LMP and EDD.
	Current GA	The most recent GA measurement result is used to calculate LMP and EDD.
	U/S GA	U/S GA is used to calculate LMP and EDD.
Select Tool to use for OB Circumference Measurements	Ellipse	Select the tool for the area/circumference measurement (HC, HA, AC, FTA, AA, or TC measurement).
	Continuous Trace	
	Cross	
	Spline Trace	
Select Tool to use for OB Vel Trace Measurements	Continuous Trace	Select the tool for the Vel Trace measurement (UmbA, MCA, Fetal Ao, Lt Uterin, or Rt Uterin measurement).
	Spline Trace	
	Line Trace	
	Range	
RI calc. method for OB	Ved	The Ved value for the measured item is used for RI calculation.
	Vmin	The Vmin value for the measured item is used for RI calculation.
PI calc. method for OB	Ved	The Ved value for the measured item is used for PI calculation.
	Vmin	The Vmin value for the measured item is used for PI calculation.

(23) OB Meas.2

Exam Type

Exam Type: OB [Save]

Imaging Preset: <Factory>

Application Preset: OB/Gyn1

Probe: PVT-376BT

Application Preset Editor: OB Meas.2

Method of AFI:  4 Distance  < 4 Distance

SD Display:  On  Off

GA Calculated by:  Only GA Chart  FG Chart with Clinical Age

Factory Setting [Save]

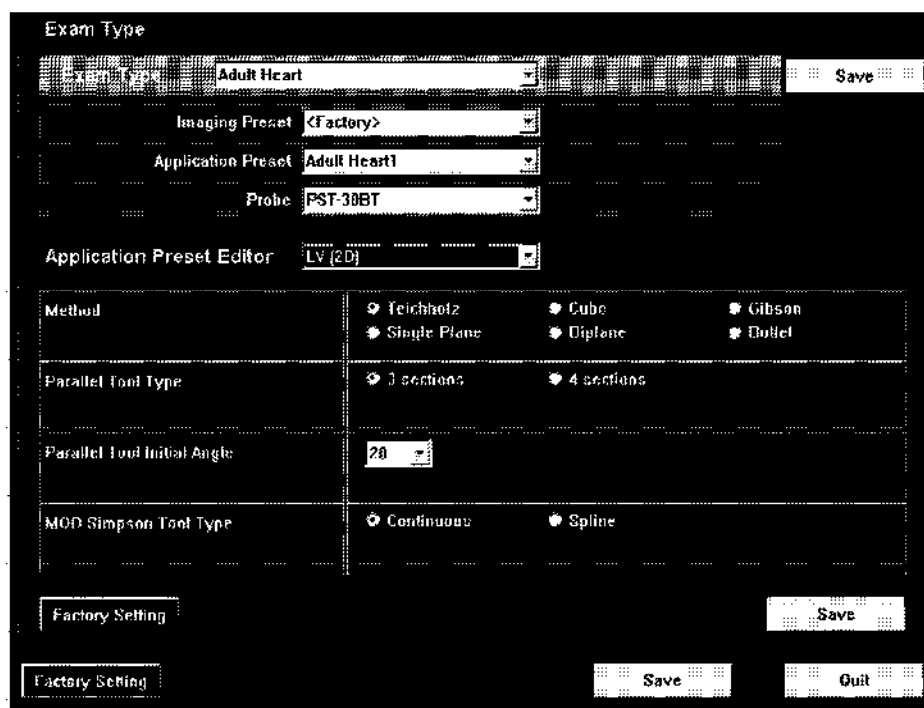
Factory Setting [Save] [Clear]

Title	Item	Description
Method for AFI	4 Distances	AFI is displayed only after all the four distances are measured.
	< 4 Distances	AFI is displayed even before all the four distances are measured.
SD Display	On/Off	Specify whether or not the SD value is displayed in the OB measurement display window.
GA Calculated by	Only GA Chart	<p>If the data type is set to "GA" or "FG + GA", the GA value is calculated based on the GA data regardless of whether or not the clinical age is input.</p> <p>If the data type is set to "FG", the GA value is not calculated before the clinical age is input. Once the clinical age has been input, the GA value is calculated based on the FG data.</p> <p>If the data type is set to "Identical", the GA value is calculated based on the Identical data regardless of whether or not the clinical age is input.</p> <p>The trend graph is generated based on the FG data.</p>
	FG Chart with Clinical Age	<p>If the data type is set to "FG", the GA value is not calculated before the clinical age is input. Once the clinical age has been input, the GA value is calculated based on the FG data.</p> <p>If the data type is set to "GA", the GA value is calculated based on the GA data before the clinical age is input. When the clinical age has been input, the GA value is not calculated.</p> <p>If the data type is set to "FG + GA", the GA value is calculated based on the GA data before the clinical age is input. Once the clinical age has been input, the GA value is calculated based on the FG data.</p> <p>If the data type is set to "Identical", the GA value is calculated based on the Identical data regardless of whether or not the clinical age is input.</p> <p>The trend graph is generated based on the FG data.</p>

The user can view the detailed contents of the two options for "GA Calculated by".

## (24) LV (2D)

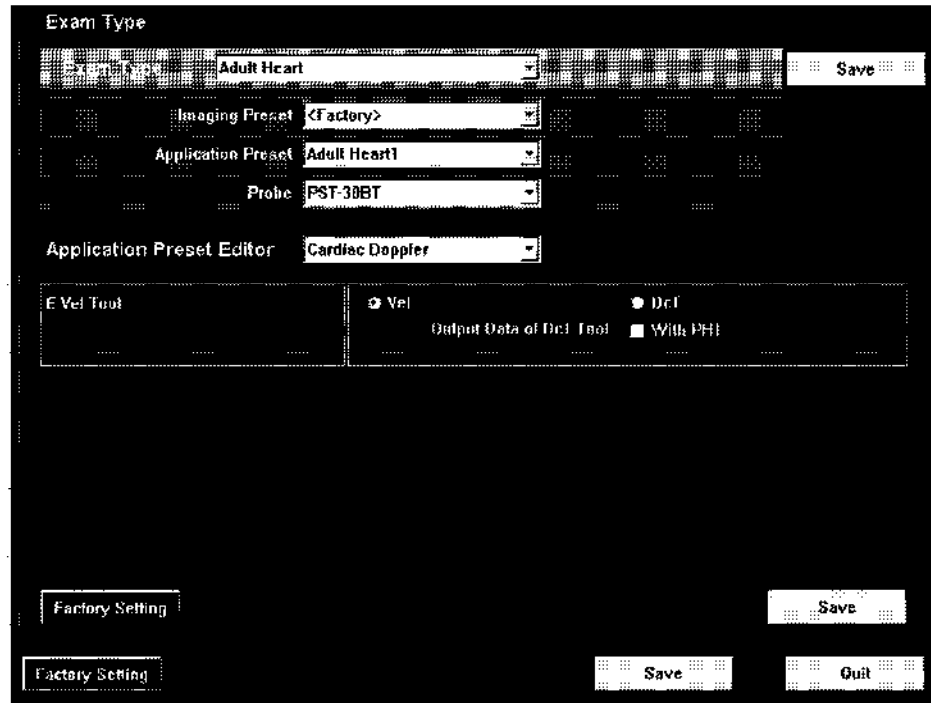
This menu is used to preset the measurement type and the measurement method to be used when 2D-mode LV measurement is started from the Cardiac measurement menu.



Title	Item	Description
Method	Teichholz Cube Gibson Single Plane Biplane Bullet	Select the LV measurement method to be displayed in the application measurement (2D mode) menu.
Parallel Tool Type	3 sections	Three segments (interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) are measured in parallel.
	4 sections	Four segments (RV diameter, interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) are measured in parallel.
Parallel Tool Initial Angle	-90 to 90	The default angle of the measurement marker for parallel measurement can be specified in 10° increments.
MOD Simpson Tool Type	Continuous	The endocardium can be traced freehand for LV measurement (MOD Simpson method).
	Spline	The endocardium can be traced using the spline trace method for LV measurement (MOD Simpson method).

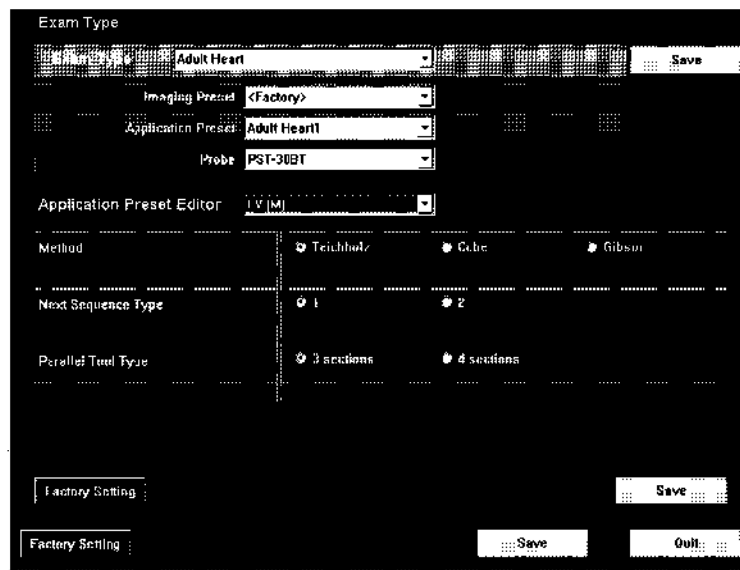
## (25) Cardiac Doppler

This menu is used to preset the measurement method etc, to be used when Doppler-mode measurement is started from the Cardiac measurement menu.



