

PERSONAL RADIOTELEPHONE
STORNOPHONE 4000 AUTOMATIC
CQP411xSxxC
CQP411xUxxC (Remote)
146 - 174 MHz

Service Coordination.

Date: 05.85

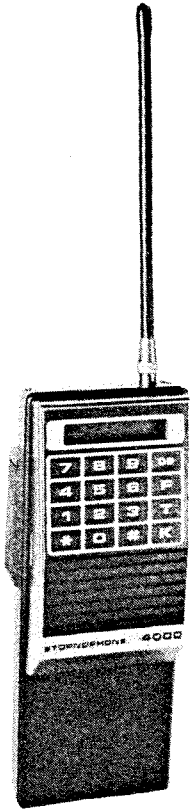
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HARDWARE
MANUAL

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STORNOPHONE 4000 AUTOMATIC



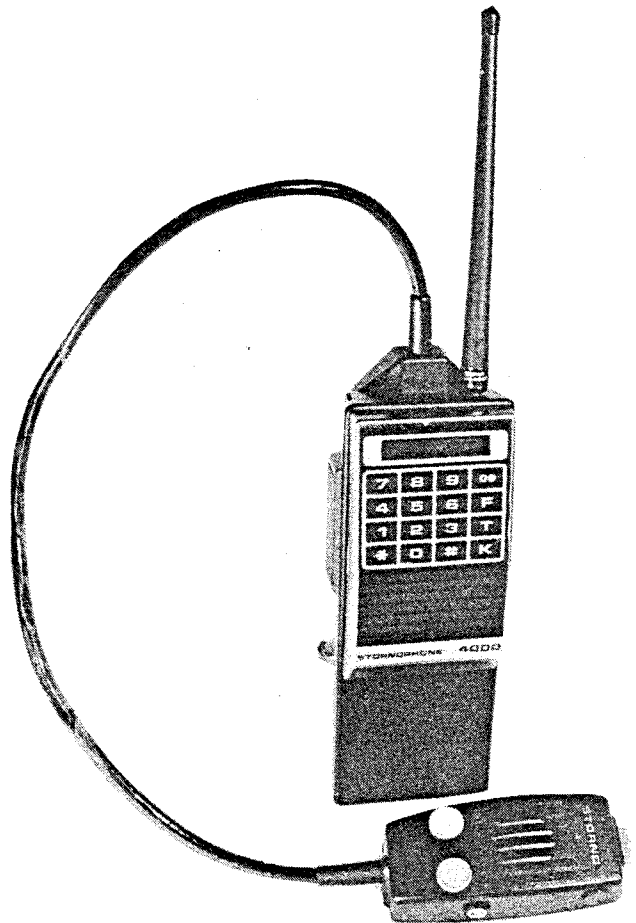
Local controlled personal radio for simplex operation with all necessary indicators located in a liquid crystal display.

The construction of the electronic keyboard is using the most modern laminated film technology.

The operation of the CQP4000 automatic is fully controlled by microprocessor.

Remote

STORNOPHONE 4000 AUTOMATIC allows remote control.



GENERAL SPECIFICATIONS

CQP4000 AUTOMATIC

Guaranted performance specifications unless otherwise noted.

TYPE CQP		4332	4333	4334	4112	4113	4114	4662	4663	4664
Freq. & splits	MHz	66-88			146-174			400-440 430-470		
Channel spacing	kHz	25	20	12.5	25	20	12.5	25	20	12.5
No. of channels		max. 99								
Service		One or two frequencies simplex								
Frequency Stability	ppm	±5 or ±10						±5	±3	
Operating temperature	deg. C	-25 to +60								
Antenna impedance	ohm	50								
Battery	V/ mAh	7.2 V Nominal			450 mAh			6 ni-cad cells		
		7.2 V Nominal			750 mAh			6.1 V to 8.6 V at extreme conditions		
* Cur. drain:										
OFF		1.0			1.0			1.0		
RX (stby)	mA	50			50			50		
RX (.5 WAF)		170			170			170		
TX (2 W)		965			965			1015		
Dimensions	mm	D= 26.5/42.5		W= 72.5		H= 192.7 450 mA/h BATT				
		D= 42.5		W= 72.5		H= 192.7 750 mA/h BATT				
Weight	kg.	0.6 with 450 mA/h Batt., 0.66 with 750 mA/h Batt.								

The equipment described above meets or exceeds all applicable CEPT, FTZ, Swiss and Swedish specifications.

* for additional standby current see tone modules.

RECEIVER SPECIFICATIONS

CQP4000 AUTOMATIC

Guaranteed performance specifications unless otherwise noted.

TYPE CQP		4332	4333	4334	4112	4113	4114	4662	4663	4664
Sensitivity 20 dB SINAD (CEPT)	μ V EMF	0.75		1	0.75		1	1		1.4
RF bandw.	MHz	2.5 (No degradation w. centertuning)								
AF outp. pwr.	W	0.5 EIA, 0.25 CEPT method.								
Aud. bandw.	Hz	300- 3000	300- 3000	300- 2700	300- 3000	300- 3000	300- 2700	300- 3000	300- 3000	300- 2700
Aud. resp.		-6 dB/oct. phase modulation characteristics.								
Tolerance	dB	+1 -3	+1 -3	+1 -3	+1 -3	+1 -3		+1* -3	+1 -3	
Hum & noise	dB	-45 (CEPT, weighted)								
Adj. ch. sel.	dB	-70	-60	-70	60	70		-60		
Cond. spur.	dBm	-57								
Rad. spurius	μ W	0.2								
AF distort.	%	2 EIA, 10 CEPT method								
Blocking	dB/ μ V	90								
Intermodul.	dB	CEPT = -70, FTZ = -66 & 80								
Spurius rej.	dB	-70 (CEPT method)								
Co-chan. rej.	dB	8								
Sq. sens.	dB	5 - 6 (dB SINAD at line Output)								
Squelch tail	mS	5 (EIA)								
RX att. time	mS	50 (EIA)								
Recovery tm.	mS	75						100		
Group delay	μ S	Less than 50								

* Tolerance on response from 400 to 2700 Hz is +1, -1.5 dB.

The equipment described above meets or exceeds all applicable CEPT, FTZ, Swiss and Swedish specifications.

TRANSMITTER SPECIFICATIONS

CQP4000 AUTOMATIC

Guaranteed performance specifications unless otherwise noted.

TYPE CQP		4332	4333	4334	4112	4113	4114	4662	4663	4664
RF outp. pwr.	W	1W or 2W								
Duty cycle	%	20% at 25 deg. C ambient : TX= 1 mn, standby/RX= 4 mn								
RF bandwidth	MHz	2.5 (No degradation)								
Mod. BW	Hz	300- 3000	300- 3000	300- 2550	300- 3000	300- 3000	300- 2550	300- 3000	400- 3000	300- 2550
Mod. resp.		+6 dB/oct. phase modulation characteristics at 6000 Hz att: ≥ 6 dB rel. to 1 kHz value.								
Tolerance	dB	+1 -3								
Max. dev.	kHz	5	4	2.5	5	4	2.5	5	4	2.5
Resid. mod.	dB	-40 (Weighted, ref. to 60% dev.)								
Adjacent Chan. power	dB/C	70	60	70	60	70	60	70	60	60
Cond. spur.	dBm	-37								
Radia. spur.	nW	200 (-37 dBm to resonant substition dipole)								
Attack time	mS	30						50		
Group delay	uS	Less than 50								
TX stability		10:1 VSWR, all phase angles								
Audio sensitivity	mV	10 mV ± 3 dB								
Aud. dist.	%	5								

CQP4000 NOMENCLATURE

DIGIT 1, 2, 3	4	5	6	7	8	9	10	11	12
PRODUCT CODE	FREQUENCY RANGE MHz		CHANNEL SPAC. kHz	RADIO TYPE	TRANSMITTER OUTPUT POWER WATT		FREQ. CAPACITY	CONTROL	VERSION
	TX	RX							
C Q P 4	•	•	•	•	•	•	Automatic C Max. 99	0 Standard	•
	1 146-174	1 146-174	2 25	S Standard	0	1 1,0	A Max. 2		A STAS EXP Standard freq. stab.
	3 66-88	3 66-88	3 20	U Universal	0	2 2,0	B Max. 10		B STAS EXP Improved freq. stab.
	6 400-470	6 400-470	4 12,5						G GERMANY
	5 350-410	5 350-410							F FRANCE
									E U. K.
									S SWEDEN
									D DENMARK
									C CANADA
									Z SWITZERLD.

STRUCTURED OPTIONS

(* - Must be added to all orders)

* TX FREQUENCY SPLIT (MHz)

AL LOW 146 - 174/68 - 88/400 - 440
AH HIGH /430 - 470

* RX FREQUENCY SPLIT (MHz)

BL LOW 146 - 174/68 - 88/400 - 440
BH HIGH /430 - 470

CABINET TYPE

IO Standard Cabinet (Default)
IA Cabinet for belt clip/swivelclip

* FIRMWARE PACKAGE TYPE

(Includes keyboard and SW)

EA	2-channel version	} Automatic version
EB	10-channel version	
EC	TEST SW for systems specials	
ED	SAS, special CAMUS	
EE	BA, special -2004	
EF	AF, special -2004	
EG	2200 standard	

GENERAL DESCRIPTION

CQP4000 AUTOMATIC

The CQP4000 Automatic is a personal radiotelephone with transmitter, receiver, controls and display, loudspeaker, microphone and battery.

Although being handheld and compact in size the radio can be programmed with up to 99 channels and equipped with tone facility.

The mechanical construction of the radio is a screened enclosure in the form of a cast chassis and a metallized plastic front as lid.

A moulded plastic house is attached to the chassis to provide mechanical protection and hold the battery. All controls and indicators are integrated in a keypad/display field on the radio front except for the transmit button which is on the left side of the radio. The electrical circuitry of the radio is built on printed wiring boards: an RF-board containing the transmitter and receiver, a control logic board and a thick film tone module.

The RF-board comprises the frequency synthesizer, the transmitter exciter and power amplifier, the receiver RF circuits and IF-circuits, the voltage regulator, and is available in different versions according to frequency band and channel spacing.

The control logic board (CL) comprises the receiver AF amplifier, the transmitter modulation processor, the microcontroller sub-module PU4001 and the display.

The tone module is a thick-film add-on module designed to be plugged into a socket on the CL-board.

ANTENNAS

The CQP4000 is designed for a 50-ohm antenna which is screwed onto the top of the radio. The following types are available:

- a resonant helical antenna, AN4xx1
- a wide band conductive rubber antenna, AN4xx2

BATTERIES

The battery is designed to snap into a compartment at the bottom of the radio and is a self-contained nickel-cadmium (Ni-Cd) pack.

Two battery packs are available:

- a 450 mA battery, BU4001
- a 750 mA battery, BU4002

The CQP4000 Automatic version is furthermore fitted with a lithium battery which serves as back-up for the microcontroller's data memory. Estimated minimum lifetime of this battery is 3 years.

CARRYING DEVICES

The following devices are available for carrying the radio:

- a carrying strap in leather with eyelets, CK4003
- two carrying cases in stout leather, CK4004 and CK4005, one for each battery version of the CQP4000
- a belt retainer, CK4006, comprising a bracket to mount on a special plast cabinet CA4002 + a leather ring with a swivel lock.
- a belt clip, CK4007, which must also be mounted together with CA4002
- a leather carrying case, CK4008, with cut-aways for multiconnector
- a leather carrying case, CK4009, with cut-aways for multiconnector intended for BU4002 application

REMOTE CONTROLS

Three different remote control boxes are available. They are used in conjunction with a special cabinet, CA4003, and a special chassis, CH4003. The control boxes differ from one another only on the basis of a "special functions button".

- CB4001 has no extra push button
- CB4002 has one extra push button either for control of tone keying or LS ON/OFF
- CB4003 has two extra push buttons, one for the tone key and one for LS ON/OFF.

BATTERY TESTER

A battery tester is available for checking the charging condition of batteries. A button on the tester loads the battery and the charge condition is read on a meter scale, SI4001.

MECHANICAL DESCRIPTION

CQP4000 AUTOMATIC

CHASSIS BOX

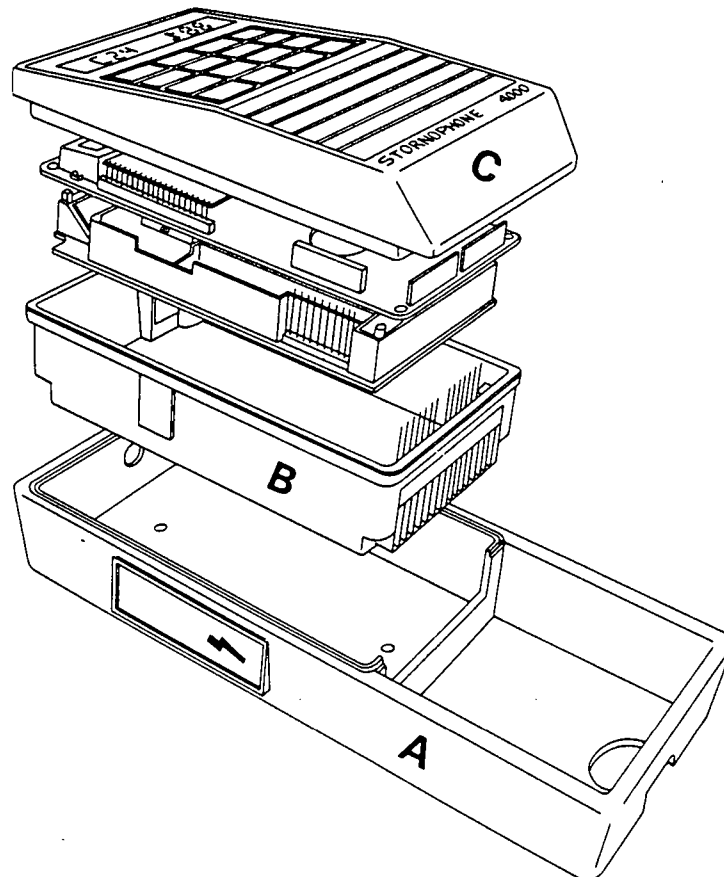
The chassis box is a tin plated zinc casting provided with an antenna socket and a sealing gasket for transmit button which activates a microswitch on the control logic board. The combined battery/test connector is attached to the chassis and potted for weather protection. Inside the bottom is a plate with fingers pressing against the solder side of the RF-board and thus obtains the necessary ground connections.

The RF and CL boards are kept in position with 4 screws which attach the chassis box

to the front part. In the chassis bottom are two threaded inserts for attaching the rear part of the plastic cover.

The plastic cover has a battery compartment which will accept two types of batteries. The battery snaps into position by means of a moulded contour on the inner side of the compartment wall. The battery is released by pressing through a hole in the rear wall.

An 18-position battery and test connector is placed inside the battery compartment. 5 of the connector pins are used for connection to the battery. The others are used for automatic or manual testing.



A: Plastic cover
 B: Chassis box
 C: Control Panel Front

CHAPTER
CHAPITRE
KAPITEL

3

Storno

CIRCUIT DESCRIPTION

CQP4xxx

RECEIVER

The receiver is a dual conversion superheterodyne receiver with a first IF of 21.4 MHz and second IF of 455 kHz. All receiver circuitry except the AF amplifier is placed on the RF board.

RECEIVER FRONT END

The receiver front-end consists of a 2-resonator input filter, an RF amplifier, a 2-resonator intermediate filter and a mixer.

IF AND DEMODULATOR

The mixer output is fed through a matching circuit to the crystal filter.

The crystal filter output is fed to the dual gate MOSFET which overcomes the noise figure of the following stages and provides constant load to the crystal filter.

The following integrated circuit includes crystal oscillator and active mixer, second IF amplifier, quadrature discriminator and schmitt trigger for squelch.

SQUELCH

The squelch circuit is a separate thick film module. The AF signal from the quadrature detector is fed to an active high-pass filter where noise above 7 kHz is extracted.

Via the squelch potentiometer, adjusted for 10-12 dB SINAD, the signal is fed to an amplifier to obtain the right level for the detector.

The detector output is connected to the schmitt-trigger, part of the preamplifier circuit, which gives the necessary hysteresis and well-defined output signal.

PREAMPLIFIER

The last stage of the IF integrated circuit is an AF preamplifier. Its output can be adjusted to 110 mV by a potentiometer.

AUDIO AMPLIFIER

The line level of the AF preamplifier is fed to the audio amplifier situated on the CL board (see the chapter about CL description).

TRANSMITTER

The transmitter consists of an exciter and a power amplifier.

The VCO (voltage controlled oscillator) drives the exciter directly. The exciter contains wide-band stages and delivers input to the power am-

plifier. All stages, including the VCO operate at carrier frequency.

The power amplifier includes the output stage, a low-pass filter and a power control circuit.

The power amplifier is connected to the low-pass filter via a diode antenna switch.

EXCITER

In the exciter, the VCO signal, 1 mV is amplified to 0.5 Watt.

The exciter consists of three wide band stages covering the whole band. The RF bandwidth is limited by the VCO.

The exciter needs no adjustment.

POWER AMPLIFIER

The power amplifier consists of a single broad-band stage.

The antenna is matched to the power amplifier by tuning the antenna or by using a wide band antenna.

A power control circuit protects the RF output from temperature or voltage variations and keeps it relatively constant.

The output power level can be set with a potentiometer over a 2:1 range.

TX AUDIO PROCESSOR

The modulation signal is delivered from the TX audio processor situated on the CL board (see chapter of CL description).

WARNING: The transmitter PA-transistors contain Beryllium. It is dangerous to cut, to file or to disassemble those transistors because the beryllium oxide is poisonous when absorbed.

FREQUENCY SYNTHESIZER

The frequency synthesizer circuits are:

- Prescaler
- PLL unit
- Ref. crystal oscillator
- TX and RX VCO (voltage controlled oscillator)
- Save switch

PRESCALER

The prescaler is a high speed counter which divides by a fixed ratio: P

Under control of the PLL circuit, it can be set to divide by the fixed ratio plus one: P+1

The prescaler has a low power consumption from 4 to 7 mA.

PLL AND ASSOCIATED CIRCUITS

The circuitry consist of:

- three programmable dividers
- control logic for the prescaler
- phase detector with lock detector

1. The R divider divides the output of the crystal oscillator in order to give channel spacing. Its output is fed into the phase detector.

2. The N divider divides the output of the prescaler. The ratio stored in the N divider must be the one giving N output equal R output. Its output is fed into the phase detector.

3. The A divider is controlled by the control logic. The ratio of the A divider makes the prescaler divide by P+1 if necessary. The A divider can not start with a zero.

4. The phase detector compares the outputs of the R and the N divider.

The phase/lock detector two outputs are:

- out of lock/lock signal to the CL board, indication whether or not the two inputs (R and N outputs) are equal.
- DC level controlling the VCO through a band-pass filter and a save switch.

REFERENCE CRYSTAL OSCILLATOR

This crystal oscillator supplies clock signals to the microprocessor on the CL board and gives the reference frequency to the PLL circuit through the R divider.

mes from the microphone amplifier placed on the CL board.

As buffer between the VCO and the PLL circuits, the following circuits are used:

- the mixer injection buffer for the RX VCO
- the exciter for the TX VCO

TX AND RX VCO

The voltage controlled oscillator (VCO) is a FET oscillator. The frequency is controlled by two varicaps, one in the RX VCO circuit and one in the TX VCO circuit. The varicaps DC voltage is delivered from the PLL circuit.

The TX VCO contains another varicap used for frequency modulation. The modulation signal co-

SAVE SWITCH

In order to reduce power consumption in standby, the save circuits disconnects:

- DC control level to the VCO
- power to the prescaler

The save circuit is controlled by the microprocessor from the CL board.

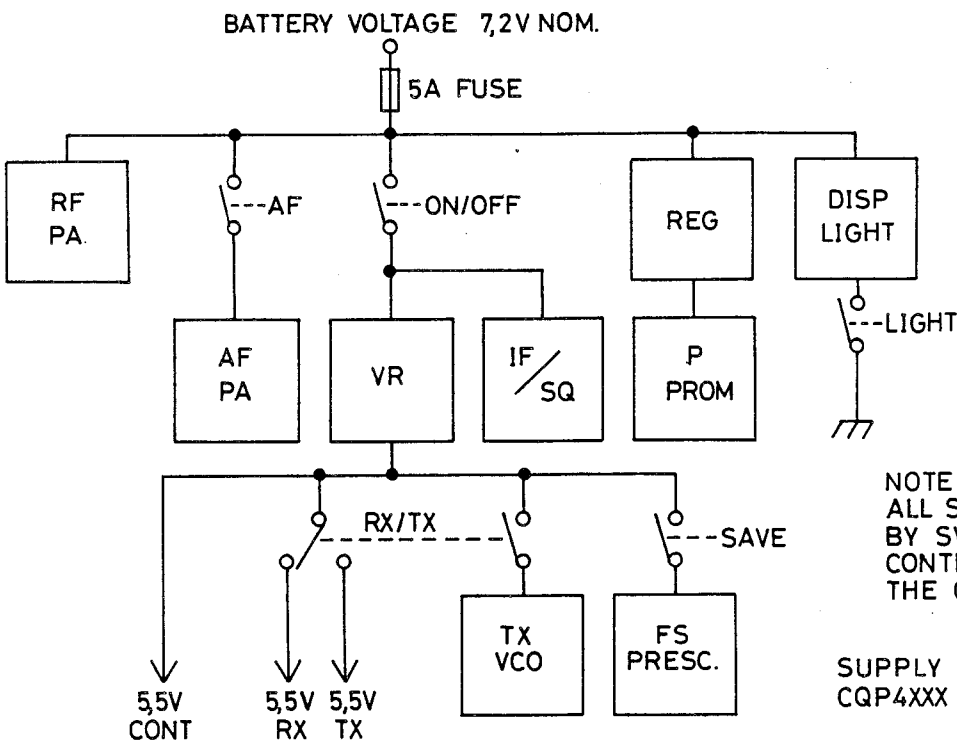
It is not connected to TX VCO.

POWER SUPPLY

The 7.2 V battery voltage is distributed for different purposes through a 5 A fuse:

- directly to the RF power amplifier
- to the audio output amplifier through a switch transistor

- to the IF/squelch circuits and the 5.5 V voltage regulator through the on/off switch transistor
- to the personality PROM through a separate regulator
- to the LED's for the LCD display-back-light.



NOTE:
ALL SWITCHES ARE MADE BY SWITCH-TRANSISTORS CONTROLLED FROM THE CONTROL LOGIC.

SUPPLY DISTRIBUTION SYSTEM
CQP4XXX

D403.635

BATTERY OPERATING TIME

Transmit	Receive	Standby	Tone Equip.	Operation			
				2 W PA		1 W PA	
				BU4001	BU4002	BU4001	BU4002
5%	5%	90%	YES	6.3 h	10.4 h	7.4 h	12.3 h
2%	5%	93%	YES	9.8 h	16.4 h	10.8 h	18.1 h
5%	25%	70%	NO	5.3 h	8.7 h	6.1 h	10.0 h
2%	25%	73%	NO	7.6 h	12.6 h	8.2 h	13.6 h

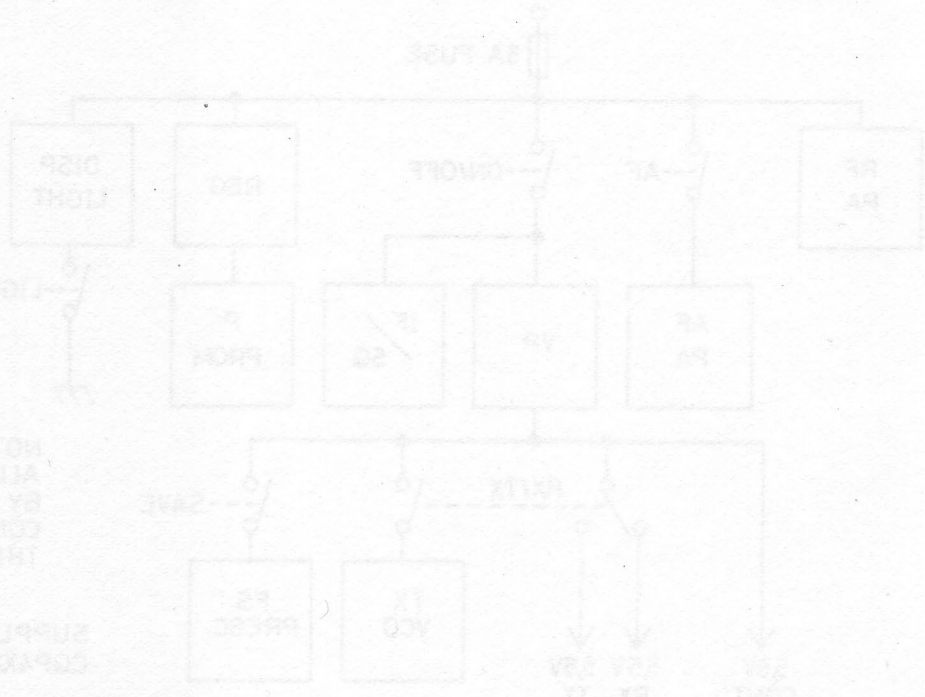
VOLTAGE REGULATOR

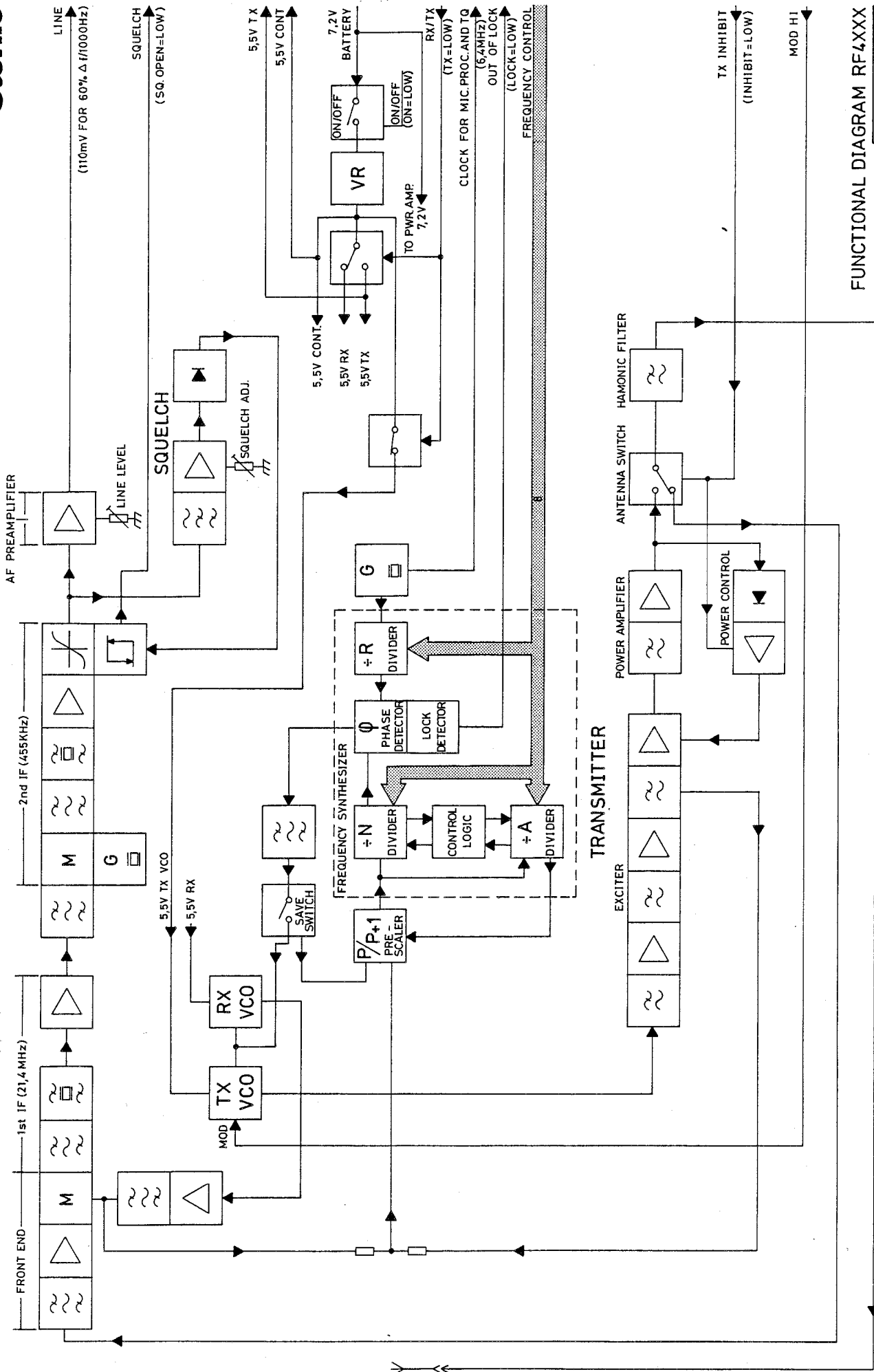
A 5.5 V stabilized voltage regulator is designed around an adjustable shunt regulator IC, with low drop-out voltage, high temperature stability and short circuit protection.

Regulated 5.5 V is continuously applied to the IF-squelch and synthesizer circuits, to the RX/

TX switch-circuit controlled by the control logic, and through a current save switch to the pre-scaler in the RF synthesizer.

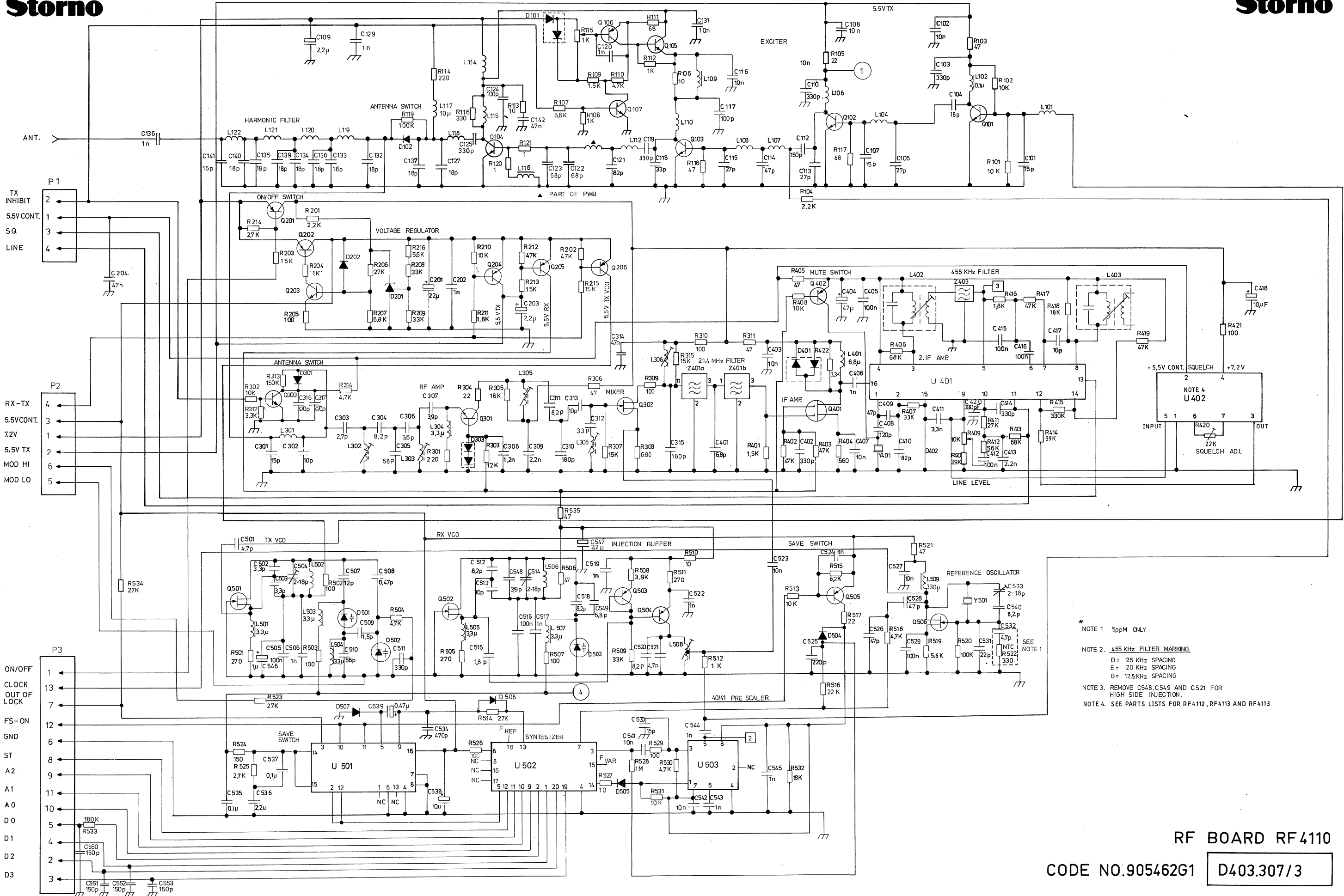
The RX/TX switching is performed, where possible, by switching only the bias currents to the involved circuits.





FUNCTIONAL DIAGRAM RF4XXX

D403.634

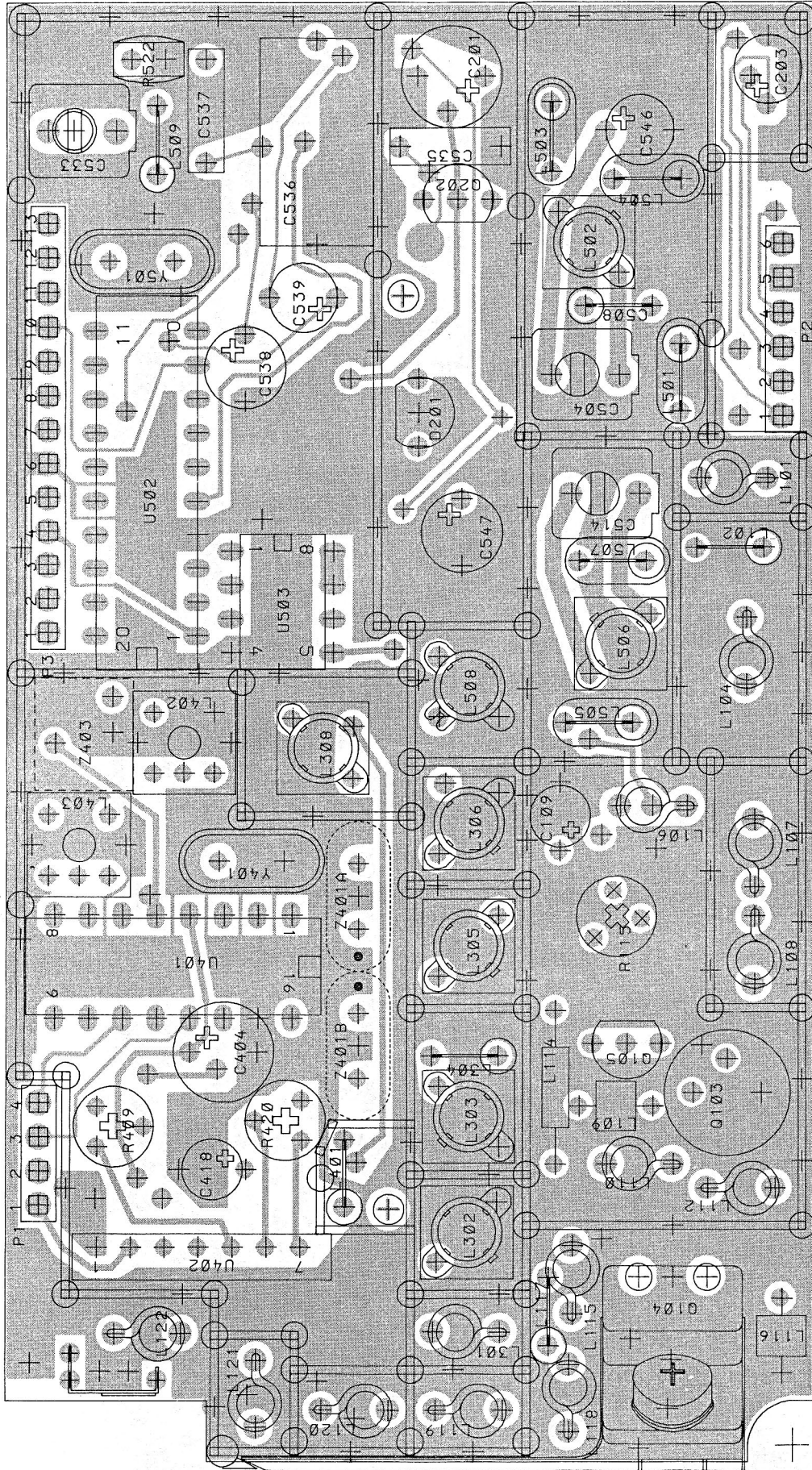


- * NOTE 1. 5ppm. ONLY
- NOTE 2. 455 KHz FILTER MARKING
D = 25 KHz SPACING
E = 20 KHz SPACING
G = 12.5KHz SPACING
- NOTE 3. REMOVE C548, C549 AND C521 FOR HIGH SIDE INJECTION.
- NOTE 4. SEE PARTS LISTS FOR RF4112, RF4113 AND RF4113

RF BOARD RF4110

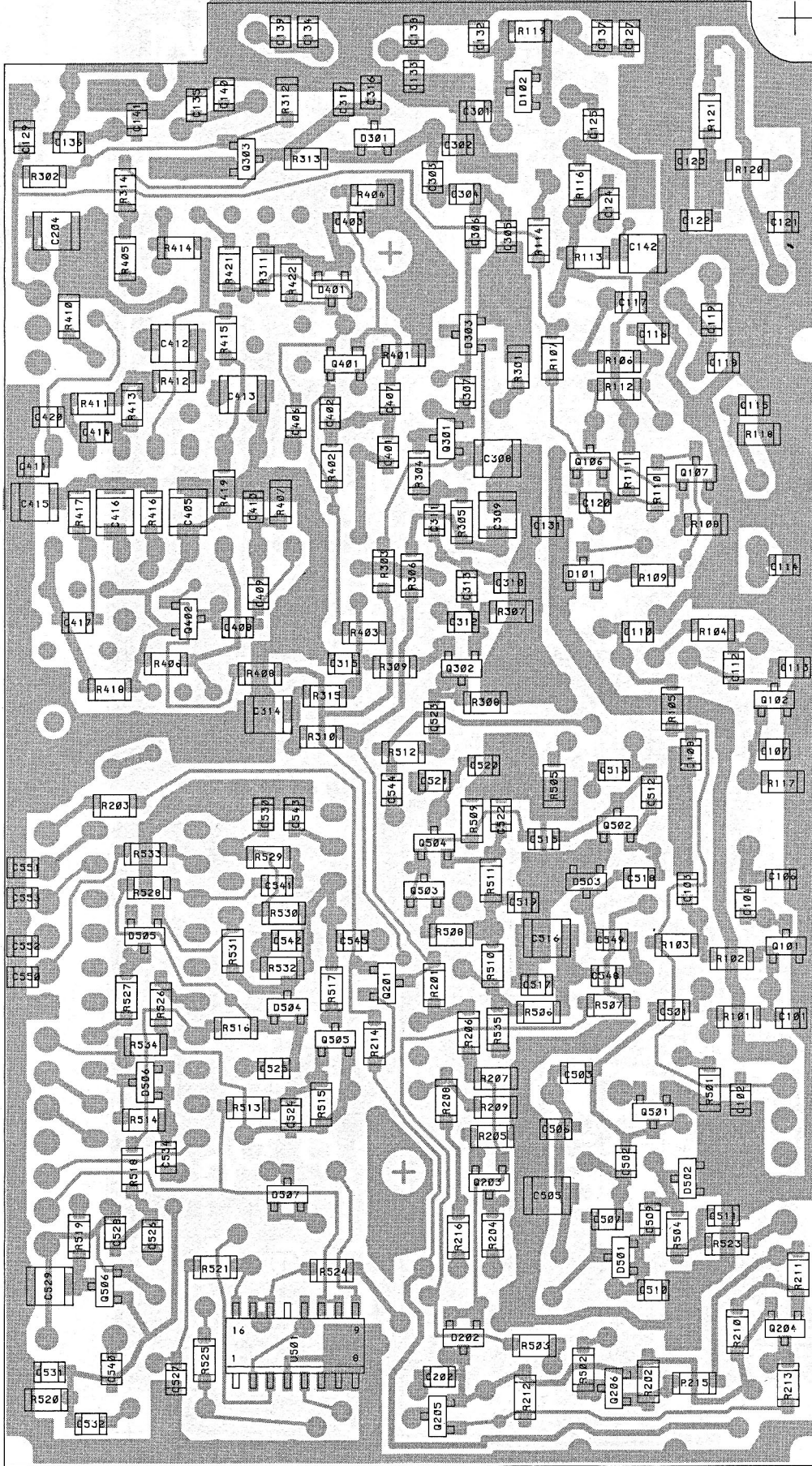
CODE NO.905462G1

D403.307/3



RADIO FREQUENCY-UNIT RF4110
COMPONENT LAYOUT
COMPONENT SIDE

CODE NO. M905462G1 D403.309/2



RADIO FREQUENCY-UNIT RF4110
COMPONENT LAYOUT
CHIP SIDE

CODE NO. M905462G1 D403.313/2

ITEM NUMBER DESCRIPTION
M905462G1 CPNT BD RF411X , 1ST. VERSION
=====

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
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CAPACITORS:

C101	J707436P21	CAP CER 15PF 50V	1
C102	J707438P14	CAP CER 10NF 50V	1
C103	J707436P73	CAP CER 330PF 50V	1
C104	J707436P25	CAP CER 18PF 50V	1
C106	J707436P33	CAP CER 27PF 50V	1
C107	J707436P21	CAP CER 15PF 50V	1
C108	J707438P14	CAP CER 10NF 50V	1
C109	J707353P5	CAP ELEC 2,2MF 50V	1
C110	J707436P73	CAP CER 330PF 50V	1
C112	J707436P65	CAP CER 150PF 50V	1
C113	J707436P33	CAP CER 27PF 50V	1
C114	J707436P45	CAP CER 47PF 50V	1
C115	J707436P33	CAP CER 27PF 50V	1
C116	J707438P14	CAP CER 10NF 50V	1
C117	J707436P61	CAP CER 100PF 50V	1
C118	J707436P37	CAP CER 33PF 50V	1
C119	J707436P73	CAP CER 330PF 50V	1
C120	J707438P5	CAP CER 1NF 50V	1
C121	J707436P57	CAP CER 82PF 50V	1
C122	J707436P53	CAP CER 68PF 50V	1
C123	J707436P53	CAP CER 68PF 50V	1
C124	J707436P61	CAP CER 100PF 50V	1
C125	J707436P73	CAP CER 330PF 50V	1
C127	J707436P25	CAP CER 18PF 50V	1
C129	J707438P5	CAP CER 1NF 50V	1
C131	J707438P14	CAP CER 10NF 50V	1
C132	J707436P25	CAP CER 18PF 50V	1
C133	J707436P25	CAP CER 18PF 50V	1
C134	J707436P25	CAP CER 18PF 50V	1
C135	J707436P25	CAP CER 18PF 50V	1
C136	J707438P5	CAP CER 1NF 50V	1
C137	J707436P25	CAP CER 18PF 50V	1
C138	J707436P25	CAP CER 18PF 50V	1
C139	J707436P25	CAP CER 18PF 50V	1
C140	J707436P25	CAP CER 18PF 50V	1
C141	J707436P21	CAP CER 15PF 50V	1
C142	J707438P22	CAP CER 47NF 50V	1
C201	J707444P8	CAP TA 22MF 16V	1
C202	J707438P5	CAP CER 1NF 50V	1
C203	J707444P5	CAP TA 2,2MF 35V	1
C204	J707438P22	CAP CER 47NF 50V	1
C301	J707436P21	CAP CER 15PF 50V	1
C302	J707436P13	CAP CER 10PF 50V	1
C303	J707436P6	CAP CER 2,7PF 50V	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
C304	J707436P12	CAP CER 8,2PF 50V	1
C305	J707436P53	CAP CER 68PF 50V	1
C306	J707436P10	CAP CER 5,6PF 50V	1
C307	J707436P8	CAP CER 3,9PF 50V	1
C308	J707436P87	CAP CER 1,2NF 50V	1
C309	J707436P93	CAP CER 2,2NF 50V	1
C310	J707436P67	CAP CER 180PF 50V	1
C311	J707436P12	CAP CER 8,2PF 50V	1
C312	J707436P37	CAP CER 33PF 50V	1
C313	J707436P13	CAP CER 10PF 50V	1
C314	J707438P22	CAP CER 47NF 50V	1
C315	J707436P67	CAP CER 180PF 50V	1
C316	J707438P3	CAP CER 470PF 50V	1
C317	J707438P3	CAP CER 470PF 50V	1
C401	J707436P11	CAP CER 6,8PF 50V	1
C402	J707436P73	CAP CER 330PF 50V	1
C403	J707438P14	CAP CER 10NF 50V	1
C404	J707444P9	CAP TA 47MF 6,3V	1
C405	J707438P26	CAP CER 100NF 50V	1
C406	J707438P5	CAP CER 1NF 50V	1
C407	J707438P14	CAP CER 10NF 50V	1
C408	J707436P63	CAP CER 120PF 50V	1
C409	J707436P45	CAP CER 47PF 50V	1
C410	J707436P57 *	* CAP CER 82PF 50V	1
C411	J707438P8	CAP CER 3,3NF 50V	1
C412	J707438P26	CAP CER 100NF 50V	1
C413	J707436P93	CAP CER 2,2NF 50V	1
C414	J707436P73	CAP CER 330PF 50V	1
C415	J707438P26	CAP CER 100NF 50V	1
C416	J707438P26	CAP CER 100NF 50V	1
C417	J707436P13	CAP CER 10PF 50V	1
C418	J707444P7	CAP TA 10MF 16V	1
*	*	*	*
C420	J707436P73	CAP CER 330PF 50V	1
C501	J707436P9	CAP CER 4,7PF 50V	1
C502	J707436P7	CAP CER 3,3PF 50V	1
C503	J707436P7	CAP CER 3,3PF 50V	1
C504	J707475P1	CAP VAR 2 - 18 PF	1
C505	J707438P26	CAP CER 100NF 50V	1
C506	J707438P5	CAP CER 1NF 50V	1
C507	J707436P17	CAP CER 12PF 50V	1
C508	J707483P1	CAP PHEN 0,47PF 500V	1
C509	J707436P3	CAP CER 1,5PF 50V	1
C510	J707436P49	CAP CER 56PF 50V	1
C511	J707436P73	CAP CER 330PF 50V	1
C512	J707436P12	CAP CER 8,2PF 50V	1
C513	J707436P13	CAP CER 10PF 50V	1
C514	J707475P1	CAP VAR 2 - 18 PF	1
C515	J707436P4	CAP CER 1,8PF 50V	1
C516	J707438P26	CAP CER 100NF 50V	1
C517	J707438P5	CAP CER 1NF 50V	1
C518	J707436P12	CAP CER 8,2PF 50V	1
C519	J707438P5	CAP CER 1NF 50V	1
C520	J707436P12	CAP CER 8,2PF 50V	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
C521	J707436P9	CAP CER 4,7PF 50V	1
C522	J707438P5	CAP CER 1NF 50V	1
C523	J707438P14	CAP CER 10NF 50V	1
C524	J707438P5	CAP CER 1NF 50V	1
C525	J707436P69	CAP CER 220PF 50V	1
C526	J707436P45	CAP CER 47PF 50V	1
C527	J707438P14	CAP CER 10NF 50V	1
C528	J707436P45	CAP CER 47PF 50V	1
C529	J707438P26	CAP CER 100NF 50V	1
C530	J707436P21	CAP CER 15PF 50V	1
C531	J707436P29	CAP CER 22PF 50V	1
C532	J707436P9	CAP CER 4,7PF 50V	1
C533	J707475P1	CAP VAR 2 - 18 PF	1
C534	J707438P3	CAP CER 470PF 50V	1
C535	J707412P9	CAP PYES 0,1MF 63V	1
C536	J707612P1	CAP POL 2,2MF 100V	1
C537	J707412P9	CAP PYES 0,1MF 63V	1
C538	J707353P7	CAP ELEC 10MF 16V	1
C539	J707444P3	CAP TA 0,47MF 35V	1
C540	J707436P12	CAP CER 8,2PF 50V	1
C541	J707438P14	CAP CER 10NF 50V	1
C542	J707438P14	CAP CER 10NF 50V	1
C543	J707438P5	CAP CER 1NF 50V	1
C544	J707438P5	CAP CER 1NF 50V	1
C545	J707438P5	CAP CER 1NF 50V	1
C546	J707444P4	CAP TA 1MF 35V	1
C547	J707444P5	CAP TA 2,2MF 35V	1
C548	J707436P8	CAP CER 3,9PF 50V	1
C549	J707436P11	CAP CER 6,8PF 50V	1
C550	J707436P65	CAP CER 150PF 50V	1
C551	J707436P65	CAP CER 150PF 50V	1
C552	J707436P65	CAP CER 150PF 50V	1
C553	J707436P65	CAP CER 150PF 50V	1

DIODES:

D101	J707389P1	DIO SI SIG BAV 99	1
D102	J707391P1	DIO SI SIG BAT 18	1
D201	J707448P1	IC LIN VR VAR TL 431 CLP	1
D202	J707390P1	DIO SI SIG BAV 74L	1
D301	J707391P1	DIO SI SIG BAT 18	1
D303	J707389P1	DIO SI SIG BAV 99	1
D401	J707389P1	DIO SI SIG BAV 99	1
D501	J707397P1	DIO SI VAR CAP BBY 40	1
D502	J707397P1	DIO SI VAR CAP BBY 40	1
D503	J707397P1	DIO SI VAR CAP BBY 40	1
D504	J707390P1	DIO SI SIG BAV 74L	1
D505	J707390P1	DIO SI SIG BAV 74L	1
D506	J707390P1	DIO SI SIG BAV 74L	1
D507	J707390P1	DIO SI SIG BAV 74L	1

COILS:

L101	J707426P1	COIL FIX	1
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CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
L102	* A700024P1	COIL FIX 100NH 10%	1
L104	J707426P5	COIL FIX	1
L106	J707426P7	COIL FIX	1
L107	J707426P2	COIL FIX	1
L108	J707426P2	COIL FIX	1
L109	J707339G1	COIL FIX ASM	1
L110	J707426P7	COIL FIX	1
L112	J707426P3	COIL FIX	1
L114	J707731G1	COIL FIX ASM	1
L115	J707426P4	COIL FIX	1
L116	J707339G1	COIL FIX ASM	1
L117	J707486P4	COIL,RF-FIXED 10 UH 10%	1
L118	J707426P2	COIL FIX	1
L119	J707426P6	COIL FIX	1
L120	J707426P7	COIL FIX	1
L121	J707426P7	COIL FIX	1
L122	J707426P6	COIL FIX	1
L301	J707426P6	COIL FIX	1
L302	J707422P2	COIL RF-VAR., 4-1/2T	1
L303	J707422P2	COIL RF-VAR., 4-1/2T	1
L304	J707486P2	COIL RF-FIX., 3.3 UH 10%	1
L305	J707422P2	COIL RF-VAR., 4-1/2T	1
L306	J707422P2	COIL RF-VAR., 4-1/2T	1
L308	J707422P3	COIL RF-VAR., 9-1/2T	1
L401	J707486P3	COIL,RF-FIX., 6.8 UH 10%	1
L402	J707431P1	COIL RF-VAR., 455KHZ 25%	1
L403	J707431P1	COIL RF-VAR., 455KHZ 25%	1
L501	J707486P2	COIL RF-FIX., 3.3 UH 10%	1
L502	J707422P1	COIL RF-VAR., 2-1/2T	1
L503	J707486P2	COIL RF-FIX., 3.3 UH 10%	1
L504	J707486P2	COIL RF-FIX., 3.3 UH 10%	1
L505	J707486P2	COIL RF-FIX., 3.3 UH 10%	1
L506	J707422P1	COIL RF-VAR., 2-1/2T	1
L507	J707486P2	COIL RF-FIX., 3.3 UH 10%	1
L508	J707375P1	COIL RF-VAR., 4-1/2 TAP	1
L509	J707486P5	COIL RF-FIX., 330 UH 10%	1

CONNECTORS:

P001	J707962G1	PLUG-ASM, 4 PIN,+ FERR. CORE	1
P002	J707962G2	PLUG-ASM, 6 PIN,+ FERR. CORE	1
P003	J707962G3	PLUG-ASM, 13 PIN,+ FERR. CORE	1

TRANSISTORS:

Q101	J707388P1	TSTR NPN SI BFR 53	1
Q102	J707388P1	TSTR NPN SI BFR 53	1
Q103	J706145P1	TSTR NPN SI BFW 16A	1
Q104	J707447P1	TSTR NPN SI RF-PWR 5W	1
Q105	J707673P1	TSTR NPN SI BC 368	1
Q106	J707387P1-	TSTR PNP SI BCW 30	1
Q107	J707386P1	TSTR NPN SI BCW 32	1
Q201	J707387P1-	TSTR PNP SI BCW 30	1
Q202	J707435P1	TSTR PNP SI BC 369	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
Q203	J707386P1	TSTR NPN SI BCW 32	1
Q204	J707432P1	TSTR PNP SI BCX 18	1
Q205	J707387P1~	TSTR PNP SI BCW 30	1
Q206	J707387P1~	TSTR PNP SI BCW 30	1
Q301	J707418P1	TSTR NPN SI BFS 17	1
Q302	J707419P1	TSTR JFET SI BF 511	1
Q303	J707386P1	TSTR NPN SI BCW 32	1
Q401	J707433P1	TSTR MFET SI BF 989	1
Q402	J707387P1~	TSTR PNP SI BCW 30	1
Q501	J707419P1	TSTR JFET SI BF 511	1
Q502	J707419P1	TSTR JFET SI BF 511	1
Q503	J707387P1~	TSTR PNP SI BCW 30	1
Q504	J707430P1	TSTR NPN SI BF 569	1
Q505	J707387P1~	TSTR PNP SI BCW 30	1
Q506	J707419P1	TSTR JFET SI BF 511	1
RESISTORS: -----			
R101	J707385P103	RES MFILM 10K OHM 0,125W	1
R102	J707385P103	RES MFILM 10K OHM 0,125W	1
R103	J707385P470	RES MFILM 47 OHM 0,125W	1
R104	J707385P222	RES MFILM 2,2K OHM 0,125W	1
R105	J707385P220	RES MFILM 22 OHM 0,125W	1
R106	J707385P100	RES MFILM 10 OHM 0,125W	1
R107	J707385P562	RES MFILM 5,6K OHM 0,125W	1
R108	J707385P102	RES MFILM 1K OHM 0,125W	1
R109	J707385P152	RES MFILM 1,5K OHM 0,125W	1
R110	J707385P472	RES MFILM 4,7K OHM 0,125W	1
R111	J707385P680	RES MFILM 68 OHM 0,125W	1
R112	J707385P102	RES MFILM 1K OHM 0,125W	1
R113	J707385P100	RES MFILM 10 OHM 0,125W	1
R115	J707478P4	RES VAR 1K OHM 0,05W	1
R116	J707385P331	RES MFILM330 OHM 0,125W	1
R117	J707385P680	RES MFILM 68 OHM 0,125W	1
R118	J707385P470	RES MFILM 47 OHM 0,125W	1
R119	J707385P104	RES MFILM 100K OHM 0,125W	1
R120	J707385P910	RES MFILM 1 OHM 0,125W	1
R121	J707385P910	RES MFILM 1 OHM 0,125W	1
R201	J707385P222	RES MFILM 2,2K OHM 0,125W	1
R202	J707385P473	RES MFILM 47K OHM 0,125W	1
R203	J707385P153	RES MFILM 15K OHM 0,125W	1
R204	J707385P102	RES MFILM 1K OHM 0,125W	1
R205	J707385P101	RES MFILM 100 OHM 0,125W	1
R206	J707385P273	RES MFILM 27K OHM 0,125W	1
R207	J707385P682	RES MFILM 6,8K OHM 0,125W	1
R208	J707385P333	RES MFILM 33K OHM 0,125W	1
R209	J707385P333	RES MFILM 33K OHM 0,125W	1
R210	J707385P103	RES MFILM 10K OHM 0,125W	1
R211	J707385P182	RES MFILM 1,8K OHM 0,125W	1
R212	J707385P473	RES MFILM 47K OHM 0,125W	1
R213	J707385P153	RES MFILM 15K OHM 0,125W	1
R214	J707385P272	RES MFILM 2,7K OHM 0,125W	1
R215	J707385P153	RES MFILM 15K OHM 0,125W	1
R216	J707385P562	RES MFILM 5,6K OHM 0,125W	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
R221	J707385P221	RES MFILM 220 OHM 0,125W	1
R301	J707385P221	RES MFILM 220 OHM 0,125W	1
R302	J707385P103	RES MFILM 10K OHM 0,125W	1
R303	J707385P123	RES MFILM 12K OHM 0,125W	1
R304	J707385P220	RES MFILM 22 OHM 0,125W	1
R305	J707385P183	RES MFILM 18K OHM 0,125W	1
R306	J707385P470	RES MFILM 47 OHM 0,125W	1
R307	J707385P153	RES MFILM 15K OHM 0,125W	1
R308	J707385P681	RES MFILM 680 OHM 0,125W	1
R309	J707385P101	RES MFILM 100 OHM 0,125W	1
R310	J707385P101	RES MFILM 100 OHM 0,125W	1
R311	J707385P470	RES MFILM 47 OHM 0,125W	1
R312	J707385P332	RES MFILM 3,3K OHM 0,125W	1
R313	J707385P154	RES MFILM 150K OHM 0,125W	1
R314	J707385P472	RES MFILM 4,7K OHM 0,125W	1
R315	J707385P153	RES MFILM 15K OHM 0,125W	1
R401	J707385P152	RES MFILM 1,5K OHM 0,125W	1
R402	J707385P473	RES MFILM 47K OHM 0,125W	1
R403	J707385P473	RES MFILM 47K OHM 0,125W	1
R404	J707385P561	RES MFILM 560 OHM 0,125W	1
R405	J707385P470	RES MFILM 47 OHM 0,125W	1
R406	J707385P683	RES MFILM 68K OHM 0,125W	1
R407	J707385P333 *	* RES MFILM 33K OHM 0,125W	1
R408	J707385P103	RES MFILM 10K OHM 0,125W	1
R409	J707478P10	RES VAR 10K OHM 0,05W	1
R410	J707385P392	RES MFILM 3,9K OHM 0,125W	1
R411	J707385P273	RES MFILM 27K OHM 0,125W	1
R412	J707385P563	RES MFILM 56K OHM 0,125W	1
R413	J707385P683	RES MFILM 68K OHM 0,125W	1
R414	J707385P393	RES MFILM 39K OHM 0,125W	1
R415	J707385P334	RES MFILM 330K OHM 0,125W	1
R416	J707385P182	RES MFILM 1,8K OHM 0,125W	1
R417	J707385P473	RES MFILM 47K OHM 0,125W	1
R418	J707385P183	RES MFILM 18K OHM 0,125W	1
R419	J707385P473	RES MFILM 47K OHM 0,125W	1
R420	J707478P12	RES VAR 22K OHM 0,05W	1
R421	J707385P101	RES MFILM 100 OHM 0,125W	1
R422	J707385P332	RES MFILM 3,3K OHM 0,125W	1
R501	J707385P271	RES MFILM 270 OHM 0,125W	1
R502	J707385P101	RES MFILM 100 OHM 0,125W	1
R503	J707385P101	RES MFILM 100 OHM 0,125W	1
R504	J707385P472	RES MFILM 4,7K OHM 0,125W	1
R505	J707385P271	RES MFILM 270 OHM 0,125W	1
R506	J707385P470	RES MFILM 47 OHM 0,125W	1
R507	J707385P101	RES MFILM 100 OHM 0,125W	1
R508	J707385P392	RES MFILM 3,9K OHM 0,125W	1
R509	J707385P333	RES MFILM 33K OHM 0,125W	1
R510	J707385P100	RES MFILM 10 OHM 0,125W	1
R511	J707385P271	RES MFILM 270 OHM 0,125W	1
R512	J707385P102	RES MFILM 1K OHM 0,125W	1
R513	J707385P103	RES MFILM 10K OHM 0,125W	1
R514	J707385P273	RES MFILM 27K OHM 0,125W	1
R515	J707385P822	RES MFILM 8,2K OHM 0,125W	1
R516	J707385P223	RES MFILM 22K OHM 0,125W	1

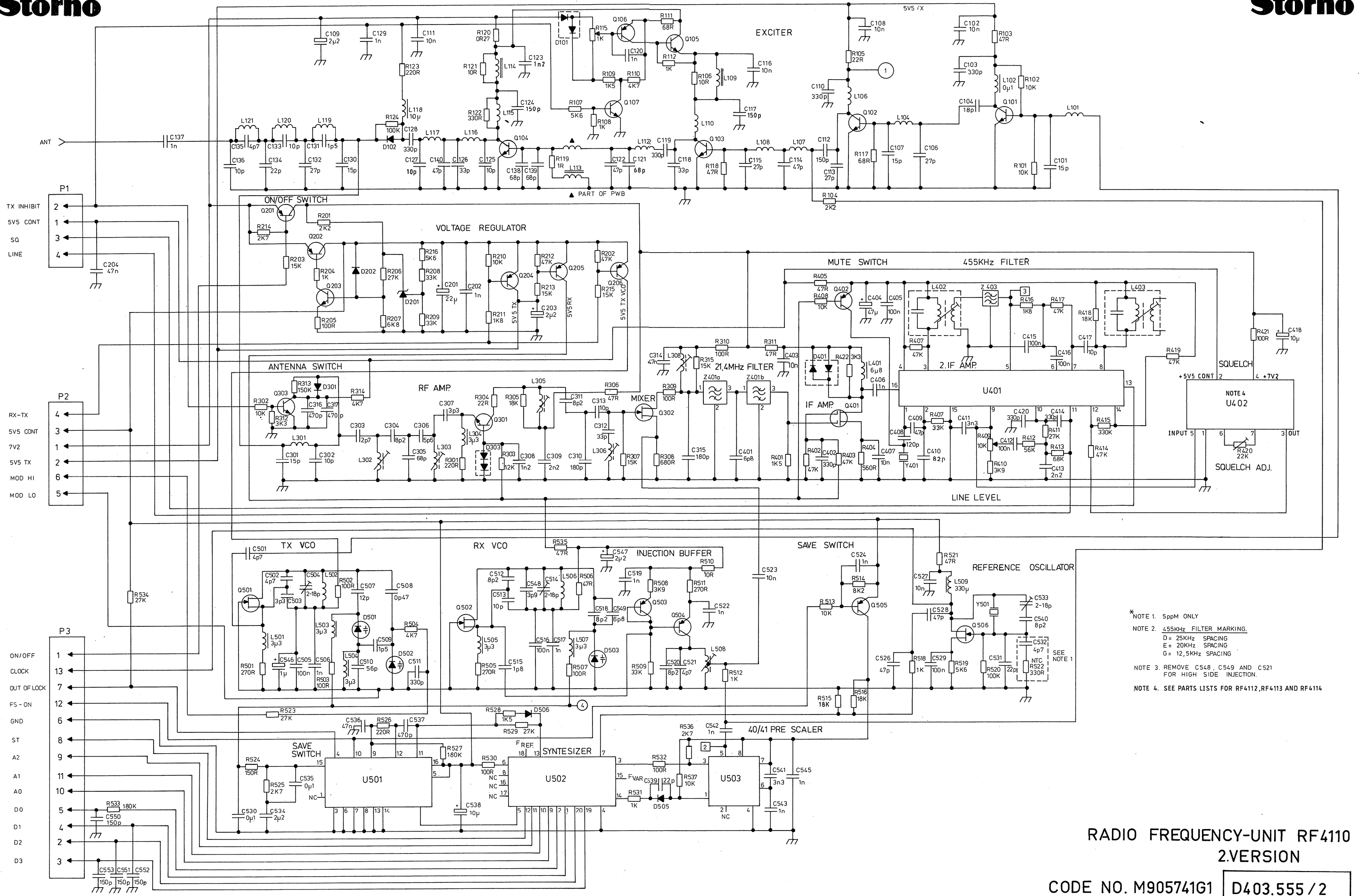
CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
R517	J707385P220	RES MFILM 22 OHM 0,125W	1
R518	J707385P472	RES MFILM 4,7K OHM 0,125W	1
R519	J707385P562	RES MFILM 5,6K OHM 0,125W	1
R520	J707385P104	RES MFILM 100K OHM 0,125W	1
R521	J707385P470	RES MFILM 47 OHM 0,125W	1
R523	J707385P273	RES MFILM 27K OHM 0,125W	1
R524	J707385P151	RES MFILM 150 OHM 0,125W	1
R525	J707385P272	RES MFILM 2,7K OHM 0,125W	1
R526	J707385P101	RES MFILM 100 OHM 0,125W	1
R527	J707385P100	RES MFILM 10 OHM 0,125W	1
R528	J707385P105	RES MFILM 1M OHM 0,125W	1
R529	J707385P101	RES MFILM 100 OHM 0,125W	1
R530	J707385P472	RES MFILM 4,7K OHM 0,125W	1
R531	J707385P103	RES MFILM 10K OHM 0,125W	1
R532	J707385P183	RES MFILM 18K OHM 0,125W	1
R533	J707385P184	RES MFILM 180K OHM 0,125W	1
R534	J707385P273	RES MFILM 27K OHM 0,125W	1
R535	J707385P470	RES MFILM 47 OHM 0,125W	1

INTEGRATED CIRCUIITS:

U401	J707449P1	INT CKT MC3357	1
U501	J707434P2	INT CKT CMOS 4053/S016	1
U502	J707337P1	INT CKT MC145146	1
U503	J707374P1	INT CKT PLL ECL SP8793	1

MECHANICAL COMPONENTS:

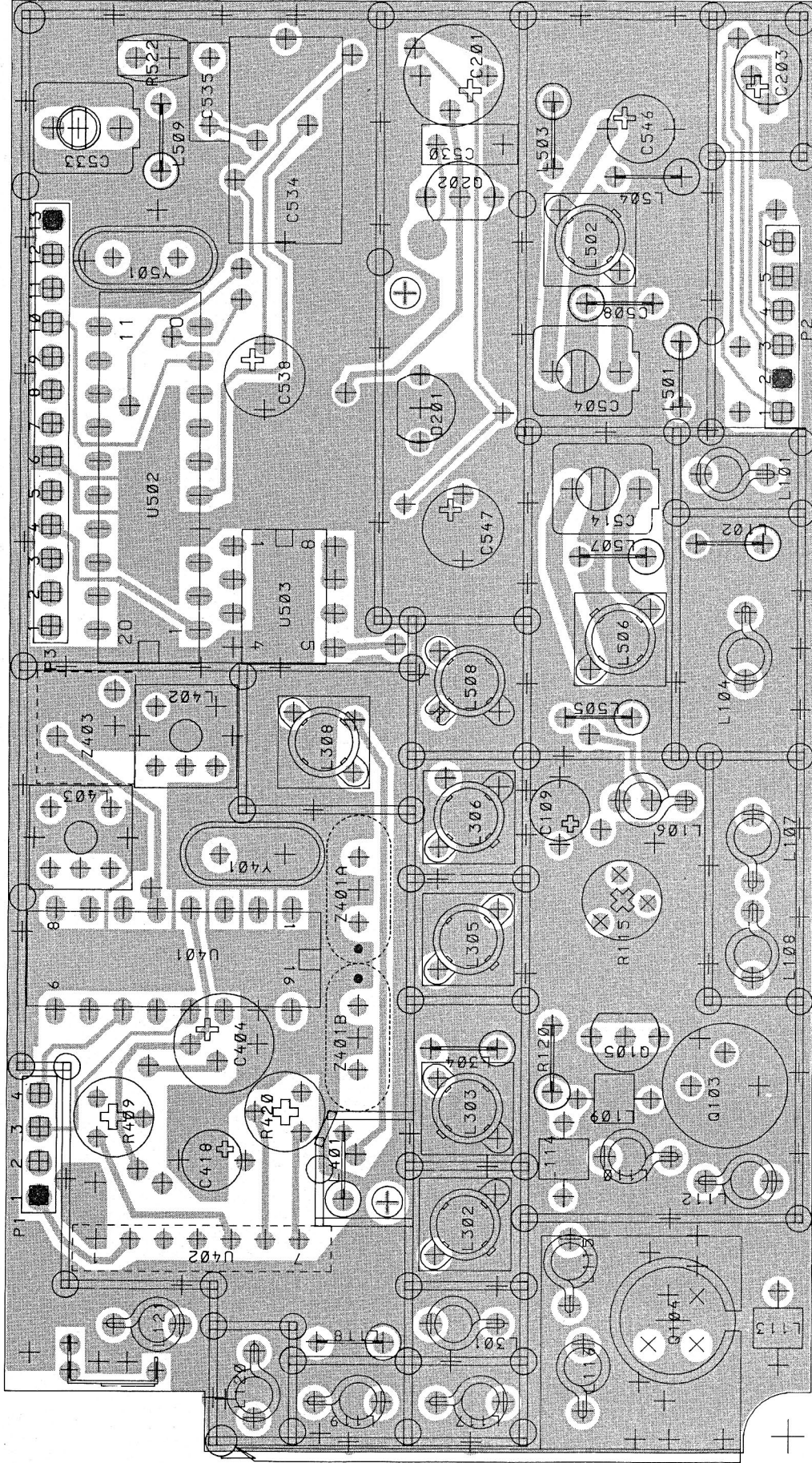
0003	K805347P1 *	SHLD METALL ASM	1
* 0004	* A701136P5	* SLVG. INS.- EL, D-4.7X0.51MM	0.05M
* 0005	* A701648P2	* SIL. RUBB. SEALANT, RTV-162	0.002KG
* 0006	* J706647P1	* SILICONE OIL, QZ 13	0.0001KG
0007	L855385P1	SPRING ANTENNA	1
0008	A701332P4	INSULATOR	1
0009	J706281P6	CORE-SCREW, FERR. U10	6
0010	K805323P1	HEAT-SINK	1



- * NOTE 1. 5ppm ONLY
- NOTE 2. 455kHz FILTER MARKING.
D = 25kHz SPACING
E = 20kHz SPACING
G = 12.5kHz SPACING
- NOTE 3. REMOVE C548, C549 AND C521 FOR HIGH SIDE INJECTION.
- NOTE 4. SEE PARTS LISTS FOR RF4112, RF4113 AND RF4114

**RADIO FREQUENCY-UNIT RF4110
2.VERSION**

CODE NO. M905741G1 **D403.555 / 2**

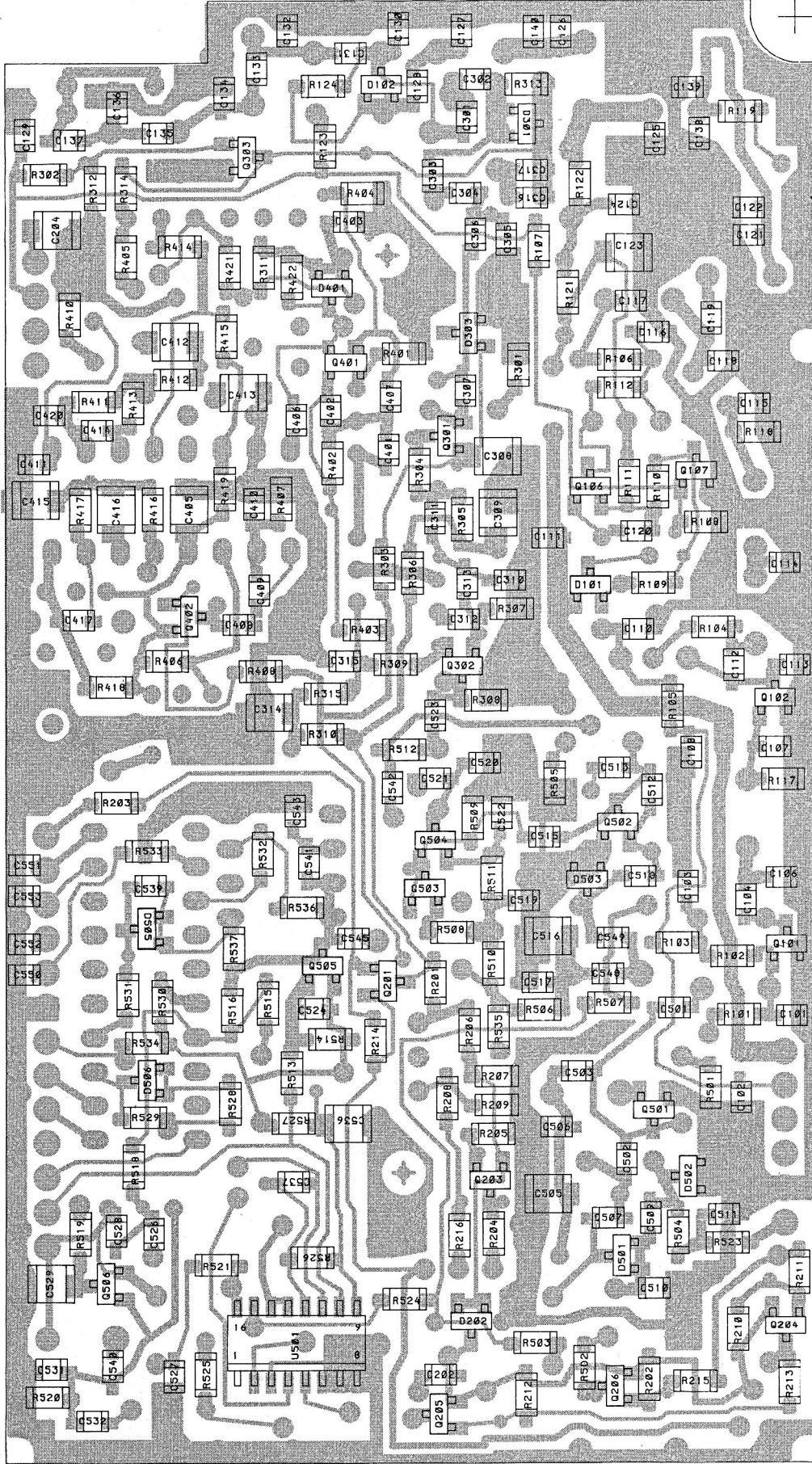


MODULE CODE NO.	MOUNTED BOARD CODE NO.
25 KHZ	J707428G1
20 KHZ	J707428G2
12, 5 KHZ	J707428G3

SEE PARTS LISTS

RADIO FREQUENCY-UNIT RF4110
 COMPONENT LAYOUT
 COMPONENT SIDE 2. VERSION

D403. 526/3



**RADIO FREQUENCY - UNIT RF4110
 COMPONENT LAYOUT
 CHIP SIDE**

2. VERSION
D403.527/3

	MODULE CODE NO.	MOUNTED BOARD CODE NO.
25 kHz	J707428G1	M905741G1
20 kHz	J707428G2	M905741G1
12, 5 kHz	J707428G3	M905741G1

