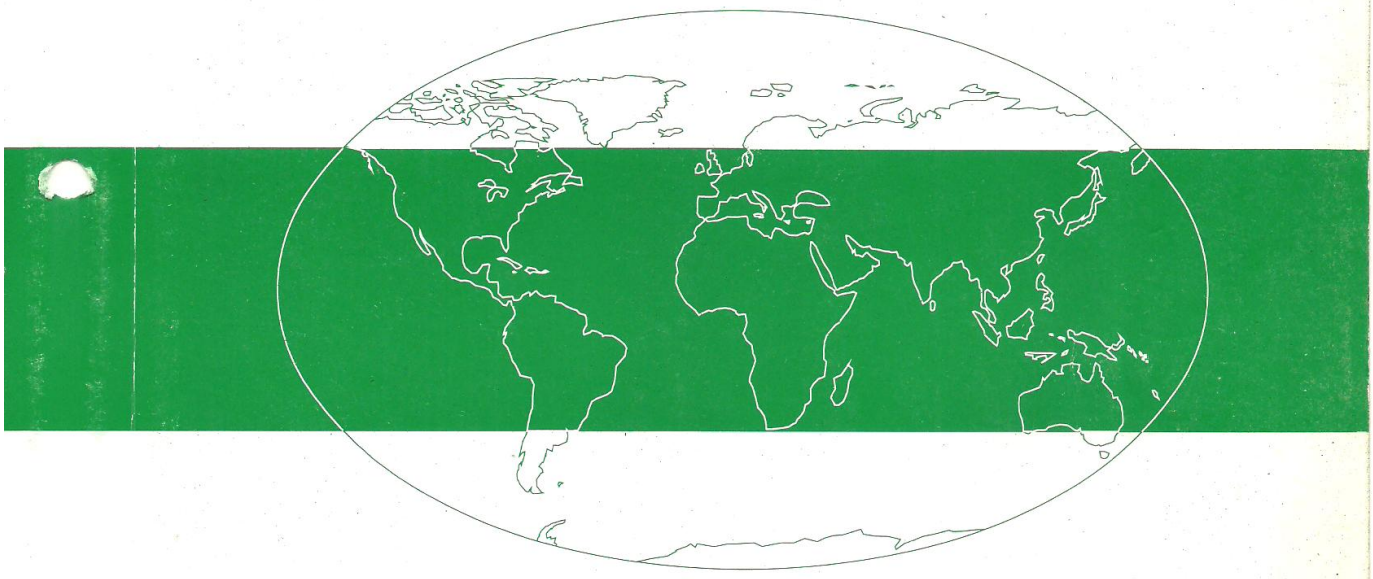
23

9/18/12

SAILOR



TECHNICAL MANUAL
FOR
COMPACT HF SSB
CW UNIT H2185

S.P. RADIO A/S

PORSVEJ 2 • DK-9200 AALBORG SV • DENMARK
TEL. INT. + 45 9634 6100 • TELEX 69 789 SPRAD DK • TELEFAX INT.+ 45 9634 6101
E-mail: sailor@sailor.dk

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1 GENERAL INFORMATION

1.1 INTRODUCTION

H2185 contains a side-tone oscillator, a loudspeaker, and the power supply for the duplex telegraphy receiver. It has to be used in conjunction with the HF SSB system 2000, a duplex receiver R2120, or a telegraphy receiver R2120/T
The RE2100 is switched to telegraphy mode (CW), and when the KEY is activated, the 1A1 signal is transmitted. This period is monitored by the build in side-tone oscillator (400-800 Hz). The side-tone frequency can be adjusted from the rear side of the H2185, and the level can be adjusted from the front panel of the H2185.
The telegraphy receiver R2120/T is used in the telegraphy mode. During transmission the receiver is muted, and when the key is opened the receiver is demuted, and thus enabling break-in.

The loudspeaker and the headset earpiece AF level are controlled from the RE2100.

When using the headset, the transmitter is controlled from a foot switch (PTT).

The headset can be used in simplex, duplex or telegraphy mode.

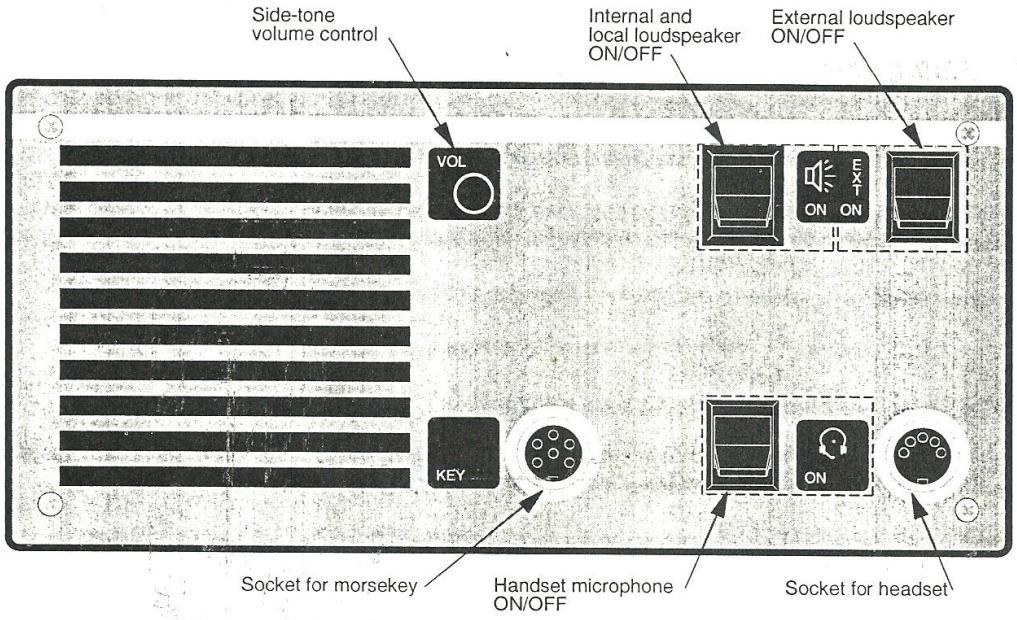
The loudspeaker, or EXT. loudspeaker can be switched off by using the loudspeaker switch on the front panel. Instead of the built-in loudspeaker a local loudspeaker can be used.

The HF SSB CW UNIT H2185 has to be used in conjunction with HF SSB RE2100 , HF SSB transmitters, HF SSB R2120 duplex receiver, or R2120/T duplex and telegraphy receiver.

1.2 TECHNICAL DATA

Supply voltage	21.6-32V DC
Current drain	
Max	1.2A, (24V supply voltage)
Standby	0.6A, (24V supply voltage)
Audio power	10 Watt, 4 Ohm, (24V supply voltage)
Distortion	< 10 %
Operation temperature	-15°to +55° C
Weight	2.1 Kg
Dimensions	Height 98mm
	Width 225mm
	Depth 134mm

1.3 CONTROLS

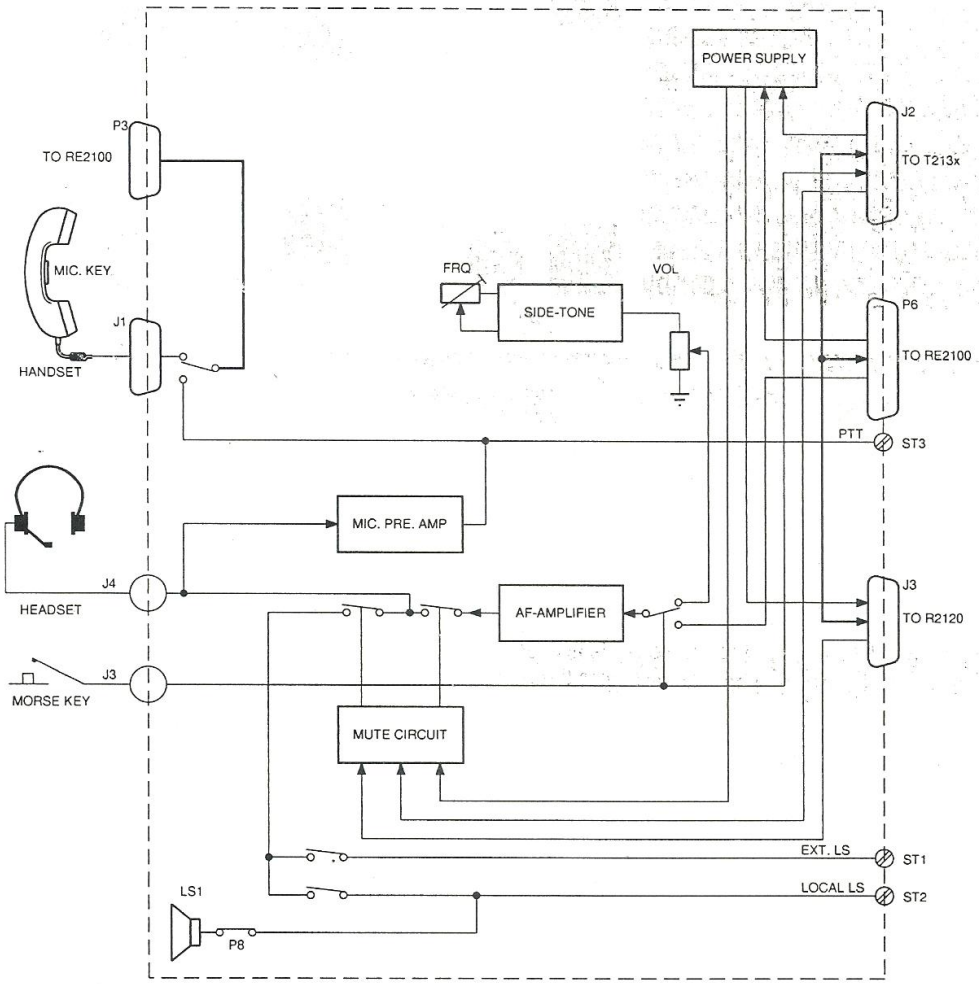


29079

The side-tone is heard when the morsekey is activated.
The side-tone frequency can be adjusted from the rear side.

1.4 PRINCIPLE OF OPERATION AND BLOCKDIAGRAM

BLOCKDIAGRAM



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CONTENTS

2 INSTALLATION

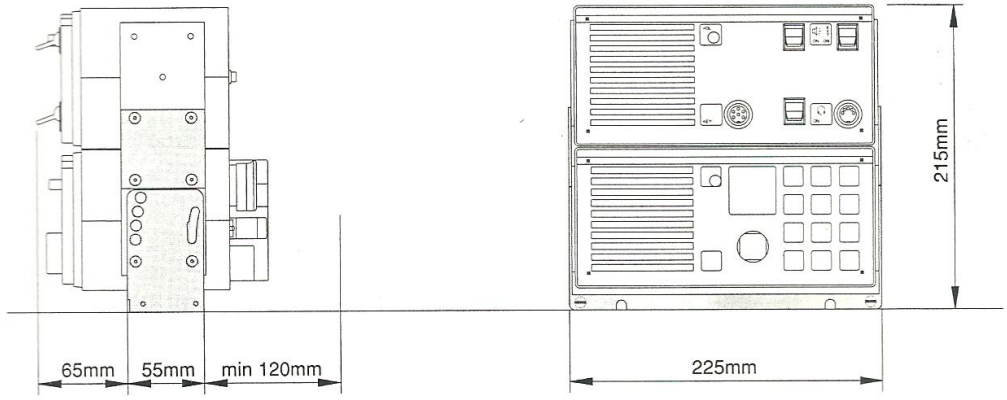
2.1 MOUNTING POSSIBILITIES

The CW Unit H2185 cabinet is designed in a module called a mini 1/4 box. For this module we can supply a wide variety of installation brackets etc. which will be described below. We have made a drawing including dimensions and drilling plan for each type and we kindly ask you to look at the drawing for the type in question.

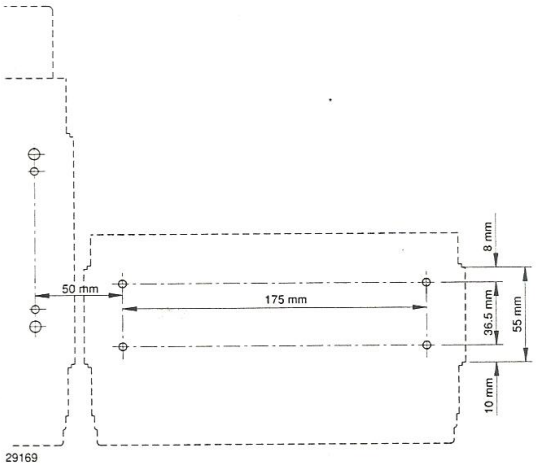
CW UNIT H2185 AND VHF RT2048 MOUNTED ON TOP OF EACH OTHER USING H2067 MOUNTING BRACKET FOR TABLETOP, BULKHEAD OR DECKHEAD FOR MINI 1/4 BOX AND H2072 LASHING KIT.

This mounting bracket H2067 and lashing kit H2072 is used when H2185 is to be mounted on top of another mini 1/4 box and next to other units in the Compact 2000 programme mounted in H2055 mounting brackets.

H2072



29165A



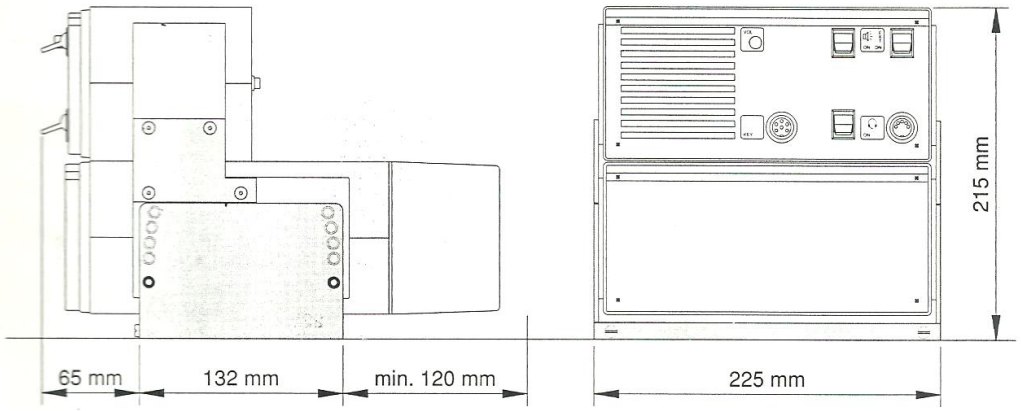
29169

Weight:

Mounting bracket H2067:	0.5 kg
Lashing kit H2072:	0.1 kg
VHF RT2048:	3.2 kg
CW Unit H2185:	2.2 kg

CW UNIT H2185 AND DUPLEX RECEIVER R2120 MOUNTED ON TOP OF EACH OTHER USING H2055 MOUNTING BRACKET FOR TABLETOP, BULKHEAD OR DECKHEAD FOR 1/4 BOX AND H2073 LASHING KIT.

This mounting bracket H2055 and lashing kit H2073 is used when R2120 and H2185 is to be mounted on top of each other and next to other units in the Compact 2000 programme mounted in H2055 mounting brackets.



