GENERAL DESCRIPTION

CQM5660 S99

The Stornophone 5000 is a mobile radiotelephone unit with self-contained controls keyboard and display.

A comparison of the various models are presented in the table below.

Although compact in size, it contains a transmitter/receiver, a microcomputer controlled synthesizer and tone equipment, optional 5-tone sequential encoder/decoder or Channel Guard, and up to 99 trarsmit and receive channels.

Type	CQM5662 S99		CQM5663 S99	
SPEC	5	20	5	20
Frequency Range MHz	420 - 470		420 - 470	
RF Power W	5	20	5	20
Channel Spacing kHz	30/25		20	
Max. Number of Channels	99		99	

ACCESSORIES

Standard accessories include:

Mounting frame
Power cable
Fist microphone with retainer or
Fixed - mount microphone
External loudspeaker
External switches

MN5001 Mounting frame for mobile installations allowing the radio to be fixed in 36 positions. Includes a base plate with locking screw.

MN703 Desk stand for fixed installations.

MN704a Mounting frame for mobile installations and direct attachment to the vehicle.

MC5001 Fist microphone with retractable spiral cable for mobile installation.

HS5001 Retainer for MC5001.

HS5002 Retainer, with switches, for MC5001

MC704 Microphone with chockabsorbing mounting bracket for mobile installation.

MC703 Desk microphone with PTT switch for fixed installations.

MK5001 Installation kit containing connectors, power cable, fuses and fuseholders.

LS701 Loudspeaker enclosed in a plastic housing, complete with cable.

SU701 Transmitter keying switch for mounting on the steering coloumn.

SU702 Transmitter keying switch for mounting on the dashboard.

PS702 Power supply regulator for 24 V car battery installations.

PS5001 Power supply for 220 V AC mains.

MECHANICAL AND ELECTRICAL DESCRIPTION

The internal construction of CQM5000 is on an H-frame chassis with a shelf separating the receiver/transmitter (RF) printed circuit board and the various option printed boards. Front panel controls, display and keyboard are an integral part of the Control Panel.

The chassis is a die cast aluminium frame comprising the left and right sides, the back, and a shelf located midway between the top and bottom. The chassis front is open and looks like an "H" viewed from the front.

Interconnection to the package exterior and to internal options are made via the Frequency Synthesizer Board located on the option side of the H-frame. A test connector is also located on the synthesizer board and is accessible from the rear of the radio.

The moulded plastic front is directly attached to the chassis and has the speaker mounted to it. A separate moulded control panel and aluminum nameplate are attached to the front.

The top and bottom covers slides under the edge of the front and are then secured by screws at the rear.

The tone signalling encoder/decoder board (TQ), the Frequency Synthesizer Board (FB), and the Control Logic (CL) mount in the top section of the chassis.

Thin casted shields with adjustment holes are placed over the RF board and the synthesizer board in order to reduce spurious radiation.

RECEIVER DESCRIPTION

The receiver circuitry is placed on the RF board and can be divided into:

- Receiver front end
- 1st IF section with first and second oscillator
- 455 kHz 2nd IF portion with demodulator.
- Squelch
- Audio Amplifier

(refer to functional block diagram)

FONT-END

The receiver front-end consists of a dual-resonator input filter, a transistor RF amplifier, Q401, a triple-resonator intermediate filter and a FET mixer, Q402. The drain of the FET is terminated in the first IF resonant circuit which adapts the output impedance to the crystal filter. The front-end, antenna relay, first mixer and part of the transmitter PA interconnections are designed in micro-stripline techniques on the mainboard.

1st IF

The first IF frequency is 21.4 MHz. The output from the crystal filter is fed to a dual-gate MOSFET amplifier, Q501, the output signal of which is fed to the second mixer, U501, a single balanced, self-oscillating, active mixer. Out of the second mixer comes the 455 kHz IF signal. Two diodes, D501-502, limit the output from the mixer.

5 kHz IF/DEMODULATOR

ie selectivity of the 455 kHz IF amplifier is rmed by a ceramic filter fed from a 455 kHz nplifier/impedance transforming stage. The ial 455 kHz amplification and limiting is per- rmed by an integrated circuit, U502, which so contains the guadrature FM detector and e AF amplifier/output emitter follower for e audio line signal.

QUELCH AND AUDIO CIRCUITS

he audio line signal (Vol/Sq HI) is fed to selective amplifier stage, where noise (fre- uencies around 8 kHz) is extracted from ie audio signal. Via the squelch potentiome- er R607, this signal reaches an expander tage which improves the level discrimination harateristics of the circuit. A passive volta- je doubler circuit (D603-D604) with high sour- :e impedance performs the action of an average value rectifier. A Schmitt Trigger gives the necessary hysteresis and a well-defined out- put from the following buffer stage, Q605. In the squelched condition and during trans- missions this output is +1.5 V and mutes the audio power amplifier. The transmit indicater is part of the muting function.
A push button switch, S601, cancels the squelch function, when depressed, by groun- ding the base of Q601.

AUDIO

In sets with Pilot tone option (CG), the audio line signal is fed to the Pilot tone board for filtering and back to the main board. In sets without CG this path is bypassed and the audio line signal is fed directly to the passive deemphasis network R629-C608 followed by the volume control. The volume control poten- tiometer R630 is mounted directly on the RF board and protrude through the front panel.

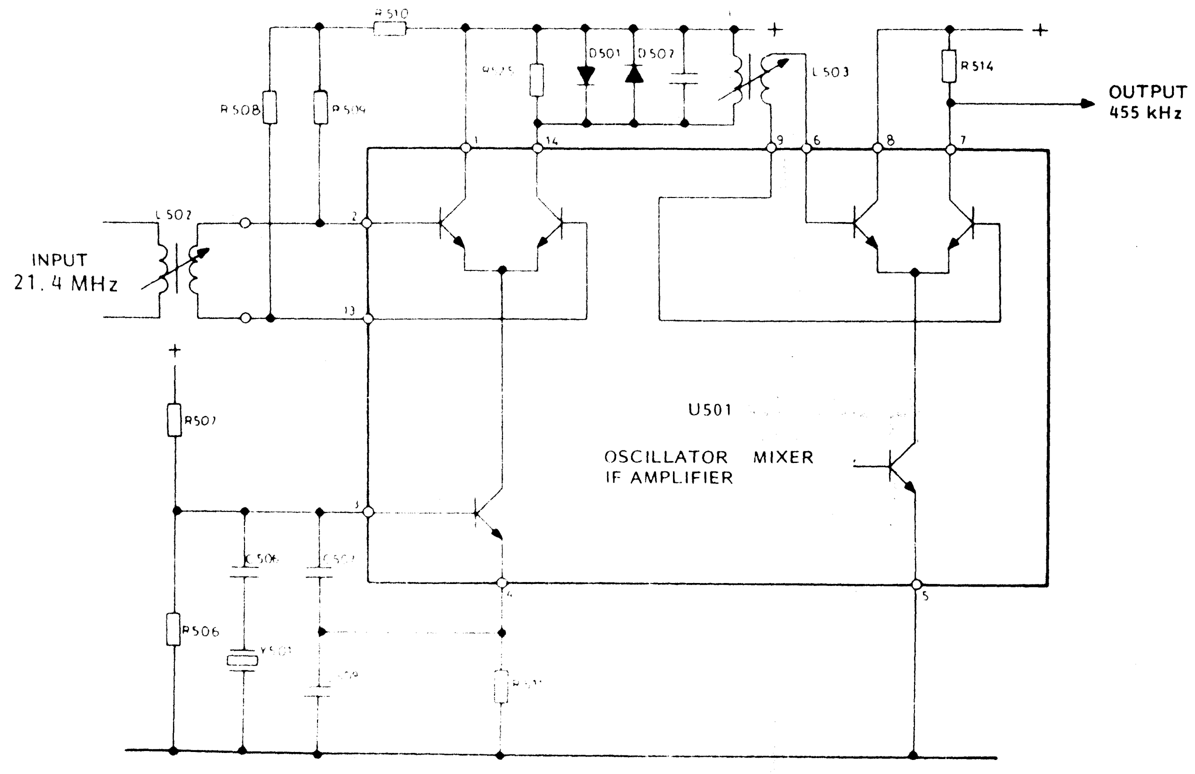


FIG. 1. SECOND OSCILLATOR, IF MIXER, AND IF AMPLIFIER

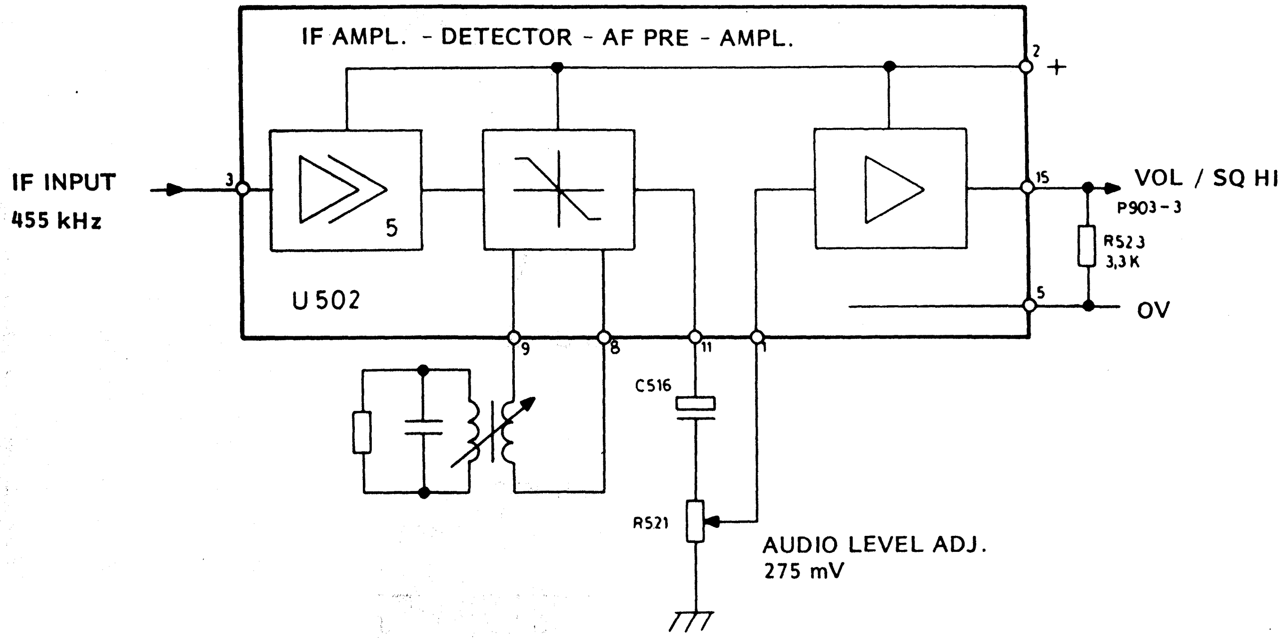


FIG. 2. IF AMPLIFIER, DETECTOR, AND AF PREAMPLIFIER

The audio output amplifier U601 is a monolithic IC package capable of driving the loudspeaker at the desired power level. The output amplifier can be muted with a DC signal from the audio mute gate, which combines different logic signals to deside whether the amplifier should be active or not. These inputs are:

Regulated TX Voltage
Squelch cancel
Squelch signal

In sets equipped with Pilot tone and/or 5-tone sequential option, an RX mute function is routed from the option board to make the extra mute conditions possible. The value of C610 in the feed back loop is chosen as the best compromise between battery ripple rejection and receiver squelch attack time.
The pilot lamp in the channel knob is supplied from A+, but controlled by the regulated 8.5 V via transistor Q968.

TRANSMITTER

The transmitter consists of a modulation processor, an exciter, and a power amplifier, all assembled on the RF board along with the receiver.

The exciter contains, an audio processor, all frequency multiplier functions, and includes those stages operating at low enough power levels to avoid heat sinks. The exciter output is at the carrier frequency when applied to the power amplifier. The power amplifier boosts the signal to the proper level, and includes a low pass filter for suppressing harmonics and a circuitry which permits adjustment of the operating power level. The PA low pass filter connects to the antenna relay via a stripline on the board.

MODULATION PROCESSOR

The signal from the microphone load R901 on the FS board is applied to amplifier U101b. The transmitter audio frequency response is

shaped by the feedback network R104-R103-C104.
The modulation limiting is obtained in the feedback network formed by D101, D102, R105, R106 and R107. The maximum permissible frequency deviation is set by a DEV. BAL. potentiometer on the FS board.
Amplifier U101A is operated as an active low-pass splatter filter feeding the modulating input of the VCO on the Frequency Synthesizer board.

EXCITER

The exciter takes the synthesized signal, filters it to reduce spurious signals and amplifies it. Four amplifier stages (Q201-2-3-4) and four filters (L204-5-8-9) are used in a narrow band design which limits the maximum frequency spread of the transmitter.
The exciter has three test points (TP201-2-3) for measurements and alignment.

POWER AMPLIFIER

The PA is constructed on the main board and employs two broadband untuned amplifier stages Q205, Q206. Two amplifier configurations are available providing options of power levels of 10 watts or 25 watts. A power control circuit is included to sense the output RF level and keep it constant with variations in temperature and supply voltage. This circuit also limits the peak power to less than maximum, as specified by the authorities, while still maintaining the output as near maximum as possible. The output power level can be set with a potentiometer, R215, over at least a 3:1 range. The transmitter delivers rated power into a 50-ohm load. A load SWR of 1.4:1 will result in more than 90% of the power being radiated. The transmitter will operate into a load with up to 3:1 SWR.

The power adjustment is achieved by controlling the supply voltage of power amplifier Q205 via transistor Q207. This series transistor is based by a voltage generated by the feedback network C255, D201, Q201, Q209, Q208.

FREQUENCY SYNTHESIZER AND CONTROL LOGIC

The frequency synthesizer FS5661 provides up to 99 channels and is built on a printed wiring board which mounts in the top section of the radioset.
The frequency of the synthesizer board is set by a binary code from the control logic board CL5001 which is placed over the main section of the synthesizer board.
The Frequency Synthesizer board also carries all interconnections between the tone modules and the RF module, and it has two connectors at the rear for accessories and the power supply cable.

SUPPLY VOLTAGE DISTRIBUTION SYSTEM

The battery voltage (A + BATT) enters the radio via two pins of the rear system connector to the synthesizer board. Both inputs are connected to reverse polarity protection diodes D741, D742. The ground lead comes through the same connector and is connected to chassis ground through a fusable printed wiring path which will open in case of the ground wire being accidently connected to A +.

One battery input goes directly from the synthesizer board via a feed-through capacitor and a connector P907 to the transmitter PA stages. The other input feeds through P903 - J903 to the RF board for two functions. One branch for the audio amplifier passes through an RC-ripple filter R638 - C618 and one of the ON/OFF switch sections S602. The other section of the ON/OFF switch controls the V_B + to the voltage regulator U602 consisting of a monolitic regulator. The regulator output is fixed at 8.5 V by means of a factory adjusted resistor.

Regulated 8.5 V is switched to either the receiver or the transmitter by the antenna relay. The antenna relay is also supplied by the 8.5 V regulated.

The squelch circuit, the modulation processor, parts of the IF amplifier U502, and the Frequency Synthesizer is supplied directly from the continuous 8.5 V.
The receiver front-end, the 10.7 MHz IF stages and the second oscillator are supplied from 8.5 V RX. The transmitter exciter is supplied from 8.5 V TX.

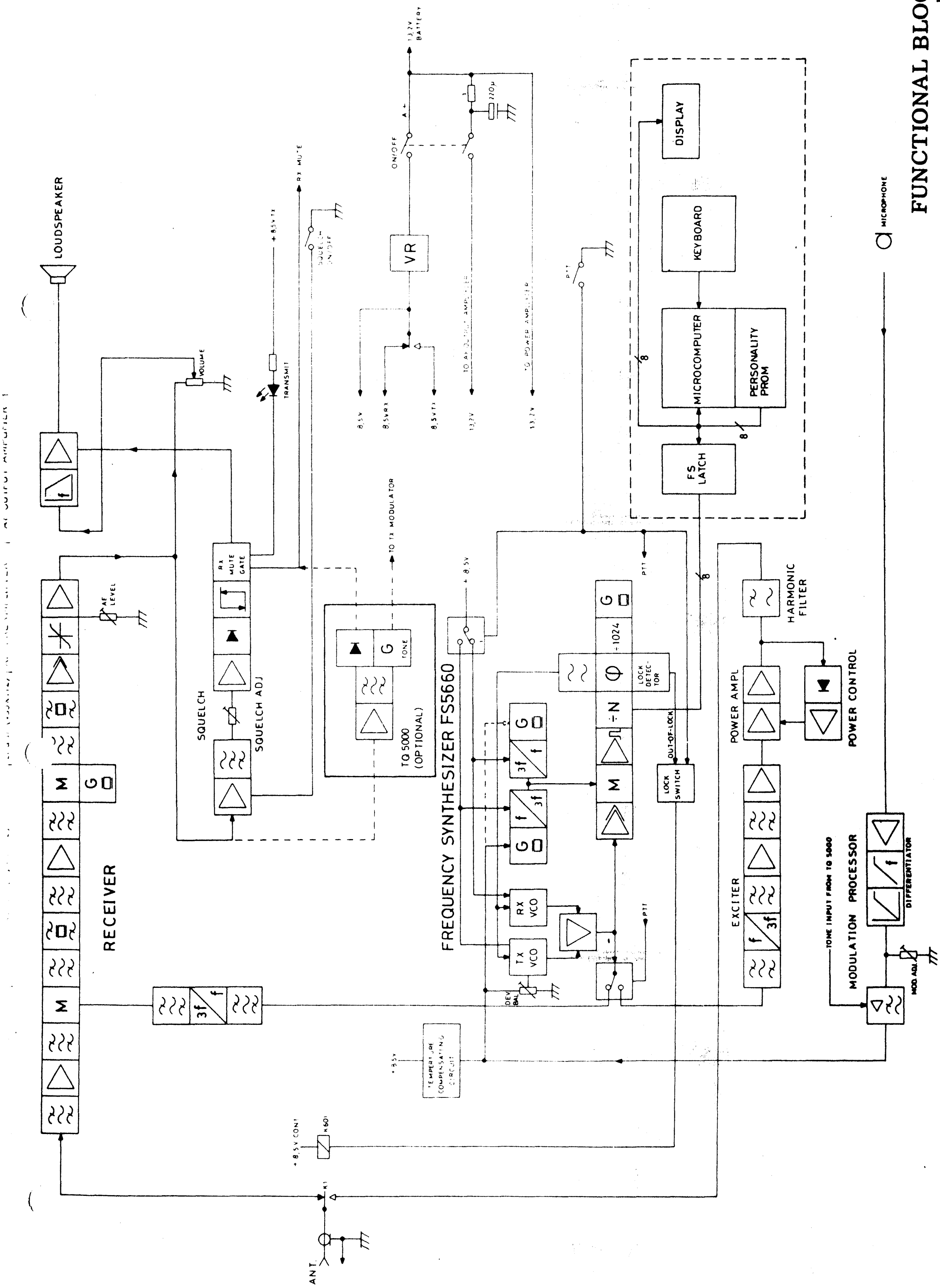
In sets with 5-tone sequential option or Pilot tone, the PTT (Push to talk) lead runs through the option board to provide for correct tone keying function.

WARNING

The transmitter PA transistors contain Beryllia which is poisonous when absorbed by the human body. Dissection, filing, or grinding of these transistor may be hazardous.

FUNCTIONAL BLOCK DIAGRAM
CQM5660 S99

D403.185



CHANNEL PROGRAMMING INSTRUCTIONS

CQM5660 S99

Programming of the PROM which contains the personality data will normally be part of the factory process, but it may also be field programmed.
The PROM programming unit must be approved by the PROM manufacturer, as for example (DATA I/O SYSTEM 19).

The programmer consists of the following items:

Programmer (DATA I/O SYSTEM 19)
Programming Pak, interchangeable
Socket adaptor
or universal programming pack.
DATA I/O UNIPAK (adaptable for more than 200 types of PROM devices).

To program a PROM the channel frequencies for all allocated channels and the channel spacing must be known.
It is recommended to complete a worksheet when calculating the PROM data.
It is also possible to use a computer to calculate the PROM data and Storno will be able to supply software programs for certain types of computers.

Operating instructions for the Programmer is supplied by the vendor.

WORKSHEET

For each PROM to be programmed a worksheet should be completed to calculate the input data for each channel.

The procedure for completing the worksheet is:

1. Complete list of receiver channel frequencies. (A).
2. Complete list of transmitter channel frequencies. (B).
3. Find highest (H) and lowest (L) receiving frequencies.
4. Find highest (H) and lowest (L) transmitting frequencies.
5. Select receiver mixer crystal frequency (C) from table 1. The highest and lowest receiver frequencies must be within the selected band.
6. Select transmitter mixer crystal frequency (D) from table 2. The highest and lowest transmitter frequencies must be within the selected band.
7. Note channel spacing and Reference frequency (F). See worksheet.
8. Use receiver formula to calculate "V_{DEC}" (divisor) for all receiver channels.
9. Use transmitter formula to calculate "V_{DEC}" (divisor) for all transmitter channels.
10. Check "V_{DEC}" for all channels to be between 256 and 511.
11. Use receiver crystal frequency and V_{DEC} to check for selfquieting frequencies, table 3.
12. In case of selfquieting select appropriate alternative and possibly recalculate "V".
13. Convert all "V_{DEC}" numbers to hexadecimal code. Refer to tabel 4.
14. Assign the hexadecimal codes to the corresponding channels and the PROM adresses.

After completing the worksheet enter correct Prom addresses and corresponding data (V_{HEX}) on the Programmer (DATA I/O), refer to Programmer Operating Instructions.

RECOMMENDED CRYSTAL FREQUENCIES

CQM5660 S99

CQM5662 FREQUENCY RANGE	CQM5663 FREQUENCY RANGE	RX CRYSTAL
418.6 - 424.9755	417.32 - 422.42	48.177777
421.1 - 427.4755	419.82 - 424.92	48.455555
423.6 - 429.9755	422.32 - 427.42	48.733333
426.1 - 432.4755	424.82 - 429.92	49.011111
428.6 - 434.9755	427.32 - 432.42	49.288888
431.1 - 437.4755	429.82 - 434.92	49.566666
433.6 - 439.9755	432.32 - 437.42	49.844444
436.1 - 442.4755	434.82 - 439.92	50.122222
438.6 - 444.9755	437.32 - 442.42	50.399999
441.1 - 447.4755	439.82 - 444.92	50.677777
443.6 - 449.9755	442.32 - 447.42	50.955555
446.1 - 452.4755	444.82 - 449.92	51.233333
441.4 - 447.7755	440.12 - 445.22	45.955555
443.9 - 450.2755	442.62 - 447.72	46.233333
446.4 - 452.7755	445.12 - 450.22	46.511111
448.9 - 455.2755	447.62 - 452.72	46.788888
451.4 - 457.7775	450.12 - 455.22	47.066666
453.9 - 460.2775	452.62 - 457.72	47.344444
456.4 - 462.7755	455.12 - 460.22	47.622222
458.9 - 465.2755	457.62 - 462.72	47.899999
461.4 - 467.7755	460.12 - 465.22	48.177777
463.9 - 470.2755	462.62 - 467.72	48.455555
466.4 - 472.7755	465.12 - 470.22	48.733333
468.9 - 475.2755	467.62 - 472.72	49.011111

TABLE 1. RECEIVER MIXER CRYSTAL FREQUENCY

RECOMMENDED CRYSTAL FREQUENCIES

CQM5660 S99

CQM5662 FREQUENCY RANGE	CQM5663 FREQUENCY RANGE	TX CRYSTAL
420.0 - 426.375	418.72 - 423.82	45.955555
422.5 - 428.875	421.22 - 426.32	46.233333
425.0 - 431.375	423.72 - 428.82	46.511111
427.5 - 433.875	426.22 - 431.32	46.788888
430.0 - 436.375	428.72 - 433.82	47.066666
432.5 - 438.875	431.22 - 436.32	47.344444
435.0 - 441.375	433.72 - 438.82	47.622222
437.5 - 443.875	436.22 - 441.32	47.899999
440.0 - 446.375	438.72 - 443.82	48.177777
442.5 - 448.875	441.22 - 446.32	48.455555
445.0 - 451.375	443.72 - 448.82	48.733333
447.5 - 453.875	446.22 - 451.32	49.011111
450.0 - 456.375	448.72 - 453.82	49.288888
452.5 - 458.875	451.22 - 456.32	49.566666
455.0 - 461.375	453.72 - 458.82	49.844444
457.5 - 463.875	456.22 - 461.32	50.122222
460.0 - 466.375	458.72 - 463.82	50.399999
462.5 - 468.875	461.22 - 466.32	50.677777
465.0 - 471.375	463.72 - 468.82	50.955555
467.5 - 473.875	466.22 - 471.32	51.233333

TABLE 2. TRANSMITTER MIXER CRYSTAL FREQUENCY

SELFQUIETING FREQUENCIES

CQM5662 S99

RECEIVER CRYSTAL FREQUENCY. MHz	V DEC	USE ALTERNATIVE+
All crystal frequencies	428	1
48.177	265	2
48.177	274	4
48.733	416	4
48.733	459	4
49.844	466	2
50.122	366	2
50.399	266	2
50.399	397	4
47.622	465	2
47.899	328	2

+refer to worksheet

TABLE 3A. SELFQUIETING FREQUENCIES

SELFQUIETING FREQUENCIES

CQM5663 S99

RECEIVER CRYSTAL FREQUENCY. MHz	V DEC	USE ALTERNATIVE+
48.177	278	4
48.177	286	2
48.177	331	4
49.566	290	4
50.122	458	4
50.122	503	4
50.399	333	2
50.399	378	2
45.955	284	4
46.511	374	2
46.788	375	4
47.899	399	4
47.899	411	4
47.899	456	2
48.177	274	4
48.177	286	4
48.177	331	4
48.177	420	2
48.733	390	4
48.733	394	2
49.011	265	4

+refer to worksheet

TABLE 3B. SELFQUIETING FREQUENCIES

HEX CODE CONVERSION TABLE

Least Significant Digit (LSD) of Hex Code

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271
1	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287
2	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303
3	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319
4	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335
5	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351
6	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367
7	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383
8	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399
9	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415
A	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431
B	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447
C	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463
D	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479
E	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495
F	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511

Most Significant Digit of Hex Code.

"V_{DEC}" Numbers.

MSD
LSD

Example "V_{DEC}"= 345 equals to hex code 59.
"V_{DEC}"= 469 equals to hex code D5.

Table 4.
"V" Number to hex code conversion table.

PROGRAMMING WORKSHEET

FOR CQM5660 S99

Customer:

RECEIVER						TRANSMITTER				
CHANNEL	A FREQUENCY MHz	L H	V DEC	V HEX	PROM ADDRESS (HEX)	B FREQUENCY MHz	L H	V DEC	V HEX	PROM ADDRESS (HEX)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

RECEIVER MIXER CRYSTAL FREQ. (Y702): C= ____________

TRANSMITTER MIXER CRYSTAL FREQ. (Y701) D= ____________

420 - 450 MHz: $V_{DEC} = \frac{(A + 21.4) - (C \times 9)}{3 \times F}$,

440 - 470 MHz: $V_{DEC} = \frac{(A - 21.4) - (C \times 9)}{3 \times F}$

FORMULA: $V_{DEC} = \frac{B - (D \times 9)}{3 \times F}$

CHANNEL SPACING:	REFERENCE CRYSTAL (Y703):	REFERENCE FREQUENCY:
20 kHz	6.8266 MHz	F= 0.006666
25 kHz	8.5333 MHz	F= 0.008333

LIST OF REFERENCE CRYSTALS (Y703)

MODE	FREQUENCY, MHz	PART No.
Standard 5662	8.5333333	19J706361P3
Standard 5663	6.8266666	19J706361P4

ALTERNATIVE SOLUTIONS IF THE RECEIVER IS SELFQUIETING:

1. SELECT ANOTHER RX MIXER CRYSTAL FREQUENCY
2. SELECT HIGH INJECTION FREQUENCY FOR 2nd OSCILLATOR Y501= 21.85500 MHz INSTEAD OF 20.945000 MHz
3. USE SLIGHTLY OFFSET REFERENCE CRYSTAL
4. WEAK QUIETING; NO ALTERNATIVE REQUIRED

ADJUSTMENT PROCEDURE

CQM5660 S99

This adjustment procedure applies to the following radiotelephone types:

CQM5662 : 30/25 kHz Channel spacing
CQM5663 : 20 kHz Channel spacing

(ore making adjustments to the radiotelephone transmitter/receiver, read the type label and note the channel frequencies. Check all straps according to the notes on the diagrams. Also check the selective calling tone equipment, if any, against the coding instructions; refer to description of tone equipment.
All screens must be in place and properly secured during the adjustments.

MEASURING INSTRUMENTS

The following list contains instruments necessary for adjusting the radiotelephone and checking its performance characteristics:

DC Voltmeter	$R_{in} \geq 1$ Mohm
AC Voltmeter	Z_{in} >1 Mohm//50 pF
Multimeter	$R_i \geq 20$ Kohm/Volt
Distortion meter	e.g. Storno E11c
RF Watt meter	25 W/50 ohm/420-470 MHz
Deviation meter	420-470 MHz
RF generator	Z_{out}= 50 ohm; 420-470 MHz
21.4 MHz signal generator	e.g. Storno TS-G21B
Frequency counter with attenuator	Z_{in} = 50 ohm; sensitivity 100 mV at 470 MHz
RF diode probe	Storno 95.0089-00
RF coaxial probe	Storno 95.0179-00
DC power supply	10.8 V - 16.6 V; 6A
Oscilloscope	0 - 5 MHz min.

MISCELLANEOUS

4 ohm/3 W resistor	3 x Storno code 82.5026-00
22 uF/40 V electrolytic capacitor	Storno code 73.5107-00
Connector, 11-pin house	Storno code 41.5543-00
Connector, 8-pin house	Storno code 41.5542-00
Pins for connectors	Storno code 41.5551-00
Trimming tools	

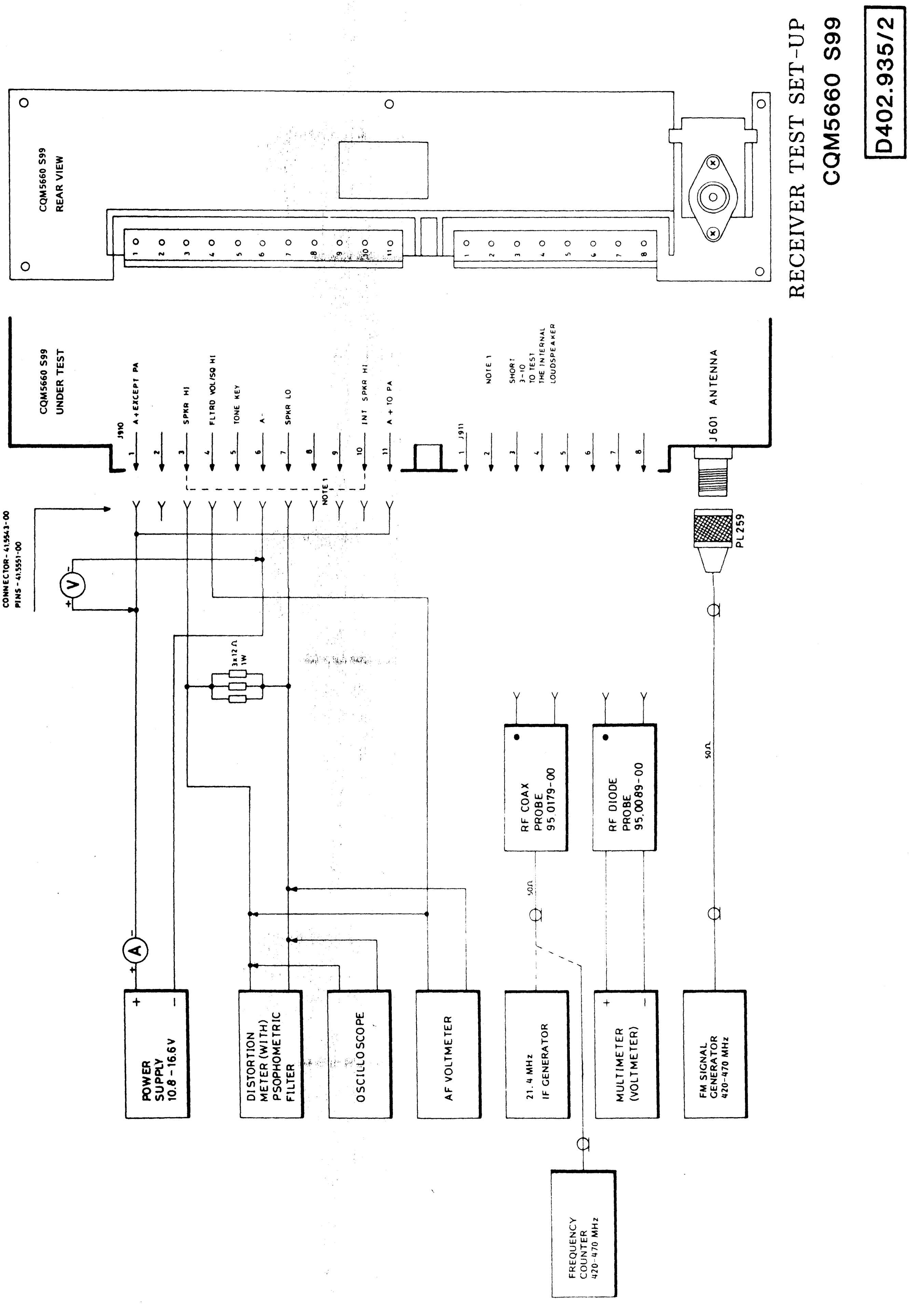
The following tables show the frequency ranges of the CQM5660 S12 radiotelephone signals:

SIGNAL	FREQUENCY MHz
TX VCO	140 - 156
TX crystal	45 - 50
TX crystal multiplication	x3
RX VCO	139 - 157
RX crystal	47 - 50 (420 - 450) 45 - 48 (440 - 470)
RX crystal multiplication	x3

Table 1.

Channel spacing kHz	Reference Crystal MHz	Min. Divider input frequency MHz	Max. Divider input frequency MHz	Reference frequency kHz
20	6.8266	1.7066	3.4066	6.666
30 or 25 [1]	8.5333	2.1333	4.2583	8.333

Table 2 1) Two steps per channel


RECEIVER TEST SET-UP
CQM5660 S99
D402.935/2
CQM5660 S99
REAR VIEW
CQM5660 S99
UNDER TEST
J910
A+EXCEPT PA
SPKR HI
FLTRD VOL/SQ HI
TONE KEY
A-
SPKR LO
INT SPKR HI
A + TO PA
NOTE 1
J911
NOTE 1
SHORT
3-10
TO TEST
THE INTERNAL
LOUDSPEAKER
J601 ANTENNA
PL259
CONNECTOR-41.5543-00
PINS-41.5551-00
3x12 Ω
1W
50Ω
RF COAX
PROBE
95.0179-00
RF DIODE
PROBE
95.0089-00
POWER
SUPPLY
10.8-16.6V
DISTORTION
METER (WITH)
PSOPHOMETRIC
FILTER
OSCILLOSCOPE
AF VOLTMETER
21.4 MHz
IF GENERATOR
MULTIMETER
(VOLTMETER)
FM SIGNAL
GENERATOR
420-470 MHz
FREQUENCY
COUNTER
420-470 MHz

RECEIVER ADJUSTMENT

CHECKING 8.5 V REGULATED SUPPLY

Turn the power supply ON and set the voltage to 13.2 V. Set the power supply current limiter to 1 A.
Turn the radiotelephone ON by depressing the ON/OFF button. Note the light in the Channel selector, if any, is on.
Depress the Squelch button.
Set the volume control to minimum.
Connect the DC voltmeter to J901 pin 3 and read the Voltage.
Requirement: 8.5 V ±0.15 V
If the requirement is not fulfilled check resistor R636 against the colour code of U602.

U602 colour code	R636 Value
Brown	omit
Red	270
Orange	100
Yellow	47
Green	22
Blue	6.8

Adjust the power supply voltage to 16.6 V and read the 8.5 V regulated. Compare the change in the 8.5 Volt regulated to the value obtained at 13.2 V.

Requirement: ≤50 mV

Repeat the procedure with the power supply adjusted for 10.8 V

FREQUENCY SYNTHESIZER ALIGNMENT

Check the PROM U801, the TX mixer crystal, the RX mixer crystal, and the reference crystal and verify the frequencies and PROM codes.

Mixer crystal output

Connect RF diode probe 95.0089-00 with multimeter to test point TP701. (1 V range).
Adjust L711 for maximum deflection on the multimeter.
Adjust L707 for maximum deflection on the multimeter.
Requirement: 45 mV ± 15 mV (corresponding to -10 dBm to -4 dBm).

Note: Be careful not to resonate L707 to the false harmonics. If in doubt consult table 1 or check the crystal oscillator output with a spectrum analyzer.

Receiver VCO

Connect the multimeter, 10 V range, to test point TP706. The synthesizer's lock signal is accessible at TP706. +8 V DC with very narrow pulses (0.1 u sec) indicates normal locked condition. Unlocked condition is indicated by a variable duty signal or logic "Low".
Select the channel whose frequency is closest to the center frequency.
Await locked condition, constant voltage.
Adjust C745 for 8 Volts on the multimeter.
Connect the multimeter to test point TP703.
Adjust C745 for a voltage corresponding to the variable divider ratio (V) as indicated by the graph fig. 3.

Requirement: The voltage shall be in the range 1.5 V to 6.5 V and not deviate from the graph by more than 20%.

Mixer Crystal Frequency

Connect coax probe 95.0179-00 to test point TP701.
Connect the frequency counter to the probe and read the frequency.

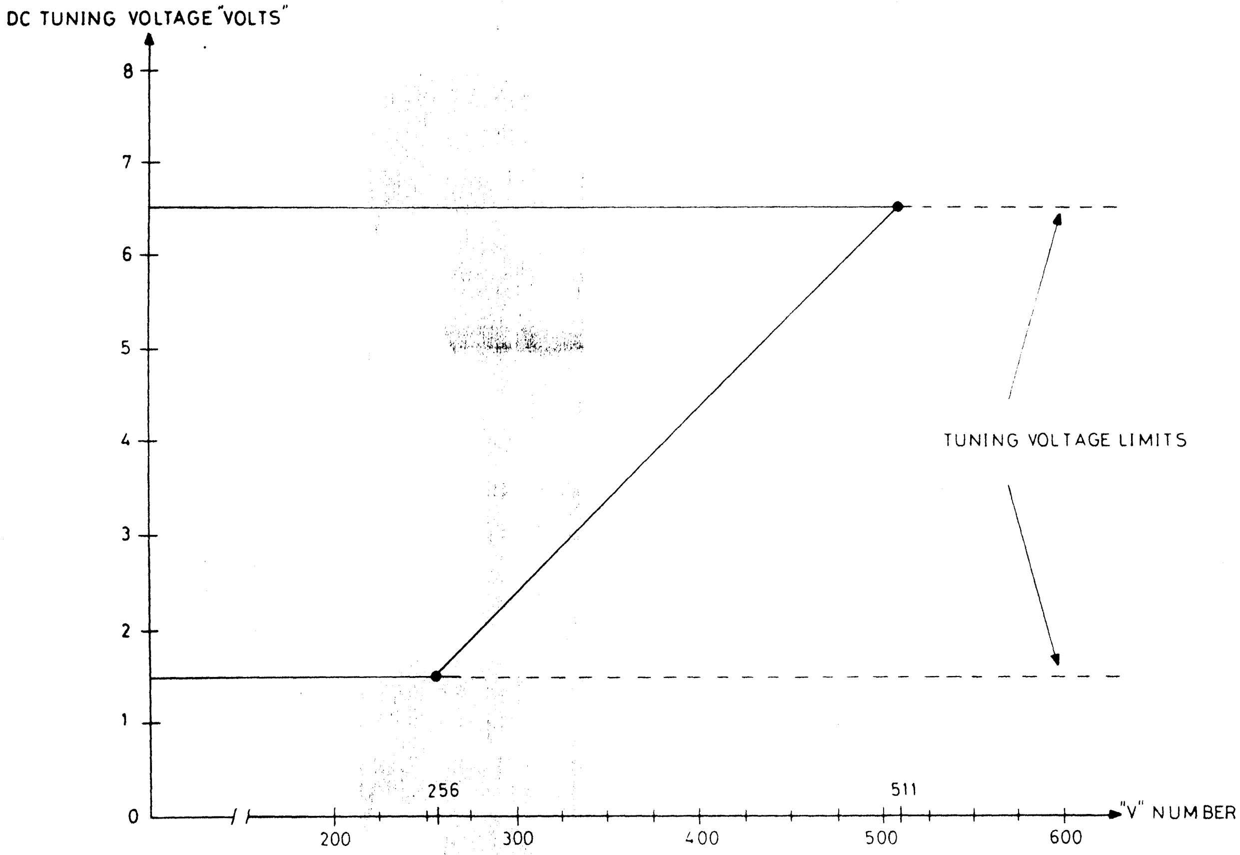


Fig. 1. Tuning voltage vs. V. number.

f= $f_x \times 3$ (f_x= crystal frequency)
Adjust L711 to the calculated frequency.
Requirement: f ±0.3 ppm at 25°C.
ppm= parts per million= 10^{-6}

<u>Injection Frequency</u>

Connect coax probe 95.0179-00 to test point TP401.
Connect the frequency counter to the probe.
Calculate the injection frequency for all channels.
$f_{inj}= f_{ant}-21.4$ (MHz)
Select, one by one, the channels and read the injection frequency.
Requirement: F_{inj} ±0.2 ppm

IF AMPLIFIERS

Connect a 21.4 MHz signal generator to TP401 via coax probe 95.0179-00.
Connect RF diode probe 95.0089-00 with multimeter to test point TP501. (50 uA range).
During adjustment the RF generator output must be kept low enough to prevent limiting in the IF stages, i.e. a maximum reading of 50 uA on the multimeter.
Adjust coils L503, L502, L501, and L406, in that order, for maximum deflection on the multimeter.

