Datex-Ohmeda

AS/3^{TM} Command Board, K-ANE (Rev. 02)
CS/3^{TM} Command Board, K-ICU (Rev. 02)
S/5^{TM} Command Bar, K-ANEB (Rev. 00)
S/5^{TM} Command Bar, K-ICUB (Rev. 00)

S/5^{TM} Remote Controller, K-REMCO (Rev. 01)

Technical Reference Manual

All specifications are subject to change without notice.

Document No. 8001589-1

June 2001

TABLE OF CONTENTS

Command Boards / Bars, Remote Controller

INTRODUCTION

This section provides information about the maintenance and service of the following products:

- Command Boards, K-ANE/ K-ICU,
- Command Bars, K-ANEB/ K-ICUB
- Remote Controller, K-REMCO

1 SPECIFICATIONS

1.1 Command Board, K-ANE/K-ICU

Dimensions, W × D × H	315 × 55 × 43 mm
Weight (incl. cable)	0.5 kg
Input voltage	5 V
Power consumption	450 mW max
Communication protocol	RS-232

NOTE: Power supply from the display controller board only.

1.2 Command Bar, K-ANEB/K-ICUB

Dimensions, W × D × H	282×26× 54 mm
Weight (incl.cable)	0.4 kg
Input voltage	5 V
Power consumption	350 mW max
Communication protocol	RS-232

NOTE: Power supply from the display controller board only.

1.3 Remote Controller, K-REMCO

Dimensions (without cable)	150 × 60 × 50 mm
Weight (incl. cable)	0.5 kg
Cable length	6 m
Input voltage	5 V
Power consumption	180 mW
Communication protocol	RS-232 (standard cable). For optional cable see chapter 2.2.

NOTE: Power supply from the display controller board only.

2   FUNCTIONAL DESCRIPTION

2.1   Command Boards, K-ANE/K-ICU and Command Bars, K-ANEB/ K-ICUB
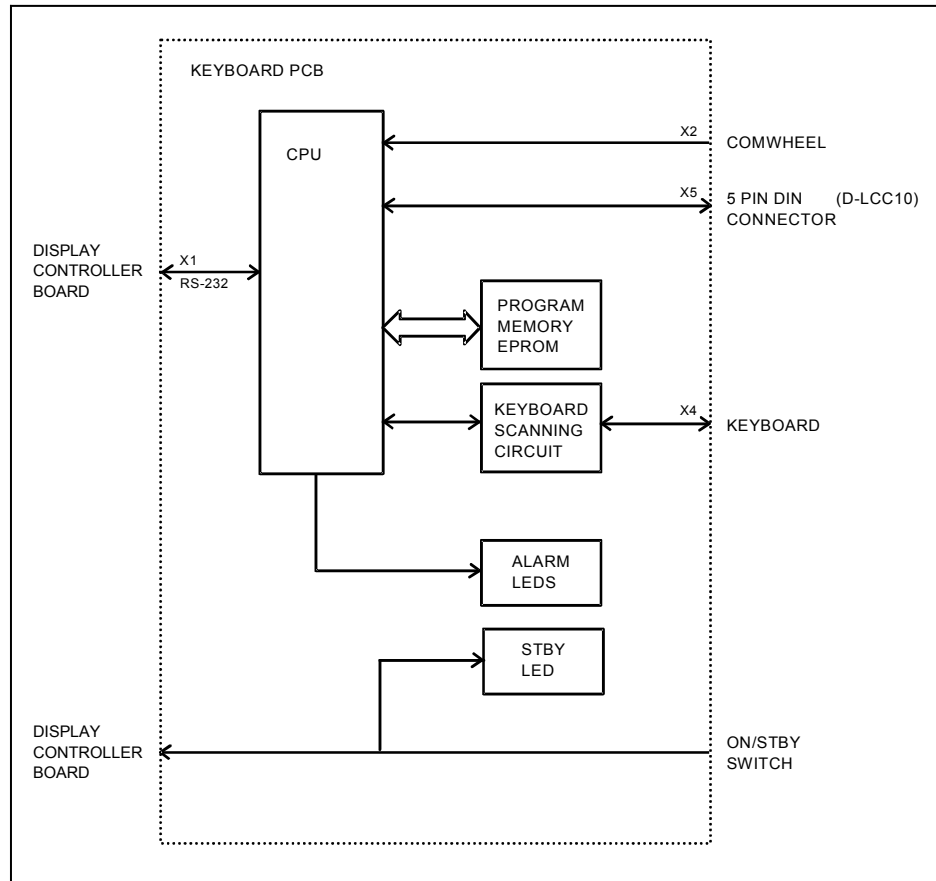
Figure 1   K-ANE/ K-ICU and K-ANEB/K-ICUB block diagram

K-ANE/ K-ICU, K-ANEB/K-ICUB

The Command board/bar consists of 17 direct function keys, ComWheel and ON/STBY switch.

Command Board/Bar PCB

The PCB is located inside the Command Board/Bar.The board reads the status of the front panel keys and the ComWheel and forwards the information to the CPU board.

External communication

Communication with the host processor takes place in RS232 serial communication channels which are available in both the CPU bus and the module bus. Two signals, TXD and RXD, are in use. No handshaking is used. The 26-pin subminiature D-connector of the Command Board/Bar is connected to a Display controller board. Serial communication speed rate is 19.2 kbps.

