OPERATING AND SERVICE MANUAL

AS 4010

ANTENNA SWITCH

WARNING

To prevent potential fire or shock hazard, do not expose antenna switch to rain or moisture.

DOCUMENT NO. 210646-001

ISSUE 91-06

SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Dansk Radio AS assumes no liability for the customer's failure to comply with these requirements.

GROUND THE EQUIPMENT

To minimize shock hazard, the equipment chassis and cabinet must be connected to an electrical ground. The equipment is equipped with a three-conductor ac power socket. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove equipment covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the equipment.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing, and adjusting.

TABLE OF CONTENT

SECTION 1
GENERAL INFORMATION

1.1 Introduction

This Operating and Service Manual contains information required to install, operate, test, and service the Antenna Switch.

Antenna Switch specifications are listed in paragraph 1.7.
These specifications are the performance standards or limits against which the Antenna Switch is tested.
Due to experience obtained from the production and operation of the equipment, minor differences between the Antenna Switch and the manual can occur.

Wherever possible such differences are covered in Section 7 "MANUAL CHANGES"

1.2 Safety Considerations

This manual contains information, cautions and warnings which must be followed to ensure safe operation and to maintain the Antenna Switch in a safe condition.

1.3 Description

AS4010 is a fast Antenna Switch intended to serve as an antenna switching unit in a transceiver system for telephony, telegraphy, ARQ and data transmission.

The Antenna Switch covers the frequency range 1.5 MHz to 30 MHz. It is designed for a power level up to 1 kW continuous and a switching time of 2 msec. The isolation between antenna and transmitter or receiver is more than 60 dB.

For protection of the switch an interlock is incorporated. The interlock reacts on supply voltages and temperature.

Four light emitting diodes on the antenna switch indicate supply status and Rx/Tx mode.

1.5 Accessories Supplied

The following accessories are supplied with the antenna Switch.

One Operating and Service Manual, DRA part no. 210646
One Mains connector, DRA part no. 232464-051 and
three 1 pole crimp connectors
DRA part no. 232464-901

1.6 Accessories Available

The following items are available for use with the Antenna Switch.

Connector Kit, DRA part no. 210683

1.7 Specifications

Power level : 1 kW PEP/Average with VSWR up to 4:1
(ref. 50 ohm)

RF current : Max. 9 Amp.

RF voltage : Max. 450 Vrms.

Switching time: Attack time : 2 msec. approx.
Release time : 1.2 msec. approx.

Isolation in a 50 ohms system:

Tx -> Rx : > 60 dB in Rx state.
> 65 dB in Tx state.
Tx -> Ant. : > 60 dB in Rx state.
Ant. -> Rx : > 65 dB in Tx state.

Return loss in a 50 ohms system:

Rx input : > 21 dB
Tx input : > 30 dB
Ant. output: > 30 dB in Tx state.
> 20 dB in Rx state.

Connections : Tx : N-connctor.
Rx : BNC-connector.
Antenna : N-connector.
Tx control: Sub-D female, 9-poles
Rx control: Sub-D male, 9-poles
AC power : 3-poles

Keying input : TTL level or 24Vdc/20 mA

Mute output : Mechanical relay contacts or TTL level or driver for optocoupler.

Interlock info: Isolated via optocoupler.

Power supply : 110/220 Vac +/- 10%, 50 - 60 Hz, 24 W approx.

Operating environment:

Temperature	:	Full performance range 0°C to +50°C Operating range -25°C to +55°C Storage -40°C to +75°C
Humidity	:	to 95% relative humidity at +40°C
Vibration	:	MIL-STD-810D-514.3, Category 8, 514.4-1 (10-150 Hz), 514.3-34, Category 9.
Shock	:	MIL-STD-810D-516.3, Procedure 11 (30g for 20 msec.).
Weight	:	1.7 kg
Dimension	:	Height 78 mm Width 96 mm Length 291 mm

SECTION 2
INSTALLATION

2.1 Introduction

This section of the manual provides installation instructions for the AS4010 Antenna Switch. It also includes information about initial inspection and damage claims, preparation for use and repacking for shipment information.

2.2 Initial Inspection

WARNING

To avoid hazardous electrical shock, do not perform electrical tests when there are signs of shipping damage to any portion of the front or rear panel or outer covers. Read the safety summary at the front of this manual before installing or operating the Antenna Switch.

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the Antenna Switch has been checked mechanically and electrically. If the contents are incomplete, if there is a mechanical damage or defect, or if the switch does not pass the performance tests, notify the nearest Dansk Radio agent. If the shipping container is damaged, or if the cushioning material shows signs of stress, notify the carrier as well as the Dansk Radio agent.

A full report of the damage should also be forwarded to Dansk Radio.
Include the following:

- Order number
- Model and serial number
- Name of transportation agency

2.3 Storage

The Antenna Switch may be stored or shipped in temperatures within the limits -40°C to +75°C. It is advisable to protect the switch from extreme temperature variation which can cause excessive condensation.

2.4 Repacking for shipment

The shipping container for the AS4010 has been carefully designed to protect the switch and its accessories during shipment. This container and its associated packing material should be used when repacking for shipment. If shipping to Dansk Radio for service is planned, attach a tag indicating the type of service required, return address, model number and full serial number. Mark the container FRAGILE to ensure careful handling.

If the original shipping container is not available, the following general instructions should be used for repacking with commercially available materials:

- Wrap the switch in heavy paper or plastic. If shipping to Dansk Radio for service, attach a tag indicating the type of service required, return address, model number and full serial number.

- Use a strong shipping container, e.g. a double walled carton of 160 kg test material.

- Protect the control panel with cardboard and insert a 7 to 10 cm layer of shock absorbing material between all surfaces of the equipment and the sides of the container.

- Seal the shipping container securely.

- Mark the shipping container FRAGILE to ensure careful handling.

