Toshiba Alexion TSX-033A Service Manual

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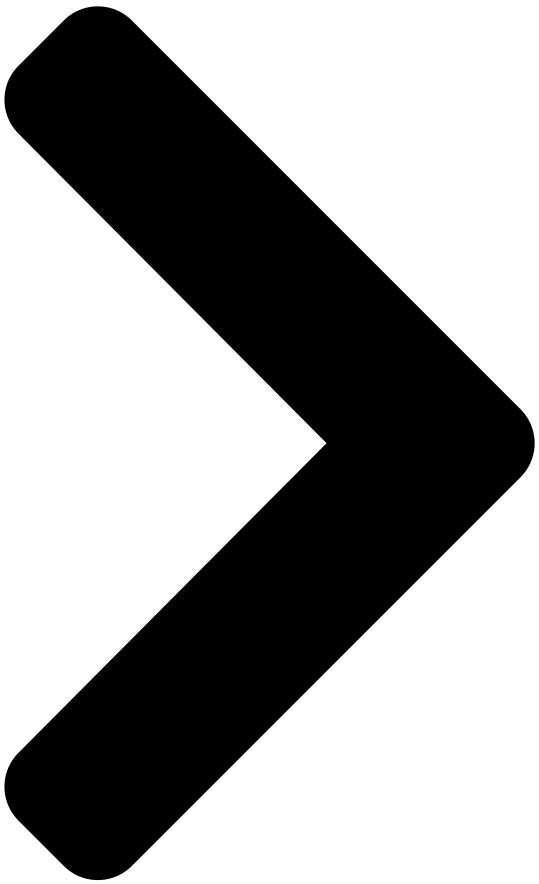

No. 2D201-177EN*F

TOSHIBA

SERVICE MANUAL 2

FOR

TOSHIBA SCANNER

TSX-033A

(2D201-177EN*F)

Alexion

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Medical Equipment Toshiba Activion 16 TSX-031A Site Planning Manual

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Medical Equipment Toshiba Aplio 500 TUS-A500 Operation Manual

Diagnostic ultrasound system (232 pages)

Medical Equipment Toshiba famio XG SSA-530A Operation Manual

Diagnostic ultrasound system (109 pages)

Medical Equipment Toshiba Aplio SSA-770A Service Manual

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Summary of Contents for Toshiba Alexion TSX-033A

Page 1 No. 2D201-177EN*F SERVICE MANUAL 2 TOSHIBA SCANNER TSX-033A (2D201-177EN*F) □ TOSHIBA MEDICAL SYSTEMS CORPORATION 2011-2013 ALL RIGHTS RESERVED...

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Page 3 REVISION RECORD REASON PAGE REV. DATE SER. DOC. (YYYY-MM) /AUTHOR CHANGED PRODUCT. INI. 2011-09 Mr. Tezuka ------- TM-WI2 2012-03 Change of configuration of PC BOX supplied as Subsections service part 4.5.2.11, Mr. Sato 4.5.2.13 2012-04 Support of improvement requests Mr. Tezuka Sections 2, 3 2012-07 Use of GMSC PWB Mr.

Page 4 THIS PAGE IS LEFT BLANK INTENTIONALLY. No. 2D201-177EN*F...

Page 5: How To Use This Manual Effectively

How to Use This Manual Effectively No. 2D201-177EN*F...

Page 6 Notation Conventions This manual uses the following conventions for word usage in addition to the signal words (refer to "General Safety Information") that indicate remarks related to safety precautions. Carefully read the contents of this manual before performing service work. NOTE: Indicates information of interest to users of equipment as to exceptional conditions or operating procedures.

Page 7: Table Of Contents

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Page 13: General Safety Information

General Safety Information No. 2D201-177EN*F...

Page 14 Meaning of Signal Words DANGER WARNING CAUTION In this manual, the signal words , and are used regarding important safety instructions. The signal words and their meanings are defined as follows. Please understand their meanings clearly before reading this manual. Signal word Meaning Indicates an imminently hazardous situation which, if not avoided,...

Page 15 Safety Precautions Please observe the following precautions to ensure the safety of the service engineer as well as operators when servicing this equipment. DANGER: 1. This system is not explosion-proof. Therefore, do not use flammable or explosive gases near the system. If flammable or explosive gases enter the system, a fire or explosion may occur.

Page 16 DANGER: 6. Gantry rotation may continue even if an eXam Plan is interrupted. Particularly when servicing work (phantom replacement etc.) is performed with the gantry cover open, observe the following. Be sure to terminate the eXam Plan and confirm that rotation of the rotation section has stopped.

Page 17 CAUTION: 1. Do not modify or repair the system without permission. Failure to do so may result in system malfunction or incorrect system operation. 2. When repair or replacement work must be temporarily interrupted, take appropriate measures such as closing the covers etc. to ensure safety.

Page 18 CAUTION: 1. Keep the site room at proper temperature and humidity, and well ventilated. Keep the system protected from unnecessary vibration or shock. 2. When cleaning or disinfecting the system, take care not to damage the system. * Use only the specified disinfectants and lubricants in the specified manner and frequency.

Page 19 Precautions for Service Work Countermeasures against static electricity If service work is performed at sites at which countermeasures against static electricity are not taken, be sure to take countermeasures against static electricity to prevent the PWBs from being

damaged and to ensure quality. [Examples] □...

Page 20 No. 2D201-177EN*F...

Page 21: The X-Ray System

CHAPTER 1 THE X-RAY SYSTEM No. 2D201-177EN*F...

Page 22: Configuration

Configuration The X-ray system comprises the following components: Component Model Features X-ray high-voltage CXXG-010A/3 Incorporates the control circuit, high- generator frequency inverter. Maximum output of 36 kW (42 kW at a line voltage of 200 V or more) X-ray tube CXB-200E Anode heat capacity: 2000 kHU, made by Varian...

Page 23: Principles Of Operation

Principles of Operation The block diagram of the X-ray system is shown below. 3-phase, 200 VAC, 50/60 Hz Line noise filter Door switch Control from External lamp outside Slice counter Rectification To each transformer management Smoothing System communication Inverter Operation Inverter driver Inverter feedback control...

Page 24: Operation Method

Operation Method Switching of the power supply, the control method as a single unit, and the operating conditions are explained. 1.4.1 Turning ON/OFF the power supply Turning ON the power supply Turn ON the power supply of the The power is supplied to the gantry, and the system (console) according to X-ray high-voltage section starts changing the the normal procedure.

Page 25: X-Ray High-Voltage Generator

X-ray High-Voltage Generator 1.5.1 Composition The configuration of the X-ray high-voltage generator is shown below. (1) AC/CONTROL section (2) INV/HV section (3) Interconnecting cables X-ray high-voltage generator No. 2D201-177EN*F...

Page 26: Operating Principle

1.5.2 Operating principle A three-phase power supply is connected to the AC/CONTROL section. The input range is from 170 to 230 VAC. The XCS PWB installed in the AC/CONTROL section functions as an interface with the system. The AC/CONTROL section outputs approximately 300 VDC. This DC voltage is supplied to the INVERTER/HV section.

Page 27: Operating Principle Of The Ac/Control Section

1.5.3 Operating principle of the AC/CONTROL section The AC/CONTROL section supplies the required direct current power to the inverter circuit. The AC/CONTROL section consists of three main subassemblies (chassis assembly, system control PWB, and AC PWB). Its input is connected to the K1 contactor, the CR1 rectifier, and the DC output connector.

Page 28: Operating Principle Of The Inv/Hv Section

1.5.4 Operating principle of the INV/HV section The INV/HV section is a DC-DC converter that consists of three main assemblies: the inverter assembly, the high-voltage multiplier, and the high-voltage transformer. DC input is applied to the resonance inverter. The inverter operates in phase mode and frequency mode.

Page 29 (3) XCS PWB PX71-07786 Gr.2 Part Name XCS2 PWB No. YWM1634 ROM No. C10051-XX Connection diagram 3XW71-1848 Mounting position Within the AC/CONTROL section Functions Communication control Output of basic control signals Monitoring of internal status Selection of output voltage and current Tube current modulation control (Sure Exposure,...

Page 30: Outline Of The X-Ray Tube System

Outline of the X-ray Tube System This subsection describes the configuration and specifications of the X-ray tube system. 1.6.1 Configuration The X-ray tube system comprises the X-ray tube unit and the heat exchanger, which are connected via the cooling oil circulating hose. The X-ray tube is mounted on the gantry rotation section.

Page 31 Varian 2000/3500 kHU tube, OLP=100% CXB-350A/2A CXB-200E min. Cooling curve No. 2D201-177EN*F...

Page 32: Overload Protection (Olp) Management Functions

Overload Protection (OLP) Management Functions This subsection outlines the overload protection (OLP) management functions of the X-ray tube system. 1.7.1 Functional description The X-ray tube system supports the OLP management functions for: (1) Calculation and monitoring of the anode heat capacity for protection (2) Short-term monitoring of the rating for protection of the focus (3) Short-term monitoring of the nominal rating for protection of the focus Items (1) to (3) are calculated continuously to check the required radiation conditions.

Page 33: Short-Term Monitoring Of The Nominal Rating

1.7.4 Short-term monitoring of the nominal rating This function is used to protect the focus from overheating during continuous radiation and is applied to a radiation time of less than 5 seconds using the same kV and mA. When kV and mA are set, the cumulative limit is obtained during repeated exposures from memory data.

Page 34: Tools And Instruments

Tools and Instruments The table below shows tools and measuring instruments required for installation, check, adjustment, and repair of the X-ray system. Tools and instruments for the X-ray system Instal- Check and Repair Remarks lation adjustment Tube voltmeter □ □ kV-201 or kV-201D (manufactured by ARCO Electric) □...

Page 35: Notices

Notices This section describes important safety and protection notices pertaining to work on the X-ray system. 1.9.1 Floating section The power supply circuit of the X-ray high-voltage generator is not insulated from the power supply. If you should touch areas other than the designated spots or connect measuring instruments, take adequate precautions against electrical shocks and short circuits.

