

MOBILE RADIOTELEPHONE
MODEL STORNOPHONE 5000

TYPE CQM5332

TYPE CQM5333

TYPE CQM5334

68-88MHz

Storno

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1st Edition

TECHNICAL SPECIFICATIONS

CQM5330

Guaranteed performance specifications unless otherwise noted.

Typical values are given in parentheses.

GENERAL

Frequency Range

66 - 88MHz

Antenna Impedance

50ohm

Channel Separation

CQM5332: 30/25kHz

CQM5333: 25kHz

CQM5334: 12.5kHz

Maximum Number of Channels

6

Maximum Frequency Deviation

CQM5332: ± 5 kHz

CQM5333: ± 4 kHz

CQM5334: ± 2.5 kHz

Supply Voltage

Minimum: 10.8V

Nominal: 13.2V

Maximum: 16.6V

Temperature Range

-30°C to $+60^{\circ}\text{C}$

Modulation Frequency Range

CQM5332: 300 - 3000Hz

CQM5333: 300 - 3000Hz

CQM5334: 300 - 2700Hz

Dimensions

B x D x H: 180 x 190 x 60mm

Maximum RF Bandwidth

Receiver: 1.5MHz

Transmitter: 2.5MHz

Weight

1.8kg.

RECEIVER

Sensitivity

12dB SINAD (EIA), $\frac{1}{2}$ e.m.f.

0.3uV (0.25uV)

EIA measuring conditions:

$\Delta f = \pm 2/3 \times \Delta f_{\text{max}}$; $f_{\text{mod}} = 1\text{kHz}$

20dB SINAD (CEPT), e.m.f.

CQM5332: 0.75uV (0.55uV)

CQM5333: 0.75uV (0.55uV)

CQM5334: 1.0uV (0.75uV)

CEPT measuring conditions:

$\Delta f = 60\% \Delta f_{\text{max}}$; $f_{\text{mod}} = 1\text{kHz}$

Measured with psophometric filter.

Crystal Frequency Range

38.35 - 49.35

Crystal Frequency Calculation (fx)

$$f_x = \frac{F_s + 10.7}{2} \text{ MHz}$$

Frequency Stability

Conforms with government regulations

Modulation Acceptance Bandwidth (EIA)

CQM5332: $\pm 7\text{kHz}$ ($\pm 7.5\text{kHz}$)

6dB Bandwidth

CQM5333: $\pm 5\text{kHz}$ ($\pm 5.8\text{kHz}$)

Adjacent Channel Selectivity

EIA

CQM5332: 75dB (90dB)

FTZ

CQM5333: 70dB (88dB)

CEPT

CQM5332: 75dB (90dB)

CQM5334: 65dB (88dB)

Spurious Rejection

EIA

80dB (85dB)

Intermodulation Attenuation

EIA

CQM5332: 75dB (90dB)

FTZ

CQM5333: 70dB (90dB)

CEPT

CQM5332: 70dB (75dB)

CQM5333: 70dB (75dB)

CQM5334: 70dB (73dB)

Blocking

90dB/uV (104dB/uV)

Radiation

CQM5332: max. 0.8nW conducted

CQM5333: max. 0.8nW radiated

CQM5334: max. 0.8nW radiated

RF Load Impedance (Loudspeaker)

4ohm

AF Power Output

EIA: 3W (3.6W)

CEPT: 1.5W

AF Distortion

5% (1.5%)

$\Delta f = 60\% \Delta f \text{ max; } 1\text{kHz; } 1\text{W; RF } 1\text{mV}$

Audio Frequency Response

CQM5332: +1/-3dB (+0/-1.5dB)

CQM5333: +1/-3dB (+0/-1.5dB)

CQM5334: +1/-3dB (+0/-2.5dB)

relative to 1000Hz, -6dB octave

f_{mod} : 300 - 3000Hz

Hum and Noise

Squelched: 80dB (better than 85dB)

Unsquelched: 55dB (60dB)

Squelch Attack Time

150ms (110ms)

Squelch Recovery Time

100ms (10ms)

Squelch Closing Time

150ms (20ms)

Current Consumption

Squelched: 150mA (130mA)

Receive, AF 2W: 500mA (450mA)

(1 channel, without tone equipment, 13.2V supply)

TRANSMITTER

RF Power Output

CQM5332-6: 6W

CQM5332-25: 25W

CQM5333-6: 6W

CQM5334-6: 6W

CQM5334-25: 25W

 $(R_L = 50\Omega)$ Crystal Frequency Range

16.5 - 22MHz

Crystal Frequency Calculation (fx)

$$f_x = \frac{F_s}{4}$$

Frequency Stability

Conforms with government regulation

Undesired Radiation

max. 0.2uW

Sideband Noise Power, CEPT

less than 70dB

Modulation AF Input Impedance

560ohm

Modulation Sensitivity70mV \pm 2dB(60% Δf max., 1kHz)Modulation Response300 - 3000Hz

+1/-3dB (+0.5/-2dB)

relative to 1000Hz, 6dB/octave

400 - 2700Hz

+1/-1.5dB (+0.5/-1dB)

relative to 1000Hz, 6dB/octave

Modulation Distortion (CEPT)

max. 3%

 $f_{mod} = 1000\text{Hz}$, $\Delta f = \pm 1.5\text{kHz}$

max. 5%

 $f_{mod} = 300\text{Hz}$, $\Delta f = \pm 0.9\text{kHz}$

measured with 750u sec de-emphasis

FM Hum and Noise, CEPT

70dB

measured with 750u sec de-emphasis
and psophometric filterAttack Time

50ms

Current Consumption

6W: less than 3.5A (2.5A)

25W: less than 6.0A (5.0A)

GENERAL DESCRIPTION

CQM5330

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

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

Although compact in size, it contains a transmitter/receiver, optional 5-tone sequential encoder/decoder, or Channel Guard (Pilot tone), Group Call, All Call, and up to 6 transmit and receive channels.

Type	CQM5332		CQM5333		CQM5334	
SPEC	6	25	6	25	6/10	25
Frequency Range MHz	66 - 88		66 - 88		66 - 88	
RF Power W	6	25	6	25	6/10	25
Channel Spacing kHz	30/25		20		12.5	
Max. Number of Channels	6		6		6	

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 column.

SU702

Transmitter keying switch for mounting on the dashboard.

Power Supply Units:		
Equipment	220V AC	+24V DC
CQM5000, max. 6/10W	PS703	PS704
CQM5000, max. 25W	PS5001	PS702

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 are an integral part of the printed board assemblies.

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 a System Interconnect Board located on the option side of the H-frame. A test connector is also located on the system board and is accessible from the rear of the radio.

This board also serves as channel switch unit in sets with multichannel option.

The moulded plastic front is directly attached to the chassis and has the speaker mounted to it. A separate moulded speaker grill 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) and the multifrequency board (XS) mount in the top section of the chassis. Their switches and push buttons mount directly to the boards and protrude through the front.

Thin cast shields with adjustment holes are placed over the transmitter and receiver oscillators and parts of the transmitter in order to reduce spurious radiation.

CIRCUIT DESCRIPTION

(refer to functional block diagram)

Receiver

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

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

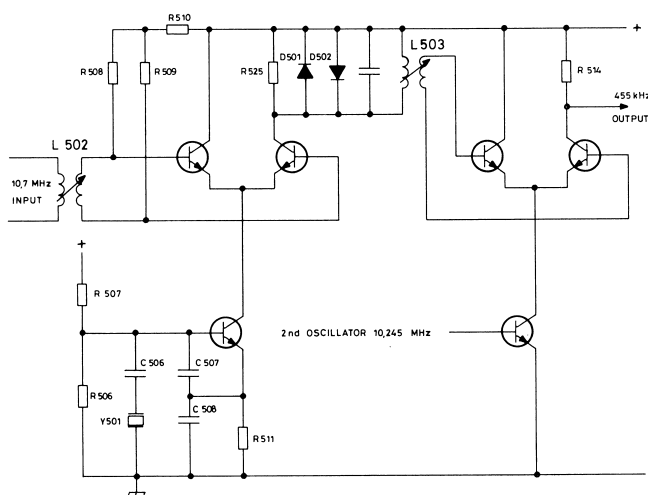
Front-End

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 design in micro-strip-line techniques on the mainboard.

1st IF

The first IF frequency is 10.7MHz. 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 455kHz IF signal. Two diodes, D501-502, limit the output from the mixer.



455kHz IF/Demodulator

The selectivity of the 455kHz IF amplifier is formed by a ceramic filter fed from a 455kHz amplifier/impedance transforming stage. The final 455kHz amplification and limiting is performed by an integrated circuit, U502, which also contains the quadrature FM detector and the AF amplifier/output emitter follower for the audio line signal.

SQUELCH AND AUDIO CIRCUITS

Squelch

The audio line signal (Vol/Sq - HI) is fed to a selective amplifier stage, where noise (frequencies around 7kHz) is extracted from the audio signal. Via the squelch potentiometer R607, this signal reaches an expander stage which improves the level discrimination characteristics of the circuit. A passive voltage doubler circuit (D603-D604) with high

source impedance performs the action of an average value rectifier. A Schmitt Trigger gives the necessary hysteresis and a well-defined output from the following buffer stage, Q605.

In the squelched condition and during transmissions this output is +1.5V and mutes the audio power amplifier.

The transmit indicator is part of the muting function.

A push button switch, S601, cancels the squelch function, when depressed, by grounding the base of Q601.

AUDIO

In sets with Pilot tone option, the audio line signal is fed to the Pilot tone board for filtering and back to the main board. In sets without Pilot tone 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 potentiometer R630 is mounted directly on the RF board and protrude through the front panel. 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 decide 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 main board along with the receiver.

The exciter contains an FM oscillator, 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 XS 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 R116 in single channel sets. In multichannel sets the potentiometer is turned 2/3 up and the deviation adjusted individually; refer to XS5331 and XS5332.

Amplifier U101A is operated as an active low-pass splatter filter feeding the modulating input of the FM oscillator.

Exciter

The exciter takes the second harmonic of the crystal oscillator, filters it to reduce spurious signals and amplifies it. Three amplifier stages (Q201-2-3) and four filters (L201-2-4-5) are used in a narrow band design which limits the maximum frequency spread of the transmitter.

The exciter has two test points (TP201-2) 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 6 (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, R221, 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 biased by a voltage generated by the feedback network C240, D201, Q201, Q209, and Q208.

OSCILLATORS

The oscillators are located on the main board for single frequency radio sets. All parts for the oscillators and compensation network are soldered to the board except the crystal which is a plug-in type.

A multifrequency board is required for more than one frequency channel. This board is available in two versions; one (XS5331) has space for accommodating two transmit and two receive channels; one (XS5332) has space

for up to six channels and an option for selecting the channels by a 3-digit BCD signal binary converter, U901-U902. The BCD signal is applied to three pins in D911. Separate active circuitry is used for each oscillator and all have their outputs connected to two buffer amplifiers Q927-Q967. The buffers' outputs are fed to their resonant circuit on the main board by a plug-in connection (J301-J151). The required oscillator is selected by switching the emitter of the oscillator transistor to the negative DC supply. The compensation voltage and audio for the oscillators is obtained from the same circuit on the main board via J902.

The maximum transmitter frequency deviation for the system is set by adjusting potentiometers, one for each channel.

The oscillator uses a Colpitt's configuration with a bipolar transistor as the active element. The RX frequency is controlled by a third mode crystal which is operated at one half of the output frequency. The TX frequency is controlled by a fundamental mode crystal at one fourth of the output frequency. This output frequency is selected by a tuned circuit in the transistor collector circuit. To provide modulation and compensation capability, the crystal, a variable inductor, and a varicap (variable capacitance diode) are connected in series. The inductor provides adjustment of the frequency to set the oscillator to the channel frequency. The varicap permits electrical adjustment of the frequency. Compensation voltage is generated by a resistor - thermistor network and applied to the varicap. A resistor in parallel with the crystal prevents oscillations with the crystal removed from the circuit.

Transmitter Oscillator

In the transmitter circuit the audio voltage is superimposed on the compensating bias voltage to give the required deviation.

SUPPLY VOLTAGE DISTRIBUTION SYSTEM

The battery voltage (A + BATT) enters the radio via two pins of the rear system connector to the interconnect board. Both inputs are connected to reverse polarity protection diodes D901, D902. The ground lead comes through the same connector and is connected to chassis ground through a fusible printed wiring path which will open in case of the ground wire being accidentally connected to A +.

One battery input goes directly from the interconnect board via a feed-through capacitor and a connector P201 to the transmitter PA stages. The other input feeds through P903 to the main 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 U602. The other section of the ON/OFF switch controls the V_B + to the voltage regulator S602 consisting of a monolithic regulator. The regulator output is fixed at 8.5V by means of a factory adjusted resistor.

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

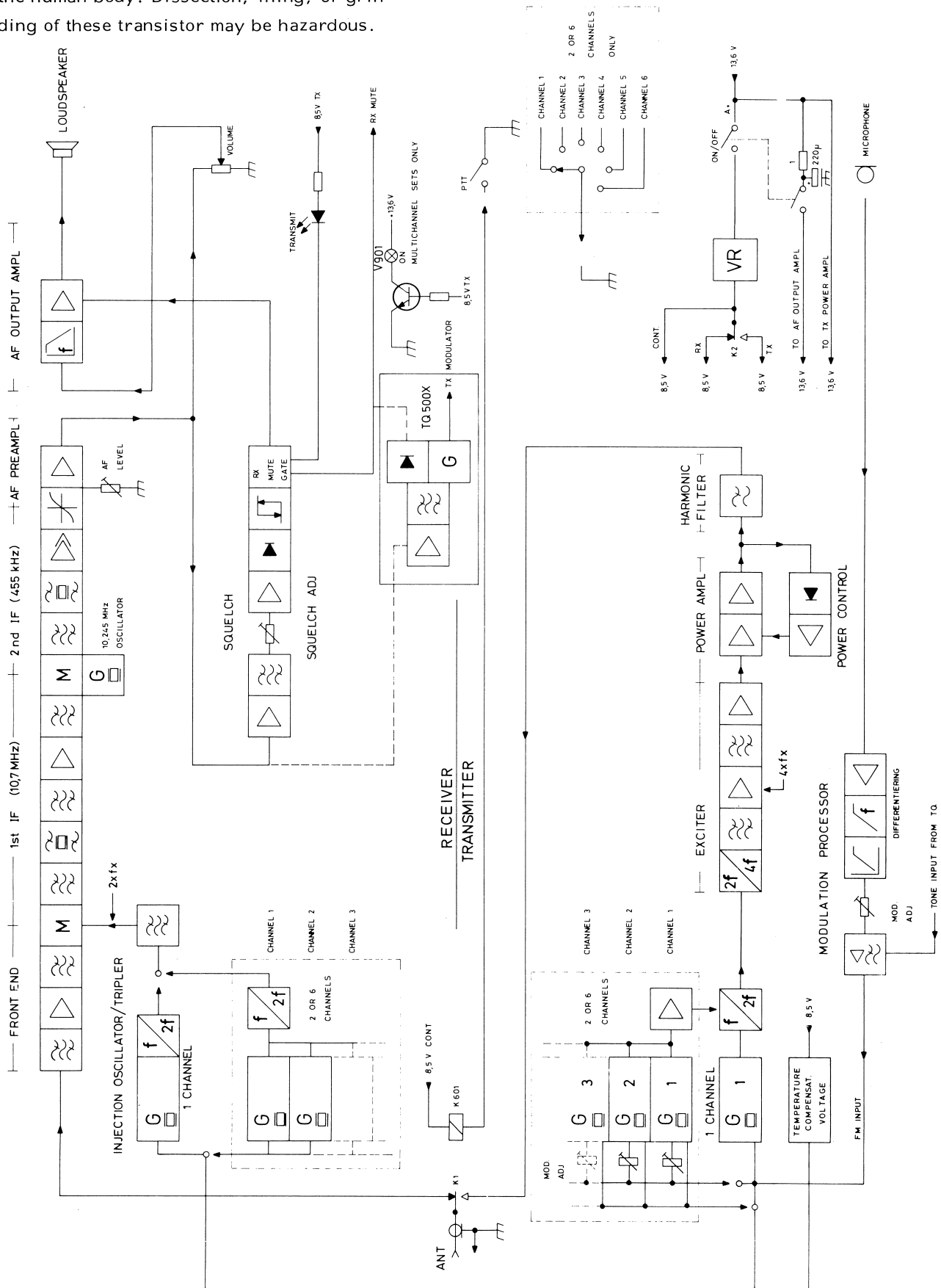
The squelch circuit, the modulation processor and parts of the IF amplifier U502 is supplied directly from the continuous 8.5 V.

The receiver front-end, the receiver oscillator, the 10.7 MHz IF stages and the second oscillator are supplied from 8.5V RX. The transmitter oscillator and the exciter are supplied from 8.5V 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
CQM 5330

OPERATING INSTRUCTIONS

STORNOPHONE 5000

Introduction

The CQM5000 is available with local control only and four different control heads cover the various versions.

No unnecessary controls are accessible at the front, e.g. radios without tone equipment don't have any loudspeaker IN/OUT nor tone transmitter key on the control head.

The transmitter key button is on the microphone MC5001 or mounted separately, SU701, SU702.

Control heads for the four versions are shown below:

Stand-by

The radio is turned on by depressing the ON/OFF switch.

The thumb-wheel channel selector is accessible on the multichannel version and has the channel numbers on the rim. A lamp built into the channel selector illuminates the channel number from the inside. Single channel units have no 'power on' indicator. The radio is now ready to receive or transmit.

Receive without tone equipment

With the radio in standby the volume control is adjusted to an appropriate level.

If no signals are received the volume may be set by depressing the squelch button and monitor the noise from the loudspeaker. Received calls will now be heard in the loudspeaker.

By pressing the squelch cancel button, the intelligibility may be improved, even if the signal is very noisy. The squelch cancel button is self locking.

Receive with tone equipment

In radios with tone equipment only calls where the number complies with the coding of the tone equipment will be heard in the loudspeaker.

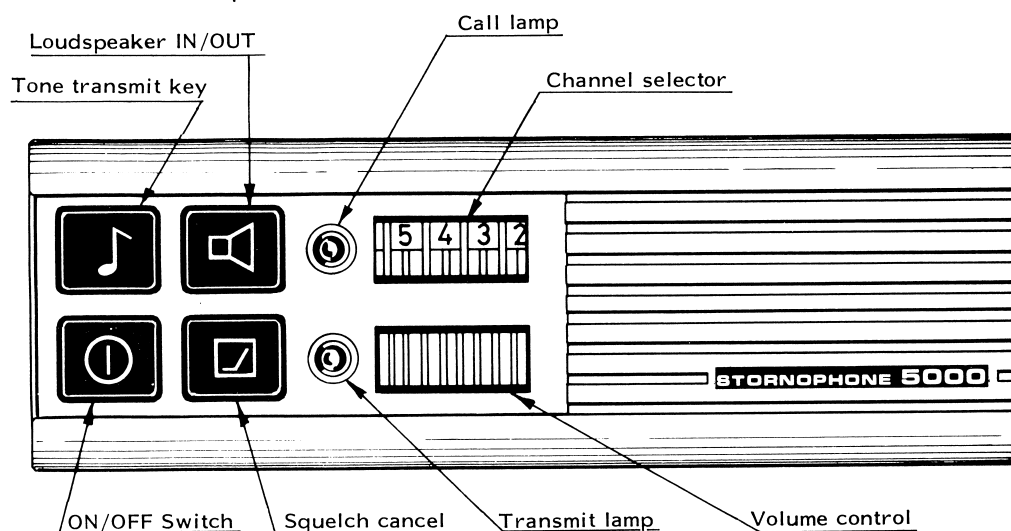
Reception of a call that matches the call number will cause the tone equipment to cancel the loudspeaker blocking so that the call can be heard. Simultaneously, the yellow call indicator will start flashing until the conversation is terminated by pressing the loudspeaker IN/OUT button.

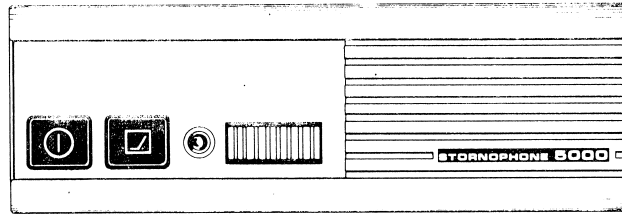
The loudspeaker will now again be blocked, and the call indicator will stop flashing.

Group Call - All Call

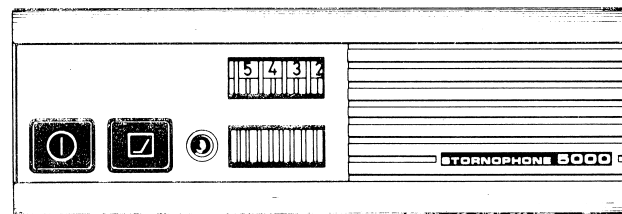
The tone unit TQ5001 function can be expanded with a group call unit SU5001 or All Call unit SU5002.

When receiving a group call or an all call, the yellow call indicator will only flash during the message. The call indicator will stop flashing when the received carrier disappears, or when the loudspeaker IN/OUT button is depressed.





Version
One channel without
tone equipment



Version
Six channel without
tone equipment

TRANSMIT without tone equipment

Before keying the transmitter the channel must be clear. In radios without tone equipment the operator can always hear when conversation takes place on the channel.

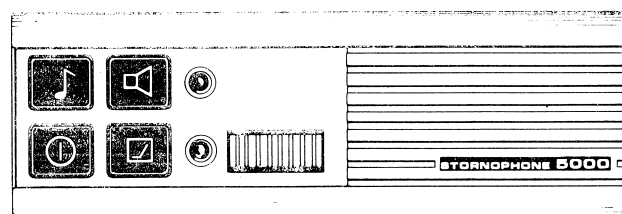
When the channel is clear, the transmitter is keyed by using the key button. The red transmit indicator will light up when the transmitter is keyed.

PRESS TO TALK-RELEASE TO LISTEN

TRANSMIT with tone equipment

When the radio is equipped with sequential tone equipment, the loudspeaker IN/OUT button must be pressed to open the loudspeaker. The yellow call indicator will then start flashing, indicating that the loudspeaker is open.

When the channel is clear, the call can be initiated by pressing the tone transmit key, for transmitting a tone call to the base station, in order to open the base station loudspeaker. When contact with the base station is established, the conversation can continue by using the normal transmitter key button on the microphone.



Version
One channel with
tone equipment

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 desired. 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.

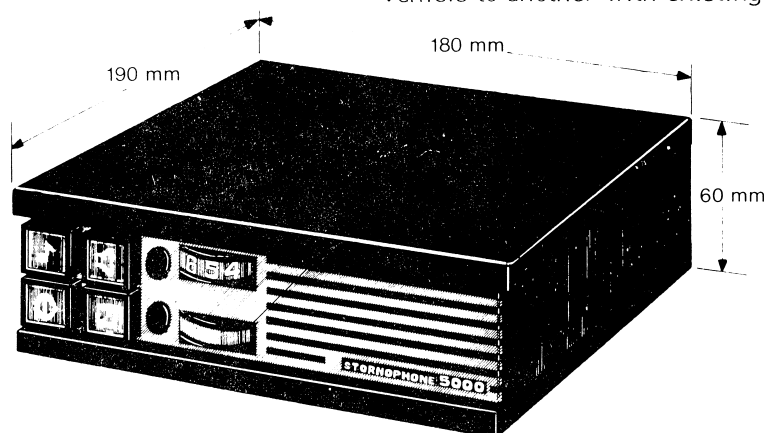
- the cables shall not run near the engine, exhaust manifold, pipes, and other hot items.
- the cables should, whenever possible, be run in parallel with existing cables and through the same holes in the chassis and car body. Suitable grommets must always be used if special holes are drilled in the metal work.
- the cables shall not be run externally underneath vehicles and cable clamps shall be used wherever 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.