2.5 Mounting information

The Antenna Switch may be conveniently mounted on a flat surface using four 4 mm screws.

When operating the Antenna Switch provide at least 30 mm of clearance at all sides except on mounting side. Failure to allow adequate air circulation will result in excessive internal temperature, reducing antenna switch reliability.

2.6 Power Requirements

110, 220, +/-10%, 50-60 Hz, 24 VA.

CAUTION

The Antenna switch is normally set at the factory for 220 Vac.

The selection of 110 volt nominal mains voltage is made by changing connections on S1 located on the PCB.

To change the mains voltage setting, proceed as follows:
(refer to Fig. 2.1)

a. Disconnect the input power cord from the antenna switch.

b. Remove the top cover by removing the ten retaining screws.

c. Change the placing of the jumper on S1 for the appropriate voltage. 110 Vac: S1 position: A - B,
220 Vac: S1 position: B - C

d. Reposition the top cover and fasten the screws.

e. Connect the input power cord to the antenna switch.

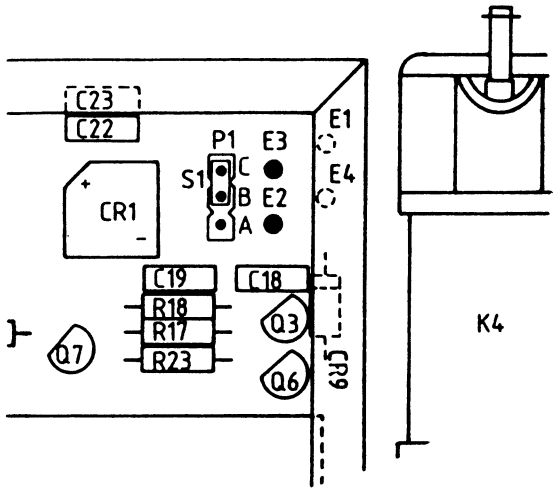


Figure 2.1 Mains strapping.

2.7 Fuses

Tabel 2.1 Fuse Ratings

Rear Panel	F1	0.2A T (220V/110V)
	F2	0.2A T (220V/110V)

2.8 Power Cable

In accordance with international safety standards this Antenna Switch is equipped with a three terminal power connector. When connected with an appropriate power cable, the Antenna Switch cabinet should be grounded via the power connector center tap.
If the power cable is terminated with a mains plug, this should only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of a power cable without a protective conductor (grounding).

2.9 Inputs/Outputs.

2.9.1 Transmitter control, J10

Sub-D, Male, 9 poles, Screw Lock.

The transmitter control socket (refer to Figure 2.2) provides key inputs and interlock output.

pin		
1	Interlock (-).	Isolated.
6	Interlock (+).	Isolated.
3	Tx key.	TTL level.
5	Tx key (-).	Isolated.
9	Tx key (+).	Isolated.
7	GND.	
8	GND.	

Figure 2.2 Transmitter control socket.

The Tx-key level accepted by the antenna switch is either a TTL signal/open collector driver (the input is pulled-up to +5 Vdc through a resistor of 10 kohms) or a floating logic signal of 24Vdc/10 mA.

The interlock is a floating output. The output (an optocoupler) will source 20 mA under no error condition. The maximum voltage allowed between the output pins is 30 Vdc.

The appropriate cable connector may be ordered from Dansk Radio as part no. 449202 or as part of the Connector Kit, part no. 210683.

2.9.2 Receiver control, J13

Sub-D, Female, 9-poles, Screw Lock.

The receiver control socket (refer to figure 2.3) provides muting for a receiver.

pin		
1	Mute no.	Mechanical relay
2	Mute common.	
6	Mute nc.	
9	+18.5 Vdc	
8	Mute (open collector)	

Figure 2.3 Receiver control Socket.

The receiver muting can be an open collector output used directly or through an optocoupler or it can be the mechanical relay contacts. The +18.5Vdc is current limited through 820 ohms.

The appropriate cable connector may be ordered from Dansk Radio as part no. 449199 or as part of the Connnector Kit, part no. 210683.

2.9.3 Tx input, J14

N-connector, Female.

RF Output from the transmitter. Level up to 1 kW/50 ohms.

The appropriate cable connector may be ordered from Dansk Radio as part no. 490180 or as part of the Connector Kit, part no. 210683.

2.9.4 Rx output, J12

BNC, Female.

RF output to the receiver.

The appropriate cable connector may be ordered from Dansk Radio as part no. 473774 or as part of the connector kit. part no. 210683.

2.9.5 Antenna, J11

N-connector, Female.

RF connection for the antenna.

The appropriate cable connector may be ordered from Dansk Radio as part no. 490180 or as part of the Connector Kit, part no. 210683.

2.10 Installation Check-out

When the installation is complete, refer to section 3 (OPERATION) and fully check the operation of the antenna switch.

SECTION 3
OPERATION

3.1 Introduction

This section of the manual contains instructions for proper operation of the AS4010 antenna switch.

3.2 Panel Features

The different connectors and indicators are printed on the antenna switch.

3.3 Power

The antenna switch requires a power source of 110 or 220Vac, single phase. The selection of power source and phases is described in Section 2, Installation.

3.4 Initial Conditions

After the power has been switched on, the antenna switch shows the status of the power supply by the two leds (light emitting diodes) marked +5 Vdc and +18.5 Vdc. Also the Tx/Rx mode will be shown.

3.5 Installation check-out

The installation check-out is a functional check of the antenna switch.

- Remove the RF-cabel between the transmitter and the antenna switch.
- Check that the led marked Rx is lit. Check via the receiver that noise or signals are present.
- Key the transmitter and check that the led marked Tx is lit and the Rx led is extinguished. Be sure that the transmitter can withstand a no-load condition. Otherwise connect the transmitter to a dummy load. Check that the signals to the receiver have dissappeared. Unkey the transmitter again.
- Connect the transmitter RF-cabel directly to the antenna. Key the transmitter and note the SWR.
- Reconnect the RF-cabel between the transmitter and the antenna

switch. Select a power level from the transmitter of maximum 20 Watts.
Key the transmitter and check that the SWR has not increased.

