



coramex S.A.
 electrónica y radiología

Engineering Department

CONTROL PANEL SERVICE MANUAL & SERVICEABLE SPARE PARTS LIST

CORIX® 70 PLUS-USV (2010 Version)
CORIX® PRO 70 DIGITAL (2010 Version)
 Rev 1.0, March 2010

I) Control Panel Parts Numbers covered in this manual:

P506USV..... Control Panel for Corix® 70 Plus-USV
 R101..... Control Panel for Corix® Pro 70 Digital

II) Purpose of this manual

This manual has been elaborated in order to diagnose and repair the electronic boards installed inside the Control Panel, and as a reference for general spare parts. Besides, some “Mechanical Drawings” have been included for ease Part Number identification.

III) Malfunction diagnosis based on the “Error Messages” displayed.

DISPLAY ERROR NUMBER	FAILURE TYPE	PROCEDURE
EO1	Tubehead block may be power supplied continuously during start-up sequence	Turn the power system off immediately. Serious failure of the power system. Safety relay and TRIACS may be short circuited
EO2	Tubehead block maybe power supplied when safety relay is activated during start-up sequence	TRIACS maybe short circuited. X-Ray exposure is controlled only by the back-up timer (5 secs maximum exposure.)
EO3	Tubehead block maybe power supplied when safety relay is off and triacs are activated during start-up sequence	Safety relay maybe short circuited. Safety relay driver maybe damaged
EO4	"Patient size" button closed at start-up	Button damaged. Harness damaged
EO5	"Tooth selection" button closed at start-up	Button damaged. Harness damaged
EO6	"Increase" button closed at start-up	Button damaged. Harness damaged
EO7	"Decrease" button closed at start-up	Button damaged. Harness damaged
EO8	"X-Ray" button closed at start-up	Button damaged. Harness damaged
EO9	Tubehead supplied when closing safety relay and TRIACS are OFF during X-Ray exposure sequence	TRIACS damaged Exposure will end when safety relay is off or controlled by the back-up timer (5 secs maximum exposure)
EO10	Tubehead not supplied when closing safety relay and TRIACS have been activated during X-Ray exposure sequence	TRIACS and/or safety relay damaged. There is no exposure radiation
EO11	Tubehead still supplied when turning the TRIACS off and safety relay is on during X-Ray exposure sequence	TRIACS damaged Exposure will end when safety relay is off or controlled by the back-up timer (5 secs maximum exposure)

The Control Panel is able to detect some malfunctions in the electronics. The display will show a message with the Error Number if a failure is detected.

Procedures (Refer to Sections “X “and “XI” for Board Layouts, and Section “IX” for the “Test Fixture”)

E01: This message error is very unlike to appear. The cause may be:

- a) Safety Relay (K1), Triacs Q2, Q3, and/or drivers U1, U4, Q1, Q4 from the Power Board may be damaged.
- b) The flat cable connecting the Power Board and the Logic Board is damaged.
- c) Feedback sensing circuitry may be damaged.

Procedure:

1) Power ON the boards. If the lamp does not light, go to step 2. If it lights, substitute the components: Q2, Q3, and K1 from the Power Board. Power ON the boards. If the problem remains, then substitute the components: U4 and U1. Power ON and test again.

2) Substitute the flat cable harness and check again. If the problem remains, substitute U2 from the Power Board.

E02: This error may be caused by Triacs (Q2, Q3 from the Power Board) short circuited and/or drivers (U1, U4 from the Power Board) damaged.

Procedure:

- 1) Substitute Triacs Q2 and Q3 and check the boards. If the problem remains then,
- 2) Substitute U1 and U4 from the Power Board.

E03: This error may be caused by Relay K1 with its contacts stocked and/ or driver Q4 in short circuit condition.

Procedure:

- 1) Substitute relay K1 from the Power Board and test.
- 2) Substitute driver Q4 from the Power Board.

E04, E05, E06 and E07: The corresponding microswitch may be damaged (short circuited) or the microcontroller (U1) may be damaged (very unlikely). A failure mode more common would be when the switches do not make electric contact. This situation can be detected only when operating the equipment.

Procedure:

- 1) Substitute the relevant microswitch from the Logic Board.

E08: The tactil switch in the Hand Controller may be short circuited.

Procedure:

- 1) Substitute the relevant microswitch from the Hand Controller. If the failure mode remains then,
- 2) Substitute the telephone connector RJ45 (J4, "Main XRB") from the Power Board. If the failure mode remains then,
- 3) Substitute the flat cable harness.

E09: Follow the procedure described in E02

E10:

Procedure:

- 1) Visually check if there are any tracks burned on the Power Board.
- 2) Check if Fuse F3 is not blown.
- 3) Substitute Triacs Q2 and Q3 from the Power Board and test. If the failure mode remains, then
- 4) Substitute drivers U1 and U4 from the Power Board and test. If the failure mode remains, then
- 5) Substitute driver Q4 from the Power Board and test. If the failure mode remains, then
- 6) Substitute relay K1 from the Power Board.

E11: Follow the procedure described in E02

IV) Diagnosis for malfunctions not detected by the equipment

1) The equipment does not work when turn on the power switch (The LCD screen is not activated):

- a) Verify that the equipment is power supplied correctly (120/127/230/Vac according equipment labels)
- b) Disconnect the equipment from the Main Supply and check fuses F1, F2, F3. If necessary, replace fuse with the same type and rating.
- c) Check if the flat cable harness which connects the Power Board to the Logic Board is not damaged or if it is correctly connected to the boards (see Fig.1 and 2).
- d) Check for the connections from the LCD board to the Logic Board (see Fig. 3).