Page 36: Precautions For Rotation

1.9.3 Precautions for rotation As the X-ray high-voltage generator is mounted in the gantry rotation section, make sure that no worker is caught in the rotation section during maintenance. DANGER: 1. When servicing is to be performed with the gantry cover open, be sure to turn OFF the power of the system at the distribution board and wait for 5 minutes or more to prevent workers from receiving electric shocks or being...

Page 37: Handling The High-Voltage Cable

1.9.4 Handling the high-voltage cable This subsection describes the handling of the X-ray tube and the INV/HV bushing section, and the procedure for replacing the silicone plate. DANGER: When disconnecting the high-voltage cable, observe the following to fully discharge its residual charge in order to ensure safety during servicing work.

Page 38 (4) After pulling out the bushing, short each of the three pins at the top of the electrode to the grounded chassis. Repeat this procedure at least twice. Then, short every combination of two pins among the three pins at the end of the bushing. Use a screwdriver for shorting.

Page 39 Plug Ring flange Cable Sleeve Polarity label Screw (2 locations) Setscrew Rubber gasket Ring nut Partition flange Silicone plate Silicone oil The surfaces must be in close contact. (8) Be sure to tighten the screws again after X-ray tube seasoning is completed, because the screws may become loose when the X-ray tube is heated and then cooled.

Page 40: Replacing The Fuse

1.9.5 Replacing the fuse When replacing the fuse, be sure to use a fuse with the same rating and type specified. WARNING: For continued protection against risk of fire, replace only with same type and rating fuse. 1.9.6 Using the tube voltage meter Prepare a high-voltage bleeder (Arco Electrical Machinery kV-201 or equivalent), and connect between the high-voltage unit and the X-ray tube as shown in the figure below.

Page 41: Tube Ammeter

1.9.7 Tube ammeter Connect a tube ammeter (MA-1201D manufactured by ARCO or equivalent) between the anode of the high-voltage transformer and the anode of the X-ray tube. Set FUNCTION to RAD.DELAY TIME 4X10. (The tube current is displayed after a delay of 0.4 seconds.) The measured value is the current on the anode side.

Page 42: Other

1.9.8 Other (1) Power cannot be supplied only to the X-ray system. Since the system has no operation section other than the console, it must be started up even if maintenance is performed only for the X-ray system. (2) A center-metal X-ray tube is used. Therefore, be sure to ground the center metal potential.

Page 43: Replacing The X-Ray Tube

(orange cable -110 V, yellow cable - 65 V) CXB-350A Nos. 4 and 6 (200 V) VARIAN side (orange cable -110 V, yellow cable - 65 V) TBX11 80/65 V RUN Purple 100 V STATOR_COM TOSHIBA Blue 80 V Yellow MAIN Orange 110 V PHASE VARIAN Yellow...

Page 44 Connection diagram for Varian X-ray tube...

Page 45 (2) If adjustment (80 kV/100 kV) Perform If adjustment for 80 kV and 100 kV using the If value remote adjustment function. Confirm that the name of the X-ray tube used is displayed in the 'Tube Information' column. (3) Seasoning (4) If adjustment (120 kV/135 kV) Use the If value remote adjustment function to adjust the If value only for the conditions of 120 kV/135 kV.

Page 46: X-Ray Tube Aging

1.10.2 X-ray tube aging Perform the aging operation from the console. (1) Select the aging menu and perform it at the console. (2) Stop 30 minutes or more after exposure is performed. (Leave the system with the power turned ON.) NOTE: The scan conditions for X-ray tube warm-up and seasoning are shown below.

Page 47: If Adjustment

1.10.3 If adjustment The If value remote adjustment explained below is carried out to smooth out the leading edge of the tube current. Normally, If adjustment is performed while monitoring the tube current waveform (TP6 on the SYSTEM-CONTROL PWB). If the mA waveform on the oscilloscope does not match the If value shown in the figure below, adjustment is performed automatically.

Page 48 [Standard] : Reads from the standard If value storage file for recommended If values, the data under the kV/mA conditions predetermined by Toshiba. (Item (b)) [XC] Reads the If value data currently set in the XC memory via SS. (Item (c))

Page 49 (a) If value data read from the Unix File When If value data read from the Unix File is chosen, the following If value read vp is displayed. Specify which file containing IF value data is to be read from the directory. Read vp screen Only the directories with file extension "---.ifs"...

Page 50 (3) Preparation for If value exposure adjustment Check the validity of the value by performing an actual X-ray exposure using read If value data. If the value is not appropriate, update the If value, check the validity of the updated value again, and calculate the appropriate If value. In order to perform the If value exposure adjustment, the following must be taken into consideration.

Page 51 <XC info.> XC firmware version (10 bytes), which is obtained via SS, is displayed. <Tube info.> The X-ray tube identification code (10 bytes), which is controlled by the XC via SS, is displayed. For CXB-200E [2000 kHU/100%] For CXB-350A [3000 kHU/100%] <Tube Voltage>: The tube voltage to be adjusted (kV) is selected.

Page 52 (b) Selecting the exposure adjustment conditions Use the following procedure to select the conditions for If value exposure adjustment. Selecting the conditions to be combined To adjust a specific tube current condition, click the tube current to be adjusted. The clicked tube current is highlighted as shown in the figure above (250 mA and 300 mA are selected in

the figure), indicating that the clicked tube current can be adjusted.

Page 53 (c) Setting If conversion value data The If conversion value data can be changed as follows: When the If conversion value data to be changed is clicked, the item is highlighted and the following "If Value Entry" vp is displayed. Perform If conversion value change on this entry vp.

Page 54 The displayed menus are as follows: <Exposure conditions> Tube kV If tube voltage for adjustment Tube mA If tube current for adjustment Focus If focus for adjustment Exp. time X-ray exposure time (fixed to 0.2 second) <If value to be set> If value The If conversion value stored in the XC memory at the time of adjustment.

Page 55 Interruption processing during If value exposure adjustment Interruption processing during exposure adjustment is as follows: <Exposure interruption by the [Interruption] key> To stop temporarily the exposure adjustment, or to perform "Interpolation Calculation" processing, press the [Interruption] key. The "Interruption" message is sent from the scan manager, and the following message vp is displayed to ask whether the system should perform "Interpolation Calculation"...

Page 56 (g) Asking whether the system should perform interpolation calculation (at the time of interruption) The system replaces If value data not adjusted with interpolation calculation data, using the If value already exposure-adjusted which is displayed in the "adj.If" column on the If value Remote Adjustment vp. Select whether or not the system should perform interpolation processing, using the following interactive vp.

Page 57 (h) Reading and judging the If value check result In order to obtain the result of If value check from the XC, the reading request text of XC and X-ray conditions (U status) is issued to SS. <1> Check result O.K. Since If value data currently set is O.K.

Page 58 Asking whether the system should perform interpolation calculation (when adjustment is completed). The system replaces non-adjusted If value data with interpolation calculation data, using the If value already exposure-adjusted which is displayed in the "adj.If" column on the If value Remote Adjustment vp. Select whether or not the system should perform interpolation processing, using the following interactive vp.

Page 59 (5) Write If value data (storage and set) When [Write] on the If value Remote Adjustment vp is clicked, the following vp is displayed. On the vp, the If value information (If, Std.) currently displayed on the If value Remote Adjustment vp can be saved in the Unix File, or the changed If value can be stored in the XC memory directly.

Page 60 (a) Writing the If value information to the Unix File When [Unix File] is clicked on the If value data archive vp, the If value write vp is displayed. Enter the file name of the If value information to be written. If value write vp screen Up to 8 alphanumeric characters can be entered for the file name.

Page 61: Troubleshooting

1.11 Troubleshooting Troubleshooting and countermeasures against problems are explained. 1.11.1 X-ray high-voltage generator troubleshooting 1.11.1.1 Error types (1) X-ray high-voltage generator error Err-No. Meaning Presumed cause Backup memory error Low battery on the XCS PWB Abnormality in the High-voltage abnormality (HV abnormal) X-ray high-voltage generator X-ray exposure time excess 110% of setting time was exceeded.

Page 62 Err-No. Meaning Presumed cause DOOR Door switch detection X-ray tube thermal error Abnormal heating of the X-ray tube The heat exchanger is faulty. The cooling fan of the gantry is faulty. Excessive temperature around the gantry X-ray tube flow error Abnormal X-ray tube heat exchanger operation Abnormal circulation of cooling oil of the X-ray tube...

Page 63 1.11.1.2 Setting and adjusting the PWBs Four PWBs; the XCS PWB, SYSTEM-CONTROL PWB (SCB), AC PWB, and INV PWB; must be inserted and adjusted. Only the XCS PWB and the SYSTEM-CONTROL PWB can be replaced as a single unit. [Test mode setting] Set the SW at the front of the AC/CONTROL section to the "TEST"...

Page 64 (b) Names and contents of LEDs LED number Name Remarks Lit: Command is being received. Lit: Rotor ON setting Lit: Preheat ON setting Lit: Main heating ON setting Lit:

Command status is busy. Lit: Rotor ON setting Rotor setup standby status Lit: Preheat is in progress (2 s).

Page 65 (e) Procedure for replacing the battery on the XCS2 PWB a. Outline This section describes the procedure for replacing the back-up battery mounted in the XCS2 PWB. Although the battery is designed to be charged while power is supplied, the performance may deteriorate after long usage.

Page 66 (2) SYSTEM-CONTROL PWB test points TP No. Name Remarks CATHODE-KV 0-10V=0-(-7.68KV) ANODE-KV 0-10V=0-76.8KV 0-10V=0-153.6KV KV-REF 0-10V=0-153.6KV ANODE-mA 0-10V=0-512mA CATHODE-mA 0-10V=0-512mA mA-REF 0-10V=0-512mA FIL-fdbk 10V=5.12A FIL-prog 10V=5.12A TP10 DC+10V DC+10V TP11 NONE TP12 NONE TP13 RAIL (K) 10V=333V TP14 RAIL (A) 10V=333V TP15 DC+5V...