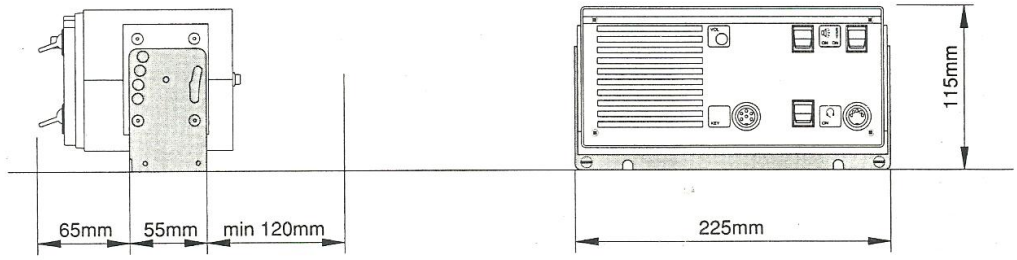
29166A

Weight:

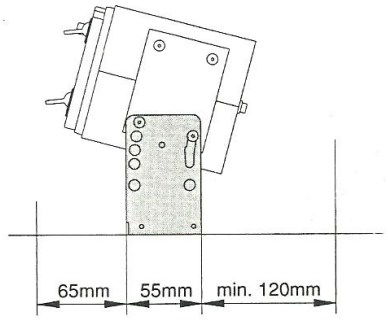
Mounting bracket H2055:	1.5 kg
Lashing kit H2073:	0.1 kg
Duplex Receiver R2120:	3.7 kg
CW Unit H2185:	2.2 kg

H2067 MOUNTING BRACKET FOR TABLETOP, BULKHEAD OR DECKHEAD MOUNTING FOR MINI 1/4 BOX

This mounting bracket is used when H2185 is to be mounted next to other units in the Compact 2000 programme mounted in H2055 mounting brackets. For example when installing the H2185 next to the HF SSB RE2100 it is possible to tilt both units in the same angle.



29167



29168

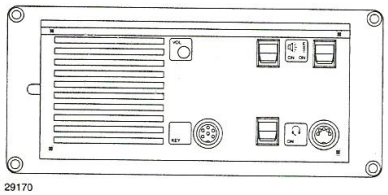
Weight:

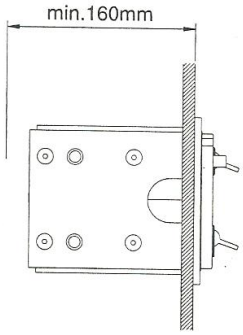
Mounting bracket H2067:	0.5 kg
CW Unit H2185:	2.2 kg

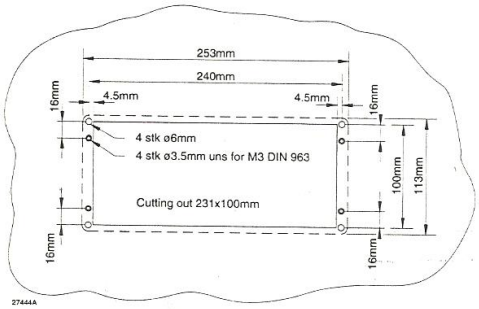
H2063 CONSOLE MOUNTING KIT FOR 1/4 BOX

This mounting kit is used for console flush mounting of 1/4 box and mini 1/4 box.
Free distance must be kept to allow free air circulation, ambient temperature max. 40°C.

H2063

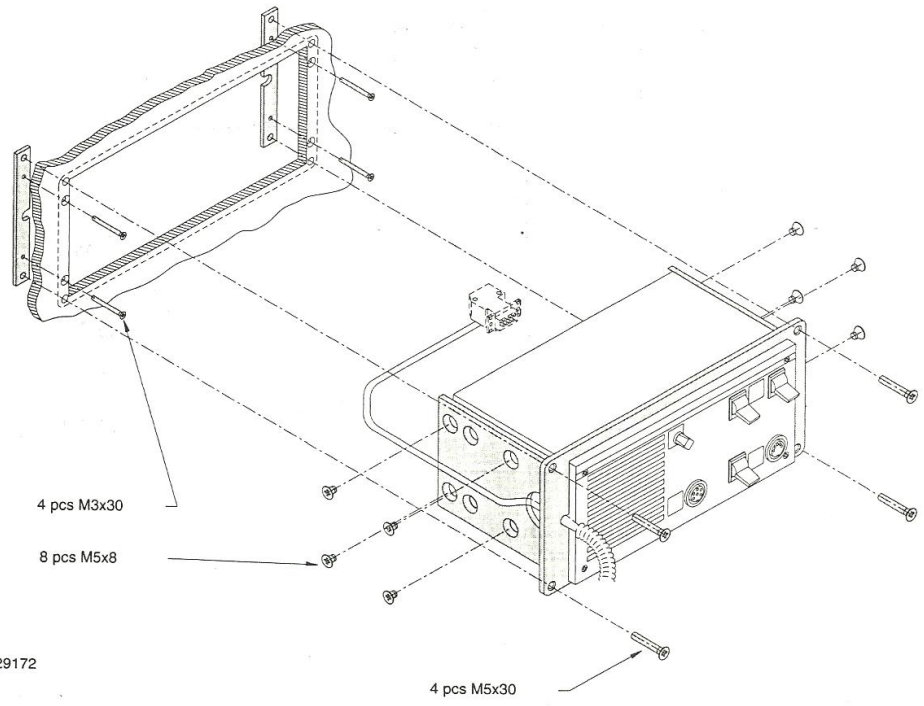






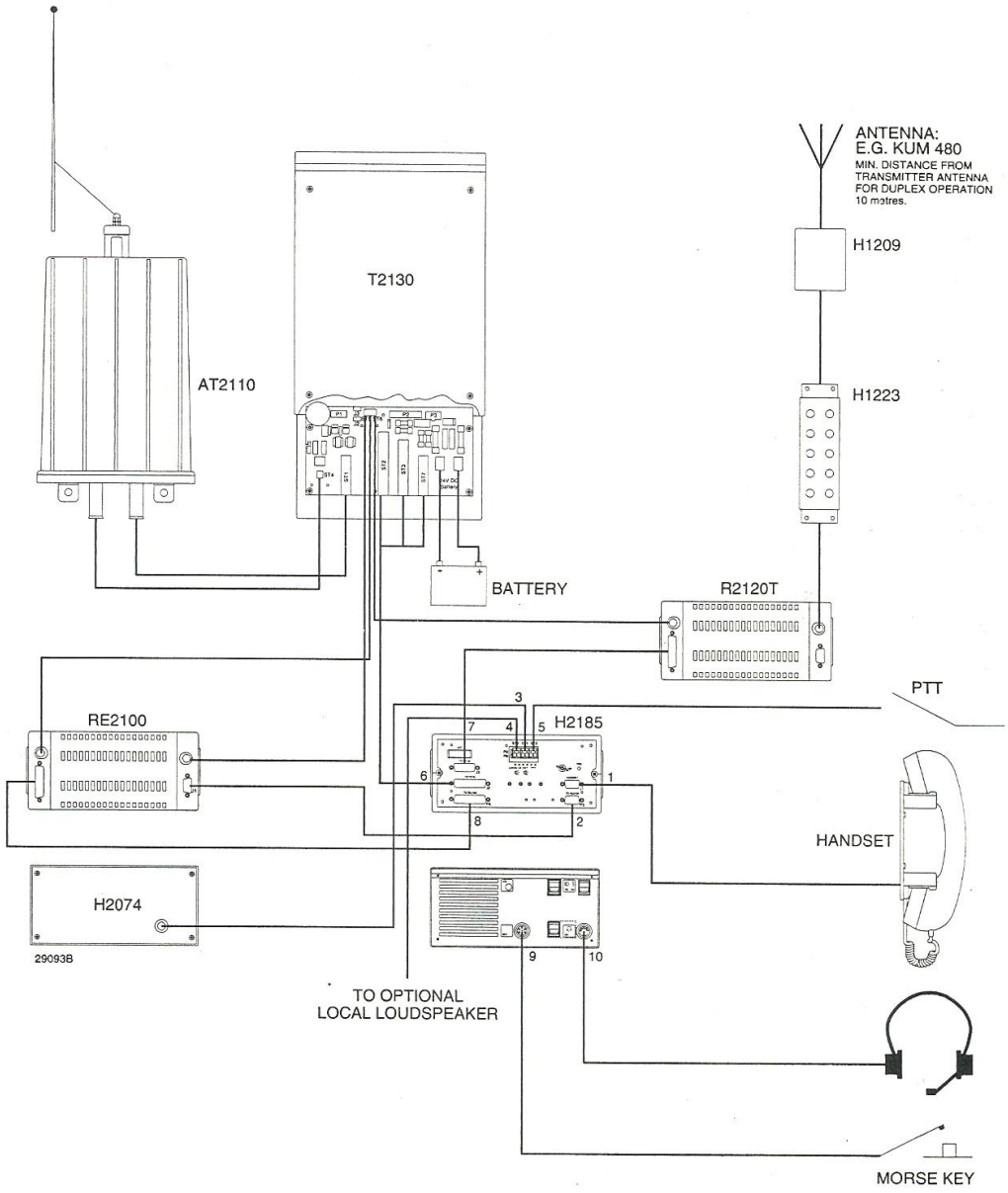
Weight:

Mounting kit H2063:	1.0 kg
CW Unit H2185:	2.2 kg



2.2 CABLE AND INTERFACING

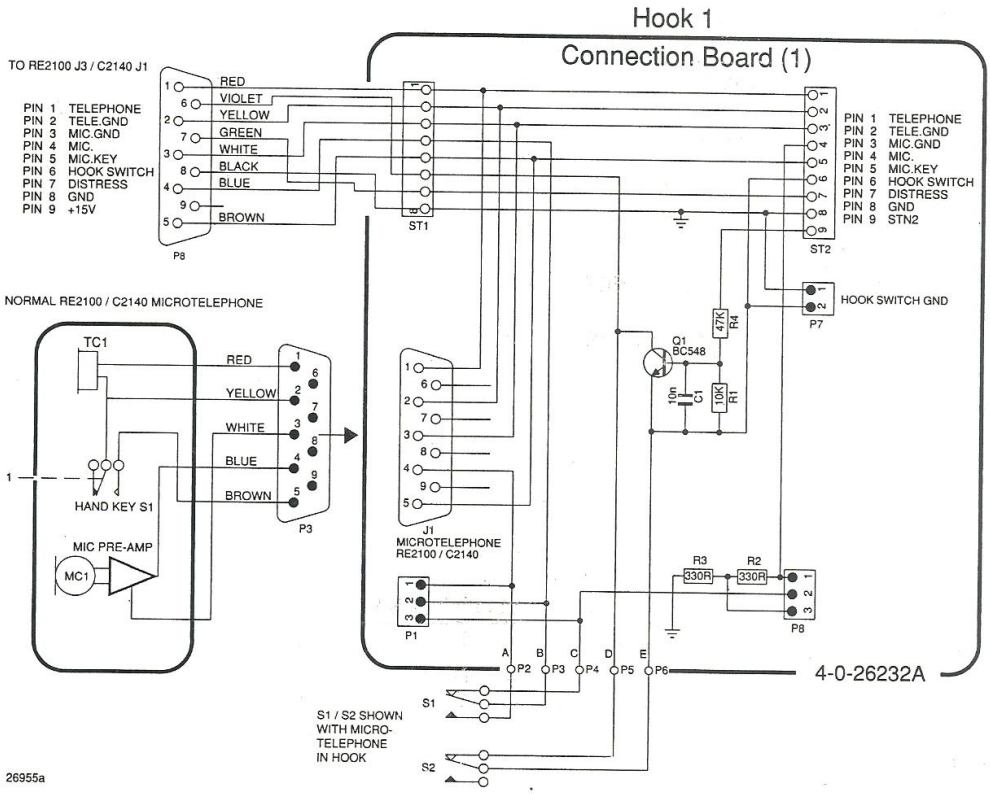
Connect the cables in accordance with the figure below and the tables on the following pages.

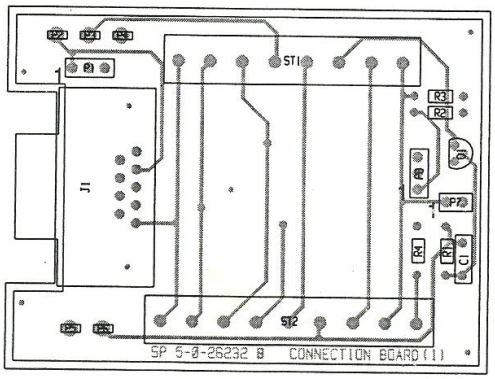


CABLE No 1.
H2185 TO MICROTELEPHONE HOOK S.P No. 726633
The microtelephone hook is supplied together with the RE2100.

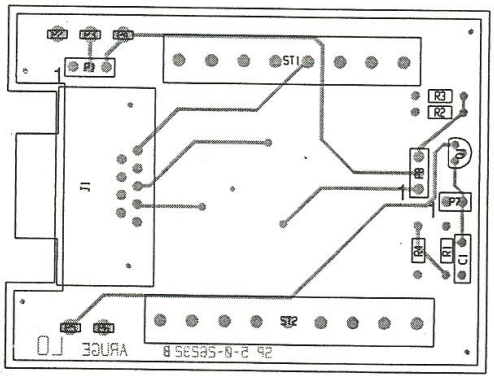
Normal installation RE2100 with one Hook Assembly 726233. The Hook Assembly is delievered with multicable mounted in Supply Terminal Block ST1, this multicable is connected to either RE2100 J3 or. Plug in the normal microtelephone in Hook Assembly 726233's J1 plug. Mount jumpers on P7 pin 1-2 and on P1 pin 1-2. Supply Terminal Block ST2 is not used.

Quick Installation Hints:
Strap settings with normal installation RE2100 / C2140:
Mount jumper on P7 pin 1-2.
Mount jumper on P1 pin 1-2.





View from component side with upper side tracks.



View from component side with lower side tracks.

5-0-26232B

CABLE No 2.
H2185 TO RE2100
Nine pole sub-D extension cable factory supplied S.P. No. 528708

CABLE No 3.
H2185 TO EXTERNAL LOUDSPEAKER
(Separate on/off switch)

H2185	SIGNAL
ST1	
1	EXT LS.
2	-VB (-BATT)

CABLE No 4.
H2185 TO LOCAL LOUDSPEAKER
(follows the on/off switch for the internal loudspeaker)

H2185	SIGNAL
ST2	
1	LS
2	-VB (-BATT)

CABLE No 5.
H2185 CONNECTIONS TO PTT FOOT PEDAL
PTT FOOT PEDAL eg. S.P.No. 62.502
When pin1 and pin 2 is connected the transmitter is on.