FRONT-END

Connect the RF probe 95.0089-00 and the multimeter to test point TP501. (50 uA range).
Connect an unmodulated RF generator to the antenna connector, J601.
Set the generator frequency to the receiver frequency.
Adjust the generator output to produce a deflection on the multimeter, i.e. a maximum reading of 50 uA on the multimeter.
Adjust L401 and L402 for maximum deflection.
Detune L406: Adjust L405 and L407 for maximum deflection on the multimeter.

Adjust L406 for maximum deflection.
Readjust L401 and L402 for maximum deflection.
Remove the RF diode probe.

Standard Test condition:

Connect the RF generator to antenna connector and adjust the output to 1 mV e.m.f.
Modulate the RF generator with 1000 Hz to 60% of Δf max.

CQM5662 S12/S99	±3 kHz
CQM5663 S12/S99	±2.4 kHz

Connect a 4 ohm/3 W resistor load to connector J910/3-7 (SPKR HI-SPKR LO).
Connect an AF voltmeter to J910/4-7 (FLTD VOL SPKR LO).

IF DEMODULATOR

Turn R521 halfway up.
Adjust L504 for maximum reading on the AF voltmeter.

Connect a distortion meter and AF voltmeter across the 4 ohm resistor. (if Storno E11c distortion meter is used switch the function to AF voltmeter).
Adjust the volume control for approx. 2 V across the load.
Adjust L501 and L406 for minimum distortion.
The demodulated signal may be monitored on an oscilloscope connected in parallel with the distortion meter.
Connect the AF voltmeter and distortion meter to J910/4-7 (FLTD VOL - SPKR LO).
Adjust R521 for a reading of 275 mV on the AF voltmeter.
Requirement: 275 mV ±5 mV.
Read the distortion.
Typical Total Harmonic Distortion (THD) will be less than 5%.

RECEIVER SENSITIVITY

EIA or CEPT method may be used.

Method of measurement CEPT

The purpose of the measurement is to define the ratio of one condition to another.
The first condition is the one where a modulated RF-signal drives the receiver into full limiting. The audio output is measured with the distortion meter (in the CAL position) and, disregarding the amplitude of the audio, this is adjusted to read 100% on the meter scale; this is our reference condition consisting of signal +noise +distortion, where 'signal' is the modulation of the RF, 'noise' is the lowest possible amount achieved from that particular receiver, when receiving a strong carrier, and 'distortion' is the modulation being slightly distorted in passing through the receiver.
The second condition is the one where the signal (modulation) is removed with a notch filter and the RF-signal is lowered in amplitude until the remaining noise and distortion increases to 20 dB below the first condition, as read on the distortion meter scale. This corresponds to a reading of 10%, 10 being 20 dB below 100, which was our reference condition.

In practice our first condition is achieved by feeding a minimum of 1000 uV of RF-signal modulated with 1000 Hz at 60% Δf max. to the receiver.
The audio output (which must be at least 100% of the receiver's audio rating) is measured through the psophometric filter, with the distortion meter in position CAL and adjusted with potentiometer ADJ. FSD. to a reading of 100.

The notch filter is then inserted in series with the audio by pressing one of the buttons marked in %. The meter needle immediately drops to indicate a low value, this being the receiver's inherent audio distortion.

By backing off the attenuator of the RF generator, thereby lowering the RF input to the receiver, the noise will eventually increase; the attenuator is now adjusted for a 10% reading on the distortion meter scale.
At this stage it must be ensured that the increased noise and the signal (with the notch filter switched out while checking) still equals 100 on the meter scale.
The RF-generator's calibrated attenuator now shows the value of RF-signal required to achieve a 20 dB ratio between signal + noise + distortion and noise + distortion, i.e. 20 dB SINAD sensitivity.

EIA Method
EIA (Electronic Industries Association) Standard, definition:
The SINAD sensitivity of a receiver is the minimum input signal that will provide at least 50% of the receivers's rated audio power with 12 dB signal + noise + distortion to noise + distortion.
The EIA method differs from CEPT by omitting the psophometric filter, adjusting the RF generator for 2/3 x Δfmax., and measure the distortion at 50% of the receiver's rated AF power. The SINAD sensitivity is measured as a 12 dB ratio between signal + noise + distortion and noise + distortion, which corresponds to a reading of 25% noise + distortion.

ADJUSTING THE SENSITIVITY

Lower the RF generator output to obtain 20 dB SINAD (10% THD as measured with the distortion meter). Readjust L402 for the best SINAD value, e.i. lowest generator output for 10% THD.

MEASURING 20 dB SINAD (CEPT)

Adjust the volume control for 2.45 V (1.5 W/4 ohm) as measured with an AF voltmeter across the load.
Adjust the RF generator output to obtain 20 dB SINAD condition.
Read the 20 dB SINAD sensitivity (e.m.f.)
Requirement: ≤1.0 uV.
The sensitivity should be measured on all channels, if more than one.

MEASURING 12 dB SINAD (EIA)

Adjust the volume control for 2.45 V as measured with an AF voltmeter across the load.
Adjust the RF generator to obtain 12 dB SINAD condition.
Read the 12 dB SINAD sensitivity.
Requirement: ≤0.4 uV (½ e.m.f.)
The sensitivity should be measured on all channels, if more than one.

AUDIO FREQUENCY RESPONSE

Set the signal generator to Standard Test Condition.
Adjust the volume control for 0.82 V across the load. (4 ohm across (SPKR HI - LO).
At 13.2 V supply, ΔF = 60% ΔF max and 1000 Hz measure the output voltage according to the following table:

	Frequency	Level	Tol.
CQM5662 S12/S99	300 Hz	+9 dB	+1 dB/-3 dB
	1000 Hz	0 dB	
	3000 Hz	-9.5 dB	+1 dB/-3 dB
CQM5663 S12/S99	300 Hz	+10.5 dB	+1.5 dB/-3 dB
	400 Hz	+8 dB	+1.5 dB/-1.5 dB
	1000 Hz	0 dB	
	2700 Hz	-8.6 dB	+1.5 dB/-1.5 dB
	3000 Hz	-9.5 dB	+1.5 dB/-3 dB
	6000 Hz	<-20 dB	

SELF QUIETING CHECK

Internal oscillators, dividers and the harmonic frequencies hereof, may cause self quieting of the receiver if a mixer product falls in the RF or IF pass band.

For proper operation of the squelch all channels must be checked for the self quieting phenomenón. .

Connect the RF generator to the antenna connector. Reduce the RF output to 0.
`et the frequency outside the 420 - 470 MHz band.
Alternatively, an attenuator (50 ohm) may be connected to the antenna connector.

Connect an AF voltmeter across the 4 ohm speaker load.
Adjust the volume control for 774 mV (0 dBm) as read on the AF voltmeter.
Select, in turn, all allocated channels.
The reading on the AF voltmeter shall not on any selected channel decline more than 6 dB.
Requirement: Quieting $\leq$6 dB.

AF POWER OUTPUT

Adjust the RF signal generator to Standard Test Condition.
Set the supply voltage to 13.2 V.

Adjust the volume control for 3 W output (3.46 V across the 4 ohm load).
Measure the distortion (THD).
Requirement: THD $\leq$5%.

SQUELCH

Release the squelch cancel button.
Adjust potentiometer R607 squelch adj. to open the receiver for an RF input signal corresponding to 8-10 dB SINAD.

The final squelch adjustment must not be set on a channel that has shown a minor dégree of selfquieting.

CURRENT CONSUMPTION

Measure the current consumption at 13.2 V.

Requirements

	CURRENT CONSUMPTION	
CONDITION	S12	S99
Standby	$\leq$350 mA	$\leq$1000 mA
Receive ~ 2.83 V r.m.s. across 4 ohm.	2 W AF/$\leq$750 mA	3 W AF/$\leq$1450 mA

For sets with selective calling facilities add current consumption of the tone unit to the figures above.

TRANSMITTER ADJUSTMENT

Adjust the power supply voltage to 13.2 V and set current limiter as follows:

20 W transmitter:	7 A
5 W transmitter:	4 A

Refer to Receiver Alignment for measuring 8.5 V regulated supply.
Preset all transmitter tuning slugs, L151, L153, L201, L202, L204, and L205 to be flush with the coil form top.

Connect a multimeter (2.5 volt range) to test point TP201.
Turn the power control potentiometer, R221, to minimum, anticlockwise (CCW).
Connect a Wattmeter, (25 W) to the antenna connector, J601.

FREQUENCY SYNTHESIZER ALIGNMENT

Check the PROM U801, the TX mixer crystal, the RX mixer crystal, and the reference crystal and verify the frequencies and the prom codes.

Mixer crystal output

Connect RF probe 95.0089-00 with multimeter to test point TP701 (1 V range).
Key the transmitter.
Adjust L701 for maximum deflection on the multimeter.
Adjust L704 for maximum deflection on the multimeter.

Requirement:
40 mV ±15 mV
(corresponding to -10 dBm to -4 dBm)

Note: Be careful not to resonate L704 to the false harmonics. If in doubt consult table 1 or check the crystal oscillator output with a spectrum analyzer.

Transmitter VCO

Connect the multimeter, 10 V range, to test point TP706.

The synthesizer's lock signal is accessible at TP706 and +8 V DC with very narrow pulses (0.1 u sec.) indicate normal locked condition. Unlocked condition is indicated by a variable duty signal or logic "LOW".

Select the channel whose frequency is closest to the center frequency. Key the transmitter. Await locked condition.
Adjust C737 for 8 Volts on the multimeter.
Connect the voltmeter to test point TP703.
Adjust C737 for a voltage corresponding to the variable divider ratio (V) as indicated by the graph fig. 1.

Requirement: The voltage shall be in the range 1.5 V to 6.5 V and not deviate from the graph by more than 20%.

Mixer Crystal Frequency

Connect coax probe 95.0179-00 to test point TP702.
Connect the frequency counter to the probe, key the transmitter and read the frequency.
$f = f_x \times 3$ (f_x = crystal frequency).
Adjust L701 to the calculated frequency.
Requirement: f ±0.3 ppm at 25°C.
ppm= parts per million= 10^{-6}.

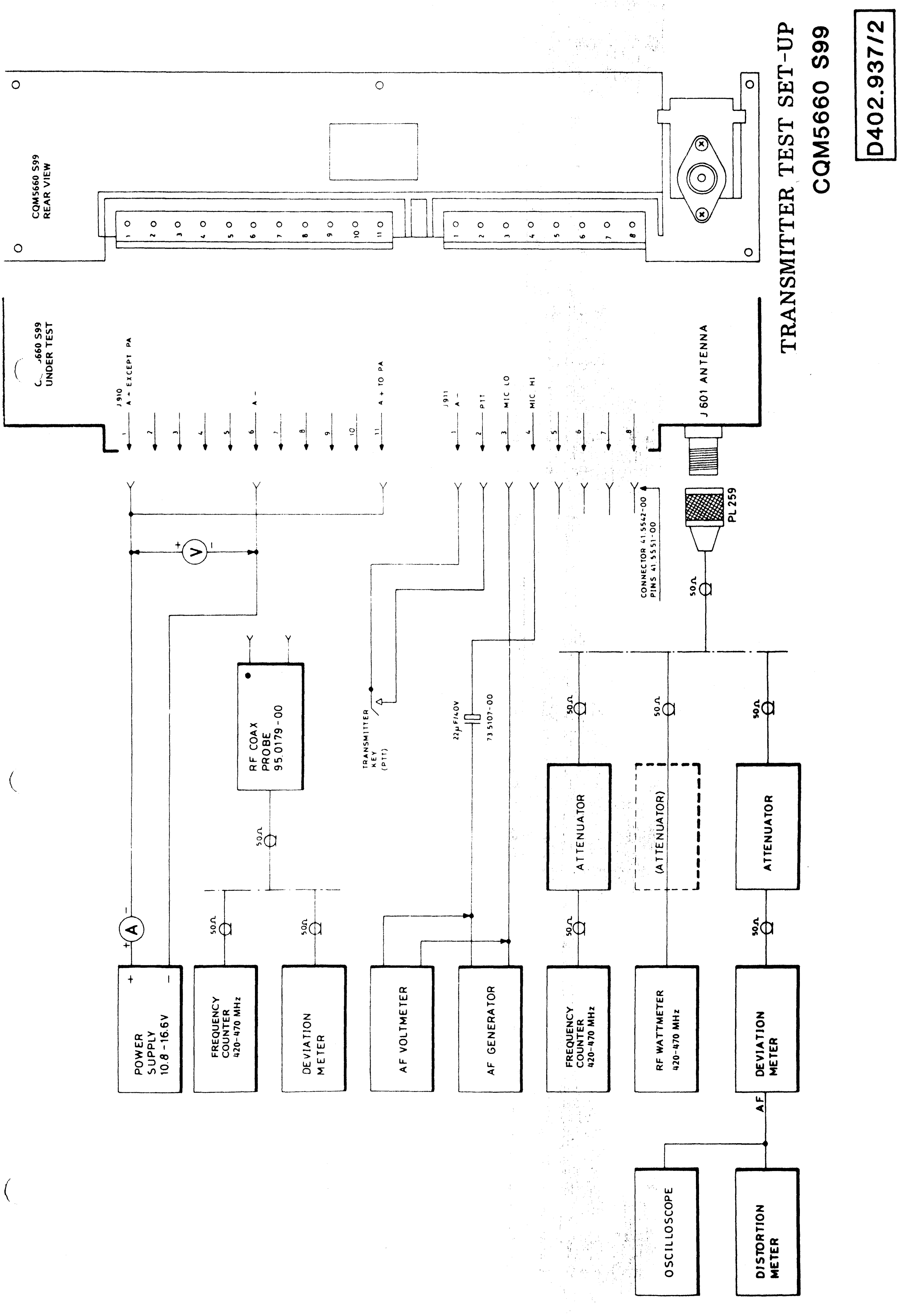
Synthesizer Output Level

Connect a multimeter, 2.5 V range, to test point TP201. Key the transmitter.

Adjust L153 for maximum deflection on the multimeter, typical more than 0.75 V.

EXCITER

Connect a multimeter (1.0 V range) to test point TP201.
Adjust L203 for minimum deflection. The dip is small.
Connect the multimeter, (1 V range) to test point TP202.
Adjust L204 for maximum deflection on the multimeter, typical 0.7 V.
Repeat the adjustments of L203, L153, and L151 (L921-L926) until no further improvements is obtainable.
Adjust C213 for minimum reading. The dip is small.
Connect the multimeter, 1 volt range, to test point TP203.
Adjust C215 for maximum reading on the multimeter, typical 0.5 V.
Repeat the adjustment of C213 and L204 until no further improvement is obtainable.
Adjust C221 m inimum deflection. The dip is small and careful tuning is required.
Connect the multimeter, 10 volt range, to the RF probe.
Connect RF diode probe 95.0089-00 to TP204.
Adjust C221 and C223 for maximum deflection (typical 4.0 V).
Adjust the PA power control, R215, for rated transmitter power, 5 W or 20 W.


TRANSMITTER TEST SET-UP
CQM5660 S99
D402.937/2
CQM5660 S99 REAR VIEW
CQM5660 S99 UNDER TEST
J910
A + EXCEPT PA
A -
A + TO PA
J911
PTT
MIC LO
MIC HI
J601 ANTENNA
PL 259
CONNECTOR 41.5542-00
PINS 41.5551-00
50Ω
RF COAX PROBE 95.0179-00
TRANSMITTER KEY (PTT)
22μF/40V
73.5107-00
ATTENUATOR
(ATTENUATOR)
POWER SUPPLY 10.8-16.6V
FREQUENCY COUNTER 420-470 MHz
DEVIATION METER
AF VOLTMETER
AF GENERATOR
RF WATTMETER 420-470 MHz
AF
OSCILLOSCOPE
DISTORTION METER

EXCITER, FINE ADJUSTMENT

Connect the multimeter to test point TP201.
Readjust L153 for maximum reading.
Connect the multimeter to test point TP202.
Peak L203 and L204 for maximum reading.
Connect the multimeter to test point TP203.
Connect C213 and C215 for maximum reading.
Connect the 95.0089-00 RF probe and multimeter to TP204.
Adjust C221 and C223 for maximum reading.

TYPICAL TEST POINT READINGS

TP201:	0.2 V
TP202:	0.7 V
TP203:	0.5 V
TP204:	4.0 V

TRANSMITTER FREQUENCY ADJUSTMENT

Connect a frequency counter through a suitable attenuator to the antenna connector J601.
Key the transmitter.
Select one by one, the channels and read their frequencies.
Adjust L701 for best frequency tracking on all channels.

Requirement: $F = F_{ant} \pm 0.2$ ppm,
ppm= parts per million= 10^{-6}

RF POWER OUTPUT, CURRENT CONSUMPTION, AND POWER CONTROL

Connect the Watt meter to the antenna connector, J601.
Increase the supply voltage to 13.2 V. The voltage is measured directly at the input connector J910.
Readjust the PA power control, R221, for rated transmitter power (P), 20 W or 5 W.
Requirement: $P_{nom} \pm 0.2$ dB.
Measure the RF power output at 16 V, 13.2 V and 10.8 V.

Requirements (20 W):

CQM5660		S12	S99
Voltage	Power	Current	Current
16.6 V	≤25 W (ref)	≤5.4 A	≤6.1 A
13.2 V	20 W	≤5.4 A	≤6.1 A
10.8 V	≥20 W	≤5.4 A	≤6.1 A

Requirements (5 W):

CQM5660		S12	S99
Voltage	Power	Current	Current
16 V	≤6.5 W	≤1.7 A	≤2.4 A
13.2 V	5 W	≤1.7 A	≤2.4 A
10.8 V	≥3.5 W	≤1.7 A	≤2.4 A

MODULATION ADJUSTMENT

Set the power supply voltage to 13.2 V.
Select the channel having the highest frequency. Set R116 to mid-position.
Connect coax probe 95.0179-00 to test point TP701.
Connect a deviation meter to the coax probe.

Connect a distortion meter and oscilloscope to the deviation meter output.
Connect a AF generator and an AF Voltmeter to the microphone input via a 22 uF capacitor; refer to test setup.

Set the AF generator to 1000 Hz.
Adjust the AF generator output to 1 V r.m.s.
This voltage is approx. 20 dB above the nominal modulation input level (60% Δf max) to ensure full limiting in the modulation processor.
Note the deviation read at TP701.
Connect the deviation meter to test point TP702.
Adjust R752 (Dev. Bal.) for same deviation as measured at TP701.

Disconnect the deviation meter from the coax-probe and connect it through an attenuator to the antenna connector, J601.

Find the AF frequency between 200 Hz and 3000 Hz giving the greatest frequency deviation as read on the deviation meter with the transmitter keyed.
Check the maximum deviation for both positive and negative deviation polarity. At that audio frequency set the maximum frequency deviation Δf max with R116.

Type	Channel spacing	Δf max
CQM5662	30/25 kHz	±5 kHz
CQM5663	20 kHz	±4 kHz

<u>Requirement</u>
Difference between + and - deviation: ≤10%

MODULATION SENSITIVITY AND MODULATION DISTORTION

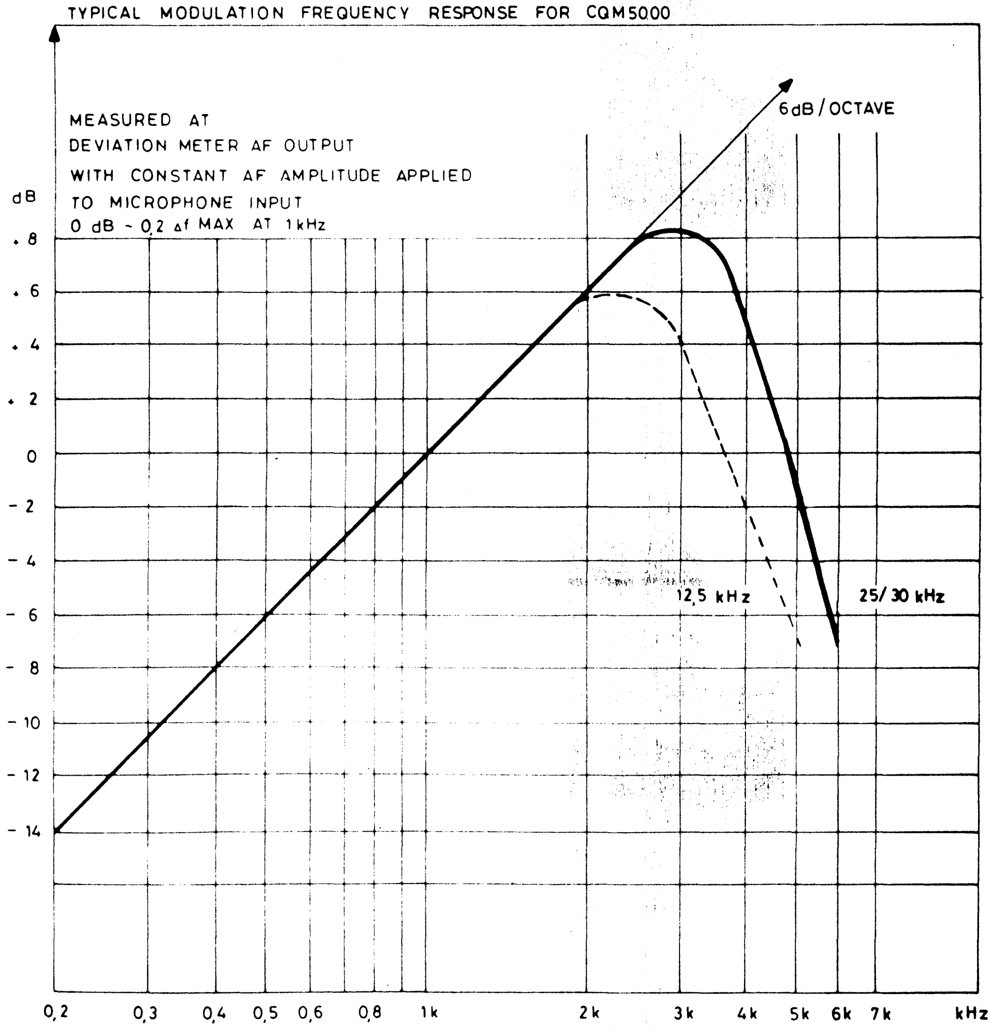
Set the AF generator frequency to 1000 Hz
Adjust the generator output until 60% of Δf max is obtained on the deviation meter.

CQM5662 : ±3.0 kHz
CQM5663 : ±2.4 kHz

Read the AF generator output and measure the modulation distortion on the audio output of the deviation meter.

Requirements:
Modulating signal: 75 mV ±3 dB
Distortion: ≤7%
(measured without deemphasis)

TYPICAL MODULATION FREQUENCY RESPONSE FOR CQM5000



MODULATION FREQUENCY RESPONSE

Set the AF generator to 1000 Hz.
Reduce the AF generator output until a deviation of 0.2 x Δf max is obtained on the deviation meter.

CQM5662 : ±1.0 kHz
CQM5663 : ±0.8 kHz

Vary the frequency of the generator and note the deviation changes as referred to the 1000 Hz value.
Requirement :
Within the frequency range 400-2700 Hz the frequency characteristic shall lie within +1 dB/-1.5 dB related to a 6 dB/octave characteristic.
With 6 kHz modulation frequency the deviation shall be attenuated at least 6 dB below the 1 kHz value.

Storno

CONTROL LOGIC BOARD

CL5001

CL5001 is a microcomputer controlled logic board used in CQM5000. The logic board interfaces the keyboard and 4-digit LED-display (CP5005), the synthesizer (FS5000), the RF-board through the FS5000/XS5002 board and the tone module (TQ5007/8).

The program ROM U802 determines the functional behavior of the logic while the personality PROM U804 determines the system mode and contains customer specified data such as channel information for the synthesizer and tonetables/ tonecodes for the TQ5007/8.

CIRCUIT DESCRIPTION

The control logic board CL5001 includes the following circuit blocks:

1. Microcomputer U801 and program ROM U802
2. Personality PROM U804
3. Latches for RF-Synthesizer (U806, U807, U810)
4. Keyboard decoder/multiplexer, individual and group tone detector (U805)
5. Attention oscillator (U812)
6. Control inputs from RF5000 through FS5000/XS5002
7. Control outputs to RF5000
8. Control outputs to TQ5007/5008
9. Display interface (U808/9), dimmer and LS-indicator (LED)
10. Voltage regulator (U813/15)

MICROCOMPUTER SYSTEM

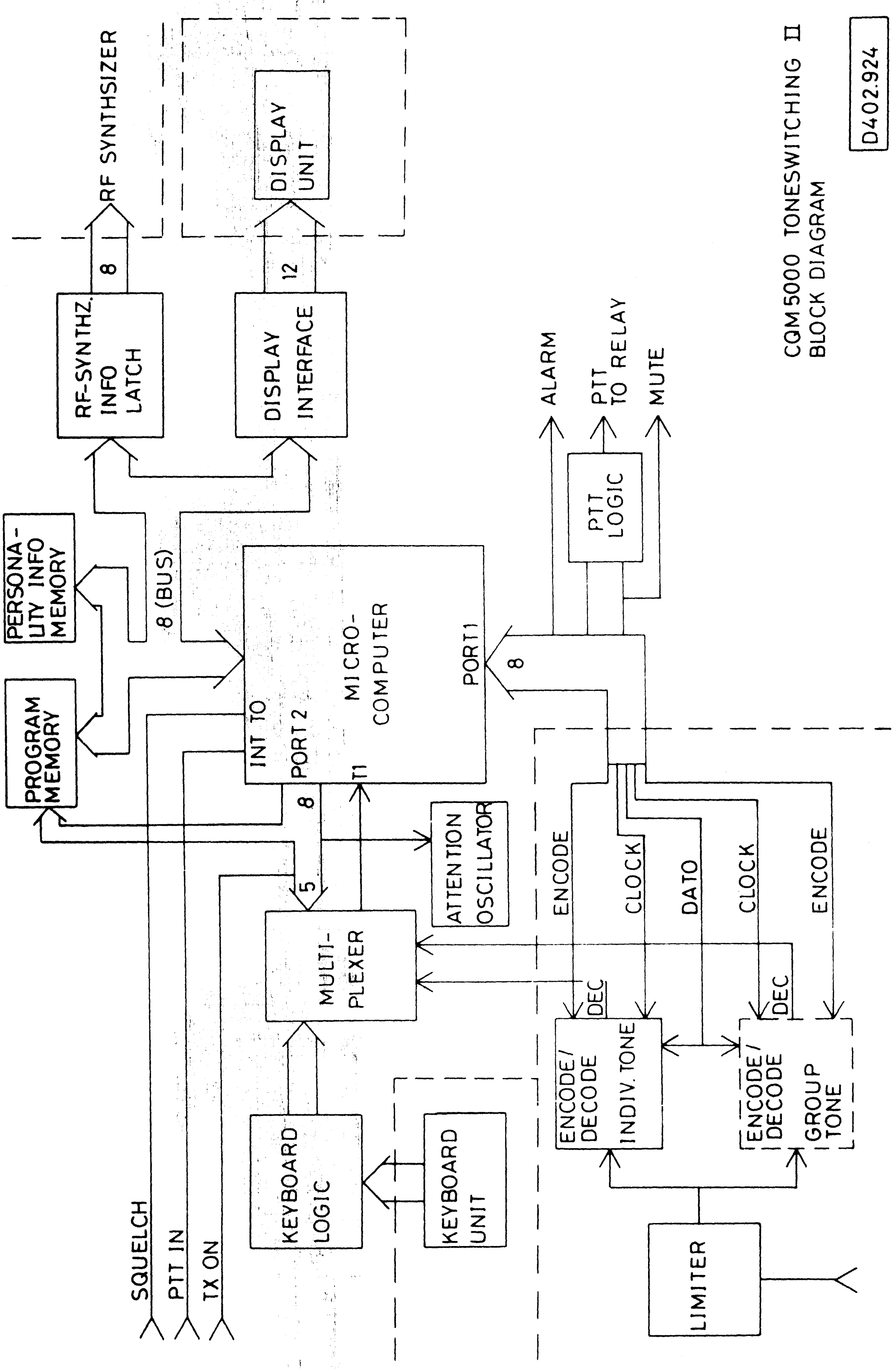
Description

The microcomputer system processes all functions and information, and controls the data communication between the different modules of the radio unit and other accessories.
The system consists of a microcomputer U801, type 8035 with a 128 byte RAM memory, a 2-Kbyte EPROM U802 where the program is stored and an address latch U803.

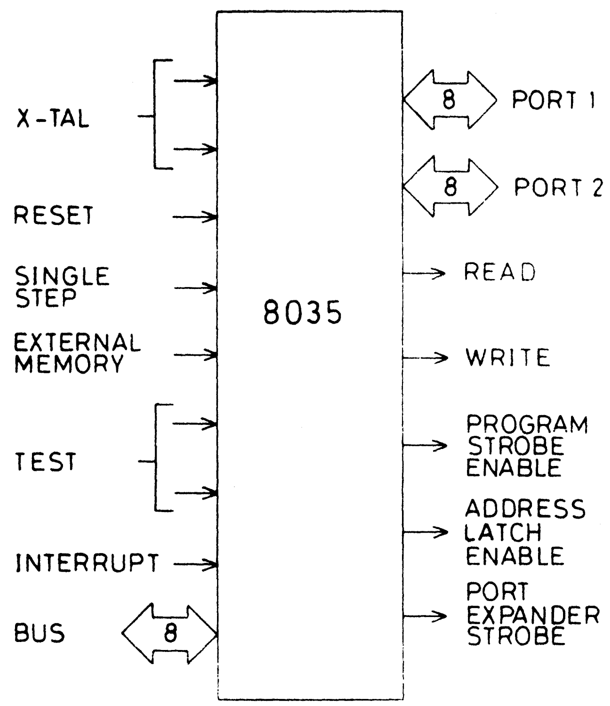
The 8 bit common bus (data and address bus) and the 3 bit address bus interconnects those three devices.

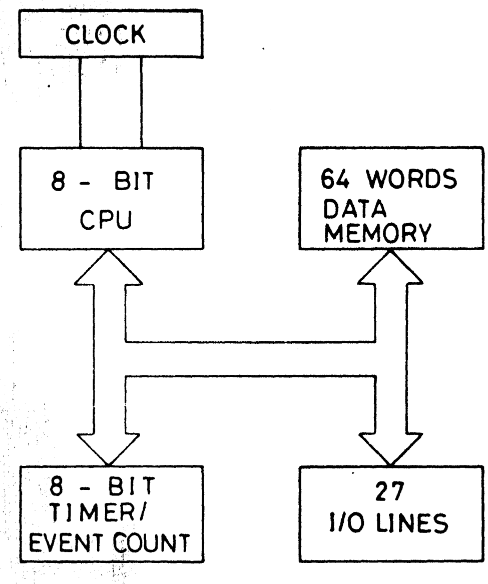
Instruction fetch

- When the EA-pin (External access) goes HIGH, the busses ar used for external program instruction fetches.
  The 8 LSB (least significant bits) of the program counter are placed on the common bus and the 3 MSB (most significant bits) on the lower half of port 2 (P20-P21-P22).
- The ALE - pin (address latch enable) indicates a valid address. Just when ALE goes LOW, the address is stored at the output of U803.
- The PSEN-pin (Program Store Enable) indicates that an address is in progress on the busses and just when it goes LOW, the external memory U802 is enabled and the data corresponding to the address are placed at the output of U802.
- The common bus then reverts to input mode (floating) and transfers the data to the microcomputer which accepts its 8 bit content as an instruction or data word.


RF SYNTHSIZER
8
RF-SYNTHZ. INFO LATCH
DISPLAY UNIT
12
DISPLAY INTERFACE
PERSONALITY INFO MEMORY
8 (BUS)
PROGRAM MEMORY
MICRO-COMPUTER
INT T0
PORT 2
T1
PORT1
8
8
5
ATTENTION OSCILLATOR
MULTI-PLEXER
KEYBOARD LOGIC
KEYBOARD UNIT
SQUELCH
PTT IN
TX ON
ALARM
PTT TO RELAY
MUTE
PTT LOGIC
ENCODE
CLOCK
DATO
CLOCK
ENCODE
DEC
DEC
ENCODE/ DECODE INDIV. TONE
ENCODE/ DECODE GROUP TONE
LIMITER
CQM5000 TONESWITCHING II BLOCK DIAGRAM
D402.924

LOGIC SYMBOL

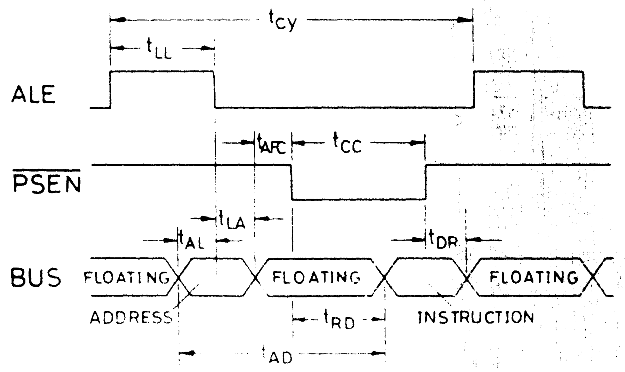




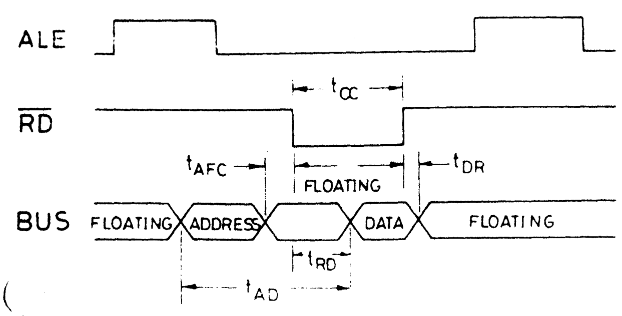
CQM5000 MICROPROCESSOR 8035 BLOCK DIAGRAM

D402.922

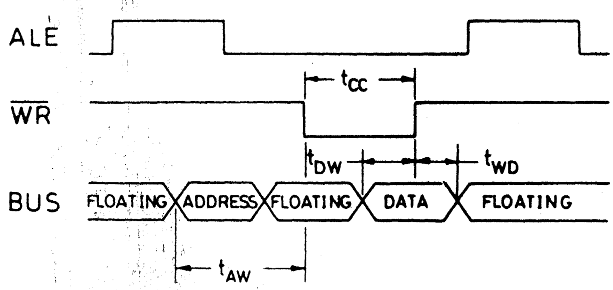
INSTRUCTION FETCH FROM EXTERNAL PROGRAM MEMORY



READ FROM EXTERNAL DATA MEMORY



WRITE TO EXTERNAL DATA MEMORY



DATA FLOW CL5001

D403.005

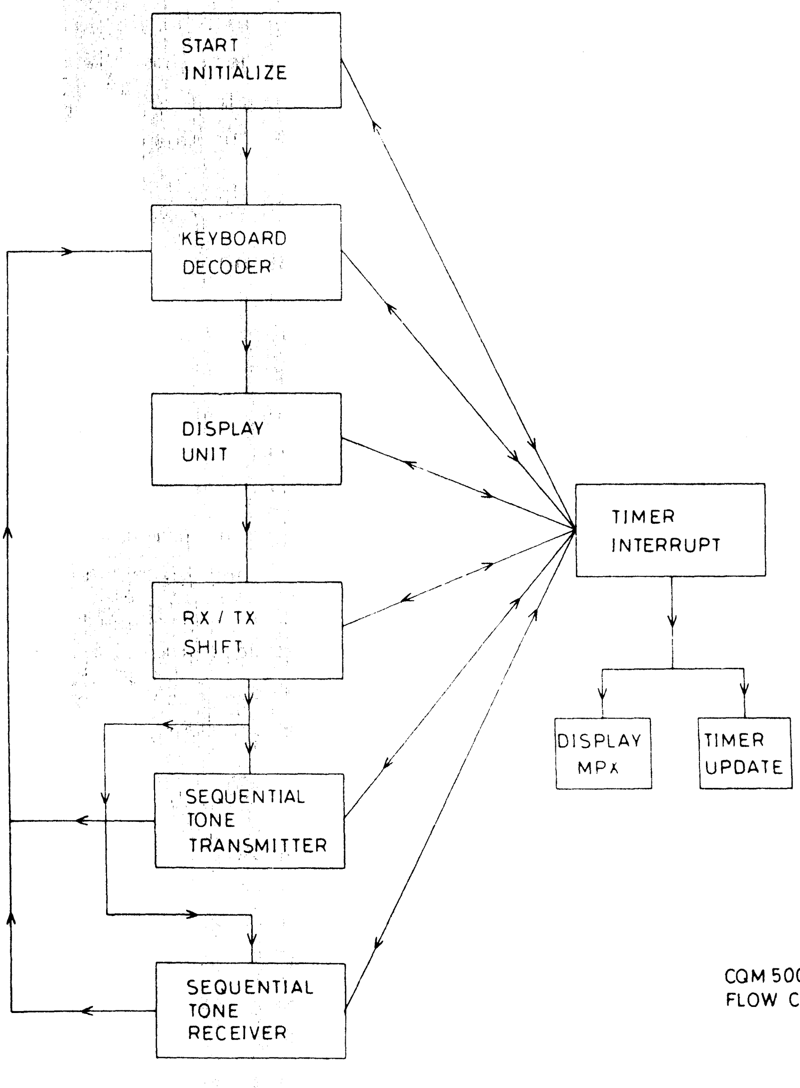
Data memory operation

The personality PROM U804, the seven-segment decoder U808 and the two quad latches U806 and U807 act in the microcomputer system as external data memories and are therefore addressable via the databus by using the read or write pulses. Pin 8, RD, output of the read pulse and pin 10, WR, output of the write pulse are active LOW. These pulses clock or enable inputs to the integrated circuits.

The data memory operation takes place as follows:

- The wanted address which is controlled by the program is placed on the common 8 bits bus.
- ALE indicates that the address is valid and as explained in the precedent section, just when ALE goes LOW, the address is stored at the output of U803.
- The WR pulse is used to enable U806/7, U808 and U809 which are processing the data output.
  To enable U806/U807 the WR pulse is not enough. They are enabled only when the WR pulse is combined with a pulse coming through the address lead A7.
- The RD pulse (read pulse) enables the personality PROM U804. Input data from U804 are valid when the RD pulse is LOW.
- The 8 bit common bus transfers all in or out data to the microcomputer.

- When the operator writes, on the keyboard, to the display, the address is available at U809 input and waits for a write pulse to be clocked in. Just when WR goes LOW, the information is clocked in and just when WR goes HIGH the data is stored.



CQM 5000 TONE SWITCHING II
FLOW CHART

D402.923

Reset
If the voltage supply falls more than 10% below the 5 volt nominal, transistors Q819 and Q820 ensure a proper reset of the microcomputer system.

PERSONALITY PROM U804

The personality PROM contains the customer specified data of the system's functional behaviour and information about tones and channels being used in the equipment.
Data informations stored in the PROM are locked out by the RD pulse and transfered to microcomputer U801 through the common bus.

LATCHES FOR RF SYNTHESIZER

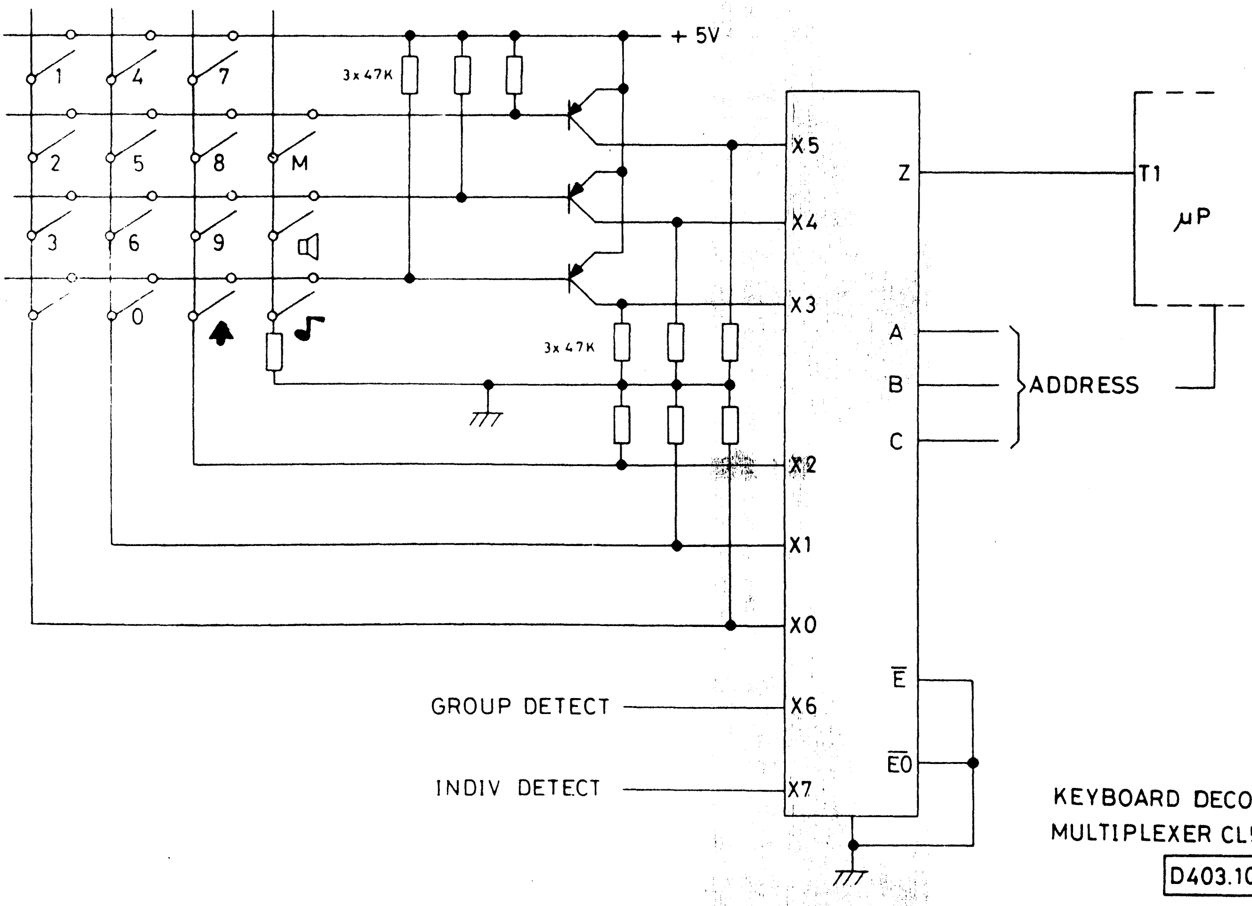
The channel information sent to the RF-synthesizer via the 8 bit bus is stored in the two quad latches U806 and U807 by the write pulse.

