PORTABLE RADIOTELEPHONE
STORNOPHONE 600
TYPE CQP611
TYPE CQP612
TYPE CQP613
TYPE CQP614
146...174 MHz

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PORTABLE RADIOTELEPHONE
STORNOPHONE 600
TYPE CQP611
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TYPE CQP614
146...174 MHz

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Technical Data and Guaranteed Performance Characteristics

Unless otherwise stated, specifications are based on the measuring methods prescribed in EIA publications RS-152A and RS-204. Storno reserves the right to change the listed specifications without notice.

General

Frequency Range

146-174 MHz

Min. Channel Separation

CQP611(F): 50 kHz
CQP612(F): 25 kHz
CQP613(F): 20 kHz
CQP614(F): 12.5 kHz

Max. Frequency Deviation

CQP611(F): ±15 kHz
CQP612(F): ± 5 kHz
CQP613(F): ± 4 kHz
CQP614(F): ± 2.5 kHz

Transmitter RF Output

10 W

Maximum Number of RF Channels

12

Type of Operation

Simplex

Modulation

CQP611(F), CQP612(F), CQP613(F): Phase-modulated telephony in the range 300-3000 Hz.
CQP614(F): Phase-modulated telephony in the range 300-2600 Hz

Total Channel Bandwidth

1 MHz

Antenna Impedance

50 ohms nominal

Supply Voltage

30V DC from battery unit type BU601 or BU603
6V, 12V, or 24V DC when power supply type PS608 is employed
220V AC, when power supply type PS609 is employed

Power Consumption

Depends on the power supply unit or battery unit employed. See under power supply data

Supply Voltage for Radio Units

-24V ± 2.5%

Ambient Temperature

Working range: -25°C to +50°C.
Function range: -30°C to +60°C.

Dimensions

Station cabinet CA609: Height 212mm, breadth 235mm, depth 80mm.
These dimensions do not include knobs, connectors, and snap-fasteners.

Weight

Approx. 3.5 kilos.

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Transmitter Section

RF Output

10 watts ± 1 dB

Crystal Frequency Calculation

For radiotelephones working in the frequency band 146-174 MHz:

Crystal frequency = $\frac{\text{signal frequency}}{12}$

Frequency Stability

Conforms with government specifications

ADC Circuit

Automatic drive control circuit which protects the transmitter against damage due to mismatching of antenna loading

Spurious and Harmonic Radiation

Less than 2×10^{-7} watts

Adjacent-channel Interference

Attenuated to meet government specifications

AF Input Impedance

300 to 800 ohms

Modulation Sensitivity

Nominal 110mV for 70% of maximum permissible frequency swing at 1000 Hz

Modulation Response

All types except CQP614(F): 6dB/octave pre-emphasis characteristic from 300 to 3000 Hz, +1dB/-3dB relative to 1000 Hz

CQP614(F): 6dB/octave pre-emphasis characteristic from 300 to 2600 Hz, +1dB/-3dB relative to 1000 Hz

Modulation Distortion

Max. 10% at 70% of maximum permissible frequency swing and 1000 Hz (measured without 750 µsec. network in the standard test receiver used for making the measurement).

Modulation Limiting

The modulation signal can be increased from -17dBm to +3dBm without exceeding the permissible frequency swing

FM Hum and Noise

CQP611(F): Min. 40 dB
CQP612(F): Min. 36 dB
CQP613(F): Min. 34 dB
CQP614(F): Min. 33 dB

(measured without 750 µsec. network in the standard test receiver used for the measurement)

Receiver Section

Maximum input signal for 12dB SINAD

CQP611(F), CQP612(F), and CQP613(F): Better than 0.8 µV e.m.f.
CQP614(F): Better than 0.7 µV e.m.f.

Maximum input signal for obtaining 20dB signal-to-noise ratio (FTZ measuring method)

CQP611(F) and CQP614(F): Better than 1.1 µV e.m.f.
CQP612(F) and CQP613(F): Better than 1.0 µV e.m.f.

Squelch Sensitivity

CQP611(F), CQP612(F), and CQP613(F): Better than 0.6 µV e.m.f.
CQP614(F): Better than 0.4 µV e.m.f.

Intermediate Frequencies

1st intermediate frequency: 10.7 MHz
2nd intermediate frequency: 455 kHz

Frequency Stability

Conforms with government specifications

Crystal Frequency Calculation

CQP611(F), CQP612(F), CQP613(F), and CQP614(F):

	With oscillator XO611		With oscillator XO666	
Range, MHz	146-160	156-174	146-160	156-174
Crystal frq. in MHz	$\frac{fs + 10.7}{3}$	$\frac{fs - 10.7}{3}$	$\frac{fs + 10.7}{3}$	$\frac{fs - 10.7}{3}$

Modulation Acceptance Bandwidth

	CQP611(F)	CQP612(F)	CQP613(F)	CQP614(F)
Max. frequency swing	± 15 kHz	± 5 kHz	± 4 kHz	± 2.5 kHz
Min. 6dB bandwidth	± 16 kHz	± 7 kHz	± 6 kHz	± 3.2 kHz

Adjacent Channel Selectivity

CQP611(F), CQP612(F): Better than 80 dB
CQP613: Better than 70 dB (FTZ measuring method)
CQP614: Better than ± 15 kHz (GPO measuring method)

Spurious Response Attenuation

CQP611(F), CQP612(F), and CQP613(F): Min. 85 dB
CQP614(F): Min. 75 dB

Blocking

Conforms with government specifications

Spurious and Harmonic Radiation

Less than 2×10^{-9}W

Loudspeaker Impedance

35 ohms nominal

AF Power output

Min. 1 watt measured at connector pins J1/J and J1/H

AF Distortion

CQP611(F), CQP612(F), and CQP613(F): Less than 5%
CQP614(F): Less than 7%

AF Response

All types except CQP614(F): 6dB/octave from 300 to 3000 Hz +0/-3dB relative to 1000 Hz

CQP614(F): 6dB/octave from 300 to 2600 Hz +0/-4dB from 300 to 2600 Hz relative to 1000 Hz

Hum and Noise

Measured in unsquelched condition according to EIA measuring method.
CQP611(F): Min. 45dB
CQP612(F), CQP613: Min. 40dB
CQP614(F): Min. 40dB

Battery and Power Supply Units

Types of Power Sources

BU601 Rechargeable battery, 30V, 1.6 Ah.
BU603 Rechargeable battery, 30V, 3.5 Ah.
PS608 Power supply unit for operation from 6V, 12V, or 24V DC.
PS609 Power supply unit for operation from 220V ac, 50 Hz.

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Consumption

BU601/BU603	Stand-by	Max. 0.060A
	Transmit	Max. 1.2A
PS608 6.3V	Stand-by	Max. 0.7A
	Transmit	Max. 10.0A
PS608 12.6V	Stand-by	Max. 0.26A
	Transmit	Max. 3.8A
PS608 25.2V	Stand-by	Max. 0.13A
	Transmit	Max. 1.8A
PS609 220V	Stand-by	Max. 7W
	Transmit	Max. 60W

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CHAPTER I. GENERAL DESCRIPTION

A. Design Details

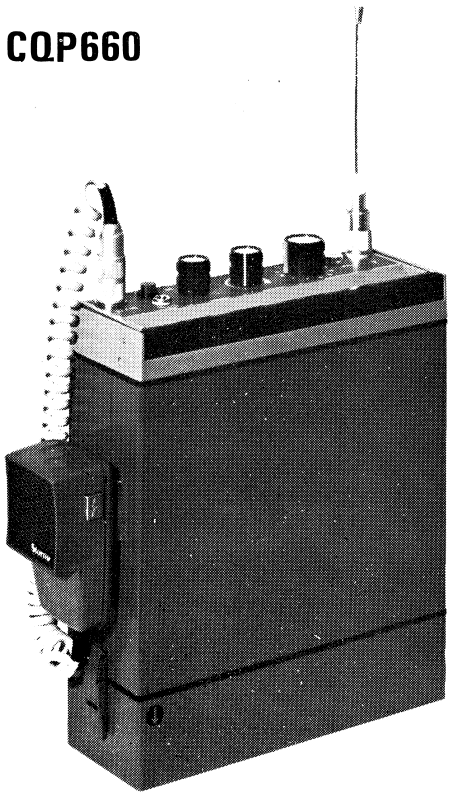
Introduction

The Stornophone CQP600 is primarily a portable radiotelephone containing a transmitter and receiver for FM radio communication in simplex service in one of the frequency bands 68-88 MHz, 146-174 MHz and 420-470 MHz. Because of the type of construction employed and the wide range of standard accessories available, including power supply units, the Stornophone CQP600 is equally suited for mobile and portable service.

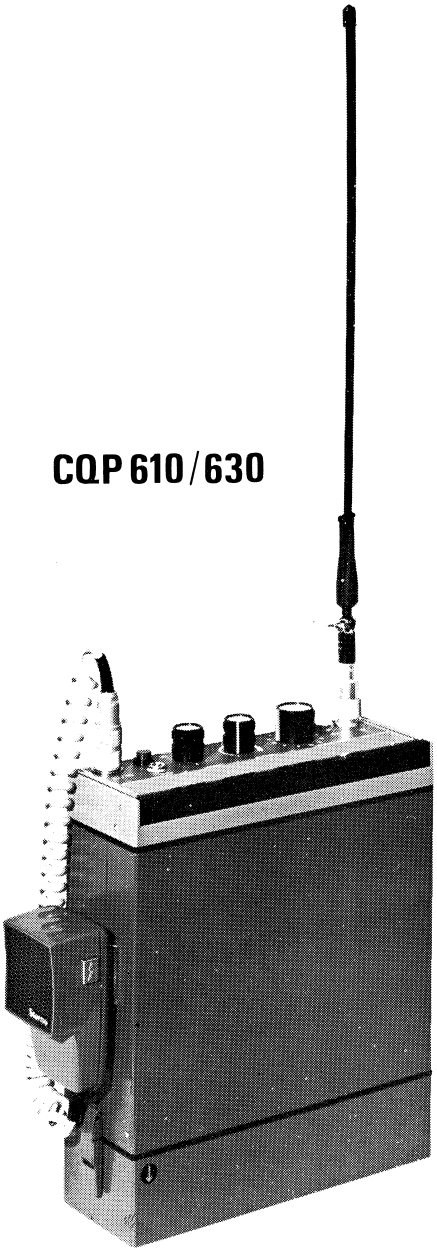
A version of the radiotelephone is the CQP600F, which is characterized by having higher oscillator stability, thus meeting government requirements in respect of fixed stations.

The Stornophone CQP600F, in addition to being used in portable and mobile service, may therefore be operated as a temporary fixed station.

CQP660



CQP 610/630



Depending on the intended application the radiotelephone may be supplied with different types of power supply units:

Power supply unit with built-in battery. Chiefly for portable operation.

Power supply unit for operation from external battery. Chiefly for mobile operation.

Power supply unit for operation from the mains (220V AC, 50 Hz). For use with radiotelephones operated in fixed-station service.

Switching from one power supply unit to another can be carried out quickly and without using tools as the power supply units are built as cassettes which are secured to the radiotelephone cabinet by means of two snap fasteners. The electrical connections are made simultaneously via a pair of multiwire connectors.

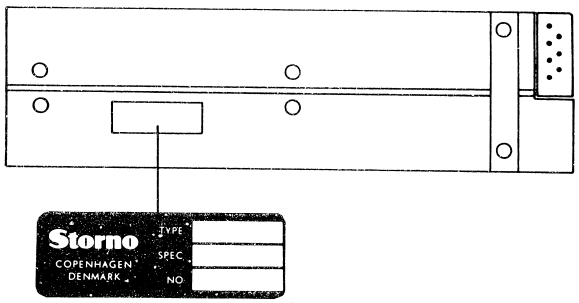
The Stornophone CQP600 and CQP600F are available with 50 kHz, 25 kHz, 20 kHz, and 12.5 kHz channel spacing inside the various frequency bands.

The table below lists existing radiotelephone types with frequency bands, channel spacings, max. numbers of channels and transmitter power outputs.

Type Designation	Frequency Band (MHz)	Channel Spacing	Number of Channels (max.)	Transmitter Power Output
CQP611/611F	146-174	50 kHz	12	10W
CQP612/612F	146-174	25 kHz	12	10W
CQP613/613F	146-174	20 kHz	12	10W
CQP614/614F	146-174	12.5 kHz	12	10W
CQP631/631F	68-88	50 kHz	12	10W
CQP632/632F	68-88	25 kHz	12	10W
CQP633/633F	68-88	20 kHz	12	10W
CQP634/634F	68-88	12.5 kHz	12	10W
CQP661/661F	420-470	50 kHz	12	6W
CQP662	420-470	25 kHz	12	6W
CQP662F	420-470	25 kHz	2	6W
CQP663	420-470	20 kHz	12	6W
CQP663F	420-470	20 kHz	2	6W

Where no distinction between radiotelephones with different channel spacings is necessary, this manual employs common designations for radiotelephones inside the same frequency band. Thus, the CQP611, CQP612, CQP613, and CQP614 2-metre radiotelephones will carry the common designation CQP610.

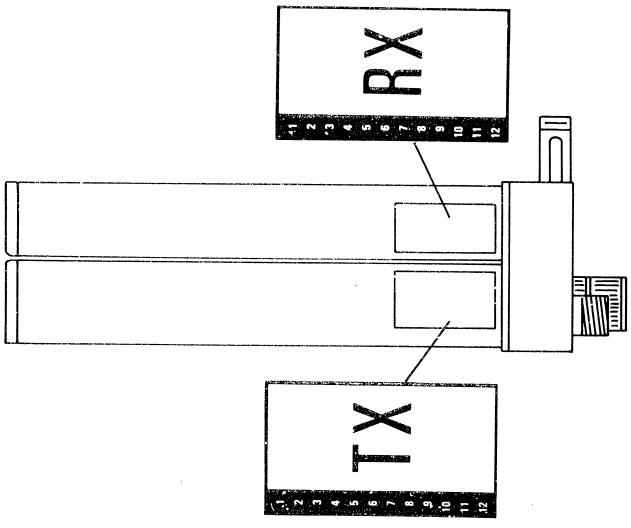
The type designation of the radiotelephone can be read on a plate on the back of the cabinet.



The type plate contains the following information:

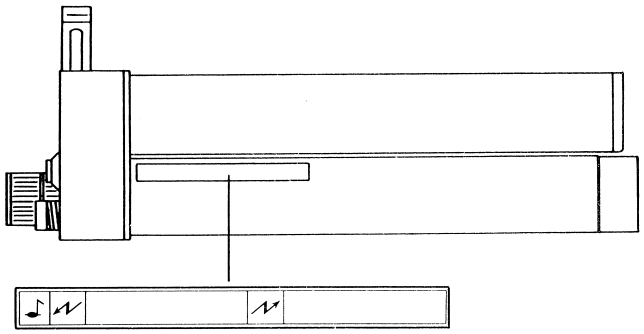
Under "TYPE": Type designation of radiotelephone
Under "SPEC": Any additional information
Under "NO": Serial number of radiotelephone.

Frequency labels are also provided on the right side of the drawer section. One label designated TX records the transmitting frequencies and another one designated RX records the receiving frequencies and the corresponding channels.



Space is provided in the radiotelephone cabinet for installation of tone equipment for selective calling.

If tone equipment is installed, the left side of the drawer section of the radio cabinet will carry a type plate which has two spaces. One space (marked ∿) states the tone receiver frequency (frequencies) either in Hz or in a code, depending on the type of tone receiver employed. The other space (marked ∿) states



the tone transmitter frequency (frequencies) in the same manner.

The meaning of the tone codes and the functioning of the tone equipment are explained in the technical manual "Tone Equipment for the Stornophone 600".

Construction

The radiotelephone is housed in a type CA609 splashproof cabinet which employs drawer design principles, consisting of a cabinet and a drawer section and front panel.

The drawer section, of 1.5 mm hard aluminium sheet, is a two-sided chassis on which the electrical units are mounted. One side of the drawer carries the radio-frequency and intermediate-frequency circuits whilst the other side accomodates the oscillator and audio-frequency circuits and (if provided) the tone equipment.

In the front of the drawer section is a die-cast magnesium front panel, which is the control panel. A push-down handle in the front panel can be laid down flush with the panel for mobile use and can be locked in an intermediate position to serve as support for the cabinet when the radiotelephone is operated in a horizontal position, for example as a fixed station.

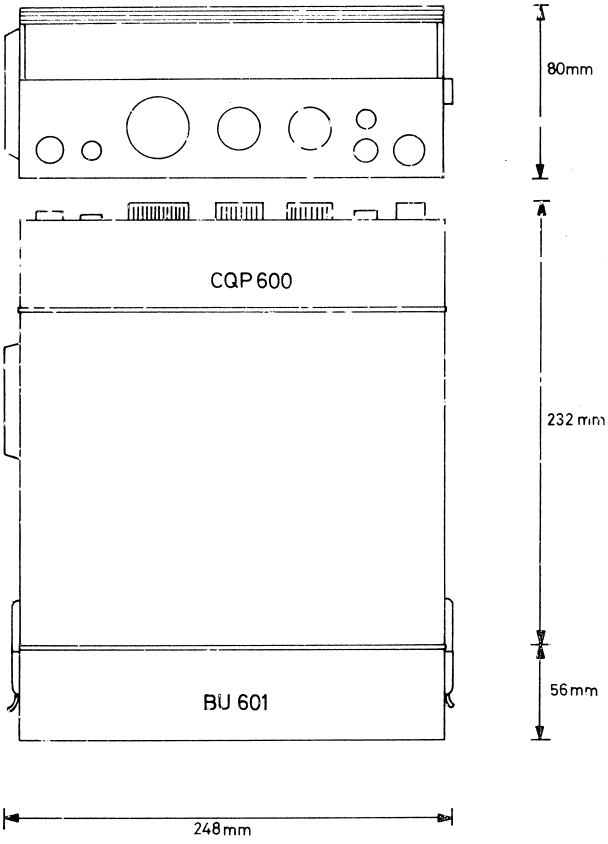
The back of the drawer section carries a type plate and a 7-contact multiwire connector which provides the electrical connections to the power supply unit.

The cabinet too is made of 1.5 mm hard aluminium sheet. A rubber fillet in front secures a dustproof and moistureproof seal between the cabinet and the front panel.

The left side of the cabinet carries a hang-up bracket for the loudspeaker microphone. On either side of the back of the cabinet are fittings which secure the snap fasteners of the power supply unit.

The back of the cabinet has two cutouts which provide access to the type plate and battery connector, both of which are located on the drawer section; also six holes for screwing the two cabinet sections together and two ways for the guide pins of the power supply unit.

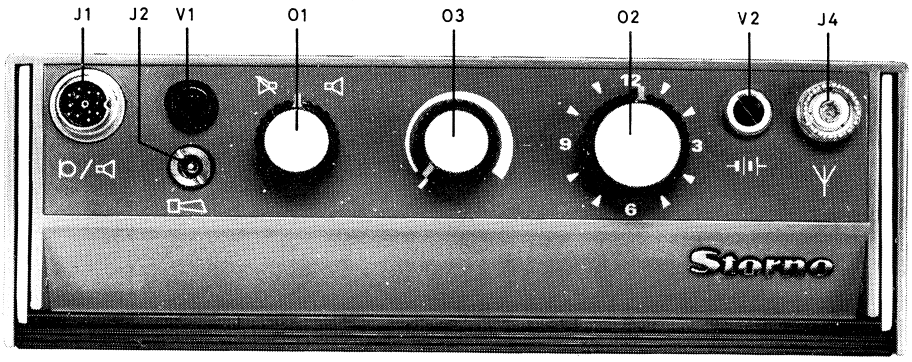
Overall cabinet dimensions appear from the sketch.



The electrical circuits of the radiotelephone are built on printed wiring boards which are screwed to the top and bottom sides of the cabinet drawer.

A complete description of the electrical design principles and mode of operation is given in Chapter II.

Operation



A complete Stornophone CQP600 radiotelephone consists of the following main units:

A transmitter/receiver unit with control panel.

A loudspeaker microphone (monofone) with transmit and tone buttons.

A battery or power supply unit.

An antenna.

Also various types of extra accessories depending on whether the CQP600 is operated as a portable, mobile, or fixed station.

The front panel carries the following controls etc.:

O1. Loudspeaker on/off switch with three positions:

Fully anti-clockwise: Receiver squelched, loudspeaker off. This position is spring-actuated and self-releasing.

Fully clockwise: Receiver unsquelched, loudspeaker on. This position is spring-actuated and self-releasing.

Middle position: Neutral.

O2. Channel selector for max. 12 channels.

O3. Combined on/off switch and volume control. Turning the knob fully anti-clockwise switches the radiotelephone off. Turning it clockwise will switch the radiotelephone on, and the knob then functions as a continuously adjustable volume control.

V1. Green calling lamp. Indicates incoming calls by flashing.

V2. Battery indicator for checking the supply voltage.

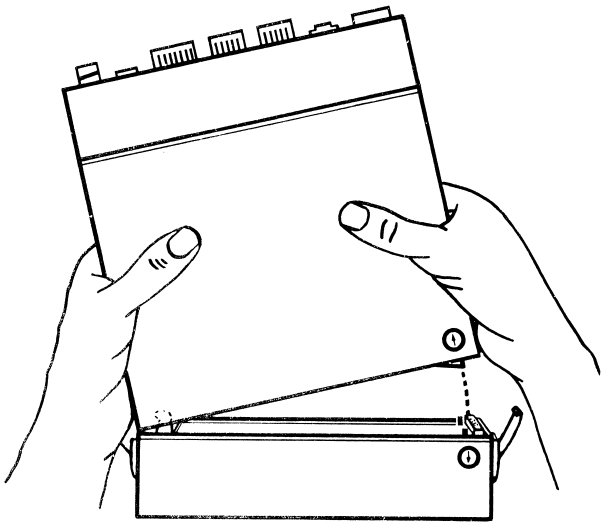
J1. Multiwire connector for loudspeaker microphone.

J2. Connector for external alarm circuit (bell, horn, or flashing light).

J4. Connector for antenna.

Loudspeaker microphone type LM601 is a combined loudspeaker and microphone. It has a transmit button (marked) and a tone button (marked ♪), and is equipped with a cable with a multiwire connector which plugs into the radiotelephone.

The battery or power supply unit is mounted on the radiotelephone cabinet by making a lock on the battery unit engage with two ways in the bottom of the cabinet. To do this, first tilt the cabinet with



respect to the battery unit and then connect the two units as shown in the sketch, thereby also making the electrical contacts through the pair of battery connectors. Lastly clamp the battery unit to the cabinet, using the two snap fasteners.

Additional information about the installation of the CQP600, for example as a mobile or fixed station, is contained in Chapter IV.

A booklet containing detailed operating instructions is supplied with each CQP600 radiotelephone. Accordingly, this manual contains no actual operating instructions.

Battery Indicator

Indicates whether the radiotelephone supply voltage has the correct value.

On stand-by, receive, and transmit the battery indicator pointer should be inside or above the green scale sector. If the pointer is inside the red scale sector it is an indication that the supply voltage is too low and the radiotelephone is no longer operating correctly.

NOTE: If powered from a battery unit, the radiotelephone should be switched off if the battery indicator pointer only reaches into the red scale sector during operation. This is an indication that the battery unit is discharged, and additional current drain, such as will occur during transmission, may result in repolarization and consequent impairment of the cells, which are of the nickel-cadmium type.

B. Accessories

A wide range of accessories for installation and operation of the Stornophone CQP600 and CQP600F are available. The following list covers only the main data of these accessories. A detailed description of their mode of operation and installation is given in the Chapters III and IV.

Loudspeaker Microphone

LM601 Splashproof loudspeaker microphone with built-in transistor amplifier. Also equipped with transmit and tone buttons and cable with connector for plugging into the radiotelephone.

Antennas

The Stornophone CQP600 is designed for operation with a 50Ω antenna.

The following antennas for portable use are available:

AN631L 1/4-wave tape antenna for the frequency band 68-75 MHz.

AN631M 1/4-wave tape antenna for the frequency band 75-82 MHz.

AN631H 1/4-wave tape antenna for the frequency band 82-88 MHz.

AN611L 1/4-wave tape antenna for the frequency band 146-158 MHz.

AN611H 1/4-wave tape antenna for the frequency band 158-174 MHz.

All of the antenna types listed above are supplied cut to specified transmitting frequency.

The following antennas are available for the UHF band:

AN661 1/4-wave factory precut whip antenna of twisted steel wire for the frequency band 420-470 MHz.

The standard antennas listed below are designed for mobile use. Each type has a base which permits doing the installation job from outside without damaging the car upholstery.

AN39-5 1/4-wave whip antenna for the frequency band 68-88 MHz.

AN19-5 1/4-wave whip antenna for the frequency band 146-174 MHz.

AN69-4 5/8-wave whip antenna for the frequency band 420-470 MHz.

These antennas are supplied cut to specified transmitting frequency. Also available is:

AN69-3 1/4-wave factory precut whip antenna for the frequency band 420-470 MHz.

Other types of antennas such as 5/8-wave rear-mounting antennas, fold-down antennas, or magnet antennas may be used if desired.

Battery and Power Supply Units

The battery and power supply units are separate units housed in cassettes which can be secured to the radiotelephone cabinet with two snap fasteners.

The following types are available:

BU601 24-cell nickel-cadmium battery, 30V, 1.6 Ah.

BU603 24-cell nickel-cadmium battery, 30V, 3.5 Ah.

PS608 Power supply unit consisting of a DC converter with change-over switch, for operation from 6, 12, or 24V battery.

PS609 Power supply unit for operation from 220V/240V AC.

Battery Chargers

The following types of chargers for battery units BU601 and BU603 are available:

CU602 For charging a type BU601 or BU603 battery unit.

CU603 A semi-automatic charger which accomodates up to five cassettes for charging a corresponding number of type BU601 or BU603 battery units simultaneously. This charger is equipped with a timer which can be preset to the desired charging time so that overcharging is avoided.

Carrying Sling and Bag

49.157 Black leather sling with hang-up bracket for loudspeaker microphone.

CK601 Black leather carrying bag with sling.

Installation Equipment

The following installation accessories are required for installing the CQP600 as a mobile station.

37.119 Radiotelephone mounting bracket

Hang-up bracket for loudspeaker microphone LM601.

CC601 Installation kit for connecting a PS608 power supply unit to a battery.

Tone Equipment

It is easy to add various types of tone equipment to the Stornophone CQP600 for use in selective calling systems.

TT680 Line of single and double tone transmitters with different tone sequences.

ST680 Line of tone sequential transmitters with different tone sequences.

TR680 Line of single and double tone receivers with different tone sequences.

SR680 Line of tone sequential receivers with different tone sequences.

Instructions for installing tone equipment are given in this manual. Additional information about tone equipment is contained in a separate manual (Tone Equipment for Stornophone 600).

The following accessories for use with a tone receiver installed in the Stornophone CQP600 are available:

AC683 Alarm circuit for installation in the radiotelephone. Incoming tone calls will cause the alarm circuit to activate an external alarm device (horn, flashing light etc.).

CC603 Installation set consisting of a cable and connector for operating an external alarm device with the radiotelephone alarm circuit.

Installation Instruction

Brief installation instructions are supplied with each accessory, but in addition to that this manual contains an installation chapter giving a detailed description of how to install the radiotelephone and all the above-mentioned types of accessories.

Storno will always be glad to furnish any information not afforded by a study of the technical manual supplied with the radiotelephone.

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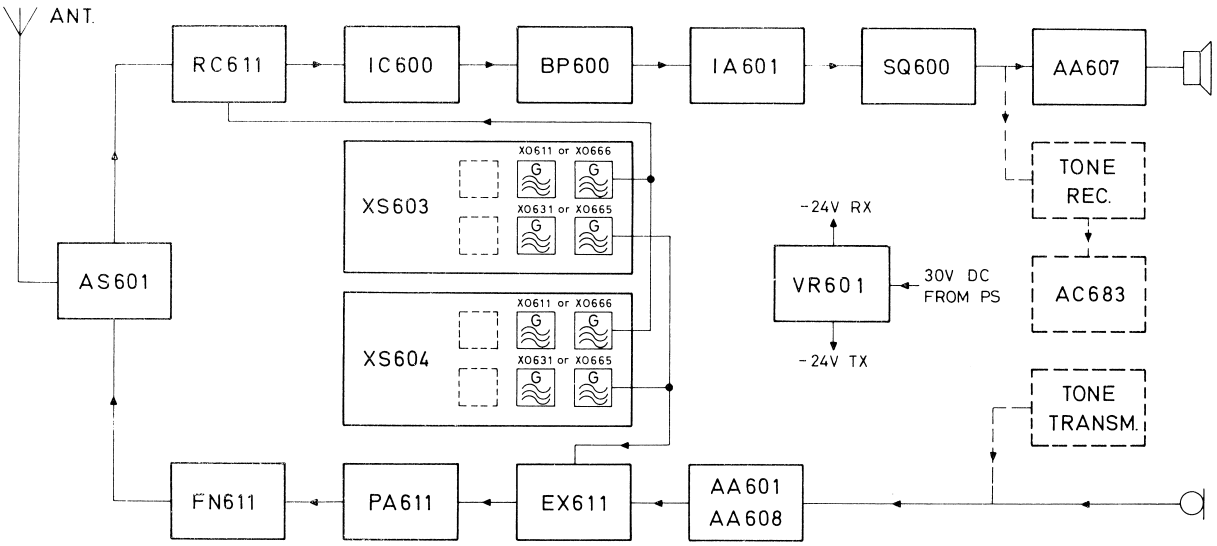
CHAPTER II. THEORETICAL CIRCUIT ANALYSIS

A. Construction

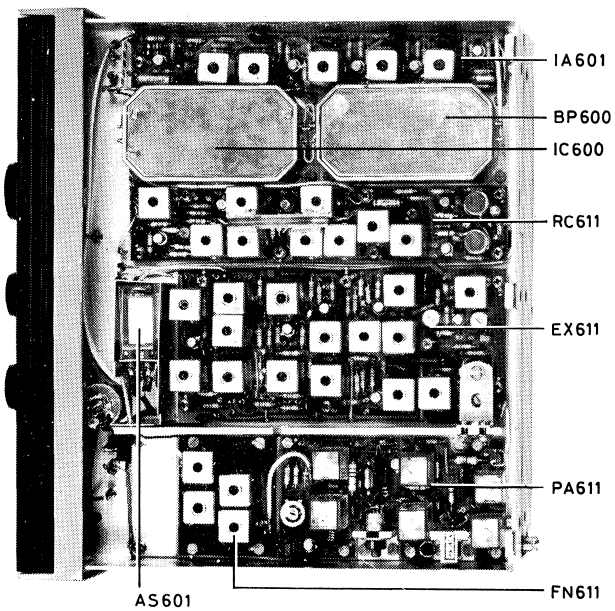


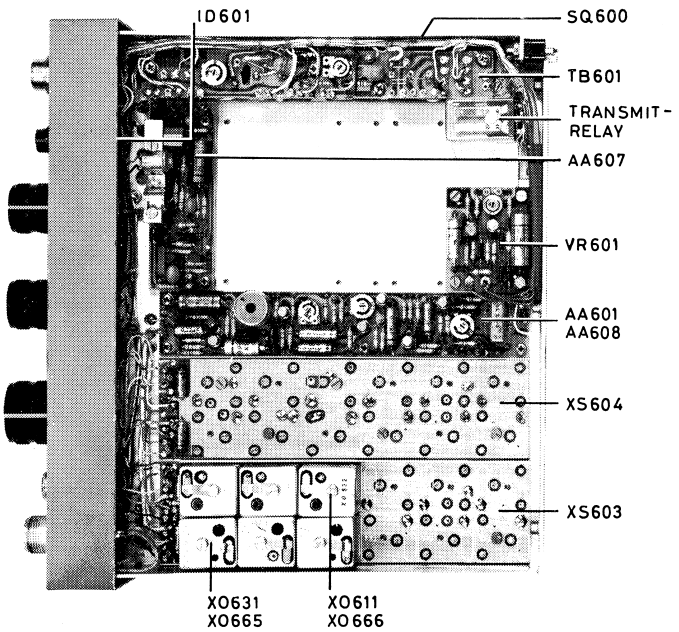
Introduction

The receiver and transmitter sections of the Stornophone CQP600 are divided into a number of sub-units each of which is built on printed wiring boards. By dividing the electrical circuits into modular units it is possible to design and manufacture a compact high-stability radiotelephone possessing the additional advantage of being easily accessible for adjustments and repairs.

Silicon transistors are used throughout. This makes for less dependence on ambient temperature and greater reliability.

The top side of the cabinet drawer mounting plate carries the AF circuits, oscillators, and voltage regulator. Besides, space is provided for installation of a tone transmitter, tone receiver and alarm circuit. The bottom side of the cabinet drawer accommodates all RF and IF circuits.





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Transmitter Section

The transmitter is phase modulated. Its output frequency is six times the crystal-oscillator frequency. Phase modulation is carried out at the fundamental frequency. The transmitter, which can be equipped with a maximum of 12 crystal oscillators, one for each frequency channel, is composed of the following sub-units:

Modulation Amplifier:	
For 50, 25 and 20 kHz channel spacing	AA601
For 12.5 kHz channel spacing	AA608
Crystal Oscillator(s), max. 12:	
Standard type:	XO631
In countries with stringent government demands for frequency accuracy:	XO665
Crystal Oscillator Panel (common to transmitter and receiver sections):	
Oscillator panel for channels 1-6	XS603
Oscillator panel for channels 7-12	XS604
Exciter with Modulator	EX611
RF Power Amplifier	PA611
Antenna Filter	FN611
Antenna Switching Unit (common to transmitter and receiver sections)	AS601
Terminal Board (common to transmitter and receiver sections)	TB601

Receiver Section

The receiver section is a double-conversion superheterodyne using 1st and 2nd intermediate frequencies of 10.7 MHz and 455 kHz, respectively. Two block filters provide the required amount of selectivity. A maximum of 12 crystal oscillators - one for each frequency channel - can be provided. The receiver is composed of the following sub-units:

Antenna Switching Unit (common to transmitter and receiver sections)	AS601
Receiver Converter with RF amplifier, oscillator-signal multiplier stage and 1st mixer	RC611
Crystal Oscillator(s), max. 12:	
Standard type	XO611
In countries with stringent government demands for frequency accuracy:	XO666
Crystal Oscillator Panel (common to transmitter and receiver sections):	
Oscillator panel for channels 1-6	XS603
Oscillator panel for channels 7-12	XS604
Intermediate-frequency Converter with 10.7 MHz crystal filter, oscillator and 2nd mixer:	
For 50 kHz channel spacing	IC601
For 25 kHz channel spacing	IC602
For 20 kHz channel spacing	IC603
For 12.5 kHz channel spacing	IC605
455 kHz Intermediate-frequency Filter:	
For 50 kHz channel spacing	BP601
For 25 or 20 kHz channel spacing	BP602
For 12.5 kHz channel spacing	BP6012
455 kHz Intermediate-frequency Amplifier:	IA601
Squelch and AF Amplifier Unit:	
For 50, 25 and 20 kHz channel spacing	SQ601
For 12.5 kHz channel spacing	SQ602
AF Output Amplifier	AA607
Call Indicator:	ID601
Terminal Board (common to transmitter and receiver sections):	TB601

The radiotelephone also contains an electronic voltage regulator, VR601, which delivers constant supply voltage, -24V, for the transmitter and receiver sections if the input voltage applied to the radiotelephone exceeds 25.5V.

The following pages of this chapter contain a complete description of the circuits of the individual sub-units and their specifications.

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B. Description of Subunits

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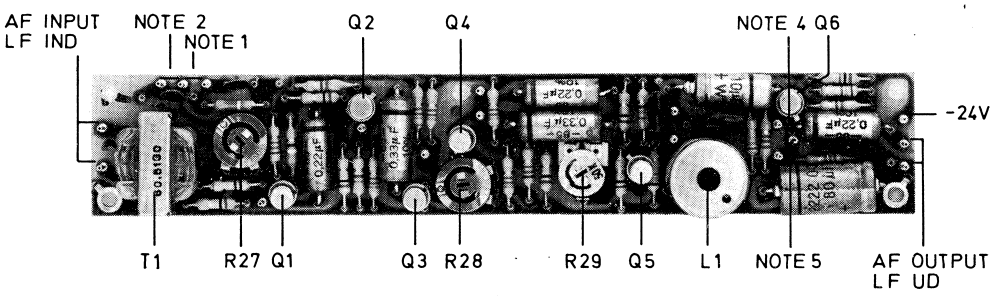
Audio Amplifiers AA601 and AA608



Audio amplifiers AA601 and AA608 are built on wiring boards. They consist of the following stages:

Differentiating network
1st amplifier
Limiter
Integrating network
2nd amplifier
Splatter filter
Output amplifier.

The audio amplifier performs two important functions: it amplifies the signal from the microphone to a level suitable for the modulator, and it limits the amplitude of the said signal so that the maximum permissible frequency swing will not be exceeded.
Besides, the AA601 attenuates frequencies above 3000 Hz and the AA608 frequencies above 2500 Hz, thus preventing adjacent-channel interference.

Mode of Operation

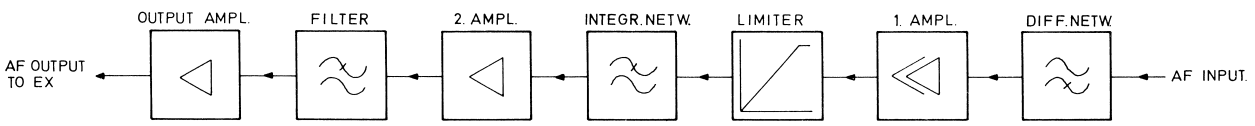
Differentiating Network

Each audio amplifier has 600-ohm balanced transformer input followed by a potentiometer, R27, for sensitivity adjustment. The following differentiating network (pre-emphasis network) is switchable between two different time constants: the strap designated NOTE 1 cuts in the differentiating network R2, C3, which provides straight phase modulation, whilst the strap designated NOTE 2 cuts in the network composed of (R1 + R2) and C1, which provides mixed phase and frequency modulation, a phase modulation characteristic being obtained for modulating frequencies below 1000 Hz and frequency modulation for modulating frequencies above 1000 Hz. From the differentiating network, the signal is fed to the 1st amplifier stage.

1st Amplifier and Limiter

The 1st amplifier consists of two transistor stages in a conventional emitter circuit. The use of un-bypassed emitter resistors results in a high degree of negative feedback. The following limiter consists of two transistors with a common emitter resistor. Limiting is accomplished in the following manner:

When the input voltage of transistor Q3 becomes positive with respect to the emitter voltage, Q3 will attempt to draw more current, and the emitter/base voltage of transistor Q4 will consequently decrease, causing the latter transistor to draw less current. A further increase in input voltage will cause Q3 to draw so much cur-



37.569-E1

Storno

rent that Q4 will cut off, thus limiting the signal amplitude. If the input signal of Q3 becomes negative with respect to the emitter voltage, the full current will flow through Q4. In this case, Q3 will cut off, again causing limiting. The symmetry of the limiting is adjustable with potentiometer R28.

Integrating Network

The integrating network consists of the output impedance of transistor Q4 in conjunction with capacitor C6. This capacitor is connected via a strap; by removing the strap, the capacitor can be left out while making measurements on the limiter, thereby avoiding integration.

The following potentiometer, R29, controls the output voltage of the audio amplifier and hence also the maximum frequency swing of the transmitter with the limiter operative.

2nd Amplifier and Splatter Filter

The 2nd amplifier consists of a single transistor stage with an un-by-passed emitter resistor, resulting in a high degree of negative feedback. The amplifier stage is followed by a splatter filter. This is a pi-network whose cutoff frequency is 3000 Hz in the AA601 and 2500 Hz in the AA608 It serves the purpose of attenuating higher frequencies such as harmonics generated by the clipper and amplifier stage.

Output Amplifier

The output amplifier consists of a single transistor stage with an un-bypassed emitter resistor. The collector resistor is a voltage divider (R25 and R17), making it possible to alter the output voltage - and hence the frequency swing - by a restrapping operation.

Depending on the frequency band in use and the desired frequency swing (channel separation), the units should be strapped in accordance with the notes on the associated diagrams.

Technical Specifications

Current Drain

13 mA.

Clipping Level (1000 Hz)

Peak value of clipped voltage at test point 24 with strap designated NOTE 3 removed: 2.9 V peak.

Minimum Input Voltage for Clipping (1000 Hz)

The input voltage at which clipping occurs with potentiometer R27 turned full on (and with strap designated NOTE 3 removed): 34 mV.

Maximum Output Voltage (1000 Hz)

Maximum output voltage across 10 k ohm load resistor, at full clipping and with potentiometer R29 turned full on (with straps designated NOTE 3 and NOTE 4 inserted): In AA601: 3.5V peak. In AA608: 1.9 V peak.

Harmonic Distortion (1000 Hz)

Distortion is measured at output voltage of 0.8V, corresponding to 0.7 ΔF max. Potentiometer R29 is adjusted so that the output voltage across 10 k ohms is 1.5 V peak for an input voltage of 20 dB above clipping level. The input voltage is reduced to 110 mV, and potentiometer R27 is adjusted for an output voltage of 0.8 V across 10 k ohms: 0.5%.

Frequency Response:

The unit is adjusted as for measurement of harmonic distortion. The input voltage is reduced by 20 dB to 11 mV.

Frequency response, AA601:
flat between 300 and 3000 Hz +0.2/0.8 dB; at 5 kHz the voltage has dropped 12 dB below 0 dB at 1000 Hz.
Frequency response, AA608:
flat between 300 and 2500 Hz +0.2/0.8 dB; at 5 kHz the voltage has dropped 12 dB below 0 dB at 1000 Hz.

Input Impedance

600 ohms. Input impedance is floating.

Output Impedance

3.9 k ohms or 1.2 k ohms, depending on strapping.

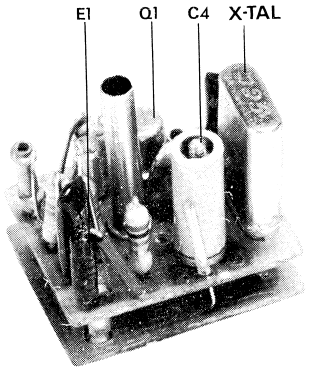
Dimensions

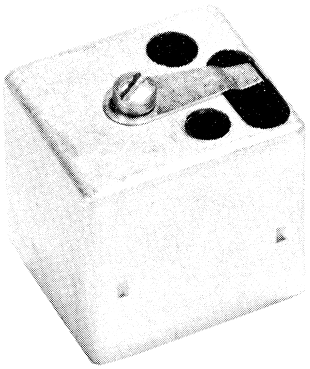
160 x 28 mm.

37.569-E1

Storno

Transmitter Oscillator Unit X0631





The transmitter oscillator unit is a crystal-controlled oscillator and is built on a double wiring board. It is a totally enclosed plug-in unit.
The oscillator units plugs into a crystal oscillator panel which has pins mating with sockets on the oscillator unit.

Mode of Operation

The oscillator uses a parallel-resonant Colpitts circuit with the crystal loosely coupled to the transistor. The oscillator is started up by connecting the CHANNEL SHIFT terminal to chassis through the channel selector in the control box. A diode in series with the -24 V supply lead prevents any flow of undesired current in the unit.
The oscillator signal is fed via the crystal oscillator panel to the RF input of the exciter.
The operating frequency can be adjusted by means of a trimmer capacitor located close to the crystal.

Technical Specifications

Crystal Frequency Range

11.3 - 14.66 Mc/s.

Frequency Pulling

$\frac{\Delta f}{f}$: $\pm 30 \times 10^{-6}$.

Frequency Stability

For voltage variations within 24V ±2.5%:
Better than $\pm 1 \times 10^{-6}$.

Load Impedance

25 ohms.

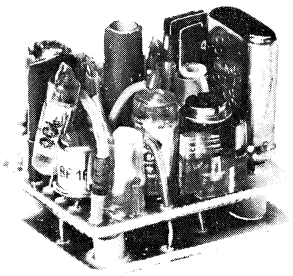
Power Output

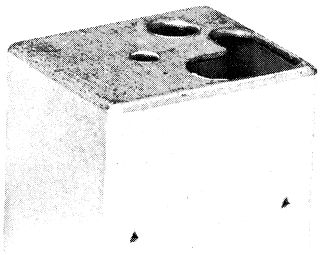
Approx. 80 μW.

37.376-E1

Storno

Transmitter Oscillator Unit XO665





Transmitter oscillator unit XO665 is a crystal-controlled parallel-resonant oscillator for use in the frequency range 11.33 MHz to 14.66 MHz. It is built on a double wiring board and is a totally enclosed plug-in unit.

The XO665 plugs into a crystal oscillator panel which has pins mating with sockets on the oscillator unit.

Mode of Operation

The oscillator is of the Colpitts type. It is started up by connecting the CHANNEL SHIFT terminal to chassis through the channel selector. A diode in series with the -24V supply lead prevents any flow of undesired current in the unit during receive periods. The oscillator signal is fed via the crystal oscillator panel to the RF input terminal of the exciter. A capacitance diode E2, biased by a temperature-dependent voltage, compensates for frequency variations at high and low temperatures. The temperature compensation is provided by applying two independent voltages to capacitance diode E2, one of these voltages which is varying within the entire temperature range is applied to E2 through R8 from the voltage divider R3, R4.

The other voltage which is only varying at high and low temperatures is applied to the capacitance circuit via R7 from voltage divider R1, R2.

Technical Specifications

Crystal Frequency Range

11.33 - 14.66 MHz

Frequency Pulling

$\frac{\Delta f}{f_o} \geq \pm 30 \times 10^{-6}$

Frequency Stability

Against voltage variations of -24V ± 5%:
Better than $\pm 0.1 \times 10^{-6}$.
In temperature range -30°C to +80°C: Better than $\pm 5 \times 10^{-6}$

Load Impedance

50 ohms

Power Output

Approx. 25 microwatts

Type of Crystal

98-16.

60.069-E1

Storno

Crystal Oscillator Panels XS603 and XS604

Crystal oscillator panels XS603 and XS604 are used in the CQP600 radiotelephone. Either panel consists of a wiring board with conductors on both sides and a screen. The wiring board has pins which accept up to 12 oscillator units.

Crystal oscillator panel XS603 accommodates six transmitter oscillator units for channels 1-6 and six receiver oscillator units for the same channels.

Crystal oscillator panel XS604 accommodates six transmitter oscillator units for channels 7-12 and six receiver oscillator units for the same channels.

In order to ensure that the proper oscillators - and hence also the proper frequencies - are provided for the channels, the pin sets of the wiring board are marked "TX" for the transmitter oscillators and "RX" for the receiver oscillators, followed by channel numbers 1-12.

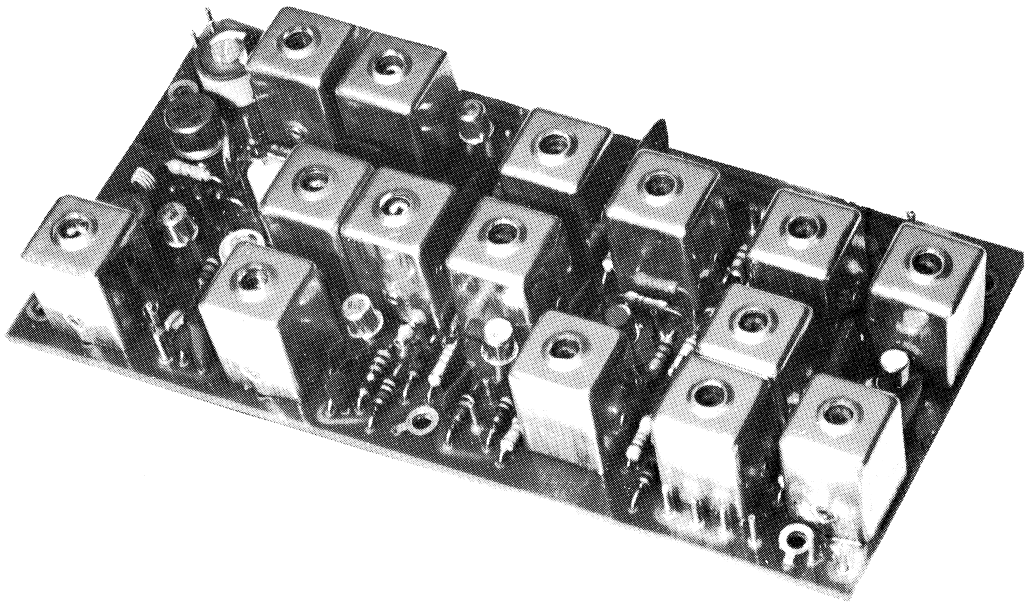
Mode of Operations

When the channel selector of the radiotelephone is operated to switch from one channel to another, switch contacts connect the transmitter and oscillator units of the selected channel to chassis, thereby applying operating voltage to them as all transmitter and receiver oscillators are connected to -24V for transmission and reception, respectively.

60.129-E1

Storno

Exciter EX611



The exciter is built on a wiring board. It consists of the following stages:

1st Buffer
Modulator
2nd Buffer
1st Frequency Doubler
Frequency Tripler
2nd Frequency Doubler
1st Power Amplifier
2nd Power Amplifier

The exciter performs two main functions: it modulates the RF oscillator signal and converts it to a frequency and a level suitable for the following power amplifier unit, PA.

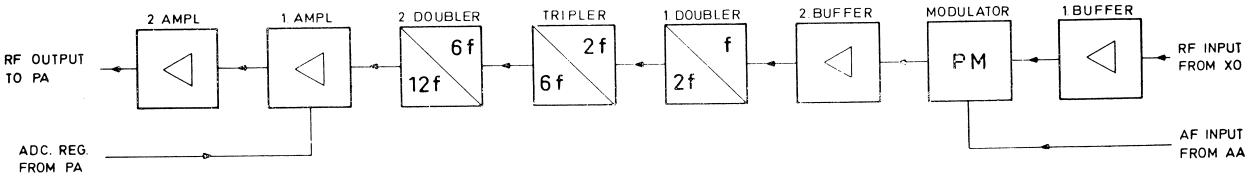
Mode of Operation

1st Buffer

The RF signal from the oscillator is applied to the 1st buffer (transistor Q1), which has tuned LC circuits in its base and collector leads. The stage is not neutralized; stability is accomplished by damping the collector circuit, L2, with a resistor. This stage amplifies the input signal to a level suitable for the modulator. The base circuit serves as an impedance transformer, providing an input impedance of approx. 50 ohms.

Phase Modulator

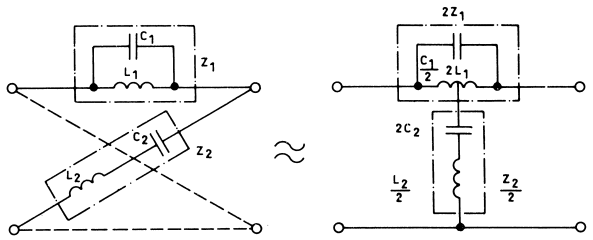
The phase modulator is a modified bridged T network composed of reactances. This circuit has



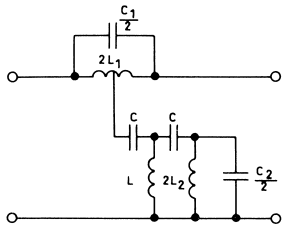
37.377-E1

Storno

low insertion loss, constant four-terminal impedances, and produces a relatively large linear phase swing. The bridged T network is derived from a lattice section as shown below.



In these networks, the insertion loss is zero (no-loss reactances) and the four-terminal impedance is constant if the value of $Z_1 \times Z_2$ is constant. The phase shift introduced by the network can be varied by varying the impedances; however, this must be done in such a way that $Z_1 \times Z_2$ remains constant. In order to make the circuit practically applicable as a phase modulator, the series resonant circuit is replaced by a quarter wave transformer and a parallel circuit.



The advantage of this arrangement is that the phase shift can be varied by varying the two circuit capacitances in the same manner. This also meets the requirement that $Z_1 \times Z_2$ must be constant. The circuit capacitances are capacitance diodes on whose bias the modulating voltage is superimposed.
Attenuating networks inserted on either side of the modulator reduce interaction between the modulator and the buffer stage during alignment.

2nd Buffer

This stage is largely identical with the 1st buffer. It, too, has tuned LC circuits in its base and collector leads. Both circuits are damped by parallel resistors to keep the stage stable. Similarly, the damping of the circuits of the first and second buffer stages cause the operation of the modulator to become less dependent on the tuning of the buffer stages.

Frequency Multipliers

The frequency multiplier chain comprises a doubler, a tripler, and another doubler, with a total frequency multiplication factor of twelve. These stages are not neutralized, the tuned circuit being damped by resistors in the interests of good stability. The circuits between the multipliers and between the last doubler and the 1st power amplifier are double-tuned bandpass filters with close-to-critical coupling between circuits. These bandpass filters set a limit to the bandwidth of the exciter by attenuating undesired harmonics generated in the frequency multiplication process.

Power Amplifiers

The 1st and 2nd power amplifiers raise the signal level to approx. 500 mW in a 50-ohm load. Impedance matching between stages is accomplished by means of a tapped parallel resonant circuit (L14). The tap connects - via a series resonant circuit consisting of C42 and L15 - to the base of transistor Q7 of the 2nd power amplifier. Battery voltage for the 1st power amplifier is taken from the drive control circuit of the following RF amplifier unit, PA. The power output delivered by the exciter is adjusted by varying this voltage. The emitter resistor of the 2nd power amplifier is un-bypassed in the interests of better stability; another advantage of omitting bypassing is that transistor tolerances are then without importance. In order to be able to tune the power amplifier stages over the entire 2-metre band it was found necessary to divide it into two frequency bands, 146-168 Mc/s and 168-174 Mc/s. Switching between these subbands is performed by means of straps in the collector circuits of the amplifier stages.

A pi-network provides impedance matching to the 50-ohm load imposed by the following RF power amplifier unit.

Technical Specifications

Frequency Range

146-174 Mc/s.

Frequency Multiplication Factor

12.

37.377-E1

Storno

Crystal Frequency Bands

12.16 - 14.50 Mc/s.

Power Output

700 mW.

Power Input

40 μW.

Generator Impedance

50 ohms.

Load Impedance

50 ohms.

Audio Input Impedance

At 1000 c/s: 10 k ohms.

Modulation

Phase modulation, +6 dB/octave ±1 dB within 300 - 3000 c/s.

Modulation Sensitivity

Modulating voltage (for $\Delta f = 0.7 \times \Delta F_{max.}$ at 1000 c/s): 0.85V.

Modulation Distortion

Measured without de-emphasis: 5%.

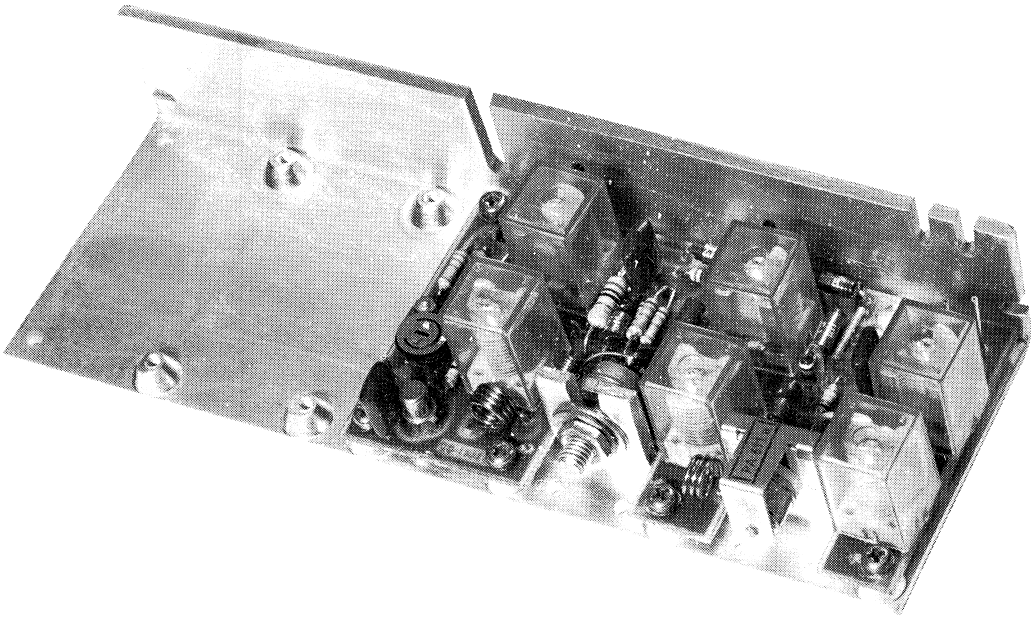
Dimensions

68 x 140 x 25 mm.

37.377-E1

Storno

RF Power Amplifier PA611



The power amplifier is built on a wiring board. It consists of the following stages:

1st Power Amplifier (Driver)
2nd Power Amplifier (Output)
ADC Circuit (Automatic Drive Control Circuit).

The RF power amplifier is a Class C amplifier. It raises the RF signal level to approx. 10 watts in a 50-ohm load. An ADC circuit ensures constant current through the output transistor and so prevents it from being overloaded. This circuit also causes the output of the RF power amplifier to be less dependent on variations in supply voltage and ambient temperature.

Mode of Operation

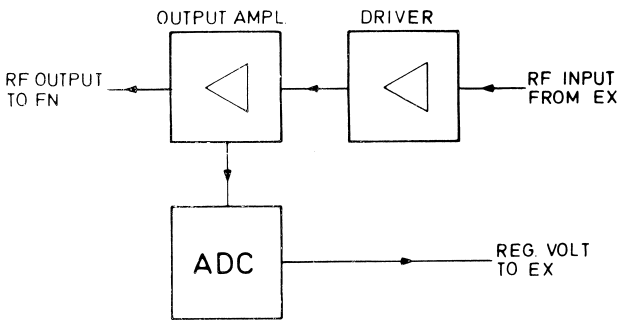
Driver Stage and Output Stage

The driver amplifies the signal from the EX exciter to a level (approx. 3 - 4 watts) suitable for driving the following output amplifier.

Pi-networks are used for matching the output stage to the driver and to the load impedance into which it works.

ADC Circuit (Automatic Drive Control Circuit)

This circuit consists of one transistor stage operating as a DC amplifier. The transistor base receives, via a potentiometer, a reference voltage which is produced by a zener diode. There is a DC path from the emitter of this transistor to the emitter of the output stage of the power amplifier unit, where a 1-ohm resistor provides operating voltage for the drive control circuit.
Lastly, the collector of the control transistor connects to the 1st power amplifier stage of the EX exciter.



37.379-E1

Storno

An increase in the current through the output stage will result in a voltage drop across the emitter resistor and hence also in a decrease in the base-emitter voltage of the control transistor. Consequently, the supply voltage applied to the 1st power amplifier stage will decrease, and so will the drive applied to the output stage. This will reduce the current through the output stage.

Technical Specifications

Frequency Range

146 - 174 Mc/s.

Power Output

10 W. Adjustable by means of the ADC circuit.

Current Drain

750 mA at 10 watts power output.

Input Impedance

50 ohms.

Output Impedance

50 ohms.

Gain

15 dB at 156 Mc/s.
The gain varies over the frequency range.