H2185	SIGNAL
ST3	
1	GND
2	MIC. KEY

CABLE No 6.
H2185 TO T2130,T2131 OR T2135
25 core multicable factory supplied together with the transmitter S.P. No. 164.191

H2185	T2130			T2130 T2135			COLOUR	SIGNAL
J2	ST2	ST3	ST7	ST6	ST7	ST8		
1	1			1			BLACK	RX MUTE
5							SHIELD	SHIELD
6	16			16			RED	SP-BUS INTERRUPT
7			9			9	PINK	+BATT/28V
8			8			8	YELLOW	-BATT/GND
10	14			14			BLUE	-18V
11	3			3			VIOLET	+9V
12	4			4			GREY	+18V
13	5			5			WHITE	SUPPLY ON/OFF
14	6			6			PINK/BROWN	MIC.KEY
15	2			2			YELLOW/BROWN	VF/AE CURRENT
17	9			9			BROWN/GREY	0dBm COMMON
18	12			12			WHITE/PINK	0dBm
19	11			11			WHITE/YELLOW	EXT.RF CONTROL
20	10			10			WHITE/GREEN	AUX AF TO TX
21	13			13			WHITE/BLUE	TX-KEY
22			10			10	WHITE/GREY	GND
24		5			8		GREY/PINK	TX-KEY
25	15			15			RED/BLUE	-BATT
	4	6						+18V TO TX-KEY+
				4	9			+18V TO TX-KEY+

CABLE No 7.
H2185 TO R2120T
Multicable with 15 pole sub-D to 25 pole sub-D connectors factory supplied together with H2185 S.P. No. 528977.

H2185	R2120/T	COLOUR	SIGNAL
J3	J1		
1	1	BLACK	RX MUTE
2	15	YELLOW/BROWN	VF/AE-CURRENT
3	19	WHITE/YELLOW	EXT. RF CONTROL
4	21	WHITE/YELLOW	TX-KEY
5	5	WHITE/BLUE	SHIELD
6			NC
7	17		0 dBm
8	18	BROWN/GREY	0 dBm
9		WHITE/PINK	NC
10	10		-18 VOLT
11	11	BLUE	+9 VOLT
12	12	VIOLET	+19 VOLT
13			NC
14	6	RED	DUPLEX MODE RE2100
15	22	WHITE/GREY	GND

CABLE No 8.
H2185 TO RE2100
25 pole sub-D extensions cable factory supplied S.P. No. 56.480.

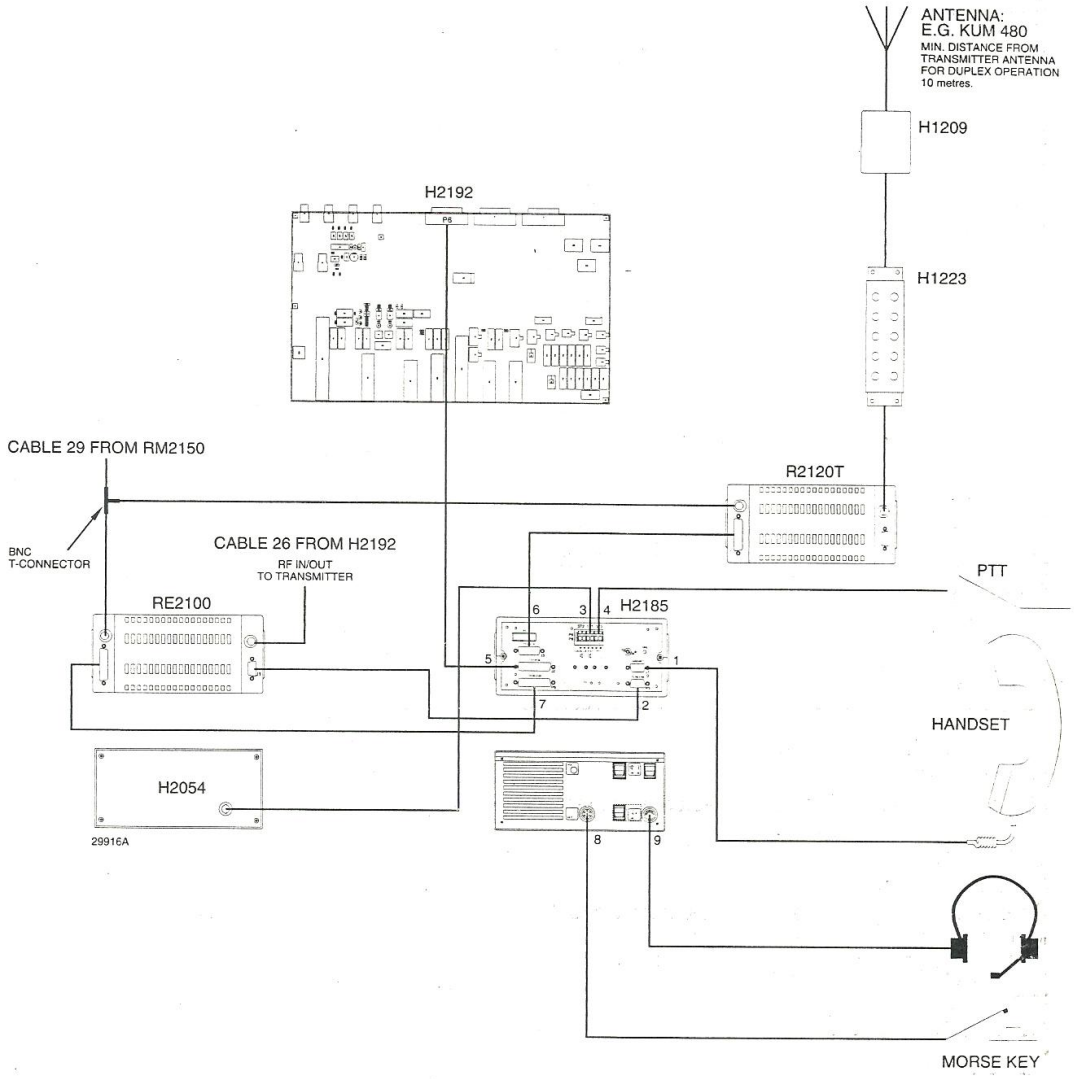
CABLE No 9.
H2185 TO MORSE KEY
Connector type: 6 pole DIN pluck factory supplied S.P. No. 78.302.
Morse key: S.P. No. 55.010.

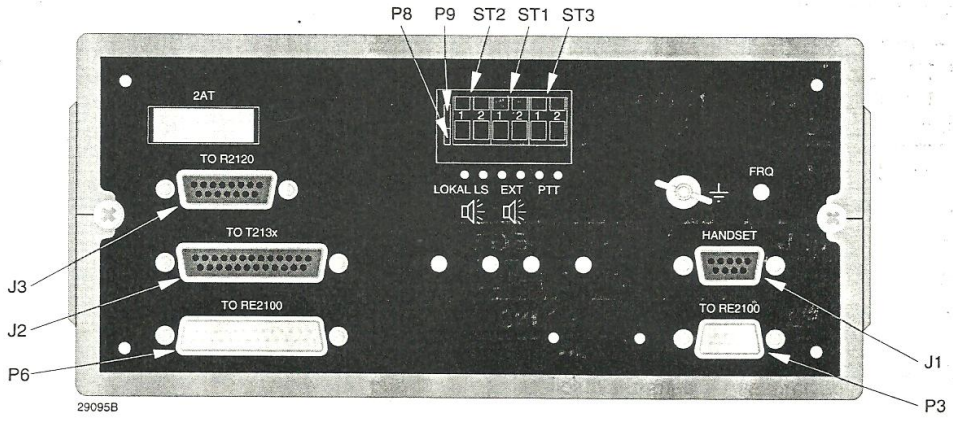
H2185	SIGNAL
J3	
1	KEY
2	+5V

CABLE No 10.
H2185 TO HEADSET
Connector type: 5 pole DIN pluck factory supplied S.P. No. 78.523.
Headset: S.P. No. 62.507.

H2185	CABLE	SIGNAL
J4		
1	SHIELD	HEADSET EARPIECE GROUND
4		HEADSET EARPIECE
3	SHIELD	MIC. GROUND
5		MIC.

CONNECTION DIAGRAM FOR H2185-H2192





CABLE No. 1
HANDSET

CABLE No. 2
H2185-RE2100
9 POLE MULTICABLE S.P. No. 528708
Pin 1 to pin 1, pin 2 to pin 2, ... , pin 9 to pin 9.

CABLE No. 3
H2185 EXTERNAL LOUDSPEAKER (OPTION)

H2185	EXTERNAL LS	COLOUR	SIGNAL
ST1			
1			LS
2			LS GROUND

CABLE No. 3
H2185 LOCAL LOUDSPEAKER (OPTION)

H2185	EXTERNAL LS	COLOUR	SIGNAL
ST2			
1			LS
2			LS GROUND

Remove jumber P8 to switch off the internal loudspeaker

CABLE No. 4
H2185-PTT, FOOT SWITCH (OPTION) S.P. No. 62.502

H2185	PTT	COLOUR	SIGNAL
ST3			
1			MIC. GND
2			MIC. KEY

CABLE No. 5.
H2185-T2131/35
25 POLE MULTICABLE S.F. No. 164.191

H2185	H2192	COLOUR	SIGNAL
J2	P6		
1	1	BLACK	RX MUTE
5			SHIELD
6	16	RED	SP-BUS INTERRUPT
7	ST8 PIN 9	PINK	28VOLT
8	ST8 PIN 8	YELLOW	GND
10	14	BLUE	-18V
11	3	VIOLET	+9V
12	4	GREY	+18V
13	5	WHITE	SUPPLY ON/OFF
14	6	PINK/BROWN	MIC.KEY
15	2	YELLOW/BROWN	VF/AE CURRENT
17	9	BROWN/GREY	0dBm COMMON
18	12	WHITE/PINK	0dBm
19	11	WHITE/YELLOW	EXT.RF CONTROL
20	10	WHITE/GREEN	AUX AF TO TX
21	13	WHITE/BLUE	TX-KEY
22	CHASSIS (GND)	WHITE/GREY - SCREEN	GND
24	ST7 PIN 8	GREY/PINK	TX-KEY -
25	15	RED/BLUE	GND

MAKE A CONNECTION BETWEEN ST6 PIN 4 AND ST7 PIN 9
ON THE CONNECTION BOARD IN THE T2131/35
PAGE 2-10

CABLE No. 6
H2185-R2120/T
15-25 POLE MULTICABLE S.P. No. 528977

H2185	R2120/T	COLOUR	SIGNAL
J3	J1		
1	1	BLACK	RX MUTE
2	15	YELLOW/BROWN	VF/AE-CURRENT
3	19	WHITE/YELLOW	EXT. RF CONTROL
4	21	WHITE/YELLOW	TX-KEY
5	5	WHITE/BLUE	SHIELD
6			NC
7	17		0 dBm
8	18	BROWN/GREY	0 dBm
9		WHITE/PINK	NC
10	10		-18 VOLT
11	11	BLUE	+9 VOLT
12	12	VIOLET	+19 VOLT
13			NC
14	6	RED	DUPLEX MODE RE2100
15	22	WHITE/GREY	GND

CABLE No. 7
H2185-RE2100
25 POLE MULTICABLE S.P. No. 56.480
Pin 1 to pin 1, pin 2 to pin 2, ... , pin 25 to pin 25.

CABLE No. 8
H2185-MORSE KEY
6 POLE DIN PLUG S.P. No. 78.302
MORSE KEY S.P. No. 55.010

H2185 J3	KEY PLUG	COLOUR	SIGNAL
1	1		KEY
4	4		+5 VOLT

CABLE No. 9
H2185-HEADSET
5 POLE DIN PLUG S.P. No. 78.523
HEADSET S.P. No. 62.507

H2185	HEADSET	COLOUR	SIGNAL
J4	PLUG		
1		SHIELD	HEADSET EARPIECE GROUND
4			HEADSET EARPIECE
3		SHIELD	MIC. GROUND
5			MIC.

2.3 INSTALLATION OF TELEGRAPHY IN CONJUNCTION WITH TELEX OR DSC

If telegraphy has to function in conjunction with the HF SSB DSC RM2150 or the HF SSB TELEX RM2151 an additional connection MUST be made in the transmitter.
The signal, HT- ON - from the DSC or TELEX equipment must be connected to +18V in order to mute the H2185 loudspeaker and headset earpiece.

T2130			
FROM	TO	COLOUR	SIGNAL
T2130, ST2 PIN 4	T2130, ST3 PIN 4		+ 18 VOLT
N2165, ST4 PIN 4	T2130, ST3 PIN 3	PINK	HT-ON -

T2131/T2135			
FROM	TO	COLOUR	SIGNAL
T2131/35, ST6 PIN 4	T2131/35, ST7 PIN 7		+ 18 VOLT
N2165, ST4 PIN 4	T2131/35, ST7 PIN 6	PINK	HT-ON -

2.4 INSTALLATION OF TELEGRAPHY IN EXISTING TRANSMITTER SYSTEMS

The HF SSB Compact 2000 System has been extended, during the period of time it has been on the market, to fullfil the latest national and international regulation for Maritime Radio Equipment. It is therefore possible that an existing installation can not support the Telegraphy Receiver R2120/T. Depending of the time the HF SSB Compact 2000 system has been in service some changes may be necessary, please refer to the section 2.4.1, 2.4.2 and 2.4.3.

Please note:
Version number for PCB is located on the component or the soldering side, ex. **5-0-25631H = version H.**
The software version is listed on top of the actual IC, ex. **SP No. 726103 C1083R D1E7 = version 1083R.**

2.4.1 RE2100 UPDATE

The update of the RE2100 depends of the software installed and the PCB versions. The schedule below shows the necessary modifications and the coresponding update kits.

<table>
<tr><td>Present version of RE2100</td><td colspan="5">Necessary changes of RE2100</td><td colspan="2">Ordering information</td></tr>
<tr><td>SOFTWARE</td><td>RECEIVER MODULE SP.625631</td><td>EXCITER MODULE SP.625634</td><td>PROCESSOR MODULE SP.625635</td><td>SOFTWARE EPROM U06-5</td><td>KIT DESCRIP-TION</td><td>S.P. RADIO PART NUMBER</td></tr>
<tr><td>1084-1084D</td><td rowspan="4">Change to version H or higher</td><td rowspan="5">Change to version E or higher</td><td rowspan="4">Change to version H or higher</td><td rowspan="5">Change software to 1086S or higher</td><td rowspan="4">Remote control update kit "1A" and "2A" for RE2100</td><td rowspan="4">726655 and 726656</td></tr>
<tr><td>1085-1085F</td></tr>
<tr><td>1086-1086D</td></tr>
<tr><td>1086E-1086F</td></tr>
<tr><td>1086H-1086R</td><td rowspan="2">No change</td><td rowspan="2">No change</td><td>Remote control update kit "2A" for RE2100</td><td>726656</td></tr>
<tr><td>1086S</td><td>No change</td><td>No change</td><td>No change</td><td></td></tr>
</table>

NOTE ! Jumper P2 on the excitermodule must be in.

2.4.2 T2130 UPDATE

The update of the T2130 depends of the software installed and the PCB versions. The schedule below shows the necessary modifications and the coresponding update kits.