Title	Item	Description
E Vel Tool	Vel	The E wave of the LV inflow is measured using the velocity measurement method.
	DcT	E-wave measurement on the E-wave waveform for LV inflow is performed together with DcT measurement.
	Output Data of DcT Tool <input checked="" type="checkbox"/> With PHT	Specify whether PHT is to be measured together with DcT. <input checked="" type="checkbox"/> : PHT is measured together. <input type="checkbox"/> : PHT is not measured together.

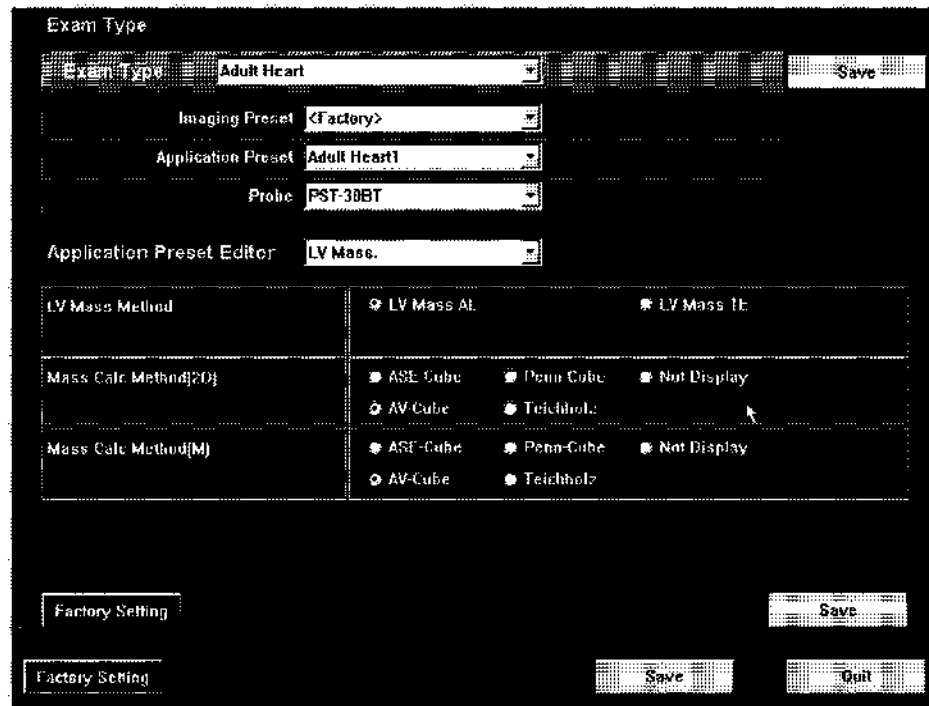
## (26) LV (M)



Title	Item	Description
Method	Teichholz Cube Gibson	Specify the LV measurement method to be displayed in the application measurement (M mode) menu.
Next Sequence Type	1	Each time the <b>Next</b> switch is pressed in LV measurement, the item to be measured next is selected automatically in the range from the interventricular septum to the posterior wall both for end diastole and end systole.
	2	When the <b>Next</b> switch is pressed in LV measurement, the endocardium only is selected as the item to be measured next for end systole.
Parallel Tool Type	3 sections	Three segments (interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) are measured in parallel.
	4 sections	Four segments (RV diameter, interventricular septal thickness, LV endocardial diameter, and LV posterior wall thickness) are measured in parallel.

## (27) LV Mass.

This menu is used to preset the measurement type and the measurement method to be used when LV Mass measurement is started from the Cardiac measurement menu.



Title	Item	Description
LV Mass Method	LV Mass AL LV Mass TE	Specify the LV Mass measurement method to be displayed in the application measurement menu (Extra).
Mass Calc Method [2D]	ASE-Cube Penn-Cube AV-Cube Teichholz	Specify the LV Mass calculation method to be used in the LV measurement (2D mode).
	Not Display	The LV Mass data is not displayed in the measurement display window or on the Report screen.
Mass Calc Method [M]	ASE-Cube Penn-Cube AV-Cube Teichholz	Specify the LV Mass calculation method to be used in the LV measurement (M mode).
	Not Display	The LV Mass data is not displayed in the measurement display window or on the Report screen.



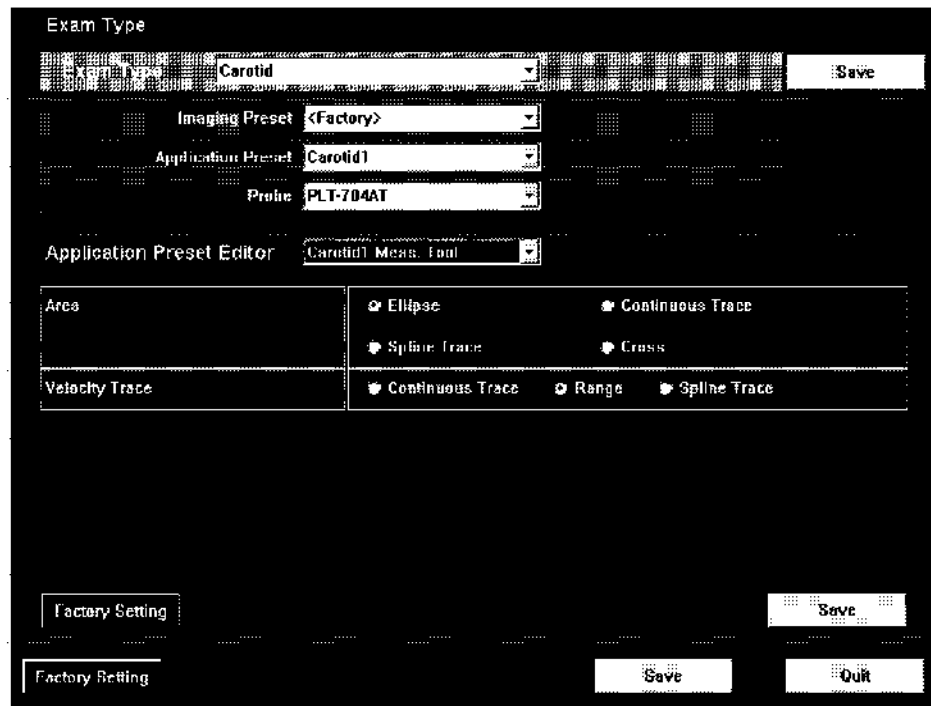
## (28) Carotid1 Doppler



Title	Item	Description
Display type of Velocity <sup>1</sup>	Velocity	The velocity (cm/s) is displayed as the measurement result.
	Frequency	The frequency (kHz) is displayed as the measurement result.
Display items of Velocity Trace <sup>2</sup>	Vmax [Fmax]	Specify the items to be displayed as the results of Velocity Trace measurement. The settings for Vmax [Fmax], Vmin [Fmin], Ved [Fed], and Vmean [Fmean] are fixed to <input checked="" type="checkbox"/> .  <input checked="" type="checkbox"/> : The item is displayed. <input type="checkbox"/> : The item is not displayed.
	Vmin [Fmin]	
	Ved [Fed]	
	Vmean [Fmean]	
	PI	
	RI	
RI calc. method <sup>3</sup>	S/D	
	Ved	RI is calculated based on Ved.
PI calc. method <sup>4</sup>	Vmin	RI is calculated based on Vmin.
	Ved	PI is calculated based on Ved.
Combinations of ICA/CCA	Vmin	PI is calculated based on Vmin.
	CCA	Specify one of the CCA measurement regions for calculating ICA/CCA.
ICA	Specify any number of the ICA measurement regions for calculating ICA/CCA.	

- \*1: [Velocity] is selected as the default.
- \*2: All the items are set to  (to be displayed) as the default.
- \*3: [Ved] is selected as the default.
- \*4: [Vmin] is selected as the default.
- \*5: When "ALL" is selected, setting for ICA is not necessary. Combinations of "Prox-Prox", "Mid-Mid", and "Dist-Dist" are set automatically.

(29) Carotid1 Meas. Tool



Title	Item	Description
Area <sup>*1</sup>	Ellipse	The area is measured using the Ellipse method.
	Continuous Trace	The area is measured using the Continuous Trace method.
	Spline Trace	The area is measured using the Spline trace method.
	Cross	The area is measured using the Cross method.
Velocity Trace <sup>*2</sup>	Continuous Trace	The velocity is measured using the Continuous Trace method.
	Range	The velocity is measured using the Auto Trace method with the range specified.
	Spline Trace	The velocity is measured using the Spline Trace method.

\*1: "Ellipse" is selected at the factory before shipment.

\*2: "Range" is selected at the factory before shipment.

## (30) Carotid2 Doppler



Title	Item	Description
Display type of Velocity <sup>*1</sup>	Velocity	The velocity (cm/s) is displayed as the measurement result.
	Frequency	The frequency (kHz) is displayed as the measurement result.
Display items of Velocity Trace <sup>*2</sup>	Vmax [Fmax] Vmin [Fmin] Ved [Fed] Vmean [Fmean] PI RI S/D	Specify the items to be displayed as the results of Velocity Trace measurement. The settings for Vmax [Fmax], Vmin [Fmin], Ved [Fed], and Vmean [Fmean] are fixed to <input checked="" type="checkbox"/> .  <input checked="" type="checkbox"/> : The item is displayed. <input type="checkbox"/> : The item is not displayed.
RI calc. method <sup>*3</sup>	Ved	RI is calculated based on Ved.
	Vmin	RI is calculated based on Vmin.
PI calc. method <sup>*4</sup>	Ved	PI is calculated based on Ved.
	Vmin	PI is calculated based on Vmin.