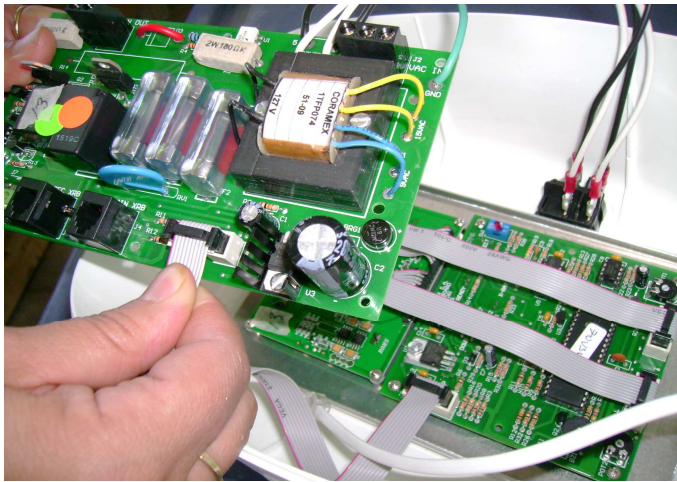


Fig. 1

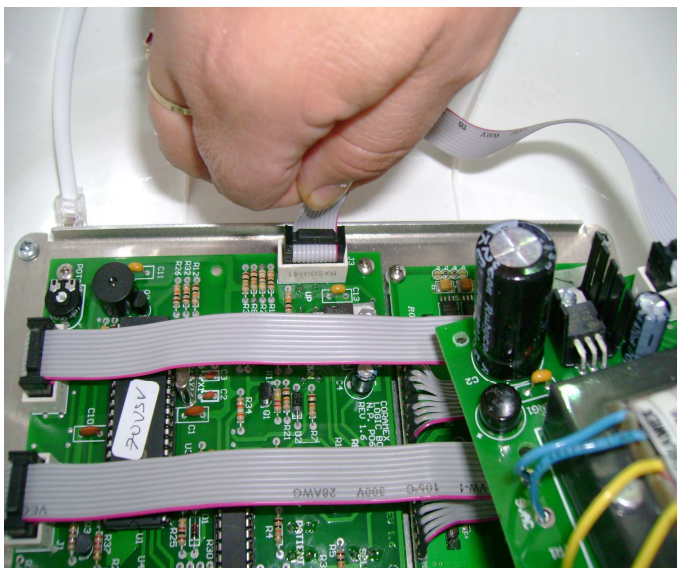


Fig. 2

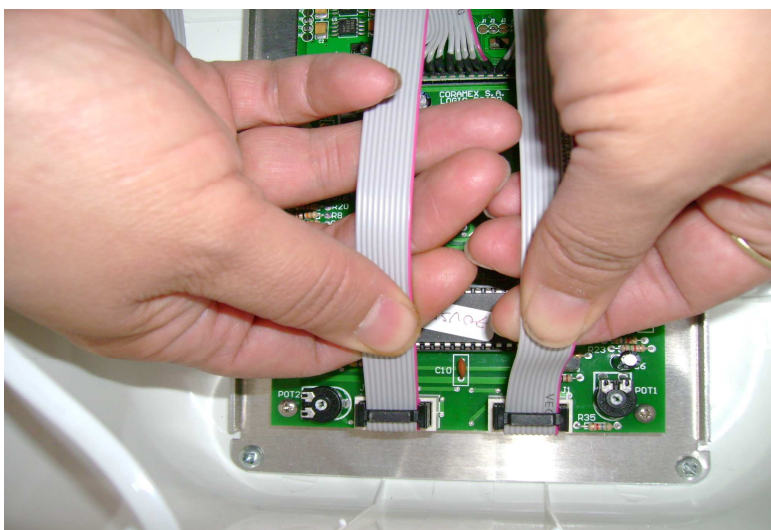


Fig. 3

2) The power switch does not light when turning on the equipment, but the LCD screen is activated:

a) The power switch internal lamp may be damaged. Substitute the power switch.

3) The LCD is difficult to read:

a) It may be necessary to adjust the LCD contrast. To perform this operation, turn on the equipment. Locate the adjustment potentiometer on the “Logic Board” (refer to section “XI”) “POT2”. Using a screwdriver, the contrast may be increased by rotating the pot in the counter clockwise direction. To decrease the contrast, rotate the pot in the clockwise direction (See Fig. 4)

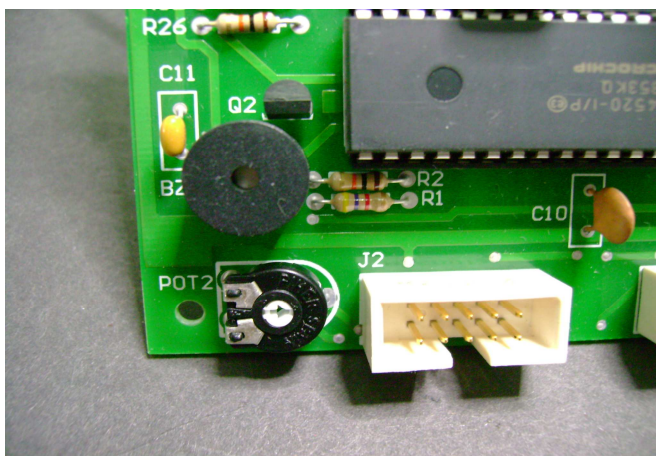


Fig. 4

b) If there are scattered white spots on the display screen, substitute the LCD screen.

c) If the characters shown on the display appear incompletely depicted or deformed, substitute the LCD screen.

4) The message “LOW LINE VOLTAGE” or “HIGH LINE VOLTAGE” frequently appeared on the display but when measuring the Line Voltage Supply using a digital voltmeter, it is within performance limits:

a) The Control Panel has a built-in AC voltmeter feature. It may be necessary to calibrate it, following the next procedure:

- Set the Control Panel in the “Menu” routine (refer to the proper “Installation & User’s Manual”). Fig.6 and 7 show the “Menu” display layout for both “Corix USV” and “Corix Pro” models.
- Connect an external AC digital voltmeter (tolerance +/- 1%) to the Voltage Main Supply where the Control Panel is plugged in.
- Using a screw driver, gently turn the potentiometer wiper named “POT1” from the “Logic Board” in the clockwise direction to increase the voltage reading, or in the counter clockwise direction to decrease it until the internal voltmeter readout matches with the external voltmeter (see Fig.5).

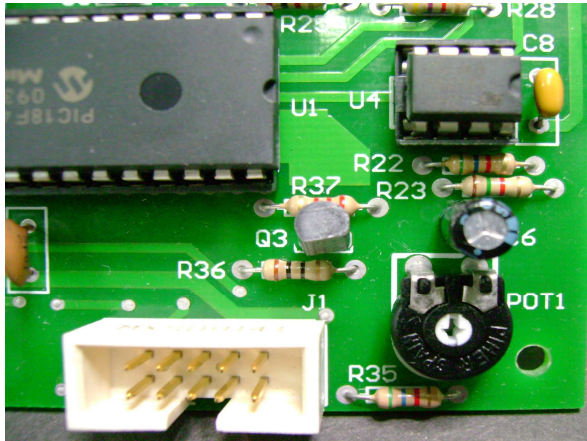


Fig.5



Fig.6 “Menu” layout for Corix 70 USV

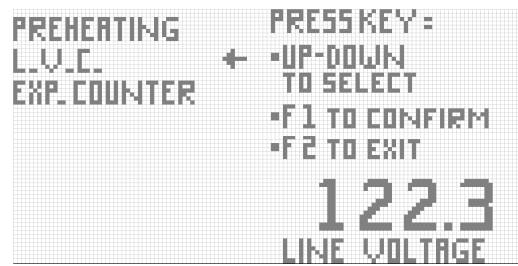


Fig.7 “Menu” layout for Corix 70 Pro

b) If it is not possible to calibrate the internal voltmeter, substitute the whole “Logic Board”

5) When pressing down any of the keyboards (“SELECT”, “PATIENT”, “UP”, “DOWN”, “F1”, “F2” according to the model), the equipment does not detect the keyboard:

- a) Substitute the relevant microswitch.
- b) Substitute the whole “Logic Board”.