Present version of T2130		Necessary changes of T2130		Ordering information	
SOFTWARE EPROM U01-3	CONNECTION BOARD SP.625646	CONNECTION BOARD SP.625646	SOFTWARE EPROM U01-3	KIT DESCRIP-TION	S.P. RADIO PART NUMBER
1083-1083E	Versions A,B,C,D,E & F	Change to version G or higher	Change to version P or higher	Remote control update KIT "1A" for T2130	726665
1083G-1083O	Versions G or higher	No change		EPROM U01-3 with software 1083P or higher	726103

If the connection board 625646 contains 4 terminal blocks with the writing ST1, ST2, ST3 and ST7, it is version G, and therefore it is only the software at the processor module which must be changed.

2.4.3 T2131/35 UPDATE

The update of T2131/35 depends of the software installed and PCB versions. The schedule below shows the necessary modifications and the coresponding update kits.

Present version of T2131/35		Necessary changes in T2131/35			Ordering information	
SOFTWARE EPROM U01-3	CONNECTION BOARD	CONNECTION BOARD IN T2131 SP. 626413	CONNECTION BOARD IN T2135 SP. 626414	SOFTWARE EPROM U01-3	KIT DESCRIP-TION	S.P. RADIO PART NUMBER
1096-1096H	Versions A,B,C,D,E,F,G	Change to version H or higher	Change to version H or higher	Change to version 1096I or higher	CONNECTION BOARD EPROM U01-3 with software 1096I or higher	T2131 SP.626413 T2135 SP. 626414
1096I	Versions H or higher	No change	No change		No change	727203

NOTE ! If the Software version is below F, Service information no. 150 must be carried out.

2.4.4 C2140 UPDATE

C2140 must have a software version C1090D or higher S.P. No. 726545.

2.5 SP-BUS ADDRESS PROGRAMMING

In order to use the SAILOR HF SSB Program 2000 for telegraphy, it is very important that the software in all units is up to date and correctly programmed.

UNIT	VERSION or HIGHER	SOFTWARE SWITCH
RE2100	C1086S	SP-07-4 = 3 SP-06-4 SP-17-2
C2140	C1090D	SP-17-2

To change the service programme SP-17-x in the RE2100, move the strap P03 on Processor module (5) RE2100 to the lower position.

2.6 JUMPER SETTINGS

The jumpers P4 and P5 must be OUT.
These jumpers are only used in special installations where more than one handset is connceted to the same RE2100/H2185 or where a scrambler is to be connected.

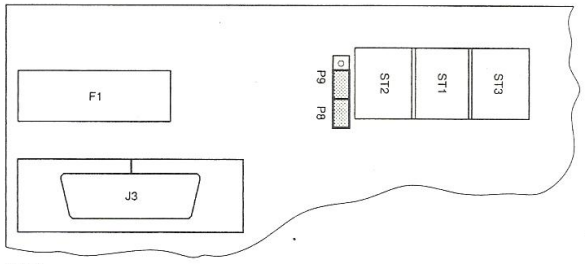
P8 H2185 internal loudspeaker.

The jumper P8 controls the built-in loudspeaker. If jumper P8 is IN, the internal loudspeaker is enabled. If jumper P8 is OUT, the internal loudspeaker is disabled.

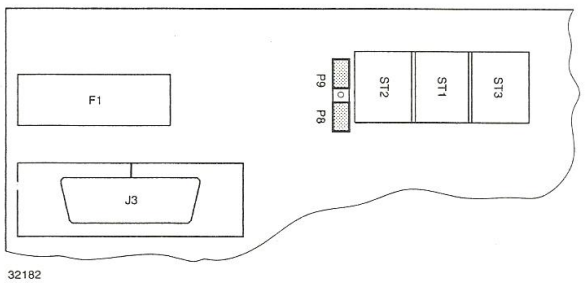
P9 T2130 or T2131/35 supply selection.

This jumper must be set in the correct position in order to switch on the H2185 and in order to ensure that the battery is isolated from ground in a T2131/35 installation.

In an installation with a T2130 transmitter, jumper P9 must be set between the centre pin and the lower pin, as shown below.



In an installation with a T2131, T2135 or H2192, jumper P9 must be set between the centre pin and the upper pin, as shown below.



CONTENTS

3 SERVICE

3.1 PREVENTIVE MAINTENANCE

Your radio is the result of a forward-looking construction work utilizing the most recent technology and manufactured from the best materials. The radio fulfils all requirements, which may reasonably be made for a modern radio, and we are convinced that it will turn out to be useful and satisfactory to you.

However, no radio is so perfect, that it does not need tending and check-up in order to be sure that everything works satisfactorily. We recommend a check every 12 month, or according to the maintenance agreement for this unit.

3.2 ALIGNMENT INSTRUCTIONS

The measuring values indicated in chapter 5. CIRCUIT DESCRIPTION AND SCHEMATIC DIAGRAMS are typical values and as indicated, it will be necessary to use instruments in absolute conformity with the below list:

3.3 NECESSARY TEST EQUIPMENT

Multimeter:

Sensitivity DC (f.s.d)	5V
Sensitivity AC (f.s.d)	100mV
Frequency range	50-1000Hz
Input impedance AC/DC	> 1M ohm
Accuracy AC/DC (f.s.d)	+/- 2%
E.g. Philips type	PM2505

Oscilloscope:

Band width	DC - 100kHz
Sensitivity	20mV/DIV
Input impedance:	1MOhm/30pF
Eg. Philips type	PM3208

Power Supply:

Vout	15-32 Volt
Iout	1ADC
Eg. B&O type	SN 17
P.S Load	180 ohm/2W, 30ohm/3W, 60ohm/6W

3.4 TROUBLE SHOOTING

Trouble shooting should only be performed by persons with sufficient technical knowledge, who have the necessary measuring instruments at their disposal, and who have carefully studied the operation principles and structure of the H2185.

LOCATING THE FAULTY CIRCUIT

When the faulty module has been found, it can be difficult to find the faulty component.
One way is to change the module. If this is not possible, the faulty component can be found in a more systematic way by using chapter 3.5 PERFORMANCE CHECK.

3.5 PERFORMANCE CHECK

GENERAL
A performance check is intended as a check after repair.
A performance check can be used to check, that the equipment fulfils its technical specifications.

The performance check MUST be made in the correct order, and ALL checks must be made.

3.5.1 POWER SUPPLY

1. Connect +24 volt to J2 pin 7
2. Connect 0 volt to J2 pin 8
3. Connect a 180 ohms 2 Watt resistor from J3 pin 10 to GND
4. Connect a 30 ohms 3 Watt resistor from J3 pin 11 to GND
5. Connect a 60 ohms 6 Watt resistor from J3 pin 12 to GND
6. Switch on the internal power supply, make a connection between J2 pin 25 and J2 pin 13

   Check with a voltmeter the following voltages:
   -18V ±0.5V at J3 pin 10
   +9V ±0.5V at J3 pin 11
   +18V ±0.5V at J3 pin 12
   +5V ±0.3V at U2 Vout on module (1)
   -5V ±0.3V at U7 Vout on module (1)

   Repeat the above checks with input voltages of 20 and 32 Volt

3.5.2 SIDE-TONE OSCILLATOR

1. Connect an oscilloscope to C6 on module (1) and (GND)
2. Adjust VOL to mid position
3. Turn R1 fully clockwise
   Check that the frequency is approx. 400 Hz
4. Turn R3 fully counter clockwise
   Check that the frequency is approx. 800 Hz
5. Adjust R3 to approx. 600 Hz.
6. Disconnect the oscilloscope.
7. Connect a multimeter (VAC) to C6 on module (1) and (GND).
8. Turn VOL fully clockwise
   Check that the maximum output level is 30 mV ±3 mV
9. Adjust VOL to 10 mVpp ±1 mV

3.5.3 AF AMPLIFIER

1. Connect an multimeter (VAC) to R16 on module (1) and (-VB).
2. Make a connection between P1 pin 4 and P1 pin 5 on module (1).
3. Switch internal loudspeaker on (P8).
   Check that the side-tone signal is heard in the loudspeaker.
   Check that the level is 330mV ± 50mV.

3.5.4 POWER UP CIRCUIT

1. Switch the 24 volt power supply OFF for approx 15 secs.
2. Switch the 24 colt power supply ON.
   Check that the side-tone signal is heard in the loudspeaker after approx. 1 sec.

3.5.5 MUTE CIRCUIT

1. Make a connection between J2 pin 14 and pin 22 (GND).
2. Connect an oscilloscope to R17 on module (1) and (-V8).
   Check that the side-tone signal is NOT heard in the loudspeaker.
   Check with an oscilloscope that the side-tone signal is 1 Vpp approx.
3. Make a connection between J2 pin 21 and pin 22 GND.
   Check that the side-tone signal is NOT heard in the loudspeaker.
   Check with an oscilloscope that the side-tone is 0 Vpp.

3.5.6 MIC.PRE.AMPLIFIER

1. Connect +15 volt through a 560 ohms resistor to P3 pin 4 (MIC)
2. Connect 0 volt to P3 pin 3 (SIGNAL GND)
3. Connect a frequent generator (1000 Hz 50 mV pp) between HEADSET pin 3 and pin 5
4. Connect an oscilloscope from MIC to SIGNAL GND in P2 pin 3 and pin 4
   Check that the level is 1.0 Vpp ±0,1V

3.6 ADJUSTMENT PROCEDURE

Please see chapter 3.7 NECESSARY ADJUSTMENT AFTER REPAIR.

3.7 NECESSARY ADJUSTMENT AFTER REPAIR

The frequency of the side-tone oscillator can be adjusted according to personal taste, from 400 Hz to 800 Hz. This can be done through a hole in the rear side of the H2185.

1. Switch loudspeaker on.

2. Activate the KEY.

3. Adjust R1 module (1) for the desired side-tone frequency.

3.8 FUNCTION CHECK

The function check is a simple test to ensure that the H2185 is working properly after installation.

The function check must always be carried out after installation or repair of the H2185.

Chapter 3.8.1 describes a SIMPLEX installation with H2185, RE2100 and T213x.

Chapter 3.8.2 describes a DUPLEX installation with H2185, RE2100, R2120 and T213x.

Chapter 3.8.3 describes a DUPLEX and TELEGRAPHY installation with H2185, RE2100, R2120/T,and T213X.

3.8.1 SIMPLEX

1. Turn on the RE2100 VOL-OFF.
2. Switch on the H2185 loudspeaker and check that noise is heard in the loudspeaker.
3. Check that noise is heard in the headset earpiece.
4. Switch off the H2185 HEADSET.
5. Key in CH 401 (RE2100).
6. Remove the handset from its holder and check that noise is heard in the handset earpiece.
7. Check that the noise level can be adjusted by using the RE2100 (RF).
8. Press the MIC.KEY and hold it.
9. Check that no noise is heard in the handset earpiece.
10. Whistle in the microphone and check that the SIGNAL/AE-CURRENT varies in the RE2100 display.
11. Release the MIC.KEY.
15. Switch on the H2185 HEADSET.
16. Check that noise is heard in the headset earpiece.
17. Check that the noise level can be adjusted from the RE2100 (VOL).
18. Activate the PTT foot switch.
19. Whistle in the headset michrophone and check that the SIGNAL/AE-CURRENT varies in the RE2100 display.
20. Release the PTT.

3.8.2 DUPLEX

1. Turn on the RE2100 VOL-OFF switch.
2. Press the RE2100 keyboard buttons 0 and 1 simultaneously.
3. Select the test programme SP-07-4.
4. Check that the RE2100 reads out 3-1 in the TX display.
5. Press the RE2100 keyboard buttons TX and TUNE.
6. Switch on the H2185 loudspeaker and check that noise is heard in the loudspeaker.
7. Check that noise is heard in the headset earpiece.
8. Switch off the H2185 HEADSET.
9. Key in CH 401 (RE2100).
10. Remove the handset from its holder and press the MIC.KEY and hold it.
11. Check that noise is heard in the handset earpiece.
12. Check that the level can be adjusted from RE2100 (RF)
13. Whistle in the microphone and check that the SIGNAL/AE-CURRENT varies in the RE2100 display.
14. Release MIC.KEY.
15. Switch on the H2185 HEADSET.
16. Activate the PTT foot switch.
17. Check that noise is heard in the headset earpiece.
18. Check that the level can be adjusted from the RE2100 (VOL).
19. Whistle in the headset microphone and check that the SIGNAL/AE-CURRENT varies in the RE2100 display.
20. Release the PTT.

3.8.3 DUPLEX and TELEGRAPHY

1. Turn on the RE2100 VOL-OFF switch.
2. Press the RE2100 keyboard buttons 0 and 1 simultaneously.
3. Select the test programme SP-07-4.
4. Check that RE2100 reads out 3-1 in the TX display.
5. Select the test programme SP-17.
6. Check that RE2100 reads out SP-17-2 in the RX display.
7. Press the RE2100 keyboard buttons TX and TUNE.
8. Switch on the H2185 loudspeaker and check that noise is heard in the loudspeaker.
9. Switch on the H2185 HEADSET and check that noise is heard in the headset earpiece.
10. Switch off HEADSET.
11. Key in CH 401 (RE2100).
12. Remove the handset from its holder and press the MIC.KEY and hold it.
13. Check that noise is heard in the handset earpiece.
14. Check that the noise level can be adjusted from RE2100 (RF).
15. Whistle in the microphone and check that the SIGNAL/AE-CURRENT varies in the RE2100 display.
16. Release MIC.KEY.
17. Switch on the H2185 HEADSET.
18. Activate the PTT foot switch.
19. Check that noise is heard in the headset earpiece.
20. Check that the level can be adjusted from the RE2100 (VOL).
21. Whistle in the headset microphone and check that the SIGNAL/AE-CURRENT varies in the RE2100 display.
22. Release the PTT foot switch.
23. Select the CW mode on RE2100 (Please look up the R2120/T manual).
24. Check that noise is heard in the H2185 loudspeaker.
25. Activate the MORSE KEY.
26. Check that the side-tone is heard in the H2185 loudspeaker every time the MORSE KEY activated.
27. Check that the SIGNAL/AE-CURRENT in the RE2100 display follows the MORSE KEY.
28. Check that the side-tone level can be adjusted.

CONTENTS

5 CIRCUIT DESCRIPTION AND SCHEMATIC DIAGRAMS

5.1 INTERFACE AND AF AMPLIFIER MODULE 1

+5 VOLT INTERNAL SUPPLY
The 78L05 U2 makes the internal +5 volt.

-5 VOLT INTERNAL SUPPLY
The 79L05 U7 makes the internal -5 volt.

SIDE-TONE OSCILLATOR
The side-tone oscillator is an integrated circuit LM555 U1. The frequency can be adjusted in the range from 400Hz to 800 Hz. The preset resistor R1 can be adjusted through a hole in the rear side of the cabinet. The level is controlled from the front panel.
A low pass filter, consisting of R4,C5,R5 and C6, suppresses frequencies above 160 Hz.