- Increase the power level to a maximum of 1 kW and check that the SWR is unchanged.

SECTION 6
REPLACEABLE PARTS

6.1 Introduction

This section contains information for ordering parts.

6.2 Replaceable Parts List

The following pages list replaceable parts and are organized as follows:

a. Electrical assemblies in alphanumerical order by reference designation.

b. Electrical assemblies and their components by alphanumerical order by reference designation.

The information given for each part consists of the following:

a. Complete reference designation.

b. Dansk Radio stock number.

c. Description of part.

d. Total quantity in first higher level.

The total quantity in first higher level for each part is given only once - at the first appearance of the part number per lower level.

6.3 Ordering Information

To order a part listed in the replaceable parts list, quote the DRA part number, indicate the quantity required and address the order to Dansk Radio.

To order a part that is not listed in the replaceable parts list, include the equipment model number, equipment serial number, the description and function of the part, and the number of parts required. Address the order to Dansk Radio.

Parts List

PRINTET..... 91/06/21

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
2	1,000	ST	60	210442-001	ANTENNA SWITCH AS4010	1				
3	1,000	ST	37	210508-001	CABLE ASSY W1 AS4010	1				
4	2,000	ST	33	BR358975	FUSE ACCES.HLDR 5X20 6,3A	4				
5	2,000	ST	31	BR262765	FUSE 200 MA	4				
6	2,000	ST	31	BR368261	CONN 23N-50-0-1	4				
7	1,000	ST	31	BR268577	COAX CONN BNC FEM-CHASS.	4				
9	1,000	ST	25	232479-001	TRANSFORMER 220V:2X18V	4				
10	1,000	ST	56	222814-027	SPACER, THREADED M4X25MM	4				
11	1,000	ST	51	BR275638	SCREW M 4 X 8 CHJ GULCR	4				
12	1,000	ST	51	BR333417	SCREW M 4 X10 UHJ GULCR	4				
13	2,000	ST	26	BR391387	TRANS.ACCESS ISOLAT.PLD	4				
14	2,000	ST	26	BR458546	TRANS.ACCESS ISOLATIONS	4				
15	14,000	ST	51	BR275522	SCREW M 3 X 8 CHJ GULCR	4				F
16	2,000	ST	52	BR333921	NUT M 3 CONTRA J GULCR	4				
17	17,000	ST	51	203798-012	SCREW M 3X10 TAPPING ST	4				B
18	2,000	ST	31	BR495905	CONN D ACCESS. JACK SOCKT	4				
19	2,000	ST	24	BR466522	IC LIN LM 317T VOLT REGL.	4			U1,U2	A1
20	4,000	ST	23	BR492566	DIO LED HLMPK150 RED Ø3	4			CR6,CR7,CR16,CR17	A1
21	1,000	ST	31	BR373273	CONN D PWB ANG 9P MALE	4			J2	A1
22	1,000	ST	31	BR446068	CONN D PWB ANG 9P FEMALE	4			J3	A1
23	1,000	ST	41	210431-001	U-PROFILE FOR AS4010	1			MP1	A2
24	1,000	ST	41	210432-001	REAR PLATE,U-PROF. AS4010	1			MP2	A2
25	2,000	ST	41	210435-001	PCB MOUNTING BAR AS4010	2			MP3	A2
26	1,000	ST	41	210433-001	TOP PLATE AS4010	2			MP4	A2
27	1,000	ST	41	210434-001	BOTTOM PLATE AS4010	2			MP5	A2
28	1,000	ST	41	210436-001	PCB MOUNTING BAR AS4010	2			MP6	A2
29	14,000	ST	51	200684-019	SCREW M 3X 8 SLTD.COU. ST	4				F
30	10,000	ST	51	202179-021	SCREW M 3X 8 SLTD.PAN I	4				D
31	2,000	ST	31	201702-022	TAG, SOLDER	4				B
32	0,001	KG	32	BR225509	WIRE,COP 1,0 TIN/BL	4				B
33	5,000	ST	45	BR371157	STRAP,CABLE L 92XB2,6	4				B
34	4,000	ST	51	202185-056	SCREW M 4X 8 SLTD.CYL BRS	4				C
35	1,000	ST	31	232464-051	CONN FEMALE 3-POLES	4				E
36	3,000	ST	31	232464-901	CONTACT,CRIMP AWG16-18	4				E
37	1,000	ST	48	BR464872	LABEL, DRA TYPE/SER.NO	3				F

TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TERMA

TITLE: ANTENNA SWITCH AS4010

DOCUMENT NO.: 09 - 210507-001

REV: F

SHEET NO.: 1 UF 2

Parts List

PRINTET..... 91/06/21

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
**********				**********	BILL OF DOCUMENTATION				**********	*****
1001			PD	210442	ANTENNA SWITCH AS4010					
1002			PD	210507	AS4010 MOUNTED					
1003			HT	210646	AS4010 OPE.AND SER.MANUAL					
1004			TP	BRQA4810	ANTENNA SWITCH AS4010					
**********				**********	********** NEXT ASSY **********				**********	*****
	1.000	ST		BRDRA	DRA TOTAL					
	1.000	ST		BR453854-002	LA.S76150 1F SMK	1				
	1.000	ST		BR453854-003	LA.S76150 1F SMK EX.RACK	1				
						1				

TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TERMA

TITLE: ANTENNA SWITCH AS4010

DOCUMENT NO.: 09 - 210507-001

REV: F

SHEET NO.: 2 OF 2

A4 Form 2004:3 FA Rev B

Parts List

PRINTET..... 91/06/21

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
1	1,000	ST	37	BR497118	PWB AS4010	3				
2	1,000	ST	22	221898-017	CAP. ELC 1M0 / 40Q	4			C1	
3	4,000	ST	22	BR450359	CAP. ELEC 1J 25 M	4			C2,C4,C5,C7	
4	8,000	ST	22	BR491357	CAP. PLST 10N 63 K	4			C3,C6,C10,C11,C12,C13,C23, C24	
5	2,000	ST	22	BR361348	CAP. PLST 10N 63 F	4			C8,C9	
6	10,000	ST	22	BR459534	CAP. PLST 100N 63 M	4			C14,C15,C16,C17,C18,C19, C20,C21,C22,C25	
7	1,000	ST	21	BR373486	RES FILM 3K32 0.6F MRS25	4			R1	
8	2,000	ST	21	208010-138	RES FILM 243R / 0.25F	4			R2,R4	B3
9	1,000	ST	21	BR405442	RES FILM 715R 0.6F MRS25	4			R3	
10	1,000	ST	21	BR240311	RES CARB. 330R 1/4J SFR25	4			R5	
11	1,000	ST	21	BR359580	RES CARB. 1K1 1/4J SFR25	4			R6	
12	2,000	ST	21	BR240109	RES CARB. 10R 1/4J SFR25	4			R7,R10	
13	1,000	ST	21	BR359564	RES CARB. 160R 1/4J SFR25	4			R8	
14	2,000	ST	21	BR240567	RES CARB. 10K 1/4J SFR25	4			R9,R11	
15	2,000	ST	21	BR240400	RES CARB. 1K0 1/4J SFR25	4			R12,R14	
16	1,000	ST	21	BR240257	RES CARB. 180R 1/4J SFR25	4			R13	
17	11,000	ST	21	BR240222	RES CARB. 100R 1/4J SFR25	4			R15,R17,R19,R21,R23,R24, R26,R29,R30,R31,R32	
18	4,000	ST	21	BR240281	RES CARB. 270R 1/4J SFR25	4			R16,R18,R20,R22	
19	2,000	ST	21	BR368555	RES FILM 274K 0.6F MRS25	4			R25,R27	
20	1,000	ST	21	BR240397	RES CARB. 820R 1/4J SFR25	4			R28	
21	2,000	ST	21	BR240559	RES CARB. 8K2 1/4J SFR25	4			R33,R34	
22	1,000	ST	26	BR273899	TRANS.LOPOW BC 547B SI-N	4			Q1	
23	9,000	ST	26	BR496626	TRANS.D-MOS BST 76A TO-92	4			Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9, Q10	
24	1,000	ST	23	BR443581	DIO BRDG.SK1.2/08 SI 1.2A	4			CR1	
25	8,000	ST	23	BR228141	DIO POW. 1N4007 SI 1KV 1A	4			CR2,CR3,CR4,CR5,CR8,CR9, CR10,CR11	
27	4,000	ST	23	BR228087	DIO SIGN. 1N4148 SI 150MA	4			CR12,CR13,CR14,CR15	
28	1,000	ST	23	BR454389	DIO ZEN ZPD16 16V 0.5W	4			VR1	
29	1,000	ST	23	BR228818	DIO ZEN ZPD 2.7 2.7V 0.5W	4			VR2	
30	1,000	ST	23	BR359742	DIO ZEN ZPD15 15V 0.5W	4			VR3	
32	2,000	ST	24	BR484555	IC LIN 4N32 OPTOCOUPL.	4			U3,U4	
33	1,000	ST	24	206743-095	IC, --74HCT221	4			U5	

TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TERMA

TITLE: ANTENNA SWITCH AS4010

DOCUMENT NO.: 60 - 210442-001

REV: B3

SHEET NO.: 1 OF 2

Parts List

PRINTET..... 91/06/21

FIND NO.	QTY RQD	U M	CL NO.	ITEM OR DOCUMENT NUMBER	NOMENCLATURE	I T	PREP NO.	BIN	REFERENCE DESIGNATION	LINE REV
34	1,000	ST	24	BR488062	IC DGTL 74HCT 14 6XINV.ST	4			U6	
37	4,000	ST	33	232330-002	RELAY REED 12.0VDC	4			K1,K2,K3,K4	
38	1,000	ST	33	200519-009	RELAY REED SPDT 24.0VDC	4			K5	
39	1,000	ST	33	223980-003	RELAY DPDT 24.0VDC	4			K6	
40	1,000	ST	31	BR494356	CONN PWB PIN 3P MALE	4			S1	
41	1,000	ST	31	BR493910	JUMPER 0,1" 2P FEMALE	4			P1	
43	1,000	ST	27	BR484725	SWITCH, THERMO	4			ST1	B2
45	1,000	ST	41	210445-001	WALL SHIELD AS4010	2			MP2	
47	8,000	ST	31	201702-023	TAG, SOLDER	4				B1
**********					BILL OF DOCUMENTATION					
			EB	210442	ANTENNA SWITCH AS4010					
			EC	210442	ANTENNA SWITCH AS4010					
			PD	210442	ANTENNA SWITCH AS4010					
			PD	210590	TERMINAL LUG, PREFORMED					
**********					NEXT ASSY					
	1,000	ST		210507-001	ANTENNA SWITCH AS4010	1				

TERMA Elektronik AS
FSCM R0567
Hovmarken 4, DK-8520 Lystrup, Denmark

TITLE: ANTENNA SWITCH AS4010

DOCUMENT NO.: 60 - 210442-001

REV: B3

SHEET NO.: 2 OF 2

A4 Form 200473 FA Rev B

SECTION 8
SERVICE

8.1 Introduction

This section provides information for servicing the Antenna Switch.

8.2 Theory of Operation

The theory of operation is located opposite the schematics in the end of this section.