SEE PARTS LISTS

ITEM NUMBER DESCRIPTION
M905741G1 CPNT BD R F 4 1 1 0, 2.ND TYPE
=====

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
C101	J707436P21	CAP CER NPO 15P 5% 50V	1
C102	J707438P14	CAP CER CL2 10N 10% 50V	1
C103	J707436P73	CAP CER NPO 330P 5% 50V	1
C104	J707436P25	CAP CER NPO 18P 5% 50V	1
C106	J707436P33	CAP CER NPO 27P 5% 50V	1
C107	J707436P21	CAP CER NPO 15P 5% 50V	1
C108	J707438P14	CAP CER CL2 10N 10% 50V	1
C109	J707353P5	CAP ELEC 2,2 UF 50V	1
C110	J707436P73	CAP CER NPO 330P 5% 50V	1
C111	J707438P14	CAP CER CL2 10N 10% 50V	1
C112	J707436P65	CAP CER NPO 150P 5% 50V	1
C113	J707436P33	CAP CER NPO 27P 5% 50V	1
C114	J707436P45	CAP CER NPO 47P 5% 50V	1
C115	J707436P33	CAP CER NPO 27P 5% 50V	1
C116	J707438P14	CAP CER CL2 10N 10% 50V	1
C117	J707436P65 *	* CAP CER NPO 150P 5% 50V	1
C118	J707436P37	CAP CER NPO 33P 5% 50V	1
C119	J707436P73	CAP CER NPO 330P 5% 50V	1
C120	J707438P5	CAP CER CL2 1N 10% 50V	1
C121	J707436P53 *	* CAP CER NPO 68P 5% 50V	1
C122	J707436P45	CAP CER NPO 47P 5% 50V	1
C123	* J707436P87	* CAP CER CL2 1N2 5% 50V	1
C124	J707436P65 *	* CAP CER NPO 150P 5% 50V	1
C125	J707436P13	CAP CER NPO 10P 5% 50V	1
C126	J707436P37	CAP CER NPO 33P 5% 50V	1
C127	J707436P13	CAP CER NPO 10P 5% 50V	1
C128	J707436P73	CAP CER NPO 330P 5% 50V	1
C129	J707438P5	CAP CER CL2 1N 10% 50V	1
C130	J707436P21	CAP CER NPO 15P 5% 50V	1
C131	J707436P3	CAP CER NPO 1P5,25P 50V	1
C132	J707436P33	CAP CER NPO 27P 5% 50V	1
C133	J707436P13 *	* CAP CER NPO 10P 5% 50V	1
C134	J707436P29	CAP CER NPO 22P 5% 50V	1
C135	J707436P9	CAP CER NPO 4P7,25P 50V	1
C136	J707436P13	CAP CER NPO 10P 5% 50V	1
C137	J707438P5	CAP CER CL2 1N 10% 50V	1
C138	J707436P53	CAP CER NPO 68P 5% 50V	1
C139	J707436P53	CAP CER NPO 68P 5% 50V	1
C140	J707436P45	CAP CER NPO 47P 5% 50V	1
C201	J707444P8	CAP TA SOL 22U 20% 16V	1
C202	J707438P5	CAP CER CL2 1N 10% 50V	1
C203	J707444P5	CAP TA SOL 2U2 20% 35V	1
C204	J707438P22	CAP CER CL2 47N 10% 50V	1
C301	J707436P21	CAP CER NPO 15P 5% 50V	1
C302	J707436P13	CAP CER NPO 10P 5% 50V	1
C303	J707436P6	CAP CER NPO 2P7,25P 50V	1
C304	J707436P12	CAP CER NPO 8P2.25P 50V	1
C305	J707436P53	CAP CER NPO 68P 5% 50V	1
C306	J707436P10	CAP CER NPO 5P6.25P 50V	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
C307	J707436P7	CAP CER NPO 3P3,25P 50V	1
C308	J707436P87	CAP CER NPO 1N2 5% 50V	1
C309	J707436P93	CAP CER NPO 2N2 5% 50V	1
C310	J707436P67	CAP CER NPO 180P 5% 50V	1
C311	J707436P12	CAP CER NPO 8P2.25P 50V	1
C312	J707436P37	CAP CER NPO 33P 5% 50V	1
C313	J707436P13	CAP CER NPO 10P 5% 50V	1
C314	J707438P22	CAP CER CL2 47N 10% 50V	1
C315	J707436P67	CAP CER NPO 180P 5% 50V	1
C316	J707438P3	CAP CER CL2 470P 10% 50V	1
C317	J707438P3	CAP CER CL2 470P 10% 50V	1
C401	J707436P11	CAP CER 6,8PF 50V	1
C402	J707436P73	CAP CER NPO 330P 5% 50V	1
C403	J707438P14	CAP CER CL2 10N 10% 50V	1
C404	J707444P9	CAP TA SOL 47U 20% 6V	1
C405	J707438P26	CAP CER CL2 100N 10% 50V	1
C406	J707438P5	CAP CER CL2 1N 10% 50V	1
C407	J707438P14	CAP CER CL2 10N 10% 50V	1
C408	J707436P63	CAP CER NPO 120P 5% 50V	1
C409	J707436P45	CAP CER NPO 47P 5% 50V	1
C410	J707436P57 *	* CAP CER NPO 82P 5% 50V	1
C411	J707438P8	CAP CER CL2 3N3 10% 50V	1
C412	J707438P26	CAP CER CL2 100N 10% 50V	1
C413	J707436P93	CAP CER NPO 2N2 5% 50V	1
C414	J707436P73	CAP CER NPO 330P 5% 50V	1
C415	J707438P26	CAP CER CL2 100N 10% 50V	1
C416	J707438P26	CAP CER CL2 100N 10% 50V	1
C417	J707436P13	CAP CER NPO 10P 5% 50V	1
C418	J707444P7	CAP TA SOL 10U 20% 16V	1
*	*	*	* DELETED
*	*	*	* DELETED
C420	J707436P73	CAP CER NPO 330P 5% 50V	1
C501	J707436P9	CAP CER NPO 4P7,25P 50V	1
C502	J707436P7	CAP CER NPO 3P3,25P 50V	1
C503	J707436P7	CAP CER NPO 3P3,25P 50V	1
C504	J707475P1	CAP VAR 2 - 18 PF	1
C505	J707438P26	CAP CER CL2 100N 10% 50V	1
C506	J707438P5	CAP CER CL2 1N 10% 50V	1
C507	J707436P17	CAP CER NPO 12P 5% 50V	1
C508	J707483P1	CAP PHEN 0P47 5% 500V	1
C509	J707436P3	CAP CER NPO 1P5,25P 50V	1
C510	J707436P49	CAP CER NPO 56P 5% 50V	1
C511	J707436P73	CAP CER NPO 330P 5% 50V	1
C512	J707436P12	CAP CER NPO 8P2.25P 50V	1
C513	J707436P13	CAP CER NPO 10P 5% 50V	1
C514	J707475P1	CAP VAR 2 - 18 PF	1
C515	J707436P4	CAP CER NPO 1P8,25P 50V	1
C516	J707438P26	CAP CER CL2 100N 10% 50V	1
C517	J707438P5	CAP CER CL2 1N 10% 50V	1
C518	J707436P12	CAP CER NPO 8P2.25P 50V	1
C519	J707438P5	CAP CER CL2 1N 10% 50V	1
C520	J707436P12	CAP CER NPO 8P2.25P 50V	1
C521	J707436P9	CAP CER NPO 4P7,25P 50V	1
C522	J707438P5	CAP CER CL2 1N 10% 50V	1
C523	J707438P14	CAP CER CL2 10N 10% 50V	1
C524	J707438P5	CAP CER CL2 1N 10% 50V	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
C526	J707436P45	CAP CER NPO 47P 5% 50V	1
C527	J707438P14	CAP CER CL2 10N 10% 50V	1
C528	J707436P45	CAP CER NPO 47P 5% 50V	1
C529	J707438P26	CAP CER CL2 100N 10% 50V	1
C530	J707412P9	CAP PYES 100N 10% 63V	1
C531	J707436P29	CAP CER NPO 22P 5% 50V	1
C532	J707436P9	CAP CER NPO 4P7,25P 50V	1
C533	J707475P1	CAP VAR 2 - 18 PF	1
C534	J707612P1	CAP POL 2,2MF 100V	1
C535	J707412P9	CAP PYES 100N 10% 63V	1
C536	J707438P22	CAP CER CL2 47N 10% 50V	1
C537	J707438P3	CAP CER CL2 470P 10% 50V	1
C538	J707353P7	CAP ELEC 10MF 16V	1
C539	J707436P29	CAP CER NPO 22P 5% 50V	1
C540	J707436P12	CAP CER NPO 8P2.25P 50V	1
C541	J707438P8	CAP CER CL2 3N3 10% 50V	1
C542	J707438P5	CAP CER CL2 1N 10% 50V	1
C543	J707438P5	CAP CER CL2 1N 10% 50V	1
C545	J707438P5	CAP CER CL2 1N 10% 50V	1
C546	J707444P4	CAP TA SOL 1U 20% 35V	1
C547	J707444P5	CAP TA SOL 2U2 20% 35V	1
C548	J707436P8	CAP CER NPO 3P9,25P 50V	1
C549	J707436P11	CAP CER 6,8PF 50V	1
C550	J707436P65	CAP CER NPO 150P 5% 50V	1
C551	J707436P65	CAP CER NPO 150P 5% 50V	1
C552	J707436P65	CAP CER NPO 150P 5% 50V	1
C553	J707436P65	CAP CER NPO 150P 5% 50V	1
D101	J707389P1	DIO SI SIG BAV 99	1
D102	J707391P1	DIO SI SIG BAT 18	1
D201	J707448P1	IC LIN VR VAR TL431 CLP	1
D202	J707390P1	DIO SI SIG BAV 74	1
D301	J707391P1	DIO SI SIG BAT 18	1
D303	J707389P1	DIO SI SIG BAV 99	1
D401	J707389P1	DIO SI SIG BAV 99	1
D501	J707397P1	DIO SI CAP BBY 40	1
D502	J707397P1	DIO SI CAP BBY 40	1
D503	J707397P1	DIO SI CAP BBY 40	1
D505	J707390P1	DIO SI SIG BAV 74	1
D506	J707390P1	DIO SI SIG BAV 74	1
L101	J707426P1	COIL FIX	1
L102	* A700024P1	* COIL RF FIX 100NH 10%	1
L104	J707426P5	COIL FIX	1
L106	J707426P7	COIL FIX	1
L107	J707426P2	COIL FIX	1
L108	J707426P2	COIL FIX	1
L109	J707339G1	COIL FIX ASM	1
L110	J707426P7	COIL FIX	1
L112	J707426P2	COIL FIX	1
L113	J707339G1	COIL FIX ASM	1
L114	J707339G1	COIL FIX ASM	1
L115	J707426P4	COIL FIX	1
L116	J707426P1 *	COIL FIX	1
L117	J707426P1 *	COIL FIX	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
L118	J707486P4	COIL RF FIX 10UH 10%	1
L119	J707426P5	COIL FIX	1
L120	J707426P4	COIL FIX	1
L121	J707426P4	COIL FIX	1
L301	J707426P6	COIL FIX	1
L302	J707422P2	COIL RF VAR 4-1/2T	1
L303	J707422P2	COIL RF VAR 4-1/2T	1
L304	J707486P2	COIL RF FIX 3.3UH 10%	1
L305	J707422P2	COIL RF VAR 4-1/2T	1
L306	J707422P2	COIL RF VAR 4-1/2T	1
L308	J707422P3	COIL RF VAR 9-1/2T	1
L401	J707486P3	COIL RF FIX 6.8UH 10%	1
L402	J707431P1	COIL RF VAR 455KHZ 25%	1
L403	J707431P1	COIL RF VAR 455KHZ 25%	1
L501	J707486P2	COIL RF FIX 3.3UH 10%	1
L502	J707422P1	COIL RF VAR 2-1/2T	1
L503	J707486P2	COIL RF FIX 3.3UH 10%	1
L504	J707486P2	COIL RF FIX 3.3UH 10%	1
L505	J707486P2	COIL RF FIX 3.3UH 10%	1
L506	J707422P1	COIL RF VAR 2-1/2T	1
L507	J707486P2	COIL RF FIX 3.3UH 10%	1
L508	J707375P1	COIL RF VAR 4-1/2 TAP	1
L509	J707486P5	COIL RF FIX 330UH 10%	1
P001	J707962G1	PLG ASM	1
P002	J707962G2	PLG ASM	1
P003	J707962G3	PLG ASM	1
Q101	J707388P1	TSTR NPN SI BFR 53	1
Q102	J707388P1	TSTR NPN SI BFR 53	1
Q103	J706145P1	TSTR NPN SI BFW 16A	1
Q104	J707868P1	TSTR NPN SI RF-PWR 4W	1
Q105	J707673P1	TSTR NPN SI BC 368	1
Q106	J707387P1	TSTR PNP SI BCW 30	1
Q107	J707386P1	TSTR NPN SI BCW 32	1
Q201	J707387P1	TSTR PNP SI BCW 30	1
Q202	J707435P1	TSTR PNP SI BC 369	1
Q203	J707386P1	TSTR NPN SI BCW 32	1
Q204	J707432P1	TSTR PNP SI BCX 18	1
Q205	J707387P1	TSTR PNP SI BCW 30	1
Q206	J707387P1	TSTR PNP SI BCW 30	1
Q301	J707418P1	TSTR NPN SI BFS 17	1
Q302	J707419P1	TSTR JFET SI BF 511	1
Q303	J707386P1	TSTR NPN SI BCW 32	1
Q401	J707433P1	TSTR MFET SI BF 989	1
Q402	J707387P1	TSTR PNP SI BCW 30	1
Q501	J707419P1	TSTR JFET SI BF 511	1
Q502	J707419P1	TSTR JFET SI BF 511	1
Q503	J707387P1	TSTR PNP SI BCW 30	1
Q504	J707430P1	TSTR NPN SI BF 569	1
Q505	J707387P1	TSTR PNP SI BCW 30	1
Q506	J707419P1	TSTR JFET SI BF 511	1
R101	J707385P103	RES MFILM 10K 5% 1/8W	1
R102	J707385P103	RES MFILM 10K 5% 1/8W	1
R103	J707385P470	RES MFILM 47R 5% 1/8W	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
R104	J707385P222	RES MFILM 2K2 5% 1/8W	1
R105	J707385P220	RES MFILM 22R 5% 1/8W	1
R106	J707385P100	RES MFILM 10R 5% 1/8W	1
R107	J707385P562	RES MFILM 5K6 5% 1/8W	1
R108	J707385P102	RES MFILM 1K0 5% 1/8W	1
R109	J707385P152	RES MFILM 1K5 5% 1/8W	1
R110	J707385P472	RES MFILM 4K7 5% 1/8W	1
R111	J707385P680	RES MFILM 68R 5% 1/8W	1
R112	J707385P102	RES MFILM 1K0 5% 1/8W	1
R115	J707478P4	RES VAR 1K OHM 0,05W	1
R117	J707385P680	RES MFILM 68R 5% 1/8W	1
R118	J707385P470	RES MFILM 47R 5% 1/8W	1
R119	J707385P910	RES MFILM 1R0 5% 1/8W	1
R120	J707945P1	RES WW R27 5%	1
R121	J707385P100	RES MFILM 10R 5% 1/8W	1
R122	J707385P331	RES MFILM 330R 5% 1/8W	1
R123	J707385P221	RES MFILM 220R 5% 1/8W	1
R124	J707385P104	RES MFILM 100K 5% 1/8W	1
R201	J707385P222	RES MFILM 2K2 5% 1/8W	1
R202	J707385P473	RES MFILM 47K 5% 1/8W	1
R203	J707385P153	RES MFILM 15K 5% 1/8W	1
R204	J707385P102	RES MFILM 1K0 5% 1/8W	1
R205	J707385P101	RES MFILM 100R 5% 1/8W	1
R206	J707385P273	RES MFILM 27K 5% 1/8W	1
R207	J707385P682	RES MFILM 6K8 5% 1/8W	1
R208	J707385P333	RES MFILM 33K 5% 1/8W	1
R209	J707385P333	RES MFILM 33K 5% 1/8W	1
R210	J707385P103	RES MFILM 10K 5% 1/8W	1
R211	J707385P182	RES MFILM 1K8 5% 1/8W	1
R212	J707385P473	RES MFILM 47K 5% 1/8W	1
R213	J707385P153	RES MFILM 15K 5% 1/8W	1
R214	J707385P272	RES MFILM 2K7 5% 1/8W	1
R215	J707385P153	RES MFILM 15K 5% 1/8W	1
R216	J707385P562	RES MFILM 5K6 5% 1/8W	1
R301	J707385P221	RES MFILM 220R 5% 1/8W	1
R302	J707385P103	RES MFILM 10K 5% 1/8W	1
R303	J707385P123	RES MFILM 12K 5% 1/8W	1
R304	J707385P220	RES MFILM 22R 5% 1/8W	1
R305	J707385P183	RES MFILM 18K 5% 1/8W	1
R306	J707385P470	RES MFILM 47R 5% 1/8W	1
R307	J707385P153	RES MFILM 15K 5% 1/8W	1
R308	J707385P681	RES MFILM 680R 5% 1/8W	1
R309	J707385P101	RES MFILM 100R 5% 1/8W	1
R310	J707385P101	RES MFILM 100R 5% 1/8W	1
R311	J707385P470	RES MFILM 47R 5% 1/8W	1
R312	J707385P332	RES MFILM 3K3 5% 1/8W	1
R313	J707385P154	RES MFILM 150K 5% 1/8W	1
R314	J707385P472	RES MFILM 4K7 5% 1/8W	1
R315	J707385P153	RES MFILM 15K 5% 1/8W	1
R401	J707385P152	RES MFILM 1K5 5% 1/8W	1
R402	J707385P473	RES MFILM 47K 5% 1/8W	1
R403	J707385P473	RES MFILM 47K 5% 1/8W	1
R404	J707385P561	RES MFILM 560R 5% 1/8W	1
R405	J707385P470	RES MFILM 47R 5% 1/8W	1
R406	J707385P683	RES MFILM 68K 5% 1/8W	1
R407	J707385P333 *	* RES MFILM 33K 5% 1/8W	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
R408	J707385P103	RES MFILM 10K 5% 1/8W	1
R409	J707478P10	RES VAR 10K OHM 0,05W	1
R410	J707385P392	RES MFILM 3K9 5% 1/8W	1
R411	J707385P273	RES MFILM 27K 5% 1/8W	1
R412	J707385P563	RES MFILM 56K 5% 1/8W	1
R413	J707385P683	RES MFILM 68K 5% 1/8W	1
R414	J707385P473	RES MFILM 47K 5% 1/8W	1
R415	J707385P334	RES MFILM 330K 5% 1/8W	1
R416	J707385P182	RES MFILM 1K8 5% 1/8W	1
R417	J707385P473	RES MFILM 47K 5% 1/8W	1
R418	J707385P183	RES MFILM 18K 5% 1/8W	1
R419	J707385P473	RES MFILM 47K 5% 1/8W	1
R420	J707478P12	RES VAR 22K OHM 0,05W	1
R421	J707385P101	RES MFILM 100R 5% 1/8W	1
R422	J707385P332	RES MFILM 3K3 5% 1/8W	1
R501	J707385P271	RES MFILM 270R 5% 1/8W	1
R502	J707385P101	RES MFILM 100R 5% 1/8W	1
R503	J707385P101	RES MFILM 100R 5% 1/8W	1
R504	J707385P472	RES MFILM 4K7 5% 1/8W	1
R505	J707385P271	RES MFILM 270R 5% 1/8W	1
R506	J707385P470	RES MFILM 47R 5% 1/8W	1
R507	J707385P101	RES MFILM 100R 5% 1/8W	1
R508	J707385P392	RES MFILM 3K9 5% 1/8W	1
R509	J707385P333	RES MFILM 33K 5% 1/8W	1
R510	J707385P100	RES MFILM 10R 5% 1/8W	1
R511	J707385P271	RES MFILM 270R 5% 1/8W	1
R512	J707385P102	RES MFILM 1K0 5% 1/8W	1
R513	J707385P103	RES MFILM 10K 5% 1/8W	1
R514	J707385P822	RES MFILM 8K2 5% 1/8W	1
R515	J707385P183 *	* RES MFILM 18K 5% 1/8W	1
R516	J707385P183	RES MFILM 18K 5% 1/8W	1
R518	J707385P102	RES MFILM 1K0 5% 1/8W	1
R519	J707385P562	RES MFILM 5K6 5% 1/8W	1
R520	J707385P104	RES MFILM 100K 5% 1/8W	1
R521	J707385P470	RES MFILM 47R 5% 1/8W	1
R523	J707385P273	RES MFILM 27K 5% 1/8W	1
R524	J707385P151	RES MFILM 150R 5% 1/8W	1
R525	J707385P272	RES MFILM 2K7 5% 1/8W	1
R526	J707385P221	RES MFILM 220R 5% 1/8W	1
R527	J707385P184	RES MFILM 180K 5% 1/8W	1
R528	J707385P152	RES MFILM 1K5 5% 1/8W	1
R529	J707385P273	RES MFILM 27K 5% 1/8W	1
R530	J707385P101	RES MFILM 100R 5% 1/8W	1
R531	J707385P102	RES MFILM 1K0 5% 1/8W	1
R532	J707385P101	RES MFILM 100R 5% 1/8W	1
R533	J707385P184	RES MFILM 180K 5% 1/8W	1
R534	J707385P273	RES MFILM 27K 5% 1/8W	1
R535	J707385P470	RES MFILM 47R 5% 1/8W	1
R536	J707385P272	RES MFILM 2K7 5% 1/8W	1
R537	J707385P103	RES MFILM 10K 5% 1/8W	1
U401	J707449P1	INT CKT MC3357	1
U501	J707434P2	IC DIG CMOS 4053	1
U502	J707337P1	INT CKT	1
U503	J707374P1	IC PLL ECL 8793	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
* 0002	* -----P1R2	* CPNT BD PW, REVISION NO.: 2	
0003	K805347P1	SHLD METALL ASM	1
0004	A700136P5	SLVG INS EL Ø4.7 X 0.51MM	0.002 M
0005	A701648P2	SIL RUBB. SEALANT RTV-162	0.001 KG
0006	J706647P1	SILICONE OIL QZ 13	0.001 KG
0007	L855385P1	SPRING ANTENNA	1
0008	A701332P4	INSULATOR	1
0009	J706281P6	CORE	6
0010	L855470P1	HEAT SINK	1

ITEM NUMBER	DESCRIPTION
J707428G1	RF 4112 , F. 25 KHZ CHANN.SPAC.
=====	
M905462G1	A001 : RF 4110 CPNT BD. 1ST. TYPE
OR	OR
M905741G1	A001 : RF 4110 CPNT BD. 2ND. TYPE

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY TOTAL
A001	M905462G1	RF 4110 CPNT BD., 1ST. TYPE	1 (NOTE)
OR :	OR :	OR :	
* A001	* M905741G1	* RF 4110 CPNT BD., 2ND. TYPE	1 (NOTE)
U402	M905492G1	SQ 4001, MIC.MOD. F.1ST.TYPE	1
OR:	OR:	OR:	
* U402	* M905766G1	* SQ 4002, MIC.MOD. F.2ND.TYPE	1
Z401	J707310P1	FLT 21,4MHZ	1
Z403	J707446P1	FLT 455KHZ	1
0002	J706804P2	WASHER, INSULATION-	2

ITEM NUMBER	DESCRIPTION
J707428G2	RF 4113 , F. 20 KHZ CHANN.SPAC.
=====	
M905462G1	A001 : RF 4110 CPNT BD. 1ST. TYPE
OR	OR
M905741G1	A001 : RF 4110 CPNT BD. 2ND. TYPE

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY TOTAL
A001	M905462G1	RF 4110 CPNT BD., 1ST. TYPE	1 (NOTE)
OR :	OR :	OR :	
* A001	* M905741G1	* RF 4110 CPNT BD., 2ND. TYPE	1 (NOTE)
U402	M905492G1	SQ 4001, MIC.MOD. F.1ST.TYPE	1
OR:	OR:	OR:	
* U402	* M905766G1	* SQ 4002, MIC.MOD. F.2ND.TYPE	1
Z401	J707310P2	FLT 21,4MHZ	1
Z403	J707446P3	FLT 455KHZ	1
0002	J706804P2	WASHER, INSULATION-	2

ITEM NUMBER	DESCRIPTION
J707428G3	RF 4114 , F. 12.5 KHZ CHANN.SPAC.
=====	
M905462G1	A001 : RF 4110 CPNT BD. 1ST. TYPE
OR	OR
M905741G1	A001 : RF 4110 CPNT BD. 2ND. TYPE

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY TOTAL
A001	M905462G1	RF 4110 CPNT BD., 1ST. TYPE	1 (NOTE)
OR :	OR :	OR :	
* A001	* M905741G1	* RF 4110 CPNT BD., 2ND. TYPE	1 (NOTE)
R522	J707406P1	RES THERM. NTC 330R 20%	1
U402	M905492G1	SQ 4001, MIC.MOD. F.1ST.TYPE	1
OR:	OR:	OR:	
* U402	* M905766G2	* SQ 4003, MIC.MOD. F.2ND.TYPE	1
Z401	J707310P3	FLT 21,4MHZ	1
Z403	J707446P4	FLT 455KHZ	1
0002	J706804P2	WASHER, INSULATION-	2

CHAPTER
CHAPITRE
KAPITEL

4

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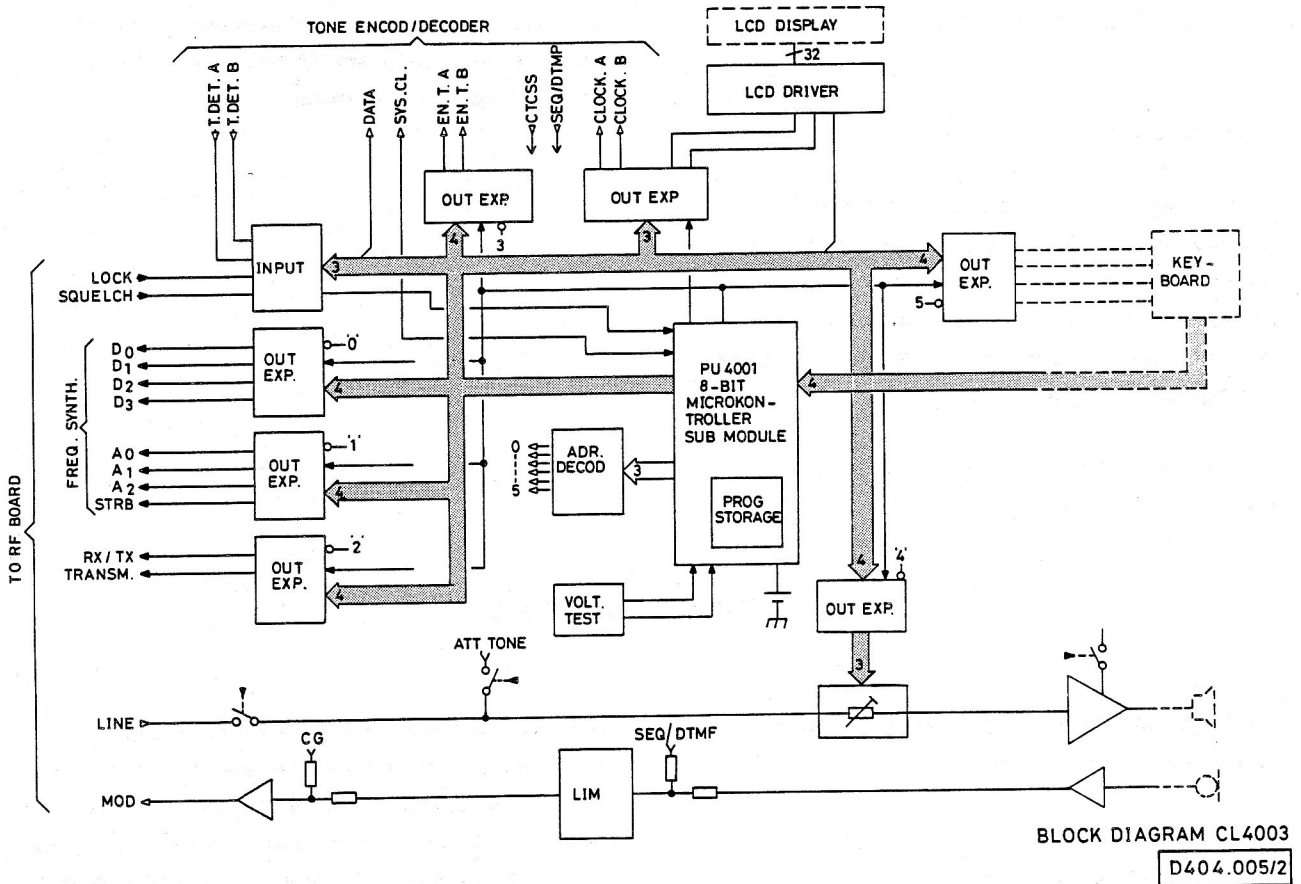
CL4003

CONTROL LOGIC BOARD

The control logic board assumes all the control functions of the radio:

- o Logic control circuitry
 - microcontroller submodule PU4001 with EPROM (including program memory and personality data)
 - frequency divider
 - display driver
 - input/output expansion system

- o Other functions
 - back-up battery
 - TX audio processor
 - audio output amplifier
 - microphone control
 - other functions
- o CL-board, Interconnections



BLOCK DIAGRAM CL4003
D404.005/2

LOGIC CONTROL CIRCUITRY

MICROCONTROLLER SUB-MODULE PU4001
(see separate description)

FREQUENCY DIVIDER U901

The crystal oscillator situated on the RF-board provides the 6.4 MHz (J903 pin 13) to the frequency divider clock input, pin 11 at U901. U901 acts as a buffer to the microcontroller clock and supplies:

- 1) system clock used in the tone option: 200 kHz
(U901, pin 5) (J904, pin 7)
- 2) clock for power-up/down circuitry: 50 kHz
(U901, pin 6)
- 3) Attention tone: 844 Hz
(U901, pin 2) (U902b, c)

DISPLAY DRIVER U913

U913 is served by the output latch U911. The display driver is capable of driving an LCD display with 32 segments in static mode. Segments are loaded serially and a built-in one point oscillator provides the correct waveforms for segment and backplane AC drive voltage.

The LED's H902 to H905 illuminate the display.

INPUT/OUTPUT EXPANSION SYSTEM

One IC (U914) is used to buffer the output expansion system and to isolate the microcontroller in the power-down state, where it receives back-up supply.

One IC (U904) decodes three lines of port 1 into 8 possible addresses, while the lower half of port 1 acts as a 4-bit data bus. Six 4-bit latches (U905, U906, U908, U909, U910, U912) are connected to this bus and serves as output ports.

The three least significant bits in the data bus concurrently acts as select addresses to an input multiplexer (U907).

U911 is an eight bit addressable output latch, serving the display driver (U913) and the optional tone signalling modules.

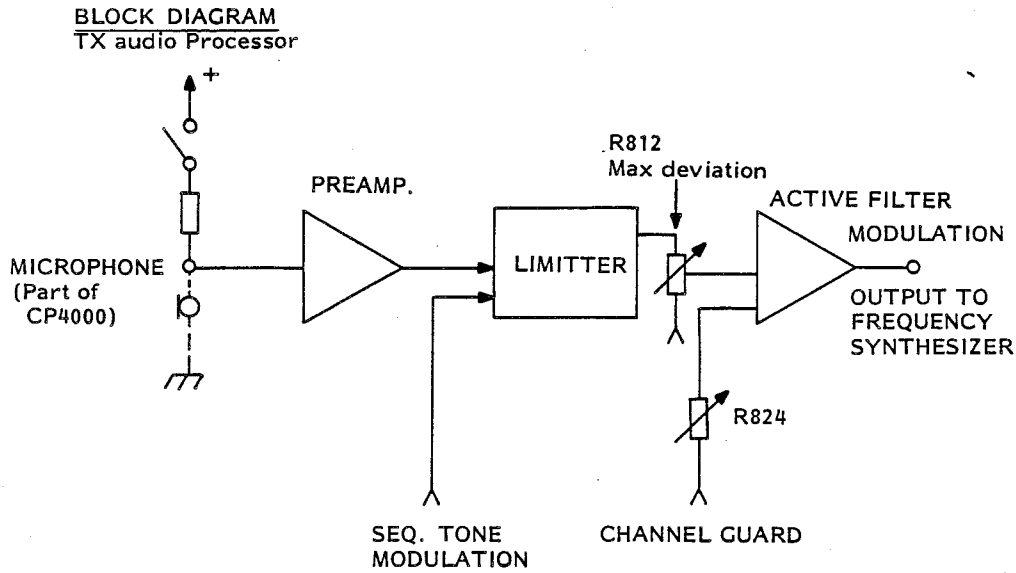
OTHER FUNCTIONS

BACK UP BATTERY CIRCUITRY B101, U903
and associated components

A lithium battery serves as back-up for the microcontroller data memory.

U903 is a dual comparator of which one gives a logic low-signal to the microcontroller when the battery voltage drops below the specified limit. The other comparator monitors the battery voltage to give a low-signal to start an emergency power down sequence. This to prevent excessive load on the back-up battery in case of improper removal of the main battery.

TX AUDIO PROCESSOR, U801 - Q802, 3, 4
and associated components

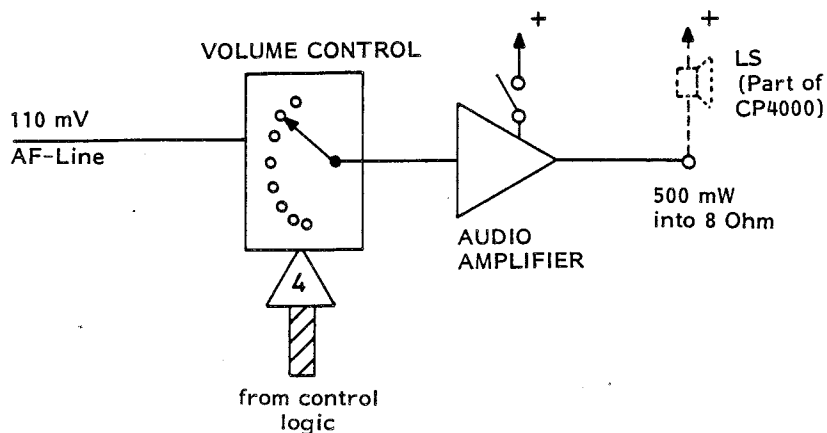


The audio processor consists of a dual operational amplifier (U801) performing the microphone preamplifier and the splatter filter, and a discrete limiter (Q802, Q803, Q804).

The audio processor contains 2 adjustment points R812 and R824 adjusting respectively: The maximum deviation and the optional channel guard tone deviation to be obtained on the transmitter frequency.

AUDIO OUTPUT AMPLIFIER AND VOLUME CONTROL
U701, Q701-Q702, U702 and associated components

BLOCK DIAGRAM
Audio output amplifier



The audio output amplifier consists of a single monolithic IC (U701) giving up to 500 mW output power.

The amplifier is switched off by Q701 and Q702 during stand by and transmit in order to squelch the radio and reduce the power consumption.

U701 is only under power when selected by the microcontroller via the output latch U906.

In connection with the audio amplifier, a digital controlled analog switch (U702) is performing the volume control with 8 selectable levels.

MICROPHONE CONTROL Q801, Q805

Q801 and Q805 controls the bias voltage to the microphone. "PTT" turns bias on if not overrided by tone signalling outputs.

OTHER FUNCTIONS

- ON/OFF
- Transmit signal
- Frequency synthesizer control
- Lock detect function
- Tone detect
- Battery control

INTERFACE TO RF-BOARD

POWER SUPPLY

Current consumption

5.5 V Cont. J902/3:

5.5 V ± 0.25 V

<25 mA typ. 15 mA

5.5 V TX J902/2:

5.5 V ± 0.25 V

<4 mA

DIGITAL

Synthesizer

Data/address/strobe output

(J903/2, 3, 4, 5, 8, 9, 10, 11):

Uoh >3.9 V, Iomax. 0.1 mA

Uol <1.6 V, Iomax. -0.1 mA

Lock input J903/7:

Uih >4 V

Uil <1 V

Other circuits

ON/OFF output J903/1:

Uoh >9 V

Uol <5 V Iomax. -1 mA

Transmit output J901/2:

Uoh >5 V Iomax. = 10 mA

(10 kOhm pull down)

RX/TX output J902/4:

Uoh >5 V

Uol <0.5 V Io = -2.5 mA

Squelch input J901/3:

Uih >3 V

Uil <1 V CMOS input

ANALOG

110 mV line input J901/4

Vin = 110 mV RMS ± 1 dB

DC component: >1.8 V, <2.5 V

Modulation HI output J902/6

Uout: adjustable 0 - 1.6 Vpp

R load >100 Ohm

DC component "5.5 V"/2

6.4/6.5 MHz input J903/13

Uin >3.5 Vpp

std. CMOS input

INTERFACE TO TONE OPTION

DIGITAL

System clock output J904/7: freq.: 200 kHz
 Enable tone A/B output J905/10, 11
 Clock A/B output J904/4, 3
 Data output J904/2
 Detect A/B input J905/12, 13
 Aux output J905/14

CTCSS (CG) modulation input J904/1

>165 mV RMS nom. for 20% dev.
 Zin = 2.2 kOhm

Filtered line input J904/6

110 mV RMS ± 1 dB
 Zin typ. 3 kOhm
 DC component: >1.8 V, <2.5 V

ANALOG

Seq./DTMF tone modulation input J905/16

280 mV RMS for 70% dev.
 Zin = 4.7 kOhm

INTERFACE TO BATTERY/TEST CONNECTOR

BATTERY

Battery voltage input J906/1, 2 - 17, 18
 6.1 - 8.6 V (7.2 V nom.)

Current consumption (CL4003 alone)

OFF-state: typ. app. 10 μ A
 ON and idle: typ. 15 mA
 500 mW AF: 170 mA/typ. 150 mA
 Light on: add. max. 25 mA

TEST

Digital

Keyboard: (matrix)
 Scan output J905/3, 4, 5
 J906/8, 12, 13
 Data input J905/6, 7, 9, 8
 J906/6, 5, 4, 3: Uil >3 V/Iil/ <500 μ A
 Uil <0.3 V
 PTT input J906/11: Uil <0.5 V/Iil/ <0.7 mA
 PGR. SW input J906/10: Uil <1 V/Iil/ <0.5 mA

Analog

MIC input J906/14: 10 mV RMS 60% of rated dev. Zin typ. 1.7 kOhm
 Ext. LS output J906/15: 500 mW into 8 Ohm (DC-connection from J906/17, 18 to the other terminal on LS)
 Int LS output: Connect to J906/17, 18 to enable internal LS

TECHNICAL SPECIFICATIONS

CONTROL LOGIC

Low battery turn off voltage

<6.1 V, >5.7 V

TX AUDIO PROCESSOR

Gain

32 ±3 dB at 1 kHz

Audio response

(5 mV RMS at mic. input)

100 Hz: <-30 dB

400 Hz: -8.5 dB +/-1 dB

1 kHz: 0 dB (ref.)

2.7 kHz: +7.6 dB +/-0.4 dB

6 kHz: <-6 dB

25 kHz: <-40 dB

Distortion

max. 1%

(10 mV RMS/1 kHz at mic. input)

AUDIO POWER AMPLIFIER

Gain26 ±3 dB at 1 kHz, $V_{in} = 25 \text{ mV}$, $R_1 = 8 \text{ Ohm}$ Rated output

0.5 W

Audio distortion<8%, $f = 1 \text{ kHz}$, $P_o = 0.5 \text{ W}$, $R_1 = 8 \text{ Ohm}$, $V_{cc} = 7.2 \text{ V}$ Audio response $(V_{in} = 25 \text{ mV}, R_1 = 8 \text{ Ohm})$

6 dB per octave deemphasis, 300 Hz - 6 kHz

300 Hz: $9 \pm 1.5 \text{ dB}$

1 kHz: 0 dB (ref.)

2.7 kHz: $-8.5 \pm 1 \text{ dB}$ 6 kHz: $-15.5 \pm 1 \text{ dB}$ Efficiency

Typ. 50%

Attack time

Typ. 40 ms

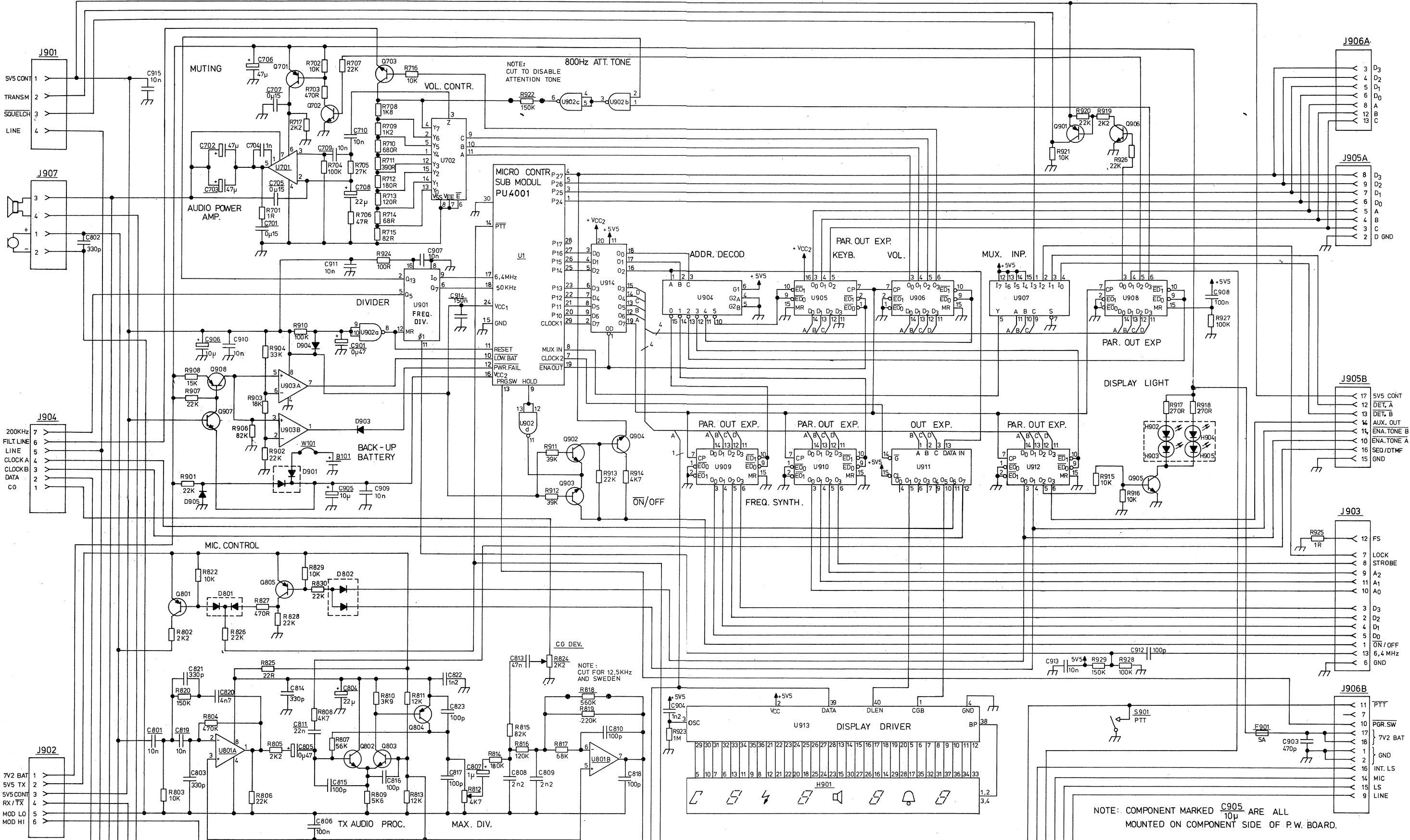
Volume control, 8 levels $5 \pm 1 \text{ dB}$ per stepTemperature rangeOperating: -25° to $+60^{\circ}\text{C}$ Storage -40° to $+70^{\circ}\text{C}$ Mechanical dimensions

Length x Width x Height:

60.9 x 114.4 x 17 mm

Weight

63 g



NOTE: COMPONENT MARKED C905 ARE ALL MOUNTED ON COMPONENT SIDE OF P.W. BOARD.