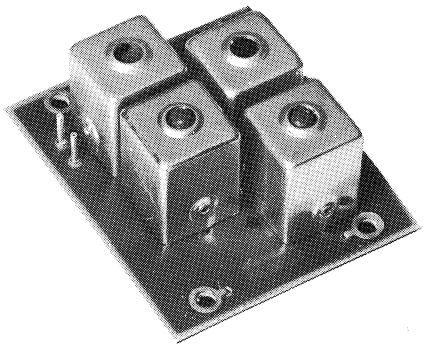
Dimensions

56 x 160 x 29 mm.

37. 379-E1

Storno

Antenna Filter FN611



The antenna filter is built on a wiring board. It consists of a bandpass filter having low insertion loss.
This bandpass filter, composed of four LC circuits (two series resonant circuits and two parallel resonant circuits), serves the purpose of preventing the transmitter from radiating signals at undesired frequencies, such as harmonics of the signal frequency.

Technical Specifications

Frequency Range

146 - 174 Mc/s.

Input Impedance

50 ohms.

Output Impedance

50 ohms.

Bandwidth (3 dB)

72 Mc/s.

Insertion Loss

146 - 174 Mc/s: 0.4 dB.

Dimensions

52 x 44 mm.

37.381-E1

Storno

Terminal Board TB601

TB601 is a terminal board for the cabling of the radiotelephone. The unit consists of a wiring board with terminals for connection of the units of which the radiotelephone is composed and for installation of straps in connection with installation of tone equipment.

Moreover, TB601 comprises these components and circuits:

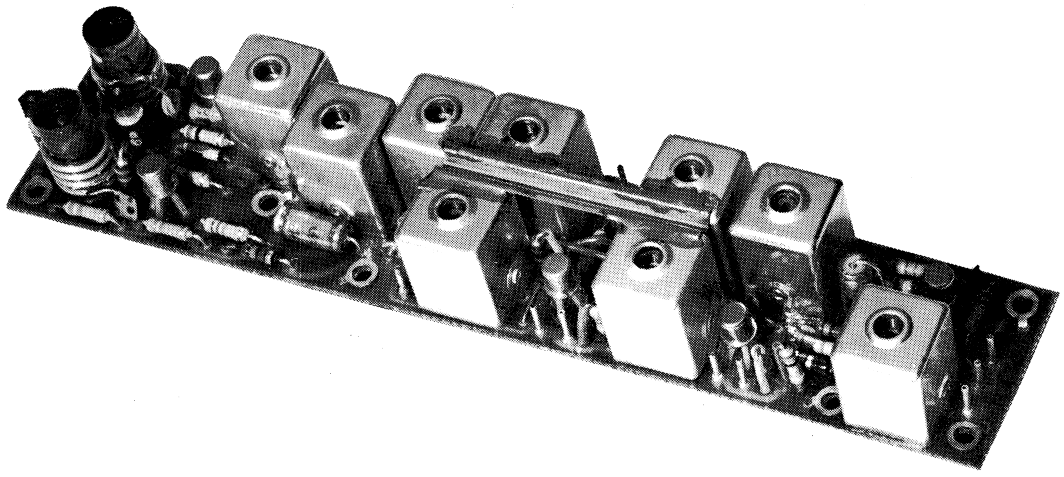
Potentiometer for squelch adjustment (R1)
Circuit for adjustment of microphone sensitivity (R8)
Series resistors for battery indicator.

Information about connection of tone equipment and installation of straps appears from the circuit diagram of TB601 (D401.263).

60.131-E1

Storno

Receiver Converter RC611



The receiver converter is built on a wiring board. It consists of the following stages:

Signal Frequency Amplifier
Mixer
Oscillator-Signal Amplifier
Oscillator-Signal Tripler.

The converter amplifies the incoming signal and converts it to a high intermediate frequency of 10.7 Mc/s, for which purpose an oscillator signal, amplified and multiplied, is injected into the mixer.
All transistors used in this unit are silicon-type n-p-n transistors.

Mode of Operation

Signal Frequency Amplifier

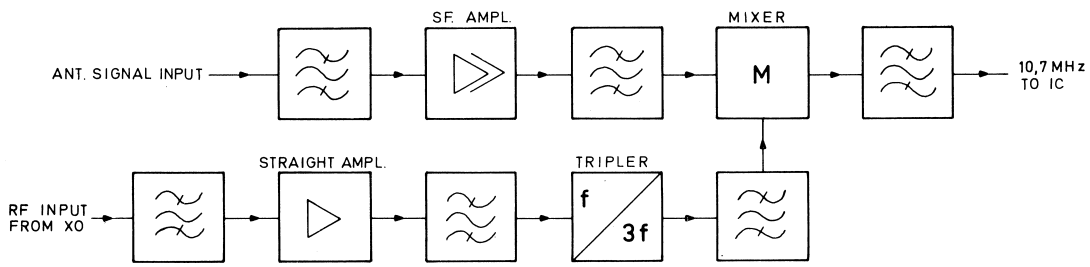
The incoming signal is applied - via a bandpass filter (L1, L2) - to the signal frequency amplifier. Good separation between the input and output circuits of this amplifier ensures good stability. - The amplified signal is fed through a four-circuit filter to the emitter of the mixer transistor.

Mixer

Whilst the amplified and filtered signal from the antenna is applied to the emitter of the mixer, the output signal of the tripler is applied to the base. In other words, additive mixing is used. The mixer works into a 10.7 Mc/s filter (L8) which can be matched to the following IF converter unit by means of a simple strapping operation.
(See circuit diagram of the RC611 receiver converter at the back of this manual).

Amplifier and Tripler

The output of the crystal oscillator is amplified by a straight amplifier stage. This is followed



37.383-E2

Storno

by a tripler the collector circuit of which consists of a double bandpass filter tuned to the third harmonic of the oscillator frequency. From there, the signal is fed to the base of the mixer transistor.

Technical Specifications

Frequency Range

146 - 174 Mc/s.

Gain

Voltage gain from antenna to input of mixer: 10-12 dB.

Input Impedance

Nominal: 50 ohms.

Crystal Frequency Calculation

For 146 - 160 Mc/s range:

$$fx = \frac{fsig + 10.7}{3} \text{ Mc/s.}$$

For 156 - 174 Mc/s range:

$$fx = \frac{fsig - 10.7}{3} \text{ Mc/s.}$$

where fx is the crystal frequency in Mc/s, and fsig is the signal frequency in Mc/s.

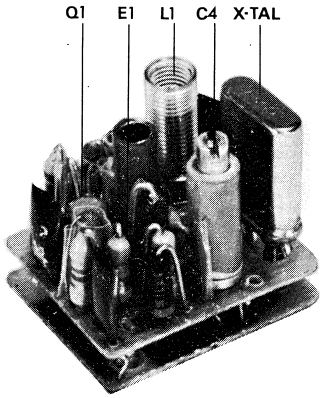
Dimensions

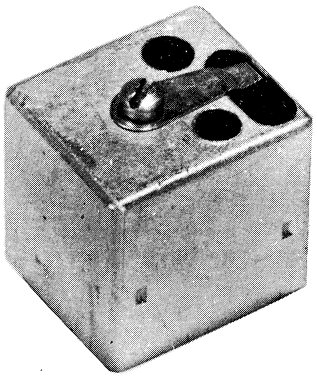
160 x 32 mm.

37.383-E2

Storno

Receiver Oscillator Unit X0611





The receiver oscillator unit is a crystal-controlled oscillator. It is built on a double wiring board, and is a totally enclosed plug-in unit. The oscillator unit plugs into a crystal oscillator panel which has pins mating with sockets on the oscillator unit.

Mode of Operation

The oscillator is a third overtone series resonant Colpitts oscillator with the crystal connected at low-impedance points to ensure good frequency stability.
Undesired pulling of the oscillator frequency is minimized through damping of the collector circuit.

The oscillator is started up by connecting the CHANNEL SHIFT terminal to chassis through the channel selector in the control box. A diode in series with the -24V supply lead prevents any flow of undesired current in the unit.
The oscillator signal is fed to the receiver converter via the crystal oscillator panel.
The operating frequency can be adjusted by means of a trimmer capacitor located close to the crystal.

Technical Specifications

Crystal Frequency Range

48.4 - 56.9 Mc/s.

Frequency Pulling

$\frac{\Delta f}{f}$: $\pm 30 \times 10^{-6}$.

Frequency Stability

For voltage variations within 24V ±2.5%:
Better than $\pm 0.2 \times 10^{-6}$.

In temperature range $-30^{\circ}C$ to $+80^{\circ}C$:
Better than $\pm 2 \times 10^{-6}$.

Load Impedance

50 ohms.

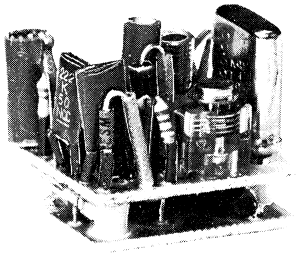
Power Output

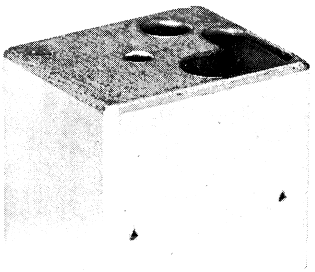
Approx. 1 mW.

37.385-E1

Storno

Receiver Oscillator Unit XO666





Receiver oscillator unit XO666 is a crystal-controlled, third-overtone oscillator. It is built on a double wiring board, and is a totally enclosed plug-in unit. The oscillator unit plugs into a crystal oscillator panel which has pins mating with sockets on the oscillator unit.

Mode of Operation

The oscillator uses a series-resonant Colpitts circuit followed by a temperature compensating network.

The oscillator is started by connecting the CHANNEL SHIFT terminal to chassis through the channel selector.

Adjustment of the oscillator frequency is performed by means of trimmer capacitor C5 inserted in series with the crystal.

A capacitance diode E3, biased by a temperature-dependent voltage, compensates for frequency variations at high and low temperatures.

The temperature compensation is provided by applying two independent voltages to capacitance diode E3.

One of these voltages which is varying within the entire temperature range is applied to E3 from the voltage dividers R4, R5 and R1, R2. The other voltage which is varying at high and low temperatures only, is applied to E3 via R8 and E1 from the voltage divider R1 and R2.

Technical Specifications

Crystal Frequency Range

45.5 - 56.9 MHz

Frequency Pulling

$\frac{\triangle f}{f_o} \geq \pm 25 \times 10^{-6}$

Frequency Stability

Against voltage variations of -24V ± 2.5%:
Better than $\pm 1.5 \times 10^{-6}$.
In temperature range -30°C to +80°C:
Better than 2.5×10^{-6}

Load Impedance

50 Ω

Output Voltage

200mV/50Ω ± 3dB

Current Drain

At 25°C: 3.5mA ± 0.5mA

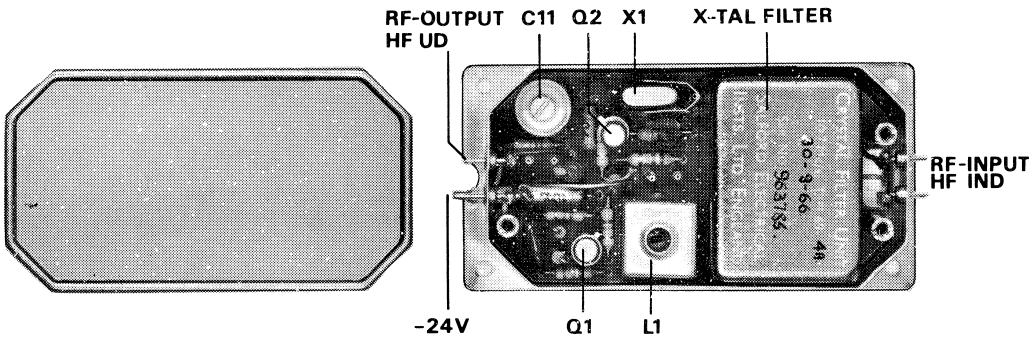
Type of Crystal

98-21.

60.070-E1

Storno

IF Converters IC601, IC602, IC603



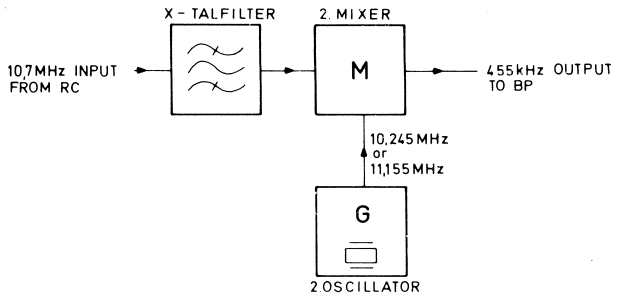
The IF converter unit is built on a wiring board, and is housed in a metal box with screw-on lid. The unit consists of the following stages:

Crystal Filter
Oscillator
Mixer

The IF converter filters the high intermediate frequency signal at 10.7 Mc/s and converts it to a low intermediate frequency signal at 455 kc/s.

IF converter IC601 is used in equipments with 50 kc/s channel separation.
IF converter IC602 is used in equipments with 25 kc/s channel separation.
IF converter IC603 is used in equipments with 20 kc/s channel separation.

The three converters use different crystal filters but are otherwise quite identical.



Mode of Operation

Crystal Filter

From the receiver converter unit, RC, the high intermediate frequency signal at 10,7 Mc/s is fed to the crystal filter. The filter connects to the mixer via a parallel resonant circuit, which ensures a perfect impedance match.

Oscillator

The oscillator is a crystal-controlled Colpitts oscillator. The crystal frequency is normally 10.245 Mc/s, but in cases where one of the harmonics of the local oscillator coincides with the frequency of the incoming signal, which might cause interference, a crystal frequency of 11.155 Mc/s is chosen instead. The crystal oscillates in a parallel resonant circuit, and frequency adjustment is performed with a trimmer capacitor.

Mixer

Both the 10.7 Mc/s signal and the oscillator signal are applied to the base of the mixer transistor. The low intermediate frequency signal at 455 kc/s is taken off at the collector.

37.387-E2

Storno

Technical Specifications

Input Frequency

10.7 Mc/s.

Output Frequency

455 kc/s.

Input Impedance

910 ohms // 20 pF.

Output Impedance

3.9 k ohms // 480 pF.

Maximum Frequency Swing

IC601: ±15 kc/s
IC602: ±5 kc/s
IC603: ±4 kc/s

Bandwidth

IC601 At 3 dB attenuation relative to 10.7 Mc/s: Greater than ±15 kc/s.
At 50 dB attenuation relative to 10.7 Mc/s: Less than ±50 kc/s.

IC602 At 3 dB attenuation relative to 10.7 Mc/s: Greater than ±7.5 kc/s.
At 50 dB attenuation relative to 10.7 Mc/s: Less than ±25 kc/s.

IC603 At 3 dB attenuation relative to 10.7 Mc/s: Greater than ±6 kc/s.
At 50 dB attenuation relative to 10.7 Mc/s: Less than ±20 kc/s.

Bandpass Ripple

IC601 Less than 2 dB
IC602 Less than 1.5 dB
IC603 Less than 1.5 dB

Oscillator Frequency

Calculation of crystal frequency (fx):
fx = 10.7 Mc/s - 0.455 Mc/s - 10.245 Mc/s.

However, at certain incoming frequencies the low crystal frequency must not be used owing to the risk of harmonic radiation. In this cases the high crystal frequency is used.
The calculation of the high crystal frequency is as follows:

fx = 10.7 Mc/s + 0.455 Mc/s = 11.155 Mc/s.

The lists below specifies what type of crystal which is to be used within the various frequency ranges.

A = 10.245 Mc/s
B = 11.155 Mc/s

146-174 Mc/s

Receiver frequency range	fx.
146.0 - 152.5 Mc/s	A
152.5 - 154.9 Mc/s	B
154.9 - 162.7 Mc/s	A
162.7 - 165.1 Mc/s	B
165.1 - 174.0 Mc/s	A

68-88 Mc/s

Receiver frequency range	fx.
68.0 - 70.5 Mc/s	A
70.5 - 72.9 Mc/s	B
72.9 - 80.8 Mc/s	A
80.8 - 83.2 Mc/s	B
83.2 - 88.0 Mc/s	A

420-470 Mc/s

Receiver frequency range	fx.
420.0 - 421.5 Mc/s	B
421,5 - 428.8 Mc/s	A
428.8 - 431.7 Mc/s	B
431.7 - 439.1 Mc/s	A
439.1 - 442.0 Mc/s	B
422.0 - 449.3 Mc/s	A
449.3 - 452.2 Mc/s	B
452.2 - 459.6 Mc/s	A
459.6 - 462.5 Mc/s	B
462.5 - 470.0 Mc/s	A

Crystal Specification

In the temperature range -15°C to +60°C:
S-98-8.
In the temperature range -25°C to +65°C:
S-98-12.

Frequency Pulling Range for Osc.

Greater than $\pm 50 \times 10^{-6}$.

Available Power Gain

With 10.245 Mc/s crystal: Greater than 15dB.
With 11.155 Mc/s crystal: Greater than 14dB.

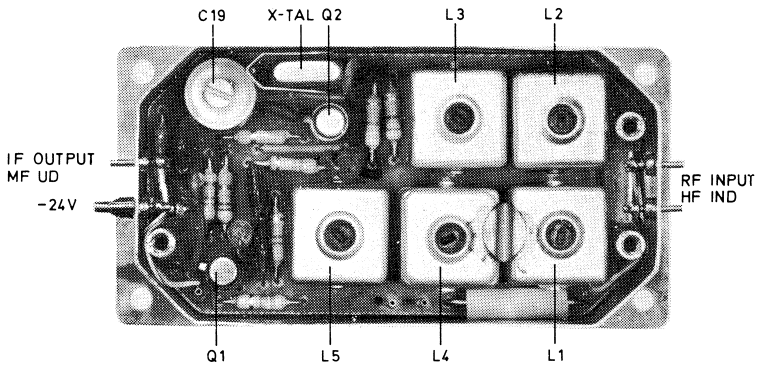
Dimensions

80 x 40 x 29 mm.

37.387-E2

Storno

IF Converter IC605



The IF converter unit is built on a wiring board, and is housed in a metal box with a screw-on lid.
The unit consists of the following stages:

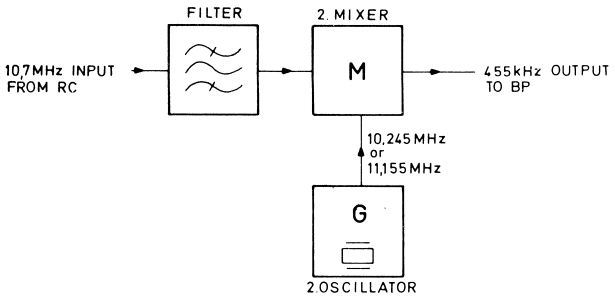
Coil filter
Oscillator
Mixer.

The IF converter filters the high intermediate-frequency signal at 10.7 MHz and converts it to a low intermediate-frequency signal at 455 kHz.

Mode of Operation

Coil Filter

From the receiver converter unit RC, the high intermediate-frequency signal at 10.7 MHz is fed to the coil filter, which consists of five tuned circuits. The output of the filter is applied to the mixer.



Oscillator

The oscillator is a crystal-controlled Colpitts oscillator. The crystal frequency is normally 10.245 MHz, but in cases where one of the harmonics of the local oscillator coincides with the frequency of the incoming signal, which might cause interference, a crystal frequency of 11.155 MHz is chosen instead. The crystal oscillates in a parallel resonant circuit, and frequency adjustment is performed with a trimmer capacitor.

Mixer

Both the 10.7 MHz signal and the oscillator signal are applied to the base of the mixer transistor. The low intermediate frequency signal at 455 kHz is taken off at the collector.

Technical Specifications

Input Frequency

10.7 MHz.

Output Frequency

455 kHz.

Input Impedance

910 ohms // 20 pF.

Output Impedance

3.8 k ohms // 480 pF.

37.558-E1

Storno

Bandwidth

At 6 dB relative to 10.7 MHz: 230 kHz.
At 55 dB attenuation relative to 10.7 MHz: 1820 kHz.

Bandpass Ripple

0 dB.

Oscillator Frequency

Calculating the crystal frequency (fx):
fx = 10.7 MHz - 0.455 MHz = 10.245 MHz.
At certain signal frequencies, however, this crystal frequency cannot be used owing to harmonic radiation. In such cases a crystal frequency of 11.155 MHz is used which is calculated as follows:

fx = 10.7 MHz + 0.455 MHz = 11.155 MHz.

Below follow lists of IC crystal frequencies for a number of signal frequencies.

A = 10.245 MHz crystal frequency
B = 11.155 MHz crystal frequency

68-88 MHz

Receiver Frequency Range	fx
68.0 - 70.5 MHz	A
70.5 - 72.9 MHz	B
72.9 - 80.8 MHz	A
80.8 - 83.2 MHz	B
83.2 - 88.0 MHz	A

146 - 174 MHz

Receiver Frequency Range	fx
146.0 - 152.5 MHz	A
152.5 - 154.9 MHz	B
154.9 - 162.7 MHz	A
162.7 - 165.1 MHz	B
165.1 - 174.0 MHz	A

420 - 470 MHz

Receiver Frequency Range	fx
420 - 421.5 MHz	B
421.5 - 428.8 MHz	A
428.8 - 431.7 MHz	B
431.7 - 439.1 MHz	A
439.1 - 442.0 MHz	B
442.0 - 449.3 MHz	A
449.3 - 452.2 MHz	B
452.2 - 459.6 MHz	A
459.6 - 462.5 MHz	B
462.5 - 470.0 MHz	A

Crystal Specification

In temperature range -15°C to +60°C: S-98-8.
In temperature range -25°C to +65°C: S-98-12.

Oscillator Frequency Pulling Range

Greater than $\pm 40 \times 10^{-6}$

Available Power Gain

With 10.245 MHz crystal: Greater than 3 dB.
With 11.155 MHz crystal: Greater than 2 dB.

Centre Frequency Variation

At 3 dB attenuation relative to 455 kHz: Less than ± 700 Hz.

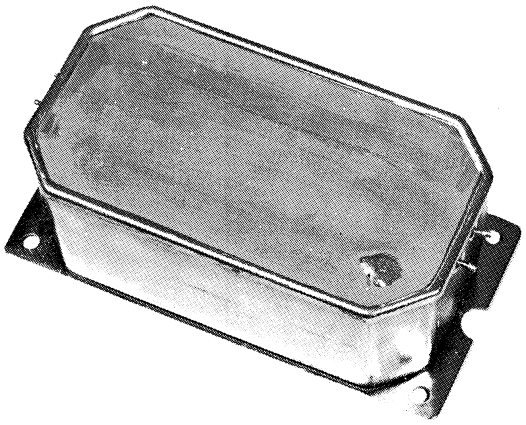
Dimensions

80 x 40 x 29 mm.

37.558-E1

Storno

IF Filters BP601 and BP602



The IF filter is built on a wiring board, and is housed in a hermetically sealed metal box.

The filter is a selective bandpass filter consisting of six resonant circuits capacitively coupled to each other at their high-impedance ends. Its input and output are inductively coupled to the first and last resonant circuits, respectively, and are consequently galvanically separated. The filter is artificially aged after wiring and insertion in the box.

IF filter BP601 is used in equipments with 50 kc/s channel separation.
IF filter BP602 is used in equipments with 20 or 25 kc/s channel separation.

Technical Specifications

Centre Frequency

455 kc/s.

Generator Impedance

3,9 k ohms // 480 pF.

Load Impedance

1 k ohm // 480 pF.

Bandwidth

BP601: At 3dB attenuation relative to 455 kc/s: Greater than ±15 kc/s.
At 45 dB attenuation relative to 455 kc/s: Greater than ±35 kc/s.

BP602: At 3dB attenuation relative to 455 kc/s: Greater than ±8 kc/s.
At 45dB attenuation relative to 455 kc/s: Less than ±20 kc/s.

Insertion Loss

BP601: 2 dB
BP602: 3 dB.

Centre Frequency Variation

At 3 dB attenuation relative to 455 kc/s: Less than ±700 c/s.

Dimensions

80 x 40 x 29 mm.

37.388-E1

Storno

IF Filters BP608, BP609, BP6010, and BP6012

The IF filter is built on a wiring board, and is housed in a hermetically sealed metal box. The filter is a selective bandpass filter consisting of eight resonant circuits capacitively coupled to each other at their high-impedance ends. Its input and output are inductively coupled to the first and last resonant circuits, respectively, and are consequently galvanically separated.
The filter is artificially aged after wiring and insertion in the box.

IF filter BP608 is used in equipments with 50 kHz channel separation.
IF filter BP609 is used in equipments with 25 kHz channel separation.
IF filter BP610 is used in equipments with 20 kHz channel separation.
IF filter BP6012 is used in equipments with 12.5 kHz channel separation.

Technical Specifications

Input Frequency

10.7 MHz.

Output Frequency

455 kHz.

Generator Impedance

3.9 k ohms // 480 pF.

Load Impedance

1 k ohm // 480 pF.

Bandwidth

BP608	At 6 dB attenuation relative to 455 kHz: Greater than ± 15 kHz. At 80 dB attenuation relative to 455 kHz: Less than ± 28 kHz.
BP609	At 6 dB attenuation relative to 455 kHz: Greater than ± 6.5 kHz. At 80 dB attenuation relative to 455 kHz: Less than ± 18.5 kHz.
BP6010	At 6 dB attenuation relative to 455 kHz: Greater than ± 5.7 kHz. At 80 dB attenuation relative to 455 kHz: Less than ± 16 kHz.
BP6012	At 6 dB attenuation relative to 455 kHz: Greater than ± 3.5 kHz. At 65 dB attenuation relative to 455 kHz: Less than ± 8.0 kHz.

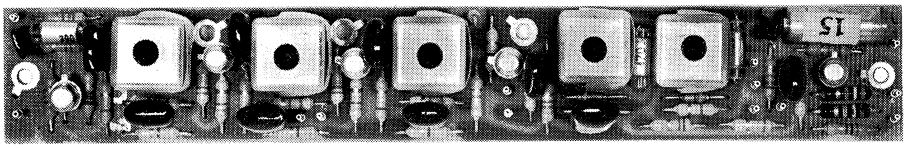
Insertion Loss

BP608	Less than 3 dB
BP609	Less than 7 dB
BP6010	Less than 8 dB
BP6012	Less than 9 dB

37.563-E1

Storno

IF Amplifier IA601



The IF amplifier is built on a wiring board. It consists of the following stages:

Four IF Amplifier Stages
Discriminator
Output Amplifier

The IF amplifier serves the purpose of amplifying and rectifying the low intermediate-frequency signal at 455 kc/s. It also amplifies the audio output delivered by the discriminator.

Mode of Operation

IF Amplifier Stages

From the filter (BP), the low intermediate-frequency signal at 455 kc/s is applied to the IF amplifier unit.
Interstage coupling consists of a single tuned collector circuit capacitively tapped for the base of the transistor of the following stage. The last IF amplifier stage works into the discriminator. The last two amplifier stages operate as voltage limiters.

Discriminator and Output Amplifier

The discriminator is an inductively coupled Foster Seeley discriminator the output circuit of which comprises a voltage divider consisting of resistors R29, R30, and R31. By shifting a strap back and forth between two taps on the voltage divider, the audio output voltage may be altered so that the IF amplifier unit can be used for different channel separations.

The strap marked I in the photograph is used in equipments with 20 or 25 kc/s channel separation.
The strap marked II in the photograph is used in equipments with 50 kc/s channel separation (see also circuit diagram of the IA601 IF amplifier at the back of this manual).

In order to ensure that the discriminator will be loaded lightly, the following audio amplifier stage is an emitter follower using a high-resistance base biasing network.

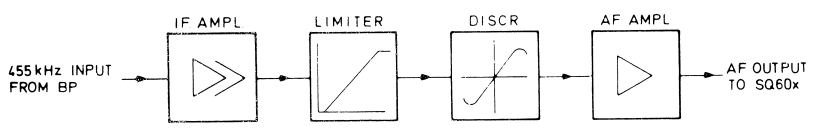
Technical Specifications

Intermediate Frequency

455 kc/s.

Max. Frequency Swing

±15 kc/s or ±5 kc/s/±4 kc/s, depending on strap used.



37.389-E1

Storno

IF Bandwidth

±20 kc/s at 3 dB attenuation.

Generator Impedance

1 k ohm/0.25 mH.

Input Impedance

1 k ohm // 480 pF.

Output Impedance

340 ohms.

Discriminator Bandwidth

Linear to ±20 kc/s.

Discriminator Slope

Measured with instrument with Ri = 1000 ohms: 2.2 μA/kc/s.

Discriminator Centre Frequency Stability

±1 kc/s.

Gain

The gain is determined as the input voltage at which the audio output voltage has dropped 1 dB below max. audio output voltage. Δf = ±10.5 kc/s and fmod = 1000 c/s: 1.6 μV.

Audio Output Level

At fmod = 1000 c/s.
For ΔF = ±2.8 kc/s, strapped for ΔFmax. = ±5 kc/s: 0.9 V.
For ΔF = ±3.5 kc/s, strapped for ΔFmax. = ±5 kc/s: 1.1 V.
For ΔF = ±10.5 kc/s, strapped for ΔFmax. = ±15 kc/s: 1.1 V.

Demodulation Characteristic

Flat: +0/-1 dB.
Deviation relative to 1000 c/s in the range 300 - 3000 c/s. ΔFmax. = 0.2 x ΔFmax. at 1000 c/s.

Distortion

In the range 3000 - 3000 c/s:
For ΔF = ±15 kc/s, strapped for ΔFmax. = ±15 kc/s: 1.4 %.
For ΔF = ±5 kc/s, strapped for ΔFmax. = ±5 kc/s: 1.2 %.

Min. Load Impedance

In the range 300 - 3000 c/s: approx. 2 k ohms.

Current Drain

10 mA.

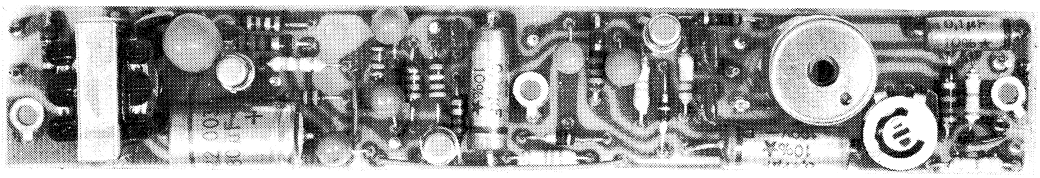
Dimensions

160 x 24 mm.

37.389-E1

Storno

Squelch and Audio Amplifier SQ601



The squelch and audio amplifier unit is built on a wiring board. It consists of the following stages:

Noise Amplifier
Noise Rectifier
Audio Amplifier.

The audio amplifier stage serves the purpose of amplifying the demodulated signal delivered by the discriminator whilst the squelch circuit - in the absence of an incoming signal - amplifies and rectifies the discriminator noise, permitting use of the rectified noise voltage for muting the audio amplifier stage.

Mode of Operation

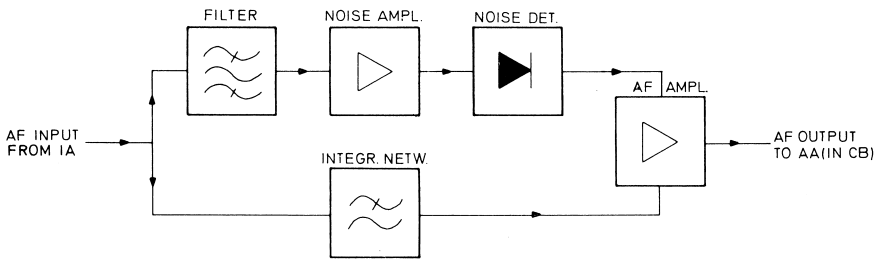
Audio Amplifier

The audio signal from the discriminator in the preceding intermediate frequency amplifier unit, IA, is applied to the audio amplifier stage via an integrating network and a potentiometer.

The integrating network, which in the case of phase modulation consists of resistor R16 and capacitor C12, produces a -6dB/octave frequency characteristic. For frequency modulation, C12 is replaced by a resistor, R18, resulting in a flat frequency characteristic. The following potentiometer, R15, makes it possible to adjust the gain for nominal power output (3dBm). The audio amplifier has transformer output with an output impedance of 600 ohms.

Squelch Circuit

A portion of the noise from the discriminator is filtered in the bandpass filter (L1, C2) and fed to the noise amplifier stage. The transistor of this stage is biased in such a manner that only noise peaks of a certain magnitude can make the transistor conductive. The noise voltage consequently generated in the collector circuit is rectified by a diode and applied to transistor Q2, which operates as a DC amplifier.



37.390-E1

Storno

When a sufficiently high noise voltage is applied to the noise rectifier, the collector-emitter impedance of the DC amplifier will be so low that the base bias for the audio amplifier disappears, thereby muting the latter.

The bias for the noise amplifier, and consequently the squelch sensitivity, can be adjusted with a squelch potentiometer located in the control box.

The resonant frequency of the bandpass filter in the input circuit of the squelch unit can be altered by strapping, permitting use of the filter at channel separations of 20, 25, and 50 kc/s.

NOTE 1 in the photograph of the unit shows the strap for 20 and 25 kc/s.

NOTE 2 in the photograph of the unit shows the strap for 50 kc/s.

Technical Specifications

Input Impedance

In the range 300 - 3000 c/s:
Greater than 3 k ohms.

Output Impedance

At 1000 c/s: 600 ohms.

Nominal Load Impedance

600 ohms.

Audio Output Level

At 1000 c/s and input voltage of 0.6V and R15 in the fully clockwise position: 1.3V.

Frequency Characteristic (PM)

In the range 300 - 3000 c/s relative to 1000 c/s: -6dB/octave +0/-1dB.

Frequency Characteristic (FM)

In the range 300 - 3000 c/s relative to 1000 c/s: Flat ±0 dB.

Distortion

At 3dBm power output and 1000 c/s: 2%.

Output Noise Attenuation

Unsquelched: better than 50 dB
Squelched: better than 70 dB.

Squelch Sensitivity

For $\Delta F = 0.7 \times \Delta F_{max}$. and fmod = 1000 c/s, full unsquelching occurs at:
Min. signal-to-noise ratio in speech channel: 3 dB.
Max. signal-to-noise ratio in speech channel: 23 dB.

Squelch Hang

At max. squelch sensitivity: approx. 0.5 sec.
At min. squelch sensitivity: approx. 0.1 sec.

Channel Separation

50 kc/s or 25/20 kc/s depending on strap.

Delay

Approx. 50 msec.

Current Drain

For unsquelched operation (audio output): 12 mA.
For squelched operation (no audio output): 8.5 mA.

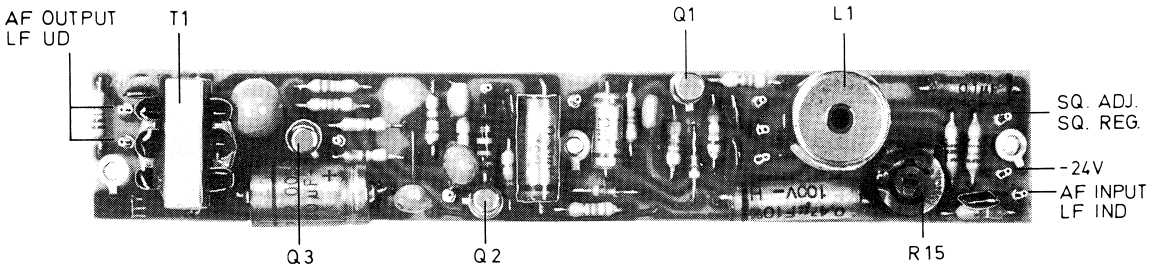
Dimensions

148 x 24 mm.

37.390-E1

Storno

Squelch and Audio Amplifiers SQ602 and SQ603



The squelch and audio amplifier unit is built on a wiring board. It consists of the following stages:

Noise Amplifier
Noise Rectifier
Audio Amplifier

The audio amplifier stage serves the purpose of amplifying the demodulated signal delivered by the discriminator whilst the squelch circuit - in the absence of an incoming signal - amplifies and rectifies the discriminator noise, permitting use of the rectified noise voltage for muting the audio amplifier stage.

Mode of Operation

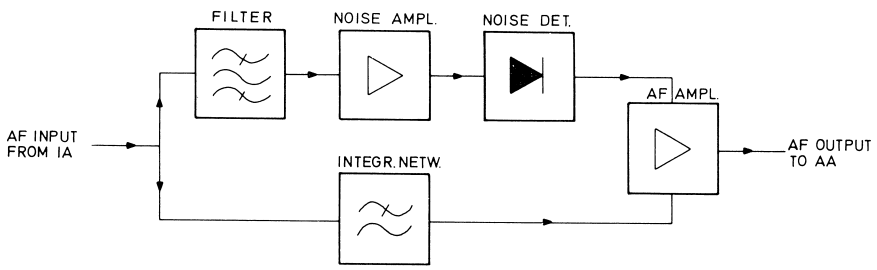
Audio Amplifier

The audio signal from the discriminator in the preceding intermediate frequency amplifier unit, IA, is applied to the audio amplifier stage via an integrating network and a potentiometer.

The integrating network, which in the case of phase modulation consists of resistor R16 and capacitor C12, produces a -6dB/octave frequency characteristic. For frequency modulation, C12 is replaced by a resistor, R18, resulting in a flat frequency characteristic. The following potentiometer, R15, makes it possible to adjust the gain for nominal power output (3dBm). The audio amplifier has transformer output with an output impedance of 600 ohms.

Squelch Circuit

A portion of the noise from the discriminator is filtered in the bandpass filter (L1, C2) and fed to the noise amplifier stage. The transistor of this stage is biased in such a manner that only noise peaks of a certain magnitude can make the transistor conductive. The noise voltage consequently generated in the collector circuit is rectified by a diode and applied to transistor Q2, which operates as a DC amplifier.



37.568-E1

Storno

When a sufficiently high noise voltage is applied to the noise rectifier, the collector-emitter impedance of the DC amplifier will be so low that the base bias for the audio amplifier disappears, thereby muting the latter.

The bias for the noise amplifier, and consequently the squelch sensitivity, can be adjusted with a squelch potentiometer located in the control box.

The resonant frequency of the bandpass filter in the input circuit of the squelch unit can be altered by strapping, permitting use of the filter at channel separations of 12, 5, 20, 25, and 50 kc/s.

(see notes on diagram).

Technical Specifications

Input Impedance

In the range 300 - 3000 c/s:
Greater than 3 k ohms.

Output Impedance

At 1000 c/s: 600 ohms.

Nominal Load Impedance

600 ohms.

Audio Output Level

At 1000 c/s and input voltage of 0.6V and R15 in the fully clockwise position: 1.3V.

Frequency Characteristic (PM)

In the range 300 - 3000 c/s relative to 1000 c/s: -6dB/octave +0/-1dB.

Frequency Characteristic (FM)

In the range 300 - 3000 c/s relative to 1000 c/s: Flat ±0 dB.

Distortion

At 3dBm power output and 1000 c/s: 2%.

Output Noise Attenuation

Unsquelched: better than 50 dB
Squelched: better than 70 dB.

Squelch Sensitivity

For $\Delta F = 0.7 \times \Delta F_{max.}$ and fmod = 1000 c/s, full unsquelching occurs at:
Min. signal-to-noise ratio in speech channel: 3 dB.
Max. signal-to-noise ratio in speech channel: Adjusted to max. 20 dB S/N.

Squelch Hang

At max. squelch sensitivity: approx. 0.5 sec.
At min. squelch sensitivity: approx. 0.1 sec.

Channel Separation

50 kc/s or 25/20 kc/s depending on strap.

Delay

Approx. 50 msec.

Current Drain

For unsquelched operation (audio output): 12 mA.
For squelched operation (no audio output): 8.5 mA.

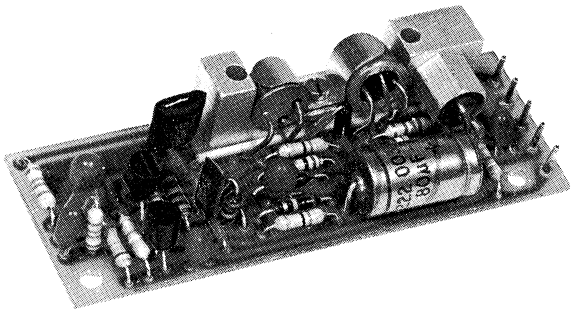
Dimensions

148 x 24 mm.

37.568-E1

Storno

Audio Output Amplifier AA607



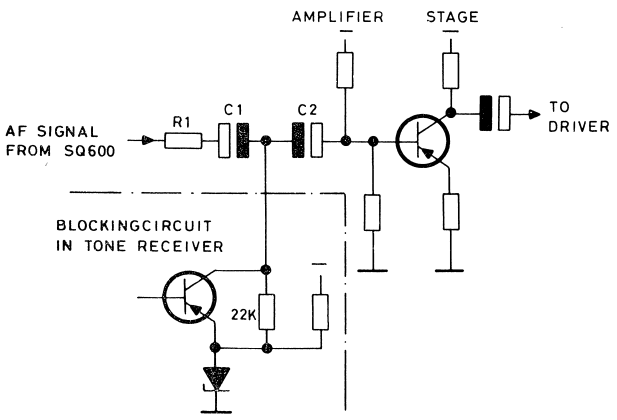
The audio output amplifier is built on a wiring board. It consists of these stages:

Blocking attenuation circuit
Pre-amplifier stage
Driver
Complementary output stage with temperature compensator.

The audio output amplifier is a transformerless push-pull amplifier which is capable of delivering 1 watt of power output.

Mode of Operation

The blocking attenuation network in the input circuit of the audio output amplifier is used only if a selective tone receiver is provided, in which case the attenuation network (a T-network) is made up of the pre-amplifier input impedance, a series resistor, and the output impedance of the tone-receiver blocking circuit; the latter impedance should be less than 1.5 ohms if the desired blocking attenuation is to be achieved (see sketch below).



The signal is fed to the output stage via the pre-amplifier stage and the driver stage, both of which receive negative feedback voltage from the output stage. Temperature compensation of the output stage is accomplished by biasing a double diode connected between the bases of the output transistors. The type of compensation employed is base-emitter voltage compensation. The output stage operates in Class B push-pull in a common-collector circuit. It is transformerless, with a loudspeaker load of approx. 30 ohms.

WARNING Never short-circuit the loudspeaker output (terminals 2 and 4) as this will cause permanent damage to transistors.

Technical Specifications

Supply Voltage
24V ± 5%

Current Drain

At 24V: without signal	10.5 mA
at 1 watt output	110 mA
blocked	10.5 mA

Power Output
Max. 1 watt

Loudspeaker Impedance
30 ohms

Input Impedance
6.5 k ohms

60.125-E1

Storno

Input Sensitivity

For 1 watt into 30 ohms

Better than -9 dBm

Frequency Response

Measuring level 1W (ref. 1000 Hz): 300-3000 Hz

+0.5 dB -2 dB

Distortion

Less than 5%

Hum and Noise

Attenuated 60 dB

Blocking

Earthing the blocking lead through a 1.5-ohm resistor connected at terminals 1 and 4: 50 dB

Dimensions

80 x 28 x 19 mm.

60.125-E1

Storno

Call Indikator ID601

ID601 is a call indicator which is used in the CQP600 to indicate incoming tone calls.

ID601 has remarkably low current drain and is used only in radiotelephones with built-in tone receivers. In radiotelephones which are not so equipped the call indicator has been made inoperative by removal of a strap from terminal board TB601 (see Circuit Diagram D401.263). The unit consists of an astable multivibrator and a lamp.

Mode of Operation

Incoming tone calls cause the multivibrator to receive operating voltage by being connected to chassis via a switching circuit (bistable trigger) in the tone receiver.

Transistor Q2 will then draw current, causing capacitor C2 to charge through resistor R2 and Q2. When the charge across C2 reaches approx. 0.7V, transistor Q1 will draw current. This will cause capacitor C1 to charge via R3 and Q1, and the Q2 base voltage will move towards a higher negative potential, causing the transistor to shut off.

When the voltage across C1 reaches approx. 0.7V, Q2 will again draw current, and the process will repeat itself.

Technical Specifications

Input Voltage

-24V

Current Drain

Lamp on: 38 mA

Lamp off: 2 mA

Turn-on Time

Approx. 0.25 sec.

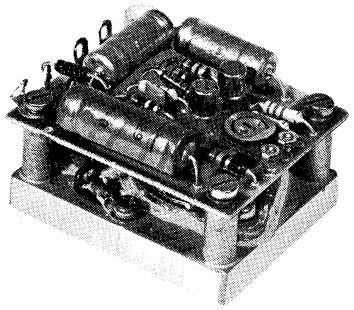
Turn-off Time

Approx. 0.75 sec.

60.130-E1

Storno

Voltage Regulator VR601



VR601 is a voltage regulator unit incorporating an electronic protective circuit. It delivers -24V of stabilized DC at input voltages between 26 and 60V DC.

The voltage regulator is a compact modulator unit consisting of a printed wiring board and a cooling block. In order to ensure adequate dissipation of heat it is important, when installing the unit in the radiotelephone, that positive contact is provided between the cooling block and the chassis plate.

Mode of Operation

Voltage Regulator Circuit

The voltage regulator circuit is a series regulator composed of a voltage amplifier Q3, a current amplifier Q2, and a series transistor, Q1.

The base of amplifier transistor Q3 receives, via potentiometer R8, a portion of the output voltage, which it compares with the reference voltage across the zener diodes E2 and E3 in the emitter circuit of the transistor. The loop consisting of transistors Q3, Q2, and Q1 will oppose any change in output voltage by regulating the voltage across series regulator Q1 at a value that will keep the output voltage constant.

Electronic Protective Circuit

This circuit cuts off the output current in the case of short-circuits or overloads. It operates on the principle of registering the voltage across a zener diode E1, which gives base bias to transistor Q4. If the output voltage of the power supply decreases to about 0 volt, in case of short-circuits, the voltage across zener diode E1 will drop. This will make transistor Q4 saturate, thereby causing Q1 and Q2 to cut off.
This condition is stable even if the fault which caused the protective circuit to function disappears. The circuit is reset by removing the supply voltage and cutting it in again after a few seconds. In order to protect the transmitter-receiver sections against over-voltage in the case of defects in the series regulator, a zener diode across the output of the regulator circuit prevents the voltage from exceeding a certain potential (approx. 30 V).

Technical Specifications

Input Voltage

25.5V to 60.0V at max. 0.8A input current
25.5V to 50.0V at max. 1.4A input current

Output Voltage

-24V ±0.6V

Ripple at Output

15 mV at 1.4A output current
and 1.0V ripple at input

10 mV at 0.25A output current
and 1.0V ripple at input

Output Current

Max. 1.4A

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DC Output Impedance

0.1 Ω

AC Output Impedance

0.5 Ω

Inherent Current Drain

Approx. 6mA at output current = 0A

Short-circuit Current

With short-circuited output terminals, input current is less than 0.2A, measured at 32V input voltage

Start

With short-circuited output terminals, input voltage must be cut off for a few seconds before the electronic protective circuit permits the voltage regulator to be started

Temperature Range

Max. temperature range, measured on the chassis: $-30^{o}C$ to $+85^{o}C$

Protective Circuit Delay

Approx. 10 μsec.

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CHAPTER III. ACCESSORIES

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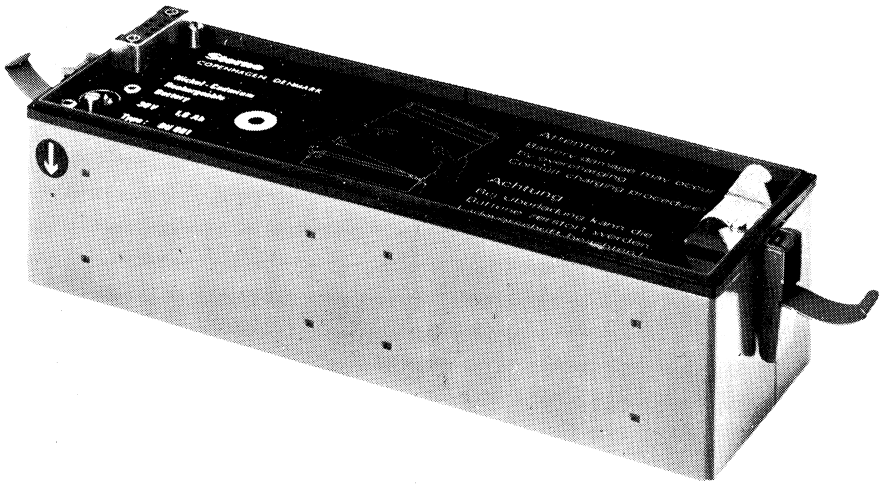
Battery Unit BU601



General

The battery unit contains 24 series-connected gasproof nickel-cadmium accumulator cells. Total capacity is 1.6 ampere-hours.

The battery is intended for operation with a type CQP600 portable radiotelephone.

Construction

The cells and a fuse are housed in a battery case of hard aluminium sheet. The case is closed by a cover plate which carries two connectors, J1 and J2.

J1 is a 7-contact connector. It handles the electrical connections to the radiotelephone. J2 is a 5-contact connector for the connection to an external charger.

The battery unit is secured to the radiotelephone cabinet by means of two snap fasteners. When the mechanical connection is made, a guide mechanism ensures that the pins of a connector in the bottom of the radiotelephone cabinet go axially into battery connector J1, thus providing the electrical connections.

The cells and fuse become accessible by loosening three slotted-head screws and removing the cover plate.

Charging

A fully charged battery can be charged in 14 hours at 160 mA. The battery voltage changes very little during charging. It is approx. 34V after three hours and approx. 35.5V after 14 hours. Overcharging causes a further increase of 0.7V to 36.2V

However, these values depend to some extent on the make of the cells and on temperature, charging current and the age of the battery.

The usual gasification voltage, known from lead-acid batteries with vent holes, does not occur in gasproof Ni-Cd cells. The battery voltage during charging therefore provides no indication of the state of charge, nor does it indicate if the battery is fully charged.

Any check on the state of charge must therefore be based on these two parameters only: Charging current and charging time.

The charging factor is 1.4. This means that the battery should receive 1.4 times the capacity drained from it (charging current x charging time) in order to reach the same state of charge as before discharging was commenced.

Overcharging at 160 mA should not occur for more than 10 hours per charging operation, but

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it is advisable to avoid overcharging and hence unnecessary wear on the battery.

Continuous charging at 60 mA will not damage the battery. A battery which has never been charged or has been out of operation for more than approx. one month must be charged and discharged two or three times before it will reach maximum capacity.

Charging at temperatures below 0°C will not result in full battery capacity. For example, charging a fully discharged battery at 160 mA for 14 hours at -20°C will give the battery only approx. 70% of the capacity it would have obtained at +20°C.

Discharging

The battery will stand continuous discharging at up to 1.6A. A diode shunted across each cell prevents repolarization. This feature prevents permanent damage such as may result if the battery is completely discharged.

Discharging should cease when the battery voltage has dropped to 25V (red scale sector on the battery indicator located on the radiotelephone).

Technical Specifikations

Nominal Voltage
30V

Capacity
1.6 ampere-hours

Cell Type
KR 14/0

Temperature Ranges (Ambient Temperatures)

Storage temperature:	-40°C to +60°C
Discharge temperature:	-25°C to +50°C
Charging temperature:	0°C to +45°C; cell surface temperature must never exceed +60°C during charging.

Number of Cells
24

Dimensions
23.5 x 8 x 6 cm

Weight
2.3 kg

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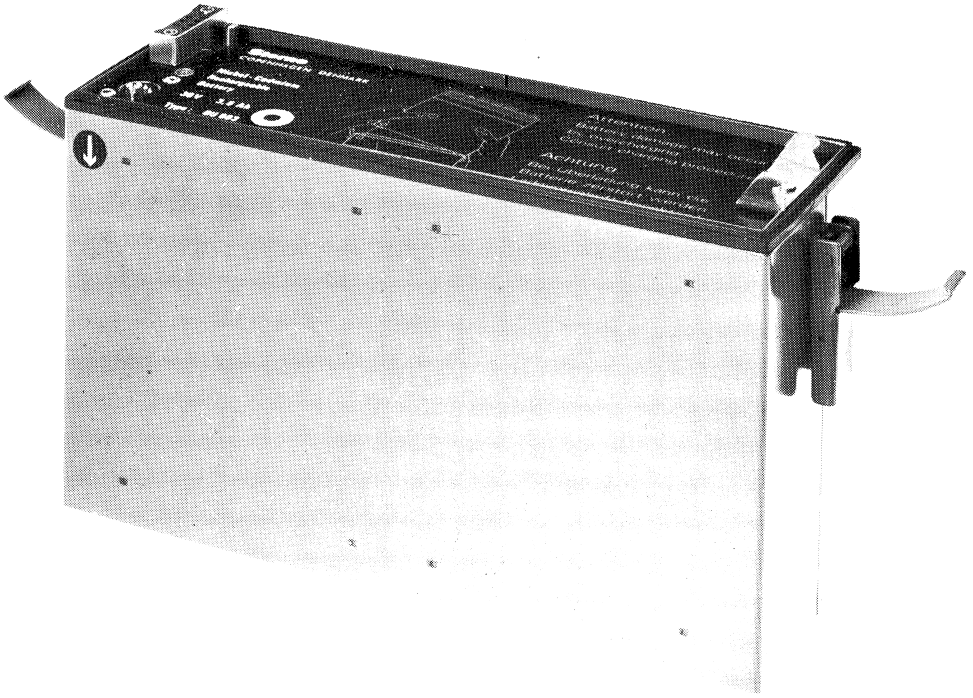
Battery Unit BU603



General

The battery unit contains 24 series-connected gasproof nickel-cadmium accumulator cells. Total capacity is 3.5 ampere-hours.

The battery is intended for operation with a type CQP600 portable radiotelephone.

Construction

The cells and a fuse are housed in a battery case of hard aluminium sheet. The case is closed by a cover plate which carries two connectors, J1 and J2.

J1 is a 7-contact connector. It handles the electrical connections to the radiotelephone. J2 is a 5-contact connector for the connection to an external charger.

The battery unit is secured to the radiotelephone cabinet by means of two snap fasteners. When the mechanical connection is made, a guide mechanism ensures that the pins of a connector in the bottom of the radiotelephone cabinet go axially into battery connector J1, thus providing the electrical connections.

The cells and fuse become accessible by loosening three slotted-head screws and removing the cover plate.

Charging

A fully charged battery can be charged in 14 hours at 350 mA.

The battery voltage changes very little during charging. It is approx. 34V after three hours and approx. 35.5V after 14 hours. Overcharging causes a further increase of 0.7V to 36.2V.

However, these values depend to some extent on the make of the cells and on temperature, charging current and the age of the battery.

The usual gasification voltage, known from lead-acid batteries with vent holes, does not occur in gasproof Ni-Cd cells. The battery voltage during charging therefore provides no indication of the state of charge, nor does it indicate if the battery is fully charged.

Any check on the state of charge must therefore be based on these two parameters only: Charging current and charging time.

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The charging factor is 1.4. This means that the battery should receive 1.4 times the capacity drained from it (charging current x charging time) in order to reach the same state of charge as before discharging was commenced.

Overcharging at 350 mA should not occur for more than 10 hours per charging operation, but it is advisable to avoid overcharging and hence unnecessary wear on the battery.

Continuous charging at 120 mA will not damage the battery. A battery which has never been charged or has been out of operation for more than approx. one month must be charged and discharged two or three times before it will reach maximum capacity.
The battery can only be charged to full capacity within the temperature range +10°C to +30°C. For example, charging a fully discharged battery at 350 mA for 14 hours at +45°C will give the battery only approx. 70% of the capacity it would have obtained at +20°C.

Discharging

The battery will stand continuous charging up to 3.5A. A diode shunted across each cell prevents repolarization. This feature prevents permanent damage such as may result if the battery is completely discharged.

Discharging should cease when the battery voltage has dropped to 25V (red scale sector on the battery indicator located on the radiotelephone).

Technical Specifikations

Nominal Voltage
30V

Capacity
3.5 ampere-hours

Cell Type
KR 20/0

Temperature Ranges (Ambient Temperatures)

Storage temperature:	-40°C to +60°C
Discharge temperature:	-25°C to +50°C
Charging temperature:	10°C to +45°C; cell surface temperature must never exceed +60°C during charging.

Number of Cells
24

Dimensions
23.5 x 8 x 13.5 cm.

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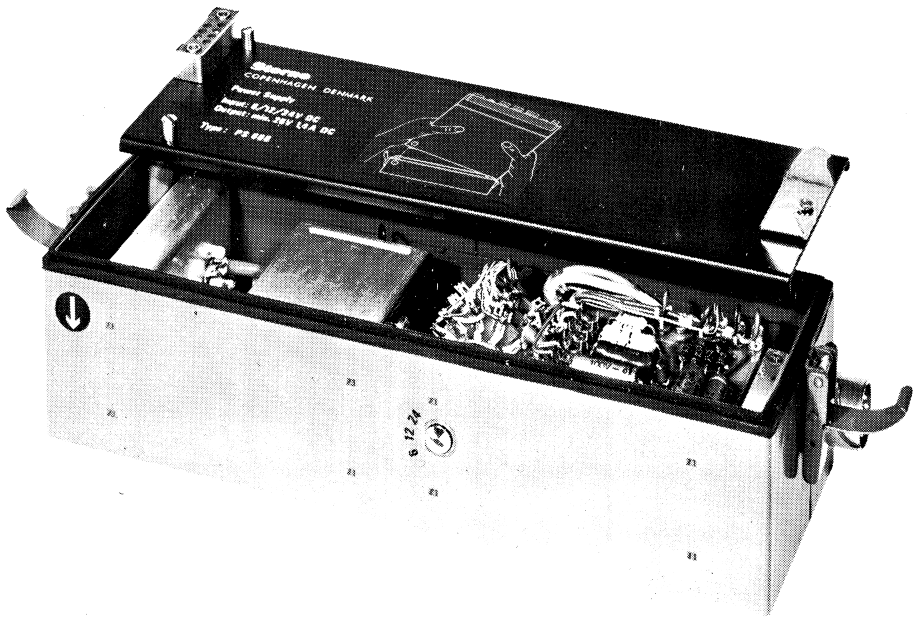
Power Supply Unit PS608



Power Supply Unit PS608 is a DC converter which will deliver 27V of unregulated DC to a type CQP600 portable radiotelephone. A voltage switch allows the power supply unit to be switched for operation from either 6, 12 or 24V DC.

Construction

The power supply is built in a cabinet of hard aluminium sheet. The top of the cabinet is closed by a cover plate which carries a 7-contact connector, J2, which handles the electrical connections to the radiotelephone.

A 7-contact connector on the side of the power supply cabinet takes care of the connections to the battery.

The power supply is secured to the radiotelephone cabinet by means of two snap fasteners. When the mechanical connection is made, a guide mechanism ensures that the pins of a connector in the bottom of the radiotelephone cabinet go axially into battery connector J1, thus providing the electrical connections.

Mode of Operation

The DC converter is a conventional push-pull oscillator with two transistors in a common emitter circuit and the transformer inserted in the collector circuit whilst the feedback windings connect to the bases.

The converter frequency is between 1 and 4 kHz.

The transformer primary is composed of four identical centre-tapped windings which are connected either in series or in parallel depending on the battery voltage. They are in parallel for 6V; for 12V they are partly in series and partly in parallel; for 24V they are in series.

An inductance between the bases of the two transistors is so dimensioned that its core will saturate before that of the transformer. In this way excessive peak currents through the transistors are avoided. The transformer secondary has a main winding with matching taps, and an auxiliary winding (not used). The main winding connects to a bridge rectifier. Normally the connection providing the maximum number of turns is used (see Circuit Diagram D400.950), but in cases where most operation occurs at high battery voltages, switching to a lower turns number is required, and the matching tap marked "19" in the circuit diagram is therefore used. This results in improved efficiency.