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.
- demand for a possible transfer from one vehicle to another with existing installation.

Volume: 2.0 litre
Weight: 1,8 kg



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 $+60^{\circ}\text{C}$. 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, 8A
	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-metallic, 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 coaxial 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 operating frequency, the transmitter frequency is the determinant. Refer to enclosed instructions.

For multichannel operation the mean frequency is calculated.

FIXED INSTALLATIONS

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

MK5001	Refer to mobile installation for specification of contents.
MN703	Desk Stand
PS703	220V AC Power Supply unit 10W
PS5001	220V AC Power Supply unit 25W
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. ---.

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 is 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 gain of MC704 is adjusted by means of a potentiometer so that the speech 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. First 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 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 radio-telephones 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 radio-telephone 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 synchronized 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 resistors (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 built-in 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 0,1uF 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 synchronized 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 nonmetallic 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.

Different proposals for placing the radio telephone.

These are recommended, but other may be used depending on the type of vehicle. However, if a transfer from one vehicle to another is demanded, without using tools, installations must be fitted in both cars and the positioning in Fig. 1, Fig. 2, or Fig. 4 be used.

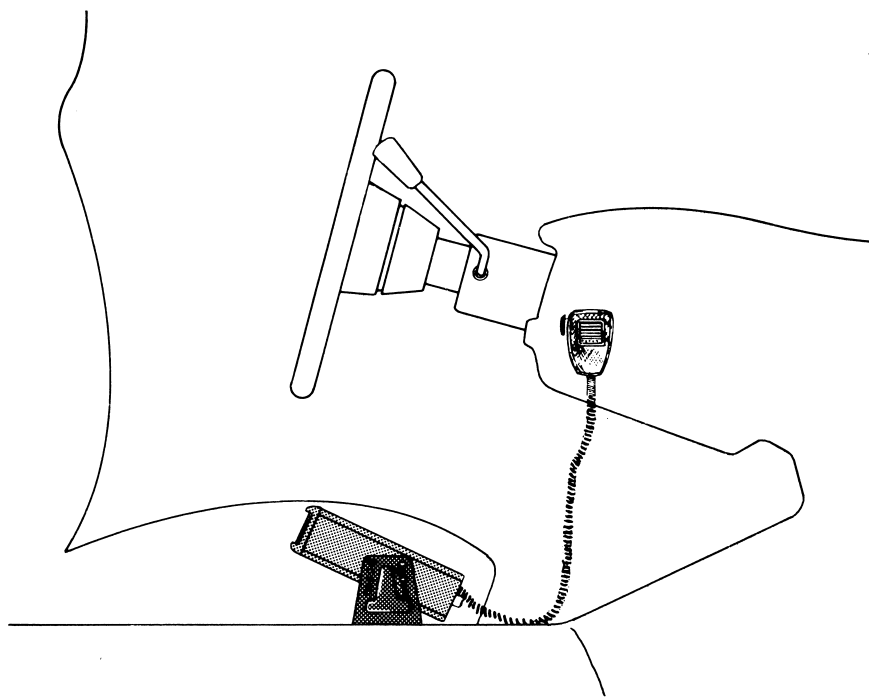


Fig. 1

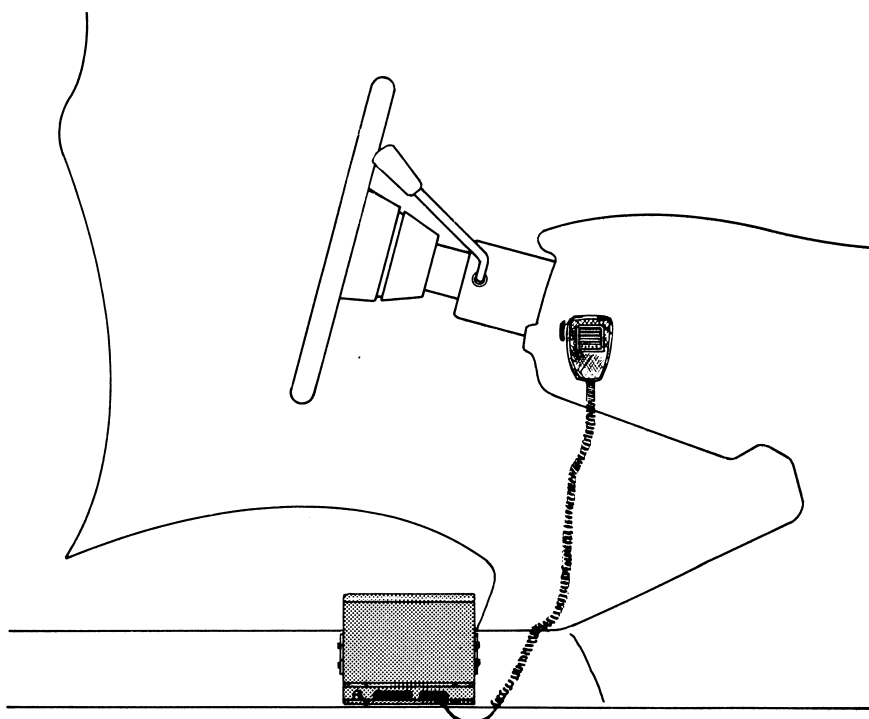


Fig. 2

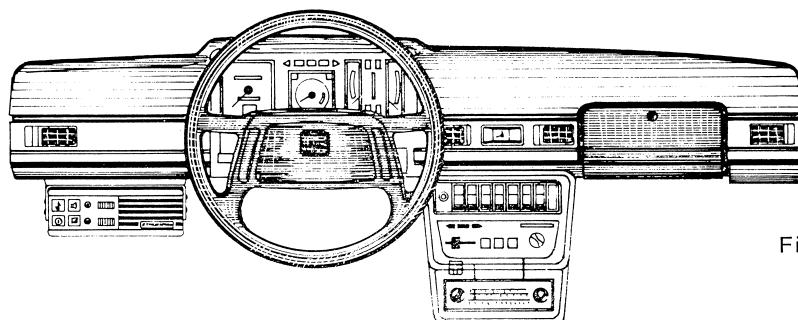


Fig. 3

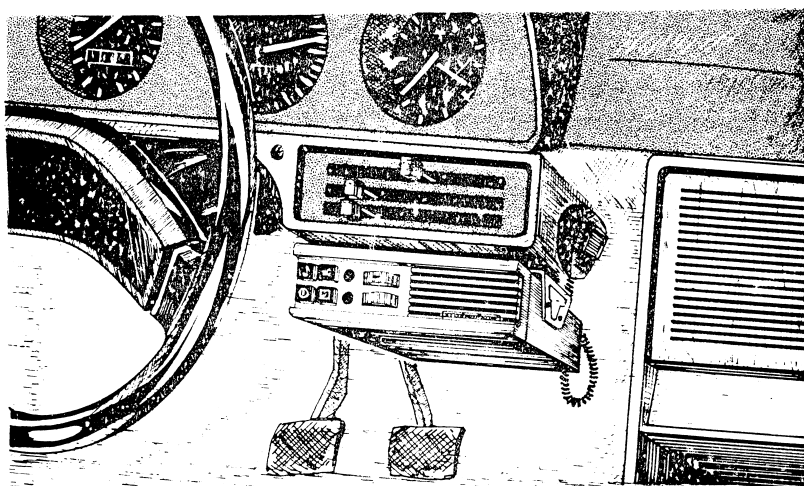


Fig. 4

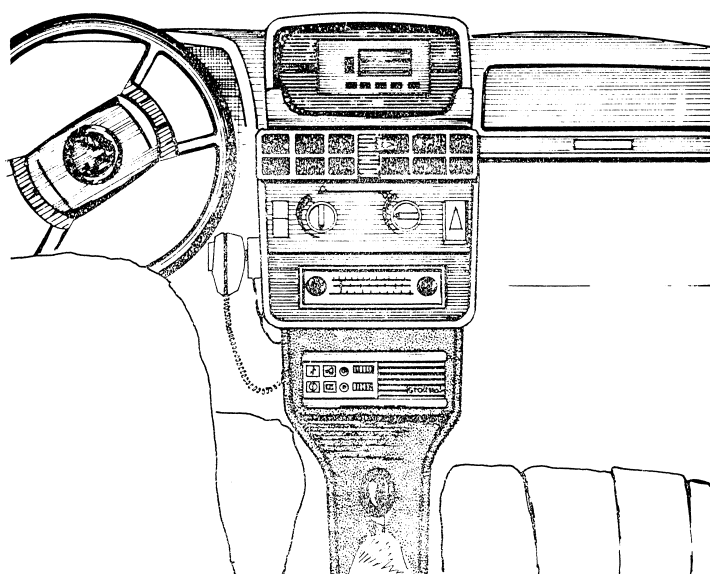


Fig. 5

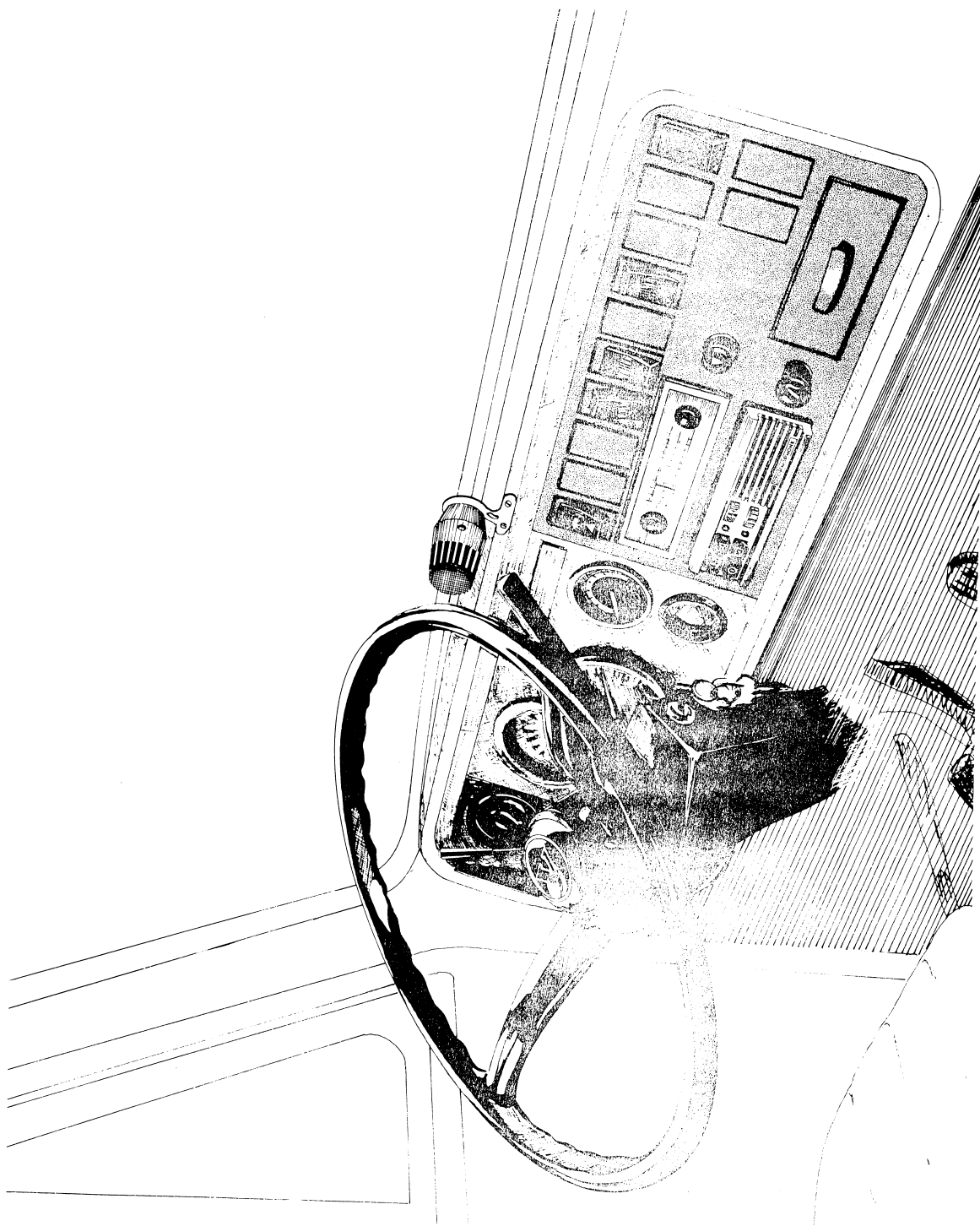


Fig. 6

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 $\lambda/2$ dipole. Reduction in coverage occurs as a result, but it is pos-

sible to compensate for higher losses by using $5/8 \lambda$ antennas which have approx. 2dB 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 $\lambda/2$ DIPOLE (0 dB)

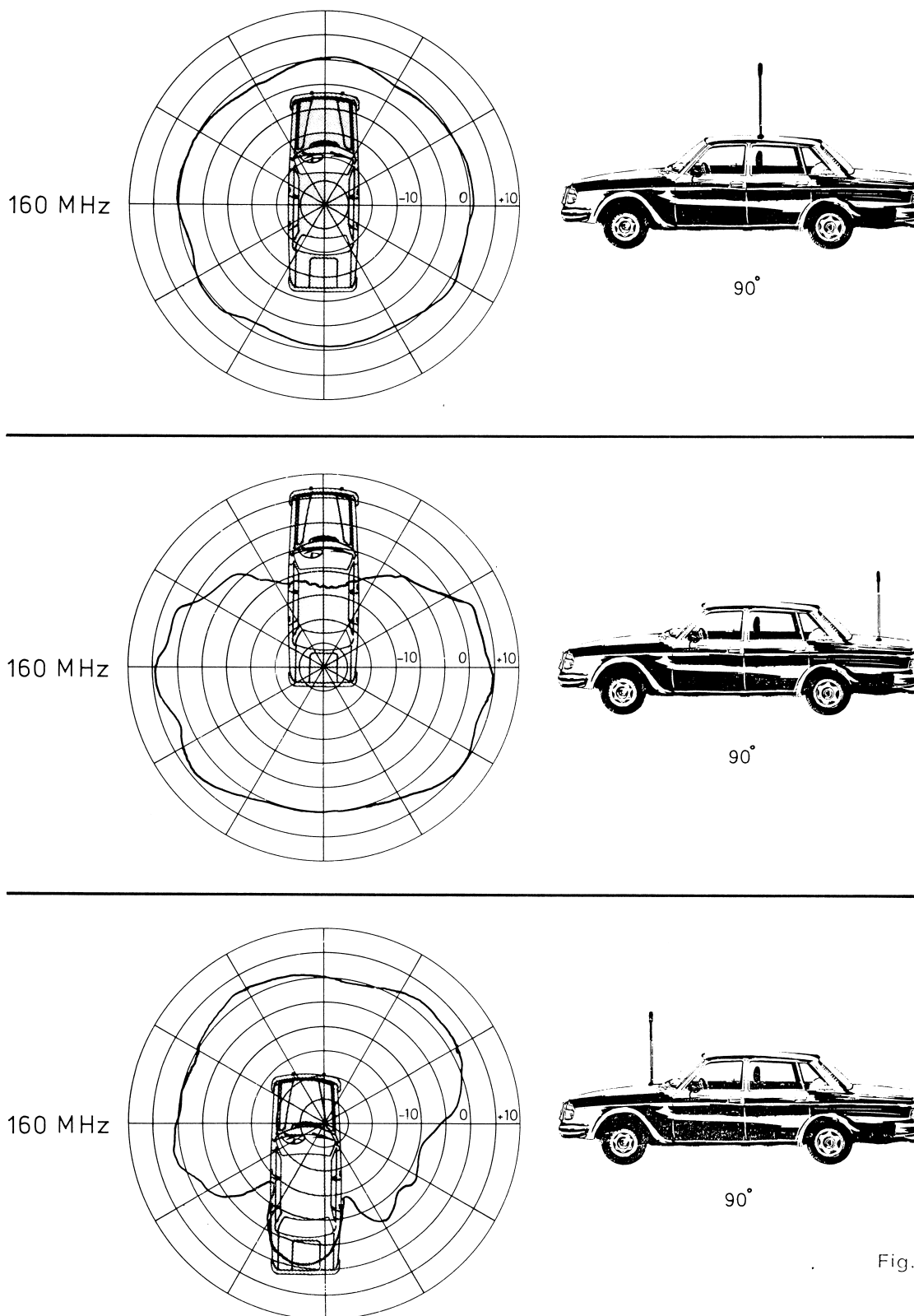


Fig. 7

ATTENUATION RELATED TO $\lambda/2$ DIPOLE (0 dB)

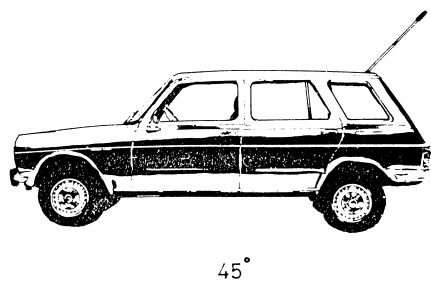
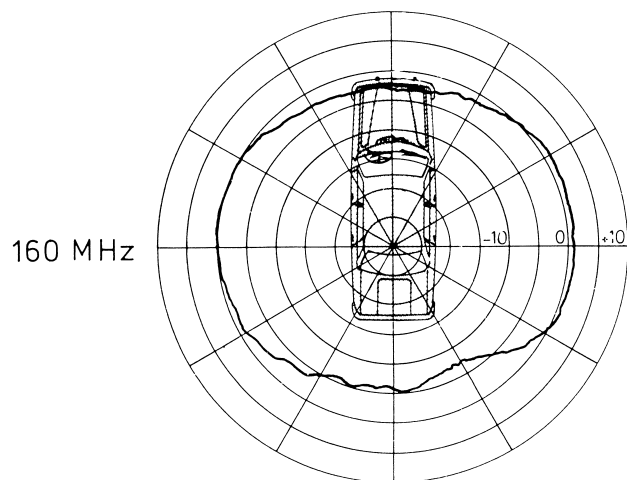
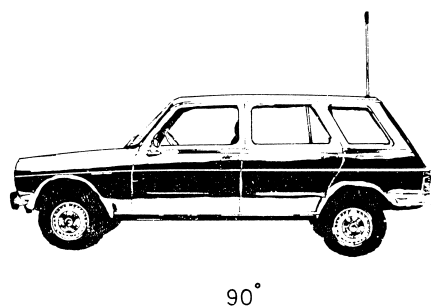
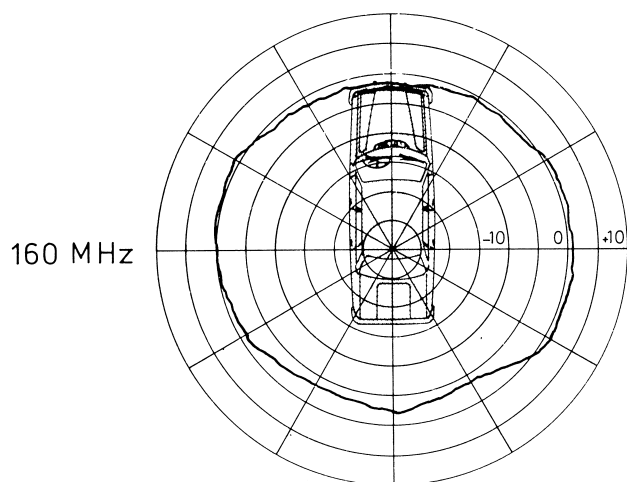
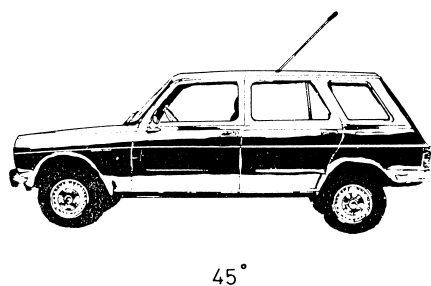
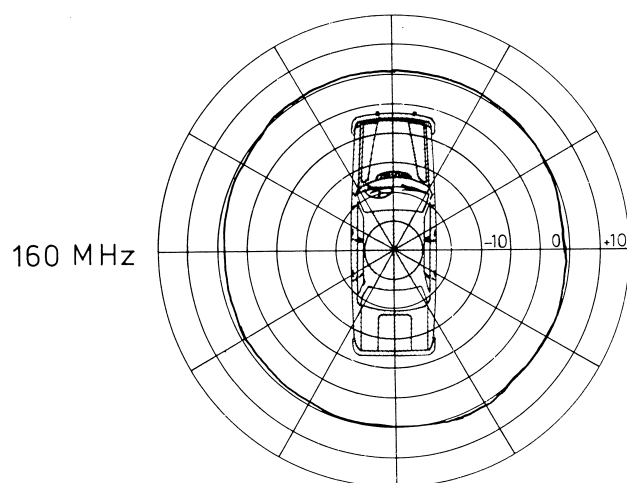


Fig. 8

ATTENUATION RELATED TO $\lambda/2$ DIPOLE (0 dB)

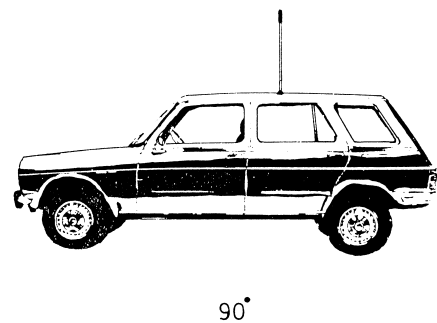
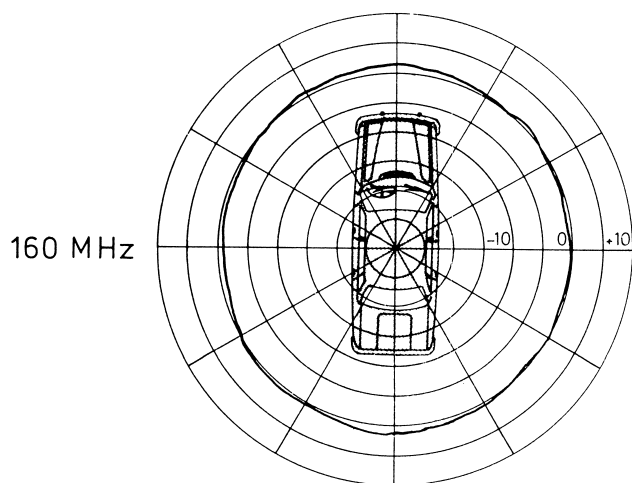
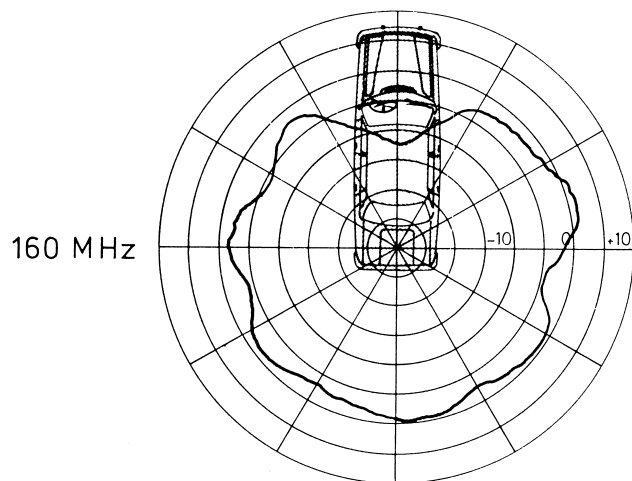
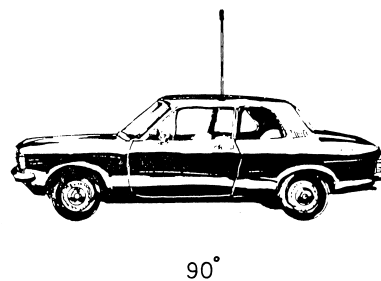
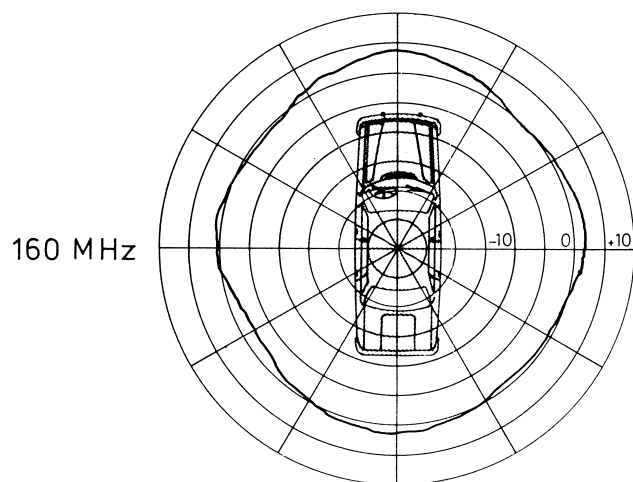


Fig. 9

SEQUENTIAL TONE UNIT

TQ5001 AND TQ5002

General

TQ5001 and TQ5002 are combined sequential tone transmitter-tone receiver units, the transmitter and receiver functions being independent of each other, and which can process 3, 4, or 5-tone signals. The units are designed to fit into CQM5000 radiotelephone equipment and the electrical design appears from the block diagram.