\*1: [Velocity] is selected as the default.

\*2: All the items are set to  (to be displayed) as the default.

\*3: [Ved] is selected as the default.

\*4: [Vmin] is selected as the default.

(31) Carotid1 Meas. Type



Title	Item	Description
Doppler*	Velocity Trace	Tracing is performed in the Velocity Trace mode.
	PS Velocity	The peak systolic velocity is measured in Velocity measurement mode.
	ED Velocity	The end-diastolic velocity is measured in Velocity measurement mode.

\* "Velocity Trace" is selected as the default.

## (32) Carotid2 Meas. Type

Exam Type

Carotid

Save

Imaging Preset <Factory>

Application Preset Carotid2

Probe PLT-704AT

Application Preset Editor Carotid2 Meas. Type

Right CV Doppler	<input checked="" type="radio"/> Velocity Trace	<input type="radio"/> PS Velocity	<input type="radio"/> ED Velocity
Right CV %Stenosis	<input checked="" type="radio"/> %Stenosis Area	<input type="radio"/> %Stenosis Distance	
Left CV Doppler	<input checked="" type="radio"/> Velocity Trace	<input type="radio"/> PS Velocity	<input type="radio"/> ED Velocity
Left CV %Stenosis	<input checked="" type="radio"/> %Stenosis Area	<input type="radio"/> %Stenosis Distance	

Factory Setting Save

Factory Setting Save Quit

Title	Item	Description
Right CV Doppler <sup>*1</sup>	Velocity Trace	The velocity is traced using the Velocity Trace method.
	PS Velocity	The peak systolic velocity is measured using the Velocity measurement method.
	ED Velocity	The end diastolic velocity is measured using the Velocity measurement method.
Right CV %Stenosis <sup>*2</sup>	%Stenosis Area	The stenosis ratio is calculated using the %Stenosis Area method.
	%Stenosis Distance	The stenosis ratio is calculated using the %Stenosis Distance method.
Left CV Doppler <sup>*3</sup>	Velocity Trace	The velocity is traced using the Velocity Trace method.
	PS Velocity	The peak systolic velocity is measured using the Velocity measurement method.
	ED Velocity	The end diastolic velocity is measured using the Velocity measurement method.
Left CV %Stenosis <sup>*4</sup>	%Stenosis Area	The stenosis ratio is calculated using the %Stenosis Area method.
	%Stenosis Distance	The stenosis ratio is calculated using the %Stenosis Distance method.

\*1: "Velocity Trace" is selected at the factory before shipment.

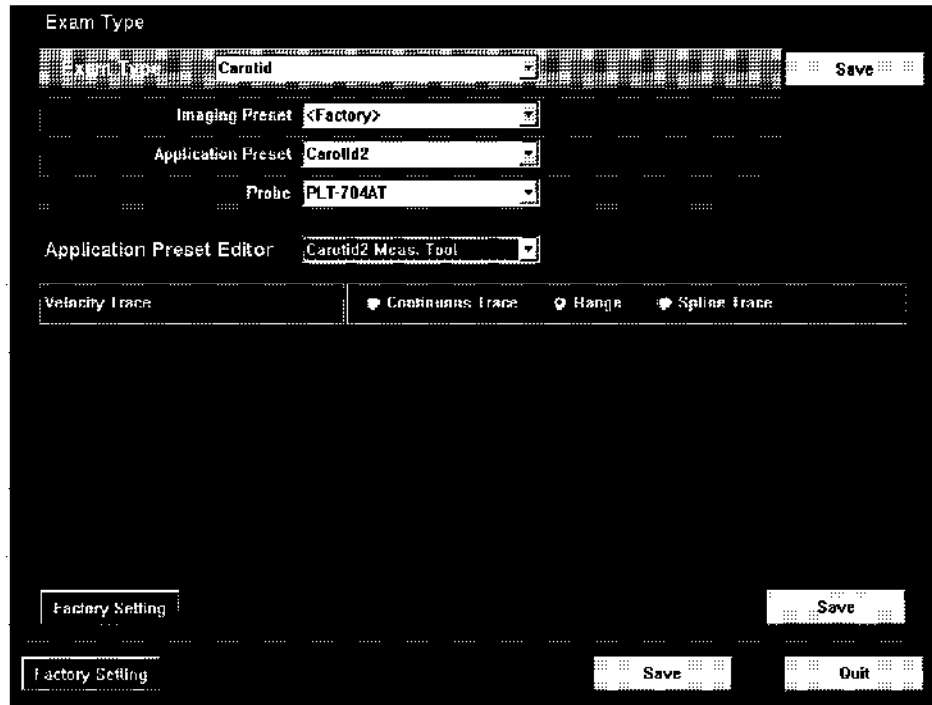
\*2: "%Stenosis Distance" is selected at the factory before shipment.

\*3: "Velocity Trace" is selected at the factory before shipment.

\*4: "%Stenosis Distance" is selected at the factory before shipment.

(33) Carotid2 Meas. Tool

This menu is used to preset the default measurement method to be started when the Velocity Trace measurement switch is pressed in the Carotid2 menu of Vascular measurement mode.



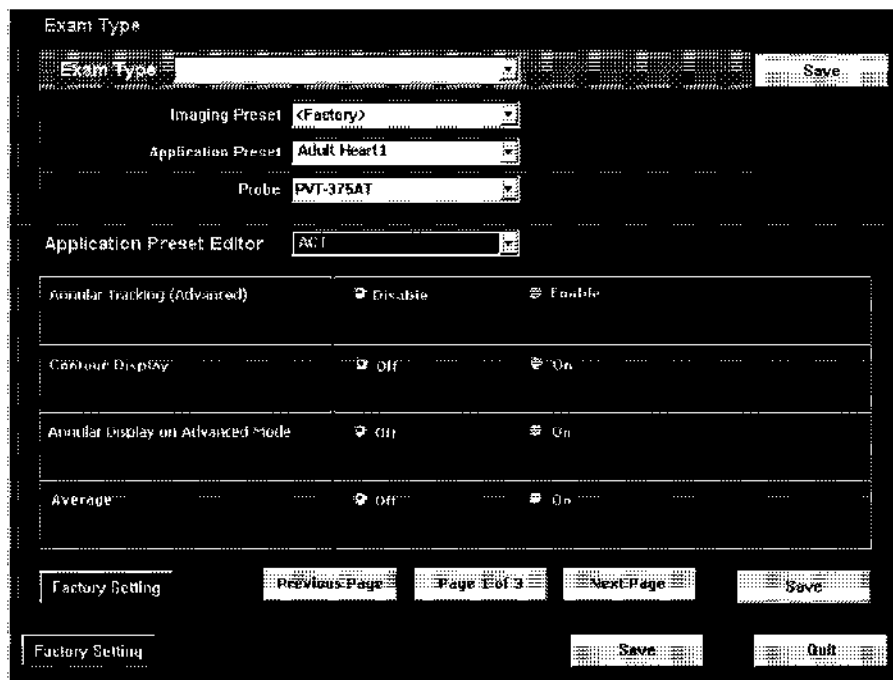
Title	Item	Description
Velocity Trace <sup>*1</sup>	Continuous Trace	The area is measured using the Continuous Trace method.
	Range	The velocity is measured using the Auto Trace method with the range specified.
	Spline Trace	The velocity is measured using the Spline Trace method.

\*1: "Range" is selected at the factory before shipment.

(34) ACT (option)

If the optional ACT measurement program is installed, defaults for ACT measurement can be preset. On this screen, 3 pages are provided for ACT measurement.

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Item	Setting	Function
Annular Tracking (Advanced)	Disable	Disables the annular tracking assessment function during ACT measurement.
	Enable	Enables the annular tracking assessment function during ACT measurement. The [Advanced], [Copy to File], [Annular Disp.], and [Trajectory Disp.] switches are displayed on the touch panel for LV ACT.
Contour Display	Off	Turns OFF the contour display.
	On	Turns ON the contour display.
Annular Display on Advanced mode <sup>*1</sup>	Off	Turns OFF display of the annular position mark.
	On	Turns ON display of the annular position mark.
Average	Off	Specifies the measurement and calculation methods for LV functions. The LV functions are measured and calculated using the data for only the cardiac cycle (between two successive end diastoles) containing the currently displayed frame.
	On	Specifies the measurement and calculation methods for LV functions. The LV functions are measured and calculated by averaging the data for the specified number of cardiac cycles.

\*1: This item is enabled only when "Annular Tracking" is set to "Enable".