8.3 Trouble shooting

WARNING

Read the Safety Summary at the front of this manual before trouble shooting the antenna switch

By the use of information indicated with the light emitting diodes and Section 3.5, Installation check out, note as many symptoms of the malfunction as possible. From these symptoms it can usually be determined which components are malfunctioning.

When a problem has been isolated, the faulty component(s) may be located using the detailed theory of operation shown on the page opposite the appropriate schematic.

8.4 Strapping

In order to get a proper function of the antenna switch, it is necessary that the switch is strapped for the proper mains voltage. Consult Section 2.6 for mains strapping.

8.5 Preventive Maintenance

The surfaces can be cleaned with a commercial, spray-type window cleaner or with a mild soap and water solution.

CAUTION

Avoid the use of chemical cleaning agents that might damage the plastics used in this switch

8.6 PC-Board Assembly Removal.

To remove the PC-board assembly, proceed as follows:

a) Remove the top and bottom cover plates by removing the twenty screws located on the top and bottom.

b) Disconnect the terminal wires from the PCB to J11-J12 and J14.

c) Disconnect the nine screws holding the PCB.

d) Disconnect the two wires from the transformer and the fuseholders.

e) Remove the four screws holding the panel with the control connectors.

f) Carefully remove the frontpanel with the PCB assembly.

g) Disconnect the four wires between the transformer and the PCB.

h) Remove the four screws holding J10 and J13 and the two screws holding the integrated circuits U1 and U2.

i) To reinstall the assembly, reverse removal procedure. Due to the use of self tapping screws holding the assembly, carefully reinsert the screws in the threads when reversing step d) above.

8.7 Replacement of Relays

To replace a faulty or worn-out relay, proceed as follows:

a) Unsolder the connection between the solid wire from the PCB and the relay tip at both ends.

b) With the use of a pair of tweezers and a soldering iron carefully bend the solid wire away from the relay tip at both ends.

c) Unsolder the four relay pins from the PCB and carefully remove the relay.

d) When mounting a relay, reverse removal procedure.

8.8 Servicing PC-Board

The PC-board have plated-through component holes. This allows components to be removed or replaced by unsoldering or soldering from either side of the board. When removing large components, rotate the soldering iron tip from lead to lead while applying pressure to the part to lift it from the board.

8.9 Logic Devices

This switch uses TTL circuits. Tabel 8.1 below lists typical voltage levels associated with TTL logic.

Table 8.1 Typical Logic Levels

Logic Family	High Level	Low Level
TTL	3 - 5V	0.2V

8.10 Overall Operation

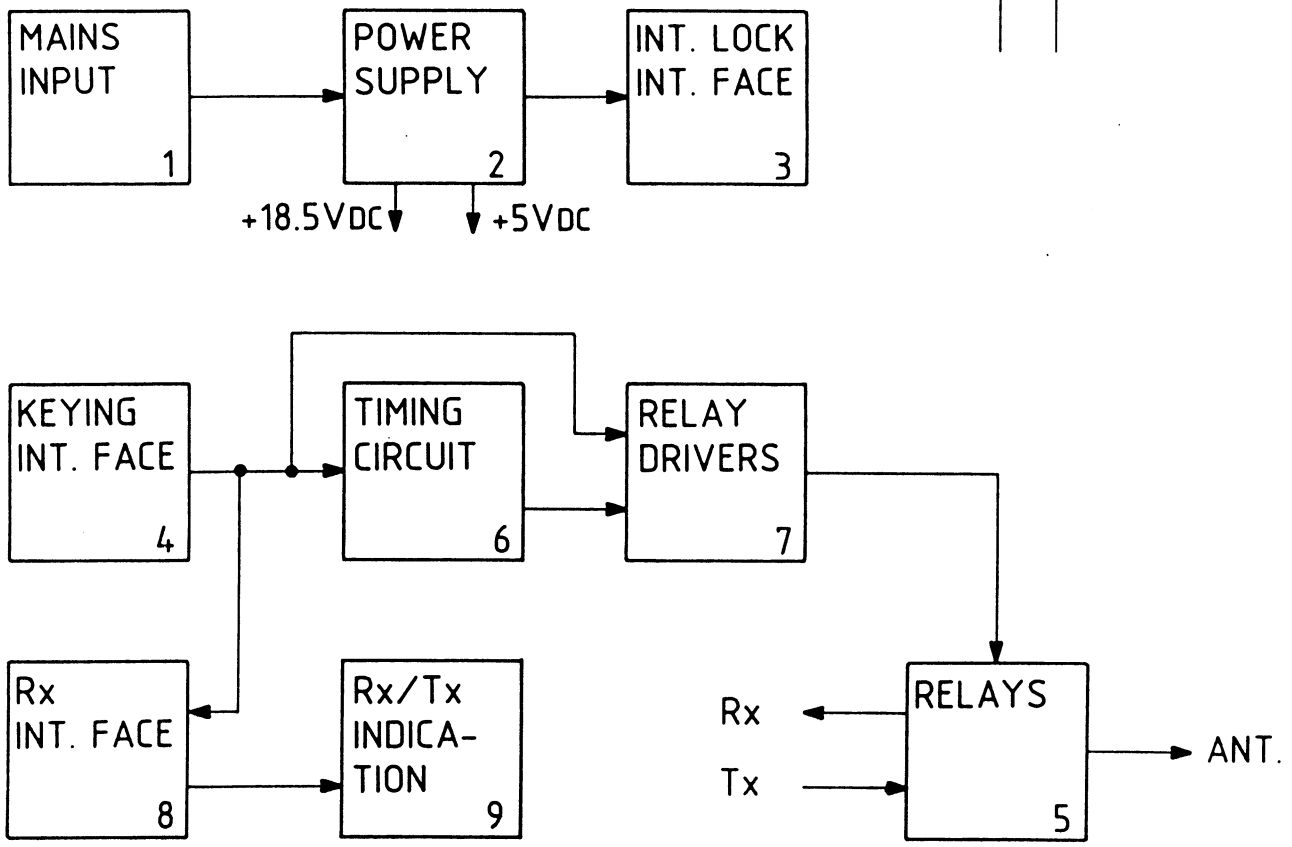
The overall functional block diagram, schematic and detailed descriptions of the circuit are located on subsequent service sheets.