The transistor array U810 inverts each output from U806/U807 and supplies sharp logic outputs.

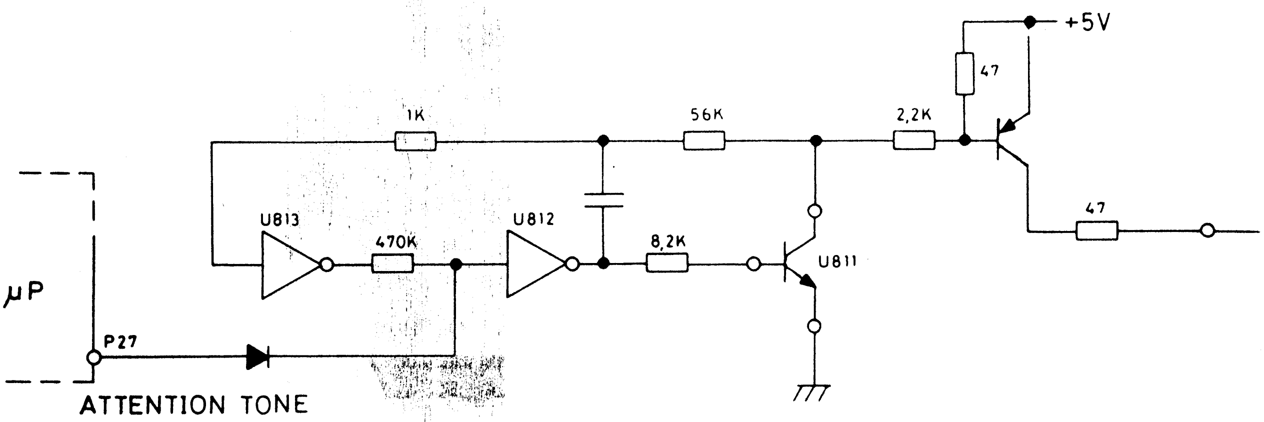
DECODER AND DETECTOR U805

The decoding circuit is able to decode a 4 x 4 matrix keyboard. The decoder output is fed into the detector (dataselector) U805 at inputs 1-6. The decoded outputs are 6 binary coded lines. The microcomputer scans the 6 lines through inputs A, B and C and read the information through U805 output z (pin 14).

This information is then decoded in order to make the microcomputer determine the function of the key being depressed.
The two remaining input lines 7 and 9 of U805 are used as detect inputs from the individual and group tone receiver; they are directly connected to TQ5007/5008 through connector P801. The microcomputer scans these inputs too to be able to set up the next tone to be received.



KEYBOARD DECODER/ MULTIPLEXER CL5001
D403.102



ATTENTION TONE GENERATOR CL5001

D403.103

ATTENTION OSCILLATOR U812

Attention oscillator U812 generates an acoustic feed-back from the loudspeaker when a push button is depressed.
The microcomputer controls U812 through P27, and when diode D801 goes off, U812 starts working. The oscillator circuit includes: the two inverters of U812, capacitor C808 and one transistor of the transistor array U811 (input B7-output C7). The generated signal passes through transistor Q818 and is sent via the connector P830 of the XS/FS board to the loudspeaker.

CONTROL INPUTS FROM RF5000

- Correspondance between the CL5001 and the RF board takes place through connector P806.
- The push-to-talk (PTT) function is directly connected to the interrupt pin (INT-pin 6) of the microcomputer and isolated from the PTT to relay by Q802. This transistor is controlled by the microcomputer output P10 (pin 27).
- The external tone-key function is transferred from connector P806 to keyboard decoder through the same lead as TONE-KEY button.

- RX-mute function is transferred through Q803 and one transistor in the transistor array U811 to the squelch detect input on the microcomputer TO (pin 1).

- 8,5 V TX passes through the voltage divider R803/R804 before entering the microcomputer at input P24 (pin 35).

- The VOL/SQ HI signal is transferred from the RF board through connector P806, pin 10, to the tone board TQ5007/5008 through connector P801, pin 9.

CONTROL OUTPUTS TO RF5000

- The RX mute depends on the transistor Q803 which is controlled by the output P10 (pin 27) of the microcomputer through an inverter.

- The mute output is controlled by the same output P10 (pin 27) through one of the transistors in the transistor array U811.

- The PTT signal from the RF board (pin 3 on connector P806) is directly transferred to the PTT-to-Relay output (pin 2 connector P806) when the transistor Q802 is on.
The PTT to Relay is also controlled by the microcomputer output P11 through an inverter and a transistor in U811.

- The output P11 (pin 28) of the microcomputer enables the MIC BLOCK function through one of the array transistors in U811 and transistor Q801 when the PTT to relay is activated by the same port.

- The output P12 (pin 29) of the microcomputer controls the external alarm function pin 12 on P806 through an inverter and one of the array transistors in U811.

- The tone output is transferred from the tone board TQ5007/5008 through connector P801, pin 10, to the RF board through connector P806, Pin 11.

CONTROL OUTPUTS TO TQ5007/5008.

- Correspondance between the CL board and the tone board takes place through connector P801.

- The system clock, which is the sample frequency for the DTD chip, is output from counter U814 at pin 2 on connector P801. The counter U814 divides the microcomputers clock frequency (3.579545 MHz) by 16 to give 223.72 KHz. This counter is controlled by the keyboard through connector P803 pin 10.

- To set up a tone, the microcomputer loads the DTD chip with 15 bits applied to P17 (pin 34). The first five bits determine the Q-value while the last ten bits program the tone frequency either to be received or to be transmitted by the TQ unit. The data are transferred at pin 1 on P801.

- In order to load the programming bits, the microcomputer generates a data clock for each DTD chips (A101 and A102 if TQ5008) at P16 (pin 32) for A101 (indiv. call) and P14 (pin 31) for A102 (gr./all call). The data clock is sent to the chips cyncronnously with the data bits at pin 5 and 6 on connector P801.

- To start and stop the tone transmission, the microcomputer controls the tone output from the TQ by two enable pins P15 (pin 32 for INDV.) and P13 (pin 30 for GR/ALL.), one for each DTD-chip.

- The detect output of each DTD-chip (pin 11 and 12 on P801) is connected to the microcomputer input T1 (pin 39) through the data selector U805.

DISPLAY INTERFACE, DIMMER AND LS-LED

- The display is a 4-digit multiplexed display. Correspondance between the CL board and the display takes place through connector P802. Pins 1 to 4 transfer information about the number to be displayed, pins 5 to 11 transfer information about which digit is going to be written.

- The microcomputer sends digit information, colon and call indicator instructions to the HEX latch U809 through the address latch U803. The write pulse from the microcomputer clocks the data in. Outputs Q0 to Q3 (pin 2, 5, 7 and 10) of U809 control 4 transistors Q807, 808, 809 and 810 whose collectors are connected to connector P802 (pin 1, 2, 3 and 4) and their emitters in series with the dimmer circuit.

- In order to turn on some or all the seven segments of one of the digits, the microcomputer places 4 bits on the common bus. The write pulse clocks them into the BCD-to-7 Segment latch decoder-drivers where they are stored, and decoded. The drivers seven outputs are connected to pin 5 - 11 on connector P802.

- The dimmer circuit consists of three transistors in cascade Q815, Q816, Q817 shunted with two diodes, and connected in series with the display driver transistors.
  When the photo transistor Q817 is subjected to strong light, transistor Q815 conducts and allows maximum current to pass through the display drivers. With weak light the transistor Q815 is cut-off and the diodes give a 2 x 0,7 volts drop in the voltage supply to the display, which then is dimmed.

VOLTAGE REGULATORS

The CL5001 is supplied by 13.6 volt nominal switched by the series transistors Q814 and Q813 which are controlled by 8.5 V cont. The 5 volt regulator U815 receives 13.6 V and supplies the entire CL and TQ board.

The other 5 volt regulator U813 ensures a continuous 5 volt supply for the data RAM in the microcomputer and gives the system a constant memory.
To interface the FS5000, 8.5 V. cont. is used to pull up the output level.

TECHNICAL SPECIFICATIONS

Voltage supply
13.6 V nom.
8.5 V regulated, continuous

Generated on CL5001
5.0 V regulated, switched
5.0 V regulated, continuous

Current consumption
420 mA +/-50 mA
max 30 mA standby, (data RAM)

Logic levels
LOW: max 0.8 V
HIGH: min 2.4 V

Squelch detect input
LOW: max 0.6 V
HIGH: min 6.5 V

Synthesizer output
LOW: max 0.3 V
HIGH: min 7.5 V

Microcomputer clock frequency
3.579545 MHz: Crystal controlled

Sample clock for TQ-unit
223.72 KHz, (Crystal/16)

Weight
150 g

Dimensions
(b x d x h) 150 x 160 x 10 mm

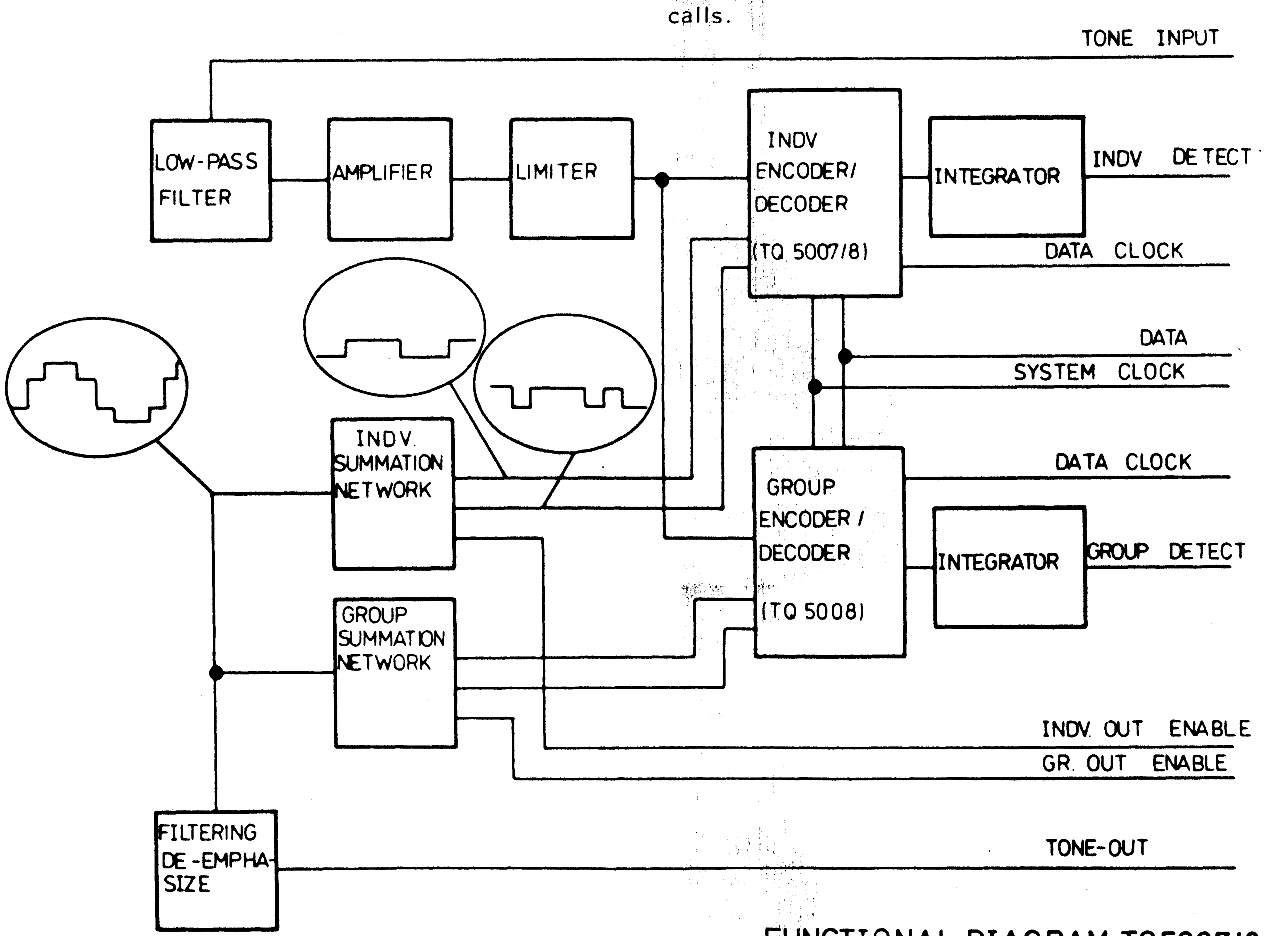
Temperature range (ambient)
$-30^{o}C$ to $+60^{o}C$

PROGRAMMABLE TONE BOARDS

TQ5007/5008

The tone boards TQ 5007/5008 are combined tone transmitter - tone receiver units, universal programmable. TQ 5007/8 are used in connection with Control Logic board CL 5001 or a similar board which is able to program the units, to control the transmitter and to handle the detected outputs.
The TQ unit is built up around a DTD-chip, Digital Tone Decoder, placed on a thick film substrate.
The peripherical circuits are:
a limiter which shapes the input signals to the DTD
an integrator which ensures proper detection of the detected output.

In tone generator mode a summation network generates the output signal from two square waves sent out from the DTD. This summation network is enabled from the control logic by two three-state buffers when the TQ is used as a tone transmitter.
After being filtered and deemphasized, the final signal is applied to the microphone amplifier.
TQ 5007 has only one DTD-substrate, A101, which detects and/or transmits tone signal for individual calls.
TQ 5008 has two DTD-substrates, A101 and A102, which detect and/or transmit tone signals for individual calls, group calls and all calls.



FUNCTIONAL DIAGRAM TQ5007/8

D403.066

TQ-LOADING

All connections on the TQ take place through connector J101 which is connected to P801 on the Control Logic board CL 5001.
A system clock, output from the counter U814 on the CL board is fed to the circuit through pin 2 at the connector. The system clock is 223,72 KHz which is the microcomputer's clock frequency divided by 16.
To set up a tone, the DTD is loaded with 15 bits serially clocked in by a data clock.
The first 5 bits determine the circuit Q-value (see programming manual, add. 32H in the personality prom.)
The last 10 bits program the tone frequency either to be received or to be transmitted by the TQ unit (see programming manual add. 08-13H)
These bits and the data clock are sent to the TQ unit from the microcomputer on CL 5001 via pin 1 and 5/6 on connector J101 (via pin 5 to be loaded on DTD chip A101, via pin 6 to be loaded on DTD chip A102).

TONERECEPTION

As soon as the radio is turned on, the system clock starts the TQ unit and the Control Logic board CL 5001 loads the 15 bits corresponding to the first tone synchronuously with the data clock in A101. When a tone call is received, the first tone of the sequence enters pin 9 at connector J101.
The sinusoidal signal passes through a 2 pole active low-pass filter built around the operational amplifier U101a. The signal is then amplified by a factor 10 in the ampliflier U101b and finally limited by the comparator (Schmitt-trigger) U101c.
The obtained square-waved signal is sent to the detect input (7) of the DTD, A101 (and A102 if TQ5008).
The DTD, which is to be considered as a programmable digital filter, compares the signal with the programmed tone cloked in by the data clock. The detect output of A101 (or A102 if group/all call) goes HIGH if the entered signal is accepted. To ensure a reliable detect aknowledge, the detected output is processed by the integrator U101d or U103. The delayed output of U101d is connected to pin 11, the delayed output of U103 (in connection with A102 in TQ5008) is connected to pin 12 on J101.
Both detect outputs are active LOW.
Note: The data clock inputs must be LOW in receiver mode, otherwise the detect outputs are inhibited.

TONE TRANSMISSION

When the tone key is depressed, pin 7 on connector J101 goes LOW and enables U102 which is an hex non-inverting tri-state buffer. The 15 programming bits are loaded into the DTD chips synchronuously with the data clock. The DTD chip generates two square wave signals at the outputs 13 and 15. These two different signals are loaded into U102 and summed, but differently weighted by the resistors R12 and R13. This output signal is then filtered and deemphasized to become a sinusoidal signal which is sent via pin 10 at connector J101 to the microphone amplifier on the RF-board.

TECHNICAL SPECIFICATIONS

Voltage supply
5.0 V

Current consumption
TQ 5007: 25 mA ±5 mA
TQ 5008: 50 mA ±5 mA

Temperature range (ambient)
-30°C to +60°C

Weight
60 g.

Dimensions
150 x 40 x 10 mm

TONE TRANSMITTER

Output impedance
typical 25 Kohm

Signal output voltage
min. 250 mV e.m.f., 1060 Hz
typical 280 mV

Frequency response
De-emphasized, Fc= 500 Hz
Tolerance:
± 1 dB

Distorsion
< 5 %

Frequency error
< 0,01 %

TONE RECEIVER

Input impedance
> 30 kohm

Input response
Low-pass, Fc= 3100 Hz

Activating level
300 mV ±6 dB

Distorsion
The tone receiver will accept tones with up to 20% distortion.

Selectivity
With Q-value= 32, TQ 5007/8 is not sensitive to adjacent tones or other tones of the same standard series.

Reaction time
20 ms < r < 45 ms

Signal to noise conditions
Tone receiver accepts a noise level:
SINAD= 5 dB.

PS5001
POWER SUPPLY UNIT

General

The PS5001 is a mains operated power supply for the Stornophone 5000 radiotelephone when used as base station. The unit consists of a mains transformer, a rectifier, a smothing filter, a switching regulator, and an output filter. The unit will supply 13.6 Volt stabilized DC when connected to a 220V/240V AC outlet.
A LED (light emitting diode) on the front panel is lit when the unit is on.

Circuit Description

Power Transformer

The power transformer is wound on a toroide core and has two windings, a 220/240Volt primary and a 24 Volt secondary. A 4 Amp slow blow fuse in series with the secondary winding protects those parts of the circuitry which are not protected by the electronic current limiter in the switching regulator.

Switching Regulator

The switching circuit is built as a normal switching mode regulator with constant switching frequency, approximately 32KHz, and variable duty cycle. The actual switching function is performed by the transistor configuration Q2, Q3, Q4 and the fly-back diode D4, which clamps the input of L-C filter L2-C8 to ground potential in that portion of the cycle where the switching transistors are off and D4 is forced to conduct by the energy from the collapsing field of L2.

The output voltage across C8 is sensed by IC1a and compared to the reference voltage across D2-D3. The resulting signal is amplified by IC1b which is driving Q2 and in turn Q3 and Q4.

Output current limiting is achieved by monitoring the voltage drop across R17 and feed this voltage to IC1d. The IC1d output is 'OR-ed' with the voltage control signal at the IC1a output and therefore overrides the control voltage when the output current goes excessively high.

The two filters, C2-L1-C3, and C8-L3-C9, are ripple-transient filters on the input and output and their function is to ensure that the inherent switching noise does not exceed acceptable limits on the input and output terminals, and the cables as well.

Technical Specifications

Mains Voltage
220/240V AC + 10/-15%; 50-60Hz

Power Consumption
Approx. 6mA; 0 Amp load
Approx. 450mA; 6 Amp load

Output Voltage
13,6V DC ± 1,0V

Output Current
Maximum 6 Ampere (short circuit protected)

Output Voltage Ripple
Less than 100mV pp (peak to peak)

Switching Frequency
approx. 32KHz

Temperature Range
-10°C to +50°C

Duty Cycle
as specified for CQM5000

INSTALLATION

STORNOPHONE 5000

GENERAL

Proper installation of the Stornophone 5000 radiotelephone is most important as its performance can be seriously impaired if the installation work is done without due care. The instructions should be read carefully and followed by the person installing the equipment. As precise instructions for all types and models of vehicles are impossible to give, and customer requirements may differ, all instructions, illustrations and examples in this chapter must be adapted to the actual installation.

UNPACKING

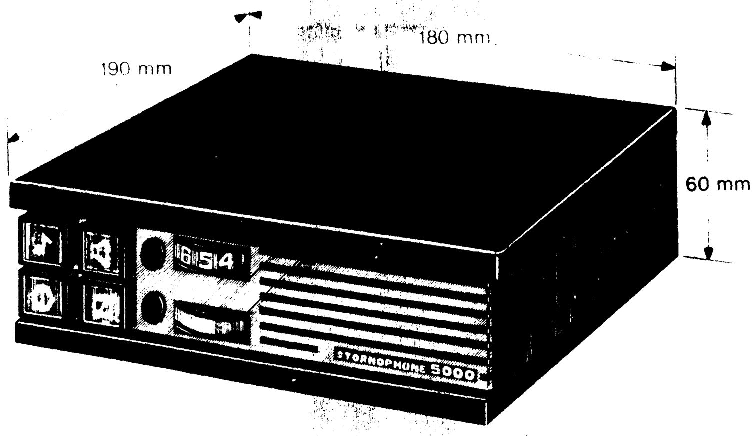
Each shipment should be checked against the packing list or invoice when arriving, and Storno must be notified immediately of any damage or shortage.

MOBILE INSTALLATION

Before the installation commences the cable run should be desided. The following hints should be noted:

- the cables shall be as short as possible.
- the cables shall be kept away from moving parts as handbrake, shock absorbers etc.
- the cables shall not run near the engine, exhaust manifold, pipes, and other hot items.
- the cables should, whenever possible, be run in parallel with existing cables and through the same holes in the chassis and car body. Suitable grommets must always be used if special holes are drilled in the metal work.
- the cables shall not be run externally underneath vehicles and cable clamps shall be used whereever the cable is likely to sag.
- to ensure that cables are not strained sharp bends should be avoided.
- the fuse in the battery cable should be placed as close to the battery as possible.

Volume: 2.0 litre
Weight: 1,8 kg



POSITIONING

When selecting a position in the vehicle to install the transmitter/receiver unit several important points should be noted:

- the unit must be allowed to dissipate heat
- the unit must be within convenient reach of the operator.
- the unit must not be liable to cause damage to the operator or passengers in case of an accident.

TEMPERATURE

The Stornophone 5000 circuitry is designed to operate over a wide range of temperature and the case is designed to provide maximum heat dissipation without vents. The ambient temperature during operation should normally not exceed -30°C to +60°C. In cases of operation in hot climates adequate ventilation must be provided.
The equipment can be stored at higher or lower temperatures without damage.
Sufficient space must be left to enable a service engineer to remove the equipment and the cables shall be left free for the unit to be removed from its cradle.

INSTALLATION MATERIAL

Mobile operation of the Stornophone 5000 requires the following accessories:

MK5001	Installation kit containing: 8-position connector housing with crimp terminals 2-position connector housing with crimp terminals UHF antenna connector Power Supply cable Fuse holder 2 fuses, 8 A Cable eyes
MN5001	Cradle for the transmitter/receiver unit consisting of two parts locked together by a screw.
or	
MN704a	Cradle for direct attachment to the vehicle.

Both cradles allow the radio to be fixed in 36 different angles and positions.

MC704	Microphone for fixed mounting. A bracket with rubber shock mounts are included.
MC5001	Fist microphone with PTT button and hook.
HS5001	Retainer for MC5001
Antenna	Various types are available, refer to Storno Antenna Sales Programme.

Mobile antennas are normally supplied with adequate lengths of coaxial cable.

OPTIONS

HS5002	Retainer for MC5001 with switches.
SU701	Keying switch, long lever
SU702	Keying switch, short lever
LS701	External loudspeaker
CC5001	Cable with fuse for installations using the ignition switch for turning the radio on and off.
PS702	Voltage regulator for 24 V DC installations (busses, vessels, heavy trucks, etc.).

Assemble and install the equipment as outlined on the installation diagram, refer to D402.612.

PLACING THE ANTENNA

The antenna should be placed as high and as much in the clear as possible in order to ensure the best matching and radiation pattern. On a vehicle, the roof must be considered the best place for the antenna. If the roof is non-metalic, a sheet of aluminium foil, at least 1 square metre in size, shall be glued to the roof below the antenna provided that the vehicle fittings make it possible. On passenger cars, the boot cover is an alternative place for the antenna although this will impair its efficiency and introduce an unfavourable directivity. Hence the latter solution should be chosen only if these factors are of secondary importance, i.e. where maximum operating range is not a significant requirement.

All Storno standard antennas can be installed from the outside without need for drilling through the upholstery, if any.

Antennas supplied by Storno have an installation instruction packed with each unit.

The coxial antenna cable, after having been routed to the radio unit, should be cut to length and fitted with the antenna connector, type PL259. The connector is a crimp-on type and hence soldering is not necessary.

If the antenna whip length must be cut to match the operating frequency, the transmitter frequency is the determinant. Refer to enclosed instructions
For multichannel operation the mean frequency is calculated.

FIXED INSTALLATIONS

Fixed operation (base station) of the Stornophone 5000 requires the following accessories:

MK5001	Refer to mobile installation for specification of contents.
MN703	Desk Stand
PS703	220 V AC Power Supply unit 10 W
PS5001	220 V AC Power Supply unit 25 W
MC703a	Desk microphone with PTT button
Antenna	Various types are available, refer to Storno Antenna Sales Programme. Storno can also supply masts, towers, and special installation material on request.

The equipment should be assembled and installed as outlined on the installation diagram, refer to D402.644.

FUNCTIONAL TEST

When the Stornophone 5000 radiotelephone has been properly installed the following points should be checked:

- that the multiway connector is strapped according to the instructions and inserted in its socket.
- that the battery cable is connected.
- that the battery polarity is correct.
- that the fuses are inserted in their holders and are of correct value.
- that the antenna and the antenna connector are properly connected.
- that the channel selector, if any, is set to the operating channel.

TEST CALLS

Turn the radiotelephone on and perform test calls with the associated base(mobile) station to ascertain that transmission quality is good and that reception is good.
In systems with selective calling the loudspeaker on/off button must be pressed to check if the channel is free before transmitting commences. When the channel is clear, the tone signal is transmitted, whereupon the base (mobile) station should reply, reporting the strength and quality of the signal. The station is then requested to call, and the loudspeaker on/off button is pressed to turn the loudspeaker off. On reception of the call from the base station (mobile) the loudspeaker will be switch on and subsequent messages are transmitted without use of the selective calling.

MODULATION SENSITIVITY ADJUSTMENT

The microphone amplifier gain is adjusted by means of a potentiometer so that the speach level is set for correct modulation of the transmitter. This is best achieved by using the operator's voice.
The potentiometer must not be set so that the ambient background noise is able to modulate the transmitter. If the speech/ noise level is too low, then the microphone must be brought closer to the operator. Fist microphone MC5001 need not be adjusted.
Too high sensitivity will cause the message to be broken up and if it is too low, the message will be clear but weak. The optimum adjustment is found when loud shouting into the microphone just causes the message to break up.

NOISE SUPPRESSION

Noise interference in mobile radio communication equipment can either be caused by the vehicle's or vessel's own noise sources or caused by other sources such as other vehicles, electrical generators, electrical wires, X-ray apparatus, etc.

The external noise cannot be avoided, but care has been taken in the design of STORNO radiotelephones to reduce the effect as much as possible. Such noisy periods can be an annoyance, but will normally be of short duration if the vehicle is on the move.

The electrical noise generated by the vehicle's or vessel's own electrical system can often be suppressed sufficiently by simple means.

It should be noted that as long as the radiotelephone is being operated close to the base station the noise will normally not be noticed. The noise will only be heard in the loudspeaker, when the equipment moves away from the base station, where the received signal is somewhat weaker.

Complete noise suppression of an electrical system can be very difficult in certain cases, but normally it is possible to achieve satisfactory results if the simple advice given below is followed.

Moreover, recommendations about noise-suppression published by manufacturers of electrical automobile accessories and noise suppression components (such as Bosch, Lucas, etc.) should be studied.

IGNITION NOISE

The most common noise source is the ignition system of an engine, and this noise is characterized by a regular ticking sound, which is syncronized with the motor revolutions. In case the vehicle is not sufficiently noise suppressed from the factory it is necessary to insert suppression resistors in series with each spark plug or replace the spark plugs with types having builtin resistors. If suppression resistors are used wirewound resis-

tors (5 Kohm) are recommended as these resistors suppress the noise better than the carbon types (10-15 Kohm).
Suppressor resistors in the spark plug leads must be placed as close as possible to the spark plugs and the spark gap should be increased. Consult the car instruction manual for the exact width.

Further noise suppression may be obtained by inserting a suppressor resistor in the cable between the ignition coil and the distributor as close to the latter as possible. The best solution is to replace the distributor rotor with a special rotor having a builtin resistor.

Screening of noisy components is expensive, but may be necessary in certain cases. Metal components, or metal coated components, such as distributor lids are used to incapsulate the noise source.

If the steps mentioned do not result in a satisfactory noise suppression, a 0,1 uF coaxial capacitor must be mounted between the primary of the ignition coil and chassis. The capacitor should be fitted near the coil with the chassis wire as short as possible.

Finally, it should be born in mind that dirty or pitted distributor contacts may cause noise similar to ignition noise.

DYNAMO NOISE

The dynamo noise is characterized by a whine, where the frequency and pitch is syncronized with the motor revolutions.
Normally this noise is due to arching between dirty or worn brushes and the commutator. Cleaning, or possibly, replacement of the carbon brushes will normally remove the noise.

In some cases it may be necessary to insert a noise filter in the dynamo circuit. A noise suppressor capacitor may be inserted in the lead from the ignition coil (connection to ignition switch) and in the battery lead from the dynamo terminal. Do not remove more insulating material than absolutely necessary in order to minimize the risk of shorting the circuit.

OTHER NOISE SOURCES

Noise from the voltage regulator can be identified by a rasping noise in the loudspeaker. This noise can normally be removed by mounting a coaxial capacitor in the dynamo lead, as close to the regulator housing as possible.

The other end of the capacitor should be connected to chassis.

All electrical instruments and motors may introduce noise into the radiotelephone. The windscreen wiper motor can for example be suppressed by a conventional noise suppressor capacitor.

The different noise sources can easily be detected by switching on and off the suspected noise sources one by one. Other noise sources are the electric clock, the petrol gauge, the oil lamp, etc., and in all cases the noise can be sufficiently suppressed by correct use of capacitors.

The ventilator fan belt may be the cause of static noise. The cure is to replace the belt with one containing a graphite compound.

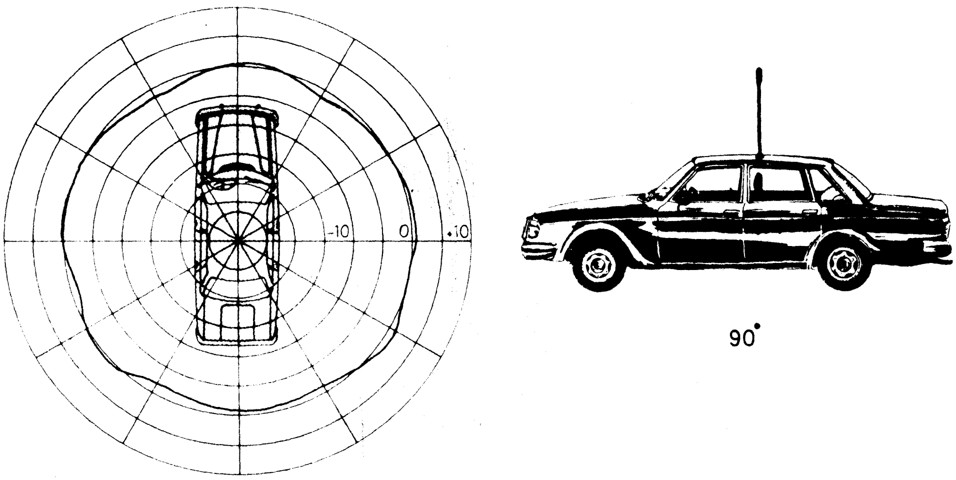
Tyre statics can sometimes produce interference and in such cases improvement may be obtained by mounting special shorting springs on each wheel.

Static noise may also be due to a nonmetalic suspension of the engine. Metal braids mounted between the engine and the chassis, or the firewall, will remove the noise. Corroded joints of existing braids may also cause static noise.

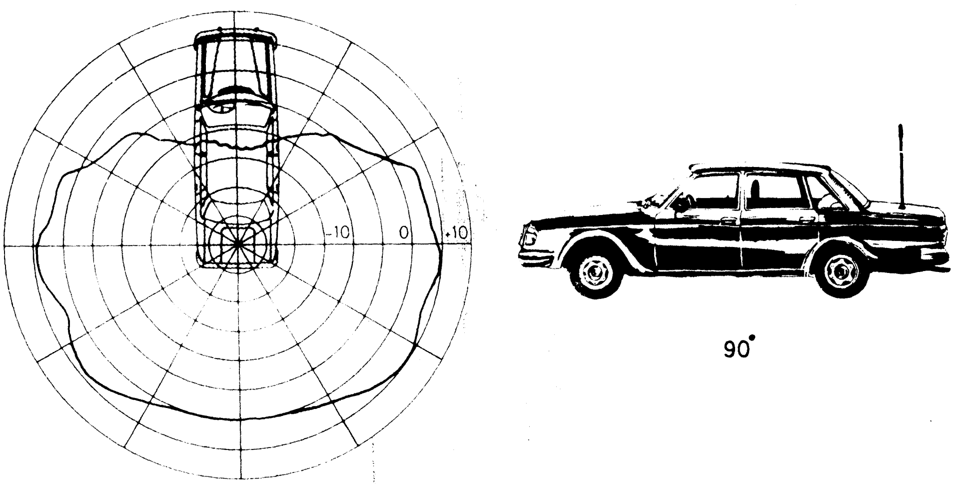
If the antenna is mounted on the boot cover, or near the edge of the roof, the radiation pattern will change considerably. Fig. 7, Fig. 8, and Fig. 9 show the attenuation for different mountings, related to a λ/2 dipole. Reduction in coverage occurs as a result, but it is possible to compensate for higher losses by using 5/8 λ antennas which have approx. 2 dB gain. Especially in the case of boot cover mounting, antennas with gain should be used if the operating range is a significant requirement.

ATTENUATION RELATED TO λ/2 DIPOLE (0 dB)

160 MHz



160 MHz



160 MHz

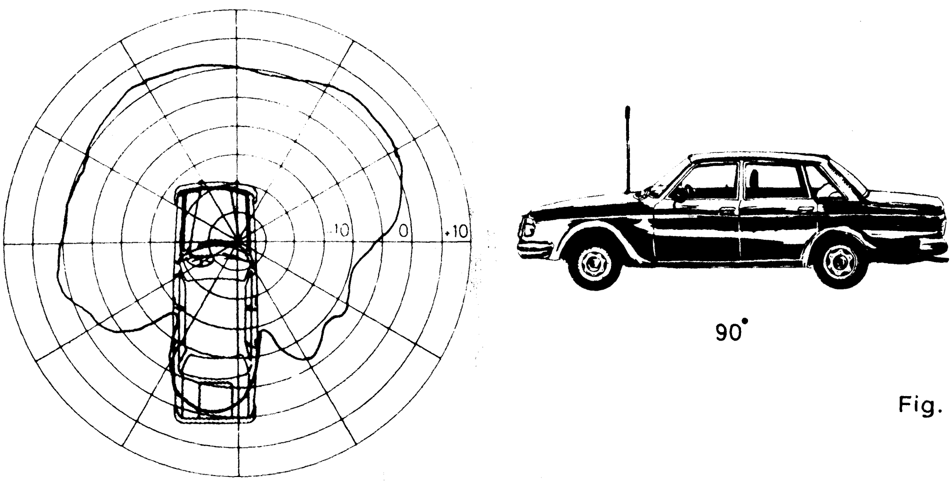


Fig. 7

ATTENUATION RELATED TO λ/2 DIPOLE (0 dB)

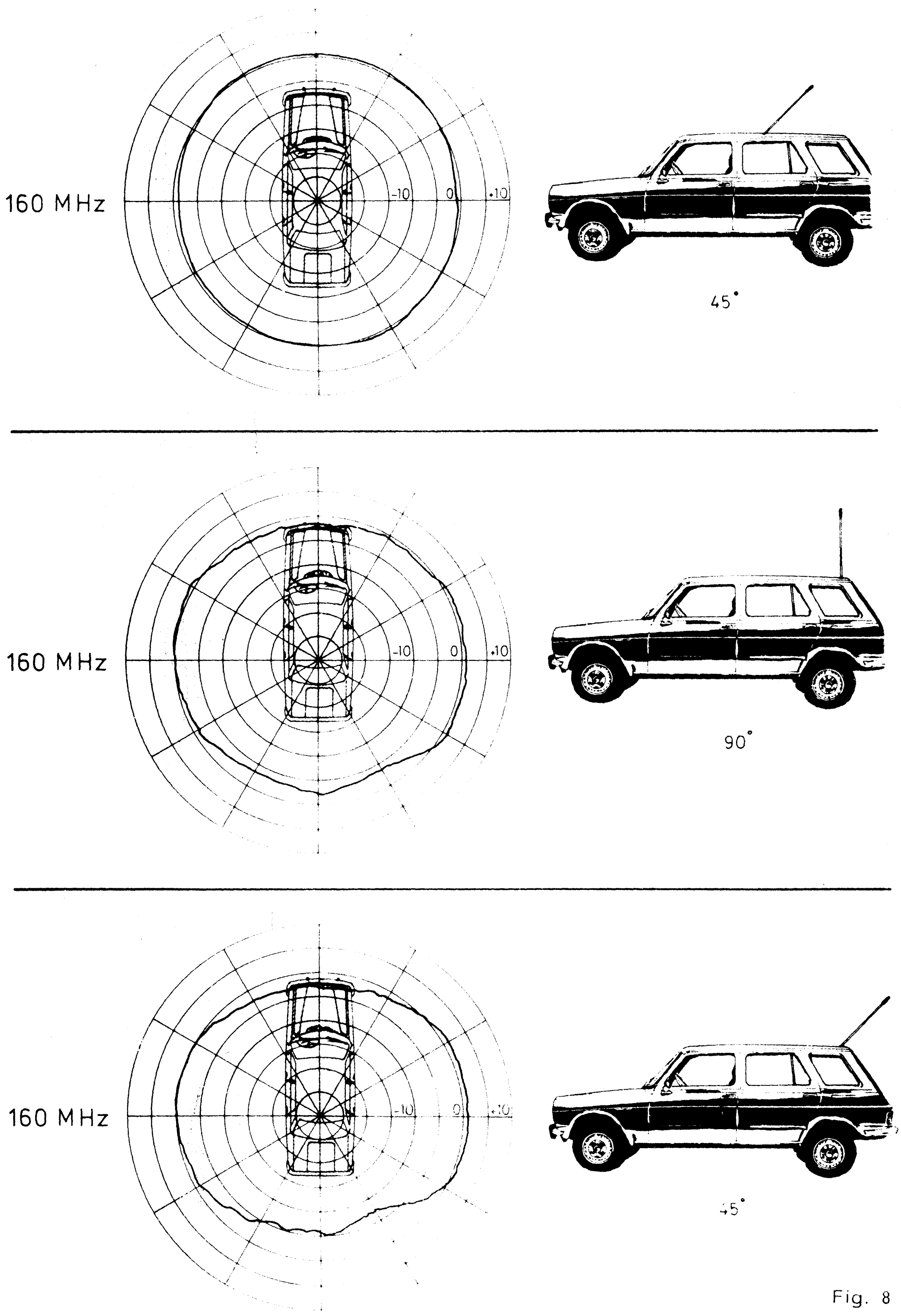
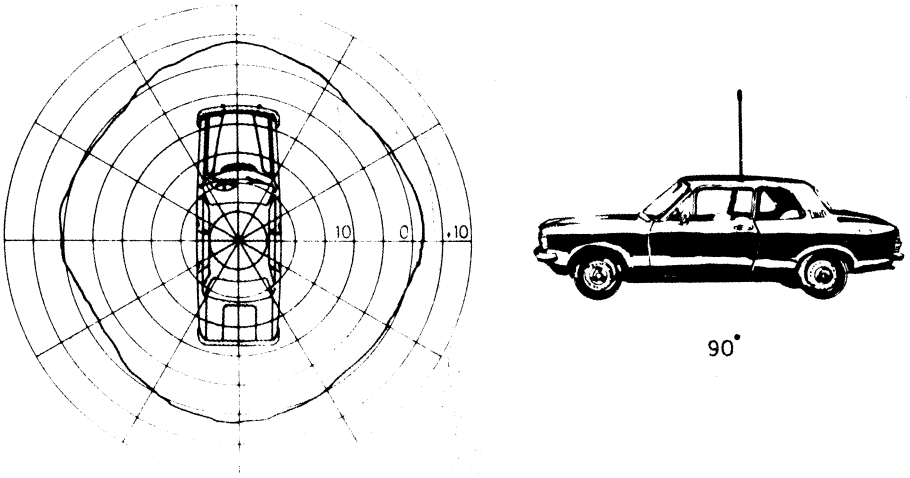


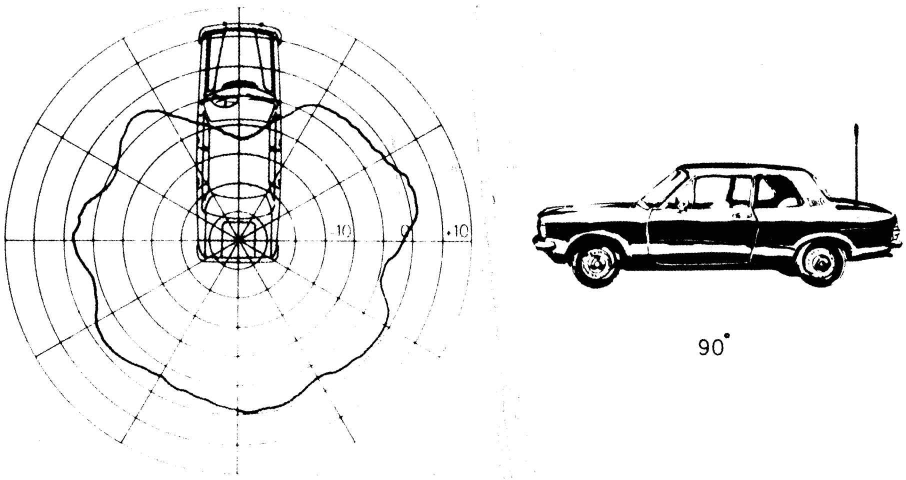
Fig. 8

ATTENUATION RELATED TO λ/2 DIPOLE (0 dB)

160 MHz



160 MHz



160 MHz

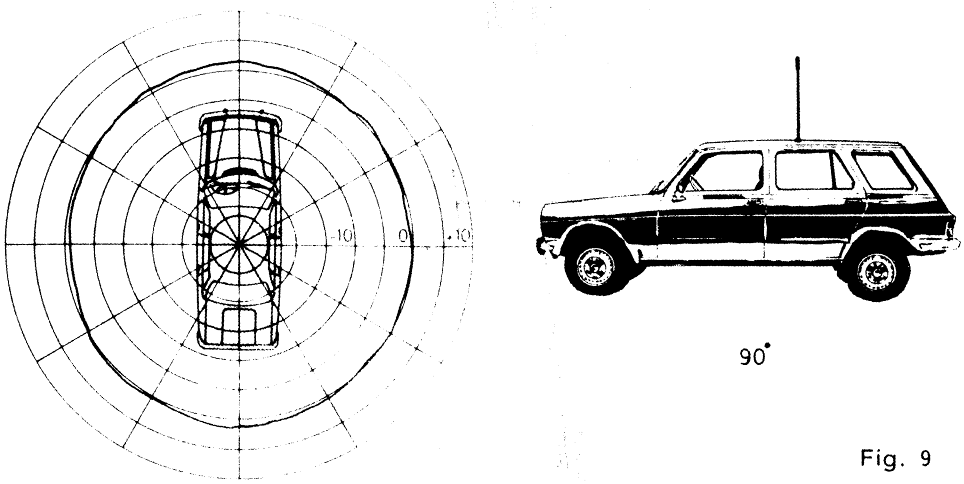


Fig. 9

ADJUSTMENT PROCEDURE

CQM5660 S12

This adjustment procedure applies to the following radiotelephone types:

CQM5662 S12 30/25 kHz Channel spacing
CQM5663 S12 20 kHz Channel spacing

Before making adjustments to the radiotelephone transmitter/receiver, read the type label and note the channel frequencies. Check all straps according to the notes on the diagrams. Also check the selective calling tone equipment, if any, against the coding instructions; refer to description of tone equipment.
All screens must be in place and properly secured during the adjustments.