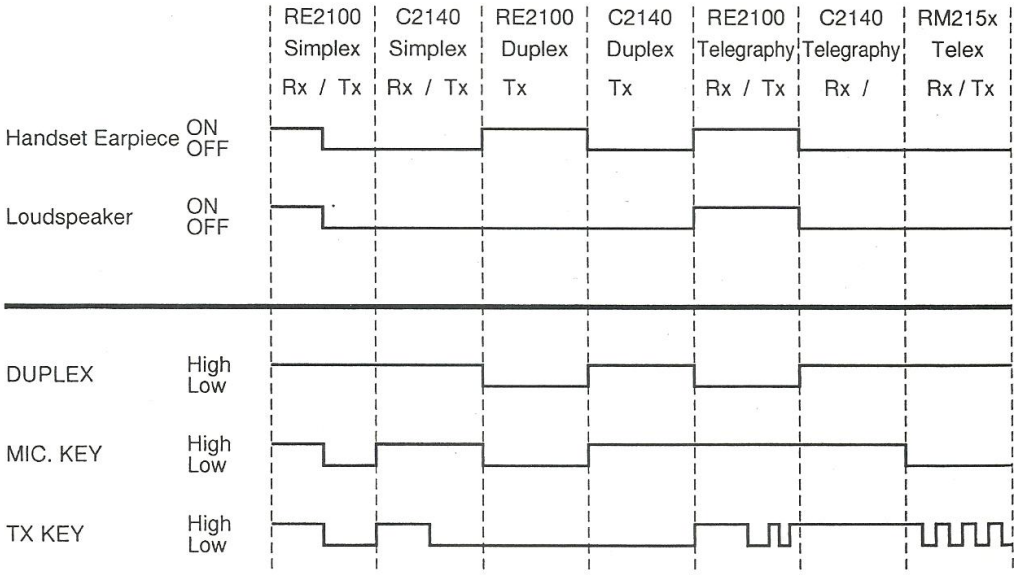
MORSE KEY
When the KEY is activated the analogue multiplexer MC14053 connects the side-tone oscillator and the AF-amplifier.
The collector of Q1 goes low, and switches on an the A1A signal in the transmitter.

AF AMPLIFIER
The audio amplifier is an integrated circuit TDA2030 U3 supplied from the +BATT or +28 supply. The transformer TR1 at the input of the amplifier insulates the battery from ground.

MUTE CIRCUIT
In order to activate the handset earpiece and the loudspeaker at the correct time, 4 signals are necessary.

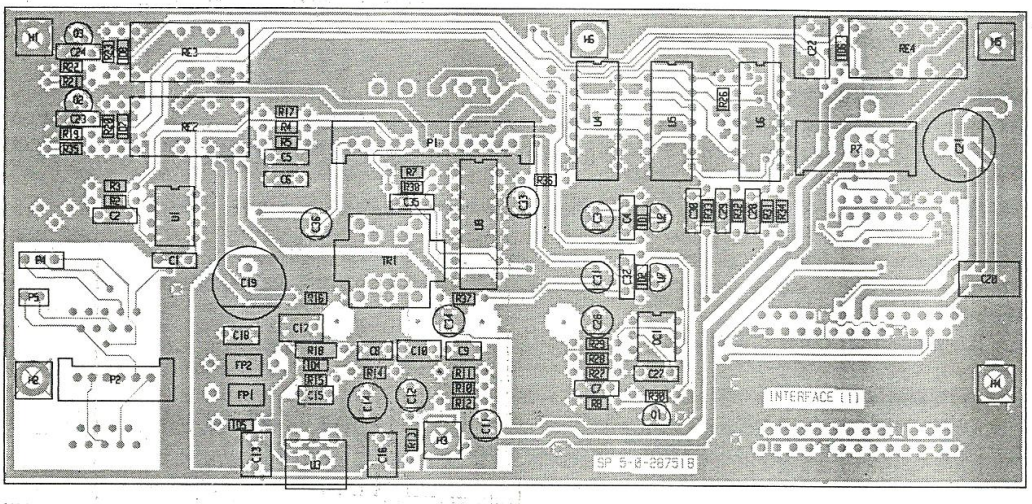
R28 and C26 ensure that the AF output signal has a delay of approx. 1 sec. after power up.

The 3 signals, DUPLEX MODE RE2100, TX-KEY and MIC.KEY, ensure that the headset earpiece and the loudspeaker just are active when necessary. Please see below.

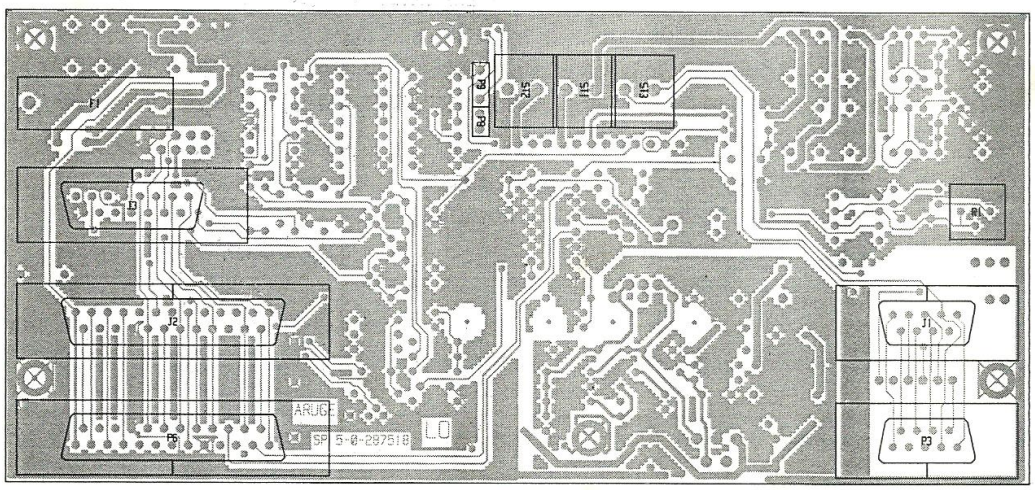


29094

COMPONENT LOCATION INTERFACE AND AF AMPLIFIER MODULE 1

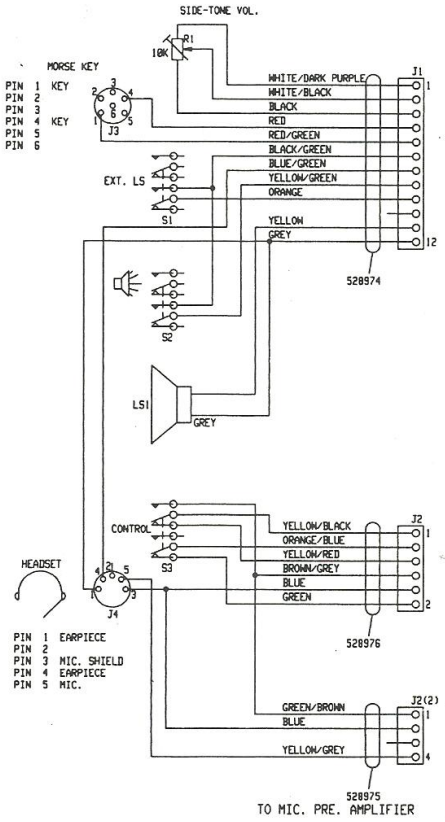


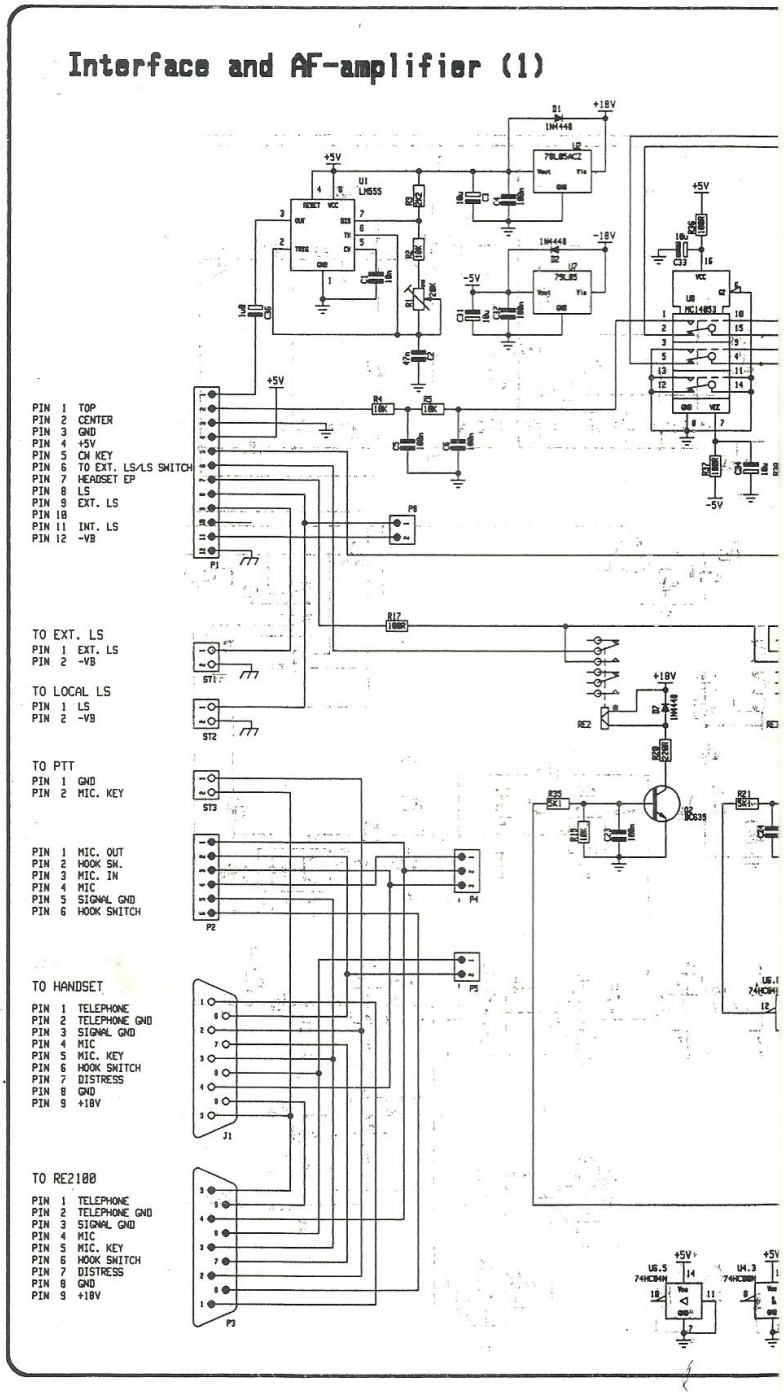
View from component side with upper side tracks.



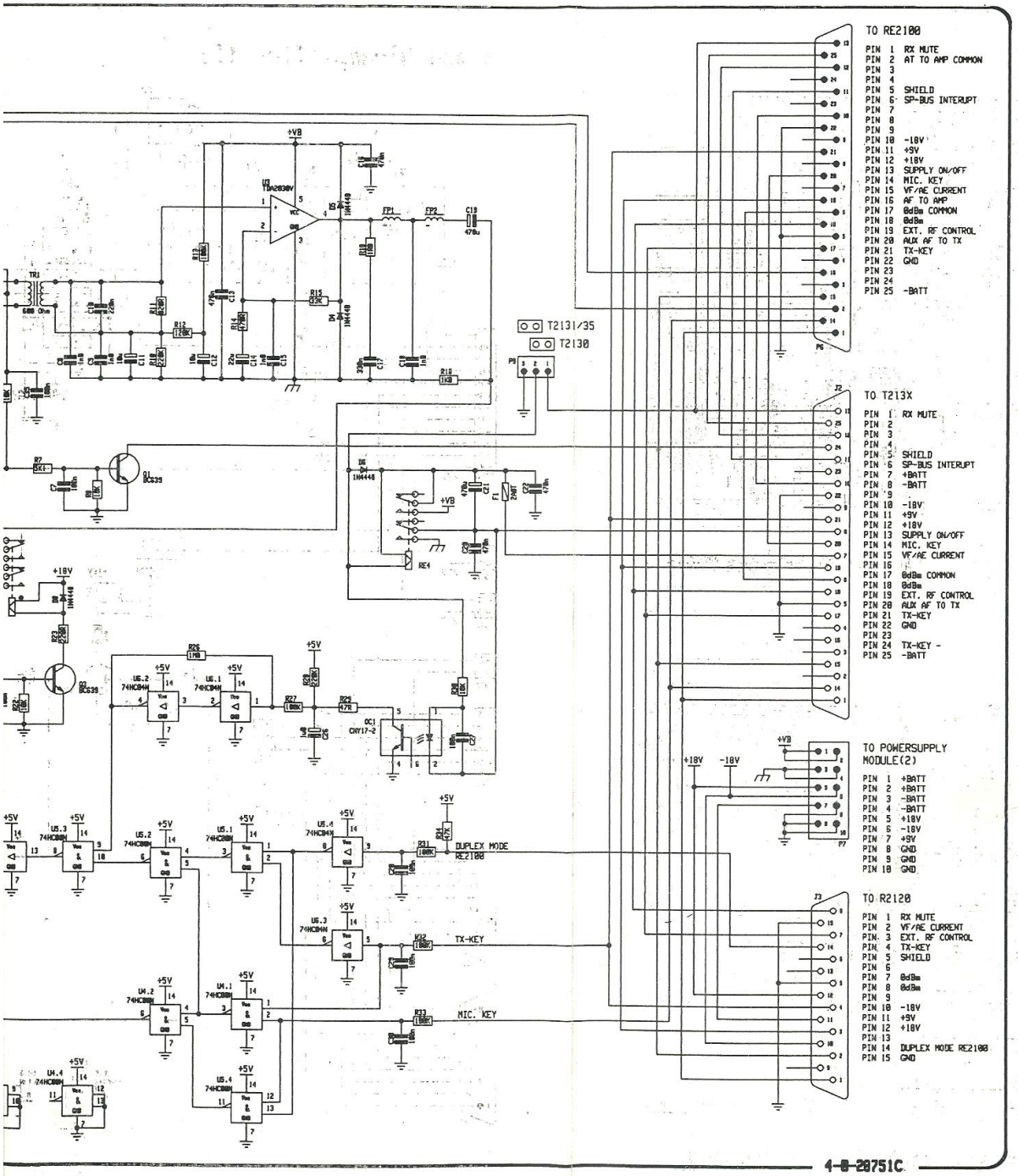
View from soldering side with lower side tracks.
PCB rev. 28751B

INTERFACE AND AF AMPLIFIER MODULE 1





This diagram is valid for PCB rev. 28751C


TO RE2100
PIN 1 RX MUTE
PIN 2 AT TO AMP COMMON
PIN 3
PIN 4
PIN 5 SHIELD
PIN 6 SP-BUS INTERUPT
PIN 7
PIN 8
PIN 9
PIN 10 -18V
PIN 11 +5V
PIN 12 +18V
PIN 13 SUPPLY ON/OFF
PIN 14 MIC. KEY
PIN 15 VF/AE CURRENT
PIN 16 AF TO AMP
PIN 17 0dBm COMMON
PIN 18 0dBm
PIN 19 EXT. RF CONTROL
PIN 20 AUX AF TO TX
PIN 21 TX-KEY
PIN 22 GND
PIN 23
PIN 24
PIN 25 -BATT
T2131/35
T2130
TO T213X
PIN 1 RX MUTE
PIN 2
PIN 3
PIN 4
PIN 5 SHIELD
PIN 6 SP-BUS INTERUPT
PIN 7 +BATT
PIN 8 -BATT
PIN 9
PIN 10 -18V
PIN 11 +5V
PIN 12 +18V
PIN 13 SUPPLY ON/OFF
PIN 14 MIC. KEY
PIN 15 VF/AE CURRENT
PIN 16
PIN 17 0dBm COMMON
PIN 18 0dBm
PIN 19 EXT. RF CONTROL
PIN 20 AUX AF TO TX
PIN 21 TX-KEY
PIN 22 GND
PIN 23
PIN 24 TX-KEY -
PIN 25 -BATT
TO POWERSUPPLY MODULE(2)
PIN 1 +BATT
PIN 2 +BATT
PIN 3 -BATT
PIN 4 -BATT
PIN 5 +18V
PIN 6 -18V
PIN 7 +5V
PIN 8 GND
PIN 9 GND
PIN 10 GND
TO R2120
PIN 1 RX MUTE
PIN 2 VF/AE CURRENT
PIN 3 EXT. RF CONTROL
PIN 4 TX-KEY
PIN 5 SHIELD
PIN 6
PIN 7 0dBm
PIN 8 0dBm
PIN 9
PIN 10 -18V
PIN 11 +5V
PIN 12 +18V
PIN 13
PIN 14 DUPLEX MODE RE2100
PIN 15 GND
DUPLEX MODE RE2100
TX-KEY
MIC. KEY
4-8-28751C

5.2 POWER SUPPLY AND MIC.PRE.AMPLIFIER MODULE 2

POWER SUPPLY

The power supply circuit can be divided into two separate circuits, a regulated step-up converter and a push-pull converter. The step-up converter converts the input supply voltage to a fixed level of approx. 43V DC. This voltage is then transformed to the 3 different output voltages by the push-pull converter.