ASSY 210442, ANTENNA SWITCH

Service Sheet

The mains input **1** supplies the voltage for the antenna switch. The mains input is regulated in the Power Supply **2**. The voltages are supervised in the Interlock Interface **3** used to interlock the transmitter in case of an error.
The Keying interface **4** interfaces the transmitter to the switch and controls the relays through the timing circuit **6** and the Relay drivers **7**. The relays **5** are fast reed relays. The Rx interface **8** allows a receiver to be muted via the Antenna Switch. The Rx/Tx condition is indicated by **9** the Rx/Tx indication.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVAL
A			



	AS4010
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075

ANGLES

LIN. DIM

MATERIAL

DR	VH	16.10.89
CH		
AP		
AP		

FIRST ANGLE PROJECTION

Dansk Radio AS

TITLE
CONFIGURATION
ANTENNA SWITCH
AS4010

SIZE	CODE IDENT NO	DRAWING NO
A 3		21 04 42 EB
SCALE		SHEET 1 OF 1

Service Sheet

1. Mains Input (ref. only)

The Mains input is fused by F1 and F2 before entering the transformer T1. The four outputs from the transformer are led to the Antenna Switch Assy 210442.

2. Power Supply

Two of the four lines from the transformer are fed directly to a bridge rectifier CR1. The two other lines are routed via S1 to CR1. S1 is used to select between 110 Vac and 220 Vac operation. The output from CR1 is filtered by C1. The filtered voltage is led to U1 which produces a stabilized voltage of +18.5 Vdc. The +18.5 Vdc is used for the relays in the switch and by U2 to produce +5 Vdc. This voltage is used by the control and interface circuit.

3. Interlock Interface

The presence of +18.5 Vdc and +5 Vdc are indicated by CR9 and CR7, two leds located on one of the sides of the antenna switch. The interlock system reacts on three different types of information, namely the +18.5 Vdc, the voltage across CR7 (+5 Vdc) and a temperature switch ST1.

The +18.5 Vdc is routed through a resistor and a 16 V Zener diode CR10 to an optocoupler U1. The other side of U1 is grounded through a transistor Q1 via the thermo switch. The transistor is controlled by the voltage across CR7.

When no error is present the output of the optocoupler is in the low impedance condition.

If the +5 Vdc dissappears the transistor Q1 goes into the off condition whereby the output of the optocoupler goes into the high impedance condition.

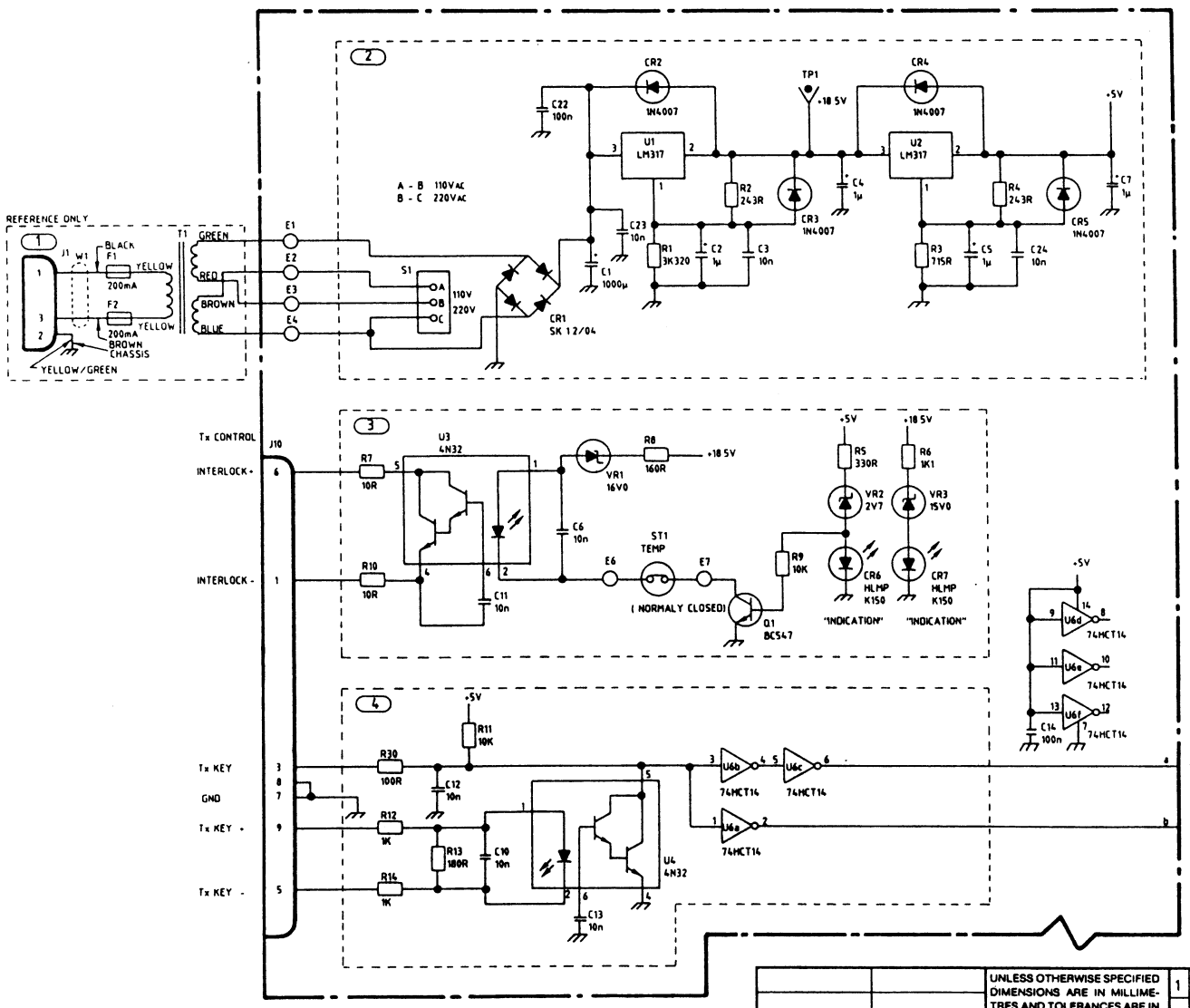
If the temperature in the antenna switch reaches the attack level (80°C) the switch opens and the output of the optocoupler goes into the high impedance condition.