A diode, E1, is connected in its back direction across the battery input of the power supply. This diode protects the converter transistors against

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the consequences of incorrect battery voltage polarization. In the case of incorrect polarization the diode will conduct, causing the battery cable fuse to blow. When this happens, the diode should be checked and replaced if necessary.

A strapping arrangement in connector J2 (which plugs into the radiotelephone) allows the power supply unit to be rewired to deliver higher or lower current.

With no strap installed in the connector, the power supply will deliver 300 mA. With a strap installed between pins C and A of the connector the power supply will deliver 1.4A.

The power supply unit is turned on and off by making and breaking the connection to the battery. This function is transferred to the radiotelephone via pins B and F of connector J2.

Technical Specifications

Supply Voltages

Measured at input terminals.

Voltage Switch	Minimum	Nominal	Maximum
"6V"	5.3V	6.3V	7.5V
"12V"	10.6V	12.6V	16.5V
"24V"	21.2V	25.2V	33.0V

Output Voltage

Unregulated, 27V to 55V

Output Load

Receive: max. 0.3A

Transmit: max. 1.4A

Output Voltage Ripple

Receive: Less than 500mVpp

Transmit: Less than 1.5Vpp

Current Drain

Voltage	Idling	Receive 0.3A	Transmit 1.4A
6.3V	0.25A	2.3A	11.5A
12.6V	0.1A	1.2A	4.6A
25.2V	0.06A	0.6A	2.2A

Converter Frequency

1-4 kHz

Temperature Range

Working range: $-25^{o}C$ to $+70^{o}C$

Functional range: $-30^{o}C$ to $+80^{o}C$

Dimensions (Exclusive of Snap Fasteners)

5.7 x 235 x 80 mm

Weight

1.2 kg

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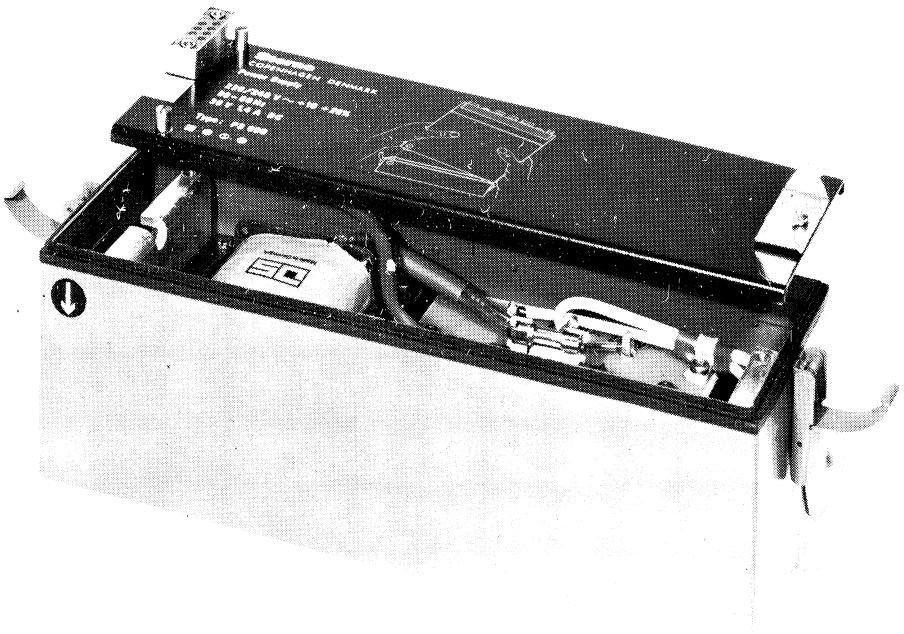
Power Supply Unit PS609



PS609 is a mains-operated power supply which converts 220 or 240V AC to 26-60V DC for operating a type CQP600 radiotelephone. The fairly large output-voltage variations are due to the dependence of the power supply on variations in load and in mains voltage. However, the voltage regulator in the radiotelephone stabilizes the supply voltage to a constant voltage of -24V.

Construction

The power supply is built in a cabinet of hard aluminium sheet. The top of the cabinet is closed by a cover plate which carries a 7-contact connector, J1, for the electrical connections to the radiotelephone.

A 2-contact connector on the side of the cabinet provides the connection to the mains, using the cable provided for the purpose.

The power supply unit is secured to the radiotelephone cabinet by means of two snap fasteners. When the mechanical connection is made, a guide mechanism ensures that the pins of a connector in the bottom of the radiotelephone cabinet go axially into battery connector J1, thus providing the electrical connections.

Mode of Operation

The mains transformer primary has two taps, for 220V and 240V respectively.

A fuse in the secondary circuit protects the rectifier against the consequences of short-circuits across the output. The transformer meets CEE standards, Class II (4kV primary-to-secondary and primary-to-chassis).

The transformer is followed by a bridge-type silicon rectifier and two filter capacitors. Additional smoothing of ripple voltages in the power supply output is provided in voltage regulator VR601 in the radiotelephone.

Technical Specifications

Supply Voltage

220V/240V +10/-20%, 50-60 Hz

Current Drain

Approx. 0.34A at max. output current of 1.4A

Output Voltage

Min. voltage at 1.4A output current and 176V supply voltage: 26V

Max. voltage at 0.3A output current and 242V supply voltage: 60V

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Ripple at Output

Max. 3.0Vpp

Output Current

Max. 1.4A

Typical Duty Periods

4 min. at 0.3A output current

2 min. at 1.4A output current

Temperature range (Ambient Temperature)

Working range: -25°C to +50°C

Functional range: -30°C to +60°C

Loss

Approx. 15W at 242V supply voltage and 1.4A output current

Dimensions

235 x 80 x 72 mm

Weight

2 kg

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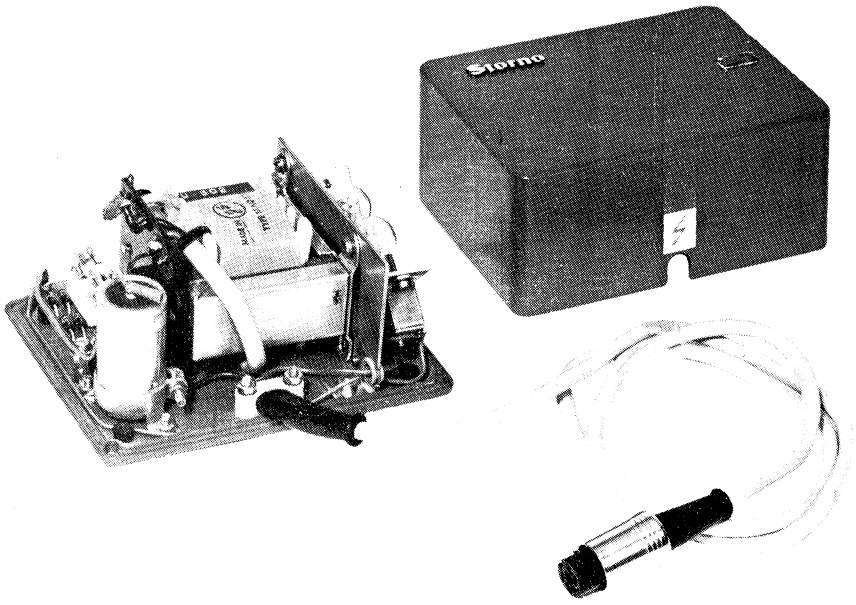
Battery Charger CU602



CU602 is a mains-operated unit for charging a type BU601 or BU603 nickel-cadmium battery.

The CU602 battery charger is housed in a pressure diecast light-alloy cabinet. It has a fixed-mounted mains lead with a 2-pin plug for 220V ac and a battery lead terminated in a 5-contact female connector which plugs into the charging connector on the battery.

The underside of the cabinet carries a type plate with approval marking. The CU602 charger must only be used indoors and only in rooms where there is no risk of splashing.

Mode of Operation

The battery charger consists of a mains transformer and a rectifier.

The transformer secondary connects via a fuse to a bridge rectifier. The rectified voltage is filtered by a capacitor, C1, and fed through a charging resistor to terminals 2 and 3 of charging connector J1.

Two lamps, V1 and V2, in series with charging resistor R1 are visible from outside through a red glass on the top side of the cabinet.

The lamps serve both as positive-temperature-coefficient charging resistors and as an indicator which shows light when the battery connected to the unit draws charging current.

Note: The lamps provide no indication of the state of charge.

Technical Specifications

Supply Voltage
220V ± 20% AC, 50 Hz

Power Consumption
At 220V: Approx. 17 VA

Output Current
At 220V: Approx. 150 mA

Temperature Range
Determined by the temperature ranges specified for charging the batteries.
Working range: +10°C to +30°C
Functional range: 0°C to +45°C

Dimensions
119 x 95 x 63 mm

Weight
1.1 kg

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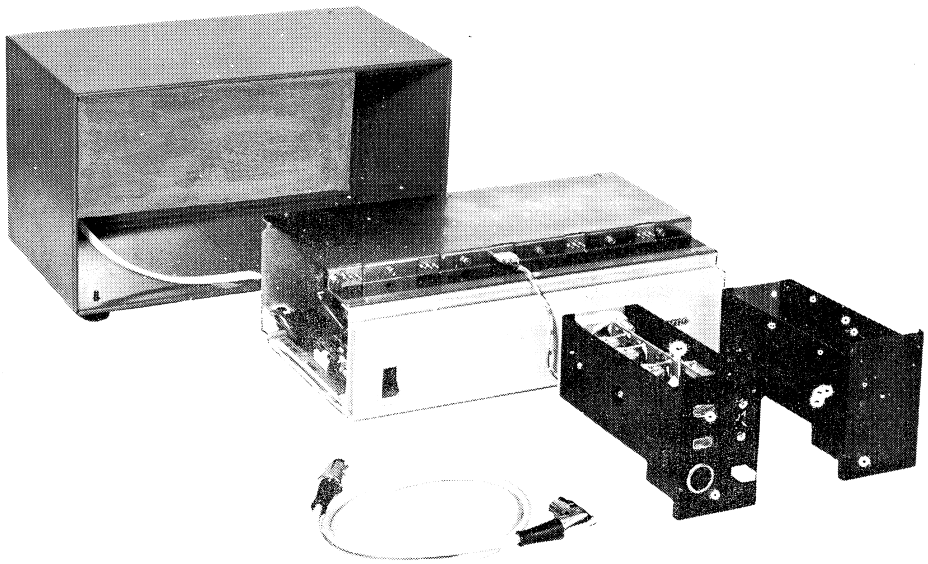
Battery Charger CU603



General

CU603 is a semi-automatic mains-operated unit which will charge a maximum of five type BU601 or BU603 nickel-cadmium batteries simultaneously.

The CU603 charger has built-in time programming and therefore automatically keeps a check on charging time. If the counter is set to the number of hours the battery has been in use, the battery will receive the correct charge. The charger consists of a type PS6011 power supply unit and a maximum of five type CR601 battery outlets - or current regulators. If the charger is equipped with less than five battery outlets, dummy chassis units will be installed in the remaining battery-outlet places.

Operation

To switch on the charger, operate the on/off switch located near the bottom left corner of the front panel. A neon lamp behind the switch will glow to indicate that the charger receives supply voltage.

Set the counter to 0 by pressing the white button of the battery outlet. Connect the battery to the outlet by means of a cable. The counter will jump to 9, and the red lamp comes on to indicate that charging has commenced. Constant current will now be fed through the battery for approx. 14 hours. The counter will step one unit backwards every 90 minutes. When the battery is fully charged, the counter will again be at zero and the green lamp will show light instead of the red one. After completion of the charging process the battery will continue to receive weak charging current, and this amount of current will not damage the battery even if charging is continued indefinitely. If a charging time shorter than 14 hours is desired, the counter should be set forward, using the white push-button, to the figure which, multiplied by 1.5, gives the desired charging time.

The purpose of having the counter jump from 0 to 9 when connecting a battery to it is to provide the user with a guarantee that every battery connected to an outlet with green lamp indication and zero counter readout has been through the

charging procedure. Whether a type BU601 or a type BU603 battery is connected to it, a battery outlet will automatically provide the charging current required for the battery in question.

Technical Specifications

Supply Voltage
220/240V +10/-20%, 50-60 Hz

Current Drain
At 220V, with five BU603 batteries (of 3.5 Ah each): Approx. 0.6A (measured with AVO-meter)

Current Output
With type BU601 battery (1.6 Ah): 160mA ±10%
With type BU603 battery (3.5 Ah): 350mA ±10%

Charging Time
Max. 13.5 hours

Temperature Range
Determined by the temperature ranges prescribed for charging of batteries
Working range: +10°C to +30°C
Functional range: 0°C to +45°C

Dimensions
28 x 157 x 157 mm.

MODE OF OPERATION

Power Supply PS6011

Power supply PS6011 is used in charger CU603, in which it steps down the mains supply voltage and rectifies it to provide approx. 60V of unstabilized DC, which is fed to the type CR601 current regulators of the charger. The power supply section incorporates a timer consisting of a motor with a gear drive which controls five switches which in their turn control the current regulator counter relays.

The power supply and timer unit are located in the lower portion of the charger cabinet.

The power supply is of the conventional type, consisting of a transformer, rectifier, and reservoir capacitor.

Taps on the transformer primary permit switching to 240V mains voltage. The front panel carries an on/off switch and a neon lamp which shows light when mains voltage is applied to the power supply.

Both the neon lamp and the timer motor are permanently connected to the 220V tap on the transformer and therefore receive the same voltage regardless of whether the PS6011 is operated from 220V or from 240V.

The bridge rectifier uses four separate diodes which are shunted by resistors in order to secure even distribution of reverse voltage across the diodes. The timer as mentioned above consists of a motor with a gear mechanism which controls five fibre cam wheels. Each wheel completes a revolution every 90 minutes, inside which time it closes and opens a microswitch which controls a counter relay in the current regulator unit.

A mains lead with a plug is permanently connected to the power supply unit, and switching between 220V and 240V supply voltage is performed by shifting one of the conductors in the connection block.

Adjacent to the block are two fuses one of which is in series with the transformer primary whilst the other one is in series with the timer motor. The electrical components of the PS6011 become accessible on removing all current regulator units from the charger cabinet and unscrewing the four rubber feet from the cabinet bottom plate. Thereafter lift the power supply chassis slightly up and pull it out.

Technical Specifications, PS6011

Output Voltage
At output current of 1.8A: Approx. 64V DC, ripple approx. 2Vpp.
No-load voltage: Approx. 70V DC

Type of Service
Continuous

Temperature Range
Working range: 0°C to +45°C
Functional range: -10°C to +55°C

For additional data see technical specifications for CU603.

Current Regulator Unit CR601

CR601 is a current regulator which is used in charger CU603. It is the unit through which a type BU601 1.6 Ah or BU603 3.5 Ah battery unit

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is connected to the CU603. The CR601 current regulator unit incorporates a transistorized current regulator, a counter relay and two pilot lamps - a red charging indicator lamp to show whether the battery connected to the unit is being charged, and a green "ready" lamp which comes on when the battery is ready for use.

The battery connects to the current regulator unit through a multi-conductor cable which has a 5-contact connector at either end.

Because the two battery types, BU601 and BU603, require different values of charging current, an automatic switching system is provided. The required value of charging current is determined by a strap in the BU603 battery unit charging connector. The strap causes the BU603 to receive a high value of charging current (350 mA) whereas battery unit BU601, which has no strap in its connector, receives a lower value of charging current (160 mA).

Circuit Analysis

In principle, the current regulator acts like a resistance in series with the charging current through the battery. This resistance varies automatically with the current so that an incipient current increase will cause the resistance value to increase, thus limiting the current and keeping it to a fixed level.

The variable resistance is based on the transistor combination Q1-Q2, actually a Darlington circuit. This circuit may be compared with a single transistor whose current gain is the product of the current gains of the two transistors. R5, R6 and R7 are constant reference resistors. By short-circuiting terminals 1 and 2 of the output connector, resistor R6 may be connected in parallel with R5 and R17. This short-circuit is always present in the charging connnector of battery unit BU603. If the current flowing through these resistors varies, the voltage drop across them will vary linearly with the current variation. The resulting voltage variation is subjected to phase reversal in transistor Q3, whose collector voltage is applied to the bases of Q2 and Q1. R4 is the operating resistance of Q3. The collector of Q2 connects to a zener stabilized voltage of 40V. This increases the current stability against mains voltage variations and ensures that Q2 - in the case of a short-circuit across the output - will never receive a collector-emitter voltage that is higher than the difference between -40V and the voltage drop from the base of Q1 to the battery plus terminal.

Such a short-circuit will exist for a certain time if the battery connected to the unit has been discharged to 0V.

Diodes E2 and E3 prevent the battery from forcing a reverse current through the circuit with the battery connected and the PS6011 power supply switched off.

Temperature stabilization of the unit is accomplished by means of thermal feedback. NTC resistor R19 senses the temperature around the circuit board, and its ohmic temperature dependence will influence the base voltage of Q3, thus ensuring temperature-stable charging current.

When the charging cable is plugged into the multiwire connector of the current regulator, terminals 4 and 5 will be short-circuited together.

Electrolytic capacitor C2 will for a short time force a flow of current through the counter relay (ReA), causing it to jump a step forward. Relay contacts (a), which are open when the relay is at 0, will close, with the result that the green lamp extinguishes and the red lamp comes on.

A special circuit prevents the counter relay from jumping forward when voltage from PS6011 is removed and applied.

Transistor Q4, shunted directly across the counter relay coil, short-circuits the coil for a brief period, determined by time-constant network C3, R15. This prevents the charging process from starting up in the event of a brief mains-voltage drop-out.

Activation of the counter relay via the timer unit occurs by connecting and disconnecting the two leads which connect the timer unit to CR601 through pins 1 and 3 of PS6011. With the timer leads disconnected, capacitor C1 will be charged to a constant voltage. When the timer leads are connected, the voltage across C1 will discharge

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through the counter relay. C1 will remain connected across the relay coil for approx. 10 minutes, whereupon the timer contacts will break again. They remain open for approx. one and a half hour, during which period C1 will again charge through R9.

Diode E5 prevents current from flowing in the opposite direction through the counter relay and C1 while the timer leads are connected. Diode E6 serves the purpose of discharging C1 through the red lamp when the counter goes to 0 and its contacts (a) break. In this way the timer is prevented from making the counter pass over the 0 position.

When contacts (a) break, the current can only flow through the green lamp, causing it to show light. The voltage drop across the lamp is so high that transistor Q1 will be driven out of its control range and hence act as a fixed resistor, with the result that the current will not remain constant should the mains voltage vary. However, this is of no importance in practice as the current which is thereafter to flow is merely a low trickle charging current.

Technical Specifications, CR601

Supply Voltage

+48V to +80V DC

Output Current for Battery

3.5 Ah battery (BU603): 350 mA ± 10%

1.6 Ah battery (BU601): 160 mA ± 10%

With counter in 0 position: Approx. 50 mA

Output Voltage for Battery

Min.: 0V

Max.: 34V

Charging Time

0-13.5 hours.

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CHAPTER IV. SETTING UP THE RADIOTELEPHONE AND PREPARING IT FOR USE

A. Portable Operation

Accessories

Portable operation of the CQP600 requires the following accessories:

Loudspeaker-microphone type LM601.

Battery unit type BU601 or BU603.

Antenna (type depends on frequency band in use).

Also required if the CQP600 is to be carried in a sling across the shoulder:

Sling with provision for carrying the loud-speaker-microphone, Storno No. 49.0157.

Optional extra:
Leather carrying bag, Storno No. 49.0158.

Loudspeaker-microphone

The loudspeaker-microphone plugs into the front-panel multi-way connector marked ○/▯

The loudspeaker microphone clips on to a hang-up bracket on the left side of the radiotelephone cabinet.

If the radiotelephone is equipped with a sling, the loudspeaker-microphone may also be carried from a mounting on the sling.

Battery Unit

The BU601 or BU603 battery unit is secured to the bottom of the radiotelephone cabinet as shown in Fig. 1.

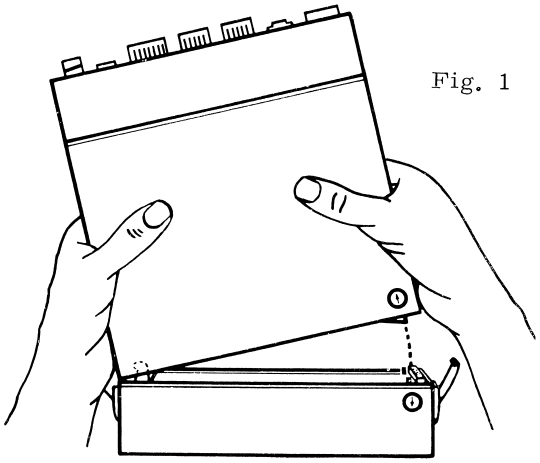


Fig. 1

Antennas

Type	Frequency Band	Description
AN611L	146-158 MHz	1/4 λ tape antenna
AN611H	158-174 MHz	1/4 λ tape antenna
AN631L	68-75 MHz	1/4 λ tape antenna
AN631M	75-82 MHz	1/4 λ tape antenna
AN631H	82-88 MHz	1/4 λ tape antenna
AN661	420-470 MHz	1/4 λ whip antenna

The antenna plugs into the connector on the front panel. When operating the radiotelephone during transport, the user should take care that the antenna does not touch his body or clothes.

Fitting the Sling

The sling has two snap fasteners with which it can be secured to the radiotelephone cabinet.

Before the sling can be fitted, two threaded nylon pins in the sides of the cabinet must be unscrewed and replaced with two locking pins which are supplied with the radiotelephone; see Fig. 2.

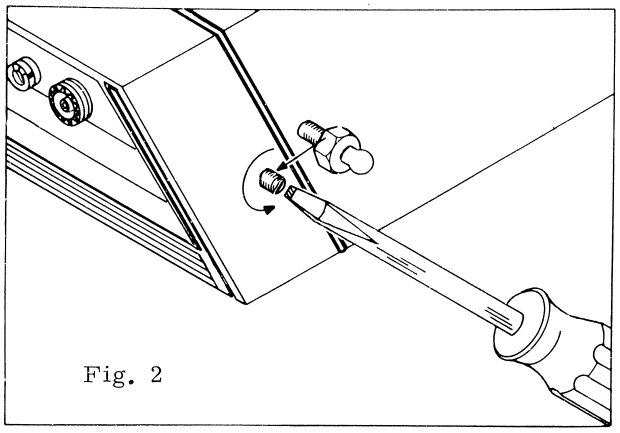


Fig. 2

To remove the sling, open the snap fasteners by pulling their spring-actuated finger grips.

The sling has a buckle to permit adjustment of its length, and a mounting to which the loud-speaker-microphone may be fastened.

B. Mobile Operation

The following accessories are required for installation of the CQP600 as a mobile unit:

Loudspeaker-microphone type LM601.

Power supply type PS608 (battery unit BU601 or BU603 if required).

Installation kit type CC601 (required only in conjunction with PS608).

Mounting cradle with hang-up bracket for loudspeaker-microphone, Storno No. 37.0130.

Mobile antenna with antenna cable and antenna connector.

Before beginning to install the radiotelephone in the vehicle, its siting and cabling should be planned with the following points in mind:

- Maximum ease of operation compatible with maximum security while driving.
- Easy servicing.
- Cables should be run far from moving, moist and hot parts. External cabling should be avoided.

The following sketch (Fig. 4) shows an example of installation of a CQP600 radiotelephone in a passenger car.

Installation of the Radiotelephone Cabinet

The following points should be kept in mind when siting the radiotelephone in the vehicle:

In passenger cars, under-dashboard mounting beside the driver is usually to be preferred.

In vans, lorries and bulldozers etc. it may be found better to install the radiotelephone vertically beside the driver's seat.

The radiotelephone is mounted in a cradle which can be mounted in any desired position.

The cradle is 27.5 cm deep by 28.5 cm wide by 9.5 cm high (overall). Countersunk holes on its top and back enable it to be secured to either plane or curved surfaces, using the self-tapping screws which are supplied.

The cradle has a double bottom which reduces its inside depth by 2 cm.

With the double bottom mounted in the cradle, the radiotelephone cabinet with a PS608 power supply - or BU601 battery unit - mounted in place will extend 2 cm from the front of the cradle.

The double bottom can be taken out after removing four screws from the back of the cradle. The radiotelephone cabinet will then be flush with the front of the cradle.

To place the radiotelephone in the mounted cradle, first loosen the two clasp nuts on the sides of the cradle by rotating them in the direction away from the cradle as indicated in Fig. 3

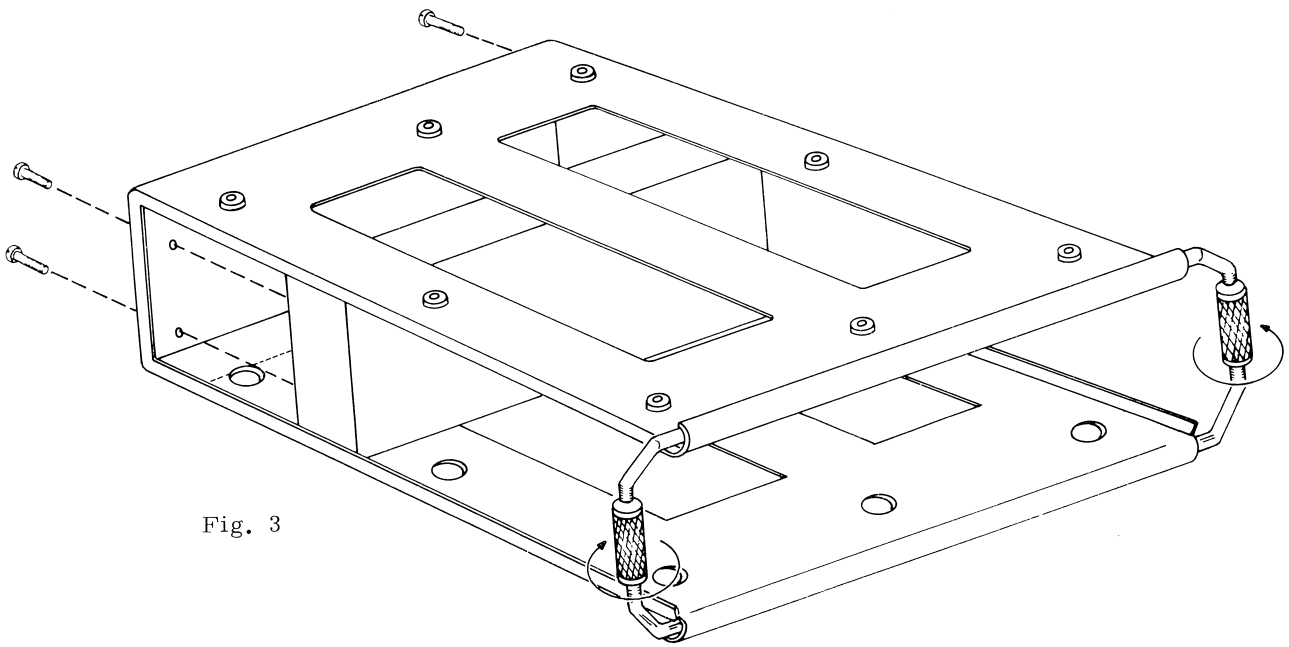
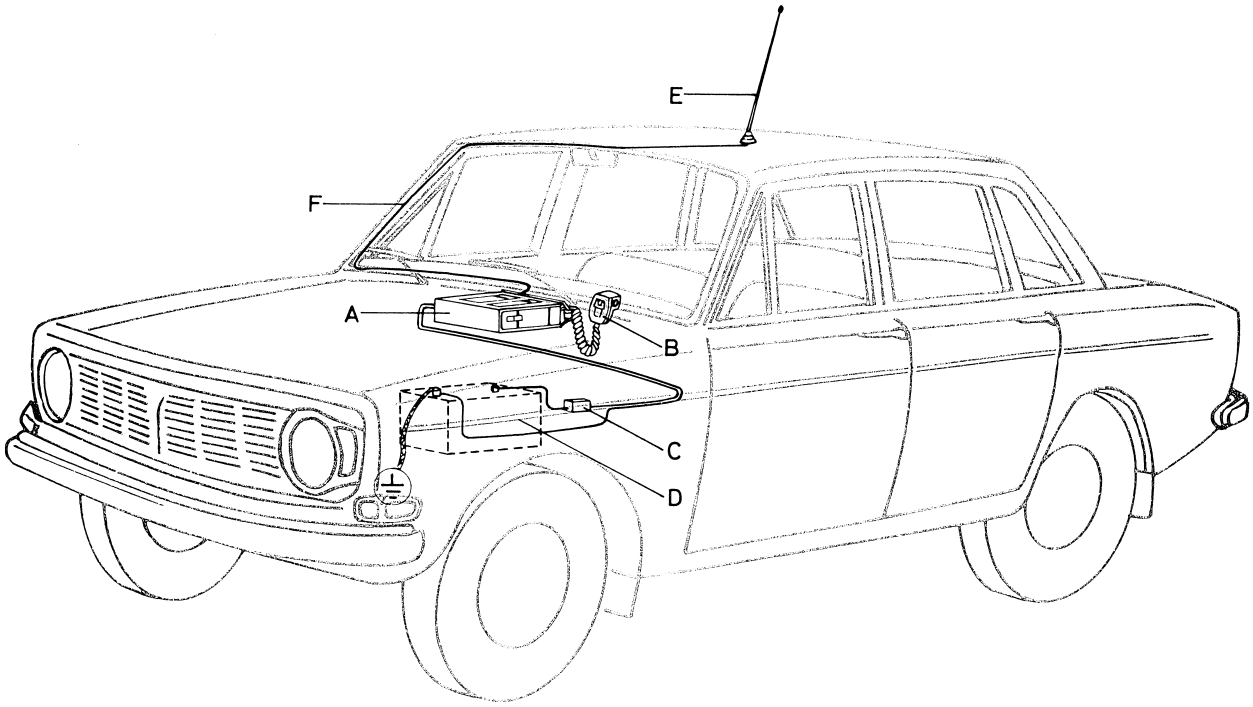


Fig. 3

Chapter IV. Setting up the Radiotelephone.



A. Cradle with radiotelephone cabinet.

B. Loudspeaker-microphone LM601.

C. Battery cable with fuse holder.

D. Battery.

E. Antenna.

F. Antenna cable.

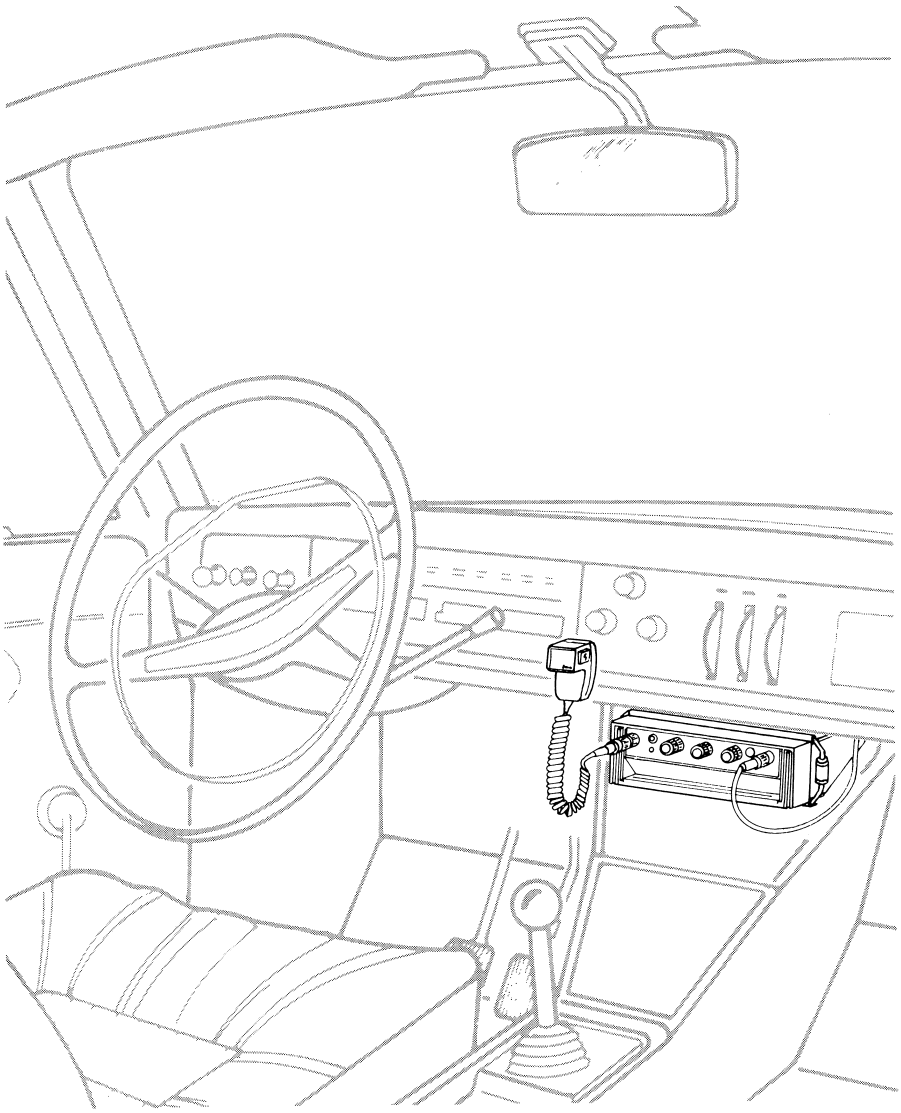


Fig. 4

The radiotelephone with the power supply or battery unit mounted in place may thereafter be placed in the cradle and secured by means of the clasp nuts.

The LM601 loudspeaker-microphone should be placed in the immediate vicinity of the radiotelephone, using the mounting bracket which is supplied, in a place where it is easily accessible to the driver, for instance on the dashboard.

Mounting the Battery Cable

If the radiotelephone is to be operated in conjunction with the PS608 power supply unit, the latter should be connected to the vehicle battery by means of a type CC601 accessories kit comprising:

One 7-way connector (female) with end piece.

Fuse holder with plate.

Fuses, one 8 amp. and one 16 amp.

8-metre length of 2-conductor cable, PVC 2 x 4 mm^2.

Cable shoes.

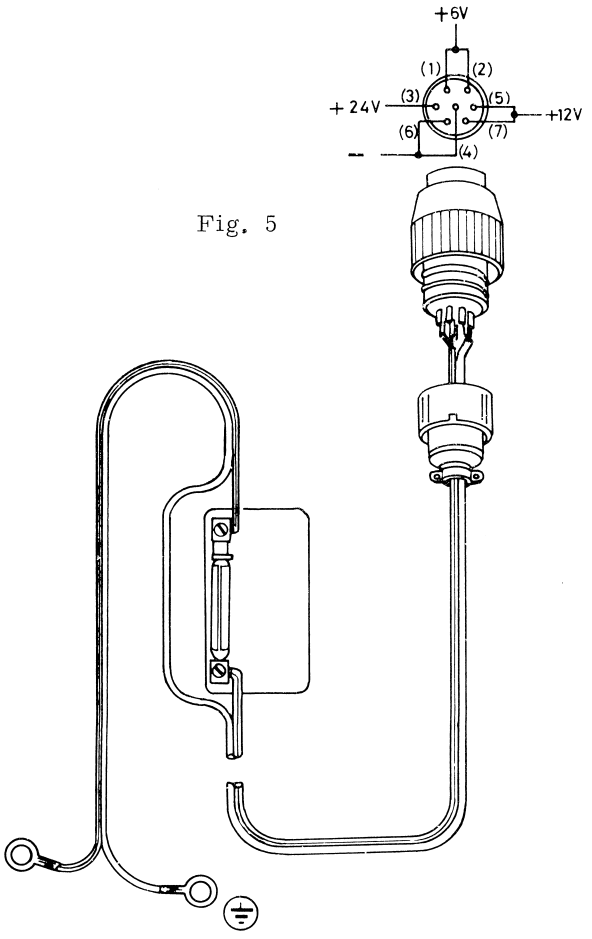


Fig. 5

Before installing the battery cable, set the voltage change-over switch on the power supply unit to the battery voltage to be employed.

Fit the 7-way connector which plugs into the power supply unit to the battery cable as shown in Fig. 5.

The battery cable conductor which is marked with a black line should serve as the live wire (to be connected to that battery potential which floats relative to the vehicle earth).

Solder the battery minus conductor to connector terminals 4 and 6.

Connect the battery plus conductor as specified below:

For 6 volts: to terminals 1 and 2.
For 12 volts: to terminals 5 and 7.
For 24 volts: to terminal 3.

Run the cable from the power supply unit to the vehicle battery and cut it to the required length.

For 6-volt installations, the cable type supplied may be used in lengths not greater than 8 metres. Greater lengths require the use of cable of proportionately heavier cross section.

Install the fuse holder in the live wire near the battery connection and insert a fuse whose rating is in accordance with the current drain of the radiotelephone at the battery voltage to be employed.

For 6 volts use a 16 amp. fuse (Storno No. 92.5067).

For 12 and 24 volts use an 8 amp. fuse (Storno No. 92.5097).

The plate which indicates fuse ratings for various battery voltages (supplied with the radiotelephone) should be attached to the lid of the fuse holder.

Lastly fit cable shoes to the battery cable and connect it directly to the battery terminals so that the conductor marked with a black line goes to the floating potential of the battery.

Installing the Antenna

The following parts are required for installing the antenna:

One coaxial connector PL259 (Storno No. 41.5113).
One adaptor UG175/U (Storno No. 41.5127).
Coaxial cable, 50 Ω, type RG-58C/U (Storno No. 075.5013).
Antenna with base (type depends on frequency band employed).

Storno offers the following types of antennas for mobile installations:

Type	Frequency Band	Description
AN19-5	146-174 MHz	1/4 λ whip
AN39-5	68-88 MHz	1/4 λ whip
AN69-3	420-470 MHz	1/4 λ whip
AN69-4	420-470 MHz	5/8 λ whip

The antennas listed here - except the AN69-3, which is already cut to frequency as supplied from Storno - should be cut to the radiotelephone's mean frequency, to be calculated as the average of its transmitting frequencies.

Placing the Antenna

The antenna should be placed as high and as much in the clear as possible. This will ensure best matching and radiation.

On a vehicle, the roof must be considered the best place for the antenna. If the roof is not of metal, a piece of aluminium foil, 1 m^2 in size, should be glued to the roof below the antenna provided that the vehicle fittings make this possible. On passenger cars, the boot cover is an alternative place for the antenna although this will impair its efficiency and introduce unfavourable directivity. Hence the latter solution should be chosen only if these factors are of secondary importance - that is, where maximum operating range is not a significant consideration.

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

Cutting Antennas to Length

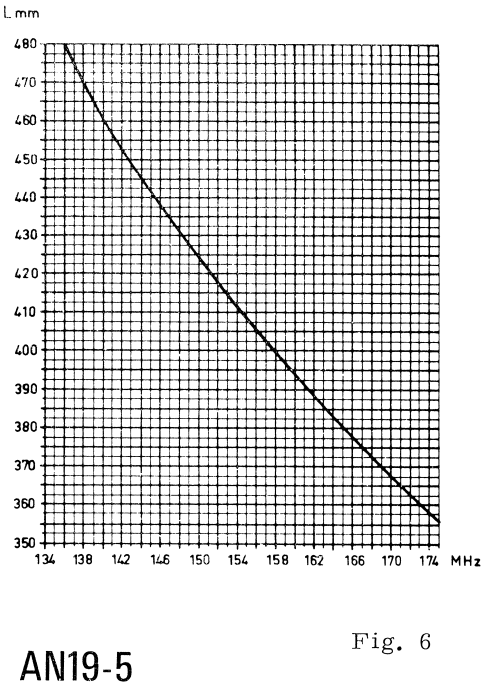


Fig. 6

AN19-5

Whip AN19-5 should be cut to 1/4 wavelength at the mean frequency (average of the transmitting frequencies). Antenna length can be taken from Fig. 6.

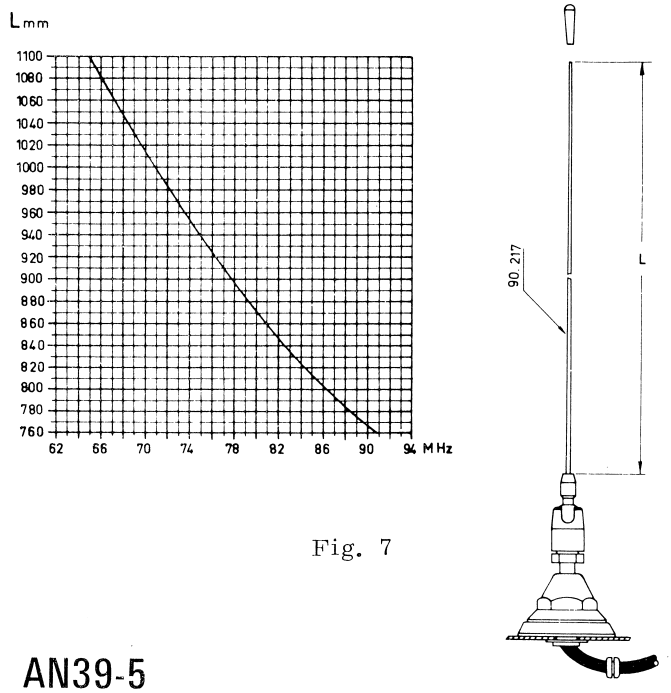


Fig. 7

AN39-5

Whip AN39-5 should be cut to 1/4 wavelength at the mean frequency (average of the transmitting frequencies). Antenna length can be taken from Fig. 7.

AN69-3

Whip AN69-3 is factory pre-cut to 1/4 wavelength. Its standing-wave ratio at various frequencies in the 450 MHz band appears from Fig. 8.

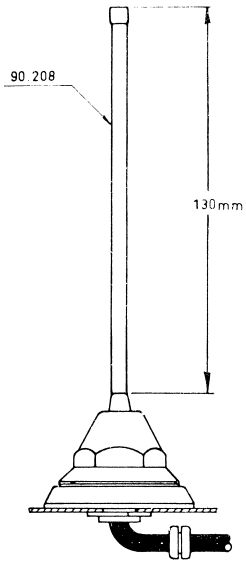
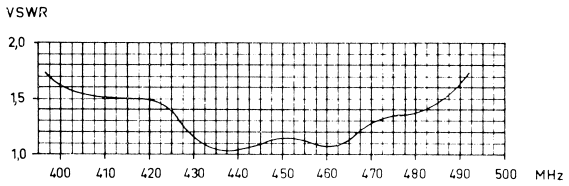


Fig. 8



AN 69-4

Whip AN69-4 should be cut to 5/8 wavelength at the mean frequency (average of the transmitting frequencies). Antenna length can be taken from Fig. 9.

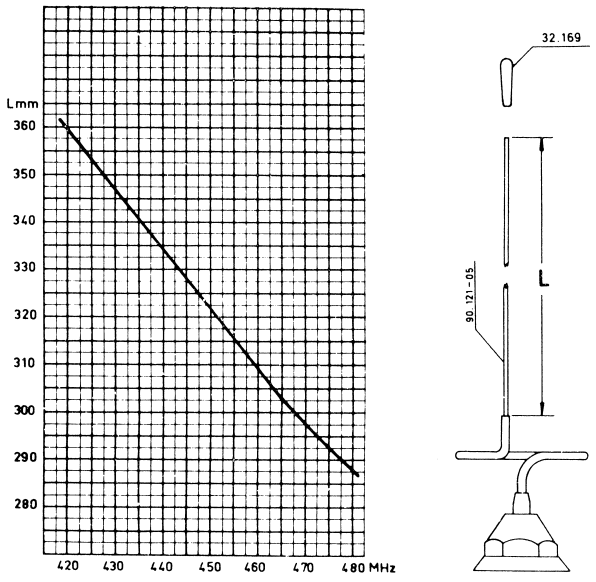


Fig. 9

Mounting the Antenna Base

The antenna base consists of a connector, which is to be fitted to the antenna cable, and a top section which provides the connection between the antenna and the connector.

The connector may be fitted to the antenna cable in two ways, either by means of a crimping tool (ERMA 29010) and tube (29271), or by conventional soldering.

Procedure (see Fig. 10)

Strip the coaxial cable as shown, taking care not to damage the strands of the centre conductor and braiding.

Slide the grommet (No. 32.5033-00), sleeve (No. 31.046-00) and crimping tube (No. 31.0347-00) over the cable, in the order shown.

Fit the collar (No. 31.0344-00) between the cable braiding and the centre conductor insulation and thereafter place the insulating washer (No. 12.0114-00) and collar (31.0345-00) as shown. Lastly secure the antenna base connector to the cable, using either a crimping tool to squeeze the crimping tube firmly around the cable braiding and squeeze the collar (No. 31.0345-00) firmly around the cable centre conductor, or soldering.

Both methods are illustrated in the sketch.

Drill a hole, 13.5 - 14.0 mm (17/32") in diameter, at the point selected for mounting the antenna (see Fig. 11). Bring the free cable end forward (between the roof and the head lining, if any) to the transmitter/receiver unit. Lower the antenna base connector halfway down the hole so that the grommet and sleeve are below roof surface level and thread the spiral washer (No. 29.0170-00) through the hole.

Lift the connector into position in the hole. Fit a washer (No. 29.0146-00) on the outside and secure with a nut (No. 29.0145-00).

Two versions of the antenna base top section are available. One of them is used with antennas AN69-3 and AN69-4. The other version is equipped with a ball joint and is used with antennas AN19-5 and AN39-5.

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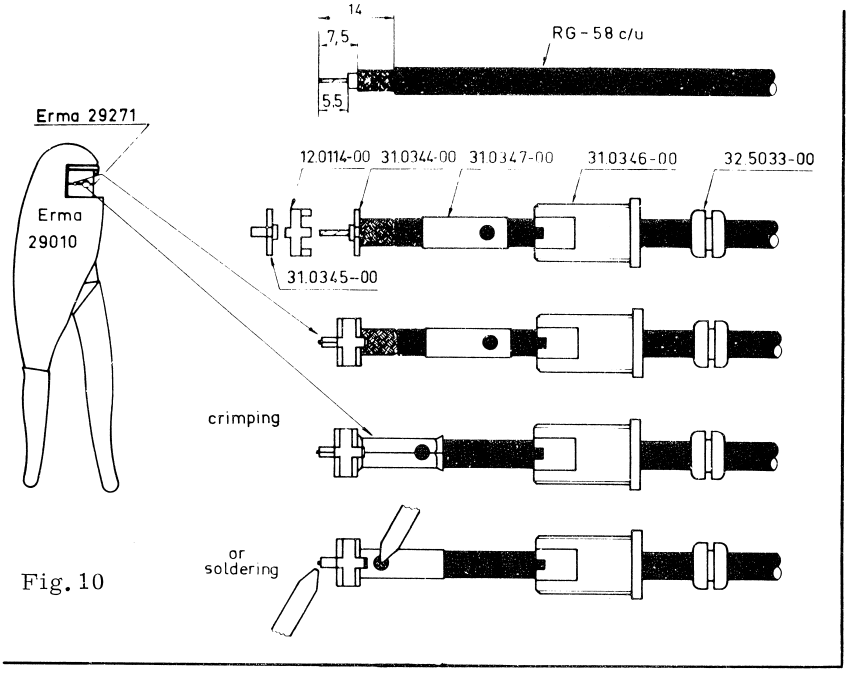


Fig. 10

Fig. 11

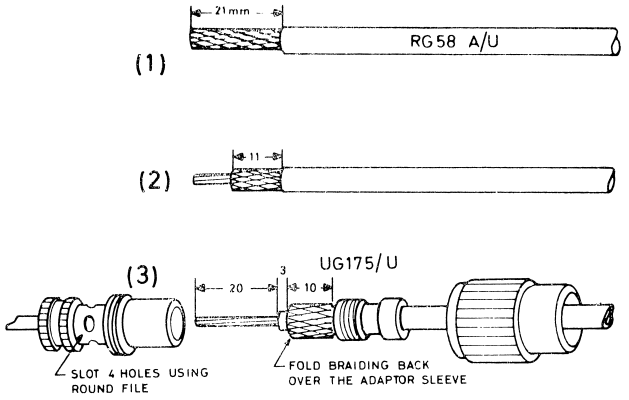
Temporarily mount the two top sections in the same place by placing a ring washer (No. 32.0362-00) between the mounting surface and the top section. Thereafter screw the top section and antenna on to the antenna base connector.
In the antenna base of AN69-3 and AN69-4 place a number of packing rings (No. 32.5042-00) between the top section and the connector section.

Use two packing rings if the roof thickness is between 1.6 and 2.6 mm.

Three packing rings are required if the roof thickness is between 2.7 and 3.7 mm (glass fibre roofs).

Mounting the Antenna Connector

The antenna cable, after having been brought forward to the transmitter/receiver unit, should be cut to the desired length, whereafter the type PL259 antenna connector and type UG175/U adaptor are fitted to the cable as shown in Fig. 12.



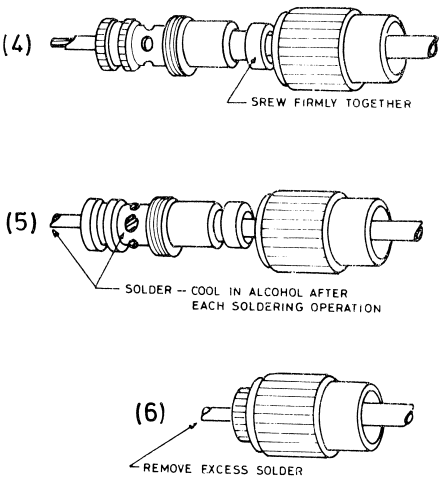


Fig. 12

NOISE SUPPRESSION

Introduction

Noise interference to a mobile radiotelephone may either originate in the vehicle's own electrical system or be generated by external sources such as other vehicles, electric motors, power lines etc.

Of course, nothing can be done about external noise sources, but in designing the CQP600 special care was taken to include features to suppress this type of noise as much as possible. Incidentally, noise interference from outside sources will usually last only for brief periods if the vehicle is on the move.

Noise interference from the vehicle's own electrical system, however, can in most cases be adequately suppressed by relatively simple means. However, it should be kept in mind that such noise will not normally be noticeable while the radiotelephone is operating close to the base station. Only at some distance from the base station, when receiver signal strength is relatively low, will this type of noise be audible in the loudspeaker during reception.

Complete noise suppression of an electrical system may require very elaborate measures but satisfactory results can as a rule be achieved by following the advice given below. It is a good plan, incidentally, to provide the special noise suppression manuals published by manufacturers of electric equipment (Bosch, Beru, Lucas, Duvieller etc.).

Ignition Noise

Ignition noise is the most common type of noise interference. Its distinctive characteristic is a regular popping sound synchronized with the engine speed. If the manufacturer of the ignition system has not provided a noise suppression device, noise suppression resistors should be inserted in series with each sparking plug or sparking plugs having built-in resistors installed instead. Noise suppression resistors should preferably be wire-wound resistors (approx. 5 kΩ), which are capable of suppressing noise more effectively than are carbon resistors (approx. 10-15 kΩ). Resistors in the sparking plug leads should be placed close to the sparking plugs and the gap between the points increased by 0.1 mm.

Further noise suppression can be accomplished 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 rotor having a built-in resistor.

Should this procedure fail to produce a satisfactory result, a 0.1 µF coaxial capacitor may be installed between the ignition coil primary terminal and chassis. The capacitor should be placed close to the ignition coil, making the chassis connection as short as at all possible.
Lastly, it may be mentioned that dirty or pitted distributor contacts may cause noise interference of a type similar to ignition noise.

Dynamo Noise

Dynamo noise is characterized by a whine which follows the engine speed in pitch and intensity. This type of noise is usually due to arcing between dirty or worn brushes and the commutator. It can as a rule be eliminated by cleaning or perhaps replacing the carbon brushes.

In certain cases, however, it may be necessary to insert adequate filtering in the dynamo circuit. A noise suppressor capacitor may be inserted in the lead from the ignition coil terminal (the lead going to the ignition lock) and in the battery lead from the dynamo relay terminal. In general, do not remove more insulation than necessary as this will increase the risk of short-circuits.

Other Noise Sources

Noise from the voltage regulator manifests itself as a rasping noise in the loudspeaker and can usually be eliminated by installing a coaxial capacitor in the dynamo lead as close to the regulator as possible and effectively connected to the chassis.

In fact, all electrical instruments and motors may be the cause of noise interference. A case in point is the windscreen wiper motor; a conventional noise suppressor capacitor is a typical remedy here. The easiest way to localize the noise source is to switch off the various potential noise sources one by one. Examples of such noise sources are the electric clock, the petrol gauge, and the oil-pressure lamp. Noise originating from these sources can in all cases be adequately suppressed by installing a capacitor of suitable value.

Tyre static can sometimes be a problem, making it necessary to use sliding copper braids or install special springs to provide a direct connection to chassis.

TESTING THE RADIOTELEPHONE AFTER INSTALLATION

Before Switching On

When the radiotelephone has been installed, check that

- the battery cable has been connected to the multi-way connector in accordance with the battery voltage to be employed;
- the voltage change-over switch on power supply unit PS608 has been set to the battery voltage to be employed;
- the marked battery-cable conductor in which the fuse holder is inserted connects to the floating battery potential;
- that the correct fuse has been placed in the fuse holder;
- that both the antenna and the antenna connector have been correctly connected;
- that a loudspeaker-microphone LM601 is connected to the radiotelephone;
- that the channel selector has been set to the desired channel.

The radiotelephone is factory adjusted and tested. The only adjustment that may be required on completion of the installation job consists in resetting the transmitter's modulation sensitivity to speech.

Switching On

To switch on, advance the volume control to mid-scale. The radiotelephone is now ready to receive.

Check that the battery indicator deflects to inside or above the green scale sector.

On turning the function selector marked to the "Loudspeaker In" position ( ), a loud rushing noise should be heard in the loudspeaker provided that no carrier is being received on the channel.

If a tone receiver is provided in the radiotelephone, the green calling lamp should start flashing on and off as well - also after the function selector has returned to its middle position.

On turning the function selector to the "Loudspeaker Out" position ( ), the loudspeaker noise should cease and - if a tone receiver is provided - the calling lamp should turn off.

Transmitting a Carrier

To transmit a carrier, press the transmit button marked on the loudspeaker-microphone.

If a tone receiver is provided in the radiotelephone, the function selector should be turned to the "Loudspeaker In" position ( ) before a carrier can be transmitted. A tone transmitter for conventional tone calling, if provided, is activated by depressing the loudspeaker microphone transmit button and the tone button together for approx. 1 second.

If the built-in tone transmitter is employed for identification, a tone code can be transmitted both by depressing the transmit button only and by depressing the tone and transmit buttons together.

Calling the Base Station

The base station should now be called. To check the performance of the tone transmitter and receiver (if provided), proceed as follows:

Turn the function selector to the "loudspeaker in" position and then release it. The selector will automatically return to its middle position.

If no traffic is heard on the channel, call the base station by depressing the transmit and tone buttons on the loudspeaker-microphone.

If the base station answers the call, the tone transmitter is functioning correctly.

Request the base station to transmit a tone call when you have ended your transmission.

Release the transmit button and turn the function selector to the "loudspeaker out" position.

The call from the base station should now be indicated by the green calling lamp flashing on and off and the tone being heard in the loudspeaker. If an external alarm device is connected to the radiotelephone, it should be activated by the call from the base station.

If the incoming call is indicated as described above, the tone receiver and (if provided) alarm circuit are functioning correctly.

To answer the base station, press the transmit button on the loudspeaker microphone.

Modulation Sensitivity Adjustment

The transmitter modulation sensitivity is factory pre-adjusted. However, if high ambient noise or other factors make re-adjustment desirable, potentiometer R8 on the radiotelephone's terminal board TB601 should be turned clockwise to reduce sensitivity.

The microphone sensitivity should not exceed the point where maximum frequency swing caused by the vehicle's own noise (that is: without speech) is $0.05 \times \Delta F_{max}$.

C. Fixed-Station Operation

Only CQP600F radiotelephones, which differ from CQP600 sets by having superior oscillator stability, may be used in fixed-station service.

Installation of the CQP600F as a fixed station requires the following accessories:

Loudspeaker microphone type LM601.
Power supply unit, usually type PS609.
Antenna connector type PL259 (Storno No.41.5127).
Antenna, 50 Ω.

Used as a fixed station, the radiotelephone may be placed on a table with the handle in its mid-position - turned halfway out - to serve as a support so that the front-panel controls will be easily accessible.

Loudspeaker-microphone LM601 plugs into the multi-way connector marked on the front panel.

Power Supply Unit

When used as a fixed station, the CQP600F will usually be powered from the mains through a PS609 power supply unit (for operation on 220V or 220V AC), but power supply unit PS608 or battery units BU601 and BU603 may also be used.

The power supply unit is secured to the radio cabinet bottom as shown in Fig. 1, Section A, Portable Operation.

Antenna

A 50Ω antenna should be connected to the radiotelephone. This requires a suitable length of type RG213/U coaxial cable to which a type PL259 antenna connector has been fitted.

Switching On the Radiotelephone and Checking its Performance

As described in Section B, Mobile Operation (subsections "Switching ON", "Transmitting a Carrier", "Calling the Base Station", and "Modulation Sensitivity Adjustment").

D. Installation of Tone Equipment

Space has been left in the CQP600 for installation of tone equipment and alarm circuits. The tone units are placed on the top side of the cabinet drawer, adjacent to terminal board TB601, to which they are to be connected electrically.

Screws and supports for mounting the tone units on the chassis plate of the cabinet drawer are supplied with the units.

The following units can be installed in the CQP600:

A TT680 tone transmitter or an ST680 sequential tone transmitter.

A TR680 tone receiver or an SR680 sequential tone receiver.

An AC683 alarm circuit.

The above type designations are common designations for a line of the units in question.

For example, the type designation TT680 covers tone transmitter types TT681, TT682, TT683, TT684 etc.

Installation of Tone Transmitter TT680

(see Diagram D400.943)

Installation of a TT680 tone transmitter requires, in addition to the tone transmitter, the following installation components:

One relay, Storno No. 58.5055
One relay cabling, Storno No. 18.6571
One 1N4004 diode, Storno No. 99.5020
One tone plate, Storno No. 51.0548.

Proceed as follows:

Solder the cabling to the relay as shown in the diagram.

Mount the relay, which is to function as the tone relay, adjacent to transmit relay RE1.

Connect the tone relay cabling to TB601.

Place tone transmitter TT680 in the radiotelephone and connect its terminals to TB601 as shown in the diagram.

Introduce the diode on TB601 as shown in the diagram (designated E2).

Strap TB601 as indicated in the diagram.

Note the tone transmitter frequency (frequencies) on the tone plate and place it on the side of the cabinet drawer as prescribed in Chapter I, General.

Installation of Sequencial Tone Transmitter ST680

Installation of a ST680 sequential tone transmitter requires, in addition to the sequential tone transmitter, the following installation components:

One relay, Storno No. 58.5055

One relay cabling, Storno No. 10.0571

Two 1N4004 diodes, Storno No. 99.5020

One tone plate, Storno No. 51.0548.

Proceed as follows:

Solder the cabling to the relay as shown in the diagram.

Mount the relay, denoted as RE2(B) in the diagram, adjacent to transmit relay RE1.