6) When pressing down the Hand Controller Button, the X-Ray emission does not start:

- a) Check if the Hand Controller Harness is correctly connected to the “Modular Jack J4” labeled “MAIN XRB” on the Power Board (see Fig.8).

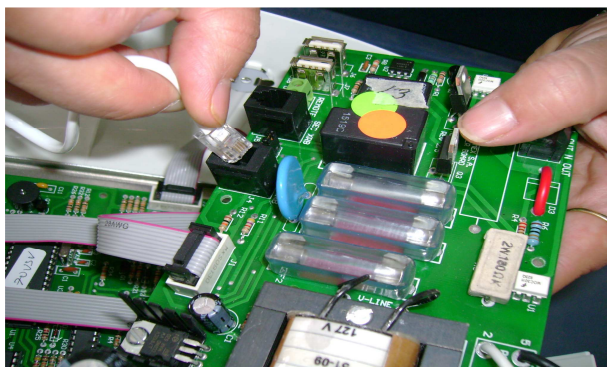


Fig. 8

b) Check if the jumper “JP1” on the Power Board is placed in its position (see Fig. 9).

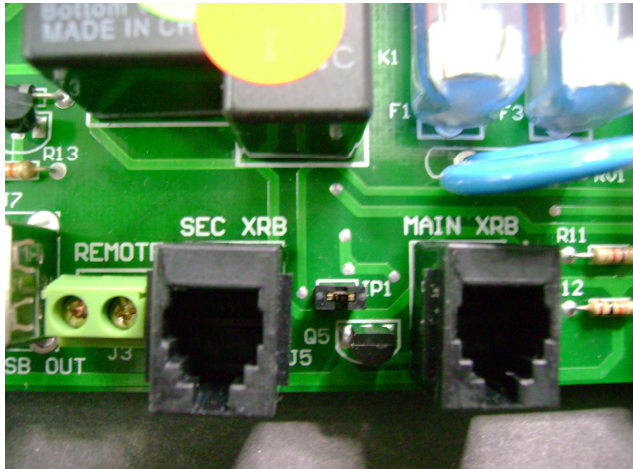


Fig. 9

- c) Substitute the relevant microswitch in the “Hand Controller”
- d) Substitute the Hand Controller assembly

VIII) Replacing the Triacs

When substituting the Triacs (Q2 and Q3 from the “Power Board”), be sure to mount them in the correct position. The Fig. 10 shows the correct position for the Triacs on the Board.

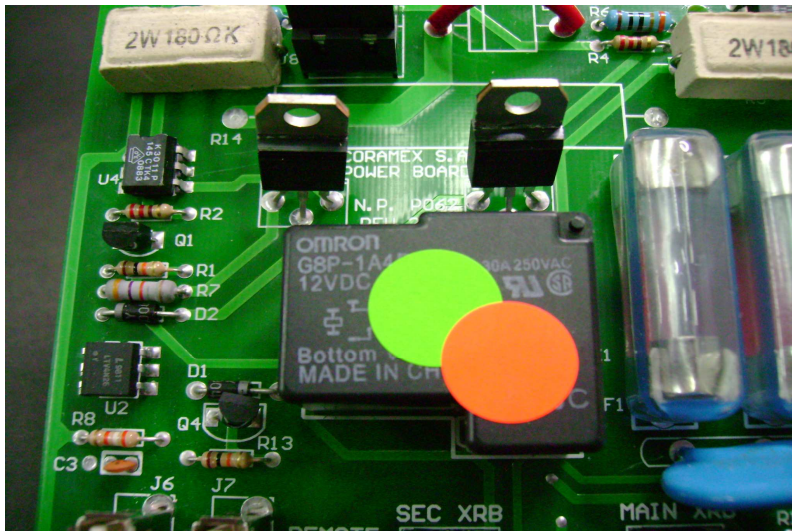
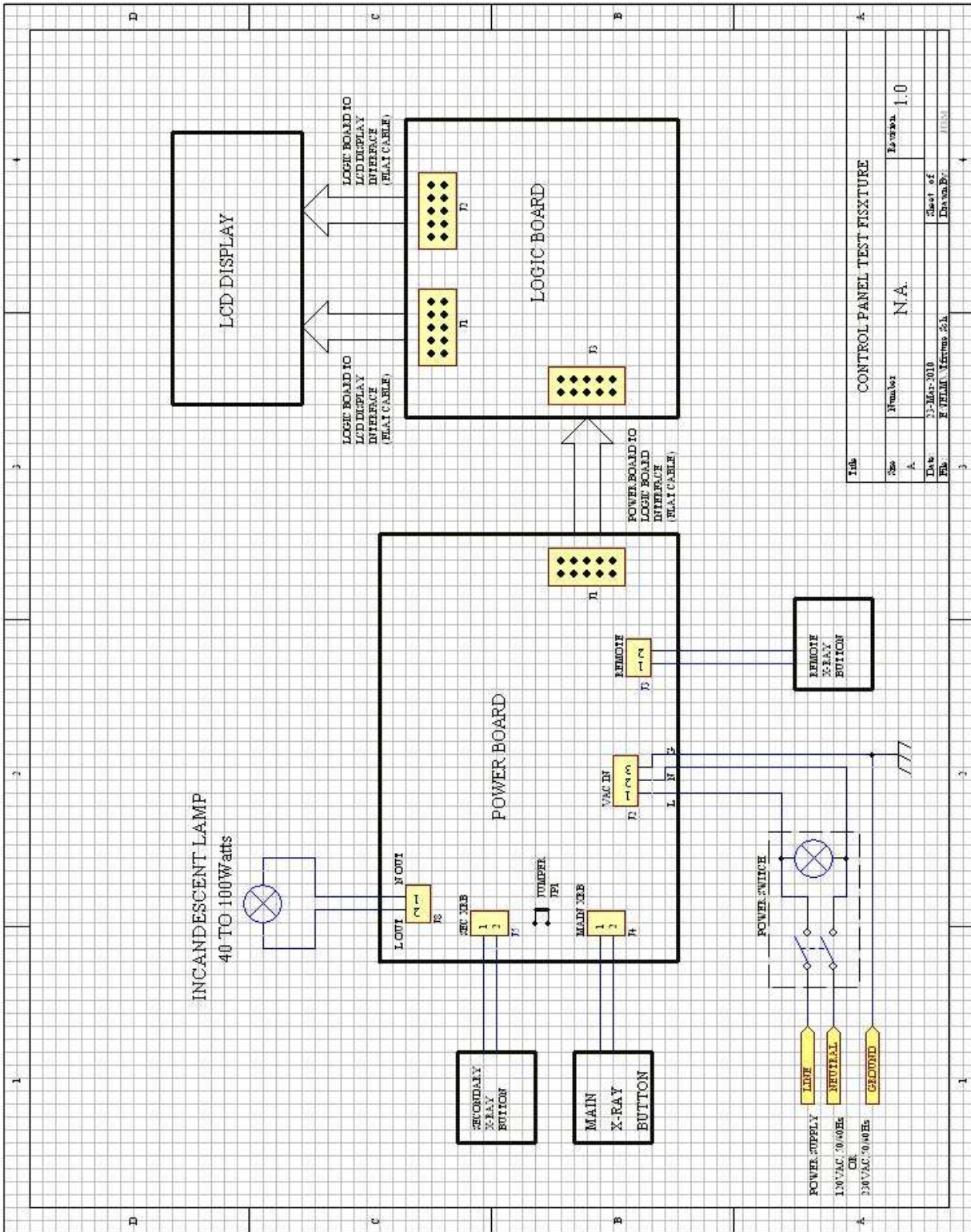