STEP-UP CONVERTER

The input current flows through the input filter C1, C2, C4, L1, C5 and C6 to a step-up converter.
Inside the integrated circuit U1 are situated an oscillator, a reference voltage, a voltage error amplifier and an output transistor with a current sense resistor in the emitter.
The purpose of the cascade coupling formed by Q2 and the output transistor of U1, is only to increase the sustaining voltage of the output transistor. In the following description called the output transistor.
R4 prevents high frequency oscillations during the turning ON and OFF of Q2.
At the start of each switch period, the output transistor is turned ON, the current rises in L2, and D7 stops conducting. When the current reaches a fixed value, the output transistor is turned OFF. The inductor forces D7 to conduct and charges C9, C10 and C11. Controle of the 43V voltage DC on C9, C10 and C11 is obtained by using the feed back via R5 - R6. This gives a pulse width modulation.
The voltage error amplifier senses the voltage via R5 and R6. The RC-combination C8 and R3 is a frequency compensation of the error amplifier.
The supply voltage to U1 is supplied by Q1, R1 and D2.

UNDERVOLTAGE LOCK-OUT

If the input voltage is less than 9.2V, the low voltage at pin 1 of U1 inhibits U1. When the voltage increases, D3 starts conducting and U1 starts functioning. When working, the output voltage on C9, C10 and C11 is approx. 43V, even though the input voltage is 10.2V. The circuit continues to supply the output voltage until the internal current limiter in U1 starts. D6 charges C9, C10 and C11 to the input voltage to avoid saturation of L2 during start-up.

PUSH-PULL CONVERTER

The switch signal of the step-up converter is sensed by Q3 and fed to U2.1 by R8. This D-flip/flop is connected as a Schmitt-trigger by R7, R8 and R9. The hysteresis is approx. 1.2V in order to avoid noise sensitivity. The output from U2.1 is fed to U2.2. This D-flip/flop creates two signals with an exact 50% duty cycle and with a 180 degrees phase displacement.
These two signals are used to drive the push-pull transistors Q5 and Q6. The diode resistor combination R12, D10, R13 and D11, gives a slow turn ON and a fast turn OFF to avoid an overlap in conduction. D15 and D16 protect the sensitive gates against spikes.
D13 senses the input voltage through R14 and R15. If the input voltage is higher than approx. 43V, D13 starts conducting and shunts the drive signals for the push-pull converter.
The supply voltage to U2 is generated by Q4. Q4 starts to conduct when the collector voltage is higher than approx. 30V. This is done to delay the start of the push-pull transistors, until the switch frequency is stabilized.

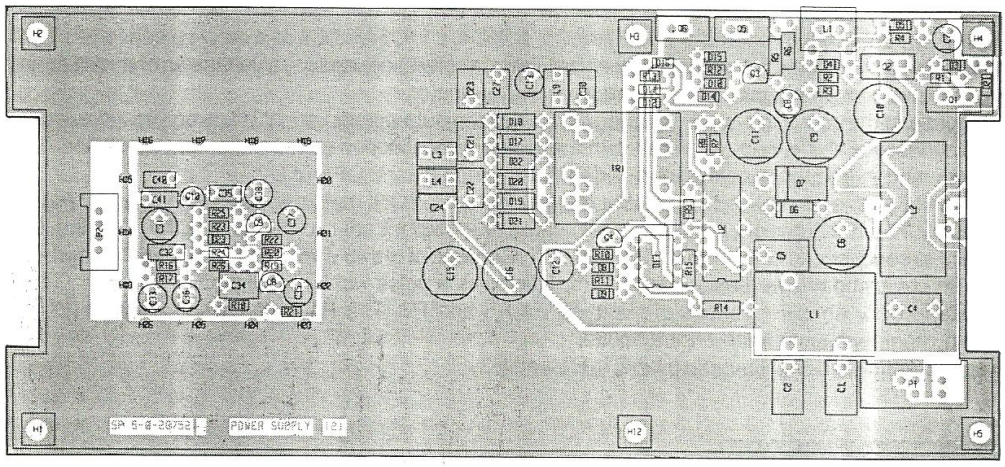
OUTPUT CIRCUIT

The outputs of the switch transformer TR1 are rectified and filtered. The resulting DC voltages are fed to the output plug P1.

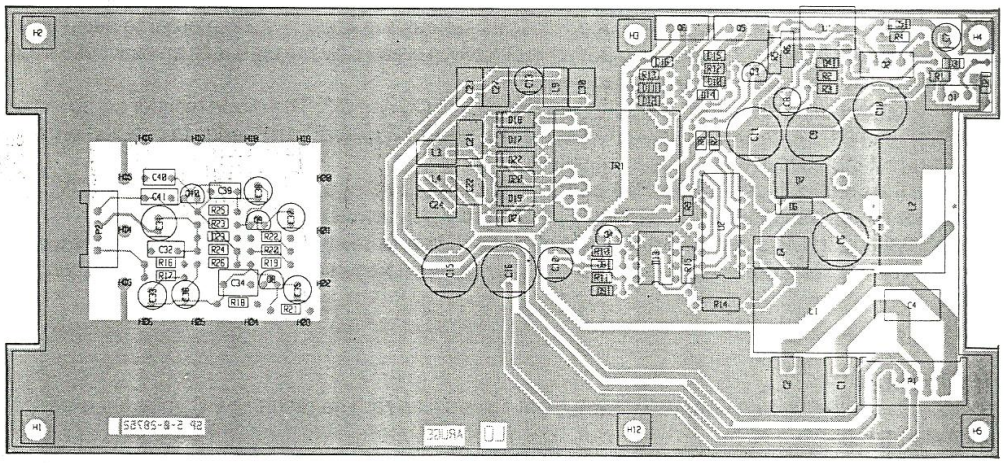
MIC.PRE.AMPLIFIER

The mic.pre.amplifier is supplied from RE2100.
The signal is amplified from approx. 50mV pp to approx. 1V pp.

COMPONENT LOCATION POWER SUPPLY AND MIC.PRE.AMPLIFIER MODULE 2

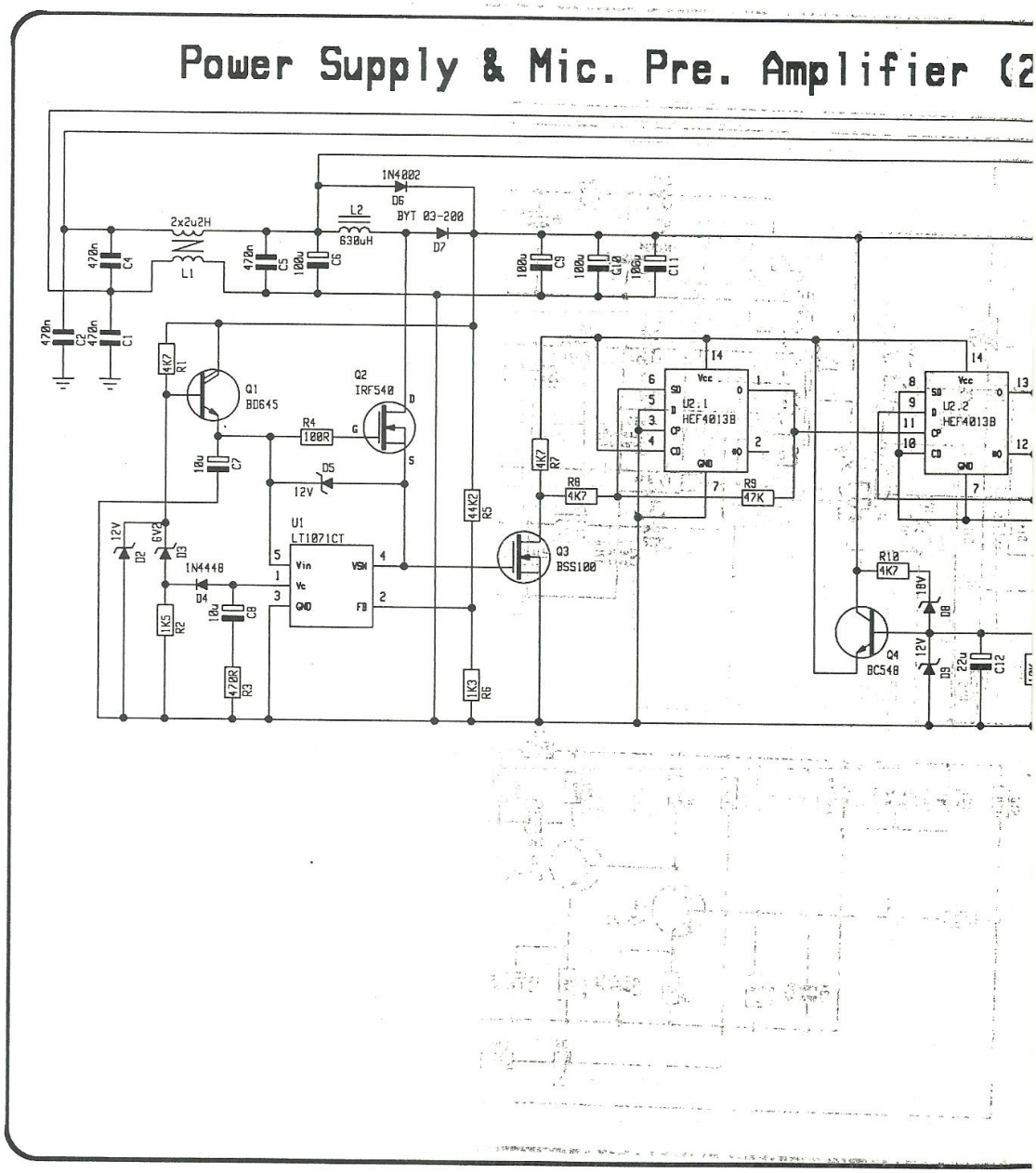


View from component side with upper side tracks.