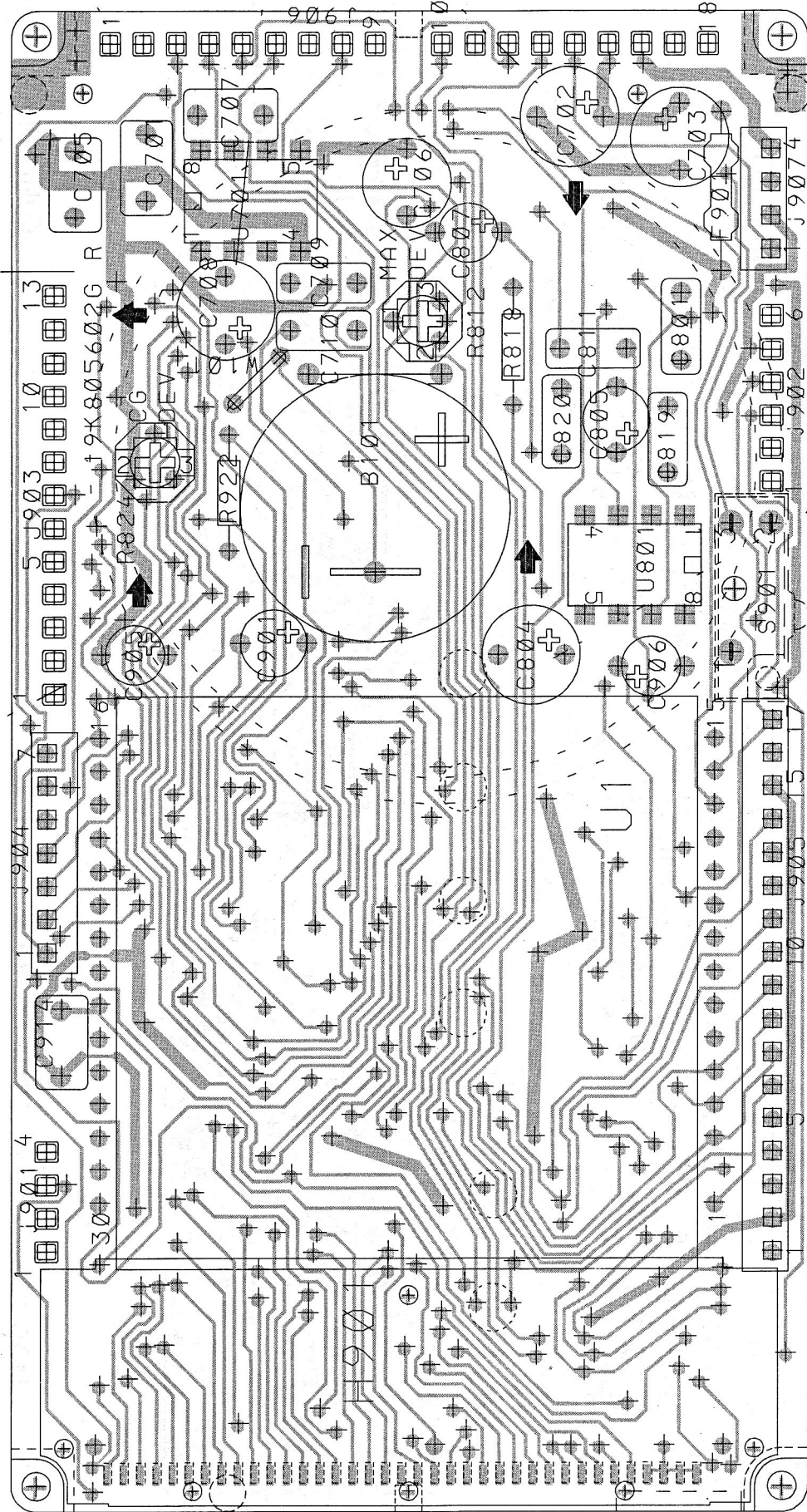
CONTROL LOGIC CL4003

MODULE CODE NO. K805602G1
MOUNTED BOARD CODE NO. M905908G1

D404.002

Storno

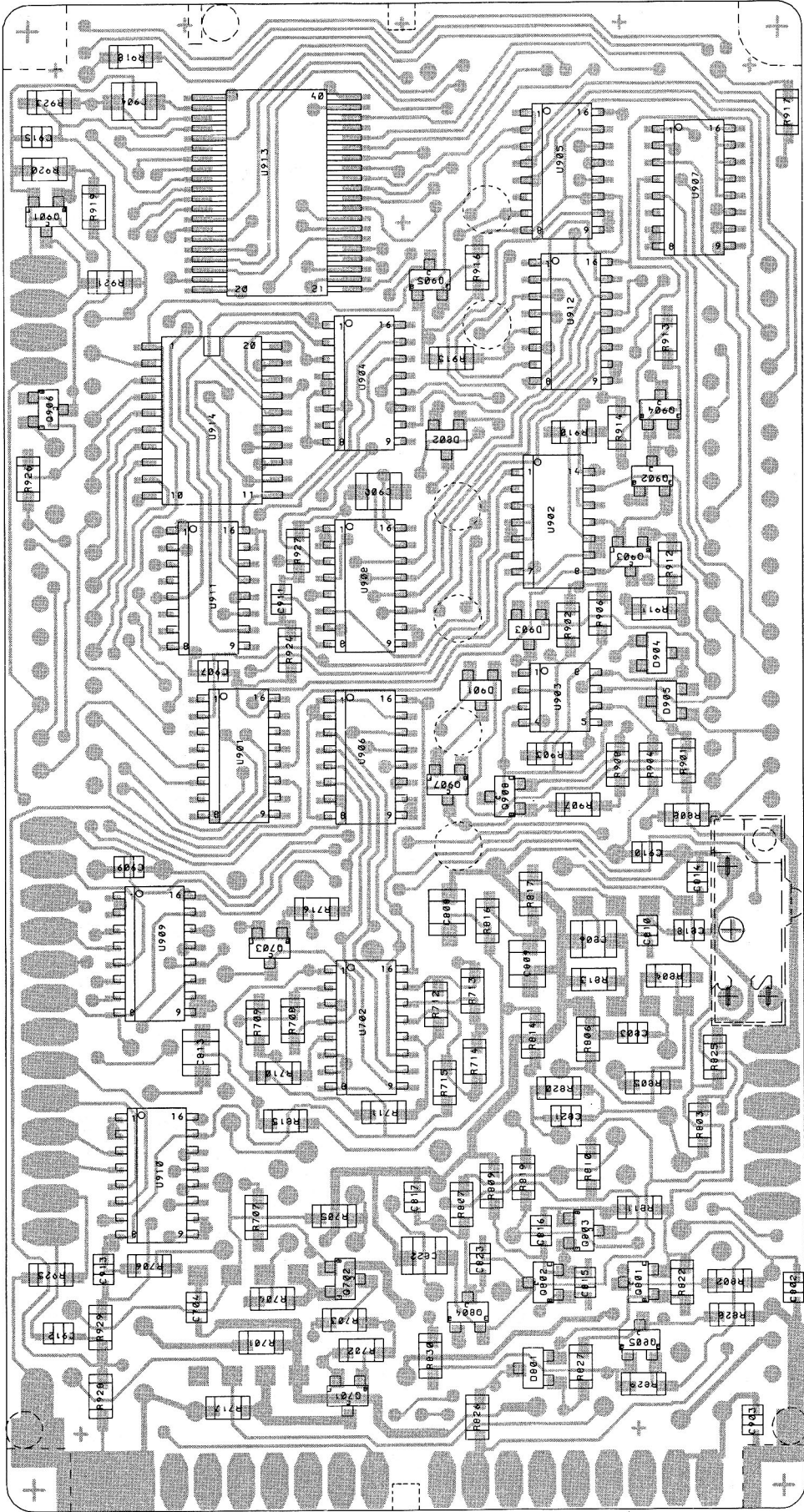
Storno



MODULE CODE NO. K805602G1
MOUNTED BOARD CODE NO. M905908G1

CONTROL LOGIC CL4003
COMPONENT LAYOUT
COMPONENT -SIDE

D404.003



MODULE CODE NO. K805602G1
MOUNTED BOARD CODE NO. M905908G1

CONTROL LOGIC CL4003
COMPONENT LAYOUT
CHIP-SIDE

D404.004

ITEM NUMBER	DESCRIPTION
K805602G1	CL 4003 ASM
=====	
M905908G1	SUB. ASM.: CPNT BD PW., F. CL 4003
K805332G1	SUB. ASM.: DISPLAY, LIGHT-
M905910G1	SUB. ASM.: PU 4001
M905912G1	SUB. ASM.: TQ 4009

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
A1	M905908G1	COMPONENT BD ASM CL4003	1 (SEE BELOW)
B101	J708463P2	BTRY PRIM 170MAH CR2032	1
H901	J707230P1	DIS LT	1
S901	J707133P3	SW PUSH PLNGR AU	1
0003	L855331P1	HSG DIS	1
0004	L855332P1	COV DIS	1
0005	K805332G1	DIS LT ASM	1
0006	J707458P1	CONN COND RUB ZEB.STRIP	1
0007	J708413P1	SLV SIL RUB NAT	0,027 M
0011	J708995P8	LABEL REV LTR	1
0012	A701303P1	NYLON CORD #6	0,15 M

A1 : M905908G1 : COMPONENT BD ASM CL4003 :

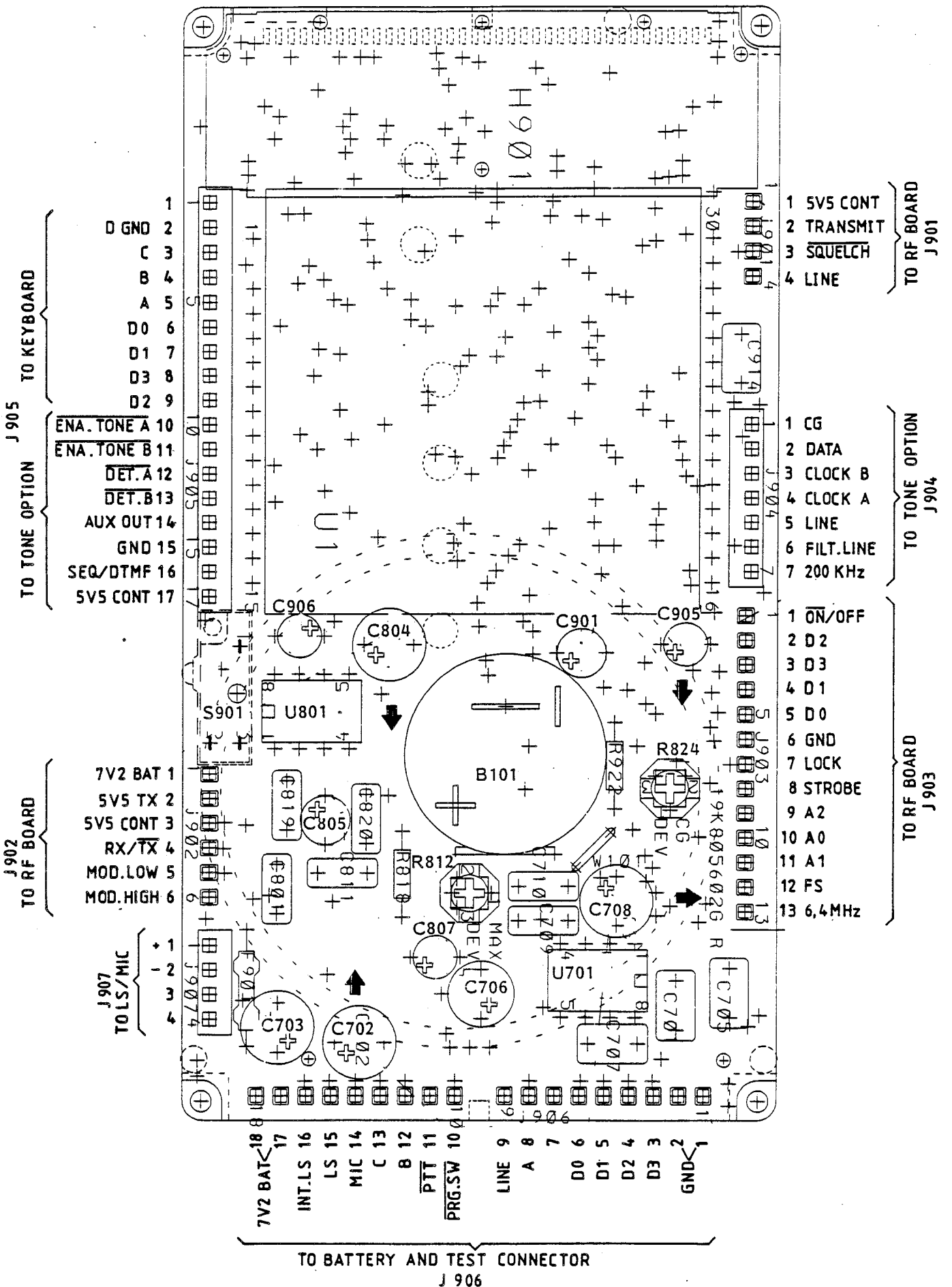
C701	J707412P10	CAP PYES 150N 10% 63V	1
C702	J707444P17	CAP TA SOL 47U 20% 10V	1
C703	J707444P17	CAP TA SOL 47U 20% 10V	1
C704	J707438P5	CAP CER CL2 1N 10% 50V	1
C705	J707412P10	CAP PYES 150N 10% 63V	1
C706	J707353P9	CAP ELECT 47U 20% 16V	1
C707	J707412P10	CAP PYES 150N 10% 63V	1
C708	J707444P8	CAP TA SOL 22U 20% 16V	1
C709	J707412P3	CAP PYES 10N 10% 63V	1
C710	J707412P3	CAP PYES 10N 10% 63V	1
C801	J707412P3	CAP PYES 10N 10% 63V	1
C802	J707436P73	CAP CER NPO 330P 5% 50V	1
C803	J707436P73	CAP CER NPO 330P 5% 50V	1
C804	J707444P8	CAP TA SOL 22U 20% 16V	1
C805	J707444P3	CAP TA SOL 0U47 20% 35V	1
C806	J707438P26	CAP CER CL2 100N 10% 50V	1
C807	J707353P4	CAP ELECT 1U0 20% 50V	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
C808	J707436P93	CAP CER NPO 2N2 5% 50V	1
C809	J707436P93	CAP CER NPO 2N2 5% 50V	1
C810	J707436P61	CAP CER NPO 100P 5% 50V	1
C811	J707412P5	CAP PYES 22N 10% 63V	1
C813	J707438P22	CAP CER CL2 47N 10% 50V	1
C814	J707436P73	CAP CER NPO 330P 5% 50V	1
C815	J707436P61	CAP CER NPO 100P 5% 50V	1
C816	J707436P61	CAP CER NPO 100P 5% 50V	1
C817	J707436P61	CAP CER NPO 100P 5% 50V	1
C818	J707436P61	CAP CER NPO 100P 5% 50V	1
C819	J707412P3	CAP PYES 10N 10% 63V	1
C820	J707412P1	CAP PYES 4N7 10% 63V	1
C821	J707436P73	CAP CER NPO 330P 5% 50V	1
C822	J707436P87	CAP CER NPO 1N2 5% 50V	1
C823	J707436P61	CAP CER NPO 100P 5% 50V	1
C901	J707444P3	CAP TA SOL 0U47 20% 35V	1
C903	J707438P3	CAP CER CL2 470P 10% 50V	1
C904	J707436P87	CAP CER NPO 1N2 5% 50V	1
C905	J707353P7	CAP ELECT 10U 20% 16V	1
C906	J707353P7	CAP ELECT 10U 20% 16V	1
C907	J707438P14	CAP CER CL2 10N 10% 50V	1
C908	J707438P26	CAP CER CL2 100N 10% 50V	1
C909	J707438P14	CAP CER CL2 10N 10% 50V	1
C910	J707438P14	CAP CER CL2 10N 10% 50V	1
C911	J707438P14	CAP CER CL2 10N 10% 50V	1
C912	J707436P61	CAP CER NPO 100P 5% 50V	1
C913	J707438P14	CAP CER CL2 10N 10% 50V	1
C914	J707412P10	CAP PYES 150N 10% 63V	1
C915	J707438P14	CAP CER CL2 10N 10% 50V	1
D801	J707390P1	DIO SI SIG BAV 74	1
D802	J708681P1	DIO SI SIG BAW 56	1
D901	J707390P1	DIO SI SIG BAV 74	1
D903	J707390P1	DIO SI SIG BAV 74	1
D904	J707390P1	DIO SI SIG BAV 74	1
D905	J707459P1	DIO SI ZENR 4V7 5% 0,2W	1
F901	J707468P11	FUSE CTG 5.0A F	1
J901	J706434P2	CONT EL BOT ENTRY	4
J902	J706434P2	CONT EL BOT ENTRY	6
J903	J706434P2	CONT EL BOT ENTRY	13
J904	J707442P11	CONN PWB FEM 07 CKT	1
J905	J707442P3	CONN PWB FEM 17 CKT	1
J906	J706434P2	CONT EL BOT ENTRY	18
J907	J707442P1	CONN PWB FEM 04 CKT	1
Q701	J707432P1	TSTR PNP SI BCX 18	1
Q702	J707386P1	TSTR NPN SI BCW 32	1
Q703	J707386P1	TSTR NPN SI BCW 32	1
Q801	J707387P1	TSTR PNP SI BCW 30	1
Q802	J707386P1	TSTR NPN SI BCW 32	1
Q803	J707386P1	TSTR NPN SI BCW 32	1
Q804	J707387P1	TSTR PNP SI BCW 30	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
Q805	J707387P1	TSTR PNP SI BCW 30	1
Q901	J707432P1	TSTR PNP SI BCX 18	1
Q902	J707386P1	TSTR NPN SI BCW 32	1
Q903	J707386P1	TSTR NPN SI BCW 32	1
Q904	J707386P1	TSTR NPN SI BCW 32	1
Q905	J707386P1	TSTR NPN SI BCW 32	1
Q906	J707386P1	TSTR NPN SI BCW 32	1
Q907	J707386P1	TSTR NPN SI BCW 32	1
Q908	J707387P1	TSTR PNP SI BCW 30	1
R701	J707385P910	RES MFILM 1R0 20% 1/8W	1
R702	J707385P103	RES MFILM 10K 5% 1/8W	1
R703	J707385P471	RES MFILM 470R 5% 1/8W	1
R704	J707385P104	RES MFILM 100K 5% 1/8W	1
R705	J707385P273	RES MFILM 27K 5% 1/8W	1
R706	J707385P470	RES MFILM 47R 5% 1/8W	1
R707	J707385P223	RES MFILM 22K 5% 1/8W	1
R708	J707385P182	RES MFILM 1K8 5% 1/8W	1
R709	J707385P122	RES MFILM 1K2 5% 1/8W	1
R710	J707385P681	RES MFILM 680R 5% 1/8W	1
R711	J707385P391	RES MFILM 390R 5% 1/8W	1
R712	J707385P181	RES MFILM 180R 5% 1/8W	1
R713	J707385P121	RES MFILM 120R 5% 1/8W	1
R714	J707385P680	RES MFILM 68R 5% 1/8W	1
R715	J707385P820	RES MFILM 82R 5% 1/8W	1
R716	J707385P103	RES MFILM 10K 5% 1/8W	1
R717	J707385P222	RES MFILM 2K2 5% 1/8W	1
R802	J707385P222	RES MFILM 2K2 5% 1/8W	1
R803	J707385P103	RES MFILM 10K 5% 1/8W	1
R804	J707385P474	RES MFILM 470K 5% 1/8W	1
R805	J707385P222	RES MFILM 2K2 5% 1/8W	1
R806	J707385P223	RES MFILM 22K 5% 1/8W	1
R807	J707385P563	RES MFILM 56K 5% 1/8W	1
R808	J707385P472	RES MFILM 4K7 5% 1/8W	1
R809	J707385P562	RES MFILM 5K6 5% 1/8W	1
R810	J707385P392	RES MFILM 3K9 5% 1/8W	1
R811	J707385P123	RES MFILM 12K 5% 1/8W	1
R812	J707478P8	RES VAR 4,7K 25% 0,05W	1
R813	J707385P123	RES MFILM 12K 5% 1/8W	1
R814	J707385P184	RES MFILM 180K 5% 1/8W	1
R815	J707385P823	RES MFILM 82K 5% 1/8W	1
R816	J707385P124	RES MFILM 120K 5% 1/8W	1
R817	J707385P683	RES MFILM 68K 5% 1/8W	1
R818	J707476P58	RES DEPC 560K 10% 1/10W	1
R819	J707385P224	RES MFILM 220K 5% 1/8W	1
R820	J707385P154	RES MFILM 150K 5% 1/8W	1
R822	J707385P103	RES MFILM 10K 5% 1/8W	1
R824	J707478P6	RES VAR 2,2K OHM 0,05W	1
R825	J707385P220	RES MFILM 22R 5% 1/8W	1
R826	J707385P223	RES MFILM 22K 5% 1/8W	1
R827	J707385P471	RES MFILM 470R 5% 1/8W	1
R828	J707385P223	RES MFILM 22K 5% 1/8W	1
R829	J707385P103	RES MFILM 10K 5% 1/8W	1
R830	J707385P223	RES MFILM 22K 5% 1/8W	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY	
R901	J707385P223	RES MFILM 22K 5% 1/8W	1	
R902	J707385P223	RES MFILM 22K 5% 1/8W	1	
R903	J707385P183	RES MFILM 18K 5% 1/8W	1	
R904	J707385P333	RES MFILM 33K 5% 1/8W	1	
R906	J707385P823	RES MFILM 82K 5% 1/8W	1	
R907	J707385P223	RES MFILM 22K 5% 1/8W	1	
R908	J707385P153	RES MFILM 15K 5% 1/8W	1	
R910	J707385P104	RES MFILM 100K 5% 1/8W	1	
R911	J707385P393	RES MFILM 39K 5% 1/8W	1	
R912	J707385P393	RES MFILM 39K 5% 1/8W	1	
R913	J707385P223	RES MFILM 22K 5% 1/8W	1	
R914	J707385P472	RES MFILM 4K7 5% 1/8W	1	
R915	J707385P103	RES MFILM 10K 5% 1/8W	1	
R916	J707385P103	RES MFILM 10K 5% 1/8W	1	
R917	J707385P271	RES MFILM 270R 5% 1/8W	1	
R918	J707385P271	RES MFILM 270R 5% 1/8W	1	
R919	J707385P222	RES MFILM 2K2 5% 1/8W	1	
R920	J707385P223	RES MFILM 22K 5% 1/8W	1	
R921	J707385P103	RES MFILM 10K 5% 1/8W	1	
R922	J707476P51	RES DEPC 150K 5% 1/10W	1	
R923	J707385P105	RES MFILM 1M0 10% 1/8W	1	
R924	J707385P101	RES MFILM 100R 5% 1/8W	1	
R925	J707385P910	RES MFILM 1R0 20% 1/8W	1	
R926	J707385P223	RES MFILM 22K 5% 1/8W	1	
R927	J707385P104	RES MFILM 100K 5% 1/8W	1	
R928	J707385P104	RES MFILM 100K 5% 1/8W	1	
R929	J707385P154	RES MFILM 150K 5% 1/8W	1	
U001	M905910G1	INT CKT, PU 4001 ASM	1	(SEE BELOW)
U002	M905912G1	INT CKT, TQ 4009 ASM	1	(SEE BELOW)
U701	J707451P1	IC LIN AF-AMP 820	1	
U702	J707434P1	IC DIG MUX 4051 CMOS	1	
U801	J707450P1	IC LIN OP-AMP 358	1	
U901	J708785P1	IC DIG CNTR PC 74HC4060	1	
U902	J708786P1	IC DIG GATE PC 74 HC 132	1	
U903	J708165P4	IC LIN OP-AMP LM 358	1	
U904	J708787P1	IC DIG DECO PC 74 HC 138	1	
U905	J708789P1	IC DIG FF-D PC 74 HC 173	1	
U906	J708789P1	IC DIG FF-D PC 74 HC 173	1	
U907	J708788P1	IC DIG MUX PC 74 HC 151	1	
U908	J708789P1	IC DIG FF-D PC 74 HC 173	1	
U909	J708789P1	IC DIG FF-D PC 74 HC 173	1	
U910	J708789P1	IC DIG FF-D PC 74 HC 173	1	
U911	J708790P1	IC DIG LTH PC 74 HC 259	1	
U912	J708789P1	IC DIG FF-D PC 74 HC 173	1	
U913	J708430P2	IC DIG LCD 2112	1	
U914	J708790P3	IC DIG LTH PC 74 HC 573	1	
0002	M-----P1R0	BD PW REVISION NO.0		

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
U001 :	M905910G1 :	INT CKT, PU 4001 ASM :	
C101	J707438P14	CAP CER CL2 10N 10% 50V	1
C102	J707438P26	CAP CER CL2 100N 10% 50V	1
C103	J707438P26	CAP CER CL2 100N 10% 50V	1
C104	J707438P26	CAP CER CL2 100N 10% 50V	1
D101	J707390P1	DIO SI SIG BAV 74	1
D102	J707390P1	DIO SI SIG BAV 74	1
D103	J707390P1	DIO SI SIG BAV 74	1
D104	J707390P1	DIO SI SIG BAV 74	1
D105	J707390P1	DIO SI SIG BAV 74	1
D106	J707390P1	DIO SI SIG BAV 74	1
D107	J707390P1	DIO SI SIG BAV 74	1
Q101	J707387P1	TSTR PNP SI BCW 30	1
U001		INT CKT (THK.FLM)	1
U101	J708468P2	IC UP 8-BIT, 80C39	1
U102	J707243P3	IC DIG REG 4035	1
U103	J708790P2	IC DIG LTH PC 74 HC 75	1
U104	J708790P2	IC DIG LTH PC 74 HC 75	1
U105	J708786P2	IC DIG GATE PC 74 HC 00	1
X101	J708838P28	IC SOCKET 28 CKT (F. PROGRAM - PROM)	1
0004	J709019P1	TAPE PYES TRPT 0.17X44.0	0,04380M
U002 :	M905912G1 :	INT CKT, TQ 4009 ASM :	
C101	J707438P14	CAP CER CL2 10N 10% 50V	1
C102	J707438P10	CAP CER CL2 4N7 10% 50V	1
C103	J707438P5	CAP CER CL2 1N 10% 50V	1
C104	A700045P6	CAP TA SOL 1U0 20% 10V	1
C105	J707438P26	CAP CER CL2 100N 10% 50V	1
C106	J707438P26	CAP CER CL2 100N 10% 50V	1
C107	J707363P4	CAP CER NPO 220P 2% 50V	1
C108	J707363P7	CAP CER NPO 470P 2% 50V	1
C109	A700045P7	CAP TA SOL 2U2 20% 10V	1
C110	J707438P26	CAP CER CL2 100N 10% 50V	1
C111	J707438P26	CAP CER CL2 100N 10% 50V	1
U001		INT CKT (THK-FLM)	1
U101	J707859P1	IC LIN OP-AMP 4558	1
U102	J707859P1	IC LIN OP-AMP 4558	1
U103	B801180G1	INT CKT CUST DTD	1
U104	B801180G1	INT CKT CUST DTD	1
U105	J708791P1	IC DIG BUFR 74HC367	1
U106	J707859P1	IC LIN OP-AMP 4558	1



CONNECTIONS DIAGRAM FOR CL4003

D 404.011

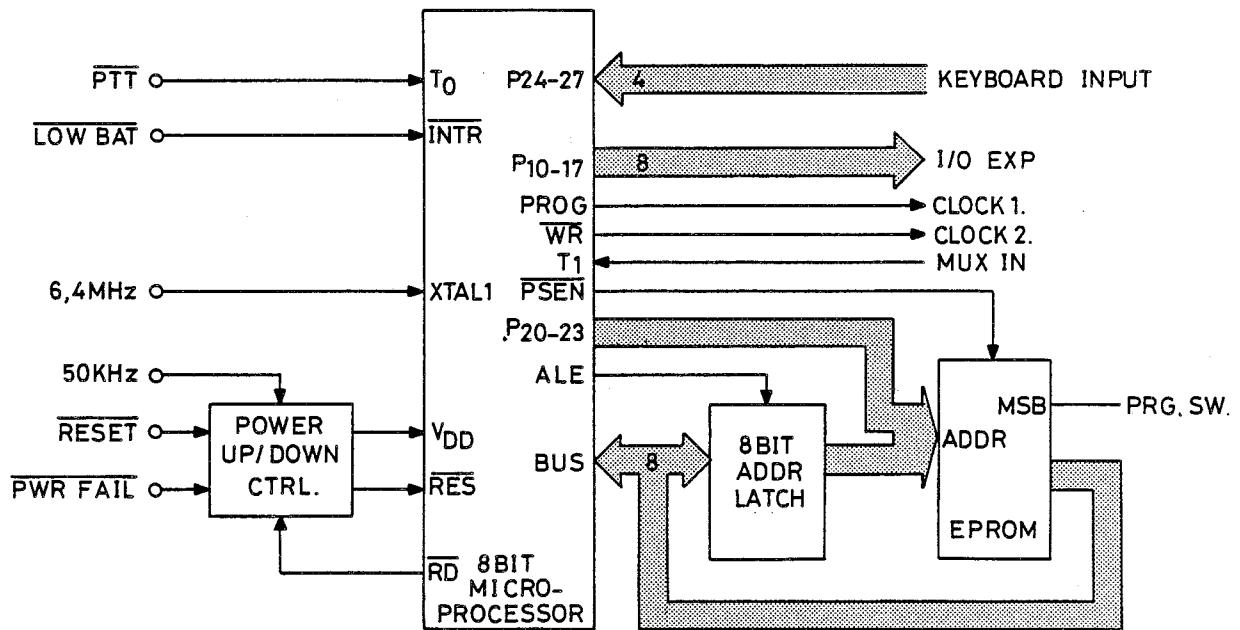
MICROCONTROLLER MODULE PU4001

PU4001 is a universal programmable microcomputer, integrate part of the control logic board CL4003.

PU4001 is a hybrid thickfilm microcontroller module based on a CMOS 8-bit singlechip microprocessor

80C39 with external program memory. The module contains a socket for the program memory PROM plus the necessary interfacing circuitry.

A circuit controls ON/OFF operation of the microprocessor.



BLOCK DIAGRAM PU4001

D404.010

CIRCUIT DESCRIPTION

MICROPROCESSOR U101

The 80C39 microprocessor uses the 6.4 MHz crystal oscillator situated on the RF board.

All timing and logical functions are processed by the software program except for power-up/down operation:

See Block Diagram D402..940/3.

EXTERNAL PROGRAM MEMORY XU101

XU101 is an 8K x 8 bit EPROM. It is divided into two separate memory banks, each 4K x 8 bit. The selection of each memory is made by a switch via the test connector.

Bank 0 (the lower) is reserved for the operational software while bank 1 is reserved for a standard program package designed for test and service support (see chapter: Test and service software).

All personality data related to the individual customer (RF-frequency codes, tone frequency, telegram specification) are programmed as a part of the operational software in the EPROM.

POWER CONTROL U102

The power-up/down is controlled by a bidirectional shift register, which is clocked by 50 kHz derived directly from 6.4 MHz.

The circuit assures maintenance of the RAM contents.

The flip-flop (U105b+c) gives the shift direction, partly hardware controlled and partly controlled by the microprocessor software.

INPUT/OUTPUT LINES

The microprocessor has 27 lines for input/output functions.

- Interface to external memory
DB0-DB7 (port 0) and P20 to P23 (lower half port 2)
- Keyboard input
P24-P27 (upper half port 2)
- To output expansion system
P10-P17 (port 1) with two signal lines Prog (pin 43) and WR (pin 28)
- To input expansion system
P10-P13 (lower half port 1) with one test input T1 (pin 16)
- Specific input signals
T0 (pin 18) and RD (pin 26)

SPECIFICATIONS

INTERFACE TO CL-BOARD

Power supply

Vcc 1 pin 24

Current consumption: $5.5V \pm 0.25V$
> 6mA, typ. 4

Vcc 2 pin 16

Current consumption: $5.0V \pm 0.25V$
active: < 10mA typ. 5
passive: < 20uA typ. 1u (NEC)
< 200uA typ. 10u (OKI)

DIGITAL

P10-17 Output pin 20-23 and 25-28

$U_{oh} > 2.4V$, $I_{oh} = -50\mu A$
 $U_{ol} < 0.45V$, $I_{ol} = 2.0mA$

Prog. Output pin 29

$U_{oh} > 2.4V$, $I_{oh} = -100\mu A$
 $U_{ol} < 0.45V$, $I_{ol} = 2.0mA$

WR Output pin 7

$U_{oh} > 2.4V$, $I_{oh} = -20\mu A$ (100k pull up)
 $U_{ol} < 1.0V$, $I_{ol} = 20\mu A$

P24-27 Input pin 1-3-5-4

$U_{ih} > 3V/I_i < 500\mu A$
 $U_{il} < 0.3V$

PTT Input pin 14U_{ih} > 3VU_{il} < 0.8V/I_i < 1.0mALOW BAT. Input pin 10U_{ih} > 3VU_{il} < 0.8V/I_i < 10uA6.4 MHz Input pin 17U_{ih} > 4VU_{il} < 0.8V/I_i < 1uA50 kHz Input pin 18

Std. CMOS

RESET Input pin 11

Std. CMOS

HOLD Output pin 9

Std. CMOS

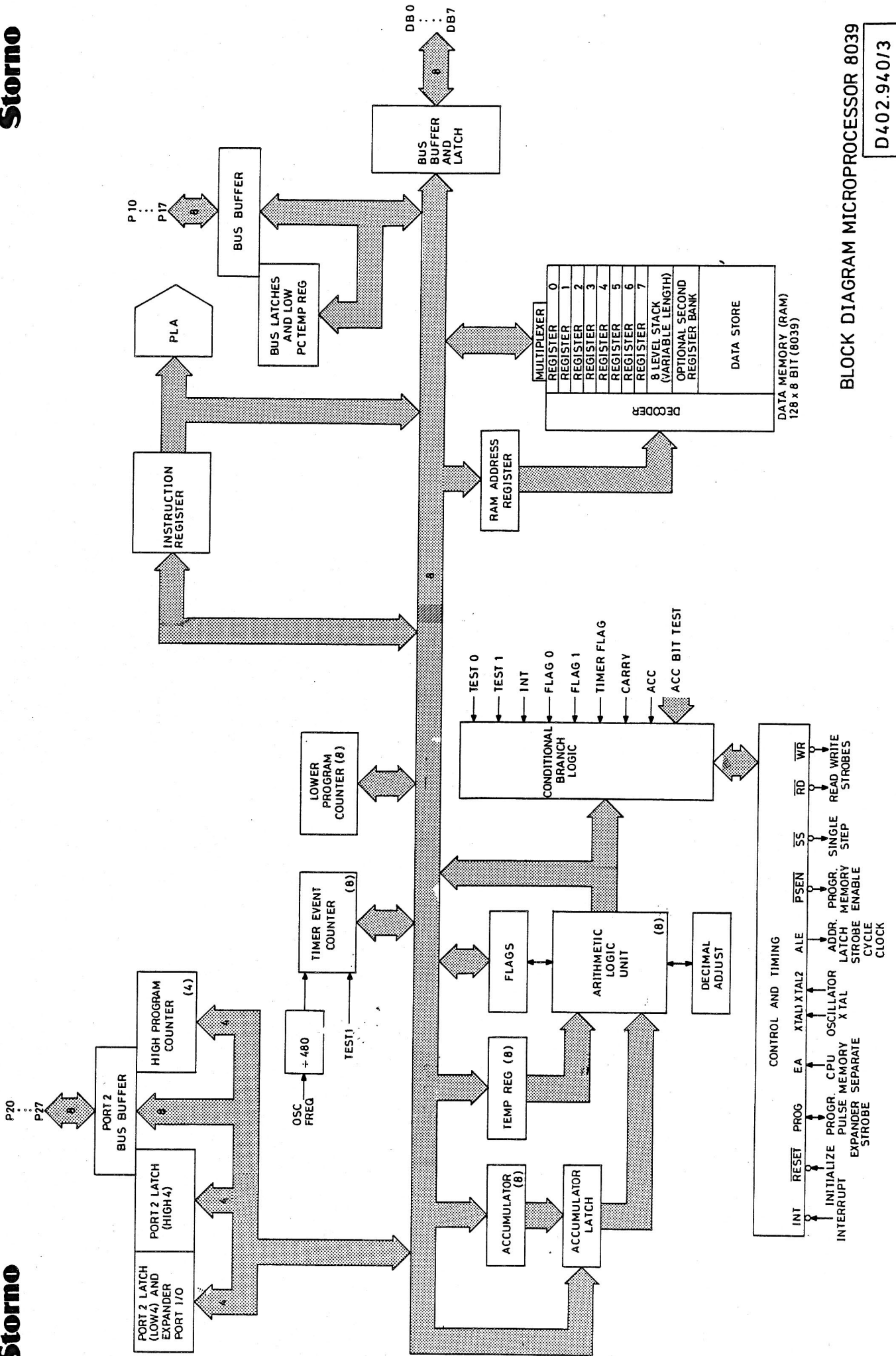
ENAOUT Output pin 19

Std. CMOS

PWR FAIL InputU_{ih} > 3V CMOS inputU_{il} < 1.0V I_{in} max. 6uA

CMOS input + 100 kOhm pull-up

PRG. SW Input pin 13U_{ih} > 5V/n. c.U_{il} < 1V/I_i < 0.5mA



BLOCK DIAGRAM MICROPROCESSOR 8039

D402.940/3

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KAPITEL

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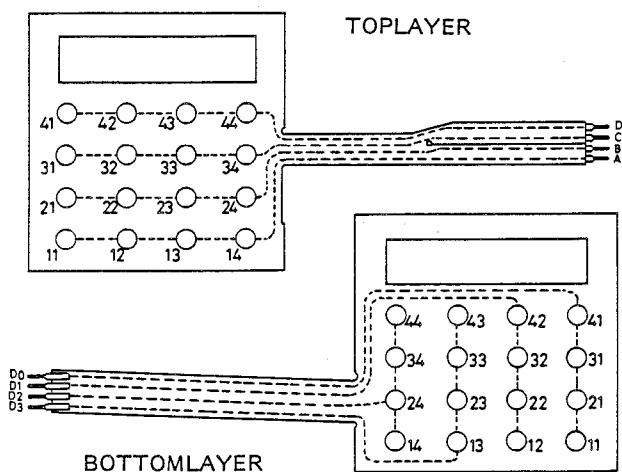
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CP4002 CONTROL PANEL

The control panel CP4002 is the interface between the operator and the radio set. CP4002 is used in the CQP4000 Automatic version (with CL4003). It consists of a moulded plastic front which holds the 16 button laminated keypad, the display-lense, the loudspeaker, and the microphone. Electrical connections are made through two flexible tails.