Fig.10

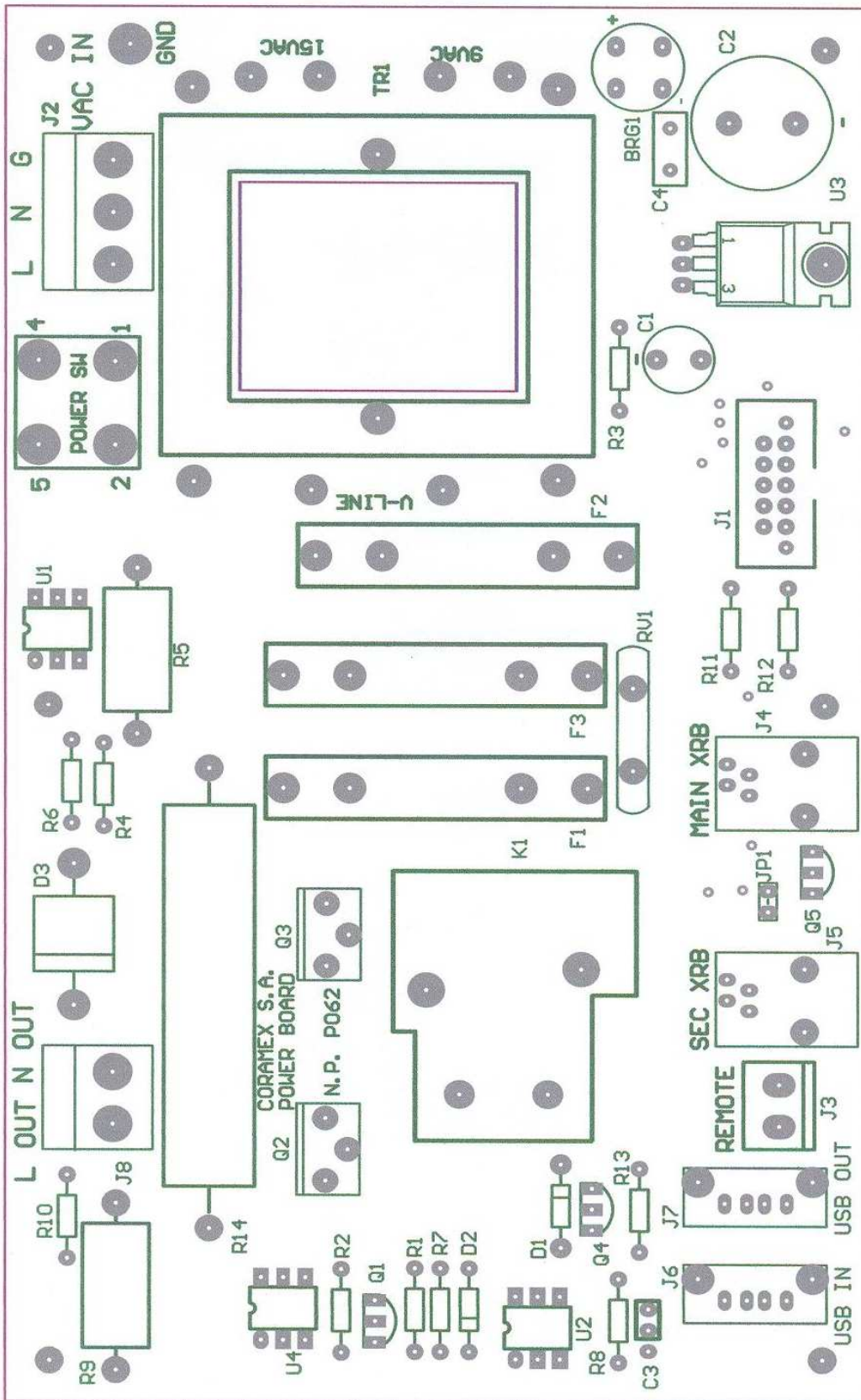
IX) Electronic Spare Parts

P/N	Designation	Description	Board
1TRBTA24/800	Q2, Q3	Power Triac	Power Board
1TRMOC3011	U1, U4	Optotriac	Power Board
1RYG8P1A4P12VDC	K1	Relay Omron	Power Board
1TRMPSA13	Q4	NPN Darlington	Power Board
1TR4N26	U2	Optocoupler	Power Board
1AE154-UL6442	J4	Modular Jack	Power Board
1TRVA20D241K	RV1	MOV 270Vdc	Power Board
1CT39380-0103	J2	Terminal Block	Power Board
1CT39380-0102	J8	Terminal Block	Power Board
1AEGMJ-2	JP1	Jumper	Power Board
1EQJHD6221286-4E		LCD Display with Harness	
1CIPIC18F4520 I/P	U1	Microcontroller	Logic Board
1SW612TL1105BF	PB1,PB2,PB3,PB4	Microswitch	Logic Board
S/P071		Logic Board Assy	
S/P072		Power Board Assy	
1CACINTA10,1CTFC-10P		Flat cable harness	