Page 67 1.11.1.3 Service parts list 42 kW Part name CXXG-010A AC/CONTROL PX71-07302 Gr1 CONTROL PWB PX71-07304 Gr1 INV/HV ANODE PX71-07303 Gr1 INV/HV CATHODE RAIL CABLE BSX71-0795E CONTROL CABLE BSX71-0796E XCS2 PWB PX71-07786 Gr1 RXP12 CX71-06496 Gr1 RXS06 CX71-06497 Gr1 RXE06 CX71-06620 Gr2 H.T.

Page 68: Troubleshooting Flowchart For Main Circuit

1.11.2 Troubleshooting flowchart for main circuit (1) AC fault AC FAULT DOES FAULT RESET OCCUR DURING GENERATOR EXPOSURE? MONITOR TP13 IS FAULT ON THE SYSTEM PRESENT? CONTROL BD DOES RAIL MONITOR E6 AND MONITOR MEET E7 ON THE AC SPEC? REPLACE REPLACE AC ARE RAIL VOLTS...

Page 69 (2) Uncommanded exposure UNCOMMANDED EXPOSURE DOES FAULT RESET OCCUR DURING GENERATOR EXPOSURE? MONITOR CKV IS FAULT (TP6) AND AKV PRESENT? (TP4) ON THE INVERTER PWB REMOVE I/O CABLE FROM JB2 DOES THE RISE AND GND JB2 PIN AND FALLTIME OF 32 ON THE CKV AND AKV SYSTEM...

Page 70 (3) Filament error FILAMENT ERROR DOES FAULT RESET OCCUR DURING GENERATOR EXPOSURE? MONITOR FILAMENT IS FAULT PROGRAMMING PRESENT? AT TP9 ON THE SYSTEM CONTROL BD REPLACE DOES FILAMENT SYSTEM PROGRAMMING (XC) = CONTROL BD ACTUAL PROGRAMMING (TP9)? MONITOR FILAMENT FEEDBACK ON TP7 ON THE INVERTER PWB DOES FIL...

Page 71 (4) Anode/cathode overvoltage fault ANODE/ CATHODE OVERVOLTAGE DOES FAULT RESET OCCUR DURING GENERATOR EXPOSURE? MONITOR KV IS FAULT REFERENCE ON PRESENT? THE SYSTEM CONTROL BD REMOVE I/O DOES KV CABLE FROM JB2 REFERENCE AND GND JB2 PIN MATCH OUTPUT 32 ON THE PROGRAM? SYSTEM CONTROL BD...

Page 72 (5) Cable interlock No. 2D201-177EN*F...

Page 73 (6) Over-temperature fault of the high-voltage section HV OVER TEMPERATURE DOES FAULT RESET OCCUR DURING GENERATOR EXPOSURE? ALLOW THE IS FAULT GENERATOR TO PRESENT? COOL FOR 30 MINUTES IS FAULT PRESENT? MEASURE RESISTANCE OF JB2 PIN 17 TO GND ON THE INV/HV CHASSIS DOES IT...

Page 74 (7) Anode/cathode arc ANODE/ CATHODE DOES FAULT RESET OCCUR DURING GENERATOR EXPOSURE? VERIFY THE INTEGRITY OF IS FAULT THE TUBE AND PRESENT? THE HIGH- TENSION X-RAY CABLES REMOVE I/O CABLE FROM JB2 AND GND JB2 PIN REPLACE THE IS THE TUBE OR THE 32 ON THE TUBE OR CABLES THE CAUSE...

Page 75 (8) Anode/cathode overcurrent No. 2D201-177EN*F...

Page 76 (9) Abnormal high voltage ABNORMAL DOES FAULT RESET OCCUR DURING GENERATOR EXPOSURE? VERIFY INTEGRITY IS FAULT OF THE TUBE AND PRESENT? VERIFY PREHEATS REMOVE I/O CABLE FROM JB2 IS THE TUBE OR AND GND JB2 PIN PREHEATS THE 32 ON THE SOURCE OF THE PROBLEM? SYSTEM...

Page 77 MONITOR AMA (TP1) AND CMA REPLACE AC (TP5) ON THE INVERTER PWB DOES MA REPLACE MONITORS REPLACE THE SYSTEM ARE THE RAILS MATCH MA AC CHASSIS CONTROL BD IN SPEC? REFERENCE? REPLACE INV/HV CHASSIS No. 2D201-177EN*F...

Page 78: X-Ray Tube Troubleshooting

1.11.3 X-ray tube troubleshooting (1) Discharging during exposure When discharging occurs in a high-voltage circuit during an exposure, the OVER-mA LED or OVERCURRENT, OVER VOLTAGE, ARC LED on the XP PWB lights. The unwanted discharging is possibly caused by low dielectric strength of the X-ray tube, the high-voltage cable, the high-voltage transformer, or the cable bushing.

Page 79 (2) Oil leakage Oil leak in the heat □ Defective heat exchanger circulation system exchanger □ Oil leak in the X-ray tube Defective tube housing Oil leak in the hose □ Improper coupling or hose flaws Oil leak in the explosion- □...

Page 80 [REFERENCE] X-RAY TUBE MALFUNCTIONS AND ERROR CODES Malfunction and error codes (CT X-ray tube) Symptom of Code Code Source of failure Code Frequency malfunction Discharge Discharge Unknown Tube overcurrent (Over-mA) Error due to discharge Always Low isolation between A and K (pin-hole, cracked glass, etc.) Frequent Insufficient rotation...

Page 81: Xc Error Log Reference Procedures

1.11.4 XC error log reference procedures 1.11.4.1 Outline The XC PWB can store error information items which have occurred in the backup memory. The number of error information items that can be stored is 64 items for the XCS2 PWB. Although the error information can usually be referred to using the error log function of the hardware provided in the system, it may be better to refer to the log in the XC memory for some error statuses.

Page 82 (2) Analysis Open the error log file. The following logs are displayed. Read the error log referring to the example below. (a) Data structure XL30 xxxx 000000000 mmddhhmm xxxxxxxxxx xxxxx xxxxxx 00□□□ <1> <2> <3> <4> <5> <6> <7> <8> <9> <10>...

Page 83 (b) Log data analysis The following error log data is analyzed. (Example) XL3000080000000000001211035??=???????U3R1w10005000008800000□□□□ ↓ XL30 0008 000000000 01211035 ??=??????? U3 00050 000088 <1> <2> <3> <4> <5> <6> <7> <8> <9> <10> <1> Bytes 5 to 8 Err log No. <2>...

Page 84 0011xxxx Over mA- Over mA+ (Always 1) Over kV- 0011xxxx (Always 1) (Always 1) MAC error (Filament Error) Overtime error 0011xxxx X-ray tube flow switch error X-ray tube thermal switch error Cable interlock error (Always 1) 0011xxxx (Always 1) Test mode (Always 1) Inverter thermal switch error 0011xxxx...

Page 85 <4> Bytes 36 to 37 : Execution commands Last received command code, command ID Exceptions (Only for XCS1 PWB) "01": Backup memory destruction detection at the time of start-up of the firmware "02": HFG error detection at the time of start-up of the firmware "03": Watchdog timeout error "04": Excess HU value...

Page 86 Therefore, this example is indicated as follows: XL30 0008 01211035 ??=??????? U3 00050 000088 <1> <2> <3> <4> <5> <6> <7> <8> <9> <10> Over mA+ errors occurred at 10:35 on January 21. The setting conditions at this time were 80 kV, 30 mA, Small focus, and 0.5 seconds.

Page 87: Data Acquisition Section

CHAPTER 2 DATA ACQUISITION SECTION No. 2D201-177EN*F...

Page 88: Introduction

Introduction Details of the data acquisition section CDAS-024A/1A (CLB-07027) are provided in subsections 2.2 "Configuration" to 2.9 "Repair". Configuration 2.2.1 Components The data acquisition section consists of the following: (1) Detector Main detector 1 set Reference detector 1 set (2) DAS T-CONTROL PWB T-CONVERTER PWBs DAS chassis...

Page 89: Configuration Table

2.2.2 Configuration table The configuration of the data acquisition section is shown below. Configuration of data acquisition section NOTE: The items above shown in dotted lines are included in the gantry in the system configuration. Refer to the gantry mechanism section when looking for the components of these units in the part list.

Page 90: Layout Drawing

2.2.3 Layout drawing A layout drawing of the components of the data acquisition section is shown below. X-ray tube REF detector Main detector Temperature controller Circuit protector (CP740) DAS main unit DAS power supply (rear of the DAS main unit) Names of components of the data acquisition section (Gantry rear panel) No.

Page 91: Overall Operation

Overall Operation X-ray entering the main detector, REF detector is converted to a current signal, and A/D conversion is performed on the DAS T-CONVERTER PWB to make it digital data. The digital data is transferred to the OPCONTA PWB of the data transmission section via the DAS T-CONTROL PWB.

Page 92: Main Detector

Main Detector The main detector is a two-dimensional multi-slice detector array with 720 channels □ 4 rows. A total of more than 10,000 detection elements are arranged in two dimensions in the channel and axial directions. The minimum slice thickness is 1.0 mm. The data for 4 slices per channel is output to the DAS.

Page 93: Ref Detector

REF Detector The reference detector uses a solid-state detector as the sensor and measures variations in the X-ray dose in the view direction. The current signals are sent to the main detector connectors through a low-noise cable. The output signal is input to the DAS via backplane PWB using a low-noise coaxial cable.

Page 94: Correspondence Between The Main Detector Channels And The Das Channels

2.5.2 Correspondence between the main detector channels and the DAS channels The correspondence between the main detector channels and the DAS channels is shown below. Correspondence between the main detector channels and the DAS channels Main detector Backplane PWB connector DAS channel T-CONVERTER PWB slot channel Only Ref...

Page 95 Correspondence between the DCA channels and the DAS T-CONVERTER PWB slot numbers T-CONVERTER01 IC NO. channel IC1B IC1D IC3B IC3D IC5B IC5D IC0A IC4A IC4C IC0C IC2A IC2C IN10 IN11 IN12 IN13 IN14 IN15 IN16 IN17 IN18 IN19 IN20 IN21 IN22 IN23 IN24...