ComWheel

The ComWheel on the front panel is used for menu selection.

LEDs

The alarm LEDs are activated by the Command Board/Bar PCB under the commands received via serial communication from the CPU board. The red or yellow alarm LED is lit when red or yellow alarm is activated. STBY -led is lit when the device is turned to stand-by and connected to mains.

NOTE: If there are two Command Boards/Bars connected to the system, the system is ON (STBY LED not lit), when at least one of the switches is positioned ON.

2.1.1 Connectors and signals

26-pin D-connector on K-ANE/K-ICU and K-ANEB/K-ICUB

Pin No	I/O	Signal
1		Not connected
2		Not connected
3		Not connected
4		Not connected
5		Not connected
6	I	GND
7		Not connected
8		Not connected
9		Not connected
10		Not connected
11		Not connected
12		Not connected
13		Not connected
14		N ot connected
15	I	+5 V
16	0	ON/STBY
17		Not connected
18		Not connected
19	0	TXDD RS232
20	I	RXDD RS232
21		Not connected
22		Not connected
23		Not connected
24		Not connected
25		Not connected
26		Not connected

2.2 Remote Controller, K-REMCO

The Remote Controller consists of 12 direct function keys and the ComWheel.

K-REMCO PCBs

The K-REMCO has two PCBs located inside the Remote Controller. One board has only the pushbutton switches of the keys. The other board reads the status of the keys and the ComWheel and forwards the information to the CPU board.

External communication

K-REMCO with standard cable:
Communication with the host processor takes place in RS232 serial communication channels which are available in both the CPU bus and the module bus. Two signals, TXD and RXD, are in use. No handshaking is used. The 26-pin subminiature D-connector of the Remote Controller is connected to a Display controller board. Serial communication speed is 19.2 kbps.

K-REMCO with optional Remote Controller - Compact Monitor cable:
The Compact Monitor or LCD display, D-LCC10A/W converts the communication to RS232 format (see above).

ComWheel
The ComWheel is used for menu selection.

3 SERVICE PROCEDURES

3.1 General service information

Field service is limited to replacing faulty PC boards or mechanical parts. The PC boards are then returned to Datex-Ohmeda for repair.

Datex-Ohmeda Technical Services is always available for service advice. Please provide the unit serial number, full type designation and a detailed description of the fault.

CAUTION   The tests and repairs outlined in this section should only be attempted by trained personnel with the appropriate equipment. Unauthorized service may void warranty of the unit.

3.2 Service check

These instructions include complete procedures for a service check. The service check is recommended to be performed after any service repair. However, the service check procedures can also be used for determining possible failures.

The procedures should be performed in ascending order.

The instructions include a check forms (*Appendix A-B*) which should be filled in when performing the procedures.

The mark ✎ in the instructions means that the check form should be signed after performing the procedure.

The procedures are designed for monitors with S/5 monitor software of revision 01. However, most of the procedures also apply to monitors, which contain some other monitor software type/revision.

3.2.1 Recommended tools

Tool	Order No.	Notes
• Central Unit	•	•
• Screwdriver	•	•

3.2.2 Command Board, K-ANE/K-ICU and Command Bar, K-ANEB/K-ICUB

- Turn the monitor to STBY.

1. Disconnect the command board cable from the display controller board.
   Check that the connector pins of the cable are clean, straight and at about the same height. Check that the cable is intact. Check that the locking screws inside the connector case are intact.

   Leave the cable disconnected.

   ✎

2.   Check that the plastic front cover and the front panel sticker are intact.

✍

3.   Check that the ComWheel cover is intact and is attached properly.

✍

4.   Check that the ON/STBY -switch and its protector (in K-ANE/K-ICU) are intact and are attached properly. Check that the ON/STBY -switch changes its state firmly when turning it back and forth. Leave the switch into STBY -position.

✍

5.   Reconnect and lock the command board/bar cable to the display controller board.
     Check that the stand-by LED is lit up (the Central Unit power cord is connected to the mains).

✍

•   Turn the monitor on and enter the service menu:

     Monitor Setup - *Install/Service* (password 16-4-34) - *Service* (password 26-23-8)

6.   Take down the information regarding keyboard software.

✍

7.   Select the menu KEYBOARD with the ComWheel.
     Highlight the text UPPER LED. Check that the red alarm LED is turning on and off when pressing the ComWheel. Check also the yellow alarm LED by selecting LOWER LED from the menu.

✍

8.   Check the membrane keys.
     Press the keys one by one. Check that each key generates a sound from the loudspeaker and the corresponding text in the menu changes from yellow to red.

✍

9.   Check the ComWheel.
     Turn the ComWheel clockwise and counterclockwise and check that each step generates a sound and the corresponding values at the bottom of the menu increase.
     Select DUMMY PRESS. Press the ComWheel and check that the press generates a sound and the corresponding value in the menu increases.

✍

10. Perform electrical safety check and leakage current test.

✍

11. Check that the Command Board/Bar functions normally after the performed electrical safety check.

✍

12. Clean the the Command Board/Bar.

✍

- Fill in all necessary documents.

3.2.3 Remote Controller, K-REMCO

- Turn the monitor to STBY.
- Disconnect the remote controller cable from the display controller board.
- Detach the remote controller upper cover and the keypad cover by removing the screws (7 pcs) from the bottom.