MATRIX TABLE

KEY \ LINE	D	C	B	A	D 0	D 1	D 2	D 3
11				x	x			
12				x		x		
13				x				x
14				x			x	
21			x		x			
22			x			x		
23			x					x
24			x				x	
31		x			x			
32		x				x		
33		x						x
34		x					x	
41	x				x			
42	x					x		
43	x							x
44	x						x	



The control panel consists of a bottom layer and a top layer each equipped with a flexible tail. These tails are connected to the CL-board via J905. By depressing a key a message is sent through the two layers. The bottom layer sends an impulse directly to the microcontroller PU4001 and the top layer sends an impulse to the output expander U905.

The above table shows which lines are activated when depressing a specific key. For instance, if key number 23 is depressed an impulse is sent through pin D3 of the bottom layer via connector J905 and directly to pin 4 of PU4001, and through pin B of the toplayer to pin 4 of the output expander U905.

INTERCONNECTIONS FOR SWITCHES S3 AND S4

The following covers the interconnections between the switches S3 and S4 in CB400x and the CQP4000 Automatic radio.

Keyboard

			a
			b
		d	c

Fig. 1

Function	Lines
a	C/D2
b	B/D2
c	A/D2
d	A/D3

Fig. 2

Four functions from the keyboard positions: a, b, c, and d, can be implemented in the control box, yet only two in the same box.

Fig. 1 shows the position of the functions on the keyboard.

The functions are obtained by connecting the lines from CQP4000 Automatic as shown in fig. 2.

The possible combinations of the functions together with the combination of wires, CB version and group numbers can be seen on diagram D404.008

SPECIFICATIONS

4x4 Matrix contact resistance

< 100 Ohm

Loudspeaker Impedance

8 Ohm nom.

Loudspeaker Power

500 mW

Microphone impedance (Load)

2 kOhm nom. connected to max. 10V DC

Output voltage

5 mV RMS nom.

Temperature range

Operation: -25°C to +60°C

Storage: -40°C to +70°C

Dimensions

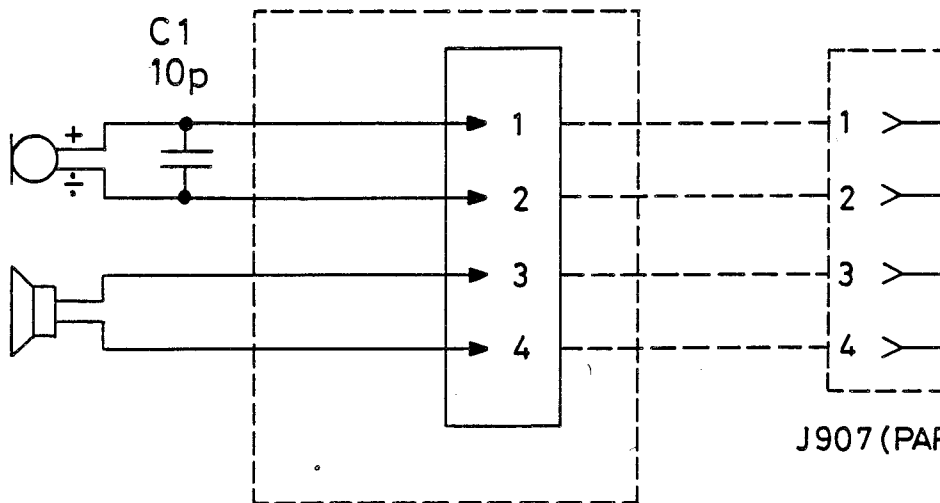
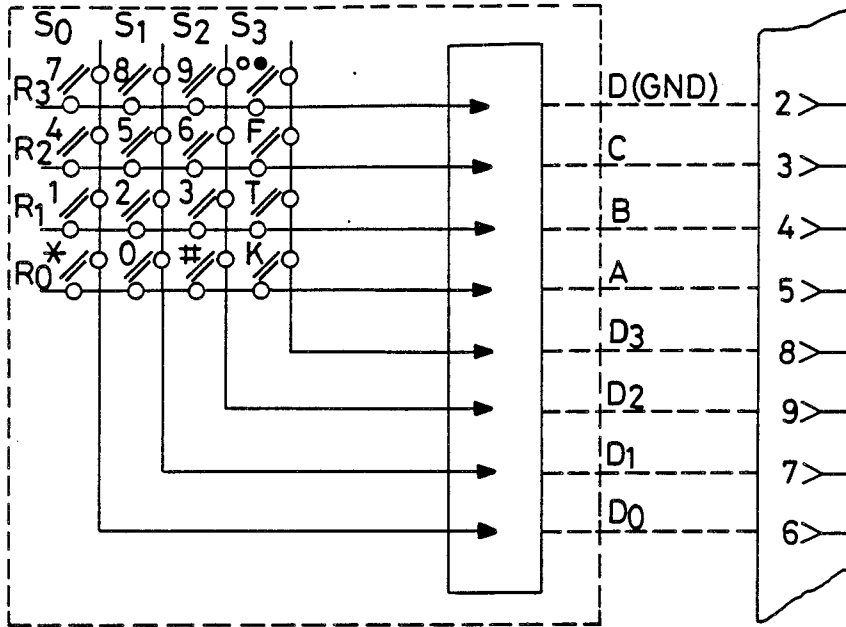
Length x Width x Height:

122.5 x 67.4 x 25 mm

Weight

90 g

J905 (PART) OF CL403)



J907 (PART) OF CL403)

CODE NO. DEPENDS ON KEYBOARD
SEE PARTS LIST

ITEM NUMBER	DESCRIPTION
M906013G1	CP 4002 ASM., F. S A S
M906013G2	CP 4002 ASM., F. A F / B A
M906013G4	CP 4002 ASM., F. GEN. PURP.

=====

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY	
C001	A700007P13	CAP CER NPO 10P 5% 50V	1	ALL
0002	K805350G1	COV METALL ASM	1	ALL
0003	K805301P1	LENS	1	ALL
0004	M905862P1	KEYBOARD ASM., F. SAS	1	F.: -G1
0004	M905862P2	KEYBOARD ASM., F. AF/ BA	1	F.: -G2
0004	M905862P4	KEYBOARD ASM., F. GEN. PURP.	1	F.: -G4
0005	A701301P2	MIKE	1	ALL
0006	J707235P1	GSKT, MIKE	1	ALL
0007	J708879P1	LS PERM MAG 8R 0,15W	1	ALL
0008	L855807P1	SPRING	1	ALL
0009	M905459P1	GRL MLD	1	ALL
0010	L855800P1	CPNT BD FLEX	1	ALL

TQ4009

PROGRAMMABLE TONE MODULE

The tone module TQ4009 is a combined tone transmitter/tone receiver unit which is universal programmable and used in connection with the control logic board CL4003 in the CQP4000 Automatic version. The TQ4009 functions only in connection with the CL4003 control logic or a similar board which is capable of programming the tone module, controlling the transmitters and handling the detected outputs.

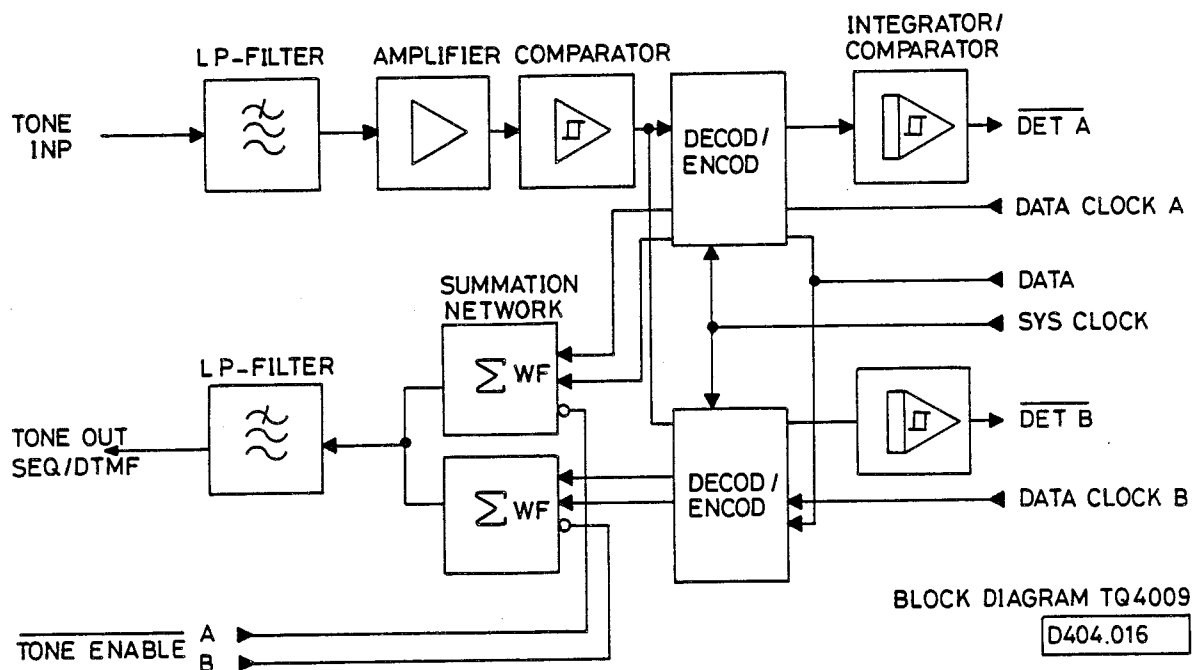
The TQ module is built around a DTD chip (Digital Tone Decoder) which is to be considered as a programmable digital filter. The peripheral circuitry consists of a limiter which shapes input signals and an integrator at the detect output which ensures proper detection.

A summation network is used to generate the output signal from two square waves from the DTD, known as Walsh Functions.

When the TQ is used as a tone encoder the summation network is enabled from the control logic via connector J905, pins 10 and 11. The final signal is filtered before being applied to the TX audio processor on the CL-board through pin 16 on J905.

TQ4009 has two DTD substrates to be able to generate dual tone signals. The circuit is not suitable for decoding dual tones.

All connections to the TQ module are through connectors J904 and J905.



TQ TONE DATA LOADING

A system clock signal from the control logic is fed to the circuit through J904, pin 7. The system clock frequency is derived from 6,4 MHz and 200 kHz is chosen.

The DTD is programmed by serially loading 15 bits of information through DTD Data and clocked on the positive edges of DTD STB (CLOCK A and CLOCK B).

The first 5 bits determine the Q-value of the tone circuit and the last 10 bits program the frequency.

The threshold is programmed with the Thresh Sel A, -B inputs to be -8,5 dB.

The data clock inputs (CLOCK A-B) must return low as the chip is reset when high.

TONE RECEPTION

Tones are received through J904, pin 5. From this pin the tone passes a 2-pole active low-pass filter built around OP-amp U101A. It is then amplified by a factor 10 in U101B and finally limited through comparator U102A.

The output from the limiter is sent to the detect inputs of the DTD's, U103 and U104. If the DTD, which is to be considered as a programmable digital filter, accepts the signal to be equivalent to the programmed tone, the detect output goes HIGH.

To ensure a reliable detect acknowledge, an integrator/comparator, U102B-U106B, is processing the DTD detect output. The delayed detect output from this integrator/comparator is active LOW.

TONE ENCODING

The DTD decode and encode simultaneously. This means that the programmed resonant frequency is present on the tone outputs.

The encode signal is built-up by two square-wave signals, the so-called Walsh Function bits. This tone is proportionally summed by a pair of TRI-state buffers, U105, and the corresponding resistor network. The result of the summed Walsh Function bits is fed through a second order active low pass filter with 0 dB gain.

If DTMF tones are wanted an extra load resistor, R134, is switched on to keep the voltage swing at the rated value.

The encode tone signal output is fixed at the level fit for the CL4000 board.

TECHNICAL SPECIFICATIONS

Power supply

5.2 V reg.

Current consumption

Decoding: 2.6 mA typical 3.5 mA max.

Encoding: 3.0 mA typical 4.0 mA max.

ANALOG INTERFACE

Tone input J905, 5

Input impedance: >30 kOhm

Input response: 600-3100 Hz, 110 mV \pm 6 dB

Tone output J905, 16

Output impedance: H100 Ohm

Output level: 270 mV RMS +1 dB/-2 dB/1124 Hz

DIGITAL INTERFACE

Input

Tone enable J905, 10-11
 DTD data J904, 2
 DTD STB J904, 4-3
 DTD SYS Clk. J904, 7

Output

Tone detect J905, 12-13: Vol <1 V/10/ <1 mA
 Uoh >4 V

INPUT (DECODING)

Frequency response

flat 600-3100 Hz

Activating level

110 mV \pm 6 dB

Distortion

20%

Selectivity

Q-value = 32: TQ4009 not sensitive to adjacent tone or other tones of same standard series.

OUTPUT (ENCODING)

Output voltage

270 mV +1 dB/-2 dB
 two poles low-pass fc=3.3 kHz

Distortion (single tone)

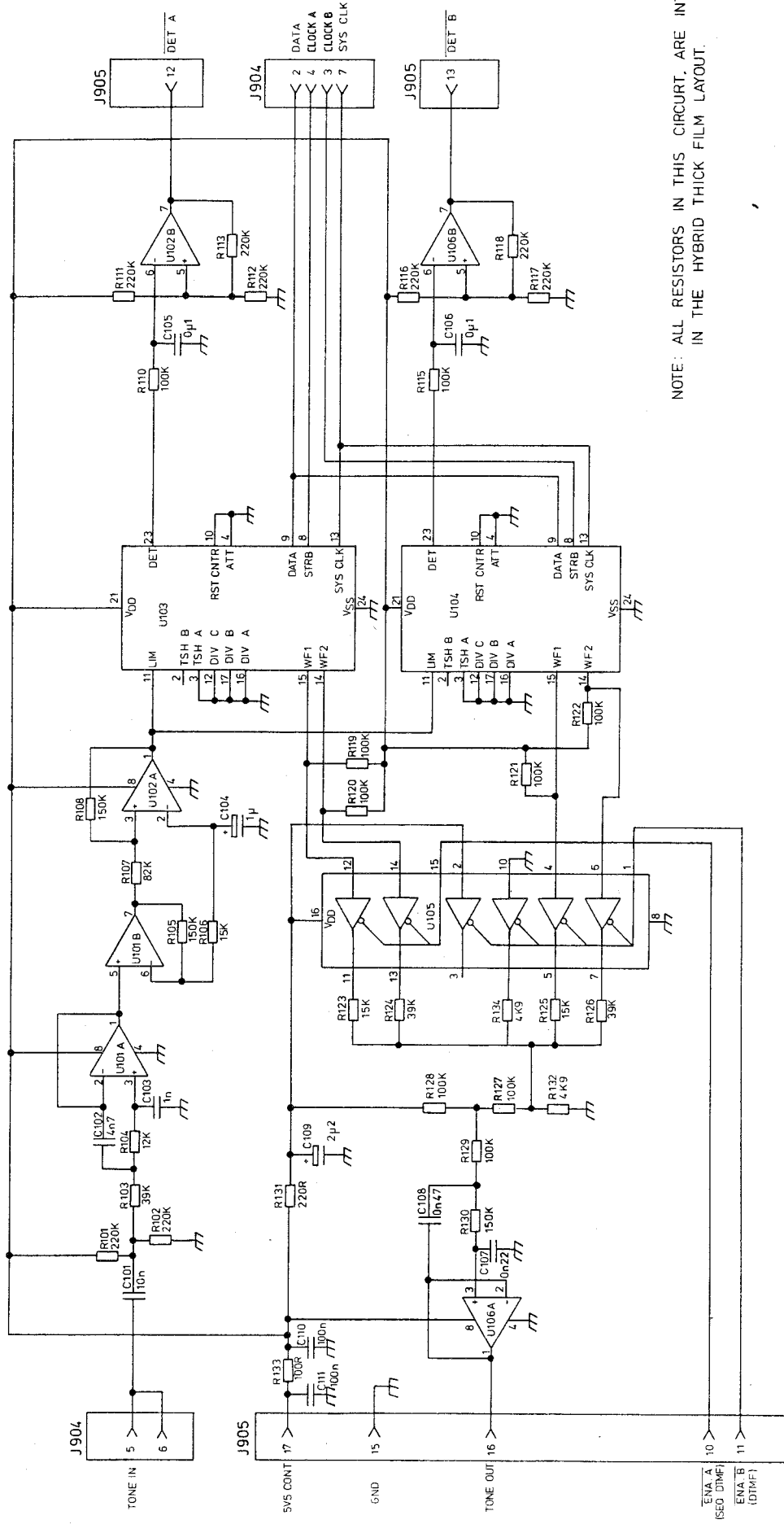
typical 4% max 10%

Dimensions

Width x Length x Height:
 23.1 x 56 x 5 mm

Weight

5 g



NOTE: ALL RESISTORS IN THIS CIRCUIT, ARE INTEGRATED IN THE HYBRID THICK FILM LAYOUT.

TONE MODULE TQ4009
CODE NO. M905912G1
D404.007

ITEM NUMBER	DESCRIPTION
M905912G1	INT CKT, TQ 4009 ASM

=====

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
C101	J707438P14	CAP CER CL2 10N 10% 50V	1
C102	J707438P10	CAP CER CL2 4N7 10% 50V	1
C103	J707438P5	CAP CER CL2 1N 10% 50V	1
C104	A700045P6	CAP TA SOL 1U0 20% 10V	1
C105	J707438P26	CAP CER CL2 100N 10% 50V	1
C106	J707438P26	CAP CER CL2 100N 10% 50V	1
C107	J707363P4	CAP CER NPO 220P 2% 50V	1
C108	J707363P7	CAP CER NPO 470P 2% 50V	1
C109	A700045P7	CAP TA SOL 2U2 20% 10V	1
C110	J707438P26	CAP CER CL2 100N 10% 50V	1
C111	J707438P26	CAP CER CL2 100N 10% 50V	1
U001	M905911G1	INT CKT, THK-FLM.	1
U101	J707859P1	IC LIN OP-AMP 4558	1
U102	J707859P1	IC LIN OP-AMP 4558	1
U103	B801180G1	INT CKT CUST DTD	1
U104	B801180G1	INT CKT CUST DTD	1
U105	J708791P1	IC DIG BUFR 74HC367	1
U106	J707859P1	IC LIN OP-AMP 4558	1
0004	J708995P9	LABEL REV LTR	1

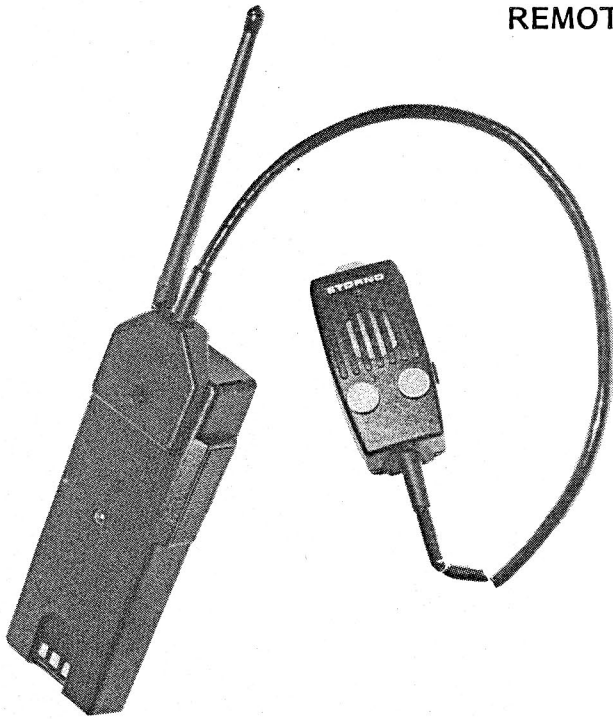
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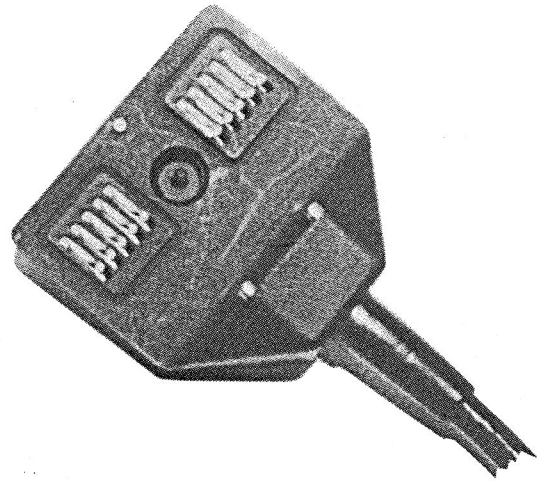
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CQP4000 UNIVERSAL

REMOTE CONTROL

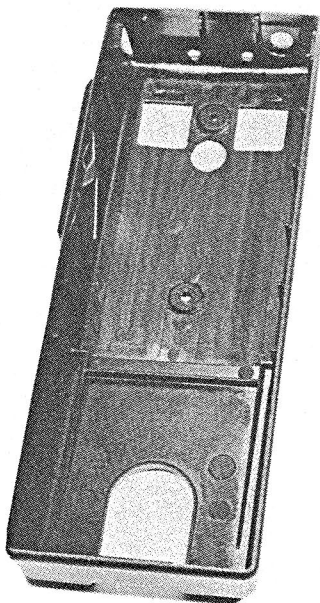


The remote control is connected to the CQP4000 by an 11 cored multi-connector terminating cable.



The installation demands a special cabinet, CA4003.

This cabinet is provided with two cut-aways, each giving access to five contact surfaces from a female multiconnector. These 10 contacts are connected to the bottom terminals on a chassis, CH4003, by means of a flexible wiring board being part of the chassis.



A threaded hole, placed between the two cut-aways, secures the multiconnector terminating the multicable from the remote control box CB400x.

If no multiconnector is used a protective cover protects the contacts.

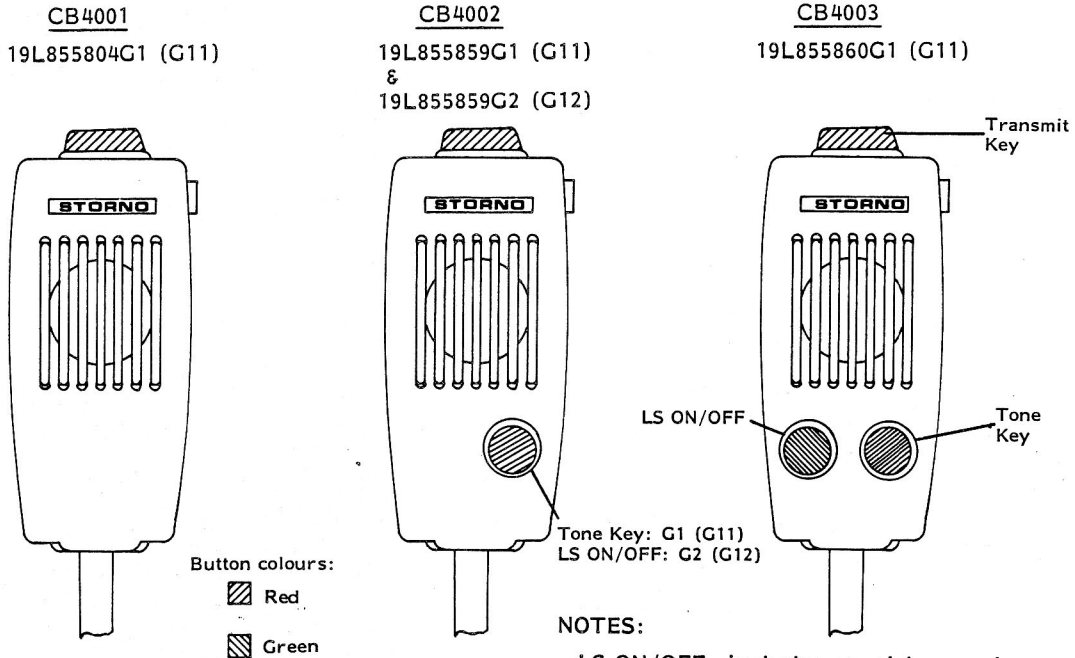


As a special option an earphone socket can be mounted on the control box.

The remote control, when connected to the CQP4000, transfers the loudspeaker and microphone facilities to the control box whereby the loudspeaker/microphone in the CQP4000 is switched off.

The control facilities comprising transmitter key, tone key, and loudspeaker ON/OFF, however, operate fully in parallel on the CQP4000U and on the remote control box.

Three different control boxes with the following functions are available:



NOTES:

- LS ON/OFF: includes squelch cancel
- G-No's in () cover types with headphone connector added
- Length of multicable - measured between connector and CB is 800 mm

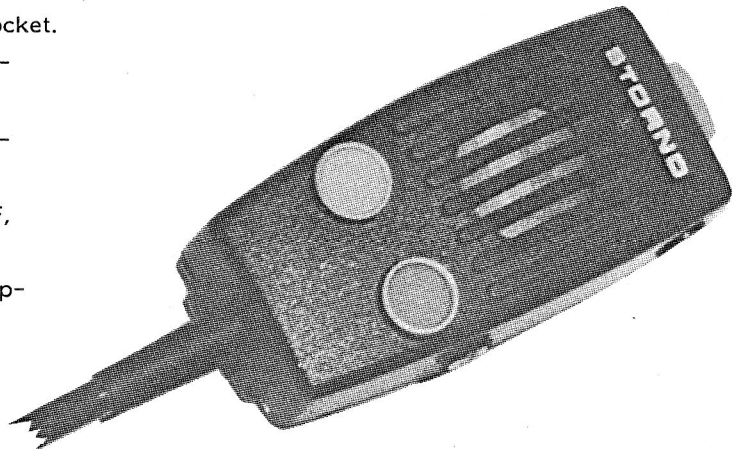
To order a CQP4000 with remote control, CQP4000U, please select "U" under digit no. 7. See nomenclature for further information concerning type specification of the radio.

CB4001 contains loudspeaker/microphone, transmitter key, and, optionally, earphone socket.
Application: CQP4000 without tone equipment or CQP4000U automatic version.

CB4002 contains loudspeaker/microphone, transmitter key, one extra push button controlling either tone keying or LS ON/OFF, and, optionally, earphone socket.
Application: CQP4000U without tone equipment, and all versions of CQP4000U for special control purposes.

CB4003 contains loudspeaker/microphone, transmitter key, two extra push buttons one controlling the tone key and one controlling LS ON/OFF, and optionally earphone socket.

Application: CQP4000U with tone equipment.



CIRCUIT DESCRIPTION

The amplifier consists of a self stabilizing input amplifier, Q101, with DC feedback. It is followed by an emitter follower, Q102, which provides for a low output impedance. This is necessary to attenuate (~ 30 dB) the signal from the internal microphone in the CQP4000 radio.

The amplifier has a low pass filter characteristic with 3 dB frequency at 7.2 kHz and a 6 dB/oct.

roll off. It is designed on discrete components to obtain the best possible chance to avoid distortion caused by RF radiation from the radio.

A transistor switch, Q103, feeds the 7.2V supply voltage to the amplifier during TX. Components related to earphone and loudspeaker are also included on the board.

SPECIFICATIONS

Supply Voltage

6.1 V to 8.6 V

Current Consumption at 7.2 V supply

during TX: 2.1 mA

standby: 325 uA

Gain

25 dB \pm 2 dB at 1 kHz

Distortion

1.5% nom., max. 3% at 1 kHz and

Vin = 10 mV RMS

Sensitivity

0.55 mV RMS, 1 kHz input signal for 60% deviation

Input Impedance

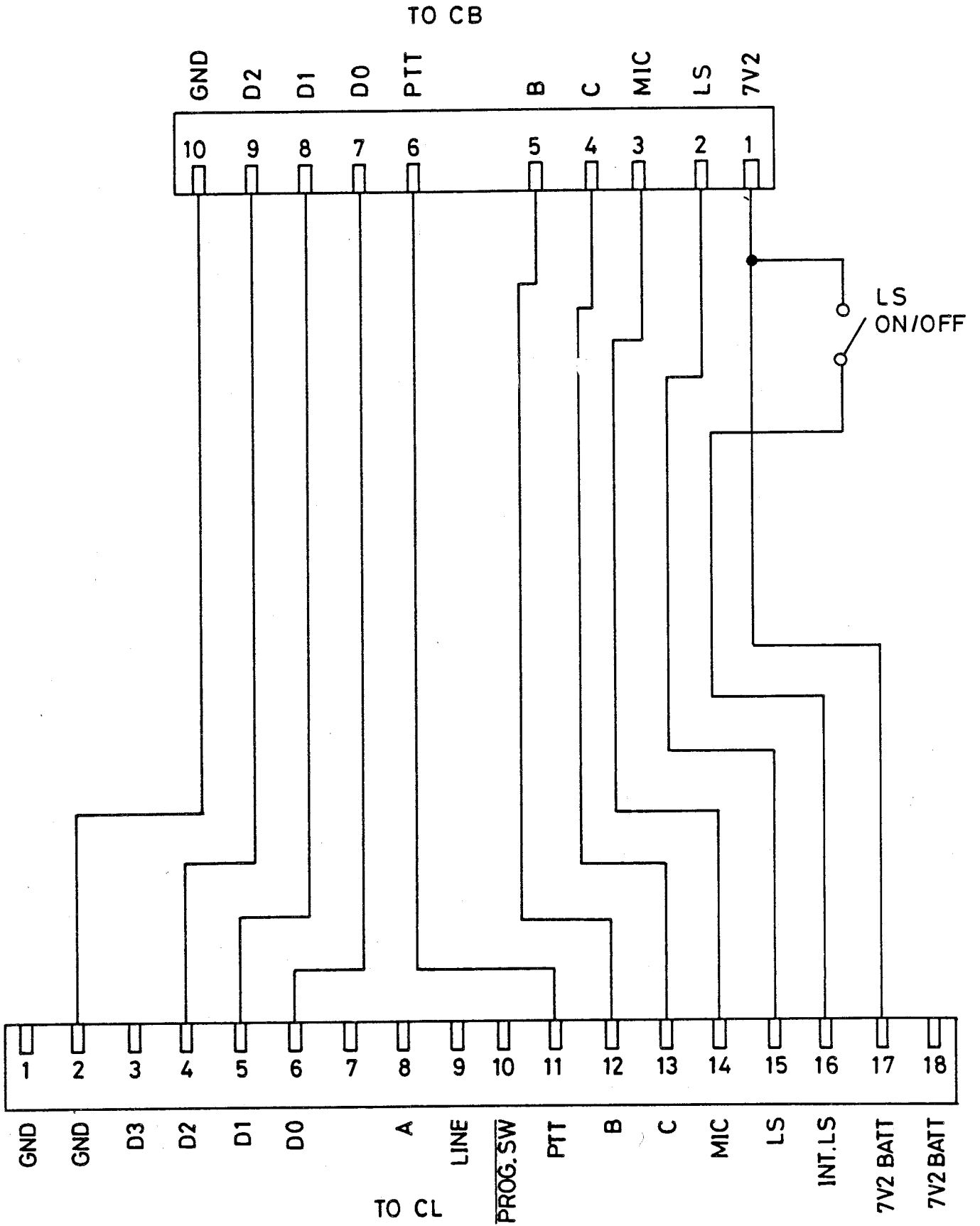
25 kOhm at 1 kHz

Output Impedance

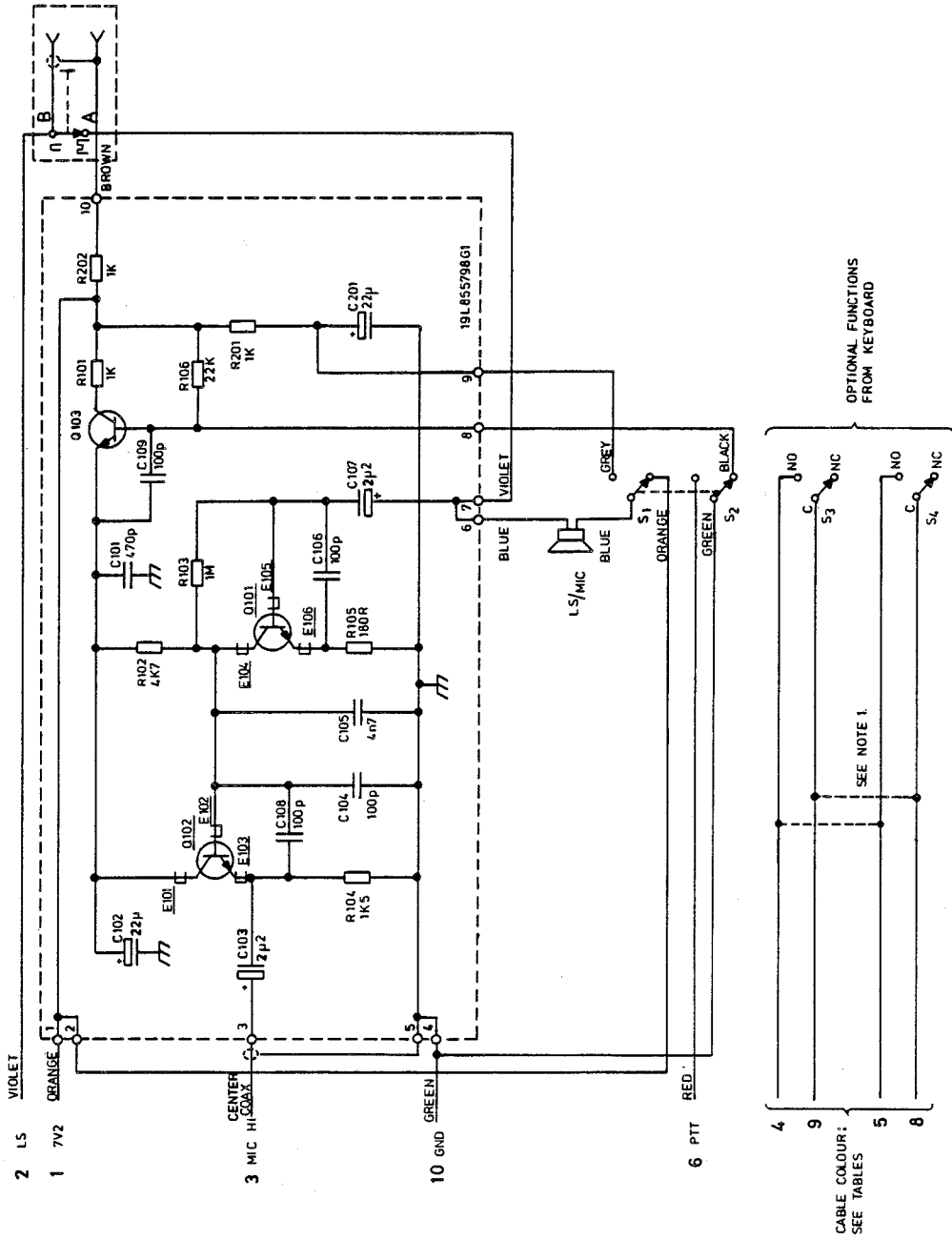
65 Ohm at 1 kHz

Temperature Range

-25^oC to +60^oC



CQP 4000
INTERCONNECTION BETWEEN
CONTROL BOX AND RADIO
D404.062



EARPHONE SOCKET.
OPTIONAL

INTERCONNECTION TABLE FOR SWITCHES S3 AND S4

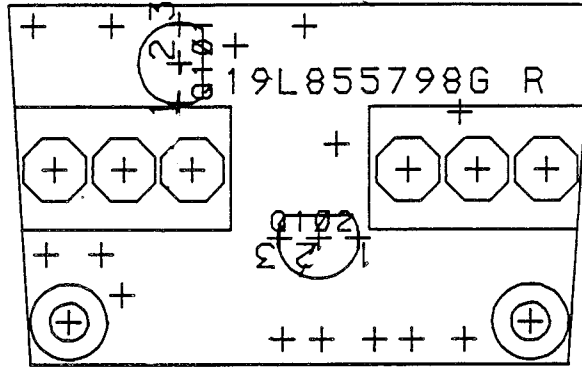
VERSION	FUNCTION	S3 LINES	S3 NO	S3 C	S4 NO	S4 C	CB VERS.	CB NUMBER	
STANDARD	NONE						4001	L855804G1	
	AND	B/D3	Brown	Yellow			4002	L855859G1	
	AND	A/D3	Black	Yellow			4002	L855859G2	
	AND	B/D3	Brown	Yellow	Black	Yellow	4003	L855860G1	
AUTOMATIC	NONE						4001	L855804G1	
	a	Key24	C/D2	White	Yellow		4002	L855859G3	
	b	Key24	B/D2	Brown	Yellow		4002	L855859G1	
	c	Key14	A/D2	Black	Yellow		4002	L855859G2	
	d	Key13	A/D3	Black	Blue		4002	L855859G4	
	a	Key24	C/D2	White	Yellow	Brown	Yellow	4003	L855860G2
	b	Key24	B/D2	White	Yellow	Black	Yellow	4003	L855860G3
	c	Key14	A/D2	White	Yellow	Black	Yellow	4003	L855860G4
	d	Key13	A/D3	White	Yellow	Black	Blue	4003	L855860G1
	b	Key24	B/D2	Brown	Yellow	Black	Yellow	4003	L855860G5
	c	Key24	B/D2	Brown	Yellow	Black	Blue	4003	L855860G6
	d	Key13	A/D3	Black	Yellow	Black	Blue	4003	L855860G6

NOTE :

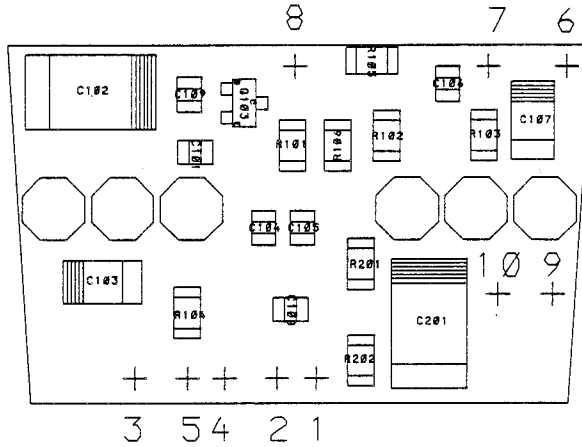
- IN CB4003 VERSIONS 19L855860G1, G2 AND G3 TERMINAL C OF S3 AND S4 IS CONNECTED TO THE SAME INPUT LINE AND HENCE MUST BE INTERCONNECTED WITH A 40MM PIECE OF YELLOW WIRE 19J707718P4.
IN 19L855860G6 THE NO TERMINALS MUST BE INTERCONNECTED WITH A PIECE OF BLACK WIRE 19J707718P10.