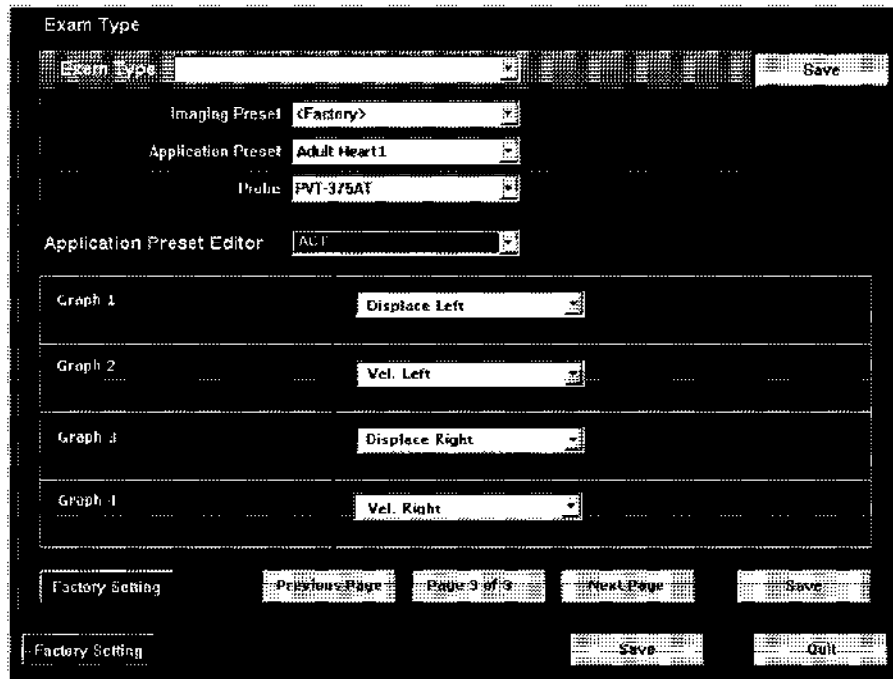
- Page 2

Item	Setting	Function
Heart Beat [Beat]	1 to 5	Sets the number of cardiac cycles included in the frame range (from the measurement start frame to the measurement end frame).
Graph fitting	Off	Turns OFF graph fitting using the Fourier approximation.
	On	Turns ON graph fitting using the Fourier approximation.
The order of graph fitting	1 to 50	Specifies the order of the Fourier approximation when "Graph fitting" is set to "On".
RR Interval Differential Time Limit [%]	0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50	Sets the acceptable time difference between the R-R intervals in the two-chamber and four-chamber cross-sectional images in Biplane Volume measurement. <sup>*1</sup>

\*1: For details, refer to subsection 11.2 "Operating Methods" in the application volume of the operation manual.



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Item	Setting	Function
Graph 1 to Graph 4	X-Pos. Left etc. <sup>*1</sup>	Specifies the types of graphs and measurement results to be displayed on the screen. It is also possible to select not to display graphs or measurement results. If the same graph type is selected for more than one of "Graph 1" to "Graph 4", only a single graph of the selected type is displayed. The graphs are displayed in a row at the top of the screen, with Graph 1 located at the leftmost position.

\*1: Refer to subsection 11.5 "Arithmetic Operation Method for ACT Measurement" of the operation manual <measurement volume>.

## 12. BACKING UP THE USERS DATA

### 12.1 Backing Up the Preset Data

#### 12.1.1 Backup

The information in "D:\aplio\user" must be backed up. These files can be backed up together with the system-specific information on an MO using the user maintenance and the service menu.

#### 12.1.2 Restoration

The backed up information is restored to "D:\aplio\user". Only the information included in the service menu need be restored. Restoration can be performed only when the system information of the system where the backup was performed and that where the restoration is to be performed match. If an attempt is made to restore information to a system other than the system where backup was performed, a warning dialog is displayed. Therefore, perform restoration carefully to the correct system.

### 12.2 Backing Up the Image Data

#### 12.2.1 Backup

Back up the image data registered on the hard disk by saving it on the MO using Patient Browser. The data is saved in the DICOM format. For the operating procedures for Patient Browser, refer to the operation manual <<Applications>>.

#### 12.2.2 Restoration

Restore the image data saved on the MO by transferring it to the hard disk using Patient Browser. The data must be saved in the DICOM format. For the operating procedures for Patient Browser, refer to the operation manual <<Applications>>.

## 13. NETWORK CONNECTION

### 13.1 Changing the PC Name

If it is necessary to change the PC name for compatibility with the network environment, the database must be deleted and then created again.

- (1) Connect the network cable to the corresponding connector at the back of the system and turn ON the power supply to start the system. After starting the system, display the service menu. Input the command "stopz.js" on Utilities Command Line and click Go to stop the system software. The service screen also disappears.



- (2) Select the Start button → Program → Accessory → Command prompt and then execute the "tus\_rmdb.js" command to delete the database.

After performing deletion, confirm that the database is deleted completely by following the procedures below.

- Right-click the Start button and select Explorer from the menu. Confirm that no file or folder exist in the directories "D:\database" and "E:\Image".
- If any file or folder exist in the directory "D:\database", select all with the Ctrl + A keys to delete them. Perform the same procedures for the directory "E:\Image".

- (3) Set the network.

Perform settings for the PC name and TCP/IP as indicated.

For these settings to become effective, the system must be restarted. However, the system must not be restarted yet.

When the PC name is changed, input "tus\_chnm.js PC name" at the command prompt (2) above.

(This work also can be performed by selecting Control panel → System → Advanced → Environment setting and by setting the PC name to VERSANT\_DBID\_NODE.)

Terminate the command prompt.

- (4) Reboot the system by clicking the Start button and selecting Restart from the menu.
- (5) After restarting the system, execute the "tus\_mkdb.js" command to create the database again.

The display shown below is then displayed automatically. Confirm that the five databases are created. The display is an example with the PC name set as "toshiba1".

<<Database list display example>>

```
VERSANT Utility DBLIST Version 5.2.2.0.0
Copyright (c) 1989-1999 VERSANT Corporation
```

```
ID          = 6
DB name     = ArchiveStore@toshiba1
creator     = toshiba
date created = Thu Apr 05 15:46:51 2001
db type     = GROUP DATABASE
db version  = 5.2.2.0
```

```
ID          = 7
DB name     = Local@toshiba1
creator     = toshiba
date created = Thu Apr 05 15:47:29 2001
db type     = GROUP DATABASE
db version  = 5.2.2.0
```

```
ID          = 8
DB name     = SchedulerStore@toshiba1
creator     = toshiba
date created = Thu Apr 05 15:48:15 2001
db type     = GROUP DATABASE
db version  = 5.2.2.0
```

```
ID          = 9
DB name     = PimsExamArch@toshiba1
creator     = toshiba
date created = Thu Apr 05 15:48:41 2001
db type     = GROUP DATABASE
db version  = 5.2.2.0
```

```
ID          = 10
DB name     = Exchangeboard@toshiba1
creator     = toshiba
date created = Thu Apr 05 15:49:59 2001
db type     = PERSONAL DATABASE
db version  = 5.2.2.0
```

- (6) Confirm that the network is connected.
- (7) Shut down the system by clicking the Start button and selecting Shutdown from the menu.  
Then restart the system and confirm that the system starts normally.

#### 14. UPGRADING THE SOFTWARE

This subsection describes the standard procedure for upgrading the software. If special operation is required, the corresponding instructions will be provided.

- (1) Turn ON the power supply to start the system. Perform backup as required and display the service menu screen. Input the command "stopz.js" on the Utilities Command Line and click Go to stop the system software. The service menu screen disappears.
- (2) Select the Start button → Program → Accessory → Command prompt and then execute the "tus\_stopAplio.js" command. Terminate the command prompt.
- (3) Reboot the system by clicking the Start button and selecting Restart from the menu.
- (4) After restarting the system, upgrade the software.

An example of the upgrade procedure is given below.

- Delete the "Zm/Orca Combined..." and "Zhui" applications using "Add/Remove Programs" of "Control Panel".
  - Start Explorer. If "C:\Hui" or "C:\Zdt" exists, delete the whole folder.
  - Execute the "setup.bat" command on the APPLI DISK MO.
- (5) After upgrading the software, execute the "tus\_restartAplio.js" command and terminate the command prompt again.
  - (6) Shutdown the system by clicking the Start button and selecting Shutdown from the menu. Then restart the system and confirm that it starts normally.
  - (7) Display the service menu and perform restoration as necessary.

If restoration is performed, the system shuts down. Restart the system and complete the procedure.

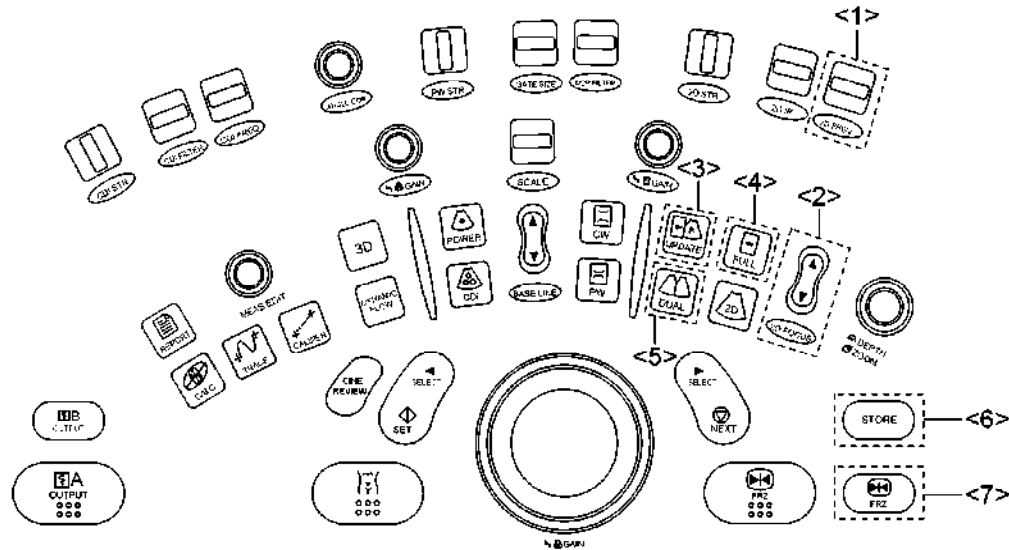


### 15.3 Panel Switch Layout and Switch Functions After Configuration Change

Replace the key tops as shown in the figure according to the selected layout.  
Confirm that the configuration has been changed correctly. If the configuration has not been changed correctly, correct it.