1. Check internal parts:

    – cables are connected properly

    – the remote controller cable is fastened to the bottom cover with screws

    – the keypad switches are intact

    – the software EPROM under the keypad is attached properly

✍

2. Check external parts:

    – the upper and bottom covers are intact

    – the keypad cover is intact

    – the ComWheel cover is intact and is attached properly

✍

- Reassemble the remote controller.

3. Check the remote controller cable:

    – the cable is intact

    – the cable connector is intact

    – the connector pins are clean, straight and at about the same height

    – the locking screws inside the connector case are intact

✍

- Reconnect the cable to the display controller board and turn the monitor on.

4. Wait until normal monitoring screen appears, then check that the picture on the screen is displayed with correct resolution.

    If the resolution is not correct, replace the remote controller cable.

    ✎

5. Enter the service menu:
    Menu (on the remote controller keypad) **- Monitor Setup** - *Install/Service* (password 16-4-34) **-** *Service* (password 26-23-8)

    Take down the information regarding remote controller software.

    ✎

*   Select the menu KEYBOARD:

    Service - Keyboard

6. Check the remote controller keys.
    Press the keys one by one. Check that each key generates a sound from the loudspeaker.

    ✎

7. Check the ComWheel.

    Turn the ComWheel clockwise and counterclockwise and check that each step generates a sound and the corresponding values at the bottom of the menu increase.

    Select DUMMY PRESS. Press the ComWheel and check that the press generates a sound and the corresponding value in the menu increases.

    ✎

8. Perform electrical safety check and leakage current test.

    ✎

9. Check that the remote controller functions normally after the performed electrical safety check.

    ✎

10. Clean the remote controller and the cable.

    ✎

*   Fill in all necessary documents.

3.3 Disassembly and reassembly

3.3.1 Command Board, K-ANE/ K-ICU

The Command Board is disassembled according to the following procedure. Please refer to the exploded view of the Command Board.

1. Disconnect the display power cable, the display data cable and the Command Board cable from the Central Unit.

2. Turn the display on its' side and loosen the two cross head screws holding the Command Board to the display screen tray.

3. Lift off the Command Board and pull out the Command Board cable through the slot in the the display screen tray.

4. Unscrew the two plastic screws holding the front cover of the Command Board to the rear cover. Carefully remove the rear cover.

5. Disconnect the Command Board cable, the wire set from the ON/STBY switch, the wire set from the ComWheel and the flat cable from the membrane keyboard.

6. Detach the Command Board PCB by pressing the two plastic fasteners holding the PCB in place and simultaneously lifting off the PCB.

The Command Board is reassembled by reversing the disassembly procedure.

3.3.2 Command Board, K-ANEB/ K-ICUB

The Command Bar is disassembled according to the following procedure. Please refer to the exploded view of the Command Bar.

1. Disconnect the Command Bar cable from the Central Unit.

2. Remove the Command Bar from the display unit .

3. Unscrew the three screws holding the front cover of the Command Bar to the rear cover. Carefully remove the rear cover.

4. Disconnect the Command Bar cable, the wire set from the ON/STBY switch, the wire set from the ComWheel (K-ANEB, K-ICUB) and the flat cable from the membrane keyboard (K-ANEB, K-ICUB).

5. Detach the Command Bar PCB by pressing the two plastic fasteners holding the PCB in place and simultaneously lifting off the PCB.

The Command Bar is reassembled by reversing the disassembly procedure.

3.3.3 Remote Controller K-REMCO

The Remote Controller is disassembled according to the following procedure. Please refer to the exploded view of the Remote Controller (chapter 6, spare parts).

1. Disconnect the K-REMCO cable from the Central unit.

2. Pull out the knob of the ComWheel.

3. Open the nut on the shaft of the ComWheel.

4. Open the three cross head screws on the bottom of the K-REMCO.

5. Remove the top cover.

6. Open the four screws on the bottom of the K-REMCO.

7. Remove the keyboard cover.

8. Disconnect the K-REMCO cable and the wire set from the Comwheel.

9. Remove the PCBs.

The Remote Controller is reassembled by reversing the disassembly procedure. In reassembly remember to put the reinforcing cord of the cable around the screw on the metal bridge before tightening the screw.

4 TROUBLESHOOTING

4.1 K-ANE/ K-ICU/ K-ANEB/ K-ICUB/ K-REMCO

See Keyboard Service Menu in chapter 5, and perform tests available. If any of the tests fail, see explanation below.

Problem	Cause	Treatment
ON/STBY switch not working	Keyboard cable loose or broken. D-26 connector pin failure. Switch leads broken. Switch connector loose. Switch faulty	Check the items. Replace them if necessary
ComWheel not working	ComWheel leads broken or connector loose. ComWheel faulty.	Check the items. Replace the ComWheel if necessary
Membrane key not working	Switch cable loose or broken. Keyboard cable loose or broken. D-26 connector pin failure. RS232 communication failure on CPU board	Check the items. Replace them if necessary.