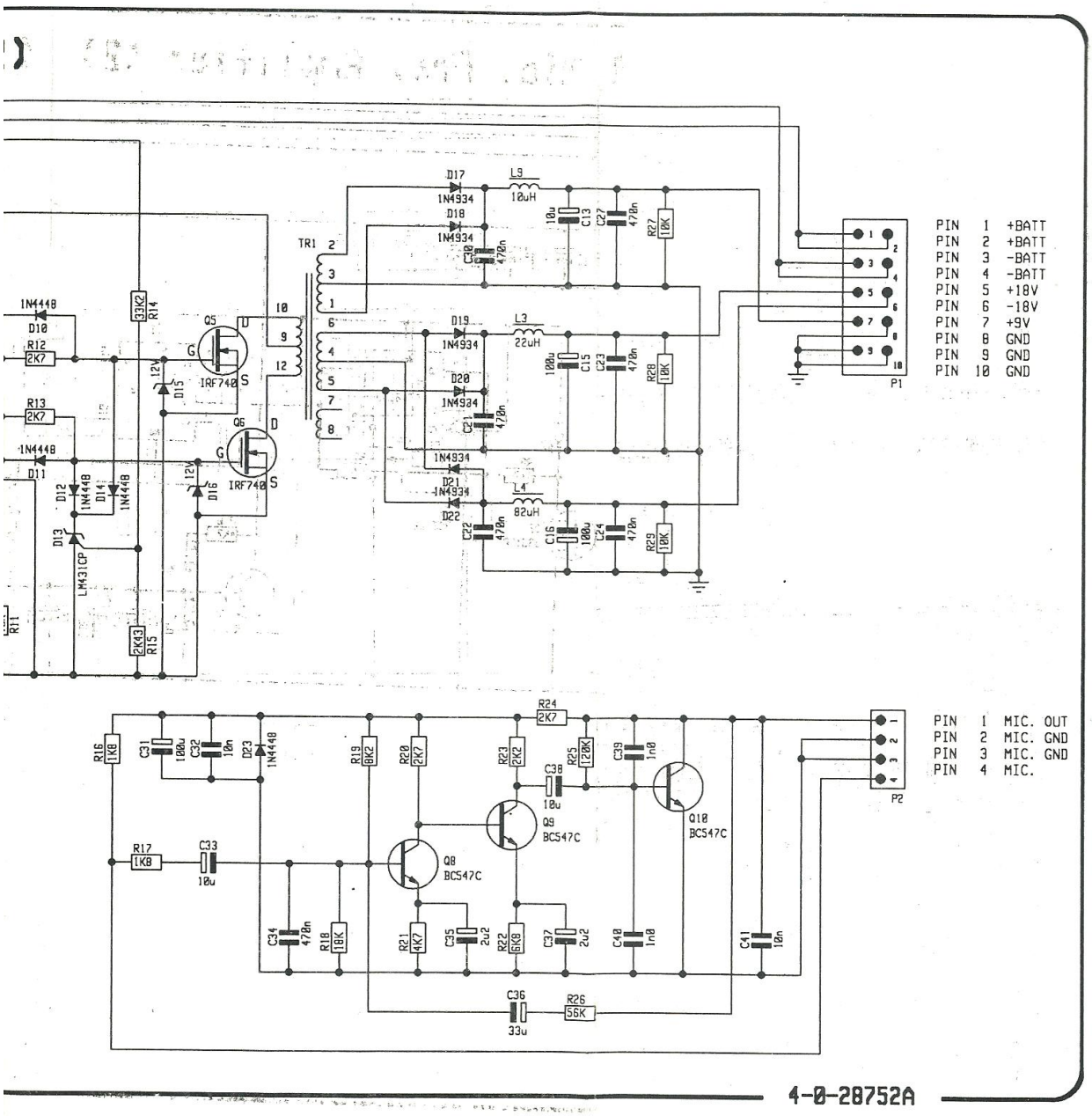


View from component side with lower side tracks.
PCB rev. 28752

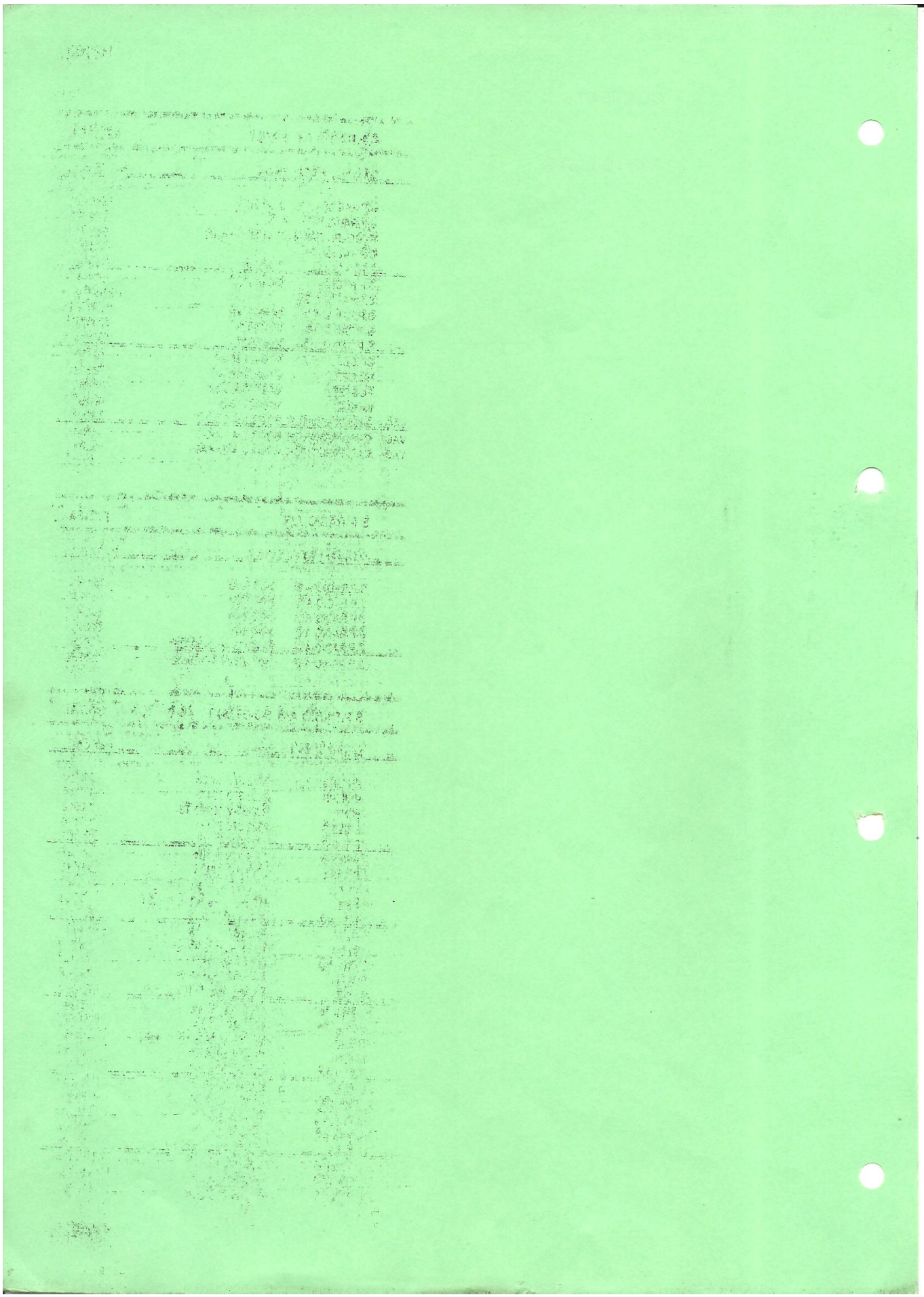
POWER SUPPLY AND MIC.PRE.AMPLIFIER MODULE 2



This diagram is valid for PCB rev. 28752


D17 1N4934
L3 10uH
D18 1N4934
C13 10u
C27 470n
R27 10K
TR1
D19 1N4934
L3 22uH
C15 100u
C23 470n
R28 10K
D20 1N4934
C21 470n
D21 1N4934
L4 82uH
C22 470n
C16 100u
C24 470n
R29 10K
P1
PIN 1 +BATT
PIN 2 +BATT
PIN 3 -BATT
PIN 4 -BATT
PIN 5 +18V
PIN 6 -18V
PIN 7 +9V
PIN 8 GND
PIN 9 GND
PIN 10 GND
Q5 IRF740
Q6 IRF740
D10 1N4448
D11 1N4448
D12 1N4448
D14 1N4448
D13 LM431CP
D15 12V
D16 12V
R12 2K7
R13 2K7
R14 33K2
R15 2K43
R11
R24 2K7
R16 1K8
C31 100u
C32 10n
D23 1N4448
R19 8K2
R20 2K7
R23 2K2
C38 10u
R25 120K
C39 1n0
Q9 BC547C
Q10 BC547C
Q8 BC547C
R17 1K8
C33 10u
C34 470n
R18 18K
R21 4K7
C35 2u2
R22 6K8
C37 2u2
C40 1n0
C41 10n
C36 33u
R26 56K
P2
PIN 1 MIC. OUT
PIN 2 MIC. GND
PIN 3 MIC. GND
PIN 4 MIC.
4-0-28752A

CONTENTS



6 PARTS LIST

HF SSB CW UNIT H2185 SAILOR GREEN FOR R2120/T — S.P.RADIO A/S H2185 — 802185

POSITION	DESCRIPTION		MANUFACTOR	TYPE	PART NO.
VARIOUS	CABLE III H2192	LENGHT 120cm	S.P.RADIO	0-0-27832	527832
VARIOUS	MULTICABLE 25-15 P H2185		S.P.RADIO A/S	3-0-28977	528977
VARIOUS	CABLE RS232	25 POLES L=1-2m	RUDOLPH SCHMIDT Art.Nr: 163-300		56.480
VARIOUS	BASE UNIT H2185		S.P.RADIO A/S		702185
VARIOUS	SPARE FUSES FOR H2185/86	H2185/86	S.P.RADIO	0-0-28986	728986
VARIOUS	JACK KIT FOR H2185	H2185	S.P.RADIO	0-0-28990	728990
VARIOUS	MANUAL R2185 ENGLISH		S.P.RADIO A/S		M2185GB
J1	MT CABLE 12 POLES H2185		S.P.RADIO A/S	3-0-28974	528974
J2 (2)	MT CABLE 4 POLES H2185		S.P.RADIO A/S	3-0-28975	528975
J2	MT CABLE 6 POLES H2185		S.P.RADIO A/S	3-0-28976	528976
J3	MULTI SOCKET 6 POLES	PANEL VERSION	BINDER	09-0324-09-06	78.515
J4	MULTI SOCKET 5 POLES	PANEL VERSION	BINDER	09-0320-09-05	78.522
LS1	LOUDSPEAKER	8 OHMS 15w 88x88mm	FOSTER	C085K03E0010	46.051
R1	POTENTIOMETER	10k OHM 10% 0.1W LOG	NOBLE	V90-10155-D	08.257
S1	ROCKER SWITCH	DPDT ON-NONE-ON 4A/250VAC	CARLINGSWITCH	6 10 1 2 4 2 1-0-0	43.011
S2	ROCKER SWITCH	DPDT ON-NONE-ON 4A/250VAC	CARLINGSWITCH	6 10 1 2 4 2 1-0-0	43.011
S3	ROCKER SWITCH	DPDT ON-NONE-ON 4A/250VAC	CARLINGSWITCH	6 10 1 2 4 2 1-0-0	43.011

BASE UNIT H2185 — S.P.RADIO A/S — 702185

POSITION	DESCRIPTION		MANUFACTOR	TYPE	PART NO.
VARIOUS	INTERCONNECTION CABLE	10 POLES L=150mm	S.P.RADIO A/S	3-0-28973	528973
VARIOUS	MT CABLE 12 POLES H2185		S.P.RADIO A/S	3-0-28974	528974
VARIOUS	MT CABLE 4 POLES H2185		S.P.RADIO A/S	3-0-28975	528975
VARIOUS	MT CABLE 6 POLES H2185		S.P.RADIO A/S	3-0-28976	528976
VARIOUS	INTERFACE AND AF AMPLIFI.	MODULE 1 H2185	S.P.RADIO A/S	5-0-28751B/ 4-0-28751C	628751
VARIOUS	POWER SUPPLY MODULE 2	H2185	S.P.RADIO A/S	5-0-28752 / 4-0-28752A	628752

INTERFACE AND AF AMPLIFI. — MODULE 1 H2185 — S.P.RADIO A/S 5-0-28751B / 4-0-28751C — 628751

POSITION	DESCRIPTION		MANUFACTOR	TYPE	PART NO.
C1-1	CAPACITOR MKT	10nF 20% 100VDC	PHILIPS	2222 370 38103	11.168
C2-1	CAPACITOR MKT	47nF 5% 63VDC	PHILIPS	2222 370 79473	11.156
C3-1	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C4-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C5-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C6-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C7-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C8-1	CAPACITOR CERAMIC	1nOF 10% CL2 500VDC	NKE	DT 360 758L B 102 K 500V	15.160
C9-1	CAPACITOR CERAMIC	1nOF 10% CL2 500VDC	NKE	DT 360 758L B 102 K 500V	15.160
C10-1	CAPACITOR MKT	220nF 10% 63VDC	PHILIPS	2222 370 78224	11.095
C11-1	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C12-1	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C13-1	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C14-1	CAPACITOR ELECTROLYTIC	22uF 20% 35VDC	ELNA	RJ2-35-V-220-M-F1	14.516
C15-1	CAPACITOR CERAMIC	1nOF 10% CL2 500VDC	NKE	DT 360 758L B 102 K 500V	15.160
C16-1	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C17-1	CAPACITOR MKT	330nF 10% 63VDC	PHILIPS	2222 370 78334	11.189
C18-1	CAPACITOR CERAMIC	1nOF 10% CL2 500VDC	NKE	DT 360 758L B 102 K 500V	15.160
C19-1	CAPACITOR ELECTROLYTIC	470uF -20/+50% 40VDC	ELNA	RJ3-50-471-M-F	14.650
C20-1	CAPACITOR MKT	470nF 10% 100VDC	PHILIPS	2222 371 28474	11.049
C21-1	CAPACITOR ELECTROLYTIC	470uF -20/+50% 40VDC	ELNA	RJ3-50-471-M-F	14.650
C22-1	CAPACITOR MKT	470nF 10% 100VDC	PHILIPS	2222 371 28474	11.049
C23-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C24-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C26-1	CAPACITOR ELECTROLYTIC	1uF 20% 50VDC	ELNA	RJ2-50-V-010-M-T34	14.506
C27-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C28-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C29-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136

POSITION	DESCRIPTION		MANUFACTOR	TYPE	PART NO.
C30-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C31-1	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C32-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C33-1	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C34-1	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C35-1	CAPACITOR MKT	0.1uF 10% 63VDC	PHILIPS	2222 370 78104	11.136
C36-1	CAPACITOR ELECTROLYTIC	1uF 20% 50VDC	ELNA	RJ2-50-V-010-M-T34	14.506
D1-1	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D2-1	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D4-1	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D5-1	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D6-1	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D7-1	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D8-1	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
F1-1	FUSE	2AT 250V 5x20mm	ELU	179 120 2AT	45.508
FP1-1	FERRITE BEAD INDUCTOR		MURATA	BLO1RN1-A62T5	35.188
FP2-1	FERRITE BEAD INDUCTOR		MURATA	BLO1RN1-A62T5	35.188
J1-1	SOCKET SUB D 9 POLES	PCB VERSION 2x 4-40 NUT	EDA INC.	8TO-009SS-244T	78.164
J2-1	SOCKET SUB D	25 POLES PCB VERSION	EDA INC.	8TO-025SS-244T	78.166
J3-1	SOCKET SUB D 15 POLES	4-40 NUTS PCB VERSION	CONEC	CDF 15 PUNSN	78.165
OC-1	OPTO COUPLER	CNY17-2	TOSHIBA	CNY 17-2	32.530
P1-1	PLUG (MALE)	12 POLE	AMP	1-826375-2	78.112
P2-1	PLUG	6 POLE	AMP	0-826375-6	78.106
P3-1	PLUG SUB D	9 POLES PCB VERSION	EDA INC.	8TO-009PS-241T	78.163
P4-1	PLUG	1/10" SIL SQ PINS 3 POLES	AMP	0-826629-3 (0-826647-3)	78.323
P5-1	PLUG	1/10" SIL SQ PINS 2 POLES	AMP	0-826629-2	78.322
P6-1	PLUG SUB D 25 POLES	4-40 NUTS PCB VERSION	CONEC	CDS 25 PFUNSN	78.178
P7-1	PLUG	2x5 POLES	3M	3654-6002 / 7610-6002 JL	78.251
P8-1	PLUG	1/10" SIL SQ PINS 2 POLES	AMP	0-826629-2	78.322
P9-1	PLUG	1/10" SIL SQ PINS 3 POLES	AMP	0-826629-3	78.323
Q1-1	TRANSISTOR AF	NPN BC639 TO-92	PHILIPS	BC639	28.120
Q2-1	TRANSISTOR AF	NPN BC639 TO-92	PHILIPS	BC639	28.120
Q3-1	TRANSISTOR AF	NPN BC639 TO-92	PHILIPS	BC639	28.120
R1-1	PRESET CERMET	20k OHM 10% 0.5W	BOURNS	3386P-1-203	07.890
R2-1	RESISTOR MF	18k OHM 5% 0.33W	PHILIPS	2322 180 73183	02.502
R3-1	RESISTOR MF	2k2 OHM 5% 0.33W	PHILIPS	2322 180 73222	02.480
R4-1	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R5-1	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R7-1	RESISTOR MF	5k1 OHM 5% 0.33W	PHILIPS	2322 180 73512	02.489
R8-1	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R10-1	RESISTOR MF	220k OHM 5% 0.33W	PHILIPS	2322 180 73224	02.528
R11-1	RESISTOR MF	820 OHM 5% 0.33W	PHILIPS	2322 180 73821	02.470
R12-1	RESISTOR MF	120k OHM 5% 0.33W	PHILIPS	2322 180 73124	02.522
R13-1	RESISTOR MF	100k OHM 5% 0.33W	PHILIPS	2322 180 73104	02.520
R14-1	RESISTOR MF	470 OHM 5% 0.33W	PHILIPS	2322 180 73471	02.464
R15-1	RESISTOR MF	33k OHM 5% 0.33W	PHILIPS	2322 180 73333	02.508
R16-1	RESISTOR MF	1k0 OHM 5% 0.33W	PHILIPS	2322 180 73102	02.472
R17-1	RESISTOR MF	100 OHM 5% 0.33W	PHILIPS	2322 180 73101	02.448
R18-1	RESISTOR MF	1 OHM 5% 0.4W	PHILIPS	2322 181 53108	01.125
R19-1	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R20-1	RESISTOR MF	220 OHM 5% 0.33W	PHILIPS	2322 180 73221	02.456
R21-1	RESISTOR MF	5k1 OHM 5% 0.33W	PHILIPS	2322 180 73512	02.489
R22-1	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R23-1	RESISTOR MF	220 OHM 5% 0.33W	PHILIPS	2322 180 73221	02.456
R26-1	RESISTOR MF	1M OHM 5% 0.33W	PHILIPS	2322 180 73105	02.544
R27-1	RESISTOR MF	100k OHM 5% 0.33W	PHILIPS	2322 180 73104	02.520
R28-1	RESISTOR MF	220k OHM 5% 0.33W	PHILIPS	2322 180 73224	02.528
R29-1	RESISTOR MF	47 OHM 5% 0.33W	PHILIPS	2322 180 73479	02.440
R30-1	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R31-1	RESISTOR MF	100k OHM 5% 0.33W	PHILIPS	2322 180 73104	02.520
R32-1	RESISTOR MF	100k OHM 5% 0.33W	PHILIPS	2322 180 73104	02.520
R33-1	RESISTOR MF	100k OHM 5% 0.33W	PHILIPS	2322 180 73104	02.520
R34-1	RESISTOR MF	47k OHM 5% 0.33W	PHILIPS	2322 180 73473	02.512
R35-1	RESISTOR MF	5k1 OHM 5% 0.33W	PHILIPS	2322 180 73512	02.489
R36-1	RESISTOR MF	100 OHM 5% 0.33W	PHILIPS	2322 180 73101	02.448
R37-1	RESISTOR MF	100 OHM 5% 0.33W	PHILIPS	2322 180 73101	02.448
R38-1	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
RE2-1	RELAY 12VDC DPDT 1.25A	M1B-12-H/AZ 820-2C212DE	MEISEI	M1B-12-H	21.295
RE3-1	RELAY 12VDC DPDT 1.25A	M1B-12-H/AZ 820-2C212DE	MEISEI	M1B-12-H	21.295
RE4-1	RELAY	24VDC 2SH 2A	OMRON	G5V-2-24 VDC	21.327
ST1-1	TERMINAL BLOCK	2 POLES 1.5mm2	PTR	AK300/2b m.MESS.SKRUER	81.023