X) Test Fixture



XI) Power Board Layout

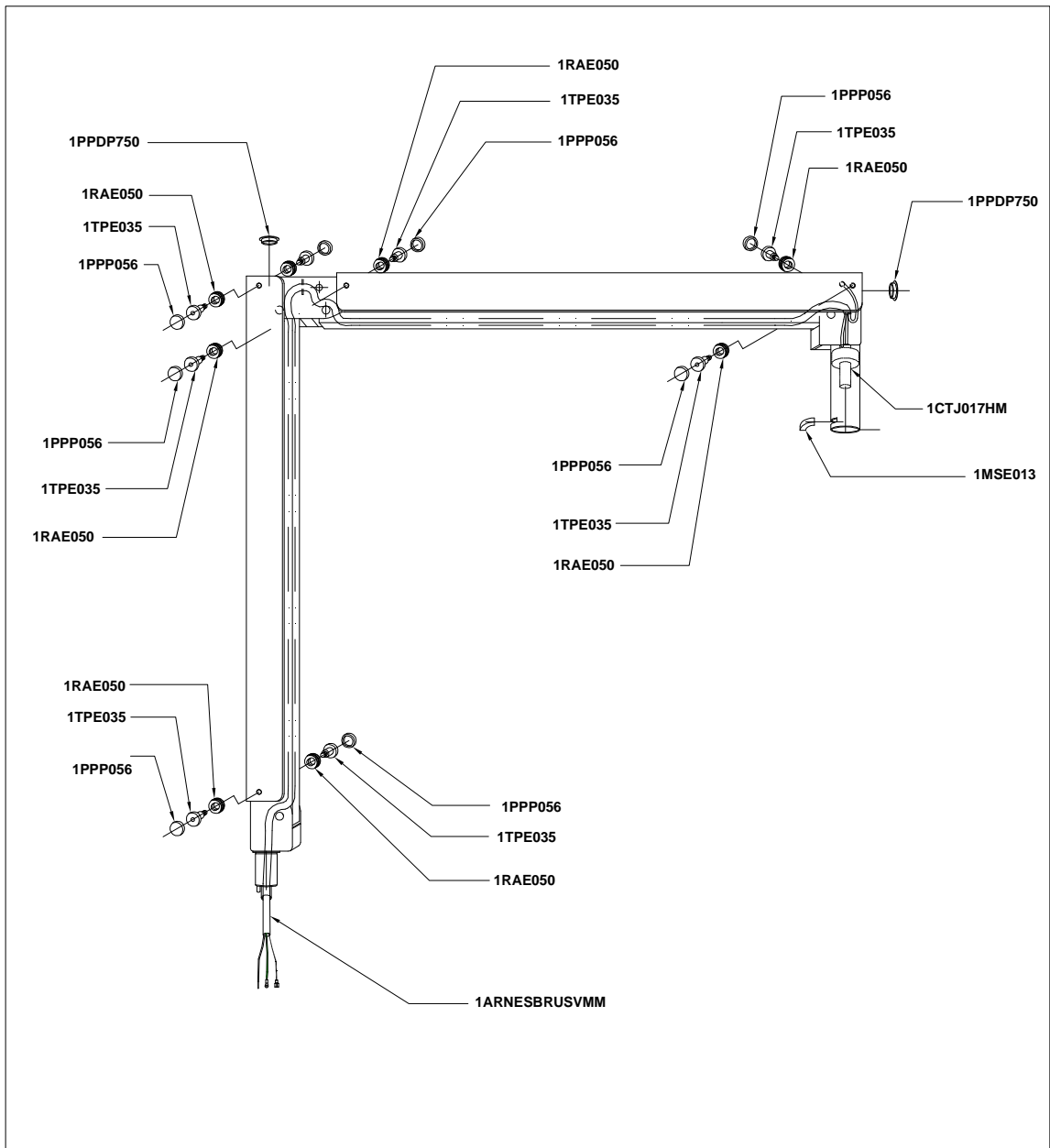




CORAMEX, S.A., DIV. OF CORIX MEDICAL SYSTEMS
X-RAY EQUIPMENT, MOD. CORIX 70 PLUS-USV (2010 VERSION)
SERVICEABLE SPARE PARTS LIST
REV.: 1.0, FEB. 2010

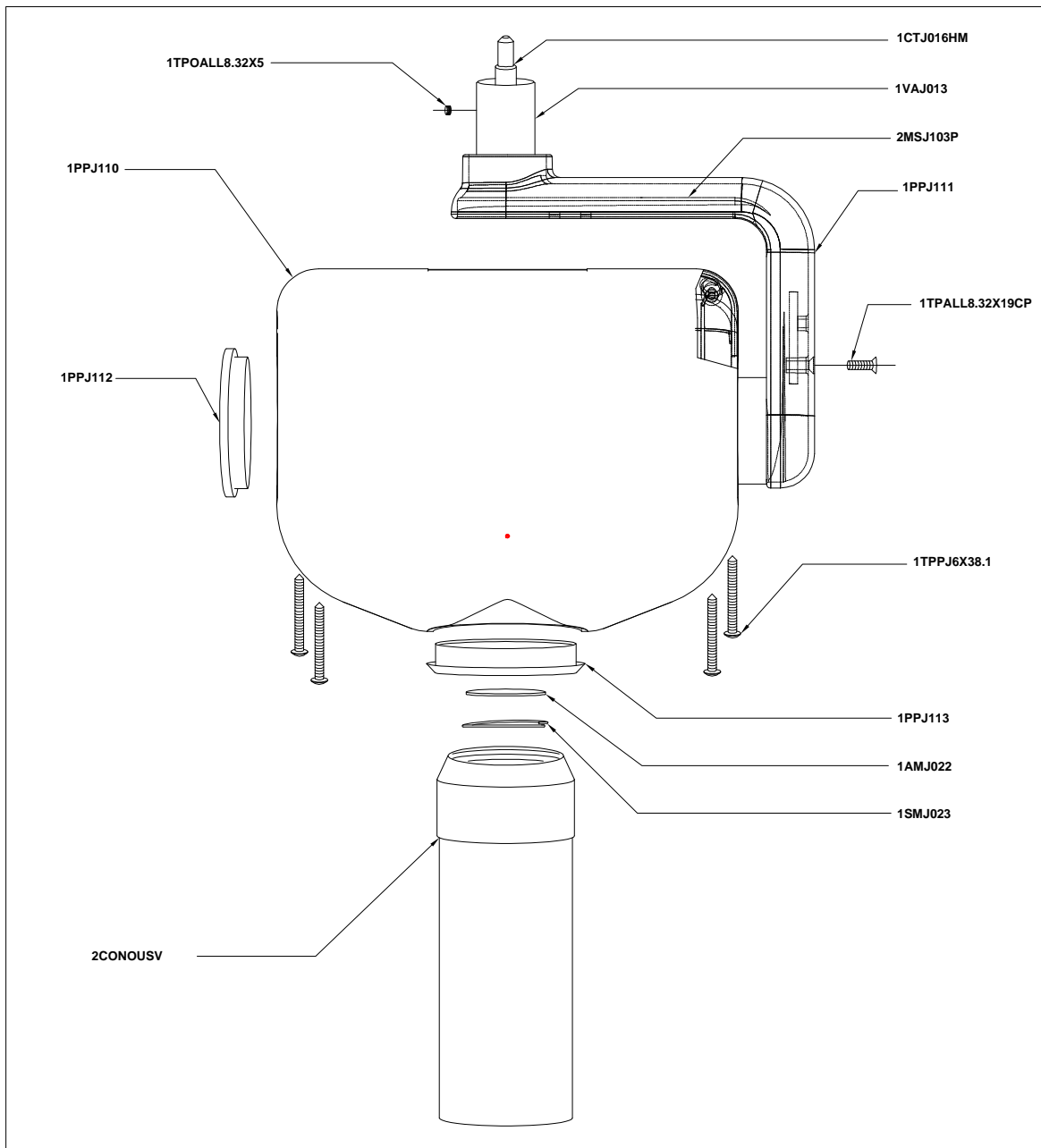
WHEN ORDERING ELECTRICAL ITEMS, SPECIFY: 120V.a.c., OR: 220V.a.c.