5 SERVICE MENU
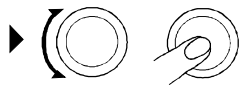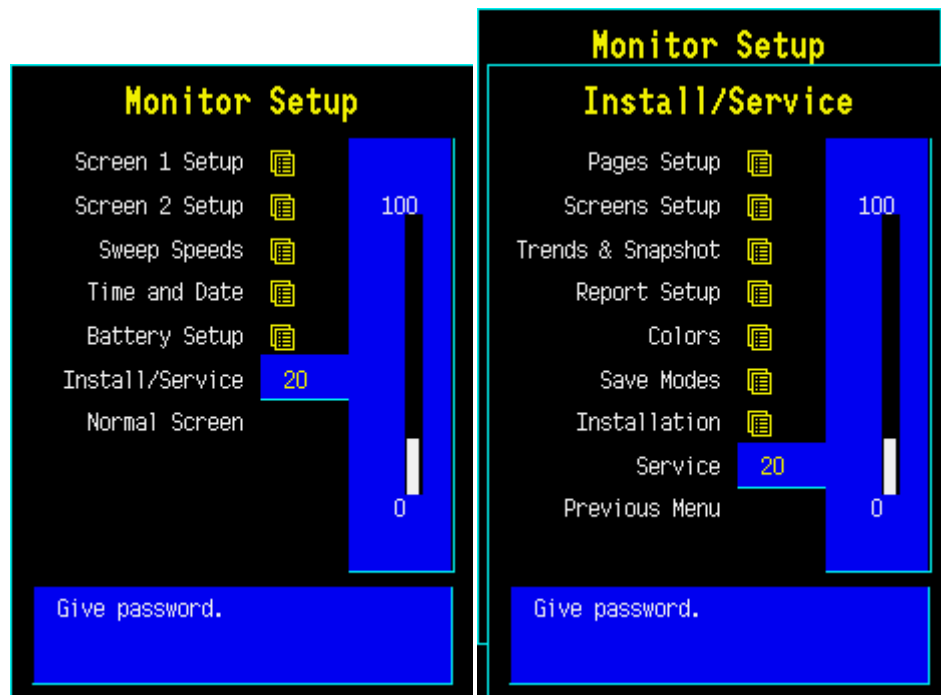
1. Press the **Monitor Setup** key.

2. Select *Install/Service* (password 16-4-34).

3. Select *Service* (password 26-23-8) - *Keyboard*.

5.1 Keyboard menu

The service menu for testing the command board functions.

Upper Led is for testing the upper alarm LED (red) on the command board. When the text is highlighted, the upper alarm LED can be turned on and off by pressing the ComWheel.

Lower Led is for testing the lower alarm LED (yellow) on the command board. When the text is highlighted, the lower alarm LED can be turned on and off by pressing the ComWheel.

Dummy Press is for testing the ComWheel. When the text is highlighted, pressing of the ComWheel create a sound from the loudspeaker and the corresponding number on the service data field increase.

Service Data

Message count counts the number of messages that are sent out to the main CPU board.

Leds upper and **lower** indicate the states of the alarm LEDs on the command board.

Direct action keys texts are indications to the command board membrane keys. When a key on the command board is pressed, the corresponding text in the menu changes its colour.

Control wheel, Press counts the ComWheel pressings.

Control wheel, Clockwise and **Counterclockwise** the ComWheel turnings.

Since shows the date and the time of the last run time reset.
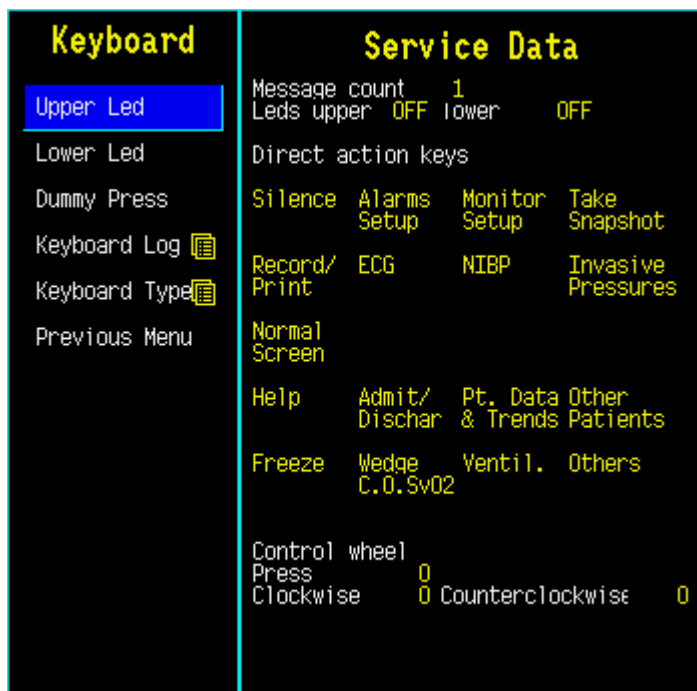
5.1.1 Keyboard Log