Page 96 T-CONVERTER02 IC NO. channel IC1B IC1D IC3B IC3D IC5B IC5D IC0A IC0C IC2A IC2C IC4A IC4C – – – – – – 4 – 153 4 – 157 4 – 161 4 – 176 4 – 172 4 – 168 –...

Page 97 T-CONVERTER03 IC NO. channel IC1B IC1D IC3B IC3D IC5B IC5D IC0A IC0C IC2A IC2C IC4A IC4C 4 – 249 4 – 225 4 – 253 4 – 229 4 – 257 4 – 233 4 – 272 4 – 248 4 – 268 4 – 244 4 – 264 4 – 240 3 –...

Page 98 T-CONVERTER04 IC NO. channel IC1B IC1D IC3B IC3D IC5B IC5D IC0A IC0C IC2A IC2C IC4A IC4C 4 – 345 4 – 321 4 – 349 4 – 325 4 – 353 4 – 329 4 – 368 4 – 344 4 – 364 4 – 340 4 – 360 4 – 336 3 –...

Page 99 T-CONVERTER05 IC NO. channel IC1B IC1D IC3B IC3D IC5B IC5D IC0A IC0C IC2A IC2C IC4A IC4C 4 – 441 4 – 417 4 – 445 4 – 421 4 – 449 4 – 425 4 – 464 4 – 440 4 – 460 4 – 436 4 – 456 4 – 432 3 –...

Page 100 T-CONVERTER06 IC NO. channel IC1B IC1D IC3B IC3D IC5B IC5D IC0A IC0C IC2A IC2C IC4A IC4C 4 – 537 4 – 513 4 – 541 4 – 517 4 – 545 4 – 521 4 – 560 4 – 536 4 – 556 4 – 532 4 – 552 4 – 528 3 –...

Page 101 T-CONVERTER07 IC NO. channel IC1B IC1D IC3B IC3D IC5B IC5D IC0A IC0C IC2A IC2C IC4A IC4C 4 – 633 4 – 609 4 – 637 4 – 613 4 – 641 4 – 617 4 – 656 4 – 632 4 – 652 4 – 628 4 – 648 4 – 624 3 –...

Page 102 T-CONVERTER08 IC NO. channel IC1B IC1D IC3B IC3D IC5B IC5D IC0A IC0C IC2A IC2C IC4A IC4C – 4 – 729 4 – 705 4 – 733 4 – 709 4 – 737 4 – 713 4 – 752 4 – 728 4 – 748 4 – 724

Page 103: Das

The DAS consists of an T-CONTROL PWB and T-CONVERTER PWBs. There are 8 T-CONVERTER PWBs into which the output currents from the detectors are input, and each PWB has A/D converter circuitry for 96 channels 4 rows of data. Therefore, the DAS has A/D converter circuits for 8 ...

Page 104 Four LEDs and one 7-segment LEDs are provided on the T-CONTROL PWB. The meanings are as follows. Meanings of the LEDs Color Meaning Status Green 3.3 V ON Lit: Normal Green 5.7 V ON Lit: Normal Green Completion of initial setting of the FPGA Lit: Normal Input error of the VIEW-TRIG signal Lit: Abnormal...

Page 105 (1) Interface with OPCONTM Signal name Signal flow Function Servo The data acquisition timing is controlled by (VIEW TRIG.) this trigger pulse. The DAS acquisition amplifier sequence starts on the rising edge of this (encoder) OPCONTM signal. When the gantry is not rotating, ...

Page 106 (2) DAS sequence control The DAS sequence is started with rise of VIEW-TRIG signal. CAUTION DAS gain setting This DAS has 7 types of gain, and the appropriate gain is automatically selected according to the slice thickness, FOV, and kV when image acquisition is performed.

Page 107 Pin arrangement of the connector for the DAS I/O cable Pin # Signals Pin # Signals Pin # Signals Pin # Signals DAS+MODE2 DATA-CLK IDATA+08 DAS-MODE3 DAS-MODE2 IDATA+00 IDATA-08 DAS+MODE4 VIEW+TRIG IDATA-00 IDATA+09 DAS-MODE4 VIEW-TRIG IDATA+01 IDATA-09 DAS+PDSW0 DAS+MODE1 IDATA-01 IDATA+10 DAS-PDSW0 DAS-MODE1...

Page 108 No. 2D201-177EN*F...

Page 109 (3) Test pattern If the test mode is specified as the DAS operation mode, test patterns on the FPGA of the T-CONTROL PWB are output in order. In this mode, any signals input to the DAS are ignored, and the test pattern has priority. To check whether or not the data transfer from the T-CONTROL PWB to the HIF4 PWB is performed normally, select this mode using the data acquisition command in DCA.

Page 110 Test data patterns 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB Row NO. Integrator NO. F555 F555 F555 F555 FAAA FAAA FAAA FAAA FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF Reserved A...

Page 111 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 112 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 113 1row 2row 3row 4row 1row 2row 3row 4row system ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 114 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 115 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 116 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 117 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 118 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA

IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 119 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 120 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 121 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 122 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 123 1row 2row 3row 4row 1row 2row 3row 4row System ch IntegA IntegA IntegA IntegA IntegB IntegB IntegB IntegB No. 2D201-177EN*F...

Page 124: Das Power Supply

DAS Power Supply □5.7 V, □3.3 V, and □24 V power supply units are mounted in the DAS power supply. The input voltage is single-phase 200 VAC. The DAS power supply has overcurrent and overvoltage protection functions. Note that if the overvoltage or overcurrent protection function is actuated, recovery can be performed by turning the DAS power supply input (CP740 of the gantry) OFF and then turning it ON again after waiting at least 3 minutes.

Page 125: Power Supply

2.7.2 □3.3 V power supply <6> <7> <1> <2> <3> AC (L) <4> AC (N) <5> □ output terminal <1> : <2> : - output terminal <3> : Frame grounding terminal (FG) <4> : AC input terminal (L) <5> : AC input terminal (N) <6>...

Page 126: Identifying Problems

Identifying Problems 2.8.1 Notices on work WARNING: Before starting service work, be sure to turn OFF the breaker and all of the system power switches on the distribution board. (1) Make sure all cables are connected correctly before supplying power to the data acquisition system.

Page 127: Possible Problems And Troubleshooting

2.8.3 Possible problems and troubleshooting The relationships between possible problems and their causes are shown in the table below. For troubleshooting, refer to the troubleshooting flowchart. Major data acquisition trouble and possible causes Data acquisition trouble Shifted CT Large Ring image Streak shower number image SD...

Page 128 Ring image troubleshooting flowchart No. 2D201-177EN*F...

Page 129 Streak shower troubleshooting flowchart No. 2D201-177EN*F...

Page 130 Shifted CT number troubleshooting flowchart No. 2D201-177EN*F...

Page 131 SD troubleshooting flowchart No. 2D201-177EN*F...

Page 132: Das Integrator-Dependent Abnormality

2.8.4 DAS integrator-dependent abnormality In this DAS, each channel has two integrators (Integ-A and Integ-B) which convert the output current of the detector into voltage signals. Each integrator controls alternate views. If one of the integrators malfunctions, the output value of only the odd views (or even views) becomes abnormal.

Page 133: Check Of The Das Supply Voltage

2.8.7 Check of the DAS supply voltage (1) Measure the voltages at the following points and confirm that the measured voltages are within the specified range. Between +V and –V of DAS PS1 : From 5.8 V to 5.9 V Between +V and –V of DAS PS2 : From 3.3 V to 3.4 V (2) If the voltages are not within the specified ranges, adjust them with the V.ADJ...

Page 134: Replacement Of The Das Pwb (Removing And Remounting A Pwb)

2.9.2 Replacement of the DAS PWB (Removing and remounting a PWB) <Tools and parts required> (1) Standard tool set : 1 set <Work procedure> (1) Open the front cover of the gantry. CAUTION: Be sure to turn OFF the circuit protector switch. Otherwise, the DAS remains ON.

Page 135 (5) Place an antistatic mat and wear clean gloves and a wrist strap. (6) Replace a defective PWB(s) with a new one(s). Note: Confirm that the DAS PWB is properly inserted when viewed from the oblique direction (it must be inserted securely). CAUTION: Be careful not to touch the parts of the DAS PWB etc.

Page 136: Replacement Of The Main Detector

2.9.3 Replacement of the main detector The mass of the main detector array including DAS is 48 kg, and at least two persons are required for this replacement. Do not shock or exert any excessive force when removing and remounting it. Flowchart of detector replacement operations (outline) Remove the detector from the gantry.

Page 137 <Work procedure for removing the main detector> (1) Disconnect the following cables: <1> DAS I/O cable (1 cable) Remove it at the DAS <2> DAS power cable (1 cable) side. <3> DAS fan power cable (1 cable) <4> REF cable (1 cable) Main detector side <5>...

Page 138 <Work procedures for mounting the main detector> (1) Remove the DAS PWB from the main detector that was removed and mount it to the new main detector. * When handling the DAS PWB, be sure to wear new clean gloves. * After transferring the DAS PWB to the new main detector, confirm that the DAS PWB is properly inserted when viewed from the oblique direction (it must be inserted securely).

Page 139 (3) Mount the main detector. (a) Insert the detector/DAS between the patient couch and the gantry. At this time, be careful not to hit the DAS against the patient couch, as interference can easily occur. It is recommended that a blanket be placed on the patient couch in order to protect it.

Page 140 <Confirmation after replacement of the main detector> (1) Gently turn the gantry by hand and make sure that the gantry is not in contact with any cable or wire during rotation. (2) Turn ON power to the system and turn ON the circuit protector switch. (3) Check that the temperature controller operates normally and that the main detector array is warm.

Page 141: Replacement Of The Ref Detector

2.9.4 Replacement of the REF detector The REF detector is behind the leakage beam shielding plate. To replace the REF detector of this system, the optical system shielding cover and the optical system (slit wedge) must first be removed. The REF detector is a high-precision part. Handle it with care. <Tools and parts required>...

Page 142 (5) Remove the collimator together with the REF detector from the R-base. REF detector Collimator No. 2D201-177EN*F...