Connect the relay cabling to TB601.

Place sequential tone transmitter ST680 in the radiotelephone and connect its terminals to TB601 as shown in the diagram.

Introduce the two diodes on TB601 as shown in the diagram, where they are designated E2 and E5.

Strap TB601 in accordance with the diagram.

Note the frequency code of the sequential tone transmitter on the tone plate and place it on the side of the cabinet drawer as prescribed in Chapter I, General.

Installation of Tone Receiver TR680 or Sequencial Tone Receiver SR680

(see Diagram D400.941)

A tone plate, Storno No. 51.0548, is required in addition to the tone or sequential tone receiver.

Place the tone receiver in the radiotelephone and connect its terminals to TB601 as shown in the diagram.

Strap TB601 in accordance with the diagram.

Note the frequency or frequency code on the tone or sequential tone receiver on the tone plate and place it on the side of the cabinet drawer as prescribed in Chapter I, General.

Installation of Alarm Circuit AC683

(See Diagram D400.941, D400.942 or D400.943)

Installation of the alarm circuit employed in conjunction with the tone receiver requires a cabling, Storno No. 18.0573. Also required is a cable kit CC603 for connection of an external alarm device.

Place the alarm circuit on top of AF output amplifier AA607 and screw it on to one of its two heat sink blocks as shown in Fig. 13.

Install the cabling between AC683 and TB601 as shown in the diagrams.

Connect the external alarm device (horn, bell etc.) at the connector marked ⊏⊐ on the radiotelephone front panel, using a connector and a two-conductor cable (included in cable kit type CC603).

Fig. 14 illustrates the method of fitting the connector to the cable.

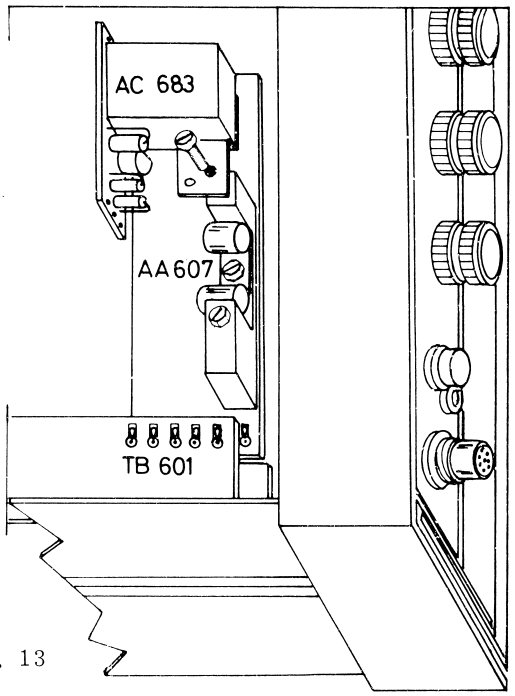


Fig. 13

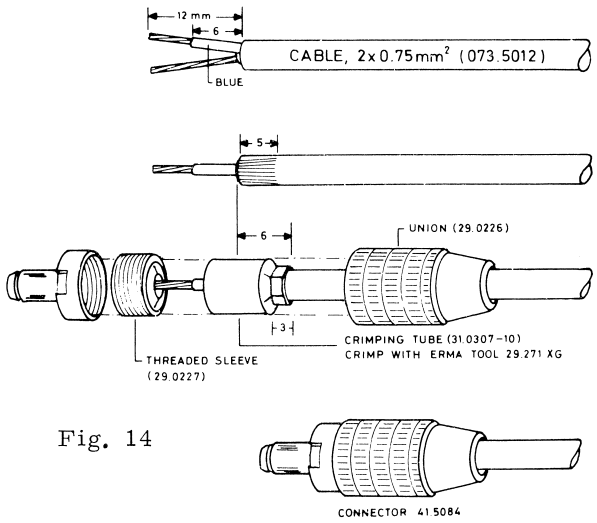
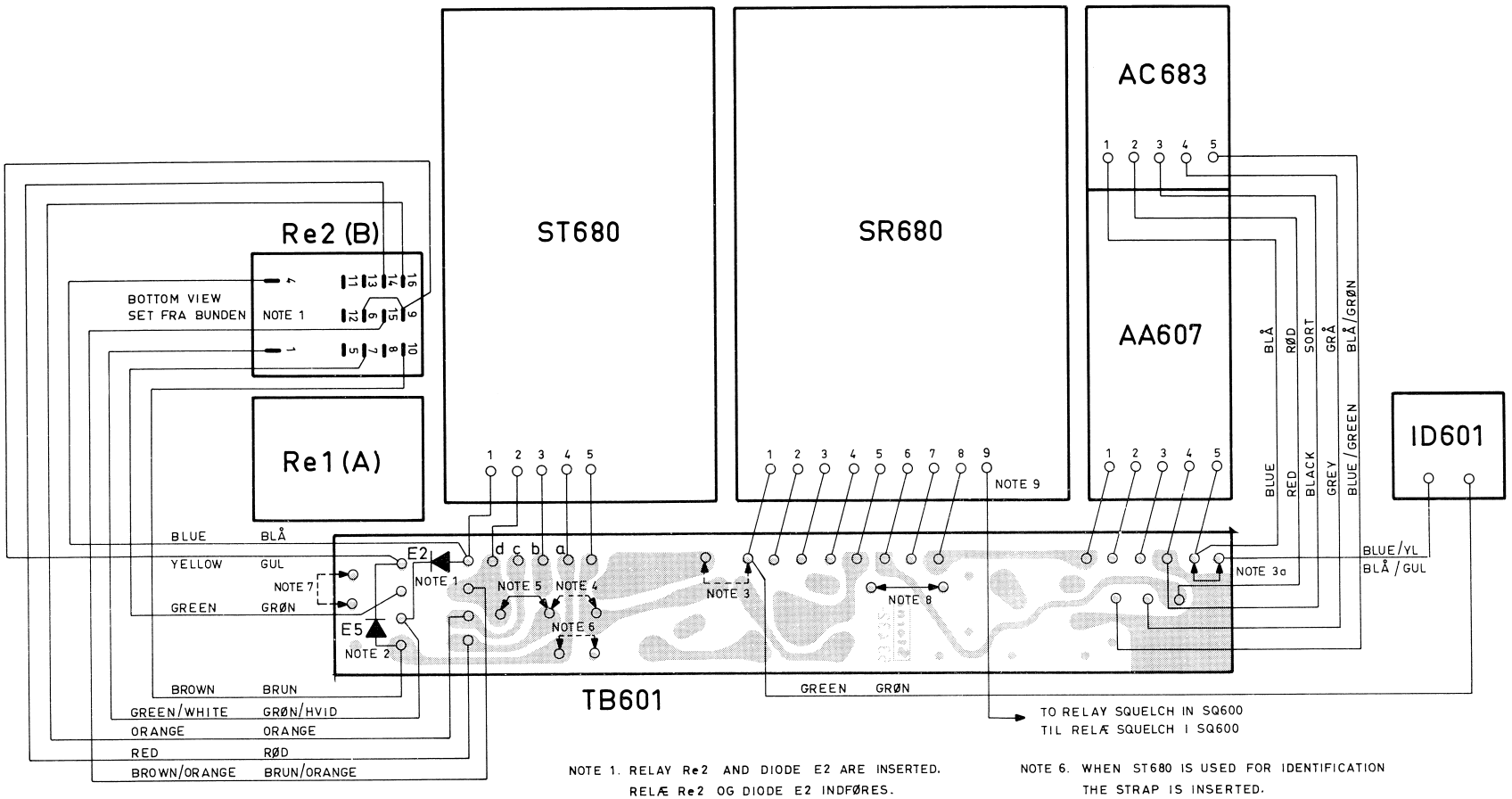


Fig. 14

Storno

Storno



NOTE 1. RELAY Re2 AND DIODE E2 ARE INSERTED.
RELÆ Re2 OG DIODE E2 INDFØRES.

NOTE 2. DIODE E5 IS INSERTED.
DIODE E5 INDFØRES.

NOTE 3. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 3a. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 4. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 5. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 6. WHEN ST680 IS USED FOR IDENTIFICATION THE STRAP IS INSERTED.
NÅR ST680 BENYTTES TIL IDENTIFIKATION INDFØRES STRAPNINGEN.

NOTE 7. STRAP INSERTED IN RADIOSTATION TYPE CQP662F AND CQP663F ONLY.
STRAPNING INDFØRES KUN I RADIOSTATION CQP662F OG CQP663F.

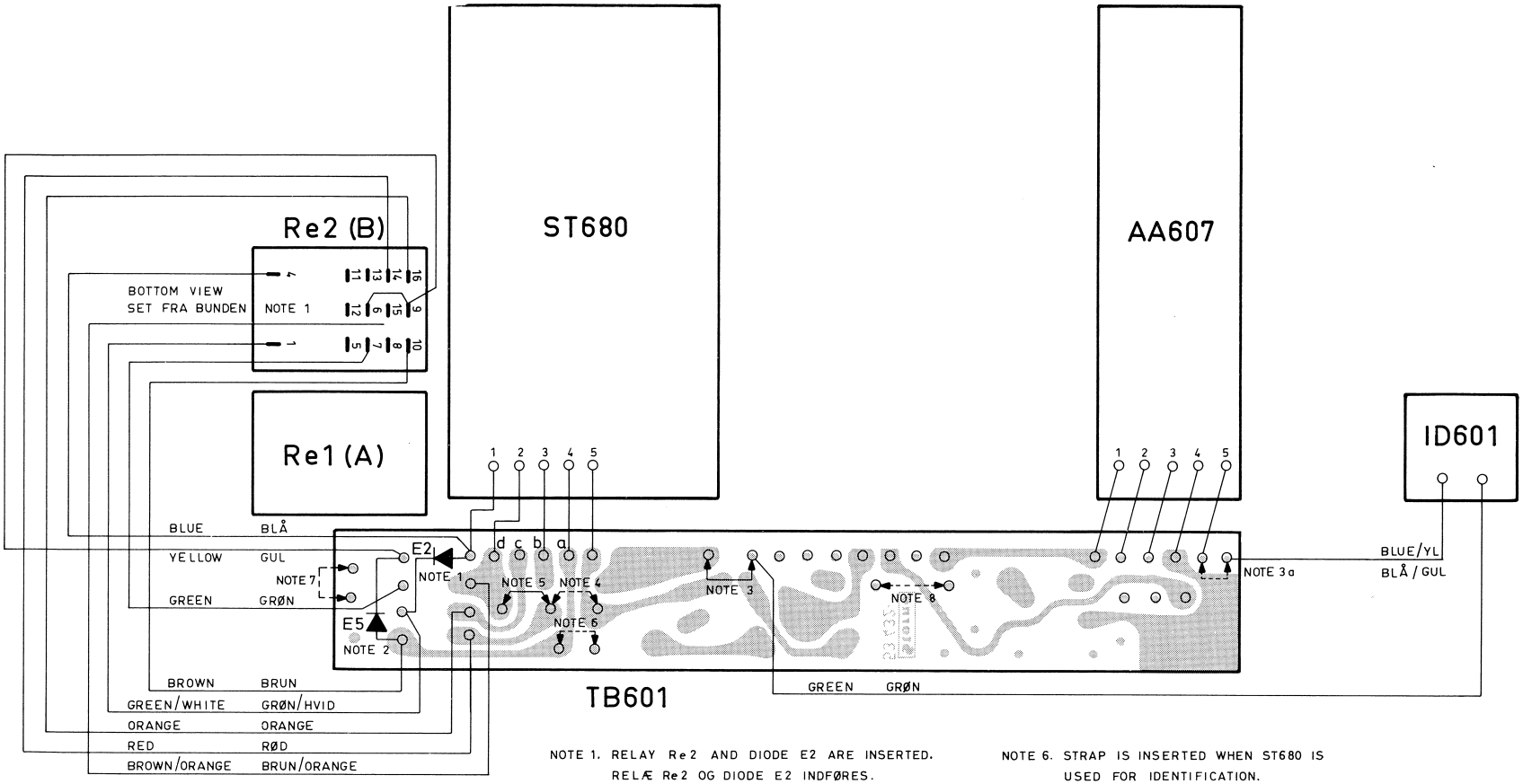
NOTE 8. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 9. CONNECTION WITH SR6841 ONLY
FORBINDELSE KUN MED SR6841

INSTALLATION OF ST680 AND SR680 OR SR6841, AND AC683 IN CQP600
INDBYGNING AF ST680 OG SR680 ELLER SR6841 OG AC683 i CQP600

D400.939/2

Storno



NOTE 1. RELAY Re2 AND DIODE E2 ARE INSERTED.
RELÆ Re2 OG DIODE E2 INDFØRES.

NOTE 2. DIODE E5 IS INSERTED.
DIODE E5 INDFØRES.

NOTE 3. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 3a. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 4. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 5. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 6. STRAP IS INSERTED WHEN ST680 IS USED FOR IDENTIFICATION.
STRAPNING INDFØRES NÅR ST680 BENYTTES TIL IDENTIFIKATION.

NOTE 7. STRAP INSERTED IN RADIOSTATION TYPE CQP662F AND CQP663F ONLY.
STRAPNING INDFØRES KUN I RADIOSTATION CQP662F OG CQP663F.

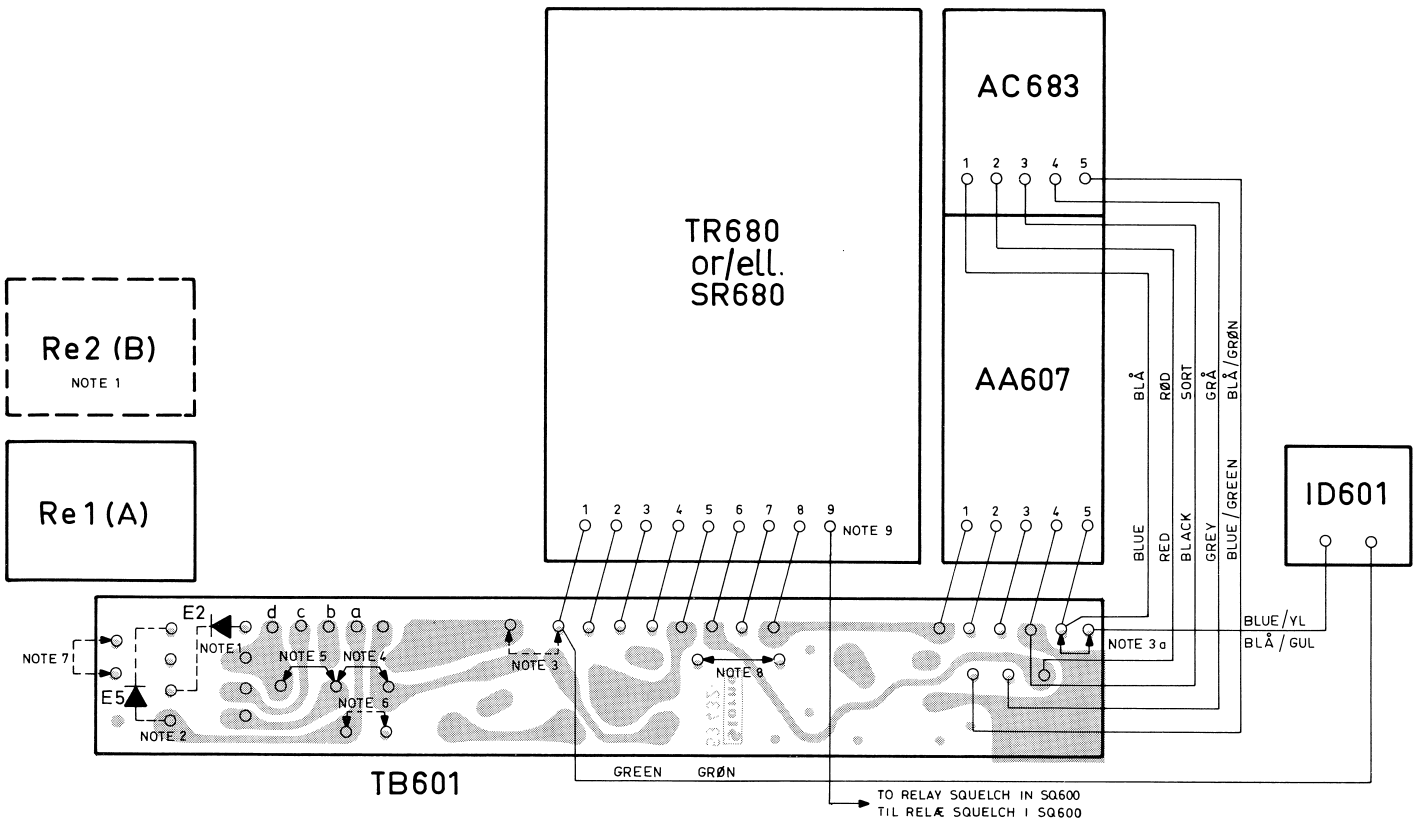
NOTE 8. STRAP IS REMOVED.
STRAPNING FJERNES.

INSTALLATION OF ST680 ONLY IN CQP600
INDBYGNING AF ST680 ALENE I CQP600

D400.940

Storno

Storno



NOTE 1+2. RELAY Re2 AND THE DIODES E2 AND E5 ARE REMOVED
RELÆ Re2 OG DIODERNE E2 OG E5 FJERNES.

NOTE 3. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 3 a. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 4. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 5. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 6. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 7. STRAP INSERTED IN RADIOSTATION TYPE
CQP662F AND CQP663F ONLY.
STRAPNING INDFØRES KUN I RADIOSTATION
CQP662F OG CQP663F.

NOTE 8. STRAP IS INSERTED.
STRAPNING INDFØRES.

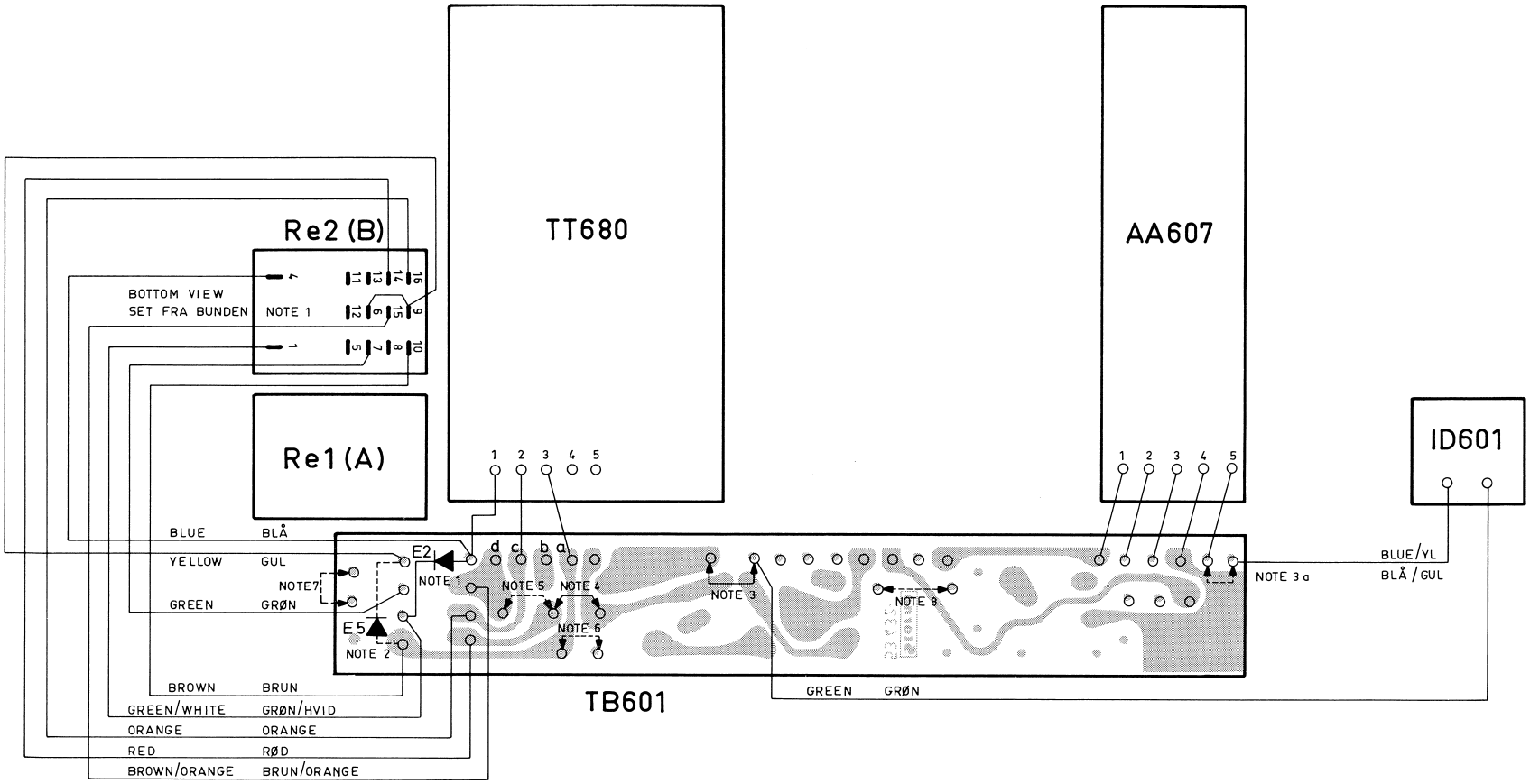
NOTE 9. CONNECTION WITH SR6841 ONLY
FORBINDELSE KUN MED SR6841

INSTALLATION OF TR680, SR680, OR SR6841 IN CQP600
INDBYGNING AF TR680, SR680 ELLER SR6841 I CQP600

D400.941/2

Storno

Storno



NOTE 1. RELAY Re 2 AND DIODE E2 ARE INSERTED.
RELÆ Re 2 OG DIODE E2 INDFØRES.

NOTE 2. DIODE E5 IS REMOVED.
DIODE E5 FJERNES.

NOTE 3. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 3a. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 4. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 5. STRAP IS REMOVED
STRAPNING FJERNES.

NOTE 6. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 7. STRAP INSERTED IN RADIOSTATION TYPE
CQP662F AND CQP663F ONLY.
STRAPNING INDFØRES KUN I RADIOSTATION
CQP662F OG CQP663F.

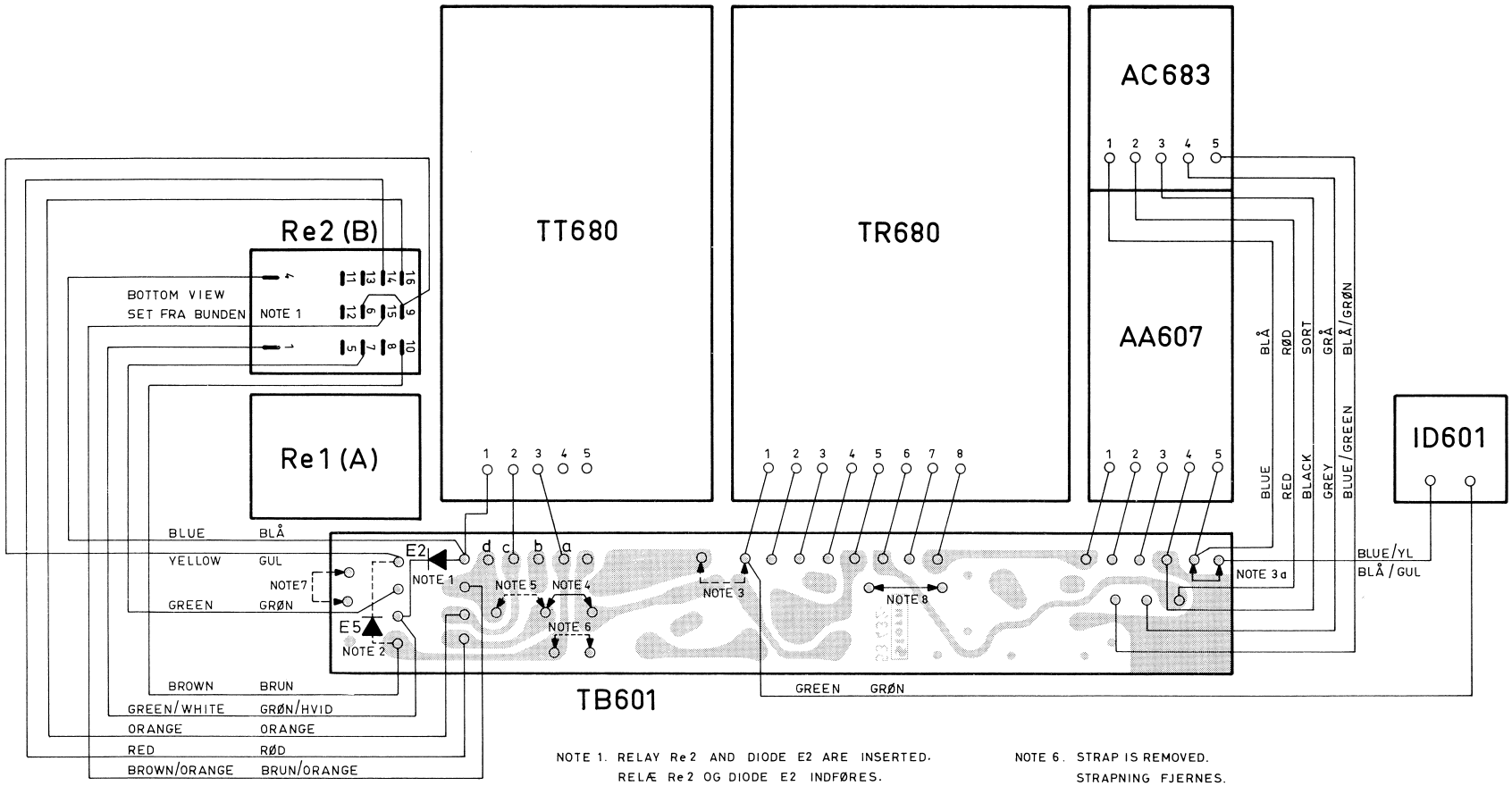
NOTE 8. STRAP IS REMOVED.
STRAPNING FJERNES.

INSTALLATION OF TT680 ONLY IN CQP600
INDBYGNING AF TT680 ALENE I CQP600

D400.943

Storno

Storno



NOTE 1. RELAY Re2 AND DIODE E2 ARE INSERTED.
RELÆ Re2 OG DIODE E2 INDFØRES.

NOTE 2. DIODE E5 IS REMOVED.
DIODE E5 FJERNES.

NOTE 3. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 3a. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 4. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 5. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 6. STRAP IS REMOVED.
STRAPNING FJERNES.

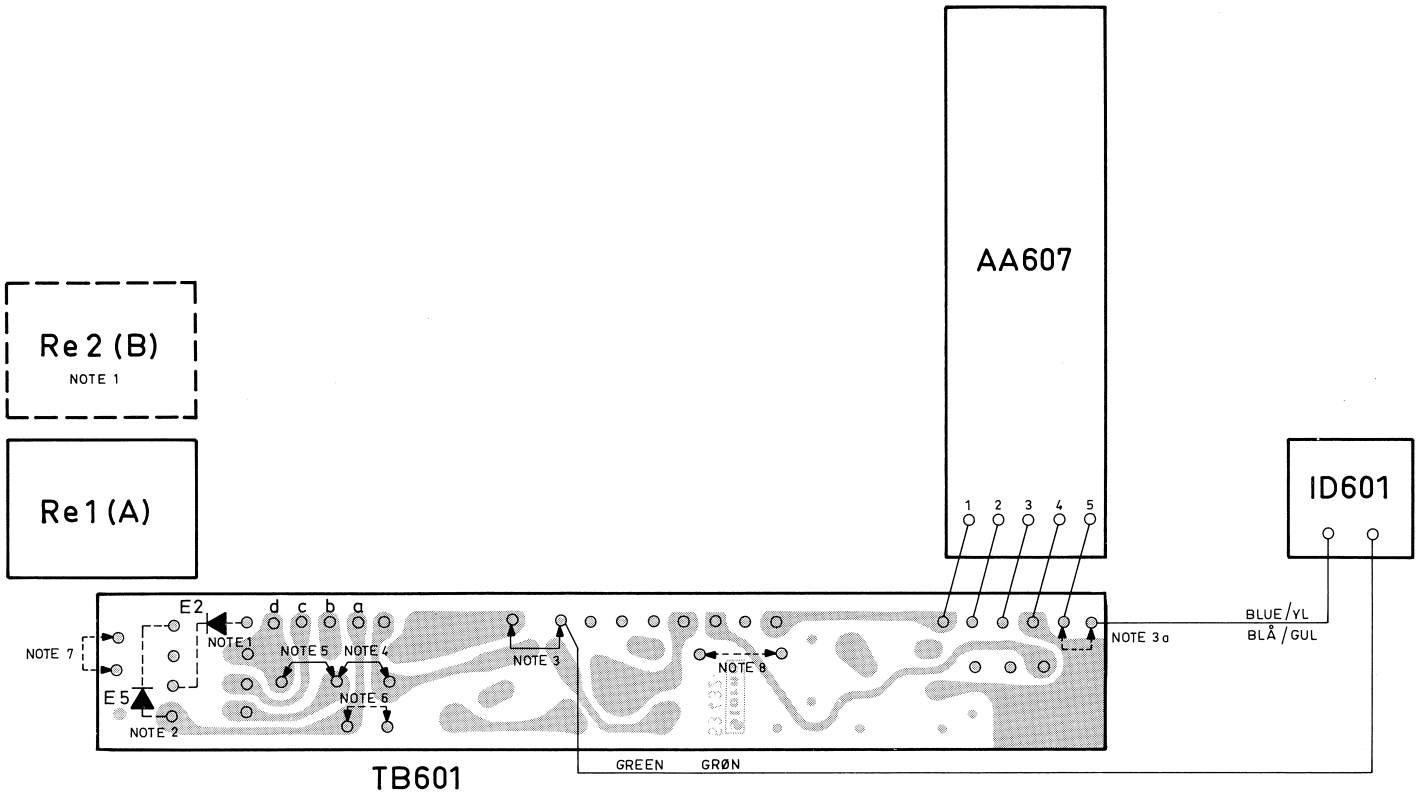
NOTE 7. STRAP INSERTED IN RADIOSTATION TYPE CQP662F AND CQP663F ONLY.
STRAPNING INDFØRES KUN I RADIOSTATION CQP662F OG CQP663F.

NOTE 8. STRAP IS INSERTED.
STRAPNING INDFØRES.

INSTALLATION OF TT680, TR680, AND AC683 IN CQP600
INDBYGNING AF TT680, TR680 OG AC683 I CQP600

D400.942

Storno



NOTE 1. RELAY Re2 AND DIODE E2 ARE REMOVED.
RELÆ Re2 OG DIODE E2 FJERNES.

NOTE 2. DIODE E5 IS REMOVED.
DIODE E5 FJERNES.

NOTE 3. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 3a. STRAP IS REMOVED.
STRAPNING FJERNES.

NOTE 4. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 5. STRAP IS INSERTED.
STRAPNING INDFØRES.

NOTE 6. STRAP IS REMOVED OR INSERTED (OF NO IMPORTANCE)
STRAPNING FJERNET ELLER INDSAT (UDEN BETYDNING)

NOTE 7. STRAP INSERTED IN RADIOSTATION TYPE
CQP662F AND CQP663F ONLY.
STRAPNING INDFØRES KUN I RADIOSTATION
CQP662F OG CQP663F.

NOTE 8. STRAP IS REMOVED.
STRAPNING FJERNES.

CQP600 WITHOUT BUILT-IN TONE EQUIPMENT
CQP600 UDEN INDBYGGET TONEUDSTYR

D400.983

Storno

CHAPTER V. SERVICE

A. Maintenance

Preventive Service Inspection

When a STORNOPHONE 600 has been properly installed and checked for satisfactory operation it should not thereafter be left to itself until breakdowns begin to occur. Every equipment should be inspected at regular intervals and readjusted if necessary. The frequency of such routine inspections will depend on the conditions under which the equipment is operated and on the total number of operating hours, but twelve months is the maximum time that should be permitted to elapse from one preventive service inspection to the next.

Thanks to the application of conservative design principles, the STORNOPHONE 600 may be expected to have a long life. Easy service and fault finding were two other important design considerations. All significant currents and voltages are specified in the circuit diagrams. On each circuit diagram is printed a screen picture of the wiring board, showing the diagram symbols of the individual components. Moreover, all modules have easily accessible test points to permit rapid checking of the operation condition of the equipment. When a module is to be serviced on the bench it is usually a good plan to illuminate the board strongly from behind, which will cause the printed wiring to stand out clearly.

Test Points

The modules have two kinds of test points - DC test points, which are designated by numbers in circles, e.g. (1) ; and signal test points, designated by numbers in squares, e.g. [2] .

Measurements at DC test points should be made with a multimeter having an internal resistance of at least 20 kΩ/V.

Measurements at RF test points may be made with a multimeter in conjunction with a Storno type 95.089 RF-probe.

AF signal measurements require the use of a vacuum-tube voltmeter.

Readings at Test Points

The following lists specify all test points in the equipment and the respective readings. Readings are intended only as a guide.

CQP611, CQP612, CQP613, CQP614

Point	Unit	Instrument	Measurement
[1]	RC611	Probe A	● 10 - 30 mV
[2]	RC611	Probe A	●◆ 30 - 80 mV
[3]	RC611	Probe B	0.6 - 1.2V
[4]	RC611	Probe B	0.3 - 0.8 V
[7]	IC600	Probe B	0.2 - 0.8 V
[8]	IA601	Probe A	□ 0.3 - 2.0 μV
[10]	IA601	AF-voltm.	■ 50kHz: 1.2-1.4V 25kHz: 0.9-1.1V 20kHz: 0.8-0.9V 12.5kHz: 0.4-0.5V
[14]	SQ600	AF-voltm.	■ 1.1V
[27]	AA601 AA608	AF-voltm.	▲ 0.9 - 1.0 V
[30]	EX611	Probe B	0.5 - 1.4 V
[32]	EX611	Probe B	1.0 - 1.6 V
[33]	EX611	Probe C	3.0 - 5.0 V
[34]	EX611	Probe C	2.0 - 6.5 V
[35]	EX611	Probe B	1.5 - 2.5 V
[36]	PA611	Probe D	○ 16 - 24V
(37)	PA611	mA-instr.	* 10W: 150-250mA 6W: 50-150mA
(38)	PA611	mA-instr.	* 10W: 500-700mA 6W: 300-400mA

CQP631, CQP632, CQP633, CQP634

Point	Unit	Instrument	Measurement
1	RC631	Probe A	● 5-20 mV
2	RC631	Probe A	● ◆ 10-40 mV
3	RC631	Probe B	0.4-1.0 V
4	RC631	Probe B	0.4-1.0 V
7	IC600	Probe B	0.2-0.8 V
8	IA601	Probe A	□20, 25, and 50kHz: 0.3-2.0 μV 12.5 kHz 0.6-6.0 μV
10	IA601	AF-voltm. AF-voltm. AF-voltm. AF-voltm.	■12.5kHz: 0.4-0.5 V 20kHz: 0.8-0.9V 25kHz: 0.9-1.1V 50kHz: 1.2-1.4V
14	SQ600	AF-voltm.	■ 1.1V
27	AA601 AA608	AF-voltm.	▲ 0.5-1.0V
30	EX630	Probe B	0.5-0.9V
32	EX630	Probe B	1.4-1.8V
33	EX630	Probe C	2.6-5.0V
35	EX630	Probe B	0.3-0.8V
36	PA631	Probe D	o 16-20V
(37)	PA631	DC-voltm.	* 6W:0.1-0.3V 10W:0.2-0.45V
(38)	PA631	DC-voltm.	* 6W:0.3-0.4V 10W:0.6-0.85V

● Antenna signal - EMF for 10 μA

◆ Without oscillator signal

□ Antenna signal - EMF for 40 μA

■ Antenna signal 1 μV EMF, 0.7 x ΔF max. and 1000 Hz

▲ Frequency deviation 0.7 x ΔF max. and 1000 Hz

o Measured across a 47Ω resistor

* Measured at nominal output power.

Probe A: Probe + 0-50 μA instrument (Ri=1kΩ)
Probe B: Probe + 0-2.5V instrument (20kΩ/V)
Probe C: Probe + 0-10V instrument (20kΩ/V)
Probe D: Probe + 0-25V instrument (20kΩ/V).

Routine Inspections

A normal routine inspection should cover checks of all test points in the equipment, and the readings taken should thereafter be checked against readings obtained in previous routine inspections. However, the routine inspection should also comprise the operations specified below:

1. Inspect (visually) transistors, diodes etc. Fasten any components that may have worked loose.
2. Check the internal operating voltage. It must not exceed 24.2V measured at the voltage regulator unit VR601.
3. Check the battery indicator.
4. Measure the carrier power delivered by the transmitter. Readjust the ADC-circuit if necessary.
5. Measure the receiver sensitivity and readjust the receiver input circuits if necessary.
6. Check the AF levels of the radio receiver output and the transmitter modulating input.
7. Call the other stations and perform speech test.
8. Check the antenna mounting, especially for rust.
9. If using the radiostation as a mobile radiotelephone check the position of the voltage selector on PS608. Also check the fuse in the battery cable.
   For 6 volt battery voltage use a 16 Amp. fuse
   For 12 volt battery voltage use an 8 Amp. fuse.
   For 24 volt battery voltage use an 8 Amp. fuse.

Replacement of Modules

In certain situations time can be saved by replacing a probably defective module with a new module of the same type.
Even if it is known to be fully aligned, such a newly inserted module may require a few minor readjustments of neighbouring circuits.

B. Fault-Finding and Repairs

Fault-Finding

Fault-finding should be performed only by skilled personnel who have the necessary measuring instruments at their disposal and have previously studied the operating principles of the radiostation. Before starting work, find out whether the fault is located in the accessories, in the outside power source, in the installation cabling or in the transmitter/receiver equipment itself.

Keep in mind when making check measurements and adjustments that the radiostation has a number of adjustments that should not be touched unless the necessary measuring instruments are available. In any case it is important that the directions given in the adjustment procedure be followed closely in each individual case if a satisfactory result is to be achieved.

Resistance Measurement

Two precautionary measures are necessary when making resistance measurements on transistor circuits. Firstly, it is necessary to make sure that the ohmmeter current does not exceed one milliampere, which may very well be the case with certain types of vacuumtube voltmeters. Secondly, the ohmmeter voltage may cause the transistors to become conductive, with incorrect readings as the obvious result. Since most faults are either short circuits or open circuits, accurate measurements of resistance are not normally required.

Soldering on Semiconductors

When soldering on semiconductors be careful to perform the soldering operation quickly and as a general rule it is not advisable to solder closer to semiconductors than 5mm, as transistors, for instance, will not stand the soldering temperature at that distance for more than 5 seconds. However, a transistor should not be replaced until it has been determined with reasonable certainty that it is defective. Even transistors of the same type and make may show fairly wide variations in their data. For this reason it is usually necessary, in the case of replacements, to check the transistor circuits and readjust then if necessary.

Crystal Ageing

The increasingly rigorous demands on frequency stability make the problem of crystal ageing grow in proportion.

The problem is chiefly associated with mechanical vibrations in consequence of which all factors causing an increase or reduction in the effective mass of the quartz plate, either during or after its manufacture, will invariably result in a frequency change.

Some of the factors contributing to undesired ageing are infinitesimal changes in crystal mass due to inadequate cleanliness and to contamination of the crystal surface. Other causes are poor electrode materials checking and excessive humidity of the air or gas trapped in the crystal holder after it has been sealed.

Indirect causes of mass changes such as unnoticed surface tension and strain introduced by the crystal mountings will likewise produce frequency drift.

Undesired frequency ageing in metal-encased and hermetically sealed high-frequency crystal units is chiefly due to difficulties in regard to securing the necessary component purity and preventing the ingress of flux vapours and other volatile substances during the process of sealing the crystal holder. A contributory cause is the difficulty of securing an airtight enclosure that will last the life of the crystal unit - a result of weakness in the solder used and of the glass-to-metal closure.

It has been found that these ageing processing are intensified at high operating temperatures.

Reduction of Ageing Processes

Unfortunately, the frequency drift caused by long-term ageing cannot be countered by any kind of compensation technique because so many unpredictable factors enter the picture. However, it can be countered by adjusting the oscillator frequency at regular intervals, and in many cases this represents a satisfactory solution to the problem.

Undesired ageing occurring after production of the crystal has made it impossible for manufacturers to offer a guarantee against frequency

changes caused by ageing. Instead a typical figure is stated, usually of the order of $\pm 10 \times 10^{-6}$ per year.

With AT cuts in metal holders, one year of ageing will cause frequency changes of the order of 5 to 10×10^{-6}. It should be noted that ageing processes vary with frequency, being more pronounced for high-frequency crystals (thin plates) than for low-frequency crystals.

Readjustment of Frequencies

In consequence of the long-term ageing described above Storno recommend that radiotelephones which must meet stringent demands for frequency stability be subjected to readjustment of their oscillator crystals at intervals.

If the requirements for frequency stability exceed $\pm 5 \times 10^{-6}$ we wish to stress the need for such frequency adjustments. The times for making readjustments depend not only on individual crystals but on operating temperature as well. As a guide, however, it is suggested that the first adjustment be made after three or four months. The second readjustment should be made six or eight months later (these times are based on operation at normal ambient temperature).

Oven crystals will age somewhat more quickly. In this case, the first adjustment should be made after two or three months of operation, the second readjustment four or six months later.

Wiring Boards

The wiring boards used in the STORNOPHONE 600 are very rugged, but in unfortunate cases it is possible for the printed wiring to break or detach itself from the board. This usually happens when excessive heat is applied when soldering or when a soldering operation lasts longer than it should. Fine cracks in the wiring or in the wiring board itself are mostly difficult to spot with the naked eye, in which cases a magnifying glass will be a good help. This type of fault can also be the cause of trouble of an intermittent nature.

Such faults are easily corrected by soldering a short end of wire across the broken place on the board.

Replacement of Components

Replacement of resistors, capacitors and similar components on printed wiring boards require the use of a small pencil-type soldering iron of 30- to 75-watt rating so as to permit rapid soldering. The use of a tin sucker to drain away melted solder is also advisable. Do not attempt to pull any component off the wiring board until the solder flows smoothly as there is otherwise a risk of pulling some of the printed wiring off the board. As a general rule the soldering iron should not be applied to the board for a longer time than strictly necessary. Care should be taken, when soldering a new component to the wiring board, that no short circuits are caused by excess solder. Do not use more solder than strictly necessary. Large blobs of solder can reduce the spacing between the printed wires, which can produce undesirable effects in RF circuits even if no actual short circuit exists.

C. Adjustment Procedure

General

The directions given in this section are intended as an aid in aligning a CQP600 radiostation and consequently must not be considered the only correct adjustment procedure. However, departures from the directions given here should be made only in cases where the technician can foresee with certainty that modified alignment methods will neither degrade the specifications stipulated nor complicate subsequent alignment procedures.

Before being dispatched from Storno each individual radiotelephone is checked and tested, and in the absence of any special agreement, the Testing Department has:

1. Inserted oscillator units with quarz crystals for the channels ordered.
2. Aligned the complete radiotelephone so that the accuracy of the transmitting and receiving frequencies is better than 1×10^{-6}.

3. Adjusted the receiver audio output and the speech limiter clipping level according to specifications.
4. Adjusted and tested the built-in tone equipment (if provided).

When the installation has been completed and its proper execution checked, the transmitter modulation sensitivity should be adjusted by potentiometer R8 in terminal board TB601, in order to make it match the operator's voice. The microphone sensitivity should not be increased beyond the point where the frequency swing caused by the car's own noise (that is, without voice) is 0.05 x ΔFmax. To increase the modulation sensitivity, turn the potentiometer in an anti-clockwise direction.

CAUTION: The greatest care should be shown when measuring currents, voltages etc. in the circuits of CQP600 as even brief short circuits, such as may be caused by the test prods of a measuring instrument, may in certain cases cause permanent damage to a transistor.

Types of Radiostations

The adjustment procedure applies to the following types of radiostations:

Type	Frequency Band	Chann. Separation
CQP611	146-174 MHz	50 kHz
CQP612	146-174 MHz	25 kHz
CQP613	146-174 MHz	20 kHz
CQP614	146-174 MHz	12.5 kHz
CQP631	68-88 MHz	50 kHz
CQP632	68-88 MHz	25 kHz
CQP633	68-88 MHz	20 kHz
CQP634	68-88 MHz	12.5 kHz

Directions for adjusting the TR680 tone receiver and the TT680 tone transmitter are also given.

Measuring Equipment

The following instruments are required for adjustment of CQP600:

A power supply rated at 5.0 - 33V/15A (e.g. type IMPO)

A signal generator covering the frequency band: 146-174 MHz for CQP610, 68-88 MHz for CQP630 (e.g. Marconi type TF1066B)

An IF signal generator (e.g. Storno type G21, code no. 95.163)

An AC vacuum tube voltmeter (e.g. Radiometer type RV36)

A distortion meter (e.g. Radiometer type BKF6)

A standard test receiver with calibrated discriminator (e.g. Radiometer type AFM1 S1)

A wattmeter 0-10/0-25W (e.g. Bird type 43)

A dummy load and measuring elements for wattmeter

A tone generator (e.g. Philips type PM5100)

An RF probe, Storno type 95.089

A multimeter, at least 20 kΩ per volt (e.g. type AVO 8)

A microammeter, 50-0-50 μA, Ri = 1000 ohms

A milliammeter, 0-500 milliamps.

An ammeter, 0-1 amp.

With these instruments available, the CQP600 radiostation can always be restored to operating condition.

Adjustment of Battery Indicator

Replacement of a defective battery indicator necessitates an adjustment of the new indicator for correct reading of the battery voltage. Connect the radiostation to a variable power supply through battery connector J3, pin D and E. Adjust the supply voltage for a voltage drop of 1.5 volts across voltage regulator VR601.

Replace resistors R10 and R11 on terminal board TB601 by a decade resistance box. Set it for a deflection between the red and green area on the battery indicator. Remove the resistance box and insert instead one or two carbon film resistors (1/8W) their values chosen to constitute the resistance for which the box had been set (3-7 kΩ).

RECEIVER ALIGNMENT

Before starting alignment of the receiver, first check the internal supply voltage, -24 volts. If necessary, adjust it for the correct value, using potentiometer R8 in voltage regulator unit VR601. Also check the straps in receiver converter RC611 or RC631, intermediate-frequency amplifier IA601, and squelch and audio amplifier SQ601 or SQ602 are in accordance with the channel separation in use (see circuit diagrams of the respective units).

Note: Drawings showing the location of test points and components referred to in the alignment procedure are placed last in this chapter

Alignment of 2nd Intermidiate Frequency and Discriminator, IA601

Apply a 455 kHz signal (approx. 0.1mV) to the input of BP600 without cutting off the connections between IC600 and BP600.

Connect RF probe and multimeter at test point [9].

Adjust coils L1, L2, and L3 for maximum reading, approx. 20 μA.

Apply a 455 kHz signal (approx. 1mV) to the input of IA601 without cutting off the connection between BP600 and IA601.

Connect 50-0-50 μA microammeter to pin marked "Discriminator Zero".

Adjust coil L4 (discriminator secondary) for zero reading on 50-0-50 microammeter.

Adjust transformer coil T1 (discriminator primary) for best symmetry at 455 kHz $\pm$15 kHz.

Since these two circuits interacts, the discriminator zero must be constantly checked and readjusted.

Reading for $\pm$15 kHz at 1mV input signal:
37.5 μA $\pm$2 μA.
Linearity at $\pm$15 kHz: 2.5 μA per kHz.

2nd IF block filter BP600 is aligned and artificially aged at the factory, making subsequent realignment unnecessary.

Alignment of Signal Frequency Amplifier and 1st IF, RC611/RC631 and XO600

Calculation of the crystal frequency (fx) for a given signal frequency (fsig):

CQP630: $fx = \frac{fant + 10.7}{2}$ MHz

CQP610: 146-160MHz: $fx = \frac{fant + 10.7}{3}$ MHz.

156-174MHz: $fx = \frac{fant - 10.7}{3}$ MHz.

Connect RF probe and multimeter at test point [3].

Adjust coil L1 in the used oscillator unit XO600 for maximum meter reading.

Adjust coils L9 and L10 in RC611/631 for maximum meter reading (see lists of test point readings).

Connect RF probe with multimeter at test point [4].

Adjust coils L11 and L12 in RC611/631 for maximum meter reading (see lists of test point readings).

Connect the signal generator to the antenna input and set it to the signal frequency.

Connect RF probe and multimeter at test point [1].

Adjust trimmer capacitor C2 and C3 and coil L4 for maximum meter reading.

Adjust coil L5 in RC611/631 for minimum meter reading.

Adjust coil L6 in RC611/631 for maximum meter reading.

Adjust coil L7 in RC611/631 for minimum meter reading.

NOTE: In RC611 there is only a small difference between maximum and minimum readings.

Connect RF probe and multimeter at test point [8] in IA601.

All stations except CQP614 and CQP634

Readjust coils L4, L5, L6, L7, and L8 in RC611/631 and L1 in IC600 for maximum meter reading. The level should be so low that limiting does not occur while adjustment of L8 in RC611/631 and L1 in IC600 is taking place (approx. 1-4 μV).

CQP614 and CQP634

Readjust coils L4, L5, L6, L7, and L8 in RC611/631 for maximum meter reading. The level should be so low that limiting does not occur (below 200 μA).

Adjustment of Oscillator, XO600

The oscillator unit is adjusted before leaving the factory. However, if a frequency counter is available, the oscillator can be adjusted by means of a trimmer capacitor C4 in the unit, with the frequency counter connected at test point [3] in RC611/631 via a capacitor. The oscillator must be adjusted to frequency with an accuracy better than 1×10^{-6}.

Checking the Oscillator in IC601, IC602, IC603

To adjust the oscillator frequency, connect a frequency counter at test point [7], and adjust the oscillator to the exact frequency (10.245 MHz or 11.155MHz) by means of trimmer capacitor C11.

Checking the Oscillator in IC605

To adjust the oscillator frequency, connect a frequency counter at test point [7], and adjust the oscillator to the exact frequency (10.245MHz or 11.155MHz) by means of trimmer capacitor C9.

Filter Matching, Sensitivity, and Audio Level Adjustment, IC600, IA601, and SQ601/602

Connect the signal generator to the antenna input of RC611/631 and set it to the signal frequency. Set the frequency swing to 70% of the maximum permissible limit:

1.75 kHz for 12.5 kHz channel separation
2.8 kHz for 20 kHz channel separation
3.5 kHz for 25 kHz channel separation
10.5 kHz for 50 kHz channel separation

The modulating frequency should be 1000 Hz.

In CQP614 and CQP634 only

Connect RF probe and multimeter at test point [8] in IA601.

Adjust coil L8 in RC611/631 and coils L1, L2, L3, L4, and L5 in IC605 for maximum meter reading. The level should be so low that limiting does not occur (below 200 μA).

Connect the audio voltmeter and the distortion meter at test point [14] on terminal board TB601 (AF output of SQ601/602).

Switch to the receiving channel using the highest frequency.

Set the signal generator to the signal frequency selected, still keeping the frequency swing at 70% of the maximum permissible limit and the modulation frequency at 1000 Hz.
Adjust the signal generator output for 1 mV.

Adjust by means of potentiometer R15 in SQ601/602 the output level for +3dBm, corresponding to 1.1V across a 600-ohm load.

Distortion: Less than 3.5%.

Calibrate the distortion meter so that the sum of signal, noise, and distortion corresponds to 100% when the filter is not inserted.

Insert filter to remove the modulating frequency.

Reduce the output of the signal generator until the distortion meter reading increases to 25%, corresponding to a 12 dB ratio between signal + noise + distortion and noise + distortion (12 dB SINAD).

Carefully adjust the input filter in RC611 or RC631 for best possible signal-to-noise ratio. It should be possible to obtain a 12-dB signal-to-noise ratio for an electromotive force of 0.8 μV.

NOTE: The 600-ohms load is located on the control panel of the radiostation where it serves as level control.

Squelch Sensitivity

Keep the signal generator connected to the antenna input of RCx1 and keep it set at the signal frequency. Set the frequency swing to 70% of the maximum permissible limit. The modulating frequency should be 1000 Hz.

Check the squelch control (potentiometer R1 in TB601). The squelch must be capable of cutting in the receiver output and turning it off again in the absence of an incoming RF signal.

Set the squelch control to the threshold value (in the absence of an incoming RF signal). Again apply an RF signal and increase it until the squelch circuit opens the signal path through the receiver.

Minimum signal-to-noise ratio in the speech channel: 4 dB, typical.

"Tighten up" the squelch control and increase the RF signal level until the squelch circuit opens the signal path.

Maximum signal-to-noise ratio in the speech channel: 21 dB, typical.

TRANSMITTER ALIGNMENT

Check that the straps in units EX611/EX630, PA611/PA631, and AA601/AA608 are in accordance with the channel separation in use and the frequency band in use (consult circuit diagrams).

Transfer the signal lead connecting the exciter (EX611/EX630) to power amplifier (PA611/PA631) to the 47-ohm load resistor in the power amplifier, test point 36 , which loads the exciter during adjustments.

During the subsequent adjustments the transmitter must operate under carrier-on conditions. This is accomplished by connecting pins G and E of connector J1 together. This strapping can also be made on terminal board TB601 to which the above pins connect electrically

Note: Drawings showing the location of test points and components referred to in the alignment procedure are placed last in this chapter

Alignment of Exciter EX611 or EX630

Alignment of the exciter should be performed without modulating signal applied from AA601/AA608.

EX611 (in CQP611, CQP612, CQP613, and CQP614)

Check that the exciter is strapped for the frequency band in use.

Connect RF probe and multimeter at test point 30 .

Adjust L1, L2, and L6 for maximum meter reading, approx. 0.5V.

Insert straps marked G and A

Adjust coil L3 for maximum meter reading, approx. 0.5V.

Insert straps marked G and B instead.

Adjust coil L4 for minimum reading, approx. 0.05V.

Insert straps marked G and C instead.

Adjust coil L5 for minimum meter reading, approx. 0.05V.

Repeat alignment of coils L3, L4, and L5 (this is necessary because of interaction between the circuits) until minima and maxima are obtained.

Remove straps.

NOTE: This completes the alignment of the modulator. Henceforth the modulator must not be adjusted for minimum distortion.

Connect RF probe and multimeter at test point 32 .

Adjust coil L7 for maximum meter reading, approx. 1.0V.

Connect RF probe and multimeter at test point 33 .

Adjust coils L8 and L9 for maximum meter reading. Repeat the adjustment of these coils several times. Reading: approx. 4.0V.

Connect RF probe and multimeter at test point 34 .

Adjust coils L10 and L11 for maximum meter reading, approx. 4.0V.

Connect RF probe and multimeter at test point 35 .

Adjust coils L12 and L13 as well as trimmer capacitor C37 for maximum meter reading, approx. 2.0V.

Connect RF probe and multimeter at test point 36 in PA611 (across 47-ohm load resistor R8).

Adjust coils L14 and L16 as well as trimmer capacitors C42 and C48 for maximum meter reading, approx. 16V.

EX631 (in CQP631) and EX632 (in CQP632, CQP633, and CQP634)

Connect RF probe and multimeter at test point 30 .

Adjust coils L1, L2, and L9 for maximum meter reading, approx. 0.5V.
Insert straps marked G and A.

Adjust coil L3 for maximum meter reading, approx. 0.5V.

Insert straps marked G and B instead.

Adjust coil L4 for minimum meter reading, approx. 0.05V.

Insert straps marked G and C instead.

Adjust coil L5 for minimum meter reading, approx. 0.05V.

Repeat alignment of coils L3, L4, and L5 (this is necessary because of interaction between the circuits) until minima and maxima are obtained.

Remove straps.

Again adjust coils L1, L2, and L9 for maximum meter reading, approx. 0.5V.

Adjustment of 2nd Modulator in EX631 only

Connect RF probe and multimeter at test point 30 .

Insert straps marked G and E.

Adjust coil L7 for minimum meter reading, approx. 0.05V.

Insert straps marked G and F.

Adjust coil L8 for minimum meter reading, approx. 0.05V.

Repeat alignment of coils L6, L7, and L8 (this is necessary because of interaction between the circuit) until minima and maxima are obtained.
Remove straps.

NOTE: This completes the alignment of the modulator. Henceforth the modulator must not be adjusted for minimum distortion.

Connect RF probe and multimeter at test point [32] .

Adjust coil L10 for maximum meter reading, approx. 1.6V.

Connect RF probe and multimeter at test point [33] .

Alternately adjust coils L11 and L12 for maximum meter reading, approx. 3.0V.

Connect RF probe and multimeter at test point [35] .

Alternately adjust coils L13 and L14 for maximum meter reading, approx. 0.4V.

Connect RF probe and multimeter at test point [36] in PA631 (across the 47-ohm load resistor, R7).

Adjust coils L15, L16, and L17 and trimmer capacitor C43 for maximum meter reading, approx. 17V.

Stop keying the transmitter, by removing strap between G and E in multiconnector J1 or TB601.

Adjustment of Power Amplifier Stage PA611 or PA631

Before initiating the adjustment the lead from the exciter should be transferred from the load resistor to the input of the power amplifier unit.

PA611 (in CQP611, CQP612, CQP613, and CQP614)

Set all trimmer capacitors of the power amplifier to half of their capacity.

Remove strap designated (37) and replace it with a 500 mA meter.

Remove strap designated (38) and replace it with a 1-amp. meter.

Back off the ADC potentiometer, R5 (anti-clockwise).

Key the transmitter by inserting strap between term. G and E in TB601.

Carefully advance the ADC potentiometer, adjusting trimmer capacitors C1, C2, C9, C10, C17, and C18 for maximum power output.

When maximum power output has been obtained with the ADC potentiometer at maximum and the entire stage completely adjusted, reduce the power output to 10 watts, using the ADC potentiometer.

Readjust trimmer capacitors C17 and C18 for maximum power output.

Again adjust the ADC potentiometer for 10 watts power output.

Every adjustment of the ADC potentiometer should be followed by a readjustment of trimmer capacitors C17 and C18.

At full power output, the current at test point (37) , as measured with the milliammeter, should not exceed 250 mA, and the current at test point (38) , as measured with the 1-amp. meter, should not exceed 700 mA.

CAUTION: Sometimes, in the low end of the frequency band, the transmitter may deliver more than 15 watts of power output. Since the resulting current drain will cause permanent damage to the power supply unit, care should be taken that the above currents at test points (37) and (38) will not exceed the stated values.

PA631 (in CQP631, CQP632, CQP633, and CQP634)

Back off the ADC potentiometer, R9 (anti-clockwise).

Key the transmitter by inserting strap between term. G and E in TB601.

Carefully advance the ADC potentiometer, adjusting coil L1 and trimmer capacitors C5, C6, C16, and C18 for maximum power output.

When maximum power output has been obtained with the ADC potentiometer at maximum and the entire stage is completely adjusted, reduce the power output to 10 watts, using the ADC potentiometer.

Readjust coil L1 and trimmer capacitors C16 and C18 for maximum power output.

Again adjust the ADC potentiometer for 10 watts power output.

Every adjustment of the ADC potentiometer should be followed by readjustment of coil L1 and trimmer capacitors C16 and C18.

Remove strap designated (37) and insert instead a milliammeter (0-500 mA).
Remove strap designated (38) and insert instead an ammeter (0-1.5A).