#### (1) TMSJ abdomen A (TMSJ\_Abd\_A.bat) (Pattern A)

The functions of the seven locations indicated in the figure below are changed.  
For <1> and <2>, replace the elliptic label below the switch. For <3> to <7>, replace the key tops.

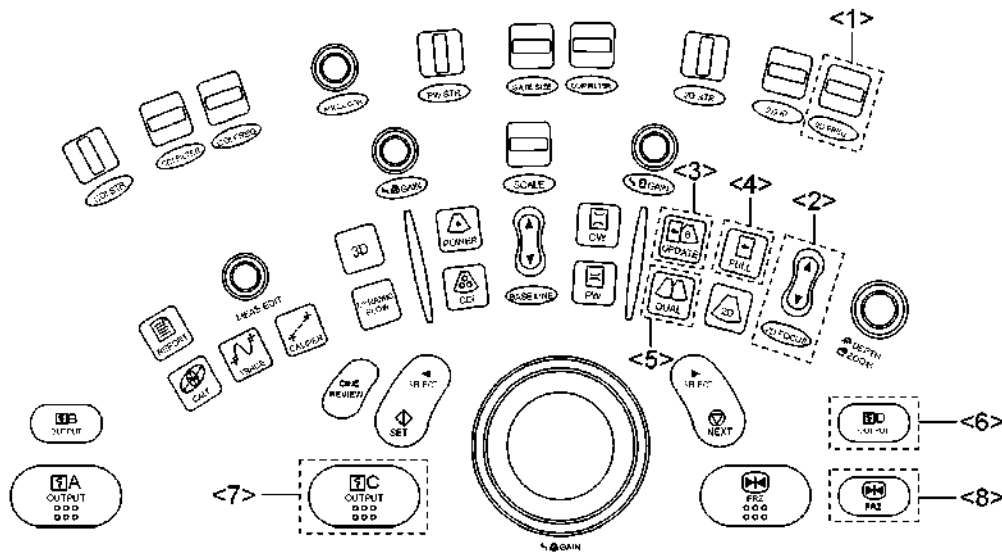


No.	Switch after layout change	Function
<1>	2D FREQ	Same as the 2D FREQ switch before the layout change
<2>	2D FOCUS	Same as the 2D FOCUS switch before the layout change
<3>	UPDATE	Same as the UPDATE switch before the layout change
<4>	FULL	Same as the FULL switch before the layout change
<5>	DUAL	Same as the DUAL switch before the layout change
<6>	STORE	Same as the STORE switch before the layout change
<7>	FREEZE	Same as the FREEZE switch before the layout change



## (2) TMSJ abdomen B (TMSJ\_Abd\_B.bat) (Pattern B)

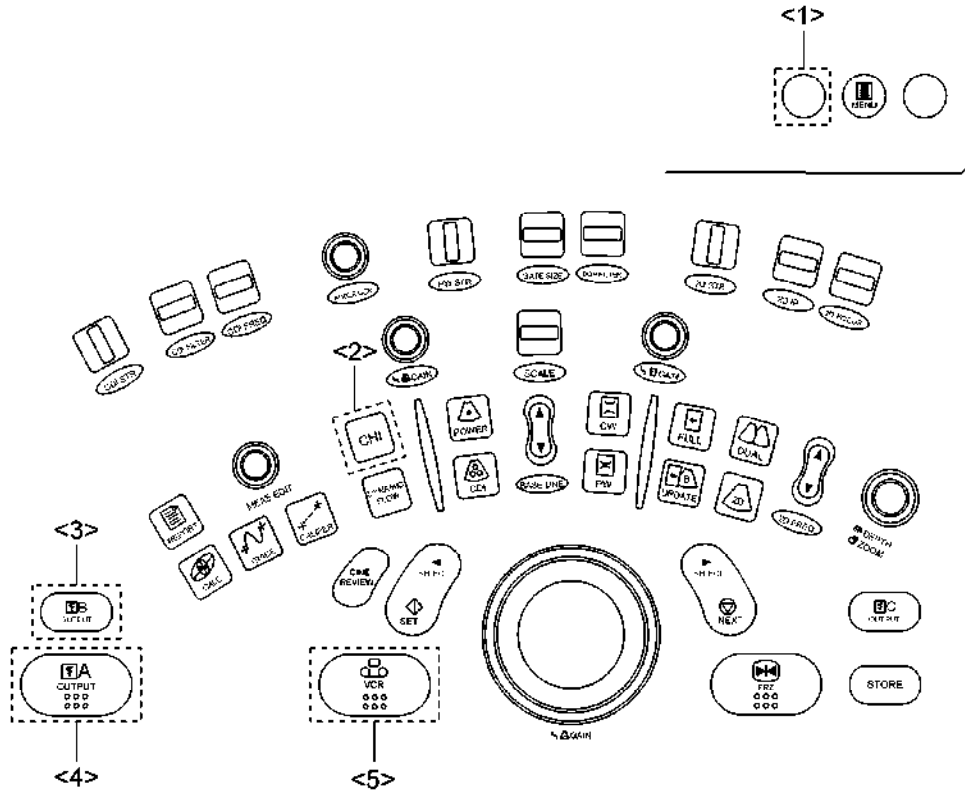
The functions of the eight locations indicated in the figure below are changed.  
For <1> and <2>, replace the elliptic label below the switch. For <3> to <8>, replace the key tops.



No.	Switch after layout change	Function
<1>	2D FREQ	Same as the 2D FREQ switch before the layout change
<2>	2D FOCUS	Same as the 2D FOCUS switch before the layout change
<3>	UPDATE	Same as the UPDATE switch before the layout change
<4>	FULL	Same as the FULL switch before the layout change
<5>	DUAL	Same as the DUAL switch before the layout change
<6>	OUTPUT D	Same as the OUTPUT C switch before the layout change (storing still images, ID areas, etc. on the screen onto an MO)
<7>	OUTPUT C	Same as the STORE switch before the layout change
<8>	FREEZE	Same as the FREEZE switch before the layout change

(3) Cardiac (Cardiac.bat) (Pattern C)

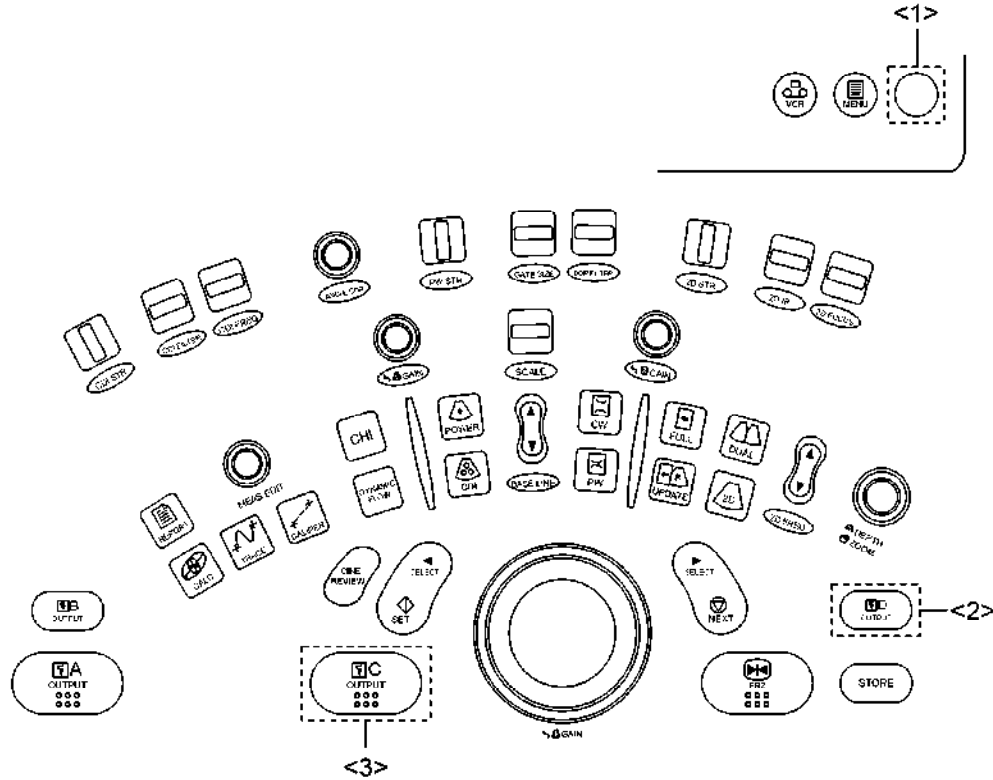
The functions of the five locations indicated in the figure below are changed.  
 Replace the key tops for <1>, <2>, and <5>.