MEASURING INSTRUMENTS

The following list contains instruments necessary for adjusting the radiotelephone and checking its performance characteristics.

DC Voltmeter	$R_{in} \geq 1$ Mohm
AC Voltmeter	$Z_{in} > 1$ Mohm//50 pF
Multimeter	$R_i \geq 20$ Kohm/Volt
Distortion meter	e.g. Storno E11c
RF Watt meter	25 W/50 ohm/420-470 MHz
Deviation meter	420-470 MHz
RF generator	$Z_{out} = 50$ ohm, 420-470 MHz
21.4 MHz signal generator	e.g. Storno TS G21B
Frequency counter with attenuator	$Z_{in} = 50$ ohm; sensitivity 100 mV at 470 MHz
RF diode probe	Storno 95.0089-00
RF coaxial probe	Storno 95.0179-00
DC power supply	10.8 V - 16.6 V; 6A
Oscilloscope	0 - 5 MHz min.

MISCELLANEOUS

4 ohm/3 W resistor	3 x Storno code 82.5026-00
22 uF/40 V electrolytic capacitor	Storno code 73.5107-00
Connector, 11-pin house	Storno code 41.5543-00
Connector, 8-pin house	Storno code 41.5542-00
Pins for connectors	Storno code 41.5551-00
Trimming tools	

The following tables show the frequency ranges of the CQM5660 S12 radiotelephone signals:

SIGNAL	FREQUENCY MHz
TX VCO	140 - 156
TX crystal	45 - 50
TX crystal multiplication	x3
RX VCO	139 - 157
RX crystal	47 - 50 (420 - 450) 45 - 48 (440 - 470)
RX crystal multiplication	x3

Table 1

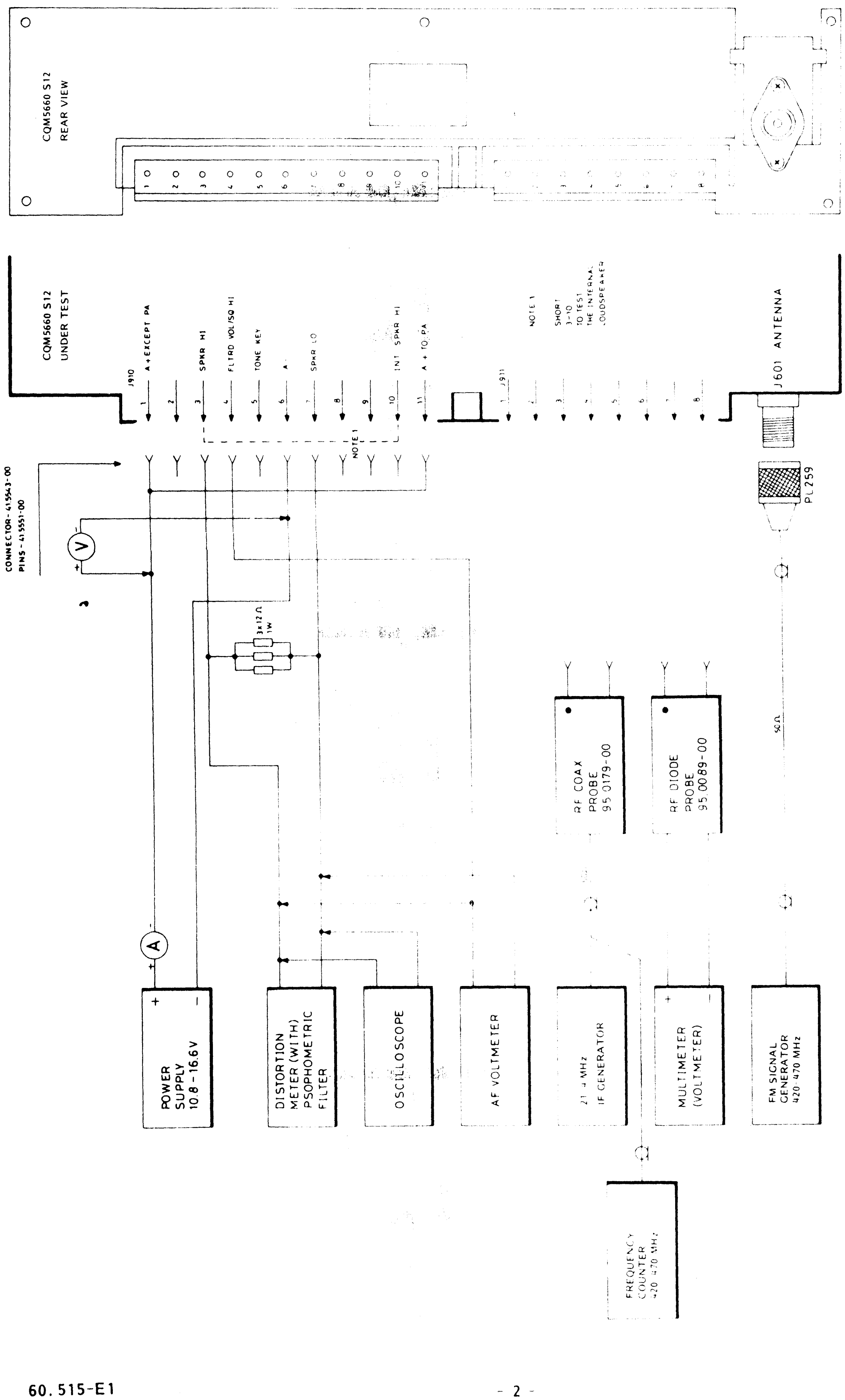
Channel spacing kHz	Reference Crystal MHz	Min. Divider input frequency MHz	Max. Divider input frequency MHz	Reference frequency kHz
20	6.8266	1.7066	3.4066	6.666
30 or 25[1]	5.8533	2.1333	4.2583	8.333

Table 2

[1] Two steps per channel

RECEIVER TEST SET-UP
CQM5660 S12

D402.935



RECEIVER ADJUSTMENT

CHECKING 8.5 V REGULATED SUPPLY

Turn the power supply ON and set the voltage to 13.2 V. Set the power supply current limiter to 1 A.
Turn the radiotelephone ON by depressing the ON/OFF button. Note the light in the Channel selector, if any, is on.
Depress the Squelch button.
Set the volume control to minimum.
Connect the DC voltmeter to J901 pin 3 and read the Voltage.
Requirement: 8.5 V ±0.15 V
If the requirement is not fulfilled check resistor R636 against the colour code of U602.

U602 colour code	R636 Value
Brown	omit
Red	270
Orange	100
Yellow	47
Green	22
Blue	6.8

Adjust the power supply voltage to 16.6 V and read the 8.5 V regulated. Compare the change in the 8.5 Volt regulated to the value obtained at 13.2 V.

Requirement: $\leq$50 mV

Repeat the procedure with the power supply adjusted for 10.8 V

FREQUENCY SYNTHESIZER ALIGNMENT

Check the PROM U801, the TX mixer crystal, the RX mixer crystal, and the reference crystal and verify the frequencies and PROM codes.

Mixer crystal output
Connect RF diode probe 95.0089-00 with multimeter to test point TP701. (1 V range).

Adjust L711 for maximum deflection on the multimeter.
Adjust L707 for maximum deflection on the multimeter.
Requirement: 45 mV ±15 mV (corresponding to -10 dBm to -4 dBm).

Note: Be careful not to resonate L707 to the false harmonics. If in doubt consult table 1 or check the crystal oscillator output with a spectrum analyzer.

Receiver VCO
Connect the multimeter, 10 V range, to test point TP706. The synthesizer's lock signal is accessible at TP706. +8 V DC with very narrow pulses (0.1 u sec) indicates normal locked condition. Unlocked condition is indicated by a variable duty signal or logic "Low".
Select the channel whose frequency is closest to the center frequency.
Await locked condition, constant voltage.
Adjust C745 for 8 Volts on the multimeter.
Connect the multimeter to test point TP703.
Adjust C745 for a voltage corresponding to the variable divider ratio (V) as indicated by the graph fig. 3.

Requirement: The voltage shall be in the range 1.5 V to 6.5 V and not deviate from the graph by more than 20%.

Mixer Crystal Frequency
Connect coax probe 95.0179-00 to test point TP701.
Connect the frequency counter to the probe and read the frequency.

$f = f_x \times 3$ (f_x = crystal frequency)
Adjust L711 to the calculated frequency.

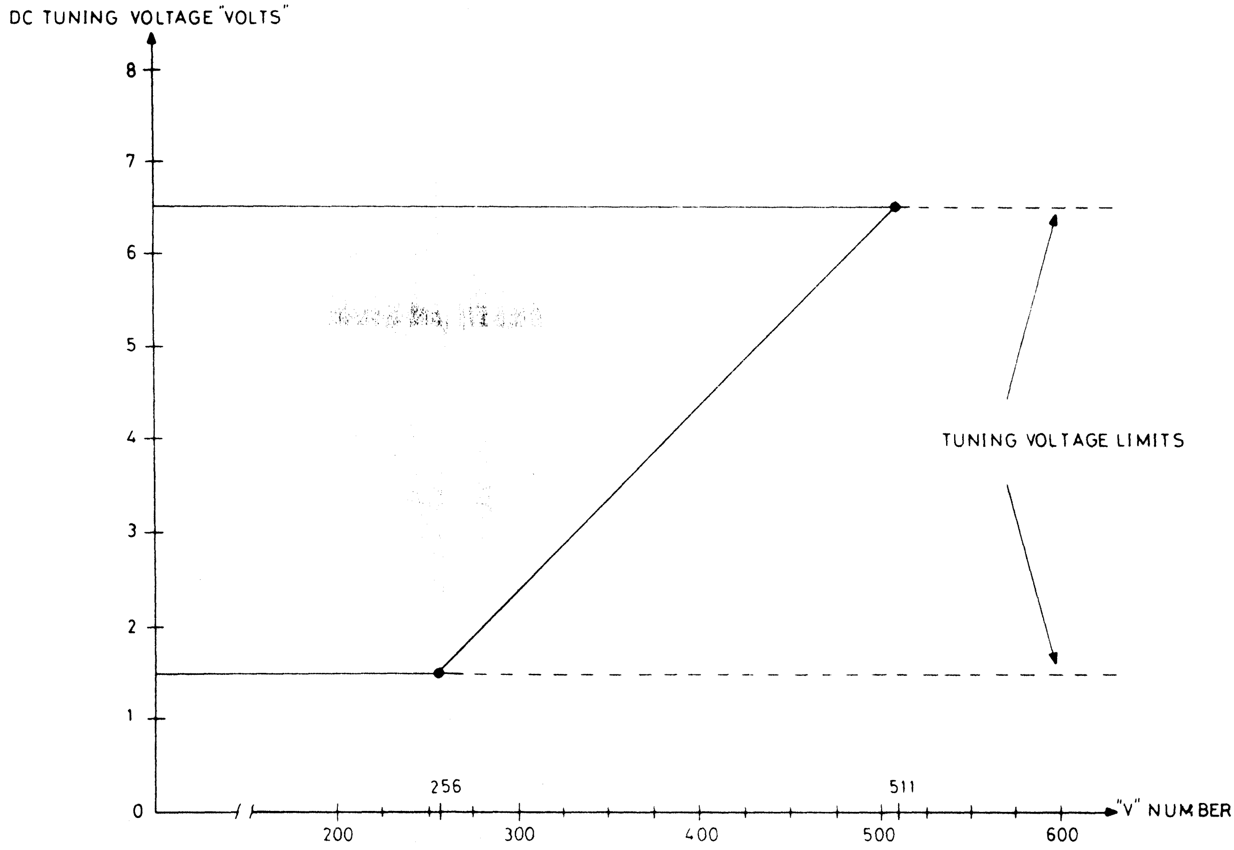


Fig. 1. Tuning voltage vs. V. number.

Requirement: f ±0.3 ppm at 25°C.
ppm= parts per million= 10^{-6}

Injection Frequency

Connect coax probe 95.0179-00 to test point TP401.
Connect the frequency counter to the probe.
Calculate the injection frequency for all channels.
$f_{inj} = f_{ant} - 21.4$ (MHz)
Select, one by one, the channels and read the injection frequency.
Requirement: F_{inj} ±0.2 ppm

IF AMPLIFIERS

Connect a 21.4 MHz signal generator to TP401 via coax probe 95.0179-00.
Connect RF diode probe 95.0089-00 with multimeter to test point TP501. (50 uA range).
During adjustment the RF generator output must be kept low enough to prevent limiting in the IF stages, i.e. a maximum reading of 50 uA on the multimeter.
Adjust coils L503, L502, L501, and L406, in that order, for maximum deflection on the multimeter.

FRONT-END

Connect the RF probe 95.0089-00 and the multimeter to test point TP501. (50 uA range).
Connect an unmodulated RF generator to the antenna connector, J601.
Set the generator frequency to the receiver frequency.
Adjust the generator output to produce a deflection on the multimeter, i.e. a maximum reading of 50 uA on the multimeter.
Adjust L401 and L402 for maximum deflection.
Detune L406: Adjust L405 and L407 for maximum deflection on the multimeter.
Adjust L406 for maximum deflection.

Readjust L401 and L402 for maximum deflection.
Remove the RF diode probe.

> Standard Test condition:
>
> Connect the RF generator to antenna connector and adjust the output to 1 mV e.m.f.
> Modulate the RF generator with 1000 Hz to 60% of Δf max.
>
> CQM5662 S12 ±3 kHz
> CQM5663 S12 ±2.4 kHz
>
> Connect a 4 ohm/3 W resistor load to connector J910/3-7 (SPKR HI-SPKR LO).
> Connect an AF voltmeter to J910/4-7 (FLTD VOL SPKR LO).

IF DEMODULATOR

Turn R521 halfway up.
Adjust L504 for maximum reading on the AF voltmeter.

Connect a distortion meter and AF voltmeter across the 4 ohm resistor. (if Storno E11c distortion meter is used switch the function to AF voltmeter).
Adjust the volume control for approx. 2 V across the load.

Adjust L501 and L406 for minimum distortion.
The demodulated signal may be monitored on an oscilloscope connected in parallel with the distortion meter.
Connect the AF voltmeter and distortion meter to J910/4-7 (FLTD VOL SPKR LO).
Adjust R521 for a reading of 275 mV on the AF voltmeter.
Requirement: 275 mV ± 5 mV.
Read the distortion.
Typical Total Harmonic Distortion (THD) will be less than 5%.

RECEIVER SENSITIVITY

EIA or CEPT method may be used.

Method of measurement CEPT
The purpose of the measurement is to define the ratio of one condition to another.
The first condition is the one where a modulated RF signal drives the receiver into full limiting. The audio output is measured with the distortion meter (in the CAL position) and, disregarding the amplitude of the audio, this is adjusted to read 100% on the meter scale; this is our reference condition consisting of signal +noise +distortion, where 'signal' is the modulation of the RF, 'noise' is the lowest possible amount achieved from that particular receiver, when receiving a strong carrier, and 'distortion' is the modulation being slightly distorted in passing through the receiver.
The second condition is the one where the signal (modulation) is removed with a notch filter and the RF-signal is lowered in amplitude until the remaining noise and distortion increases to 20 dB below the first condition, as read on the distortion meter scale. This corresponds to a reading of 10%, 10 being 20 dB below 100, which was our reference condition.

In practice our first condition is achieved by feeding a minimum of 1000 uV of RF-signal modulated with 1000 Hz at 60% Δf max. to the receiver.
The audio output (which must be at least 100% of the receiver's audio rating) is measured through the psophometric filter, with the distortion meter in position CAL and adjusted with potentiometer ADJ. FSD. to a reading of 100.

The notch filter is then inserted in series with the audio by pressing one of the buttons marked in %. The meter needle immediately drops to indicate a low value, this being the receiver's inherent audio distortion.

By backing off the attenuator of the RF generator, thereby lowering the RF input to the receiver, the noise will eventually increase; the attenuator is now adjusted for a 10% reading on the distortion meter scale.
At this stage it must be ensured that the increased noise and the signal (with the notch filter switched out while checking) still equals 100 on the meter scale.
The RF-generator's calibrated attenuator now shows the value of RF-signal required to achieve a 20 dB ratio between signal + noise + distortion and noise + distortion, i.e. 20 dB SINAD sensitivity.

EIA Method
EIA (Electronic Industries Association) Standard, definition:
The SINAD sensitivity of a receiver is the minimum input signal that will provide at least 50% of the receivers's rated audio power with 12 dB signal + noise + distortion to noise + distortion.
The EIA method differs from CEPT by omitting the psophometric filter, adjusting the RF generator for 2/3 x Δfmax., and measure the distortion at 50% of the receiver's rated AF power. The SINAD sensitivity is measured as a 12 dB ratio between signal + noise + distortion and noise + distortion, which corresponds to a reading of 25% noise + distortion.

ADJUSTING THE SENSITIVITY

Lower the RF generator output to obtain 20 dB SINAD (10% THD as measured with the distortion meter). Readjust L402 for the bes SINAD value, e.i. lowest generator output for 10% THD.

MEASURING 20 dB SINAD (CEPT)

Adjust the volume control for 2.45 V (1.5 W 4 ohm) as measured with an AF voltmeter across the load.
Adjust the RF generator output to obtain 20 dB SINAD condition.
Read the 20 dB SINAD sensitivity (e.m.f.)
Requirement: ≤1.0 uV.
The sensitivity should be measured on all channels, if more than one.

MEASURING 12 dB SINAD (EIA)

Adjust the volume control for 2.45 V as measured with an AF voltmeter across the load.
Adjust the RF generator to obtain 12 dB SINAD condition.
Read the 12 dB SINAD sensitivity.
Requirement: ≤0.4 uV (½ e.m.f.)
The sensitivity should be measured on all channels, if more than one.

AUDIO FREQUENCY RESPONSE

Set the signal generator to Standard Test Condition.
Adjust the volume control for 0.82 V across the load. (4 ohm across (SPKR HI - LO).
At 13.2 V supply, ΔF = 60% ΔF max and 1000 Hz measure the output voltage accordin(to the following table:

	Frequency	Level	Tol.
Type CQM5662 S12	300 Hz	+9 dB	+1 dB/-3 dB
	1000 Hz	0 dB	
	3000 Hz	-9.5 dB	+1 dB/-3 dB
Type CQM5663 S12	300 Hz	+10.5 dB	+1.5 dB/-3 dB
	400 Hz	+8 dB	+1.5 dB/-1.5 dB
	1000 Hz	0 dB	
	2700 Hz	-8.6 dB	+1.5 dB/-1.5 dB
	3000 Hz	-9.5 dB	+1.5 dB/-3 dB
	6000 Hz	≤-20 dB	

SELF QUIETING CHECK

Internal oscillators, dividers and the harmonic frequencies hereof, may cause self quieting of the receiver if a mixer product falls in the RF or IF pass band.

For proper operation of the squelch all channels must be checked for the self quieting phenomenon.

Connect the RF generator to the antenna connector. Reduce the RF output to 0.
t the frequency outside the 420 - 470 MHz band.
Alternatively, an attenuator (50 ohm) may be connected to the antenna connector.

Connect an AF voltmeter across the 4 ohm speaker load.

Adjust the volume control for 774 mV (0 dBm) as read on the AF voltmeter.

Select, in turn, all allocated channels.

The reading on the AF voltmeter shall not on any selected channel decline more than 6 dB.

quirement: Quieting $\leq$6 dB.

AF POWER OUTPUT

Adjust the RF signal generator to Standard Test Condition.

Set the supply voltage to 13.2 V.
Adjust the volume control for 3 W output (3.46 V across the 4 ohm load).
Measure the distortion (THD).
Requirement: THD $\leq$5%.

SQUELCH

Release the squelch cancel button.
Adjust potentiometer R607 squelch adj. to open the receiver for an RF input signal corresponding to 8-10 dB SINAD.

The final squelch adjustment must not be set on a channel that has shown a minor degree of selfquieting.

CURRENT CONSUMPTION

Measure the current consumption at 13.2 V.

Requirements

Condition	Current comsumption
Standby	$\leq$400 mA
Receive 2 W AF ~ 2.83 V r.m.s. across 4 ohm.	$\leq$750 mA

For sets with selective calling facilities add current consumption of the tone unit to the figures above.

TRANSMITTER ADJUSTMENT

Adjust the power supply voltage to 13.2 V and set current limiter as follows:

20 W transmitter:	6A
5 W transmitter:	4A

Refer to Receiver Alignment for measuring 8.5 V regulated supply.

Preset all transmitter tuning slugs, L151, L153, L201, L202, L204, and L205 to be flush with the coil form top.

Connect a multimeter (2.5 volt range) to test point TP201.
Turn the power control potentiometer, R221, to minimum, anticlockwise (CCW).

Connect a Wattmeter, (25 W) to the antenna connector, J601.

FREQUENCY SYNTHESIZER ALIGNMENT

Check the PROM U801, the TX mixer crystal, the RX mixer crystal, and the reference crystal and verify the frequencies and the prom codes.

Mixer crystal output

Connect RF probe 95.0089-00 with multimeter to test point TP701 (1 V range).

Key the transmitter.

Adjust L701 for maximum deflection on the multimeter.

Adjust L704 for maximum deflection on the multimeter.

Requirement:
40 mV ± 15 mV
(corresponding to -10 dBm to -4 dBm)

Note: Be careful not to resonate L704 to the false harmonics. If in doubt consult table 1 or check the crystal oscillator output with a spectrum analyzer.

Transmitter VCO

Connect the multimeter, 10 V range, to test point TP706.

The synthesizer's lock signal is accessible at TP706 and +8 V DC with very narrow pulses (0.1 u sec.) indicate normal locked condition. Unlocked condition is indicated by a variable duty signal or logic "LOW".

Select the channel whose frequency is closest to the center frequency. Key the transmitter. Await locked condition.

Adjust C737 for 8 Volts on the multimeter.
Connect the voltmeter to test point TP703.
Adjust C737 for a voltage corresponding to the variable divider ratio (V) as indicated by the graph fig. 1.

Requirement: The voltage shall be in the range 1.5 V to 6.5 V and not deviate from the graph by more than 20%.

Mixer Crystal Frequency

Connect coax probe 95.0179-00 to test point TP702.
Connect the frequency counter to the probe, key the transmitter and read the frequency.
$f = f_x \times 3$ (f_x = crystal frequency).
Adjust L701 to the calculated frequency.
Requirement: f ±0.3 ppm at 25°C.
ppm= parts per million= 10^{-6}.

Synthesizer Output Level

Connect a multimeter, 2.5 V range, to test point TP201. Key the transmitter.

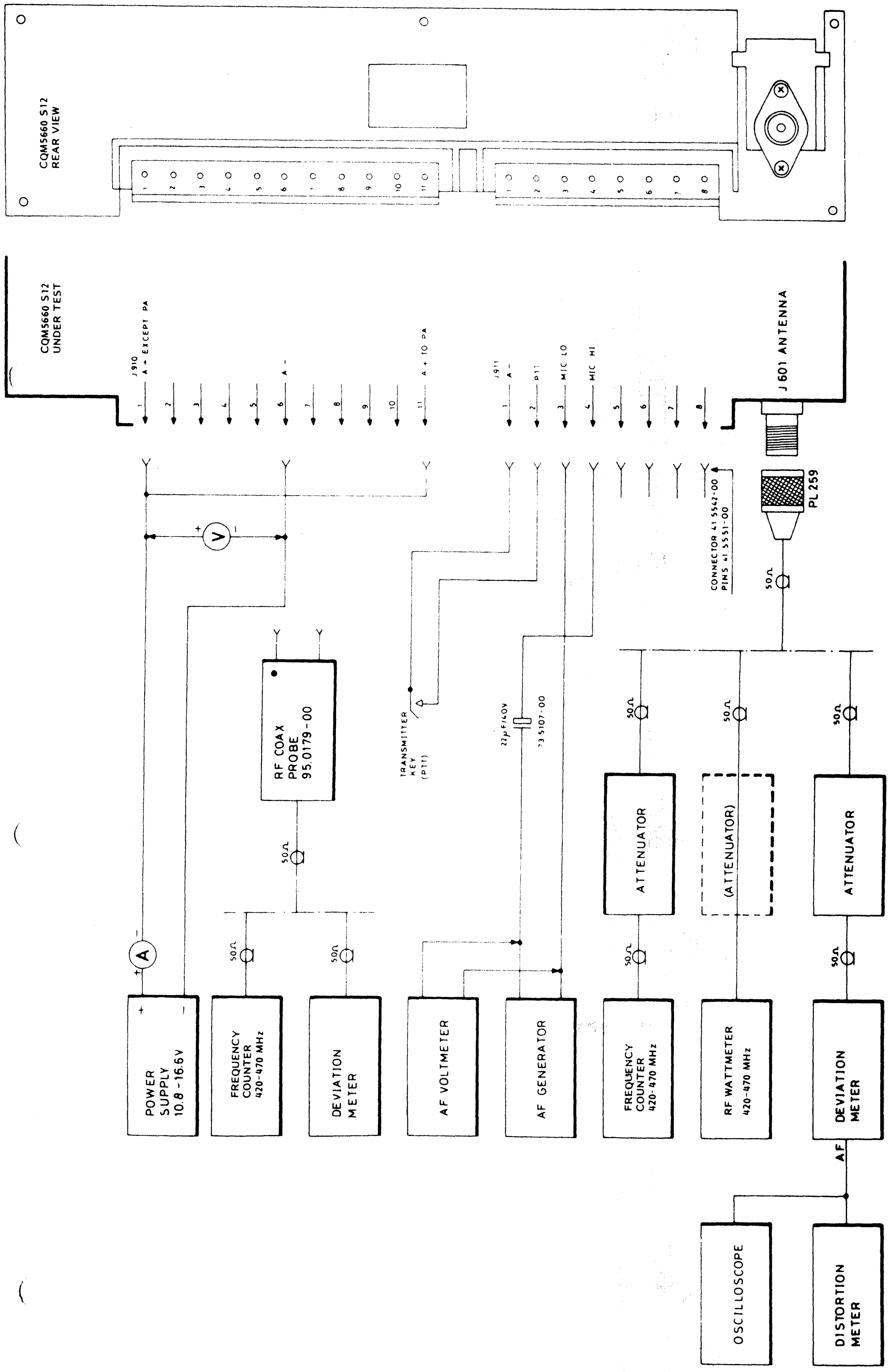
Adjust L153 for maximum deflection on the multimeter, typical more than 0.75 V.

EXCITER

Connect a multimeter (1.0 V range) to test point TP201.
Adjust L203 for minimum deflection. The dip is small.
Connect the multimeter, (1 V range) to test point TP202.
Adjust L204 for maximum deflection on the multimeter, typical 0.7 V.
Repeat the adjustments of L203, L153, and L151 (L921-L926) until no further improvements is obtainable.
Adjust C213 for minimum reading. The dip is small.
Connect the multimeter, 1 volt range, to test point TP203.
Adjust C215 for maximum reading on the multimeter, typical 0.5 V.

TRANSMITTER TEST SET-UP
CQM5660 S12

D402.937



Repeat the adjustment of C213 and L204 until no further improvement is obtainable.
Adjust C221 munimum deflection. The dip is small and careful tuning is required.
Connect the multimeter, 10 volt range, to the RF probe.
Connect RF diode probe 95.0089-00 to TP204.
Adjust C221 and C223 for maximum deflection (typical 4.0 V).
Adjust the PA power control, R215, for rated transmitter power, 5 W or 20 W.

EXCITER, FINE ADJUSTMENT

Connect the multimeter to test point TP201.
Readjust L153 for maximum reading.
Connect the multimeter to test point TP202.
Peak L203 and L204 for maximum reading.
Connect the multimeter to test point TP203.
Connect C213 and C215 for maximum reading.
Connect the 95.0089-00 RF probe and multimeter to TP204.
Adjust C221 and C223 for maximum reading.

TYPICAL TEST POINT READINGS

TP201:	0.2 V
TP202:	0.7 V
TP203:	0.5 V
TP204:	4.0 V

TRANSMITTER FREQUENCY ADJUSTMENT

Connect a frequency counter through a suitable attenuator to the antenna connector J601.

Key the transmitter.
Select one by one, the channels and read their frequencies.
Adjust L701 for best frequency tracking on all channels.

Requirement: $F = F_{ant} \pm 0.2$ ppm,
ppm= parts per million= 10^{-6}

RF POWER OUTPUT. CURRENT CONSUMPTION, AND POWER CONTROL

Connect the Watt meter to the antenna connector, J601.
Increase the supply voltage to 13.2 V. The voltage is measured directly at the input connector J910.
Readjust the PA power control, R221, for rated transmitter power (P), 20 W or 5 W.
Requirement: $P_{nom} \pm 0.2$ dB.
Measure the RF power output at 16 V, 13.2 V and 10.8 V.

Requirements (20 W):

Voltage	Power	Current
16 V	$\leq$25 W (ref)	5.4 A
13.2 V	20 W	5.4 A
10.8 V	$\geq$12 W	5.4 A

Requirements (5 W):

Voltage	Power	Current
16 V	$\leq$6.5 W	1.7 A
13.2 V	5 W	1.7 A
10.8 V	$\geq$3.5 W	1.7 A

MODULATION ADJUSTMENT

Set the power supply voltage to 13.2 V.
Select the channel having the highest frequency. Set R116 to mid-position.
Connect coax probe 95.0179-00 to test point TP701.
Connect a deviation meter to the coax probe.

Connect a distortion meter and oscilloscope to the deviation meter output.
Connect a AF generator and an AF Voltmeter to the microphone input via a 22 uF capacitor; refer to test setup.
Set the AF generator to 1000 Hz.

Adjust the AF generator output to 1 V r.m.s. This voltage is approx. 20 dB above the nominal modulation input level (60% Δf max) to ensure full limiting in the modulation processor.
Note the deviation read at TP701.
Connect the deviation meter to test point TP702.
Adjust R752 (Dev. Bal.) for same deviation as measured at TP701.
Connect the deviation meter through an attenuator to the antenna connector, J601.

Connect a distortion meter and oscilloscope to the deviation meter output.
Connect an AF generator and an AF Voltmeter to the microphone input via a 22 uF capacitor; refer to test setup.
Set the AF generator to 1000 Hz.
Adjust the AF generator output to 1 V r.m.s. This voltage is approx. 20 dB above the nominal modulation input level (60% Δf max) to ensure full limiting in the modulation processor.

Find the AF frequency between 200 Hz and 3000 Hz giving the greatest frequency deviation as read on the deviation meter with the transmitter keyed.
Check the maximum deviation for both positive and negative deviation polarity. At that audio frequency set the maximum frequency deviation Δf max with R116.

Type	Channel spacing	Δf max
CQM5662 S12	30/25 kHz	±5 kHz
CQM5663 S12	20 kHz	±4 kHz

Requirement
Difference between + and - deviation: ≤10%

MODULATION SENSITIVITY AND MODULATION DISTORTION

Set the AF generator frequency to 1000 Hz
Adjust the generator output until 60% of Δf max is obtained on the deviation meter.

CQM5662 S12 : ±3.0 kHz
CQM5663 S12 : ±2.4 kHz

Read the AF generator output and measure the modulation distortion on the audio output of the deviation meter.

Requirements:
Modulating signal: 75 mV ±3 dB
Distortion: ≤7%
(measured without deemphasis)

MODULATION FREQUENCY RESPONSE

Set the AF generator to 1000 Hz.
Reduce the AF generator output until a deviation of 0.2 x Δf max is obtained on the deviation meter.

CQM5662 S12 : ±1.0 kHz
CQM5663 S12 : ±0.8 kHz

Vary the frequency of the generator and note the deviation changes as referred to the 1000 Hz value.
Requirement :
Within the frequency range 400-2700 Hz the frequency characteristic shall lie within +1 dB/-1.5 dB related to a 6 dB/octave characteristic.
With 6 kHz modulation frequency the deviation shall be attenuated at least 6 dB below the 1 kHz value.

ADJUSTMENT OF TONE EQUIPMENT

Measuring equipment
Tone Test Generator Storno TS-G13 95B0251-00

Check the connections and the tone combination of the TQ5001/TQ5002/TQ5004/TQ5005 and SU/5002; refer to description and diagrams.

Adjustment of frequency deviation

Apply Standard test condition to the transmitter; refer to transmitter test setup. Establish a shortcircuit between emitter and collector of Q108, on the solder side of the TQ unit, which will produce a continuous tone to the modulator.

Key the transmitter using the tone button.

Adjust R113, TQ5001/TQ5002/TQ5004/TQ5005 for 70% of maximum frequency deviation.

Remove the short circuit.

Connect the G13 Tone Test set to the AF output on the Deviation Meter.

Check that the tone call is properly received when the tone button is depressed.

Checking the Tone Receiver

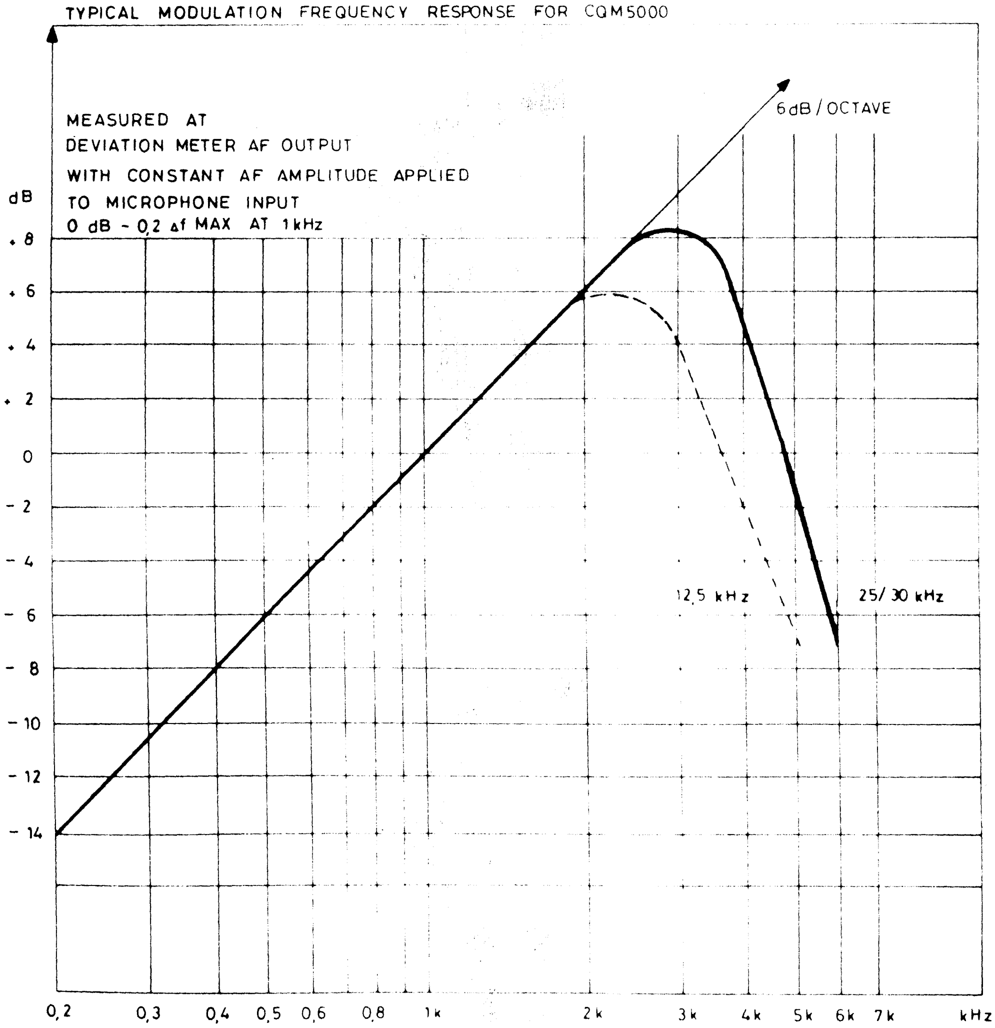
Apply Standard test condition to the receiver; refer to receiver test setup.

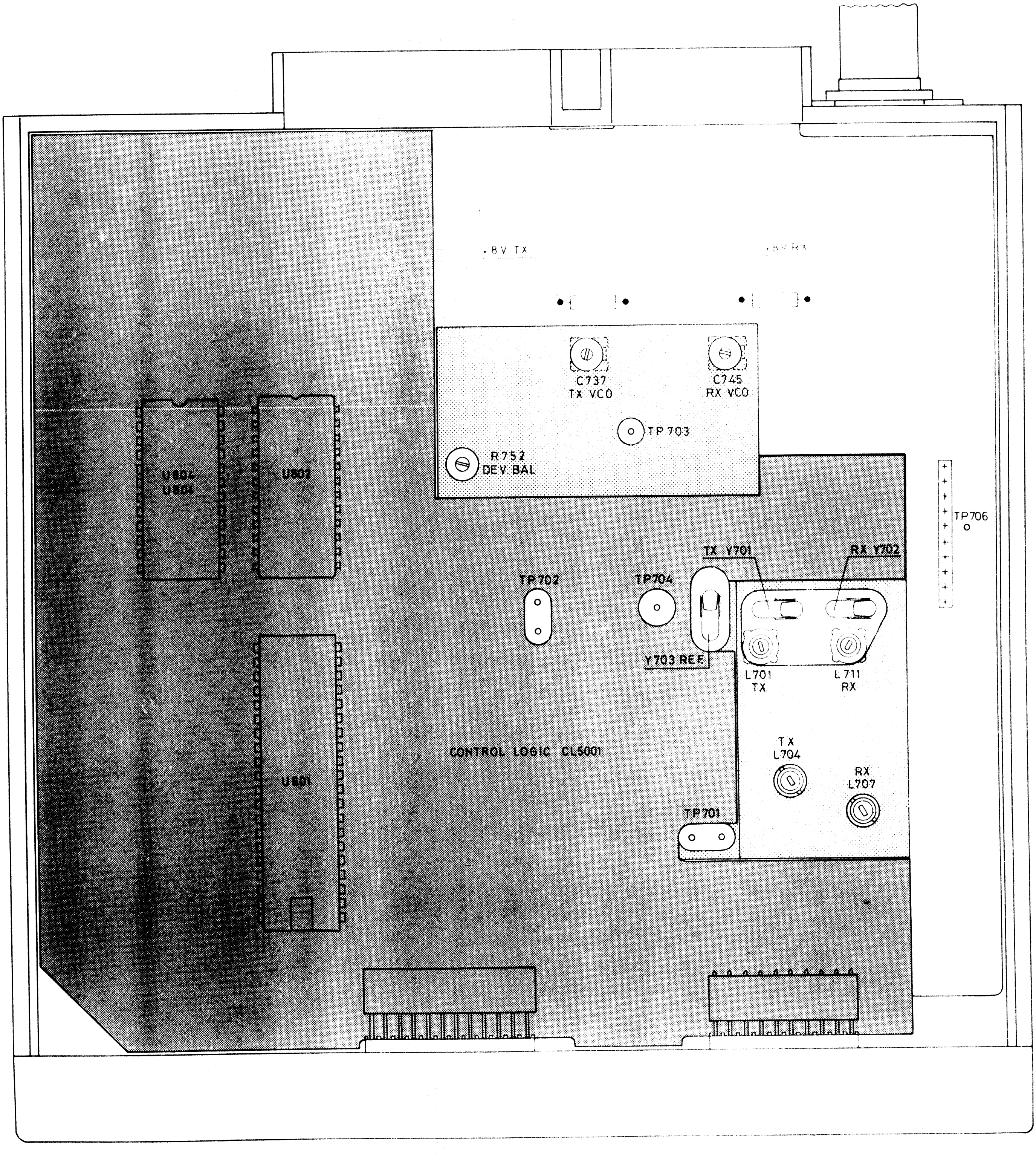
Modulate the signal generator with the G13 Tone Test Set.