CONTROL BOX CB400X
D404.0081Z

COMPONENT SIDE



CHIP SIDE



CONTROL BOX CB400X
COMPONENT LAYOUT

MOUNTED BOARD CODE NO. L855798G1

D404.009

ITEM NUMBER	DESCRIPTION
L855804G1	CB 4001 ASM
L855804G11	CB 4001 ASM W. EARPHONE

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY	
S001	J709320P1	SWITCH MICRO	1	
S002	J709320P1	SWITCH MICRO	1	
0002	L855837G1	HOUSING MODIF	1	
0003	J706854P1	NAME PLATE (STORNO)	1	
0004	J709147G1	COVER ASM	1	
0005	J706960P1	PACKING	1	
0006	J709138P1	NETTING	1	
0007	J709318P1	GASKET RUBBER	1	
0008	J709139P1	WASHER	1	
0009	J709056P1	MICROPHONE 10R	1	
0010	J709087P1	BUTTON SCREW	1	
0011	J707200P2	O-RING 4.0MM	1	
0012	J709142P1	WASHER	1	
0013	J709141P1	SPRING	1	
0014	J709143P1	BUTTON, - ("RED"), F. PTT-SWITCH	1	
0015	J709148P1	SPACER	2	
0016	J708300P106	SCREW PAN H 2.2X12.5BZ	2	
0017	L855798G1	CPNT BD ASM	1	(SEE BELOW)
0018	J709134P1	CABLE CLAMP	1	
0019	J708003P1	GROMMET	1	
0020	J709140P1	PACKING	1	
0021	J709136P1	LABEL	1	
0022	J706212P204	SCREW PAN HD SZ 4.0X9.5	8	
0023	M906065G1	CONNECTOR ASM	1	(SEE BELOW)
0028	J707718P3	WIRE STRD ORANGE	0.08M	
0029	J707718P5	WIRE STRD GREEN	0.08M	
0030	J707718P8	WIRE STRD GRAY	0.08M	
0031	J707718P10	WIRE STRD BLACK	0.08M	
0033	A700136P3	SLVG INS EL D 2.4X0.51	0.01M	
0034	A701293P113	SLV	0.03M	
0035	A700136P3	SLVG INS EL D 2.4X0.51	0.01M	
0041	J709191	INTERCONNECTION TABLE		

0002	K805738G1	KIT, EARPHONE ASM.-	1	(SEE BELOW)

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
------------------	-----------------------	-----------------------	----------

0017 : L855798G1 : CPNT BD ASM :

C101	J707438P3	CAP CER CL2 470P 10% 50V	1
C102	A700045P9	CAP TA SOL 22U 20% 10V	1
C103	A700045P7	CAP TA SOL 2U2 20% 10V	1
C104	J707436P61	CAP CER NPO 100P 5% 50V	1
C105	J707438P10	CAP CER CL2 4N7 10% 50V	1
C106	J707436P61	CAP CER NPO 100P 5% 50V	1
C107	A700045P7	CAP TA SOL 2U2 20% 10V	1
C108	J707436P61	CAP CER NPO 100P 5% 50V	1
C109	J707436P61	CAP CER NPO 100P 5% 50V	1
C201	A700045P9	CAP TA SOL 22U 20% 10V	1

E101	J706002P2	CORRE FERR	1
E102	J706002P2	CORRE FERR	1
E103	J706002P2	CORRE FERR	1
E104	J706002P2	CORRE FERR	1
E105	J706002P2	CORRE FERR	1
E106	J706002P2	CORRE FERR	1

Q101	J707511P1	TSTR NPN SI BC 548A/B	1
Q102	J707511P1	TSTR NPN SI BC 548A/B	1
Q103	J707386P1	TSTR NPN SI BCW 32	1

R101	J707385P102	RES MFILM 1K0 5% 1/8W	1
R102	J707385P472	RES MFILM 4K7 5% 1/8W	1
R103	J707385P105	RES MFILM 1M0 10% 1/8W	1
R104	J707385P152	RES MFILM 1K5 5% 1/8W	1
R105	J707385P181	RES MFILM 180R 5% 1/8W	1
R106	J707385P223	RES MFILM 22K 5% 1/8W	1
R201	J707385P102	RES MFILM 1K0 5% 1/8W	1
R202	J707385P102	RES MFILM 1K0 5% 1/8W	1

0002 L855799P1R0 BD PW, REVISION NO.0 (1)

0023 : M906065G1 : CONNECTOR ASM :

0001	M906065P1	CONNECTOR ASM	
0002	M905973P1	CONNECTOR	1
0003	M905974P1	CONNECTOR COVER	1
0004	J709170G1	SPRING CONTACT MODIF	10
0005	K805724G1	CABLE ASM	1
0006	J708865P1	GUIDE ROD	2
0007	J708868P1	CONNECTOR SCREW	1

0002 : K805738G1 : KIT, EARPHONE ASM- F. CB 400X :

0002	J708770P1	SOCKET LEMO	1
0003	J707718P1	WIRE STRD BROWN	0.05M
0004	J707718P7	WIRE STRD WIOLET	0.04M
0005	J708634P2	TERMINAL, SOLDER-	1

01/03/'85

STORNO - DEPT. OF SERVICE CO-ORDINATION

X403.999

JEV

ITEM NUMBER	DESCRIPTION
L855859G1	CB 4002 ASM.,-W. TONE KEY-BUTTON
L855859G11	CB 4002 ASM W. EARPHONE + TONE KEY-BUTT.
L855859G2	CB 4002 ASM.,-W. LS ON/OFF-BUTTON
L855859G12	CB 4002 ASM W. EARPHONE + LS ON/OFF-BUTT
L855859G3	CB 4002 ASM ,NOT YET AVAIL.
L855859G13	CB 4002 ASM W. EARPHONE,NOT YET AVAIL.
L855859G4	CB 4002 ASM ,NOT YET AVAIL.
L855859G14	CB 4002 ASM W. EARPHONE,NOT YET AVAIL.

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	COMPONENT
S001	J709320P1	SWITCH MICRO	1
S002	J709320P1	SWITCH MICRO	1
S003	J708023P3	SWITCH PUSH BUTTON	1
0002	L855837G2	HOUSING MODIF	1
0003	J706854P1	NAME PLATE (STORNO)	1
0004	J709147G1	COVER ASM	1
0005	J706960P1	PACKING	1
0006	J709138P1	NETTING	1
0007	J709318P1	GASKET RUBBER	1
0008	J709139P1	WASHER	1
0009	J709056P1	MICROPHONE 10R	1
0010	J709087P1	BUTTON SCREW	1
0011	J707200P2	O-RING 4.0MM	1
0012	J709142P1	WASHER	1
0013	J709141P1	SPRING	1
0014	J709143P1	BUTTON,-("RED"),F.PTT-SWITCH	1
0015	J709148P1	SPACER	2
0016	J708300P106	SCREEW PAN H 2.2X12.5BZ	2
0017	L855798G1	CPNT BD ASM	1 (SEE BELOW)
0018	J709134P1	CABLE CLAMP	1
0019	J708003P1	GROMMET	1
0020	J709140P1	PACKING	1
0021	J709136P2	LABEL	1
0022	J706212P204	SCREW PAN HD SZ 4.0X9.5	8
0023	M906065G1	CONNECTOR ASM	1 (SEE BELOW)
0025	J709144G1	BUTTON ASM.,("RED"PUSHPAD)	1 -G1/-G11
0026	J709144G2	BUTTON ASM.,("GREEN"PUSHPAD)	1 -G2/-G12
0027	J708543P6	WASH FLAT 6.4/12.5X1.0	1
0028	J707718P3	WIRE STRD ORANGE	0.08M
0029	J707718P5	WIRE STRD GREEN	0.08M
0030	J707718P8	WIRE STRD GRAY	0.08M
0031	J707718P10	WIRE STRD BLACK	0.08M
0033	A700136P3	SLVG INS EL D 2.4X0.51	0.01M
0034	A701293P113	SLV	0.03M
0035	A700136P3	SLVG INS EL D 2.4X0.51	0.01M
0041	J709191	INTERCONNECTION TABLE	

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	COMPONENT
0002	K805738G1	KIT, EARPHONE ASM.-	1 (SEE BELOW)

0017 : L855798G1 : CPNT BD ASM :

C101	J707438P3	CAP CER CL2 470P 10% 50V	1
C102	A700045P9	CAP TA SOL 22U 20% 10V	1
C103	A700045P7	CAP TA SOL 2U2 20% 10V	1
C104	J707436P61	CAP CER NPO 100P 5% 50V	1
C105	J707438P10	CAP CER CL2 4N7 10% 50V	1
C106	J707436P61	CAP CER NPO 100P 5% 50V	1
C107	A700045P7	CAP TA SOL 2U2 20% 10V	1
C108	J707436P61	CAP CER NPO 100P 5% 50V	1
C109	J707436P61	CAP CER NPO 100P 5% 50V	1
C201	A700045P9	CAP TA SOL 22U 20% 10V	1
E101	J706002P2	CORRE FERR	1
E102	J706002P2	CORRE FERR	1
E103	J706002P2	CORRE FERR	1
E104	J706002P2	CORRE FERR	1
E105	J706002P2	CORRE FERR	1
E106	J706002P2	CORRE FERR	1
Q101	J707511P1	TSTR NPN SI BC 548A/B	1
Q102	J707511P1	TSTR NPN SI BC 548A/B	1
Q103	J707386P1	TSTR NPN SI BCW 32	1
R101	J707385P102	RES MFILM 1K0 5% 1/8W	1
R102	J707385P472	RES MFILM 4K7 5% 1/8W	1
R103	J707385P105	RES MFILM 1M0 10% 1/8W	1
R104	J707385P152	RES MFILM 1K5 5% 1/8W	1
R105	J707385P181	RES MFILM 180R 5% 1/8W	1
R106	J707385P223	RES MFILM 22K 5% 1/8W	1
R201	J707385P102	RES MFILM 1K0 5% 1/8W	1
R202	J707385P102	RES MFILM 1K0 5% 1/8W	1

0002 L855799P1R0 BD PW, REVISION NO.0 (1)

0023 : M906065G1 : CONNECTOR ASM :

0002	M905973P1	CONNECTOR	1
0003	M905974P1	CONNECTOR COVER	1
0004	J709170G1	SPRING CONTACT MODIF	10
0005	K805724G1	CABLE ASM	1
0006	J708865P1	GUIDE ROD	2
0007	J708868P1	CONNECTOR SCREW	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	COMPONENT
0025 :	J709144G1 :	BUTTON ASM,-("RED" PUSHPAD) :	
0002	J709145P3	BUTTON RED	1
0003	J709146P1	BUSH WITH SURFACE	1
0004	A701648P4	SIL RUB SEALANT RTV-3140	0.001KG
0026 :	J709144G2 :	BUTTON ASM,-("GREEN" PUSHPAD) :	
0002	J709145P1	BUTTON GREEN	1
0003	J709146P1	BUSH WITH SURFACE	1
0004	A701648P4	SIL RUB SEALANT RTV-3140	0.001KG
0002 :	K805738G1 :	KIT, EARPHONE ASM- F. CB 400X :	
0002	J708770P1	SOCKET LEMO	1
0003	J707718P1	WIRE STRD BROWN	0.05M
0004	J707718P7	WIRE STRD WIOLET	0.04M
0005	J708634P2	TERMINAL, SOLDER-	1
0006	J709193	INSTRUCTION MOUNTING	

ITEM NUMBER	DESCRIPTION
L855860G1	CB 4003 ASM W. LS ON/OFF + TONE KEY
L855860G11	CB 4003 ASM W. EARPH.+ LS ON/OFF + T.KEY
L855860G2	CB 4003 ASM , NOT YET AVAIL.
L855860G12	CB 4003 ASM W. EARPHONE , NOT YET AVAIL.
L855860G3	CB 4003 ASM , NOT YET AVAIL.
L855860G13	CB 4003 ASM W. EARPHONE , NOT YET AVAIL.
L855860G4	CB 4003 ASM , NOT YET AVAIL.
L855860G14	CB 4003 ASM W. EARPHONE , NOT YET AVAIL.
L855860G5	CB 4003 ASM , NOT YET AVAIL.
L855860G15	CB 4003 ASM W. EARPHONE , NOT YET AVAIL.
L855860G6	CB 4003 ASM , NOT YET AVAIL.
L855860G16	CB 4003 ASM W. EARPHONE , NOT YET AVAIL.

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P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
S001	J709320P1	SWITCH MICRO	1
S002	J709320P1	SWITCH MICRO	1
S003	J708023P3	SWITCH PUSH BUTTON	1
S004	J708023P3	SWITCH PUSH BUTTON	1
0002	L855837G3	HOUSING MODIF	1
0003	J706854P1	NAME PLATE (STORNO)	1
0004	J709147G1	COVER ASM	1
0005	J706960P1	PACKING	1
0006	J709138P1	NETTING	1
0007	J709318P1	GASKET RUBBER	1
0008	J709139P1	WASHER	1
0009	J709056P1	MICROPHONE 10R	1
0010	J709087P1	BUTTON SCREW	1
0011	J707200P2	O-RING 4.0MM	1
0012	J709142P1	WASHER	1
0013	J709141P1	SPRING	1
0014	J709143P1	BUTTON,-("RED") F.PTT-SWITCH	1
0015	J709148P1	SPACER	2
0016	J708300P106	SCREEW PAN H 2.2X12.5BZ	2
0017	L855798G1	CPNT BD ASM	1 (SEE BELOW)
0018	J709134P1	CABLE CLAMP	1
0019	J708003P1	GROMMET	1
0020	J709140P1	PACKING	1
0021	J709136P3	LABEL	1
0022	J706212P204	SCREW PAN HD SZ 4.0X9.5	8
0023	M906065G1	CONNECTOR ASM	1 (SEE BELOW)
0025	J709144G1	BUTTON ASM,-("RED" PUSHPAD)	1 (SEE BELOW)

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
0026	J709144G2	BUTTON ASM,-("GREEN" PUSH PAD)	1 (SEE BELOW)
0027	J708543P6	WASH FLAT 6.4/12.5X1.0	2
0028	J707718P3	WIRE STRD ORANGE	0.08M
0029	J707718P5	WIRE STRD GREEN	0.08M
0030	J707718P8	WIRE STRD GRAY	0.08M
0031	J707718P10	WIRE STRD BLACK	0.08M
0032	A701268P4	WIRE YELLOW	0.04M
0033	A700136P3	SLVG INS EL D 2.4X0.51	0.01M
0034	A701293P113	SLV	0.03M
0035	A700136P3	SLVG INS EL D 2.4X0.51	0.01M
0041	J709191	INTERCONNECTION TABLE	

0002	K805738G1	KIT, EARPHONE ASM.-	1 (SEE BELOW)

0017 :	L855798G1 :	CPNT BD ASM :	

C101	J707438P3	CAP CER CL2 470P 10% 50V	1
C102	A700045P9	CAP TA SOL 22U 20% 10V	1
C103	A700045P7	CAP TA SOL 2U2 20% 10V	1
C104	J707436P61	CAP CER NPO 100P 5% 50V	1
C105	J707438P10	CAP CER CL2 4N7 10% 50V	1
C106	J707436P61	CAP CER NPO 100P 5% 50V	1
C107	A700045P7	CAP TA SOL 2U2 20% 10V	1
C108	J707436P61	CAP CER NPO 100P 5% 50V	1
C109	J707436P61	CAP CER NPO 100P 5% 50V	1
C201	A700045P9	CAP TA SOL 22U 20% 10V	1
E101	J706002P2	CORRE FERR	1
E102	J706002P2	CORRE FERR	1
E103	J706002P2	CORRE FERR	1
E104	J706002P2	CORRE FERR	1
E105	J706002P2	CORRE FERR	1
E106	J706002P2	CORRE FERR	1
Q101	J707511P1	TSTR NPN SI BC 548A/B	1
Q102	J707511P1	TSTR NPN SI BC 548A/B	1
Q103	J707386P1	TSTR NPN SI BCW 32	1
R101	J707385P102	RES MFILM 1K0 5% 1/8W	1
R102	J707385P472	RES MFILM 4K7 5% 1/8W	1
R103	J707385P105	RES MFILM 1M0 10% 1/8W	1
R104	J707385P152	RES MFILM 1K5 5% 1/8W	1
R105	J707385P181	RES MFILM 180R 5% 1/8W	1
R106	J707385P223	RES MFILM 22K 5% 1/8W	1
R201	J707385P102	RES MFILM 1K0 5% 1/8W	1
R202	J707385P102	RES MFILM 1K0 5% 1/8W	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY
0002	L855799P1R0	BD PW, REVISION NO.0	

0023 :	M906065G1 :	CONNECTOR ASM :	

0001	M906065P1	CONNECTOR ASM	
0002	M905973P1	CONNECTOR	1
0003	M905974P1	CONNECTOR COVER	1
0004	J709170G1	SPRING CONTACT MODIF	10
0005	K805724G1	CABLE ASM	1
0006	J708865P1	GUIDE ROD	2
0007	J708868P1	CONNECTOR SCREW	1

0025 :	J709144G1 :	BUTTON ASM,-("RED" PUSHPAD) :	

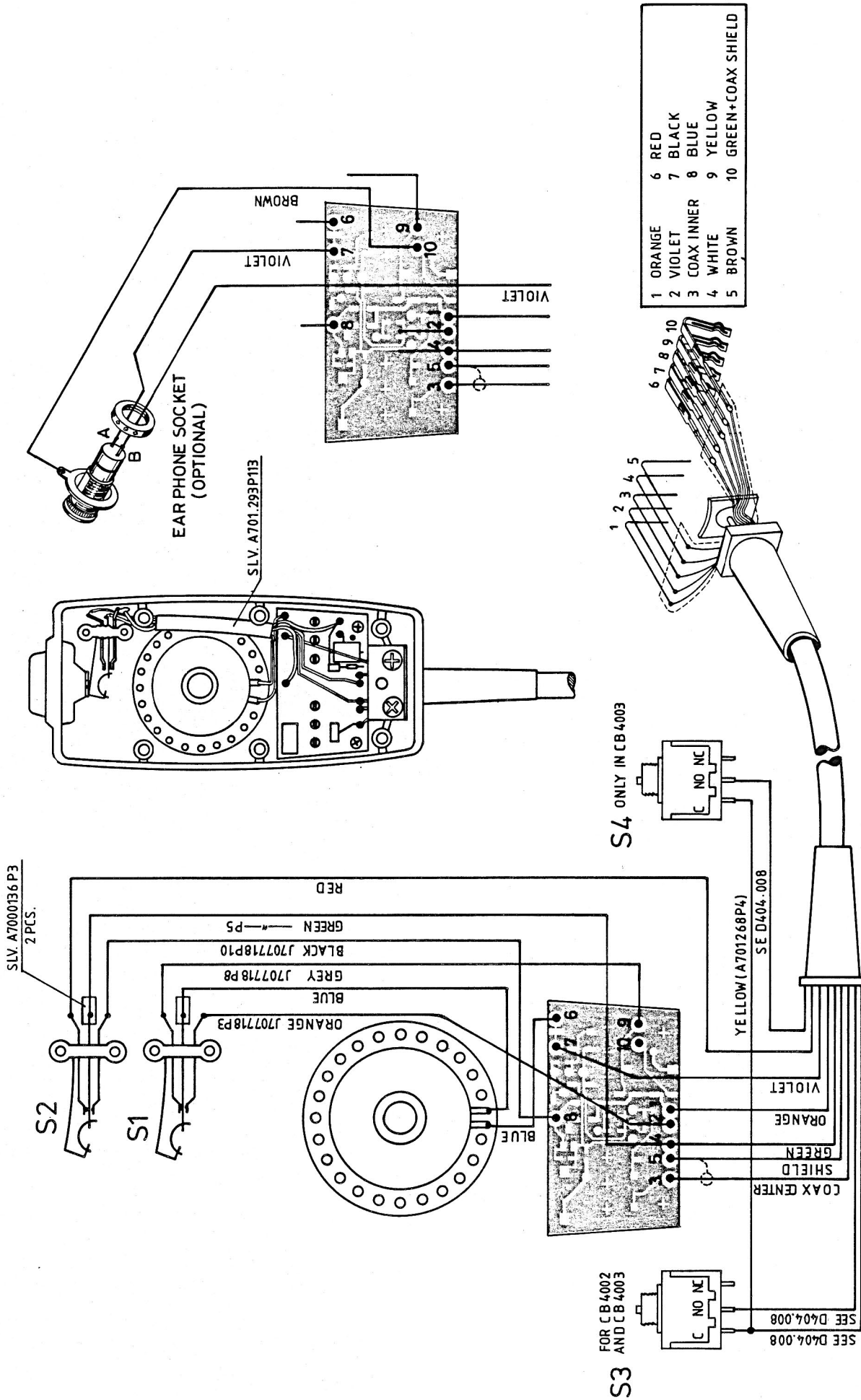
0002	J709145P3	BUTTON RED	1
0003	J709146P1	BUSH WITH SURFACE	1
0004	A701648P4	SIL RUB SEALANT RTV-3140	0.001KG

0026 :	J709144G2 :	BUTTON ASM,-("GREEN" PUSHPAD) :	

0002	J709145P1	BUTTON GREEN	1
0003	J709146P1	BUSH WITH SURFACE	1
0004	A701648P4	SIL RUB SEALANT RTV-3140	0.001KG

0002 :	K805738G1 :	KIT, EARPHONE ASM- F. CB 400X :	

0002	J708770P1	SOCKET LEMO	1
0003	J707718P1	WIRE STRD BROWN	0.05M
0004	J707718P7	WIRE STRD WIOLET	0.04M
0005	J708634P2	TERMINAL, SOLDER-	1
0006	J709193	INSTRUCTION MOUNTING	



WIRING AND CABLE LAYOUT
FOR CB400X

M405.198

POS	CODE No.	DESCRIPTION	QTY.
1	J709056P1	Microohone 10R	1
2	J706960P1	Packing	1
3	J709393G1	Washer with surface	1
4	J709318P1	Gasket Rubber	1
5	J708023P3	S3-Micro Switch (only in CB4002 & CB4003)	1
6	J708543P6	Washer Flat (only in CB4002 & CB4003)	1
7	J708023P3	S4-Micro Switch (only in CB4003)	1
8	J708543P6	Washer Flat (only in CB4003)	1
9	J709390P1	Spacer Non Metalic	2
10	J709138P1	Netting	1
11	J709134P1	Cable Clamp	1
12	L855837G1	Housing Modified CB4001	1
	L855837G2	Housing Modified CB4002	1
	L855837G3	Housing Modified CB4003	1
13	J709144G1	Button Asm.(only in CB4002 & CB4003)	1
13.1	J709145P3	Red Pushpad (only in CB4002 & CB4003)	1
14	J709144G2	Button Asm. (only i CB4003)	1
14.1	J709145P1	Green Pushpad (only in CB4003)	1
15	L855798G1	Component Board Asm.	1
16	J709320P1	S2-Switch Micro	1
17	J709320P1	S2-Switch Micro	1
18	J709143P1	Button (Red) PTT.	1
19	J709141P1	Spring for PTT Button	1
20	J709142P1	Washer	1
21	J709200P2	O-ring 4.0 mm.	1
22	J709147G1	Cover Asm.	1
23	J709140P1	Packing	1
24	M906065G1	Connector Asm.	1
24.1	J708868P1	Connector Screw	1
25	J709087P1	Button , Screw PTT.	1
26	J706854P1	Name Plate (STORNO)	1
27	J709136P3	Label	1
28	J708300P106	Screw Pan Head 2.2x12.5 BZ	2
29	J706212P204	Screw Pan Head 2.0x9.5 SZ	8
30	K805738G1	Earphone Kit (optional)	1
30.1	J708634P2	Soldrig Termial	1
30.2	J708770P1	Socket, Lemo with nut	1
		Earphone Kit also contains the following items	
	J707718P1	Wire Strd. Brown 0.05M.	1
	J707718P7	Wire Strd. Violet 0.04M.	1
		End of Part List	

CB400X

MECHANICAL PART LIST

Page 1 of 1

Revision 00

MPL405.197

25 th. Mar. 1985

CHAPTER
CHAPITRE
KAPITEL

7

Storno

CQP4000 UNIVERSAL ACCESSORIES

CK4008

CK4008 is a leather carrying case designed for BU4001 application with cut-aways for the multi-connector used with the remote control.

CK4009

CK4009 is a leather carrying case intended for BU4002 application with cut-aways for the multi-connector used with the remote control.

19K805738G1

This part number designates a complete earphone socket kit (including mounting instructions).

19M906065G1

This is a remote multiconnector with an 11-cored shielded multicable of approx. 900 mm mounted.

K19J709305G1

This is a kit for changing an existing standard CQP4000 into a universal version. The kit includes modification instructions and new labels to be filled-in.

MISCELLANEOUS

ANTENNAS

Whip antenna AN4661

This antenna is for the frequency band 400-470 MHz.

Rubber antenna AN4xx2

The AN4112 is a wide band conductive rubber antenna.

AN4332 is a rubber antenna existing in two versions: AN4332-L (low band) for 68-76 MHz and AN4332-H (high band) for 75-88 MHz.

Preadjusted, resonant helical antenna AN4xx3

This antenna exists in five versions, A to E, fitted for five sub-bands in the 146 to 174 MHz frequency range.

The adjustment to the sub-band is done by cutting the length.

SUB-BAND DESIGNATION	RANGE MHz
A	145-155
B	150-160
C	155-165
D	160-170
E	165-175

OTHER ACCESSORIES

Carrying strap CK4003

The carrying strap is delivered as a kit containing:

1. Strap (leather)
2. Buckles
4. Clamps
1. Shoulder protector

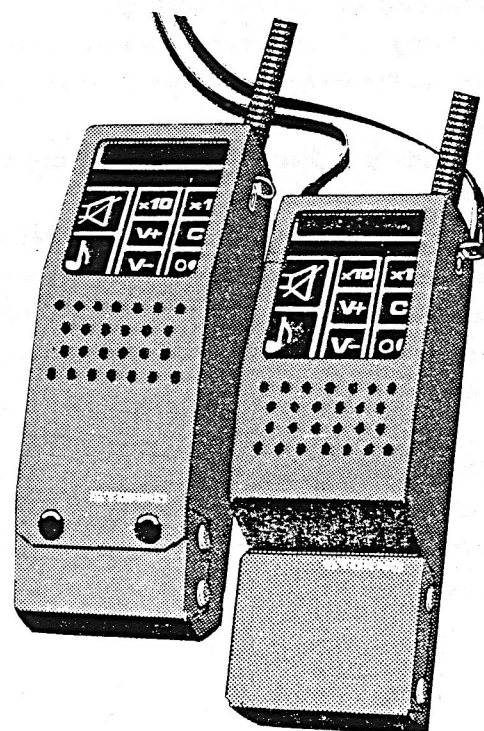
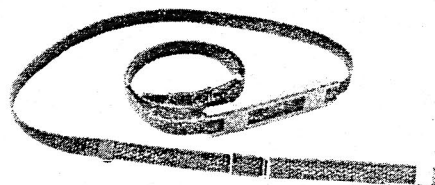
It is possible to cut the strap to any length and therefore to use it as a wrist-strap.

Carrying cases CK4004 and CK4005

The two carrying cases are in black leather. CK4004 is for the BU4001 battery version of the CQP4000 and CK4005 is for a CQP4000 with BU4002.

The display and the keypad are accessible through a transparent window in the case as well as there are four rows of holes for the loudspeaker. A separate flap allows the battery to be charged without removing the radio from the case.

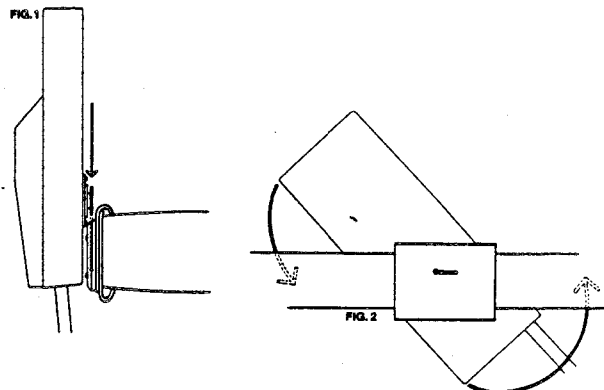
The carrying cases may be used together with the carrying strap.



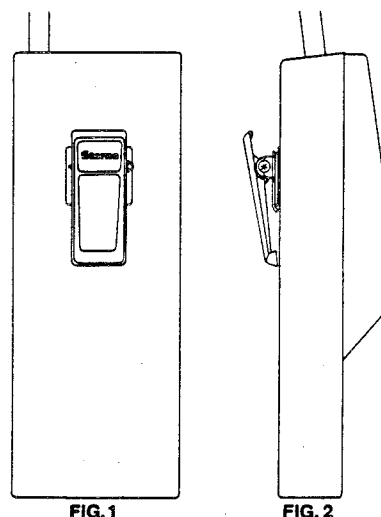
Belt retainer CK4006.

In order to fasten the belt retainer a special plastic cabinet, CA4002, must be ordered. The retainer consists of a bracket to mount on CA4002 and a leather ring with a swivel lock.

With the belt loop in position the radio shoe is pushed upside down into the receiver, turned 180° where it locks and cannot be removed unless you reverse the procedure.

Belt clip CK4007.

To fasten the belt clip the special plastic cabinet, CA4002, must be ordered. The clip is made of stainless steel. It has a shoe which locks into the receiver mounted on the back of the radio.

Battery tester S14001

The battery tester is based on mechanical parts used for the radio-package.

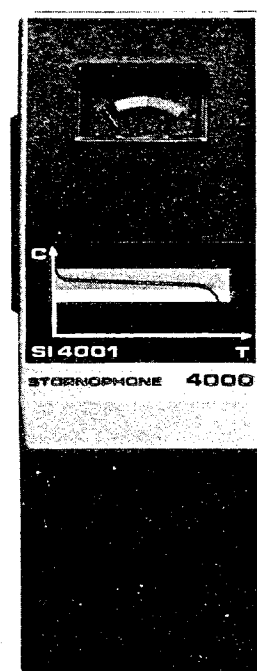
A moving-coil instrument is placed in the front part, in the area normally used for the keypad.

The battery is placed in the battery compartment.

When the button on the left side (normally used for PTT) is depressed, the battery is loaded corresponding to the 2 W transmitter and the instrument will show the charge-condition.

Display and keypad cover

A plastic cover to protect the display and keypad from being scratched by tools, etc. is available.



BU4001/BU4002

BATTERIES

The battery unit BU4001/BU4002 is intended for use in STORNOPHONE 4000 radiotelephones.

The battery pack consists of 2 moulded plastic parts, contact-strips and 6 NiCd-cells connected in serie.

2 sizes of batteries are provided as options. A 450 mAh battery and a larger, 750 mAh battery. The nominal battery voltage is 7.2 V. The batteries are provided with two sets of terminals, one set in the top giving the supply to the radio and one set in the back for charging purposes. The charge - terminals are short circuit protected by means of a diode mounted in the battery. This enables the unit to be charged separately or when in the radio.

Because of the big area of the charging terminals, a diode is connected between the positive terminal and the battery in order to avoid short-

circuits when handling the battery. Furthermore, because the battery shall supply the charging unit in case of mains drop-out, a 470 ohm resistor is coupled parallel to the diode.

The third terminal (in the middle) of the charging inlet is designed for another version of the battery.

NOTE:

A new battery may not reach full capacity until it has been charged/discharged 2 to 3 times.

After a longer period of storing, the capacity of the battery can be lower than its nominal capacity.

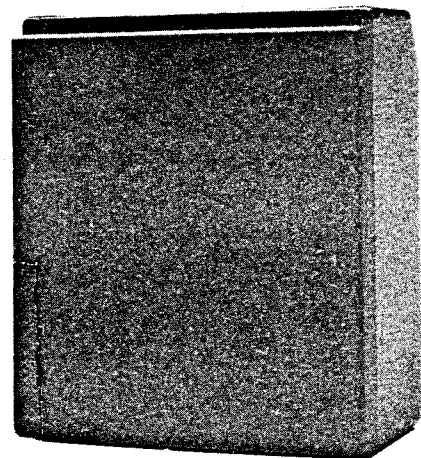
The battery must be started up, i.e. used with a few full charge/deep discharge cycles. Using the battery with full charge/deep discharge cycles from time to time will avoid storage and memory effects. A deep discharge corresponds to 6 V.

BU4001, 450 mAh

The operating time for a fully recharged battery is shown below (100% of nominal capacity):

Duty cycle %			Oper.* time	Standard type 2 & 10 ch.		Automatic type	
Transm.	Receive	Stand-by		1 W	2 W	1 W	2 W
2	5	93	Hrs	10.7	8.9	8.7	7.6
5	5	90	Hrs	8.4	6.1	7.3	5.6
5	10	85	Hrs	7.7	5.7	6.8	5.3
10	5	85	Hrs	6.3	4.0	5.7	3.9
10	10	80	Hrs	5.3	3.8	5.4	3.8

* Values shown for VHF. UHF values approx. 7% lower.

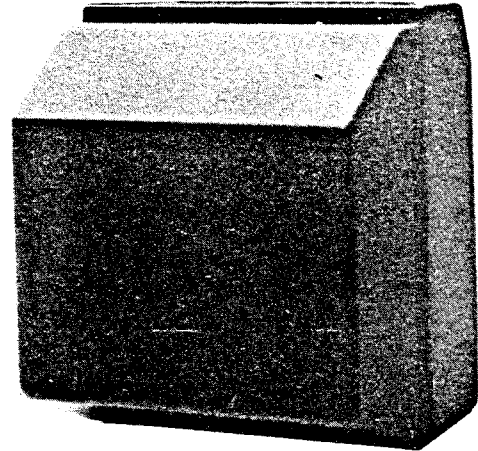


BU4002, 750 mAh

The operating time for a fully recharged battery is shown below (100% of nominal capacity):

Duty cycle %			Oper. * time	Standard type 2 & 10 ch.		Automatic type	
Transm.	Receive	Stand-by		1 W	2 W	1 W	2 W
2	5	93	Hrs	17.1	15.0	14.4	12.6
5	5	90	Hrs	14.1	10.3	12.1	9.3
5	10	85	Hrs	12.9	9.6	11.3	8.9
10	5	85	Hrs	10.4	6.7	9.6	6.5
10	10	80	Hrs	9.8	6.4	9.1	6.3

* Values shown for VHF. UHF values approx. 7% lower.



TECHNICAL SPECIFICATIONS

BU4001

Capacity:

450 mAh nominal at 25°C.

Voltage:

7.2 V nominal at 25°C.

Charging current:

Max. 135 mA.

Charging temperature:

10 to 45°C.

Discharge temperature:

-25 to +60°C.

Storage temperature:

-40 to +60°C.

Internal resistance at 25°C:

DC resistance: 0.4 ohm max

AC resistance: 0.3 ohm max.

Dimensions

Length: 67.2 mm

Width: 67.4 mm

Height: 21.0 mm

Weight

150 g

BU4002

Capacity:

750 mAh nominal at 25°C.

Voltage:

7.2 V nominal at 25°C.

Charging current:

Max. 250 mA.

Charging temperature:

10 to 45°C.

Discharge temperature:

-25 to +60°C.

Storage temperature:

-40 to +60°C.

Internal resistance at 25°C:

DC resistance: 0.225 ohm max

AC resistance: 0.17 ohm max.

Dimensions

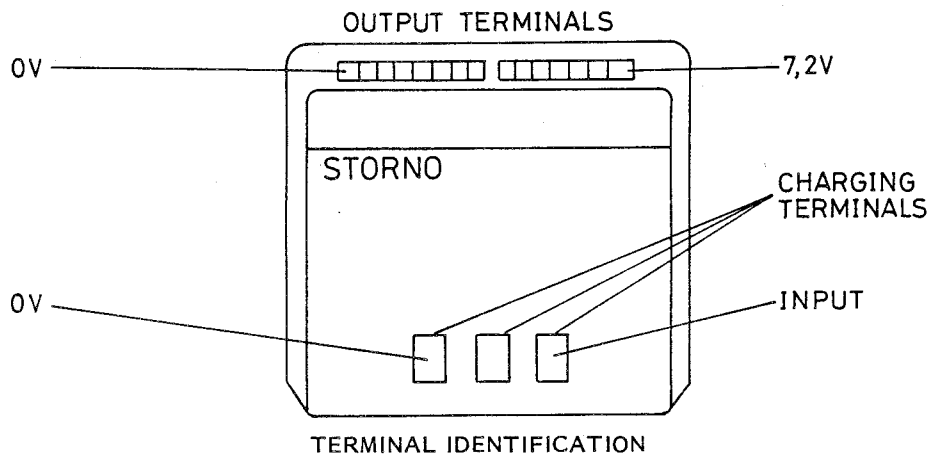
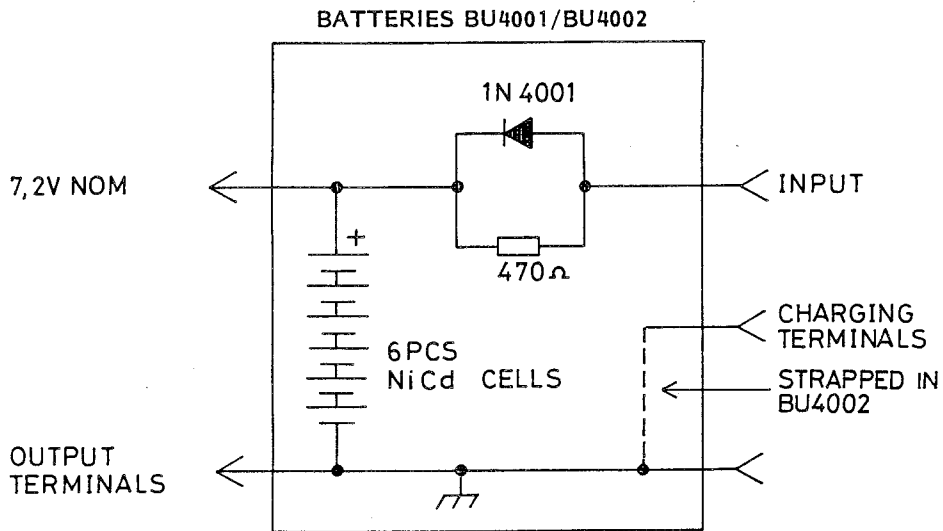
Length: 67.2 mm

Width: 67.4 mm

Height: 36.5 mm

Weight

220 g



BU4001/BU4002

D403.315/3

CU4001/CU4002

BATTERY CHARGERS

The CU4001 and CU4002 battery chargers are designed for the NiCd batteries BU4001 (450 mAh) and BU4002 (750 mAh).

The chargers are available in a standard version and UK version with a special mains plug containing fuses.

The chargers provide charging of either the battery alone or when inserted in the radio.

The chargers are fully automatic, and the charging time is approximately:

- o 450 mAh battery - 6 hours
- o 750 mAh battery - 10 hours

A red light emitting diode placed in the cabinet front indicates that the charging unit is connected to mains power supply.