No.	Switch after layout change	Function
<1>	White switch	No function is assigned.
<2>	CHI	Sets the system to CHI mode.
<3>	OUTPUT B	Same as the OUTPUT A switch before the layout change (Auto Print)
<4>	OUTPUT A	Same as the OUTPUT B switch before the layout change (B/W printer)
<5>	VCR	Same as the VCR switch before the layout change

(4) TMSE/TAMS abdomen (TMSE\_TAMS\_Abd.bat) (Pattern D)

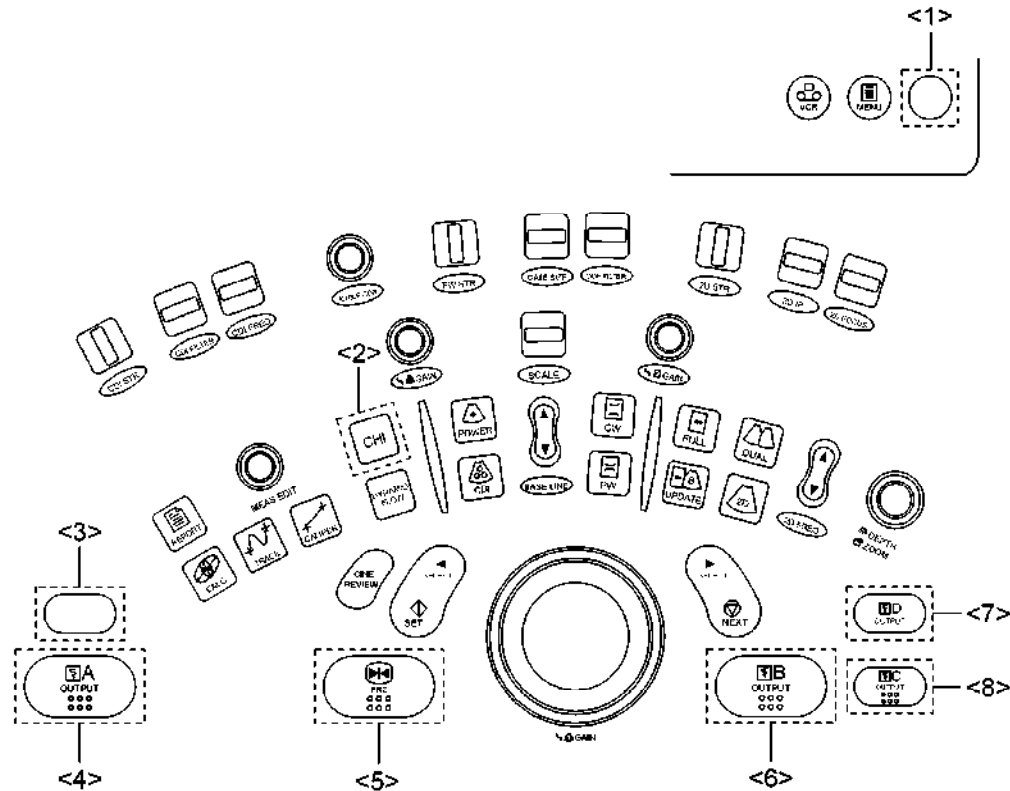
The functions of the three locations indicated in the figure below are changed.  
 Replace the key tops for <2> and <3>.



No.	Switch after layout change	Function
<1>	White switch	No function is assigned. (DICOM Server switch in the standard configuration)
<2>	OUTPUT D	Same as the DICOM Server switch before the layout change
<3>	OUTPUT C	Same as the OUTPUT C switch before the layout change (storing still images, ID areas, etc. on the screen onto an MO)

(5) TAMS left-handed (TAMS\_Left\_Hand.bat) (Pattern E)

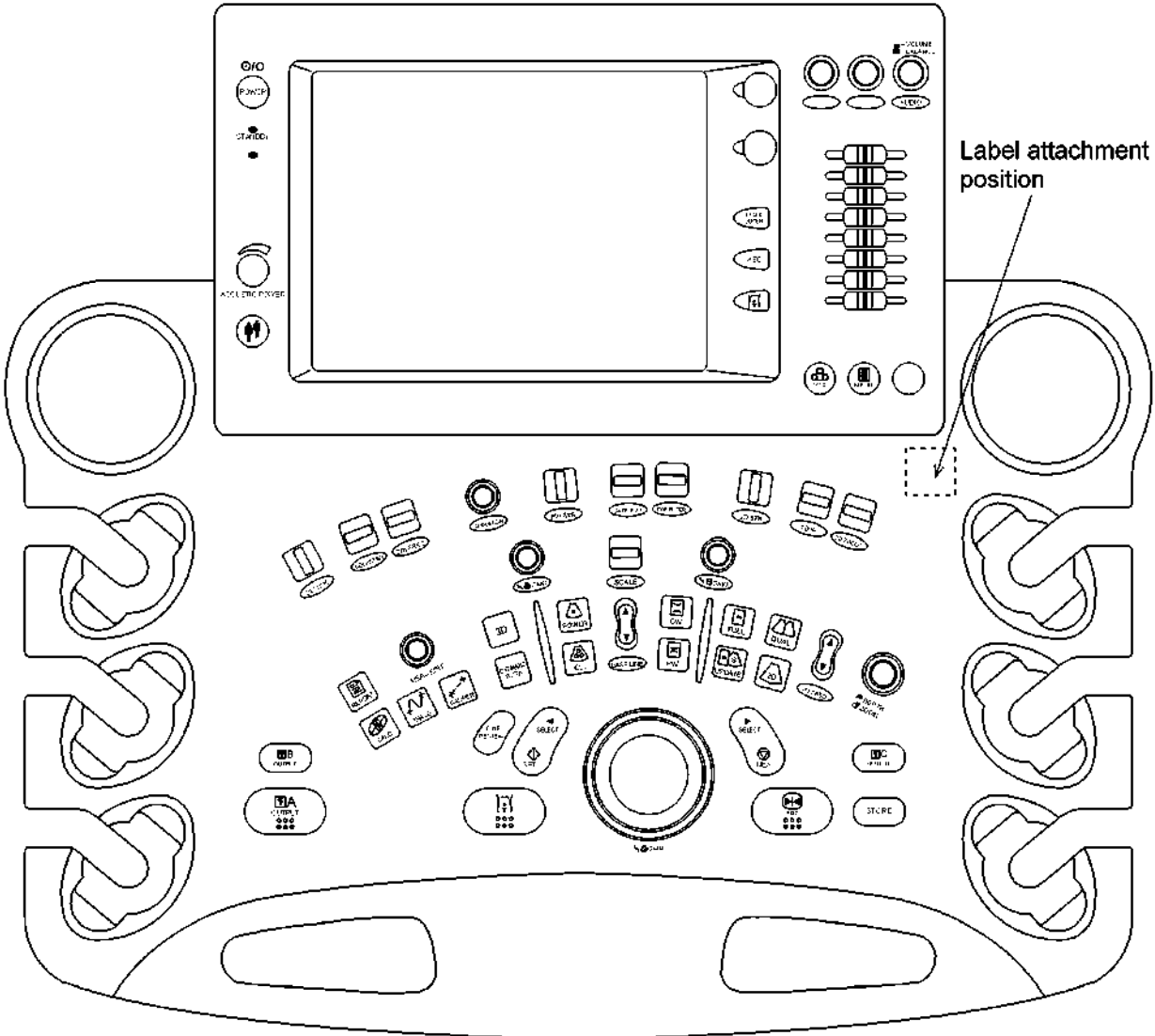
The functions of the eight locations indicated in the figure below are changed.  
Do not replace the key tops for <1> and <4>.



No.	Switch after layout change	Function
<1>	White switch	No function is assigned. (DICOM Server switch in the standard configuration)
<2>	CHI	Sets the system to CHI mode.
<3>	White switch	Same as the DICOM Server switch before the layout change
<4>	OUTPUT A	Same as the STORE switch before the layout change
<5>	FREEZE	Same as the FREEZE switch before the layout change
<6>	OUTPUT B	Same as the OUTPUT A switch before the layout change (Auto Print)
<7>	OUTPUT D	Same as the OUTPUT C switch before the layout change (storing still images, ID areas, etc. on the screen onto an MO)
<8>	OUTPUT C	Same as the OUTPUT B switch before the layout change (B/W printer)

15.4 Attaching the Label


Attach the label that matches the selected pattern (one from among A to E) to the main panel.



## 16. DATE/TIME SETTING CHANGE

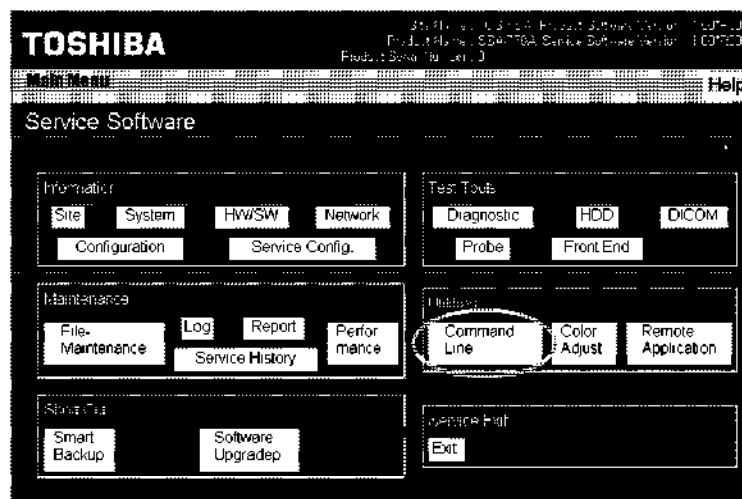
To change the system date and time, use the procedure described below.