All the keyboard presses and the commands given by the ComWheel are recorded in the Keyboard Log. The keyboard log is saved in the permanent memory of the monitor. The length of the log is 1150 events. The log is FIFO type.
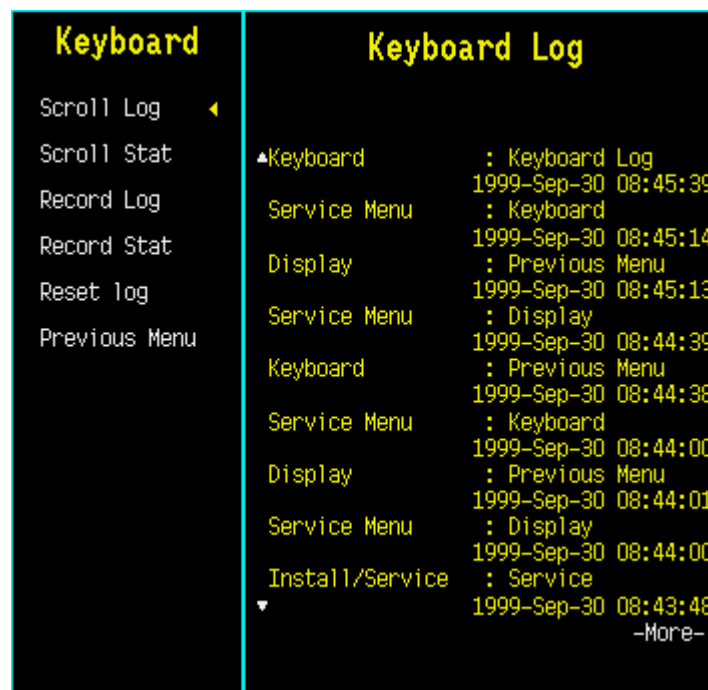
5.1.2 Keyboard Type

Store Mask A selection for setting the anaesthesia keyboard's language. The selected language determines the outcome of the lower keypad.
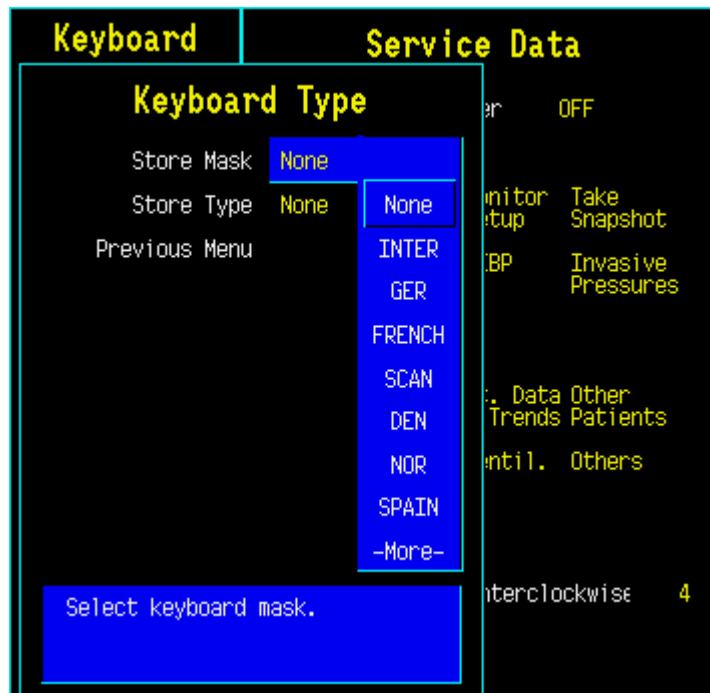
Store Type is for setting the keyboard's type;

COM = Command Board

ARK = Anaesthesia Keyboard

AIC = Information Center Keyboard

NOTE: The settings should be checked if the controller board is replaced. If settings are changed, the new settings will not be valid until the next start-up.

6   SPARE PARTS

NOTE: Only changed part numbers are listed under later revisions. To find the desired part: check first the list of the revision that corresponds your device. If the part is not listed there, check the previous revision, etc. until you find the right number.

* this part is recommended for stock

Item numbers refer to the exploded view.