If the +18.5 Vdc falls below +16 Vdc CR10 stops conduction whereby the optocoupler goes into the high impedance condition.

4. Keying Interface

The keying interface accepts TTL levels via pin 3 and isolated input via U4. The isolated input is excercised by an input of 24 Vdc/20 mA.

The two inputs are summed together. The key signal for the Tx mode is inverted in U6a, while the Rx key signal is buffered in U6a,b.



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	A			
	B	RETTET Æ04600	21190	VH
1,2	C	Æ09367	4 9 90	VH/GUS

	AS4010
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075

ANGLES

LIN. DIM.

MATERIAL

DR.	VH	11.10. 1989
CH.		
AP.		
AP.		

FIRST ANGLE PROJECTION

Dansk Radio AS

TITLE
ANTENNA SWITCH
AS4010

SIZE	CODE IDENT	DRAWING NO.
A2		21 04 42 EC
SCALE		SHEET 1 OF 2

Service Sheet

5. Relay configuration

The antenna switch incorporates 5 relays. In Tx mode the relays K2, K3 and K5 are closed and K1 and K4 are open. K2 and K3 lead the RF-current from the transmitter to the antenna connector, while K5 shortcircuits the Rx terminal.

In Rx mode K2, K3 and K5 are open, while K1 and K4 are closed. K1 shortcircuits the Tx terminal while K4 leads the RF-current from the antenna to the Rx terminal.

6. Timing circuit

In order to increrase the switching speed of the switch the relays K1, K2, K3 and K4 are excercised by +18,5 Vdc in the first 2 mS of the keying before entering the steady state where the relays are fed by +12 Vdc. U5a supplies the puls for K1 and K4, while U5b supplies K2, K3 and K5.

7. Relay drivers

When the key is activated both transistors for the relay are exercised. The transistor coupled directly to the relay coil terminals is activated in the first 2 mS through the timimg circuit giving a decrease in the switching time. After the first 2 mS the transistor goes into the off condition, whereby the relay is supplied by +12 Vdc via a resistor and the other transistor.

The relay K5 is only controlled by one transistor because of the lower switching speed of the relay.

8. Rx interface

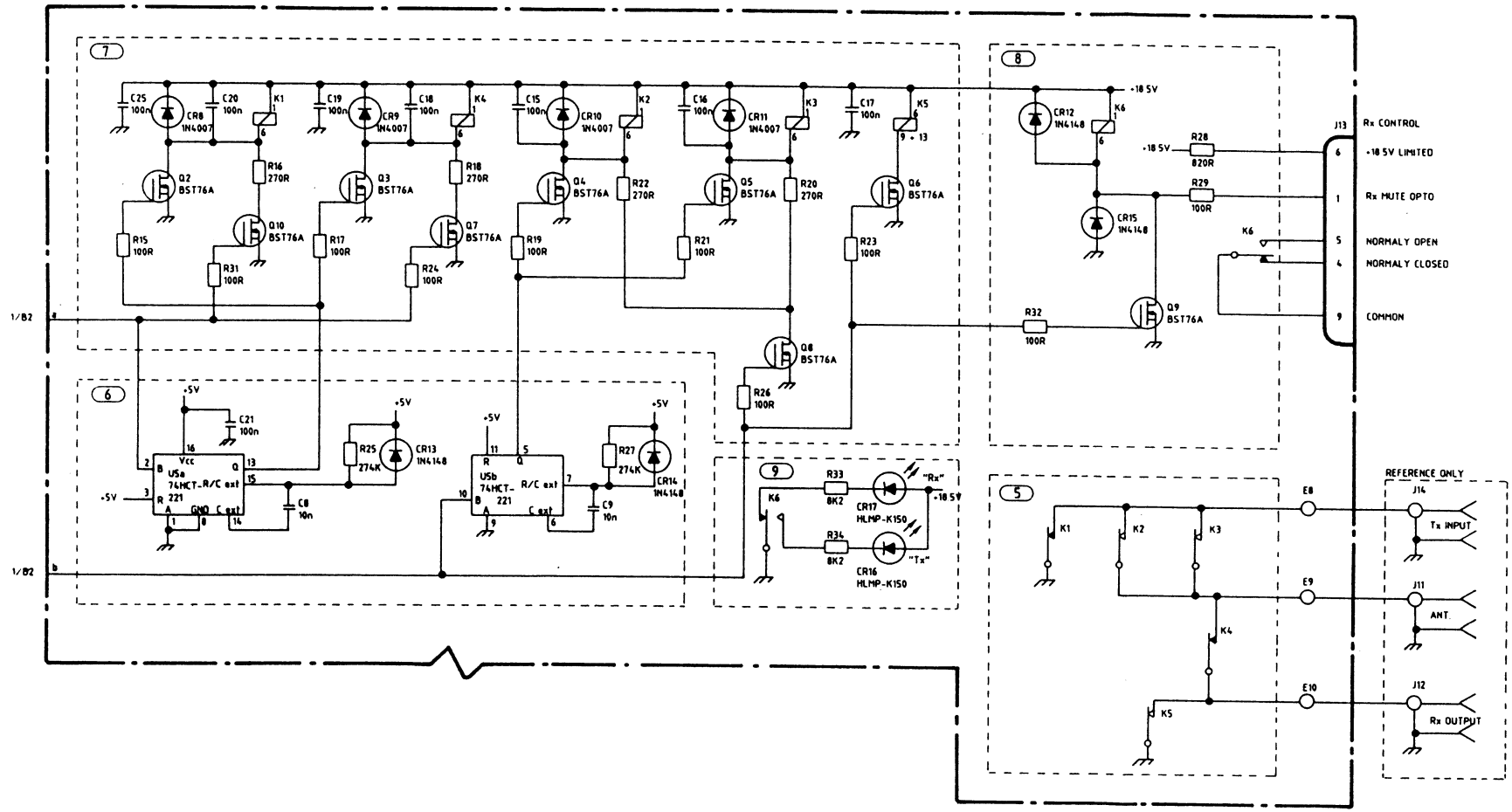
In order to mute a receiver two muting outputs are provided. One output is an open drain with a series resistor for protection. This output can either drive a TTL input or an optocupler via the +18.5 Vdc avaiable on J3.