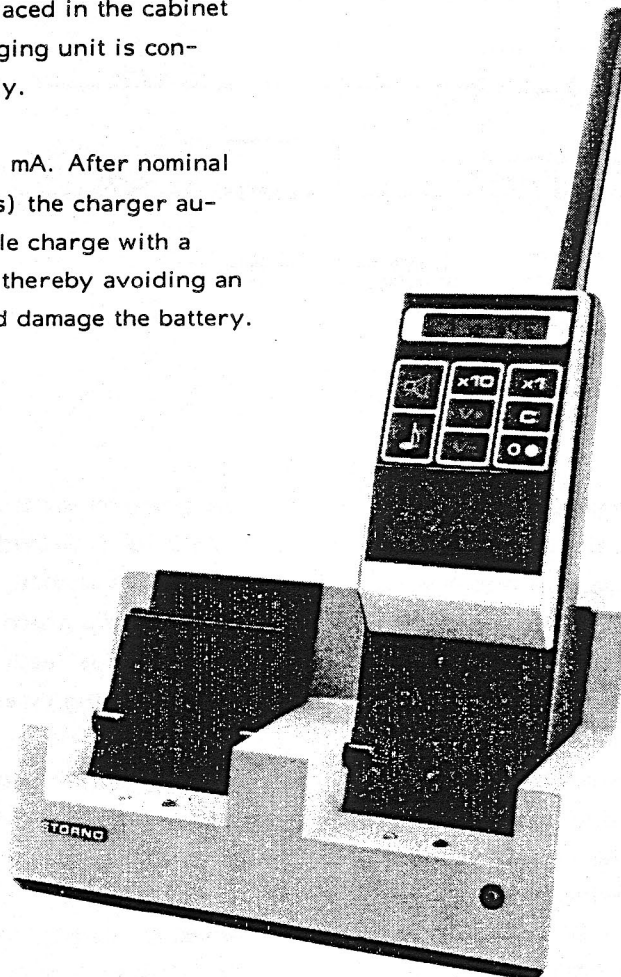
The charging current is 120 mA. After nominal charging time (6 or 10 hours) the charger automatically switches to trickle charge with a charging current of 38 mA, thereby avoiding an overload condition that could damage the battery.

The battery contains a coding terminal, which automatically programs the charger for the right charging time so that the charger need not be adjusted to charge the two different battery types.

CU4001 is designed with two outlets, each provided with two LED-indicators.

- o Yellow LED - charging in process.
- o Green LED - charging finished.

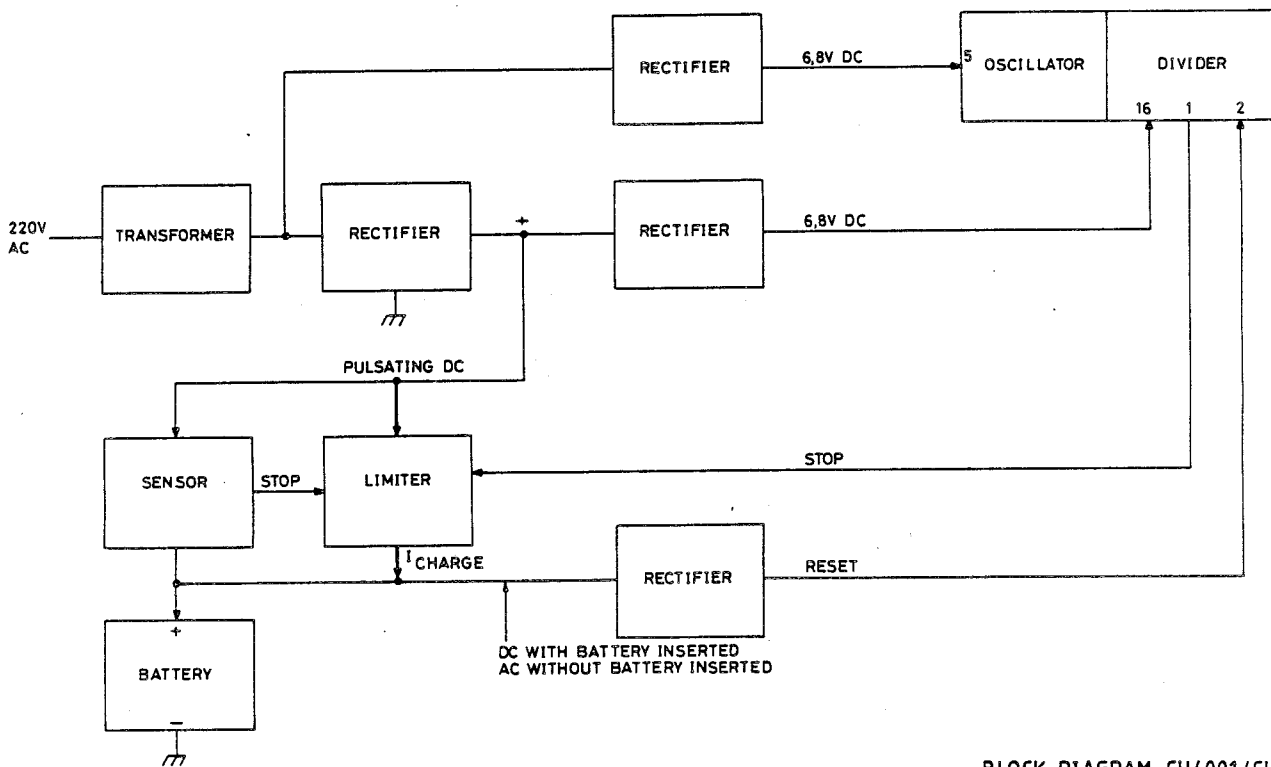
CU4002 is a 6 position unit consisting of the same basic parts as the 2 position charger CU4001. 3 component boards with mains transformer and 3 cabinets are placed side by side on one common bottom plate. The boards are therefore functionally identical to the 2 position charger.



CIRCUIT DESCRIPTION

The charger comprises identical circuits, one for each outlets.
 The charging current is a rectified alternating current (100/120 Hz). The output AC voltage from the mains transformer is rectified and fed to the battery through a current limiting circuitry consisting of a zener diode (D201-D301) and a power transistor (Q201-Q301) providing a

constant peak voltage drop across two series coupled resistors (R203/211-204, R303/311-304). R204/304 is short circuited during the predetermined periode of quick charging. R203/211, R303/311 thereby determine the quick charge rate. The standby charge rate is determined by the series combination of the three resistors.



BLOCK DIAGRAM CU4001/CU4002

0403.314/2

The timing circuit U201-U301, consists of a clock pulse oscillator and a divider for each outlet. The oscillator is only supplied from the mains transformer (Pin 5). The divider is supplied from the mains transformer and from the inserted battery (Pin 16), in order to maintain information of the elapsed quick charge time and to stop oscillation in case of mains dropout. The output voltage is limited to 11.5 V peak. The proper functioning of the timer is ensured by a resetting circuitry sensing whether there is an alternating voltage or a DC voltage at the battery outlet (Q203, D206, R212, R213). The

reset input of the frequency divider is at pin 2. Each outlet is provided with a yellow LED-indicator (H201-H301) to show that charging is in process and a green LED (H202-H302) to show that battery is ready after the predetermined quick charging time.

When a 750 mAh battery is inserted into the charger an extra contact strip in the battery connects a capacitor (C202) in the charger to ground whereby the oscillator frequency is lowered to prolong the charging time. The charger is short-circuit protected.

TECHNICAL SPECIFICATIONS

NOTE: All charge currents are mean values.

Supply voltage

220/240VAC, +10%, -15% 50/60 Hz.

Mains transformer primary is strapped to either 220 V or 240 V nom.

Input current

Max. 45 mA

Input power

Max. 11 W

Temperature range

10 - 45 deg.C

Output voltage

$U_{\text{max.}} = 11.5 \text{ Vpeak}$

Quick charge current at 220 V

min: 105 mA

typ: 120 mA

max: 135 mA

Standby charge rate at 220 V

min: 34 mA

typ: 38 mA

max: 42 mA

Short-circuit current

max. 80 mA (mean value)

Charging time/osc. frequency

450 mAh battery:

min: 4.8 h/480 Hz

typ: 5.3 h/435 Hz

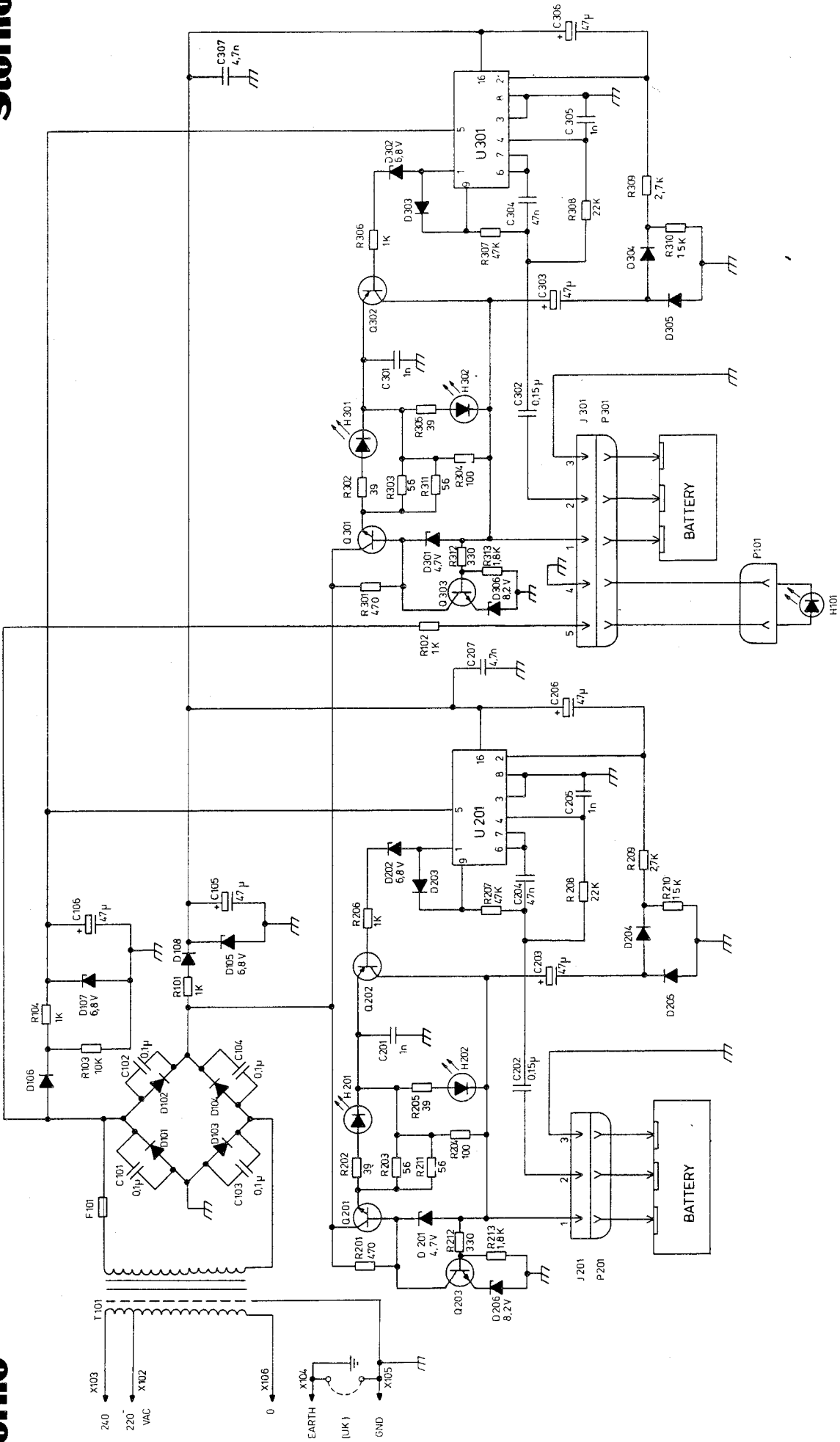
max: 6.0 h/390 Hz

750 mAh battery:

min: 7.5 h/310 Hz

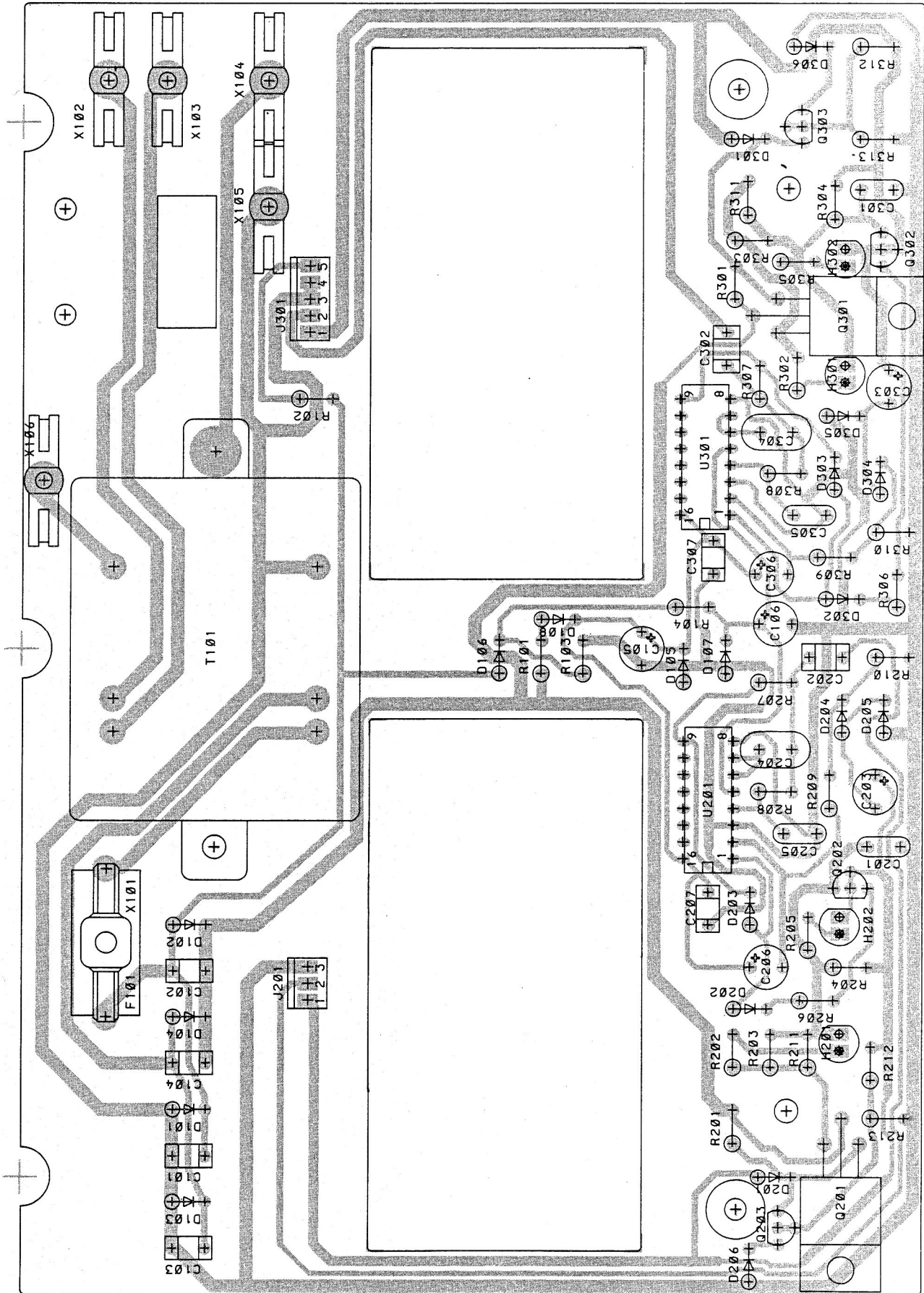
typ: 8.3 h/280 Hz

max: 9.1 h/250 Hz



CHARGING UNIT CU4001

D 403.293



CHARGING UNIT CU4001
COMPONENT LAYOUT

D403.310

ITEM NUMBER	DESCRIPTION
M905550G1	CU4001 , BATT CHARGER
=====	
M905427G1	SUB ASM : CPNT BD CU4001

L855370G1	SUB ASM : CABINET ASM CU400X
L855365G1	SUB-SUB ASM : SLIDE BD ASM CU4001
J707524G1	SUB-SUB ASM : PWR-CORD ASM CU4001

P A R T S L I S T

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY TOTAL
	L855370G1	CABINET ASM CU4000	(1)

	A700031P413	SCR M3 X 13 MM	2
	A700034P4	NUT HEX M3	2
	A701312P4	WASH	2
	J706076P5	WASH	6
	J706136P2	DIO OPTO	1
	J706163P1	NAME PLT	1
	J706212P205	SCREW P.HD SZ 4,0 X 12,7MM	7
	J706902P1	CLAMP	1
	J706902P2	CLAMP	1
	J706921P1	RET	1
	J707524G1	CORD PWR ASM CU4001	1
	J707525P1	LABEL, EUR	1
	J707527P1	WASH	2
	J707688P2	BUMPER	4
	J707867P416	SCREW	4
	K805333P1	GUIDE	4
	K805336G1	CABLE-SLIDE BD	1
	K805336G2	CABLE-SLIDE BD AND LED	1
	K805356G1	CAB CHARGER DRILL	1
	L855361P1	SPRING	2
	L855404G1	PLATE BOT PAINT	1
	L855365G1	SLIDE BD ASM CU4001	(2)

	A701488P2	RING RETAINING	6
	J707531P1	SPRING COMPR D=2,8 - L=8,6 ;	6
	K805339P1	CONTACT PIN	6
	M905485P1	SLIDE BD	2

	COMPONENT BOARD:		

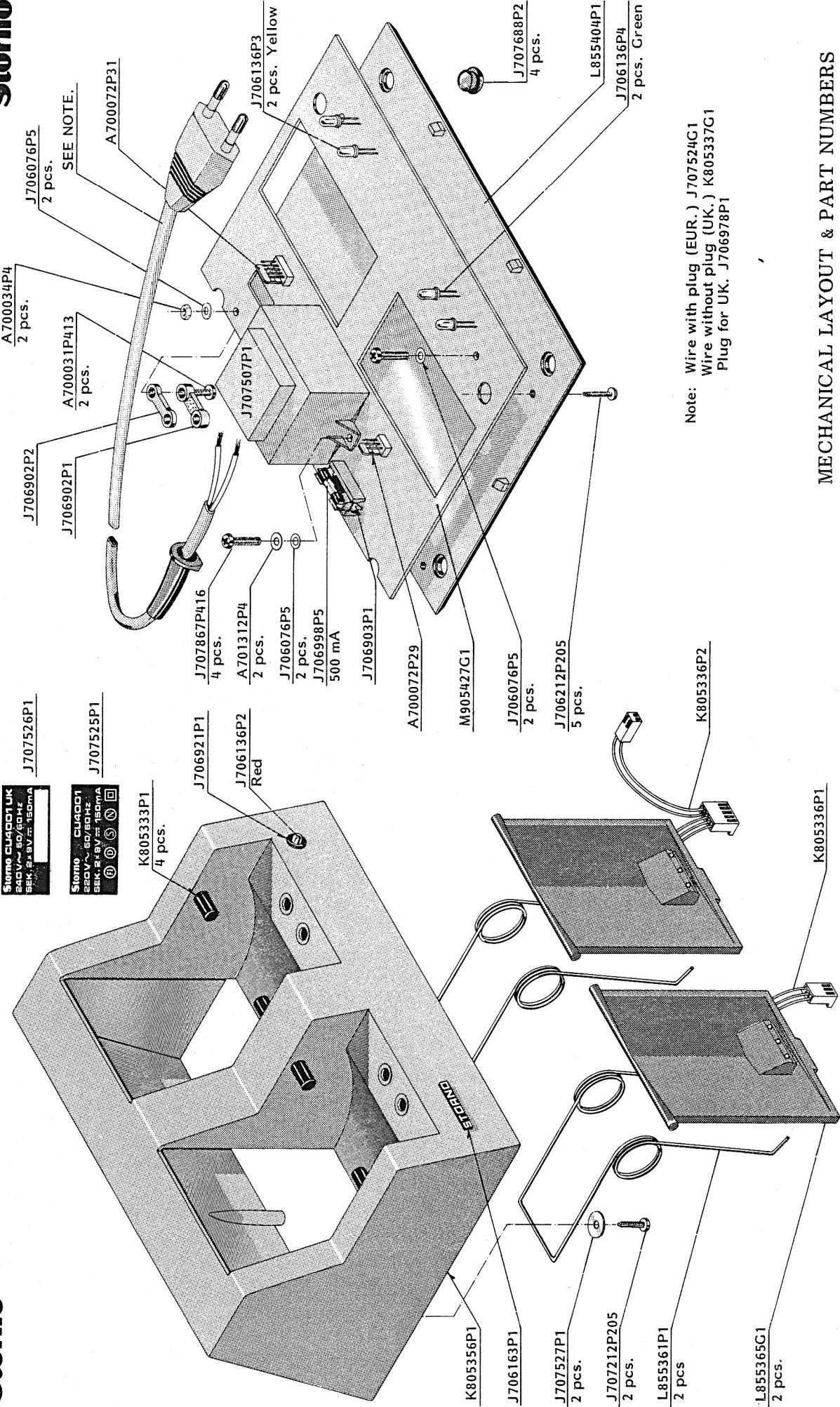
C101	J707412P9	CAP PYES 100N 10% 63V	1
C102	J707412P9	CAP PYES 100N 10% 63V	1
C103	J707412P9	CAP PYES 100N 10% 63V	1
C104	J707412P9	CAP PYES 100N 10% 63V	1
C105	J707353P9	CAP ELEC 47 UF 16V	1
C106	J707353P9	CAP ELEC 47 UF 16V	1
C201	A700233P7	CAP CER 1NF 50V	1
C202	J707412P10	CAP PYES 150N 10% 63V	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY TOTAL
C203	J707353P9	CAP ELEC 47 UF 16V	1
C204	A702059P11	CAP PYES 47U 5% 50V	1
C205	A700233P7	CAP CER 1NF 50V	1
C206	J707353P9	CAP ELEC 47 UF 16V	1
C207	J707412P1	CAP PYES 4N7 10% 63V	1
C301	A700233P7	CAP CER 1NF 50V	1
C302	J707412P10	CAP PYES 150N 10% 63V	1
C303	J707353P9	CAP ELEC 47 UF 16V	1
C304	A702059P11	CAP PYES 47U 5% 50V	1
C305	A700233P7	CAP CER 1NF 50V	1
C306	J707353P9	CAP ELEC 47 UF 16V	1
C307	J707412P1	CAP PYES 4N7 10% 63V	1
D101	J706100P1	DIO SI SIG 1N4001	1
D102	J706100P1	DIO SI SIG 1N4001	1
D103	J706100P1	DIO SI SIG 1N4001	1
D104	J706100P1	DIO SI SIG 1N4001	1
D105	J707514P4	DIO SI ZENR 6,8V	1
D106	J707513P1	DIO SI 1N4148	1
D107	J707514P4	DIO SI ZENR 6,8V	1
D108	J707513P1	DIO SI 1N4148	1
D201	J707514P1	DIO SI ZENR 4,7V	1
D202	J707514P4	DIO SI ZENR 6,8V	1
D203	J707513P1	DIO SI 1N4148	1
D204	J707513P1	DIO SI 1N4148	1
D205	J707513P1	DIO SI 1N4148	1
D206	J707514P5	DIO SI ZENR 8,2V	1
D301	J707514P1	DIO SI ZENR 4,7V	1
D302	J707514P4	DIO SI ZENR 6,8V	1
D303	J707513P1	DIO SI 1N4148	1
D304	J707513P1	DIO SI 1N4148	1
D305	J707513P1	DIO SI 1N4148	1
D306	J707514P5	DIO SI ZENR 8,2V	1
F101	J706998P5	FUSE CTG 0.500A	1
H201	J706136P3	DIO OPTO ELEC YELLOW	1
H202	J706136P4	DIO OPTO ELEC GREEN	1
H301	J706136P3	DIO OPTO ELEC YELLOW	1
H302	J706136P4	DIO OPTO ELEC GREEN	1
J201	A700072P29	CONN PWB MALE 'D3 CKT	1
J301	A700072P31	CONN PWB MALE '05 CKT	1
Q201	A700054P1	TSTR NPN SI BD 201	1
Q202	J707435P1	TSTR PNP SI BC 369	1
Q203	J707511P1	TSTR SI BC548	1
Q301	A700054P1	TSTR NPN SI BD 201	1
Q302	J707435P1	TSTR PNP SI BC 369	1
Q303	J707511P1	TSTR SI BC548	1
R101	A702110P37	RES DEPC 1K0 5% 1/4W	1
R102	A702110P37	RES DEPC 1K0 5% 1/4W	1
R103	A702110P49	RES DEPC 10K 5% 1/4W	1
R104	A702110P37	RES DEPC 1K0 5% 1/4W	1
R201	A702110P33	RES DEPC 470R 5% 1/4W	1
R202	A702110P20	RES DEPC 39R 5% 1/4W	1

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY TOTAL
R203	A702110P22	RES DEPC 56R 5% 1/4W	1
R204	A702110P25	RES DEPC 100R 5% 1/4W	1
R205	A702110P20	RES DEPC 39R 5% 1/4W	1
R206	A702110P37	RES DEPC 1K0 5% 1/4W	1
R207	A702110P57	RES DEPC 47K 5% 1/4W	1
R208	A702110P53	RES DEPC 22K 5% 1/4W	1
R209	A702110P42	RES DEPC 2K7 5% 1/4W	1
R210	A702110P51	RES DEPC 15K 5% 1/4W	1
R211	A702110P22	RES DEPC 56R 5% 1/4W	1
R212	A702110P31	RES DEPC 330R 5% 1/4W	1
R213	A702110P40	RES DEPC 1K8 5% 1/4W	1
R301	A702110P33	RES DEPC 470R 5% 1/4W	1
R302	A702110P20	RES DEPC 39R 5% 1/4W	1
R303	A702110P22	RES DEPC 56R 5% 1/4W	1
R304	A702110P25	RES DEPC 100R 5% 1/4W	1
R305	A702110P20	RES DEPC 39R 5% 1/4W	1
R306	A702110P37	RES DEPC 1K0 5% 1/4W	1
R307	A702110P57	RES DEPC 47K 5% 1/4W	1
R308	A702110P53	RES DEPC 22K 5% 1/4W	1
R309	A702110P42	RES DEPC 2K7 5% 1/4W	1
R310	A702110P51	RES DEPC 15K 5% 1/4W	1
R311	A702110P22	RES DEPC 56R 5% 1/4W	1
R312	A702110P31	RES DEPC 330R 5% 1/4W	1
R313	A702110P40	RES DEPC 1K8 5% 1/4W	1
T101	J707507P1	TRAFO	1
U201	A700029P214	INT CKT TIMR 4521B	1
U301	A700029P214	INT CKT TIMR 4521B	1
X101	J706903P1	FZ HLR	1
X102	J706904P1	TERM SLD RLN 2689002	1
X103	J706904P1	TERM SLD RLN 2689002	1
X104	J706904P1	TERM SLD RLN 2689002	1
X105	J706904P1	TERM SLD RLN 2689002	1
X106	J706904P1	TERM SLD RLN 2689002	1

Storno

Storno



Note: Wire with plug (EUR.) J707524G1
 Wire without plug (UK.) K805337G1
 Plug for UK. J706978P1

MECHANICAL LAYOUT & PART NUMBERS
 SCHEMA MECANIQUE & NUMEROS DE PIECES
 MECHANISCHE ZEICHNUNG & TEILENUMMERN

CU4001 Code No. M905550G1

M405.161

TEST ADAPTOR

SE4002

The test adaptor is designed with the same dimension as a battery and fits into the battery compartment. The adaptor can be used to connect various test instruments to the radio and has built-in toggle switches to operate the radio during test and when adjusting the circuitry.

7.2 V CABLE

A cable terminated in two banana plugs, one red and one black, connects to the external power supply whose nominal output voltage should be +7.2 V.

AF OUT CABLE

A coaxial cable terminated in a BNC plug is used to measure the receiver AF output, either the line output (nominal 110 mV) or the loudspeaker output, dependent on the setting of the AF-LINE switch.

MOD. IN CABLE

A coaxial cable terminated in a BNC plug connects to an AF generator for external modulation of the transmitter. The test adaptor has a built-in 11:1 attenuator and the nominal modulation sensitivity as measured at the generator output is 110 mV/1 kHz

TOGGLE SWITCHES

KEY

switches between receive mode RX and transmit mode TX.

AF-LINE

switches the AF out cable between the line output and the loudspeaker output.

AF

switches the AF receiver output between the internal loudspeaker INT and a built-in 8 ohm dummy load.

SQ

switches between the normal SQUELCH function and the unsquelched condition CANCEL.

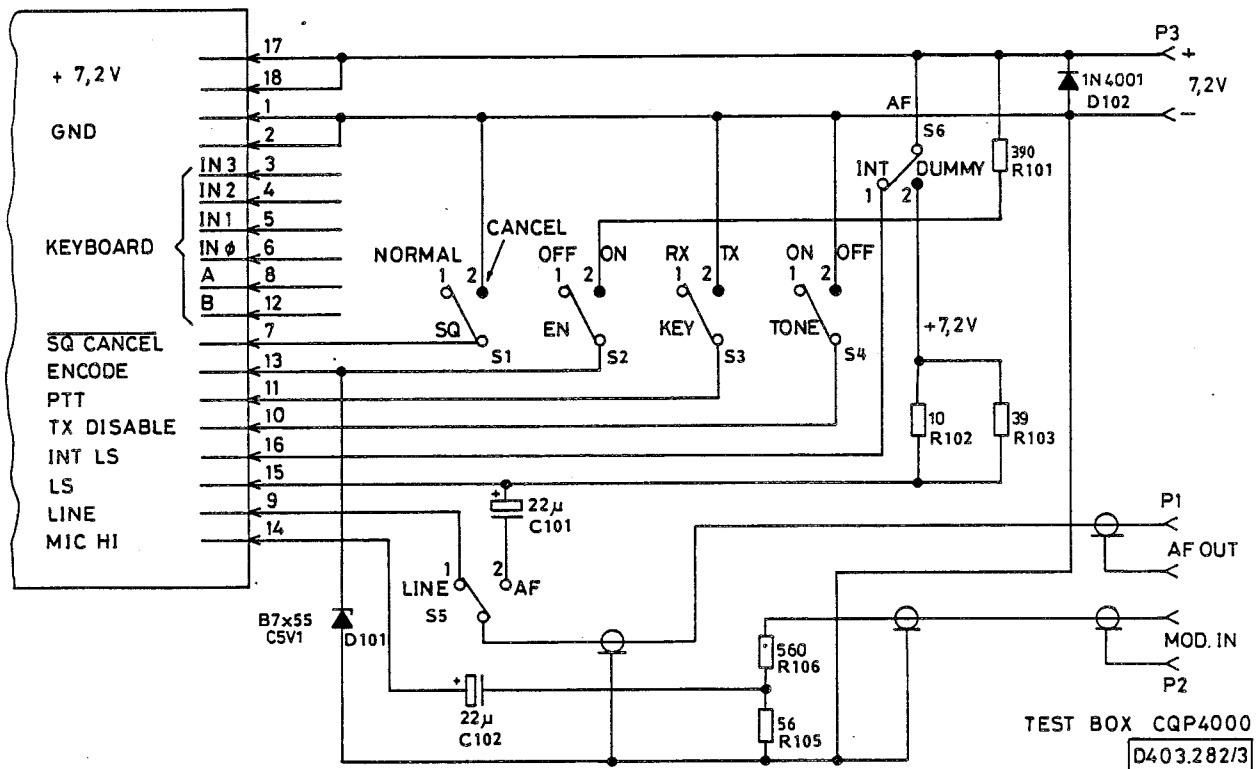
EN and TONE

are switches which when manipulated as described below key the transmitter and continuously modulate it with the first tone of the tone receiver code. The EN switch should always be in OFF position and the TONE switch in ON position unless the tone module is being tested.

The following procedure sets up the tone test mode:

1. Turn radio OFF
2. Set KEY to RX
3. Set EN to OFF
4. Set TONE to ON
5. Turn radio ON
6. Set TONE to OFF
7. Set KEY to TX
8. Set TONE to ON
9. Set EN to ON

The radio will now be in transmit mode and continuously modulated with a frequency which is the first tone of the tone receiver telegram code.



ITEM NUMBER	DESCRIPTION
K805371G1	SE 4002
=====	
L855450G1	SUB ASM CPNT BD SE4002

P A R T S L I S T :

CIRCUIT POSITION	COMPONENT ITEM NUMBER	COMPONENT DESCRIPTION	QUANTITY TOTAL

	A700189P1	SW TGL 7101G	6
	J706075P2	GROMMET	3
	J707717P1	NAME PLATE	1
	J707726G1	COV, DRILLED	1
	J707727G1	COV, MACHINED	1
	J707736P6	WASHER 8.4X12X0.9 MM	3
	J707749G1	CABLE ASM	2
	J706049P2	CABLE RF COAX	(1)
	J707750P1	CONN RF COAX 50R PLG BNC	1
	K805375G1	CABLE ASM	(1)
	J707734P1	CONN	1
	J707734P2	CONN	1
	J707735P1	CABLE POWER 2-COND	1
	L855450G1	CPNT BD	(1)
R102	A700019P13	RES DEPC 10R 5% 1/4W	1
R103	A700019P20	RES DEPC 39R 5% 1/4W	1
R105	A700019P22	RES DEPC 56R 5% 1/4W	1
R101	A700019P32	RES DEPC 390R 5% 1/4W	1
R106	A700019P34	RES DEPC 560R 5% 1/4W	1
D101	A700025P6	DIO SI ZENR 5V1 5% 0,4W	1
D102	J706100P1	DIO SI SIG 1N4001	1
	J706315P5	SPACER	4
C101	J707444P8	CAP TA SOL 22U 20% 16V	1
C102	J707444P8	CAP TA SOL 22U 20% 16V	1
	L855439P1	BD PW	1

CHAPTER
CHAPITRE
KAPITEL

8

Storno

STORNOPHONE 4000 AUTOMATIC

ADJUSTMENT PROCEDURE

RF BOARD ADJUSTMENTS

For adjustment of the RF board refer to the appropriate description:

- RF411x - 60.617-E3
- RF433x - 60.778-E2
- RF466x - 60.779-E2

TEST SETUP

When the radio has been dismantled it should be fixed in service equipment SE4005 with the Control Panel CP4002 connected, or assembled in the test cabinet with extension cables and the test adapter SE4002. Note that the operation of the radio is totally different in the service mode.

SERVICE MODE SOFTWARE

The Stornophone 4000 Automatic software has an inherent test program which can be invoked when the radio is set up for test and alignment. In service mode the radio can be operated on 3 channels:

- Channel 1: A lower pair of the user frequencies (RX/TX)
- Channel 2: A pair of calculated center frequencies
- Channel 3: The higher pair of the user frequencies

Channel 2 may necessarily not be a user channel but is included for alignment purposes as to optimize performance.

To invoke the service mode set the SE4002/SE4005 toggle switches as follows:

<u>SWITCH</u>	<u>POSITION</u>
EN	OFF
TONE	OFF
SQ	NORMAL
AF	INT
AF-LINE	LINE
KEY	RX

When the radio is turned on it will be in SERVICE MODE.

IMPORTANT

Don't change the setting of the EN and TONE switches while the radio is in service mode as this will result in an undefined condition of program execution. If this is done accidentally it will not harm the radio set but the operation will be in an uncontrollable state. The only way to clear the situation is to remove the DC power to the radio.

SERVICE MODE OPERATION

The service mode has two operating levels, 1 and 2.

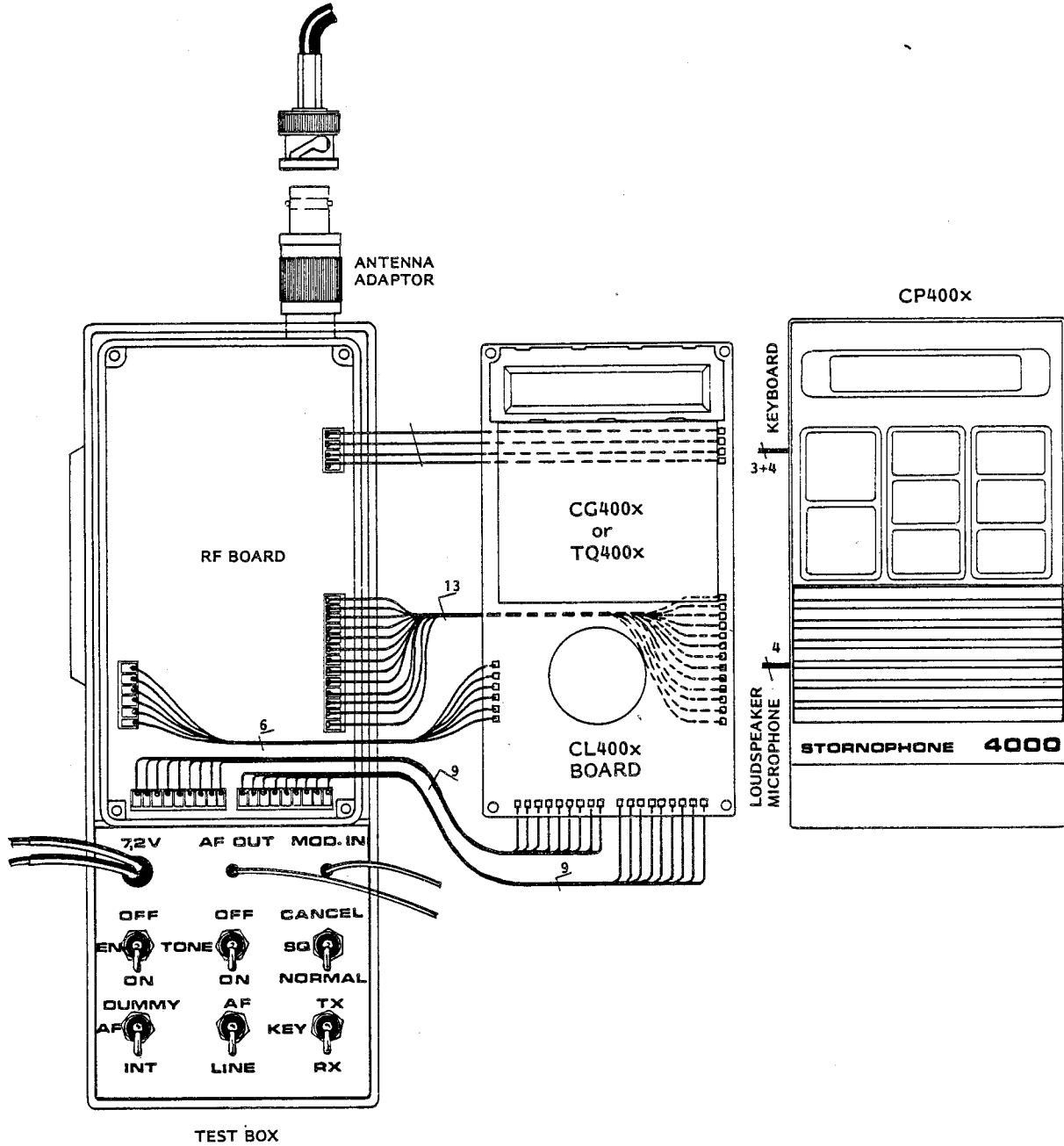
- Level 1 is used for RF test (channel select), setting the volume and selecting the tone mode. Level 2 is entered by pressing the ON/OFF button.
- Level 2 is used for display test (LCD), Keyboard test, Squelch ON/OFF, Encode/Decode switch of subunit 0 and 1 (TQ4009) and continuous side tone ON/OFF.