Set the G13 to the proper tone combination

Check that the TQ unit responds to a released tone call.

TYPICAL MODULATION FREQUENCY RESPONSE FOR CQM5000

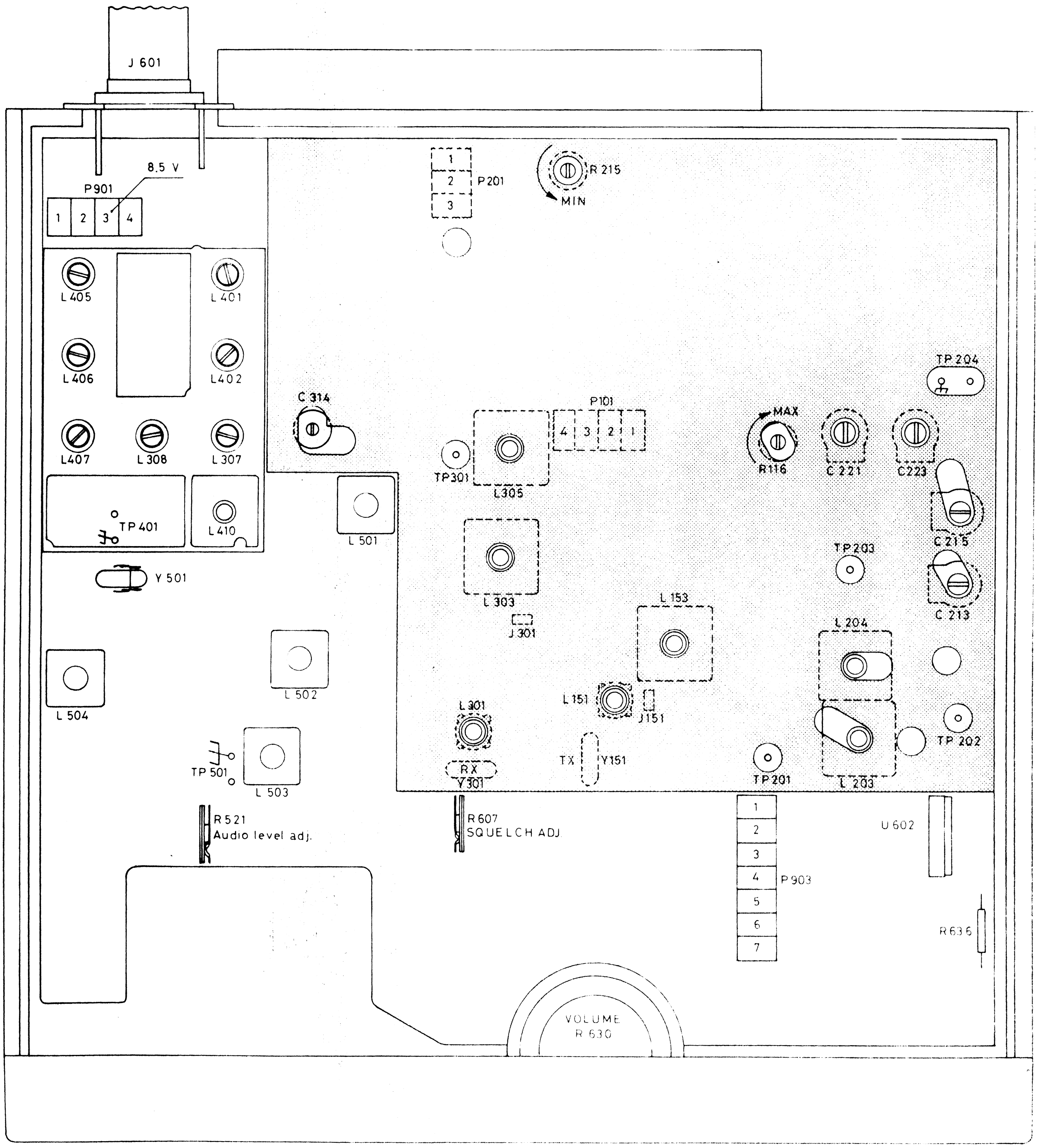




ADJUSTABLE COMPONENTS AND TEST POINTS ON CQM5000SXXS99

D403. 113

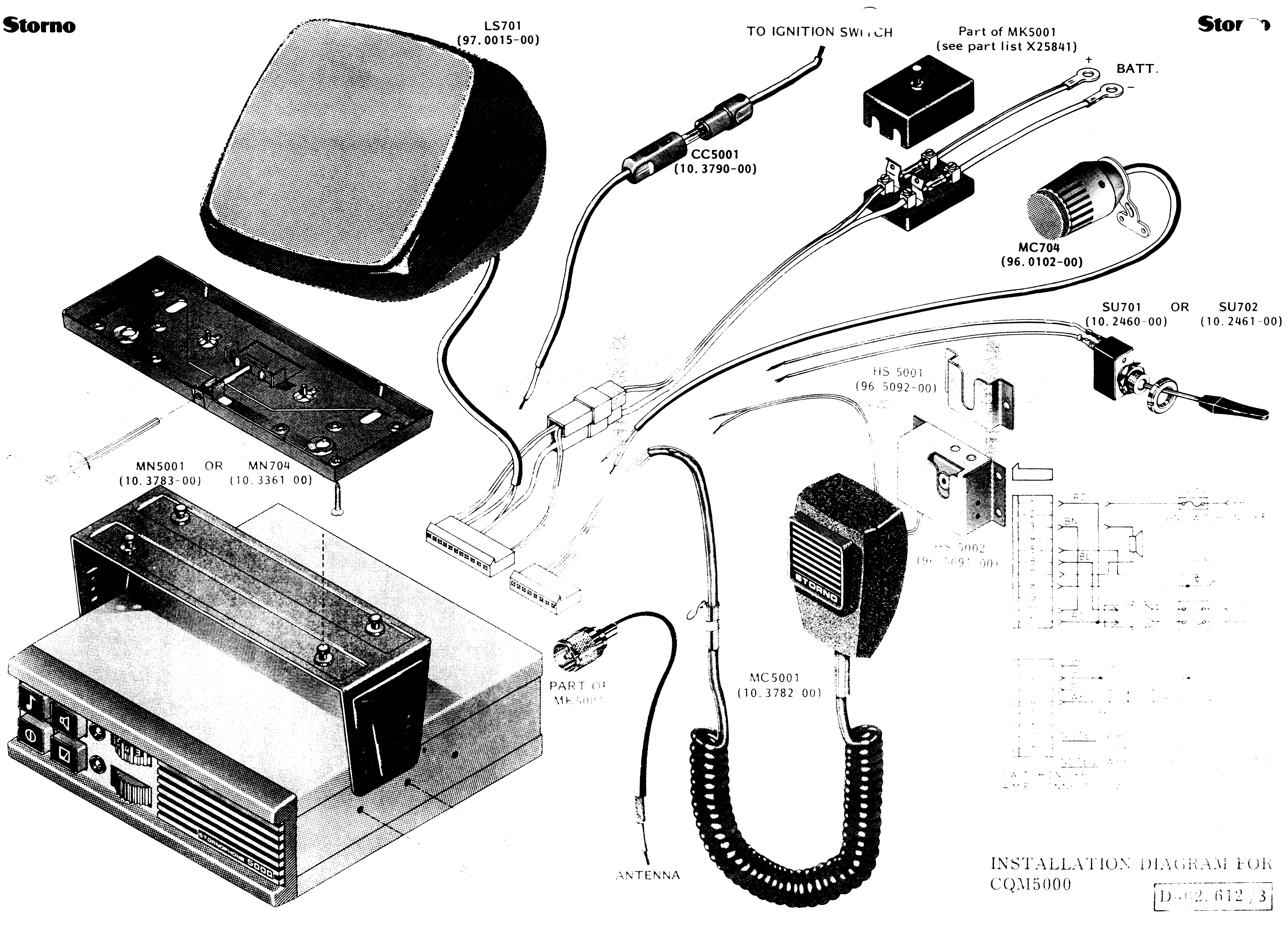
Storno



ADJUSTABLE COMPONENTS AND TEST POINTS ON RF5660 & RF5550

D402.672/2

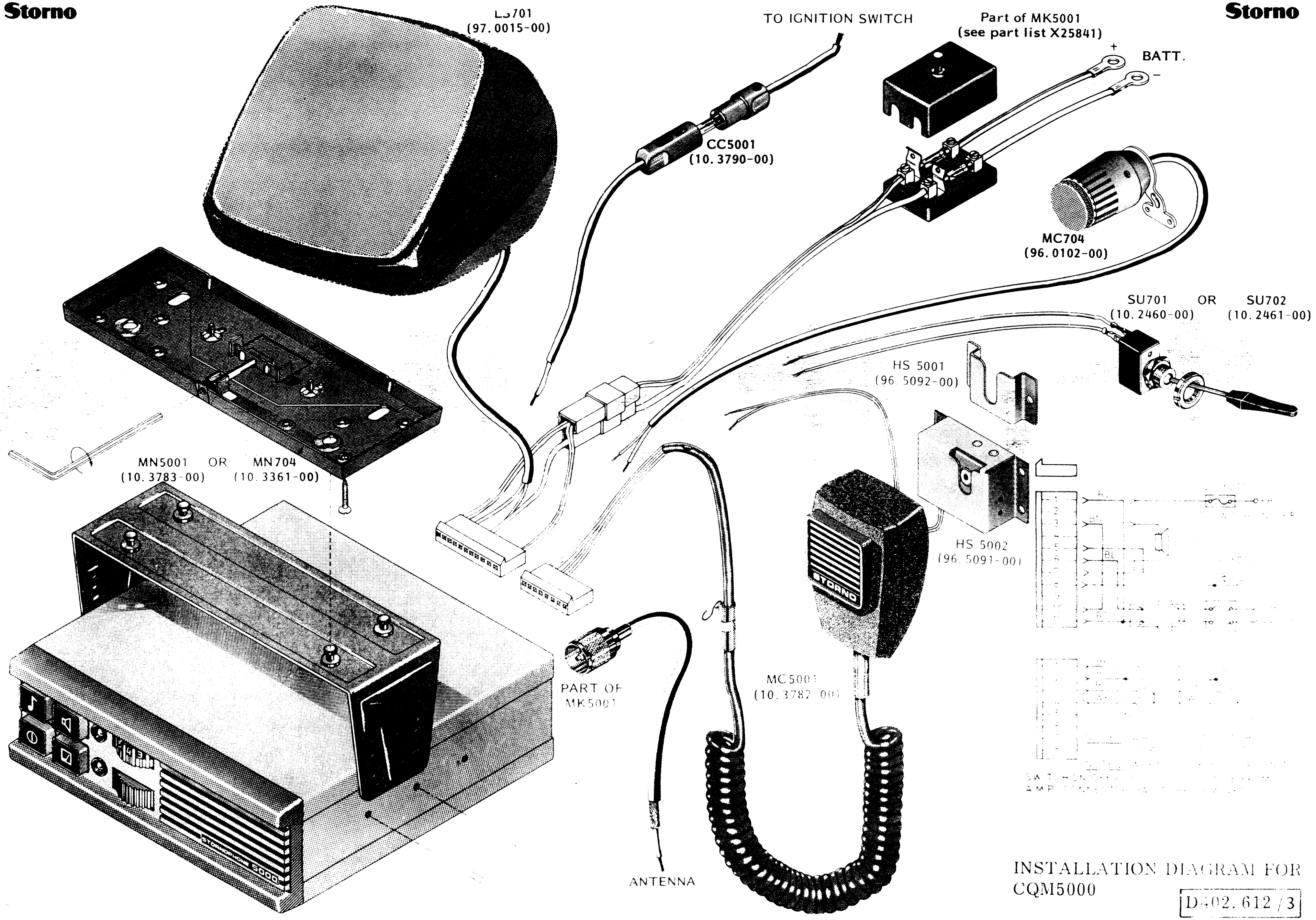
Storno



INSTALLATION DIAGRAM FOR
CQM5000

D402.612/3

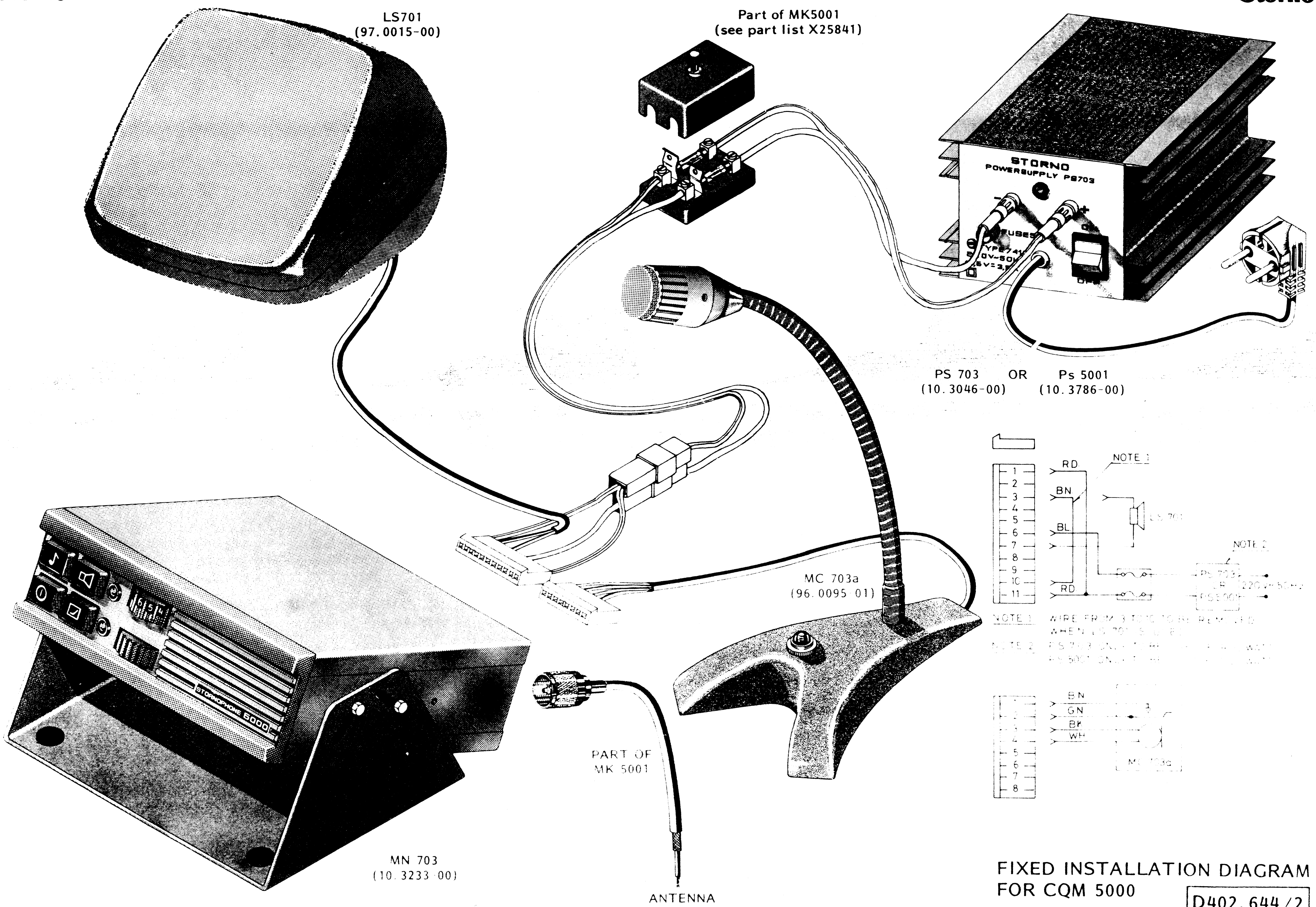
Storno



INSTALLATION DIAGRAM FOR
CQM5000

D402.612/3

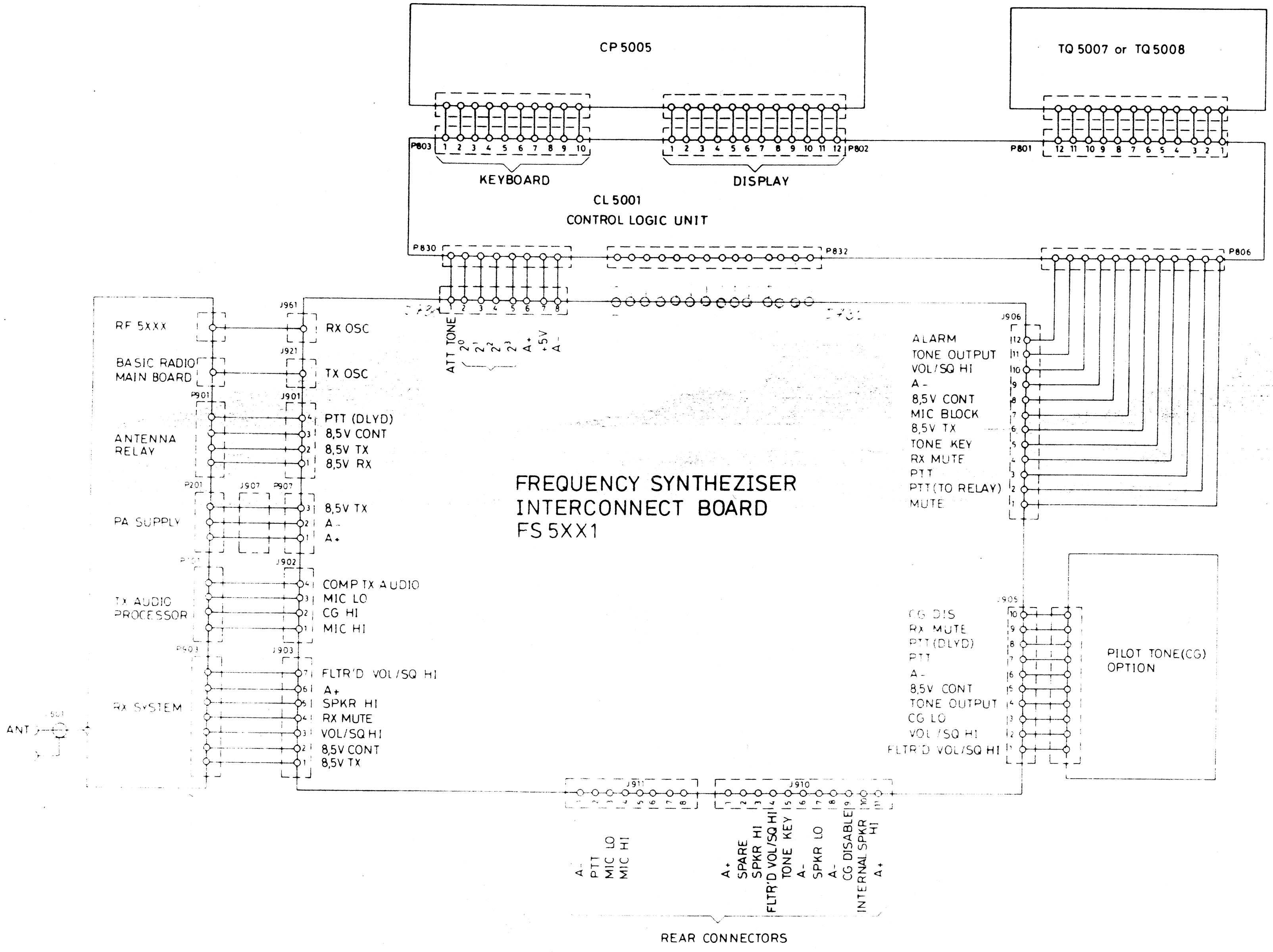
Storno



FIXED INSTALLATION DIAGRAM FOR CQM 5000

D402.644/2

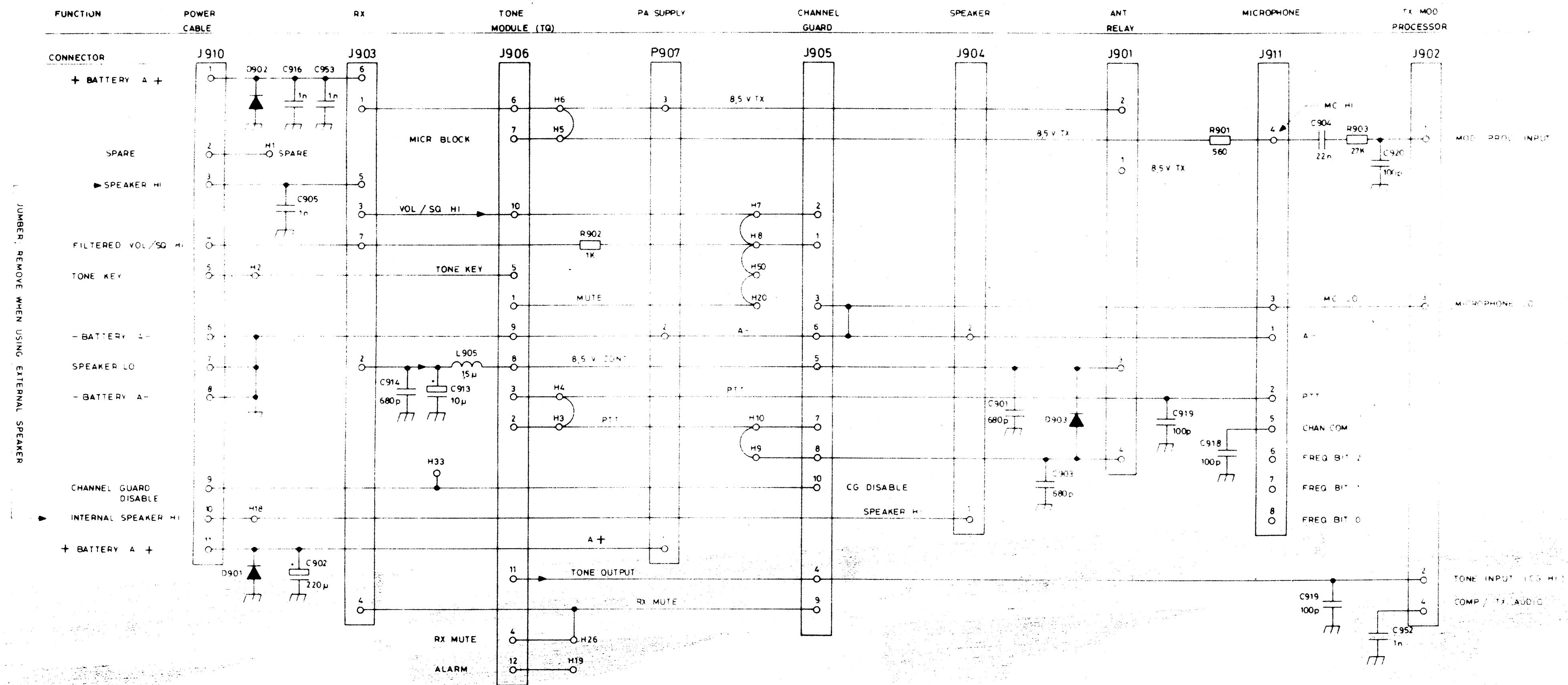
Storno

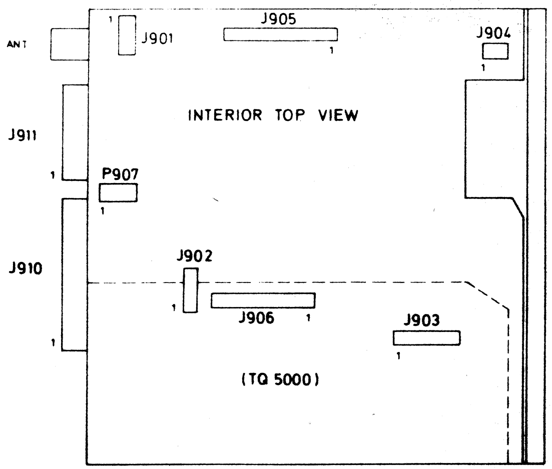


SYSTEM LAYOUT CQM5000SXXS99

D403.106

Storno





NOTES

ALL CONNECTORS SHOWN ARE ON THE XS 5000 BOARD

COMPONENTS SHOWN ARE PARTS OF THE XS BOARD

TONE OPTIONS	STRAPS H3 - H4	H5 - H6	H7 - H8	H9 - H10	H 20 - H50
T0 - NONE	+	+	+	+	+
T1 - TQ 5001	—	—	+	+	—
T2 - TQ 5002	—	—	+	+	—
T3 - TQ 5001 + SU 5001	—	—	+	+	—
T4 - TQ 5001 + SU 5002	—	—	+	+	—
T5 - TQ 5003	+	+	—	+	+
T6 - TR 5001	+	+	—	+	+
T7 - TT 5001	+	+	+	+	+
T8 - FN 5001	+	+	—	+	+

INSERT = +
REMOVE = —

INTERCONNECTION DIAGRAM CQM 5000

D402.695

NOTE: 1
TO MODIFY FOR MULTI FREQUENCY AND FOR TEMPERATURE COMPENSATED OSCILLATORS REMOVE R157 (DISABLE TX OSC.) AND R309 (DISABLE RX OSC.)

NOTE: 2
VALUE OF R636 DEPENDS ON COLOR MARK ON U602

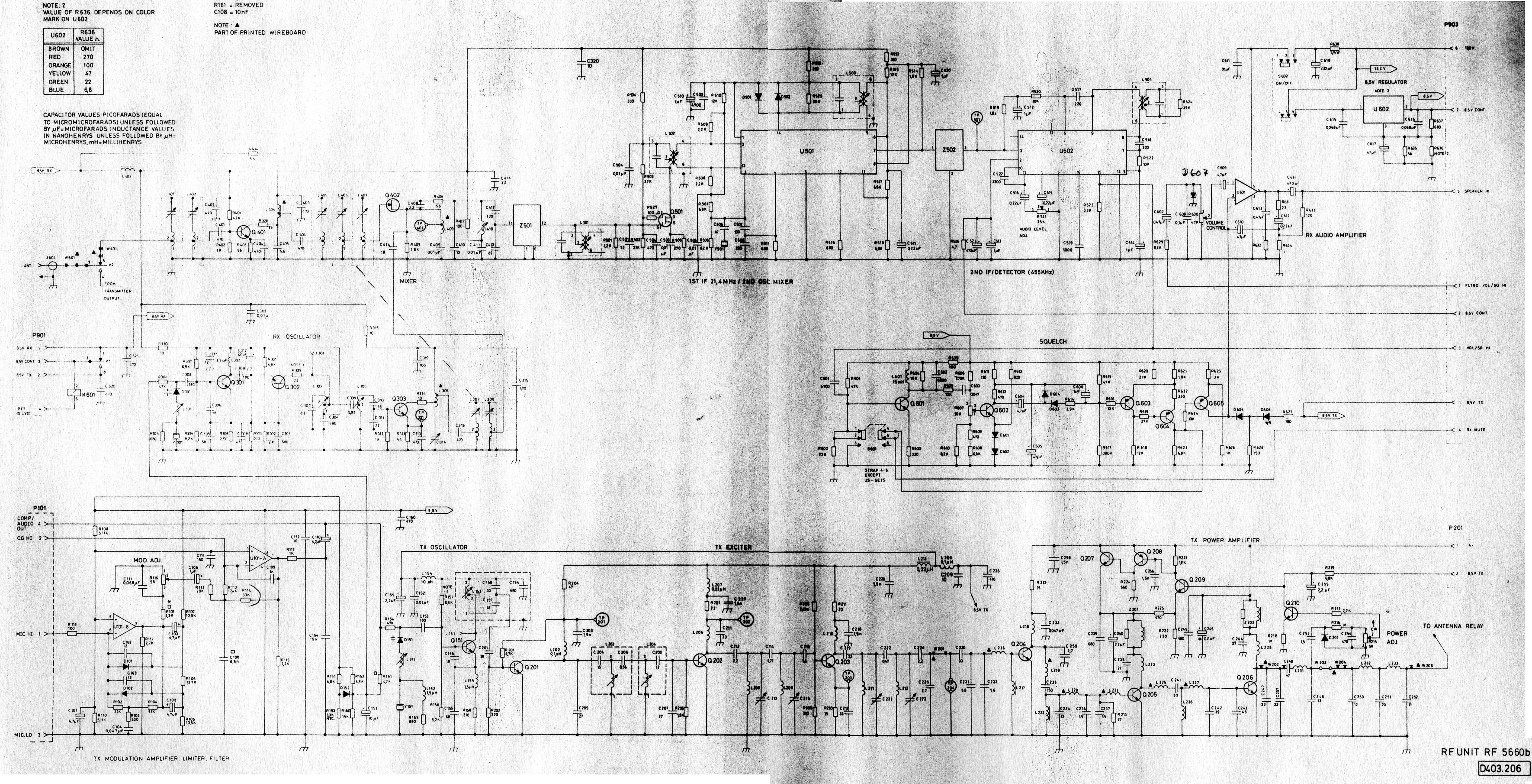
U602	R636 VALUE Ω
BROWN	OMIT
RED	270
ORANGE	100
YELLOW	47
GREEN	22
BLUE	6,8

CAPACITOR VALUES PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY μF=MICROFARADS INDUCTANCE VALUES IN NANOHENRYS UNLESS FOLLOWED BY μH=MICROHENRYS, mH=MILLIHENRYS.

NOTE: ✱
R109 = 1,8K FOR SWEDEN

NOTE: □
12,5 KHz UNITS (RF 5664)
R109 = 1,8K
R161 = REMOVED
C108 = 10nF

NOTE: ▲
PART OF PRINTED WIREBOARD



RF UNIT RF 5660b

D403.206

TYPE	Nº	CODE	DATA	
	C102	73.5172	4.7uF 20% Tantal	35V
	C103	73.5172	4.7uF 20% Tantal	35V
	C104	76.5142	47nF 5% Polyester FL	63V
	C106	73.5170	1.0uF 20% Tantal	35V
	C107	73.5172	4.7uF 20% Tantal	35V
	C108	76.5140	6.8nF 5% Polyester FL	50V
RF5664	C108	76.5135	10 nF 5% Polyester FL	50V
	C109	76.5156	1nF 5% Polyester FL	50V
	C110	73.5172	4.7uF 20% Tantal	35V
	C111	76.5151	68nF 5% Polyester FL	63V
	C112	74.5371	10pF 20% Ceram DI	50V
	C114	74.5392	150 pF 20% Ceramic DI2	50 V
	C151	73.5173	10uF 20% Tantal	35V
	C152	76.5135	10nF 10% Polyester FL	50V
	C153	74.5386	180pF 5% Ceram DI	50V
	C154	74.5396	680pF 20% Ceram DI	50V
	C155	74.5405	68pF 5% Ceram DI	50V
	C156	74.5403	18pF 5% Ceram DI	50V
	C157	74.5374	18pF 5% Ceram DI	50V
	C158	74.5377	33pF 5% Ceram DI	50V
	C159	73.5171	2,2uF 20% Tantal	35V
	C160	74.5395	470pF 20% Ceram DI	50V
	C162	74.5372	12pF 5% Ceram DI	50V
	C163	74.5372	12pF 5% Ceram DI	50V
	C164	76.5135	10nF 10% Polyester FL	50V
	C201	74.5378	39pF 5% Ceram DI	50V
	C203	74.5398	1.5nF 20% Ceram DI	50V
	C204	74.5373	15pF 5% Ceram DI	50V
	C205	74.5376	27pF 5% Ceram DI	50V
	C206	79.5005	0.56pF 5% Phenolic TB	500V
	C207	74.5376	27pF 5% Ceram DI	50V
	C208	74.5372	12pF 5% Ceram DI	50V
	C209	74.5371	10pF 5% Ceram DI	50V
	C211	74.5377	33pF 5% Ceram DI	50V
	C212	74.5413	2.2pF 0.1pF DI	100V
	C213	78.5065	2/10pF Air trimmer	250V
	C214	79.5002	0.27pF 5% Phenolic TB	500V
	C215	78.5065	2/10pF Air trimmer	250V
	C216	74.5368	5.6pF 0.25pF Ceram DI	50V
	C217	74.5377	33pF 5% Ceram DI	50V
	C218	74.5398	1.5nF 20% Ceram DI	50V
	C219	74.5413	2.2pF 0.1pF DI	100V
	C220	74.5398	1.5nF 20% Ceram DI	50V
	C221	78.5065	2/10pF Air trimmer	250V
	C222	79.5004	0.47pF 5% Phenolic TB	500V
	C223	78.5065	2/10pF Air trimmer	250V

TYPE	Nº	CODE	DATA	
	C224	74.5413	2.2pF 0.1pF DI	100V
	C225	74.5364	2.7pF 0.25pF Ceram DI	50V
	C226	74.5395	470pF 20% Ceram DI	50V
	C227	74.5398	1.5 nF 20% Ceramic 2DI	50 V
	C230	74.5377	33pF 5% Ceram DI	50V
	C231	74.5368	5.6pF 0.25pF Ceram DI	50V
	C232	74.5368	5.6pF 0.25pF Ceram DI	50V
	C233	76.5139	47nF 10% Polyester FL	50V
	C234	74.5372	12pF 5% Ceram DI	50V
	C235	74.5414	150pF 20% Ceram DI	500V
	C236	75.5038	45pF 5% Mica	250V
	C237	75.5038	45pF 5% Mica	250V
	C238	74.5376	27pF 5% Ceram DI	50V
	C239	74.5396	680pF 20% Ceram DI	50V
	C240	73.5171	2.2uF 20% Tantal	35V
	C241	75.5025	30 pF 5% Teflon	250 V
	C242	75.5054	39 pF 5% Mica	250 V
	C243	75.5038	45 pF 5% Mica	250 V
	C244	74.5376	27 pF 5% Ceram DI	50 V
	C245	74.5396	680 pF 20% Ceram DI	50 V
	C246	73.5171	2.2 uF 20% Tantal	35 V
	C247	75.5053	33 pF 5% Mica	250 V
	C248	75.5051	13 pF 5% Mica	250 V
	C249	75.5044	47 pF 2% Teflon	250 V
	C250	75.5034	12pF 0.5pF Teflon	250V
	C251	75.5036	20pF 0.5pF Teflon	250V
	C252	75.5035	11pF 0.5pF Teflon	250V
	C253	74.5361	1.5 pF 0.25 pF Ceram DI	50 V
	C254	74.5395	470pF 20% Ceram DI	50V
	C255	73.5171	2.2uF 20% Tantal	35V
	C256	74.5398	1.5nF 20% Ceram DI	50V
	C257	75.5053	33 pF 5% Mica	250 V
	C258	74.5398	1.5 nF 20% Ceramic 2DI	50 V
	C259	74.5364	2.7 pF 0.25 pF Ceram DI	50 V
	C301	74.5396	680pF 20% Ceram DI	50V
	C302	76.5135	10nF 10% Polyester FL	50V
	C303	74.5386	180pF 5% Ceram DI	50V
	C304	74.5396	680pF 20% Ceram DI	50V
	C305	74.5405	68pF 5% Ceram DI	50V
	C306	74.5403	18pF 5% Ceram DI	50V

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TYPE	NO	CODE	DATA	
	C307	74.5370	8.2pF 5% Ceram DI	50V
	C308	74.5386	180pF 5% Ceram DI	50V
	C309	79.5007	0.82pF 5% Phenolic TB	500V
	C310	74.5374	18 pF 5% Ceram DI	50 V
	C311	74.5375	22pF 5% Ceram DI	50V
	C312	73.5171	2.2uF 20% Tantal	35V
	C313	74.5395	470pF 20% Ceram DI	50V
	C314	78.5068	1.8/10pF Teflon trimmer	300V
	C315	74.5395	470pF 20% Ceram DI	50V
	C316	74.5395	470pF 20% Ceram DI	50V
	C317	74.5375	22pF 5% Ceram DI	50V
	C318	74.5379	47pF 5% Ceram DI	50V
	C319	74.5391	100 pF 20% Ceramic DI	50 V
	C320	74.5371	10 pF 5% Ceram DI	50 V
	C401	74.5395	470pF 20% Ceram DI	50V
	C402	74.5395	470pF 20% Ceram DI	50V
	C403	74.5395	470pF 20% Ceram DI	50V
	C404	74.5395	470pF 20% Ceram DI	50V
	C405	74.5368	5.6pF 0.25pF Ceram DI	50V
	C406	74.5395	470pF 20% Ceram DI	50V
	C408	74.5365	3.3pF 0.25pF Ceram DI	50V
	C409	75.5135	10nF 10% Polyester FL	50V
	C410	74.5371	10pF 5% Ceram DI	50V
	C411	76.5135	10nF 10% Polyester FL	50V
	C412	74.5384	120pF 5% Ceram DI	50V
	C413	74.5382	82pF 5% Ceram DI	50V
	C414	74.5374	18pF 5% Ceram DI	50V
	C416	74.5375	22 pF 5% Ceram DI	50 V
	C501	74.5375	22pF 5% Ceram DI	50V
	C502	74.5395	470pF 20% Ceram DI	50V
	C503	76.5135	10nF 10% Polyester FL	50V
	C504	76.5135	10nF 10% Polyester FL	50V
	C505	76.5135	10nF 10% Polyester FL	50V
	C506	74.5379	47pF 5% Ceram DI	50V
	C507	74.5383	100pF 5% Ceram DI	50V
	C508	74.5387	220pF 5% Ceram DI	50V
	C509	76.5133	4.7nF 10% Polyester FL	50V
	C510	73.5170	1.0uF 20% Tantal	35V
	C511	73.5168	0.22uF 20% Tantal	35V
	C512	73.5170	1.0uF 20% Tantal	35V
	C513	73.5170	1.0uF 20% Tantal	35V
	C514	73.5170	1.0uF 20% Tantal	35V
	C515	73.5168	0.22uF 20% Tantal	35V
	C516	73.5168	0.22uF 20% Tantal	35V
	C517	74.5393	220pF 20% Ceram DI	50V

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TYPE	NO	CODE	DATA	
	C518	74.5393	220pF 20% Ceram DI	50V
	C519	74.5397	1nF 20% Ceram DI	50V
	C520	73.5170	1.0uF 20% Tantal	35V
	C521	73.5166	470uF -10 +100% Elco	16V
	C522	76.5132	3.3nF 10% Polyester FL	50V
	C601	76.5133	4.7nF 10% Polyester FL	50V
	C602	76.5134	6.8nF 10% Polyester FL	50V
	C603	76.5139	47nF 10% Polyester FL	50V
	C604	73.5172	4.7uF 20% Tantal	35V
	C605	73.5164	47uF -10 +100% Elco	16V
	C606	73.5170	1.0uF 20% Tantal	35V
	C607	73.5169	0.47uF 20% Tantal	35V
	C608	76.5144	0.1uF 10% Polyester FL	63V
	C609	73.5172	4.7uF 20% Tantal	35V
	C610	73.5175	47uF 20% Tantal	6.3V
	C611	76.5144	0.1uF 10% Polyester FL	63V
	C612	73.5168	0.22uF 20% Tantal	35V
	C613	76.5148	0.47uF 10% Polyester FL	63V
	C614	73.5166	470uF -10 +100% Elco	16V
	C615	76.5143	68nF 10% Polyester FL	63V
	C616	76.5143	68nF 10% Polyester FL	63V
	C617	73.5164	47uF -10 +100% Elco	16V
	C618	73.5165	220uF -10 +100% Elco	25V
	C620	74.5395	470pF 20% Ceram DI	50V
	C621	74.5395	470pF 20% Ceram DI	50V
	D101	99.5374	1N458A Diode, Select	
	D102	99.5374	1N458A Diode, Select	
	D151	99.5341	Cap. diode	
	D152	99.5237	1N4148 Diode	
	D201	99.5237	1N4148 Diode	
	D301	99.5341	Cap. diode	
	D501	99.5237	1N4148 Diode	
	D502	99.5237	1N4148 Diode	
	D601	99.5237	1N4148 Diode	
	D602	99.5237	1N4148 Diode	
	D603	99.5237	1N4148 Diode	
	D604	99.5237	1N4148 Diode	
	D605	99.5237	1N4148 Diode	
	D606	99.5303	1.6V LED/RD	20mA
	D607	99.5237	1N4148 Diode	

TYPE	Nº	CODE	DATA	
	J151	41.5529	Socket	
	J301	41.5529	Socket	
	J601	41.5165	Connector UHF	
	K601	58.5085	21-21 Relay	12V
	L151	61.5034	RF coil, tuneable	
	L152	61.5030	1.5uH 10% HF choke	800mA
	L153	61.5033	RF coil, tuneable	
	L154	61.5031	10uH 10% HF choke	300mA
	L155	61.5030	1.5uH 10% HF choke	800mA
	L202	A700024P1	0.1 uH 10% HF choke	1.3 A
	L203	61.5035	RF coil, tuneable	
	L204	61.5035	RF coil, tuneable	
	L205	A700024P1	0.1 uH 10% HF choke	1.3 A
	L206	62.1001	RF coil	
	L207	A700024P5	0.22 uH 10% HF choke	
	L208	62.0999-01	RF coil	
	L209	62.0998-01	RF coil	
	L210	62.1002	RF coil	
	L211	62.0999-01	RF coil	
	L212	62.0999-01	RF coil	
	L213	A700024P5	0.22 uH 10% HF-choke	
	L217	61.1383	RF choke	
	L218	62.1034	RF coil	
	L222	61.1383	RF choke	
	L223	62.1000	RF coil	
	L226	61.5044	6.3 uH 10% HF choke	400 mA
	L228	62.1000	RF coil	
	L231	62.1038	Strap	
	L232	62.0996	RF coil, L233 incl.	
	L301	61.5034	RF coil, tuneable	
	L302	61.5015	3.3uH 10% HF choke	700mA
	L303	61.5046	RF coil, tuneable	
	L305	61.5045	RF coil, tuneable	
	L307	J706154P2	Helecal coil	
	L308	J706154P2	Helical coil	
	L401	J706154P2	Helical coil	
	L402	J706154P2	Helical coil	
	L403	61.1411	RF choke	
	L405	J706154P2	Helical coil	
	L406	J706154P2	Helical coil	
	L407	J706084P1	Helical coil	
	L410	61.5050	RF coil, tuneable	
	L501	61.5027	21.4MHz IF transformer	