The unit is built on a single printed circuit board (p.c.b.) with plated through holes which connects to the radiotelephone circuits via plug-in sockets. The loudspeaker IN/OUT button, the TONE KEY button, and the yellow call indicator is mounted directly on the board and protrude through holes in the front plate. The unit is mechanically secured to the radiotelephone chassis by four screws and spacers. For TQ5001 the tone frequencies are the STORNO series, 885Hz to 2800Hz; for TQ5002 the tone frequencies are the CCIR series, 960Hz to 2110Hz. The tone combinations for the tone receiver and the tone transmitter are selected by soldering colour coded wires to the tone coil, or by establishing the connections on the wiring side of the p.c.b.

In standby, when turning on the equipment, the unit is in the tone receive mode and set to the 1st tone of the combination. Receipt of a sequential tone signal, that matches this combination, will cause the following events to take place.

The key blocking is cancelled (Q127 ON).
The loudspeaker blocking is cancelled (Q130 OFF).
The LED call indicator D107 will start flashing.

When the tone unit is strapped for Auto-Receipt, a correct tone call will automatically trigger the sequential tone transmitter circuit and

after having generated the last tone of the sequential tone signal the unit reverts to the condition described above, i.e. the loudspeaker is on.

Accordingly, when in the LS in mode, the tone transmitter can be manually triggered by pressing the Tone key button.

With 70ms tone length, the time from depressing the Tone key to the generation of the 1st tone is approximate by 220ms for TQ5001, and 320ms for TQ5002.

ms = millisecond = 0,001 second.

When using 3 tones or 4 tones in the sequence this interval may be extended if the unused tone gate wires are left unconnected.

The transmitter remains keyed for approximately 640ms for TQ5001, and 920ms for TQ5002 even if the Tone key button is pressed for a shorter or longer period. Simultaneously with the keying of the transmitter, the microphone amplifier will be blocked. The blocking signal disappears after the last tone has ceased, that is when the unit reverts to standby.

The units can accommodate a Group Call unit, SU5001, when an extension of the call tone system is required, and the unit may also be used as a combined single tone transmitter and sequential tone receiver.

Mode of Operation

In standby the TQ5001/TQ5002 unit is set to the sequential tone receiver mode and when a tone signal having the proper code is applied to the input, the following events take place:

The 1st tone is amplified and limited in the input stage.

The signal is then, via a coupling link, applied to the selective circuit.

In standby the 1st tone gate, Q117, selects the 1st tone of the combination.

The active part of the selective circuit is a Q-multiplier, which also operates as oscillator

when the selective circuit is part of the tone transmitter.

Owing to the high signal voltage across the selective circuit the gate transistors are biased in the nonconductive direction, and simultaneously the tone and oscillator signal amplitude is limited.

If the level of the 1st tone is within the sensitivity range of the tone receiver, the selected signal will switch the comparator output (U101A).

The schmitt-trigger (U101b) will go negative after approximately 17ms which is generated by the Clock Delay circuit. At the same time the schmitt trigger rapidly charges the Clear Delay circuit in order to enable the counter.

At the end of the 1st tone the Schmitt trigger reverts to standby and the positive leading edge is fed to the counter's clock input. The counter steps forward and the next tone gate tunes the selective circuit to the 2nd tone.

Each gate transistor has its collector connected to one of the tone coil terminals. The sequential tone receiver is now set to receive the 2nd tone of the signal, and it remains in this state for approximately 120ms, the time being determined by the Clear-Delay. Except for the requirement of a tone length of Approximately 40 ms, the tone receiver is independent of the duration of the signal elements, because the counter switches to the next tone gate at the end of the preceeding tone. If the 2nd tone is not accepted within approximately 120ms, the counter is reset to standby, i. e. ready for the 1st tone.

The 2nd, 3rd, 4th, and 5th tone of a sequential signal are received as described for the 1st. When the 5th tone has been accepted information of the counter is read out to Latch U104b, which cancels the key and loudspeaker blockings. At the same time the Call indicator is turned on, and the call may also cause an automatic transmission of receipt to take place, if used. The colour coded wires from the tone generator gates are soldered to the tone coil terminals, but if the same tone code is used for both tone transmitter and tone receiver, the code can be set by arranging the wires on the p.c.b. With the loudspeaker turned on depressing the Tone

key button causes the following to take place:

A positive pulse from the Tone key button toggles the latch U104a whose Q and \bar{Q} outputs control the internal switching from receive to transmit, and U104b controls the Transmitter Key switch and the Microphone Blocking. When the clock generator U101c starts, the comparator U101a and the counter U103, are inhibited by the Q-output of U104a. The Q output enables the tone transmitter counter U102, inhibits the Clock Delay circuit, and turns on Q108 which increases the gain of the Q-multiplier Q107.

The clock generator pulses are applied to the counter U102, the repetition rate being 70ms for TQ5001 and 100ms for TQ5002. Upon arrival of the 3rd clock pulse the 1st tone gate transistor is turned on and the tone oscillator generates the 1st tone of the signal code. The oscillator output is passing an emitter-follower before being applied to the output terminal. The output voltage is adjustable by means of R113.

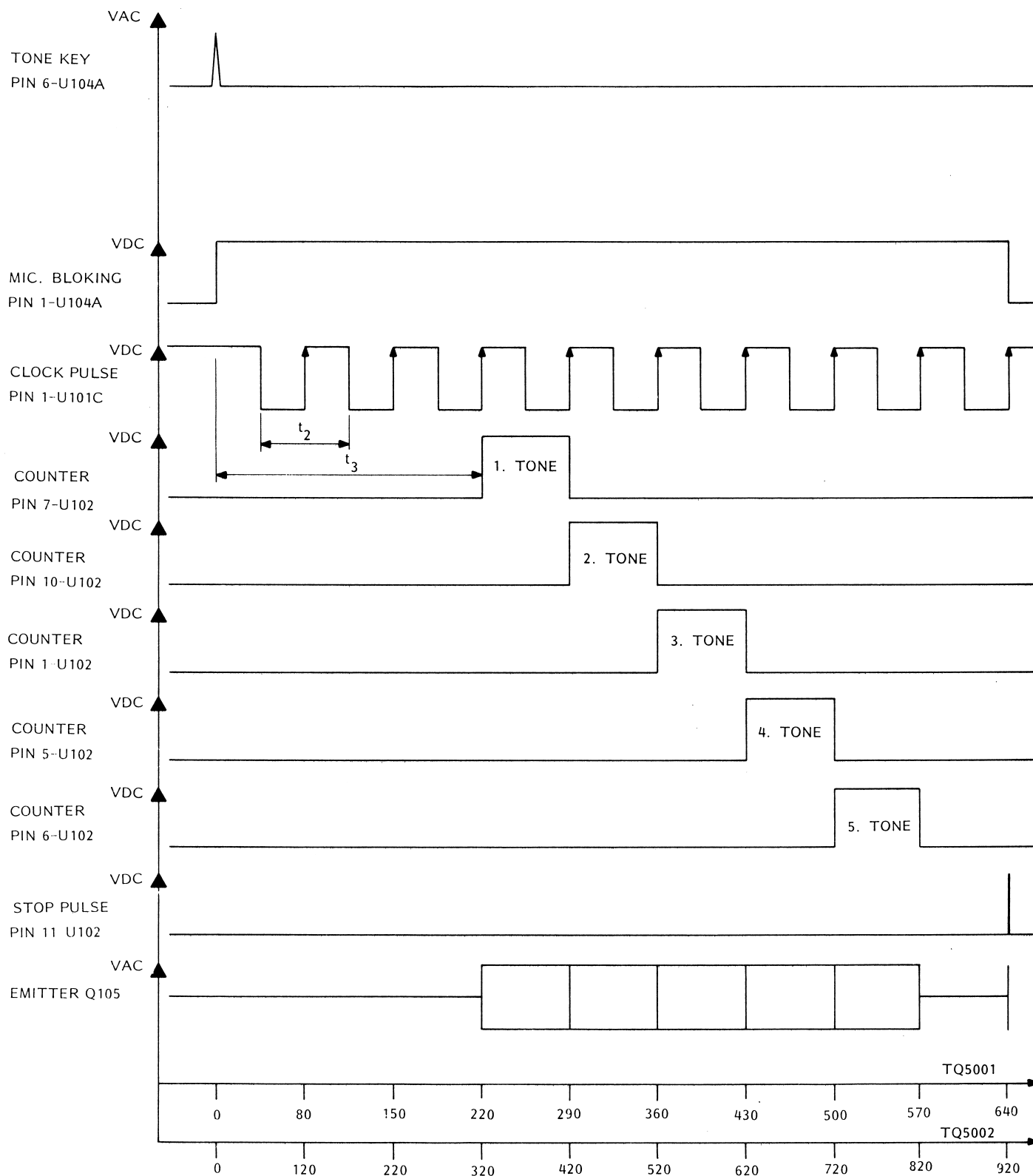
The 4th, 5th, 6th, and the 7th clockpulse successively turn on the remaining gate transistors to accomplish the signal code. The 8th clock pulse is used to introduce an interval before the 9th clock pulse resets the latch, U104a, and the TQ-unit reverts to the tone receive mode with the loudspeaker turned on.

Circuit Description

Input amplifier and limiter

Transistors Q101, Q102, and Q103 form a differential input amplifier/limiter, and Q104 is the resonant circuit driver. The received tone signal is amplified the gain being constant and determined by the ratio of R106 to R107. Signal levels higher than the minimum sensitivity (approx. 85mV) will cause limiting, and the tone signal is then applied to the Group Call Unit SU5001, if any, (terminal 9) and to driver Q104. Transistor Q104 operates as current generator with its collector connected to a separate winding on the tone coil. The sensitivity and thus the sequential tone receiver bandwidth is adjustable with R111.

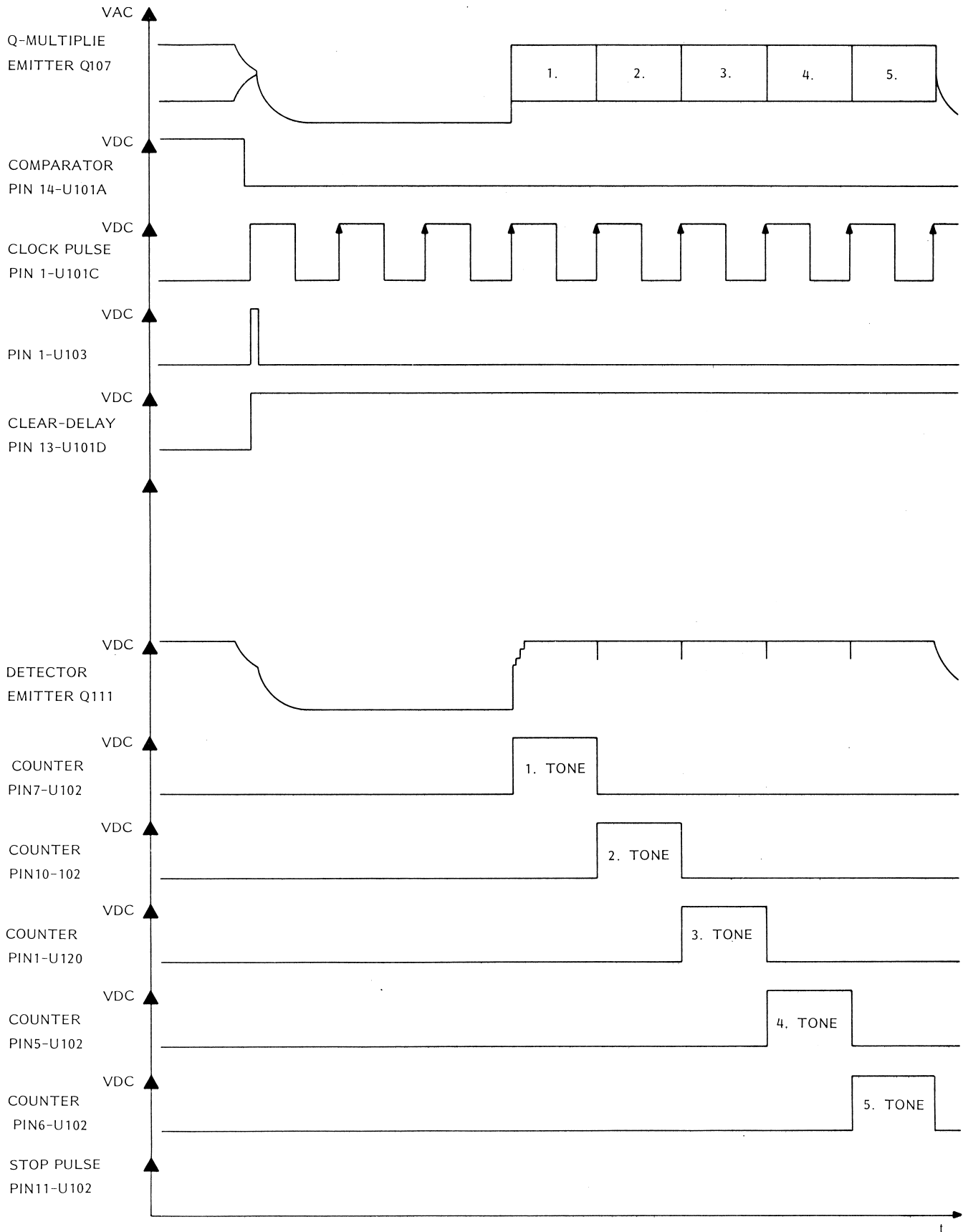
PULSE-TIME DIAGRAM FOR 5-TONE SEQUENTIAL CALL TRANSMITTING IN TQ5001 AND TQ5002



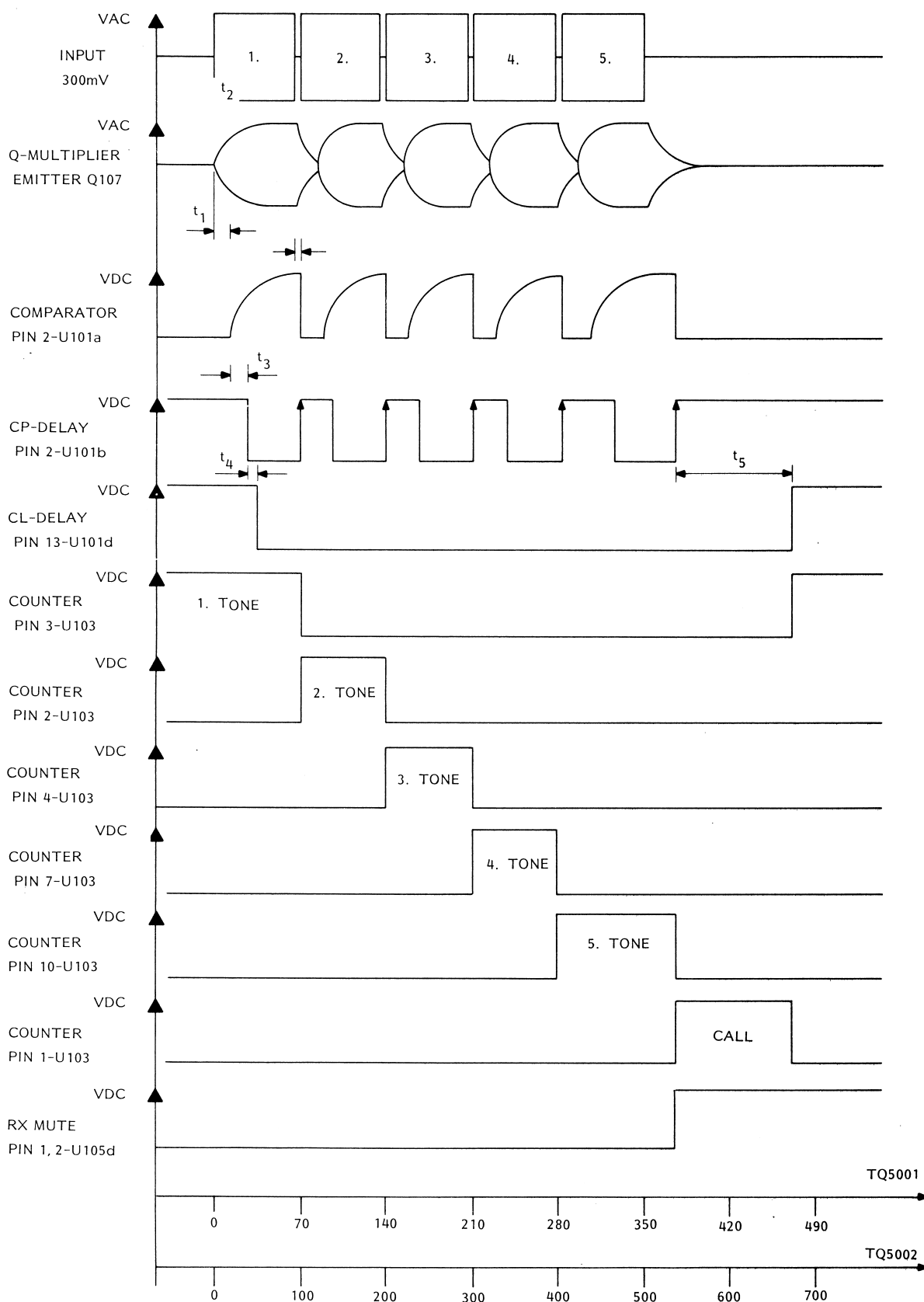
LOUDSPEAKER MANUALLY TURNED ON

 t_1 CHARGING TIME FOR CLOCK GENERATOR t_2 CLOCK PULSE PERIOD (TONE LENGHT) t_3 UNMODULATED PULSES BEFORE THE 1 ST TONE

PULSE-TIME DIAGRAM FOR 5-TONE AUTOMATIC RECEIPT

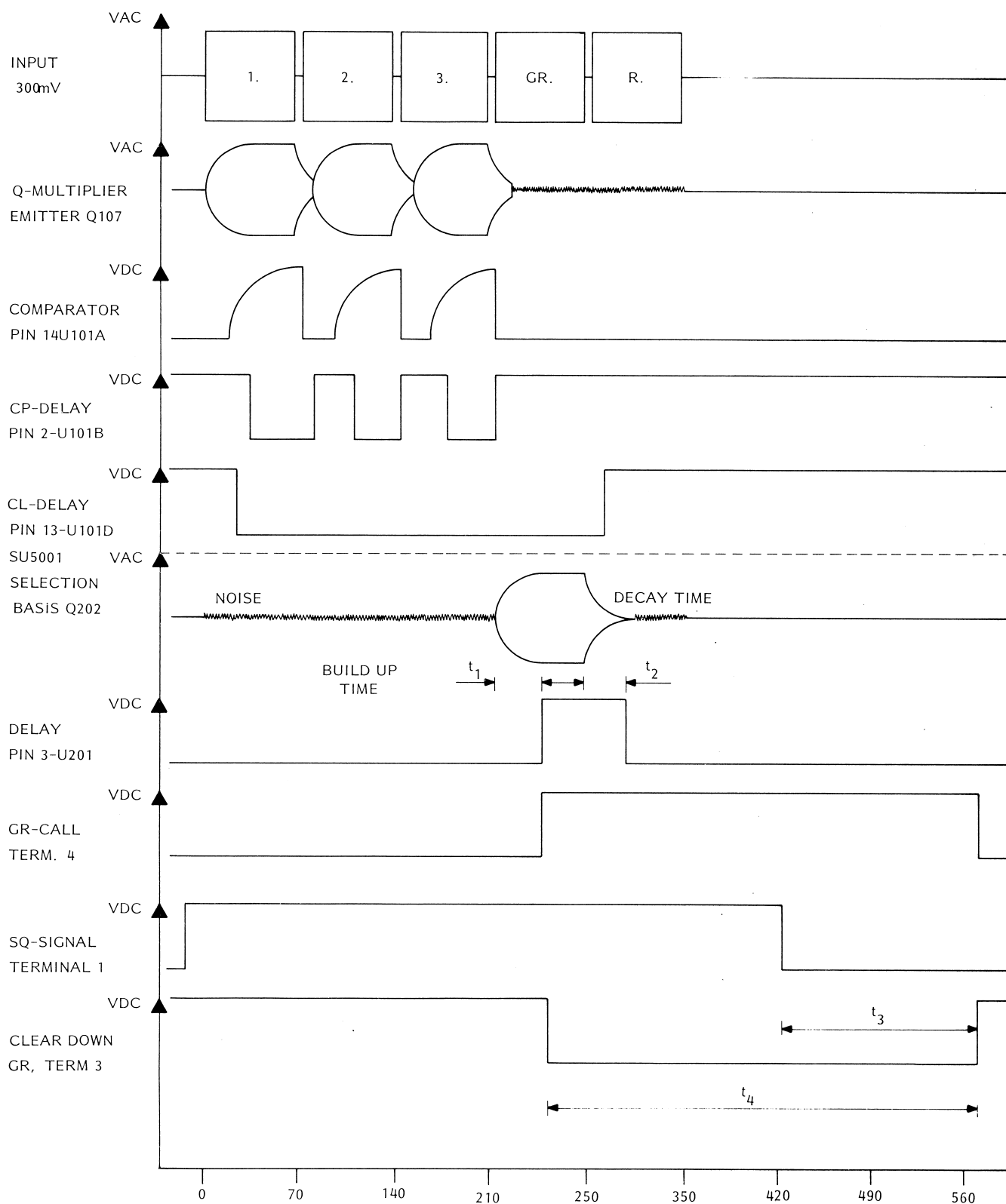


PULSE-TIME DIAGRAM FOR 5-TONE, SEQUENTIAL TONE RECEPTION IN TQ5001 AND TQ5002



- t_1 . SELECTIVE CIRCUIT BUILD-UP TIME
- t_2 . DELAYTIME
- t_3 . CLOCK-DELAY
- t_4 . DELAY CHARGING TIME
- t_5 . CLEAR-DELAY

PULSE-TIME DIAGRAM FOR 5-TONE SEQUENTIAL CALL WITH GROUP CALL



t_1 BUILD-UP TIME DELAY

t_2 DELAY TIME HANGE TIME

t_3 SQ-DELAY

IN PERIOD t_4 THE AUTOMATIC RECEIPT TONE KEY AND LS IN OUT ARE INHIBITED.