Page 143 <Work procedure for remounting the REF detector> Basically reverse the above steps for removing the REF detector. Note the following when remounting the REF detector: (1) Clean the inspection window of the REF detector before remounting. (2) Be sure to remount the insulating washers. (3) Make sure that the whole body of the REF detector is fully insulated from the gantry.

Page 144: Setting After Replacing The Temperature Controller

2.9.5 Setting after replacing the temperature controller After the temperature controller is replaced, setting is required. This subsection describes the setting procedure. (1) Names of parts of the temperature controller First indicator Second indicator Level key UP key DOWN key Mode key First indicator Displays the current value (current temperature) or the type of...

Page 145 <Step 1> Initial setting Hold down the level key (for more than 3 seconds. The display changes. Change the setting Use the DOWN/UP keys (from 5 to 6. to change the

setting. Press Maintain the default settings. Press Maintain the default settings.

Page 146 Change the setting Use the DOWN/UP keys (from oNoF to PID. to change the setting. Press Maintain the default settings. Press Change the setting Use the DOWN/UP keys (from on to off. to change the setting. Press Maintain the default settings.

Page 147 <Step 2> Setting the temperature Use the DOWN/UP key ( ) to set the second indicator setting to " ". Note: Decimal point NOTE: Since step 3 has not yet been performed at this point, the value displayed on the first indicator (current temperature) may vary significantly. The standard value is approximately "34.0 to 40.0".

Page 148 <Step 3> Adjustment No. 2D201-177EN*F...

Page 149 <Reference> When is held down, the display changes as follows; however, it is not necessary to change the default settings. <Step 4> Protection No. 2D201-177EN*F...

Page 150 (3) Confirmation Confirm that the specified temperature "37.0" displayed on the second indicator does not change when the DOWN/UP key ( ) is pressed. No. 2D201-177EN*F...

Page 151: Data Transmission Unit

CHAPTER 3 DATA TRANSMISSION UNIT (MUDAT, GCIFM, OPCONTM) No. 2D201-177EN*F...

Page 152: Introduction

Introduction The data transmission unit performs data transmission between the rotating section and the stationary section in the gantry using optical signal transfer. The data is as follows: Control signals of the optical system HFG control signals Detector data signals The data transmission unit transmits these signals.

Page 153 Main terms and their meanings Term Full spelling Meaning MUDAT Multi-Data Optical data transmission unit in the gantry Transmitting System GCIFM Gantry Console PWB which handles MUDAT stationary section Interface side I/F OPCONTM Optics Controller PWB which handles MUDAT rotation section side I/F and optical system control PPBM Power PWB...

Page 154: Beam Emitting/Receiving Section (Mudat)

Beam Emitting/Receiving Section (MUDAT) 3.2.1 Functions of the MUDAT The MUDAT is divided between the stationary section and the rotation section in the gantry and transfers all data between the sections in a form of optical data. Since light is the transfer medium, the transfer speed is considerably faster than the rotation speed of the rotation section, so data can be transmitted and received while the rotation section is rotating.

Page 155 (4) PRTM (PaRenT unit) PWB name: PRTM (used in common for the stationary section and the rotation section) Distributing signals transmitted as optical data at the stationary section: Data sent from the GCIFM is distributed to the SOT (7 PWBs). ...

Page 156 No. 2D201-177EN*F...

Page 157 No. 2D201-177EN*F...

Page 158 PWB table PWB name PWB name Function Size, form (design) (system) LPBM ROT-0 to PWB only for transmission of optical Square 240 24 ROT-15 data at the MUDAT RPDM Gr-1 RPD-0 PWB only for transmission of optical Square 200 40 Gr-2 RPD-1 data at the MUDAT...

Page 159: External View

3.2.3 External view The configuration of the MUDAT system in the gantry is shown below. The PWBs of the rotation section are attached to the doughnut-shaped metal plate mounted to the R support through the shield cover. The PWBs of the stationary section are attached to the metal plate mounted to the main frame through the shield cover.

Page 160 (2) Configuration of the MUDAT stationary section MUDAT stationary section (as

viewed from the rear) No. 2D201-177EN*F...

Page 161: System Diagram And Operating Principle

3.2.4 System diagram and operating principle (1) Light emitting section The figure below shows a block diagram of the light emitting section of the MUDAT. The light emitting section consists of five PWBs with LEDs. The five LEDs are turned ON and OFF by transistors and light beams are output. Light emitting section block diagram No.

Page 162 (2) Light receiving section The figure below shows a block diagram of the light receiving section. The light receiving section for each data set consists of two PWBs, each of which has two PDs. Each PD consists of a pin PD. The very small current generated by the light entering the PD is amplified by an amplifier.

Page 163: If Unit (Interface Unit) [Opcontm, Gcifm]

IF Unit (Interface Unit) [OPCONTM, GCIFM] 3.3.1 Functions of the IF unit The IF unit consists of the OPCONTM PWB and the GCIFM PWB. The OPCONTM functions as the interface unit of the rotation section and the GCIFM as the interface unit of the stationary section. The OPCONTM performs parallel-serial (P/S) conversion of data sent from the external units DAS, XC, SSCONTX, KGTSM (GMSC), etc.

Page 164 (2) GCIFM (Gantry-Console Interface) (a) MUDAT interface unit of the stationary section Converts 4-channel serial data (DAS data, control data) received from the MUDAT into parallel data and transfers the converted data to the stationary section and the console. (S/P conversion) ...

Page 165 (4) Non-rotation (Disable) scan To perform Disable scanning using the DCA, position SW setting must be performed at the GCIFM (because gantry rotation is not performed and the MUDAT position data cannot be obtained as described above). (a) Procedure <1> Set rotary SW2-4 and SW5 of the GCIFM.

Page 166 (5) Errors detected in the data transfer section Data transfer section detects the following 14 types of errors. The meaning of each error, error handling by the system, the error clearing method, and the display LED No. are shown in the table below. Errors detected in the data transfer section [stationary section ...

Page 167 Error handling Clearing Error type Meaning Display LED by the system method <9> SOTROT Fatal A control data transfer error The error is The error is GCIFM LED17 Error occurred three or more times in latched by the OPCONTM automatically succession.

Page 168 (6) Data transfer section error identification tools The data transfer section has six error identification tools. <1> DAS test: Outputs test data from the DAS. <2> Console test: Outputs test data from the GCIFM. <3> ROTSOT test: Tests transfer between the OPCONTM, the LPBA (ROT), the SPDA, and the GCIFM by transferring test data from the OPCONTM and checking the result at the GCIFM.

Page 169: External Appearance

3.3.3 External appearance The figure below shows the layout of the IF section in the gantry. The OPCONTM PWB is mounted in the PWB chassis of the gantry rotation section and the GCIFM PWB is mounted at the upper right of the gantry. Locations of the OPCONTM PWB and the GCIFM PWB No.

Page 170: Led Display And Switch Setting

LED Display and Switch Setting 3.4.1 OPCONTM PWB (1) List of DIP switches (a) The DIP switches provided on the OPCONTM PWB are described in the table below (when the part No. of the OPCONTM PWB is not PX79-47845). Switch No. Function Setting DSW3-1, 3-2...

Page 171 (b) The DIP switches provided on the OPCONTM PWB are described in the table below (when the part No. of the OPCONTM PWB is PX79-47845). Switch No. Function Setting DSW2-1 Data writing to Writing to the FPGA (for debugging): DSW2-1: ON the data Writing to the PROM transmission...

Page 172 (2) Fuses Five types of fuses (F1 to F4) are mounted on the OPCONTM PWB. If fuse F4, which is mounted in the DC5V line (CN801-1, pin 4), blows due to a short circuit in the PWB

etc., replace the OPCONTM PWB. Mounted fuses F1: 3 A, 250 V, time lag F2: 3 A, 250 V, time lag...

Page 173 (4) OPCONTM LED list The OPCONTM LEDs are described in the table below. Optical system control related signals LED No. Name Meaning LEDG1 S.RESET OPCONTM firmware reset LEDG2 HALT OPCONTM firmware halt LEDG3 PERIINT OPCONTM interrupt LEDG4 SERIAL Serial communication (KGTSM (GMSC)) interrupt signal LEDG5 SLTINT Slit operation completion interrupt...

Page 174 MUDAT related signals LED No. Name Meaning LED1 NORMAL OPCONTM ON LED2 RESET OPCONTM hardware reset LED4 S.TEST MUDAT test data output (ROTSOT test or OPCONTM test) LED5 R.TEST MUDAT test check mode (check of SOTROT test or OPCONTM test) LED10 DCLK0 Always blinking: DAS-to-OPCONTM data writing clock...

Page 175 LED No. Name Meaning LED66 POSD4 MUDAT position data (MSB) LED67 OPCOM OPCONTM command line LED68 Indicates that the FIFO (memory) is empty. (For CH 1 and 2) LED69 Indicates that the FIFO (memory) is full. (For CH 1 and 2) LED70 EF11 Indicates that the FIFO (memory) is empty.

Page 176 OPCONTM PWB (when the part No. of the OPCONTM PWB is PX79-40214) No. 2D201-177EN*F...

Page 177 OPCONTM PWB (when the part No. of the OPCONTM PWB is PX79-47845) No. 2D201-177EN*F...

Page 178 Arrangement and names of the LEDs on the OPCONTM PWB *1: Applicable when the part No. of the OPCONTM PWB is PX79-47845 No. 2D201-177EN*F...

Page 179: Gcifm Pwb

3.4.2 GCIFM PWB (1) DIP switch list The DIP switches provided on the GCIFM PWB are described in the table below. Switch No. Function Setting SW1-1 Local View Trigger setting ON : Local VT [corresponds to 1200 views] VT generated by the GCIFM corresponding to 1200 views is sent OFF : System VT to the rotation section.

Page 180 Switch No. Function Setting SW6-6 SOTROT test data output ON : Outputs test data to the MUDAT. OFF : System setting SW6-7 GCIFM test data check ON : Test data check mode OFF : Normal setting SW6-8 GCIFM check data switching ON : Checks GCIFM test data.