The Service Mode Keyboard configurations appear from fig. 1, 2 and 3.

TONE SUBUNIT TEST (TQ4009)

The Tone Subunits 0 and 1 (TQ4009) can be tested for DECODE and ENCODE. In ENCODE-phase a capital letter "E" is indicated in the display for the pertinent tone subunit.

When a correct tone is decoded (detected) a "small" letter "d" is indicated in the display.



TEST SETUP
STORNOPHONE 4000 AUTOMATIC

D403.279/3

Please note: This tone subunit test is a single tone test, not sequential. In EN-CODE-mode the transmitter is permanently and automatically keyed with a single continuous AF-signal.

In ENCODE-mode it is further possible to transmit a true (continuous) DTMF (Touch-tone or Double-tone signal). It is not possible in DE-CODE-mode to decode (detect) a DTMF-signal.

The Tone Loading-Codes are listed below.

tone loading codes

Display-code CCIR no. Frequency (norm.)

00	0	1981 Hz
01	1	1124 Hz
02	2	1197 Hz
03	3	1275 Hz
04	4	1358 Hz
05	5	1446 Hz
06	6	1540 Hz
07	7	1640 Hz
08	8	1747 Hz
09	9	1860 Hz
10	G	2400 Hz
11		930 Hz
12		2247 Hz
13		991 Hz
14	R (Repeat)	2110 Hz

Display code CCITT DTMF (norm.)

15	697 Hz
16	770 Hz
17	852 Hz
18	941 Hz
19	1209 Hz
20	1336 Hz
21	1475 Hz
22	1633 Hz

Display codes

> 22 Will be ignored

tone modulation adjustment

Connect a frequency deviationmeter to the antenna connector.

Enter service mode level 2 and turn the side tone on. The transmitter will automatically be keyed.

Adjust R824 for 3.5 kHz deviation.

KEYBOARD CONFIGURATION

FIG. 1 SERVICE MODE 1. LEVEL

7	8	9	(NOTE 2) <u>ON/OFF</u> (ENTER TO 2. LEVEL)
4	5	6	(NOTE 1) <u>CHANNEL</u> <u>MODE</u>
1	2	3	<u>TONE MODE</u> (SUBUNIT NO 0 OF TQ4009)
(NOTE 3) LOAD	0	VOLUME MODE	<u>TONE MODE</u> (SUBUNIT NO 1 OF TQ4009)

NOTE 1: In service mode only 3 RF channels can be accessed,
 CH1 = lowest user RF frequency (RX and TX)
 CH2 = center RF frequency (RX and TX)
 CH3 = highest RF user RF frequency (RX and TX)

NOTE 2: After pressing this button once the set will be in the 2nd
 service mode for approx. 5 seconds.

NOTE 3: Load, i. e.: enter channel number og AF-tone.

KEYBOARD CONFIGURATION

SERVICE MODE 2. LEVEL

FIG. 2

7	8	9	ON/OFF
4	5	6	<u>SQUELCH</u> ON/OFF
1	2	3	<u>DECODE/</u> <u>ENCODE (:E)</u> (Subunit 0)
<u>LCD TEST</u>	0 <u>KEYBOARD</u> <u>TEST</u>	<u>SIDETONE</u> <u>CONTINUOUS</u> ON/OFF	<u>DECODE/</u> <u>ENCODE (:E)</u> (Subunit 1)

KEYBOARD TEST

FIG. 3

DISPLAY VALUE = 27	DISPLAY VALUE = 28	DISPLAY VALUE = 29	NO ACTION
DISPLAY VALUE = 24	DISPLAY VALUE = 25	DISPLAY VALUE = 26	DISPLAY VALUE = 2E
DISPLAY VALUE = 21	DISPLAY VALUE = 22	DISPLAY VALUE = 23	DISPLAY VALUE = 2D
DISPLAY VALUE = 2A	DISPLAY VALUE = 20 (30)	DISPLAY VALUE = 2B	DISPLAY VALUE = 2C

NOTE: The first digit indicates the test level
 The second digit indicates the HEX value
 of the pertinent keyboard field.

ADJUSTMENT PROCEDURE

CQP4110

This adjustment procedure applies to the following types of STORNOPHONE 4000 radios:

CQP4112: 146-174 MHz - 25 kHz channel spacing
 CQP4113: 146-174 MHz - 20 kHz channel spacing
 CQP4114: 146-174 MHz - 12.5 kHz channel spacing

Before making adjustments to the radio circuit, read the type label and note the channel frequencies and the tone system coding. Also check the personality PROM and its data against the type label information.

MEASURING INSTRUMENTS

The following measuring instruments are necessary for making service and adjustments to the CQP4110:

RF Signal Generator	146-174 MHz
AF Voltmeter	$Z_i > 0.5 \text{ Mohm}$
Multimeter	20 Kohm/V
Distortion meter	
Deviation meter	
Watt meter	0-2.5 W
AF Generator 50 Hz-5 kHz	$Z_{out} \geq 600 \text{ ohm}$
Frequency counter	5-200 MHz/50 mV
Power Supply	6-10 V/2 A
Signal Sampler	Storno D52
RF diode probe	Storno 95.0059-00
RF coil tuning tool	Storno 17.0053-00
Ref. oscillator tuning tool	Storno 19J707496G1

Test adaptor	SE4002 19K805371G1
Service kit	SE4003 19J707744G1
Consisting of service cabinet and antenna adaptor	
Extension cables	CC4001 19J707704G1

DISMANTLING OF CQP4000

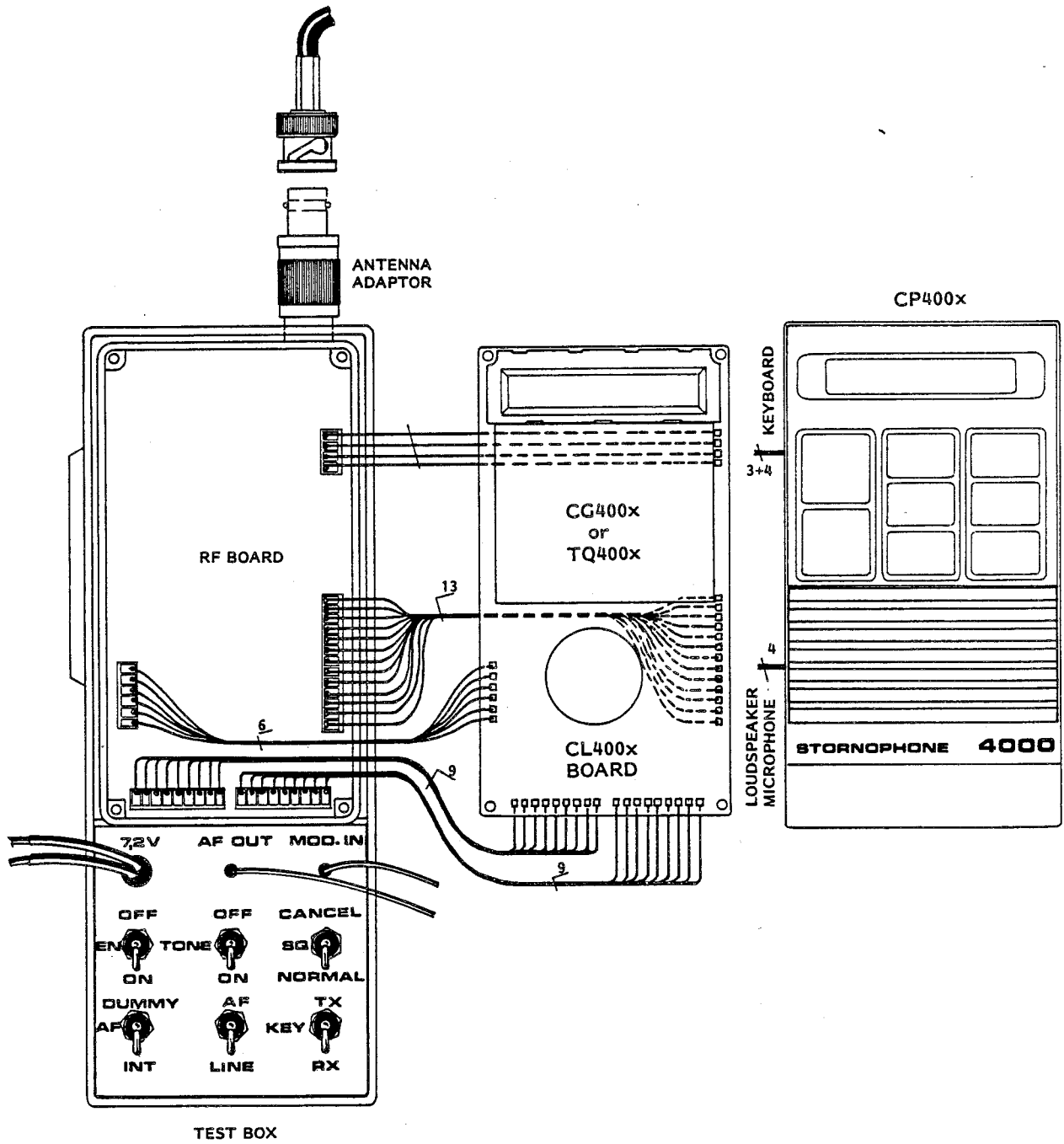
Before the CQP4000 can be adjusted the radio must be dismantled for access to all test points and adjustable components.

- Remove the battery, if inserted.
- Remove the two rear screws holding the cabinet.
- Remove the chassis box.
- Remove the four corner screws holding the front.
- Open the chassis box, carefully, without damaging the contact fingers on the rim.
- Take the CL400x board and the RF4110 board apart.
- Connect the CL400x board to the RF4110 board by means of the extension cables.
- Insert the chassis box in the service cabinet and firmly press the RF board to the bottom of the chassis box to establish good ground connections.
- Attach the antenna adaptor.
- Insert the test box in the battery compartment.
- The STORNOPHONE 4000 is now prepared for adjustment.

TRANSMITTER ADJUSTMENT

Refer to transmitter test setup.
 Set the power supply voltage to 7.2 V.
 Turn the radio on in receive mode and measure the current consumption.

Requirement: less than 30 mA.
 Connect the voltmeter to the +5.5 V test point.
 Read the 5.5 V regulated voltage.



TEST SETUP
STORNOPHONE 4000

D403.279/3

1. SYNTHESIZER REFERENCE FREQUENCY ADJUSTMENT

Connect the frequency counter to P3 pin 13-CLOCK.

Read the reference frequency.

Check the reference crystal's frequency (6.4 MHz or 6.5 MHz).

Adjust C533 for $f_{nom} \pm 10$ Hz.

Note:

The final adjustment of the reference frequency is performed later with closed chassis box.

2. TRANSMITTER VCO ADJUSTMENT

Set the ADC potentiometer to minimum, anti-clockwise.

Key the transmitter and read the current drain.

Requirement: less than 1 A.

Connect the voltmeter to P3 pin 7; OUT OF LOCK signal.

Adjust C504 for 0 V steady ready reading on the voltmeter. Connect the voltmeter to TP4.

Adjust C504 for a reading of 3 Volts. Adjust C504 so that the reading for each channel is inside the tuning range, 1 - 4 V. The channel with the lowest frequency has the lowest voltage reading.

3. TRANSMITTER POWER OUTPUT ADJUSTMENT

Connect the wattmeter to the antenna connector. Adjust ADC potentiometer R115 for rated output power according to the type designation.

Note:

The current drain at rated output power must not exceed 1 A.

4. TRANSMITTER FREQUENCY ADJUSTMENT

Connect the wattmeter to the antenna connector through the signal sampler.

Connect the frequency counter to the signal sampler.

Key the transmitter and read the frequency.

Adjust C533 for correct frequency. (C533 is fine adjusted later with closed chassis box).

Requirement: $F_{nom} \pm 0.2$ ppm (30 Hz at 150 MHz)

Deenergize the transmitter.

Select next channel

Key the transmitter and check for correct output frequency for each channel.

NOTE:

Adjustment of the transmitter frequency which also adjusts the receiver for correct frequency is done later when the chassis box is closed.

5. TRANSMITTER MODULATION ADJUSTMENT

Connect the deviation meter to the signal sampler.

Connect the AF generator to MOD IN on the test box.

Set the AF generator frequency to 1000 Hz and the output as follows:

1100 mV with test box (11:1 built-in attenuator)

Vary the AF frequency between 100 Hz and 3000 Hz and find peak deviation. Check the frequency for both + and - deviation. At the frequency producing peak deviation adjust R812 for maximum system deviation.

CQP4112: ± 5 kHz

CQP4113: ± 4 kHz

CQP4114: ± 2.5 kHz

Set the AF generator frequency to 1000 Hz.

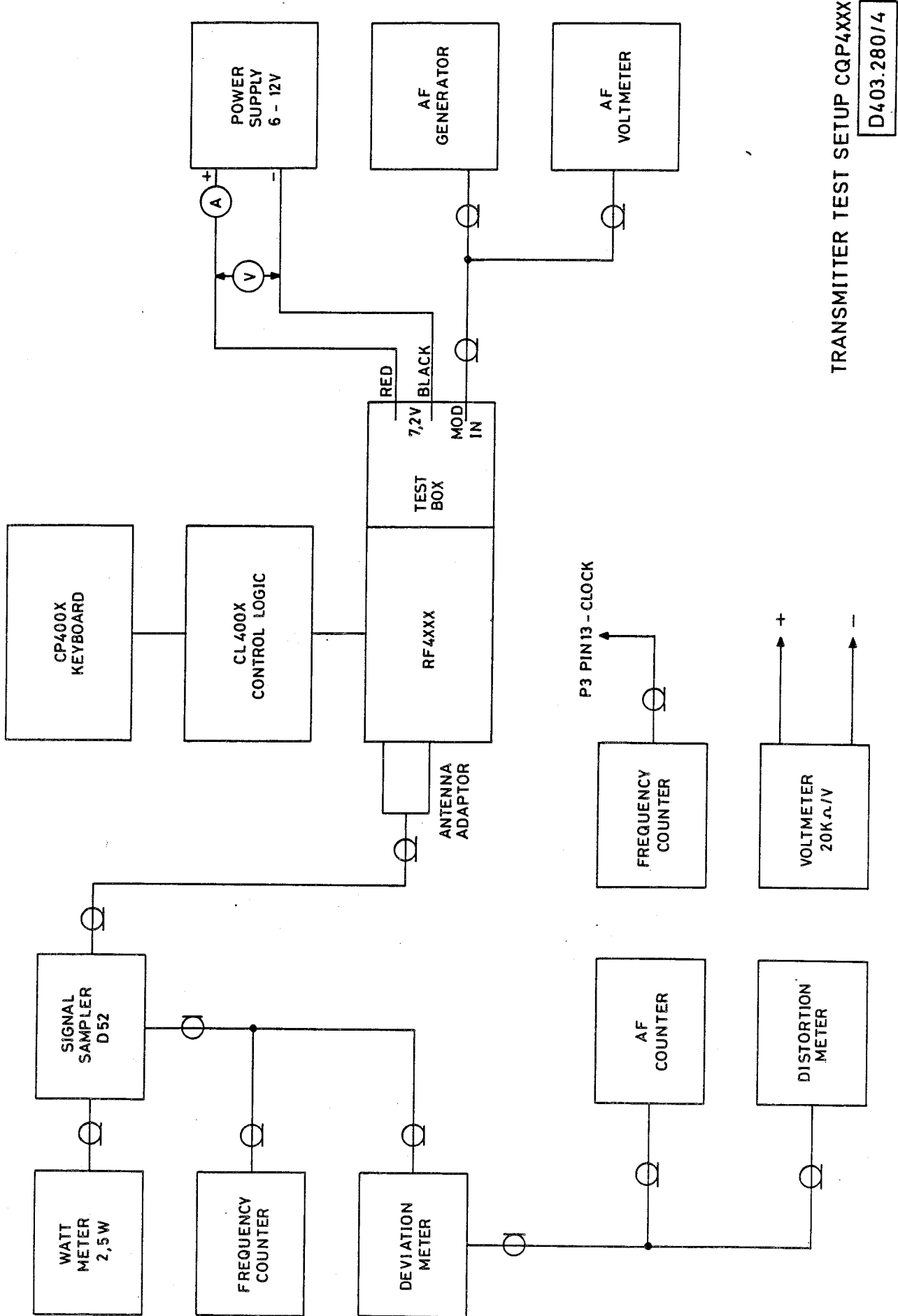
Reduce the AF generator output until a deviation of 0.7 x maximum deviation is obtained:

CQP4112: ± 3.5 kHz

CQP4113: ± 2.8 kHz

CQP4114: ± 1.75 kHz

Typical generator output is 100 mV.



TRANSMITTER TEST SETUP CQP4XXX
D403.280/4

RECEIVER ADJUSTMENT

Refer to receiver test setup.

1. RECEIVER VCO ADJUSTMENT

Connect the voltmeter to P3 pin 7, OUT OF LOCK signal.

Preset coil L508 as follows:

High end of band: 2/3 out of coil.

Low end of band: Fully down in coil form.

Set SQ switch to cancel.

Adjust C514 for 0 V steady reading on the voltmeter. Connect the voltmeter to TP4.

Adjust C514 for a reading of 3 Volts. Adjust C514 so that the reading for each channel is inside the tuning range, 1 - 4 V.

The channel with the lowest frequency has the lowest voltage reading.

2. RECEIVER INJECTION SIGNAL ADJUSTMENT

Connect the diode probe and the voltmeter to TP2.

Adjust L508 for maximum voltmeter reading, $0.2 \text{ V} \pm 0.1 \text{ V}$. (L508 is readjusted together with the front-end).

3. IF SIGNAL ADJUSTMENT

Connect the signal generator to the antenna connector and set it to the channel frequency.

Modulate the signal generator with 1000 Hz to $0.7 \times$ maximum system deviation.

CQP4112: $\pm 3.5 \text{ kHz}$

CQP4113: $\pm 2.8 \text{ kHz}$

CQP4114: $\pm 1.75 \text{ kHz}$

Set the signal generator output to 100 mV.

Connect the diode probe and the voltmeter to TP3.

Reduce the signal generator output until voltage reading is less than 1 V.

Adjust L402 and L308 for maximum voltmeter reading.

Connect the AF voltmeter to AF OUT. Set the signal generator output to 100 mV.

Adjust L403 for maximum voltmeter reading.

ALTERNATIVE PROCEDURE

Connect the distortion meter to AF OUT.

Adjust L403 for minimum distortion.

4. AF LINE LEVEL ADJUSTMENT

Connect the AF voltmeter to the AF OUT (J906 pin 14).

Set signal generator as described in paragraph 3.

Adjust R409 for a voltmeter reading of 110 mV $\pm 5 \text{ mV}$.

5. FRONT-END ADJUSTMENT

Connect the signal generator to the antenna connector and set its frequency to the channel frequency.

Modulate the signal generator as described in paragraph 3. Adjust the generator output to approx. 12 dB SINAD.

Connect a distortion meter to AF OUT.

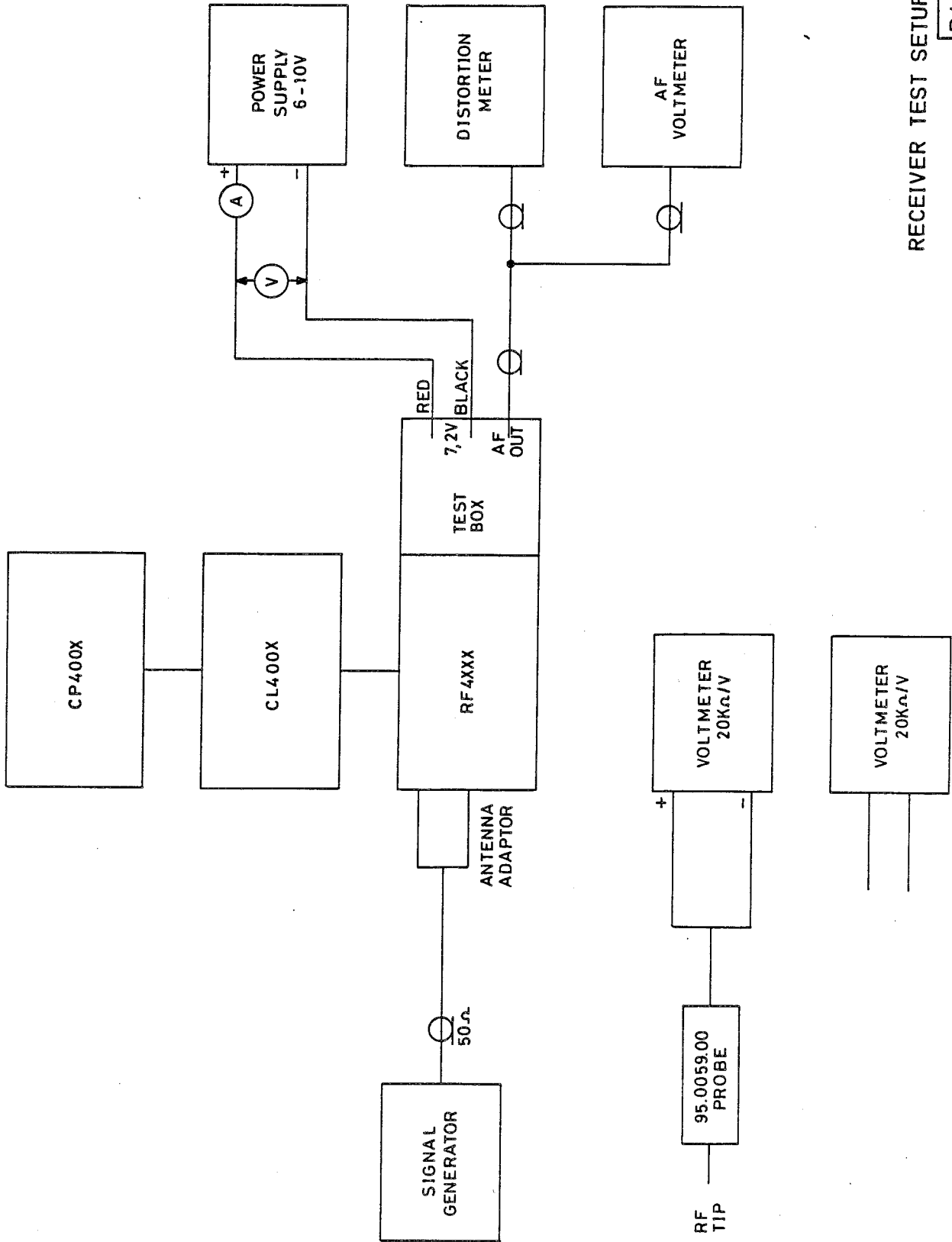
Set the LS-LINE switch on the test box to LINE.

Set the SQ switch to cancel.

Adjust the following coils for minimum distortion. L306, L305, L303, L302 and L508.

As the sensitivity increases during the adjustment decrease the signal generator output to maintain 12 dB SINAD.

Repeat the adjustments until no further improvement is possible.



RECEIVER TEST SETUP CQP4XXX

D403.281/4

Check the 12 dB SINAD on all channels.

Requirement: 12 dB SINAD for less than 0.45 μ V.

6. SQUELCH ADJUSTMENT

Turn the squelch potentiometer R420 completely anticlockwise to close the squelch.

Open squelch by setting SQ switch to cancel.

Set the signal generator output to the value giving 12 dB SINAD.

Close squelch by setting SQ switch to normal. Slowly turn R420 clockwise to the point where the squelch just opens.

Vary the signal generator output slowly up and down to obtain the opening and closing level of the squelch.

Squelch opening level: 12 dB SINAD

Squelch closing level: 6-10 dB SINAD

FREQUENCY ADJUSTMENT

The reference oscillator frequency controls both the transmitter and receiver frequencies and final adjustment must be done with the chassis box properly assembled.

Turn the radio off and remove the test box.

Assemble the radio but use the service cabinet to hold the chassis box.

Connect the test box and turn the radio on.

Connect a frequency counter to the signal sampler, refer to transmitter test setup.

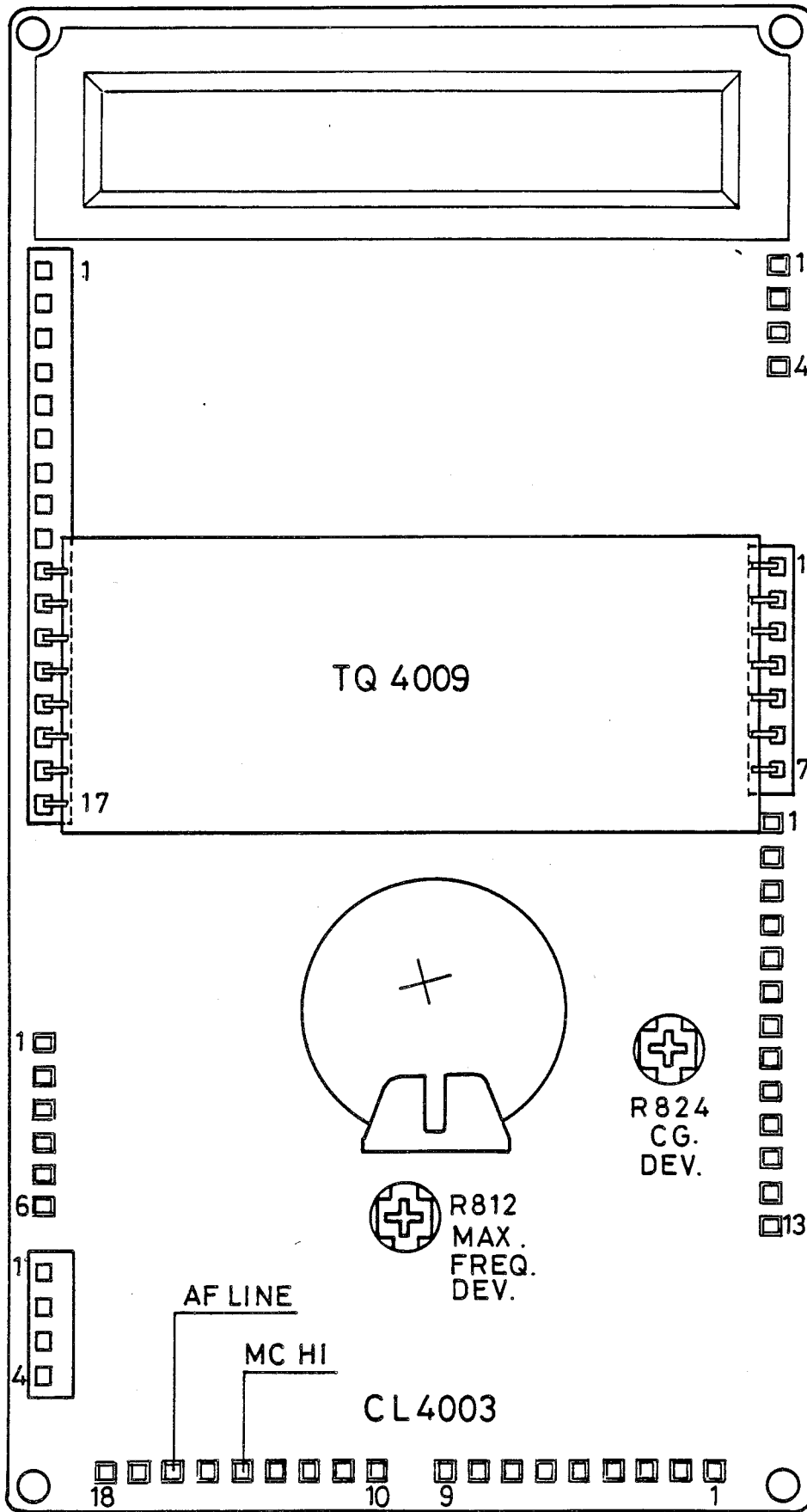
Key the transmitter.

Adjust, through the hole in the rear of the service cabinet, the reference oscillator, C533 for nominal frequency.

Requirement:

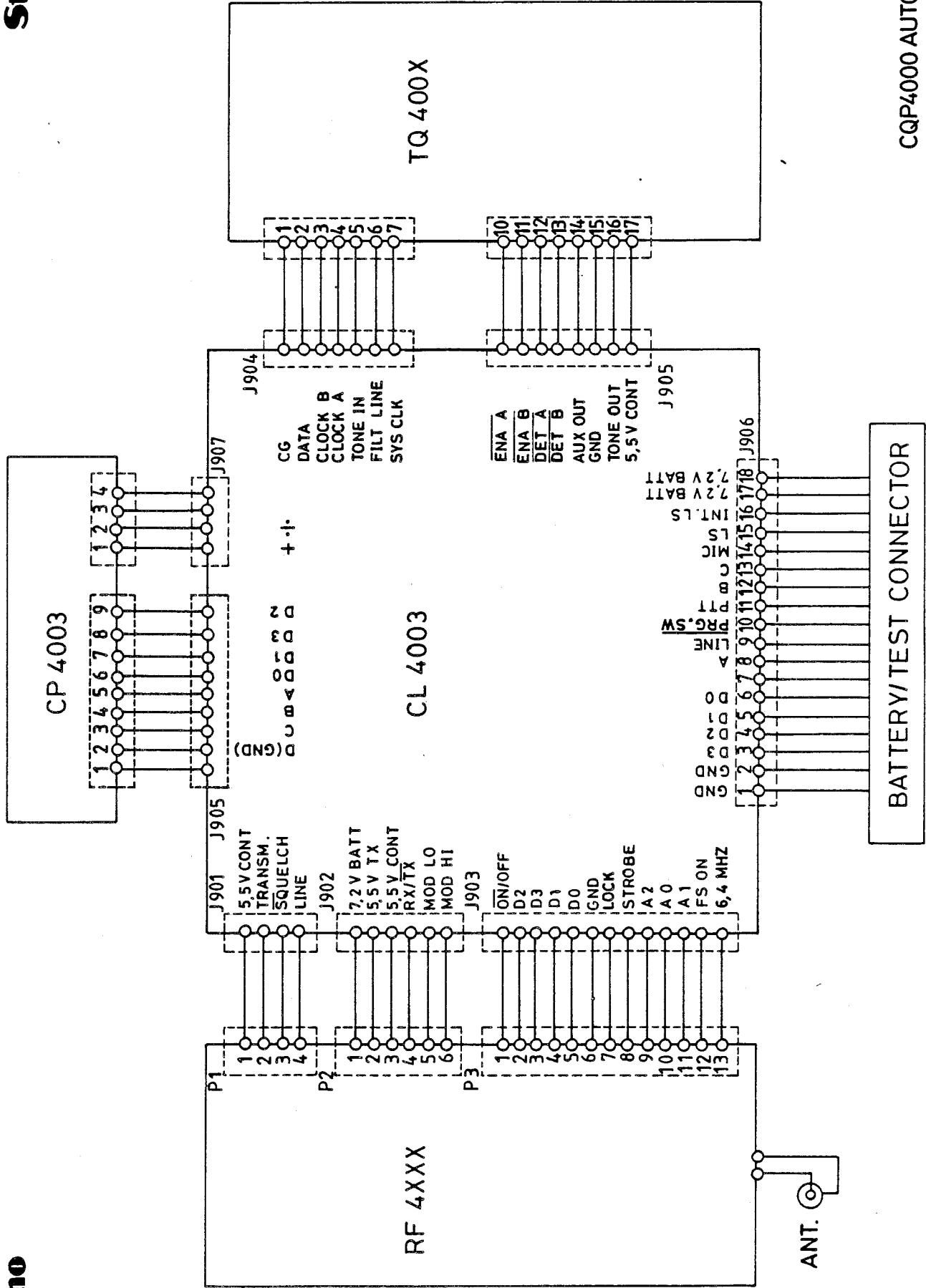
$$F = F_{\text{nom}} \pm 0.2 \text{ ppm (30 Hz at 150 MHz).}$$

Switch to next channel. Verify the frequency for all channels. (Channel switching is not possible while transmitting).



ADJUSTABLE COMPONENTS AND TEST POINTS
TQ4009, CL4003

M405.199



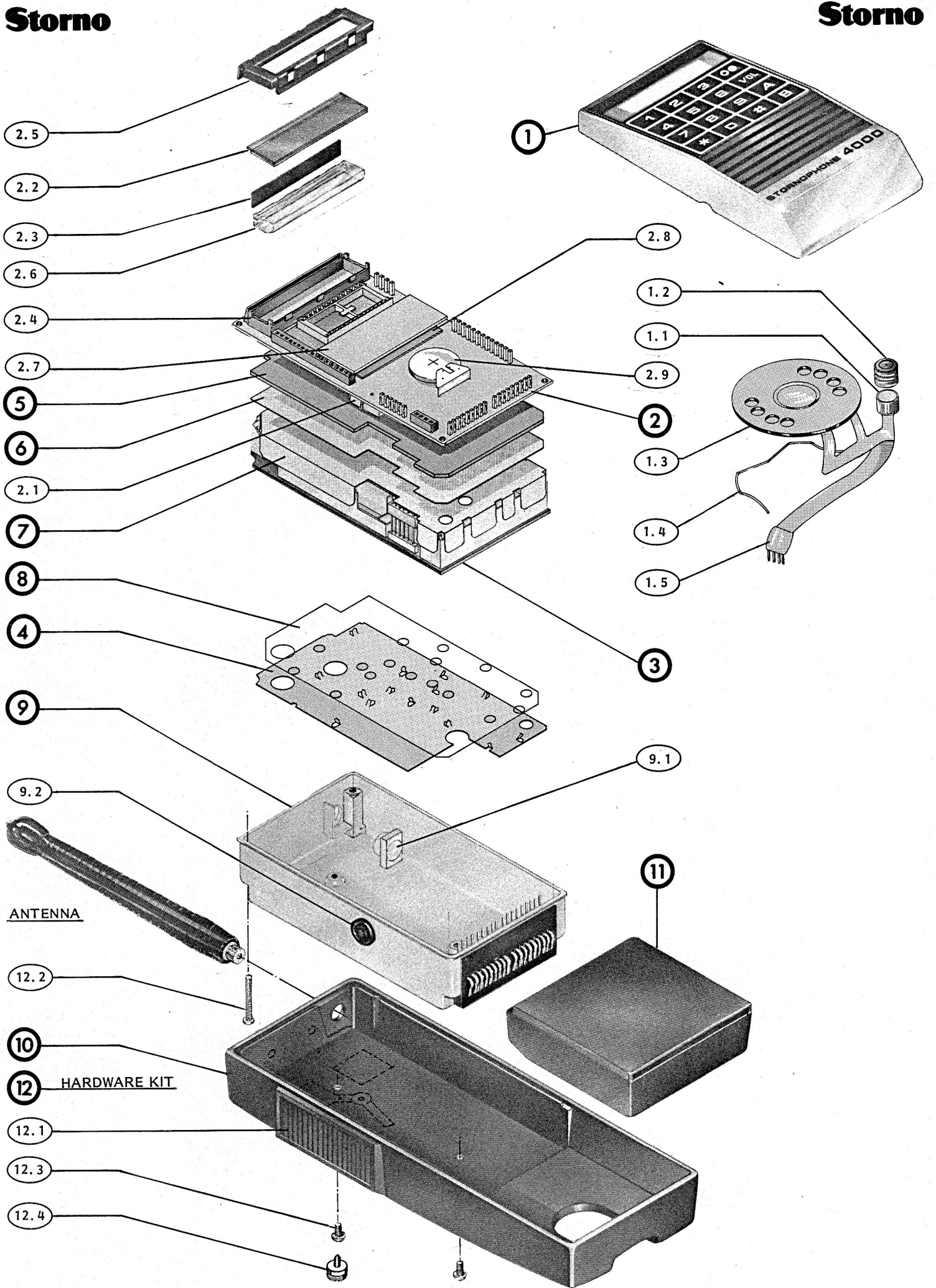
CQP4000 AUTOMATIC CONNECTION DIAGRAM

D404.014

Storno

CHAPTER
CHAPITRE
KAPITEL

9



MECHANICAL LAYOUT AND PART NUMBERS
FOR CQP4000 AUTOMATIC

M405.194

POS	CODE No.	DESCRIPTION	QTY.
9	L855356G1	Chassis CH4001 Assembled	1
	L855356G3	Chassis CH4003 Asm. (only with remote control)	1
9.1	K805297P1	Antenna Connector	1
9.2	K805306P1	Gasket PTT.	1
10	M905458P1	Cabinet CA4001	1
	K805729G1	Cabinet CA4003 Asm. (only with remote control)	1
11	L855364G1	Battery Unit BU4001 450 mAh.	1
	L855364G2	Battery Unit BU4002 750 mAh.	1
12	J707463G1	Hardware Kit	1
	J707463G2	Hardware Kit (only with remote control)	1
12.1	K805348G1	Knob PTT. Assembled	1
	L855621P1	Knob PTT. (only with remote control)	1
12.2	A700031P220	Screw Pan Head M2x20	4
12.3	J707518P1	Screw Pan Head M2.5x4 (only 1 pcs. for remote)	2
12.4	J708869P1	Screw (only with remote control)	1
	J707586P1	Hardware Kit also contains the following items Gasket	1
	K805318P1	Eyelet 1	1
	K805318P2	Eyelet 2	1
End of Part List			

CQP 4000 AUTOMATIC MECHANICAL PART LIST

POS	CODE No.	DESCRIPTION	QTY.
1	M906013G1	CP4002 Assembled For SAS	1
	M906013G2	CP4002 Assembled For Air France & British Air	1
	M906013G4	CP4002 Assembled For Generalpurpos	1
1.1	A701301P2	Microphone	1
1.2	J707235P1	Gasket, Microphone	1
1.3	J708879P1	Loudspeaker permanent magnet 8R 0.15 W	1
1.4	L855807P1	Lock Spring For Loudspeaker	1
1.5	L855800P1	Cpnt. Board Flex.	1
2	K805602G1	CL4003 Assembled	1
2.1	J707133P3	Micro Switch	1
2.2	J707230P1	Display	1
2.3	J707458P1	Conn. Cond. Rubber Zeb. Strip	1
2.4	L855331P1	Housing display	1
2.5	L855332P1	Cover display	1
2.6	L855333P1	Plate Acrylic	1
2.7	M905912G1	TQ4009 Assembled	1
2.8	M905910G1	PU4001 assembled	1
2.9	J708463P2	Battery Prim 170 MAH R2032	1
3	J707428G1	RF 4112	1
	J707428G2	RF 4113	1
	J707428G3	RF 4114	1
	J707942G1	RF 4332	1
	J707942G2	RF 4333	1
	J707942G3	RF 4334	1
	J707801G1	RF 4662 H	1
	J707801G2	RF 4663 H	1
	J707801G3	RF 4664 H	1
	J707801G4	RF 4662 L	1
	J707801G5	RF 4663 L	1
	J707801G6	RF 4664 L	1
4	J707989G1	Plate Grounding Asm. UHF	1
	J707959G1	Plate Grounding Asm. 80 MHz.	1
	J708035G1	Plate Grounding Asm. 160 MHz.	1
5	J708184P1	Insulation Foam For UHF & 160 MHz.	1
6	J708218P1	Insulation Foil	1
7	M905648P1	Shield For UHF	1
	M905943P1	Shield For 160 MHz.	1
8	L855532P1	Insulation Plate For 160 MHz.	1
	L855532P2	Insulation Plate For UHF	1
	L855532P3	Insulation Plate For 80 MHz.	1
continues on the next page			

CQP 4000 AUTOMATIC MECHANICAL PART LIST