The other output is a relay with normally open and normally closed contacts, used when isolation is needed.

9. Rx/Tx indication

Two leds are located on the side of the antenna switch to indicate which state the switch is in. CR20 indicates the Rx state while CR19 indicates the Tx state.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	A			
	B	Æ04600	4.2.90	VH
1,2	C	Æ09367	4.9.90	VH/GUS



6 SEP. 1990

FIRST ANGLE PROJECTION	SIZE	CODE IDENT	DRAWING NO.
	A2		21 04 42 EC
	SCALE		SHEET 2

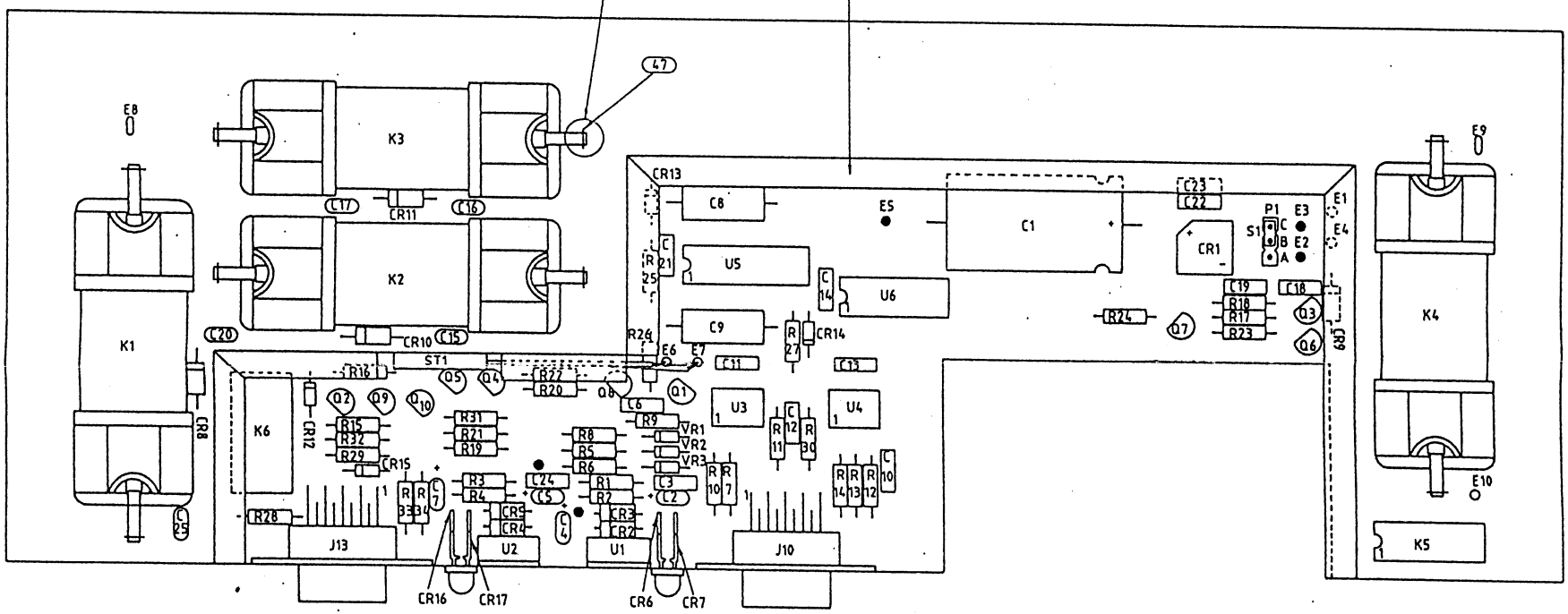
Service Sheet

1.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	A			
	B	ÆO4600	31.1.90	VH
	C	ÆO9165	8.6.90	VH
	D	ÆO9367	4.9.90	VH/GUS

(47) PREPPES I VÆRKTØJ NO. 997040330
8 STEDER
LODDES FØRST PÅ PRINT
DEREFTER PÅ RELÆ.

(45) LODDES PÅ
SIDEN MOD RELÆER.



		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES AND TOLERANCES ARE IN ACCORDANCE WITH DS 2075			Dansk Radio AS
		ANGLES	DR. VH	16.10 1989	TITLE COMPONENT LOCATION ANTENNA SWITCH AS4010
		LIN. DIM.	CH.		
			AP.		
	AS4010	MATERIAL	AP.		
NEXT ASSY	USED ON		FIRST ANGLE PROJECTION		SIZE A2 / CODE IDENT / DRAWING NO. 210442-PD
APPLICATION					SCALE 2:1 / SHEET 1 OF 1

Service Sheet