The amplifier is inhibited when depressing the Tone Key (and the normal Key) causing the 8.5V TX to be applied to the base of Q101 through D101. Less than 100ms after reverting from the tone transmitting mode the unit is ready to receive a call.

Resonant circuit

The band pass filter consists of tone coil L101 and capacitor C113.

The signal from the input amplifier is coupled to the parallel resonant circuit via the coupling link. The colour coded wires from the tone gates switch the tone coil taps into the circuit in parallel with capacitor C113.

Q-multiplier, limiter, reference voltage, and detector

These circuits consist of Q107, Q108, Q109, Q110, Q111, and their associated components. A part of the selected tone signal is fed via the Q-multiplier Q107 back to the coupling link and in phase with the input signal. This increases the bandpass filter Q-factor to approx. 30.

Resistors R123-R148 linearize this factor throughout the band, and the NTC resistor in the Q107 emitter compensates the Q-factor variations with ambient temperature.

The tone signal is rectified by transistor Q111 and the resultant d.c. voltage is applied to comparator U101a. Q108 is turned on by U104a when depressing the Tone Key, which increases the feedback so that the resonant circuit and Q107, which is the active component, form an oscillator. The signal voltage across the resonant circuit is amplitude limited by Q109 in order to obtain a constant signal output level from the oscillator and to reduce the decay time for strong signals. The gate transistor bias and the detector bias voltages are derived from Q110.

Output emitter follower and clipper

The desired frequency characteristic is flat because the tone signal is connected directly

to the splatter-filter. The output stage consists of the emitter follower Q105, and R113 is generator impedance for the OP-Amp of the splatterfilter. Due the DC-shift in the oscillator a peak will appear at the start, and the end of the tone signal, but this peak will be limited by Q106.

Comparator

The comparator is build around U101a, whose trigger reference level is determined by voltage divider R130-R131/R181 and controlled by the Q-output of latch U104a. The rectified tone signal increases the d.c. voltage to the non-inverting input of the comparator and when the level exceeds the reference voltage, the output of U101a will change from being a short to ground, to be the off state.

This state persists for a time determined by the length of the tone. After the tone period the output will revert to form a ground path. When depressing the Tone Key, U101a is inhibited in its standby state by the Q-output of U104a.

Clock-delay and clock generator

The Clock-delay is terminated by R132 and C107. In standby the charge of capacitor C107 is neutral due to the discharge through the output of U104a, and the clock generator U101c is inhibited in its off position. The reference voltage, which is common to U101b and U101c, is, via voltage divider R133, R134, R135, applied to their non-inverting inputs. When the comparator U101a is activated, the voltage across C107 will start to go positive. After 17ms (Clock-delay) the Schmitt trigger U101b will be activated and the output voltage will drop to 0V. At the end of the tone C107 again discharges via U101a.

This produces a positive going voltage edge at the U101b output which is applied to the clock inputs of counters U102 and U103 whose outputs switch the circuits to the next tone gate. If the comparator detects a new tone the procedure is repeated as previously described.

The comparator will, in its inhibited state (TONE KEY activated), keep U101b off. On the

other hand, the clock generator U101c is released by biasing D104 off. C108 is charged through resistors R136, R137, and R138 until reaching the common reference voltage, and the output of U101c drops to 0V. This d.c. voltage transition is via R134 fed back to the non-inverting input and thus causes a hysteresis. C108 is discharged to the lower voltage level and the positive edge so created is used as clock input to counter U102. The period time is adjusted by means of resistor, R137, to 70ms (TQ5001) or 100ms for TQ5002.

Clear delay

Comparator U101d is controlled by the Schmitt trigger U101b. In standby the charge of C109 is neutral because D103 is reverse biased. The output level of U101d corresponds to the supply voltage, 8.5V, and counter U103 is cleared and set to the 1st tone gate. Triggering U101b enables C109 to be charged of via D103 and R140, and when the voltage of C109 has fallen to the reference level, U101d changes its output to 0V and releases counter 103 which now is ready to receive the clock pulses.

The U101d reference level is controlled by U104a's Q-output which in standby is approximately 8.5V. Depressing the Tone Key button causes the reference level to fall to 0V and U101d is blocked in its standby position, and hence counter U103 is blocked accordingly. As long as the Schmitt trigger, U101b, is active, D103 will maintain the charge of C109. When the last tone ceases, U101b reverts to standby and D103 is reverse biased. The discharge of C109 is determined by R139 and R140 which within approximately 120ms reduces the charge of the capacitor until it corresponds to the reference level.

The U101d output voltage returns to 8.5V and clears the counter, U103, after which the 1st tone gate is reengaged, and the tone receiver is ready to receive a new call. As the intervals between the individual tones in sequential tone call are far less than the above mentioned 120ms, the clear delay will retain its state for this period.

Counter and tone gates

Two decimal counters are employed as tone generator pulse counter (U102) and tone receiver pulse counter, (U103). The counter output control the tone gates, Q112-121.

Determined by the clock generator period counter U102's outputs will, consequently, open gate transistors Q112 to Q116 the collectors of which are tied to the tone coil taps and so producing the tones of the sequential tone signal. The first gate transistor is connected to the third counter output for which reason a period of 220ms, for TQ5001 and 320ms for TQ5002 elapses -corresponding to the three first clock pulses- before generation of the 1st tone is started.

The time following the 9th clock pulse is utilized to discharge detector Q111, and the 10th clock pulse is fed, via R154, to latch U104a as a "stop" information. In order to hold the gate transistors effectively cut off their emitters are biased at 4.1V.

The clear input of U102 is controlled by U104a's Q-output, and therefore the counter is inhibited in standby and is not released until the Tone Key button is depressed.

Counter U103 opens the tone receiver gate transistors, Q117-Q121.

The control signals for the counter is derived from U101b and the clear delay U101d, respectively.

In standby the counter is inhibited by U101d and the 1st tone gate is opened by the "0" output. The mode of operation for counter U103 is similar to that of U102 the clock pulse period corresponding to the received tone pulse lengths.

Approximately 120ms after the cessation of the last tone the counter is reset to standby by U101d. All counter outputs of U103 are accessible on the p.c.b. for setting the individual and the group call combinations (see instructions for coding and strapping).

Transistor Q122 is, together with the counter enable input, controlled by U104a's Q-output, which in standby is 0V. Depressing the Tone Key button blocks the U103 clock input, and at the same time the 1st tone gate is blocked by Q122. The elapse of time to transmit, or receive, a 5-tone sequential signal appears from the time-pulse diagrams.

Latch, LS IN/OUT, TONE KEY and flashing circuit

As latch for the tone receiver and tone transmitter functions, a dual-D-flip-flop U104 is employed of which U104a is directly controlled by U104b via diodes D105 and D106. An R-S flip-flop, U105a-U105b, prevents contact bounce in the LS in/out button from operating the latch.

After a tone call, or after having opened the loudspeaker manually the flashing circuit, U106 with its associated components will start flashing the yellow LED Call indicator (D107).

When applying the supply voltage, 8.5RX, U104b is forced into state "LS out" by the positive pulse fed to the latch reset input via C115. The call pulse is derived from one of counter U103's outputs and applied to U104b's set input and, according to note 6 on the diagram, to U104a as a receipt pulse.

After a received tone call, U104b remains in state "LS in" until manually reset by depressing the LS in/out button. The tone transmitter latch, U104a, is inhibited in standby via diode D106 and, accordingly, the information from the Tone Key input terminal is short circuited via D105.

To perform a tone call U104b must be toggled manually to reverse bias D105 and D106.

Mute and Alarm

The mute function takes the information from the Q output of U104b and turns Q124 ON after a call or a manuel opening of the loudspeaker. The Alarm (Q123) is ON for a short time (70ms) immediately after the 5th tone.

PTT (To Relay) and PTT (Push To Talk)

When pressing the Tone Key, Q126 will go on and operate the transmitter relay. Q125 is controlled by the Q output of U104a which is triggered by U105c.

The normal keying of the RF transmitter is achieved by shorting terminal 3 to ground, but if the tone receiver is not opened, Q127 is off, and hence it prevents the transmitter from being keyed.

Microphone blocking and RX mute

When the transmitter is keyed, the microphone amplifier supply comes via Q129.

When "Tone Key" is activated, U104a blocks Q129, the microphone is deprived of its supply, and the amplifier blocked.

After reception of a correct call, or manual opening, Q130 switches off and cancels the clamping of the RX mute lead, so that only the noise controlled squelch circuit decides whether the sets audio channel should be open or not.

TECHICAL SPECIFICATIONS TQ5001.

Supply Voltage

8.5 ± 0.25V (Cont. and TX)

Current Drain

Standby

<20mA

Engaged

20mA +25mA peak when call indicator is on

Temperature Range

-30°C to +60°C

SEQUENTIAL TONE TRANSMITTER

Output Impedance

50Kohm max.

Output Signal

3.4 or 5 tones in burst of 70ms \pm 15ms.

The interval between triggering and emission of the 1st tone is min. 200ms.

Signal output level

600mV emf. max.

Frequency response

Flat. \pm 1dB

Distortion

max. 5%

Tone frequencies

885, 970, 1060, 1160, 1270, 1400, 1530, 1670, 1830, 2000, 2200, 2400, 2600, 2800Hz.

Frequency accuracy

Typical deviation (28)

1%

Maximum deviation

1.4%

Relative frequency accuracy

0.3%

Adjustment accuracy

0.1%

Frequency stability

1%

CONTROL FUNCTIONS

Receipt

TQ5001 can be strapped to automatic transmission of receipt after a received sequential call.

Automatic Keying

TQ5001 energizes the transmitter for approx. 640ms.

Microphone inhibit

The voltage supply to the microphone amplifier is inhibited during the tone key.

SEQUENTIAL TONE RECEIVER

Input impedance

>30Kohm, DC isolation

Input Response

De-emphasis according to an RC-function with $F_c=2900\text{Hz}$.

Signalling code

3.4 or 5 tone burst of min 55ms duration.

Activating Level

300mV \pm 6dB

Distortion

The TQ5001 can process tone signals having less than 20% distortion.

Tone Frequencies

885, 970, 1060, 1160, 1270, 1400, 1530, 1670, 1830, 2000, 2200, 2400, 2600, 2800Hz.

Frequency Accuracy

$\pm 0.3\%$

Selectivity

The tone receiver responds to tones with a frequency deviation less than 1.4%. The tone receiver is not sensitive to adjacent tones or other tones of the same standard series.

Reset Time

minimum 90ms

maximum 140ms

Reaction Time

minimum 20ms

maximum 45ms

Signal to Noise Conditions

The tone receiver will accept a noise level corresponding to SINAD = 5dB as measured in the speech channel of the CQM5000.

TECHICAL TQ5002 SPECIFICATIONS.

Supply Voltage

8.5 ± 0.25V (Cont and TX)

Current Drain

Standby

<20mA

Engaged

20mA +25mA peak when call indicator is on.

Temperature Range

-30°C to +60°C

SEQUENTIAL TONE TRANSMITTER

Output Impedance

50Kohm max.

Output Signal

3, 4 or 5 tones in burst of 100ms ± 15ms.

The interval between triggering and emission of the 1st tone is min 300ms.

Signal output level

600mV emf. max.

Frequency response

Flat. ±1dB

Distortion

max. 5%

Tone frequencies

(960, 1022), 1124, 1197, 1275, 1358, 1446, 1540, 1640, 1747, 1860, 1981, 2110Hz.

Frequency accuracy

Typical deviation (2σ)

1%

Maximum deviation

1.4%

Relative frequency accuracy

0.3%

Adjustment accuracy

0.1%

Frequency stability

1%

CONTROL FUNCTIONS

Receipt

TQ5002 can be strapped to automatic transmission of receipt after a received sequential call.

Automatic Keying

TQ5002 energizes the transmitter for approx. 900ms.

Microphone inhibit

The voltage supply to the microphone amplifier is inhibited during the tone key.

SEQUENTIAL TONE RECEIVER

Input impedance

>30Kohm, DC isolation

Input Response

De-emphasis according to an RC-function with Fc= 2900Hz.

Signalling code

3, 4 or 5 tone burst of min. 55ms duration.

Activating Level

300mV ± 6dB

Distortion

The TQ5002 can process tone signals having less than 20% distortion.

Tone Frequencies

(960, 1022), 1124, 1197, 1275, 1358, 1446, 1540, 1640, 1747, 1860, 1981, 2110Hz.

Frequency Accuracy

±0.3%

Selectivity

The tone receiver responds to tones with a frequency deviation less than 1.4%. The tone receiver is not sensitive to adjacent tones or other tones of the same standard series.

Reset Time

minimum 90ms

maximum 140ms

Reaction Time

minimum 20ms

maximum 45ms

Signal to Noise Conditions

The tone receiver will accept a noise level corresponding to SINAD = 5dB as measured in the speech channel of the CQM5000.

OUTPUT FUNCTIONS

A sequence call produces the following output signals.

Yellow L.E.D. will start flashing, cancel the short-circuit of terminal 4, and short-circuit 2-3.

Manual activation of LS in/out

establishes the output functions as above.

Switching the LS off

produces the following output signals.

The L.E.D. will stop flashing.

Key Blocking:

The connection between terminal 2 and 3 will be cancelled.

Audio Blocking:

Short-circuits terminal 4 to ground.

Length

159.8mm.

Width

69mm

Weight

86g.

SWITCHING UNIT

SU5003

The SU5003 switching unit is used as driver for an alarm device, horn, buzzer, bell, etc., or as a broadcast radio muting switch. The unit comprises a timer circuit and a relay with one changeover contact set. The unit is triggered by the CQM5000, either the tone receiver, or the squelch circuit and the monostable multivibrator timer sounds the alarm device for a preset time, approximately 1 second.

Alarm.

A horn or bell is connected to the relay and the SU5003 is controlled by the alarm output of the CQM5000 (pin 2 on J910). The alarm will be on for approximately 1 second.

Broadcast Radio Muting

The unit is connected to the muting output on the CQM5000 (pin 9 on J910) which actuates the relay when the TQ5001/TQ5002 opens the AF output. In radiotelephones without tone equipment the relay will be activated whenever the squelch circuit is opened or the transmitter is keyed. The broadcast radio supply voltage is applied via the relay contacts that are normally closed, or its loudspeaker is disconnected.

Technical Specifications

Supply Voltage

10.8V to 16.6V

Current Drain, 13.2V

Standby: approximately 0 mA

Engaged: 140 mA

Relay Contact Current

Max. 16A (t less than 3 seconds)

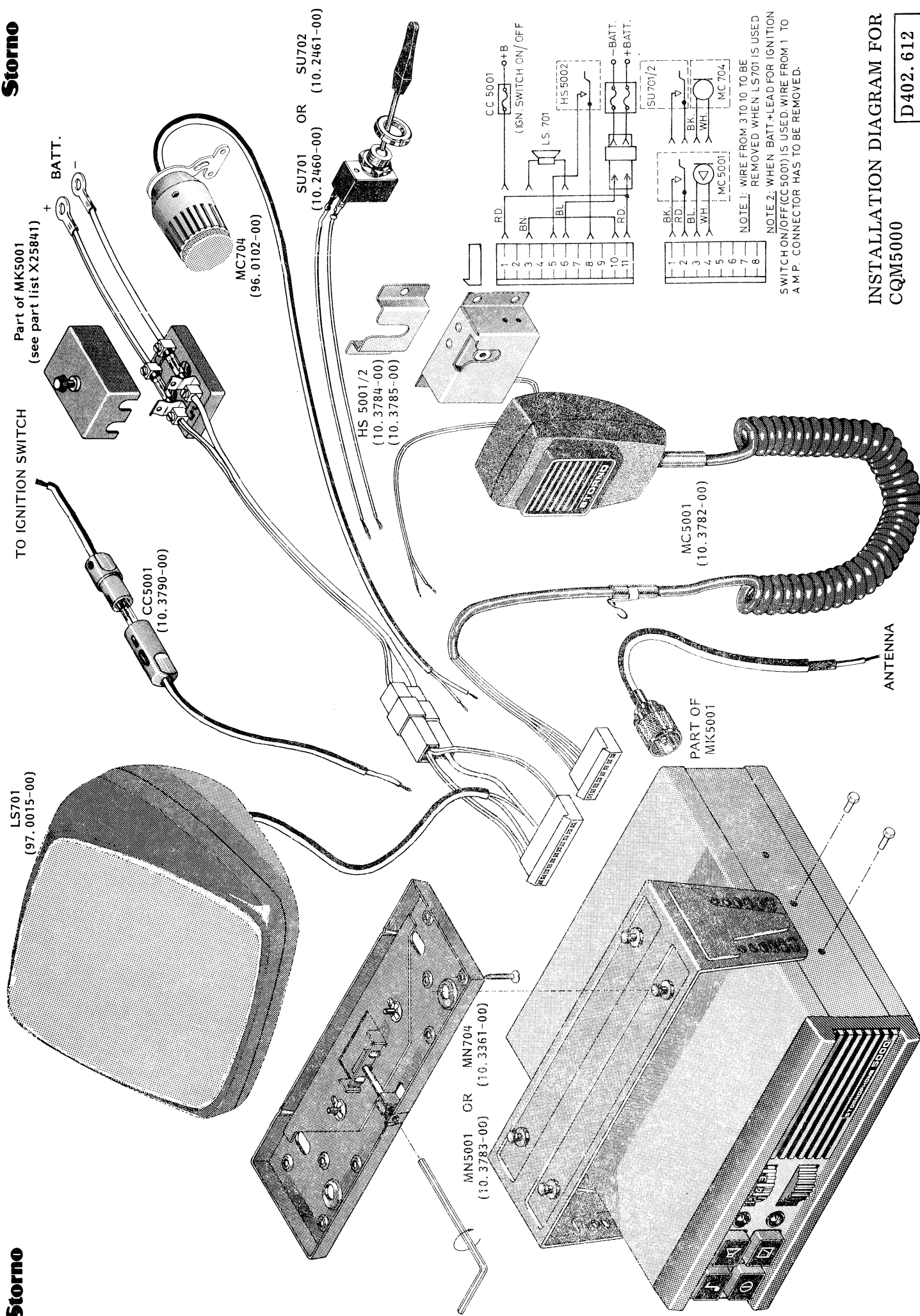
5A continuously

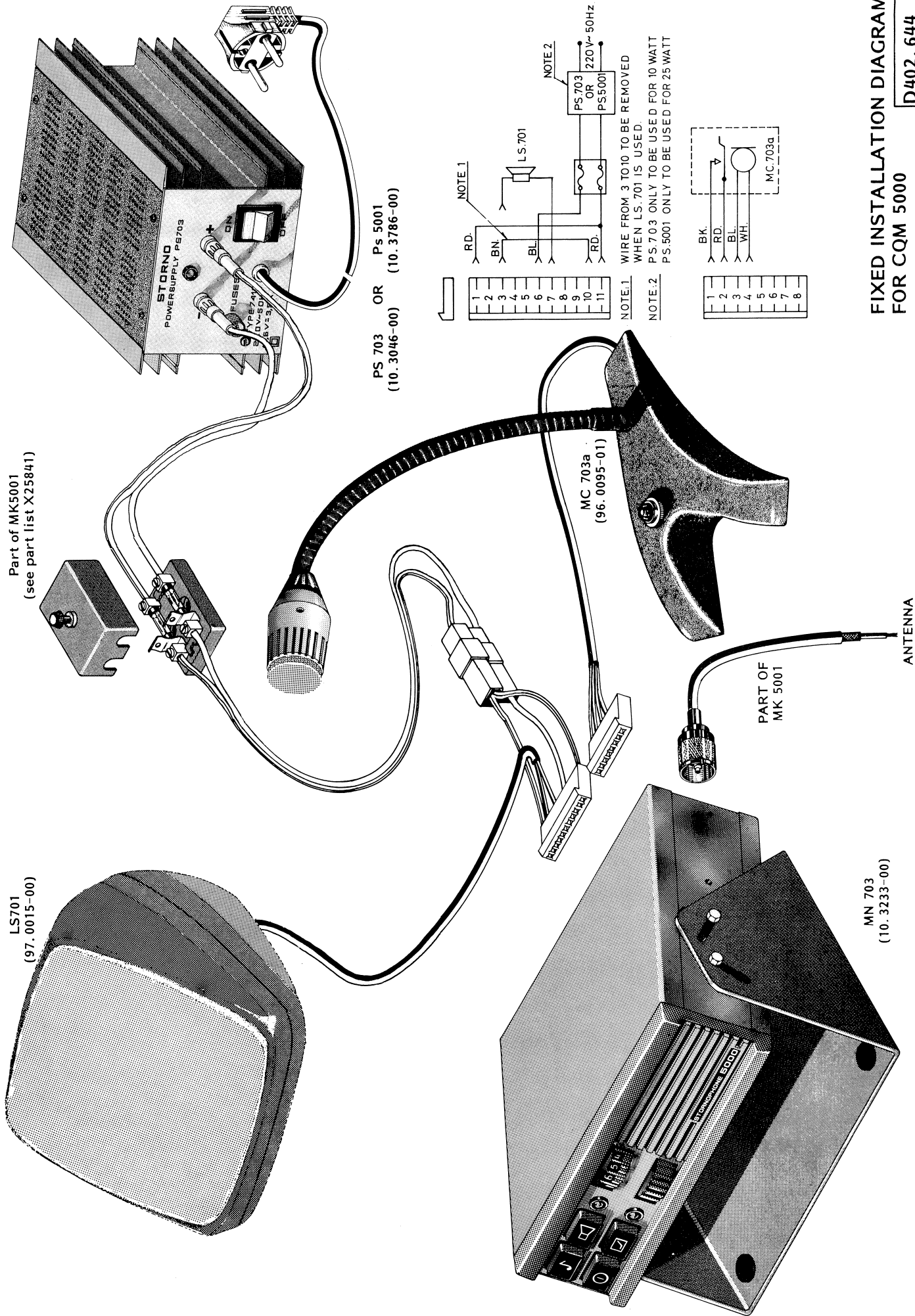
One change over contact set

Input

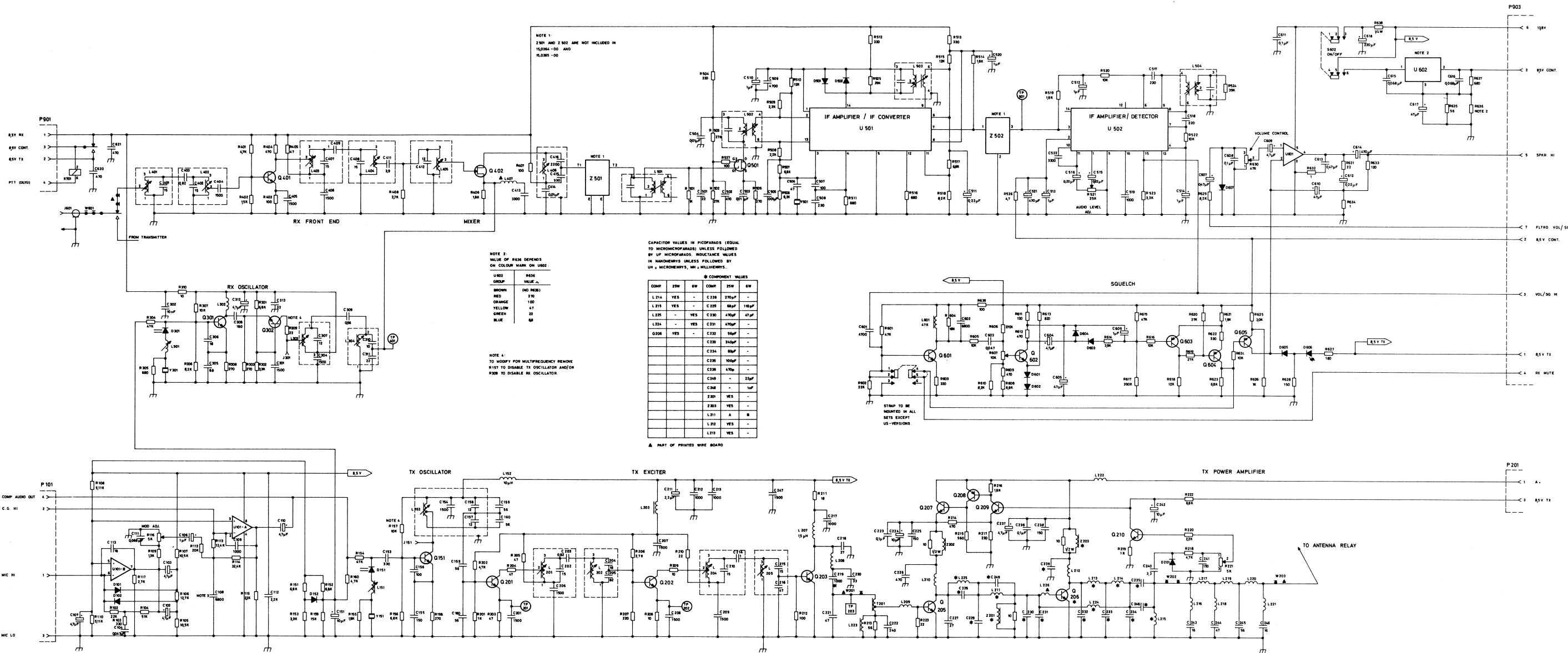
Alarm: A short pulse grounding the input terminal will actuate the relay for approx. 1 second.