Page 181 (2) Fuse On the GCIFM PWB, a fuse is mounted in the DC5V line (CN601-1, pin 2). If fuse F1 or F2 blows due to a short circuit in the PWB etc., replace the GCIFM PWB. Mounted fuse F1: 8 A, 125 V, normal type (3) Test data output (a) If raw data is abnormal (abnormal image), output test data from the GCIFM in order to identify the cause (gantry or console).

Page 182 (4) LED list The GCIFM LEDs are described in the table below. GCIFM LED list GCIFM status display LED No. Name Meaning LED1 STATUS GCIFM ON LED2 RESET GCIFM reset LED3 C.TEST Console test mode (outputs console test data) LED4 GC.CHECK MUDAT test check mode (check of ROTSOT test or...

Page 183 GCIFM error display LED No. Name Meaning LED6 DUMMY Number of acquired projections: "00" in normal status, "88" during image acquisition LED7 MULTI ERR Number of errors in acquisition data (pure raw data) transfer LED8 SOTROT ERR Number of errors that occurred in communication from the stationary section to the rotation section LED9 ROTSOT ERR...

Page 184 Communication signal status display (lit, out, blinking [the color is slightly less intense than when the LED is lit]) LED No. Name Meaning LED10 DCLK Always blinking: GCIFM-to-Console data writing clock LED11 R.PULSE Always blinking: Resolver pulse sent from the KGTSM (GMSC) LED40 Lit when data is being acquired (during scanning): Acquisition signal sent from the KGTSM (GMSC)

Page 185 No. 2D201-177EN*F...

Page 186 (5) Error counters The number of errors corresponding to lighting of LEDs 7 to 9 is

described below. (a) Outline The cumulative number of transmission errors is displayed. The number of errors that occurred after the power is turned ON or after forcible reset is executed is displayed as a hexadecimal value.

Page 187 (d) Additional notes If the value continues to change from "00", the number of errors that occurred after turning ON the power or after forcible reset is displayed. If the displayed value appears to be "88" and forcible reset cannot be performed, errors are occurring in rapid succession and communication is interrupted.

Page 188: Installing The Cpu Data For The Opcontm Pwb

Installing the CPU Data for the OPCONTM PWB * This subsection is applicable only when the part number of the OPCONTM PWB is PX79-47845. * When using the service parts for the OPCONTM PWB, be sure to install the CPU data and perform SW setting.

Page 189 3.5.2.2 VCP driver software installation procedure (1) Run the installation executable file (CP210x_VCP_Win_XP_S2K3_Vista_7.exe) and perform installation by following the procedure below. (2) Turn ON the power of the gantry and connect the installation PC to CN803 of the OPCONTM PWB using the USB-B cable. Then perform automatic allocation of the installed drivers by PnP (Plug and Play).

Page 190: Installation Of The Pwb Data

3.5.3 Installation of the PWB data Install the PWB data by following the procedure below. (1) Connect the installation PC to CN803 of the OPCONTM PWB using the USB-B cable and set bits 1, 2, and 8 of DSW5 specified in the table below to ON. The other bits should be set to OFF.

Page 191 (4) The following window opens and the installation data is transferred to the PWB automatically. NOTE: 1. The above screen indicates that data transfer to the PWB is in progress. Wait until data transfer is completed (about 10 minutes). 2. If [] is clicked in the above window, data transfer is interrupted and installation fails.

Page 192: Changing The Data Version Identification Label

(6) Press any key at the installation PC to close the window. (7) Set the DSW5 as follows. DSW No. for PWB DSW settings settings DSW5 Set DSW5-3 to ON (switches other than DSW5-3 should be set to OFF). DSW5 OFF * For other DSW settings, refer to step (1) (b) of subsection 3.4.1.

Page 193 (2) Apply the label to the PWB in place. NOTE: If an old CPU data label has already been applied, apply the new label over the old label or remove the old label and then apply the new label. No. 2D201-177EN*F...

Page 194: Troubleshooting

Troubleshooting 3.6.1 Malfunction of the data transmission section The types of data transmission section errors are: <1> control data communication errors and <2> DAS data communication errors. 3.6.2 Malfunction of control system data communication NOTE: 1. Be sure to turn the power OFF/ON after maintenance or check work. The system may detect an error due to the following operation: ...

Page 195 (1) Verify error occurrence Perform MUDAT tests (ROTSOT test, SOTROT test) to check whether an error occurs by observing the LEDs on the OPCONTM PWB and GCIFM PWB. Confirm that SOTROT FAIL (GCIFM LED17) and SOTROT TEST ERR (OPCONTM LED20) or ROTSOT FAIL (GCIFM LED15) and ROTSOT TEST ERR (GCIFM LED20) lights.

Page 196 (2) Detailed investigation The flow of detailed investigation is shown in four tree diagrams corresponding to the 4 possible results of the "Verify error occurrence" tree. Each procedure is described after each tree. (a) Part of SOTROT is abnormal (b) SOTROT transfer abnormality No.

Page 197 (c) Part of ROTSOT is abnormal (d) ROTSOT transfer abnormality No. 2D201-177EN*F...

Page 198 (e) OPCONTM test Procedure <1> Turn OFF gantry NFB1. <2> Disconnect the cables of CN906 and CN907 of the OPCONTM PWB and bind them using cable ties to prevent their connectors from coming into contact with other parts. <3> Connect CN906 and CN907 of

the OPCONTM PWB using a MUDAT coaxial cable.

Page 199: Malfunction Of Das Data Communication

3.6.3 Malfunction of DAS data communication Relationship between MUDAT and an abnormal image A communication error of DAS data results in an abnormal image. An abnormality in the MUDAT appears as streak or ring artifacts. Data corruption by a single communication error becomes a streak artifact. If the frequency of errors becomes high, the number of streak artifacts will increase.

Page 200 3.6.3.1 Investigating the cause of abnormal image No. 2D201-177EN*F...

Page 201 No. 2D201-177EN*F...

Page 202 (1) Raw data check The DCA test program uses the extra data to determine the existence of generated errors, and the error position. Raw data configuration (for one projection) Data Word # Contents 001 (E0) Tube position 002 (E1) Rotation speed 003 (E2) Couch position 004 (E3)

Page 203 * Details concerning extra data Raw Data Error : Number of errors in pure data transfer DAS Word : Number of data sets transferred from the DAS: ^h 8C00 is normal. Proj. #1 : Number of projections 16 higher-order bits (bits 17 to 32) Proj.

Page 204 4) When an error occurs, it is assumed that optical data communication between SPDM and the ROT located opposite is malfunctioning. 5) Determine whether the error occurs for a specific ROT PWB or at random. If the error occurs at random, corresponding SPDM may be abnormal. 6) Return SW1-2 of the GCIFM PWB to OFF.

Page 205 Detector row 1 (Segment 1) Channel 0002 0002 0003 0003 0004 0004 0005 0005 0006 0006 0007 0007 0008 0008 0009 0009 Channel 000A 000A 000B 000B 000C 000C 000D 000D 000E 000E Channel 1 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0018 0018 0018 0018 17 0019 0019 0019 0019 001A 001A 001A 001A 001B 001B 001B 001B 001C 001C 001C 001C 33 001D 001D 001D 001D 001E 001E 001E 001E 001F 001F 001F 001F 0020 0020 0020 0020 49 0021 0021 0021 0021 0022 0022 0022 0022 0023 0023 0023 0023 0024 0024 0024 0024...

Page 206 Detector row 2 (Segment 2) Channel 01B3 01B3 01B4 01B4 01B5 01B5 01B6 01B6 01B7 01B7 01B8 01B8 01B9 01B9 01BA 01BA Channel For channels REF to D, row 1 is copied. They are not checked by DCA. 01BB 01BB 01BC 01BC 01BD 000C 000D 000D 000E 000E Channel 1 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 01C9 01C9 01C9 01C9 17 01CA 01CA 01CA 01CA 01CB 01CB 01CB 01CB 01CC 01CC 01CC 01CC 01CD 01CD 01CD 01CD...

Page 207 Detector row 3 (Segment 3) Channel 0364 0364 0365 0365 0366 0366 0367 0367 0368 0368 0369 0369 036A 036A 036B 036B Channel For channels REF to D, row 1 is copied. They are not checked by DCA. 036C 036C 036D 036D 036E 000C 000D 000D 000E 000E Channel 1 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 037A 037A 037A 037A 17 037B 037B 037B 037B 037C 037C 037C 037C 037D 037D 037D 037D 037E 037E 037E 037E...

Page 208 Detector row 4 (Segment 4) Channel 0515 0515 0516 0516 0517 0517 0518 0518 0519 0519 051A 051A 051B 051B 051C 051C Channel For channels REF to D, row 1 is copied. They are not checked by DCA. 051D 051D 051E 051E 051F 000C 000D 000D 000E 000E Channel 1 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 052B 052B 052B 052B 17 052C 052C 052C 052C 052D 052D 052D 052D 052E 052E 052E 052E 052F 052F 052F 052F...

Page 209 (4) DAS test mode (a) Procedure 1) Select "Acquisition" in the DCA test program. 2) Set the parameter for DAS mode to Test Mode, and perform scanning. 3) Check data of each channel using "Calc". 4) If no abnormality is found, operation from the OPCONTM PWB, the GCIFM PWB, to the console is normal, and DAS is assumed to have an internal abnormality.

Page 210: Procedure For Checking The Luminescence

3.6.4 Procedure for checking the luminescence The light of the communication LED is not visible to the eye because it is in the infrared region. Therefore, convert the infrared rays to visible

light (red) using an IR converter and visually check whether light is emitted. The figure below shows an outline of the IR converter.

Page 211 (1) ROT side Remove the connector cover. Because the LED located at the SPD is Rotate the gantry rotating unit so not visible in this position, the that the ROT is aligned with the luminescence check is performed by notch. shifting the position in a later step.

Page 212 DANGER: Hazardous voltage in the LCSR (slipring section) and brush section will cause electric shock. Do not remove the rear dome cover. If it is necessary to remove the rear dome cover, turn OFF the breaker before mounting/removing the rear dome cover. Do not turn ON the power of the gantry when the rear dome cover is removed.