ITEM P/N	DESCRIPTION	QTY.	CATALOG #
3CPLUSUSVMM	X-RAY EQ. MOD. CORIX 70 PLUS-USV-MM		
2BGC70/8-02	X-RAY TUBEHEAD, MOD. COR 70/08-02-120V / 220V	1	PART: P500 USV
2BRC70PUSVMM	MM FOLDING ARM	1	PART: P508 USV
2MMCPPLUSUSVE	MM MOBILE BASE & COLUMN	1	PART: P509 USV
2CPANELUSVMM	MM CONTROL PANEL 120V / 220V	1	PART: P506 USV
2BGC70/8-02	X-RAY TUBEHEAD MOD. COR 70/08-02 120V / 220V		
1AMJ022	ALUMINUM FILTER S/J022		
1SMJ023	"C" CLIP FOR ALUMINUM FILTER S/J023		
1CTJ016HM	COAXIAL CONNECTOR, MALE S/J016		
2MSJ103P	ALUMINUM YOKE		
1PPJ110	TUBEHEAD PLASTIC ENCLOSURE S/J110		
1PPJ111	ALUMINUM YOKE PLASTIC COVER S/J111		
1PPJ112	LATERAL PLASTIC CAP FOR TUBEHEAD S/J112		
1PPJ113	PLASTIC COLLAR FOR TUBEHEAD ENCLOSURE S/J113		
1VAJ013	ALUMINUM PIVOT AT THE YOKE S/J013		
2CONQUSV	BEAM CENTERING DEVICE (CONE ASSY) S/P501		
1TPALL8.32X19CP	ALLEN SCREW FLAT HEAD 8.32X19MM.		
1TPOALL8.32X5	ALLEN SET SCREW 8.32X4.7MM.		
1TPPJ6X38.1	SELF TAPPING SCREW FOR THD PLASTIC ENCLOSURE		
2BRC70PUSVMM	MM FOLDING ARM		
1ARNESBRUSVMM	ELECTRICAL HARNESS FOR MM FOLDING ARM		
1CTJ017HM	COAXIAL CONNECTOR, FEMALE S/J117		
1RAE050	MYLAR WASHER S=0.15" S/E050		
1TPE035	CUSTOM ALLEN SCREW S/E035		
1PPP056	PLASTIC COVER CAP FOR ALLEN SCREW (ARM ASSY) S/E035		
1PPDP750	HEYCO PLASTIC CAP 2684 DP750		
1MSE013	RETAINING WEDGE FOR THD ASSY. P/N S/E013		
2MMCPPLUSUSVE	MM MOBILE BASE & STAND		
1AESR6N3	STRAIN RELIEFT BUSHING FOR POWER CABLE P/N 1201 SR6N3		
1AMH024BP	BASEMENT FOR LEGS ASSY. P/N S/H024		
2AME001V1P	LEG (RIGHT & LEFT) STEEL, PAINTED P/N E001		
2AME004P	HANDLE, STEEL, PAINTED P/N E004		
2AMP078P	THIMBLE ASSY. FOR ARM INSERTION P/N SW/P078		
1AMH516	ROLLING WHEEL P/N H516-HT		
1CAT3X18L3.5	POWER CABLE 3X18 AWG		
1COP069P	COLUMN (POST), STEEL, PAINTED P/N S/P069		
2MSP060P	BACK PLATE FOR CONTROL PANEL, STEEL, PAINTED S/P060		
1PPDP750	HEYCO PLASTIC CAP 2684 DP750		
1PPH020	PLASTIC END COVER FOR COLUMN P/N S/H020		
1PPH026	PLASTIC COVER 45 DEG. FOR TOP OF COLUMN P/N S/H026		
1HUE032	NITRIL BUMPER P/N S/E032		
1PB6.3X31.7	ALIGNING PIN 6.3X31.7		
1RAPL4.7	FLAT WASHER 4.7MM.		
1RAPL7.9	FLAT WASHER 7.9MM.-EXT. DIAM. 14MM.		
1RAPLPV9.5	FLAT WASHER, BROWNED, 7.9MM.		
1RAPR7.9	PRESSURE WASHER 7.9MM.		
1RAPR11.1	PRESSURE WASHER 11.1MM.		
1TPAL4.7X19CP	ALLEN SCREW, FLAT HEAD, 4.7X19MM.		
1TPALL4.7X9.6	ALLEN SCREW 4.7X9.6MM.		
1TPALL9.5X32	ALLEN SCREW 9.5X31.75MM.		
1TPALL9X50.8	ALLEN SCREW 9.5X50.8MM.		
1TPHEX7.9X25.4	HEX. HEAD SCREW 7.9X25.4MM.		
1TPTU11.1G	NUT, HEXAGONAL, 11.1MM.		
2CPANELUSVMM	MM CONTROL PANEL 120V / 220V		
1AEHEYCO1138	STRAIN RELIEFT BUSHING, HEYCO 1138SR5P3-4		
2ARNESCPANEL	10 VIAS IDC FEM. CONNECTOR + FLAT CABLE HARNESS		
2BOTONX-RAY-RAYSTD	X-RAY BUTTON ASSY.		
1EQJHD6221286-4E	GRAPHIC LCD DISPLAY JHD622-12864E 6 O'CLOCK		
2EQP071	LOGIC BOARD S/P071		
2EQP072	POWER BOARD S/P072 120V / 220V		
1ETP067	OVERLAY FOR CONTROL PANEL		
1MSP064	SUPPORT PLATE, ALUMINUM, S/P064		
1PPP079	PLASTIC ANCHOR FOR CONTROL PANEL COVER		
1PPP080	PLASTIC COVER FOR CONTROL PANEL S/P080		
1TPCPH4-40X7.9	PHILLIPS SCREW 4.40X7.9MM.		
1TPPJ6X6.3	PHILLIPS SELF TAPPING SCREW No. 6X6.3MM.		
1RAMYLAR3	MYLAR WASHER, 3MM. INT. DIAM., CAL. 010"		
1RAPL3	FLAT WASHER, 3MM. INT. DIAM., CAL. 18		
1SW2P1TCN202	ROCKER SWITCH 120V / 220V		