6.1   Command Board, K-ANE, K-ICU
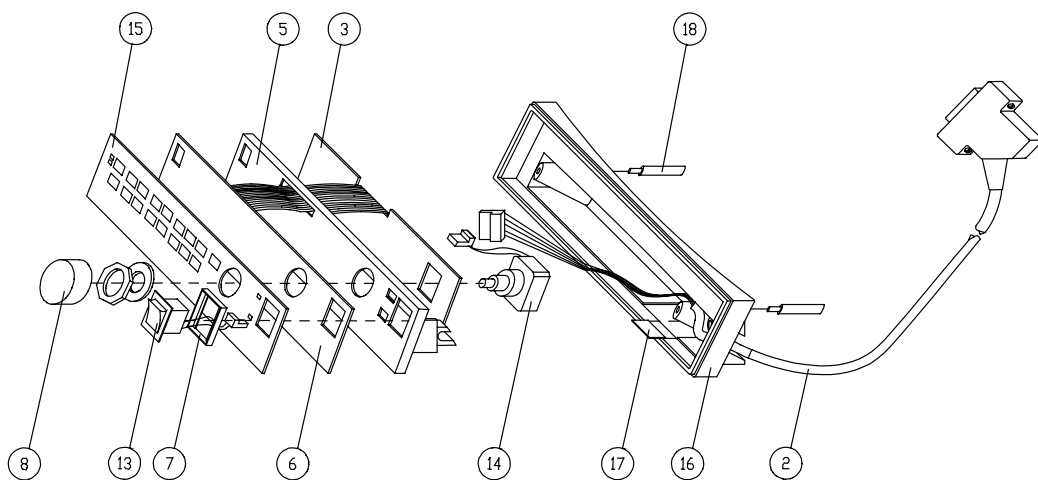
6.1.1 Command Board, K-ANE, K-ICU Rev. 00

Item	Item description	Order No.
2	Command board cable, K-VHC14 (Rev.02)	*(883229) Use 893945
3	Command board PC board, K-VCH14, K-VNC15	*(883228) Use 893943
5	Plastic front cover, K-VHC14 (Rev. 02), K-VNC15	883178
6	Keyboard membrane, AS/3 AM/CM	879373
7	ON/STBY switch protector	881431
8	ComWheel cover and spring	879191
13	ON/STBY switch	*879871
14	Rotary wheel	879872
16	Plastic rear cover, K-VHC14 (Rev. 02)	883177
17	Insulation plate	883963
18	Bushing 25x6.5, M3	640446

6.1.2 Command Board, K-ANE, K-ICU Rev. 01

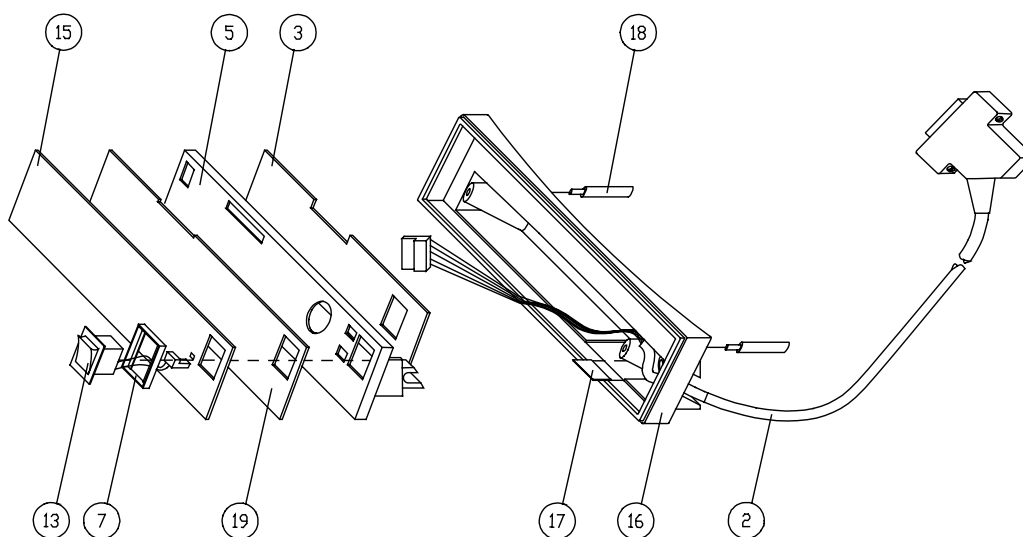| Item	Item description	Order No.
2	Command board cable, K-ANE/ICU/BLANK	*893945
3	Command board PC board, K-ANE/ICU, D-LCC10	*893943
5	Plastic front cover, K-ANE/ICU/BLANK (Rev. 01)	892812
16	Plastic rear cover, K-ANE/ICU /BLANK (Rev. 01)	892811

6.2 Command Bar, K-ANEB, K-ICUB Rev.00
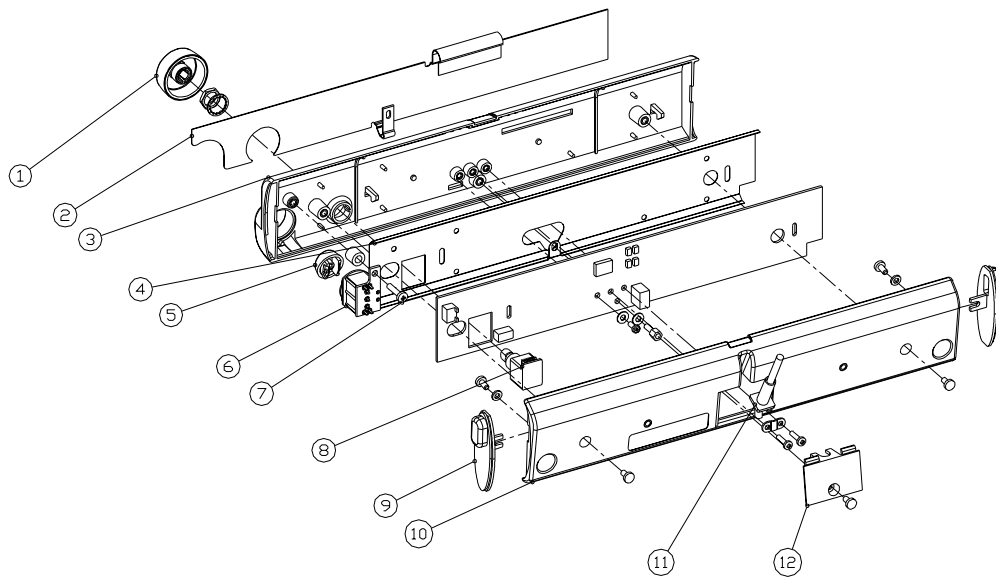
6.2.1 Command Board, K-ANEB, K-ICUB Rev. 00