Storno

TYPE	Nº	CODE	DATA	
	L502	61.5027	21.4MHz IF transformer	
	L503	61.5025	455kHz IF transformer	
	L504	61.5025	455kHz IF transformer	
	L601	61.5023	75mH Choke	10mA
		28.0123	Tuning slug	
	P101	41.0238	Modified connector	
	P201	41.5545	Fem. connector	3 pin
	P901	41.0238	Modified connector	
	P903	41.0230	Fem. connector	7 pin
	Q151	99.5347	PN2369 Transistor	
	Q201	99.5348	RF transistor	0.4W
	Q202	99.5355	RF transistor	0.4W
	Q203	99.5348	RF transistor	0.4W
	Q204	99.5354	RF transistor	0.8W
	Q205	99.5357	RF power transistor	5.5W
	Q206	99.5375	RF Power transistor	23 W
	Q207	99.5345	BD201 Transistor	
	Q208	99.5251	BC307 transistor	
	Q209	99.5121	BC237 transistor	
	Q210	99.5121	BC237 transistor	
	Q301	99.5347	PN2369 Transistor	
	Q302	99.5347	PN2369 Transistor	
	Q303	99.5356	BFW92 Transistor	
	Q401	99.5290	BFR34 transistor	
	Q402	99.5245	2N5245 J-FET	
	Q501	99.5291	3N205 MOS-FET	
	Q601	99.5143	BC238 transistor	
	Q602	99.5201	BC239 transistor	
	Q603	99.5115	BC309 transistor	
	Q604	99.5115	BC309 transistor	
	Q605	99.5115	BC309 transistor	
	R102	80.5265	22Kohm 5% Carbon film	1/8W
	R103	80.5243	330ohm 5% Carbon film	1/8W
	R104	89.5095	51Kohm 5% Carbon film	1/8W
	R105	89.5083	10.5Kohm 1% Metal film	1/4W
	R106	89.5085	12.7Kohm 1% Metal film	1/4W
	R107	89.5083	10.5Kohm 1% Metal film	1/4W
	R108	89.5082	5.11Kohm 1% Metal film	1/4W

RF UNIT RF5660b

TYPE	Nº	CODE	DATA	
	R109	89.5091	1.3Kohm 5% Carbon film	1/8W
RF5664	R109	80.5252	1.8 Kohm 5% Carbon film	1/8 W
	R110	89.5082	5.11Kohm 1% Metal film	1/4W
	R112	89.5086	20Kohm 1% Metal film	1/4W
	R113	89.5084	12.4Kohm 1% Metal film	1/4W
	R114	80.5267	33 Kohm 5% Carbon film	1/8W
	R115	80.5253	2.2 Kohm 5% Carbon film	1/8W
	R116	86.5078	5Kohm 10% Trimm. Cermet	0.5W
	R117	80.5249	1 Kohm 5% Carbon film	1/8 W
	R118	80.5237	100 ohm 5% carbon film	1/8 W
	R151	80.5259	6.8Kohm 5% Carbon film	1/8W
	R152	80.5259	6.8Kohm 5% Carbon film	1/8W
	R153	89.5088	3.3Kohm 10% NTC	0.5W
	R154	80.5269	47Kohm 5% Carbon film	1/8W
	R155	80.5242	270ohm 5% Carbon film	1/8W
	R156	80.5260	8.2Kohm 5% Carbon film	1/8W
	R157	80.5259	6.8 Kohm 5% Carbon film	1/8W
	R158	80.5242	270ohm 5% Carbon film	1/8W
	R160	80.5263	15Kohm 5% Carbon film	1/8W
-5664	R161	80.5257	4.7Kohm 5% Carbon film	1/8W
	R201	80.5254	2.7 Kohm 5% Carbon film	1/8 W
	R202	80.5241	220 ohm 5% Carbon film	1/8 W
	R204	80.5233	47ohm 5% Carbon film	1/8W
	R205	80.5250	1.2 Kohm 5% Carbon film	1/8 W
	R207	80.5229	22ohm 5% Carbon film	1/8W
	R208	89.5098	2.43Kohm 1% Metal film	1/4W
	R209	89.5097	392ohm 1% Metal film	1/4W
	R210	80.5227	15ohm 5% Carbon film	1/8W
	R211	80.5229	22ohm 5% Carbon film	1/8W
	R212	80.5227	15ohm 5% Carbon film	1/8W
	R213	89.5100	27ohm 5% Carbon comp.	1/4W
	R215	86.5078	5Kohm 10% Trimm. Cermet	0.5 W
	R216	80.5249	1Kohm 5% Carbon film	1/8W
	R217	80.5253	2.2Kohm 5% Carbon film	1/8W
	R218	80.5249	1Kohm 5% Carbon film	1/8W
	R219	80.5259	6.8Kohm 5% Carbon film	1/8W
	R221	80.5252	1.8Kohm 5% Carbon film	1/8W
	R222	80.5241	220ohm 5% Carbon film	1/8W
	R224	80.5246	560ohm 5% Carbon film	1/8W
	R225	80.5245	470ohm 5% Carbon film	1/8W
	R301	80.5259	6.8Kohm 5% Carbon film	1/8W
	R302	80.5255	3.3Kohm 5% Carbon film	1/8W
	R303	80.5242	270ohm 5% Carbon film	1/8W
	R304	80.5269	47Kohm 5% Carbon film	1/8W
	R305	80.5247	680ohm 5% Carbon film	1/8W

Storno

TYPE	Nº	CODE	DATA	
	R306	80.5260	8.2Kohm 5% Carbon film	1/8W
	R307	80.5259	6.8 Kohm 5% Carbon film	1/8W
	R308	80.5242	270ohm 5% Carbon film	1/8W
	R309	80.5229	22ohm 5% Carbon film	1/8W
	R310	80.5225	10ohm 5% Carbon film	1/8W
	R312	80.5249	1Kohm 5% Carbon film	1/8W
	R313	80.5234	56ohm 5% Carbon film	1/8W
	R314	80.5225	10ohm 5% Carbon film	1/8W
	R315	80.5225	10ohm 5% Carbon film	1/8W
	R401	80.5257	4.7Kohm 5% Carbon film	1/8W
	R402	80.5249	1Kohm 5% Carbon film	1/8W
	R403	80.5234	56ohm 5% Carbon film	1/8W
	R404	80.5234	56ohm 5% Carbon film	1/8W
	R405	80.5252	1.8Kohm 5% Carbon film	1/8W
	R406	80.5234	56ohm 5% Carbon film	1/8W
	R407	80.5237	100ohm 5% Carbon film	1/8W
	R408	80.5232	39ohm 5% Carbon film	1/8W
	R501	80.5253	2.2Kohm 5% Carbon film	1/8W
	R502	80.5266	27Kohm 5% Carbon film	1/8W
	R503	80.5266	27Kohm 5% Carbon film	1/8W
	R504	80.5243	330ohm 5% Carbon film	1/8W
	R505	80.5242	270ohm 5% Carbon film	1/8W
	R506	80.5260	8.2Kohm 5% Carbon film	1/8W
	R507	80.5259	6.8Kohm 5% Carbon film	1/8W
	R508	80.5253	2.2Kohm 5% Carbon film	1/8W
	R509	80.5253	2.2Kohm 5% Carbon film	1/8W
	R510	80.5262	12Kohm 5% Carbon film	1/8W
	R511	80.5247	680ohm 5% Carbon film	1/8W
	R512	80.5243	330ohm 5% Carbon film	1/8W
	R513	80.5243	330ohm 5% Carbon film	1/8W
	R514	80.5252	1.8Kohm 5% Carbon film	1/8W
	R515	80.5262	12Kohm 5% Carbon film	1/8W
	R516	80.5247	680ohm 5% Carbon film	1/8W
	R517	80.5259	6.8Kohm 5% Carbon film	1/8W
	R518	80.5260	8.2Kohm 5% Carbon film	1/8W
	R519	80.5252	1.8Kohm 5% Carbon film	1/8W
	R520	80.5261	10Kohm 5% Carbon film	1/8W
	R521	86.5060	25Kohm 20% Carbon pot.	0.1W
	R522	80.5261	10Kohm 5% Carbon film	1/8W

TYPE	Nº	CODE	DATA	
	R523	80.5255	3.3Kohm 5% Carbon film	1/8W
	R524	80.5268	39Kohm 5% Carbon film	1/8W
	R525	80.5268	39Kohm 5% Carbon film	1/8W
	R526	80.5221	4.7ohm 5% Carbon film	1/8W
	R527	80.5237	100ohm 5% Carbon film	1/8W
	R601	80.5269	47Kohm 5% Carbon film	1/8W
	R602	80.5265	22Kohm 5% Carbon film	1/8W
	R603	80.5243	330ohm 5% Carbon film	1/8W
	R604	80.5264	18Kohm 5% Carbon film	1/8W
	R605	80.5261	10Kohm 5% Carbon film	1/8W
	R606	80.5278	270Kohm 5% Carbon film	1/8W
	R607	86.5080	10Kohm 20% Carbon pot.	0.1W
	R608	80.5259	6.8Kohm 5% Carbon film	1/8W
	R609	89.5053	470ohm 20% NTC	0.5W
	R610	80.5260	8.2Kohm 5% Carbon film	1/8W
	R611	80.5238	120ohm 5% Carbon film	1/8W
	R612	80.5245	470ohm 5% Carbon film	1/8W
	R613	80.5248	820ohm 5% Carbon film	1/8W
	R614	80.5256	3.9Kohm 5% Carbon film	1/8W
	R615	80.5269	47Kohm 5% Carbon film	1/8W
	R616	80.5261	10Kohm 5% Carbon film	1/8W
	R617	80.5280	390Kohm 5% Carbon film	1/8W
	R618	80.5262	12Kohm 5% Carbon film	1/8W
	R619	80.5266	27Kohm 5% Carbon film	1/8W
	R620	80.5266	27Kohm 5% Carbon film	1/8W
	R621	80.5252	1.8Kohm 5% Carbon film	1/8W
	R622	80.5243	330ohm 5% Carbon film	1/8W
	R623	80.5259	6.8Kohm 5% Carbon film	1/8W
	R624	80.5261	10Kohm 5% Carbon film	1/8W
	R625	89.5093	3 Kohm 5% Carbon film	1/8W
	R626	80.5249	1Kohm 5% Carbon film	1/8W
	R627	80.5240	180 ohm 5% Carbon film	1/8W
	R628	80.5239	150 ohm 5% Carbon film	1/8W
	R629	80.5260	8.2Kohm 5% Carbon film	1/8W
	R630	86.5077	47Kohm 20% Carbon pot., log.	0.15W
	R631	80.5229	22ohm 5% Carbon film	1/8W
	R632	80.5213	1ohm 5% Carbon film	1/8W
	R633	80.5238	120ohm 5% Carbon film	1/8W
	R634	80.5213	1ohm 5% Carbon film	1/8W
	R635	80.5234	56ohm 5% Carbon film	1/8W
	R636	80.52xx	ADJ 5% Carbon film, see diagr.	1/8W
	R637	80.5247	680 ohm 5% Carbon film	1/8W
	R638	80.5413	1ohm 5% Carbon film	1/4W
	R639	80.5237	100ohm 5% Carbon film	1/8W

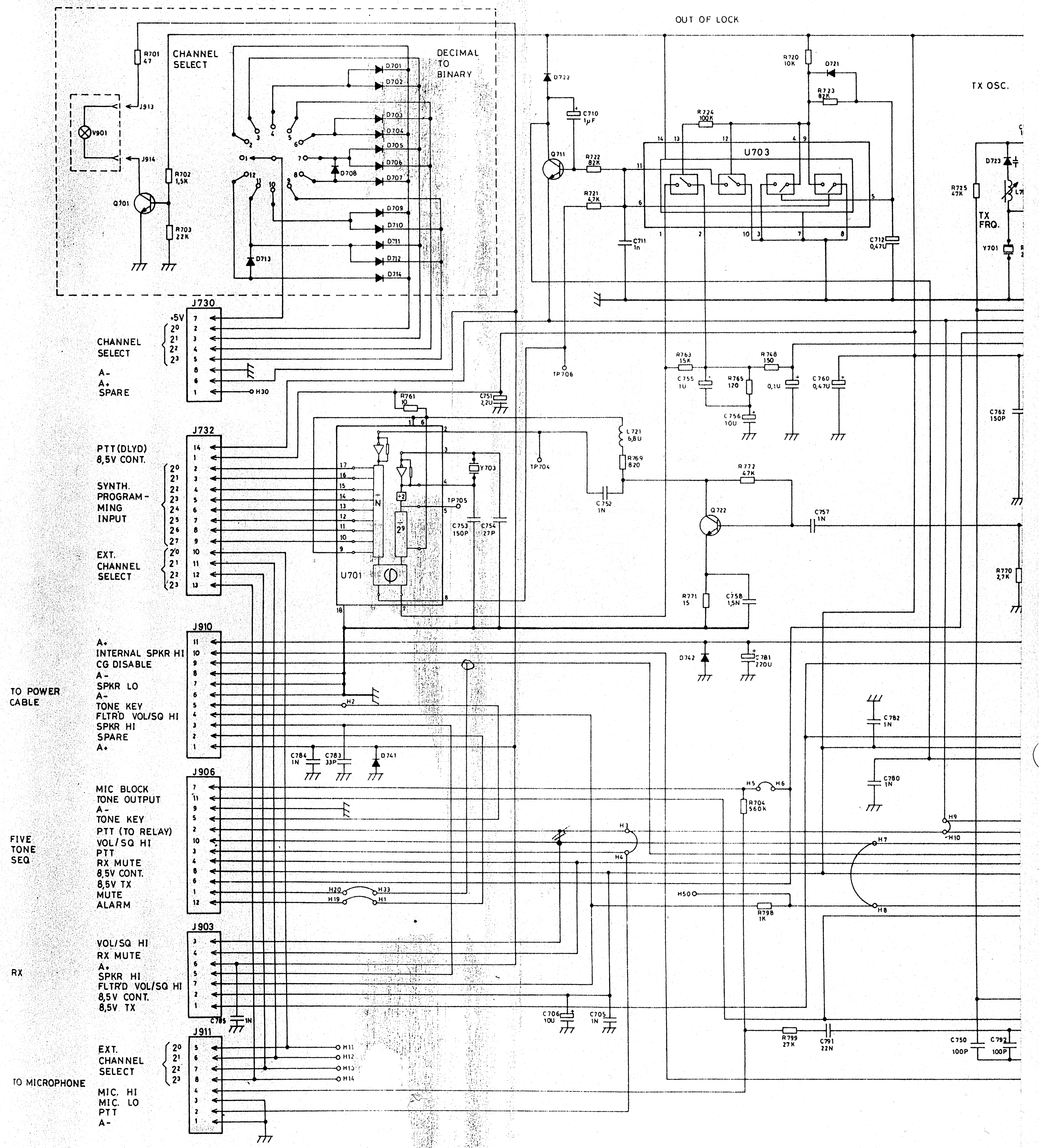
Storno

TYPE	Nº	CODE	DATA	
	S601	B800563P1	Switch	
	S602	B800563P1	Switch	
	U101	14.5141	4558 Dual op-amp	
	U501	14.5128	CA3054 IF amplifier	
	U502	14.5129	TBA750 IF amplifier/detector	
	U601	14.5130	TDA2002 AF power amplifier	
	U602	14.0133	Voltage reg., grouped	8V 0.5A
	W201	62.1004	Jumper	
	W202	62.1004	Jumper	
	W203	62.1037	Coil, jumper	
	W204	62.1004	Jumper	
	W205	62.1004	Jumper	
	W401	62.1004	Jumper	
	W601	62.1004	Jumper	
	Y501	98.5032	Crystal 98-58	20.945 MHz
	Z201	61.1384	Damping choke	
	Z202	61.1384	Damping choke	
5662	Z501	69.5040	21.4MHz Crystal filter	25kHz
5663	Z501	69.5041	21.4MHz Crystal filter	20kHz
5664	Z501	J706046P1	21.4 MHz Crystal filter	12.5 kHz
5662/63	Z502	69.5045	455kHz Ceramic filter	20/25kHz
5664	Z502	69.5046	455 kHz Ceramic filter	12.5 kHz

RF UNIT RF5660b

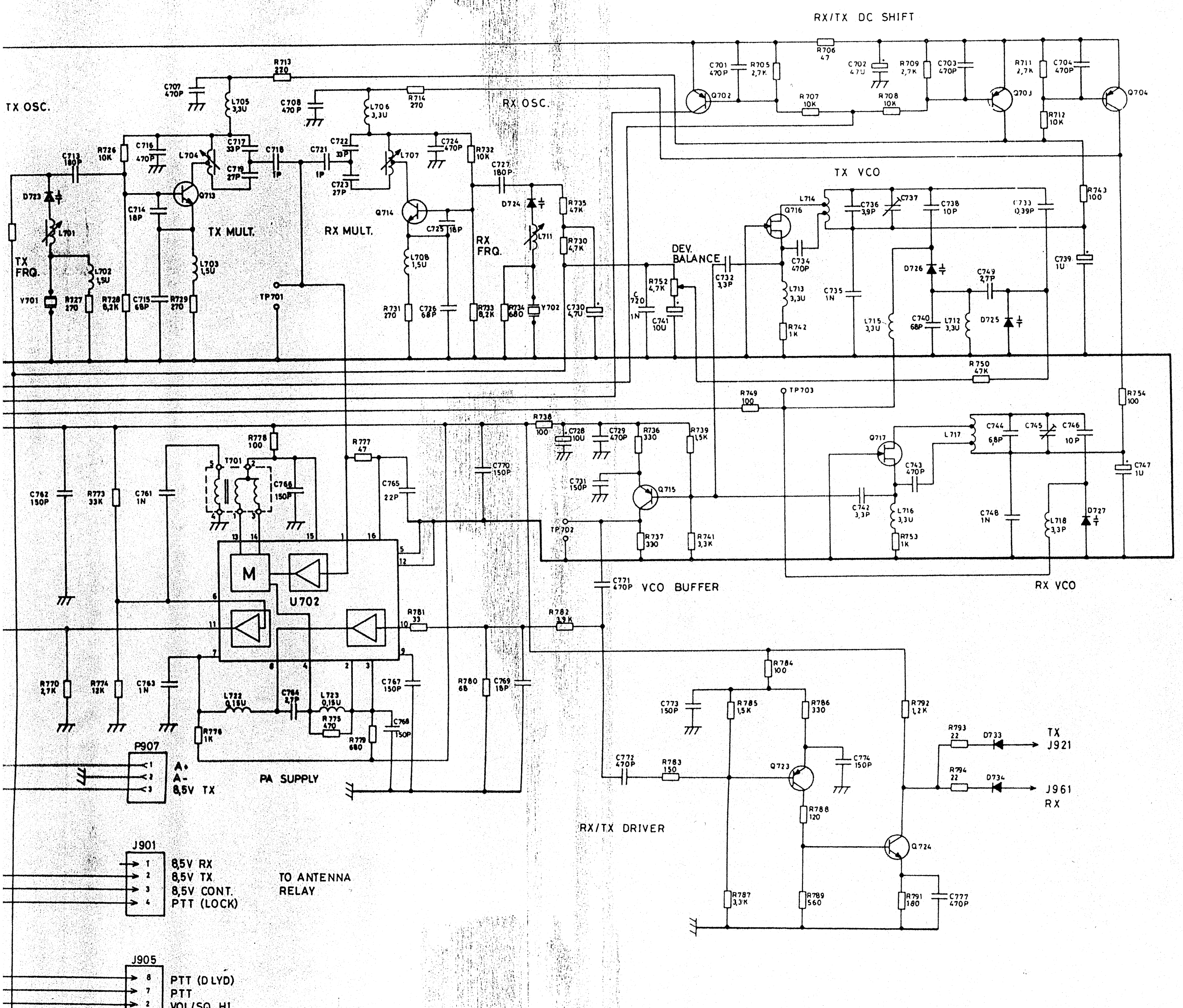
X403.221

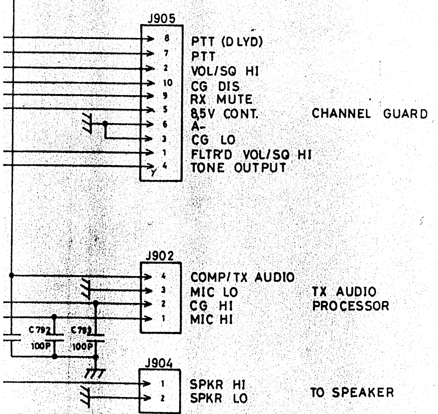
Storno



OUT OF LOCK
TX OSC.
CHANNEL SELECT
DECIMAL TO BINARY
U703
U701
J730
+5V
CHANNEL SELECT
A-
A+
SPARE
J732
PTT (DLYD)
8,5V CONT.
SYNTH. PROGRAM-MING INPUT
EXT. CHANNEL SELECT
J910
A+
INTERNAL SPKR HI
CG DISABLE
A-
SPKR LO
A-
TONE KEY
FLTR'D VOL/SQ HI
SPKR HI
SPARE
A+
TO POWER CABLE
J906
MIC BLOCK
TONE OUTPUT
A-
TONE KEY
PTT (TO RELAY)
VOL/SQ HI
PTT
RX MUTE
8,5V CONT.
8,5V TX
MUTE
ALARM
FIVE TONE SEQ
J903
VOL/SQ HI
RX MUTE
A+
SPKR HI
FLTR'D VOL/SQ HI
8,5V CONT.
8,5V TX
RX
J911
EXT. CHANNEL SELECT
MIC. HI
MIC. LO
PTT
A-
TO MICROPHONE
TX FRQ.

Storno





NOTE1: IN CQM5000 US, H1-H19 AND H20-H33 SHALL BE OMITTED INSTEAD H20-H50 SHALL BE INSTALLED

NOTE2: IF THE PREVIOUSLY USED CG UNITS TO5003 TR5001 TT5001 OR FN5001 ARE USED, H20-H33, H7-H8 SHALL BE OMITTED AND H20-H50 INSTALLED

THE TABLES BELOW SHOW WHICH STRAPS THAT HAVE TO BE REMOVED WHEN DIFFERENT TONE - OPTIONS (T - NUMBERS) ARE INSTALLED IN CQM5000 SETS.

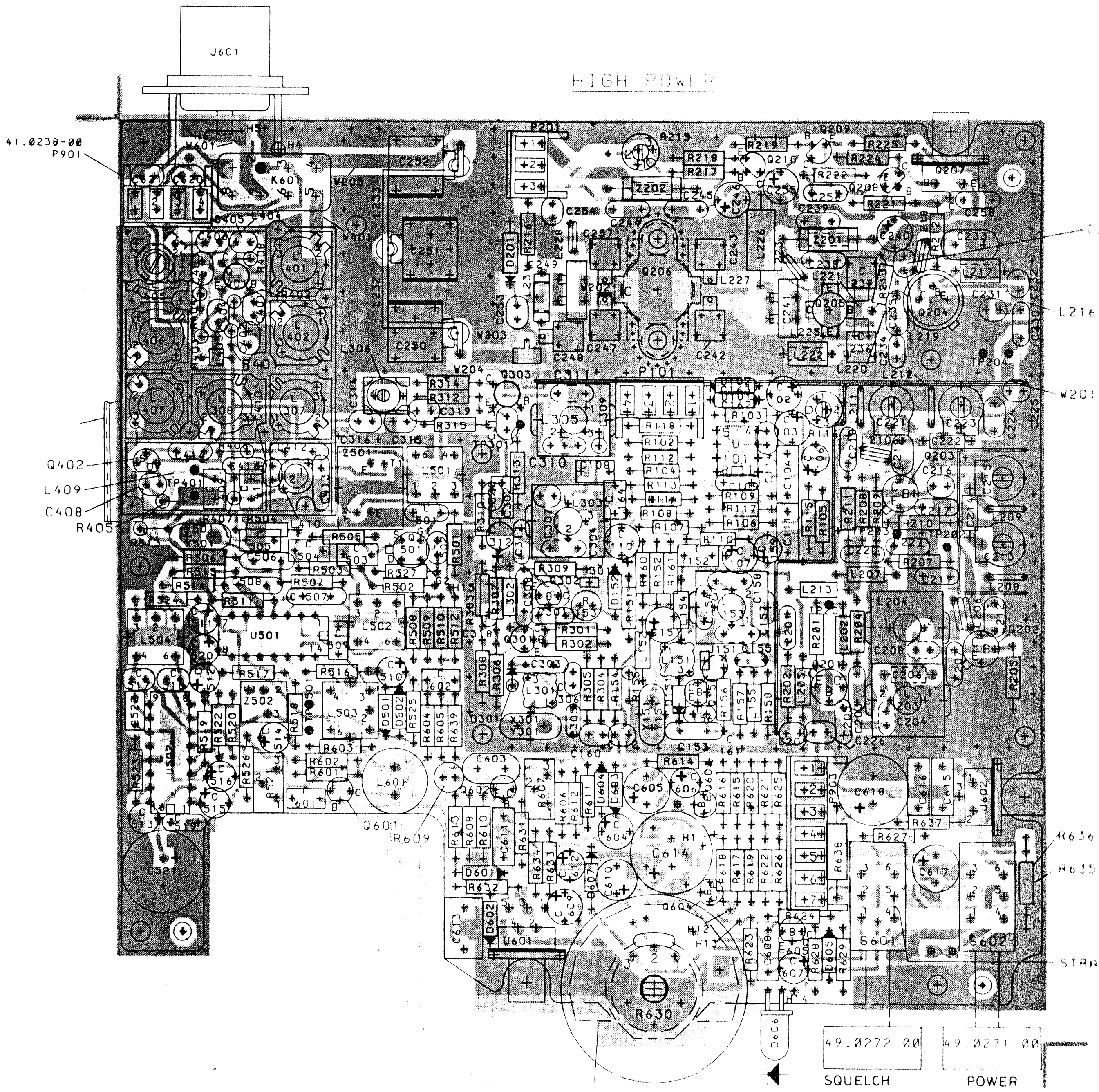
	TO	T1 TO T4 INCL. T25 TO T28 INCL.	T5 TO T8 INCL.	T9 TO T24 INCL. T29 TO T44 INCL.
H1 -H19	+	+	+	+
H3 -H4 H5 -H6	+	−	+	−
H7 -H8 H9 -H10 H20-H33	+	+	−	−

FREQUENCY SYNTHESIZER FS5661, FS5662

D402.926

Storno

Storn



RF UNITS RF5660b, RF5550
COMPONENT LAYO
D403 207

Nº	CODE	DATA	
C701	19A700233P5	470 pF Capacitor Ceramic	50 V
C702	19J706005P3	47 uF Capacitor Electrolytic	16 V
C703	19A700233P5	470 pF Capacitor Ceramic	50 V
C704	19A700233P5	470 pF Capacitor Ceramic	50 V
C705	19A700233P7	1 nF Capacitor Ceramic	50 V
C706	19A700003P7	10 uF Capacitor Tantalum	16 V
C707	19A700233P5	470 pF Capacitor Ceramic	50 V
C708	19A700233P5	470 pF Capacitor Ceramic	50 V
C711	19A700003P1	0. 1 uF Capacitor Tantalum	35 V
C712	19A700003P5	2. 2 uF Capacitor Tantalum	35 V
C713	19A700235P28	180 pF Capacitor Ceramic	50 V
C714	19J706256P202	18 pF N1500 Capacitor Ceramic	
C715	19J706256P205	68 pF N1500 Capacitor Ceramic	
C716	19A700233P5	470 pF Capacitor Ceramic	50 V
C717	19A700235P19	33 pF Capacitor Ceramic	50 V
C718	19A700235P7	3. 3 pF Capacitor Ceramic	50 V
C719	19A700235P18	27 pF Capacitor Ceramic	50 V
C720	19A700233P7	1 nF Capacitor Ceramic	50 V
C721	19A700235P7	3. 3 pF Capacitor Ceramic	50 V
C722	19A700235P19	33 pF Capacitor Ceramic	50 V
C723	19A700235P18	27 pF Capacitor Ceramic	50 V
C724	19A700233P5	470 pF Capacitor Ceramic	50 V
C725	19J706256P202	18 pF N1500 Capacitor Ceramic	50 V
C726	19J706256P205	68 pF N1500 Capacitor Ceramic	50 V
C727	19A700235P28	180 pF Capacitor Ceramic	50 V
C728	19A700003P7	10 uF Capacitor Tantalum	16 V
C729	19A700233P5	470 pF Capacitor Ceramic	50 V
C730	19A700003P6	4. 7 uF Capacitor Tantalum	35 V
C731	19A700233P2	150 pF Capacitor Ceramic	50 V
C732	19A700235P7	3. 3 pF Capacitor Ceramic	50 V
C733	19A700013P8	0. 39 pF Capacitor Phenolic	500 V
C734	19A700233P5	470 pF Capacitor Ceramic	50 V
C735	19A700233P7	1 nF Capacitor Ceramic	50 V
C736	19A700235P8	3. 9 pF Capacitor Ceramic	50 V
C737	19J706003P1	1. 8-10 pF Capacitor Variable	
C738	19A700235P13	10 pF Capacitor Ceramic	50 V
C739	19A700003P4	1 uF Capacitor Tantalum	35 V
C740	19A700235P23	68 pF Capacitor Ceramic	50 V
C741	19A700003P7	10 uF Capacitor Tantalum	16 V
C742	19A700235P7	3. 3 pF Capacitor Ceramic	50 V
C743	19A700233P5	470 pF Capacitor Ceramic	50 V
C744	19A700235P11	6. 8 pF Capacitor Ceramic	50 V
C745	19J706003P1	1. 8-10 pF Capacitor Variable	
C746	19A700235P13	10 pF Capacitor Ceramic	50 V
C747	19A700003P4	1 uF Capacitor Tantalum	35 V
C748	19A700233P7	1 nF Capacitor Ceramic	50 V
C749	19A700235P8	3. 9 pF Capacitor Ceramic	50 V

Storno

Nº	CODE	DATA	
C750	19A700233P1	100 pF Capacitor Ceramic	50 V
C751	19A700003P5	2. 2 uF Capacitor Tantalum	35 V
C752	19A700233P7	1 nF Capacitor Ceramic	50 V
C753	19A700233P2	150 pF Capacitor Ceramic	50 V
C754	19A700235P18	27 pF Capacitor Ceramic	50 V
C755	19A700003P4	1 uF Capacitor Tantalum	35 V
C756	19A700003P7	10 uF Capacitor Tantalum	35 V
C757	19A700233P7	1 nF Capacitor Ceramic	50 V
C758	19A700233P8	1. 5 nF Capacitor Ceramic	50 V
C759	19A700003P4	1 uF Capacitor Tantalum	35 V
C760	19A700003P3	0. 47 uF Capacitor Tantalum	35 V
C761	19A700233P7	1 nF Capacitor Ceramic	50 V
C762	19A700233P2	150 pF Capacitor Ceramic	50 V
C763	19A700233P7	1 nF Capacitor Ceramic	50 V
C764	19A700235P6	2. 7 pF Capacitor Ceramic	50 V
C765	19A700233P2	150 pF Capacitor Ceramic	50 V
C766	19A700233P2	150 pF Capacitor Ceramic	50 V
C767	19A700233P2	150 pF Capacitor Ceramic	50 V
C768	19A700233P2	150 pF Capacitor Ceramic	50 V
C769	19A700235P16	18 pF Capacitor Ceramic	50 V
C770	19A700233P2	150 pF Capacitor Ceramic	50 V
C771	19A700233P5	470 pF Capacitor Ceramic	50 V
C772	19A700233P5	470 pF Capacitor Ceramic	50 V
C773	19A700233P2	150 pF Capacitor Ceramic	50 V
C774	19A700233P2	150 pF Capacitor Ceramic	50 V
C776	19A700235P13	10 pF Capacitor Ceramic	50 V
C777	19A700233P5	470 pF Capacitor Ceramic	50 V
C780	19A700233P7	1 nF Capacitor Ceramic	50 V
C781	19J706005P5	220 uF Capacitor Electrolytic	16 V
C782	19A700233P7	1 nF Capacitor Ceramic	50 V
C783	19A700235P19	33 pF Capacitor Ceramic	50 V
C784	19A700233P7	1 nF Capacitor Ceramic	50 V
C785	19A700233P7	1 nF Capacitor Ceramic	50 V
C791	19J706261P1	22 nF Capacitor Polyester	100 V
C792	19A700233P1	100 pF Capacitor Ceramic	50 V
C793	19A700233P1	100 pF Capacitor Ceramic	50 V
D721	19A700028P1	1N4148 Diode Silicon	
D722	19A700028P1	1N4148 Diode Silicon	
D723	19A706262P1	Variable Cap. Diode	
D724	19J706262P1	Variable Cap. Diode	

FREQUENCY SYNTHESIZER FS5661

X403.049

Nº	CODE	DATA	
R753	19A700019P37	1 Kohm Resistor Depos.	0.25 W
R754	19A700019P25	100 ohm Resistor Depos.	0.25 W
R761	19A700019P13	10 ohm Resistor Depos.	0.25 W
R763	19A700019P51	15 Kohm Resistor Depos.	0.25 W
R765	19A700019P26	120 ohm Resistor Depos.	0.25 W
R769	19A700019P35	820 ohm Resistor Depos.	0.25 W
R770	19A700019P42	2.7 Kohm Resistor Depos.	0.25 W
R771	19A700019P15	15 ohm Resistor Depos.	0.25 W
R772	19A700019P57	47 Kohm Resistor Depos.	0.25 W
R773	19A700019P55	33 Kohm Resistor Depos.	0.25 W
R774	19A700019P50	12 Kohm Resistor Depos.	0.25 W
R775	19A700019P33	470 ohm Resistor Depos.	0.25 W
R776	19A700010P37	1 Kohm Resistor Depos.	0.25 W
R777	19A700019P21	47 ohm Resistor Depos.	0.25 W
R778	19A700019P25	100 ohm Resistor Depos.	0.25 W
R779	19A700019P35	680 ohm Resistor Depos.	0.25 W
R780	19A700019P23	68 ohm Resistor Depos.	0.25 W
R781	19A700019P19	33 ohm Resistor Depos.	0.25 W
R782	19A700019P44	3.9 Kohm Resistor Depos.	0.25 W
R783	19A700019P27	150 ohm Resistor Depos.	0.25 W
R784	19A700019P25	100 ohm Resistor Depos.	0.25 W
R785	19A700019P39	1.5 Kohm Resistor Depos.	0.25 W
R786	19A700019P31	330 ohm Resistor Depos.	0.25 W
R787	19A700019P43	3.3 Kohm Resistor Depos.	0.25 W
R788	19A700019P26	120 ohm Resistor Depos.	0.25 W
R789	19A700019P34	560 ohm Resistor Depos.	0.25 W
R791	19A700019P28	180 ohm Resistor Depos.	0.25 W
R792	19A700019P38	1.2 Kohm Resistor Depos.	0.25 W
R793	19A700019P17	22 ohm Resistor Depos.	0.25 W
R794	19A700019P17	22 ohm Resistor Depos.	0.25 W
R798	19A700019P37	1 Kohm Resistor Depos.	0.25 W
R799	19A700019P54	27 Kohm Resistor Depos.	0.25 W
T701	19J706284G1	Transformer	
U701	19J706263P1	MC145106	
U702	19J706238P1	TDA1062 IC	
U703	19A700029P44	4066B IC	

Storno

Nº	CODE	DATA

FREQUENCY SYNTHESIZER FS5661

X403.049

Storno

Nº	CODE	DATA	
D725	19A700073P1	BB409 Variable Cap. Diode	
D726	19A700073P1	BB409 Variable Cap. Diode	
D727	19A700073P1	BB409 Variable Cap. Diode	
D733	19J706006P2	BA282 Diode	
D734	19J706006P2	BA282 Diode	
D741	19J706026P1	1N5401 Diode Silicon	
D742	19J706026P1	1N5401 Diode Silicon	
J730	19J706215P108	Male Connector	8 pin
J732	19J706215P114	Male Connector	14 pin
J901	19J706214P4	Male Connector	4 pin
J902	19J706214P4	Male Connector	4 pin
J903	19J706214P7	Male Connector	7 pin
J904	19A700072P28	Male Connector	2 pin
J905	19A700072P9	Male Connector	10 pin
J906	19A700072P11	Male Connector	12 pin
J907	19A700102P21	Female Connector	3 pin
J910	19J706223P11	Male Connector	11 pos
J911	19J706223P8	Male Connector	8 pos
J921	19J706219P1		pin
J961	19J706219P1		pin
L701	19J706029P4	Variable Coil	
L702	19A700024P15	1.5 uH Coil	
L703	19A700024P15	1.5 uH Coil	
L704	19J706083P1	Coil	
L705	19A700024P19	3.3 uH Coil	
L706	19A700024P19	3.3 uH Coil	
L707	19J706083P1	Variable Coil	
L708	19A700024P15	1.5 uH Coil	
L711	19J706029P4	Variable Coil	
L712	19A700024P19	3.3 uH Coil	
L713	19A700024P19	3.3 uH Coil	
L714	19J706258P1	Coil	
L715	19A700024P19	3.3 uH Coil	
L716	19A700024P19	3.3 uH Coil	
L717	19J706258P1	Coil	
L718	19A700024P19	3.3 uH Coil	
L721	19A700024P23	6.8 uH Coil	
L722	19A700024P3	0.15 uH Coil	
L723	19A700024P3	0.15 uH Coil	
Q702	19A700020P1	BC558 Transistor	
Q703	19A700020P1	BC558 Transistor	
Q704	19A700020P1	BC558 Transistor	
Q711	19A700017P2	BC548 Transistor	
Q713	19J706283P1	BFR54 Transistor	
[illegible]	19J706283P1	BFR54 Transistor	

Storno

Nº	CODE	DATA	
Q716	19J706038P1	2N5245 Transistor	
Q717	19J706038P1	2N5245 Transistor	
Q722	19J706146P1	BF357S Transistor	
Q723	19J706164P1	BF414 Transistor	
Q724	19J706146P1	BF357S Transistor	
R704	19A700019P34	560 ohm Resistor Depos.	0.25 W
R705	19A700019P42	2.7 Kohm Resistor Depos.	0.25 W
R706	19A700019P21	47 ohm Resistor Depos.	0.25 W
R707	19A700019P49	10 Kohm Resistor Depos.	0.25 W
R708	19A700019P49	10 Kohm Resistor Depos.	0.25 W
R709	19A700019P42	2.7 Kohm Resistor Depos.	0.25 W
R711	19A700019P42	2.7 Kohm Resistor Depos.	0.25 W
R712	19A700019P49	10 Kohm Resistor Depos.	0.25 W
R713	19A700019P17	22 ohm Resistor Depos.	0.25 W
R714	19A700019P17	22 ohm Resistor Depos.	0.25 W
R720	19A700019P37	1 Kohm Resistor Depos.	0.25 W
R721	19A700019P45	4.7 Kohm Resistor Depos.	0.25 W
R722	19A700019P60	82 Kohm Resistor Depos.	0.25 W
R723	19A700019P58	56 Kohm Resistor Depos.	0.25 W
R724	19A700019P49	10 Kohm Resistor Depos.	0.25 W
R725	19A700019P57	47 Kohm Resistor Depos.	0.25 W
R726	19A700019P49	10 Kohm Resistor Depos.	0.25 W
R727	19A700019P30	270 ohm Resistor Depos.	0.25 W
R728	19A700019P48	8.2 Kohm Resistor Depos.	0.25 W
R729	19A700019P30	270 ohm Resistor Depos.	0.25 W
R730	19A700019P45	4.7 Kohm Resistor Depos.	0.25 W
R732	19A700019P49	10 Kohm Resistor Depos.	0.25 W
R733	19A700019P48	8.2 Kohm Resistor Depos.	0.25 W
R734	19A700019P35	680 ohm Resistor Depos.	0.25 W
R735	19A700029P57	47 Kohm Resistor Depos.	0.25 W
R736	19A700029P31	330 ohm Resistor Depos.	0.25 W
R737	19A700019P31	330 ohm Resistor Depos.	0.25 W
R738	19A700019P25	100 ohm Resistor Depos.	0.25 W
R739	19A700019P39	1.5 Kohm Resistor Depos.	0.25 W
R741	19A700019P43	3.3 Kohm Resistor Depos.	0.25 W
R742	19A700019P37	1 Kohm Resistor Depos.	0.25 W
R743	19A700019P25	100 ohm Resistor Depos.	0.25 W
R748	19A700019P27	150 ohm Resistor Depos.	0.25 W
R749	19A700019P25	100 ohm Resistor Depos.	0.25 W
R750	19A700019P57	47 Kohm Resistor Depos.	0.25 W
R752	19A700016P3	4.7 Kohm Resistor Variable	