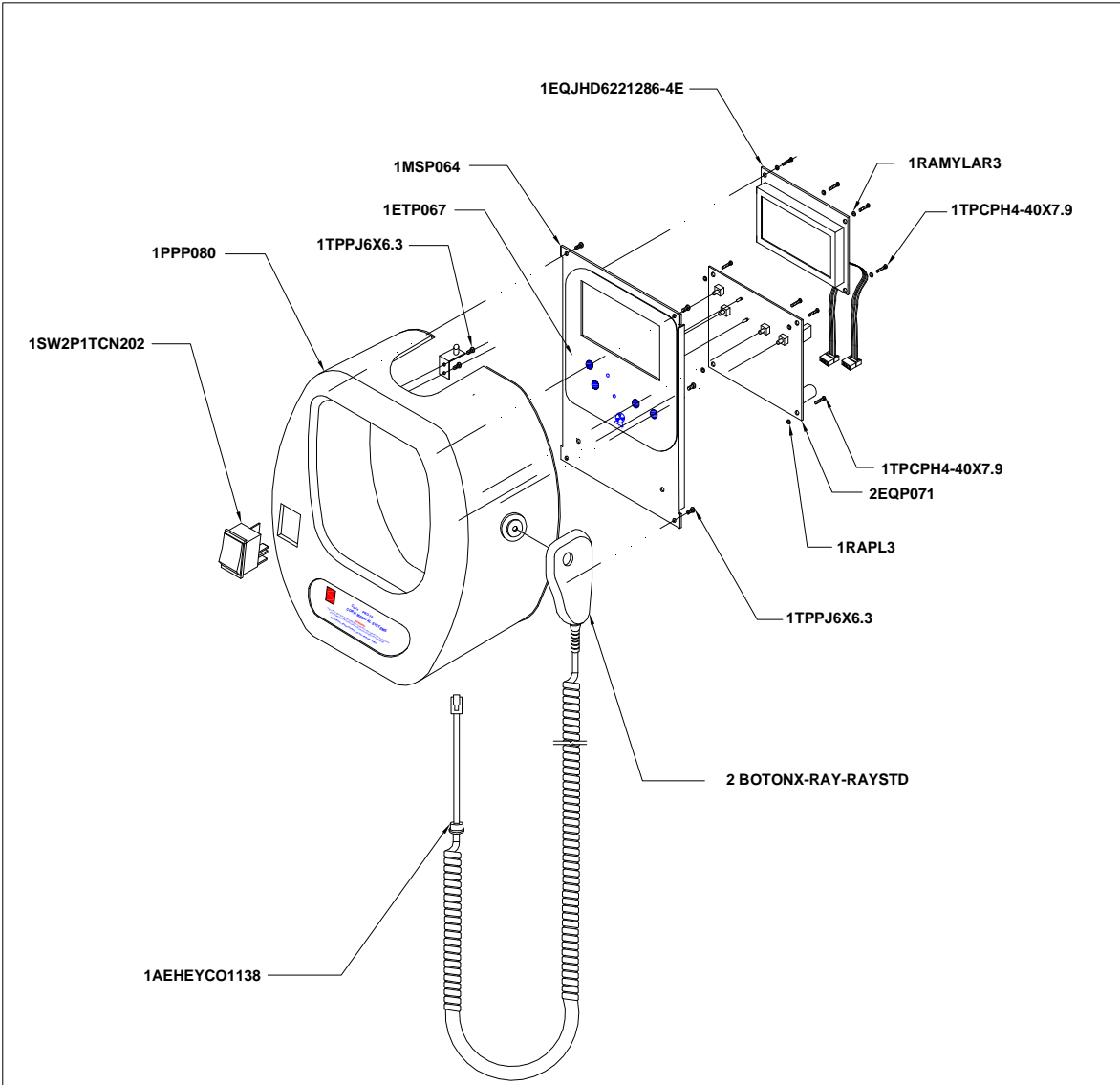
ITEM P/N	DESCRIPTION	QTY.	CATALOG #
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2BGC70/8-02	X-RAY TUBEHEAD, MOD. COR 70/08-02-120V / 220V	1	PART: P500 USV
2BRC70PUSVWM	WM FOLDING ARM	1	PART: P502 USV
2BREXC70PLUSE	EXTENSION ARM STANDARD	1	PART: P503 USV
2WMCPLUSUSVE	WALL PLATE - DOUBLE STUD	1	PART: P510 USV
2CPANELUSVMM	WM CONTROL PANEL 120V / 220V	1	PART: P506 USV
2BGC70/8-02	X-RAY TUBEHEAD, MOD. COR 70/08-02-120V / 220V		
1AMJ022	ALUMINUM FILTER S/J022		
1SMJ023	"C" CLIP FOR ALUMINUM FILTER S/J023		
1CTJ016HM	COAXIAL CONNECTOR, MALE S/J016		
2MSJ103P	ALUMINUM YOKE		
1PPJ110	TUBEHEAD PLASTIC ENCLOSURE S/J110		
1PPJ111	ALUMINUM YOKE PLASTIC COVER S/J111		
1PPJ112	LATERAL PLASTIC CAP FOR TUBEHEAD S/J112		
1PPJ113	PLASTIC COLLAR FOR TUBEHEAD ENCLOSURE S/J113		
1VAJ013	ALUMINUM PIVOT AT THE YOKE S/J013		
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1TPE035	CUSTOM ALLEN SCREW S/E035		
1PPP056	PLASTIC COVER CAP FOR ALLEN SCREW (ARM ASSY) S/E035		
1PPDP750	HEYCO PLASTIC CAP 2684 DP750		
1MSE013	RETAINING WEDGE FOR THD ASSY. P/N S/E013		
2BREXC70PLUSE	EXTENSION ARM STANDARD		
1HUE032	NITRIL BUMPER P/N S/E032		
1HUSJ5023	ADHESIVE RUBBER BUMPER SJ5023		
1PPE031	PLASTIC COVER CAP S/E031		
1PPE031D	PLASTIC COVER CAP S/E031D		
2WMCPLUSUSVE	WALL PLATE - DOUBLE STUD		
2AMP020A	THIMBLE ASSY. FOR ARM INSERTION P/N S/P020A		
2MSP060P	BACK PLATE FOR CONTROL PANEL, STEEL, PAINTED S/P060		
1PPDP750	HEYCO PLASTIC CAP P/N 2684 DP750		
2MSP115P	WALL PLATE, DOUBLE STUD P/N S/P115		
1TPALL4.7X9.6	ALLEN SCREW 4.7X9.5MM.		
1TP6.3X22	ALLEN SCREW 6.3X22MM.		
1TPALL9X50.8	ALLEN SCREW 9.5X50.8MM.		
1RTEXP 9.5	EXPANSION STEEL ANCHOR 9.5MM.		
2CPANELUSVMM	WM CONTROL PANEL 120V / 220V		
1AEHEYCO1138	STRAIN RELIEFT BUSHING, HEYCO 1138SR5P3-4		
2ARNESCPANEL	10 VIAS IDC FEM. CONNECTOR + FLAT CABLE HARNESS		
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2EQP072	POWER BOARD S/P072-120V / 220V		
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1RAPL3	FLAT WASHER, 3MM. INT. DIAM., CAL. 18		
1SW2P1TCN202	ROCKER SWITCH, 120V / 220V		