### 16.1 To Change the System Time Only

- (1) Press  on the main panel.
- (2) Select [General Preset] from the System Setting pop-up menu.
- (3) In the "Time" field of the General Setting screen, change the setting of hour/minute/second.

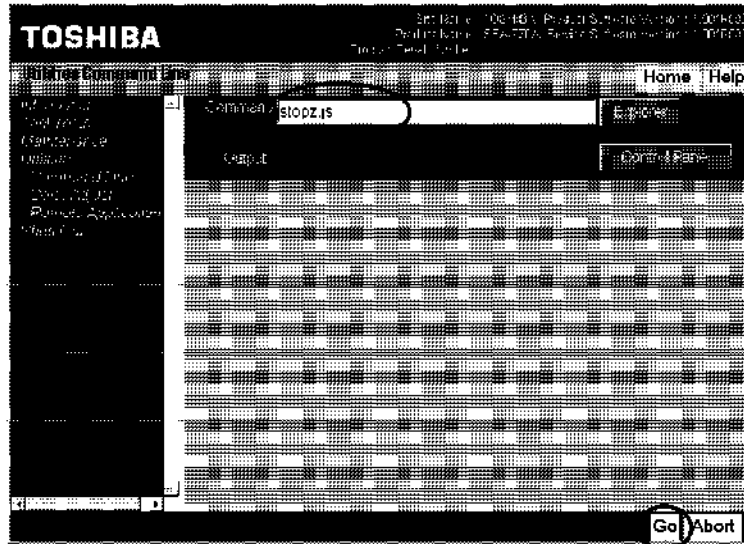
### 16.2 To Change the System Date and Time

- (1) Activate the maintenance menu (for service engineers).  
For the activating procedures, refer to the service manual (2D730-149E).
- (2) Select [Command Line] in "Utilities".

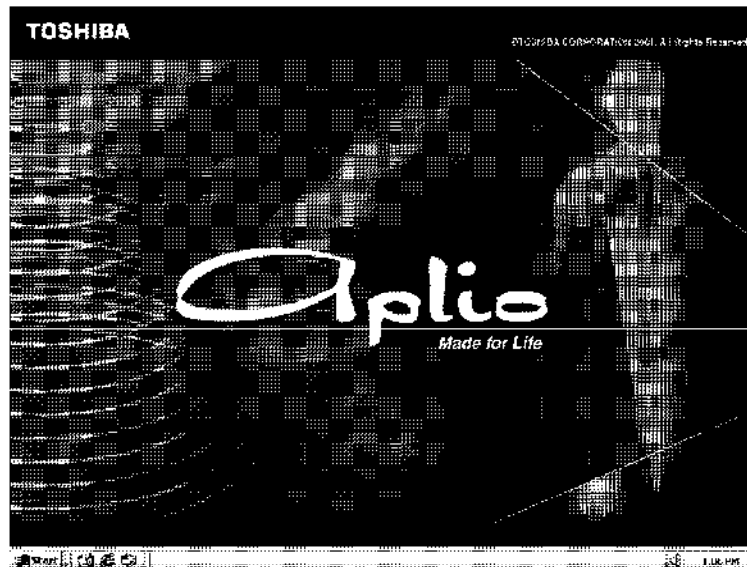


- (3) Use the keyboard to enter "stopz.js" in the Command field and select [Go].

\* Execution of this command takes approximately 2 minutes. Do not perform other key operations until execution of the command is completed.



- (4) The Aplio software is terminated and a Windows screen appears.



- (5) Remove the rubber cap at the left side of the operating panel and connect the USB mouse.

\* This is because the **SET** and **NEXT** switches are not operable when the Aplio software is terminated. The trackball is operable though.

- (6) Select [Start] → [Programs] → [Accessories] → [Windows Explorer] to open the Windows Explorer window.

- (7) Select [My Computer] → [Control Panel] → [Date/Time] to open the Date/Time window.

Change the date and time in this window.

**CAUTION:** Never change the system date or time to differ from the factory setting by 24 hours or more.

If the system date and time is changed from the factory setting by 24 hours or more, system performance cannot be assured and the HDD will have to be replaced.

- (8) Select [Start] → [Shutdown...] → [Shutdown] to shut down the system.

- (9) Start up the system again.



## 17. 3D POSITION SENSOR

### 17.1 3D Position Sensor Unit

#### (1) Outline

The position sensor receiver of the 3D position sensor detects the magnetic field emitted by the position sensor transmitter. Based on this information from the magnetic field, the control unit of the 3D position sensor measures the three-dimensional position and direction of the position sensor receiver with respect to the transmitter, and transmits the results to the diagnostic ultrasound system (hereinafter referred to as "the system").

#### (2) Functions

As shown in figure 17-1, the position sensor receiver detects the magnetic field in the three directions generated by the position sensor transmitter, and the control unit measures the three-dimensional position  $(x, y, z)$  of the position sensor receiver in the orthogonal 3D space around the position sensor transmitter. The control unit also measures the directions  $(\alpha, \beta, \gamma)$  that represent the rotation angles of the coordinate system formed by the position sensor receiver as shown in figure 17-2. The control unit then transmits the obtained positional and directional data to the system.

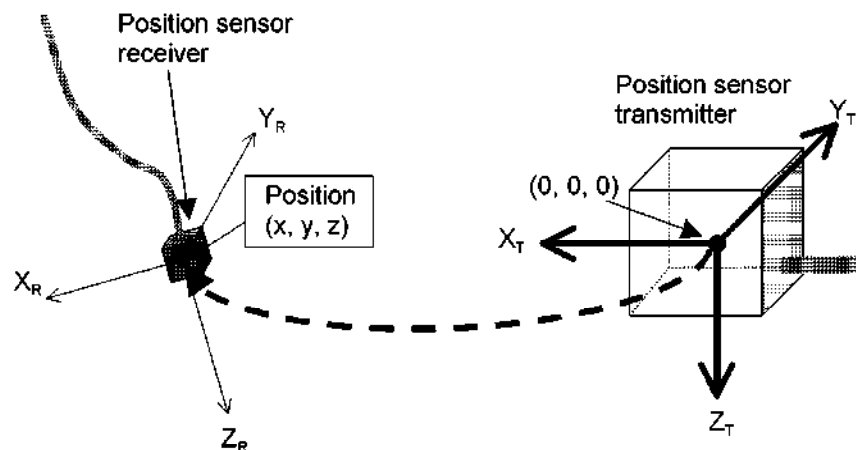


Figure 17-1 Positional data

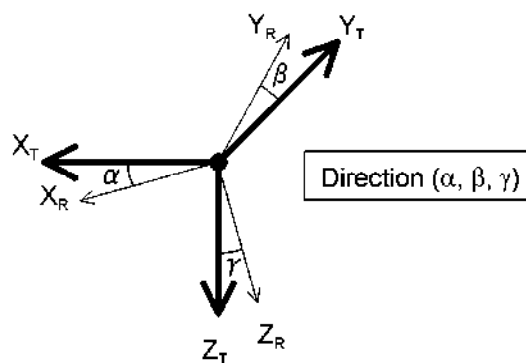


Figure 17-2 Directional data

## (3) Operations

As shown in figure 17-3, the 3D position sensor consists of the control unit, the position sensor transmitter, the position sensor receiver, and the power unit. They are connected to the system by a cable and a 9-pin D-sub connector. The power unit is supplied with 100/240 VAC by the system and supplies DC voltage to the control unit. The control unit receives the positional data transmission request command from the system and transmits a pair of positional and directional data sets ( $x, y, z: \alpha, \beta, \gamma$ ) via a serial interface (RS-232C) at 10-ms intervals. The data must be input to the COM2 port on the system, which is a serial interface\*. The control unit calculates the position and directions based on the amount of current that is induced in the position sensor receiver in each of the three magnetic field directions  $x, y,$  and  $z$  that are generated at different times.

\* For  $\alpha$  protocol, select a COM port not used by the VCR or 3D position sensor.

The FLY/STDBY switch, which is intended to switch the status of the control unit between running and standby, must be set to FLY at all times.