Nº	CODE	DATA	
C701	19A700233P5	470 pF Capacitor Ceramic	50 V
C702	19J706005P3	47 uF Capacitor Electrolytic	16 V
C703	19A700233P5	470 pF Capacitor Ceramic	50 V
C704	19A700233P5	470 pF Capacitor Ceramic	50 V
C705	19A700233P7	1 nF Capacitor Ceramic	50 V
C706	19A700003P7	10 uF Capacitor Tantalum	16 V
C707	19A700233P5	470 pF Capacitor Ceramic	50 V
C708	19A700233P5	470 pF Capacitor Ceramic	50 V
C711	19A700003P1	0.1 uF Capacitor Tantalum	35 V
C712	19A700003P5	2.2 uF Capacitor Tantalum	35 V
C713	19A700235P28	180 pF Capacitor Ceramic	50 V
C714	19J706256P202	18 pF N1500 Capacitor Ceramic	
C715	19J706256P205	68 pF N1500 Capacitor Ceramic	
C716	19A700233P5	470 pF Capacitor Ceramic	50 V
C717	19A700235P19	33 pF Capacitor Ceramic	50 V
C718	19A700235P7	3.3 pF Capacitor Ceramic	50 V
C719	19A700235P18	27 pF Capacitor Ceramic	50 V
C720	19A700233P7	1 nF Capacitor Ceramic	50 V
C721	19A700235P7	3.3 pF Capacitor Ceramic	50 V
C722	19A700235P19	33 pF Capacitor Ceramic	50 V
C723	19A700235P18	27 pF Capacitor Ceramic	50 V
C724	19A700233P5	470 pF Capacitor Ceramic	50 V
C725	19J706256P202	18 pF N1500 Capacitor Ceramic	50 V
C726	19J706256P205	68 pF N1500 Capacitor Ceramic	50 V
C727	19A700235P28	180 pF Capacitor Ceramic	50 V
C728	19A700003P7	10 uF Capacitor Tantalum	16 V
C729	19A700233P5	470 pF Capacitor Ceramic	50 V
C730	19A700003P6	4.7 uF Capacitor Tantalum	35 V
C731	19A700233P2	150 pF Capacitor Ceramic	50 V
C732	19A700235P7	3.3 pF Capacitor Ceramic	50 V
C733	19A700013P8	0.39 pF Capacitor Phenolic	500 V
C734	19A700233P5	470 pF Capacitor Ceramic	50 V
C735	19A700233P7	1 nF Capacitor Ceramic	50 V
C736	19A700235P8	3.9 pF Capacitor Ceramic	50 V
C737	19J706003P1	1.8-10 pF Capacitor Variable	
C738	19A700235P13	10 pF Capacitor Ceramic	50 V
C739	19A700003P4	1 uF Capacitor Tantalum	35 V
C740	19A700235P23	68 pF Capacitor Ceramic	50 V
C741	19A700003P7	10 uF Capacitor Tantalum	16 V
C742	19A700235P7	3.3 pF Capacitor Ceramic	50 V
C743	19A700233P5	470 pF Capacitor Ceramic	50 V
C744	19A700235P11	6.8 pF Capacitor Ceramic	50 V
C745	19J706003P1	1.8-10 pF Capacitor Variable	
C746	19A700235P13	10 pF Capacitor Ceramic	50 V
C747	19A700003P4	1 uF Capacitor Tantalum	35 V
C748	19A700233P7	1 nF Capacitor Ceramic	50 V

Storno

Nº	CODE	DATA	
C749	19A700235P8	3.9 pF Capacitor Ceramic	50 V
C750	19A700233P1	100 pF Capacitor Ceramic	50 V
C751	19A700003P5	2.2 uF Capacitor Tantalum	35 V
C752	19A700233P7	1 nF Capacitor Ceramic	50 V
C753	19A700233P2	150 pF Capacitor Ceramic	50 V
C754	19A700235P18	27 pF Capacitor Ceramic	50 V
C755	19A700003P4	1 uF Capacitor Tantalum	35 V
C756	19A700003P7	10 uF Capacitor Tantalum	35 V
C757	19A700233P7	1 nF Capacitor Ceramic	50 V
C758	19A700233P8	1.5 nF Capacitor Ceramic	50 V
C759	19A700003P4	1 uF Capacitor Tantalum	35 V
C760	19A700003P3	0.47 uF Capacitor Tantalum	35 V
C761	19A700233P7	1 nF Capacitor Ceramic	50 V
C762	19A700233P2	150 pF Capacitor Ceramic	50 V
C763	19A700233P7	1 nF Capacitor Ceramic	50 V
C764	19A700235P6	2.7 pF Capacitor Ceramic	50 V
C765	19A700233P2	150 pF Capacitor Ceramic	50 V
C766	19A700233P2	150 pF Capacitor Ceramic	50 V
C767	19A700233P2	150 pF Capacitor Ceramic	50 V
C768	19A700233P2	150 pF Capacitor Ceramic	50 V
C769	19A700235P16	18 pF Capacitor Ceramic	50 V
C770	19A700233P2	150 pF Capacitor Ceramic	50 V
C771	19A700233P5	470 pF Capacitor Ceramic	50 V
C772	19A700233P5	470 pF Capacitor Ceramic	50 V
C773	19A700233P2	150 pF Capacitor Ceramic	50 V
C774	19A700233P2	150 pF Capacitor Ceramic	50 V
C776	19A700235P13	10 pF Capacitor Ceramic	50 V
C777	19A700233P5	470 pF Capacitor Ceramic	50 V
C780	19A700233P7	1 nF Capacitor Ceramic	50 V
C781	19J706005P5	220 uF Capacitor Electrolytic	16 V
C782	19A700233P7	1 nF Capacitor Ceramic	50 V
C783	19A700235P19	33 pF Capacitor Ceramic	50 V
C784	19A700233P7	1 nF Capacitor Ceramic	50 V
C785	19A700233P7	1 nF Capacitor Ceramic	50 V
C791	19J706261P1	22 nF Capacitor Polyester	100 V
C792	19A700233P1	100 pF Capacitor Ceramic	50 V
C793	19A700233P1	100 pF Capacitor Ceramic	50 V
D701	19A700028P1	1N4148 Diode Silicon	
D702	19A700028P1	1N4148 Diode Silicon	
D703	19A700028P1	1N4148 Diode Silicon	

FREQUENCY SYNTHESIZER FS5662

X403.050

Nº	CODE	DATA	
R726	19A700019P49	10 Kohm Resistor Depos.	0.25 W
R727	19A700019P30	270 ohm Resistor Depos.	0.25 W
R728	19A700019P48	8.2 Kohm Resistor Depos.	0.25 W
R729	19A700019P30	270 ohm Resistor Depos.	0.25 W
R730	19A700019P45	4.7 Kohm Resistor Depos.	0.25 W
R732	19A700019P49	10 Kohm Resistor Depos.	0.25 W
R733	19A700019P48	8.2 Kohm Resistor Depos.	0.25 W
R734	19A700019P35	680 ohm Resistor Depos.	0.25 W
R735	19A700029P57	47 Kohm Resistor Depos.	0.25 W
R736	19A700029P31	330 ohm Resistor Depos.	0.25 W
R737	19A700019P31	330 ohm Resistor Depos.	0.25 W
R738	19A700019P25	100 ohm Resistor Depos.	0.25 W
R739	19A700019P39	1.5 Kohm Resistor Depos.	0.25 W
R741	19A700019P43	3.3 Kohm Resistor Depos.	0.25 W
R742	19A700019P37	1 Kohm Resistor Depos.	0.25 W
R743	19A700019P25	100 ohm Resistor Depos.	0.25 W
R748	19A700019P27	150 ohm Resistor Depos.	0.25 W
R749	19A700019P25	100 ohm Resistor Depos.	0.25 W
R750	19A700019P57	47 Kohm Resistor Depos.	0.25 W
R752	19A700016P3	4.7 Kohm Resistor Variable	
R753	19A700019P37	1 Kohm Resistor Depos.	0.25 W
R754	19A700019P25	100 ohm Resistor Depos.	0.25 W
R761	19A700019P13	10 ohm Resistor Depos.	0.25 W
R763	19A700019P51	15 Kohm Resistor Depos.	0.25 W
R765	19A700019P26	120 ohm Resistor Depos.	0.25 W
R769	19A700019P35	820 ohm Resistor Depos.	0.25 W
R770	19A700019P42	2.7 Kohm Resistor Depos.	0.25 W
R771	19A700019P15	15 ohm Resistor Depos.	0.25 W
R772	19A700019P57	47 Kohm Resistor Depos.	0.25 W
R773	19A700019P55	33 Kohm Resistor Depos.	0.25 W
R774	19A700019P50	12 Kohm Resistor Depos.	0.25 W
R775	19A700019P33	470 ohm Resistor Depos.	0.25 W
R776	19A700010P37	1 Kohm Resistor Depos.	0.25 W
R777	19A700019P21	47 ohm Resistor Depos.	0.25 W
R778	19A700019P25	100 ohm Resistor Depos.	0.25 W
R779	19A700019P35	680 ohm Resistor Depos.	0.25 W
R780	19A700019P23	68 ohm Resistor Depos.	0.25 W
R781	19A700019P19	33 ohm Resistor Depos.	0.25 W
R782	19A700019P44	3.9 Kohm Resistor Depos.	0.25 W
R783	19A700019P27	150 ohm Resistor Depos.	0.25 W
R784	19A700019P25	100 ohm Resistor Depos.	0.25 W
R785	19A700019P39	1.5 Kohm Resistor Depos.	0.25 W
R786	19A700019P31	330 ohm Resistor Depos.	0.25 W
R787	19A700019P43	3.3 Kohm Resistor Depos.	0.25 W
R788	19A700019P26	120 ohm Resistor Depos.	0.25 W
R789	19A700019P34	560 ohm Resistor Depos.	0.25 W
R791	19A700019P28	180 ohm Resistor Depos.	0.25 W

Storno

Nº	CODE	DATA	
R792	19A700019P38	1.2 Kohm Resistor Depos.	0.25 W
R793	19A700019P17	22 ohm Resistor Depos.	0.25 W
R794	19A700019P17	22 ohm Resistor Depos.	0.25 W
R798	19A700019P37	1 Kohm Resistor Depos.	0.25 W
R799	19A700019P54	27 Kohm Resistor Depos.	0.25 W
S901	19J706322G1	Channel Switch	
T701	19J706284G1	Transformer	
U701	19J706263P1	MC145106	
U702	19J706238P1	TDA1062 IC	
U703	19A700029P44	4066B IC	

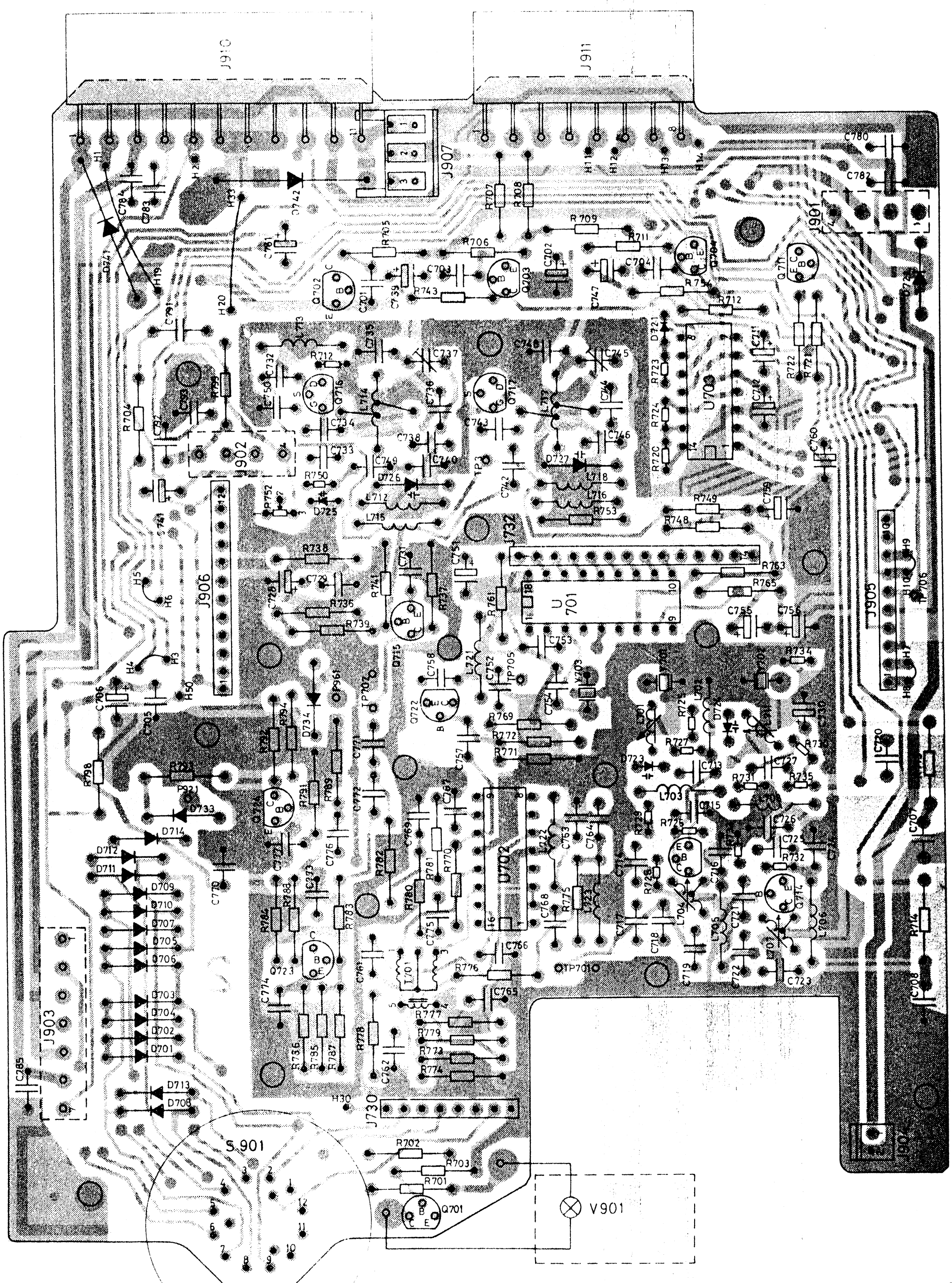
FREQUENCY SYNTHESIZER FS5662

X403.050

Nº	CODE	DATA
D704	19A700028P1	1N4148 Diode Silicon
D705	19A700028P1	1N4148 Diode Silicon
D706	19A700028P1	1N4148 Diode Silicon
D707	19A700028P1	1N4148 Diode Silicon
D708	19A700028P1	1N4148 Diode Silicon
D709	19A700028P1	1N4148 Diode Silicon
D710	19A700028P1	1N4148 Diode Silicon
D711	19A700028P1	1N4148 Diode Silicon
D712	19A700028P1	1N4148 Diode Silicon
D713	19A700028P1	1N4148 Diode Silicon
D714	19A700028P1	1N4148 Diode Silicon
D721	19A700028P1	1N4148 Diode Silicon
D722	19A700028P1	1N4148 Diode Silicon
D723	19A706262P1	Variable Cap. Diode
D724	19J706262P1	Variable Cap. Diode
D725	19A700073P1	BB409 Variable Cap. Diode
D726	19A700073P1	BB409 Variable Cap. Diode
D727	19A700073P1	BB409 Variable Cap. Diode
D733	19J706006P2	BA282 Diode
D734	19J706006P2	BA282 Diode
D741	19J706026P1	1N5401 Diode Silicon
D742	19J706026P1	1N5401 Diode Silicon
J730	19J706215P108	Male Connector 8 pin
J732	19J706215P114	Male Connector 14 pin
J901	19J706214P4	Male Connector 4 pin
J902	19J706214P4	Male Connector 4 pin
J903	19J706214P7	Male Connector 7 pin
J904	19A700072P28	Male Connector 2 pin
J905	19A700072P9	Male Connector 10 pin
J906	19A700072P11	Male Connector 12 pin
J907	19A700102P21	Female Connector 3 pin
J910	19J706223P11	Male Connector 11 pos
J911	19J706223P8	Male Connector 8 pos
J921	19J706219P1	pin
J961	19J706219P1	pin
L701	19J706029P4	Variable Coil
L702	19A700024P15	1.5 uH Coil
L703	19A700024P15	1.5 uH Coil
L704	19J706083P1	Coil
L705	19A700024P19	3.3 uH Coil
L706	19A700024P19	3.3 uH Coil
L707	19J706083P1	Variable Coil
L708	19A700024P15	1.5 uH Coil
L711	19J706029P4	Variable Coil

Nº	CODE	DATA
L714	19J706258P1	Coil
L715	19A700024P19	3.3 uH Coil
L716	19A700024P19	3.3 uH Coil
L717	19J706258P1	Coil
L718	19A700024P19	3.3 uH Coil
L721	19A700024P23	6.8 uH Coil
L722	19A700024P3	0.15 uH Coil
L723	19A700024P3	0.15 uH Coil
Q701	19A700017P1	BC548 Transistor
Q702	19A700020P1	BC558 Transistor
Q703	19A700020P1	BC558 Transistor
Q704	19A700020P1	BC558 Transistor
Q711	19A700017P2	BC548 Transistor
Q713	19J706283P1	BFR54 Transistor
Q714	19J706283P1	BFR54 Transistor
Q715	19J706264P1	BF414 Transistor
Q716	19J706038P1	2N5245 Transistor
Q717	19J706038P1	2N5245 Transistor
Q722	19J706146P1	BF357S Transistor
Q723	19J706164P1	BF414 Transistor
Q724	19J706146P1	BF357S Transistor
R701	19A700019P21	47 ohm Resistor Depos. 0.25 W
R702	19A700019P39	1.5 Kohm Resistor Depos. 0.25 W
R703	19A700019P53	22 Kohm Resistor Depos. 0.25 W
R704	19A700019P34	560 ohm Resistor Depos. 0.25 W
R705	19A700019P42	2.7 Kohm Resistor Depos. 0.25 W
R706	19A700019P21	47 ohm Resistor Depos. 0.25 W
R707	19A700019P49	10 Kohm Resistor Depos. 0.25 W
R708	19A700019P49	10 Kohm Resistor Depos. 0.25 W
R709	19A700019P42	2.7 Kohm Resistor Depos. 0.25 W
R711	19A700019P42	2.7 Kohm Resistor Depos. 0.25 W
R712	19A700019P49	10 Kohm Resistor Depos. 0.25 W
R713	19A700019P17	22 ohm Resistor Depos. 0.25 W
R714	19A700019P17	22 ohm Resistor Depos. 0.25 W
R720	19A700019P37	1 Kohm Resistor Depos. 0.25 W
R721	19A700019P45	4.7 Kohm Resistor Depos. 0.25 W
R722	19A700019P60	82 Kohm Resistor Depos. 0.25 W
R723	19A700019P58	56 Kohm Resistor Depos. 0.25 W
R724	19A700019P49	10 Kohm Resistor Depos. 0.25 W
R725	19A700019P57	47 Kohm Resistor Depos. 0.25 W

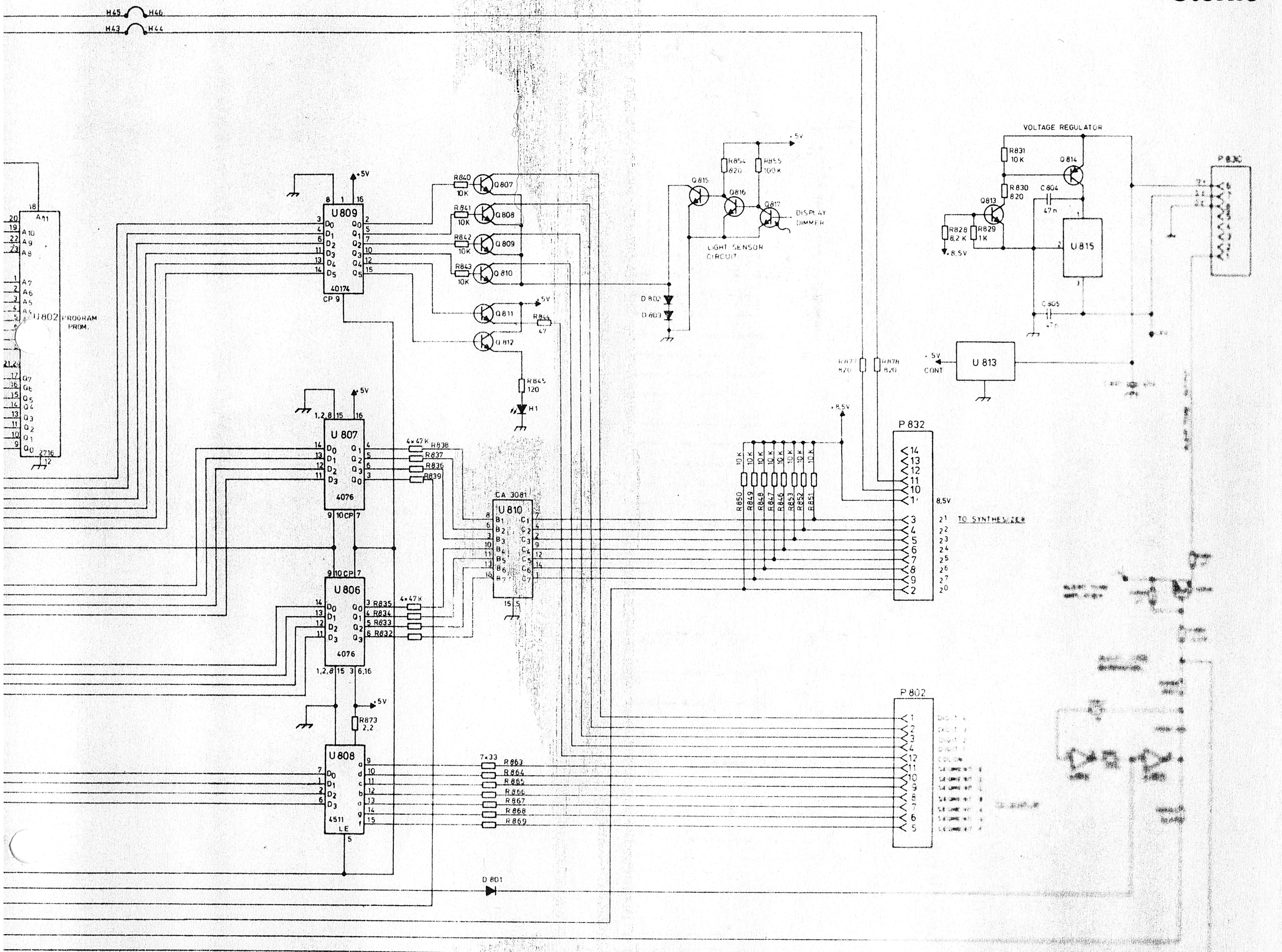
Storno



FREQUENCY SYNTHESIZER
FS5XX1 , FS5XX2

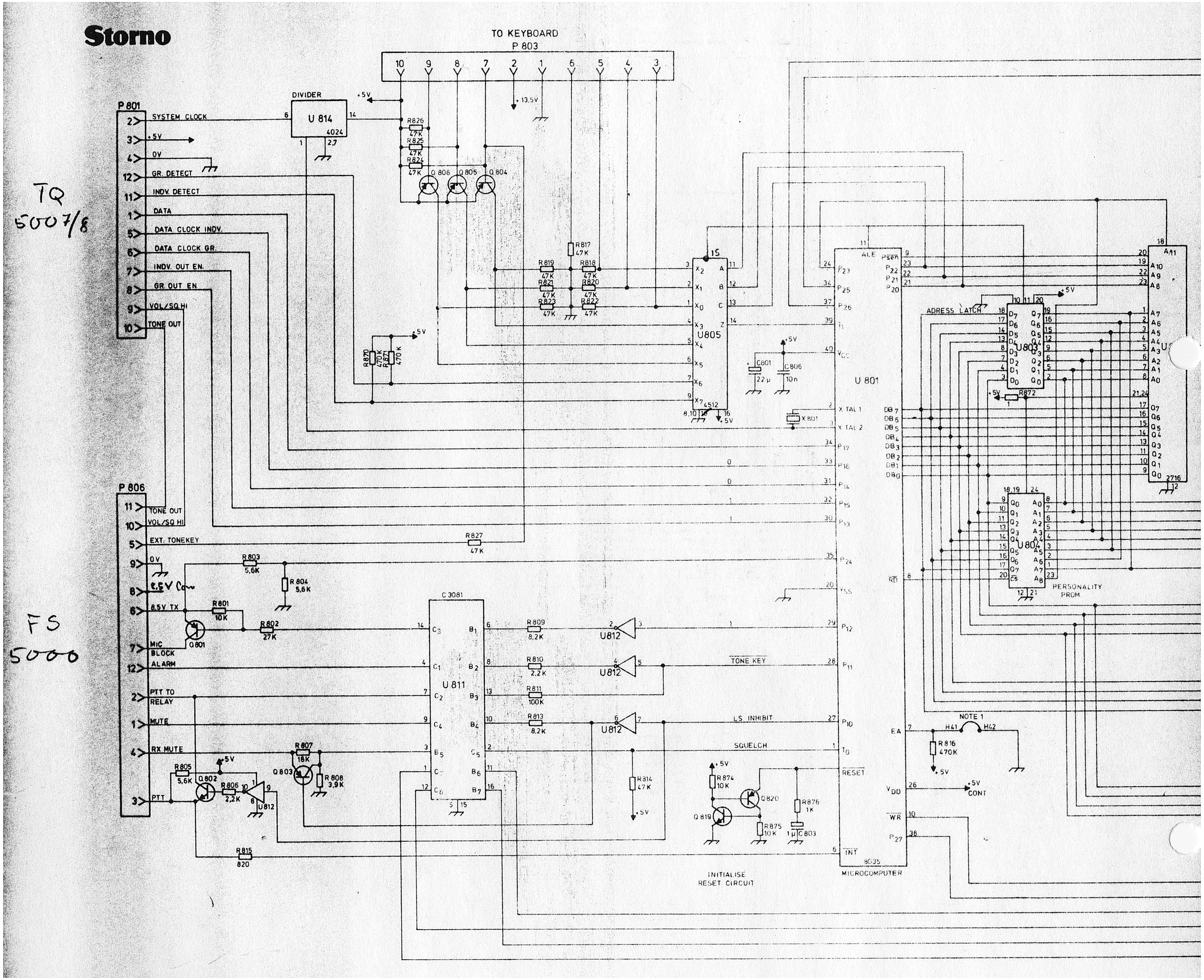
D402.886/2

Storno



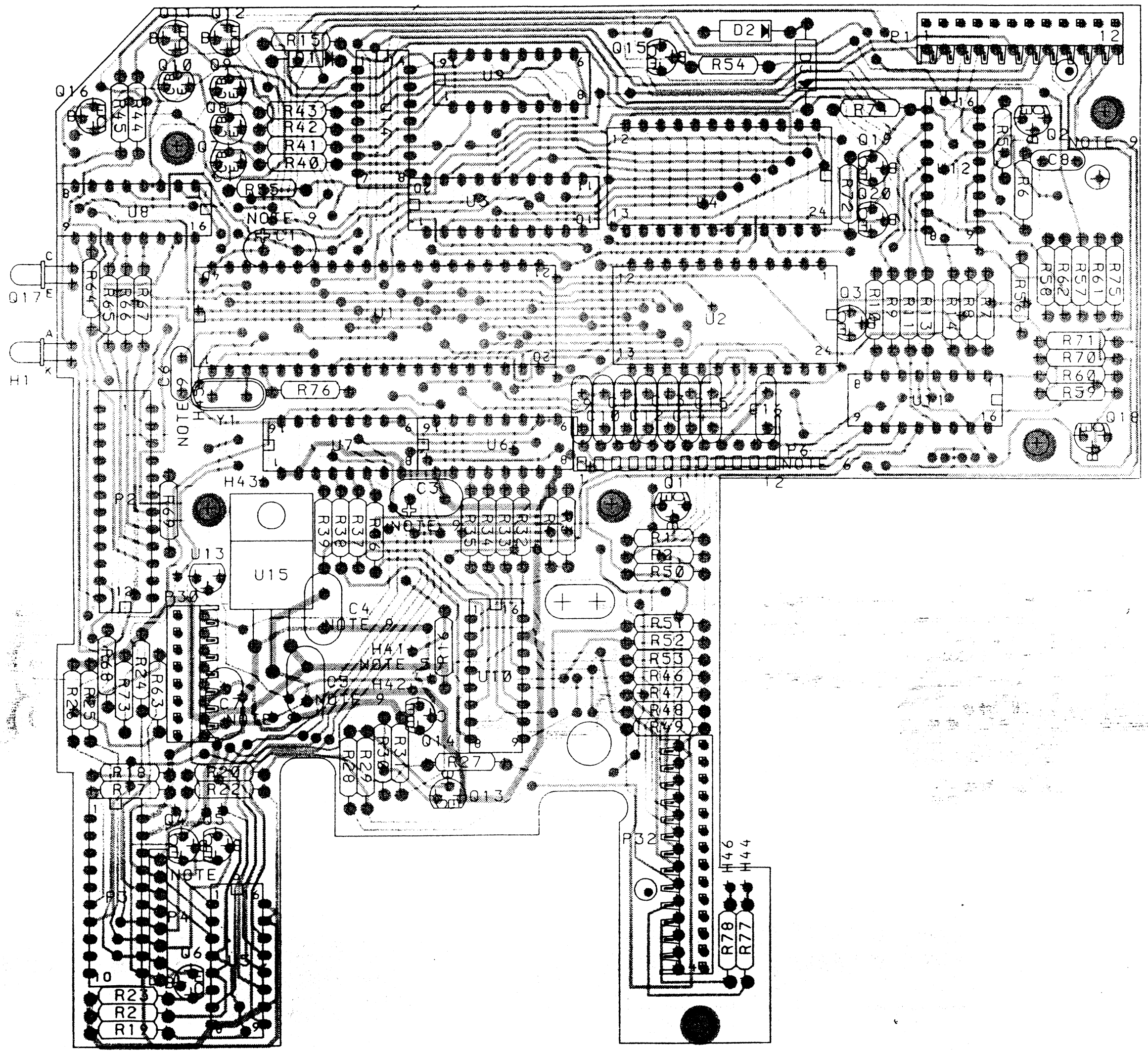
NOTE1 OMIT STRAP FOR E PROM
INSERT STRAP FOR INTERNAL PROGRAM MEMORY

Storno



TO KEYBOARD
P 803
P 801
SYSTEM CLOCK
+5V
0V
GR. DETECT
INDV. DETECT
DATA
DATA CLOCK INDV.
DATA CLOCK GR.
INDV. OUT EN.
GR. OUT EN.
VOL/SQ HI
TONE OUT
DIVIDER
U 814
4024
P 806
TONE OUT
VOL/SQ HI
EXT. TONEKEY
0V
8,5V TX
MIC BLOCK
ALARM
PTT TO RELAY
MUTE
RX MUTE
PTT
C 3081
U 811
U812
U805
4512
U 801
8035
MICROCOMPUTER
ADRESS LATCH
U803
U804
PERSONALITY PROM
2716
TONE KEY
LS. INHIBIT
SQUELCH
INITIALISE RESET CIRCUIT
NOTE 1
5V CONT
TQ 5007/8
FS 5000

Storno



CONTROL LOGIC CL5001

D403.039

NO	CODE	DATA	
C801	19J7063[illegible]9P8	22 uF Elco	
C803	19A701352P7	1 uF Elco	
C804	19A700005P11	47 NF Polyester	50 V
C805	19A700005P11	47 NF Polyester	50 V
C806	19A700005P7	10 NF Polyester	50 V
C807	19A700005P11	47 NF Polyester	50 V
C808	19A700005P9	22 NF Polyester	50 V
C809	19A700233P27	150 pF Ceramic	
C810	19A700233P27	150 pF Ceramic	
C811	19A700233P27	150 pF Ceramic	
C812	19A700233P27	150 pF Ceramic	
C813	19A700233P27	150 pF Ceramic	
C814	19A700233P27	150 pF Ceramic	
C815	19A700233P27	150 pF Ceramic	
C816	19A700233P27	150 pF Ceramic	
D801	19A700028P1	1N4148 Diode	
D802	19J706100P1	1N4004 Diode	
D803	19J706100P1	1N4004 Diode	
H1	19J706493P2	LED/YW	
P801	19A700041P11	Connector, Fem.	12 pos
P802	19J706143P4	Connector, Fem.	12 pos
P803	19J706143P2	Connector, Fem.	10 pos
P804	19J706215P8	Connector, Male, Test	8 pos
P806	19A700041P61	Connector, Fem.	12 pos
P830	19A700041P7	Connector, Fem.	8 pos
P832	19A700041P13	Connector, Fem.	14 pos
Q801	19A700020P1	BC308 Transistor	
Q802	19A700017P1	BC238 Transistor	
Q803	19A700020P1	BC308 Transistor	
Q804	19A700020P1	BC308 Transistor	
Q805	19A700020P1	BC308 Transistor	
Q806	19A700020P1	BC308 Transistor	
Q807	19J706133P1	MPSA13 Transistor	
Q808	19J706133P1	MPSA13 Transistor	
Q809	19J706133P1	MPSA13 Transistor	
Q810	19J706133P1	MPSA13 Transistor	
Q811	19A700017P1	BC238 Transistor	
Q812	19A700017P1	BC238 Transistor	
Q813	19A700017P1	BC238 Transistor	
Q814	19A700026P1	BC369 Transistor	
Q815	19A700017P1	BC238 Transistor	
Q816	19A700017P1	BC238 Transistor	
Q817	19J706036P1	BP103B111 Transistor, Photo	
Q818	19A700020P1	BC308 Transistor	
Q819	19A700017P1	BC238 Transistor	
Q820	19A700020P1	BC308 Transistor	
R801	19A700019P49	10 Kohm Resistor	0.25 W

Storno

NO	CODE	DATA	
R802	19A700019P54	27 Kohm Resistor	0.25 W
R803	19A700019P41	2.2 Kohm Resistor	0.25 W
R804	19A700019P38	1.2 Kohm Resistor	0.25 W
R805	19A700019P46	5.6 Kohm Resistor	0.25 W
R806	19A700019P41	2.2 Kohm Resistor	0.25 W
R807	19A700019P52	18 Kohm Resistor	0.25 W
R808	19A700019P44	3.9 Kohm Resistor	0.25 W
R809	19A700019P48	8.2 Kohm Resistor	0.25 W
R810	19A700019P41	2.2 Kohm Resistor	0.25 W
R811	19A700019P61	100 Kohm Resistor	0.25 W
R813	19A700019P48	8.2 Kohm Resistor	0.25 W
R814	19A700019P57	47 Kohm Resistor	0.25 W
R815	19A700019P36	820 ohm Resistor	0.25 W
R816	19A700010P69	470 Kohm Resistor	0.25 W
R817	19A700019P57	47 Kohm Resistor	0.25 W
R818	19A700019P57	47 Kohm Resistor	0.25 W
R819	19A700019P57	47 Kohm Resistor	0.25 W
R820	19A700019P57	47 Kohm Resistor	0.25 W
R821	19A700019P57	47 Kohm Resistor	0.25 W
R822	19A700019P57	47 Kohm Resistor	0.25 W
R823	19A700019P57	47 Kohm Resistor	0.25 W
R824	19A700019P57	47 Kohm Resistor	0.25 W
R825	19A700019P57	47 Kohm Resistor	0.25 W
R826	19A700019P57	47 Kohm Resistor	0.25 W
R827	19A700019P57	47 Kohm Resistor	0.25 W
R828	19A700019P48	8.2 Kohm Resistor	0.25 W
R829	19A700019P37	1 Kohm Resistor	0.25 W
R830	19A700018P40	1.8 Kohm Resistor	0.25 W
R831	19A700019P49	10 Kohm Resistor	0.25 W
R832	19A700019P57	47 Kohm Resistor	0.25 W
R833	19A700019P57	47 Kohm Resistor	0.25 W
R834	19A700019P57	47 Kohm Resistor	0.25 W
R835	19A700019P57	47 Kohm Resistor	0.25 W
R836	19A700019P57	47 Kohm Resistor	0.25 W
R837	19A700019P57	47 Kohm Resistor	0.25 W
R838	19A700019P57	47 Kohm Resistor	0.25 W
R839	19A700019P57	47 Kohm Resistor	0.25 W
R840	19A700019P49	10 Kohm Resistor	0.25 W
R841	19A700019P49	10 Kohm Resistor	0.25 W
R842	19A700019P49	10 Kohm Resistor	0.25 W
R843	19A700019P49	10 Kohm Resistor	0.25 W

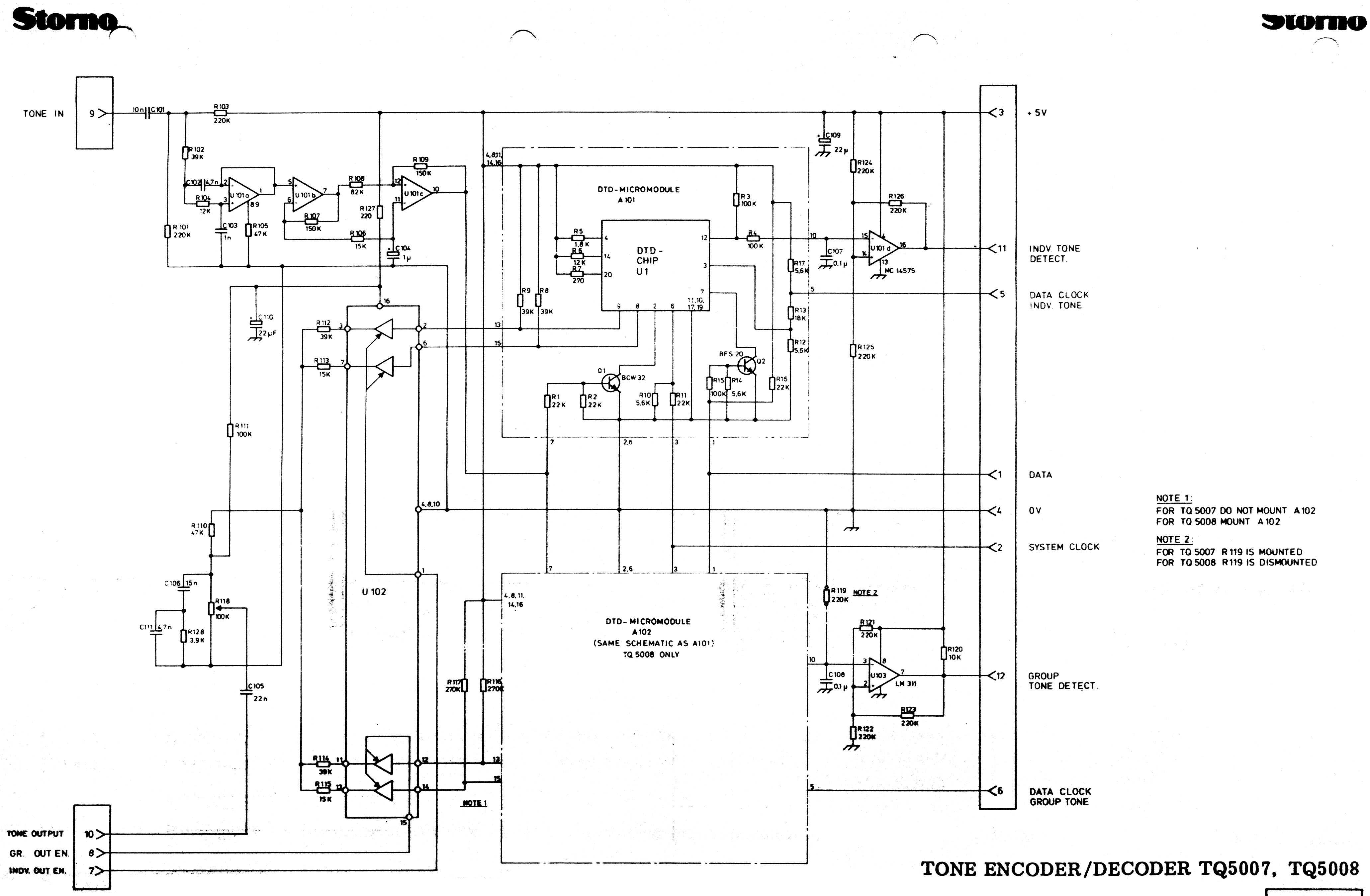
CONTROL LOGIC CL5001

Nº	CODE	DATA	
R844	19A700019P21	47 ohm Resistor	0.25 W
R845	19A700019P26	120 ohm Resistor	0.25 W
R846	19A700019P49	10 Kohm Resistor	0.25 W
R847	19A700010P49	10 Kohm Resistor	0.25 W
R848	19A700010P49	10 Kohm Resistor	0.25 W
R849	19A700019P49	10 Kohm Resistor	0.25 W
R850	19A700019P49	10 Kohm Resistor	0.25 W
R851	19A700019P49	10 Kohm Resistor	0.25 W
R852	19A700019P49	10 Kohm Resistor	0.25 W
R853	19A700019P49	10 Kohm Resistor	0.25 W
R854	19A700019P36	820 ohm Resistor	0.25 W
R855	19A700019P61	100 Kohm Resistor	0.25 W
R856	19A700019P48	8.2 Kohm Resistor	0.25 W
R857	19A700019P69	470 Kohm Resistor	0.25 W
R858	19A700019P58	56 Kohm Resistor	0.25 W
R859	19A700019P41	2.2 Kohm Resistor	0.25 W
R860	19A700019P41	2.2 Kohm Resistor	0.25 W
R861	19A700019P21	47 ohm Resistor	0.25 W
R862	19A700019P37	1 Kohm Resistor	0.25 W
R863	19A700019P19	33 ohm Resistor	0.25 W
R864	19A700019P19	33 ohm Resistor	0.25 W
R865	19A700019P19	33 ohm Resistor	0.25 W
R866	19A700019P19	33 ohm Resistor	0.25 W
R867	19A700019P19	33 ohm Resistor	0.25 W
R868	19A700019P19	33 ohm Resistor	0.25 W
R869	19A700019P19	33 ohm Resistor	0.25 W
R870	19A700019P69	470 Kohm Resistor	0.25 W
R871	19A700019P69	470 Kohm Resistor	0.25 W
R872	19A700019P1	1 ohm Resistor	0.25 W
R873	19A700019P5	2.2 ohm Resistor	0.25 W
R874	19A700019P49	10 Kohm Resistor	0.25 W
R875	19A700019P49	10 Kohm Resistor	0.25 W
R876	19A700019P37	1 Kohm Resistor	0.25 W
R877	19A700019P36	820 ohm Resistor	0.25 W
R878	19A700019P36	820 ohm Resistor	0.25 W
U801	19J706033P1	8035 Int. circuit	
U802	19J706385P1	2716 EProm, 16 K	
U803	19A7000037P115	64LS373 Int. Circuit	
U804	19A700117P1	512 x 8 Prom	
U805	19A700029P205	HEF4512 Int. Circuit	
U806	19A700029P59	HEF4076 Int. Circuit	
U807	19A700029P59	HEF4076 Int. Circuit	
U808	19A700029P204	HEF4511 Int. Circuit	
U809	19A700029P53	HEF40174 Int. Circuit	
U810	19A706383P1	CA3081 Int. Circuit	
U811	19J706383P1	CA3081 Int. Circuit	
U812	19A700176P1	HEF4049 Int. Circuit	