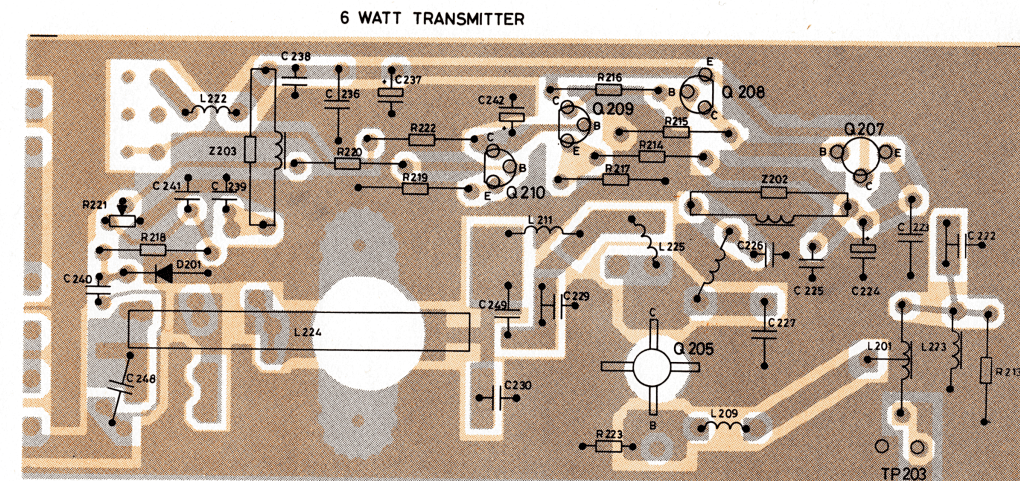
Mute: A ground connection will actuate the relay.











RF UNIT RF 5330
25W, 6W

D402.776

Storno

TYPE	Nº	CODE	DATA
5332 5333 5334	C102	73. 5172	4. 7uF 20% Tantal
	C103	73. 5172	4. 7uF 20% Tantal
	C104	76. 5142	47nF 5% Polyester FL
	C106	73. 5170	1. 0uF 20% Tantal
	C107	73. 5172	4. 7uF 20% Tantal
	C108	76. 5140	6. 8nF 5% Polyester FL
	C108	76. 5140	6. 8nF 5% Polyester FL
	C108	76. 5135	10nF 5% Polyester FL
	C109	76. 5156	1nF 5% Polyester FL
	C110	73. 5172	4. 7uF 20% Tantal
	C111	76. 5151	68nF 5% Polyester FL
	C112	74. 5392	150pF 5% Ceram DI
	C113	74. 5374	18pF 5% Ceram DI
	C151	73. 5173	10uF 20% Tantal
	C153	74. 5389	330pF 5% Ceram DI
	C154	74. 5398	1. 5nF 20% Ceram DI
	C155	74. 5385	150pF 5% Ceram DI
	C156	74. 5417	100pF 5% Ceram DI
	C157	74. 5372	12pF 5% Ceram DI
	C158	74. 5372	12pF 5% Ceram DI
	C159	74. 5380	56pF 5% Ceram DI
	C160	74. 5380	56pF 5% Ceram DI
	C201	74. 5398	1. 5nF 20% Ceram DI
	C202	74. 5373	15pF 5% Ceram DI
	C203	79. 5007	0. 82pF Phenolic TB
	C204	74. 5374	18pF 5% Ceram DI
	C205	74. 5382	82pF 5% Ceram DI
5332 5333 5334	C206	74. 5398	1. 5nF 20% Ceram DI
	C207	74. 5398	1. 5nF 20% Ceram DI
	C208	74. 5398	1. 5nF 20% Ceram DI
	C209	74. 5398	1. 5nF 20% Ceram DI
	C210	74. 5373	15pF 5% Ceram DI
	C211	73. 5171	2. 2uF 20% Tantal
	C212	74. 5397	1nF 20% Ceram DI
	C213	74. 5397	1nF 20% Ceram DI
	C214	79. 5008	1pF Phenolic TB
	C215	74. 5373	15pF 5% Ceram DI
	C216	74. 5379	47pF 5% Ceram DI
	C217	74. 5397	1nF 20% Ceram DI
	C218	74. 5376	27pF 5% Ceram DI
	C219	74. 5397	1nF 20% Ceram DI
	C220	74. 5377	33pF 5% Ceram DI
	C221	74. 5379	47pF 5% Ceram DI
	C222	75. 5047	240pF 2% Mica
	C223	76. 5144	0. 1uF 10% Polyester FL
	C224	73. 5173	10uF 20% Tantal
	C225	74. 5392	150pF 5% Ceram DI
	C226	74. 5395	470pF 20% Ceram DI

Storno

TYPE	Nº	CODE	DATA
25W 25W 6W 6W 25W 25W 25W 25W 25W 25W	C227	74. 5415	27pF 5% Ceram DI
	C228	75. 5048	270pF 5% Mica
	C229	75. 5046	68pF 5% Mica
	C229	75. 5026	110pF 5% Mica
	C230	75. 5044	47pF 2% Teflon
	C230	75. 5049	470pF 5% Mica
	C231	75. 5049	470pF 5% Mica
	C232	74. 5418	56pF 5% Ceram DI
	C233	75. 5047	240pF 2% Mica
	C234	75. 5032	82pF 2% Mica
	C235	75. 5020	100pF 5% Mica
	C236	76. 5144	0. 1uF 10% Polyester FL
	C237	73. 5172	4. 7uF 20% Tantal
	C238	74. 5392	150pF 5% Ceram DI
	C239	74. 5395	470pF 20% Ceram DI
	C240	74. 5365	3. 3pF 0. 25pF Ceram DI
	C241	74. 5392	150pF 5% Ceram DI
	C242	73. 5173	10uF 20% Tantal
	C243	75. 5043	16pF 0. 5pF Teflon
	C244	75. 5044	47pF 2% Teflon
	C245	75. 5045	56pF 2% Mica
	C246	75. 5043	16pF 0. 5pF Teflon
	C247	74. 5398	1. 5nF 20% Ceram DI
	C248	74. 5015	1nF -20 +50% Ceram DI
	C249	74. 5375	22pF 5% Ceram DI
6W 6W	C301	74. 5398	1. 5nF 20% Ceram DI
	C302	76. 5135	10nF 10% Polyester FL
	C303	74. 5386	180pF 5% Ceram DI
	C304	74. 5398	1. 5nF 20% Ceram DI
	C305	74. 5405	68pF 5% Ceram DI
	C306	74. 5403	18pF 5% Ceram DI
	C307	74. 5372	12pF 5% Ceram DI
	C308	74. 5386	180pF 5% Ceram DI
	C309	79. 5005	0. 56pF Phenolic TB
	C310	74. 5372	12pF 5% Ceram DI
	C311	74. 5375	22pF 5% Ceram DI
	C312	73. 5172	4. 7uF 20% Tantal
	C313	74. 5375	22pF 5% Ceram DI
	C401	74. 5373	15pF 5% Ceram DI
	C402	74. 5373	15pF 5% Ceram DI
	C403	79. 5007	0. 82pF Phenolic TB
	C404	74. 5398	1. 5nF 20% Ceram DI
	C405	74. 5398	1. 5nF 20% Ceram DI

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TYPE	Nº	CODE	DATA
C406	74. 5398	1. 5nF 20% Ceram DI	50V
C407	74. 5373	15pF 5% Ceram DI	50V
C408	74. 5373	15pF 5% Ceram DI	50V
C409	79. 5008	1pF Phenolic TB	500V
C411	74. 5366	3. 9pF 0. 25pF Ceram DI	50V
C412	74. 5372	12pF 5% Ceram DI	50V
C413	76. 5132	3. 3nF 10% Polyester FL	50V
C414	76. 5135	10nF 10% Polyester FL	50V
C415	74. 5389	330pF 5% Ceram DI	50V
C416	76. 5131	2. 2nF 10% Polyester FL	50V
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
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

TYPE	Nº	CODE	DATA
	C617	73. 5164	47uF -10 +100% Elco
	C618	73. 5165	220uF -10 +100% Elco
	C620	74. 5395	470pF 20% Ceram DI
	C621	74. 5395	470pF 20% Ceram DI
	C634	80. 5213	1ohm 5% Carbon film
	D101	99. 5374	Diode
	D102	99. 5374	Diode
	D151	99. 5373	BB109C Cap. diode
	D152	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	Diode LED
	D607	99. 5237	1N4148 Diode
	J151	41. 5529	Socket
	J301	41. 5529	Socket
	J601	41. 5165	Connector
	K601	58. 5085	2121 Relay
	L151	61. 5052	16-22MHz RF coil
	L152	61. 5031	10uH 10% RF choke
	L153	61. 5057	33-44MHz RF coil
	L201	61. 5054	66-88MHz RF coil
	L201	99. 5237	1N4148 Diode
	L202	61. 5058	66-88MHz RF coil
	L203	61. 1383	RF choke
	L204	61. 5059	66-88MHz RF coil
	L205	61. 5058	66-88MHz RF coil
	L207	61. 5030	1. 5uH 10% RF choke
	L209	62. 1017	RF coil
	L210	62. 1018	RF coil
	L211	62. 1019	RF coil
	L211	62. 1025	RF coil
	L212	62. 1020	RF coil
	L213	62. 1021	RF coil
	L214	62. 1022	RF coil
	L215	62. 1023	RF coil
	L216	62. 1024	RF coil

25W
6W
25W
25W
25W
25W

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TYPE	Nº	CODE	DATA
6W 6W	L217	62. 1026	RF coil
	L218	62. 1019	RF coil
	L219	62. 1026	RF coil
	L220	62. 1026	RF coil
	L221	62. 1027	RF coil
	L222	62. 0981	RF coil
	L223	61. 1383	RF choke
	L224	62. 1029	RF coil
	L225	62. 1028	RF coil
	L301	61. 5051	38-50MHz RF coil
	L302	61. 5015	3.3uH 10% HF choke
	L303	61. 5055	76-99MHz RF coil
	L304	61. 5056	76-99MHz RF coil
	L401	61. 5053	66-88MHz RF coil
	L402	61. 5053	66-88MHz RF coil
	L403	61. 5054	66-88MHz RF coil
	L404	61. 5053	66-88MHz RF coil
	L405	61. 5054	66-88MHz RF coil
	L406	61. 5050	10.7MHz RF coil
	L501	61. 5026	10.7MHz IF transformer
	L502	61. 5026	10.7MHz IF transformer
	L503	61. 5025	455kHz IF transformer
	L504	61. 5025	455kHz IF transformer
	L601	61. 5023	75uH 10% Choke
25W	P101	41. 5541	Fem. connector
	P201	41. 5545	Fem. connector
	P901	41. 5541	Fem. connector
	P903	41. 0230	Fem. connector
	Q151	99. 0001	PN2369 Transistor
	Q201	99. 0001	PN2369 Transistor
	Q202	99. 5348	RF transistor
	Q203	99. 5349	RF transistor
	Q205	99. 5369	BLY87C Transistor
	Q206	99. 5368	RF transistor
	Q207	99. 5345	BD201 Transistor
	Q208	99. 5251	BC307 Transistor
	Q209	99. 5121	BC237 Transistor
	Q210	99. 5121	BC237 Transistor
	Q301	99. 0001	PN2369 Transistor
	Q302	99. 5347	PN2369 Transistor
	Q401	99. 5240	BFX89 Transistor
	Q402	99. 5245	2N5245 Transistor
	Q501	99. 5291	3N205 Transistor
	Q601	99. 5143	BC238 Transistor
	Q602	99. 5201	BC602 Transistor
	Q603	99. 5115	BC309 Transistor
	Q604	99. 5115	BC309 Transistor
	Q605	99. 5115	BC309 Transistor

TYPE	Nº	CODE	DATA
5332 5333 5334	R102	80. 5265	22Kohm 5% Carbon film
	R103	80. 5243	330ohm 5% Carbon film
	R104	89. 5095	51Kohm 5% Carbon film
	R105	89. 5083	10. 5Kohm 1% Metal film
	R106	89. 5085	12. 7Kohm 1% Metal film
	R107	89. 5083	10. 5Kohm 1% Metal film
	R108	89. 5082	5. 11Kohm 1% Metal film
	R109	89. 5091	1. 3Kohm 5% Carbon film
	R109	89. 5091	1. 3Kohm 5% Carbon film
	R109	89. 5252	1. 8Kohm 5% Carbon film
	R110	89. 5082	5. 11Kohm 1% Metal film
	R112	89. 5086	20Kohm 1% Metal film
	R113	89. 5084	12. 4Kohm 1% Metal film
	R114	89. 5087	32. 4Kohm 1% Metal film
	R115	80. 5253	2. 2Kohm 5% Carbon film
	R116	86. 5050	5Kohm 20% Trim Carbon
	R117	80. 5254	2. 7Kohm 5% Carbon film
	R151	80. 5259	6. 8Kohm 5% Carbon film
	R152	80. 5259	6. 8Kohm 5% Carbon film
	R153	89. 5088	3. 3Kohm 10% NTC
	R154	80. 5269	47Kohm 5% Carbon film
	R155	80. 5252	1. 8Kohm 5% Carbon film
	R156	80. 5259	6. 8Kohm 5% Carbon film
	R157	80. 5261	10Kohm 5% Carbon film
	R158	80. 5242	270ohm 5% Carbon film
	R159	80. 5263	15Kohm 5% Carbon film
	R160	80. 5257	4. 7Kohm 5% Carbon film
	R201	80. 5249	1Kohm 5% Carbon film
	R202	80. 5257	4. 7Kohm 5% Carbon film
	R203	80. 5233	47ohm 5% Carbon film
	R204	80. 5233	47ohm 5% Carbon film
	R205	80. 5233	47ohm 5% Carbon film
	R206	80. 5254	2. 7Kohm 5% Carbon film
	R207	80. 5241	220ohm 5% Carbon film
	R208	80. 5225	10ohm 5% Carbon film
	R209	80. 5225	10ohm 5% Carbon film
	R210	80. 5229	22ohm 5% Carbon film
	R211	80. 5228	18ohm 5% Carbon film
	R212	80. 5237	100ohm 5% Carbon film
	R213	80. 5234	56ohm 5% Carbon film
	R214	80. 5245	470ohm 5% Carbon film
	R215	80. 5246	560ohm 5% Carbon film

RF UNIT RF5330

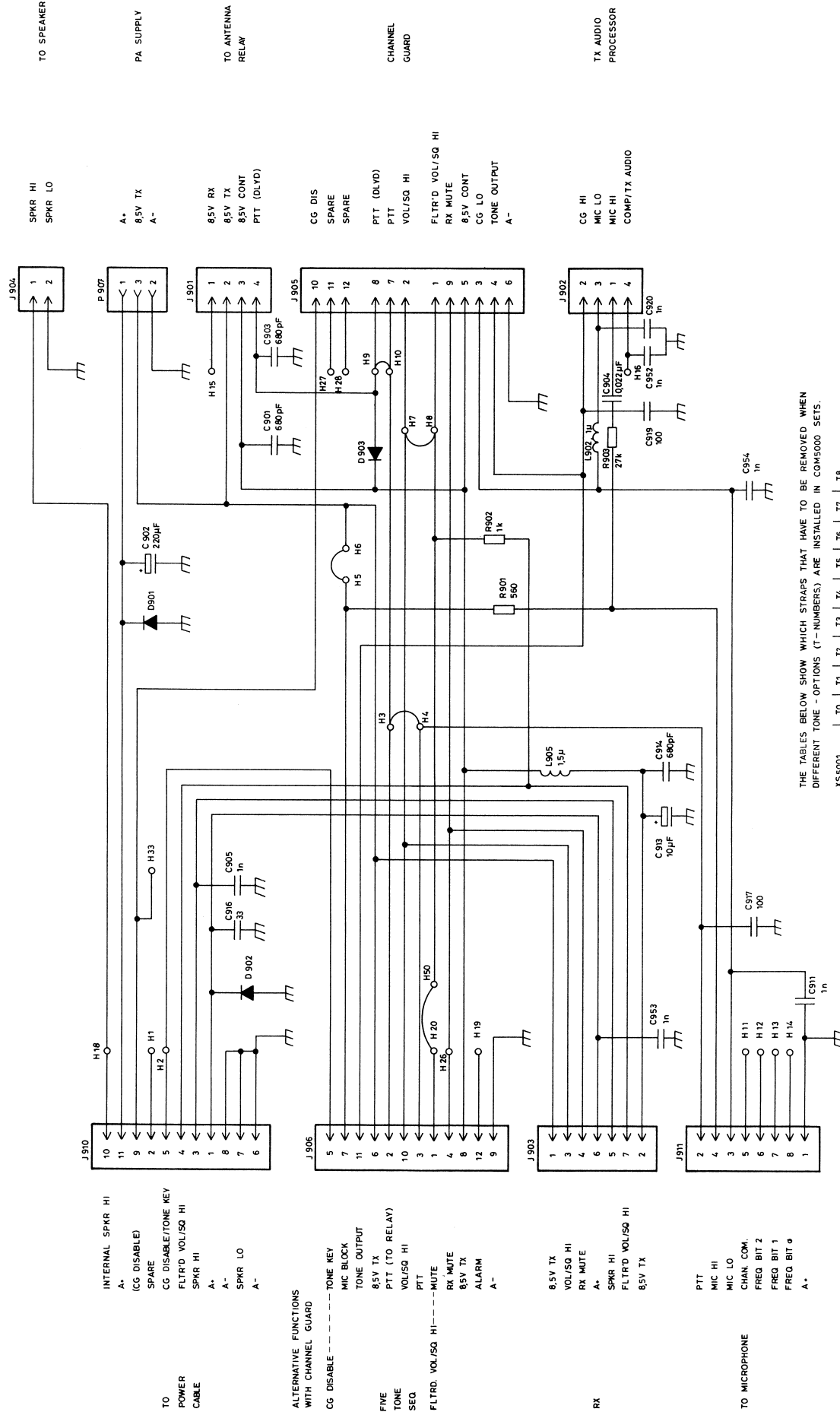
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TYPE	Nº	CODE	DATA
	R216	80. 5252	1. 8Kohm 5% Carbon film
	R217	80. 5241	220ohm 5% Carbon film
	R218	80. 5257	4. 7Kohm 5% Carbon film
	R219	80. 5249	1Kohm 5% Carbon film
	R220	80. 5253	2. 2Kohm 5% Carbon film
	R221	86. 5078	5Kohm 20% Trim Cermet
	R222	80. 5259	6. 8Kohm 5% Carbon film
	R223	39. 5104	22ohm 5% Carbon comp.
	R301	80. 5259	6. 8Kohm 5% Carbon film
	R302	80. 5255	3. 3Kohm 5% Carbon film
	R303	90. 5242	270ohm 5% Carbon film
	R304	80. 5269	47Kohm 5% Carbon film
	R305	80. 5247	680ohm 5% Carbon film
	R306	80. 5260	8. 2Kohm 5% Carbon film
	R307	80. 5261	10Kohm 5% Carbon film
	R308	80. 5242	270ohm 5% Carbon film
	R309	80. 5229	22ohm 5% Carbon film
	R310	80. 5225	10ohm 5% Carbon film
	R401	80. 5257	4. 7Kohm 5% Carbon film
	R402	80. 5251	1. 5Kohm 5% Carbon film
	R403	80. 5237	100ohm 5% Carbon film
	R404	80. 5245	470ohm 5% Carbon film
	R405	80. 5233	47ohm 5% Carbon film
	R406	80. 5252	1. 8Kohm 5% Carbon film
	R407	80. 5237	100ohm 5% Carbon film
	R408	80. 5254	2. 7Kohm 5% Carbon film
	R501	80. 5249	1Kohm 5% Carbon film
	R502	80. 5266	27Kohm 5% Carbon film
	R503	80. 5266	330ohm 5% Carbon film
	R504	80. 5243	270ohm 5% Carbon film
	R505	80. 5242	8. 2Kohm 5% Carbon film
	R506	80. 5260	6. 8Kohm 5% Carbon film
	R507	80. 5259	2. 2Kohm 5% Carbon film
	R508	80. 5253	2. 2Kohm 5% Carbon film
	R509	80. 5253	2. 2Kohm 5% Carbon film
	R510	80. 5262	12Kohm 5% Carbon film
	R511	80. 5247	680ohm 5% Carbon film
	R512	80. 5243	330ohm 5% Carbon film
	R513	80. 5243	330ohm 5% Carbon film
	R514	80. 5252	1. 8Kohm 5% Carbon film
	R515	80. 5262	12Kohm 5% Carbon film
	R516	80. 5247	680ohm 5% Carbon film
	R517	80. 5259	6. 8Kohm 5% Carbon film
	R518	80. 5260	8. 2Kohm 5% Carbon film
	R519	80. 5252	1. 8Kohm 5% Carbon film
	R520	80. 5261	10Kohm 5% Carbon film
	R521	86. 5060	25Kohm 20% Trim Carbon
	R522	80. 5261	10Kohm 5% Carbon film

TYPE	Nº	CODE	DATA
	R523	80. 5255	3. 3Kohm 5% Carbon film
	R524	80. 5268	39Kohm 5% Carbon film
	R525	80. 5268	39Kohm 5% Carbon film
	R526	80. 5221	4. 7ohm 5% Carbon film
	R527	80. 5237	100ohm 5% Carbon film
	R601	80. 5269	47Kohm 5% Carbon film
	R602	80. 5265	22Kohm 5% Carbon film
	R603	80. 5243	330ohm 5% Carbon film
	R604	80. 5264	18Kohm 5% Carbon film
	R605	80. 5261	10Kohm 5% Carbon film
	R606	80. 5278	270Kohm 5% Carbon film
	R607	86. 5080	10Kohm 20% Trim Carbon
	R608	80. 5259	6. 8Kohm 5% Carbon film
	R609	89. 5053	470ohm 20% NTC
	R610	80. 5260	8. 2Kohm 5% Carbon film
	R611	80. 5238	120ohm 5% Carbon film
	R612	80. 5245	470ohm 5% Carbon film
	R613	80. 5248	820ohm 5% Carbon film
	R614	80. 5256	3. 9Kohm 5% Carbon film
	R615	80. 5269	47Kohm 5% Carbon film
	R616	80. 5261	10Kohm 5% Carbon film
	R617	80. 5280	390Kohm 5% Carbon film
	R618	80. 5262	12Kohm 5% Carbon film
	R619	80. 5266	27Kohm 5% Carbon film
	R620	80. 5266	27Kohm 5% Carbon film
	R621	80. 5252	1. 8Kohm 5% Carbon film
	R622	80. 5243	330ohm 5% Carbon film
	R623	80. 5259	6. 8Kohm 5% Carbon film
	R624	80. 5261	10Kohm 5% Carbon film
	R625	89. 5093	3Kohm 5% Carbon film
	R626	80. 5249	1Kohm 5% Carbon film
	R627	80. 5240	180ohm 5% Carbon film
	R628	80. 5239	150ohm 5% Carbon film
	R629	80. 5260	8. 2Kohm 5% Carbon film
	R630	86. 5077	47Kohm 20% Carbon pot.
	R631	80. 5229	22ohm 5% Carbon film
	R632	80. 5213	1ohm 5% Carbon film
	R633	80. 5238	120ohm 5% Carbon film
	R635	80. 5234	56ohm 5% Carbon film
	R637	80. 5247	680ohm 5% Carbon film
	R638	80. 5413	1ohm 5% Carbon film
	R639	80. 5237	100ohm 5% Carbon film

RF UNIT RF5330

X402. 774

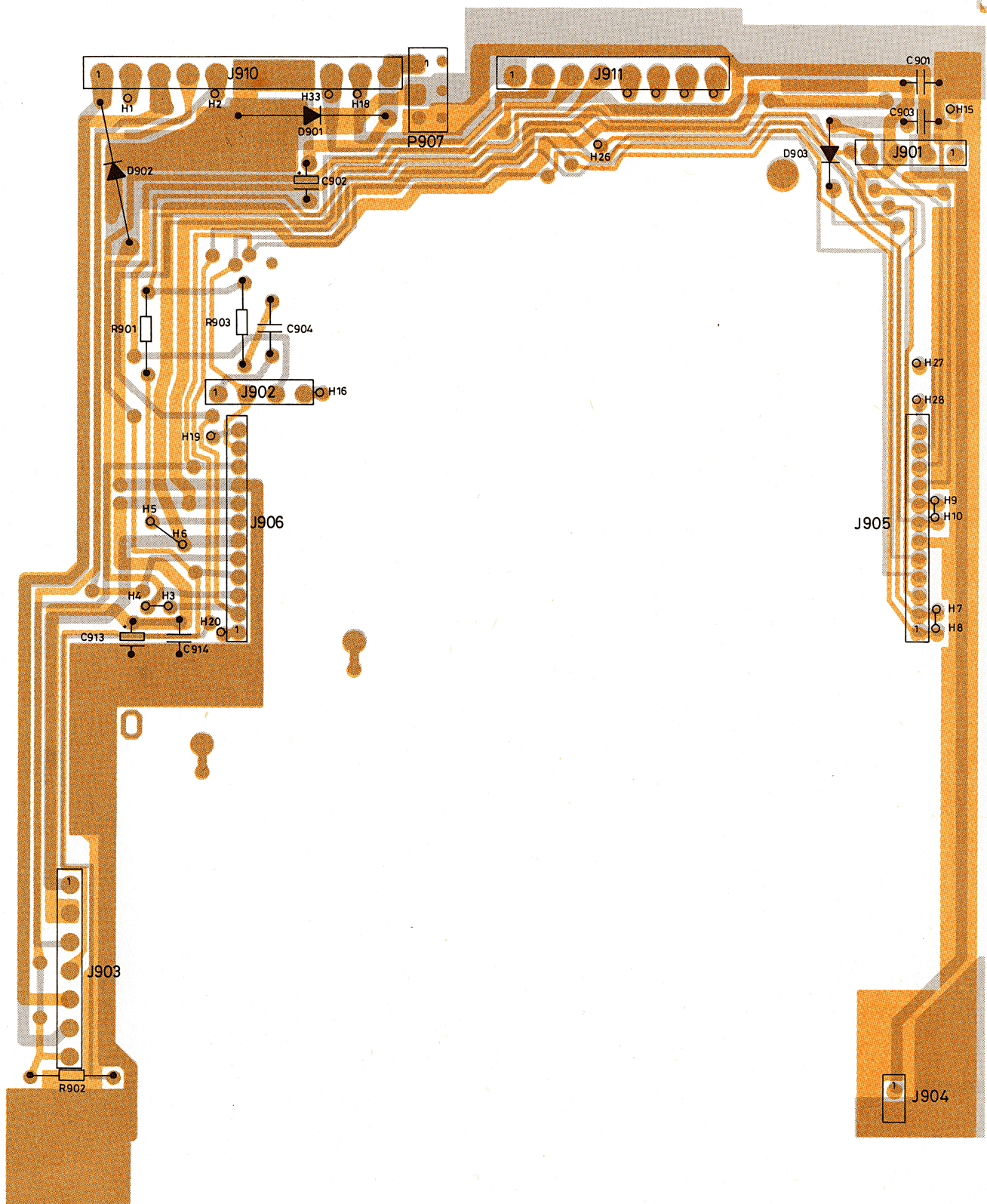


THE TABLES BELOW SHOW WHICH STRAPS THAT HAVE TO BE REMOVED WHEN DIFFERENT TONE - OPTIONS (T - NUMBERS) ARE INSTALLED IN COM5000 SETS.

XS5001	T0	T1	T2	T3	T4	T5	T6	T7	T8
H3 - H4	+	-	-	-	+	+	+	+	+
H5 - H6	+	-	-	-	+	+	+	+	+
H7 - H8	+	-	+	+	-	+	+	-	+
H9 - H10	+	+	+	+	+	+	+	+	+
H20 - H50	+	+	+	+	+	+	+	+	+

Storno

Storno



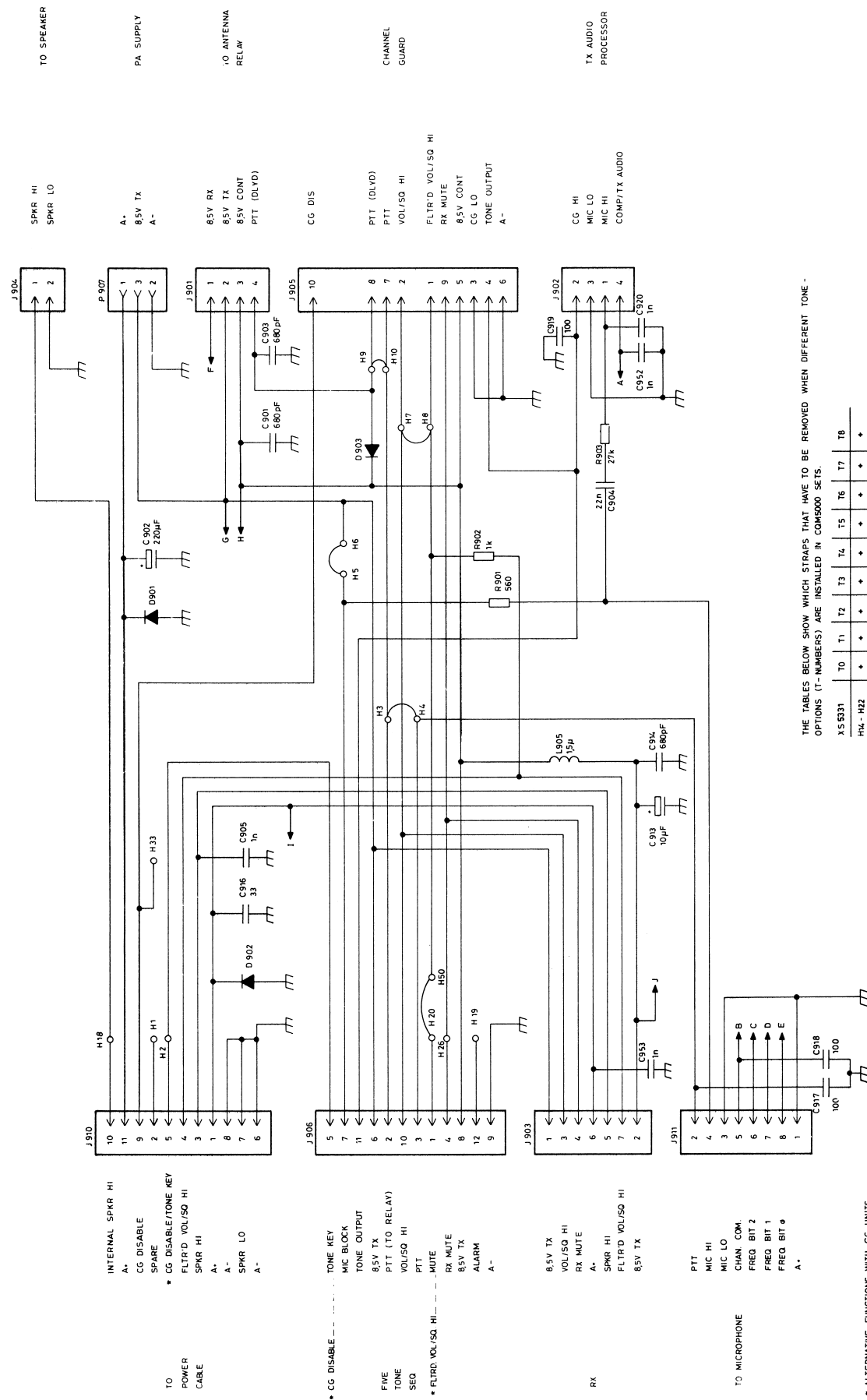
INTERCONNECT UNIT
XS 5001

D402.637

Storino

TYPE	Nº	CODE	DATA

X402. 648

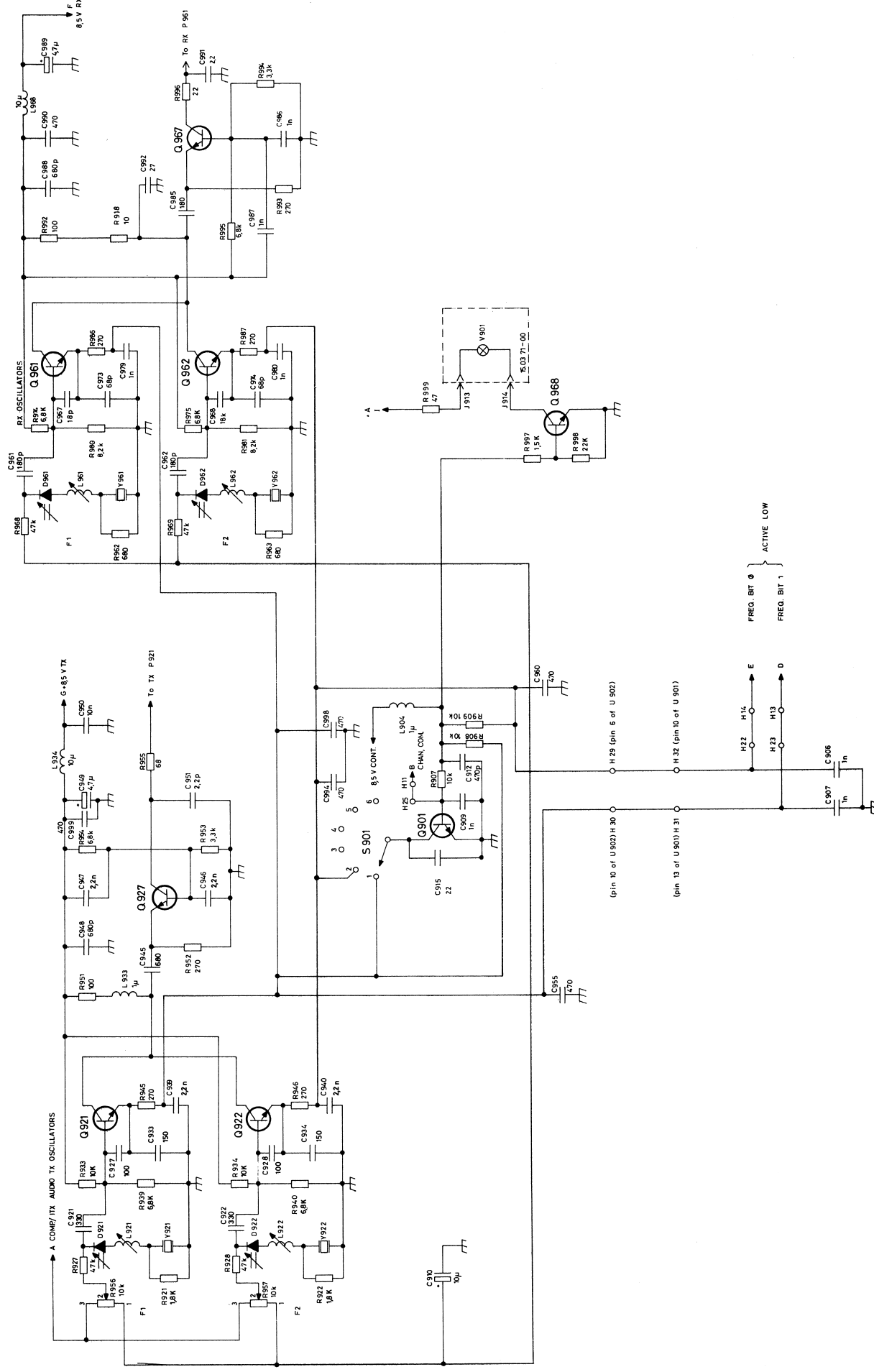


THE TABLES BELOW SHOW WHICH STRAPS THAT HAVE TO BE REMOVED WHEN DIFFERENT TONE-
OPTIONS (T-NUMBERS) ARE INSTALLED IN COM5000 SETS.

XS 5331	T0	T1	T2	T3	T4	T5	T6	T7	T8
H14 - H22	+	+	+	+	+	+	+	+	+
H13 - H23	+	+	+	+	+	+	+	+	+
H11 - H25	+	+	+	+	+	+	+	+	+
H32 - H28	+	+	+	+	+	+	+	+	+
H31 - H30	+	+	+	+	+	+	+	+	+
H3 - H4	+	+	+	+	+	+	+	+	+
H5 - H6	+	+	+	+	+	+	+	+	+
H7 - H8	+	+	+	+	+	+	+	+	+
H9 - H10	+	+	+	+	+	+	+	+	+
H20 - H50	+	+	+	+	+	+	+	+	+

ALTERNATIVE FUNCTIONS WITH CG UNITS
TQ 5001, TT 5001, TR 5001, FW 5001

CHANNEL SELECTOR UNIT
XS 5331



Storno

TYPE	Nº	CODE	DATA
	C901	74. 5396	680pF 20% Ceramic DI
	C902	73. 5165	220uF -20 +100% Elco
	C903	74. 5396	680pF 20% Ceramic DI
	C904	76. 5141	22nF 5% Polyester FL
	C905	74. 5397	1nF 20% Ceramic DI
	C906	74. 5397	1nF 20% Ceramic DI
	C907	74. 5397	1nF 20% Ceramic DI
	C909	74. 5397	1nF 20% Ceramic DI
	C910	73. 5173	10uF 20% Tantal
	C912	74. 5395	470pF 20% Ceramic DI
	C913	73. 5173	10uF 20% Tantal
	C914	74. 5396	680pF 20% Ceramic DI
	C915	74. 5375	22pF 5% Ceramic DI
	C916	74. 5377	33pF 5% Ceramic DI
	C917	74. 5391	100pF 20% Ceramic DI
	C918	74. 5391	100pF 20% Ceramic DI
	C919	74. 5391	100pF 20% Ceramic DI
	C920	74. 5391	100pF 20% Ceramic DI
	C921	74. 5389	330pF 5% Ceramic DI
	C922	74. 5389	330pF 5% Ceramic DI
	C927	74. 5417	100pF 5% Ceramic DI
	C928	74. 5417	100pF 5% Ceramic DI
	C933	74. 5385	150pF 5% Ceramic DI
	C934	74. 5385	150pF 5% Ceramic DI
	C939	74. 5399	2. 2nF 20% Ceramic DI
	C940	74. 5399	2. 2nF 20% Ceramic DI
	C945	74. 5396	680pF 20% Ceramic DI
	C946	74. 5399	2. 2nF 20% Ceramic DI
	C947	74. 5399	2. 2nF 20% Ceramic DI
	C948	74. 5396	680pF 20% Ceramic DI
	C949	73. 5172	4. 7uF 20% Tantal
	C950	76. 5135	10nF 10% Polyester FL
	C951	74. 5363	2, 2pF 0. 25pF Ceramic DI
	C952	74. 5391	100pF 20% Ceramic DI
	C953	74. 5397	1nF 20% Ceramic DI
	C955	74. 5395	470pF 20% Ceramic DI
	C960	74. 5395	470pF 20% Ceramic DI
	C961	74. 5386	180pF 5% Ceramic DI
	C962	74. 5386	180pF 5% Ceramic DI
	C967	74. 5403	18pF 5% Ceram DI
	C968	74. 5403	18pF 5% Ceramic DI
	C973	74. 5405	68pF 5% Ceramic DI
	C974	74. 5405	68pF 5% Ceramic DI
	C979	74. 5397	1nF 20% Ceramic DI
	C980	74. 5397	1nF 20% Ceramic DI
	C985	74. 5386	180pF 5% Ceramic DI
	C986	74. 5397	1nF 20% Ceramic DI

Storno

TYPE	Nº	CODE	DATA
	C987	74. 5397	1nF 20% Ceramic DI
	C988	74. 5396	680pF 20% Ceramic DI
	C989	73. 5172	4. 7uF 20% Tantal
	C990	74. 5395	470pF 20% Ceramic DI
	C991	74. 5263	2. 2pF 0. 25pF Ceramic DI
	C992	74. 5376	27pF 5% Ceramic DI
	C994	74. 5395	470pF 20% Ceramic DI
	C998	74. 5395	470pF 20% Ceramic DI
	D901	99. 5220	1N5401 Diode
	D902	99. 5220	1N5401 Diode
	D903	99. 5237	1N4148 Diode
	D921	99. 5373	Cap. diode
	D922	99. 5373	Cap. diode
	D961	99. 5341	Cap. diode
	D962	99. 5241	Cap. diode
	J901	41. 0228	Male connector
	J902	41. 0228	Male connector
	J903	41. 0229	Male Connector
	J904	41. 0225	Male Connector
	J905	41. 0245	Male connector
	J906	41. 0227	Male connector
	J907	41. 5545	Fem. connector
	J910	41. 0232	Male cconnector
	J911	41. 0231	Male connector
	L904	61. 5029	1. 0uH RF Choke
	L905	61. 5030	1. 5uH RF choke
	L921	61. 5052	16. 5-22MHz RF coil
	L922	61. 5052	16. 5-22MHz RF coil
	L933	61. 5015	3. 3uH RF choke
	L934	61. 5031	10uH RF choke
	L961	61. 5051	38-50MHz RF coil
	L962	61. 5051	38-50MHz RF coil
	L968	61. 5031	10uH RF choke
	P921	41. 5550	Connector
	P961	41. 5550	Connector
	Q901	99. 5121	BC237 Transistor
	Q921	99. 5347	PN2369A Transistor
	Q922	99. 5347	PN2369A Transistor
	Q927	99. 5347	PN2369A Transistor
	Q961	99. 5347	PN2369A Transistor
	Q962	99. 5347	PN2369A Transistor
	Q967	99. 5347	PN2369A Transistor

CHANNEL SWITCH XS5331

Storno

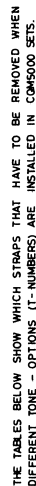
TYPE	Nº	CODE	DATA
	Q968	99. 5121	BC237 Transistor
	R902	80. 5249	1Kohm 5% Carbon film
	R903	80. 5266	27Kohm 5% Carbon film
	R907	80. 5261	10Kohm 5% Carbon film
	R908	80. 5261	10Kohm 5% Carbon film
	R909	80. 5261	10Kohm 5% Carbon film
	R918	80. 5225	10ohm 5% Carbon film
	R921	80. 5252	1. 8Kohm 5% Carbon film
	R922	80. 5252	1. 8Kohm 5% Carbon film
	R927	80. 5269	47Kohm 5% Carbon film
	R928	80. 5269	47Kohm 5% Carbon film
	R933	80. 5261	10Kohm 5% Carbon film
	R934	80. 5261	10Kohm 5% Carbon film
	R939	80. 5259	6. 8Kohm 5% Carbon film
	R940	80. 5259	6. 8Kohm 5% Carbon film
	R945	80. 5242	270ohm 5% Carbon film
	R946	80. 5242	279ohm 5% Carbon film
	R951	80. 5237	100ohm 5% Carbon film
	R952	80. 5242	270ohm 5% Carbon film
	R953	80. 5255	3. 3Kohm 5% Carbon film
	R954	80. 5259	6. 8Kohm 5% Carbon film
	R955	80. 5235	68ohm 5% Carbon film
	R956	86. 5079	10Kohm 10% Trim Cermet
	R957	86. 5079	10Kohm 10% Trim Cermet
	R962	80. 5247	680ohm 5% Carbon film
	R963	80. 5247	680ohm 5% Carbon film
	R968	80. 5269	47Kohm 5% Carbon film
	R969	80. 5269	47Kohm 5% Carbon film
	R974	80. 5259	6. 8Kohm 5% Carbon film
	R975	80. 5259	6. 8Kohm 5% Carbon film
	R980	80. 5260	8. 2Kohm 5% Carbon film
	R981	80. 5260	8. 2Kohm 5% Carbon film
	R986	80. 5242	270ohm 5% Carbon film
	R987	80. 5242	270ohm 5% Carbon film
	R992	80. 5237	100ohm 5% Carbon film
	R993	80. 5242	270ohm 5% Carbon film
	R994	80. 5255	3. 3Kohm 5% Carbon film
	R995	80. 5259	6. 8Kohm 5% Carbon film
	R996	80. 5229	22ohm 5% Carbon film
	R997	80. 5251	1. 5Kohm 5% Carbon film
	R998	80. 5265	22Kohm 5% Carbon film
	R999	80. 5233	47ohm 5% Carbon film

Storno

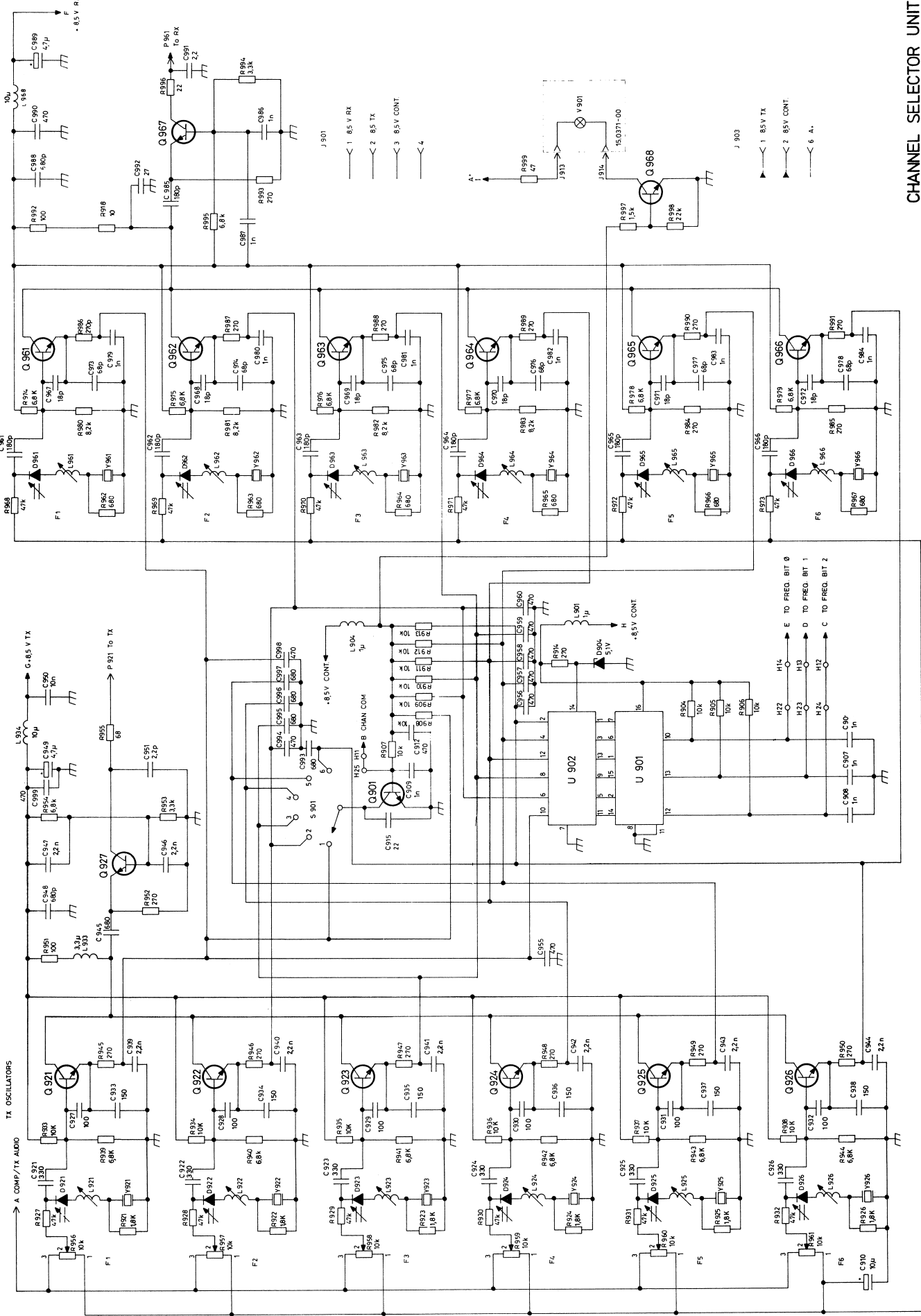
TYPE	Nº	CODE	DATA

CHANNEL SWITCH XS5331

X402. 779

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ALTERNATIVE FUNCTIONS WITH CG UNITS
TQ 5003 TT 5001 TR 5001 FN 5001



TYPE	Nº	CODE	DATA
	C901	74. 5396	680pF 20% Ceramic DI
	C901	74. 5396	680pF 20% Ceramic DI
	C902	73. 5165	220uF -20 +100% Elco
	C903	74. 5396	680pF 20% Ceramic DI
	C904	76. 5141	22nF 5% Polyester FL
	C905	74. 5397	1nF 20% Ceramic DI
	C905	74. 5397	1nF 20% Ceramic DI
	C906	74. 5397	1nF 20% Ceramic DI
	C907	74. 5397	1nF 20% Ceramic DI
	C908	74. 5397	1nF 20% Ceramic DI
	C909	74. 5397	1nF 20% Ceramic DI
	C910	73. 5173	10uF 20% Tantal
	C912	74. 5395	470pF 20% Ceramic DI
	C913	73. 5173	10uF 20% Tantal
	C914	74. 5396	680pF 20% Ceramic DI
	C915	74. 5375	22pF 5% Ceramic DI
	C916	74. 5377	33pF 5% Ceramic DI
	C917	74. 5391	100pF 20% Ceramic DI
	C918	74. 5391	100pF 20% Ceramic DI
	C919	74. 5391	100pF 20% Ceramic DI
	C920	74. 5391	100pF 20% Ceramic DI
	C921	74. 5389	330pF 5% Ceramic DI
	C922	74. 5389	330pF 5% Ceramic DI
	C923	74. 5389	330pF 5% Ceramic DI
	C924	74. 5389	330pF 5% Ceramic DI
	C924	74. 5395	470pF 20% Ceramic DI
	C925	74. 5389	330pF 5% Ceramic DI
	C926	74. 5389	330pF 5% Ceramic DI
	C927	74. 5417	100pF 5% Ceramic DI
	C927	74. 5417	100pF 5% Ceramic DI
	C928	74. 5417	100pF 5% Ceramic DI
	C929	74. 5417	100pF 5% Ceramic DI
	C930	74. 5417	100pF 5% Ceramic DI
	C931	74. 5417	100pF 5% Ceramic DI
	C932	74. 5417	100pF 5% Ceramic DI
	C933	74. 5385	150pF 5% Ceramic DI
	C933	74. 5385	150pF 5% Ceramic DI
	C934	74. 5385	150pF 5% Ceramic DI
	C935	74. 5384	150pF 5% Ceramic DI
	C936	74. 5385	150pF 5% Ceramic DI
	C937	74. 5385	150pF 5% Ceramic DI
	C938	74. 5385	150pF 5% Ceramic DI
	C939	74. 5399	2. 2nF 20% Ceramic DI
	C939	74. 5399	2. 2nF 20% Ceramic DI
	C940	74. 5399	2. 2nF 20% Ceramic DI
	C941	74. 5399	2. 2nF 20% Ceramic DI

TYPE	Nº	CODE	DATA
	C942	74. 5399	2. 2nF 20% Ceramic DI
	C943	74. 5399	2. 2nF 20% Ceramic DI
	C944	74. 5399	2. 2nF 20% Ceramic DI
	C945	74. 5396	680pF 20% Ceramic DI
	C946	74. 5399	2. 2nF 20% Ceramic DI
	C947	74. 5399	2. 2nF 20% Ceramic DI
	C948	74. 5396	680pF 20% Ceramic DI
	C949	73. 5172	4. 7uF 20% Tantal
	C950	76. 5135	10nF 10% Polyester FL
	C951	74. 5363	2. 2pF 0. 25pF Ceramic DI
	C952	74. 5391	100pF 20% Ceramic DI
	C953	74. 5397	1nF 20% Ceramic DI
	C955	74. 5395	470pF 20% Ceramic DI
	C956	74. 5395	470pF 20% Ceramic DI
	C957	74. 5395	470pF 20% Ceramic DI
	C958	74. 5395	470pF 20% Ceramic DI
	C959	74. 5395	470pF 20% Ceramic DI
	C960	74. 5395	470pF 20% Ceramic DI
	C961	74. 5386	180pF 5% Ceramic DI
	C961	74. 5386	180pF 5% Ceramic DI
	C962	74. 5386	180pF 5% Ceramic DI
	C963	74. 5386	180pF 5% Ceramic DI
	C964	74. 5386	180pF 5% Ceramic DI
	C965	74. 5386	180pF 5% Ceramic DI
	C966	74. 5386	180pF 5% Ceramic DI
	C967	74. 5403	18pF 5% Ceramic DI
	C967	74. 5403	18pF 5% Ceramic DI
	C968	74. 5403	18pF 5% Ceramic DI
	C969	74. 5403	18pF 5% Ceramic DI
	C970	74. 5403	18pF 5% Ceramic DI
	C971	74. 5403	18pF 5% Ceramic DI
	C971	74. 5403	18pF 5% Ceramic DI
	C973	74. 5405	68pF 5% Ceramic DI
	C973	74. 5405	68pF 5% Ceramic DI
	C974	74. 5405	68pF 5% Ceramic DI
	C975	74. 5405	68pF 5% Ceramic DI
	C976	74. 5405	68pF 5% Ceramic DI
	C977	74. 5405	68pF 5% Ceramic DI
	C978	74. 5405	68pF 5% Ceramic DI
	C979	74. 5397	1nF 20% Ceramic DI
	C980	74. 5397	1nF 20% Ceramic DI
	C981	74. 5397	1nF 20% Ceramic DI

CHANNEL SWITCH XS5332

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TYPE	Nº	CODE	DATA
C982		74. 5397	1nF 20% Ceramic DI
C983		74. 53. 97	1nF 20% Ceramic DI
C984		74. 5397	1nF 20% Ceramic DI
C985		74. 5386	180pF 5% Ceramic DI
C986		74. 5397	1nF 20% Ceramic DI
C987		74. 5397	1nF 20% Ceramic DI
C988		74. 5396	680pF 20% Ceramic DI
C989		73. 5172	4. 7uF 20% Tantal
C990		74. 5395	470pF 20% Ceramic DI
C991		74. 5263	2. 2pF 0. 25pF Ceramic DI
C992		74. 5376	27pF 5% Ceramic DI
C993		74. 5396	680pF 20% Ceramic DI
C994		74. 5395	470pF 20% Ceramic DI
C995		74. 5396	680pF 20% Ceramic DI
C996		74. 5396	680pF 20% Ceramic DI
C997		74. 5396	680pF 20% Ceramic DI
C998		74. 5395	470pF 20% Ceramic DI
C999		74. 5395	470pF 20% Ceramic DI
D901		99. 5220	1N5401 Diode
D903		99. 5237	1N4148 Diode
D904		99. 5346	5. 1V 5% Zenerdiode
D921		99. 5373	Cap. diode
D921		99. 5373	BB109G Cap. diode
D922		99. 5373	Cap. diode
D923		99. 5373	Cap. diode
D924		99. 5373	Cap. diode
D925		99. 5373	Cap. diode
D926		99. 5373	Cap. diode
D961		99. 5341	Cap. diode
D961		99. 5341	Cap. diode
D962		99. 5241	Cap. diode
D963		99. 5341	Cap. diode
D964		99. 5341	Cap. diode
D965		99. 5341	Cap. diode
D966		99. 5341	Cap. diode
J901		41. 0228	Male connector
J902		41. 0228	Male connector
J903		41. 0229	Male Connector
J904		41. 0225	Male Connector
J905		41. 0245	Male connector
J906		41. 0227	Male connector
J907		41. 5545	Fem. connector
J910		41. 0232	Male connector
J911		41. 0231	Male connector
L901		61. 5029	1. 0uH RF choke
L904		61. 5029	1. 0uH RF Choke
L904		61. 5029	1. 0uH RF Choke
L905		61. 5030	1. 5uH RF choke

TYPE	Nº	CODE	DATA
	L921	61. 5052	16. 5-22MHz RF coil
	L921	61. 5052	16. 5-22MHz RF coil
	L922	61. 5052	16. 5-22MHz RF coil
	L923	61. 5052	16. 5-22MHz RF coil
	L924	61. 5052	16. 5-22MHz RF coil
	L925	61. 5052	16. 5-22MHz RF coil
	L926	61. 5052	16. 5-22MHz RF coil
	L933	61. 5015	3. 3uH RF choke
	L934	61. 5031	10uH RF choke
	L961	61. 5051	38-50MHz RF coil
	L961	61. 5051	38-50MHz RF coil
	L962	61. 5051	38-50MHz RF coil
	L963	61. 5051	38-50MHz RF coil
	L964	61. 5051	38-50MHz RF coil
	L965	61. 5051	38-50MHz RF coil
	L966	61. 5051	38-50MHz RF coil
	L968	61. 5031	10uH RF choke
	P921	41. 5550	Connector
	P961	41. 5550	Connector
	Q901	99. 5121	BC237 Transistor
	Q921	99. 5347	PN2369A Transistor
	Q921	99. 5347	PN2369A Transistor
	Q922	99. 5347	PN2369A Transistor
	Q923	99. 5347	PN2369A Transistor
	Q924	99. 5247	PN2369A Transistor
	Q925	99. 5347	PN2369A Transistor
	Q926	99. 5347	PN2369A Transistor
	Q927	99. 5347	PN2369A Transistor
	Q961	99. 5347	PN2369A Transistor
	Q962	99. 5347	PN2369A Transistor
	Q963	99. 5347	PN2369A Transistor
	Q964	99. 5347	PN2369A Transistor
	Q965	99. 5347	PN2369 Transistor
	Q966	99. 5347	PN2369A Transistor
	Q967	99. 5347	PN2369A Transistor
	Q968	99. 5121	BC237 Transistor
	R902	80. 5249	1Kohm 5% Carbon film
	R902	99. 5220	1N5401 Diode
	R903	80. 5266	27Kohm 5% Carbon film
	R904	80. 5261	10Kohm 5% Carbon film
	R905	80. 5261	10Kohm 5% Carbon film

CHANNEL SWITCH XS5332

X402. 780

Storno

TYPE	Nº	CODE	DATA
	R906	80. 5261	10Kohm 5% Carbon film
	R907	80. 5261	10Kohm 5% Carbon film
	R907	80. 5261	10Kohm 5% Carbon film
	R908	80. 5261	10Kohm 5% Carbon film
	R909	80. 5261	10Kohm 5% Carbon film
	R910	80. 5261	10Kohm 5% Carbon film
	R911	80. 5261	10Kohm 5% Carbon film
	R912	80. 5261	10Kohm 5% Carbon film
	R913	80. 5261	10Kohm 5% Carbon film
	R914	80. 5242	270ohm 5% Carbon film
	R918	80. 5225	10ohm 5% Carbon film
	R921	80. 5252	1. 8Kohm 5% Carbon film
	R921	80. 5252	1. 8Kohm 5% Carbon film
	R922	80. 5252	1. 8Kohm 5% Carbon film
	R923	80. 5252	1. 8Kohm 5% Carbon film
	R924	80. 5252	1. 8Kohm 5% Carbon film
	R925	80. 5252	1. 8Kohm 5% Carbon film
	R926	80. 5249	1. 8Kohm 5% Carbon film
	R927	80. 5269	47Kohm 5% Carbon film
	R927	80. 5269	47Kohm 5% Carbon film
	R928	80. 5269	47Kohm 5% Carbon film
	R929	80. 5269	47Kohm 5% Carbon film
	R930	80. 5269	47Kohm 5% Carbon film
	R931	80. 5269	47Kohm 5% Carbon film
	R932	80. 5269	47Kohm 5% Carbon film
	R933	80. 5261	10Kohm 5% Carbon film
	R934	80. 5261	10Kohm 5% Carbon film
	R935	80. 5261	10Kohm 5% Carbon film
	R936	80. 5261	10Kohm 5% Carbon film
	R937	80. 5261	10Kohm 5% Carbon film
	R938	80. 5261	10Kohm 5% Carbon film
	R939	80. 5259	6. 8Kohm 5% Carbon film
	R940	80. 5259	6. 8Kohm 5% Carbon film
	R941	80. 5259	6. 8Kohm 5% Carbon film
	R942	80. 5259	6. 8Kohm 5% Carbon film
	R943	80. 5259	6. 8Kohm 5% Carbon film
	R944	80. 5259	6. 8Kohm 5% Carbon film
	R945	80. 5242	270ohm 5% Carbon film
	R945	80. 5242	270ohm 5% Carbon film
	R946	80. 5242	270ohm 5% Carbon film
	R947	80. 5242	270ohm 5% Carbon film
	R948	80. 5242	270ohm 5% Carbon film
	R949	80. 5242	270ohm 5% Carbon film
	R950	80. 5242	270ohm 5% Carbon film
	R951	80. 5237	100ohm 5% Carbon film
	R952	80. 5242	270ohm 5% Carbon film
	R953	80. 5255	3. 3Kohm 5% Carbon film
	R954	80. 5259	6. 8Kohm 5% Carbon film

Storno

TYPE	Nº	CODE	DATA
	R954	80. 5259	6. 8Kohm 5% Carbon film
	R955	80. 5235	68ohm 5% Carbon film
	R956	86. 5079	10Kohm 10% Trim Cermet
	R956	86. 5079	10Kohm 10% Trim Cermet
	R957	86. 5079	10Kohm 10% Trim Cermet
	R958	86. 5079	10Kohm 10% Trim Cermet
	R960	86. 5079	10Kohm 10% Trim Cermet
	R961	86. 5079	10Kohm 10% Trim Cermet
	R962	80. 5247	680ohm 5% Carbon film
	R962	80. 5247	680ohm 5% Carbon film
	R963	80. 5247	680ohm 5% Carbon film
	R964	80. 5247	680ohm 5% Carbon film
	R965	80. 5247	680ohm 5% Carbon film
	R966	80. 5247	680ohm 5% Carbon film
	R967	80. 5247	680ohm 5% Carbon film
	R968	80. 5269	47Kohm 5% Carbon film
	R969	80. 5269	47Kohm 5% Carbon film
	R969	86. 5079	10Kohm 10% Trim Cermet
	R970	80. 5269	47Kohm 5% Carbon film
	R971	80. 5269	47Kohm 5% Carbon film
	R972	80. 5269	47Kohm 5% Carbon film
	R973	80. 5269	47Kohm 5% Carbon film
	R974	80. 5259	6. 8Kohm 5% Carbon film
	R975	80. 5259	6. 8Kohm 5% Carbon film
	R976	80. 5259	6. 8Kohm 5% Carbon film
	R977	80. 5259	6. 8Kohm 5% Carbon film
	R978	80. 5259	6. 8Kohm 5% Carbon film
	R979	80. 5259	6. 8Kohm 5% Carbon film
	R980	80. 5260	8. 2Kohm 5% Carbon film
	R981	80. 5260	8. 2Kohm 5% Carbon film
	R982	80. 5260	8. 2Kohm 5% Carbon film
	R983	80. 5260	8. 2Kohm 5% Carbon film
	R984	80. 5260	8. 2Kohm 5% Carbon film
	R985	80. 5260	8. 2Kohm 5% Carbon film
	R986	80. 5242	270ohm 5% Carbon film
	R987	80. 5242	270ohm 5% Carbon film
	R988	80. 5242	270ohm 5% Carbon film
	R989	80. 5242	270ohm 5% Carbon film
	R990	80. 5242	270ohm 5% Carbon film
	R991	80. 5242	270ohm 5% Carbon film
	R992	80. 5237	100ohm 5% Carbon film

CHANNEL SWITCH XS5332

X402. 780

TONE OUTPUT

VOL./SQ HI

+85V CONT.

+85V TX

ALARM

-A

MUTE

LS IN/OUT

TONE KEY

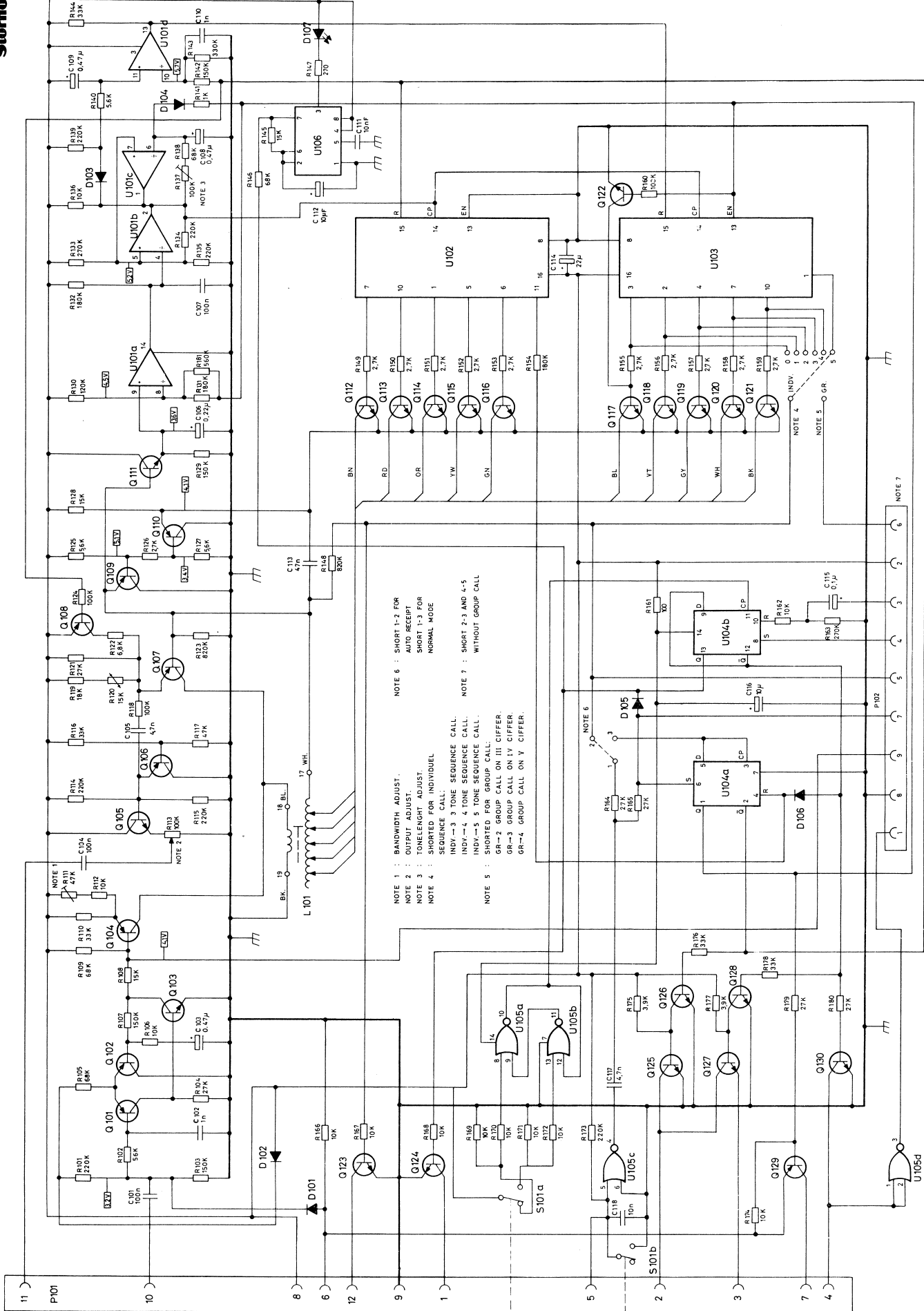
TONE KEY

PTT(TO RELAY)

PTT

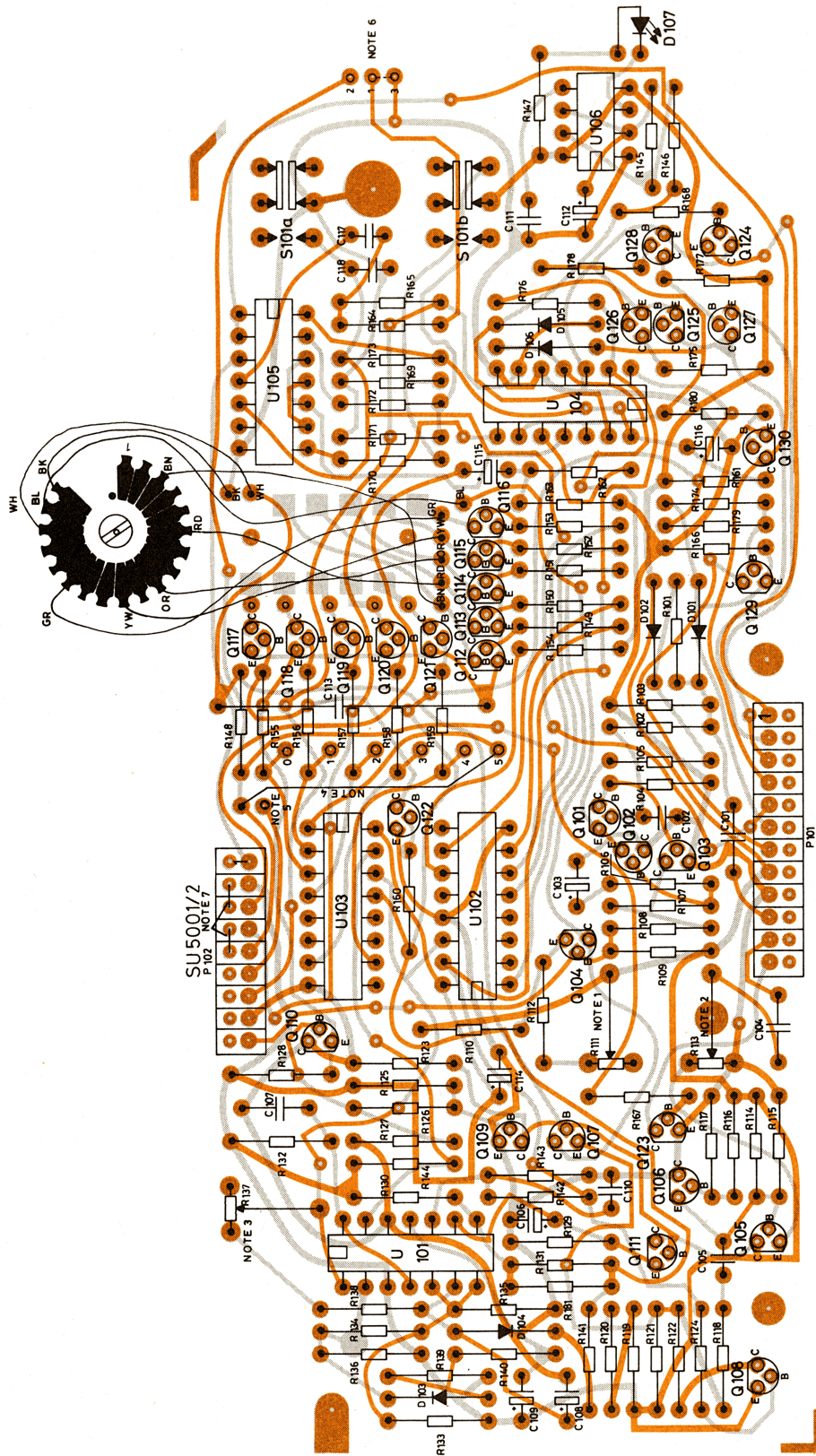
MIC BLOCK

RX MUTE



SEQUENTIAL TONE UNIT
TQ 5001, TQ 5002

D402.610



COIL TERM	DIGIT	TQ5001 STORNO FREQ	TQ5002 CCIR FREQ
1	X	885 HZ	960 HZ
2	Y	970 HZ	1062 HZ
3	1	1060 HZ	1124 HZ
4	2	1160 HZ	1197 HZ
5	3	1270 HZ	1275 HZ
6	4	1400 HZ	1358 HZ
7	5	1530 HZ	1446 HZ
8	6	1670 HZ	1540 HZ
9	7	1830 HZ	1640 HZ
10	8	2000 HZ	1747 HZ
11	9	2200 HZ	1860 HZ
12	0	2400 HZ	1981 HZ
13	R	2600 HZ	2110 HZ
14	A	2800 HZ	-

SEQUENTIAL TONE UNIT
COMPONENT LAYOUT
TQ 5001, TQ5002

D402.622

Storno

[illegible]

SEQUENTIAL TONE UNIT TQ5002

X402.645

Storno

TYPE	Nº	CODE	DATA	
	R130	80. 5274	120 Kohm 5% Carbon film	0. 125 W
	R131	80. 5276	180 Kohm 5% Carbon film	0. 125 W
	R132	80. 5276	180 Kohm 5% Carbon film	0. 125 W
	R133	80. 5278	270 Kohm 5% Carbon film	0. 125 W
	R134	80. 5277	220 Kohm 5% Carbon film	0. 125 W
	R135	80. 5277	220 Kohm 5% Carbon film	0. 125 W
	R136	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R137	80. 5074	100 Kohm 20% Carbon pot.	0. 1 W
	R138	80. 5271	68 Kohm 5% Carbon film	0. 125 W
	R139	80. 5277	220 Kohm 5% Carbon film	0. 125 W
	R140	80. 5258	5. 6 Kohm 5% Carbon film	0. 125 W
	R141	80. 5249	1 Kohm 5% Carbon film	0. 125 W
	R142	80. 5275	150 Kohm 5% Carbon film	0. 125 W
	R143	80. 5279	330 Kohm 5% Carbon film	0. 125 W
	R144	80. 5267	33 Kohm 5% Carbon film	0. 125 W
	R145	82. 5263	15 Kohm 5% Carbon film	0. 125 W
	R146	80. 5271	68 Kohm 5% Carbon film	0. 125 W
	R147	80. 5243	270 ohm 5% Carbon film	0. 125 W
	R148	80. 5284	820 Kohm 5% Carbon film	0. 125 W
	R149	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R150	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R151	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R152	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R153	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R154	80. 5276	180 Kohm 5% Carbon film	0. 125 W
	R155	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R156	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R157	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R158	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R159	80. 5254	2. 7 Kohm 5% Carbon film	0. 125 W
	R160	80. 5273	100 Kohm 5% Carbon film	0. 125 W
	R161	80. 5237	10 ohm 5% Carbon film	0. 125 W
	R162	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R163	80. 5278	270 Kohm 5% Carbon film	0. 125 W
	R164	80. 5266	27 Kohm 5% Carbon film	0. 125 W
	R165	80. 5266	27 Kohm 5% Carbon film	0. 125 W
	R166	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R167	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R168	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R169	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R170	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R171	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R172	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R173	80. 5277	220 Kohm 5% Carbon film	0. 125 W
	R174	80. 5261	10 Kohm 5% Carbon film	0. 125 W
	R175	80. 5256	3. 9 Kohm 5% Carbon film	0. 125 W
	R176	80. 5267	33 Kohm 5% Carbon film	0. 125 W

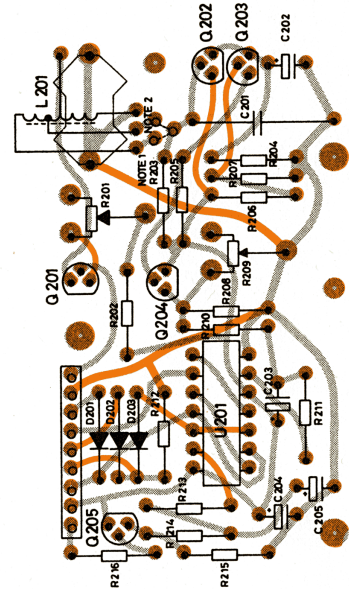
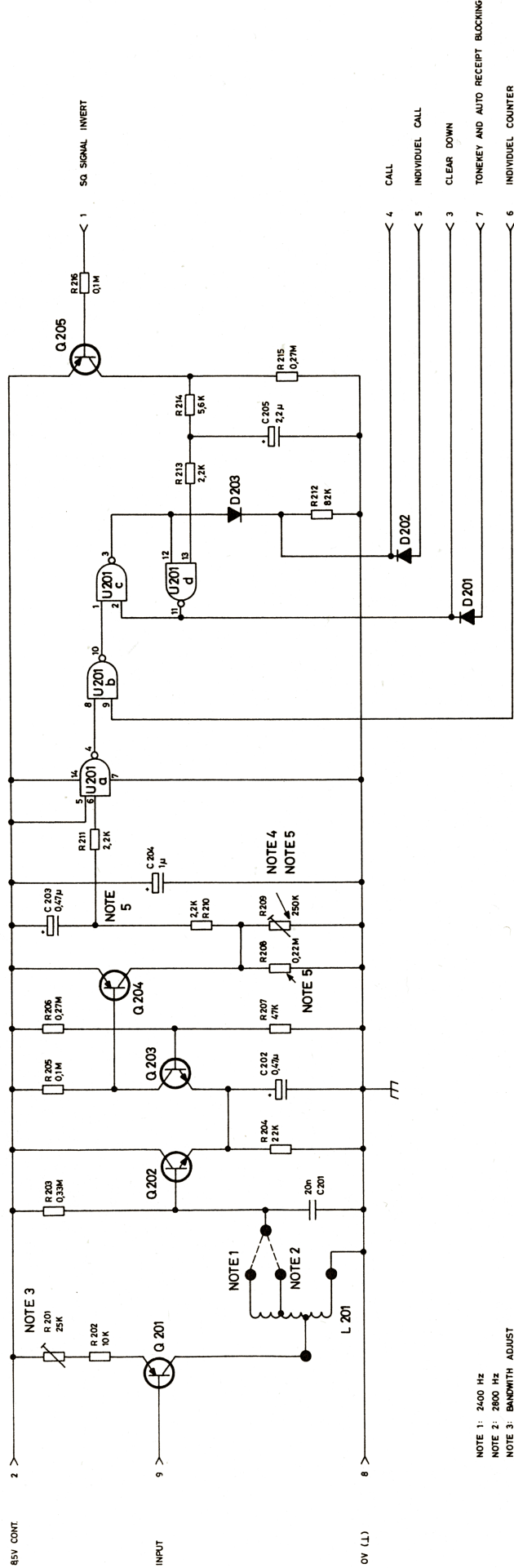
Storno

TYPE	Nº	CODE	DATA	
	R177	80. 5256	3. 9 Kohm 5% Carbon film	0. 125 W
	R178	80. 5267	33 Kohm 5% Carbon film	0. 125 W
	R179	80. 5266	27 Kohm 5% Carbon film	0. 125 W
	R180	80. 5266	27 Kohm 5% Carbon film	0. 125 W
	R181	80. 5281	560 Kohm 5% Carbon film	0. 125 W
	S101	47. 0642	Switch	
	U101	14. 5019	MC3302 Quad. Comparat.	
	U102	14. 5052	4017 Johnson Counter	
	U103	14. 5052	4017 Johnson Counter	
	U104	14. 5098	4013 Dual D-FF	
	U105	14. 5074	4001 Quad. 2-inp. NAND	
	U106	14. 5134	555 Timer	

SEQUENTIAL TONE UNIT TQ5001

SEQUENTIAL TONE UNIT TQ5002

X402. 645



GROUP CALL - ALL CALL UNIT
SU 5001, SU 5002

D402.620

Storno

TYPE	Nº	CODE	DATA
SU5002	C202	73. 5125	0. 47 uF 20% Tantal
	C203	73. 5109	10 uF 20% Tantal
	C204	73. 5114	1 uF 20% Tantal
	C205	73. 5102	2. 2 uF 20% Tantal
	C210	76. 5127	20 nF 2% Polystyr. TB
	D201	99. 5237	1N4148 Diode
	D202	99. 5237	1N4148 Diode
	D203	99. 5237	1N4148 Diode
	L1	61. 1358	Tone coil
	Q201	99. 5237	BC308 Transistor
SU5002	Q202	99. 5143	BC238 Transistor
	Q203	99. 5143	BC238 Transistor
	Q204	99. 5237	BC308 Transistor
	Q205	99. 5237	BC308 Transistor
	R201	86. 5054	25 Kohm 20% Carbon pot.
	R202	80. 5260	10 Kohm 5% Carbon film
	R203	80. 5282	560 Kohm 5% Carbon film
	R204	80. 5265	22 Kohm 5% Carbon film
	R205	80. 5273	100 Kohm 5% Carbon film
	R206	80. 5278	270 Kohm 5% Carbon film
SU5002	R207	80. 5269	47 Kohm 5% Carbon film
	R208	80. 5277	220 Kohm 5% Carbon film
	R209	86. 5038	500 Kohm 20% Carbon pot.
	R210	80. 5253	2. 2 Kohm 5% Carbon film
	R211	80. 5253	2. 2 Kohm 5% Carbon film
	R212	80. 5272	82 Kohm 5% Carbon film
	R213	80. 5253	2. 2 Kohm 5% Carbon film
	R214	80. 5258	5. 6 Kohm 5% Carbon film
	R215	80. 5278	270 Kohm 5% Carbon film
	R216	80. 5273	100 Kohm 5% Carbon film
	U201	14. 5051	4011 Quad-2-inp. NAND

Storno

TYPE	Nº	CODE	DATA

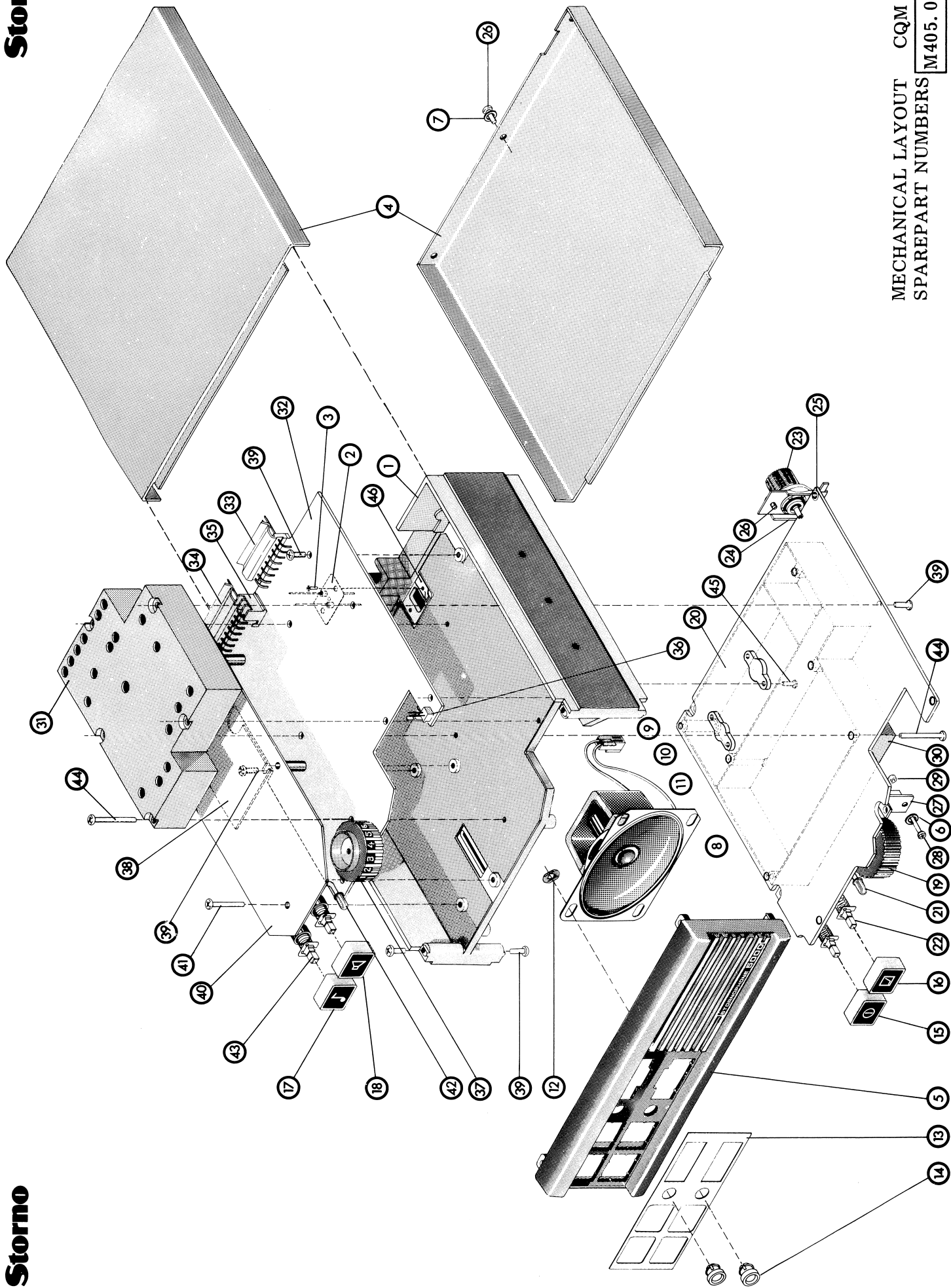
GROUP CALL UNIT SU5001

ALL CALL UNIT SU5002

X402. 649

Storno

Storno



MECHANICAL LAYOUT CQM 5000
SPAREPART NUMBERS M405. 096 / 1

ITEM	CODE	DESCRIPTION
1	10.3742-00	Cabinet Coffret
2	69.0016-00	Feed through connector Connecteur d'alimentation
3	20022-02003	Screw M2x3mm Vis M2x3mm
4	11.1177-00	Cover Couvercle
5	15.0379-00	Front cap Eur.
	15.0380-00	Avant Europ. Front cap U.S. Avant Améric
6	2450-048027	Spring washer Rondelle grower
7	2450-06032	Spring washer Rondelle grower
8	97.0018-00	Loudspeaker modified Haut-parleur modifié
9	41.5546-00	Connector housing female Prise femelle pour connecteur
10	41.5547-00	Crimp terminal for connector Embout pour connecteur
11	173.5203-00	Wire for loudspeaker Fil du H. P.
12	2453-102040	Speed nut Ecrou
		Item No. 5 to 12 are assembled under one code No. 10.3740-00 for Eur. and 10.3741 for U.S.
		L'ensemble des pièces 5 à 12 a le numéro 10.3740-00 (europ.) L'ensemble des pièces 5 à 12 a le numero 10.3741 (améric.)
13	51.1160-00 51.1161-00 51.1164-00 51.1165-00	Nameplate Nameplate Eur. Version Nameplate Plaque europ. Nameplate
	51.1169-00 51.1170-00 51.1173-00 51.1174-00	Nameplate Nameplate U.S. version Nameplate Plaque améric. Nameplate
14	32.0512-00	Bushing for led indicator Voyant pour diode lumineuse
15	490271-00 49.0275-00	Push button(on/off) Eur. Bouton marche/arrêt europ. Push button(on/off) U.S. Bouton marche/arrêt améric.

ITEM	CODE	DESCRIPTION
16	490272-00 49. 0276-00	Push button (SQ) Eur. Bouton de squelch europ. Push button (SQ) U.S. Bouton de squelch améric.
17	49. 0273-00 49. 0277-00	Push button (tone key) Eur. Bouton de tonalité europ. Push button (tone key) U.S. Bouton de tonalité améric.
18	49. 0274-00 49. 0278-00	Push button (LS. in/out) Eur. Bouton de H. P. europ. Push button (LS. in/out) U.S. Bouton de H. P. améric.
19	49. 0267-00 49. 0281-00	Knob volume control Eur. Bouton de volume europ. Knob volume control U.S. Bouton de volume améric.
		Item No. 13 to 19 are available as a Kit for name plate. At ordering of Kit or single item see choice sheet No. M405. 096-4
		Les pièces 13 à 19 peuvent être com- mandées ensemble. Voir choice sheet M405. 096-4
20	10. 3732-00 10. 3733-00 10. 3734-00 10. 3776-00 10. 3735-00 10. 3736-00	RF 5112-6/10 WATT RF 5112-25 WATT RF 5113-6/10 WATT RF 5113-25 WATT RF 5114-6/10 WATT RF 5114-25 WATT
21	99. 5303-00	Light emitt. diode red Diode lumineuse rouge
22	470641-00	Switch Commutateur
23	41. 5165-00	Connector UHF Connecteur UHF
24	33. 0406-00	Braket Applique
25	305023-00	Tubular rivet Rivet tubulaire
26	20022-03005	Screw M3x5 Vis M3x5
27	59. 0049-00	Heat sink Radiateur
28	20022. 02508	Screw M2, 5x8 Vis M2, 5x8
29	2202-025050	Nut M2, 5 Ecrou M2, 5
		Item No. 20 is fully assembled cir- cuit including item No. 21 to 29.
		20 complètement assemblé contient les pièces 21 à 29.

ITEM	CODE	DESCRIPTION
30	12. 0357-01 12. 0400-00	Shield Eur. Ecran europ. Shield U.S. Ecran améric.
31	12. 0361-00	Shield Multifreq. Ecran multifreq.
32	10. 3737-00 10. 3738-00 10. 3739-00	Channel selector unit XS5001 Channel selector unit XS5002 Channel selector unit XS5003 Sélecteur de canal XS5001, XS5002, XS5003
33	41. 0231-00	Connector 8 pos. male Connecteur mâle 8 pos.
34	41. 0232-00	Connector 11 pos. male Connecteur mâle 11 pos.
35	41. 5545-00	Connector 3 pos. female Connecteur femelle 3 pos.
36	41. 0225-00	Connector 2 pos. male Connecteur mâle 2 pos.
37	49. 0268-00	Knob channel switch (only XS5002 and XS5003) Bouton de sélecteur de canal (pour XS5002 et XS5003 seul) Item No. 32 is fully assembled circuit including item No. 33 to 37. 32 complètement assemblé contient les pièces 33 à 37.
38	10. 3745-00 10. 3746-00	Switching unit SU5001 Switching unit SU5002
39	20562-03008	Screw M3x8 mm Vis M3x8 mm
40	10. 3743-00 10. 3744-00	Tone transmitter/receiver TQ5001 Emetteur-récepteur de tonalité TQ5001 Tone transmitter/receiver TQ5002 Emetteur-récepteur de tonalité TQ5002
41	20562-03022	Screw M3x22 mm Vis M3x22 mm
42	99. 5325-00	L. E. D. Yellow Diode lumineuse jaune
43	47. 0642-00	Switch Commutateur Item No. 40 is fully assembled circuit including item No. 41 to 43. 40 complètement assemblé contient les pièces 41 à 43.
44	20562-03028	Screw M3x28 mm Vis M3x28 mm
45	20022-02508	Screw M2, 5x8 mm Vis M2, 5x8 mm
46	36. 0298-00	Plate, grounding spring Plaque à ressort de mise à la terre

* ONE CHANNEL ** MORE THAN ONE CHANNEL

CQM 5000 TONE EQUIPMENT T. No.	KIT WITH NAMEPLATE AND BUTTON				NAME PLATE Eur.				NAME PLATE US.				BUSHING Eur. & US. 32.0512-00	KNOB VOL. 49.0267-00Eur. 49.0281-00 US.	PUSH BUTTON			
	ONE CHANNEL		MORE THAN ONE CHANNEL	NAME PLATE Eur.				NAME PLATE US.				ON/OFF			SQ.	TONE KEY	LS. IN/OUT	
	17.0116-00Eur. 17.0122-00 US.	17.0120-00Eur. 17.0126-00 US.		* 51.1160-00	* 51.1164-00	** 51.1161-00	** 51.1165-00	* 51.1169-00	* 51.1173-00	** 51.1170-00	** 51.1174-00							
T0	1		1		1	1	1	1	1	1	1	1	1	1				
T1		1		1		1	1	1	1	1	1	1	2	1		1	1	
T2		1		1		1	1	1	1	1	1	1	2	1		1	1	
T3		1		1		1	1	1	1	1	1	1	2	1		1	1	
T4		1		1		1	1	1	1	1	1	1	2	1		1	1	
T5	1		1		1	1	1	1	1	1	1	1	1	1				
T6	1		1		1	1	1	1	1	1	1	1	1	1				
T7	1		1		1	1	1	1	1	1	1	1	1	1				
T8	1		1		1	1	1	1	1	1	1	1	1	1				
T9		1		1		1	1	1	1	1	1	1	2	1		1	1	
T10		1		1		1	1	1	1	1	1	1	2	1		1	1	
T11		1		1		1	1	1	1	1	1	1	2	1		1	1	
T12		1		1		1	1	1	1	1	1	1	2	1		1	1	
T13		1		1		1	1	1	1	1	1	1	2	1		1	1	
T14		1		1		1	1	1	1	1	1	1	2	1		1	1	
T15		1		1		1	1	1	1	1	1	1	2	1		1	1	
T16		1		1		1	1	1	1	1	1	1	2	1		1	1	
T17		1		1		1	1	1	1	1	1	1	2	1		1	1	
T18		1		1		1	1	1	1	1	1	1	2	1		1	1	
T19		1		1		1	1	1	1	1	1	1	2	1		1	1	
T20		1		1		1	1	1	1	1	1	1	2	1		1	1	
T21		1		1		1	1	1	1	1	1	1	2	1		1	1	
T22		1		1		1	1	1	1	1	1	1	2	1		1	1	
T23		1		1		1	1	1	1	1	1	1	2	1		1	1	
T24		1		1		1	1	1	1	1	1	1	2	1		1	1	

EXAMPLE: CQM 5112 Spec. 25x6 T2J → COMBINATIONS OF TONE EQUIPMENT
WATT → NUMBER OF CHANNELS
CHOICE OF NAMEPLATE KIT AND PUSH BUTTON
M40 5096-4

The versions T9 - T24 incl. are not available
until further notice is given.