Page 213 (2) SOT side Remove the connector cover. Check the luminescence. Refer to the figure below. This part emits red light. Hole Notch IR converter Red light can be seen. SOT mounting plate Use the cover switch, CP320, mechanical rotation lock pin, etc. to prevent the gantry from rotating during the work.

Page 214: Procedure For Disassembling The Mudat

3.6.5 Procedure for disassembling the MUDAT Remove the connector cover of the stationary section. Disconnect the cables of the stationary section. Before removing the SOT mounting plate, place a reference mark using a pen etc. for easy identification of the remounting position.

Page 215: Operation Check After Mudat Work

3.6.6 Operation check after MUDAT work (1) Procedure (a) Locally perform at least one rotation of the gantry from the KGTSM (GMSC). (b) Turn ON SW1-2 on the GCIFM PWB. (c) Confirm that the error display of the 7-segment LED corresponding to each of the three LEDs is "00".

Page 216 No. 2D201-177EN*F...

Page 217: Console

CHAPTER 4 CONSOLE No. 2D201-177EN*F...

Page 218: Outline

Outline This section describes the configuration of the console and the internal structure of the Navibox chassis, which is a major component of the console. 4.1.1 The configuration of the console <1> Power controller <2> Operation section (monitor, keyboard, mouse, microphone) <3>...

Page 219: Internal Configuration Of The Navibox

4.1.2 Internal configuration of the Navibox Front side Rear side Left side Right side No. 2D201-177EN*F...

Page 220: Components Of The Navibox

4.1.3 Components of the Navibox Internal components on the front and left sides Internal components on the right side No. 2D201-177EN*F...

Page 221: Power Supply, Signals, And Connection Diagrams

Power Supply, Signals, and Connection Diagrams The connection diagrams of the power system and the signal system are shown here. 4.2.1 Power system connection diagram Connection diagram of the power system No. 2D201-177EN*F...

Page 222: Signal System Connection Diagram

4.2.2 Signal system connection diagram Connection diagram of signal system No. 2D201-177EN*F...

Page 223: Power Controller

Power Controller 4.3.1 External appearance of the power CONT Front side Left side Right side No. 2D201-177EN*F...

Page 224: Setting The Dip Switches Of The Power Cont

4.3.2 Setting the DIP switches of the power CONT DIP SW Used for setting the gantry reset time. Set only bit 4 of DIP SW1 to ON as shown in the figure below. * The relationship between the DIP SW1 setting and the gantry reset time is as follows.

Page 225: Connection Diagram Of The Power Cont

4.3.3 Connection diagram of the power CONT Connection diagram of the power CONT No. 2D201-177EN*F...

Page 226: Power Control

4.3.4 Power control The power ON/OFF operation of the system is controlled by the power controller in the Navibox. The power ON/OFF sequences are shown below. Power ON sequence: Power switch ON About 0.5 seconds later Console power ON ...

Page 227

Power control timing charts No. 2D201-177EN*F...

Page 228: Operation Section

Operation Section 4.4.1 Configuration The configuration of the operating section of the console is shown below. <1> Monitor <2> Keyboard <3> Mouse <4> Microphone Unit: mm Operating section No. 2D201-177EN*F...

Page 229: Monitor

4.4.2 Monitor (1) Specifications and operation Refer to the operation manual supplied with the monitor. (2) Precautions (a) The monitor connected to the console must be part of the standard configuration. Do not connect any other monitor. (b) Install the monitor in a place that is well ventilated, stable, and at a distance of at least 10 cm from the nearest wall.

Page 230

(2) The layout of external connectors on the keyboard is shown in the figure below. CN 1 CN 4 (a cover is provided.) External view of the keyboard (rear view) (3) The locations of the switches/connectors on the control PWB are shown in the figure below.

Page 231: Mouse

4.4.4 Mouse (1) Outline of specifications PS/2 standard mouse with wheel Mini-DIN 6-pin connector (2) External appearance Unit: mm Outline diagram of mouse (3) Precautions (a) When the outer surface is dirty, wipe it with a soft cloth that is moistened with neutral detergent and wrung out.

Page 232: System/Acquisition Section (Navibox)

System/Acquisition Section (Navibox) 4.5.1 Configuration The system/acquisition section (Navibox) consists of the PC BOX in which PWBs, including the motherboard, are installed and other components as listed below. <1> PC BOX Motherboard (including the CPU and memory) Graphics card ...

Page 233: Pc Box

4.5.2 PC BOX 4.5.2.1 Outline The PC BOX is a unit in which various types of PWBs, including the motherboard, are installed and is the core of the Navibox. 4.5.2.2 External appearance The PC BOX is installed in the Navibox. The external appearance of the PC BOX is shown below.

Page 234

4.5.2.3 Composition The PC BOX consists of the following components. <1> Motherboard (2 CPUs mounted) <2> Memory <3> Graphics card <4> HIF4 PWB <5> SSCONTX PWB <6> ABP PWB <7> CAN card (option) <8> USB port (external access USB port for maintenance) <9>...

Page 235

Rear of the PC BOX Front of the PC BOX Motherboard connectors (detail) No. 2D201-177EN*F...

Page 236

4.5.2.4 Motherboard and CPU The specifications of the motherboard are as follows. Item Specifications Intel Xeon 64-bit CPU Quad core 2 Memory slot 6 slots or more SATA 3 or more I/F for drive connection SAS 2 or more USB 2.0 ...

Page 237 4.5.2.7 HIF4 PWB (1) Outline The HIF4 PWB is used to receive the scan data sent from the DAS unit of the gantry. (2) Connectors, switches, and LEDs The connectors, switches, and LEDs on the HIF4 PWB are described below. Connectors Name Contents...

Page 238 (3) Replacement of the HIF4 PWB FLASH ROM for the FPGA firmware is mounted on the HIF4 PWB. If the version of the FLASH ROM is older than the system version, the FLASH ROM must be rewritten. Up to three minutes is needed for rewriting. Be sure to update the FLASH ROM when the PWB is replaced.

Page 239 4.5.2.8 ABP PWB (1) Outline The ABP PWB is used for allowing the back projection processing that requires the largest amount of calculation in reconstruction calculation processing to be performed in the hardware. One FPGA (PCI-FPGAS) for data transfer and two FPGAs (BP1/2-FPGA) for calculation (total three FPGAs) are installed in the ABP PWB.

Page 240 LEDs Name (LED color) Description MP12D (Yellow) Lit when power is supplied (+12 V) MP5D (Yellow) Lit when power is supplied (+5 V) PCI-CONF (Red) Out in normal status (lit when an error occurs in configuration between the PCI and the FPGA) BP1-CONF (Red) Out in normal status (lit when an error occurs in configuration between the BP1 and the FPGA)

Page 241 The FPGA execute modules stored in the FLASH ROM are listed in the table below. FPGA Description of the ROMs PCI-FPGA ROM for operations between the PCI and the FPGA ROM for cBPJ BP1-FPGA ROM for fBPJ ROM for diagnosis ROM for cBPJ BP2-FPGA ROM for fBPJ...

Page 242 LED2 : CPU-2. When scanning is permitted by the host computer, this LED lights. LED3 : CPU-3. (Indicates the CPU working status.) LED4 : CPU ERR. (Lights when the CPU error has occurred.) LED5 : WERR (Lights when a watchdog timer error occurs.) LED6 : LRST (Lights when a reset signal is sent from the host.) LED7 : SERR (Lights when a system error occurs.) LED8 : RST (Lights when the SSCONTX PWB is initialized.)

Page 243 4.5.2.10 Replacing the PWBs in the PC BOX The procedures for replacing the PWBs in the PC BOX are described below. For some PWBs, resetting is required after PWB replacement. Perform setting as required, referring to the setting procedures described in the subsection for the corresponding PWB.

Page 244 4.5.2.11 Replacing the PC BOX The PC BOX must be replaced mainly when the motherboard has malfunctioned. The configuration of the PC BOX supplied as a service part is as follows. Motherboard (with two CPUs installed) Memory Graphics card The following parts such as PWBs are not included in the service part.

Page 245 (3) Disconnect all cables connected to the PC BOX referring to the figure below. Cables connected to the left side of the PC BOX No. 2D201-177EN*F...

Page 246 Cables connected to the rear of the PC BOX (4) Remove the two mounting screws on the upper part and the mounting bracket (four mounting screws) on the lower part. (5) Pull out the PC BOX toward the front. Be sure to hold the PC BOX while doing this to prevent it from falling.

Page 247 4.5.2.12 Replacement of the battery in the PC BOX Procure a lithium battery (BSX74-1789) for replacement beforehand. (1) Turn OFF the power of the console. (2) Replace the lithium battery in the PC BOX as shown in the figure below. (a) Disengage the retaining tab of the lithium battery socket with a bladed screwdriver and remove the old battery.

Page 248 (3) BIOS settings (date and time) (a) Turn ON the power of the console. (b) Press the [Delete] key on the hybrid keyboard while the BIOS startup screen is displayed in order to open the BIOS login screen to log in to the BIOS setting screen.

Page 249 4.5.2.13 Countermeasures against memory PWB contact failure If the console does not start up normally, contact failure of the memory PWBs is a possible reason. Follow the procedures below to determine whether or not there is contact failure of the memory PWBs. If contact failure is found, remove and then reinstall the corresponding memory PWB.

Page 250 If memory is not recognized, logs entries remain displayed below the summary list as shown in the figure below. No. 2D201-177EN*F...

Page 251 <2> Check the memory bank that was not recognized. There is a log entry under the application event log in the log file as shown in the figure below. The memory uses memory banks with even numbers (BANK0, 2, 4, 6, 8, and 10). In the following example, BANK6 is not recognized.

Page 252 <Locations of the memory banks> <Precautions when removing/reinstalling the memory> When removing the memory, push the left and right lock levers outward. No. 2D201-177EN*F...

Page 253 When reinstalling the memory, push the center of the memory PWB until the lock levers click. If the lock levers do not click, lock the levers manually while pushing the memory PWB with your fingers. <4> Remount the left side cover and turn ON the breaker on the front of the console.