POSITION	DESCRIPTION		MANUFACTOR	TYPE	PART NO.
ST2-1	TERMINAL BLOCK	2 POLES 1.5mm2	PTR	AK300/2b m.MESS.SKRUER	81.023
ST3-1	TERMINAL BLOCK	2 POLES 1.5mm2	PTR	AK300/2b m.MESS.SKRUER	81.023
TR1-1	TRAFO AF	1:1 600 OHMS	TDK	L04EE13-C10153	22.500
U1-1	TIMER	"555" DIL 8	TEXAS	NE 555 P	31.205
U2-1	POS. VOLTAGE REG. FIXED	5V 5% 0.1A 78L05AC	MOTOROLA	MC78L05ACP	31.135
U3-1	AF POWER AMPLIFIER	TDA 2030 VERT.	THOMSON	TDA 2030 V	31.483
U4-1	QUAD 2-INPUT NAND GATE	74HC00	TEXAS	SN74HC00N	34.515
U5-1	QUAD 2-INPUT NAND GATE	74HC00	TEXAS	SN74HC00N	34.515
U6-1	HEX INVERTERS	74HC04	TEXAS	SN74HC04N	34.520
U7-1	VOLTAGE REGULATOR	-5VOLT 5% 0.1A.	NATIONAL	LM79L05ACZ	31.131
U8-1	ANALOG MULTIPLEXER	MC14053BCP	SIGNETICS	HEF 4053 BP	33.201

POWER SUPPLY MODULE 2 H2185 S.P.RADIO A/S 5-0-28752 / 4-0-28752A 628752

POSITION	DESCRIPTION		MANUFACTOR	TYPE	PART NO.
C1-2	CAPACITOR MKT	470nF 10% 100VDC	PHILIPS	2222 371 28474	11.049
C2-2	CAPACITOR MKT	470nF 10% 100VDC	PHILIPS	2222 371 28474	11.049
C4-2	CAPACITOR MKT	470nF 10% 100VDC	PHILIPS	2222 371 28474	11.049
C5-2	CAPACITOR MKT	470nF 10% 100VDC	PHILIPS	2222 371 28474	11.049
C6-2	CAPACITOR ELECTROLYTIC	100uF -20/+50% 63VDC	ELNA	RJ2-63-V-101-M-F	14.620
C7-2	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C8-2	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C9-2	CAPACITOR ELECTROLYTIC	100uF -20/+50% 63VDC	ELNA	RJ2-63-V-101-M-F	14.620
C10-2	CAPACITOR ELECTROLYTIC	100uF -20/+50% 63VDC	ELNA	RJ2-63-V-101-M-F	14.620
C11-2	CAPACITOR ELECTROLYTIC	100uF -20/+50% 63VDC	ELNA	RJ2-63-V-101-M-F	14.620
C12-2	CAPACITOR ELECTROLYTIC	22uF 20% 35VDC	ELNA	RJ2-35-V-220-M-F1	14.516
C13-2	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C15-2	CAPACITOR ELECTROLYTIC	100uF -10/+50% 25VDC	ERO	EKM 00 CC 310 E G5	14.610
C16-2	CAPACITOR ELECTROLYTIC	100uF -10/+50% 25VDC	ERO	EKM 00 CC 310 E G5	14.610
C21-2	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C22-2	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C23-2	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C24-8	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C27-2	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C30-2	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C31-2	CAPACITOR ELECTROLYTIC	100uF 20% 10VDC	ELNA	RJ3-10-V-101-M-T34	14.607
C32-2	CAPACITOR CERAMIC	10nF -20/+80% CL2 50VDC	NKE	DT 350 758L F 103 Z 50V	15.170
C33-2	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C34-2	CAPACITOR MKT	470nF 5% 63VDC	PHILIPS	2222 370 79474	11.187
C35-2	CAPACITOR ELECTROLYTIC	2u2F 20% 50VDC	ELNA	RJ2-50-V-2R2-M-T34	14.503
C36-2	CAPACITOR ELECTROLYTIC	33uF 20% 16VDC	ELNA	RJ2-16-V-330-M-T34	14.518
C37-2	CAPACITOR ELECTROLYTIC	2u2F 20% 50VDC	ELNA	RJ2-50-V-2R2-M-T34	14.503
C38-2	CAPACITOR ELECTROLYTIC	10uF 20% 35VDC	ELNA	RJ2-35-V-100-M-T34	14.512
C39-2	CAPACITOR CERAMIC	1nOF 10% CL2 500VDC	NKE	DT 360 758L B 102 K 500V	15.160
C40-2	CAPACITOR CERAMIC	1nOF 10% CL2 500VDC	NKE	DT 360 758L B 102 K 500V	15.160
C41-2	CAPACITOR CERAMIC	10nF -20/+80% CL2 50VDC	NKE	DT 350 758L F 103 Z 50V	15.170
D2-2	DIODE ZENER	12V 5% 0.4W BZX79C12	PHILIPS	BZX79C12	26.554
D3-2	DIODE ZENER	6.2V 5% 0.4W BZX79C6V2	PHILIPS	BZX79C6V2	26.533
D4-2	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D5-2	DIODE ZENER	12V 5% 0.4W BZX79C12	PHILIPS	BZX79C12	26.554
D6-2	DIODE RECTIFIER	1N4002 100V/1A	THOMSON	1N4002 (03/04/05/06/07)	25.100
D7-2	DIODE FAST RECOVERY	200V/3A BYT03-200/MUR420	THOMSON	BYT 03-200 TAPED	25.210
D8-2	DIODE ZENER	18V 5% 0.4W BZX79C18	PHILIPS	BZX79C18	26.564
D9-2	DIODE ZENER	12V 5% 0.4W BZX79C12	PHILIPS	BZX79C12	26.554
D10-2	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D11-2	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D12-2	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D13-2	DIODE SHUNT REGULATOR	PROGRAMMABLE TL431C	MOTOROLA	TL431CP	26.997
D14-2	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
D15-2	DIODE ZENER	12V 5% 0.4W BZX79C12	PHILIPS	BZX79C12	26.554
D16-2	DIODE ZENER	12V 5% 0.4W BZX79C12	PHILIPS	BZX79C12	26.554
D17-2	DIODE FAST RECOVERY	100V/1A 1N4934	PHILIPS	1N4934 (1N4935-36-37)	25.155
D18-2	DIODE FAST RECOVERY	100V/1A 1N4934	PHILIPS	1N4934 (1N4935-36-37)	25.155
D19-2	DIODE FAST RECOVERY	100V/1A 1N4934	PHILIPS	1N4934 (1N4935-36-37)	25.155
D20-2	DIODE FAST RECOVERY	100V/1A 1N4934	PHILIPS	1N4934 (1N4935-36-37)	25.155
D21-2	DIODE FAST RECOVERY	100V/1A 1N4934	PHILIPS	1N4934 (1N4935-36-37)	25.155
D22-2	DIODE FAST RECOVERY	100V/1A 1N4934	PHILIPS	1N4934 (1N4935-36-37)	25.155

POSITION	DESCRIPTION		MANUFACTOR	TYPE	PART NO.
D23-2	DIODE HIGH SPEED	1N4448	PHILIPS	1N4448	25.147
L1-2	CHOKE DUAL 2x2m2H/2ADC	CURRENT COMPENSATED	SIEMENS	B82722-J2202-N1	20.055
L2-2	CHOKE FIXED TOROIDAL	630uH/1A6 +20/-12.5%	ULVECO	Art.Nr: DK11-542	20.244
L3-2	CHOKE	22uH 5%	NEOSID	006122 04	20.156
L4-2	CHOKE FIXED	82uH 5%	NEOSID	00 6122 11	20.168
L9-2	CHOKE FIXED	10uH 5%	NEOSID	00 6122 00	20.118
P1-2	PLUG	2x5 POLES	3M	3654-6002 / 7610-6002 JL	78.251
P2-2	PLUG (MALE)	4 POLE	AMP	0-826375-4	78.104
Q1-2	TRANSISTOR AF POWER NPN	DARLINGTON BD645/BDX53	PHILIPS	BD645	29.122
Q2-2	TRANS.POW.MOSFET N-CHANN	100V/27A/85mOHM IRF540	MOTOROLA	IRF540	29.402
Q3-2	TRANSISTOR LOWPOW.MOSFET	N-CHANNEL 100V/0.25A	PHILIPS	BST76A	28.230
Q4-2	TRANSISTOR AF	BC548 NPN TO-92	PHILIPS	BC548 (-A/-B/-C)	28.070
Q5-2	TRANS.POW.MOSFET N-CHANN	400V/10A/550mOHM IRF740	MOTOROLA	IRF740	29.405
Q6-2	TRANS.POW.MOSFET N-CHANN	400V/10A/550mOHM IRF740	MOTOROLA	IRF740	29.405
Q8-2	TRANSISTOR AF	NPN BC547C TO-92	PHILIPS	BC547C	28.068
Q9-2	TRANSISTOR AF	NPN BC547C TO-92	PHILIPS	BC547C	28.068
Q10-2	TRANSISTOR AF	NPN BC547C TO-92	PHILIPS	BC547C	28.068
R1-2	RESISTOR MF	4k7 OHM 5% 0.33W	PHILIPS	2322 180 73472	02.488
R2-2	RESISTOR MF	1k5 OHM 5% 0.33W	PHILIPS	2322 180 73152	02.476
R3-2	RESISTOR MF	470 OHM 5% 0.33W	PHILIPS	2322 180 73471	02.464
R4-2	RESISTOR MF	100 OHM 5% 0.33W	PHILIPS	2322 180 73101	02.448
R5-2	RESISTOR MF	44k2 OHM 1% 0.6W	PHILIPS	2322 156 14423	03.236
R6-2	RESISTOR MF	1k3 OHM 1% 0.6W	PHILIPS	2322 156 11302	03.402
R7-2	RESISTOR MF	4k7 OHM 5% 0.33W	PHILIPS	2322 180 73472	02.488
R8-2	RESISTOR MF	4k7 OHM 5% 0.33W	PHILIPS	2322 180 73472	02.488
R9-2	RESISTOR MF	47k OHM 5% 0.33W	PHILIPS	2322 180 73473	02.512
R10-2	RESISTOR MF	4k7 OHM 5% 0.33W	PHILIPS	2322 180 73472	02.488
R11-2	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R12-2	RESISTOR MF	2k7 OHM 5% 0.33W	PHILIPS	2322 180 73272	02.482
R13-2	RESISTOR MF	2k7 OHM 5% 0.33W	PHILIPS	2322 180 73272	02.482
R14-2	RESISTOR MF	33k2 OHM 1% 0.6W	PHILIPS	2322 156 13323	03.232
R15-2	RESISTOR MF	2k43 OHM 1% 0.6W	PHILIPS	2322 156 12432	03.396
R16-2	RESISTOR MF	1k8 OHM 5% 0.33W	PHILIPS	2322 180 73182	02.478
R17-2	RESISTOR MF	1k8 OHM 5% 0.33W	PHILIPS	2322 180 73182	02.478
R18-2	RESISTOR MF	18k OHM 5% 0.33W	PHILIPS	2322 180 73183	02.502
R19-2	RESISTOR MF	8k2 OHM 5% 0.33W	PHILIPS	2322 180 73822	02.494
R20-2	RESISTOR MF	2k7 OHM 5% 0.33W	PHILIPS	2322 180 73272	02.482
R21-2	RESISTOR MF	4k7 OHM 5% 0.33W	PHILIPS	2322 180 73472	02.488
R22-2	RESISTOR MF	6k8 OHM 5% 0.33W	PHILIPS	2322 180 73682	02.492
R23-2	RESISTOR MF	2k2 OHM 5% 0.33W	PHILIPS	2322 180 73222	02.480
R24-2	RESISTOR MF	2k7 OHM 5% 0.33W	PHILIPS	2322 180 73272	02.482
R25-2	RESISTOR MF	120k OHM 5% 0.33W	PHILIPS	2322 180 73124	02.522
R26-2	RESISTOR MF	56k OHM 5% 0.33W	PHILIPS	2322 180 73563	02.514
R27-2	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R28-2	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
R29-2	RESISTOR MF	10k OHM 5% 0.33W	PHILIPS	2322 180 73103	02.496
TR1-2	TRANSFORMER SMPS	C2140/R2122	DANTRAFO	6-0-26617A	22.510
U1-2	SWITCHING REGULATOR	5 PIN TO-220	LINEAR TECHNOL.	LT1071CT	31.175
U2-2	DUAL TYPE D FLIP-FLOP	MC14013BCP	SIGNETICS	HEF4013BP	33.056

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