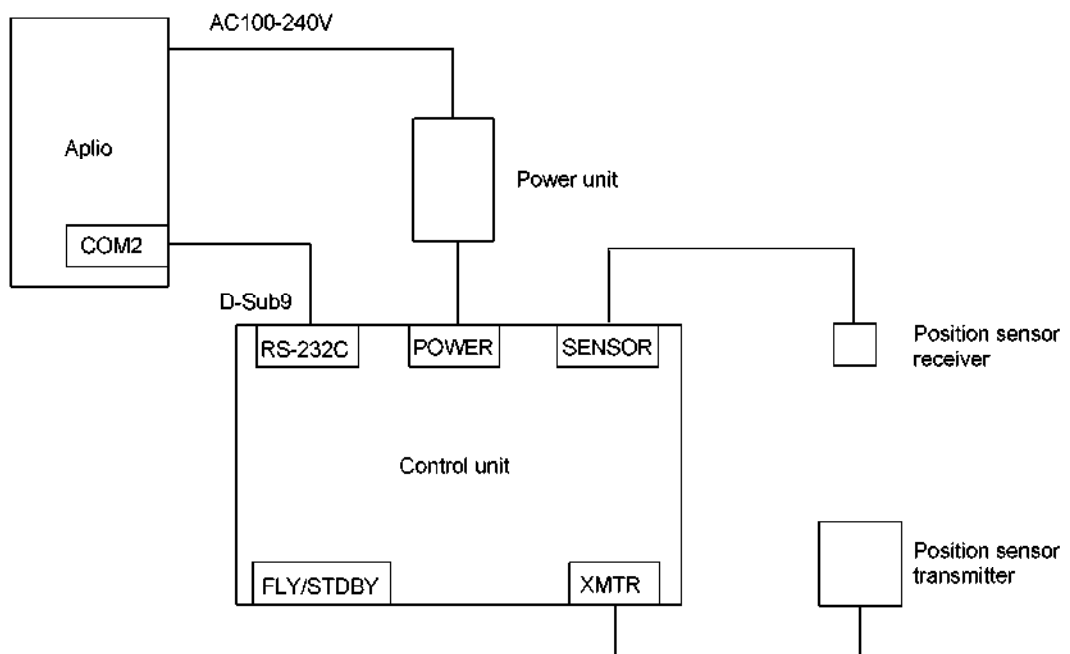


Figure 17-3 System configuration

The intensity of the magnetic field generated by the position sensor transmitter becomes lower as the measurement point is moved away from the transmitter. The position sensor receiver must be within the spherical range from 21 cm to 76 cm from the center of the position sensor transmitter as shown in figure 17-4. In addition, the position sensor receiver must be within the front hemisphere of the magnetic field, which is one of the two hemispheres defined by the positive and negative directions on the x-axis, in order to assure the accuracy of the positional data. If the position sensor receiver is moved across the front and rear hemispheres during data acquisition, image reconstruction becomes impossible.

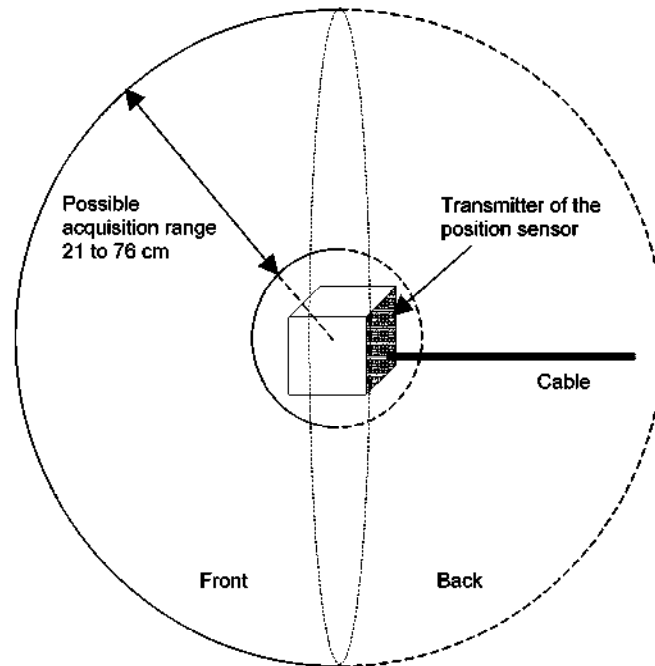


Figure 17-4 Position sensor transmitter

The position sensor receiver is attached to a transducer using the dedicated attachment as shown in figure 17-5 (the transducer shown in the figure is the 375AT). Refer to the relevant operation manual for the procedure for attaching the position sensor receiver.

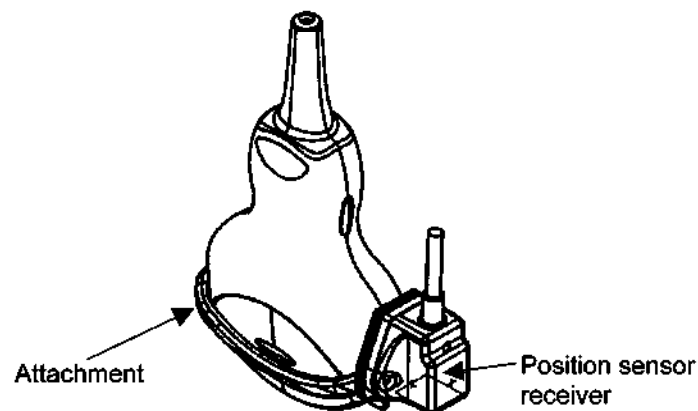


Figure 17-5 Attaching the position sensor receiver to a transducer

The acquired 2D ultrasound image is accompanied with the size information on the 2D image itself and the positional and directional information of the position sensor receiver with respect to the position sensor transmitter. This information is used to reconstruct a 3D image. Therefore, it is necessary to correct the positional relationship between the position sensor receiver and the 2D-ultrasound image using a conversion table called a calibration matrix. The shape of the transducer is taken into consideration when the calibration matrix is prepared.

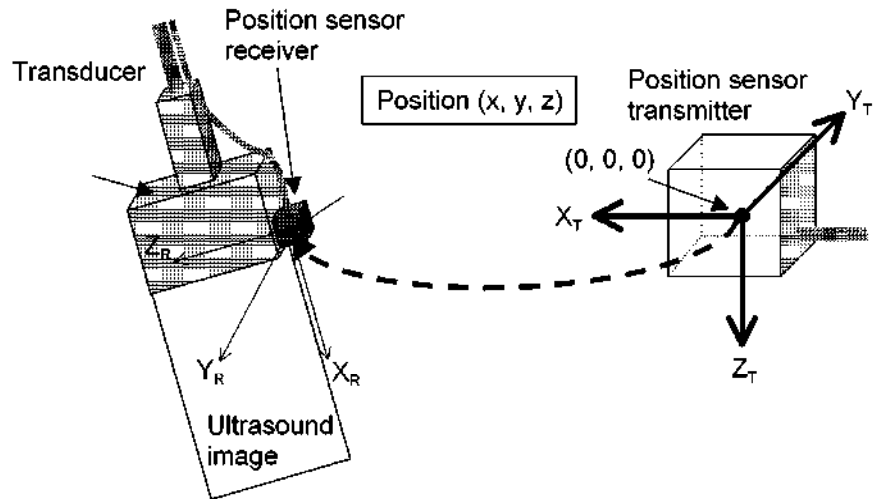


Figure 17-6 Positional data

## 17.2 Magnetic Field Distortion Check Tool

### (1) Outline

The magnetic field distortion check tool is used to confirm that the magnetic field generated by the transmitter of the position sensor is not affected by the magnetic field environment in which the Aplio is installed. This check should be performed in the following cases.

- By the service personnel during the installation of the Aplio system.
- By the user after the system installation environment is changed.
- By the service personnel during maintenance work.
- By the user as a part of daily checks.

### (2) Functions

Since the operating principle of the 3D position sensor is based on the magnetic field as described in subsection 17.1, the magnetic field distortion in the area in which data acquisition is performed must be below the specified level. The magnetic field distortion check tool is designed to check whether the magnetic field distortion in the possible acquisition range is acceptable or unacceptable.

### (3) Procedure

Place the position sensor receiver at each of positions A, B, and C that are located on a straight line at regular intervals. At each position, the receiver must be placed in the same orientation. Based on the positional and directional information at each check position, the magnetic field distortion check tool obtains the following three parameters: 1) direction at each position, 2) vector ( $p$ ) between A and B, and 3) vector ( $q$ ) between B and C. If the magnetic field is not distorted, these three parameters should be equal. Based on this rule, the check tool analyzes any errors in the actual magnetic field environment as compared with the ideal and determines whether or not the level of magnetic field distortion is acceptable.

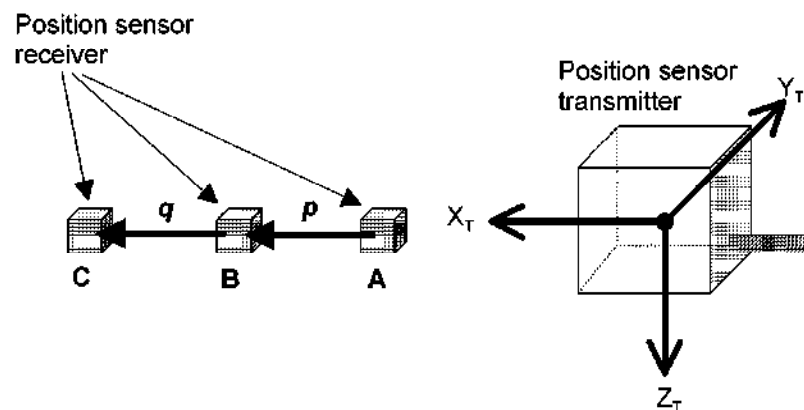


Figure 17-7 Principle of magnetic field distortion check

(4) **Magnetic field distortion check**

For details of the magnetic field distortion check procedure, refer to one of the manuals listed below.

- (a) Installation manual for the UIFR-771A (2C708-634E)
- (b) Operation manual for the UIFR-771A (2B708-114E)
- (c) Operation manual <<Applications volume>> for the SSA-700A/SSA-770A

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**TOSHIBA MEDICAL SYSTEMS CORPORATION**

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