Item	Item description	Order No.
1	ComWheel	898794
2	Membrane keypad	898255
3	Front cover	897980
4	EMC plate	8000225
5	Switch cover	640453
6	ON/STBY-switch	8001395
7	Command board PC board	898007
8	Rotary switch, opto-encoder	113291
9	Closing cover	897983
10	Back cover	897981
11	Command bar cable	898283
12	Cable plate	897982

6.3 Blank Command Board, K-BLANK

6.3.1 Blank Command Board, K-BLANK Rev. 00

Item	Item description	Order No.
2	Command board cable, K-VHC14 (Rev.02)	*(883229) Use 893945
3	Command board PC board, K-VCH14, K-VNC15	(883228) Use 893943
5	Plastic front cover, K-VHC14 (Rev. 02), K-VNC15	883178
7	ON/STBY switch protector	881431
13	ON/STBY switch	*879871
16	Plastic rear cover, K-VHC14 (Rev. 02)	883177
17	Insulation plate	883963
18	Bushing 25x6.5, M3	640446
19	Fitting plate, K-BLANK	892335

6.3.2 Blank Command Board, K-BLANK Rev. 01

Item	Item description	Order No.
2	Command board cable, K-ANE/ICU/BLANK	*893945
3	Command board PC board, K-ANE/ICU, D-LCC10	*893943
5	Plastic front cover, K-ANE/ICU/BLANK (Rev. 01)	892812
16	Plastic rear cover, K-ANE/ICU /BLANK (Rev. 01)	892811

6.4   Remote Controller, K-REMCO
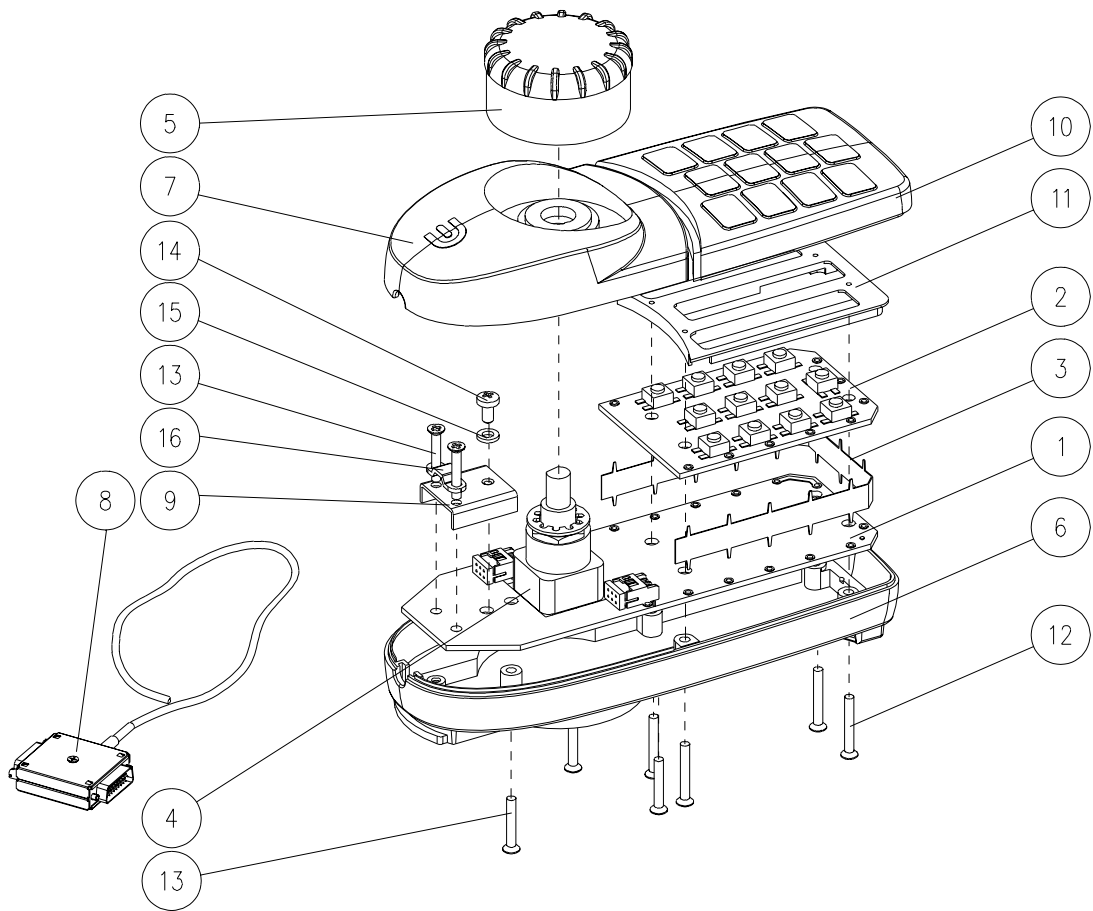
6.4.1 Remote Controller, K-REMCO Rev. 00

Item	Item description	Order No.
1	CPU board, K-REMCO	*890368
2	Keyboard PCB, K-REMCO	890371
3	Connecting plate	891427
4	Rotary wheel	891036
5	ComWheel cover	891423
6	Plastic rear cover, K-REMCO	891421
7	Plastic front cover, K-REMCO	891422
8	Remote controller cable, K-REMCO	*891813
9	Bridge for cable	893235
11	Front panel framework	891426
12	Slotted recess screw M2.5x22	61218
13	Cross recess screw M2.5x16	628719
14	Cross recess screw M3x6	61721
15	Star washer	63611
16	Cable binder	546454