Page 254: Adi Pwb

4.5.3 ADI PWB In the audio function of the ADI PWB, the sound volume and tone can be adjusted using variable resistors (VRs). The locations of the audio system VRs, a block diagram, and the adjustment procedures are shown below. VR10 Locations of the audio system VRs (for PX74-08073) Locations of the audio system VRs (for PX74-10971)

Page 255 Sound volume adjustment method Adjustment method Function Clockwise Counterclockwise Adjustment of console microphone input Volume: Max. Volume: Min. line tone (bass) Adjustment of console microphone input Volume: Max. Volume: Min. line tone (treble) Adjustment of gantry microphone input Volume: Max. Volume: Min.

Page 256 GANTRY Gantry front microphone (KGTSPA) (ADI) Tone control circuit-1 Digital volume circuit-1 Gantry front microphone Console speaker Gantry front microphone Bass VR10 Treble Keyboard Tone control circuit-2 Digital volume circuit-2 Keyboard microphone Gantry speaker Bass Treble Automatic audio message playback circuit Tone control circuit-3 Bass Treble...

Page 257: Multi Drive

4.5.4 Multi drive (1) Specifications Item Specifications Drive type BD Multi Drive Host I/F SATA Media that can be used DVD-RAM (double-sided, 9.4 GB) DICOM media □ DVD-R □ CD-R (read only) (2) Precautions (a) Use only media approved by the factory. (b) As far as possible, remove the media from the drive when the system is not in use.

Page 258: System Disk, Image Disk, And Raw Data Disk

4.5.6 System disk, image disk, and raw data disk 4.5.6.1 Outline (1) Specifications Specifications of the HDDs Item Specifications Remarks System disk 3.5-inch SATA I/F Connected to SATA1 of the motherboard Image disk 3.5-inch SAS I/F Connected to SAS0-3 of the motherboard Raw data disk 3.5-inch SAS I/F...

Page 259 4.5.6.2 Replacing the HDD (1) Open the front cover of the Navibox. (2) Disconnect the cables connected to the HDD to be replaced and remove the HDD mounting screws (2 locations). (3) The HDD (together with the mounting bracket) can be removed. Remove the four screws as shown in the figure below to remove the mounting bracket.

Page 260 (Reference) The entire system disk/image disk/raw data disk unit (3 HDDs and chassis) can be removed. [Method for removing the entire HDD unit] <1> Open the front cover of the Navibox. <2> Disconnect all cables connected to the front of the HDDs. <3>...

Page 261: Hub

4.5.7 HUB 4.5.7.1 Specifications Specifications of the HUB Item Specifications Input and output 10BASE-T/100BASE-TX/1000BASE-T (auto negotiation) Ports 8 ports (Auto MDI/MDIX: The cable type is automatically detected. Cascade connection is possible.) Communication system Half-duplex/full-duplex (auto negotiation) 4.5.7.2 Connection and setup The 1000BASE HUB is connected and set up as follows.

Page 262 Recommended connections from the console are shown below. For 1000Base-T, a UTP category 6 cable is recommended. Console Uplink port For 10Base-T Max. 200 m For 100Base-TX Max. 100 m For 1000Base-T Max. 100 m Normal port Switching HUB Facilities of the

hospital ------- Imager etc.

Page 263 (3) Port LEDs Each port has two LEDs. The left LED indicates the speed, link, and activity statuses. The right LED indicates duplex mode. Left LED Lit in green The ports are linked at 1000 Mbps. Blinking in green The ports transmit/receive data at 1000 Mbps.

Page 264: Malfunction Diagnosis Program

Malfunction Diagnosis Program There are two types of test programs: a malfunction diagnosis program (hwtest) for performing tests of the entire hardware and the independent test program (diag) dedicated for the reconstruction PWB (ABP) and data acquisition PWB (HIF4 PWB). Each of these programs can be executed from the console window of the system.

Page 265 (4) Enter the test number in the displayed menu. (Also enter the number of repetitions depending on the test.) The test program starts up. *: To interrupt the test program, press the [DEL] key. *: To return the system to its normal operation status after the test program is executed, shut down the system and then start it up again.

Page 266: Malfunction Diagnosis Program (Hwtest) Menus And Details Of Each Test

4.6.2 Malfunction diagnosis program (hwtest) menus and details of each test The menu No. to be entered to execute the hwtest program, test details, and applicable hardware are shown in the table below. For tests with a circle for "Specified number of repetitions"...

Page 267: Executing The Independent Test Program (Diag)

4.6.3 Executing the independent test program (diag) (1) With the system started up, select Engineering Utility from the menu to open the console window. Then, enter "x:[Enter]" to display the [X:/] prompt window. (2) In the console window, enter the following underlined parts to move the directory. etc[Enter] ...

Page 268: Independent Test Program (Diag) Execution Results

4.6.4 Independent test program (diag) execution results When the test program (diag) is executed and the test item is selected in the menu, the test progress status and results are displayed. Many messages are displayed. The summary window in which the test results are summarized is displayed last. Check the summary window to determine whether or not an error is detected.

Page 269 HIF4 PWB No. 2D201-177EN*F...

Page 270 (2) Summary window displayed when the diag program is terminated ABP PWB No. 2D201-177EN*F...

Page 271 HIF4 PWB In normal status, "Test Summary OK" is displayed. In abnormal status, "Test Summary NG" is displayed. No. 2D201-177EN*F...

Page 272: Signal Tables (External Cables)

Respiratory-gated For the respiratory-gated scan system scan system SIO7 Reserved For expansion SIO1 Reserved For expansion SIO8 Reserved For expansion SIO2 Injector Injector synchronization scan system (Toshiba protocol) SIO3 CAN IO Injector Injector synchronization scan system (CAN protocol) No. 2D201-177EN*F...

Page 273 (2) Signal specifications (a) INTERPHONE Pin No. Signal name Pin No. Signal name C_SPK+ C_SPK- G_SPK+ G_SPK- +9 V G_MIC XC, GTS Pin No. Signal name Pin No. Signal name TCMD TCMD* TACK TACK* TRDY TRDY* CCMD CCMD* CRTS CRTS* CDTR CDTR* XCMD...

Page 274 DAS1 Pin No. Signal name Pin No. Signal name DATA115 DATA115* DATA114 DATA114* DATA113 DATA113* DATA112 DATA112* DATA111 DATA111* DATA110 DATA110* DATA109 DATA109* DATA108 DATA108* DATA107 DATA107* DATA106 DATA106* DATA105 DATA105* DATA104 DATA104* DATA103 DATA103* DATA102 DATA102* DATA101 DATA101* DATA100 DATA100* CLK* DATA200...

Page 275 Pin No. Signal name Pin No. Signal name C_MIC +12 V C_MIC_G KRCD RESERVE

KGND EMM* K +5 V PCMDO KCLK PCMDO* RESERVE XRAYO MRCD XRAYO* RESERVE RESTO MGND RESTO* M +5 V PACKO MCLK PACKO* RESERVE PMOVEO WDCD PMOVEO* PRDYO PRDYO* WDTR...

Page 276 MONITOR Pin No. Signal name Pin No. Signal name +5 V GREEN BLUE RESERVED RESERVED IIC DATA HORIZONTAL SYNC VERTICAL RETURN SYNC GREEN IIC CLOCK RETURN BLUE RETURN SIO4 Pin No. Signal name Pin No. Signal name 03CTS0 03RTS0 XRAY0 03CTS0* 03CTS0* XRAY0*...

Page 277 SIO6 Pin No. Signal name Pin No. Signal name 03DTR0* 03DSR0 03DSR0* 03DTR0 SIO7 Pin No. Signal name Pin No. Signal name 04DSR0 04DSR0* 04DTR0 04DTR0* SIO1 Pin No. Signal name Pin No. Signal name O0DSR1 O0ACK1 O0RTS1 O0CMD1 O0CTS1 O0DTR1 SIO8 Pin No.

Page 278 (m) SIO2 Pin No. Signal name Pin No. Signal name I1CMD1 I1ACK1 I1RTS1 I1CTS1 I1DSR1 I1DTR1 SIO3 Pin No. Signal name Pin No. Signal name I2CMD1 I2ACK1 I2RTS1 I2CTS1 I2DSR1 I2DTR1 No. 2D201-177EN*F...

Page 279 CAN IO Pin No. Signal name Pin No. Signal name CAN-L CAN-L CAN-H CAN-GND CAN-H CAN-GND No. 2D201-177EN*F...

Page 280 No. 2D201-177EN*F...

Page 281: Power Distributor

CHAPTER 5 POWER DISTRIBUTOR No. 2D201-177EN*F...

Page 282: Functions

Functions Output systems The power distributor converts the input voltage (three-phase 380/400/415/440/ 480 V) from the power supply of the facility to three-phase 200 V and distributes the power to each unit. The internal connection is a Y-Y connection with secondary neutral grounded. Refer to connection diagram.

Page 283 Dimensions W 700 □ H 973 □ D 695 (Unit: mm) The anchor bolts must be installed at the locations shown in one of the following patterns 1 to 3. Pattern 1: A1, A3, B1, B3 Pattern 2: A1, A2, B1, B2 Pattern 3: A2, A3, B2, B3 Approximate mass: 365 kg (including accessories: 374 kg)

Page 284: Cable Connection

Cable Connection Open the rear cover of the power distributor to access the connection terminals. Perform cable connection as shown in the figure below. Terminal board on the rear of the power distributor No. 2D201-177EN*F...

Page 285: Settings

Settings Switch the connections at the voltage-setting tap of the power distributor according to the input voltage at the facility. When the cover below the operating panel on the front side of the power distributor is opened, the terminal board for changing the voltage is exposed. Set the same voltage for the three phases (U, V, and W phases) according to the input voltage at the facility.

Page 286: Use

When the power distributor is receiving power, the "power ON" lamp on the front panel of the power distributor lights. Turn ON the circuit breakers corresponding to the three systems currently being used. CAUTION: Do not connect equipment other than that specified to the power distributor.

Page 287 LEGAL MANUFACTURER 1385, SHIMOISHIGAMI, OTAWARA-SHI, TOCHIGI-KEN 324-8550, JAPAN...