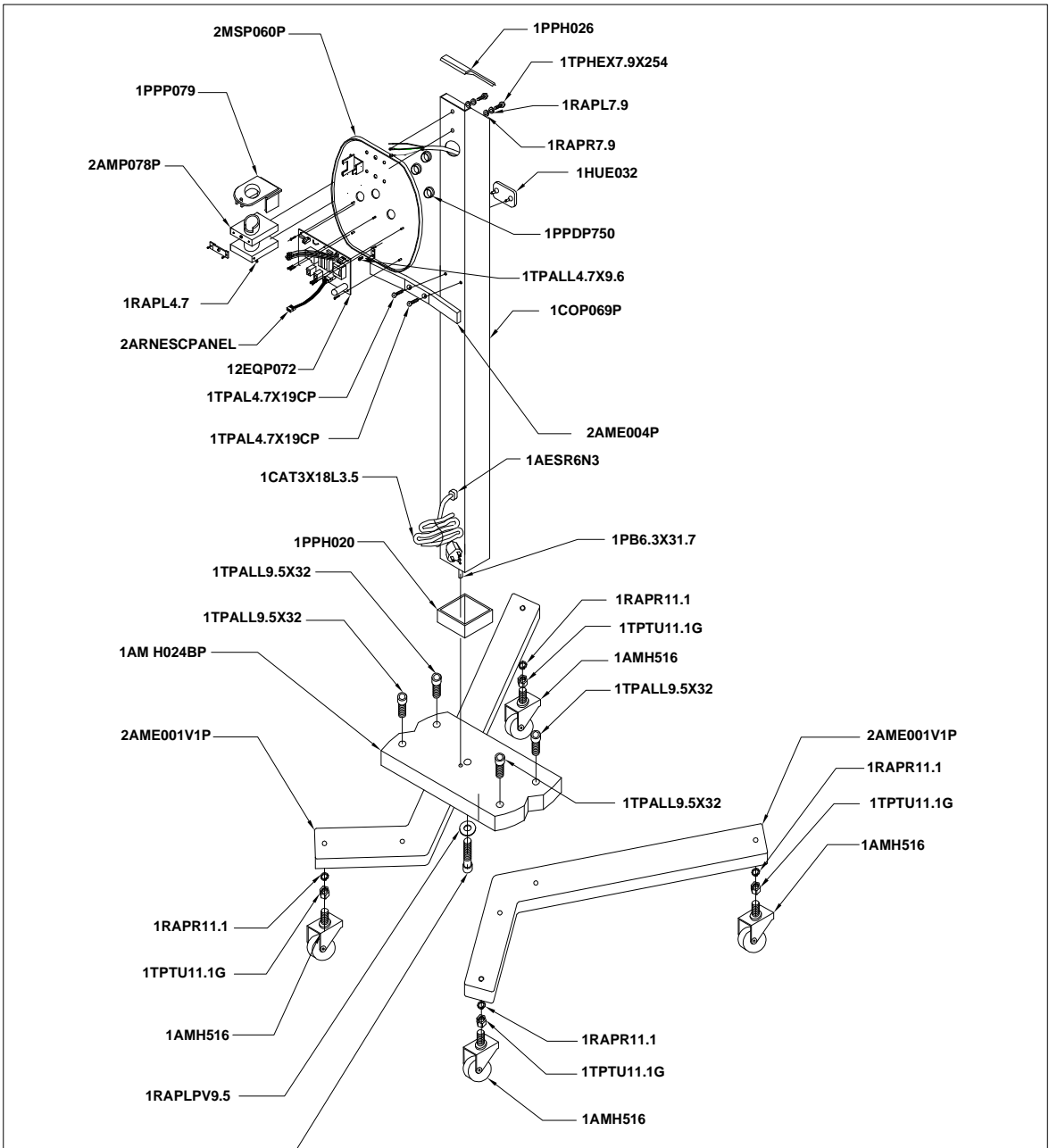
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C.D.I. No	NIVEL	DESCRIPCIÓN	ELABORO	REVISO	FECHA.	FIRMA.
 CORAMEX, S.A. electrónica y radiología			MATERIAL:			
			MM FOLDING ARM			
DIBUJO	C.CEDILLO	09-03-10	TOL.GRAL.		DIBUJO No. 2BRC70PUSVMM	
REVISO	J. LAVIN					
APROBO	J.VAZQUEZ		ESCALA: - ACOT: mm			






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C.D.I. No	NIVEL	DESCRIPCIÓN	ELABORO	REVISO	FECHA.	FIRMA.
 CORAMEX, S.A. electrónica y radiología			MATERIAL:			
			X-RAY TUBEHEAD. MOD. COR70/8-02-120V/220V			
DIBUJO	C.CEDILLO	09-03-10	 TOL. GRAL.		DIBUJO No.	
REVISO	J. LAVIN		 ACOT: mm		2BGC70/8-02	
APROBO	J.VAZQUEZ		ESCALA: -			



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C.D.I. No	NIVEL	DESCRIPCIÓN	ELABORO	REVISO	FECHA.	FIRMA.	
 CORAMEX, S.A. electrónica y radiología			MATERIAL:				
			MM CONTROL PANEL 120V/220V				
DIBUJO	C.CEDILLO	09-03-10	TOL.GRAL	DIBUJO No. 2CPANELUSVMM			
REVISO	J.LAVIN		ACOT: mm				
APROBO	J.VAZQUEZ		ESCALA: -				



	0	EMISION INICIAL	C.C.CH.	J. V. N.	22-03-10	
C.D.I. No	NIVEL	DESCRIPCIÓN	ELABORO	REVISO	FECHA.	FIRMA.
 CORAMEX, S.A. electrónica y radiología			MATERIAL: MM MOBILE BASE & STAND			
DIBUJO	C.CEDILLO	09-03-10	 TOL.GRAL.		DIBUJO No. 2MMCPLUSUSVE	
REVISO	J. LAVIN		 ACOT: mm			
APROBO	J.VAZQUEZ		ESCALA: -			