6.4.2 Remote Controller, K-REMCO Rev. 01

Item	Item description	Order No.
5	ComWheel cover	898940
6	Plastic rear cover, K-REMCO	898939
7	Plastic front cover, K-REMCO	898938

6.4.3 Front panel stickers for K-ANE/ICU/REMCO

Adaptation	K-ANE (Rev. 00) Order No.	K-ANE (Rev. 01) Order No.	K-ANE * (Rev. 02) Order No.	K-ICU (Rev. 00) Order No.	K-ICU (Rev. 01) Order No.	K-ICU * (Rev. 02) Order No.
-23- (Eng)	891663	893069	8000158	891589	893484	8000169
-26- (Fin)	891669	893070	8000165	892324	893490	8000176
-31- (Jpn)	892080	893071	8000692	--	--	8000693
-33- (Ger)	891664	893072	8000159	892319	893485	8000170
-40- (Spa)	891667	893073	8000162	892322	893488	8000173
-41- (Swe)	891670	893074	8000166	892325	893491	8000177
-42- (Dnk)	892197	893075	8000168	892198	893492	8000179
-43- (Fre)	891665	893076	8000160	892320	893486	8000171
-44- (Dut)	891666	893077	8000161	892321	893487	8000172
-46- (Ita)	891668	893078	8000163	892323	893489	8000174
-47- (Nor)	--	893550	8000167	--	893563	8000178
-48-(Por)	--	--	8000164	--	--	8000175

Adaptation	K-REMCO (Rev. 00) Order No.	K-REMCO * (Rev. 01) Order No.
-23- (Eng)	891425	891425
-26- (Fin)	892317	892317
-31- (Jpn)	--	894962
-33- (Ger)	892312	892312
-40- (Spa)	892315	892315
-41- (Swe)	892318	892318
-42- (Dnk)	892203	892203
-43- (Fre)	892313	892313
-44- (Dut)	892314	892314
-46- (Ita)	892316	892316
-47- (Nor)	893553	893553
-48-(Por)		895233

* NOTE: S/5 stickers

6.4.4 Front panel stickers for K-ANEB/ICUB

Adaptation	K-ANEB (Rev. 00) Order No.	K-ICUB (Rev. 00) Order No.
..00..DA	898093	898105
..00..DE	898084	898096
..00..EN	898083	898095
..00..ES	898087	898099
..00..FI	898090	898102
..00..FR	898085	898097
..00..IT	898088	898100
..00..JA	898094	898106
..00..NL	898086	898098
..00..NO	898092	898104
..00..PT	898089	898101
..00..SV	898091	898103

7 EARLIER REVISIONS

For more service information on the earlier revisions, please refer to:

Command Board revision 01   Service Manual p/n 880850
Command Board revision 02   Service Manual p/n 885930

This manual supports all later revisions.

APPENDICES A, B

Service check form
Command Board, K-ANE/K-ICU,
Command Bar, K-ANEB/K-ICUB

Customer	
Service	Keyboard type _____ S/N _____
Service engineer	Date _____

☐ OK = Test OK   ☐ N.A. = Test not applicable   ☐ Fail = Test Failed

		OK	N.A.	Fail			OK	N.A.	Fail
1.	Cable	☐	☐	☐	2.	Front cover and front panel sticker	☐	☐	☐
3.	ComWheel cover	☐	☐	☐	4.	ON/STBY -switch and protector	☐	☐	☐

Notes _____

		OK	N.A.	Fail			OK	N.A.	Fail
5.	Stand by -LED	☐	☐	☐					
6.	Command board software	KB							
7.	Alarm LEDs	☐	☐	☐	8.	Membrane keys	☐	☐	☐
9.	ComWheel	☐	☐	☐					

Notes _____

		OK	N.A.	Fail			OK	N.A.	Fail
10.	Electrical safety check	☐	☐	☐	11.	Functioning after electrical safety check	☐	☐	☐
12.	Final cleaning	☐	☐	☐					

Notes _____

Used Spare Parts _____

Signature _____

A-1(1)

Service check form
Remote Controller, K-REMCO

Customer			
Service	Keyboard type		S/N
Service engineer			Date

☐ OK = Test OK   ☐ N.A. = Test not applicable   ☐ Fail = Test Failed

		OK	N.A.	Fail			OK	N.A.	Fail
1.	Internal parts	☐	☐	☐	2.	External parts	☐	☐	☐
3.	Cable	☐	☐	☐	4.	Monitor picture	☐	☐	☐

Notes

		OK	N.A.	Fail			OK	N.A.	Fail
5.	Stand by -LED	☐	☐	☐					
6.	Command board software	KB							
7.	Alarm LEDs	☐	☐	☐	8.	Membrane keys	☐	☐	☐
9.	ComWheel	☐	☐	☐					

Notes

		OK	N.A.	Fail			OK	N.A.	Fail
10.	Electrical safety check	☐	☐	☐	11.	Functioning after electrical safety check	☐	☐	☐
12.	Final cleaning	☐	☐	☐					

Notes

Used Spare Parts

Signature

B-1(1)