Storno

Nº	CODE	DATA	
U813	19J706031P1	78L05 Int. Circuit	
U814	19A700029P18	HEF4024 Int. Circuit	
U815	19J706032P1	MC7805 Int. Circuit	
X801	19J706331P6	Socket	40 pos
X802	19J706331P8	Socket	24 pos
X803	19J706331P8	Socket	24 pos
Y801	19J706635P1	Crystal	3.579545 MHz

CONTROL LOGIC CL5001



NOTE 1:
FOR TQ 5007 DO NOT MOUNT A102
FOR TQ 5008 MOUNT A102

NOTE 2:
FOR TQ 5007 R119 IS MOUNTED
FOR TQ 5008 R119 IS DISMOUNTED

TONE ENCODER/DECODER TQ5007, TQ5008

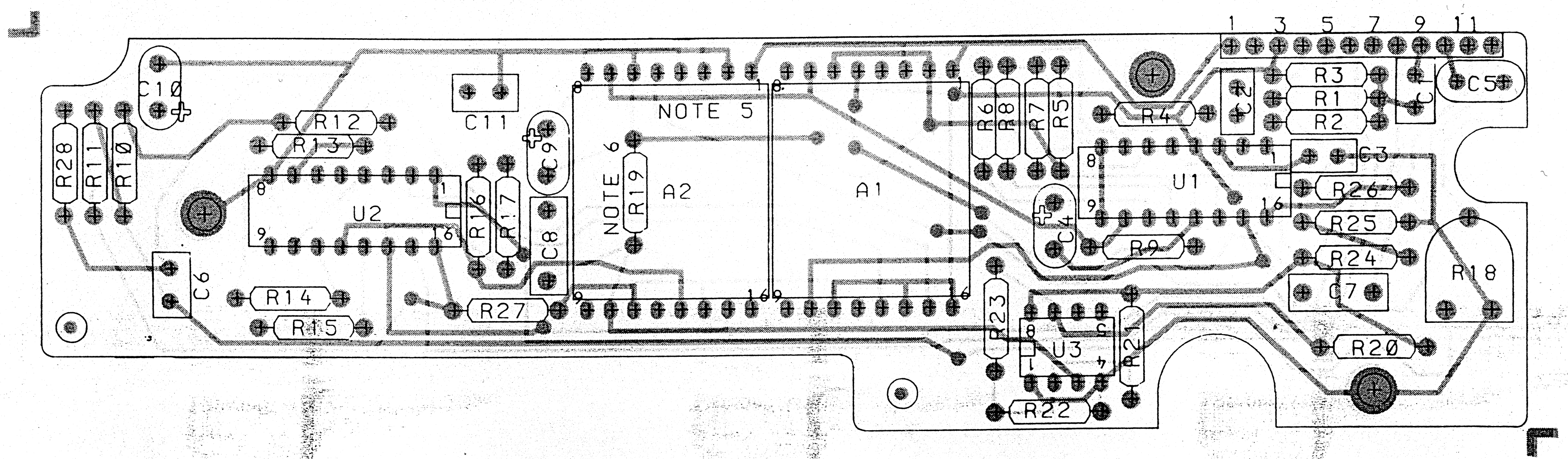
D403.012/2

Nº	CODE	DATA
	M905144G1	TQ5007
	M905144G2	TQ5008
A101	M905148G1	Assem., Micromodule-incl. Digital Tone Det
A102+	M905148G1	Assem., Micromodule-incl. Digital Tone Det
C101	A700005P7	Capacitor, 10 nF 5%, Polyest. 50 V
C102	A700005P5	Capacitor, 4,7 nF 5%, Polyest. 50 V
C103	A700005P1	Capacitor, 1 nF 5%, Polyest. 50 V
C104	A701352P7	Capacitor, 1 µF -10+100%, Elco 6,3 V
C105	A700005P9	Capacitor, 22 nF 5%, Polyest. 50 V
C106	A700005P8	Capacitor, 15 nF 5%, Polyest. 50 V
C107	A700004P2	Capacitor, 0,1 µF 5%, Polyest. 50 V
C108	A700004P2	Capacitor, 0,1 µF 5%, Polyest. 50 V
C109	J706339P8	Capacitor, 22 µF -10+100%, Elco 50 V
C110	J706339P8	Capacitor, 22 µF -10+100%, Elco 50 V
C111	A700005P5	Capacitor, 4,7 nF 5%, Polyest. 50 V
J101	J706215P112	Connector, 12 Pin, Male.
R101	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R102	A700019P56	39 Kohm 5%, Resistor, carb. film 0,25 W
R103	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R104	A700019P50	12 Kohm 5%, Resistor, carb. film 0,25 W
R105	A700019P57	47 Kohm 5%, Resistor, carb. film 0,25 W
R106	A700019P51	15 Kohm 5%, Resistor, carb. film 0,25 W
R107	A700019P63	150 Kohm 5%, Resistor, carb. film 0,25 W
R108	A700019P60	82 Kohm 5%, Resistor, carb. film 0,25 W
R109	A700019P63	150 Kohm 5%, Resistor, carb. film 0,25 W
R110	A700019P57	47 Kohm 5%, Resistor, carb. film 0,25 W

Storno

Nº	CODE	DATA
R111	A700019P61	100 Kohm 5%, Resistor, carb. film 0,25 W
R112	A700019P56	39 Kohm 5%, Resistor, carb. film 0,25 W
R113	A700019P51	15 Kohm 5%, Resistor, carb. film 0,25 W
R114	A700019P56	39 Kohm 5%, Resistor, carb. film 0,25 W
R115	A700019P51	15 Kohm 5%, Resistor, carb. film 0,25 W
R116	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R117	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R118	J706042P1	100 Kohm 10%, Pot. meter-lin. 0,1 W
R119°	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R120	A700019P49	10 Kohm 5%, Resistor, carb. film 0,25 W
R121	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R122	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R123	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R124	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R125	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R126	A700019P65	220 Kohm 5%, Resistor, carb. film 0,25 W
R127	A700019P29	220 ohm 5%, Resistor, carb. film 0,25 W
R128	A700019P44	3,9 Kohm 5%, Resistor, carb. film 0,25 W
U101	J706293P1	MC14575, IC, Dual/Dual Progr. Op. Amp. Comp
U102	A700029P229	F40097, IC, Hex Tri-State Buffer.
U103	J706579P2	LM311N, IC, Voltage Comparator.

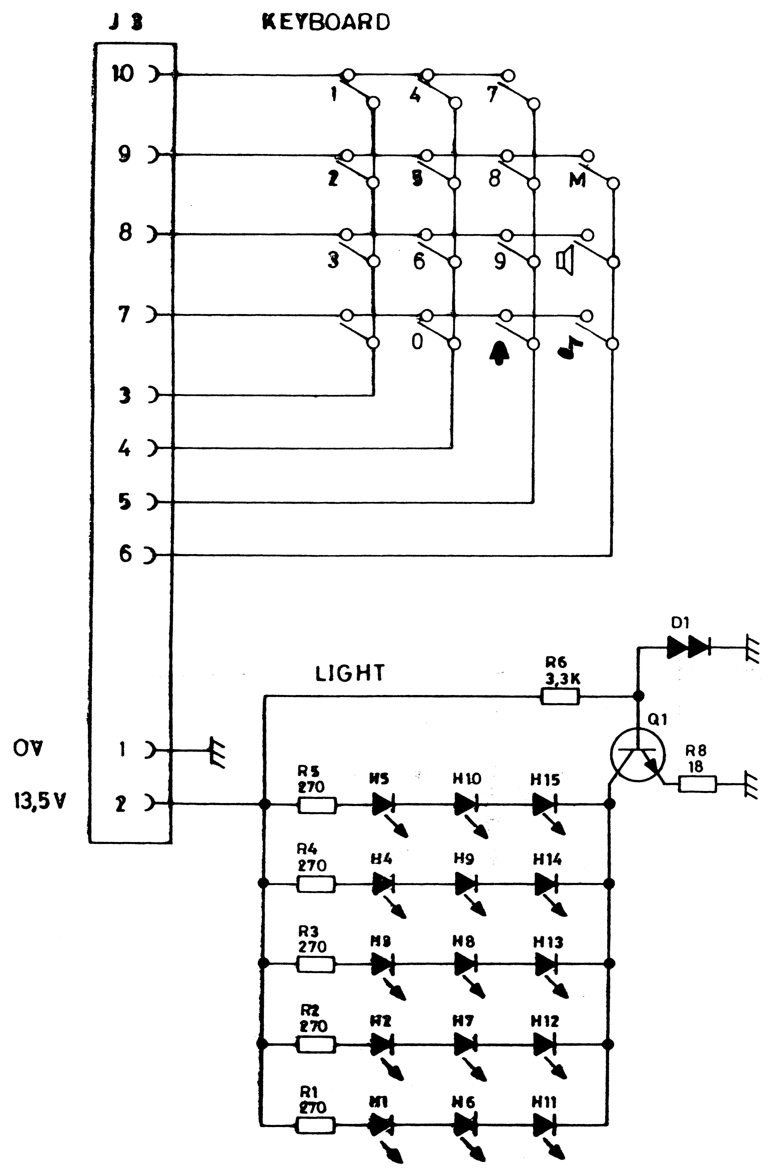
Storno



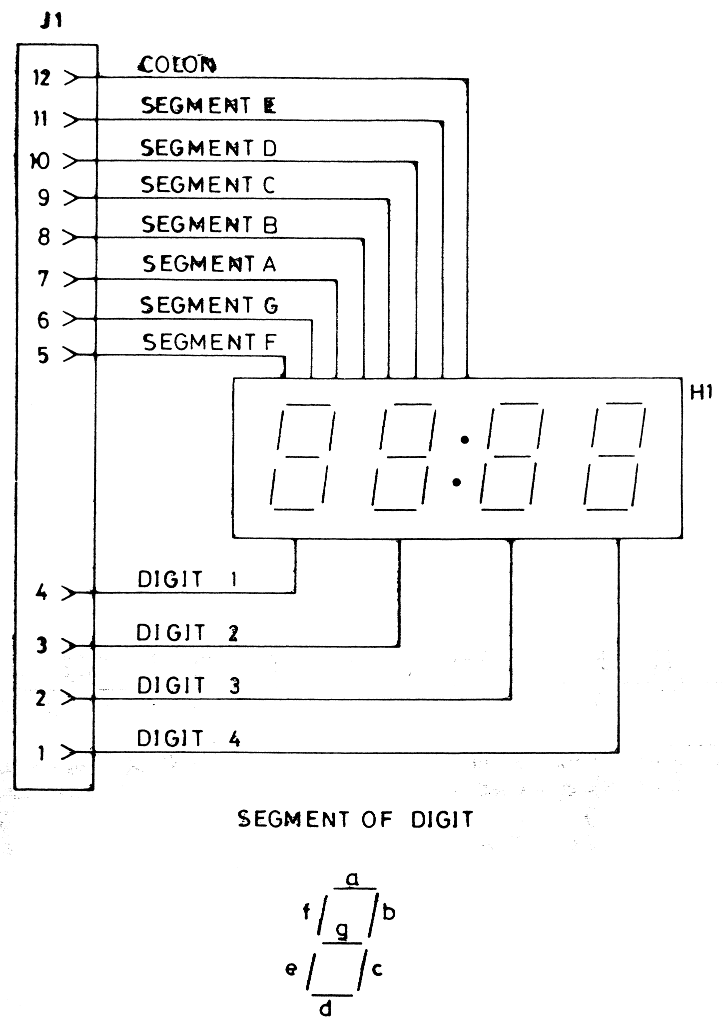
TONE MODULE TQ5007-5008

D403.038

Storno



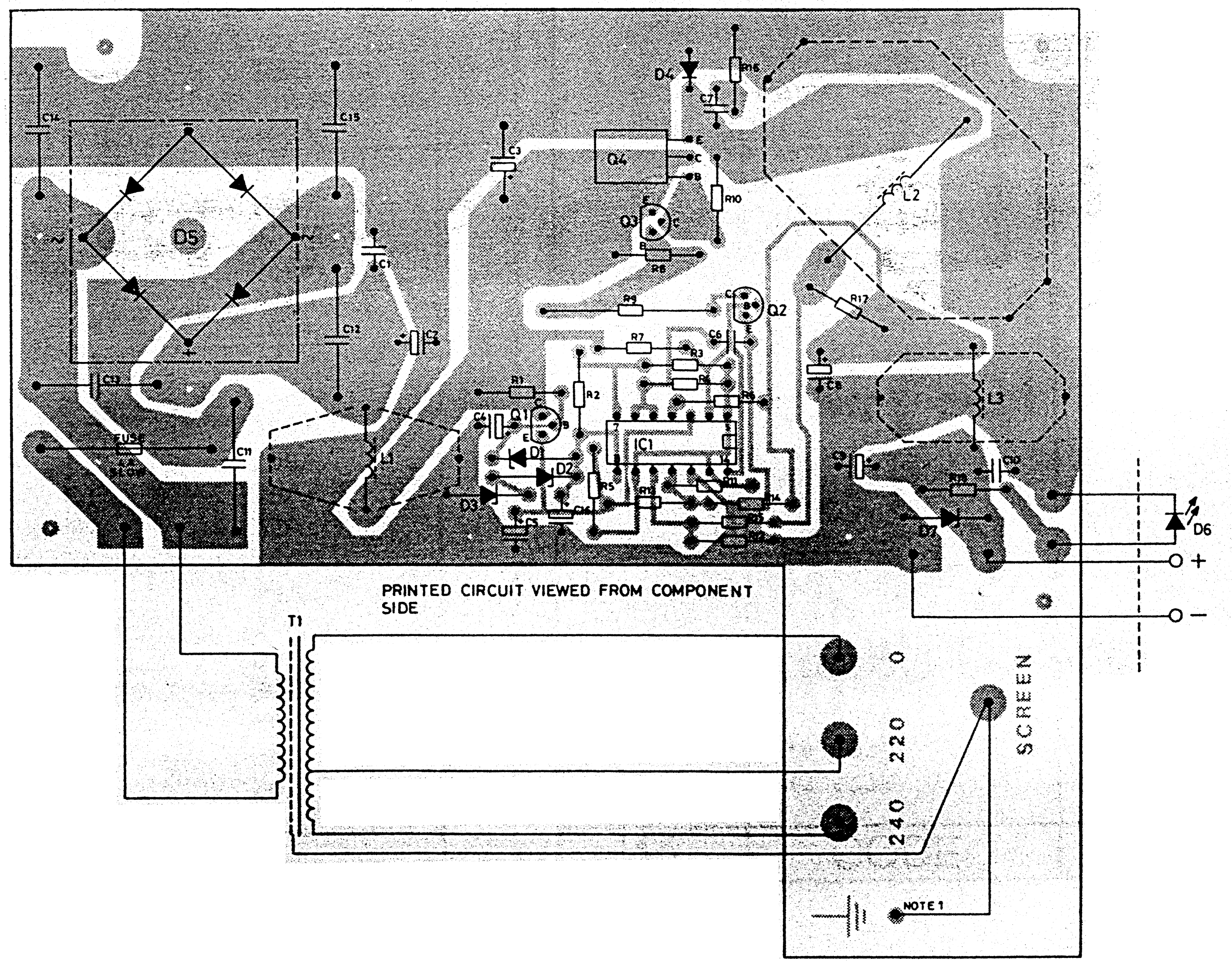
Storno



CONTROL PANEL CP5005

D403.013/2

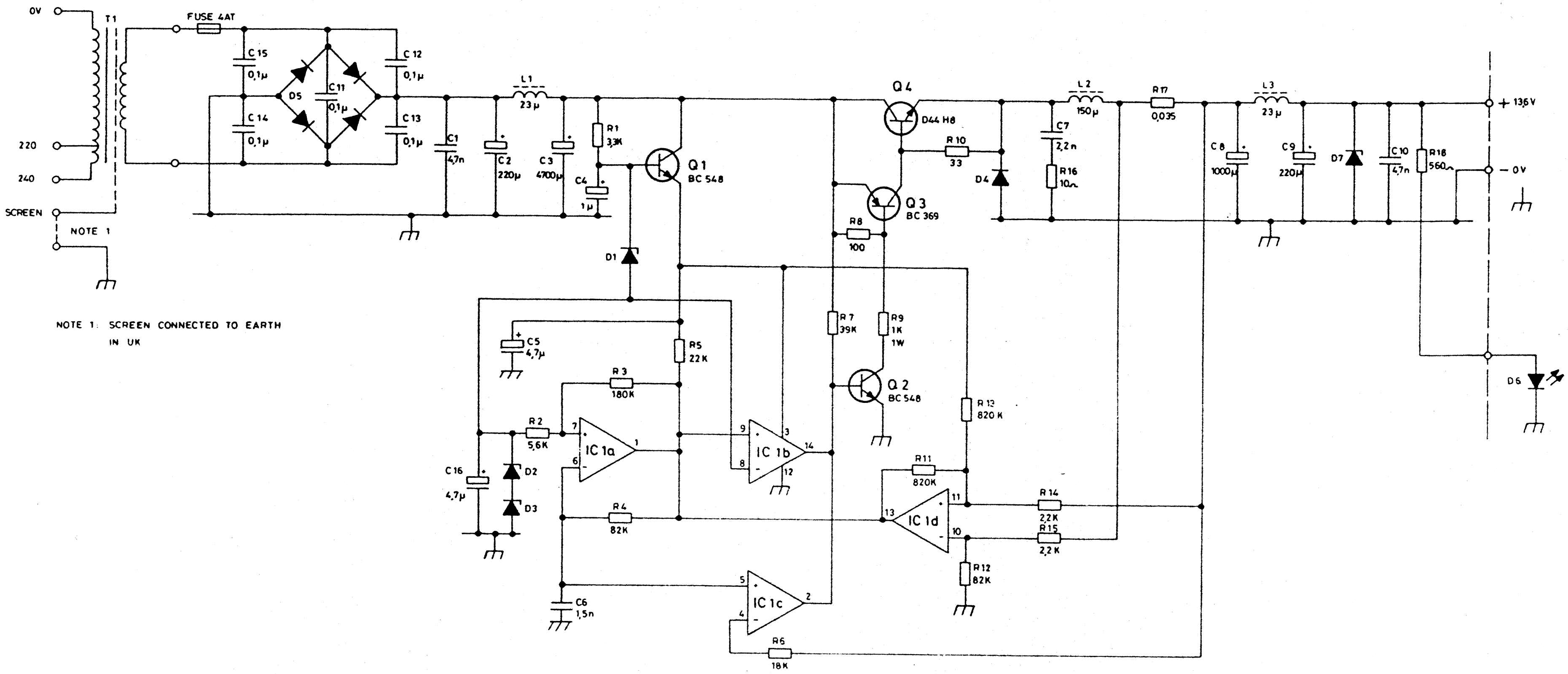
Storno



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE

POWER SUPPLY PS5001

D402.713/3



POWER SUPPLY PS5001

D402.713/3

Storno

Nº	CODE	DATA
	L855164P1	Front cap. assembly
	L855165G1	Keyboard assembly
	L855189G1	Display assembly
H1-15	J906022P1	LED
D1	A700053P1	BAV99 diode
J3	A700072P9	Connector male 10 pos
Q1	J706718P1	BCX54 Transistor
R1	B800671P271	270 ohm Chipresistor 0.125 W
R2	B800671P271	270 ohm Chipresistor 0.125 W
R3	B800671P271	270 ohm Chipresistor 0.125 W
R4	B800671P271	270 ohm Chipresistor 0.125 W
R5	B800671P271	270 ohm Chipresistor 0.125 W
R6	B800671P271	270 ohm Chipresistor 0.125 W
R8	B800607P180	18 ohm Chipresistor 0.125 W
H1-4	J706834P1	7-segment display
J2	A700072P11	Connector male 12 pos

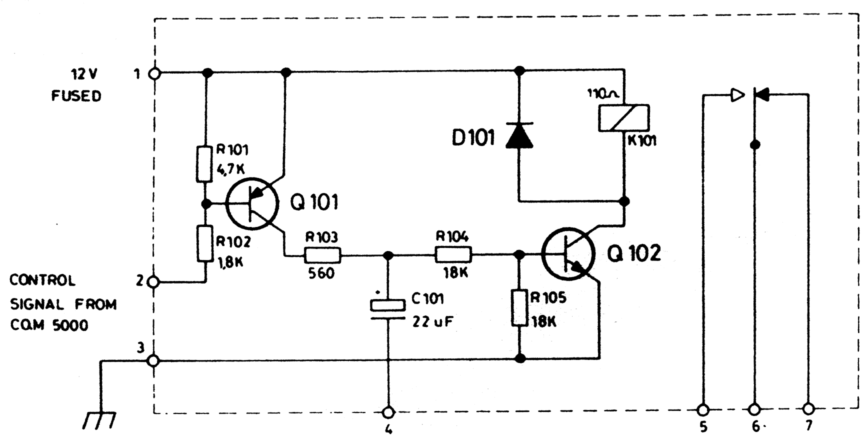
Storno

Nº	CODE	DATA

Nº	CODE	DATA	
C 1	74.5401	4700pF 10% Ceram DI	50V
C 2	73.5178	220uF -10 +100% Elco	40V
C 3	73.5155	4700uF -10 +50% Elco	40V
C 4	73.5170	1uF 20% Tantal	35V
C 5	73.5172	4.7uF 20% Tantal	35V
C 6	76.5130	1.5nF 10% Polyester FL	50V
C 7	74.5399	2200pF 20% Ceram DI	50V
C 8	73.5179	1000uF -10 +100% Elco	16V
C 9	73.5165	220uF -10 +100% Elco	25V
C 10	74.5401	4700pF 10% Ceram DI	50V
C 11	76.5073	0.1uF 10% Polyest TB	100V
C 12	76.5073	0.1uF 10% Polyest TB	100V
C 13	76.5073	0.1uF 10% Polyest TB	100V
C 14	76.5073	0.1uF 10% Polyest TB	100V
C 15	76.5073	0.1uF 10% Polyest TB	100V
C 16	73.5172	4.7uF 20% Tantal	35V
D 1	99.5224	4.7V 5% Zenerdiode	0.4W
D 2	99.5146	6.8V 5% Zenerdiode	0.4W
D 3	99.5146	6.8V 5% Zenerdiode	0.4W
D 4	99.5371	BYW29-150 Diode	
D 5	99.5174	10A Rectifier bridge	100V
D 6	99.5303	LED red	1.6 V/20 mA
D 7	99.5334	16V 5% Zenerdiode	1W
F1	92.5094	4A Fuse, slow	
L 1	61.1419	Choke	
L 2	61.1420	Choke	
L 3	61.1419	Choke	
Q 1	99.5143	BC548 Transistor	
Q 2	99.5143	BC548 Transistor	
Q 3	99.5337	BC369 Transistor	
Q 4	99.5372	D44H. 8 Transistor	
R 1	80.5265	22Kohm 5% Carbon film	1/8W
R 2	80.5258	5.6Kohm 5% Carbon film	1/8W
R 3	80.5276	180Kohm 5% Carbon film	1/8W
R 4	80.5272	82Kohm 5% Carbon film	1/8W
R 5	80.5265	22Kohm 5% Carbon film	1/8W
R 6	80.5264	18Kohm 5% Carbon film	1/8W
R 7	80.5268	39Kohm 5% Carbon film	1/8W
R 8	80.5237	100ohm 5% Carbon film	1/8W
R 9	82.5049	1Kohm 5% Carbon film	1W
R 10	80.5231	33ohm 5% Carbon film	1/8W
R 11	80.5284	820Kohm 5% Carbon film	1/8W
R 12	80.5272	82Kohm 5% Carbon film	1/8W
R 13	80.5284	820Kohm 5% Carbon film	1/8W
R 14	80.5253	2.2Kohm 5% Carbon film	1/8W
R 15	80.5253	2.2Kohm 5% Carbon film	1/8W
R 16	80.5225	10ohm 5% Carbon film	1/8W
R 17	89.0026	0.035ohm Resistor Constantan	
R 18	80.5246	560ohm 5% Carbon film	1/8W
T 1	60.5170	Main transformer	
U 1	14.5019	MC3302P Quad comparator	

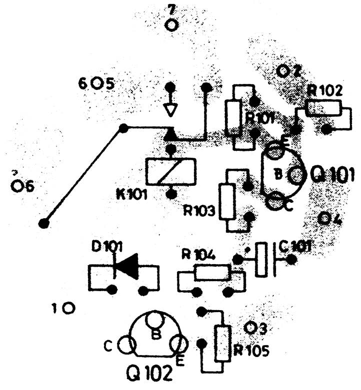
POWER SUPPLY PS5001

Storno



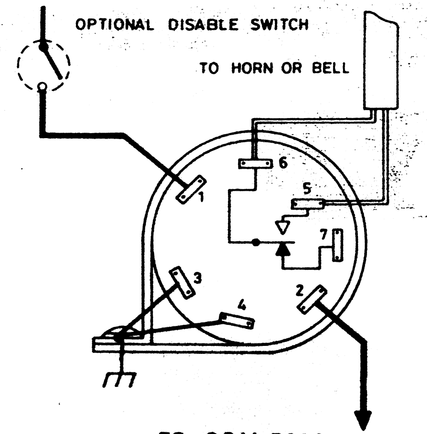
GROUND FOR DELAY

BOTTOM VIEW



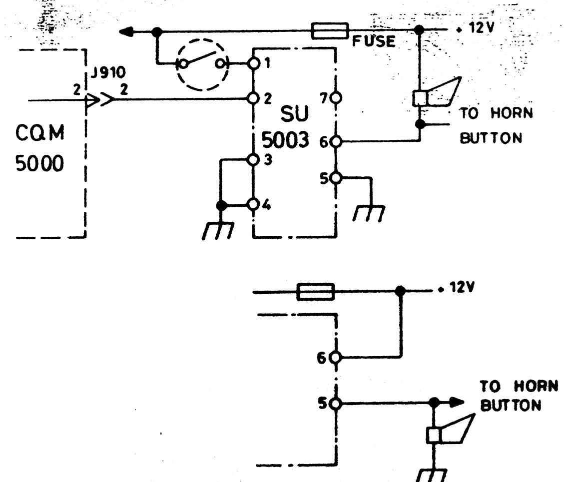
PRINTED CIRCUIT VIEWED FROM SOLDER SIDE

ALARM (HORN, BELL)



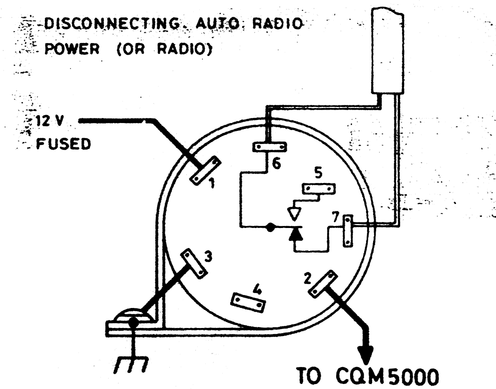
TO CQM 5000 CONNECTOR J910 - PIN 2

NOTES: STRAP H1 - H19 ON XS 5000.
THE HORN ALARM MAY BE SWITCHED OFF BY A SWITCH IN SERIES WITH 12V FUSED



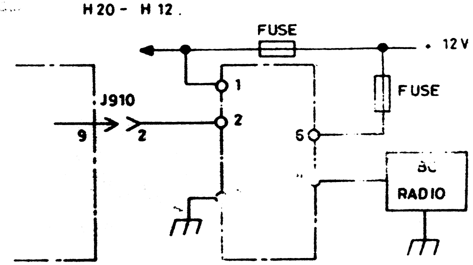
CONSULT CAR MANUAL FOR HORN SCHEMATIC

DISCONNECTING AUTO BROADCAST RADIO



TO CQM5000 CONNECTOR J910 PIN 9

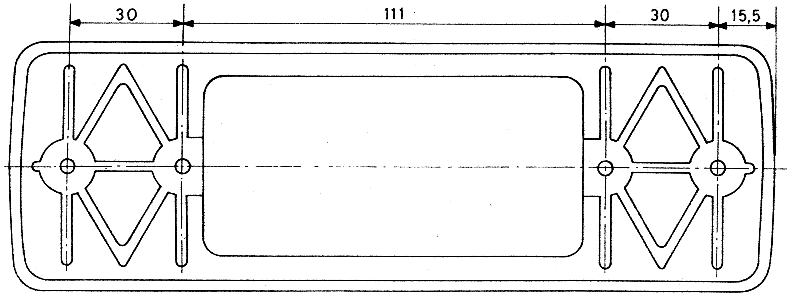
NOTES: STRAP H20 - H33 ON XS5000.
J910 - PIN 9 IS NOT FREE IF A CHANNEL GUARD / PILOT TONE UNIT IS CONNECTED TO J905.
J911 PIN 6 MAY BE USED IN THESE CASES (REMOVE STRAP H12 - H24 IF ANY) AND STRAP H20 - H12.

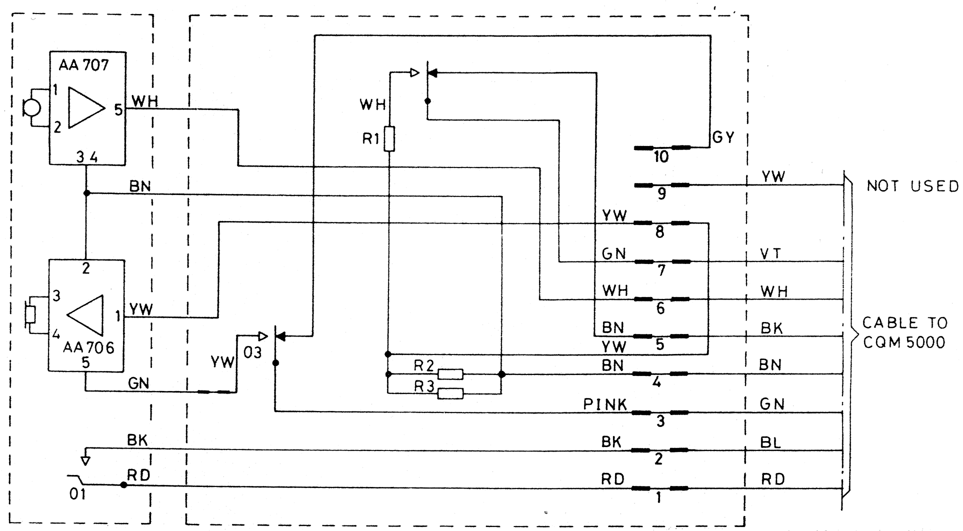


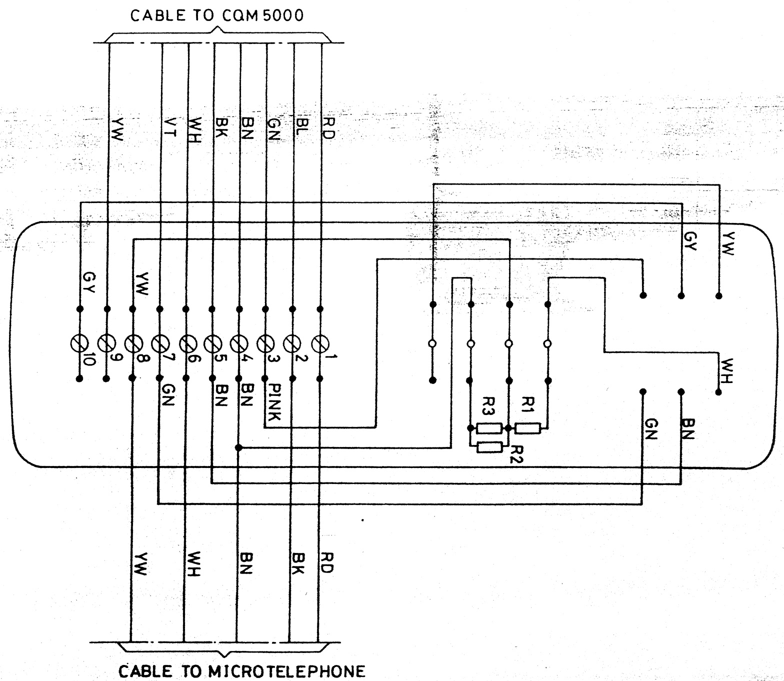
SWITCHING UNIT SU5003

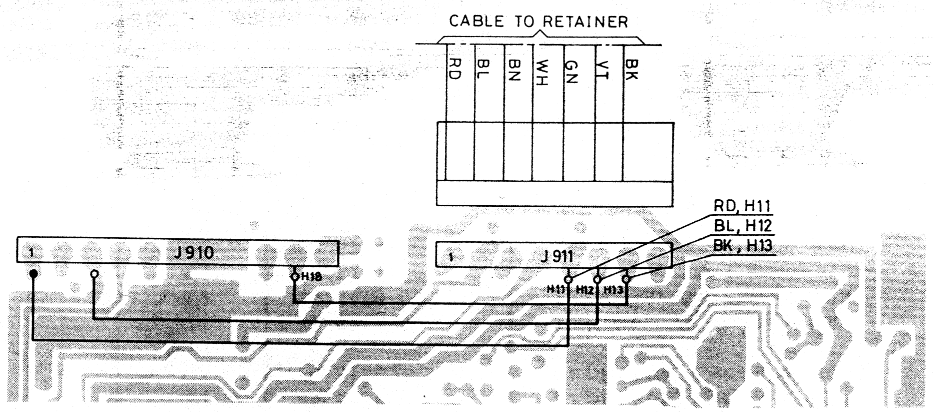
D402.725

Storno









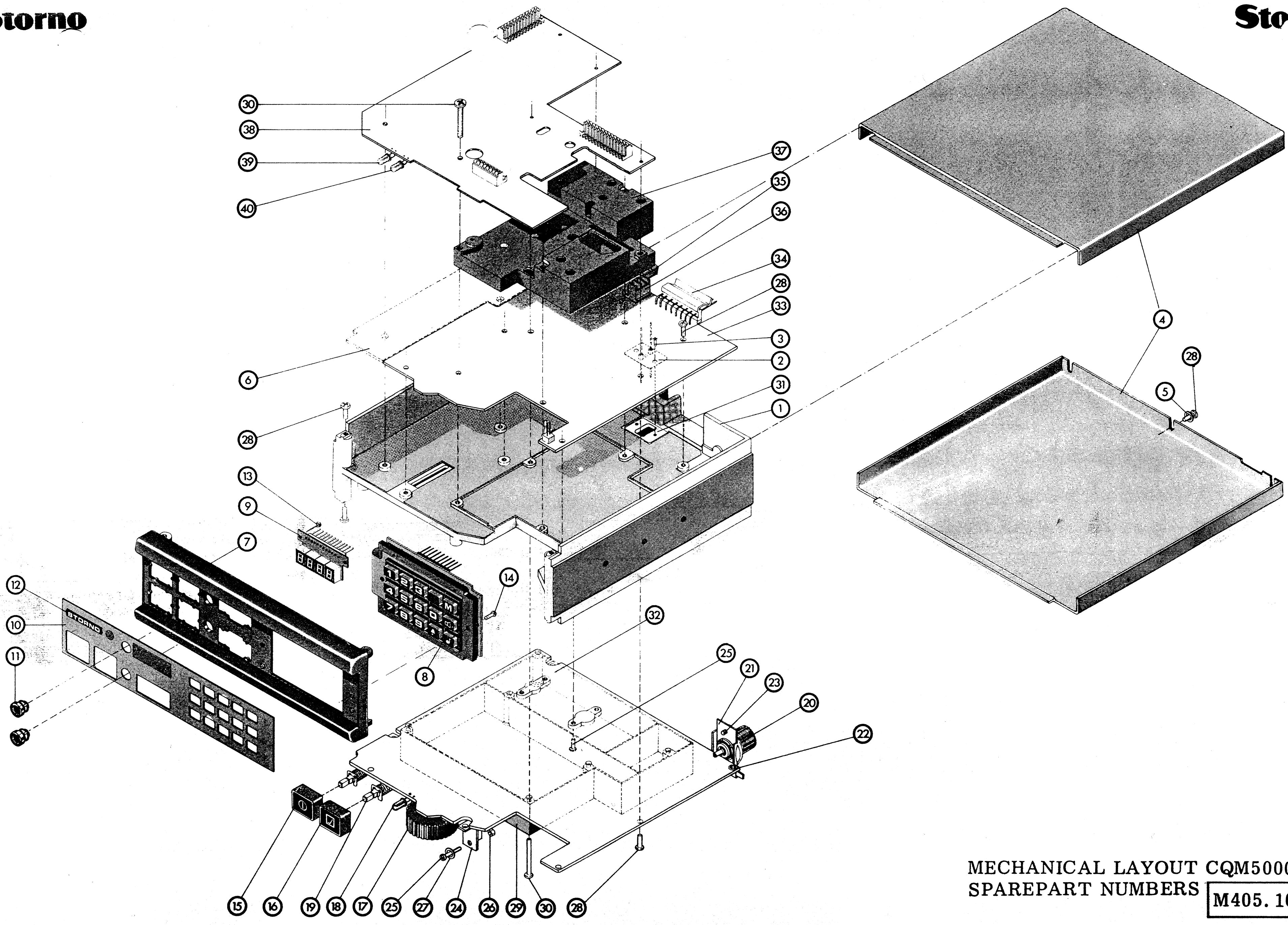
INSTALLATION DIAGRAM MT5001
MICROTELEPHONE WITH RETAINER

D402. 880

Nº	CODE	DATA	
MT5001	96.0105-00	HANDSET, COMPLETE	
	18.0760-01	Cable	
SUBASS.	96.5087-00	HANDSET/MICROTELEPHONE	
	10.3616-00	AA706, Telephone Amplifier	
	10.3617-00	AA707, Microphone Amplifier	
	32.0486-00	Suspension f. telephone	
	32.0486-00	Suspension f. microphone	
	52.0077-00	Netting f. telephone	
	52.0077-00	Netting f. microphone	
	96.5076-00	Cartridge, telephone	
	96.5079-00	Cartridge, microphone	
	177.5013-00	Spiral wire	
SUBASS.	96.5088-01	RETAINER WITH SWITCH	
R1	80.5263-00	15 Kohm 5%, Carbon film	1/8 W
R2	80.5245-00	470 ohm 5%, Carbon film	1/8 W
R3	80.5249-00	1 Kohm 5%, Carbon film	1/8 W
	20422-03913	Screw 3.9 x 13 mm	
	10.3616-00	AA706	
C1	73.5114	1 uF 20%, Tantal	35 V
C2	74.5345	1 uF 10%, Ceram 2PL	65 V
C3	73.5126	4.7 uF 20%, Tantal	35 V
R1	80.5261-00	10 Kohm 5%, Carbon film	1/8 W
R2	80.5255-00	3.3 Kohm 5%, Carbon film	1/8 W
R3	80.5259-00	6.8 Kohm 5%, Carbon film	1/8 W
R4	80.5249-00	1 Kohm 5%, Carbon film	1/8 W
R5	80.5243-00	330 ohm 5%, Carbon film	1/8 W
E1	99.5209-00	Diode, Stabilizing, 1.5 V.	
Q1	99.5143	Transistor BC238	
Q2	99.5230	Transistor BC308	

Storno

Nº	CODE	DATA	
	10.3617-00	AA707	
C1	73.5102	2.2 uF 20%, Tantal	35 V
C2	74.5186	47 pF 10%, Ceram N750PL	25 V
C3	74.5186	47 pF 10%, Ceram N750PL	25 V
R1	80.5261-00	10 Kohm 5%, Carbon film	1/8 W
R2	80.5239-00	150 Kohm 5%, Carbon film	1/8 W
R3	80.5251-00	1.5 Kohm 5%, Carbon film	1/8 W
R4	80.5271-00	68 Kohm 5%, Carbon film	1/8 W
R5	80.5247-00	680 ohm 5%, Carbon film	1/8 W
Q1	99.5143	Transistor BC238	
Q2	99.5230	Transistor BC308	



MECHANICAL LAYOUT CQM5000 TS2
SPAREPART NUMBERS

M405. 104

ITEM	CODE	DESCRIPTION
1	10.3742-01	Cabinet Coffret
2	69.0016	Feedthrough Connector Connecteur d'alimentation
3	20022-02003	Screw, M2 x 3 mm. Vis, M2 x 3 mm.
4	11.1177-00	Cover Couvercle
5	2450-060032	Spring washer Rondelle grower
6	19M905148P1	Tone transmitter/Receiver (only in TQ5007/TQ5008) Module de tonalité (seulement dans TQ5007/TQ5008)
7	19L855164P1	Front cap Avant
8	19L855166G1	Keyboard Clavier
9	19L855189G1	Display Afficheur
10	19K805129P1	Nameplate Plaque
11	19K805164	Bush Voyant
12	19J706163P1	Nameplate Plaque
13	19J706212P1	Screw Vis
14	19A700031P305	Screw Vis
		Item No. 7 to 14 are assembled under one code No. 19L855169P1 L'ensemble despièces 7 à 14 a le numéro 19L855169P1
15	49.0271-00	Push button, ON/OFF Bouton marche/arrêt
16	49.0272-00	Push button, SQ. Bouton de squelch
17	49.0267-00	Knob, volume control Bouton de volume
18	99.5303-00	Light emitt. diode, red Diode lumineuse, rouge
19	47.5096-00	switch Commutateur