At maximum (10W) power output the current in test points (37) should not exceed 300 mA. The current in test points (38) should not exceed 800 mA.

Remove the meters and insert the straps.

Adjustment of Power Amplifier for 6 Watt Power Output

Adjust the unit for maximum obtainable power output as described above.

Using the ADC potentiometer, reduce the power output to 7-8 watts.

In PA611: Readjust trimmer capacitors C17 and C18 for maximum power output.

In PA631a: Readjust coil L1 and trimmer capacitors C16 and C18 for maximum power output.

Adjust the ADC potentiometer for 5 watts power output.

Again readjust for maximum power output.

Lastly, using the ADC potentiometer, adjust the power output level for 6 watts.

Currents and voltages at the test points should be as follows:

PA611: (37) less than 180 mA.
(38) less than 500 mA.

PA631a: (37) less than 200 mA.
(38) less than 600 mA.

Antenna Filter FN611 or FN631

The antenna filter is adjusted before leaving the factory and subsequent adjustment is unnecessary.

Crystal Oscillator XO631

Crystal oscillators are as a general rule adjusted before leaving the factory, for which reason frequency adjustment is necessary only when a new crystal has been inserted.
A frequency counter is required for making the exact adjustment.

In this case the transmitter should be aligned first, because the frequency is most easily measured at the transmitter output to which the frequency counter is connected through an attenuation network.

The frequency accuracy should be better than 1×10^{-6}.

Modulation Adjustment, AA601 or AA608

Make sure that the unit is strapped for phase modulation (see circuit diagram).

Set potentiometer R28 at mid-scale.

Set potentiometer R27 for maximum sensitivity (turned fully clockwise).

Set potentiometer R8 in TB601 for minimum limitation of speech modulation input (turned fully counter-clockwise).

Connect standard receiver and distortion meter to the transmitter output through attenuating networks.

Connect audio voltmeter and tone generator across pins A and H of connector J1, or the

corresponding terminals on TB601 (designated A and H on the service diagram at the end of this chapter).

Adjust the input signal from the tone generator for modulation level, 110 mV + 20 dB, corresponding to 1.1V.

AA601 (all stations except CQP614 and CQP634)

Vary the frequency between 300 and 3000 Hz while adjusting for maximum frequency swing.

CQP611 and CQP631: ΔFmax = 15 kHz
CQP612 and CQP632: ΔFmax = 5 kHz
CQP613 and CQP633: ΔFmax = 4 kHz.

Adjust by means of potentiometer R29 in AA601 the frequency swing so that it will not exceed the maximum value (ΔFmax.) anywhere inside the frequency range 300 to 3000 Hz. This should be checked at both negative and positive modulation peaks.

AA608 (in CQP614 and CQP634)

Vary the frequency between 300 and 2600 Hz while adjusting for maximum frequency swing.

CQP614 and CQP634: ΔFmax = 2.5 kHz.

Adjust by means of potentiometer R29 in AA608, the frequency swing so that it will not exceed the maximum value (ΔFmax.) anywhere inside the frequency range 300 to 2600 Hz. This should be checked at both negative and positive modulation peaks.

Using potentiometer R27, adjust the modulation sensitivity so that a 110 mV input voltage at 1000 c/s from the tone generator produces a frequency swing that is 70% of the maximum permissible swing.

Repeat the adjustment of potentiometers R29 and R27.

Adjust, at the 110 mV (1000 c/s) input voltage, the symmetry of the limiter for minimum distortion, using potentiometer R28.

Recheck the modulation sensitivity and readjust it if it has changed.

Read the distortion meter. Distortion should be less than 8%.

NOTICE! Distortion should be measured with de-emphasis.

Checking the Audio Output Amplifier, AA 607

Connect the signal generator to the antenna input of the receiver and set it to the signal frequency at a frequency swing that is 70% of the maximum permissible swing at 1000 Hz. Connect a 35-ohm load resistor across the output terminals of the AA607 output amplifier, terminals designated J and H on TB601 (see service diagrams at the end of this chapter). Also connect an audio voltmeter across the same terminals.

Turn the volume control on the control panel fully open. The voltage across the load should be at least 5.9V.

Tone Transmitter TT680

This unit is adjusted before leaving the factory and requires no subsequent readjustment.

Tone Receiver TR680

Connect an audio voltmeter to the output of the tone transmitter and connect a standard receiver to the antenna output of the transmitter section.

Adjust the coil of the tone transmitter for a tone frequency of 1060 c/s.

Apply power to the tone transmitter.

Adjust, by means of the alignment potentiometer of the tone transmitter unit, the tone transmitter output level for 110 mV, corresponding to a measuring level of -17 dB.

If a two-tone transmitter is used, each transmitter section should deliver only half the voltage specified above. This is performed by short-circuiting one of the tone-coils and thus cut out one of the oscillators. Then adjust the output level for 55 mV.

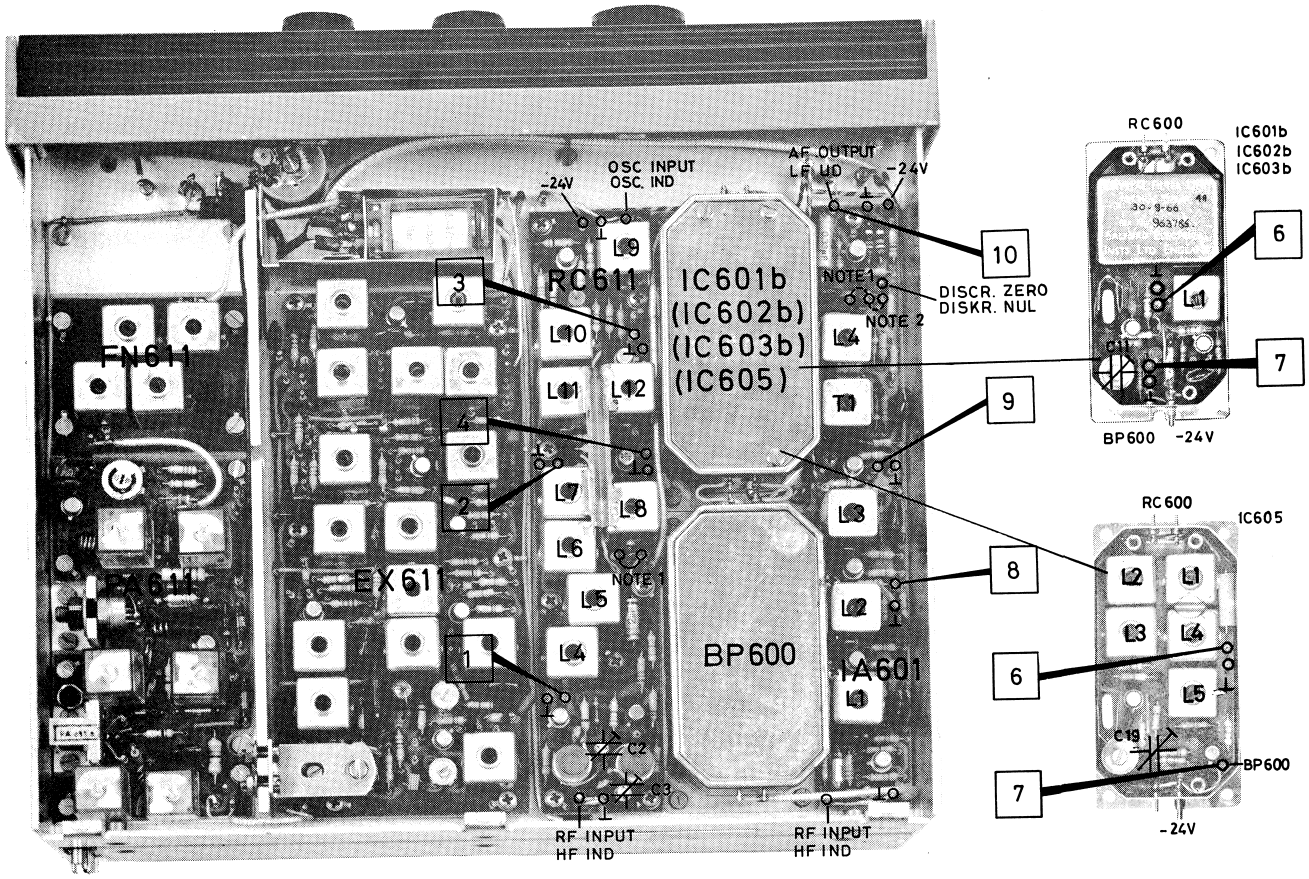
Check the frequency swing at 1060 Hz.

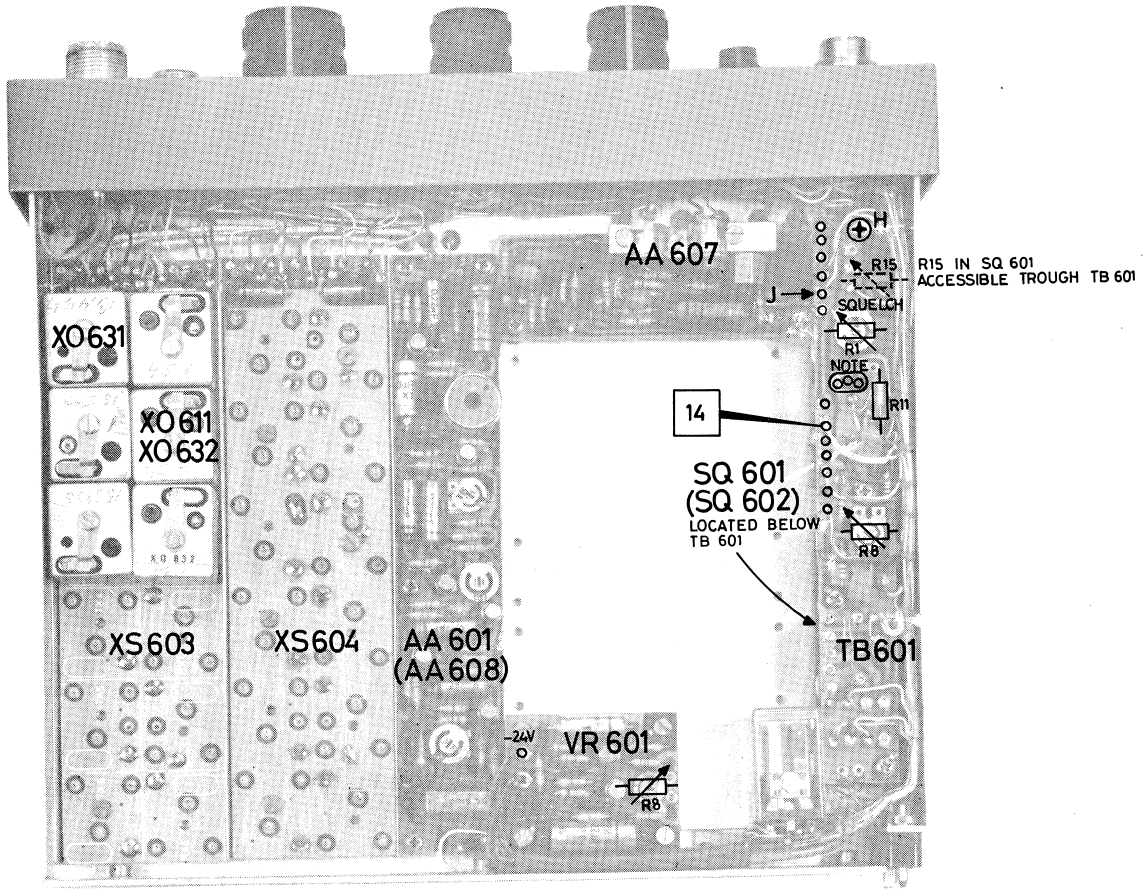
Adjust the tone transmitter coil for the desired tone frequency. Recheck the frequency swing.

Frequency swing for single-tone transmitter: 70%+1/-2 dB of maximum frequency swing.

Frequency swing for two-tone transmitter: 35% for each tone.

Storno





RECEIVER SECTION, CQP610

Location of Test Points and Adjustable Components

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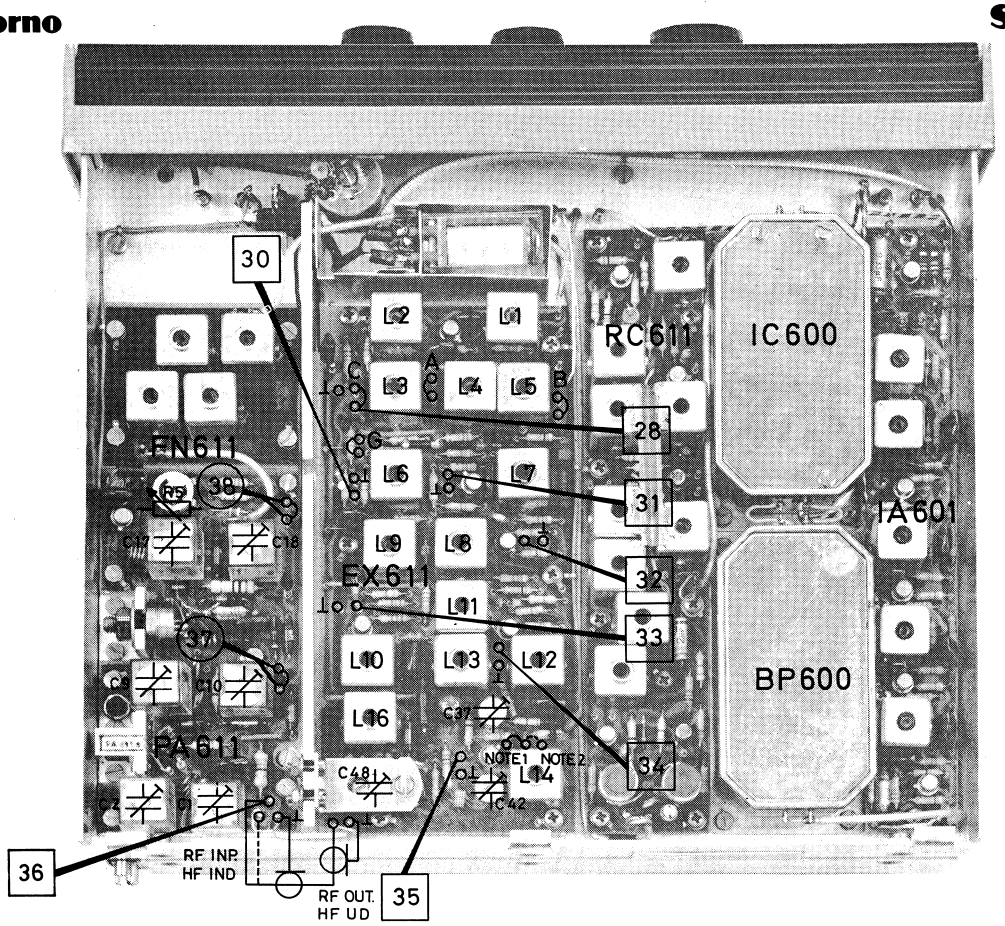

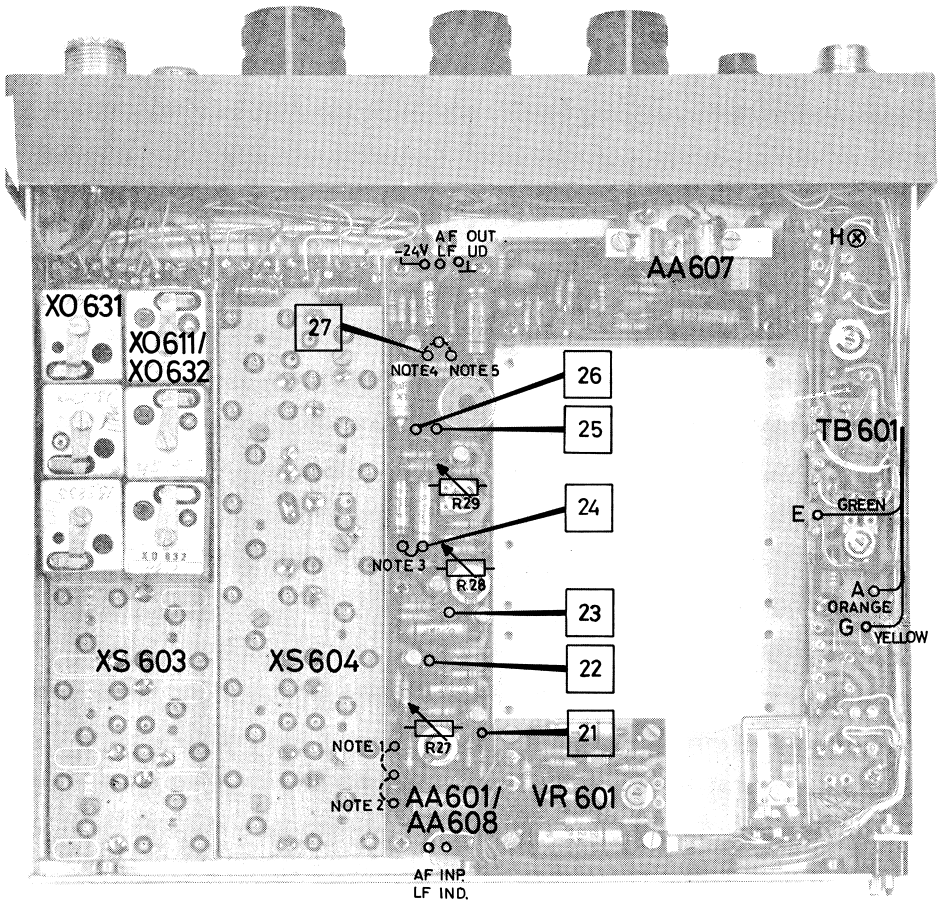

TRANSMITTER SECTION, CQP610

Location of Test Points and Adjustable Components

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Storno

CHAPTER VI. DIAGRAMS AND PARTS LISTS

GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

Resistors (R)


Resistor


Resistor with fixed tap


Variable resistor


Resistor with movable tap

Varistor (voltage-dependent resistor)

Temperature-dependent resistor with negative temperature coefficient


Light-sensitive resistor (Photosensitive resistor)

Capacitors (C)


Capacitor


Variable capacitor


Trimmer capacitor


Feedthrough capacitor


Electrolytic capacitor

Coils (L)

RF coil, air core


Coupled RF coils, air core

RF coil with core


RF coil with adjustable core

AF choke

Transformers (T)

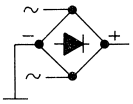

Transformer with adjustable RF cores


Transformer with iron core


Transformer with screen connected to chassis

Diodes (E)


Diode


Bridge rectifier


Series-connected stabilizer diodes within one case


Light-sensitive diode (Photosensitive diode)


Light-emitting diode


Zener diode (unidirectional)


Zener diode (bidirectional)


Tunnel diode


Varactor diode (capacitance diode)


Controlled rectifier, PNPN (N-thyristor)


Controlled rectifier, NPNP (P-thyristor)

Transistors (Q)


Transistor, PNP

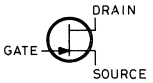

Transistor, NPN


Light-sensitive transistor


Unipolar transistor with N-type base

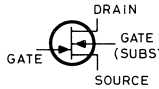

Unipolar transistor with P-type base

Junction Field Effect Transistors (JFET)



N-channel JFET


P-channel JFET



N-channel dual gate JFET


P-channel dual gate JFET

N-channel JFET tetrode

P-channel JFET tetrode

Insulated Gate Field Effect Transistors (IGFET or MOS)

N-channel IGFET (MOS)

P-channel IGFET (MOS)

N-channel dual gate IGFET (MOS)

P-channel dual gate IGFET (MOS)

Integrated Circuits (IC)

Several integrated circuits contained within one case are designated by one common number followed by an identifying letter (a, b, c etc.). Thus, circuits IC1a, IC1b and IC1c are contained within one case.

Gates

AND gate

OR gate

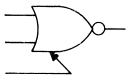
NAND gate

NOR gate

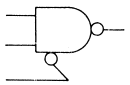
GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

Gates, continued

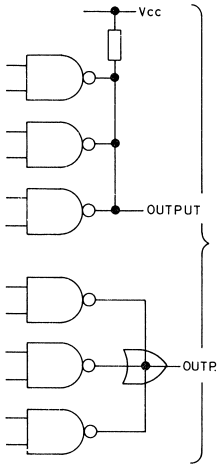
Exclusive OR gate



NOR gate with expander input (high)



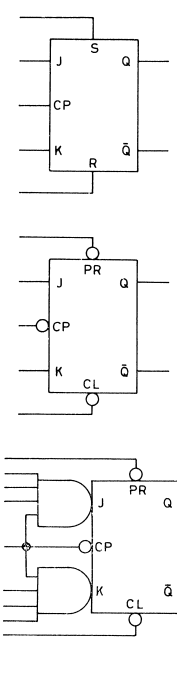
NAND gate with expander input (low)



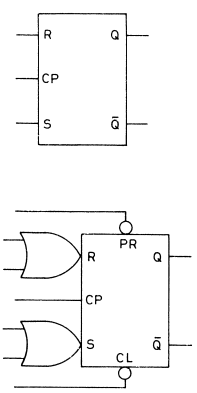
Wired OR (combined OR outputs) (presentation at top is used in detailed diagrams; presentation below is used in functional diagrams)

Flip-flops

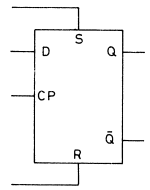
Abbreviations used: S = Set
R = Reset
CP = Clock Pulse
PR = Preset
CL = Clear



J-K Flip-flops

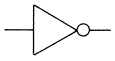


R-S Flip-flops



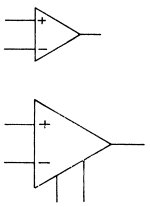
D Flip-flop

Inverters



Inverter

Operational Amplifiers

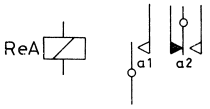


Operational amplifiers

Relays (RE)

Single-coil relay

Dual-coil relay



Relay with make contacts and change-over contacts

Relay with direction of winding indicated. Dot indicates two coils wound in the same direction

Polarized relay

Coil for slow-release relay

Coil for slow-acting relay

Contacts

Contacts are always shown in their non-operated positions unless otherwise specified

Make contacts

Break contacts

Change-over contacts

Change-over contacts, centre off

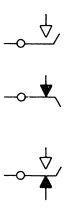
Make contacts, delayed operation

Make contacts, delayed release

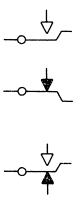
Mechanically coupled make contacts

Switches and Keys (O)

On/off switch



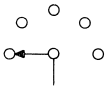
Locking keys or switches; push on, push off



Non-locking self-releasing keys or switches

Locking mutually releasing keys or switches (in row of push-buttons etc.)

Self-releasing switch (overcurrent switch etc.)



Rotary switch

GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

Lamps (V)

Indicator lamp

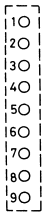
Neon lamp

Fuses and Cut-outs (S)

Fuse

Circuit-breaker

Tag Strips (KL)



Tag strip - dashed frame may be wholly or partly omitted

Batteries (BT)

Battery

Feedthrough Filters (F)

Feedthrough filter

Ferrite Beads (FB)

Ferrite bead

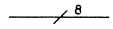
Crystals (X)

Crystal

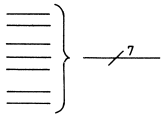
Cables and Wires (W)

Usual conductor

Three conductors



Eight conductors



Shift from multiple-line to single-line presentation

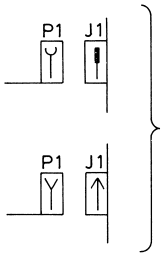
Screened wire

Coaxial cable

Connectors (J and P)

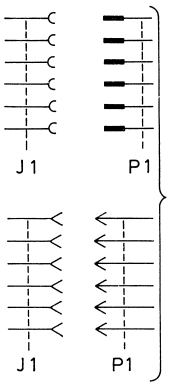
Female connector (socket). Lower symbol discontinued

Male connector (plug). Lower symbol discontinued



Schematic symbols for multi-wire connectors. (Upper symbol will gradually supersede lower symbol)

Multi-wire connectors are always designated "J" when permanently mounted on a cabinet or unit etc., "P" when fitted to cables

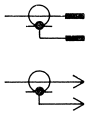


Detail symbols for multi-wire connectors. (Upper symbol will gradually supersede lower symbol)

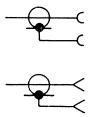
Where both connectors are fitted to cables, male connector is designated "P" and female connector "J"

Coaxial plug

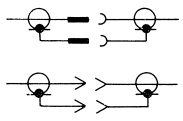
Coaxial socket



Coaxial plug for floating screen



Coaxial socket for floating screen



Coaxial plug with mating socket

Loudspeakers (LS)

Loudspeaker

Telephones (TEL)

Telephone

Single headphone (earphone)

Double headphone (headset)

Microphones (M)

Meters etc.

Indicating instrument

Balancing instrument

Inkwriter, recording instrument

Test Points

DC test point

AC test point

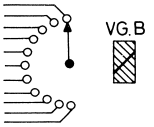
Replaceable Connections

Cross-field connection (jumper)

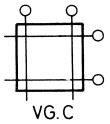
Strap

Selectors (VG)

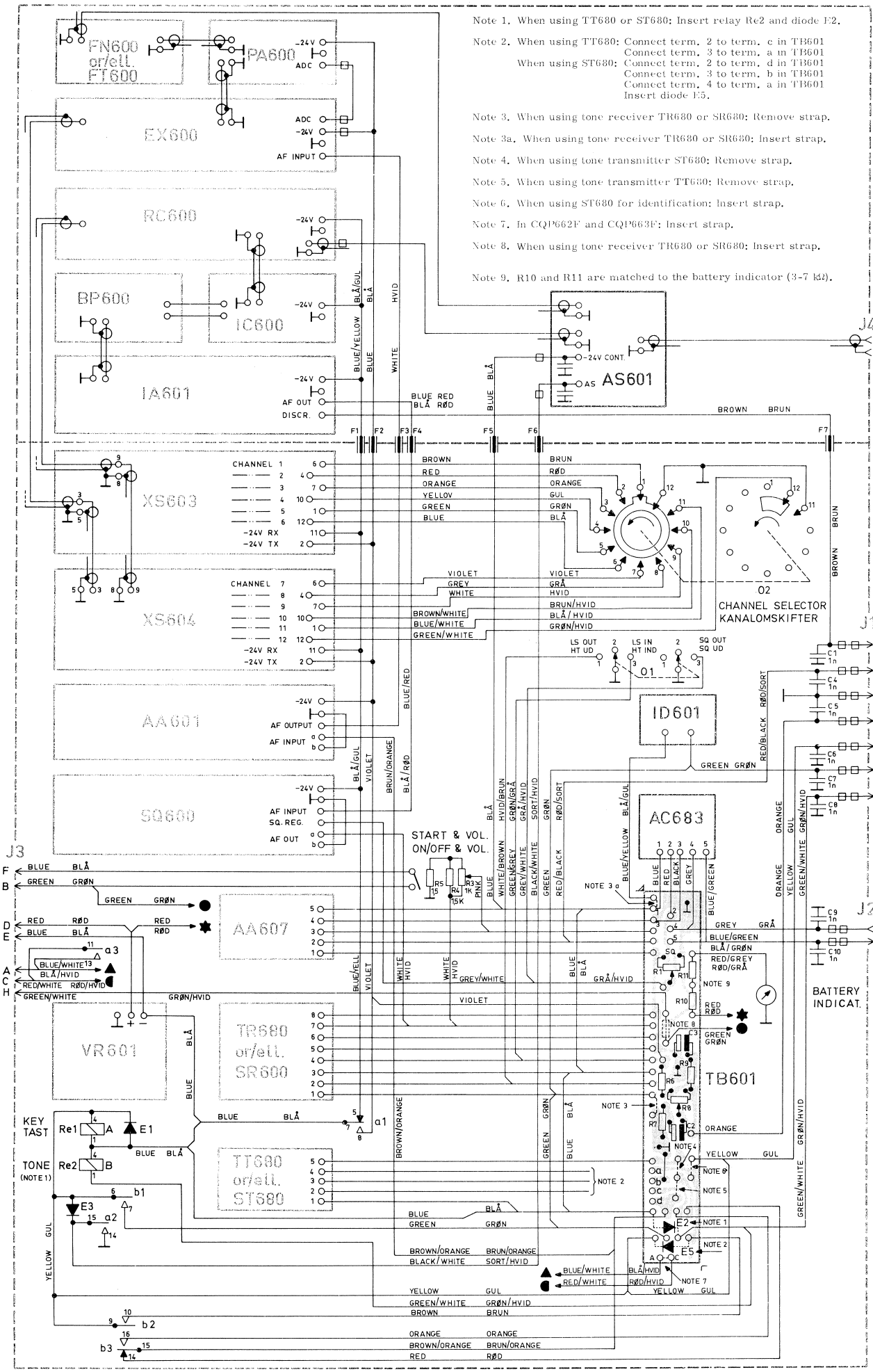
Schematic symbol for rotary selector with designation of number of contact points



Detail symbol for rotary selector



Co-ordinate selector



CABLEFORM CQP610/610F, CQP630/630F

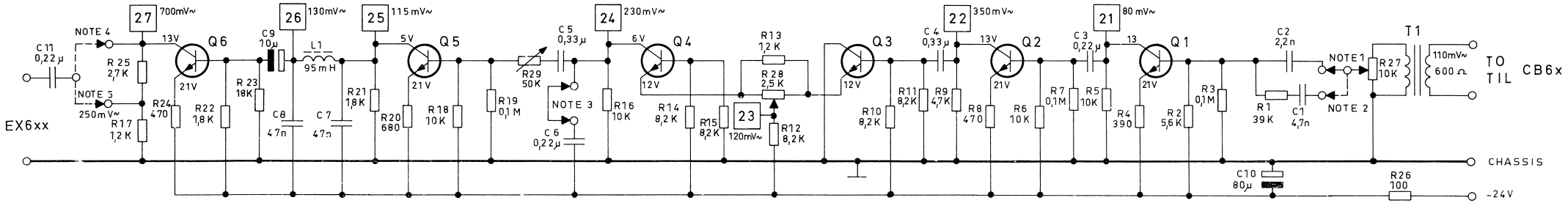
KABLINGSDIAGRAM CQP660/661F

D400.915/2

Storno

Storno

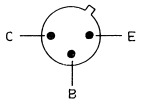
3. AMPLIFIER	2. AMPLIFIER	INTEGRAT. CIRCUIT	LIMITER	1. AMPLIFIER	DIFFERENTIATOR
3. FORSTÆRKER	2. FORSTÆRKER	INTEGRAT. LED	BEGRÆNSER	1. FORSTÆRKER	DIFFERENTIATIONSLED



AC VALUES MEASURED AT 1000Hz
AC VÆRDIER MÅLT VED 1000Hz

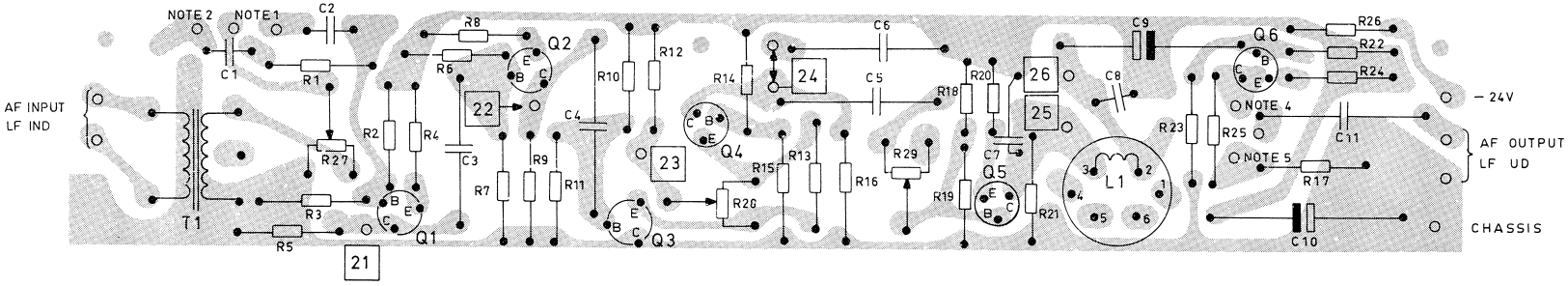
NOTE 1. DIFFERENTATION CIRCUIT FOR PURE PHASE MODULATION
NOTE 2. DIFFERENTATION CIRCUIT FOR MIXED PHASE AND FREQUENCY MODULATION.
NOTE 3. THE SHORTING LINK IS REMOVED AT MEASUREMENTS WHERE INTEGRATION IS UNWANTED.
NOTE 4. CONNECTION FOR 50kHz AND 25kHz IN 4 METER AND 50kHz CHANNEL SEPARATION IN 2 METER EQUIPMENT.
NOTE 5 CONNECTION FOR 25kHz AND 20kHz CHANNEL SEPARATION IN 2 METER EQUIPMENT.

NOTE 1. DIFFERENTIATIONSLED FOR REN FASEMODULATION
NOTE 2. DIFFERENTIATIONSLED FOR BLANDET FASE-OG FREKVENS-MODULATION.
NOTE 3. VED MÅLINGER HVOR INTEGRATION ER UØNSKET FJERNES STRAPNINGEN.
NOTE 4. TILSLUTNING FOR 50kHz OG 25kHz I 4 METER OG 50kHz KANALAFSTAND I 2 METER ANLÆG.
NOTE 5 TILSLUTNING FOR 25kHz OG 20kHz KANALAFSTAND I 2 METER ANLÆG.



BOTTOM VIEW
SET FRA BUNDEN

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF-AMPLIFIER
LF-FORSTÆRKER

AA601

D 400.671/3

TYPE	NO.	CODE	DATA	
	C1	76.5061	4,7nF 10% polyest. FL	50V
	C2	76.5059	2,2nF 10% polyest. FL	50V
	C3	76.5074	0,22uF 10% polyest. TB	100V
	C4	76.5075	0,3uF 10% polyest. TB	100V
	C5	76.5075	0,3uF 10% polyest. TB	100V
	C6	76.5074	0,22uF 10% polyest. TB	100V
	C7	76.5072	47nF 10% polyest. FL	50V
	C8	76.5072	47nF 10% polyest. FL	50V
	C9	73.5001	10uF -10 +50% elco	25V
	C10	73.5110	80uF -10 +50% elco	25V
	C11	76.5074	0,22uF 10% polyest. TB	100V
	R1	80.5268	39kΩ 5% carbon film	1/8W
	R2	80.5258	5,6kΩ 5% carbon film	1/8W
	R3	80.5273	100kΩ 5% carbon film	1/8W
	R4	80.5244	390Ω 5% carbon film	1/8W
	R5	80.5261	10kΩ 5% carbon film	1/8W
	R6	80.5261	10kΩ 5% carbon film	1/8W
	R7	80.5273	100kΩ 5% carbon film	1/8W
	R8	80.5245	470Ω 5% carbon film	1/8W
	R9	80.5257	4,7kΩ 5% carbon film	1/8W
	R10	80.5260	8,2kΩ 5% carbon film	1/8W
	R11	80.5260	8,2kΩ 5% carbon film	1/8W
	R12	80.5260	8,2kΩ 5% carbon film	1/8W
	R13	80.5250	1,2kΩ 5% carbon film	1/8W
	R14	80.5260	8,2kΩ 5% carbon film	1/8W
	R15	80.5260	8,2kΩ 5% carbon film	1/8W
	R16	80.5261	10kΩ 5% carbon film	1/8W
	R17	80.5250	1,2kΩ 5% carbon film	1/8W
	R18	80.5261	10kΩ 5% carbon film	1/8W
	R19	80.5273	100kΩ 5% carbon film	1/8W
	R20	80.5247	680Ω 5% carbon film	1/8W
	R21	80.5252	1,8kΩ 5% carbon film	1/8W
	R22	80.5252	1,8kΩ 5% carbon film	1/8W
	R23	80.5264	18 kΩ 5% carbon film	1/8W
	R24	80.5245	470Ω 5% carbon film	1/8W
	R25	80.5254	2,7kΩ 5% carbon film	1/8W
	R26	80.5237	100Ω 5% carbon film	1/8W
	R27	86.5039	10kΩ 20% trim lin	0,1W
	R28	86.5043	2,5kΩ 20% trim lin	0,1W
	R29	86.5040	50 kΩ 20% trim lin	0,1W
	L1	61.824	Filter coil/Filterspole	95 mH
	T1	60.5130	Transformator LF600/1000Ω	
	Q1	99.5143	Transistor BC108	
	Q2	99.5143	Transistor BC108	
	Q3	99.5143	Transistor BC108	

Storno

TYPE	NO.	CODE	DATA
	Q4	99.5143	Transistor BC108
	Q5	99.5143	Transistor BC108
	Q6	99.5143	Transistor BC108

AF-AMPLIFIER
LF-FORSTÆRKER

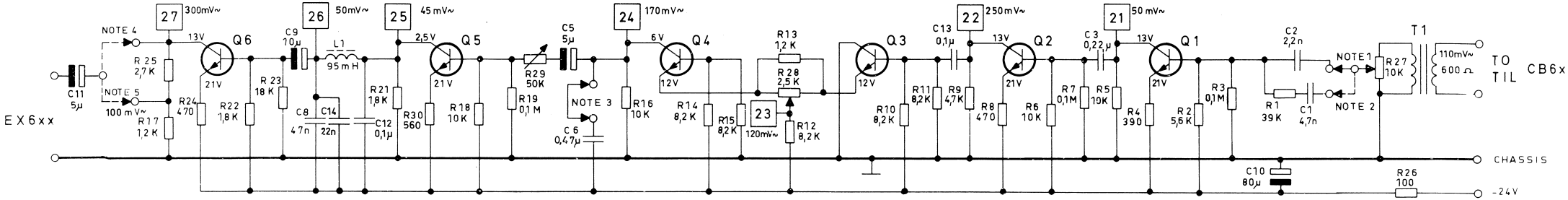
AA601

X400.683/3

Storno

Storno

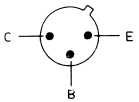
3. AMPLIFIER	2. AMPLIFIER	INTEGRAT. CIRCUIT	LIMITER	1. AMPLIFIER	DIFFERENTIATOR
3. FORSTÆRKER	2. FORSTÆRKER	INTEGRAT. LED	BEGRÆNSER	1. FORSTÆRKER	DIFFERENTIATIONSLED



AC VALUES MEASURED AT 1000Hz
AC VÆRDIER MÅLT VED 1000Hz

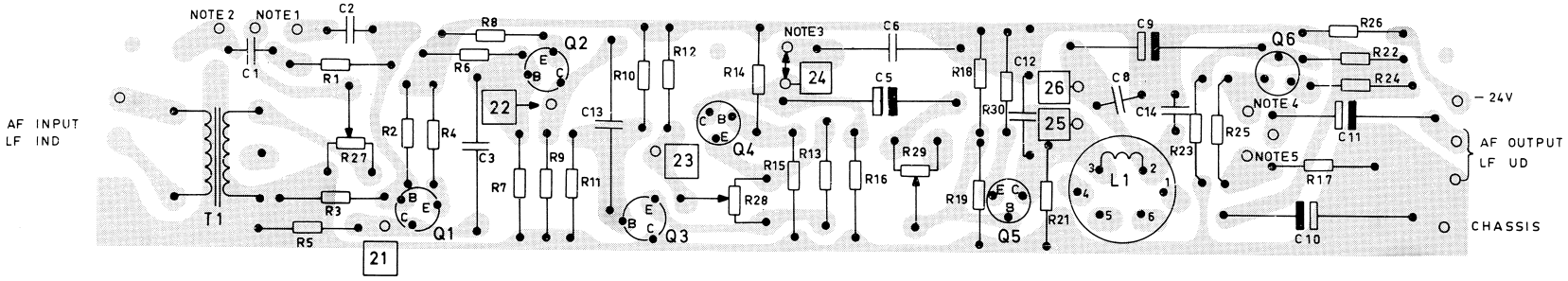
NOTE 1. DIFFERENTATION CIRCUIT FOR PURE PHASE MODULATION
NOTE 2. DIFFERENTATION CIRCUIT FOR MIXED PHASE AND FREQUENCY MODULATION.
NOTE 3. THE SHORTING LINK IS REMOVED AT MEASUREMENTS WHERE INTEGRATION IS UNWANTED.
NOTE 4. CONNECTION FOR 12,5kHz CHANNEL SEPARATION IN 4 METER EQUIPMENT.
NOTE 5 CONNECTION FOR 12,5kHz CHANNEL SEPARATION IN 2 METER EQUIPMENT.

NOTE 1. DIFFERENTIATIONSLED FOR REN FASEMODULATION
NOTE 2. DIFFERENTIATIONSLED FOR BLANDET FASE-OG FREKVENS-MODULATION.
NOTE 3. VED MÅLINGER HVOR INTEGRATION ER UØNSKET FJERNES STRAPNINGEN.
NOTE 4. TILSLUTNING FOR 12,5kHz KANALAFSTAND I 4 METER ANLÆG.
NOTE 5 TILSLUTNING FOR 12,5kHz KANALAFSTAND I 2 METER ANLÆG



BOTTOM VIEW
SET FRA BUNDEN

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF-AMPLIFIER
LF-FORSTÆRKER

AA608

D400.838/2

TYPE	NO.	CODE	DATA	
	C1	76.5061	4.7 nF 10% polyest. FL	50V
	C2	76.5059	2.2 nF 10% " FL	50V
	C3	76.5074	0.22 µF 10% " TB	100V
	C5	73.5104	5 µF 10/+100% elco	100V
	C6	76.5094	0.47 µF 20% polyest. FL	
	C8	76.5072	47 nF 10% polyest. FL	50V
	C9	73.5001	10 µF -10/+50% elco	25V
	C10	73.5110	80 µF -10/+50% elco	25V
	C11	73.5104	5 µF 10/+100% elco	100V
	C12	76.5073	0.1 µF 10% polyest. FL	50V
	C13	76.5073	0.1 µF 10% polyest. FL	50V
	C14	76.5071	22 nF 10% polyest. FL	50V
	R1	80.5268	39 kΩ 5% carbon film	1/8W
	R2	80.5258	5.6 kΩ 5% " "	1/8W
	R3	80.5273	0.1 MΩ 5% " "	1/8W
	R4	80.5244	390 Ω 5% " "	1/8W
	R5	80.5261	10 kΩ 5% " "	1/8W
	R6	80.5261	10 kΩ 5% " "	1/8W
	R7	80.5273	0.1 MΩ 5% " "	1/8W
	R8	80.5245	470 Ω 5% " "	1/8W
	R9	80.5257	4.7 kΩ 5% " "	1/8W
	R10	80.5260	8.2 kΩ 5% " "	1/8W
	R11	80.5260	8.2 kΩ 5% " "	1/8W
	R12	80.5260	8.2 kΩ 5% " "	1/8W
	R13	80.5250	1.2 kΩ 5% " "	1/8W
	R14	80.5260	8.2 kΩ 5% " "	1/8W
	R15	80.5260	8.2 kΩ 5% " "	1/8W
	R16	80.5261	10 kΩ 5% " "	1/8W
	R17	80.5250	1.2 kΩ 5% " "	1/8W
	R18	80.5261	10 kΩ 5% " "	1/8W
	R19	80.5273	0.1 MΩ 5% " "	1/8W
	R21	80.5252	1.8 kΩ 5% " "	1/8W
	R22	80.5252	1.8 kΩ 5% " "	1/8W
	R23	80.5264	18 kΩ 5% " "	1/8W
	R24	80.5245	470 Ω 5% " "	1/8W
	R25	80.5254	2.7 kΩ 5% " "	1/8W
	R26	80.5237	100 Ω 5% " "	1/8W
	R27	86.5039	10 kΩ 20% potentiometer lin.	0.1W
	R28	86.5043	2.5 kΩ 20% " "	0.1W
	R29	86.5040	50 kΩ 20% " "	0.1W
	R30	80.5246	560 Ω 5% carbon film	1/8W
	L1	61.824-01	Filter coil/Filterspole	95 mH
	T1	60.5130	Transformer 600/1000 Ω	
	Q1	99.5143	BC108 Transistor	

Storno

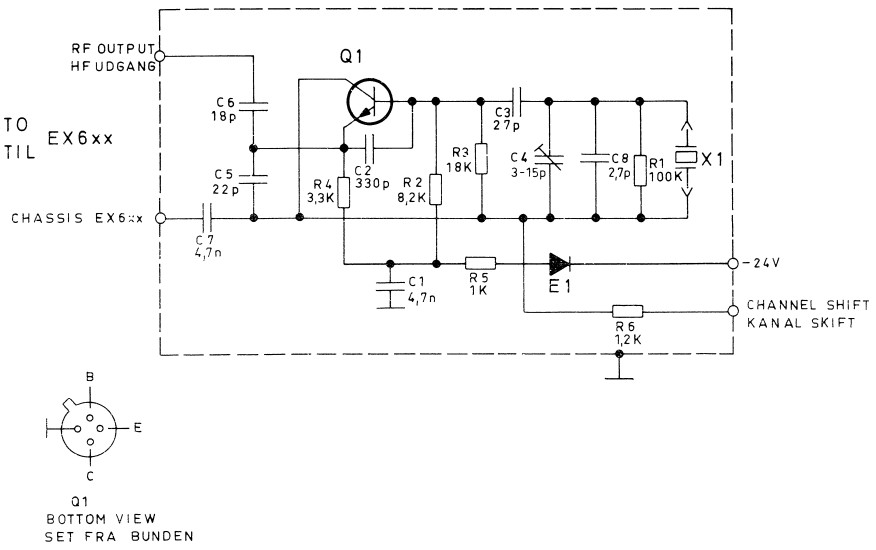
TYPE	NO.	CODE	DATA
	Q2	99.5143	BC108 Transistor
	Q3	99.5143	BC108 Transistor
	Q4	99.5143	BC108 Transistor
	Q5	99.5143	BC108 Transistor
	Q6	99.5143	BC108 Transistor

AF-AMPLIFIER
LF-FORSTÆRKER

AA608

X400.850/2

Storno



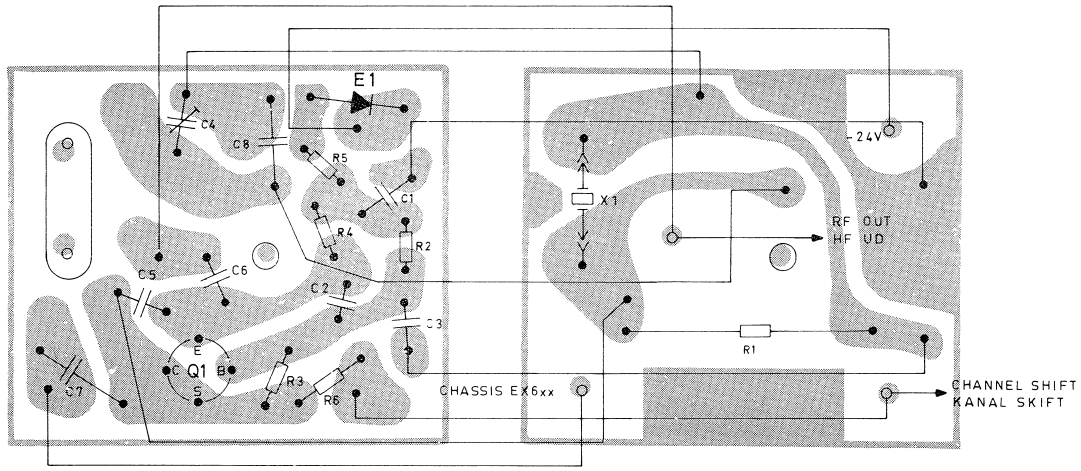
Q1
BOTTOM VIEW
SET FRA BUNDEN

UPPER PRINTED WIRING BOARD VIEWED
FROM COMPONENT SIDE

ØVERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN

LOWEST PRINTED WIRING BOARD VIEWED
FROM COMPONENT SIDE

NEDERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN



CRYSTALOSCILLATOR FOR TX.

XO631a

D400.666/3

TYPE	NO.	CODE	DATA	
	C1	76.5061	4,7nF ± 10% polyester FL	50V
	C2	76.5105	330pF 2,5% polystyren	30V
	C3	74.5107	27pF ± 0,5pF ceram NO75TB	250V
	C4	78.5032	3-15pF trimmer ceram NPOTB	500V
	C5	74.5106	22 pF ± 0,5pF ceram NO75TB	250V
	C6	74.5142	18 pF ± 0,5pF " NO75TB	250V
	C7	76.5061	4,7nF ± 10% polyester	50V
	C8	74.5128	2,7pF ± 0,25pF ceram N150DI	250V
	R1	80.5273	100 kΩ 5% carbon film	1/8W
	R2	80.5260	8,2 kΩ 5% " "	1/8W
	R3	80.5264	18 kΩ 5% " "	1/8W
	R4	80.5255	3,3kΩ 5% " "	1/8W
	R5	80.5249	1 kΩ 5% " "	1/8W
	R6	80.5250	1,2 kΩ 5% " "	1/8W
	E1	99.5028	Diode OA200	
	Q1	99.5118	Transistor BF115	
	X1	98.	Crystal	

Storno

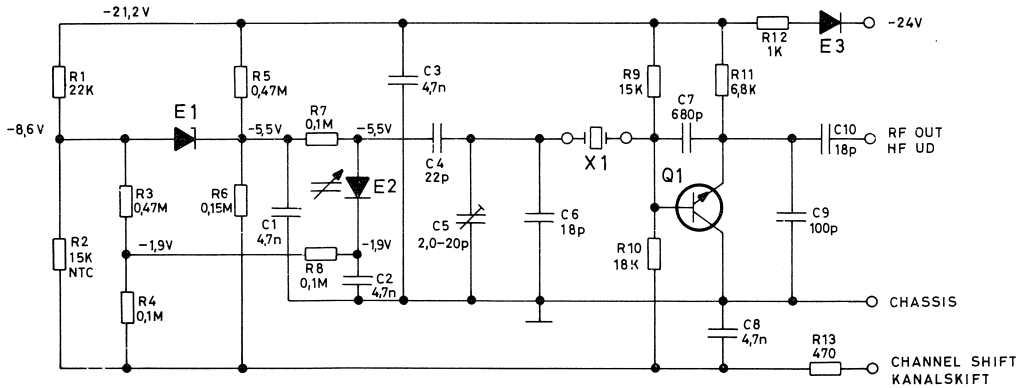
TYPE	NO.	CODE	DATA

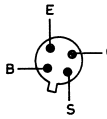
CRYSTALOSCILLATOR FOR TX.

XO631

X400.680/2

Storno



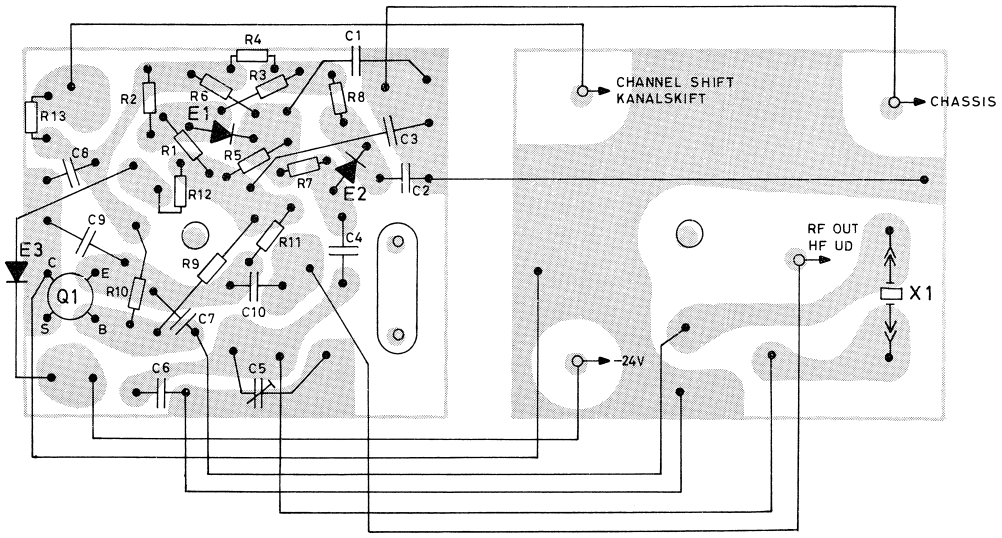


UPPER PRINTED WIRING BOARD
VIEWED FROM COMPONENT SIDE

ØVERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN

LOWEST PRINTED WIRING BOARD
VIEWED FROM COMPONENT SIDE

NEDERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN



CRYSTAL OSCILLATOR
KRYSTAL OSCILLATOR

XO665

D400.991/2

TYPE	NO.	CODE	DATA	
	C1	76.5061	4.7 nF 10% polyest. FL	50V
	C2	76.5061	4.7 nF 10% polyest. FL	50V
	C3	76.5061	4.7 nF 10% polyest. FL	50V
	C4	74.5106	22 pF ±0,5 pF ceram N075 TB	160V
	C5	78.5044	2-20 pF teflon N250 norm.	500V
	C6	74.5142	18 pF ±0,5 pF ceram N075 TB	160V
	C7	76.5018	680 pF 5% polystyr. TB	125V
	C8	76.5061	4.7 nF 10% polyest. FL	50V
	C9	76.5079	100 pF 5% polystyr. TB	125V
	C10	74.5138	18 pF 5% ceram N150 DI	125V
	R1	80.5065	22 kΩ 5% carbon film	1/10W
	R2	89.5010	15 kΩ 20% NTC	0,6W
	R3	80.5081	0,47 MΩ 5% carbon film	1/10W
	R4	80.5073	0,1 MΩ 5% carbon film	1/10W
	R5	80.5081	0,47 MΩ 5% carbon film	1/10W
	R6	80.5075	0,15 MΩ 5% carbon film	1/10W
	R7	80.5073	0,1 MΩ 5% carbon film	1/10W
	R8	80.5073	0,1 MΩ 5% carbon film	1/10W
	R9	80.5063	15 kΩ 5% carbon film	1/10W
	R10	80.5064	18 kΩ 5% carbon film	1/10W
	R11	80.5059	6,8 kΩ 5% carbon film	1/10W
	R12	80.5049	1 kΩ 5% carbon film	1/10W
	R13	80.5045	470 Ω 5% carbon film	1/10W
	E1	99.5042	Zenerdiode 9,1V 5%	0,25W
	E2	99.5140	Capacitance diode BA101C	
	E3	99.5028	Diode 1N914	
	Q1	99.5166	Transistor BF167	

Storno

TYPE	NO.	CODE	DATA

CRYSTAL OSCILLATOR
KRYSTALOSCILLATOR

XO665

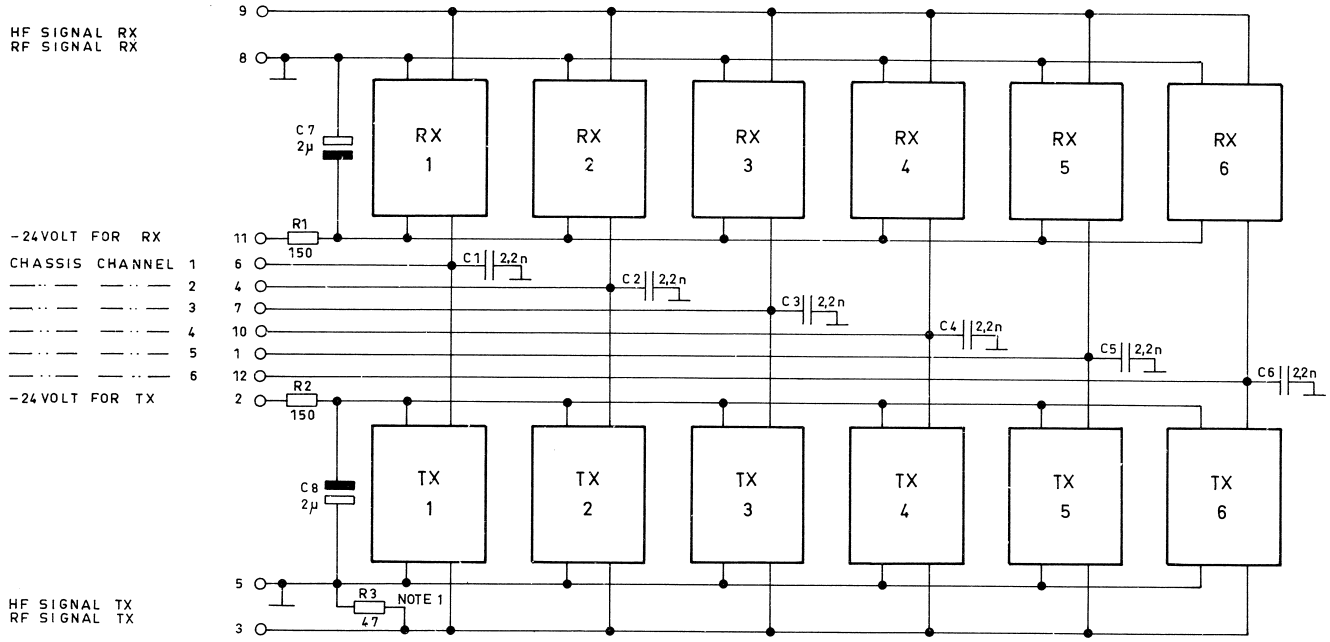
X401.038

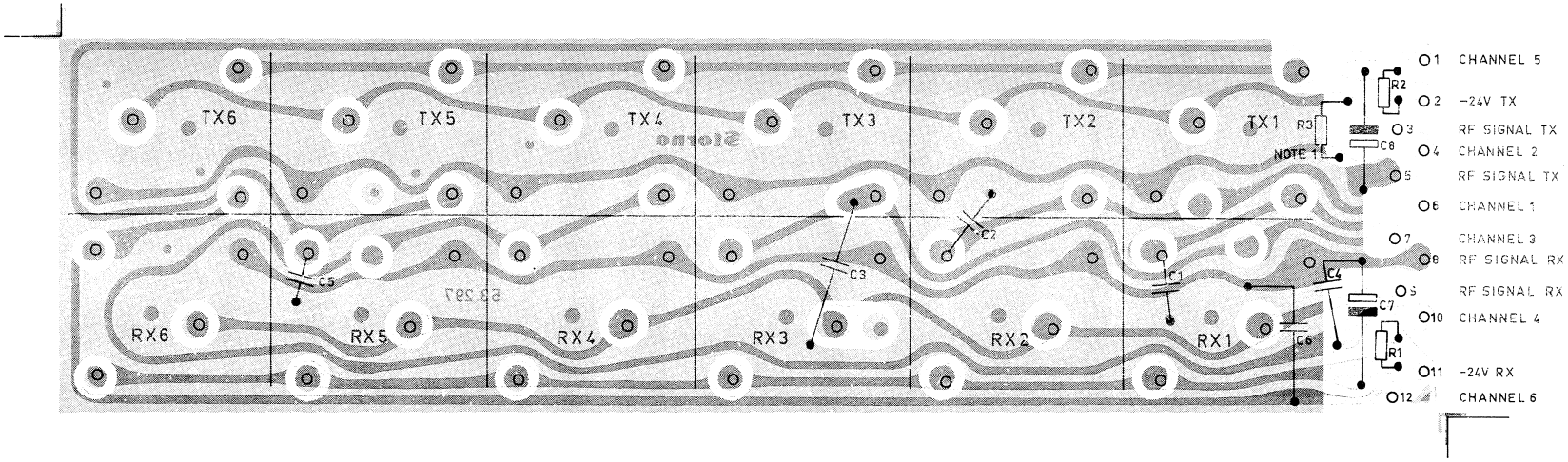
Storno

Storno

NOTE 1 : R3(47Ω) IS ONLY PROVIDED IN CONNECTION WITH TRANSMITTER OSCILLATORS.

R3(47Ω) MONTERES KUN I FORBINDELSE MED SENDEROSCILLATORER.





CRYSTAL SHIFT PANEL
KRYSTALSKIFTEPANEL

XS603

D400.817

Storno

TYPE	NO.	CODE	DATA
	C1	76.5059	2.2 nF 10% polyest. FL 50V
	C2	76.5059	2.2 nF 10% " FL 50V
	C3	76.5059	2.2 nF 10% " FL 50V
	C4	76.5059	2.2 nF 10% " FL 50V
	C5	76.5059	2.2 nF 10% " FL 50V
	C6	76.5059	2.2 nF 10% " FL 50V
	C7	73.5064	2 μF -10/+50% elco TB 70V
	C8	73.5064	2 μF -10/+50% elco TB 70V
	R1	80.5239	150Ω 5% carbon film 1/8W
	R2	80.5239	150Ω 5% " " 1/8W
CQL	R3	80.5033	47 Ω 5% " " 1/10W

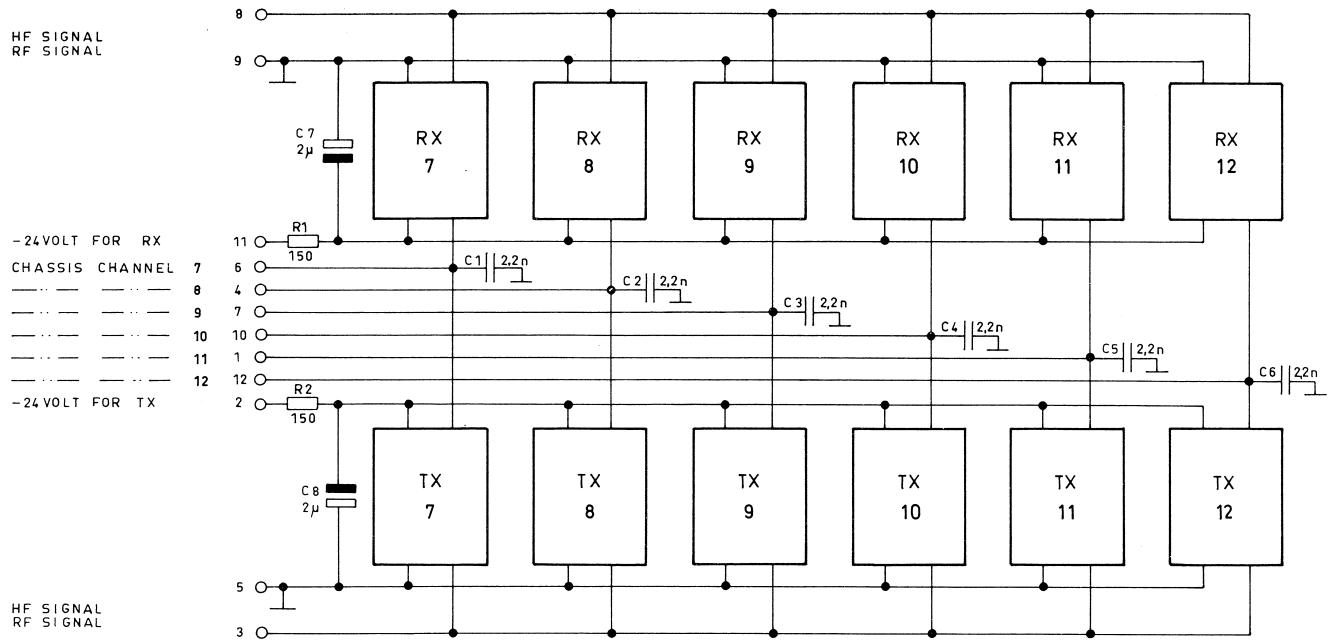
TYPE	NO.	CODE	DATA

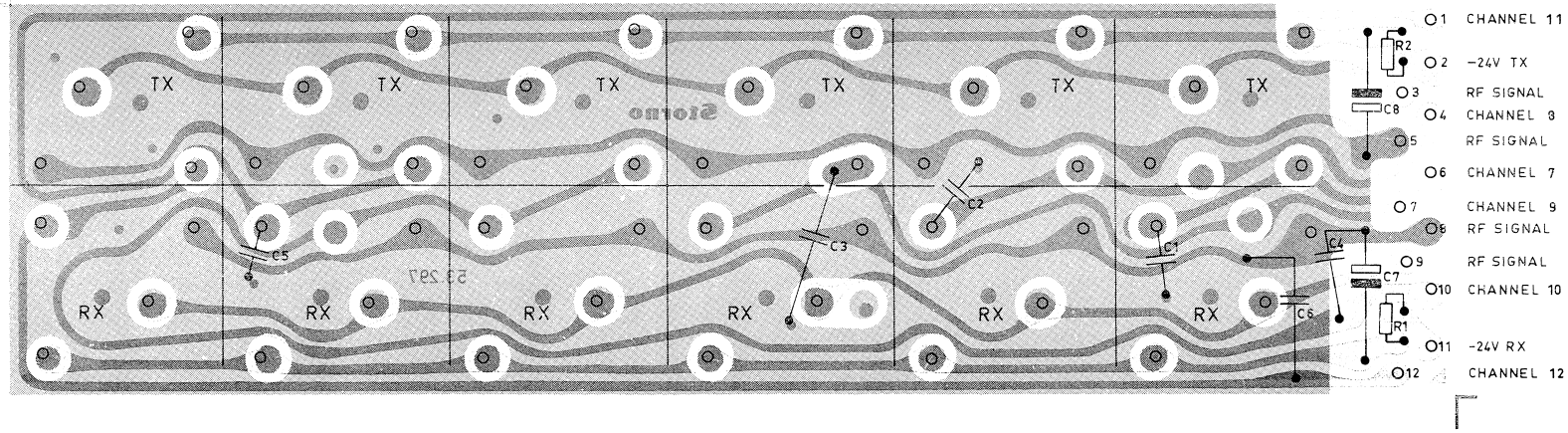
CRYSTAL OSCILLATOR PANEL XS603

X400.876

Storno

Storno





CRYSTAL SHIFT PANEL
KRYSTALSKIFTEPANEL

XS604

D400.906

Storno

TYPE	NO.	CODE	DATA	
	C1	76.5059	2,2 nF 10% polyest. FL	50V
	C2	76.5059	2,2 nF 10% polyest. FL	50V
	C3	76.5059	2,2 nF 10% polyest. FL	50V
	C4	76.5059	2,2 nF 10% polyest. FL	50V
	C5	76.5059	2,2 nF 10% polyest. FL	50V
	C6	76.5059	2,2 nF 10% polyest. FL	50V
	C7	73.5064	2 µF -10/+50% elco TB	70V
	C8	73.5064	2 µF -10/+50% elco TB	70V
	R1	80.5239	150 Ω 5% carbon film	1/8W
	R2	80.5239	150 Ω 5% carbon film	1/8W

Storno

TYPE	NO.	CODE	DATA

CRYSTAL SHIFT PANEL
KRYSTALSKIFTEPANEL

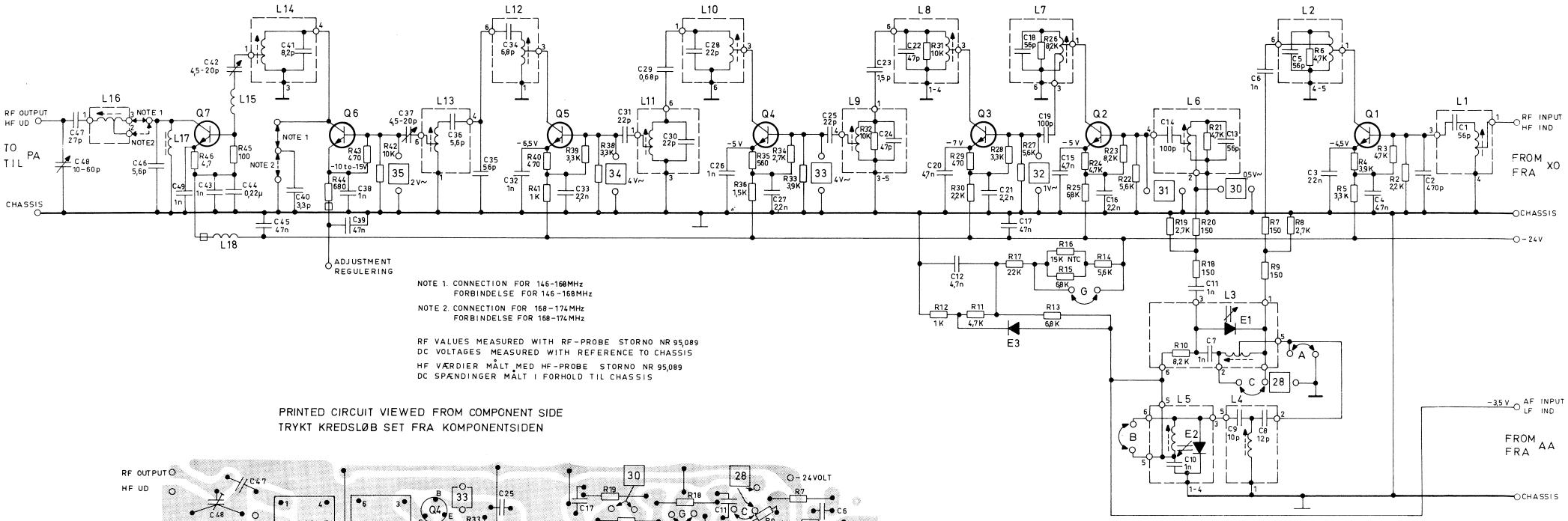
XS604

X401.037/2

Storno

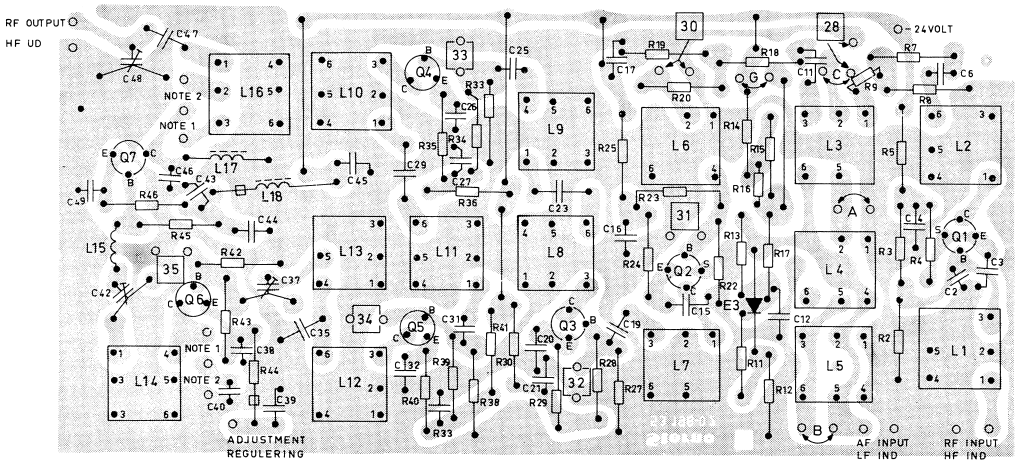
2. PA 1. PA 2. DOUBLER 2. DOBLER TRIPLER 1. DOUBLER 1. DOBLER 2. BUFFER 1. BUFFER

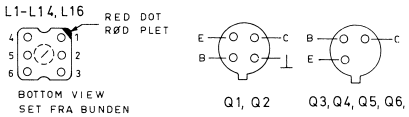
Storno



MODULATOR

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN





EXCITER
STYRESENDER EX611

D400.670/4

TYPE	NO.	CODE	DATA	
	C1	74.5111	56pF 2% ceram TB	250V
	C2	74.5161	470pF -20/+50% ceram PL	63V
	C3	76.5071	22nF 10% polyest. FL	50V
	C4	74.5163	2,2nF -20/+50% ceram PL	63V
	C5	74.5111	56pF 2% ceram TB	250V
	C6	74.5155	1 nF -20/+50% ceram PL	63V
	C7	74.5155	1 nF -20/+50% " PL	63V
	C8	74.5136	12pF 5% ceram DI	125V
	C9	74.5135	10pF 5% " DI	125V
	C10	74.5155	1 nF -20/+50% ceram PL	63V
	C11	74.5155	1 nF -20/+50% " PL	63V
	C12	74.5164	4,7nF -20/+50% " PL	63V
	C13	74.5111	56 pF 2% ceram TB	250V
	C14	74.5013	100pF 20% " DI	500V
	C15	74.5164	4.7nF -20/+50% ceram PL	63V
	C16	74.5163	2,2nF -20/+50% " PL	63V
	C17	76.5072	47nF 10% polyest. FL	50V
	C18	74.5111	56pF 2% ceram TB	250V
	C19	74.5013	100pF 20% ceram DI	500V
	C20	74.5164	4.7nF -20/+50% ceram PL	63V
	C21	74.5163	2.2nF -20/+50% " PL	63V
	C22	74.5118	47pF 2% ceram TB	250V
	C23	74.5125	1.5pF ± 0.25pF ceram BO	250V
	C24	74.5118	47 pF 2% ceram TB	250V
	C25	74.5106	22 pF ± 0,5pF ceram TB	250V
	C26	74.5155	1 nF -20/+50% " PL	63V
	C27	74.5163	2,2 nF -20/+50% " PL	63V
	C28	74.5106	22 pF ± 0,5pF " TB	250V
	C29	74.5121	0,68pF ± 0,1pF " BD	250V
	C30	74.5106	22pF ± 0.5pF " TB	250V
	C31	74.5106	22pF ± 0.5pF " TB	250V
	C32	74.5155	1 nF -20/+50% " PL	63V
	C33	74.5163	2.2nF -20/+50% " PL	63V
	C34	74.5133	6.8pF ± 0.25pF " DI	250V
	C35	74.5111	56pF 2% ceram TB	250V
	C36	74.5132	5.6pF ± 0,25pF ceram DI	250V
	C37	78.5026	4.5-20pF Trimmer ceram	100V
	C38	74.5155	1 nF -20/+50% ceram PL	63V
	C39	76.5072	47nF 10% polyest. FL	50V
	C40	74.5129	3.3pF ± 0,25pF ceram DI	250V
	C41	74.5134	8,2pF ± 0,25pF " DI	250V
	C42	78.5026	4.5-20pF Trimmer ceram	100V
	C43	74.5155	1 nF -20/+50% ceram PL	63V
	C44	76.5074	0.22 μF 10% polyest. TB	100V
	C45	76.5072	47nF 10% " FL	50V
	C46	74.5132	5.6pF ± 0.25pF ceram DI	250V
	C47	74.5107	27pF 2% ceram TB	250V
	C48	78.5030	10-60pF Trimmer ceram	250V

Storno

TYPE	NO.	CODE	DATA	
	C49	76.5072	47nF 10% polyest. FL	50V
	C50	74.5155	1 nF -20/+50 ceram PL	63V
	R2	80.5253	2.2 kΩ 5% carbon film	1/8W
	R3	80.5257	4.7 kΩ 5% " "	1/8W
	R4	80.5256	3.9 kΩ 5% " "	1/8W
	R5	80.5255	3.3 kΩ 5% " "	1/8W
	R6	80.5057	4.7 kΩ 5% " "	1/8W
	R7	80.5239	150 Ω 5% " "	1/8W
	R8	80.5254	2,7 kΩ 5% " "	1/8W
	R9	80.5239	150 Ω 5% " "	1/8W
	R10	80.5060	8.2 kΩ 5% " "	1/10W
	R11	80.5257	4.7 kΩ 5% " "	1/8W
	R12	80.5249	1 kΩ 5% " "	1/8W
	R13	80.5259	6.8 kΩ 5% " "	1/8W
	R14	80.5258	5.6 kΩ 5% " "	1/8W
	R15	80.5259	6.8 kΩ 5% " "	1/8W
	R16	89.5010	15 kΩ 10% NTC	0.6W
	R17	80.5265	22 kΩ 5% carbon film	1/8W
	R18	80.5239	150 Ω 5% " "	1/8W
	R19	80.5254	2.7 kΩ 5% " "	1/8W
	R20	80.5239	150 Ω 5% " "	1/8W
	R21	80.5057	4.7 kΩ 5% " "	1/10W
	R22	80.5257	4.7 kΩ 5% " "	1/8W
	R23	80.5260	8.2 kΩ 5% " "	1/8W
	R24	80.5257	4.7 kΩ 5% " "	1/8W
	R25	80.5259	6.8 kΩ 5% " "	1/8W
	R26	80.5060	8.2 kΩ 5% " "	1/10W
	R27	80.5259	6.8 kΩ 5% " "	1/8W
	R28	80.5255	3.3 kΩ 5% " "	1/8W
	R29	80.5245	470 Ω 5% " "	1/8W
	R30	80.5253	2.2 kΩ 5% " "	1/8W
	R31	80.5061	10 kΩ 5% " "	1/10W
	R32	80.5061	10 kΩ 5% " "	1/10W
	R33	80.5256	3.9 kΩ 5% " "	1/8W
	R34	80.5254	2.7 kΩ 5% " "	1/8W
	R35	80.5246	560 Ω 5% " "	1/8W
	R36	80.5251	1.5 kΩ 5% " "	1/8W
	R38	80.5255	3.3 kΩ 5% " "	1/8W
	R39	80.5255	3.3 kΩ 5% " "	1/8W
	R40	80.5245	470 Ω 5% " "	1/8W
	R41	80.5249	1 kΩ 5% " "	1/8W
	R42	80.5261	10 kΩ 5% " "	1/8W

EXCITER
STYRESENDER

EX611

X400.690/4

TYPE	NO.	CODE	DATA
	R43	80.5245	470 Ω 5% carbon film 1/8W
	R44	80.5247	680 Ω 5% " " 1/8W
	R45	80.5237	100 Ω 5% " " 1/8W
	R46	80.5221	4.7 Ω 10% " " 1/8W
	L1	61.825	Coil/spole 12,16-14,5 MHz (C1,)
	L2	61.826	Coil/spole 12,16-14,5 MHz (C5, R6)
	L3	61.827	Coil/spole 12,16-14,5 MHz (C7, R10, E1)
	L4	61.828	Coil/spole 12,16-14,5 MHz (C8, C9)
	L5	61.829	Coil/spole 12,16-14,5 MHz (C10, E2)
	L6	61.846	Coil/spole 12,16-14,5 MHz (C13, C14, R21)
	L7	61.847	Coil/spole 12,16-14,5 MHz (C18, R26)
	L8	61.848	Coil/spole 24, 33-29 MHz (C22, R31)
	L9	61.849	Coil/spole 24, 33-29 MHz (C24, R32)
	L10	61.850	Coil/spole 73-87 MHz (C28)
	L11	61.851	Coil/spole 73.87 MHz (C30)
	L12	61.852	Coil/spole 146-174 MHz (C34)
	L13	61.853	Coil/spole 146-174 MHz (C36)
	L14	61.854	Coil/spole 146-174 MHz (C41)
	L15	62.715	Coil/spole 146-174 MHz
	L16	61.856	Coil/spole 146-174 MHz
	L17	61.5007	Filter coil/Filterspole 15μH 20% 200mA
	L18	63.5008	Filter coil/Filterspole 0,47μH 20% 2.2A
	E1	99.5140	Capacitance diode BA101C
	E2	99.5140	Capacitance diode BA101C
	E3	99.5136	Diode AA119
	Q1	99.5118	Transistor BF115
	Q2	99.5118	Transistor BF115
	Q3	99.5139	Transistor BSX19
	Q4	99.5139	Transistor BSX19
	Q5	99.5139	Transistor BSX19
	Q6	99.5139	Transistor BSX19
	Q7	99.5138	Transistor 2N3866

Storno

TYPE	NO.	CODE	DATA

EXCITER
STYRESENDER

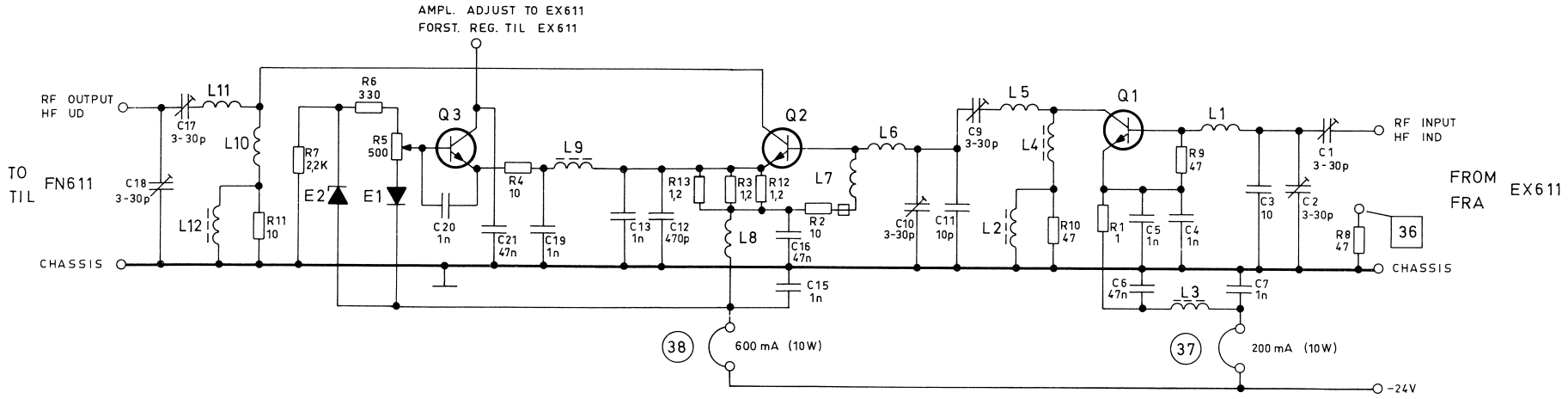
EX611

X400.690/4

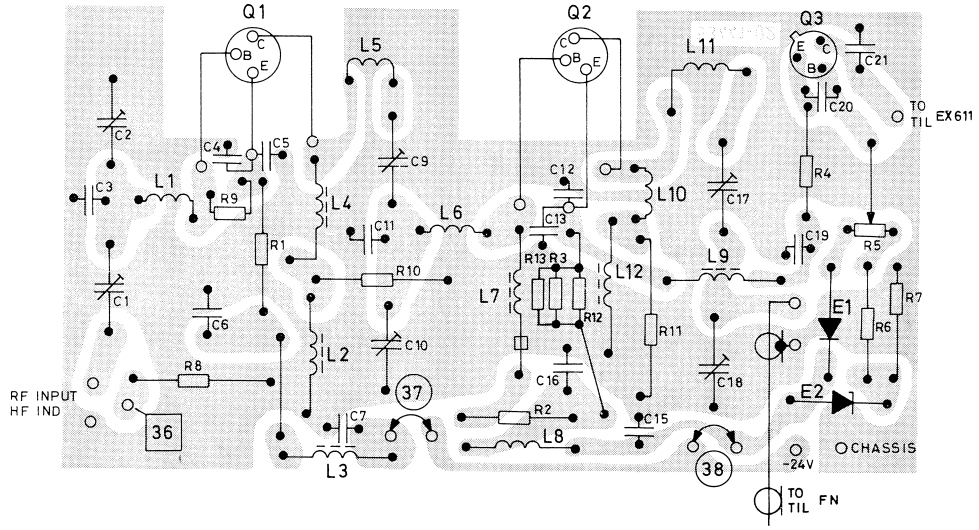
Storno

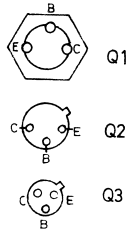
Storno

ADC PA DRIVER



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE.
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN.





BOTTOM VIEW
SET FRA BUNDEN

NOTE 1: THE SHORT CIRCUITS ARE REPLACED BY mA-INSTRUMENTS DURING ADJUSTMENT.

NOTE 1: KORTSLUTNINGERNE ERSTATTES AF mA-METRE UNDER JUSTERING

RF POWER AMPLIFIER
HF-EFFEKTFORSTÆRKER

PA611a

D400.669/5

Storno

TYPE	NO.	CODE	DATA	
	C1	78.5029	3-30 pF trimmer	300V
	C2	78.5029	3-30 pF "	300V
	C3	74.5135	10 pF 5% ceram N150	125V
	C4	74.5155	1 nF -20 +50% ceram PL	63V
	C5	74.5155	1 nF -20 +50% " PL	63V
	C6	76.5072	47 nF 10% polyest. FL	500V
	C7	74.5155	1 nF -20 +50% ceram PL	63V
	C9	78.5029	3-30 pF trimmer	300V
	C10	78.5029	3-30 pF "	300V
	C11	74.5135	10 pF 5% ceram N150	125V
	C12	74.5161	470 pF -20 +50% ceram PL	63V
	C13	74.5155	1 nF -20 +50% ceram PL	63V
	C15	74.5155	1 nF -20 +50% " PL	63V
	C16	76.5072	47 nF 10% polyest. FL	500V
	C17	78.5029	3-30 pF trimmer	300V
	C18	78.5029	3-30 pF "	300V
	C19	74.5155	1 nF -20 +50% ceram PL	63V
	C20	74.5155	1 nF -20 +50% " PL	63V
	C21	76.5072	47 nF 10% polyest. FL	500V
	R1	80.5213	1 Ω 10% carbon film	1/8W
	R2	80.5225	10 Ω 5% " "	1/8W
	R3	80.5214	1.2 Ω 10% " "	1/8W
	R4	80.5225	10 Ω 5% " "	1/8W
	R5	86.5042	500 Ω 20% potentiometer	0.1W
	R6	80.5243	330 Ω 5% carbon film	1/8W
	R7	80.5253	2.2 kΩ 5% " "	1/8W
	R8	80.5433	47 Ω 5% " "	1/4W
	R9	80.5233	47 Ω 5% " "	1/8W
	R10	80.5233	47 Ω 5% " "	1/8W
	R11	81.5025	10 Ω 5% " "	1/2W
	R12	80.5214	1.2 Ω 10% " "	1/8W
	R13	80.5214	1.2 Ω 10% " "	1/8W
	L1	62.718	RF-coil/HF spole 146-174 MHz	
	L2	63.5007	15 μH 10% choke/drossel	0.5A
	L3	63.5006	2.2 μH 20% " "	0.6A
	L4	63.5008	0.47 μH 20% " "	2 A
	L5	62.719	RF-coil/HF spole 146-174 MHz	
	L6	62.718	RF-coil/HF spole 146-174 MHz	
	L7	63.5008	0.47 μH 20% choke/drossel	2 A
	L8	63.5008	0.47 μH 20% " "	2 A
	L9	63.5006	2.2 μH 20% " "	0.6A
	L10	62.717	RF-coil/HF-spole	
	L11	62.716	RF-coil/HF-spole 146-174 MHz	
	E1	99.5028	OA 200 Diode	
	E2	99.5114	BZY 57 Zenerdiode	

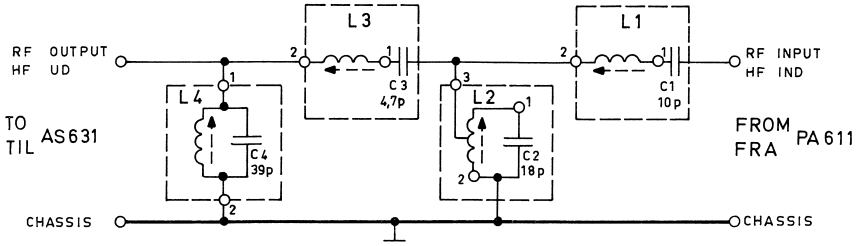
TYPE	NO.	CODE	DATA
	Q1	99.5129	2N3553 Transistor
	Q2	99.5137	2N3632 Transistor
	Q3	99.5121	BC107 Transistor

RF-POWER AMPLIFIER
HF-EFFEKTFORSTÆRKER

PA611a

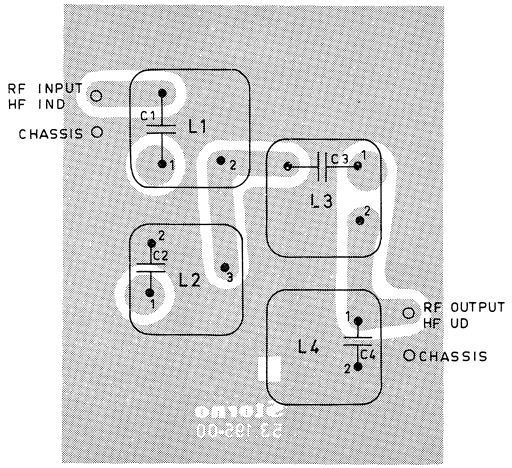
X400.678/4

Storno



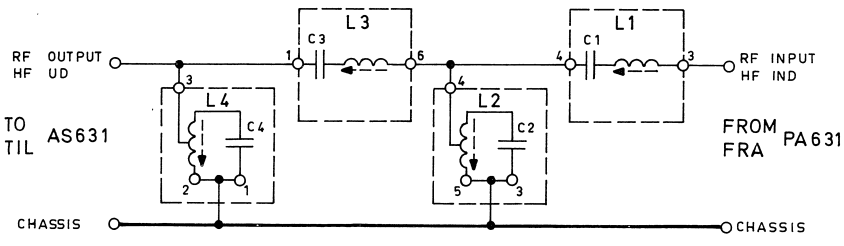
FN611

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



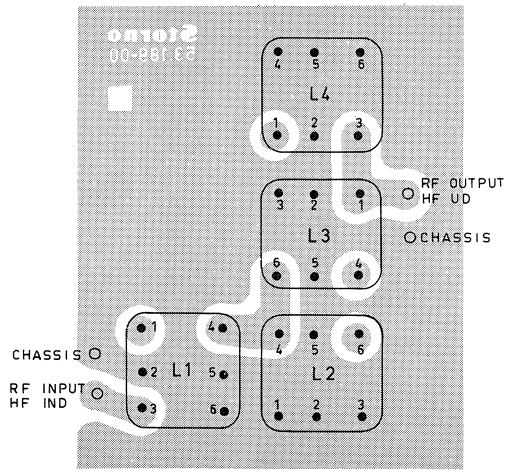
FN611

Storno



FN631

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



FN631

ANTENNA FILTER
ANTENNE FILTER

FN611 FN631

D400.668/2

Storno

TYPE	NO.	CODE	DATA
611	C1	74.5135	10pF 5% ceram. N15 DI 125V
631	C1	74.5106	22pF ±0,5pF " NO75 TB 250V
611	C2	74.5138	18pF 5% " N150 DI 250V
631	C2	74.5117	39pF ±2% " NO75 TB 250V
611	C3	74.5131	4,7pF ±0,25pF " N150 DI 250V
631	C3	74.5141	12pF ±0,5pF " NO75 TB 250V
611	C4	74.5117	39pF ±2% " NO75 TB 250V
631	C4	74.5106	22pF ±0,5pF " NO75 TB 250V
611	L1	61.861	Coil/Spole 146-174 MHz (C1)
631	L1	61.807	Coil/Spole 68-88 MHz (C1)
611	L2	61.862	Coil/Spole 146-174 MHz (C2)
631	L2	61.808	Coil/Spole 68-88 MHz (C2)
611	L3	61.863	Coil/Spole 146-174 MHz (C3)
631	L3	61.809	Coil/Spole 68-88 MHz (C3)
611	L4	61.864	Coil/Spole 146-174 MHz (C4)
631	L4	61.810	Coil/Spole 68-88 MHz (C4)

Storno

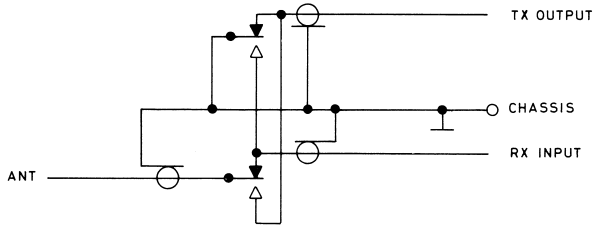
TYPE	NO.	CODE	DATA

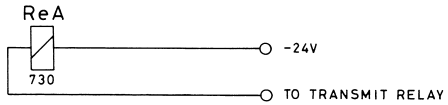
ANTENNA FILTER
ANTENNE FILTER

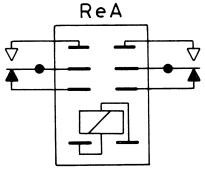
X400.689

FN611, FN631

Storno







BOTTOM VIEW
SET FRA BUNDEN

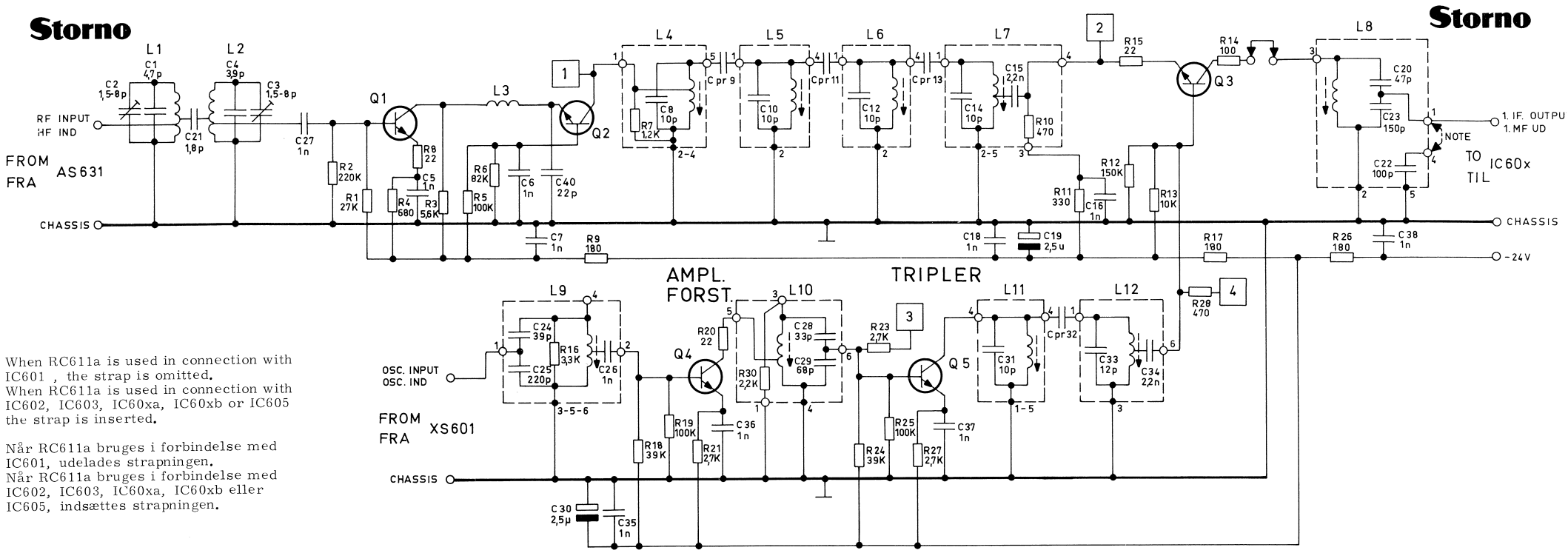
ReA: 58.5063 RELAY/RELÆ 24V 730Ω

ANTENNA SWITCHING UNIT
ANTENNESKIFTEENHED

AS601

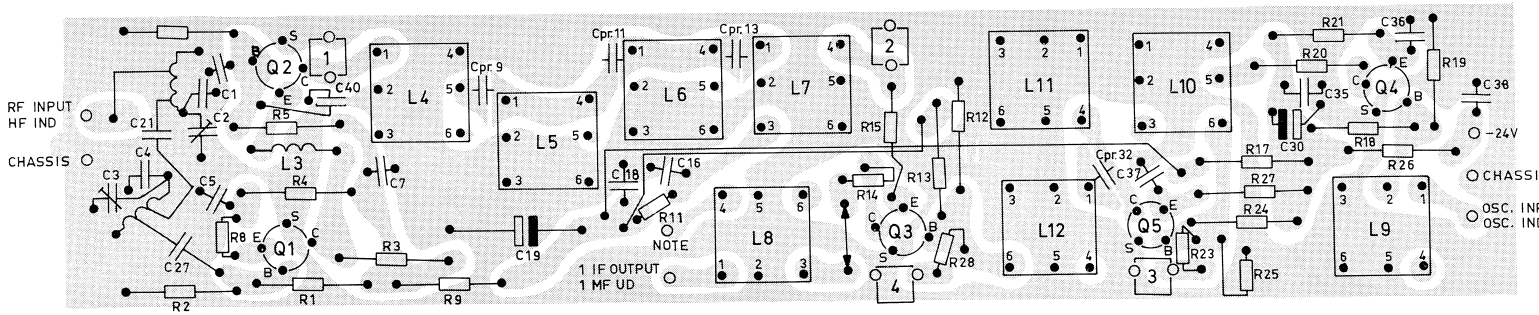
D400.905

SF. MX.



Note: When RC611a is used in connection with IC601 , the strap is omitted.
When RC611a is used in connection with IC602, IC603, IC60xa, IC60xb or IC605 the strap is inserted.

Når RC611a bruges i forbindelse med IC601, udelades strapningen.
Når RC611a bruges i forbindelse med IC602, IC603, IC60xa, IC60xb eller IC605, indsættes strapningen.



RECEIVER CONVERTER
MODTAGER KONVERTER

RC611a

D400.833/2

TYPE	NO.	CODE	DATA	
	C1	74.5131	4,7pF ± 0,25pF N150 DI	500V
	C2	78.5034	1,5-8pF trimmer NPO TB	125V
	C3	78.5034	1,5-8pF trimmer NPO TB	125V
	C4	74.5130	3,9pF ± 0,25pF N150 DI	500V
	C5	74.5155	1nF -20 +50% ceram. PL	63V
	C6	74.5155	1nF -20 +50% ceram. PL	63V
	C7	74.5155	1nF -20 +50% ceram. PL	63V
	C8	74.5110	10pF ± 0,5pF ceram. NO75 TB	250V
	C9		print capacitance/printkapacitet	
	C10	74.5110	10pF ± 0,5pF ceram. NO75 TB	250V
	C11		print capacitance/printkapacitet	
	C12	74.5110	10pF ± 0,5pF ceram. NO75 TB	250V
	C13		print capacitance/printkapacitet	
	C14	74.5110	10pF ± 0,5pF ceram. NO75 TB	250V
	C15	76.5059	2,2nF 10% polyest. FL	50V
	C16	74.5155	1nF -20 +50% ceram. PL	63V
	C18	74.5155	1nF -20 +50% ceram. PL	63V
	C19	73.5064	2,5µF -10 +50% elco	70V
	C20	74.5118	47pF ± 2% ceram. NO75 TB	250V
	C21	74.5126	1,8pF ± 0,25pF N150 BD	250V
	C22	76.5079	100pF 5% polystyr. TB	125V
	C23	76.5062	150pF 5% polystyr. TB	125V
	C24	74.5117	39pF 2% ceram. TB	250V
	C25	76.5063	220pF 5% polystyr.	125V
	C26	74.5059	1nF 10% polyest. FL	50V
	C27	74.5155	1nF -20 +50% ceram. PL	63V
	C28	74.5116	33pF 2% ceram. NO75 TB	250V
	C29	74.5144	68pF 2% ceram. NO75 TB	250V
	C30	73.5064	2,5µF -10 +50% elco	70V
	C31	74.5110	10pF ± 0,5pF ceram. NO75 TB	250V
	C32		print capacitance/printkapacitet	
	C33	74.5141	12pF ± 0,5pF ceram. NO75 TB	250V
	C34	76.5059	2,2nF 10% polyest. FL	50V
	C35	74.5155	1nF -20 +50% ceram. PL	63V
	C36	74.5155	1nF -20 +50% ceram. PL	63V
	C37	74.5155	1nF -20 +50% ceram. PL	63V
	C38	74.5155	1nF -20 +50% ceram. PL	63V
	C40	74.5106	22 pF ± 0,5 pF NO75 TB	160V
	R1	80.5266	27kΩ 5% carbon film	1/8W
	R2	80.5277	0,22MΩ 5% carbon film	1/8W
	R3	80.5258	5,6kΩ 5% carbon film	1/8W
	R4	80.5247	680kΩ 5% carbon film	1/8W
	R5	80.5273	0,1MΩ 5% carbon film	1/8W
	R6	80.5272	82kΩ 5% carbon film	1/8W
	R7	80.5250	1,2kΩ 5% carbon film	1/8W
	R8	80.5259	22Ω 5% carbon film	1/8W
	R9	80.5240	180Ω 5% carbon film	1/8W
	R10	80.5045	470Ω 5% carbon film	1/10W

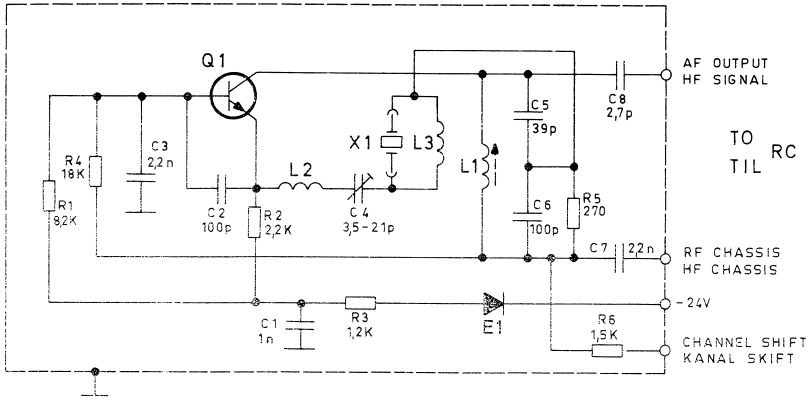
TYPE	NO.	CODE	DATA	
	R11	80.5243	330Ω 5% carbon film	1/8W
	R12	80.5275	0,15MΩ 5% carbon film	1/8W
	R13	80.5261	10kΩ 5% carbon film	1/8W
	R14	80.5237	100Ω 5% carbon film	1/8W
	R15	80.5229	22Ω 5% carbon film	1/8W
	R16	80.5035	3,3kΩ 5% carbon film	1/10W
	R17	80.5240	180Ω 5% carbon film	1/8W
	R18	80.5268	39kΩ 5% carbon film	1/8W
	R19	80.5273	0,1MΩ 5% carbon film	1/8W
	R20	80.5229	22Ω 5% carbon film	1/8W
	R21	80.5254	2,7kΩ 5% carbon film	1/8W
	R23	80.5254	2,7kΩ 5% carbon film	1/8W
	R24	80.5268	39kΩ 5% carbon film	1/8W
	R25	80.5273	0,1MΩ 5% carbon film	1/8W
	R26	80.5240	180Ω 5% carbon film	1/8W
	R27	80.5254	2,7kΩ 5% carbon film	1/8W
	R28	80.5245	470Ω 5% carbon film	1/8W
	R30	80.5253	2,2kΩ 5% carbon film	1/10W
	L1	62.759	RF coil/HF-spole 146-174MHz	
	L2	62.758	RF coil/HF-spole 146-174MHz	
	L3	62.659	RF choke/HF-drosselspole	
	L4	61.1034	RF coil/HF-spole (C8, R7)	
	L5	61.868-01	RF coil/HF-spole (C10)	
	L6	61.869-01	RF coil/HF-spole (C12)	
	L7	61.870-01	RF coil/HF-spole (C14, C15, R10)	
	L8	61.871-01	RF coil/HF-spole (C20, C21, C22, C23)	
	L9	61.872-01	RF coil/HF-spole (C24, C25, C26, R16)	
	L10	61.1033	RF coil/HF-spole (C28, C29, R30)	
	L11	61.874-02	RF coil/HF-spole (C31)	
	L12	61.875-02	RF coil/HF-spole (C33, C34)	
	Q1	99.5177	Transistor BF166	
	Q2	99.5118	Transistor BF115	
	Q3	99.5168	Transistor BF173	
	Q4	99.5166	Transistor BF167	
	Q5	99.5166	Transistor BF167	

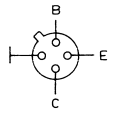
RECEIVER CONVERTER
MODTAGER KONVERTER

RC611a

X400.888/2

Storno





Q1

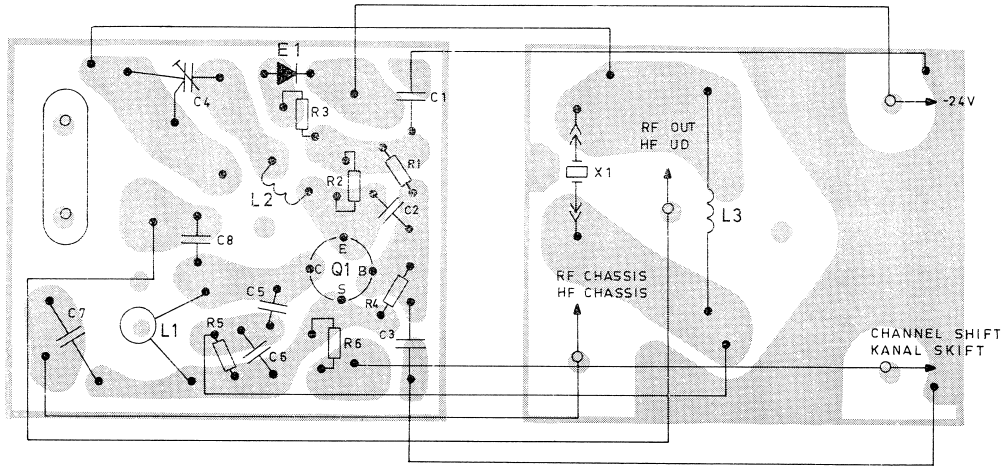
BOTTOM VIEW
SET FRA BUNDEN

UPPER PRINTED WIRING BOARD VIEWED
FROM COMPONENT SIDE

ØVERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN

LOWEST PRINTED WIRING BOARD VIEWED
FROM COMPONENT SIDE

NEDERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN



CRYSTALOSCILLATOR FOR RX.

XO611a

D400.667/4

TYPE	NO.	CODE	DATA	
	C1	76.5069	1nF 10% polyester FL	50V
	C2	76.5102	100pF 2, 5% polystyr	30V
	C3	76.5059	2, 2nF 10% polystyr FL	50V
	C4	78.5044	2 - 18 pF trimmer	300V
	C5	74.5117	39 pF ± 2% ceram NO75TB	250V
	C6	76.5102	100pF 2, 5% polystyr	30V
	C7	76.5059	2, 2nF 10% polyester FL	50V
	C8	74.5128	2, 7pF ± 0, 25pF ceram N150BD	250V
	R1	80.5260	8, 2kΩ 5% carbon film	1/8W
	R2	80.5253	2, 2kΩ 5% " "	1/8W
	R3	80.5250	1, 2kΩ 5% " "	1/8W
	R4	80.5264	18 kΩ 5% " "	1/8W
	R5	80.5242	270Ω 5% " "	1/8W
	R6	80.5251	1, 5 kΩ 5% " "	1/8W
	E1	99.5028	Diode 1N914	
	L1	61.876	RF coil/HF-spole 48-57 MHz	
	L2	62.662	Filter coil/Drosselspole	
	L3	62.652-01	Filter coil/Drosselspole	
	Q1	99.5028	Transistor BF167	
	X1		Crystal	

Storno

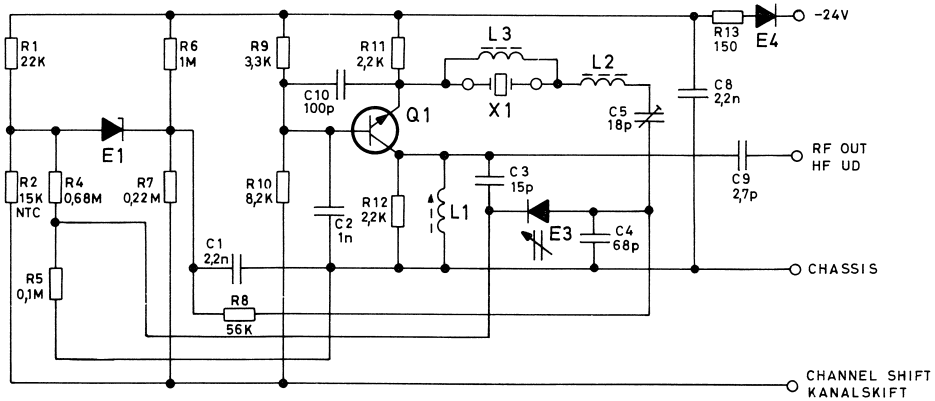
TYPE	NO.	CODE	DATA

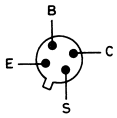
CRYSTALOSCILLATOR FOR RX.

XO611a

X400.686/3

Storno





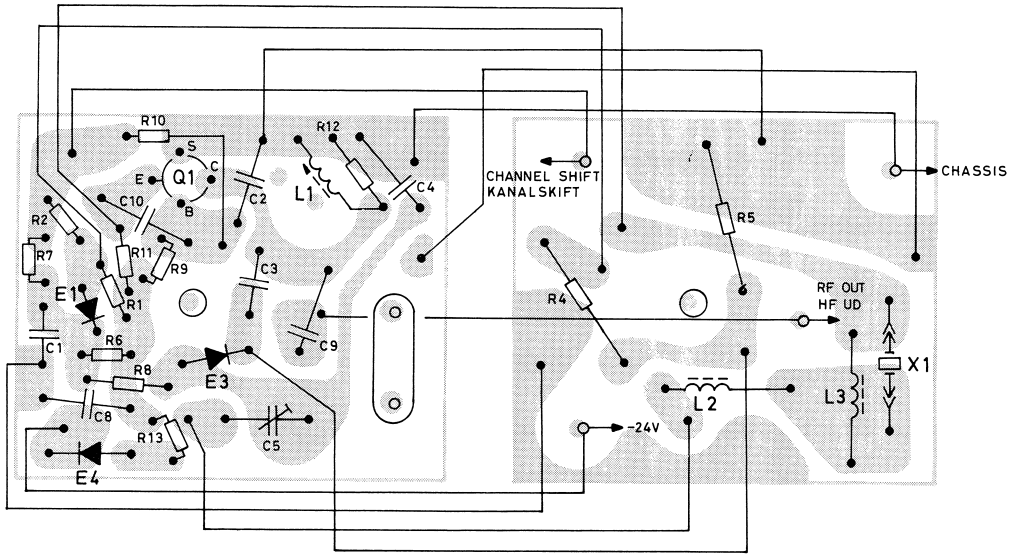
Q1
BOTTOM VIEW
SET FRA BUNDEN

UPPER PRINTED WIRING BOARD
VIEWED FROM COMPONENT SIDE

ØVERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN

LOWEST PRINTED WIRING BOARD
VIEWED FROM COMPONENT SIDE

NEDERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN



CRYSTAL OSCILLATOR
KRYSTAL OSCILLATOR

XO666

D401.018/3

TYPE	NO.	CODE	DATA	
	C1	76.5059	2,2 nF 10% polyest. FL	50V
	C2	74.5155	1 nF -20 +50% ceram II PL	63V
	C3	74.5173	15 pF 5% ceram N750 PI	125V
	C4	76.5101	68 pF 5% polystyr. TB	125V
	C5	78.5044	2-20 pF teflon N250 norm.	500V
	C8	76.5059	2,2 nF 10% polyest. FL	50V
	C9	74.5128	2,7 pF ± 0,25 pF ceram N150	250V
	C10	76.5102	100 pF 5% polystyr. TB	30V
	R1	80.5065	22 kΩ 5% carbon film	1/10W
	R2	89.5010	15 kΩ 20% NTC	0,6W
	R4	80.5083	0,68 MΩ 10% carbon film	1/10W
	R5	80.5073	0,1 MΩ 5% carbon film	1/10W
	R6	80.5085	1 MΩ 10% carbon film	1/10W
	R7	80.5077	0,22 MΩ 5% carbon film	1/10W
	R8	80.5070	56 kΩ 5% carbon film	1/10W
	R9	80.5055	3,3 kΩ 5% carbon film	1/10W
	R10	80.5060	8,2 kΩ 5% carbon film	1/10W
	R11	80.5053	2,2 kΩ 5% carbon film	1/10W
	R12	80.5053	2,2 kΩ 5% carbon film	1/10W
	R13	80.5039	150 Ω 5% carbon film	1/10W
	L1	61.1077	RF coil/HF-spole	
	L2	61.1076	RF coil/HF-spole	
	L3	61.1076	RF coil/HF-spole	
	E1	99.5223	Zenerdiode 12V 5%	0,25W
	E3	99.5140	Capacitance diode BA101C	
	E4	99.5028	Diode 1N914	
	Q1	99.5217	Transistor 2N918	

Storno

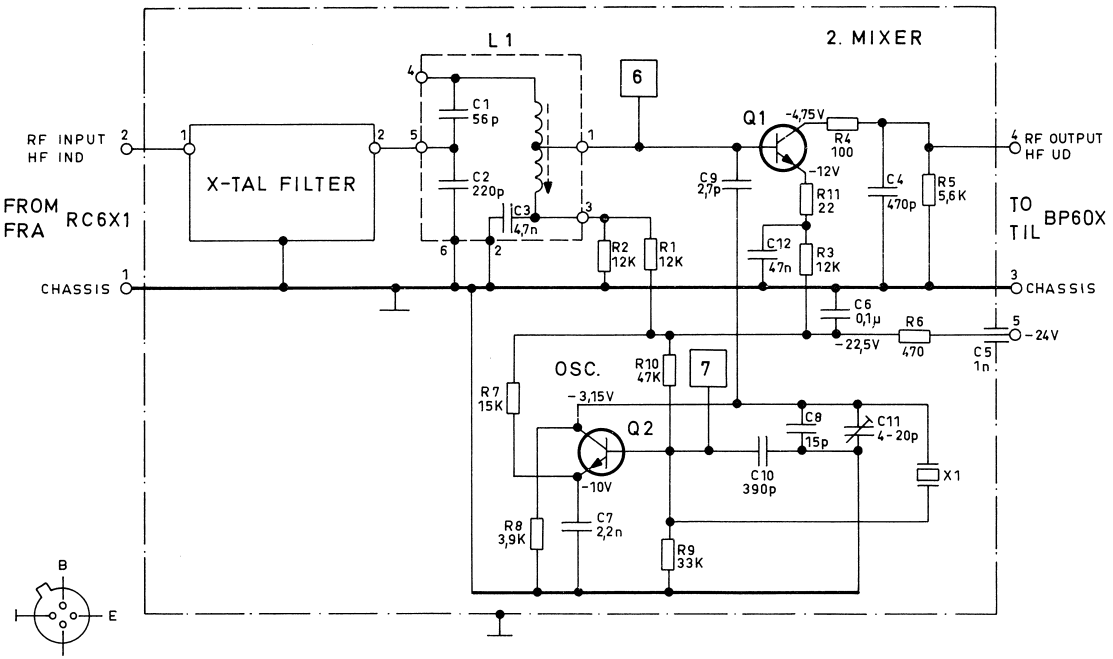
TYPE	NO.	CODE	DATA

CRYSTAL OSCILLATOR
KRYSTALOSCILLATOR

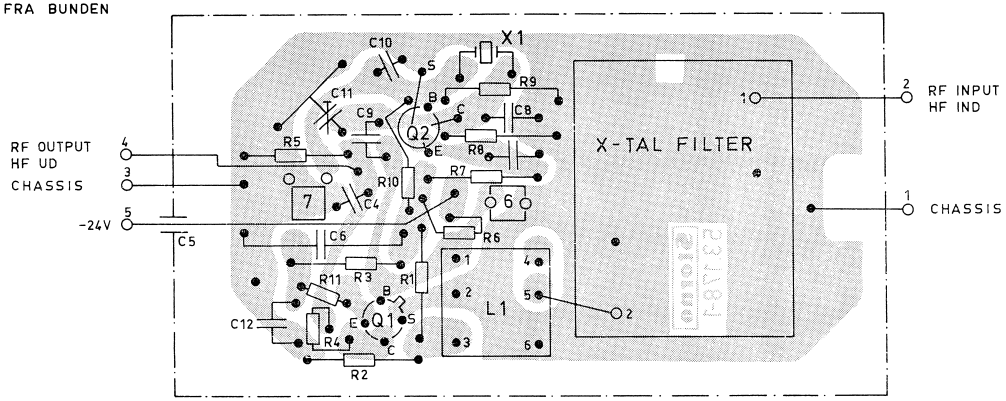
XO666

X401.039

Storno



Q1-Q2
BOTTOM VIEW
SET FRA BUNDEN



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

IF-CONVERTER
MF-KONVERTER

IC601b, IC602b, IC603b

D400.664/3

Storno

TYPE	NO.	CODE	DATA
	C1	74.5111	56 pF 2% ceram NO75 TB 250V
	C2	76.5063	220 pF 5% polystyr. TB 125V
	C3	76.5061	4,7nF 10% polyest. FL 50V
	C4	76.5065	470 pF 5% polystyr. TB 125V
	C5	74.5167	1 nF -20/+50% ceram. FT 300V
	C6	76.5073	0,1µF 10% polyest. TB 100V
	C7	76.5059	2.2nF 10% " FL 50V
	C8	74.5142	18 pF ±0.5pF ceram. NO75 TB 250V
	C9	74.5107	2,7pF 2% " NO75 TB 250V
	C10	76.5017	390 pF 5% polystyr. TB 125V
	C11	78.5031	40/20pF ceram trimmer N470 DI 100V
	C12	76.5072	47 nF 10% polyest. 50V
	R1	80.5262	12 kΩ 5% carbon film 1/8W
	R2	80.5262	12 kΩ 5% " " 1/8W
	R3	80.5262	12 kΩ 5% " " 1/8W
	R4	80.5237	100 Ω 5% " " 1/8W
	R5	80.5258	5.6kΩ 5% " " 1/8W
	R6	80.5245	470Ω 5% " " 1/8W
	R7	80.5263	15 kΩ 5% " " 1/8W
	R8	80.5256	3.9kΩ 5% " " 1/8W
	R9	80.5267	33 kΩ 5% " " 1/8W
	R10	80.5269	47 kΩ 5% " " 1/8W
	R11	80.5229	22 Ω 5% " " 1/8W
	L1	61.977	Coil/spole 10.7 MHz (C1, C2, C3)
	Q1	99.5166	Transistor BF 167
	Q2	99.5166	Transistor BF 167
	X1	98.5004	10.2450 MHz crystal, Storno type 98-8 or/eller
		98.5005	11.1550 MHz crystal, Storno type 98-8
IC601b		69.5010	10.7 MHz X-tal filter/krystalfilter 50 kHz
IC602b		69.5009	10.7 MHz X-tal filter/krystalfilter 25 kHz
IC603b		69.5008	10.7 MHz X-tal filter/krystalfilter 20 kHz

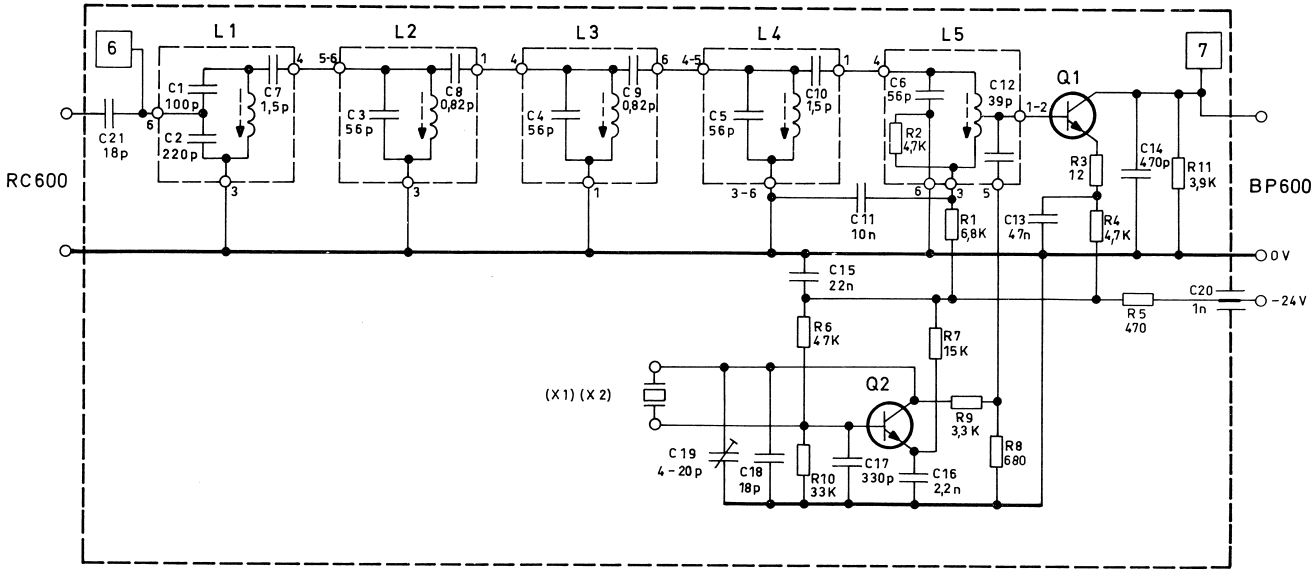
TYPE	NO.	CODE	DATA

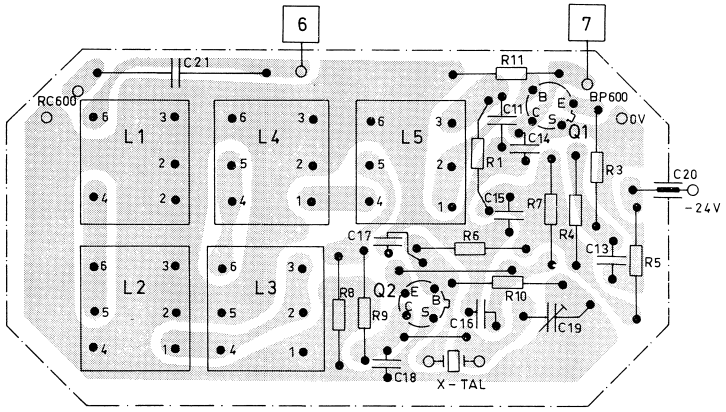
IF-CONVERTER
MF-KONVERTER

IC601b, IC602b, IC603b

X400.684/3

Storno





VIEWED FROM COMPONENT SIDE
SET FRA KOMPONENTSIDEN

Q1

Q2

BOTTOM VIEW
SET FRA BUNDEN

IF-CONVERTER
MF-KONVERTER

IC605

D400.775/2

TYPE	NO.	CODE	DATA	
	C1	76.5079	100 pF 5% polystyr. TB	125V
	C2	76.5063	220 pF 5% polystyr. TB	125V
	C3	74.5177	56 pF 2% ceram N150 TB	250V
	C4	74.5177	56 pF 2% ceram N150 TB	250V
	C5	74.5177	56 pF 2% ceram N150 TB	250V
	C6	74.5177	56 pF 2% ceram N150 TB	250V
	C7	74.5125	1.5pF ± 0,25 pF ceram N150 BD	250V
	C8	74.5122	0,82pF ± 0,1pF ceram P100 BD	250V
	C9	74.5122	0,82pF ± 0,1pF ceram P100 BD	250V
	C10	74.5125	1,5 pF ± 0,25 pF ceram N150 BD	250V
	C11	76.5070	10 nF 10% polyest. FL	50V
	C12	74.5117	39 pF 2% ceram NO75 TB	250V
	C13	76.5072	47 nF 10% polyest. FL	50V
	C14	76.5065	470 pF 5% polystyr. TB	125V
	C15	76.5171	22 nF 10% polyest. FL	50V
	C16	76.5059	2,2 nF 10% polyest. FL	50V
	C17	76.5064	330 pF 5% polystyr. TB	125V
	C18	74.5138	18 pF 5% ceram N150 DI	125V
	C19	78.5131	4/20 pF ceram trimmer N470 DI	100V
	C20	74.5167	1 nF -20+80% ceram II FT	300V
	C21	74.5138	18 pF 5% ceram N150 DI	125V
	R1	80.5259	6,8 kΩ 5% carbon film	1/8W
	R2	80.5257	4,7 kΩ 5% carbon film	1/8W
	R3	80.5226	12 Ω 5% carbon film	1/8W
	R4	80.5257	4,7 kΩ 5% carbon film	1/8W
	R5	80.5245	470 Ω 5% carbon film	1/8W
	R6	80.5269	47 kΩ 5% carbon film	1/8W
	R7	80.5263	15 kΩ 5% carbon film	1/8W
	R8	80.5247	680 Ω 5% carbon film	1/8W
	R9	80.5255	3,3 kΩ 5% carbon film	1/8W
	R10	80.5267	33 kΩ 5% carbon film	1/8W
	R11	80.5256	3,9 kΩ 5% carbon film	1/8W
	L1	61.998	Coil/spole 10,7 MHz (C1-C2-C7)	
	L2	61.999	Coil/spole 10,7 MHz (C3-C8)	
	L3	61.1000	Coil/spole 10,7 MHz (C4-C9)	
	L4	61.1001	Coil/spole 10,7 MHz (C5-C10)	
	L5	61.1002	Coil/spole 10,7 MHz (C6-C12-R2)	
	X1	98.5004	Crystal/Krystal 98-8 10,2450 MHz	
	X2	98.5005	Crystal/Krystal 98-8 11,1550 MHz	
	Q1	99.5177	Transistor BF166	
	Q2	99.5166	Transistor BF167	

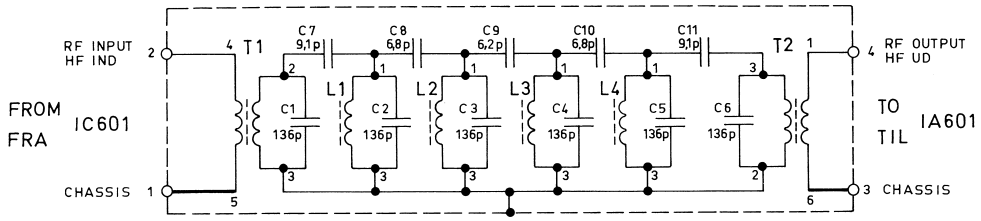
TYPE	NO.	CODE	DATA

IF CONVERTER
MF KONVERTER

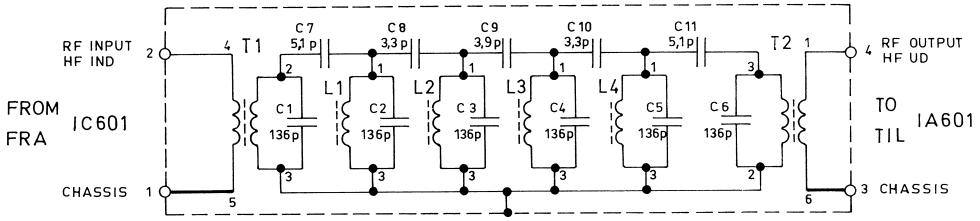
IC605

X400.815/3

Storno



BP601



BP602

BAND-PASS FILTER
BÅNDPASFILTER

BP601, BP602

D400.663/3

TYPE	NO.	CODE	DATA
	C1	74.5144	2x68pF ±2% ceram. NO75 TB 250V
	C2	74.5144	2x68pF ±2% " NO75 TB 250V
	C3	74.5144	2x68pF ±2% " NO75 TB 250V
	C4	74.5144	2x68pF ±2% " NO75 TB 250V
	C5	74.5144	2x68pF ±2% " NO75 TB 250V
	C6	74.5144	2x68pF ±2% " NO75 TB 250V
BP601	C7	74.5169	9,1pF ±5% " N150 DI 250V
BP602	C7	74.5168	5,1pF ±0,25pF " N150 DI 250V
BP601	C8	74.5133	6,8pF ±0,25pF " N150 DI 250V
BP602	C8	74.5129	3,3pF ±0,25pF " N150 DI 250V
BP601	C9	74.5170	6,2pF ±0,25pF " N150 DI 250V
BP602	C9	74.5130	3,9pF ±0,25pF " N150 DI 250V
BP601	C10	74.5133	6,8pF ±0,25pF " N150 DI 250V
BP602	C10	74.5129	3,3pF ±0,25pF " N150 DI 250V
BP601	C11	74.5169	9,1pF ±5% " N150 DI 250V
BP602	C11	74.5168	5,1pF ±0,25pF " N150 DI 250V
BP601	L1	61.885	Coil/Spole 455 kHz
BP602	L1	61.819	Coil/Spole 455 kHz
BP601	L2	61.818	Coil/Spole 455 kHz
BP602	L2	61.822	Coil/Spole 455 kHz
BP601	L3	61.818	Coil/Spole 455 kHz
BP602	L3	61.822	Coil/Spole 455 kHz
BP601	L4	61.885	Coil/Spole 455 kHz
BP602	L4	61.819	Coil/Spole 455 kHz
BP601	T1	61.884	Transformer sec.coil/sek.spole 455 kHz
BP602	T1	61.821	Transformer " / " 455 kHz
BP601	T2	61.886	Transformer prim.coil/prim.spole 455kHz
BP602	T2	61.823	Transformer " / " 455kHz

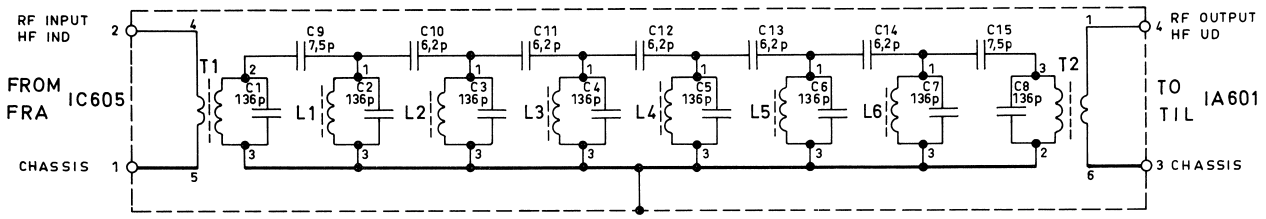
Storno

TYPE	NO.	CODE	DATA

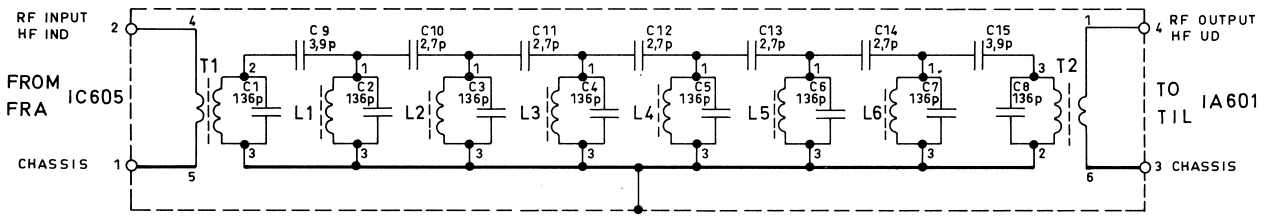
BAND-PASS FILTER
BÅNDPASFILTER

BP601, BP602

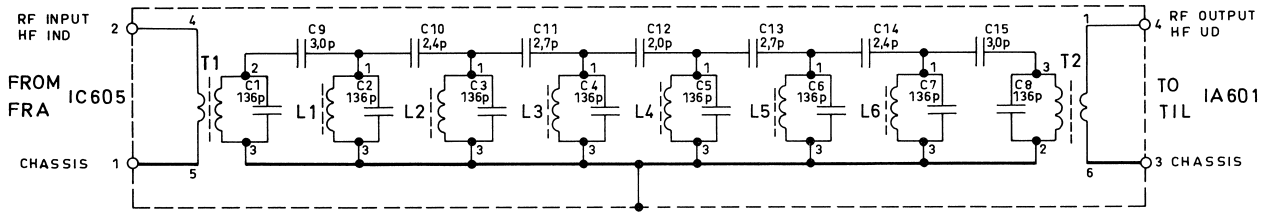
X400.687/2



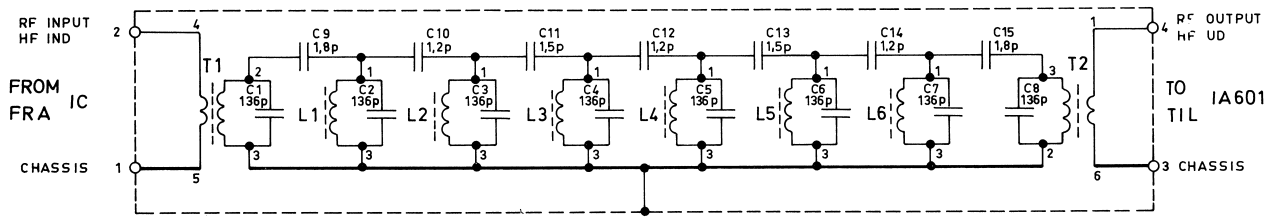
BP608 D400.806



BP609 D400.807



BP6010 D400.808



BP6012 D400.860/2

BAND-PASS FILTER BP608, BP609,
BÅNDPASFILTER BP6010, BP6012

TYPE	NO.	CODE	DATA	
			BP608	
	C1-8	74.5144	68 pF 2% ceram NO75 TB	250V
	C9	74.5179	7,5 pF 0,25 pF ceram N150 DI	250V
	C10	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C11	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C12	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C13	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C14	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C15	74.5179	7,5 pF 0,25pF ceram N150 DI	250V
	L1	61.885-01	Coil/spole 455 kHz	
	L2	61.885-01	Coil/spole 455 kHz	
	L3	61.885-01	Coil/spole 455 kHz	
	L4	61.885-01	Coil/spole 455 kHz	
	L5	61.885-01	Coil/spole 455 kHz	
	L6	61.885-01	Coil/spole 455 kHz	
	T1	61.1009	Coil/spole 455 kHz	
	T2	61.1010	Coil/spole 455 kHz	
			BP609	
	C1-8	74.5144	68 pF 2% ceram NO75 TB	250V
	C9	74.5130	3,9 pF 0,25pF ceram N150 DI	250V
	C10	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C11	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C12	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C13	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C14	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C15	74.5130	3,9 pF 0,25pF ceram N150 DI	250V
	L1	61.819-01	Coil/spole 455 kHz	
	L2	61.819-01	Coil/spole 455 kHz	
	L3	61.819-01	Coil/spole 455 kHz	
	L4	61.819-01	Coil/spole 455 kHz	
	L5	61.819-01	Coil/spole 455 kHz	
	L6	61.819-01	Coil/spole 455 kHz	
	T1	61.979-01	Coil/spole 455 kHz	
	T2	61.979-01	Coil/spole 455 kHz	
			BP6010	
	C1-8	74.5144	68 pF 2% ceram NO75 TB	250V
	C9	74.5172	3 pF 0,25 pF ceram N150 DI	250V
	C10	74.5178	2,4 pF 0,25 pF ceram N150 DI	250V
	C11	74.5128	2,7 pF 0,25 pF ceram N150 DI	250V
	C12	74.5174	2 pF 0,25 pF ceram N150 DI	250V
	C13	74.5128	2,7 pF 0,25 pF ceram N150 DI	250V

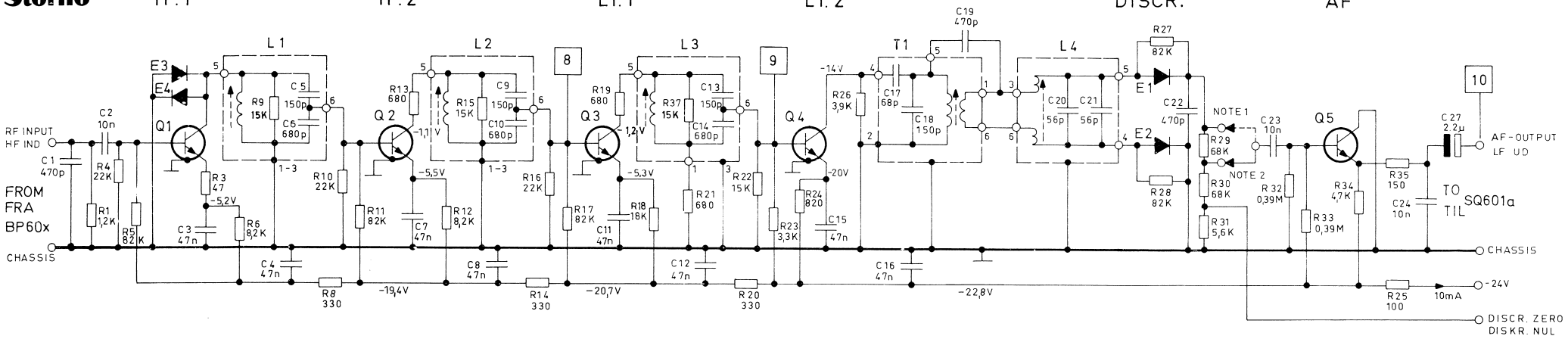
Storno

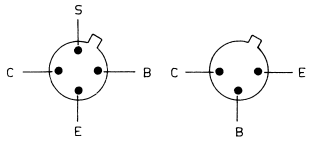
TYPE	NO.	CODE	DATA	
	C14	74.5178	2,4 pF 0,25 pF ceram N150 DI	250V
	C15	74.5172	3 pF 0,25 pF ceram N150 DI	250V
	L1	61.819-01	Coil/spole 455 kHz	
	L2	61.819-01	Coil/spole 455 kHz	
	L3	61.819-01	Coil/spole 455 kHz	
	L4	61.819-01	Coil/spole 455 kHz	
	L5	61.819-01	Coil/spole 455 kHz	
	L6	61.819-01	Coil/spole 455 kHz	
	T1	61.979-01	Coil/spole 455 kHz	
	T2	61.980-01	Coil/spole 455 kHz	
			BP6012	
	C1-8	74.5144	68 pF 2% ceram NO75 TB	250V
	C9	74.5126	1,8 pF 0,25 pF ceram N150 DI	250V
	C10	74.5124	1,2 pF 0,25 pF ceram N150 DI	250V
	C11	74.5125	1,5 pF 0,25 pF ceram N150 DI	250V
	C12	74.5124	1,2 pF 0,25 pF ceram N150 DI	250V
	C13	74.5125	1,5 pF 0,25 pF ceram N150 DI	250V
	C14	74.5124	1,2 pF 0,25 pF ceram N150 DI	250V
	C15	74.5126	1,8 pF 0,25 pF ceram N150 DI	250V
	L1	61.819-01	Coil/spole 455 kHz	
	L2	61.819-01	Coil/spole 455 kHz	
	L3	61.819-01	Coil/spole 455 kHz	
	L4	61.819-01	Coil/spole 455 kHz	
	L5	61.819-01	Coil/spole 455 kHz	
	L6	61.819-01	Coil/spole 455 kHz	
	T1	61.1048	Coil/spole 455 kHz	
	T2	61.1049	Coil/spole 455 kHz	

BAND-PASS FILTER BP608, BP609, BP6010, BP6012
BANDPASFILTER

X400.879/2

Storno IF.1 IF.2 LI.1 LI.2 DISCR. AF **Storno**





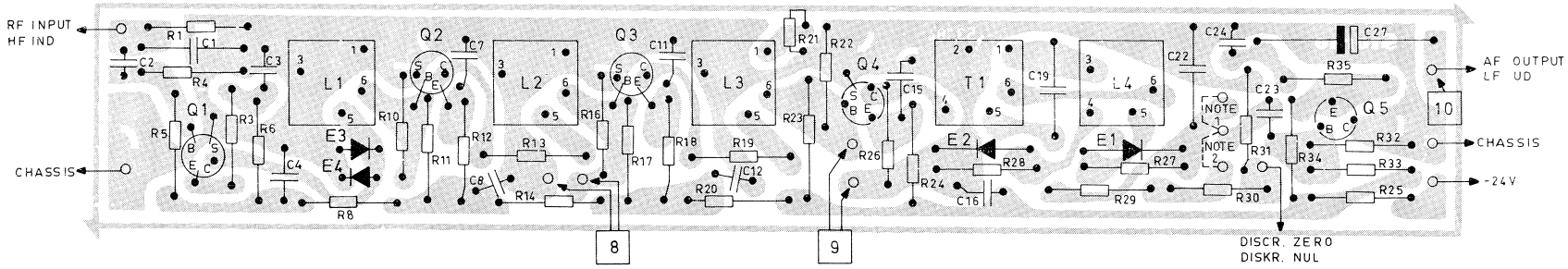
Q1, Q2, Q3, Q4
BOTTOM VIEW
SET FRA BUNDEN

Q5
BOTTOM VIEW
SET FRA BUNDEN

NOTE 1. CONNECTION FOR ±4kHz OR ±5kHz FREQ. DEVIATION
NOTE 2. CONNECTION FOR ±15kHz FREQ. DEVIATION

NOTE 1. FORBINDELSE VED ±4kHz ELLER ±5kHz FREKVENSSVING.
NOTE 2. FORBINDELSE VED ±15kHz FREKVENSSVING.

PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



IF-AMPLIFIER
MF-FORSTÆRKER

IA601c

D401.042/3

TYPE	NO.	CODE	DATA	
	C1	76.5065	470 pF 5% polystyr TB	125V
	C2	76.5070	10 nF 10% polyest. FL	50V
	C3	76.5072	47 nF 10% polyest. FL	50V
	C4	76.5072	47 nF 10% polystyr FL	50V
	C5	76.5103	150 pF 2,5% polystyr TB	30V
	C6	76.5107	680 pF 2,5% polystyr TB	30V
	C7	76.5072	47 nF 10% polyest. FL	50V
	C8	76.5072	47 nF 10% polyest. FL	50V
	C9	76.5103	150 pF 2,5% polyest. TB	30V
	C10	76.5107	680 pF 2,5% polystyr. TB	30V
	C11	76.5072	47 nF 10% polyest. FL	50V
	C12	76.5072	47 nF 10% polyest. FL	50V
	C13	76.5103	150 pF 2,5% polystyr. TB	30V
	C14	76.5107	680 pF 2,5% polystyr. TB	30V
	C15	76.5072	47 nF 10% polyest. FL	50V
	C16	76.5072	47 nF 10% polyest. FL	50V
	C17	76.5101	68 pF 2,5% polystyr. TB	30V
	C18	76.5103	150 pF 2,5% polystyr TB	30V
	C19	76.5065	470 pF 5% polystyr TB	125V
	C20	74.5111	56 pF 2% ceram. NO75 TB	250V
	C21	74.5111	56 pF 2% ceram. NO75 TB	250V
	C22	76.5065	470 pF 5% polystyr. TB	125V
	C23	76.5070	10 nF 10% polyest. FL	50V
	C24	76.5070	10 nF 10% polyest. FL	50V
	C27	73.5064	2.2 µF -10+100% elco	63V
	R1	80.5250	1,2 kΩ 5% carbon film	1/8W
	R3	80.5233	47 Ω 5% carbon film	1/8W
	R4	80.5265	22 kΩ 5% carbon film	1/8W
	R5	80.5272	82 kΩ 5% carbon film	1/8W
	R6	80.5260	8,2 kΩ 5% carbon film	1/8W
	R8	80.5243	330 Ω 5% carbon film	1/8W
	R9	80.5064	18 kΩ 5% carbon film	1/10W
	R10	80.5265	22 kΩ 5% carbon film	1/8W
	R11	80.5272	82 kΩ 5% carbon film	1/8W
	R12	80.5260	8,2 kΩ 5% carbon film	1/8W
	R13	80.5247	680 Ω 5% carbon film	1/8W
	R14	80.5243	330 Ω 5% carbon film	1/8W
	R15	80.5064	18 kΩ 5% carbon film	1/10W
	R16	80.5265	22 kΩ 5% carbon film	1/8W
	R17	80.5272	82 kΩ 5% carbon film	1/8W
	R18	80.5264	18 kΩ 5% carbon film	1/8W
	R19	80.5247	680 Ω 5% carbon film	1/8W
	R20	80.5243	330 Ω 5% carbon film	1/8W
	R21	80.5247	680 Ω 5% carbon film	1/8W
	R22	80.5263	15 kΩ 5% carbon film	1/8W
	R23	80.5255	3,3 kΩ 5% carbon film	1/8W
	R24	80.5248	820 Ω 5% carbon film	1/8W

Storno

TYPE	NO.	CODE	DATA	
	R25	80.5237	100 Ω 5% carbon film	1/8W
	R26	80.5256	3,9 kΩ 5% carbon film	1/8W
	R27	80.5272	82 kΩ 5% carbon film	1/8W
	R28	80.5272	82 kΩ 5% carbon film	1/8W
	R29	80.5271	68 kΩ 5% carbon film	1/8W
	R20	80.5271	68 kΩ 5% carbon film	1/8W
	R31	80.5258	5,6 kΩ 5% carbon film	1/8W
	R32	80.5280	0,39 MΩ 5% carbon film	1/8W
	R33	80.5280	0,39 MΩ 5% carbon film	1/8W
	R34	80.5257	4,7 kΩ 5% carbon film	1/8W
	R35	80.5239	150 Ω 5% carbon film	1/8W
	R37	80.5064	18 kΩ 5% carbon film	1/10W
	L1	61.811-02	Coil/spole 455 kHz (C5-C6-R9)	
	L2	61.811-02	Coil/spole 455 kHz (C9-C10-R15)	
	L3	61.811-02	Coil/spole 455 kHz (C13-C14-R37)	
	L4	61.813-01	Coil/spole 455 kHz discr. (C20-C21)	
	T1	61.812-02	Trafo 455 kHz (C17-C18)	
	E1	99.5028	Diode 1N914	
	E2	99.5028	Diode 1N914	
	E3	99.5028	Diode 1N914	
	E4	99.5021	Diode 1N914	
	Q1	99.5166	Transistor BF167	
	Q2	99.5166	Transistor BF167	
	Q3	99.5166	Transistor BF167	
	Q4	99.5168	Transistor BF173	
	Q5	99.5143	Transistor BC108	

IF-AMPLIFIER
MF-FORSTÆRKER

IA601c

X400.797/5

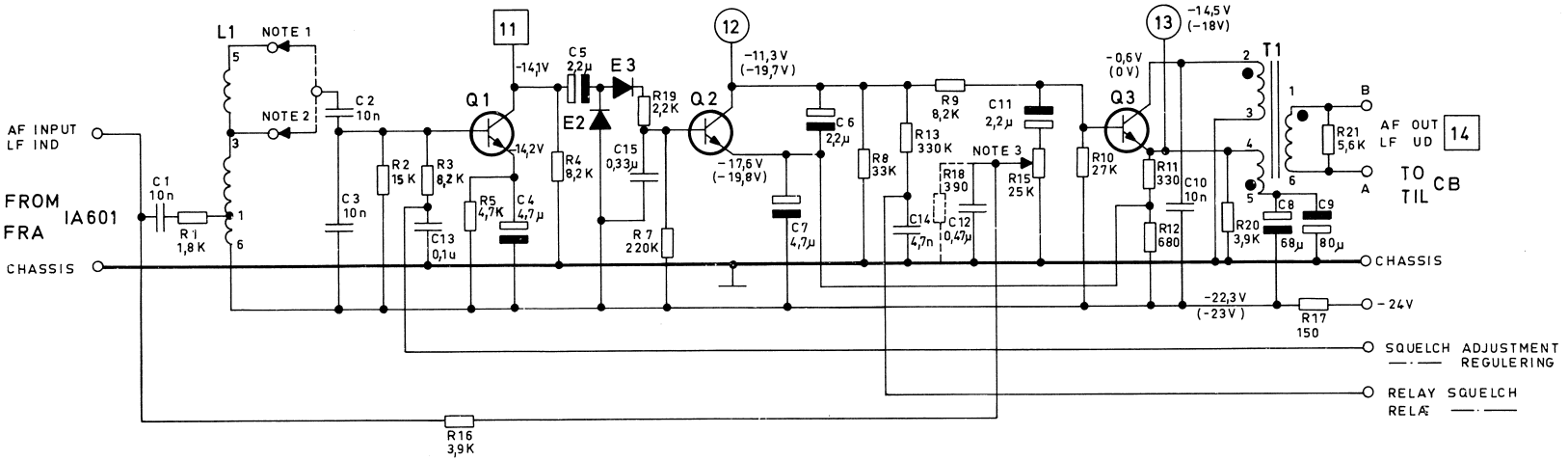
Storno

NOISE AMP
STØJFORST.

NOISE DETECTOR
STØJDETEKTOR

AF AMP
LF FORST

Storno

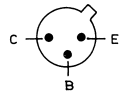


NOTE 1. CONNECTED IF 20 OR 25KHz CHANNEL SEPARATION IS USED.
NOTE 2. CONNECTED IF 50KHz CHANNEL SEPARATION IS USED.
NOTE 3. IF FM IS USED INSTEAD OF PM, C12 IS REPLACED BY R18(390Ω)

NOTE 1. STRAPPES VED 20/25KHz KANALAFSTAND.
NOTE 2. STRAPPES VED 50KHz KANALAFSTAND.
NOTE 3. VED FM UDBYTTES C12 MED R18(390Ω)

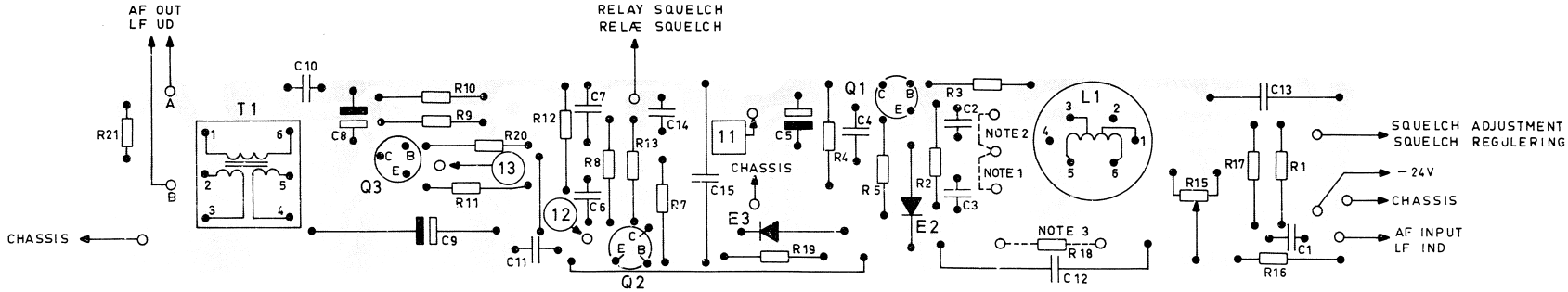
DC VOLTAGES WITHOUT PARENTHESES ARE MEASURED WITH SQUELCH OFF (AF-SIGNAL OUT).
DC VOLTAGES IN PARENTHESES ARE MEASURED WITH SQUELCH ON (NO AF-SIGNAL OUT).
SQUELCH REGULATOR ADJUSTED TO 10KΩ.

DC SPÆNDINGER UDEN PARENTES MÅLT VED SQUELCH OFF (LF-SIGNAL UD).
DC SPÆNDINGER I PARENTES MÅLT VED SQUELCH ON (INTET LF-SIGNAL UD).
SQUELCH REG. INDSTILLET TIL 10KΩ.



Q1, Q2 Q3
BOTTOM VIEW
SET FRA BUNDEN

PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF-AMPLIFIER AND SQUELCH
LF-FORSTÆRKER OG SQUELCH

SQ601a

D400.661/5

TYPE	NO.	CODE	DATA	
	C1	76.5070	10nF 10% polyest. FL	50V
	C2	76.5070	10nF 10% polyest. FL	50V
	C3	76.5070	10nF 10% polyest. FL	50V
	C4	73.5103	4,7uF 20% tantal	15V
	C5	73.5102	2,2µF 20% tantal	35V
	C6	73.5102	2,2uF 20% tantal	35V
	C7	73.5103	4,7uF 20% tantal	15V
	C8	73.5106	68uF 20% tantal	15V
	C9	73.5110	80uF -10/+50% elco	25V
	C10	76.5070	10nF 10% polyest. FL	50V
	C11	73.5102	2,2uF 20% tantal	35V
	C12	76.5076	0,47uF 20% polyest. TB	100V
	C13	76.5073	0,1uF 10% polyest. TB	100V
	C14	76.5061	4,7nF 10% polyest. FL	50V
	C15	76.5075	0,33uF 10% polyest. TB	100V
	R1	80.5252	1,8k 5% carbon film	1/8W
	R2	80.5263	15k 5% carbon film	1/8W
	R3	80.5260	8,2k 5% carbon film	1/8W
	R4	80.5260	8,2k 5% carbon film	1/8W
	R5	80.5257	4,7k 5% carbon film	1/8W
	R7	80.5277	220k 5% carbon film	1/8W
	R8	80.5267	33k 5% carbon film	1/8W
	R9	80.5260	8,2k 5% carbon film	1/8W
	R10	80.5266	27k 5% carbon film	1/8W
	R11	80.5243	330Ω 5% carbon film	1/8W
	R12	80.5247	680Ω 5% carbon film	1/8W
	R13	80.5279	330k 5% carbon film	1/8W
	R15	86.5044	25k 20% potm. lin.	0,1W
	R16	80.5256	3,9k 5% carbon film	1/8W
	R17	80.5239	150Ω 5% carbon film	1/8W
	R19	80.5253	2,2k 5% carbon film	1/8W
	R20	80.5256	3,9k 5% carbon film	1/8W
	R21	80.5258	5,6k 5% carbon film	1/8W
	L1	61.816-01	coil/spole	
	T1	60.5134	Trafo 2400Ω/600Ω	
	E2	99.5028	Diode 1N914	
	E3	99.5028	Diode 1N914	
	Q1	99.5143	Transistor BC108	
	Q2	99.5121	Transistor BC107	
	Q3	99.5121	Transistor BC107	

Storno

TYPE	NO.	CODE	DATA

AF-AMPLIFIER AND SQUELCH
LF-FORSTÆRKER OG SQUELCH

SQ601a

X400.682/4

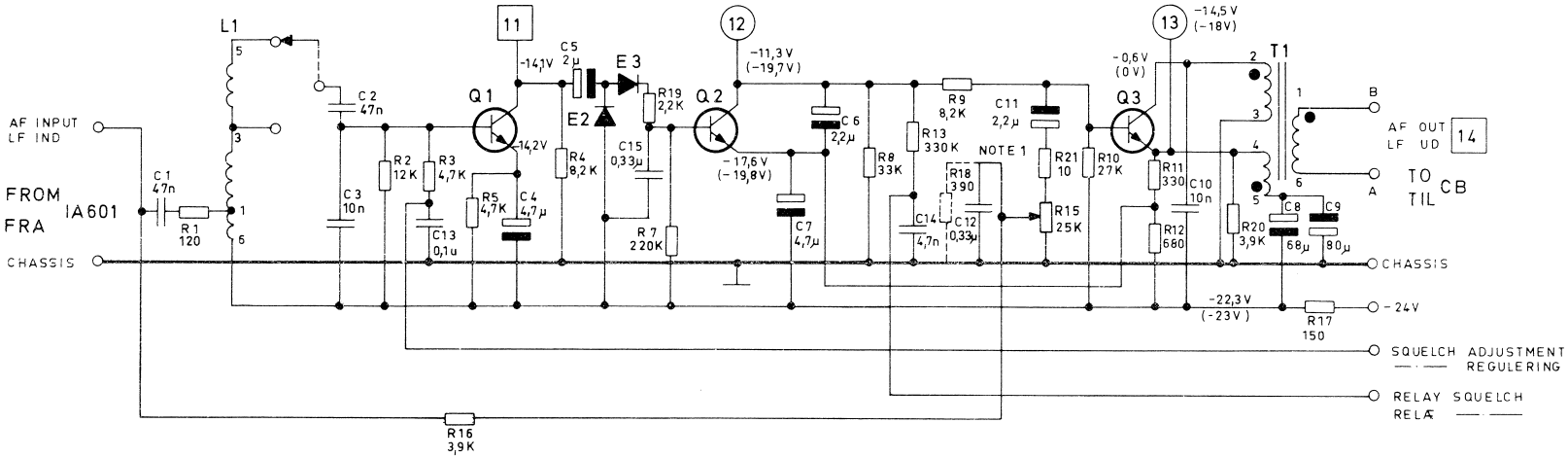
Storno

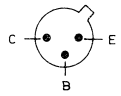
NOISE AMP
STØJFORST.

NOISE DETECTOR
STØJDETEKTOR

AF AMP
LF FORST

Storno





Q1, Q2 Q3
BOTTOM VIEW
SET FRA BUNDEN

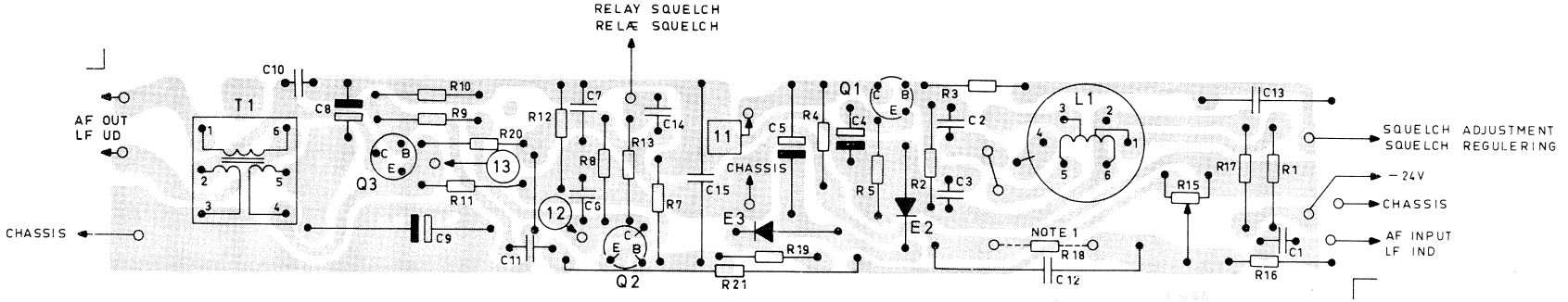
NOTE 1. IF FM IS USED INSTEAD OF PM, C12 IS REPLACED BY R18(390Ω)

NOTE 1. VED FM UDBYTTES C12 MED R18(390Ω)

DC VOLTAGES WITHOUT PARENTHESES ARE MEASURED WITH SQUELCH OFF (AF-SIGNAL OUT).
DC VOLTAGES IN PARENTHESES ARE MEASURED WITH SQUELCH ON (NO AF-SIGNAL OUT).
SQUELCH REGULATOR ADJUSTED TO 10KΩ.

DC SPÆNDINGER UDEN PARENTES MÅLT VED SQUELCH OFF (LF-SIGNAL UD).
DC SPÆNDINGER I PARENTES MÅLT VED SQUELCH ON (INTET LF-SIGNAL UD).
SQUELCH REG. INDSTILLET TIL 10KΩ.

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF-AMPLIFIER AND SQUELCH
LF-FORSTÆRKER OG SQUELCH

SQ 602

D400.844

Storno

TYPE	NO.	CODE	DATA	
	C1	76.5072	47 nF 10% polyest.	50V
	C2	76.5072	47 nF 10% polyest.	50V
	C3	76.5070	10 nF 10% polyest. FL	50V
	C4	73.5103	4,7 µF 20% tantal	15V
	C5	73.5102	2,2 µF 20% tantal	35V
	C6	73.5102	2,2 µF 20% tantal	35V
	C7	73.5103	4,7 µF 20% tantal	15V
	C8	73.5106	68 µF 20% tantal	15V
	C9	73.5110	80 µF -10 +50% elco	25V
	C10	76.5070	10 nF 10% polyest. FL	50V
	C11	73.5102	2.2 µF 20% tantal	35V
	C12	76.5075	0.33 µF 10% polyest. TB	100V
	C13	76.5073	0,1 µF 10% polyest. TB	100V
	C14	76.5061	4,7 nF 10% polyest. FL	50V
	C15	76.5075	0,33 µF 10% polyest. TB	100V
	R1	80.5238	120 Ω 5% carbon film	1/8W
	R2	80.5262	12 kΩ 5% carbon film	1/8W
	R3	80.5257	4,7 kΩ 5% carbon film	1/8W
	R4	80.5260	8,2 kΩ 5% carbon film	1/8W
	R5	80.5257	4,7 kΩ 5% carbon film	1/8W
	R7	80.5277	0,22 MΩ 5% carbon film	1/8W
	R8	80.5267	33 kΩ 5% carbon film	1/8W
	R9	80.5260	8,2 kΩ 5% carbon film	1/8W
	R10	80.5266	27 kΩ 5% carbon film	1/8W
	R11	80.5243	330 Ω 5% carbon film	1/8W
	R12	80.5247	680 Ω 5% carbon film	1/8W
	R13	80.5279	0,33 MΩ 5% carbon film	1/8W
	R15	86.5044	25 kΩ 20% potm. Lin.	0,1W
	R16	80.5256	3,9 kΩ 5% carbon film	1/8W
	R17	80.5239	150 Ω 5% carbon film	1/8W
	R19	80.5253	2.2 kΩ 5% carbon film	1/8W
	R20	80.5256	3,9 kΩ 5% carbon film	1/8W
	R21	80.5225	10 Ω 5% carbon film	1/8W
	L1	61.816	Coil/spole	
	T1	60.5134	Transformer 2400 Ω/600 Ω	
	E2	99.5028	Diode 1N914	
	E3	99.5028	Diode 1N914	
	Q1	99.5143	Transistor BC108	
	Q2	99.5121	Transistor BC107	
	Q3	99.5121	Transistor BC107	

Storno

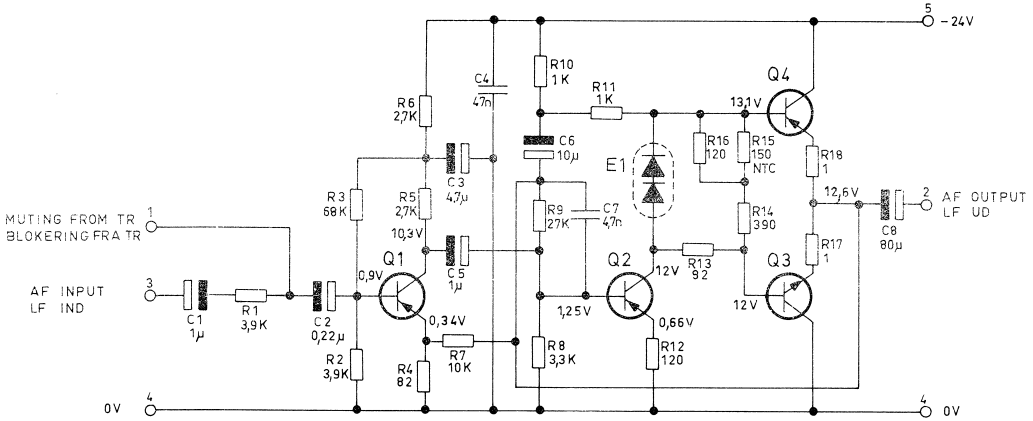
TYPE	NO.	CODE	DATA

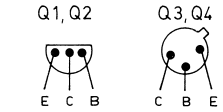
AF-AMPLIFIER AND SQUELCH
LF-FORSTÆRKER OG SQUELCH

SQ602

X400.845/2

Storno

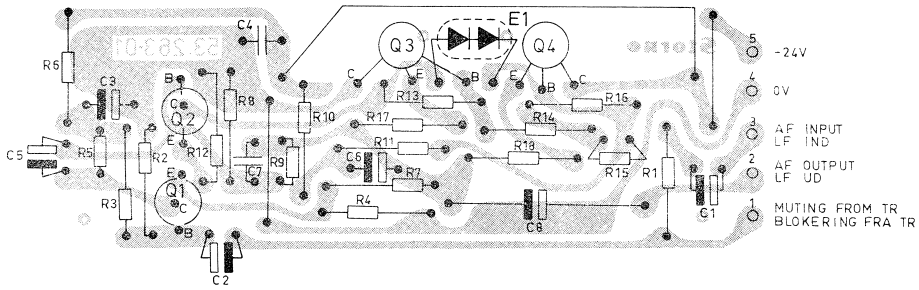




BOTTOM VIEW
SET FRA BUNDEN

DC MEASUREMENT WITH RESPECT
TO CHASSIS. INSTRUMENT 20KΩ/V

DC MÅLT I FORHOLD TIL STEL
MED INSTRUMENT 20KΩ/V



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

AF-OUTPUT AMPLIFIER
LF-UDGANGSFORSTÆRKER

AA607

D400.889/2

TYPE	NO.	CODE	DATA	
	C1	73.5114	1 µF 20% Tantal	30V
	C2	73.5079	0.3 µF 10% ETx	10V
	C3	73.5126	4.7 µF 20% Tantal	35V
	C4	76.5072	47 nF 10% polyest. FL	50V
	C5	73.5114	1 µF 20% Tantal	30V
	C6	73.5109	10 µF 20% Tantal	15V
	C7	76.5061	4.7 nF 10% polyest FL	50V
	C8	73.5110	80 µF -10/+50% elco	25V
	R1	80.5256	3.9 kΩ 5% carbon film	1/8W
	R2	80.5256	3.9 kΩ 5% " "	1/8W
	R3	80.5271	68 kΩ 5% " "	1/8W
	R4	80.5236	82 Ω 5% " "	1/8W
	R5	80.5254	2.7 kΩ 5% " "	1/8W
	R6	80.5254	2.7 kΩ 5% " "	1/8W
	R7	80.5261	10 kΩ 5% " "	1/8W
	R8	80.5255	3.3 kΩ 5% " "	1/8W
	R9	80.5266	27 kΩ 5% " "	1/8W
	R10	80.5249	1 kΩ 5% " "	1/8W
	R11	80.5249	1 kΩ 5% " "	1/8W
	R12	80.5238	120 Ω 5% " "	1/8W
	R13	80.5236	82 Ω 5% " "	1/8W
	R14	80.5243	390 Ω 5% " "	1/8W
	R15	89.5029	150 Ω 10% NTC	0,6W
	R16	80.5038	120 Ω 5% carbon film	1/8W
	R17	80.5213	1 Ω 5% " "	1/8W
	R18	80.5213	1 Ω 5% " "	1/8W
	E1a, E1b	99.5209	Stab. diode ZE 1.5	
	Q1	99.5144	Transistor 2N3702	
	Q2	99.5144	Transistor 2N3702	
	Q3	99.5216	Transistor BSx96	
	Q4	99.5215	Transistor 2N2905A	

Storno

TYPE	NO.	CODE	DATA

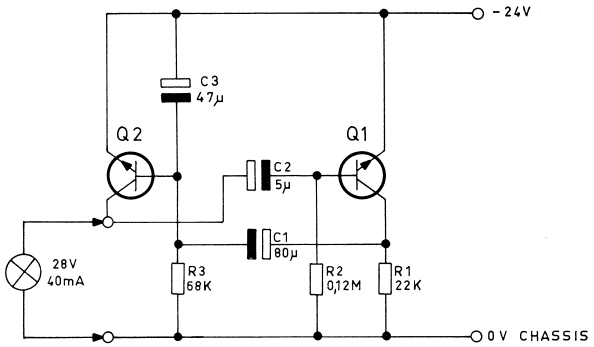
AF-OUTPUT AMPLIFIER
LF-UDGANGSFORSTÆRKER

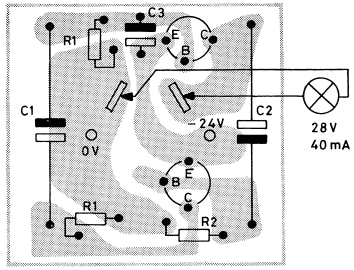
AA607

X400.906/2

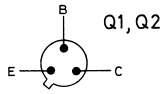
Storno

Storno





PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



BOTTOM VIEW
SET FRA BUNDEN

CALL INDICATOR
OPKALDSBLINK

ID601

D400.899/2

TYPE	NO.	CODE	DATA	
ID601		10.1978	Call Indicator	
	C1	73.5104	5 µF -10 +100% elco	70V
	C2	73.5110	80 µF -10 +50% elco	25V
	C3	73.5124	47 µF 20% tantal	6,3V
	R1	80.5265	22 kΩ 5% carbon film	1/8W
	R2	80.5274	0,12 MΩ 5% " "	1/8W
	R3	80.5271	68 kΩ 5% " "	1/8W
	Q1	99.5121	Transistor BC107	
	Q2	99.5121	Transistor BC107	

Storno

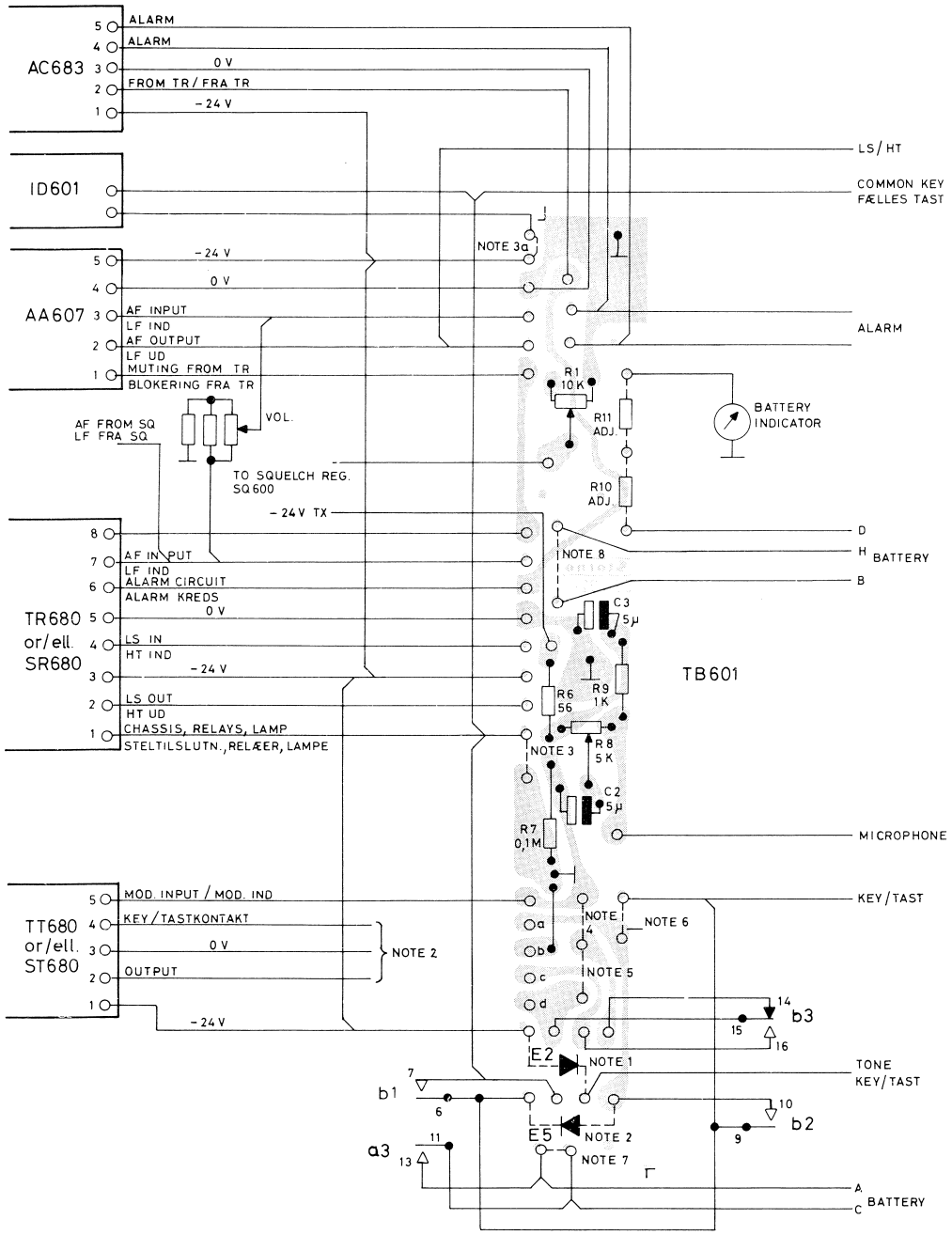
TYPE	NO.	CODE	DATA

CALL INDICATOR
OPKALDSBLINK

ID601

X401.036/2

Storno



Note 1. When using TT680 or ST680: Insert relay Re2 and diode E2.
Med TT680 eller ST680: Indsæt relæ ReA og diode E2.

Note 2. When using TT680: Connect term. 2 to term. c in TB601.
Connect term. 3 to term. a in TB601.
When using ST680: Connect term. 2 to term. d in TB601.
Connect term. 3 to term. b in TB601.
Connect term. 4 to term. a in TB601.
Insert diode E5.

Med TT680: Forbind term. 2 til term. c i TB601.
Forbind term. 3 til term. a i TB601.
Med ST680: Forbind term. 2 til term. d i TB601.
Forbind term. 3 til term. b i TB601.
Forbind term. 4 til term. a i TB601.
Indsæt diode E5.

Note 3. When using tone receiver TR680 or SR680: Remove strap.
Med tonemodtager TR680 eller SR680: Fjern strapning.

Note 3a. When using tone receiver TR680 or SR680: Insert strap.
Med tonemodtager TR680 eller SR680: Indsæt strapning.

Note 4. When using tone transmitter ST680: Remove strap.
Med tonesender ST680: Fjern strapning.

Note 5. When using tone transmitter TT680: Remove strap.
Med tonesender TT680: Fjern strapning.

Note 6. When using ST680 for identification: Insert strap.
Med ST680 til identifikation: Indsæt strapning.

Note 7. In CQP662F and CQP663F: Insert strap.
I CQP662F og CQP663F: Indsæt strapning.

Note 8. When using tone receiver TR680 or SR680: Insert strap.
Med tonemodtager TR680 eller SR680: Indsæt strapning.

Note 9. R10 and R11 are matched to the battery indicator (3-7 kΩ).
R10 og R11 er tilpasset batteriindikatoren (3-7 kΩ).

TERMINAL BOARD
TERMINALBRÆDT

TB601

D401.263

Storno

TYPE	NO.	CODE	DATA	
TB 601		10.1971	Terminal Board	
	C2	73.5113	5,6 µF 20% tantal	35V
	C3	73.5113	5,6 µF 20% tantal	35V
	R1	86.5039	10 kΩ 20% potm. carbon film	
	R6	80.5234	56 Ω 5% carbon film	1/8W
	R7	80.5273	0,1 MΩ 5% " "	1/8W
	R8	86.5050	5 kΩ 20% potm. carbon film	
	R9	80.5249	1 kΩ 5% carbon film	1/8W
	R10	80.52xx	Adjusted/tilpasses	
	R11	80.52xx	Adjusted/tilpasses	
	R12	80.5224	8,2 Ω 5% carbon film	1/8W

Storno

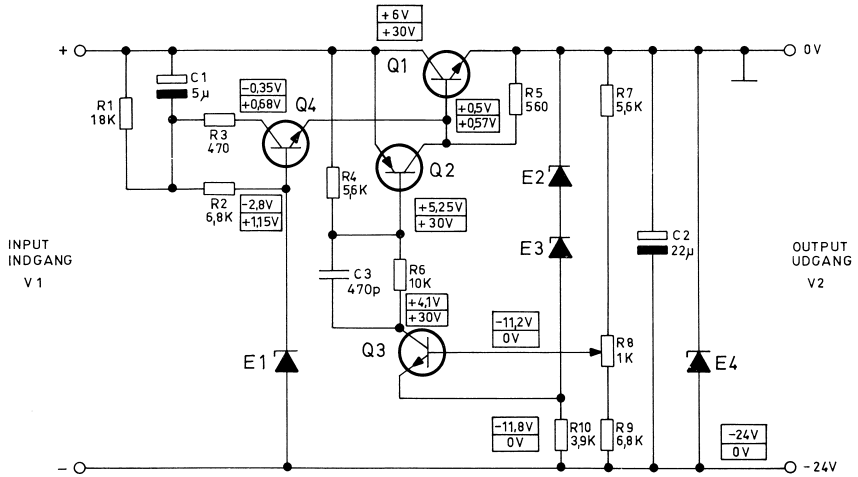
TYPE	NO.	CODE	DATA

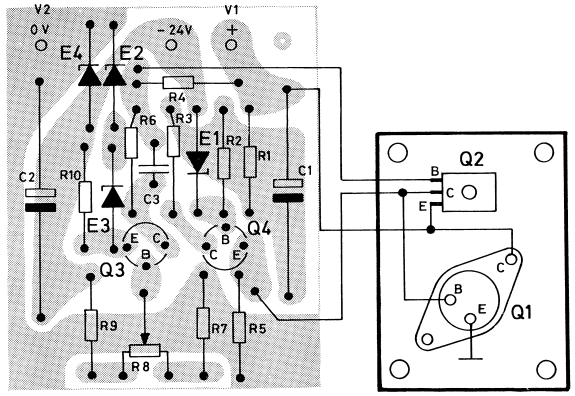
TERMINAL BOARD
TERMINALBRÆDT

TB601

X401.034/2

Storno





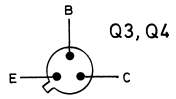
PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

DC VOLTAGES MEASURED WITH RESPECT TO CHASSIS WITH A METER (20KΩ/V)

V UNLOADED
V OUTPUT SHORT CIRCUIT

DC SPÆNDINGER ER MÅLT I FORHOLD TIL STEL MED ET METER (20KΩ/V)

V UBELASTET
V UDGANG KORTSLUTTET



BOTTOM VIEW
SET FRA BUNDEN

VOLTAGE REGULATOR
SPÆNDINGSREGULATOR

VR601

D400.896/2

TYPE	NO.	CODE	DATA	
VR601		10.1845	Voltage Regulator	
	C1	73.5104	5 µF -10 +100% elco	70V
	C2	73.5120	22 µF 20% elco	25V
	C3	74.5161	470 pF -20 +50% ceram II PL	63V
	C4	73.5104	5µF -10 +100% elco	70V
	R1	80.5264	18 kΩ 5% carbon film	1/8W
	R2	80.5259	6,8 kΩ 5% " "	1/8W
	R3	80.5245	470 Ω 5% " "	1/8W
	R4	80.5258	5,6 kΩ 5% " "	1/8W
	R5	80.5246	560 Ω 5% " "	1/8W
	R6	80.5261	10 kΩ 5% " "	1/8W
	R7	80.5258	5,6 kΩ 5% " "	1/8W
	R8	86.5043	2.5 kΩ 20% potm. lin. carbon film	0,1W
	R9	80.5259	6,8 kΩ 5% carbon film	1/8W
	R10	80.5256	3,9 kΩ 5% " "	1/8W
	E1	99.5212	Zenerdiode 22V 5%	1/4W
	E2	99.5114	Zenerdiode 5,6V 5%	1/4W
	E3	99.5114	Zenerdiode 5,6V 5%	1/4W
	E4	99.5222	Zenerdiode 27V 5%	1/4W
	Q1	99.5171	Transistor 2N3055	
	Q2	99.5213	Transistor 2N4919	
	Q3	99.5214	Transistor BCY65	
	Q4	99.5121	Transistor BC107	

Storno

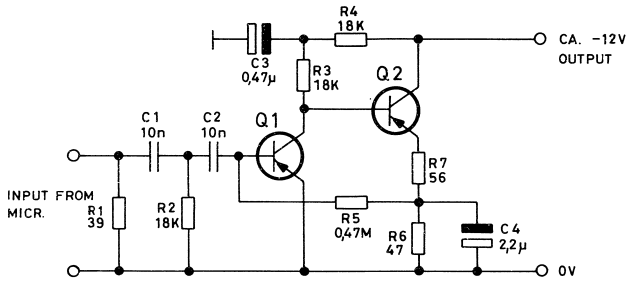
TYPE	NO.	CODE	DATA

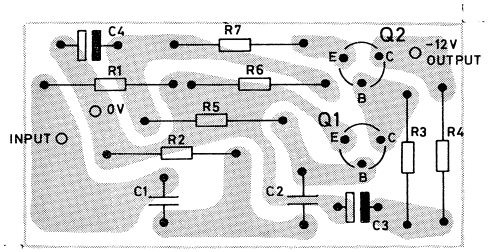
VOLTAGE REGULATOR
SPÆNDINGSREGULATOR

VR601

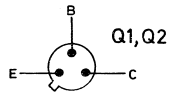
X401.035/3

Storno





PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



BOTTOM VIEW
SET FRA BUNDEN

AF AMPLIFIER
LF FORSTÆRKER

AA609

D401.021/2

TYPE	NO.	CODE	DATA	
AA609		10.2166	Microphone Amplifier	
	R1	80.5232	39 Ω 5% carbon film	1/8W
	R2	80.5264	18 kΩ 5% " "	1/8W
	R3	80.5264	18 kΩ 5% " "	1/8W
	R4	80.5264	18 kΩ 5% " "	1/8W
	R5	80.5281	0,47 MΩ 5% " "	1/8W
	R6	80.5233	47 Ω 5% " "	1/8W
	R7	80.5264	56 Ω 5% " "	1/8W
	C1	76.5070	10 nF 10% polyest. FL	50 V
	C2	76.5070	10 nF 10% " "	50 V
	C3	73.5125	0,47 µF 20% tantal	35 V
	C4	73.5102	2,2 µF 20% "	35 V
	Q1	99.5115	Transistor BC179	
	Q2	99.5115	Transistor BC179	

Storno

TYPE	NO.	CODE	DATA

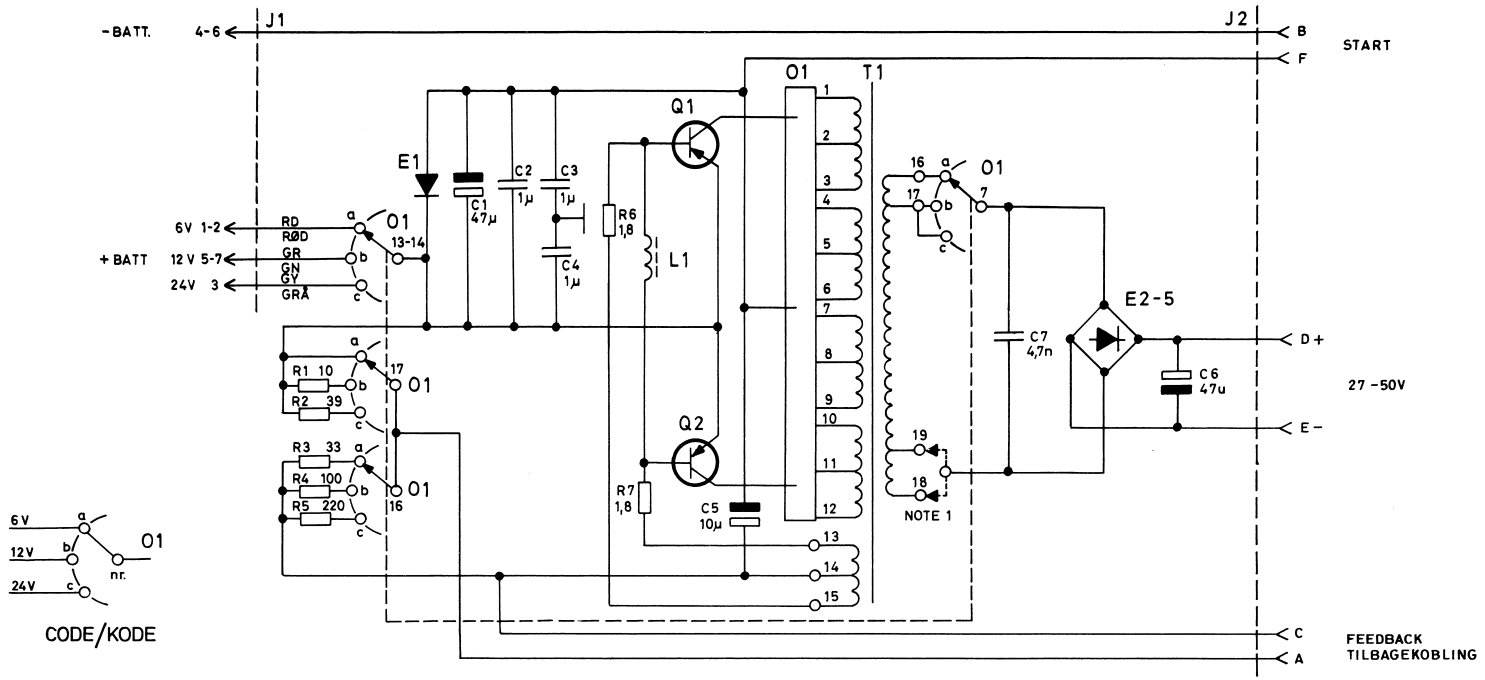
AF AMPLIFIER
LF FORSTÆRKER

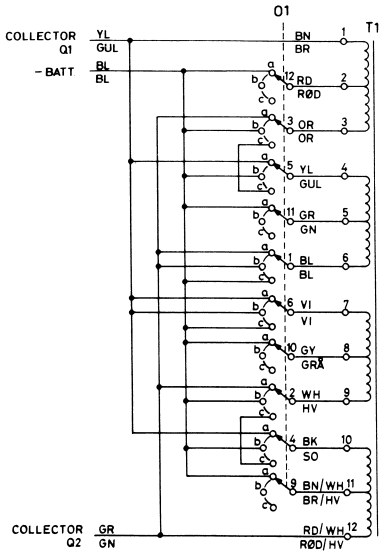
AA609

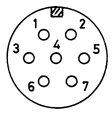
X401.031/2

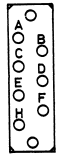
Storno

Storno









NOTE 1: NORMAL SUPPLY VOLTAGE: CONNECT E2-5 TO TERM. 18 ON T1
HIGH SUPPLY VOLTAGE: CONNECT E2-5 TO TERM. 19 ON T1

NOTE 1: NORMAL DRIFTSPÆNDING: FORBIND E2-5 TIL TERMINAL 18 PÅ T1
HØJ DRIFTSPÆNDING: FORBIND E2-5 TIL TERMINAL 19 PÅ T1

POWER SUPPLY UNIT
STRØMFORSYNING

PS608

D400.950

Storno

TYPE	NO.	CODE	DATA	
PS608		10.1975		
	C1	73.5101	47µF -10 +100% elco	75/90V
	C2	76.5078	1µF 10% polyest.	100V
	C3	76.5078	1µF 10% polyest.	100V
	C4	76.5078	1µF 10% polyest.	100V
	C5	73.5100	10µF -10 +100% elco	35V
	C6	73.5101	47µF -10 +100% elco	75/90V
	C7	76.5061	4,7nF 10% polyest. FL	50V
	R1	84.5019	10Ω 10% wirewound/trådv.	5,5W
	R2	81.5032	39Ω 5% carbon film	1/2W
	R3	80.5031	33Ω 5% carbon film	1/2W
	R4	80.5437	100Ω 5% carbon film	1/4W
	R5	80.5441	220Ω 5% carbon film	1/4W
	R6	84.5022	1,8Ω 10% wirewound/trådv.	5 W
	R7	84.5022	1,8Ω 10% wirewound/trådv.	5 W
	L1	61.803	Coil/spole	
	T1	60.5133	Transformer 6-12-24V/24V 70 VA	
	E1	99.5020	Diode 1N4004	
	E2	99.5020	Diode 1N4004	
	E3	99.5020	Diode 1N4004	
	E4	99.5020	Diode 1N4004	
	E5	99.5020	Diode 1N4004	
	Q1	99.5126	Transistor 2N2492	
	Q2	99.5126	Transistor 2N2492	
	O1	47.513	Selector/Omskifter	
	FC	65.5061	Ferroxcube beads/Ferritperler 60 MHz	

Storno

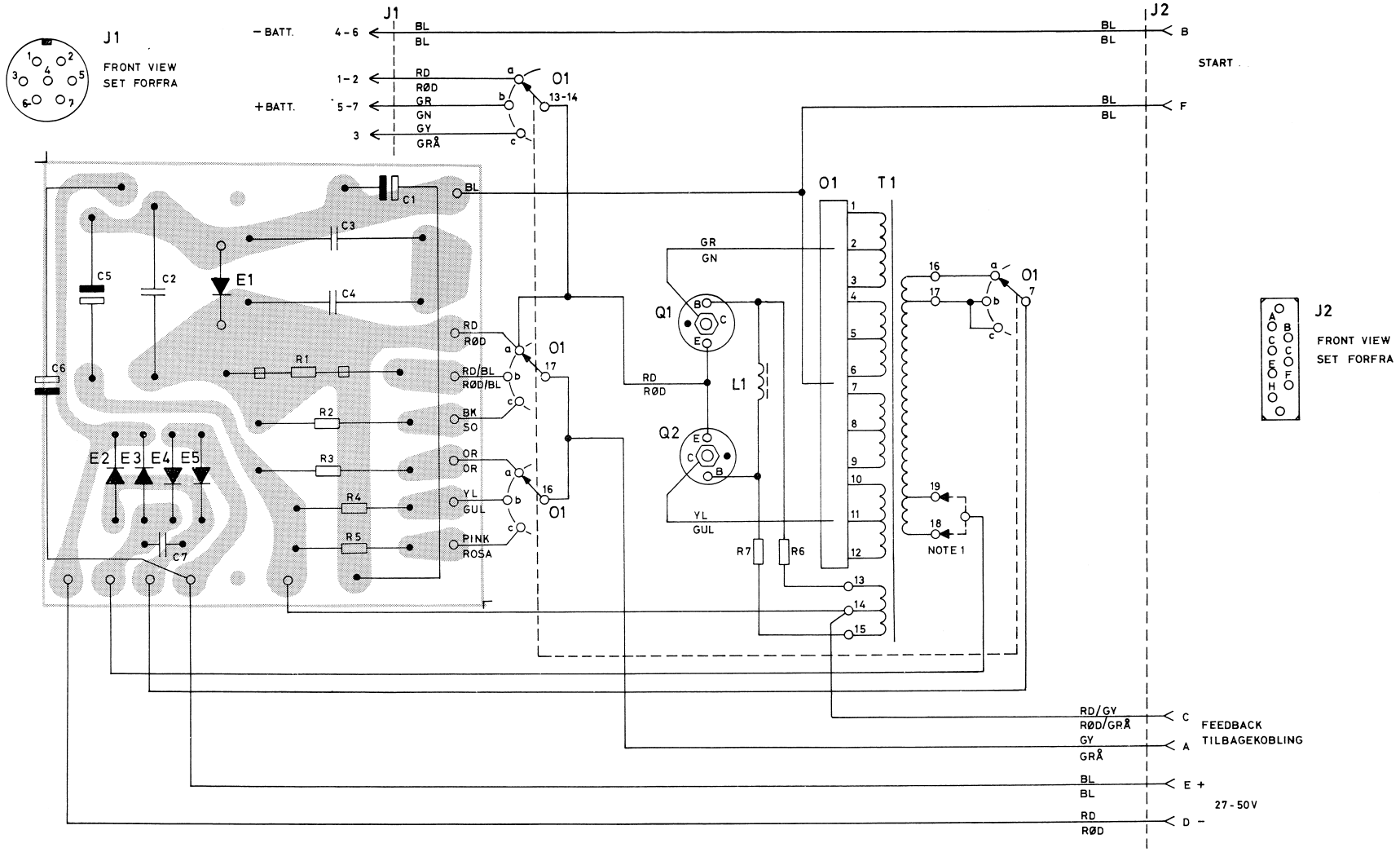
TYPE	NO.	CODE	DATA

POWER SUPPLY UNIT
STRØMFORSYNING

PS608

X401.050

Storno



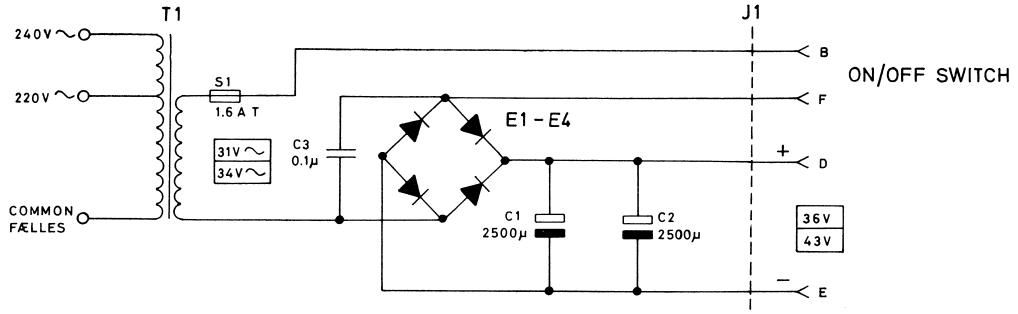
PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

POWER SUPPLY UNIT
STRØMFORSYNING

PS608

D401.143

Storno



CONNECTION TO TERM. BOARD	NOM. LINE VOLT 220V	240V
PHASE TO	220V~	240V~
NEUTRAL TO	COM.	COM.

MEASUREMENT ARE PERFORMED WITH A AVO-METER AT 220V AC ±10%

MÅLINGERNE ER FORETAGET MED ET AVO-METER VED 220V~ ±10%

V	1.4A (DURING TRANSMISSION)
V	0.05A (DURING RECEPTION IN SQUELCHED CONDITION)

V	1.4A (VED SENDING)
V	0.05A (MODTAGER SQUELCHED)

POWER SUPPLY UNIT
STRØMFORSYNING

PS609

D400.978/3

TYPE	NO.	CODE	DATA
PS609		10.1974	Power supply Unit
	C1	73.5122	2500 µF -20 +50% elco 70V
	C2	73.5122	2500µF -20 +50% elco 70V
	C3	76.5073	0.1 µF 10% polyester TB 100V
	E1	99.5020	Diode 1N4004
	E2	99.5020	Diode 1N4004
	E3	99.5020	Diode 1N4004
	E4	99.5020	Diode 1N4004
	T1	60.5152	Transformer 220-240/31.5V 45 VA
	S1	92.5093	Fuse/sikring 1,6A (T)
	J1	41.5099	7 pol. connector
	J2	41.5514	2 pol. connector

Storno

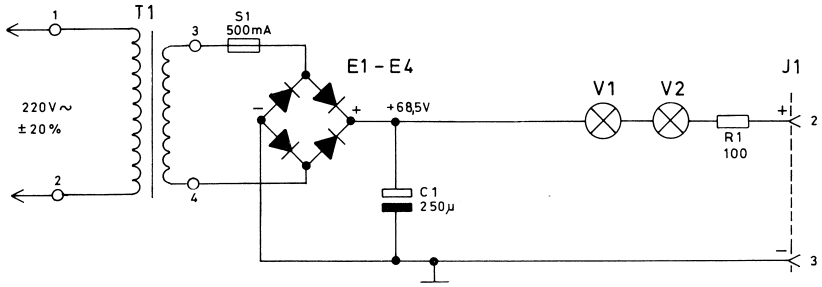
TYPE	NO.	CODE	DATA

POWER SUPPLY UNIT
STRØMFORSYNING

PS609

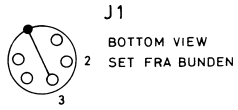
X401.033/2

Storno

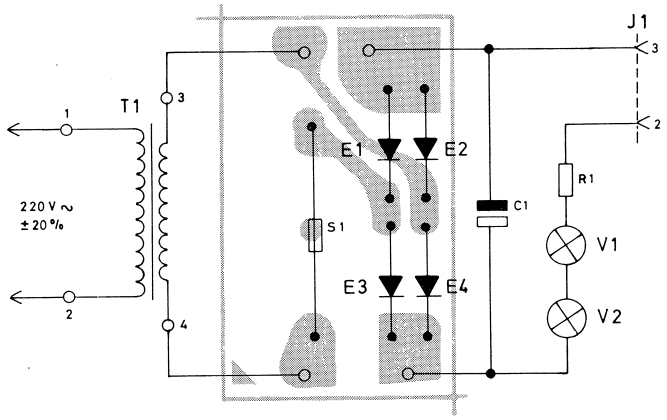


DC MEASUREMENT WITH RESPECT
TO CHASSIS, INSTRUMENT 20KΩ/V

DC ER MÅLT I FORHOLD TIL
CHASSIS INSTRUMENT 20KΩ/V



BOTTOM VIEW
SET FRA BUNDEN



BATTERY CHARGER
LADEAGGREGAT

CU602

D400.926/3

TYPE	NO.	CODE	DATA
CU602		10.1972	Battery Charger/ladeaggregat
	C1	73.5121	250 µF -20/+50% elco 100V
	R1	84.5223	100 Ω 5% wirewound/trådviklet 8W
	T1	60.5148	Transformer 220V/50V 16VA 50 Hz
	E1	99.5020	Diode 1N4004
	E2	99.5020	Diode 1N4004
	E3	99.5020	Diode 1N4004
	E4	99.5020	Diode 1N4004
	V1	92.5076	Lamp/Lampe 24V 250 mA
	V2	92.5076	Lamp/Lampe 24V 250 mA
	S1	92.5077	Fuse/sikring 500 mA
	J1	41.5504	Connector female (5-pol)

Storno

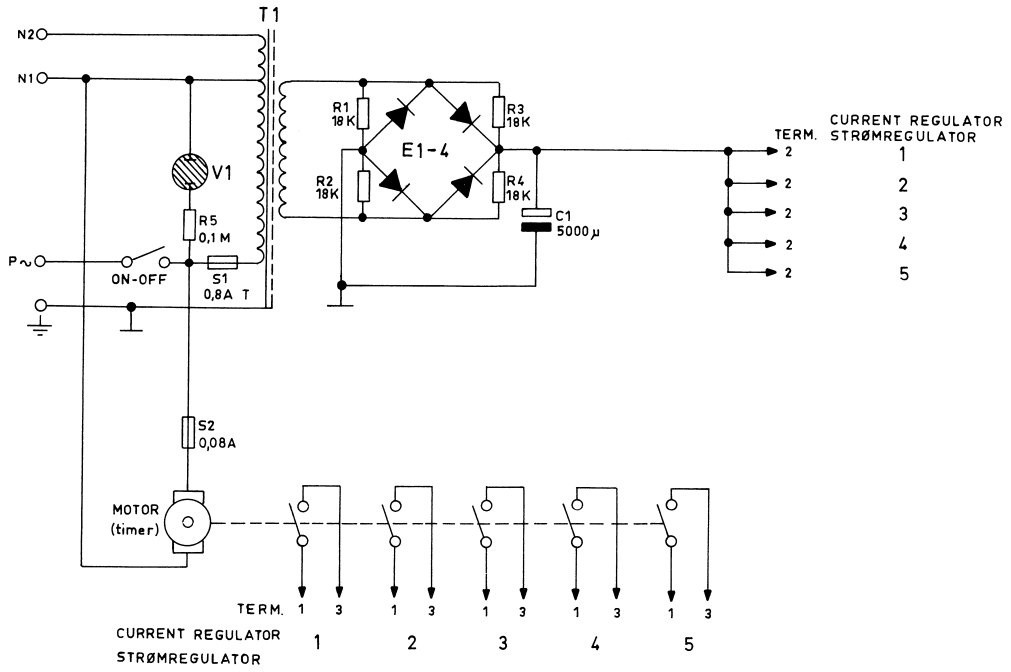
TYPE	NO.	CODE	DATA

BATTERY CHARGER
LADEAGGREGAT

CU602

X401.255

Storno



CONNECTIONS TO TERM. BOARD	NOM. LINE VOLTS 220V	240V
PHASE TO	P ~	P ~
NEUTRAL TO	N1	N2

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS6011

D400.933

Storno

TYPE	NO.	CODE	DATA	
PS6011		10.2118	Power Supply/Strømforsyning	
	C1	73.5123	5000 µF-20/+50% elco	100V
	R1	81.5064	18 kΩ 5% carbon film	1/2W
	R2	81.5064	18 kΩ 5% " "	1/2W
	R3	81.5064	18 kΩ 5% " "	1/2W
	R4	81.5064	18 kΩ 5% " "	1/2W
	R5	81.5073	0,1 MΩ 5% " "	1/2W
	T1	60.5151	Transformer 220/240V/48V	170 VA
	E1	99.5220	Diode 1N5401	
	E2	99.5220	Diode 1N5401	
	E3	99.5220	Diode 1N5401	
	E4	99.5220	Diode 1N5401	
	S1	92.5078	Fuse/sikring 0.8 AT	
	S2	92.5078	Fuse/sikring 80 mA F	

Storno

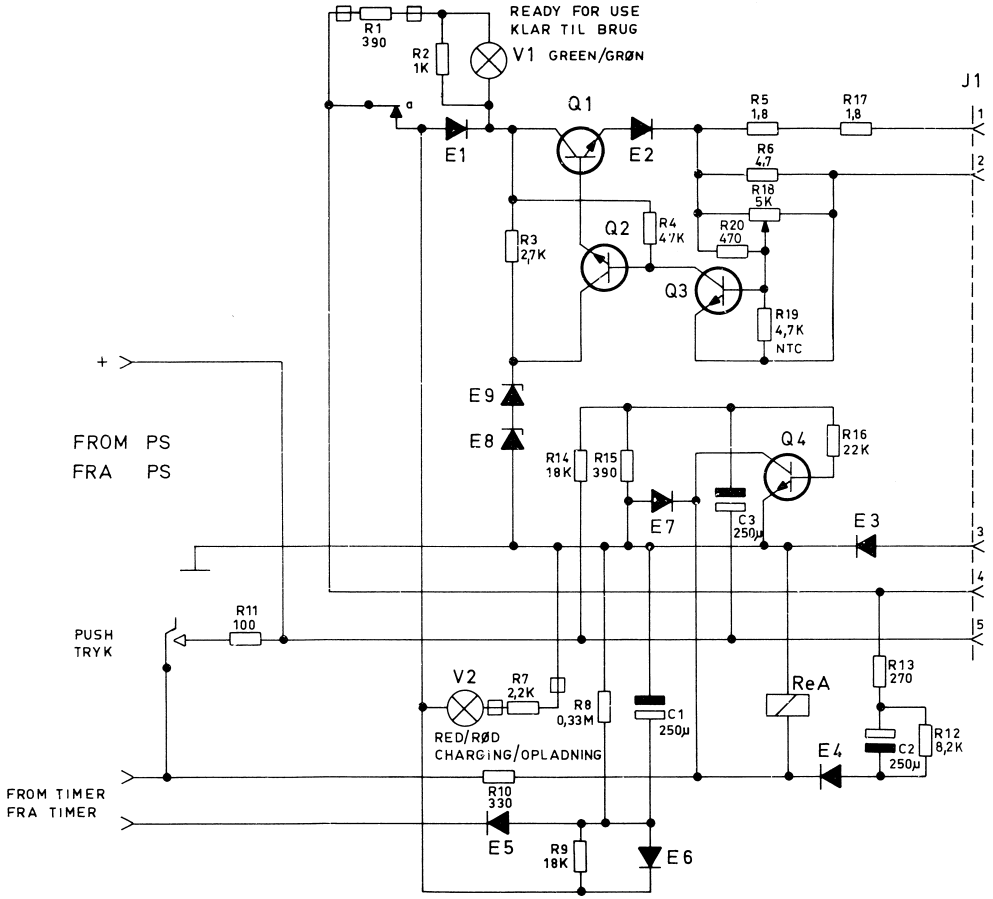
TYPE	NO.	CODE	DATA

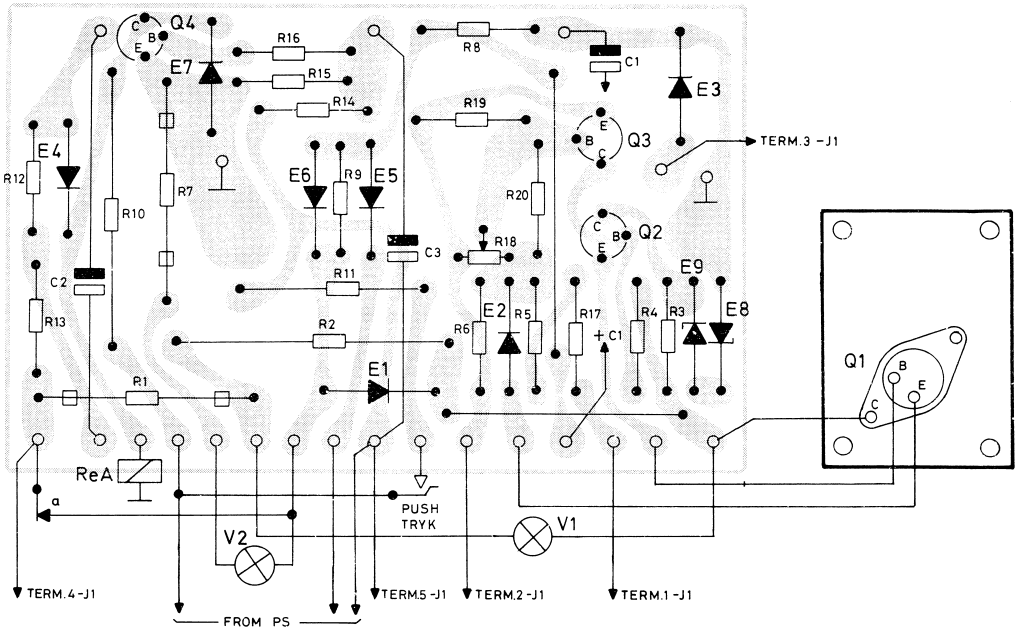
POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS6011

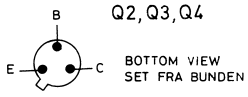
X401.254

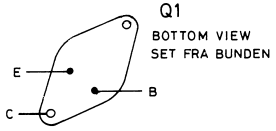
Storno





PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN





CURRENT REGULATOR
STRØMREGULATOR

CR601

D400.923/2

TYPE	NO.	CODE	DATA	
CR601		10.2117	Current Regulator/Strømregulator	
	C1	73.5121	250 µF -20/+50% elco	100V
	C2	73.5121	250 µF -20/+50% elco	100V
	C3	73.5121	250 µF -20/+50% elco	100V
	R1	83.5503	390 Ω 5% wirewound/trådv.	3W
	R2	82.5049	1 kΩ 5% carbon film	1W
	R3	80.5254	2,7 kΩ 5% carbon film	1/8W
	R4	80.5269	47 kΩ 5% carbon film	1/8W
	R5	80.5216	1.8 Ω 5% carbon film	1/8W
	R6	80.5221	4.7 Ω 5% carbon film	1/8W
	R7	83.5504	2.2 kΩ 5% wirewound/trådv.	3W
	R8	80.5279	0.33 MΩ 5% carbon film	1/8W
	R9	80.5264	18 kΩ 5% carbon film	1/8W
	R10	82.5043	330 Ω 5% carbon film	1/8W
	R11	81.5037	100 Ω 5% carbon film	1/2W
	R12	80.5260	8.2 kΩ 5% carbon film	1/8W
	R13	80.5242	270 Ω 5% carbon film	1/8W
	R14	80.5264	18 kΩ 5% carbon film	1/8W
	R15	80.5244	390 Ω 5% carbon film	1/8W
	R16	80.5265	22 kΩ 5% carbon film	1/8W
	R17	80.5216	1.8 Ω 5% carbon film	1/8W
	R18	86.5059	5 kΩ 20% potm. carb.film	0.1W
	R19	89.5009	4.7 kΩ 20% NTC	0.6W
	R20	80.5245	470 Ω 5% carbon film	1/8W
	E1	99.5020	Diode 1N4004	
	E2	99.5020	Diode 1N4004	
	E3	99.5020	Diode 1N4004	
	E4	99.5020	Diode 1N4004	
	E5	99.5020	Diode 1N4004	
	E6	99.5020	Diode 1N4004	
	E7	99.5020	Diode 1N4004	
	E8	99.5184	Zenerdiode 20V 5%	0.25W
	E9	99.5184	Zenerdiode 20V 5%	0.25W
	Q1	99.5171	Transistor 2N3055	
	Q2	99.5121	Transistor BC107	
	Q3	99.5121	Transistor BC107	
	Q4	99.5121	Transistor BC107	
	V1	92.5003	Lamp/Lampe 24V 25 mA	
	V2	92.5003	Lamp/Lampe 24V 25 mA	

Storno

TYPE	NO.	CODE	DATA

CURRENT REGULATOR
STRØMREGULATOR

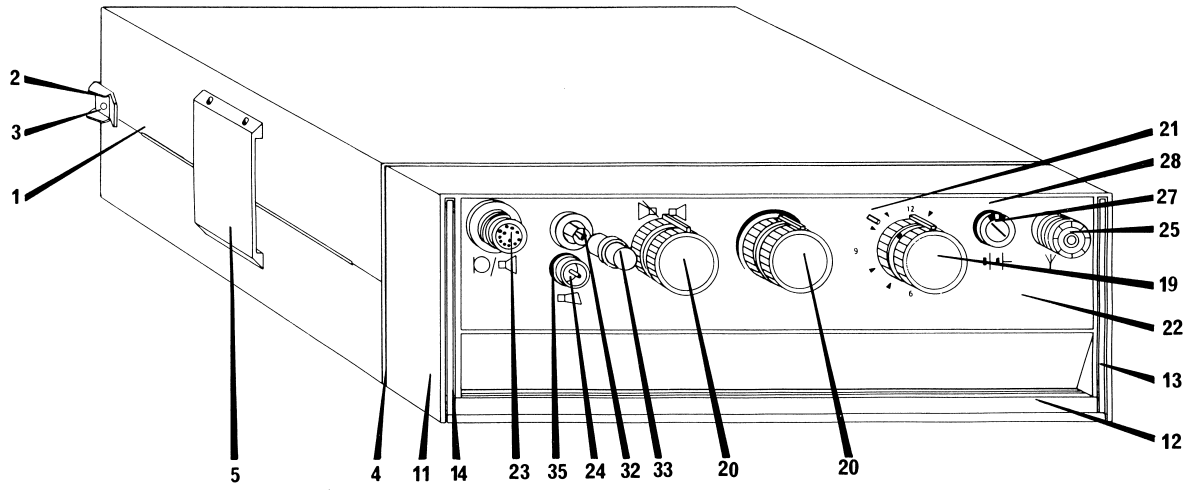
CR601

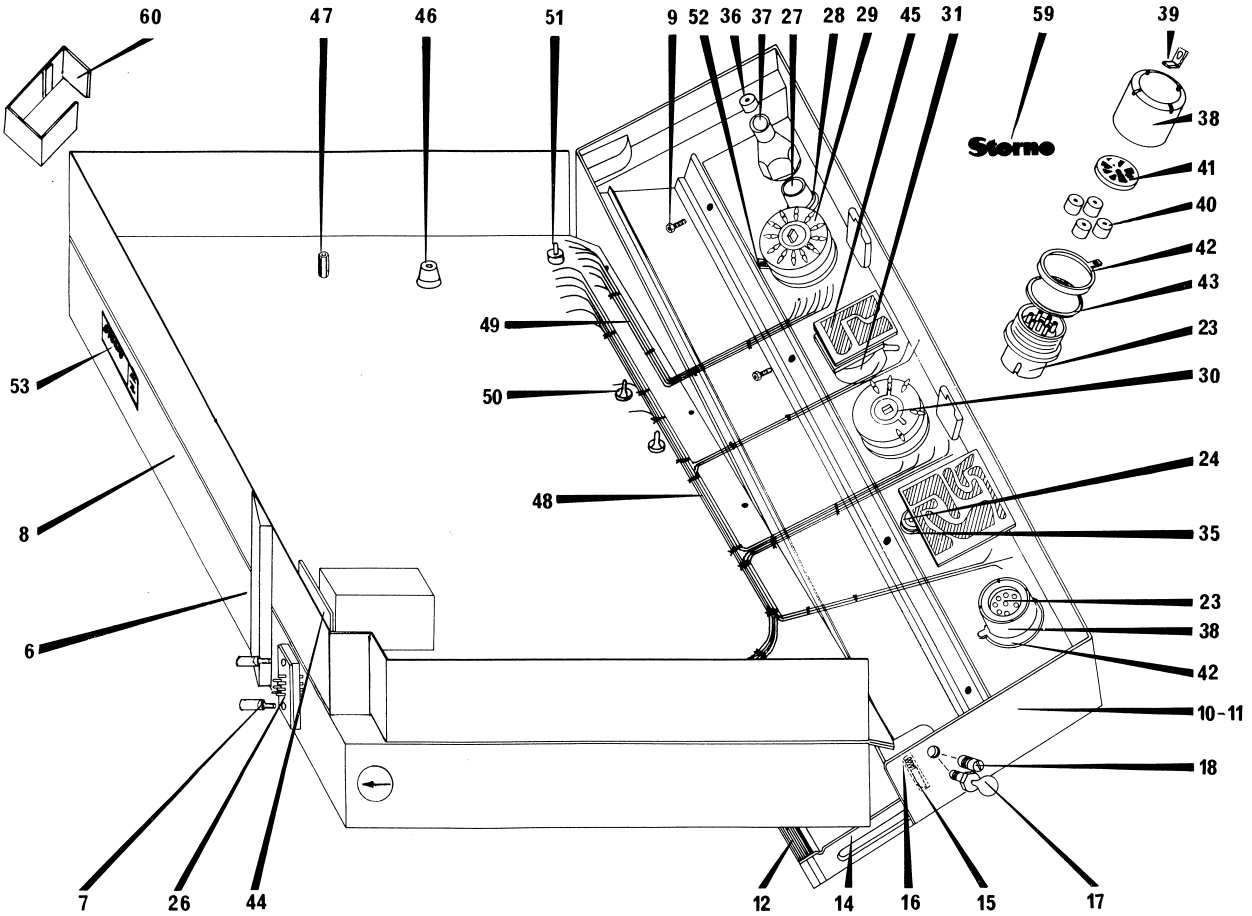
X401.253

Storno

CHAPTER VII. MECHANICAL PARTS LISTS

When ordering mechanical parts from Storno please state the code numbers and descriptions given in the parts lists.





CABINET FOR CQP600
GEHÄUSE FÜR CQP600 CA609

M405.017

ITEM	CODE	DESCRIPTION
1-18	10.1801	Cabinet CA609 Complete assembly Kabinet CA609 komplet
1	11.0650-01	Cover assembly Svøb samlet
2	37.0127-01	Snap fastener hook Snaplåshager
3	30.5031	Copper rivet 2.6^{Ø} x 6 (for item 2) Nitte for pos. 2, 2,6 x 6
4	32.0237	Gasket Pakning for svøb
5	37.0125	Microphone retainer Mikrofonophæng
6	11.0804	Angular guide block Vinkelstyr
7	31.0443	Guide pin Styrestift
8	11.0651	Chassis assembly Samlet chassis
9	20033-03008	Allen screw M3 x 8 (for item 8) Umbraco skrue for pos. 8
10	15.0021	Front plate assembly Forplade komplet (pos. 11-18)
11	12.0131	Front plate without handle Forplade uden håndtag
12	37.0126	Handle assembly Håndtag, samlet
13	33.0301	Bracket, left hand (for item 12) Vinkel for pos. 12, venstre
14	33.0301-10	Bracket, right hand (for item 12) Vinkel for pos. 12, højre
15	32.0276	Locking pin (for item 12) Låsetap for pos. 12
16	36.0188	Spring (for item 15) Fjeder for pos. 15
17	28.0084	Shoulder strap stud Holdestift for bærerem
18	21141-05007	Tapped stud, nylon Nylon gev. stift
19	49.0164	Knob, channel Knap for kanalvalg
20	49.0165	Knob Knap
21	20063-03006	Screw M3 x 6 Skrue for knap (10K 3 x 6)
22	51.0639	Escutcheon Forpladeskilt
23	41.5085	12 way connector, female Konnektor
24	41.5083	Connector Konnektor
25	41.5147	Antenna connector Antenne konnektor
26	41.5098	7 way connector, male Konnektor (7-polet)
27	95.5015	Battery charge indicator Instrument

CABINET FOR CQP600 CA609

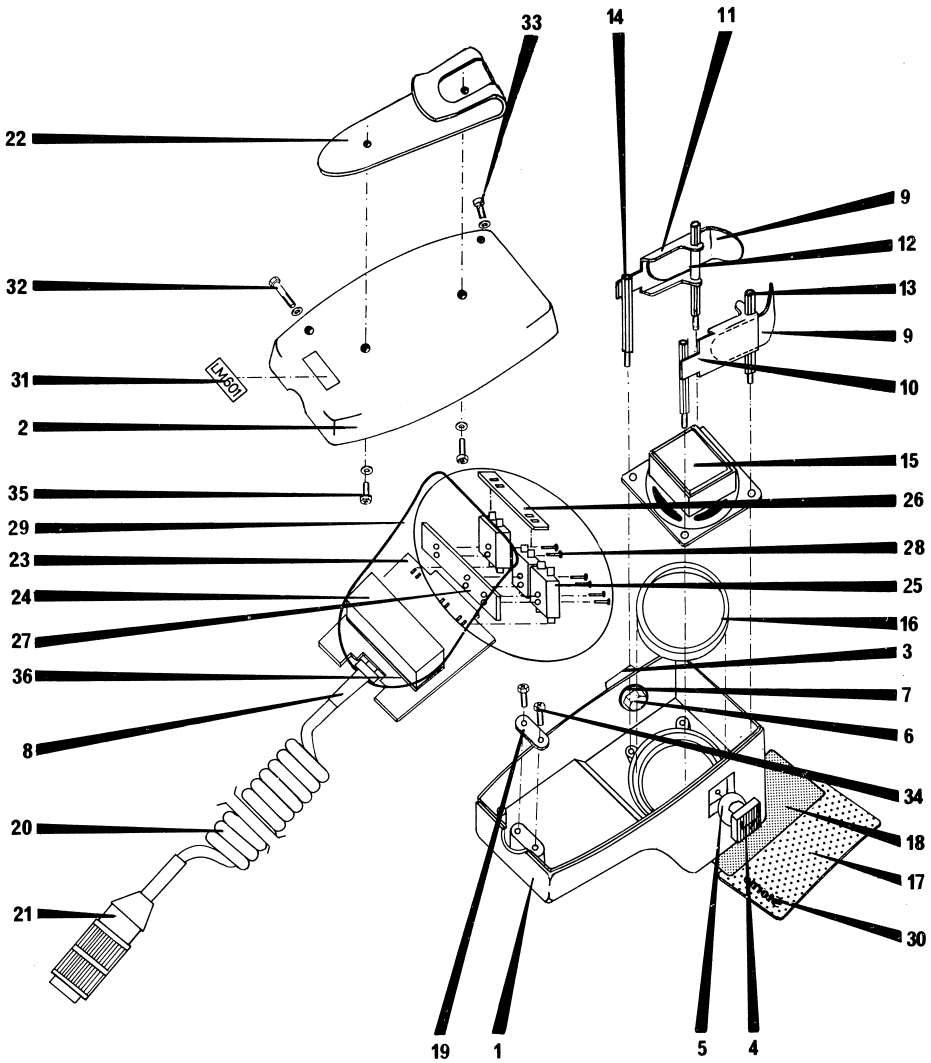
ITEM	CODE	DESCRIPTION
28	32.0157-01	Sealing ring (for item 27) Pakning for pos. 27
29	47.0483	Switch, channel Kanalomskifter
30	47.0482	Switch, speaker in and out Omskifter (højttaler ind og ud)
31	86.5065	Potentiometer and switch, volume Potentiometer med afbryder (volumen)
32	92.5074	Lamp 28V 40mA, call Lampe for opkald 28V/40mA
33	48.5026	Lamp socket assembly Fatning for pos. 32
35	32.0253	Insulating bush (for item 24) Nylonring for pos. 24
36	34.0054	Ferrule (for item 25) Bøsning for pos. 25
37	29.0214	Screen nut (for item 25) Møtrik
38	29.0225	Screen nut (for item 23) Skærmmøtrik for pos. 23
39	34.5007	Solder tag (for item 23) Loddeflig for pos. 23
40	65.5061	Ferrox bead Ferrit perle
41	53.0425	Printed circuit Lederplade
42	34.0033	Solder tag Loddeflig
43	32.0176	Sealing ring Pakning for pos. 38
44	33.0309	Mounting bracket, key relay Vinkel for tastrelæ
45	53.0490	Printed circuit (for item 31) Lederplade for pos. 31
46	32.0159	Insulating spacer Isoleringsstag
47	31.0371	Spacer (TB/SQ) Stag for TB/SQ
48	18.0572	Cableform Kabling, stor
49	18.0569	Cableform, channel switch Kabling, kanalomskifter
50	69.5011	Feed-through filter Gennemføringsfilter
51	43.5025	Terminal pin 2.4 mm Loddeterminal 2,4 mm
52	34.5024	Solder tag Loddeflig
53	51.0637	Type label, without text Typeskilt uden tekst
54	51.0493	Frequency label, TX Frekvensskilt TX
55	51.0494	Frequency label, RX Frekvensskilt RX
56	51.0548	Tone label Toneskilt

CABINET FOR CQP600 CA609

ITEM	CODE	DESCRIPTION
57	18.0571	Cableform, 'B' relay Kabling for toneudstyr (for relæ B)
58	18.0573	Cableform, AC683 Kabling for toneudstyr (for alarmkreds)
59	51.0171	Motif Firmaskilt Storno
60	11.0640	Screen plate, relay Skærmplade for relæ

CABINET FOR CQP600 CA609

Storno



LOUDSPEAKER MICROPHONE
LAUTSPRECHER MIKROFON

LM601

M405.018/2

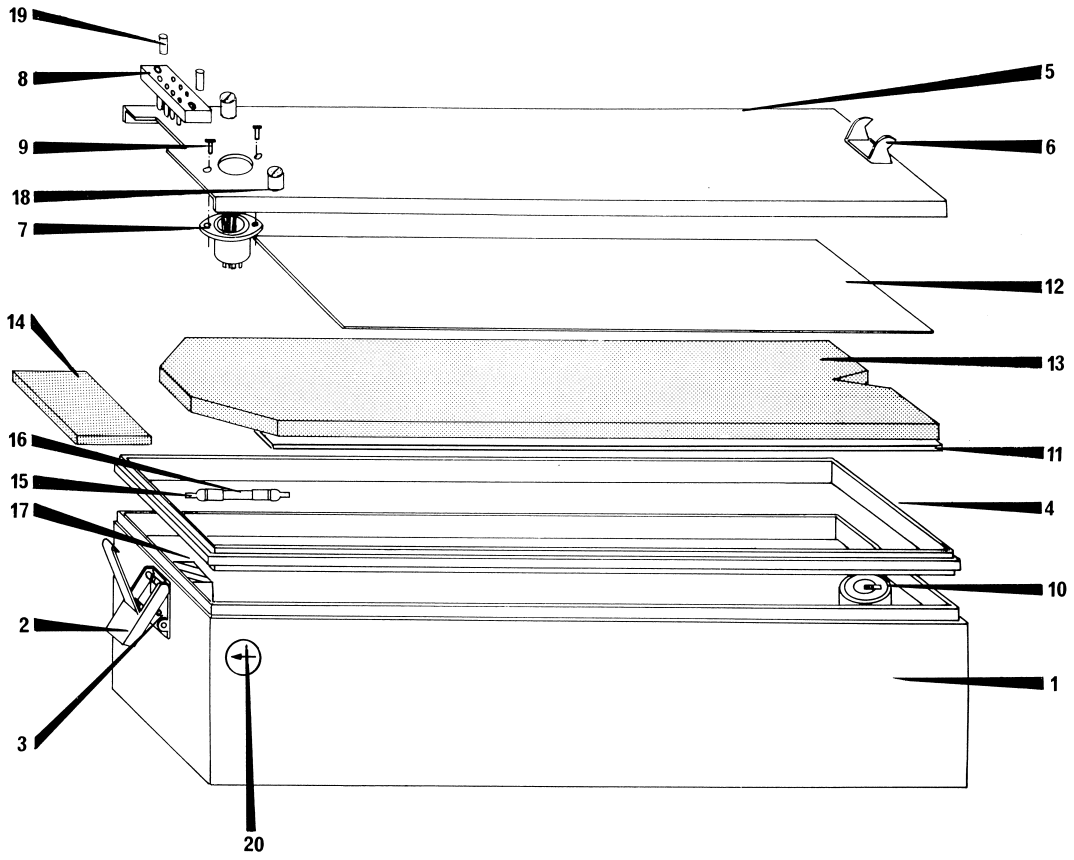
ITEM	CODE	DESCRIPTION
	96.0086	LM601 (STORNO)
1	12.0132	Microphone housing (front) Mikrofonhus (forside)
2	12.0133-01	Microphone housing (rear) Mikrofonhus (bagside)
3	49.0089	Key button Tastknap
4	49.0090	Tone key button Tonetastknap
5	32.0113	Packing Pakninger
6	28.0059	Screw Skruer
7	2504-120.053	Washer SRBP 12 x 5, 3 x 0.5 Skive, bak.papir 12 x 5,3 x 0,5
8	32.0272	Sleeve Pakning
9	36.0204	Spring Fjeder
10	36.0198-01	Spring Fjeder
11	36.0206	Spring Fjeder
12	31.0406-01	Spacer Stag
13	31.0407-01	Spacer Stag
14	31.0408	Spacer Stag
15	97.5031	47 x 47mm Loudspeaker 35 ohm 1W 47 x 47mm højttaler 35 Ω 1W
16	32.0298	Packing gland Pakning
17	52.0036	Loudspeaker grille Højttalernet
18	52.0037	Dust cover Beskyttelsesnet
19	44.0080	Cable clamp Aflastningsbøjle
20	177.5010	6 core spiral cable Snøre 6-leder spiral
21	41.5531-00	Connector 12 pole Konnektor
22	49.0018	Clip Clip
23	54.0549	Printed circuit sub-assy Lederplade, delsamlet
24	68.0098	Screen box Skærmdåse
25	47.5057	Microswitch Mikroswitch
26	44.0082-01	Plate for microswitch Laske til mikroswitch
27	44.0081-01	Plate for microswitch Plade til mikroswitch

LOUDSPEAKER-MICROPHONE
HØJTTALER-MIKROFON

LM601

ITEM	CODE	DESCRIPTION
28	30.5029	Tubular rivet 2^{Ø} x 8 Rørnitte 2^{Ø} x 8
29	47.0532	Microswitch and plate Mikroswitch med plade
30	51.0666	'Storno' motif Firmaskilt
31	51.0718	Type label Typeskilt
32	20022-02612	Screw M2.6 x 12 Skrue M2,6 x 12
33	20022-02606	Screw M2.6 x 6 Skrue M2,6 x 6
34	20412-02210	Screw 2.2 x 10 Skrue 2,2 x 10
35	20022-02603	Screw M2.6 x 3 Skrue M2,6 x 3
36	32.0352	Insulating foil for item 24 Bundfolie

Storno



BATTERY UNIT
BATTERIENHED BU601

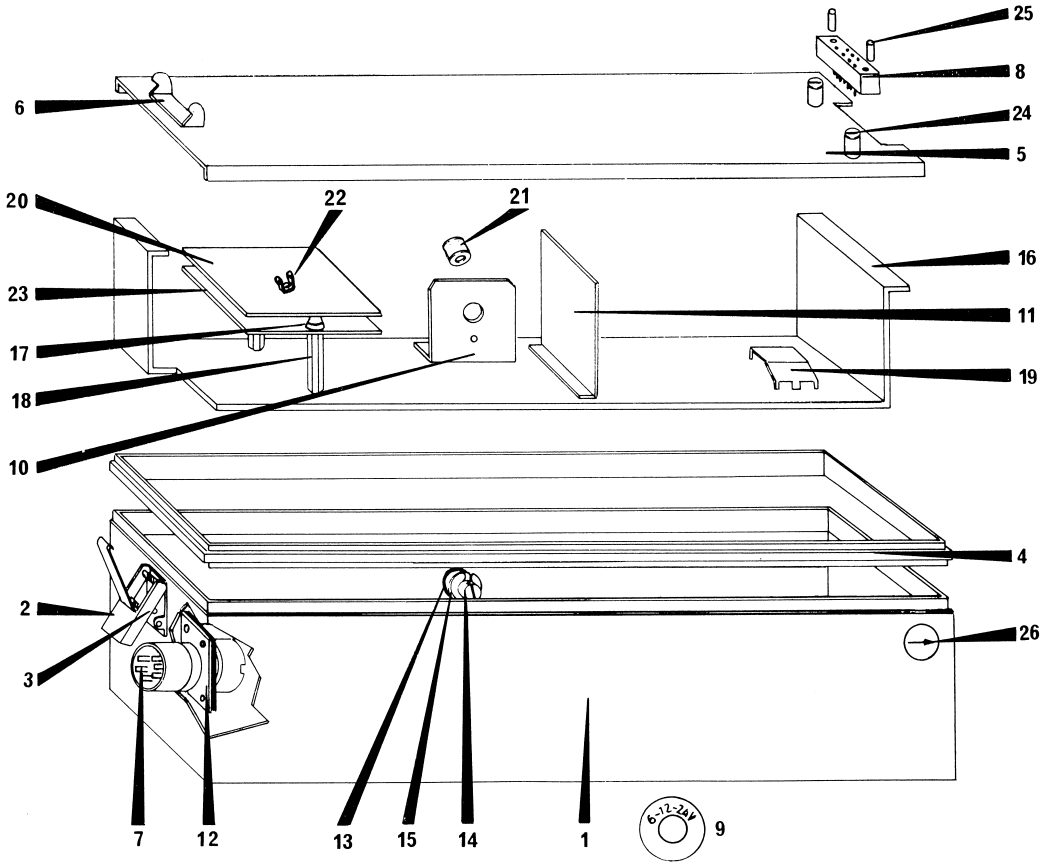
M405.021

ITEM	CODE	DESCRIPTION
	10.1584	BU601
1	11.0649	Battery case, mech. assy Kasse komplet
2	37.0095	Snap fastener Snaplås
3	30.5032	Rivet (For item 2) Nitte for pos. 2
4	32.0237	Gasket Pakning for pos. 1
5	11.0648-01	Cover plate Låg
6	33.0305	Locking plate Låsebøjle
7	41.5505	5 way connector, Male Konnektor 5-polet han
8	41.5528	7 way connector, Female Konnektor 7-polet hun
9	30.5014	Rivet (For item 7) Nitte for pos. 7
10	94.5018	Ni cd cell 1.6 Ah Akk. celler (Ni-cd) 1,6 Ah
11	32.0264	Insulating plate, bottom Isoleringsplade bund
12	32.0263	Insulating plate, top Isoleringsplade top
13	32.0262-01	Foam neoprene packing, large Skumgummiplade stor
14	32.0293	Foam neoprene packing, small Skumgummiplade lille
15	46.0009	Fuse retainer Sikringsholder halvdel
16	92.5088	Fuse 2A Sikring 2A
17	32.0281	Packing block, neoprene Gummiklods
18	31.0442	Locating pin Styretap
19	31.0444	Bush Styrebøsning
20	51.0729	Label Mærkat

BATTERY UNIT
BATTERIENHED BU601

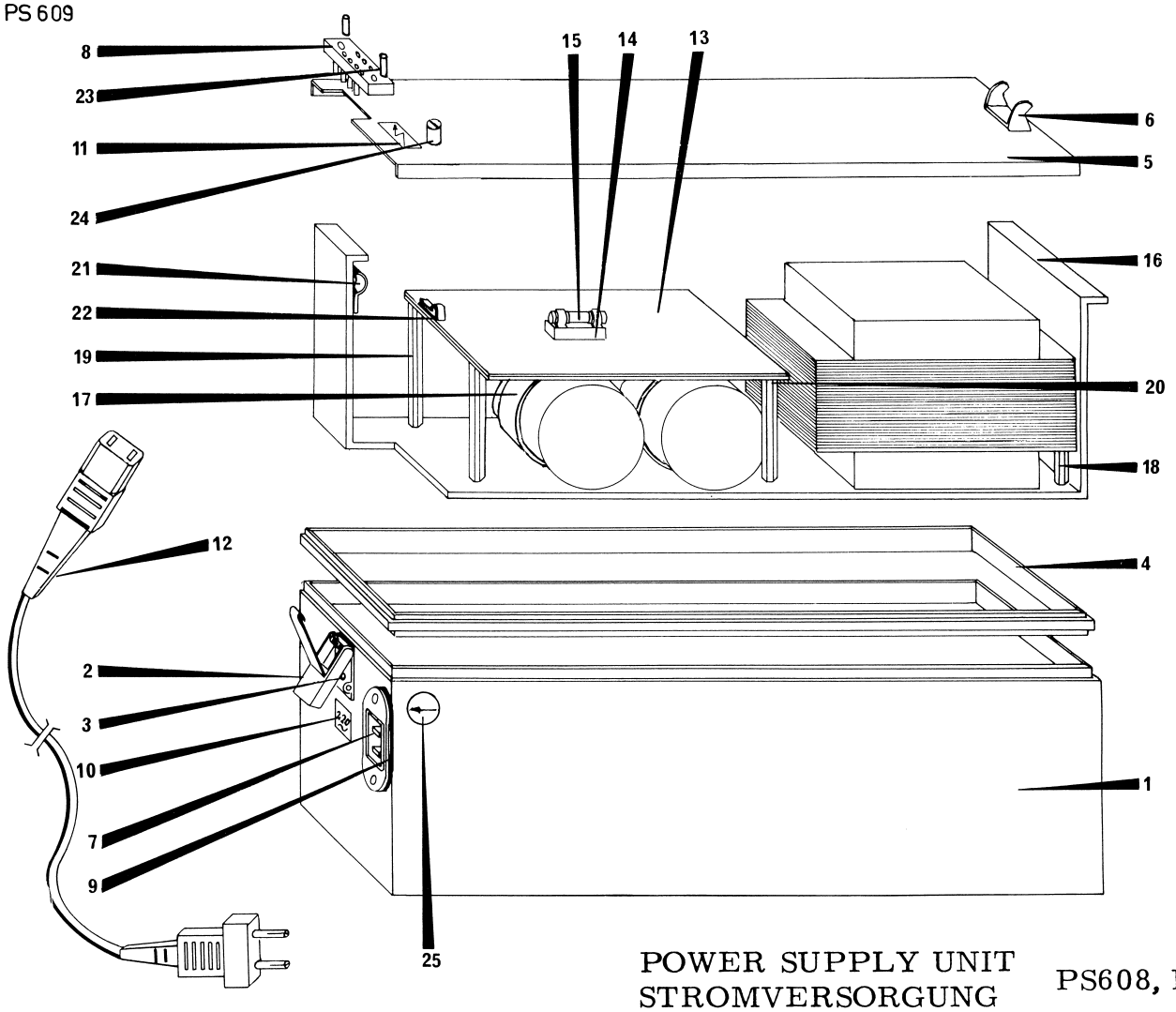
Storno

Storno



PS608

PS 609



POWER SUPPLY UNIT
STROMVERSORGUNG

PS608, PS609

M405.022

ITEM	CODE	DESCRIPTION
	10.1975	PS608
1	11.0693	Case complete (items 2 and 3) Kasse komplet (pos. 2-3)
2	37.0095	Snap lock assy Snaplås
3	30.5032	Rivet for item 2 Nitte for pos. 2
4	32.0237	Neoprene packing for item 1 Pakning for pos. 1
5	11.0716	Lid Låg
6	33.0305	Locking clip Låsebøjle
7	41.5510	Connector 2 pole (male) Konnektor 2-polet han
8	41.5528	Multi-connector 7 pole (female) Multikonnektor 7 polet hun
9	51.0658	Label 6 - 12 - 24V Skilt 6 - 12 - 24V
10	33.0336	Bracket for switch Vinkel for omskifter
11	33.0337	Bracket for transformer Vinkel for transformer
12	32.0289	Packing for connector Pakning for konnektor
13	32.5018	'O' ring for switch O-ring for omskifteraksel
14	55.0017-01	Extension spindle for switch Forlængeraksel for omskifter
15	2445-110050	Fuse washer 11 x 5 x 07 Sikringsskive 11 x 5 x 07
16	11.0784	Chassis assy Chassis samlet
17	32.0159	Insulating spacer Isoleringsstag
18	31.0211-04	Spacer M3 x 2.6 Stag M3 x 2,6
19	36.0318	Clamp for resistor Bøjle for modstand
20	54.0531	Printed circuit sub-assy Lederplade delsamlet
21	31.0402	Bush for bracket (item 10) Bøsning for vinkel pos. 10
22	29.0177	Washer with solder tag Skive med loddeflig
23	32.0304-01	Insulating plate Isolationsplade
24	31.0442	Guide pin Styretap
25	31.0444	Guide bush Styrebøsning
26	51.0729	Stick-on label (arrow) Mærkat

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS608

Storno

ITEM	CODE	DESCRIPTION
	10.1974	PS609
1	11.0709	Case complete (items 2 and 3) Kasse komplet (pos. 2-3)
2	37.0095	Snap lock assy Snaplås
3	30.5032	Rivet for item 2 Nitte for pos. 2
4	32.0237	Packing for item 1 Pakning for pos. 1
5	11.0687	Lid Låg
6	33.0305	Locking clip Låsebøjle
7	41.5514	Chassis socket 2 pole (male) Chassisfatning 2-polet han
8	41.5528	Connector 7 pole (female) Konnektor 7-polet hun
9	32.0313	Packing for item 7 Pakning for pos. 7
10	51.0327	Label 220V AC Skilt 220V~
11	51.0694	Label with lightning flash (red) Skilt med rødt lyn
12	19.5004	Cable c/w connector plugs Ledning komplet med stik
13	43.0078-02	Terminal board assy Terminalbræt samlet
14	46.5014	Fuse holder Sikringsholder
15	92.5093	Fuse 1.6 amp Sikring 1,6 Amp
16	11.0700	Chassis assy Chassis samlet
17	38.5023	Clamp for capacitor Bøjle for elektrolyt
18	31.0002-21	Spacer M3 x 16.5 Stag M3 x 16,5
19	31.0002-05	Spacer M3 x 40 Stag M3 x 40
20	32.0308-01	Support plate for item 13 Underlagsplade for pos. 13
21	38.5019	Cable clamp 6mm 6mm aflastningsbøjle
22	38.5018	Cable clamp 8mm 8mm aflastningsbøjle
23	31.0444	Guide bush Styrebøsning
24	31.0442	Guide pin Styretap
25	51.0729	Stick-on label (arrow) Mærkat

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS609