FIXED UHF RADIOSTATION
MODEL STORNOPHONE 600
TYPE CQF661-12, -20
TYPE CQF662-12, -20
TYPE CQF663-12, -20
420-470 MHz

CONTENTS

Service Coordination
04-82
2nd Edition

Storno

TECHNICAL SPECIFICATIONS

A. General

Unless otherwise stated, specifications are based on the measuring methods prescribed in EIA publications RS-152-A, RS-204, and RS-237. Figures in brackets are typical values.

Frequency Range

420 - 470 MHz.

Channel Spacing and Frequency Swing

TYPE	CQF661	CQF662	CQF663
Min. channel spacing	50 kHz	25 kHz	20 kHz
Max. frequency swing	± 15 kHz	± 5 kHz	± 4 kHz

Service

Simplex or duplex

Modulation

Phase modulated telephony in the range 300 to 3000 Hz.

Frequency Stability

Meets government requirements.

Total Channel Bandwidth

Simplex 1 MHz
Duplex 0.6 MHz

Antenna Impedance

50 Ω nominal.

Number of RF Channels

CQF661 Max. 2 channels with provision for extension to 12 channels

CQF662 and CQF663: Max. 2 channels with provision for extension to 4 transmitter channels and 6 receiver channels.

Operation

Type CAF600 Control Equipment, or Type CB601 Control Box.

Supply Voltage

220/240 VAC, 50 Hz, or 12/24 VDC, depending on power supply unit used.

Supply Voltage for Radio Units

-24 V ± 5%.

Ambient Temperature

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

Dimensions

Station cabinet CA602:
550 mm x 365 mm x 135 mm.

Weight

Depends on whether the radiotelephone is for simplex or duplex service and on the type of power supply used.

A simplex radiotelephone less control panel and power supply unit weighs 19.2 kilos.

A duplex radiotelephone less control panel and power supply unit weighs 21.2 kilos.

To these figures must be added the weight of the power supply unit:

Type PS602 220 V power supply for 12 W radiotelephone: 6.2 kilos.

Type PS603 220 V power supply for 6 W radiotelephone: 4.8 kilos.

Type PS604 12/24 V power supply for 6 W radiotelephone: 1.4 kilos.

Type PS605 24 V voltage regulator for 6/15 W radiotelephone: 0.6 kilos.

B. Transmitter

RF Output

12 watts or 20 watts, +0/-1 dB, measured without antenna branching filter (if one is used).

Crystal Frequency Calculation

$$\text{Crystal frequency} = \frac{\text{signal frequency}}{36}$$

Spurious and Harmonic Radiation

Less than 2×10^{-7} watts (FTZ measuring method).
12 mV/50 Ω (GPO measuring method).

Adjacent Channel Interference

Attenuated in accordance with government requirements.

AF Input Impedance

600 Ω

Modulation Sensitivity

Nominal value 110 mV for 70% of max. permissible frequency swing at 1000 Hz.

Modulation Response Characteristic

6 dB/octave pre-emphasis characteristic from 300 to 3000 Hz +1/-3 dB relative to 1000 Hz.

By means of a restrapping operation the modulation response characteristic can be altered to be 6 dB/octave from 300 to 1000 Hz and flat over the range from 1000 to 3000 Hz.

Modulation Distortion

Max. 7% of max. permissible frequency swing at 1000 Hz.

Modulation Limiting

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

FM Hum and Noise

CQF661:	Min. 45 dB (-50 dB)
CQF662:	Min. 38 dB (-43 dB)
CQF663:	Min. 35 dB (-40 dB)

Current Drain

At 12 watts: 1.3 A
At 20 watts: 3.3 A

Dimensions

275 mm x 180 mm x 40 mm.

Weight (TX660)

2.2 kilos.

C. Receiver

(typical values)

Receiver Sensitivity

Input signal for 12 dB SINAD: 1.0 μV e.m.f. (0.8 μV)
Input signal for 20 dB signal-to-noise ratio (FTZ measuring method): 1.2 μ V e.m.f. (1.0 μV)

NOTE: If the radiotelephone is used with antenna branching filter BF661, the sensitivity is decreased by approx. 1 dB.

Intermediate Frequency

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

Adjacent Channel Selectivity

CQF661: 82 dB (70 dB)
CQF662: 80 dB (70 dB)
CQF663: 80 dB (70 dB) FTZ measuring method.

Modulation Acceptance Bandwidth

EQUIPMENT	CQF661	CQF662	CQF663
Max. frequency swing	±15kHz	± 5kHz	± 4kHz
Min. 6 dB bandwidth	±16kHz	± 8kHz	± 6kHz

Spurious Response Attenuation

Min. 75 dB (78 dB)

Intermodulation Attenuation

CQF661 and CQF662: Min. 60 dB. (66 dB)
CQF663: Min. 60 dB(66 dB) (FTZ measuring method).

Blocking

Conforms to government requirements.

Spurious and Harmonic Emissions

Less than 0.5×10^{-9} watts (FTZ measuring method).

AF Output Impedance

600 Ω ± 20% measured at frequencies in the range 300 - 3000 Hz.

AF Load Impedance

Nominal 600 Ω.

AF Power Output

2 milliwatts.

AF Distortion

3%.

AF Response

6 dB/octave from 300 to 3000 Hz +1/-3 dB relative to 1000 Hz.

Dimensions (RX660)

275 x 180 x 40 mm.

Weight (RX660)

Approx. 1.9 kilos.

Crystal Frequency Calculation

	CQF661 with oscillator XO611	CQF661 with oscillator XO661	CQF662 and CQF663 with oscillator XO664
Oscillator frequency range, MHz	45.5 - 51.1	45.5 - 56.9	11.37 - 12.6
Crystal frequency, MHz	$\frac{fs - 10.7}{9}$	$\frac{fs - 10.7}{9}$	$\frac{fs - 10.7}{36}$

fs = signal frequency.

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D. Power Supply Units

Power Consumption and Current Drain (typical values) without CP600 and with CB601.

Power Consumption at 220 VAC:

RF Output	Type of Operation	Power Consumption
12 W	Stand-by	15 W
12 W	Transmit	75 W
20 W	Stand-by	25 W
20 W	Transmit	130 W

Current Drain at 12 VDC (PS604):

RF Output	Type of Operation	Current Drain
12 W	Stand-by	0.4 A
12 W	Transmit	5.0 A

Current Drain at 24 VDC (PS604):

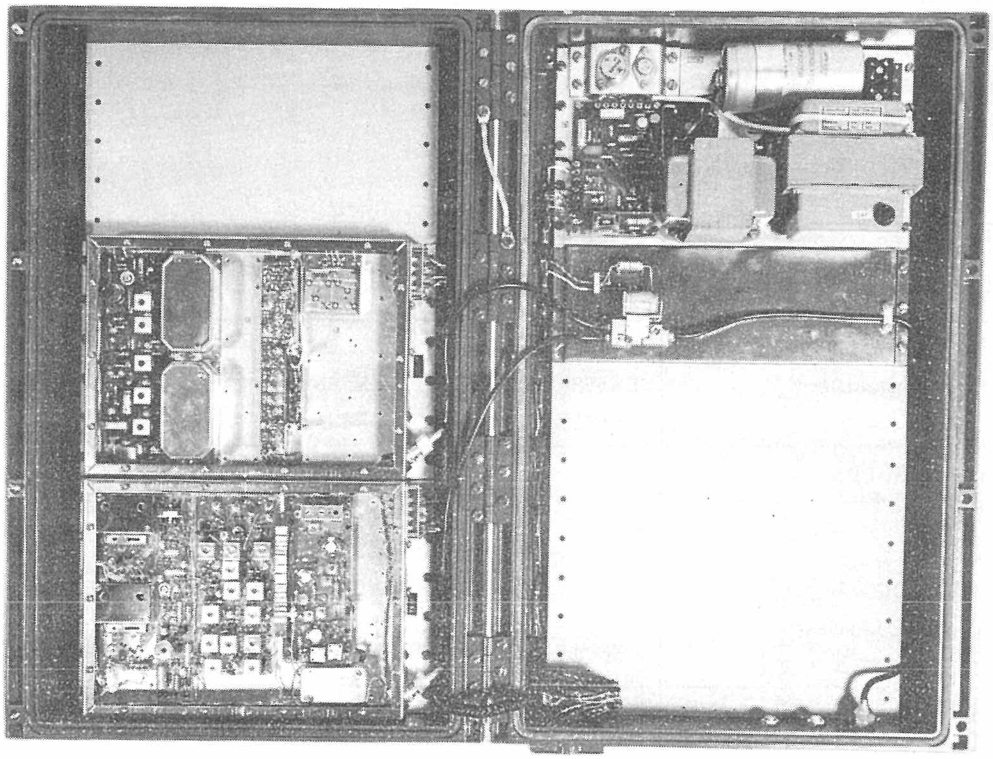
RF Output	Type of Operation	Current Drain
12 W	Stand-hy	0.25 A
12 W	Transmit	2.5 A

Additional specifications for power supply units are listed in Chapter II under the respective circuit descriptions.

Storno reserve right to change the listed specifications without notice.

CHAPTER I. GENERAL DESCRIPTION

A. Construction



Introduction

The fixed UHF-FM radio station, Type CQF600, is a transmitter/receiver combination. It employes a type of modular construction that has enabled Storno to offer a wide range of station types. These can be supplied, inside the frequency band 420 - 470 MHz, with 50, 25, and 20 kHz channel spacing, for either simplex or duplex service, or as a repeater station. RF output is either 12 or 20 watts. The CQF600 can be supplied for operation from either 220 VAC or 12/24 VDC supply voltage.

Various types of control systems are available for use with the CQF600, with facilities for repeater function, selective calling, etc.

Control equipment (if any) supplied with the CQF600 is covered by a separate manual.

The CQF600 fully meets the specifications of the governments of a number of countries, hence also the requirements of the British GPO standard and the American EIA standard for land mobile radio communication.

This manual is intended as a guide to the installation, maintenance, and adjustment of the CQF600, and every effort has been made to provide, through text and diagrams, an adequate description of its circuitry, construction, and mode of operation.

However, because we at Storno are constantly processing the experience we acquire during the production, testing, and operation of our radiotelephones, minor modifications and corrections will be made continually, These will be listed on a supplement and amendment sheet which is inserted as the first page of this manual.

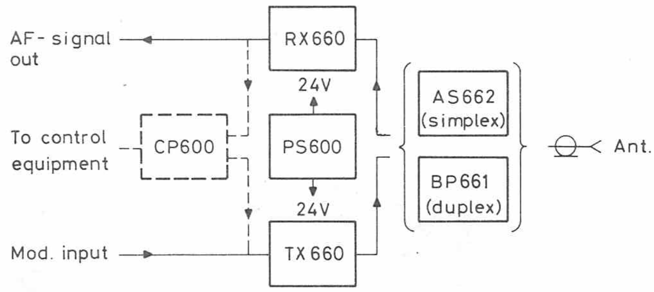
If your radiotelephone is a special version, the necessary descriptions of modifications are compiled in a supplement which is placed first in the standard description whilst the associated circuit diagrams and parts list are placed last in the manual.

Standard Versions

This manual covers the following types of equipment:

CQF661: 420-470 MHz, 50 kHz channel spacing.
CQF662: 420-470 MHz, 25 kHz channel spacing.
CQF663: 420-470 MHz, 20 kHz channel spacing.

These equipments are composed of the units tabulated below:



TYPE OF RADIOTELEPHONE	CQF661	CQF662	CQF663
RECEIVER	RX661	RX662	RX663
TRANSMITTER 12 W adjustable 20 W	 TX668 TX6610	 TX669 TX6611	 TX669 TX6611
POWER SUPPLY 220 VAC 220 VAC 12/24 VDC Voltage regulator 20 - 28 VDC Δ	 PS602, used in radiotelephones with 20 W TX PS603, used in radiotelephones with 12 W TX PS604, used in radiotelephones with 12 W TX PS605, used in radiotelephones with 12 or 20 W TX		
ANTENNA SWITCHING UNIT	AS660, used in radiotelephones for simplex operation		
DUPLEX FILTER	BF661, used in radiotelephones for duplex operation		

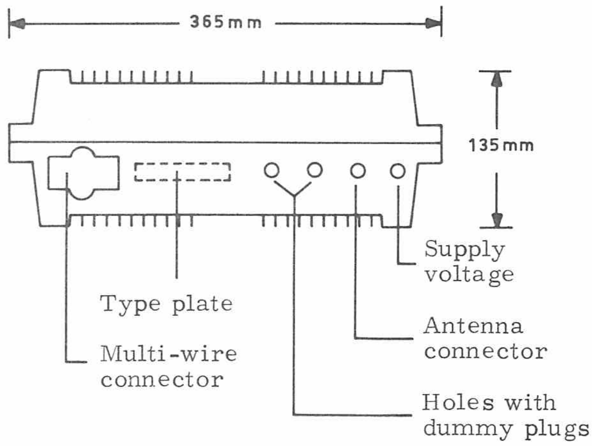
Δ Voltage regulator PS605 is used in conjunction with an emergency power supply in which the operation voltage is supplied from a charger and buffer batteries.

Construction

The units of the radiotelephone are contained in a pressure diecast cabinet, type CA602. This consists of two sections, a front section and a rear section which are held together by four hinges in the left side of the cabinet and locked with four screws in the opposite side. A rubber packing between the two cabinet sections prevents any ingress of moisture into the equipment.

The outside surface of the cabinet is heavily ribbed in order to be capable of draining heat away from the equipment.

The lower section of the rear wall carries a multi-wire connector which accepts the control cable, and an antenna connector and a supply-



cable feedthrough bushing. Also provided are two holes with dummy plugs. These holes are to accomodate additional antenna connectors in cases where more than one antenna is to be used.

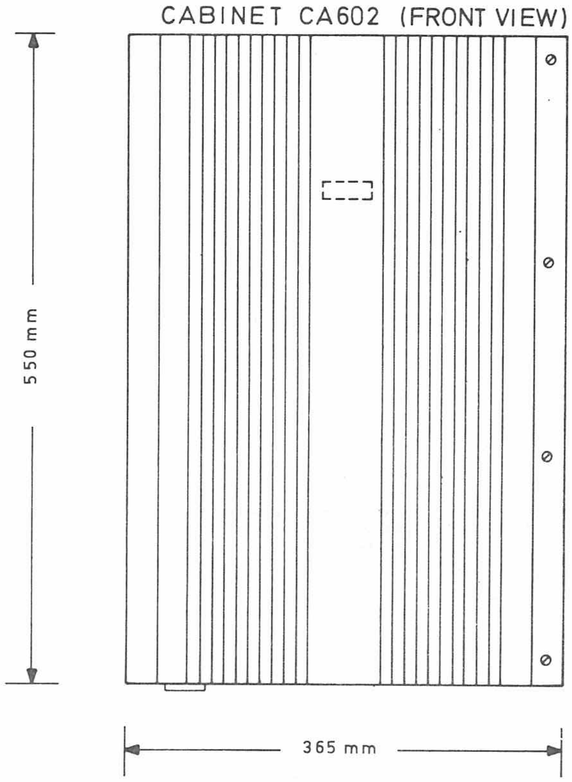
The interior of the cabinet provides space for all units of the station. The transmitter unit and receiver unit, both housed in screen boxes, are bolted to the inner side of the front section, which also houses a group switching relay in equipment employing between 8 and 12 channels.

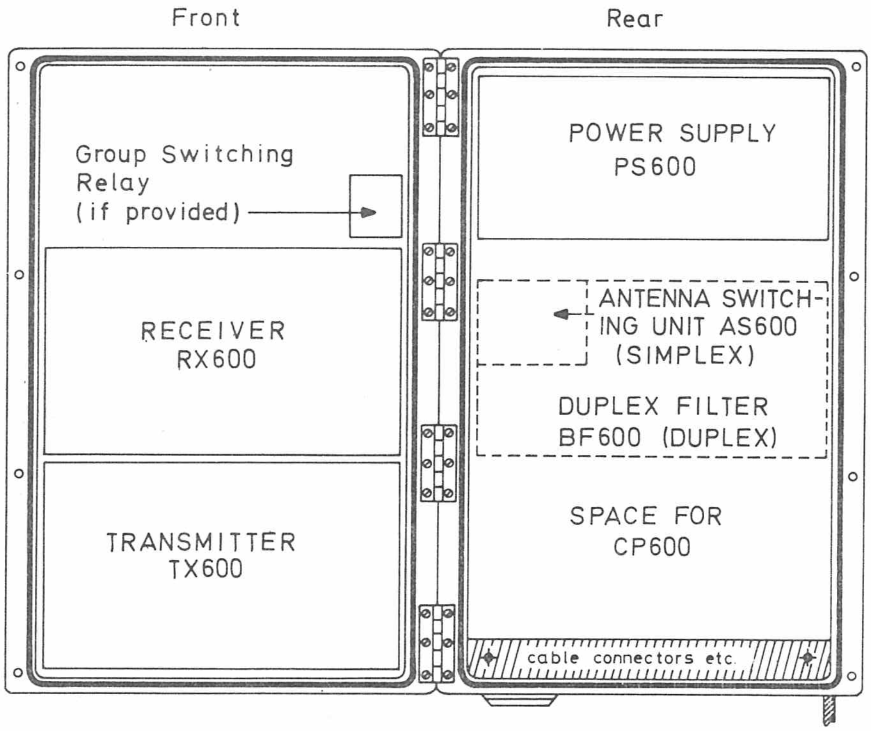
The rear section contains the power supply unit and the antenna switching unit or duplex filter, depending on whether the station is for simplex or duplex operation. Space is also provided for installation of a control panel, type CP600.

Both the transmitter and receiver sections are composed of a number of modular units which are built on printed wiring boards and bolted into position side by side with their respective screen boxes.

Some of the components of the power supply unit are placed on a printed wiring board. This board and the large components of the power supply are mounted on a metal chassis which is bolted to the cabinet.

All RF connectors in the radiotelephone are type BNC connectors except for the antenna connector, which is a type N connector.





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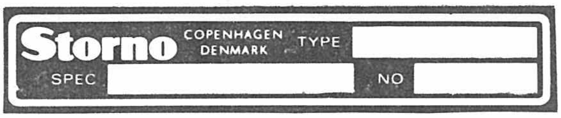
Type Designations and Specifications

A type plate on the lower section of the cabinet rear wall carries the type designation, chief specifications and serial number of the radiotelephone. The type designation states the frequency band and channel spacing of the station as mentioned above.

The specification lists the following data:

Supply voltage (220 VAC, 24 VDC or 12 VDC)
Maximum RF output (12 W or 20W)
Service (S = simplex, D = duplex)
Maximum number of channels that can be provided (2, 4, or 12).



Where no distinction between radiotelephones with different channel spacings is necessary, the following description will employ a common designation for the different types of equipment.

For example, equipments CQF661, CQF662, and CQF663 will be included under the common designation of CQF660. Similarly, the common designation TX660 will be used for all transmitters and RX660 will be used for all receivers.

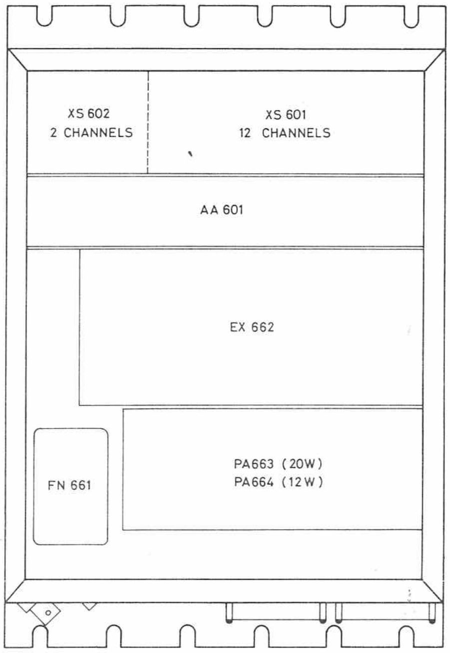
Placement

The radiotelephone is intended for wall mounting, and various types of brackets for this purpose are available. However, other methods of mounting may be used if care is taken to provide adequate cooling and sufficient room to permit opening the cabinet so that the individual units of the equipment will become accessible.

The chapter"INSTALLATION" contains additional information on how to mount the radio station, as well as a description of the accessories required for this purpose.

CHAPTER II. THEORETICAL CIRCUIT ANALYSIS

A. Transmitters



TX 668, TX 669, TX 6610, TX 6611.

General

TX660 is the group designation of a number of transmitters comprising types TX668, TX669, TX6610, and TX6611 for use in the frequency band 420 - 470 MHz with different channel spacings and with either 12 W or 20 W RF power output.

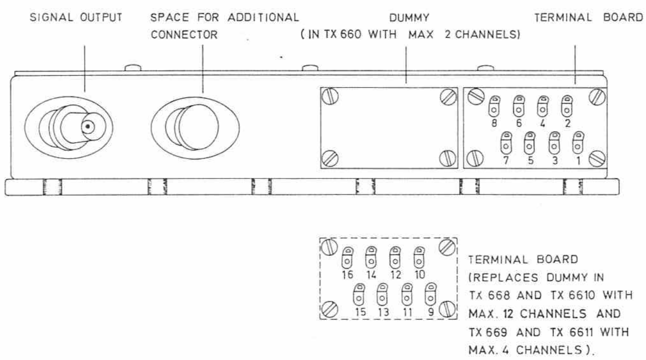
The transmitters are phase modulated on the fundamental frequency. The maximum number of crystal oscillators that can be provided is two - one for each frequency channel.

However, transmitter types TX669 and TX6611 which are used for channel spacings of 20 and 25 kHz, can be extended to a maximum of 4 channels.

The transmitter is housed in a closed metal box carrying on its outside a coaxial connector from which the output signal is taken off, and terminals for the transmitter cabling which connects, via feedthrough filter, to the respective circuits inside the screen box.

The top of the screen box can be removed on loosening a number of screws in it, providing access to the transmitter circuits.

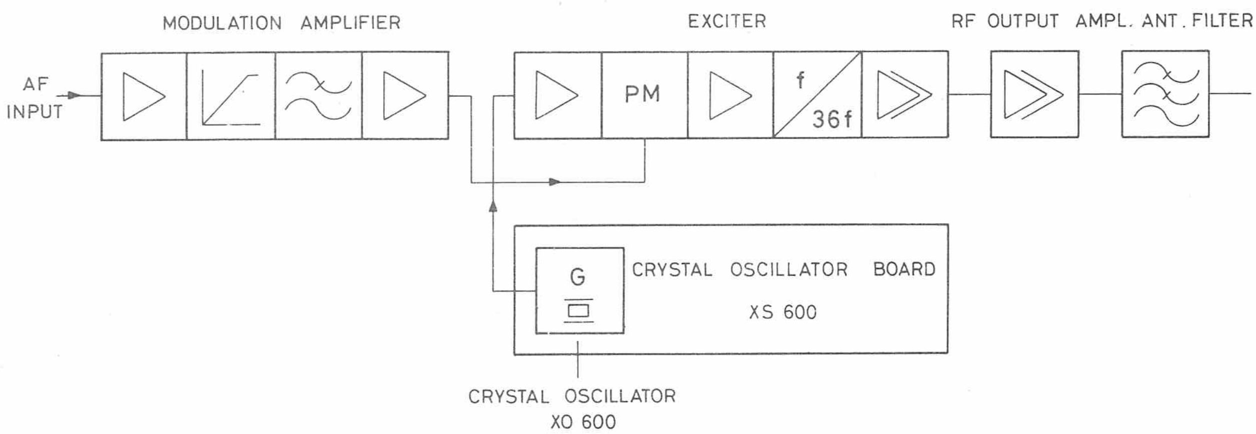
The transmitter is divided into a number of sub-units each of which is built on printed wiring boards. The division follows practical and logical lines, the aim being to make the transmitter easily accessible for adjustment and repairs.



The chart on the next page lists the various types of transmitters and their sub-units.

TRANSMITTER TYPE	TX668	TX669	TX6610	TX6611
Channel spacing	50 kHz	25/20 kHz	20 kHz	25/20 kHz
RF output	12 W	12 W	20 W	20 W
SUB-UNITS				
AF Amplifier	AA601	AA601	AA601	AA601
Crystal oscillator (s)	XO631/XO665	XO663	XO631/XO665	XO663
Crystal oscillator panel	XS601/XS602	XS663+	XS601/XS602	XS663+
Exciter	EX662	EX662	EX662	EX662
RF power amplifier	PA664	PA664	PA663	PA663
Antenna filter	FN661	FN661	FN661	FN661

+Crystal oscillator panel XS663 may be fitted with an oscillator lock, type SU603, which protects the oscillators from being switched off during heating of the oscillator panel crystal oven.



AF Amplifier AA601

This unit is the transmitter AF section. It serves the purpose of differentiating, clipping, integrating, and filtering and amplifying the modulation signal before it is applied to the phase modulator in the exciter which follows it.

Crystal Oscillator Units XO631, XO663, and XO665

The crystal oscillator is housed in a screen box. It is a plug-in unit for placement on the transmitter crystal oscillator panel.

The transmitter has an oscillator unit for each frequency channel.

The three types of oscillators are used as specified below:

In transmitter TX668: XO631 or XO665, depending on the frequency stability required.

In transmitter TX669: XO663

In transmitter TX6610: XO631 or XO665, depending on the frequency stability required.

In transmitter TX6611: XO663

Crystal Oscillator Panels XS601, XS602, and XS663

The crystal oscillator panel is intended for the connection of the transmitter crystal oscillator units.

Crystal oscillator panel XS601, which may be used in TX668 and in TX6610 accomodates a maximum of 12 crystal oscillator units.

Crystal oscillator panel XS602, which may be used in TX668 and in TX6610, accomodates a maximum of 2 crystal oscillator units.

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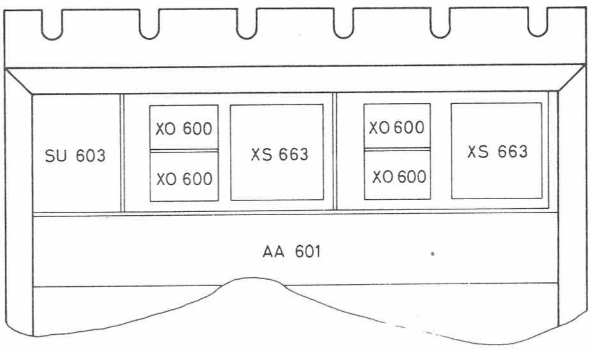
Crystal oscillator panel XS663, which is used in TX669 and in TX6611, accomodates a maximum of 2 type crystal oscillator units. The crystal oscillator panel comprises a crystal oven with space for the crystals of the two oscillators.

The maximum number of type XS663 crystal oscillator panels that can be accomodated by the transmitter is two. They are placed as shown in the sketch below.



PLACEMENT OF SU 603 AND XS 663

Oscillator Lock SU603

The oscillator lock is used with crystal oscillator panel XS663 in transmitters whose oscillators are to remain inoperative until the crystal oven of the XS663 has reached its operating temperature, thus ensuring that the oscillator frequencies are inside the specified range.

The oscillator lock is placed in the transmitter as shown in the sketch above.

Exciter EX662

In the exciter, the oscillator signal is amplified and phase modulated and thereafter undergoes frequency multiplication by a factor of 36, followed by amplification in a power amplifier.

RF Power Amplifiers PA663, and PA664

The RF power amplifier steps up the output of the exciter to the output level required.

PA663 is used in 20 W transmitters.

PA664 is used in 12 W transmitters.

Antenna Filter FN661.

Four section π-filter for suppressing harmonic frequencies

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

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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

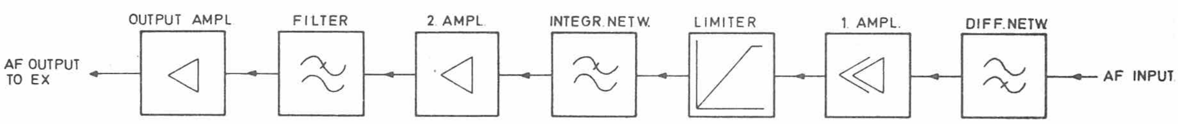
Differentiating Network

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-



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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.

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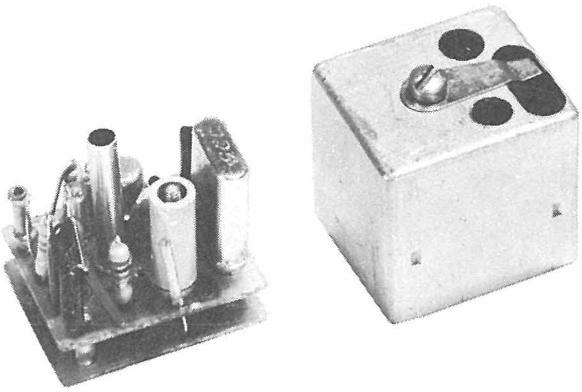
Transmitter Oscillator Unit X0631



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 μV.

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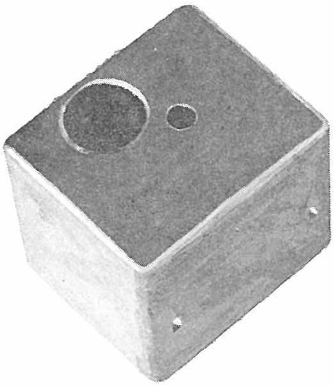
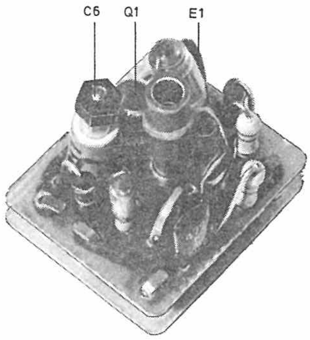
Transmitter Oscillator Unit XO663





Transmitter oscillator unit XO663 is a crystal-controlled parallel-resonant oscillator for use in the frequency range 11.67 MHz to 13.1 MHz. It is built on a double wiring board and is a totally enclosed plug-in unit.

The XO663 plugs into a type XS663 crystal oscillator panel which has pins mating with sockets on the oscillator unit. The oscillator crystal is located in the crystal oven of the panel.

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 in the control box. A diode in series with the -24 V 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. Coarse adjustment of frequency is carried out with a trimmer potentiometer located in the crystal oscillator panel in parallel with the oscillator crystal. Adjustment to exact frequency is performed with a trimmer capacitor in the crystal oscillator unit proper.

Technical Specifications

Crystal Frequency Range

11.67 - 13.1 MHz.

Frequency Pulling

With trimmer in XS663: $\frac{\Delta f}{fo} > \pm 30 \times 10^{-6}$

With trimmer in XO663: $\frac{\Delta f}{fo} > \pm 2 \times 10^{-6}$

Frequency Stability

Against voltage variations within -24 V ± 5%:
Better than $\pm 0.2 \times 10^{-6}$.

In temperature range -30°C to +80°C:
Better than $\pm 0.2 \times 10^{-6}$.

Load Impedance

25 ohms.

Power Output

Approx. 25 microwatts.

Current Drain

3.0 mA ± 0.3 mA.

Crystal

(Crystal located in XS663): 98-18.

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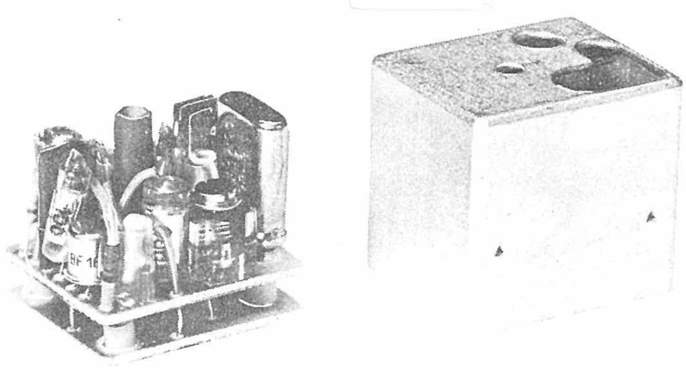
Transmitter Oscillator Unit XO665



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 $-30^{\circ}C$ to $+80^{\circ}C$: Better than $\pm 5 \times 10^{-6}$

Load Impedance

50 ohms

Power Output

Approx. 25 microwatts

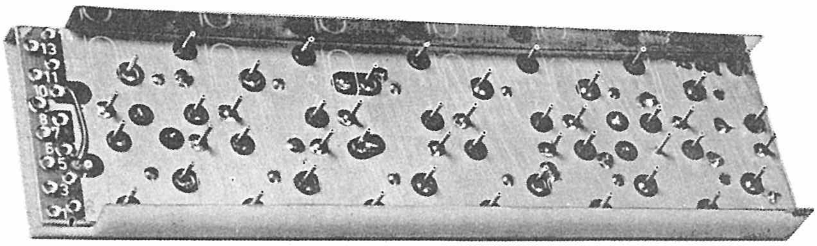
Type of Crystal

98-16.

 60.069-E1

Storno

Crystal Oscillator Panel XS601



The crystal oscillator panel consists of a wiring board with conductors on both sides, and a screen. The station uses two panels of this type, one for the transmitter-oscillator units and one for the receiver-oscillator units.

The front of the wiring board has plug pins for connection of up to 12 oscillator units, a crystal oscillator unit being required for each frequency channel provided in the station.

In order to ensure that the channels are equipped with the correct oscillators - and hence the correct frequencies - the plug pins of the wiring board are marked with the channel numbers 1-12.

Mode of Operation

Channel Switching

Channel switching is performed with the channel selector in the control desk or control box of the station. The switch contacts connect the transmitter and receiver oscillator units of the selected channel to chassis, thereby applying power to them since all transmitter and receiver oscillators connect to the -24V potential during transmit and receive, respectively.

If the station is equipped with more than 8 channels, a group switching system is used which incorporates a group switching relay, located outside the crystal oscillator panel. This system serves the purpose of limiting the number of conductors in the control cable.

When the group switching feature is provided, the oscillators are divided into two groups - A and B. Group A covers channels 1-8, group B comprising channels 9-12. Each group has a common minus lead which - via the contacts of the switch relay - is always open for one group when it is closed for the other one. The group switching relay is not operated when channels 1-8 are in use.

For channels 9-12, the relay is operated, being energized via an extra contact pair on the channel switch. This will cause the relay contacts in the minus lead of group A to break, instead causing those of group B to make.

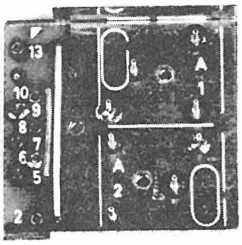
The crystal oscillator units for the first four and the last four channels have pairwise common chassis leads, in this sequence: 1+9, 2+10, 3+11, and 4+12. On the channel switch, the same pairwise positions are shorted. But because the group switching relay has opened the minus lead of the unused group of channels, only one transmitter oscillator and one receiver oscillator will be in operation at any time.

If the radio station is equipped with a type PS601 or PS604 power supply unit, the group switching relay (Re C) is inserted in that unit when the group switching function is installed; besides, two straps in the power supply unit are removed (see circuit diagram of PS in question).

37.391-E2

Storno

Crystal Oscillator Panel XS602



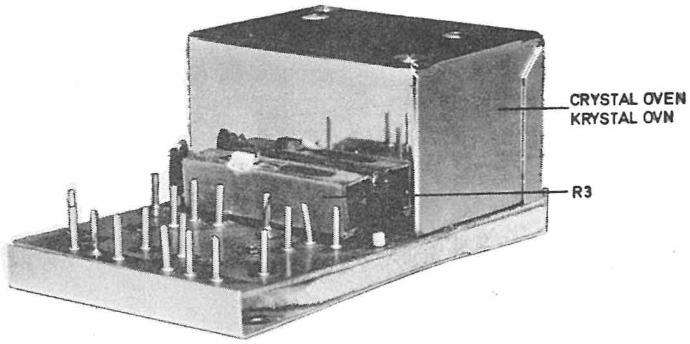
The crystal oscillator panel consists of a wiring board with conductors on both sides, and a screen.
Two panels of this type are used, one for the transmitter-oscillator units and one for the receiver-oscillator units.
The front of the wiring board has pins for connection of 2 plug-in oscillator units, each of the frequency channels of the station using a crystal-oscillator unit of each own.
In order to secure that the proper oscillators - and hence also the proper frequencies - are provided for the channels, the pin sets of the wiring board are marked with the channel numbers 1 and 2.

Mode of Operation

Channel switching is performed from the control desk or control box of the radio station, whose channel selector connects the selected transmitter and receiver oscillator units to chassis and thereby puts them into operation seing that both receiver oscillators and transmitter oscillators connect to the -24V potential on receive and transmit, respectively.

37.643-E1

Crystal Oscillator Panel XS663



Crystal oscillator panel XS663 has plug pins which permit two oscillator units, XO663 or XO664, to be connected to it. The panel also incorporates a proportionally controlled crystal oven.

Mode of Operation

The oven circuit of the crystal oscillator panel is based on a transistor, Q1, which receives 24 volts of supply voltage through its collector resistor, R1. The heating current through the transistor is controlled at its base by means of a zener-regulated variable bias voltage and two temperature-dependent resistors, R2 and R5.

R2 is a PTC resistor which is moulded into the crystal holder together with the transistor and collector resistor R1, thereby causing thermal balance in the system.

R5 is an NTC resistor which is mounted in thermal contact with the outer metal casing of the oven. Its function is to reduce variations in oven temperature. In series with R5 is a resistor, R6, which serves the purpose of linearizing the effect of the NTC resistor at high ambient temperatures.

Resistor R4 and diodes E1 and E2 reduce the effect of any supply-voltage variations.

Potentiometer R3 may be used for adjusting the temperature of the crystal oven - normally +80°C.

Technical Specifications

Supply Voltage

-24V ± 5%.

Ambient Temperature

-30°C to ± 80°C.

Oven Temperature

+80°C ± 3%.

Temperature Stability

Against voltage variations (24 volts ± 5%):
ΔT less than ± 0.5°C.

Against temperature variations from -30°C to 5°C below oven temperature:
ΔT less than ± 0.3°C.

Current Consumption

Warm-up: approx. 195 mA.
Steady current consumption at room temperature and oven temperature of 80°C: approx. 50 mA.

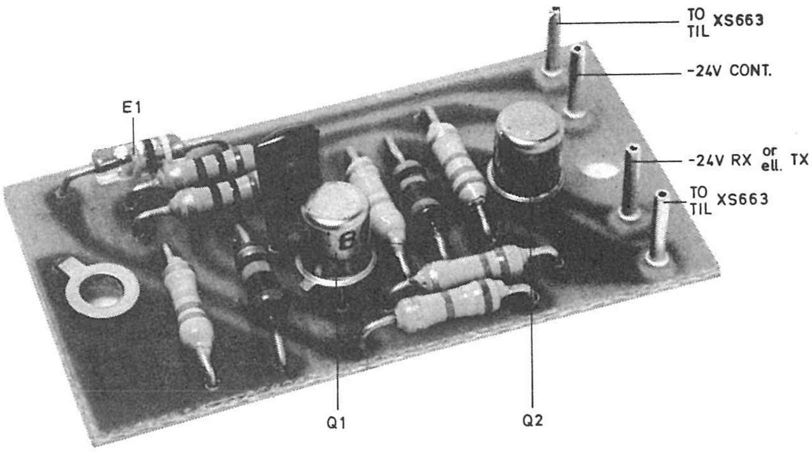
Dimensions

68 mm x 44 mm x 30 mm.

Crystal Type

98-18.

Oscillator Lock SU603



The oscillator lock used in conjunction with oscillator panel XS663 ensures that power is not applied to the oscillator units until the ovens of the crystal oscillator panels have reached their operating temperatures.

Mode of Operation

The oscillator lock operates as a Schmitt trigger, with the oscillators wired as the collector impedance of one transistor. Current for the crystal oven of the XS663 is passed through two resistors (R1 and R2), and the resulting voltage drop actuates the Schmitt trigger. Whether supply voltage will be applied to the oscillators therefore depends on whether or no the oven has reached its operating temperature.

Diode E1 reduces any variations in the threshold of the Schmitt trigger that might be caused by temperature variations.

Technical Specifications

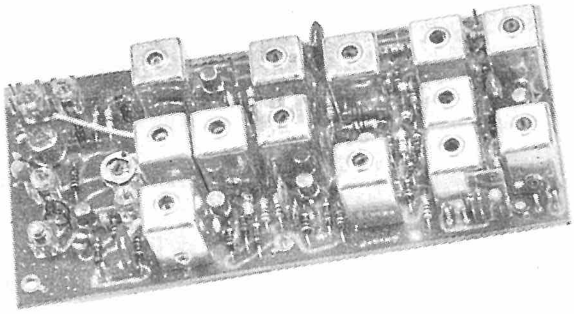
Current Drain
1.6 mA with oscillators operating.

Off-to-on Threshold
90 mA ±10 mA.

Hysteresis
15 mA ±5 mA.

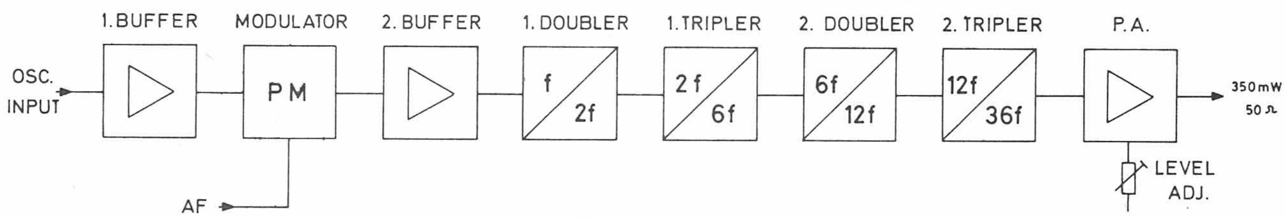
Dimensions
44 x 24 mm.

EXCITER EX662



General

EX662 is an exiter unit employing open print construction. It contains all the necessary frequency multiplication and modulation circuitry to deliver a modulated output level of 350mW/50Ω at 450MHz, from a non - modulated input signal of approx. 80μW/50Ω, 12MHz. These are the levels required for, and avaible from, the succeeding power amplifier unit, PA663/664, and the preceeding oscillator source.
The oscillator signal is delivered to the first buffer stage, Q1, via the matching network L1 - C1. After amplification the signal is fed to the modulator network L3, L4, L5 via the matching network L2 - C5. From here the modulated signal passes the second buffer stage Q2, the first doubler stage Q3, the first tripler stage Q4, the second doubler stage Q5, the second tripler stage Q6 and finally an amplifier stage Q7.
The output level can be adjusted by means of variable resistor R45.
The signal path is illustrated by the following block diagram.



Circuit Description

Buffer stages Q1, Q2

Buffer stages Q1 and Q2 are almost identical, both employ tuned matching networks at input and output. Neutralisation is not employed, stability being assured by resistive loading of the matching networks. This approach gives negligible interaction between buffer networks and the modulator circuitry. Input circuit L1 - C1 gives an approximate match to 50Ω, Q1 delivers a partially limited signal of suitable level for the modulator. Q2 raises the modulator output signal to a level suitable for driving doubler Q3.

Modulator

The phase modulator L3, L4, L5, consists of a modified bridged - T network. This type of network employs two circuits which are the inverse of each other i.e. Z1 x Z2 = K. This is acheived by employing two iden- tical "modulated" parallel networks L3 - E2 and L5 - E3. The network L5 - E3 is "inverted" by quarter wave transformer (high pass) L4 - C8 - C9, so that con- dition Z1 x Z2 = K applies. The advantages of this network are: low insertion loss, constant four-pole impedance, large phase swing with low AM. To improve the isolation between the modulator and the buffer matching networks 3dB attenuators R7 - R19 - R20 are interposed.

Frequency Multiplier Stages

Each multiplier stage, Q3 - first doubler, Q4 - first tripler, Q5 - second doubler Q6 - second tripler are conventional common emitter stages. All multiplier stages employ band - pass filters as coupling networks. The choise of bandpass filters as interstage networks is dictated by spurious suppression considerations, this in it's turn determines the exiter unit's high frequency band width.

Final Amplifier

Q6 is a conventionel common emitter power amplifier which raises the available power level (approx. 40mW) from tripler stage Q5 to an output level of 350mW. The output matching network L18 - C46 - C47 is a π - network allowing matching to 50Ω. Network L17 - R46 is a selective damping circuit which suppresses parasitic oscillations under conditions of mismatch.

Technical Specifications

Supply voltage:

- 24V

Current consumption:

<130mA

Tuning range:

420 - 470MHz

Frequency multiplication factor:

36

Crystal frequency range:

11.666 - 13.06MHz

Output power:

≥350mW

Input power:

>40μW

Generator and load impedance

50Ω

LF input impedance:

10KΩ

Modulation sensitivity (Δ f = 10kHz/1000Hz):

0,7 ± 0,2V.

Distortion (Δ f = 10kHz/1000Hz):

5%

RF Bandwidth:

1MHz.

Temperature range:

Normal Working: -25°C- +70°C
Reduced Performance: -30°C- +80°C

Mechanical dimensions:

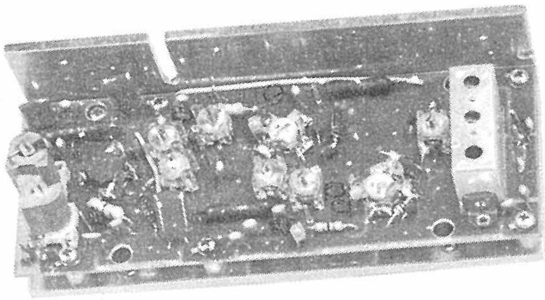
68 x 140 x 25mm

Weight:

85gr.

Storno

RF POWER AMPLIFIER PA663



General

Power amplifier PA663 is a three stage amplifier operating in the UHF frequency range. All the stages are in the common-emitter configuration and operate in class B - C. The emitters are returned directly to a local earth plane which is elevated at -24V (600 series positive to chassis). All matching networks are realised as lumped networks in order to conserve space. The amplifier is provided with a double helical resonator input filter to reduce inband spurious content from EX662 to negligible proportions.
The transistors employed are infinite SWR tested types thus eliminating the necessity of employing ADC protection networks. The amplifier operates with a supply voltage of -24V.

Input Filter.

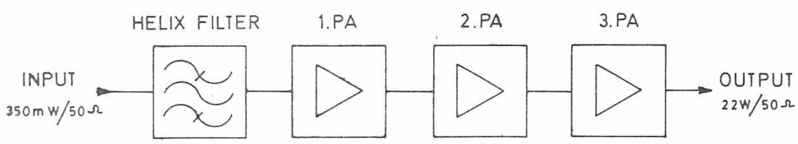
The input filter consists of a double helical resonator, band-pass, network which cleans the input signal of inband spurious signals. The filter matches into 50Ω at both input and output.

First stage Q1.

The first impedance transformation is performed by C8, C9, C8A, C9A and the transistor package inductance. This transformed impedance is then approximately matched to 50Ω by the network L1, C7, C6. The output from Q1 (approx. 3W) is matched into the next stage by network L4, C12, C13, L5. Network C36, R2, L3, is a parasitic killer.

Second stage Q2.

Capacitors C16, C17, C16A, C17A perform the first transformation together with the transistor package inductance. This gives a near optimum match between Q1 and Q2 with the aid of network L4, C12, C13, L5. The output from Q2 (approx.



Storno

12W) is matched into the next stage, Q3, by network C22, L9, C23, C24, L10. This network contains an amount of redundacy in order to acheive a 50Ω interface at the junction L9, C23.

Final stage Q3

Capacitors C25, C26, C25A. C26A perform the first transformation together with the transistor package inductance. This together with network C22, L9, C 23, C24, L10 gives a near optimum match to the previous stage Q2. Network R7, L13, C30 is a parasitic killer. Network L14, C34, C35 matches the output into 50Ω.

Power Supply - Measuring Points

Each stage is supplied with DC via a measuring shunt. Q1 is supplied via R3 giving measuring point 1 . Q2 is supplied via R4 giving measuring point 2 . Q3 is supplied via R6 giving measuring point 3
Each stage is provided with a low value feed choke and individual HF decoupling capacitor.
Capacitors C27 and C28 decouple the entire amplifier at low and intermediate frequencies. The chassis plane, as mentioned earlier, is elevated at -24V and is provided with decoupling capacitors at each attaching screw.

Technical Specifications

Supply voltage:

-24V

Frequency range:

420 - 470MHZ

Output power (24V):

$\geq$ 22W

Current consumption (24V):

$\leq$ 3.2A

Generator and load impedance:

50Ω

Input power:

$\geq$ 350mW

Temperature range (heat sink):

Normal working range
-25°C to + 70°C

Functional range (reduced performance)
-30°C to + 80°C.

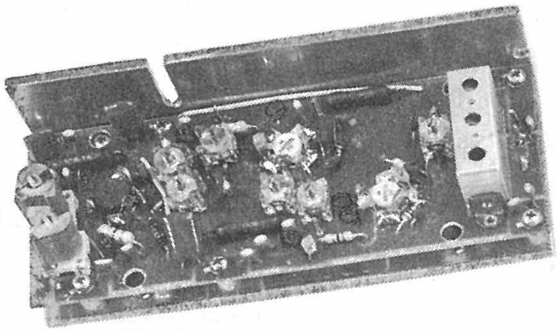
Mechanical dimensions:

130 x 56 x 29mm

Weight:

200gr.

RF POWER AMPLIFIER PA664



General

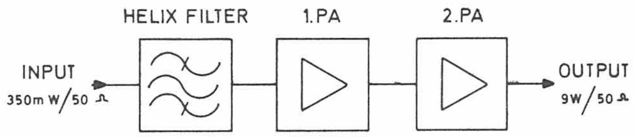
Power amplifier PA664 is a two stage amplifier operating in the UHF frequency range. Both stages are in the common emitter configuration and operate in class B - C. The emitters are returned directly to a local earth plane which is elevated at -24V. (600 series positive to chassis).
All matching networks are realised as lumped networks in order to conserve space. The amplifier is provided with a double helical resonator input filter to reduce inband spurious content from EX662 to negligible proportions. The transistors employed are infinite SWR tested types thus eliminating the necessity of employing ADC protection networks. The amplifier operates with supply voltage of -24V.

Input Filter

The input filter consists of a double helical resonator, band-pass network, which cleans the input signal of inband spurious signals. The filter matches into 50Ω at both input and output.

First stage Q1

The first empedance transformation is performed by C8, C9, C8A, C9A and the Transistor package inductance. This transformed impedance is then approximately matched to 50Ω by the network L1, C7, C6. The output from Q1 (approx. 3W) is matched into the next stage by network L4, C12, C13, L5. Networks C28, R2, L3, C11 is a parasitic killer.



Storno

Final stage Q2

Capacitors C16, C17, C16A, C17A perform the first transformation together with the transistor package inductance.
This gives a near optimum match between Q1, and Q2 with the aid of network L4, C12, C13, L5.
The output from Q2 (approx. 12W) is matched into 50Ω by means of network C22, L9, C23. Network R5, L8, C21 is a parasitic killer.

Power Supply - Measuring Points

Each stage is supplied with DC via a measuring shunt. Q1 is supplied via R3 giving measuring poin 1 . Q2 is supplied via R4 giving measuring point 2
Each stage is provided with a low value feed choke and RF decoupling capacitor. Capacitors C24 and C20, C15 decouple the entire amplifier at low and intermediate frequencies. The chassis plane, as mentioned earlier, is elevated at -24V and is provided with decorpling capacitors at each attaching screw.

Technical Specifications

Supply Voltage:

-24V

Frequency range:

420 - 470Mhz

Output power (24V):

≥ 9W

Current consumption (24V):

1,4A

Generator and load impedance:

50Ω

Input power:

350mW min.

Temperature range (heat sink):

Normal working range:
-25°C to + 70°C
Functional range (reduced performance):
-30°C to + 80°C.

Mechanical dimensions:

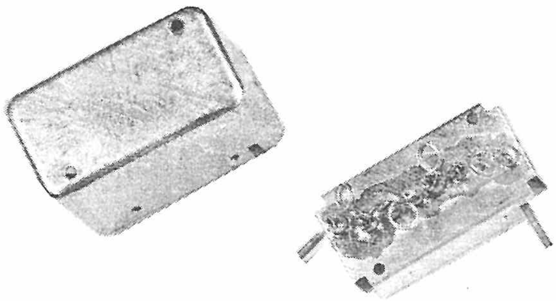
130 x 56 x 29mm

Weight:

200gr.

Storno

ANTENNA FILTER FN661



General

FN661 is a harmonic filter containing four full - section, π, constant K filter elements. Use of feed through capacitors as shunt reactive element gives good cooling and low self inductance, this in turn gives high power capability and good stop - band attenuation as a result.

Technical Specifications

Filter type:

Low pass, constant K.

No. of full sections:

4 (π)

Cut off frequency:

550MHz

Insertion loss 400 - 470MHz

inclusive reflection loss (50Ω/50Ω):

<0,8dB

True ohmic loss:

<0,2dB

Power capability:

50W

Temperature range:

-30°C to + 80°C

Dimensions:

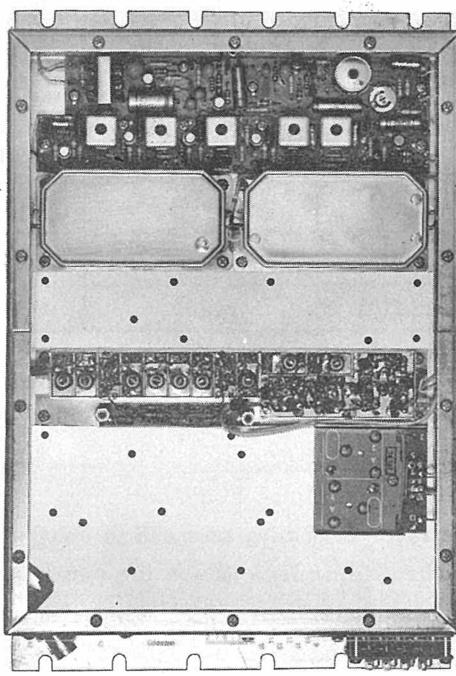
54 x 31 x 29mm

Weight:

50gr.

60.260-E1

B. Receivers



General

RX660 is the group designation of a number of receivers comprising types RX661, RX662, and RX663 for use in the frequency band 420-470 MHz with channel spacings of 50 kHz, 25 kHz, and 20 kHz, respectively.

The receivers are double-conversion superheterodyne receivers employing intermediate frequencies of 10.7 MHz and 455 kHz. The requisite amount of adjacent-channel selectivity is obtained by means of two block filters.

The maximum number of crystal oscillators that can be provided in the receiver is usually 2 - one for each channel.

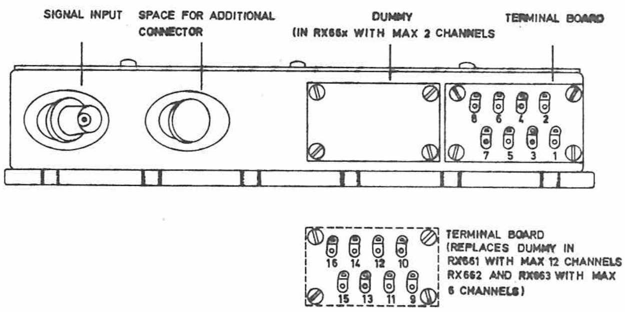
However, receiver type RX661, which is used for 50 kHz channel spacing, can be extended to a maximum of 12 channels.

Receiver types RX662 and RX663, for 25 and 20 kHz channel spacing, respectively, can be extended to a maximum of 6 channels.

The receiver is housed in a closed metal box carrying on its outside a coaxial connector for incoming signals, and terminals for the receiver cabling which connects, via feedthrough filters, to the respective circuits inside the screen box.

The top of the screen box can be removed by loosening a number of screws in it, providing access to the receiver circuits.

The receiver is divided into a number of subunits each of which is built on printed wiring boards. The division follows practical and logical lines, the aim being to make the receiver easily accessible for adjustment and repairs.

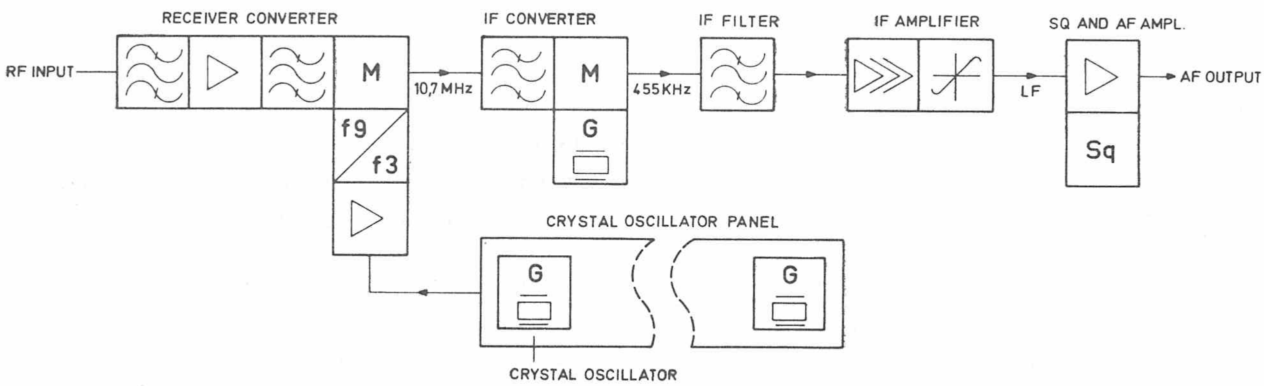


RECEIVER TYPE	RX661	RX662	RX663
Channel Spacing	50 kHz	25 kHz	20 kHz
SUB-UNITS			
Receiver Converter	RC661$^{\Delta}$	RC661$^{\Delta}$	RC661$^{\Delta}$
Crystal Oscillator	XO611/XO666	XO664	XO664
Crystal Oscillator Panel	XS601/XS602	XS663^{+}	XS663^{+}
IF Converter	IC601	IC602	IC603
IF Filter	BP601	BP602	BP602
IF Amplifier	IA601	IA601	IA601
Squelch and AF Amplifier	SQ601	SQ601	SQ601

$^{\Delta}$Space has been left in the receiver screen box for installation of an additional receiver converter for use where additional receiver input bandwidth is required.

$^{+}$A type SU603 oscillator lock may be used in conjunction with oscillator panel XS663. The oscillator lock keeps the oscillators inoperative while the crystal oven of the oscillator panel is warming up.

Sub-units



Receiver Converter RC661

The receiver converter amplifies the incoming signal and provides adequate image rejection. It also multiplies the oscillator signal frequency to the injection signal frequency required by the mixer, which converts the incoming signal frequency to 10.7 MHz.

Crystal Oscillator Units XO611, XO664, and XO666

The crystal oscillator unit is housed in a screen box. It is a plug-in unit for placement on the receiver crystal oscillator panel. The receiver has an oscillator unit for each frequency channel.

The three types of crystal oscillators are employed as specified below:

In receiver RX661: XO611 or XO666, depending on the frequency stability required.

In receiver RX662: XO664.
In receiver RX663: XO664.

Crystal Oscillator Panels XS601, XS602, and XS663

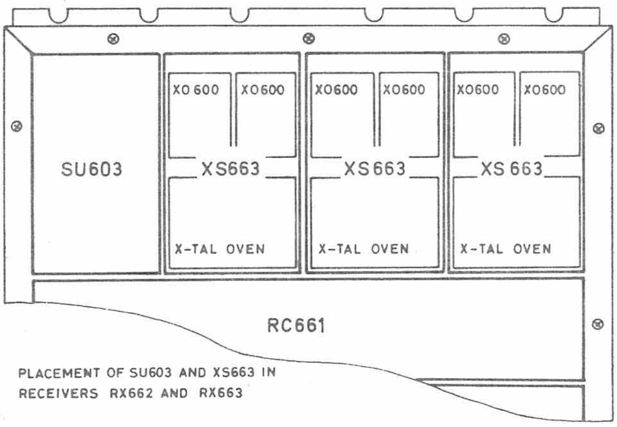
The crystal oscillator panel is intended for the connection of the receiver crystal oscillator units.

Crystal oscillator panel XS601, which may be used in the RX661, accommodates a maximum of 12 crystal oscillator units.

Crystal oscillator panel XS602, also used in the RX661, accommodates a maximum of 2 crystal oscillator units.

Crystal oscillator panel XS663, used in the RX662 and in the RX663, accommodates a maximum of 2 type XO664 crystal oscillator units. The crystal oscillator panel comprises a crystal oven with space for the crystals of the two oscillators.

The maximum number of type XS663 crystal oscillator panels that can be accommodated by the receiver is 3. They are placed as shown in the sketch below.



PLACEMENT OF SU603 AND XS663 IN RECEIVERS RX662 AND RX663

Oscillator Lock SU603

The oscillator lock is used with crystal oscillator panel XS663 in receivers whose oscillators are to remain inoperative until the crystal oven of the XS663 has reached its operating temperature, thus ensuring that the oscillator frequency is inside the specified range.

The oscillator lock is placed in the receiver as shown in the sketch below.

IF Converters IC601, IC602, and IC603

The intermediate-frequency converter filters the 10.7 MHz signal from the receiver converter and converts it to 455 kHz.

IF Filters BP601 and BP602

455 kHz bandpass filter.

IF Amplifier IA601

455 kHz intermediate-frequency amplifier with limiter and FM signal demodulator.

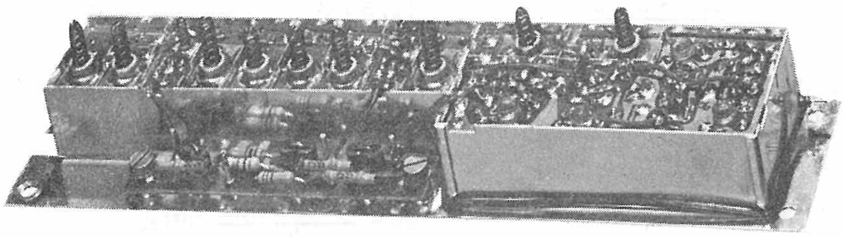
Squelch and AF Amplifier SQ601

AF amplifier unit with electronic squelch.

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

Storno

Receiver Converter RC661



The receiver converter consists of the following stages:

1st Signal Frequency Amplifier
2nd Signal Frequency Amplifier
Mixer
Oscillator-signal Buffer Amplifier
1st Oscillator-signal Tripler
2nd Oscillator-signal Tripler
DC Filter

The stages and circuits of the receiver converter are built on a number of wiring boards which are housed in a screen box with partitions, providing screening of the entire unit and of each circuit separately. Only the DC-filter, which is built as a separate unit, is located outside the screen box.

The receiver converter serves the purpose of amplifying the incoming signal and converting it to a first intermediate frequency of 10.7 MHz, for which purpose an oscillator signal, amplified and multiplied, is injected into the mixer.

Silicon n-p-n transistors are used throughout, and all RF circuits are capacitance tuned and temperature stabilized.

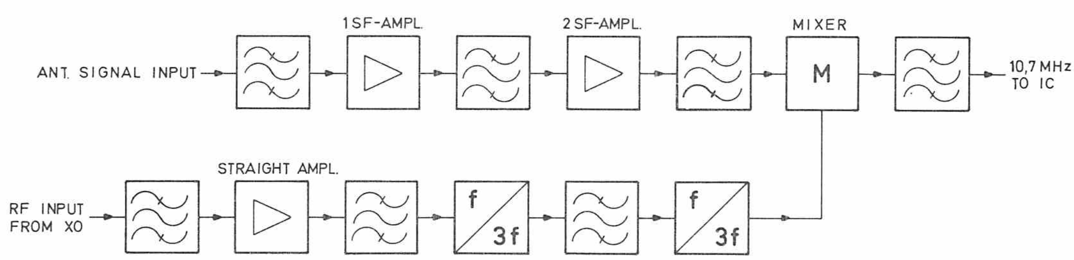
Mode of Operation

Signal Frequency Amplifiers

The incoming signal is applied, via a bandpass filter (L1 and L2), to the 1st signal-frequency amplifier. This stage operates in a grounded-emitter circuit and has a variable neutralizing capacitance (C8). From this stage, the amplified signal is fed through a four-circuit filter (L3, L4, L5, and L6) to the 2nd signal-frequency amplifier, which is identical with the preceding stage and has a variable neutralizing capacitance (C20). The 2nd signal-frequency amplifier works into a three-circuit filter (L7, L8, L9), the last circuit of which is common to the output signals of the signal-frequency amplifier and multiplier chain, the frequency difference being 10.7 MHz. For this reason the circuit has been made so wide that neither signal undergoes appreciable attenuation.

Mixer

From L9, the amplified and filtered signal from the antenna and the multiplied oscillator signal are fed to the emitter of the mixer transistor, which operates in a grounded base circuit.



37.565-E1

Storno

The intermediate-frequency signal at 10.7 MHz is taken off across the collector circuit of the mixer, which can be matched to the following IF converter unit by means of a system of straps.

Buffer Amplifier and Multiplier Stages

The oscillator-signal buffer amplifier and the two following tripler stages are built on a wiring board which is screened from the other stages of the converter unit. The oscillator signal is applied to the buffer amplifier, which has low-impedance input and incorporates feedback and neutralizing circuits. The output of the buffer is fed via the circuit L12, which is tuned to the oscillator frequency, to the base of the 1st tripler. This stage operates in a grounded-emitter circuit.

From the collector circuit (L13) of the 1st tripler, signals are fed to the emitter of the 2nd tripler. This stage operates in a grounded-base circuit. The multiplied oscillator signal is thereafter applied to the mixer-stage emitter via the circuit L9.

Technical Specifications

Frequency Range

420 - 470 MHz.

Gain

Voltage gain from antenna to emitter of mixer: 11.5 dB.

Input Impedance

Nominal 50 dB.

Crystal Frequency Calculation

$$fx = \frac{fant - 10.7}{9} \text{ MHz},$$

where fx is the crystal frequency in MHz and fant is the signal (antenna) frequency in MHz.

Crystal Frequency Ranges

See under technical specifications for the crystal oscillator type employed: XO611, XO662, or XO664.

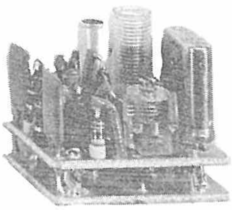
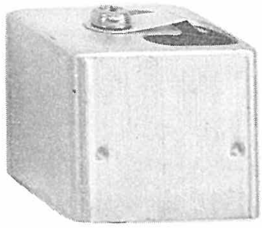
Mechanical Dimensions

160 x 32 mm.

37.565-E1

 Storno

Receiver Oscillator Unit XO611

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°C to +80°C:
Better than $\pm 2 \times 10^{-6}$.

Load Impedance

50 ohms.

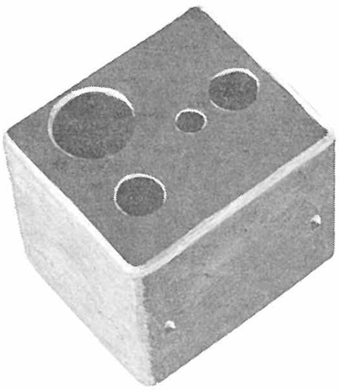
Power Output

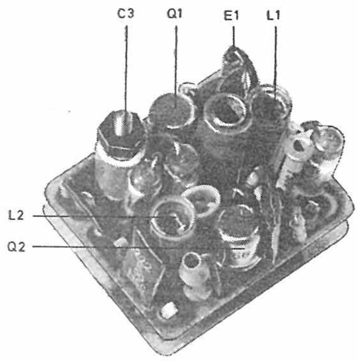
Approx. 1 mW.

 37.385-E1

 Storno

Receiver Oscillator Unit XO664





Receiver oscillator unit XO664 is a crystal-controlled parallel resonant oscillator for use in the frequency range 11.37 MHz to 12.76 MHz. It is built on a double wiring board, and is a totally enclosed plug-in unit. The XO664 plugs into a type XS663 oscillator panel which has pins mating with sockets on the oscillator unit. The oscillator crystal is located in the crystal oven of the panel.

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 in the control box. A diode in series with the -24 V supply lead prevents any flow of undesired current in the unit during transmit periods.

Oscillator transistor Q1 has a tuned collector circuit from where the second harmonic of the oscillator frequency is taken off and applied to transistor Q2 which operates as a doubler. This arrangement provides output at four times the crystal frequency.

The oscillator signal is fed to the receiver via the crystal oscillator panel. A trimmer potentiometer located on the crystal oscillator panel in parallel with the oscillator crystal permits coarse adjustment to frequency. Accurate adjustment is performed with a trimmer capacitor in the crystal oscillator unit proper.

Technical Specifications

Frequency Range

For crystal: 11.37 - 12.76 MHz.

For output signal: 45.5 - 51.5 MHz.

Frequency Pulling

With trimmer in XS663: $\frac{\Delta f}{fo} > \pm 30 \times 10^{-6}$.

With trimmer in XO664: $\frac{\Delta f}{fo} > \pm 4 \times 10^{-6}$.

Frequency Stability

Against voltage variations (-24 V ± 5%):

Better than $\pm 0.2 \times 10^{-6}$.

In temperature range -30°C to +80°C:

Better than $\pm 0.2 \times 10^{-6}$.

Load Impedance

50 ohms.

Power Output

Approx. 800 microwatts.

Current Drain

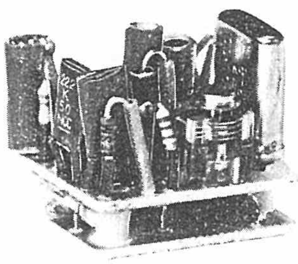
3.0 mA.

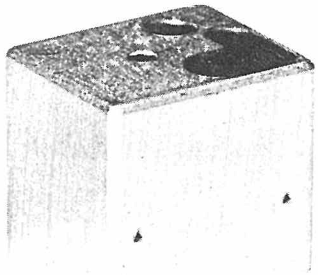
Crystal

(Crystal located in XS663): 98-18.

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

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

Frequency Stability

Against voltage variations of -24V ± 2.5%:

Better than $\pm 1.5 \times 10^{-6}$.

In temperature range $-30^{\circ}C$ to $+80^{\circ}C$:

Better than 2.5×10^{-6}

Load Impedance

50 Ω

Output Voltage

200mV/50Ω ± 3dB

Current Drain

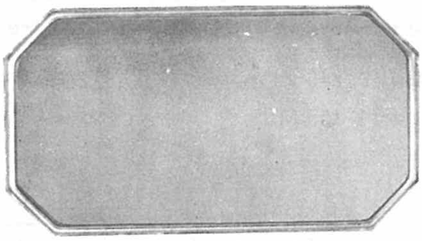
At $25^{\circ}C$: 3.5mA ± 0.5mA

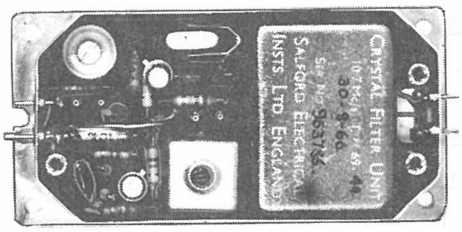
Type of Crystal

98-21.

60.070-E1

IF CONVERTER IC601, IC602, IC603, and IC607





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 MHz and converts it to a low intermediate frequency signal at 455 kHz.

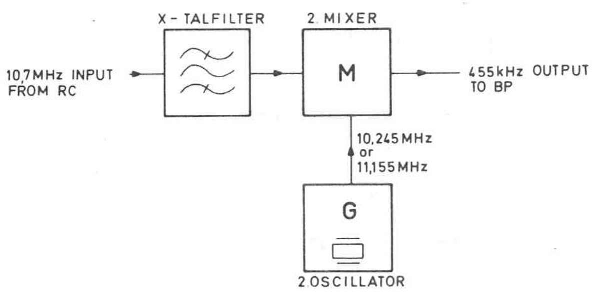
IF converter IC601 is used in equipments with 50 kHz channel separation.

IF converter IC602 is used in equipments with 25 kHz channel separation.

IF converter IC603 is used in equipments with 20 kHz channel separation.

IF converter IC607 is used in equipment with 12.5 kHz channel separation.

The 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 MHz 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 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

Storno

Output Frequency

455 kHz

Input Impedance

910 Ω //20 pF

Output Impedance

4.7 KΩ //480 pF.

Maximum Frequency Swing

IC601: ± 15 kHz
IC602: ± 5 kHz
IC603: ± 4 kHz
IC607: ± 2.5 kHz

Bandwidth

IC601 At 3 dB attenuation relative to 10.7 MHz: < ±14.5 kHz.

At 50 dB attenuation relative to 10.7 MHz: > ± 50 kHz.

IC602 At 3 dB attenuation relative to 10.7 MHz: < ± 7 kHz.

At 50 dB attenuation relative to 10.7 MHz: > ± 25 kHz.

IC603 At 3 dB attenuation relative to 10.7 MHz: < ± 5.5 kHz.

At 50 dB attenuation relative to 10.7 MHz: > ± 20 kHz.

IC607 At 3 dB attenuation relative to 10.7 MHz: < ± 2.75 kHz.

At 50 dB attenuation relative to 10.7 MHz: > ± 7.5 kHz.

Bandpass Ripple

IC601 > 2 dB
IC602 > 1.5 dB
IC603 > 1.5 dB
IC607 > 2 dB

Oscillator Frequency

Calculation of crystal frequency (fx):

fx = 10.7 MHz - 0.455 MHz - 10.245 MHz

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 MHz + 0.455 MHz = 11.155 MHz.

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

A = 10.245 MHz
B = 11.155 MHz

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

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

420-470 MHz

Receiver frequency range	fx.
420.0 - 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 the temperature range -15°C to +60°C: S-98-8.

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

Storno

Frequency Pulling Range for Osc.

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

Available Power Gain

With 10.245 MHz crystal: < 15 dB

With 11.155 MHz crystal: < 14 dB

Dimensions

80 x 40 x 29 mm.

Storno

IF FILTER BP601b, BP602b, and BP6013

The filter is a selective band pass filter consisting of a ceramic filter coupled to tuned input and output impedance transformers.

IF filter BP601b is used in equipments with 50 kHz channel separation.

IF filter BP602b is used in equipments with 20/25 kHz channel separation.

IF filter BP6013 is used in equipments with 12.5 kHz channel separation.

Technical Specifications

Centre Frequency

455 kHz.

Generator Impedance

4.7 KΩ //480 pF.

Load Impedance

1 KΩ //480 pF.

Bandwidth

BP601b At 3 dB attenuation relative to 455 kHz:
$> \pm$ 15 kHz.
$\leq \pm$ 20 kHz.

At 50 dB attenuation relative to 455 kHz.
$\leq$ 40 kHz.

BP602b At 3 dB attenuation relative to 455 kHz:
$> \pm$ 7 kHz.
$\leq \pm$ 10 kHz.

At 50 dB attenuation relative to 455 kHz:
$\leq \pm$ 20 kHz.

BP6013 At 3 dB attenuation relative to 455 kHz:
$> \pm$ 4 kHz.
$\leq \pm$ 8 kHz.

At 15 dB attenuation relative to 455 kHz:
$\leq \pm$ 10 kHz.

Insertion Loss

BP601b $<$ 8 dB
BP602b $<$ 9 dB
BP6013 $<$ 8 dB

Filter Ripple

$\leq$ 2 dB

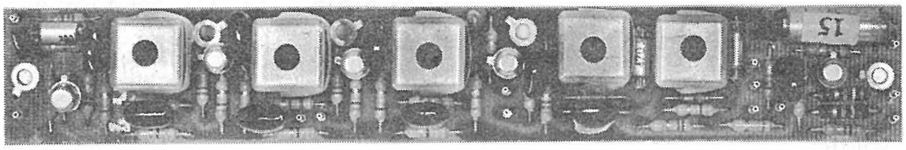
Dimensions

80 x 40 x 24 mm.

60.261-E2

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 markėd 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.

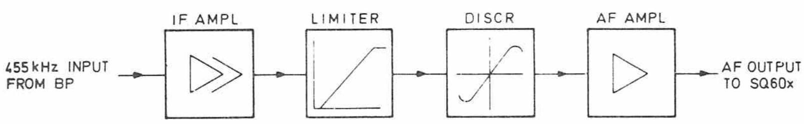
Technical Specifications

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.

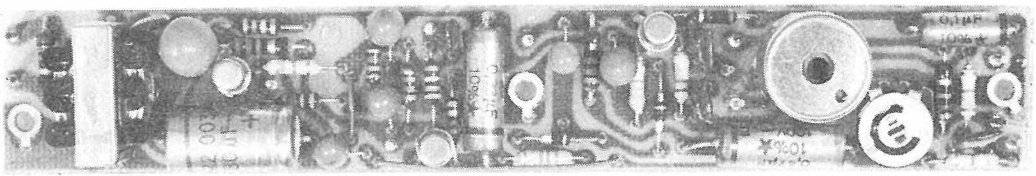
Dimensions

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

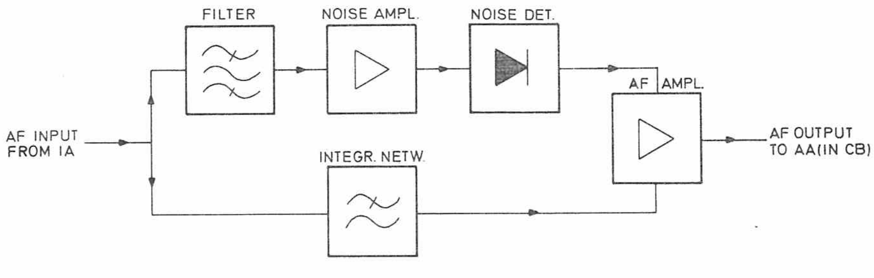
Audio Amplifier

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 ΔF = 0.7 x ΔFmax. 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

C. Power Supply Units

General

Depending on supply voltage and transmitter RF output, radio station CQF600 can be supplied with several different types of power supply units to provide the -24 volts of stabilized DC required for powering its transmitter and receiver.

For example, the CQF600 can be supplied for operation from 12/24V DC, 220V AC, or with a voltage regulator for use with an external emergency power supply consisting of a charger buffer batteries.

The power supply unit of the CQF600 is built on a module chassis which is screw-mounted at the top of the rear wall of the station cabinet whilst the supply-voltage cable for the power supply unit is brought in through a hole in the bottom of the cabinet.

Types

PS602. Mains power supply for operation from 220V AC, 50 Hz. Used in stations with 25-watt transmitters.

PS603. Mains power supply for operation from 220V AC, 50 Hz. Used in stations with 10-watt transmitters.

PS604. Converter power supply for operation from 12V or 24V DC. Used in stations with 10-watt transmitters.

PS605. Voltage regulator for operation from 20-28V DC. Used in stations with 10-watt transmitters.

The following pages contain a detailed description of the circuits of the individual power-supply units and their specifications.

32.039-E1

POWER SUPPLY UNIT PS602b

Power supply unit PS602b is operated from the mains. It converts 220 VAC or 240 VAC to 24V stabilized DC.
The unit is built on a module chassis, and is intended for installation in a CQF600 station cabinet.
It consists of the following main components:

Power Transformer
Rectifier
Filter
Preregulation Circuit
Series voltage Regulators
Electronic protective Circuits
Electronic receive-transmit change-over Circuit

Circuit Description

Power Transformer

The transformer has three windings: a primary for 220V and 240V, and two secondaries, one for 48V and one for 28-0-28V. A fuse is inserted in the primary circuit.
The transformer meets CEE standard, class II (4 kV primary-to-secondary and primary-to-chassis).

Rectifier and filter

Rectifiers E1, E2, E3, and E4 operate in a bridge circuit in which E1 and E2 are conventional silicon rectifiers whereas E3 and E4 are controlled rectifiers whose firing times can be altered by means of a preregulation circuit, permitting adjustment of the power delivered to filter L1 and electrolytic capacitors C1 and C2.

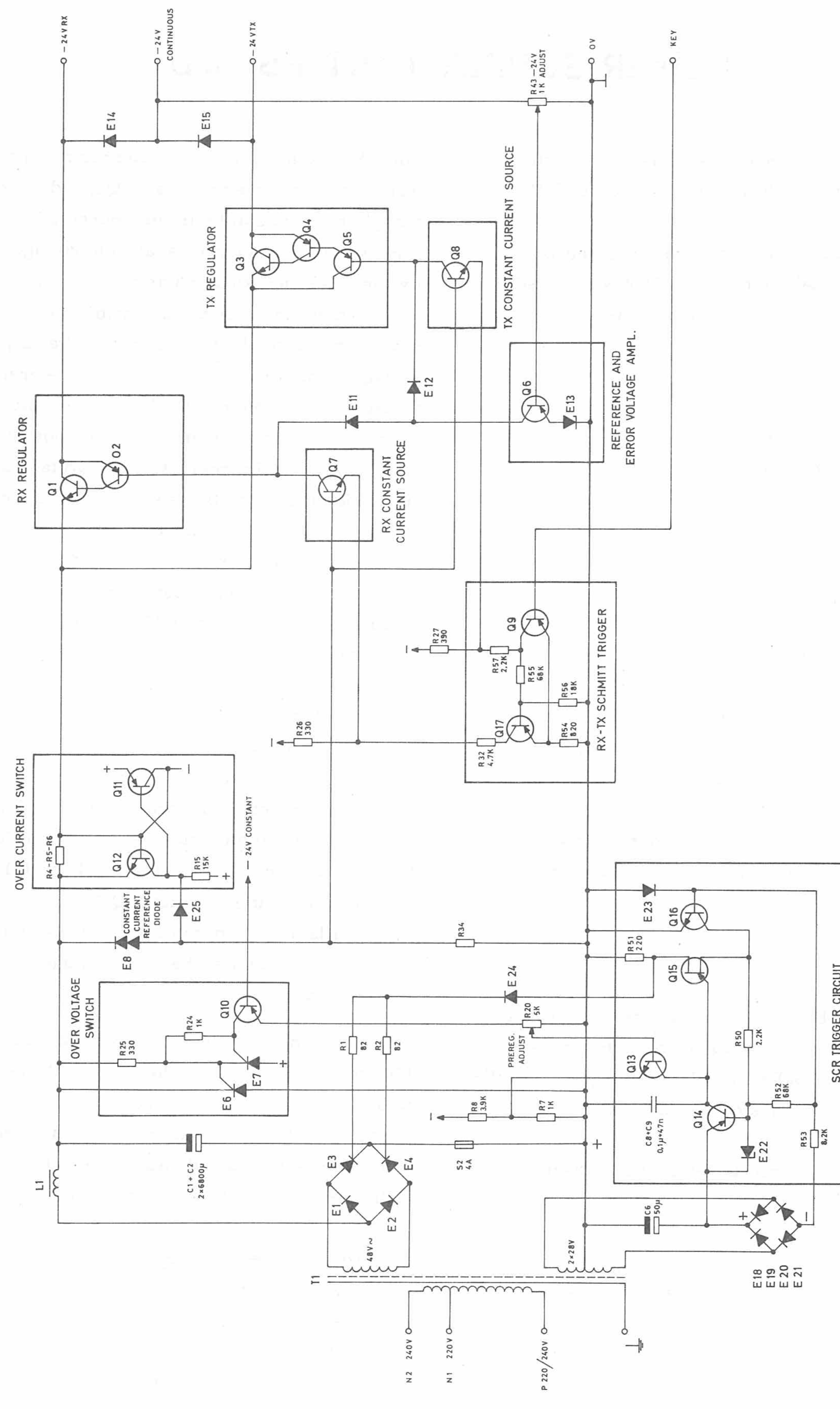
The TX series regulator is composed of four transistors:
a series regulator Q3, two driver transistors Q4 and Q5, and a constant current source Q8.

The RX series regulator is composed of three transistors: a series regulator Q1, a driver transistor Q2 and a constant current source Q7.
The two current sources share the voltage produced by the reference diode E8 and resistor R34.
The base of the error voltage amplifier Q6 receives, via potentiometer R43, a portion of the output voltage, which it compares with the reference voltage across zener diode E13 in the emitter of the transistor. Any change in the output voltage will be opposed by regulating the voltage across the series regulator transistor at a value that will keep the output constant.
The preregulator circuit consists of unijunction oscillator Q15, syncronization transistor Q16 and regulator transistor Q13, which receives a constant current from Q14.
By adjusting the firing time of SCR E3 and SCR E4 the voltage across the series regulator is kept fairly constant regardless of mains-voltage and load fluctuations.
The factors determining the frequency of the unijunction oscillator include capacitors C8 and C9, the constant current source Q14 and the current regulating transistor Q13.
The oscillator is syncronized by transistor Q16 which is turned on at the time of the mains passing the zero point.

An increasing voltage across charging capacitors C1 and C2 will increase the current through Q13. This current is subtracted from the charging current of C8 and C9 and the ignition pulses to E3 and E4 is delayed. As a result the power delivered to C1 and C2 is decreased.

Electronic Protective Circuits

The power supply unit incorporates circuits to protect against overcurrent and overvoltage.
If the load current exceeds a certain value (5A for TX, 2.1A for RX) the voltage drop across R4, R5 and R6 turns on Q12 and Q11. The reference



FUNCTIONAL DIAGRAM PS 602b

Storno

voltage to the constant voltage sources is disabled and the transistors biased off. To reset the circuit the mains must be disconnected and the capacitors allowed to discharge for approx. 15 seconds.
In case of regulator failure causing excessive voltage at the output, transistor Q10 will start conducting. The voltage drop across R24 will turn SCR E7 and SCR E6 ON. This will place E6 as a direct short circuit across the rectifier with the blow of fuse S2 as a result.

Receive-Transmit Change-over circuit

The current sources are switched on and off by a Schmitt Trigger which is controlled by the transmitter key.
In position receive the base current through R31 and R59 turns Q9 on allowing current to flow through R54, R57 and R27. The voltage drop across R27 is able to switch current source Q8 off and so the RX voltage regulator is on and the TX voltage regulator is off.
Grounding the KEY terminal switches Q9 off and Q17 on allowing current to flow through R32. This will switch current source Q7 off and current source Q8 on and thus the RX voltage is off and the TX voltage on. The regulators are supplying voltage to a common terminal via isolating diodes.

Technical Specifications

Mains voltage

220V or 240V AC + 10 /-20%, 50 to 60Hz.

Current consumption

Approx. 1.1A at max. output load 3.8A.

Output voltage

24V RX: 24.4V ± 0.6V.
24V TX: 24.4V ± 0.6V.
24V Continouus: 23.6V ± 0.6V.

Output Current

RX : max. 1.0A
TX : max. 3.8A
Cont. : max. 0.7A

Loss

Approx. 60W at 264V supply voltage (primary 240V tap. at maximum output load 3.8A).

Type of service

Continous

Temperature

PS602b is intended for mounting on a heat sink, which may assume the following temperature:
Working range : -25°C to +65°C.
Function range : -30°C to +75°C.

Transmitter key function

Change-over level RX-TX approx. - 9V
Change-over level TX-RX approx. -12V

POWER SUPPLY UNIT PS603a

Power supply unit PS603 is operated from the mains. It converts 220V or 240V AC to 24V stabilized DC.

The unit is built on a module chassis, and is intended for installation in a CQF600 station cabinet. It consists of the following main components:

Power transformer
Rectifier
Filter
Series regulator
Electronic protective circuit
Transmit relay.

Circuit Description

Power Transformer

The transformer has three windings. A primary for 220V and 240V, and two secondaries, one for 39/43V and one for 15-0-15V. The 39V tap is used if the mains voltage does not decrease by more than 10%. When using the 43V tap, mains-voltage drops of up to 20% are permissible. A fuse is inserted in the primary circuit.

The transformer meets CCE standard, class II (4 kV primary-to-secondary and primary-to-chassis).

Rectifier and Filter

Rectifier E1 is a bridge-type silicon rectifier. The filter consists of a swinging choke and an electrolytic capacitor C1, chosen in the interests of low ripple, low internal resistance, and reasonable physical dimensions.

Series Regulator

The series regulator is composed of three transistors, a voltage amplifier Q3, a current amplifier Q2, and a series transistor Q1. The base of amplifier transistor Q3 receives, via potentiometer R16, a portion of the output voltage, which it compares with the reference voltage across the zener diode E6 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 transistor 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 resistor R5, inserted in the collector circuit of series transistor Q1. If the voltage across R5 increases to a value corresponding to approx. 2.8A or more, transistor Q5 will saturate, causing transistors 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 mains voltage and cutting it in again after approx. 15 seconds, when capacitor C1 will be sufficiently discharged.

The RX and TX voltage outputs are protected against overload by means of transistor Q5 and diodes E12 and E13.

The -24 volts at either the RX or TX terminal will cause either diode E12 or diode E13

Storno

to conduct. This will hold the base potential of transistor Q5 below the conducting level.

An overload will cause a voltage drop at the collector of the conducting switch transistor (Q7 or Q8). If the output voltage drops below -23 volts, the base potential of Q5 will raise accordingly. This will bring transistors Q4 and Q5 into the stable condition priviously described, causing transistors Q1 and Q2 to cut off.

The output voltage is protected against overvoltage by zener diode E7 which is connected directly across the output. If, for example, the series transistor short-circuits, the output voltage will become so high that E7 becomes conductive and melts, whereafter the fuse S1 in the transformer circuit blows. Both the fuse and the zener diode must be replaced in order to put the equipment back into operation.

Receive-Transmit change-over Circuit

The receive-transmit change-over circuit is composed of transistors Q6, Q7, Q8 and associated components.

In receiving mode transistors Q6 and Q7 are OFF and transistor Q8 is ON, as base current is allowed to flow through diode E10 and resistors R28, R29 and R30. -24 volt is then present at the RX-terminal (4).

Grounding the KEY terminal (7) will bias transistor Q6 ON through resistor R31.

The current through transistor Q6 and resistors R29 and R30 will bring transistor Q7 into saturation placing -24 volt on the TX-terminal (3).

The collector voltage of Q6 will be lower than the break-down voltage of zener diode E10 and transistor Q8 is OFF, as it is deprived of its base current. Consequently the RX voltage is cut off.

Grounding the KEY terminal (7) will also operate the antenna switch relay, which is placed outside the power supply unit. Diode E9 suppresses voltage spikes arrising from the antenna relay being released.

NOTE: The power supply unit may be used for both simplex and duplex operation of a radio station. In the latter case a strap must be inserted between terminals 4 and 5.

Technical Specifications

Supply Voltage

220V or 240V +10, -20%, 50 to 60 Hz.

Current Consumption

Approx. 0.5A at max. load of 1.9A.

Output Voltage

24V + 2.5%
Ripple less than 10 mV p-p.

Output Current

Max. 1.9A
-24V RX : 0.3A
-24V TX : 1.3A

Loss

Approx. 60 watts at 264V supply voltage (primary 240V tap) and at maximum output load (1.9A).

Type of Service

Continuous

Temperature

PS603 is intended for mounting on a heat sink, which may assume the following temperatures:

Working range: -25°C to +65°C
Function range: -30°C to +75°C

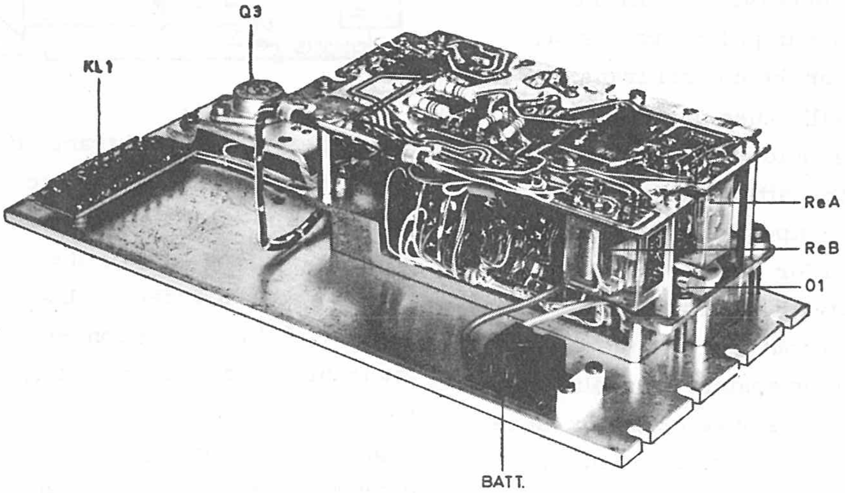
Weight

4.8 kilos

Dimensions

275mm x 150mm x 88mm

Power Supply Unit PS604



Power supply unit PS604 is a converter power supply which converts 12 or 24 volts of battery voltage into a 24-volt stabilized DC voltage.

The unit is built on a module chassis, and is intended for installation in a CQF600 station cabinet. It consists of the following main components:

DC converter with voltage switch
Series regulator
Starter and transmit relay

Voltage switching is performed by means of a rotary switch. Besides, when switching from 24V to 12V battery voltage a strap must be inserted between the C terminal of the power supply unit and the +Batt. terminal (see circuit diagram of PS604).

Mode of Operation

DC Converter

The DC converter is a conventional push-pull type with two transistors in a common-emitter circuit and the transformer inserted in the collector circuit, the feedback windings being connected to the bases.

The converter frequency is between 1 and 4 kHz.
The transformer primary consists of four identical centre-tapped windings which are connected either in series or in parallel depending on the battery supply voltage. 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. This arrangement protects the transistors from excessive peak currents.

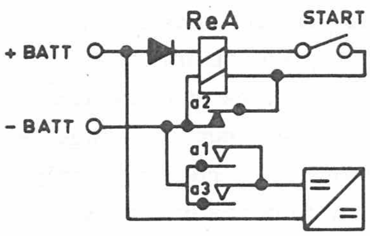
The transformer secondary has a main winding with taps for matching, and an auxilliary winding. The main winding connects to a bridge rectifier. The secondary auxiliary winding is used to furnish a positive auxiliary voltage for the following series regulator and also powers the starter lamp of the radio station.

Series Regulator

The series regulator consists of a series transistor, a control transistor, and an amplifier transistor.

The base of the amplifier transistor receives, via an alignment potentiometer, a portion of the output voltage. A reference diode in the emitter circuit compares the voltage across it with the base voltage. The collector of the amplifier transistor connects to the base of the control begins to increase, so will the collector current of the amplifier transistor, and the base voltage for the control transistor will decrease. This will cause the base voltage for the series transistor to decrease, and the voltage drop across the latter will increase, resulting in a drop in output voltage. The output voltage is adjusted for -24V by means of alignment potentiometer R14. A zener diode across the regulator output protects the transmitter-receiver modules against overvoltage in the case of defects in the series regulator since the voltage cannot exceed a certain potential (approx. 30V).

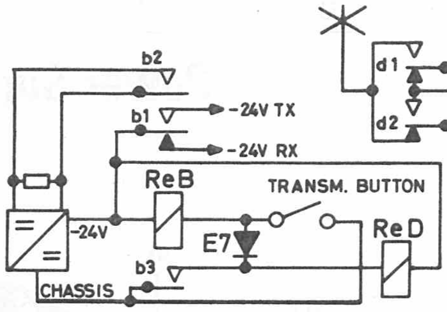
Starter Relay



The starter relay (Re. A) serves the purpose of turning the battery voltage for the power supply unit on and off; this is done via contact pairs a1 and a3. The relay has two coils, but only one of them is energized for starting, the other coil being short-circuited via one of the contact pairs of the relay (a2). After the station has been started, this latter contact pair will break, thereby connecting the two coils in series and reducing the holding current.
A diode in series with the relay protects the power supply unit against incorrect battery voltage polarity.

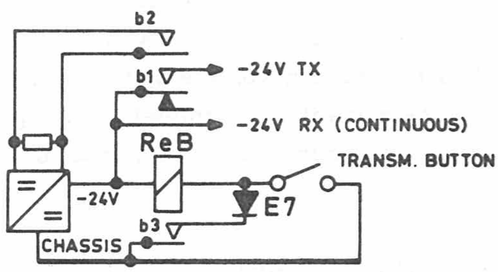
Transmit Relay (function in simplex operation)

Transmit relay (Re. B) is operated from the control box or control equipment. This relay switches the supply voltage back and forth be-



tween the receiver and transmitter sections (contact set b1) and short-circuits a feedback resistance in the DC converter during transmission (contact set b2); the latter operation is performed in order to obtain maximum efficiency at fluctuating converter loads. When the transmit relay is operated, the antenna switching relay - placed outside the power supply unit - is energized via the DC path through diode E7 and the transmit button to earth. This occurs simultaneously with the operation of the transmit relay, but since the operating time of the antenna switching relay is shorter than that of the transmit relay, the antenna will be connected to the transmitter before the latter begins to operate and can deliver any power.
On switching to receive, the transmit relay will be de-energized before the antenna relay because the latter relay remains operated via contact set b3 of the transmit relay.

(function in duplex operation)



In duplex operation, the antenna switching function is not performed, and the power supply unit delivers -24V for the receiver section continuously.

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Technical Specifications

Supply Voltages

Measured at input terminals

Supply Voltage	Minimum	Nominal	Maximum
12V	10.0V	12.6V	16.5V
24V	20.0V	25.2V	33.0V

Output Voltage

Regulated, -24V.

Output Voltage Fluctuation

For temperature and load fluctuations.
Less than ±0.6V.

Current Consumption, typical

Voltage	Receiver Setting		Transmitter Setting	
	I_{out} = 0A	I_{out} = 0.5A	I_{out} = 0A	I_{out} = 1.6A
12.6V	0.2A	1.9A	0.5A	6.2A
25.2V	0.11A	0.88A	0.2A	2.7A

Output Load

Receive: max. 0.5A.
Transmit: max. 1.6A.

Output Voltage Ripple

Less than 10 mV p-p.

Converter Frequency

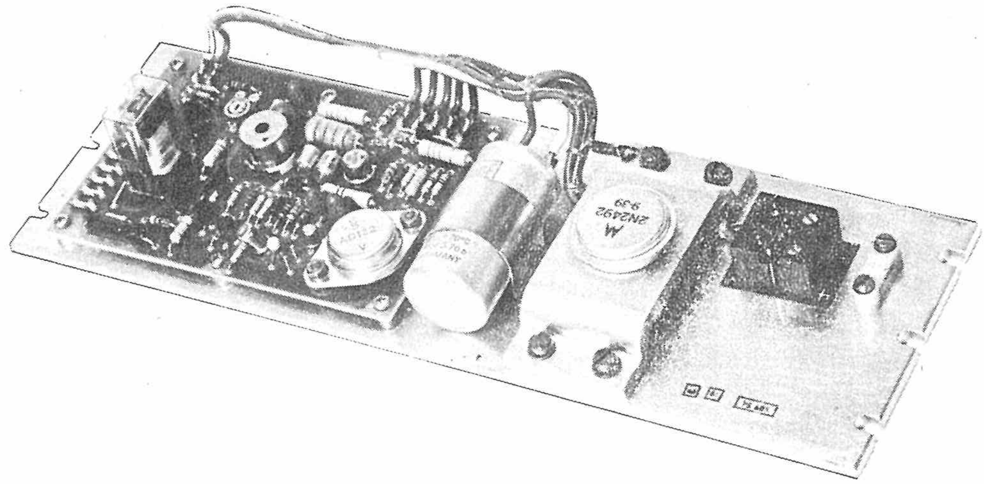
1-4 kHz.

Temperature Range

Ambient temperature:
Working range: -25°C to +70°C.
Function range: -30°C to +80°C.

37.646-E1

Power Supply Unit PS605



Introduction

The battery regulator PS605 regulates the d.c. voltage from the 24- or 28 volt battery. PS605 automatically operates on its battery whenever the ac line power is disconnected.

Installation

The PS605 is installed as sub-modular unit in combination with other sub-modular units on a specially constructed heat sink in a CQF600 radio station.

Mode of Operation

The PS605 regulator consists of the following elements.

Sampling element
Comparison element
d.c. amplifier element
Preregulator element
Series regulator
Over voltage protection
d.c. voltage converter.

Voltage regulation is performed by applying a sample of the output voltage at the base of the Q7 and by comparing it to the reference voltage at the base of Q6 of the symmetrical differential amplifier.

The amplified difference voltage from the differential amplifier is taken from Q7 to the d.c. amplifier Q3 which raises the difference signal from the comparison element to a level sufficient to drive the series control element Q5. The series control element Q5 interprets the signal from the d.c. amplifier Q3 and makes the adjustments necessary to maintain a constant output voltage at 24 volts.

The preregulator element Q2 provides a constant current to the base of the d.c. amplifier Q3 which helps eliminate the ripple current to appear at the base of the series regulator Q5.

Over Voltage Protection

Q8 is normally off. If the voltage through E9 exceeds the predetermined level at 5.6V. Q8 turns on. This tends to turn Q3 on, which results in switching Q5 off and consequently the potential at the regulator output is shortened. Over voltage protection switch can be reset to its normal position by shorting C8.

D.C. power converter transforms available d.c. voltage from 24-28 volt battery to -10V auxilliary voltage which is applied in series with -24V battery supply voltage in order to compensate for variations in battery voltage.

Storno

Technical Specifications

Maximum unregulated input voltage		28V
Ripple	Less than	10mV p-p
	output voltage	24V ± 2.5V
Maximum load current		4A
Maximum current drain		120-200 mA
Maximum temperature range		$-30^{o}C-+70^{o}C$
Operational performance		continous
Weight		560 grammes
Dimensions, modular chassis		89 x 274 mm.

60.159-E1

Storno

POWER SUPPLY UNIT

PS2605

INTRODUCTION

The battery voltage regulator PS2605 regulates the d.c. voltage from a 24, or 32 volt battery. The regulator automatically operates on its battery whenever the a.c. line power is disconnected.

INSTALLATION

The PS2605 is installed in combination with other sub-units on a specially constructed heatsink in a CQF600 radio station.

MODE OF OPERATION

The PS2605 regulator consists of the following circuits:

d.c. switching converter
d.c. regulator
electronic key circuit

CONVERTER

The switching converter comprises an astable multivibrator, Q17-Q18, two driver transistors, Q20-Q21, and a switching output transistor, Q22, which drives transformer T1. At the anode of E14 a negative voltage greater than the input voltage is available. A portion of this voltage is applied to the base of the comparison transistor, Q19, which controls the frequency of the astable multivibrator. A resistor, R45, sets the converter output voltage to -27 V. Transistor Q19 will be off whenever the input voltage exceeds -27 V. The multivibrator then stops running and hence the switching transistor Q22 is off.

The output voltage is then analagous to the input voltage.
Transistors Q15 and Q16 form a Schmitt trigger circuit of which Q16 is on when the input voltage is less than -15.5 V. When on, Q8 and Q16 inhibits the transmitter key circuit and thus the transmitter cannot be keyed. When the input voltage is above -18.5 V, Q16 is off and the transmitter inhibit is removed.

DC REGULATOR

The d.c. regulator comprises one output for the transmitter, one for the receiver and a constant voltage output, which is derived from the two regulator outputs via diodes E6 and E7. The two regulator circuits each employs a series regulator transistor, Q1, Q8, a driver transistor, Q2, Q9, and a comparator transistor, Q3, Q10. Transistors Q4 and Q11 make the circuits self-starting and transistor Q5 inhibits the TX regulator, when the transmitter is not keyed. Q5 also controls transistor Q6, the purpose of which is to discharge the TX output capacitor via R11 when the station reverts to the recieve mode.
Transistor Q12 inhibits the RX voltage when keying the transmitter in the simplex mode and also controls transistor Q13 which, via R30 discharges the RX output capacitor.

KEYING CIRCUIT

When keying the transmitter diode E5 ensures the antenna switch relay to energize fast and when the keying ceases, transistor Q7 holds the antenna relay until the TX voltage has dropped to half the nominal output.
Keying the tranmitter also shorts the base

of Q5 to 0 V causing it to be nonconductive and the TX voltage to rise. When the voltage exceeds -12 V, base voltage is applied to Q12 via R31. Transistors Q12 and Q13 turn on and the RX voltage disappears. Releasing the key button causes transistor Q14 to turn on (base voltage applied via R17-R33) and transistor Q12 to turn off. The RX voltage rises and when exceeding -12 V, Q5 and Q6 turn on and the TX voltage disappears.
In the duplex mode a shorting link is inserted to disable the function of Q14 and hence the RX voltage is continuously on.

TECHNICAL SPECIFICATIONS

Supply Voltage
-21 V to -32 V d.c.

Supply Current
Max. 10 A at full load and -21 V.

Outputs

Continuous voltage:	-24 V ± 5%, 1 A max.
RX voltage:	-24 V ± 5%, 1 A max.
TX voltage:	-24 V ± 5%, 4 A max. 5 A max. with continuous voltage output unloaded.

Automatic TX voltage inhibit for battery input voltage less than -15.5 V.

All outputs are short circuit proof.

Converter frequency
Above audible range

Radiations
Comply with Authorities regulations. (<Störgrad klein on all terminals).

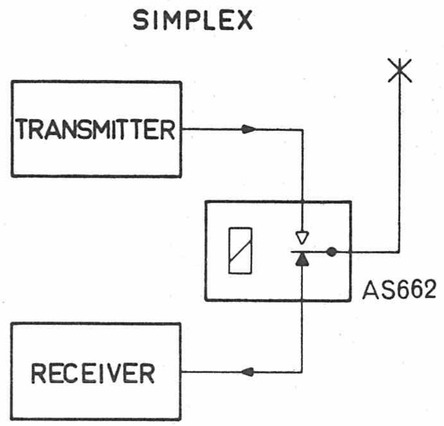
Temperature range:
Working range: -25°C - +65°C.
Function range: -30°C - +70°C.

Dimensions
275 mm x 150 mm

D. Antenna Switching Units and Antenna Branching Filters

Antenna Switching Unit

In radio stations using simplex operation - alternate transmission and reception - it must be possible to switch the antenna between the transmitter output and the receiver input. This function is performed by the antenna switching unit, which incorporates a coaxial relay.

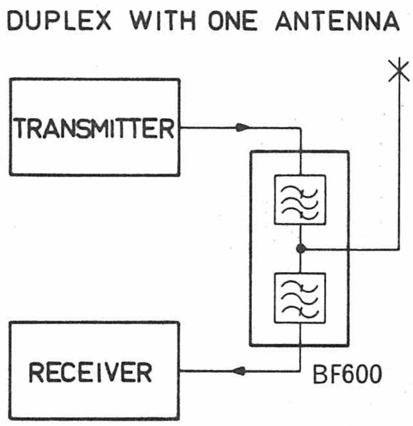


Types

AS662 Antenna switching unit for use in fixed radio stations for simplex operation.

Antenna Branching Filters

In radio stations using duplex operation - simultaneous transmission and reception - the transmitter and receiver sections are as a general rule connected to the same antenna. In such radio stations, an antenna branching network is inserted between the transmitter output, the receiver input, and the antenna. The chief function of the branching network is to prevent the transmitter power output from being applied to the receiver input.



Types

BF611 Antenna branching network for the frequency band 146 - 174 MHz.

BF631 Antenna branching network for the frequency band 68 - 88 MHz.

BF661 Antenna branching network for the frequency band 420 - 470 MHz.

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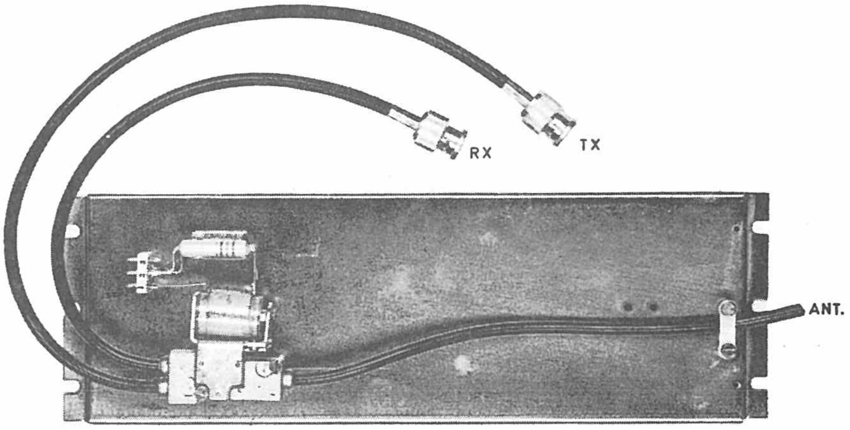
Antenna Switching Unit AS662

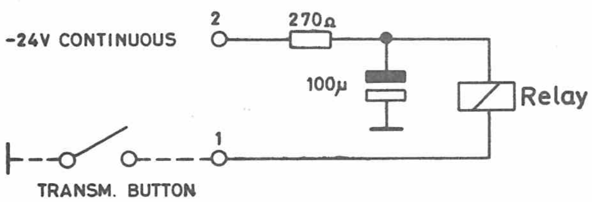


Antenna switching unit AS662 is a coaxial antenna switching unit for use at frequencies up to approx. 500 MHz. Its impedance is 50 ohms.

The antenna switching unit is mounted on a chassis which can be fastened inside the radiotelephone cabinet.

The antenna switching relay switches the antenna between the receiver and transmitter antenna terminals. The interconnections are performed by means of three coaxial cables fitted to the unit. Two of them, with BNC connectors, are connected to the transmitter RF output and receiver signal input, respectively; the third cable goes to the antenna connector provided on the radiotelephone.

Mode of Operation



A resistor and capacitor in the antenna switching unit provide a high value of operating voltage - and hence also a brief operating time - for the relay, in addition to ensuring a low value of locking voltage.

This is accomplished by applying -24 volts continuously to the capacitor when the relay is not operated.

When the relay is operated, the 24-volt potential across the capacitor discharges through the relay coil to chassis, whereupon the relay voltage drops to 12 volts, the continuous voltage being halved owing to the voltage drop across the resistor.

Technical Specifications

Impedance

50 ohms.

Contact Current

Max. 0.75 amp. in range 60-500 MHz.

Insertion Loss

0.1 dB.

Attenuation between Closed and Open Contacts

Max. 35 dB at 470 MHz.

Operating Voltage

24 volts ± 5%.

Operating Current

50 mA.

Operating Time

Max. 7 msec.

Drop-out Time

Max. 20 msec.

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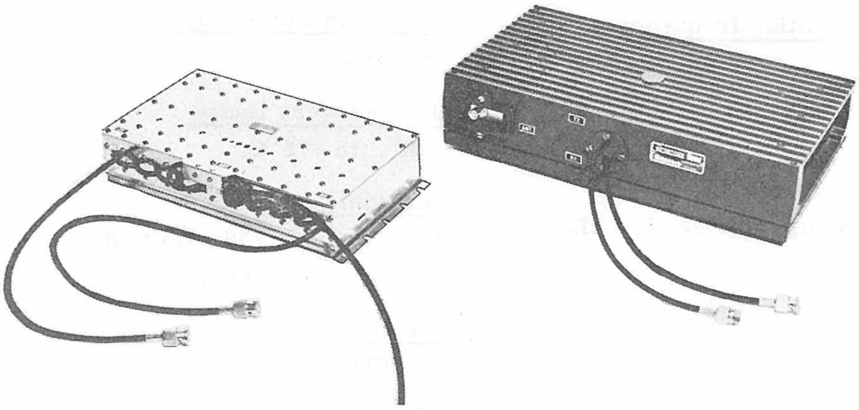
Branching Filters BF661 and BF662



Branching filters BF661 and BF662 are used with radiotelephones operating in duplex service in the frequency range 420-470 MHz with the transmitter and receiver connected to the same antenna.

Branching filter BF661 is used in the fixed radio-station CQF660, where it is mounted in the station cabinet. The filter is housed in a screen box the top side of which has a number of holes in it to provide access for adjustment of the filter circuits. Two cables fitted with connectors are used for connecting the filter to the transmitter signal output and the receiver signal input whilst a third cable is connected to the antenna connector of the station cabinet.

Branching filter BF662 is used in conjunction with the mobile radiotelephone CQM610. The BF662 consists of a type BF661 branching filter housed in a cabinet which may either be installed separately or mounted to the radiotelephone cabinet.

Branching filter BF662, just like the BF611, is equipped with two cables with connectors which plug into the transmitter output and receiver input whereas the antenna terminal of the network is a connector mounted on the cabinet.

Mode of Operation

The branching filter is composed of two band-stop filters one of which is the transmitter section, the other one being the receiver section. Each band-stop filter consists of five series-resonant traps.

These traps are identical except for L5, C51, C52, and L6, C61, C62, which are two identical series-resonant traps of considerably higher Q than the other circuits, to compensate for the insertion loss introduced by the filter. Four straps in each filter section have fixed coupling capacitors whereas the last trap has an adjustable coupling capacitor.

Each series resonant trap is a shortened quarter-wave coaxial circuit which is tuned at a point approx. $\lambda/12$ from the shorted end of the circuit. This is also the point at which the circuit is connected to the cable through the filter, by means of a trimmer capacitor or fixed coupling capacitor. Where a trimmer capacitor is used for the connection it may be used for adjustment of the apparent surge impedance of the series-resonant trap.

The traps connect to each other in each section of the branching filter via the cable through the filter in such a way that the length of cable between traps is approx. $\lambda/4$.

 37.790-E1

Storno

Each of the two filter sections connects to the antenna feed cable through a quarter-wave cable.

Technical Specifications

Frequency Range

420-470 MHz.

Duplex Spacing (transmitting frequency - receiving frequency)

Min. 9-20 MHz.

Insertion Loss

At 9 MHz duplex spacing: approx. 1.7 dB

At 20 MHz duplex spacing: approx. 1.4 dB.

Pass Band

±0.3 MHz ∽ 0.6 MHz.

Isolation

Min. 45 dB.

Peak Isolation

Min. 60 dB.

Nominal Impedance

50 ohms.

Standing-wave Ratio

Less than 2.

Maximum Power Input

15 watts.

Temperature Range

-25°C to +75°C.

Dimensions

BF661: 274 x 149 x 53 mm

BF662: 307 x 160 x 72 mm.

Weight

BF661: 2.2 kilos

BF662: 3.8 kilos.

37.790-E1

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ANTENNA BRANCHING FILTER

BF663, BF664, BF665, BF666

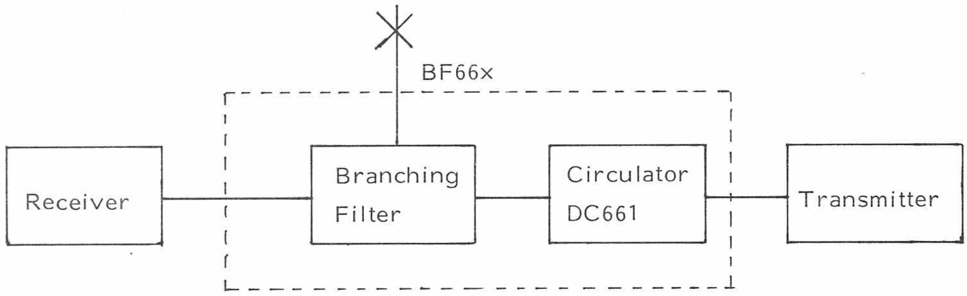
DESCRIPTION

GENERAL

The branching filter connects the transmitter and the receiver to the antenna in a station working in the duplex mode. The purpose is to utilize a common antenna for simultaneous transmitting and receiving.

The branching filter may be integrated with the circulator unit DC661 or may work alone. Furthermore, the filter can be designed so that TX > RX or TX < RX, and hence 4 differents BF units appear:

1.	TX > RX	BF663
2.	TX < RX	BF664
3.	TX > RX + DC661	BF665
4.	TX < RX + DC661	BF666



BRANCHING FILTER

The applied filter has 5 resonators working in the frequency range of 406 to 470 MHz. The resonators are divided so that 2 are used in the transmitter branch (tuned to the receiver frequency) and 3 are used in the receiver branch (tuned to the transmitter frequency).

The filter is designed as a notch filter and the 2 resonator branch provides an isulation of minimum 60 dB while the insertion loss is less than 1.2 dB.

The 3 resonator branch provides an isulation of minimum 80 dB while the maximum insertion loss is 2.4 dB.

Depending on whether the transmitter frequency is higher than the receiver frequency, or, vice versa, the branching filter is designated and adjusted accordingly.

BRANCHING FILTER WITH CIRCULATOR

If, in certain cases, an improvement of the transmitter intermodulation characteristics is desired, the circulator DC661 is inserted between the transmitter and the branching filter.

Both filter and circulator are mounted on a common chassis after which they all together constitute a BF unit, the designation of which is determined by the filter.

SPECIFICATIONS

		BF663	BF664	BF665	BF666
				TX>RX	TX<RX
		TX>RX	TX<RX	+circulator	
Frequency range	MHz	406 - 470			
Duplex spacing	MHz	10			
Maximum power applied	W	50		25	
Insertion loss, TX	dB	1.2		2.4	
Insertion loss, RX	dB	1.2		1.2	
RX-isolation on TX-freq.	dB	60		60	
TX-isolation on RX-freq.	dB	80		80	
Nominal impedance	Ω	50		50	
SWR		1.3 : 1		-	
Frequency stability	ppm/°C	2.7		-	
Temperature range	°C	-40 - +70		-25 - +70	
Mechanical dimensions	mm	275 x 148 x 50			
Weight	kg	1.725		1.950	

Storno

ANTENNA BRANCHING FILTER

BF663b, BF664b, BF665b, BF666b

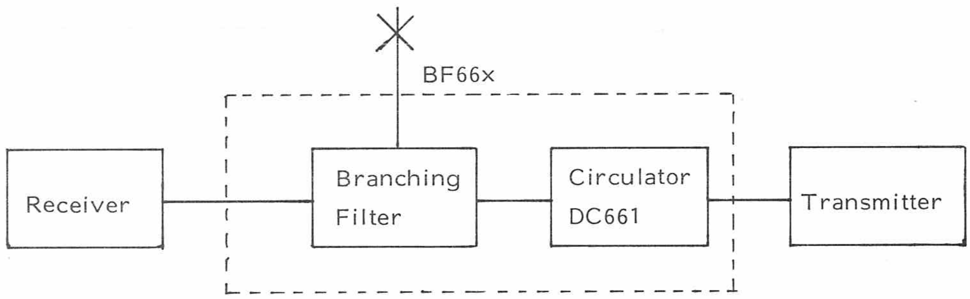
DESCRIPTION

GENERAL

The branching filter connects the transmitter and the receiver to the antenna in a station working in the duplex mode. The purpose is to utilize a common antenna for simultaneous transmitting and receiving.

The branching filter may be integrated with the circulator unit DC661 or may work alone. Furthermore, the filter can be designed so that TX > RX or TX < RX, and hence 4 differents BF units appear:

1.	TX > RX	BF663b
2.	TX < RX	BF664b
3.	TX > RX + DC661	BF665b
4.	TX < RX + DC661	BF666b



BRANCHING FILTER

The applied filter has 5 resonators working in the frequency range of 406 to 470 MHz. The resonators are divided so that 2 are used in the transmitter branch (tuned to the receiver frequency) and 3 are used in the receiver branch (tuned to the transmitter frequency).

The filter is designed as a notch filter and the 2 resonator branch provides an isulation of minimum 35 dB while the insertion loss is less than 1.2 dB.

The 3 resonator branch provides an isulation of minimum 70 dB while the maximum insertion loss is 2.7 dB.

Depending on whether the transmitter frequency is higher than the receiver frequency, or, vice versa, the branching filter is designated and adjusted accordingly.

BRANCHING FILTER WITH CIRCULATOR

If, in certain cases, an improvement of the transmitter intermodulation characteristics is desired, the circulator DC661 is inserted between the transmitter and the branching filter.

Both filter and circulator are mounted on a common chassis after which they all together constitute a BF unit, the designation of which is determined by the filter.

SPECIFICATIONS

		BF663b TX>RX	BF664b TX<RX	BF665b TX>RX +circulator	BF666b TX<RX +circulator
Frequency range	MHz	406 - 470			
Duplex spacing	MHz	5			
Maximum power applied	W	50		25	
Insertion loss, TX	dB	1.5		2.7	
Insertion loss, RX	dB	1.2		1.2	
RX-isolation on TX-freq.	dB	35		35	
TX-isolation on RX-freq.	dB	70		70	
Nominal impedance	Ω	50		50	
SWR		1.3 : 1		-	
Frequency stability	ppm/°C	2.7		-	
Temperature range	°C	-40 - +70		-25 - +70	
Mechanical dimensions	mm	275 x 148 x 50			
Weight	kg	1.725		1.950	

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ANTENNA BRANCHING FILTER

BF667 / BF6611 and BF668 / BF6612
BF669 / BF6613 and BF6610 / BF6614

DESCRIPTION

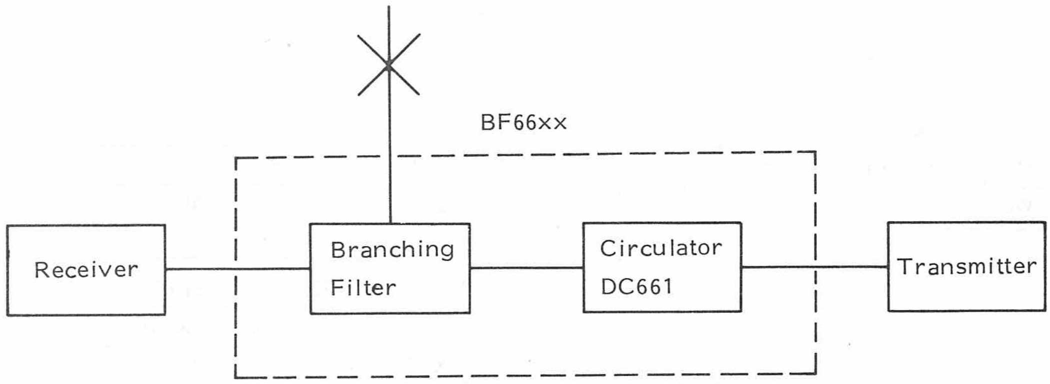
GENERAL

The branching filter connects the transmitter and the receiver to the antenna in a station working in the duplex mode. The purpose is to utilize a common antenna for simultaneous transmitting and receiving.

The branching filter may be integrated with the circulator unit DC661 or may work alone.

Furthermore, the filter can be designed so that TX > RX or TX < RX, and for either 5 MHz or 10 MHz branching, hence 8 different BF units appear:

	BRANCHING 5 MHz	BRANCHING 10 MHz
1. TX > RX	BF667	BF6611
2. TX < RX	BF668	BF6612
3. TX > RX + DC661	BF669	BF6613
4. TX < RX + DC661	BF6610	BF6614



BRANCHING FILTER

The applied filter has 5 resonators working in the frequency range of 406 to 470 MHz. The resonators are divided so that 3 are used in the transmitter branch (tuned to the receiver frequency) and 2 are used in the receiver branch (tuned to the transmitter frequency).

The filter is designed as a notch filter and the 2 resonator branch provides an isolation of minimum 35/60 dB while the insertion loss is less than 1.2 dB.

The 3 resonator branch provides an isolation of minimum 60/80 dB while the maximum insertion loss is 2.7 dB.

Depending on whether the transmitter frequency is higher than the receiver frequency, or, vice versa, the branching filter is designated and adjusted accordingly.

BRANCHING FILTER WITH CIRCULATOR

If, in certain cases, an improvement of the transmitter intermodulation characteristics is desired, the circulator DC661 is inserted between the transmitter and the branching filter.

Both filter and circulator are mounted on a common chassis after which they all together constitute a BF unit, the designation of which is determined by the filter.

SPECIFICATIONS

		BF667	BF668	BF669	BF6610
				TX>RX	TX<RX
		TX>RX	TX<RX	+circulator	
Frequency range	MHz	406 - 470			
Duplex spacing	MHz	5			
Bandwidth	MHz	1			
Maximum power applied	W	50		25	
Insertion loss, TX	dB	1.5		2.7	
Insertion loss, RX	dB	1.2		1.2	
RX-isolation on TX-freq.	dB	35		35	
TX-isolation on RX-freq.	dB	60		60	
Nominal impedance	ohm	50		50	
SWR		1.4 : 1		-	
Frequency stability	ppm/°C	2.7		-	
Temperature range	°C	-40 - +70		-25 - +70	
Mechanical dimensions	mm	275 x 148 x 50			
Weight	kg	1.725		1.950	

		BF6611	BF6612	BF6613	BF6614
				TX>RX	TX<RX
		TX>RX	TX<RX	+circulator	
Frequency range	MHz	406 - 470			
Duplex spacing	MHz	10			
Bandwidth	MHz	1			
Maximum power applied	W	50		25	
Insertion loss, TX	dB	1.2		2.4	
Insertion loss, RX	dB	1.2		1.2	
RX-isolation on TX-freq.	dB	60		60	
TX-isolation on RX-freq.	dB	80		80	
Nominal impedance	ohm	50		50	
SWR		1.4 : 1		-	
Frequency stability	ppm/°C	2.7		-	
Temperature range	°C	-40 - +70		-25 - +70	
Mechanical dimensions	mm	275 x 148 x 50			
Weight	kg	1.725		1.950	

Storno

CIRCULATOR

DC661

GENERAL

The circulator DC661 is a directional coupler unit working in the UHF range. It is connected between the transmitter output and the antenna and, if a duplex filter is used, the unit is connected to the transmitter side of the filter.

The directional coupler is built around a ferrite element, which together with the matching networks at the ports, is mounted in a sealed inclosure in order to hinder unwanted RF-radiation.

The input port match and the port, on which the load resistor is mounted, are designed as L-circuits as only impedance matching is made here.

At the output port the aim is, besides impedance matching, an attenuation of the second harmonic and therefore two L-circuits are used.

As well the input port as the output port are matched to 50 ohm.

SPECIFICATIONS

Frequency Range
420 to 470 MHz

Bandwidth
>2%

Insertion Loss
<1.2 dB

Maximum Power applied
50 W

Isulation
>20 dB

Temperature Range
-25°C to +80°C

Nominal Impedance
50 ohm

Dimensions (l x w x h)
136 x 48.5 x 32 mm

Weight
225 g

CHAPTER III. INSTALLATION

A. Installation of the Cabinet

General

The site for a fixed radio station should be chosen on a basis of the following factors:

a) The distance between the station and the antenna should be as short as possible so as to limit the length of the antenna feed cable and hence also the losses involved.

b) Maximum ambient temperature permitted for the equipment is 50°C, and the temperature in the station room should never exceed this limit. Since all the heat generated in the equipment must be drained away through the surface of the cabinet, it is important to avoid covering up the latter.

c) In order to secure easy access to all circuits in the event of service, sufficient room should be left around the cabinet so that it can be opened, thereby making the circuitry accessible.

Installation of the Cabinet

The Stornophone 600 fixed radio station is intended for wall mounting. STORNO can supply the following types of suspension:

Conventional suspension (code No. 37.091). For use where special requirements are not made concerning the mounting of the cabinet.

T-suspension (code No. 37.088). For use where the equipment may be exposed to vibrations, making particularly rugged mounting a necessity. In order to remove the cabinet from the suspension it is necessary to loosen a locking screw, using an Unbrako key (L-shaped hexagonal key).

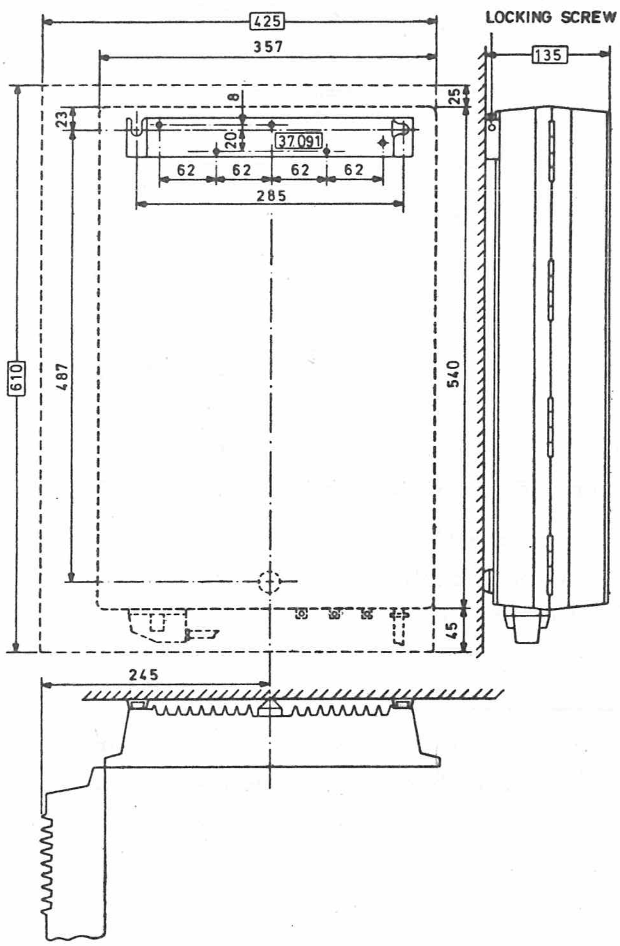
T-suspension (code No. 37.105). Identical with the T-suspension described above except that the locking screw is spring activated and can be loosened without using tools.

Conventional Suspension, 37.091

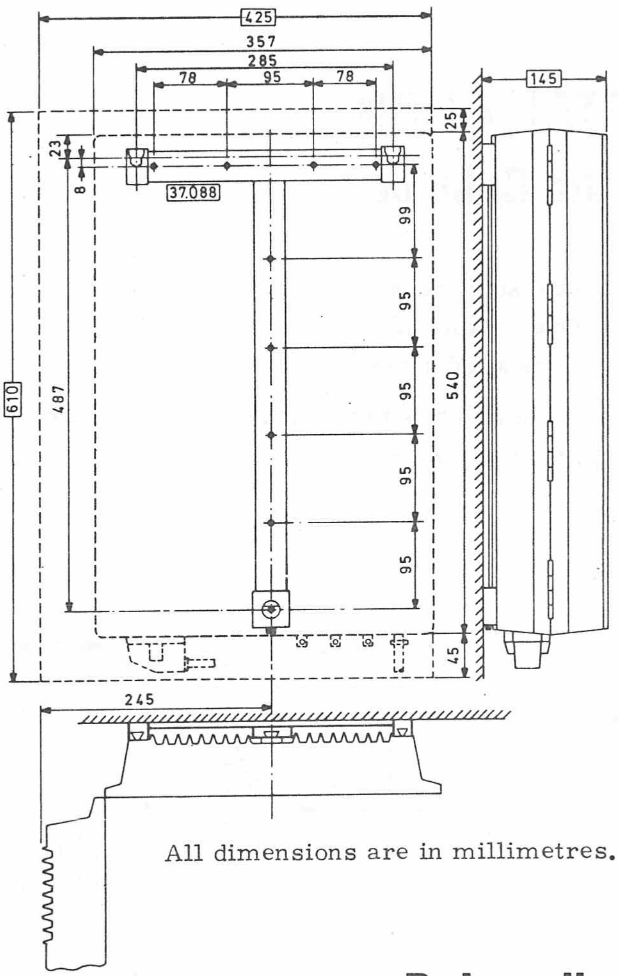
This is a kit comprising the following parts:

One suspension plate
One locking screw
Five wood screws

Fig. 1 shows how to mount the cabinet. All dimensions are listed.



All dimensions are in millimetres.



All dimensions are in millimetres.

T-Suspension (code No. 37.088 or 37.105)

A T-suspension is a kit comprising the following parts:

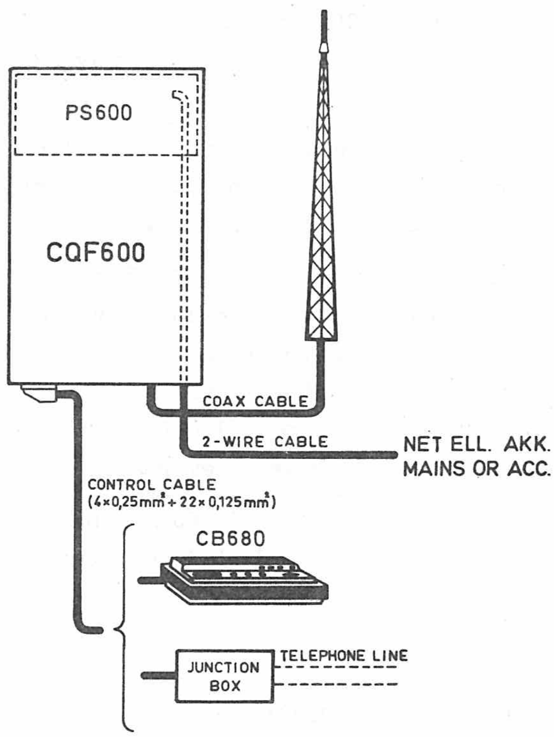
One suspension plate with locking pawl
Nine wood screws

Fig. 2 shows how to mount the cabinet. All dimensions are listed.

B. Installation of Cabling

The cabling required for operation of the Stornophone 600 fixed radio station comprises:

Power cable
Antenna cable
Control cable.



Power Cable

Bring the power cable from the mains or accumulator through the hole in the bottom of the cabinet and connect it to the power supply unit of the equipment.

Antenna Cable

Plug the antenna cable, with a connector mounted on it, into the station's antenna connector (UHF connector, Type N).

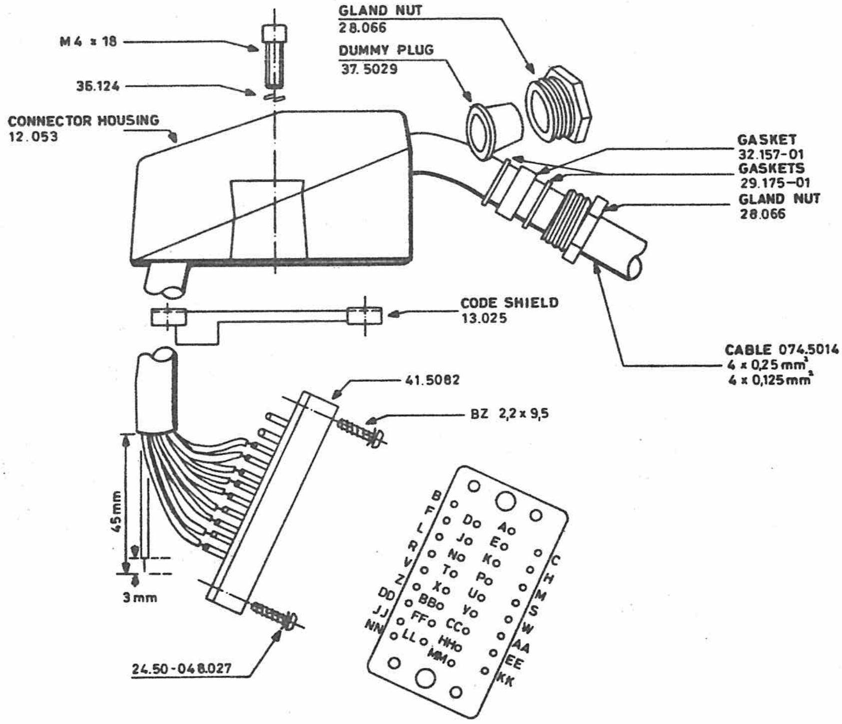
Control Cable with Multiwire Connector

The control cable connecting the control equipment to the radio station proper is a 26-conductor cable, STORNO type 074.5014 (4 x 0.25 mm^2 + 22 x 0.125 mm^2). This cable should be connected to the station via a multiwire connector (41.159) one part of which (the male plug) is mounted on the radiotelephone cabinet. The other part (the female plug) should be mounted on the control cable.

To mount the connector on the control cable, first slide the gland nut and rubber gaskets in over the cable and bring the latter through the bushing provided in the connector housing. Then strip the control cable and its conductors of insulation as shown in the installation drawing and solder the conductors to the solder tags of the connector in accordance with the terminal/colour code.

Thereafter pull the connector into position in the connector housing with the code screen (13.025) inserted as shown and secure them, using the screws supplied. Lastly, slide the connector components into place and tighten the gland nut.

Terminal	Colour	Terminal	Colour
B	green-white	X	brown-white
F	green-grey	BB	brown-grey
L	red-yellow	FF	grey-white
R	black-yellow	LL	green-red
V	violet	A	green
Z	grey-red	E	green-brown
DD	grey	K	red
JJ	orange and yellow	P	none
NN	none	U	brown
D	yellow-white	Y	black and blue
J	yellow-green	CC	red-brown
N	yellow-brown	HH	blue-brown
T	yellow-grey	MM	white



 Storno

CHAPTER IV. SERVICE

A. Maintenance

When a CQF600 radio station 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 re-adjusted 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 CQF600 may be expected to have long life. Easy service and fault finding were two other important design considerations. All significiant 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 operational 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

Most modules have two kinds of test points - DC test points, which are designated by numbers in circles (1) ; and signal test points, designated by numbers in squares, [2] . Measurements at DC test points should be made with a multimeter having an internal resistance of at least 20 KΩ /V. RF signal measurements may be made with a multimeter in conjunction with STORNO type 95.089 RF probe. Audio-frequency signal measurements require the use of a vacuum-tube voltmeter.

Readings at Test Points

The list below specifies all points in the equipment and the respective reading. Readings are intended only as a guide.

CQF661, CQF662, and CQF663			
POINT	UNIT	INSTR.	MEASUREMENT
[1]	RC661	Probe A	15-35 μA
[2]	RC661	Probe A	15-35 μA
[3]	RC661	Probe A	5-25 μA
[4]	RC661	Probe B	Δ◆ 15-50 mV
[5]	RC661	Probe A	Δ 30-80 mV
[7]	IC600	Probe B	0.2-0.8 mV
[8]	IA601	Probe B	□ 1.0-3.0 μV
[10]	IA601	AF-voltm.	■ 20 kHz: 0.8-0.9 V
			25 kHz: 0.9-1.1 V
			50 kHz: 1.2-1.4 V
[14]	SQ601	AF-voltm.	■ 1.1 V
[27]	AA601	AF-voltm.	▲ 0.5-1.0V
[30]	EX662	Probe B	0.5-1.4 V
[32]	EX662	Probe B	1.0-1.6 V
[33]	EX662	Probe C	3.0-5.0 V
[34]	EX662	Probe C	2.0-6.5 V
(35)	EX662	DC-voltm.	5-7 V
(1)	PA664	mV-instr.	20 mV
(2)	PA664	mV-instr.	80 mV
(1)	PA663	mV-instr.	20 mV
(2)	PA663	mV-instr.	80 mV
(3)	PA663	mV-instr.	180 mV

Δ Antenna signal (EMF) for 4 μA reading at the test point.

◆ Measured without oscillator signal.

□ Antenna signal (EMF) for 1V reading at the test point.

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

▲ Frequency deviation 0.7 x $\Delta F_{max.}$ and 1000 Hz.

○ Measured across a 47 Ω resistor.

* Measured at nominal output power.

Probe A: Probe +0 -50 μA instrument (Ri = 1 KΩ).
Probe B: Probe +0 -2.5 V instrument (20 KΩ/ V).
Probe C: Probe +0 -10 V instrument (20 KΩ/ V).
Probe D: Probe +0 - 25 V instrument (20 KΩ/ 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, each routine inspection should also include the following operations.

1. Inspect (visually) transistors, diodes etc. Fasten any components that may have worked loose.
2. Check the supply voltage (see specifications for the power supply used).
3. Check cable connections and connectors. Also check the current drain.
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. Call the other stations and perform speech test.
7. Check the antenna mounting, especially for rust.

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.

B. Fault-finding and Repairs

Fault Finding

Fault-finding should be performed only by skilled personel who have the necessary measuring instruments etc. at their disposal and have previously studied the operating principles of the radio station.

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 radio station 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 Sec. C (Adjustment Procedure) be followed closely in each individual case if a satisfactory result is to be obtained.

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 op 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

Never forget, when soldering on semiconductors, that the soldering operation should be performed quickly and as a general rule it is not advisable to solder closer to semiconductors than approx. 5 mm - germanium transistors, for instance, will not stand temperatures above 85 - 90° C.

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 them if necessary.

Wiring Boards

The wiring boards used in the radiostation 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 in the board. The wiring boards also carry some fixed capacitances. Here, repairs must be made with some caution in order to avoid changes in capacitance.

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 CQF660 radio station 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. Only such skilled radio technicians as have already acquainted themselves with the operation of the radio station should perform adjustments and repairs.

Each individual radio station is checked and tested before being dispatched from STORNO. In the absence of any special agreement, the Testing Department has:

1. Inserted oscillator units with quartz crystals for the channels ordered.
2. Aligned the complete radio station so that the accuracy of the transmitting and receiving frequencies is better than 0.5×10^{-6}.
3. Adjusted the receiver audio output and the speech limiter clipping level according to specifications.
4. Adjusted and tested the radio station in conjunction with control equipment (if provided).

Types of Radiostations

This adjustment procedure applies to the following radio stations:

CQF661: 420-470 MHz, 50 kHz channel separation.
CQF662: 420-470 MHz, 25 kHz channel separation.
CQF663: 420-470 MHz, 20 kHz channel separation.

Measuring Equipment

While adjustments are being performed, the radio station should be connected to a control desk and a power source delivering a voltage as specified in the specifications for the power supply unit used.

The following instruments are required:

A signal generator, for 420-470 MHz (for example a MARCONI type TF1066B).

A crystal-controlled signal generator for 455 kHz and 10.7 MHz (for example STORNO type G21, code no. 95.163).

An audio voltmeter (for example a RADIOMETER type RV36).

A distortion meter (for example a RADIOMETER type BKF6).

A standard receiver with calibrated discriminator (for example a RADIOMETER type AFM1).

A wattmeter 0-10 W/0-25W (for example a BIRD type 43).

A dummy load (same make as wattmeter).

A tone generator (for example PHILLIPS type PM5100).

A signal coupling network, STORNO type 95.155.

An adjustment kit, STORNO type TK601a (code no. 17.033-01).

An RF probe, STORNO type 95.089.

A 40 dB attenuation network, STORNO type D52 (code no. 95.2001).

A multimeter, 20 kΩ per volt.

A microammeter 50-0-50 μA, Ri = 1000 Ω.

A milliammeter, 0-500 milliamps.

An ammeter, 0-1 amp.

With these instruments available, the radio station can always be restored to operating condition.

RECEIVER ALIGNMENT

Before starting alignment of the receiver, first check the internal supply voltage, -24V. If necessary, adjust it for the correct value, using a potentiometer located in the power supply unit.

In PS602b: potentiometer R43
In PS603a: potentiometer R16
In PS604 : potentiometer R14
In PS605 : potentiometer R19.

Also check that the straps in receiver converter RC661, intermediate-frequency amplifier IA601, and squelch and audio amplifier SQ601 are in accordance with the channel separation in use (see circuit diagrams of the respective units).

Alignment of Low IF Channel and Discriminator, IC600 and IA601

Apply a 455 kHz signal (approx. 3 μV) to the input of BP60x without cutting off the connection between IC60x and BP60x.

Connect RF probe and multimeter at testpoint 9

Adjust coils L1, L2, and L3 in IA601 for maximum meter reading, approx. 10 μA.

Apply a 455 kHz signal (approx. 1 mV) to the input of IA601 without cutting off the connection between BP60x and IA601.

Connect 50-0-50 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 ± 15 kHz.

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

Reading for ± 15 kHz at 1 mV input signal: 37.5 μA ± 2 μA.

Liniarity at ± 15 kHz: 2.5 μA per kHz.

Receiver Oscillators

The oscillator unit is adjusted before leaving the factory in case no arrangement has been made to the contrary, 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.

Adjustment of Oscillator XO611

Connect RF probe and multimeter at test point [2] in RC661.

Adjust coil L1 in XO611 for maximum meter reading (see list of test point readings).

Check that the oscillator works properly (that it starts oscillating again after having been cut off). If not so, readjust coil L1 thereby making the oscillator work on the lineary part of the resonance curve (approx. 1-2 μA below maximum).

Connect the frequency counter at test point [2] in RC661 via a capacitor.

Adjust the oscillator frequency by means of capacitor C4 in XO611.

Requirements:

$$\frac{\Delta f}{fo} \leq 0.5 \times 10^{-6}$$

Example: antenna frequency 450 MHz, accuracy of oscillator frequency 0.5 x 450 = ± 225 Hz.

Adjustment of Oscillator XO664 and Oscillator Panel XS663

Connect RF probe and multimeter at test point [2] in RC661.

Before the adjustment is initiated the radio station should warm up for at least five minutes.

Adjust the coils L1 and L2 in XO664 for maximum meter reading (see list of test point readings).

Connect the frequency counter at test point [2] in RC661 via a capacitor.

Adjust the frequency coarsly by means of trimmer capacitor C1 (channel 1) or C2 (channel 2) in oscillator panel XS663.

Requirements:

$$\frac{\Delta f}{fo} \leq \pm 2 \times 10^{-6}$$

If this accuracy of the oscillator frequency cannot be obtained, change capacitor C8 (channel 1) or C6 (channel 2) of 5.6 pF as follows:

a) If the frequency is too high replace the capacitor by 10 pF.

b) If the frequency is too low the capacitor should be omitted.

Readjust the oscillator frequency by means of trimmer capacitor C3 in XO664.

Requirements:

$$\frac{\Delta f}{fo} \leq \pm 0.2 \times 10^{-6}$$

Owing to ageing of crystal and oscillator the radio station should remain in Stand-by position for at least 48 hours after which the frequency is readjusted.

The oven temperature of XS663 is adjusted at the factory, making subsequent readjustment unnecessary.

Adjustment of Oscillator XO666

Connect RF probe and multimeter at test point [2] in RC661.

Adjust coil L1 in XO666 for maximum meter reading (see list of test point readings).

Connect the frequency counter at test point [2] in RC661 via a capacitor.

Adjust the frequency by means of trimmer capacitor C5 in XO666.

Requirements:

$$\frac{\Delta f}{fo} \leq \pm 0.5 \times 10^{-6}$$

Alignment of Signal Frequency Amplifier and High IF Channel, RC661

Calculation of the crystal frequency (fx) for a given signal frequency (f sig).

When using oscillator type XO664:

$$fx = \frac{f_{sig} - 10.7}{36} \text{ MHz}$$

When using oscillator type XO611 or XO666:

$$fx = \frac{f_{sig} - 10.7}{9} \text{ MHz}$$

Alignment

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

Adjust coil L11 in RC661 for maximum meter reading (see list of point readings).

Connect RF probe and multimeter at test point [2].

Adjust coil L12 in RC661 for maximum meter reading (see list of test point readings).

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

Adjust coil L13 in RC661 for maximum meter reading (see list of test point readings).

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

Adjust capacitor C25 in RC661 for maximum meter reading, 15 - 45 μA.

Set the neutrodyne capacitors C8 and C20 for minimum capacity (their tuning slugs fully turned out).

Connect the signal generator via a signal coupling network, Storno type 95.155, at test point [5] and set it to the signal frequency.

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

Adjust capacitors C15, C21, C23, and coil L10 in RC661 and coil L1 in IC60x for maximum meter reading.

Adjust capacitor C13 in RC661 for minimum meter reading.

Adjust capacitor C11 in RC661 for maximum meter reading.

Adjust capacitor C9 in RC661 for minimum meter reading.

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

Adjust capacitors C1, C3, C9, C11, C13, and C15 in RC661 for maximum meter reading.

Set the output of the signal generator for a level corresponding to a meter reading of approx. 100 µA at test point [8] in IA601.

Reduce the output from the signal generator by 6 dB and increase the capacity of C20 by a quarter of a turn at a time (at the beginning, however, a little more) at the same time readjust the adjacent circuits until a reference of 100 µA at test point [8] is obtained.

Again reduce the output from the signal generator by 6 dB and increase the capacity of C8 by a quarter of a turn at a time (at the beginning however, a little more) at the same time readjust the adjacent circuits intil a reference of 100 µA at test point [8] is obtained.

Adjustment of 2nd Oscillator, IC600

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

Filter Matching, Sensitivity, and Audio Level Adjustment

Connect the signal generator to the antenna input of RC661, and set it to the signal frequency.

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

Readjust the coils L10 in RC661, L1 in IC60x, and L1 and L2 in BP600 for maximum amplification. The signal from the generator should be the lowest possible, approx. 2 µV e.m.f.

Set the frequency swing of the signal generator to 70% of the maximum permissible limit:

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.
The RF level should be 1 mV.

Connect the distortionmeter and the audio voltmeter at test point [14] in SQ601 (at output terminals) or the terminals 2 and 3 on the terminal board of the receiver cabinet.

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

Distortion less than 3.5%.

Note: The 600 Ω load is located in the control box, where it serves as level control.

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 modulating frequency at 1000 Hz.

Adjust the signal generator output for 1 mV.

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

Insert the filter to remove the modulating frequency.

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

Readjust the input filter L1 and L2 in RC661 for the best possible signal-to-noise ratio. It should be possible to obtain a 12 dB signal-to-noise ratio for 1.0 µV e.m.f.

In case the sensitivity is too poor adjust the neutrodyne capacitors C8 and C20 in RC661 for increased amplification 1 dB per step. This increase in amplification, however, must not exceed 6 dB per amplifier stage (Q1 and Q2). (see the last section of paragraph "Alignment of Signal Frequency Amplifier and High IF Channel, RC661").

If the sensitivity is better than 1.0 µV e.m.f. keep the setting of C8 and C20 in RC661 and thus the 6 dB amplification per stage, for which adjustment has been made formerly.

Adjusting for better than 1 µV e.m.f. sensitivity should be avoided, as this will deteriorate the intermodulation attenuation.

Squelch Sensitivity

Keep the signal generator connected to the antenna input of RC661 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 that the squelch control is working; that is, it must be capable of cutting in the receiver output and turning if off again in the absence of an incoming RF signal.

The squelch control is located in the control desk or the control panel of the control equipment.

Set the squelch control to the threshold value (without RF signal applied). 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 AA601 are in accordance with the channel separation in use (see circuit diagram).

Transfer the signal lead connecting exciter EX662 to 50 Ω wattmeter during exciter alignment.

The transmitter must operate under carrier-on conditions during the subsequence adjustments.

This is accomplished by depressing the transmit button on the control desk or by connecting terminals V and K-L in the multi-wire connector together.

Alignment of Exciter EX662

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

Buffer, Modulator adjustment

The following adjustments are performed without AF input to the modulator.

Place probe 95.059 in position [30] . Tune L1, L2, and L6 for maximum. Indication ca. 0.5 V.

Short terminals G and terminals A (i.e. G to G and A to A) and tune L3 to maximum indication with probe still in position [30] . Indication ca. 0.5 V.

Short terminals G and terminals B. Tune L4 to minimum indication with probe still in position [30] . Indication ca. 0.05 V.

Short terminals G and terminals C. Tune L5 to minimum indication with probe still in position [30] . Indication ca. 0.05 V.

The last three steps should be repeated. Remove shorting devices.

With probe still in pos. [30] fine tune L2 and L6 for max. indication. Indication ca. 0.5 V.

Place probe in pos. [32] . Tune L7 for maximum indication. Indication ca. 1 V. The modulator and buffer stages are now correctly tuned.

Multiplier chain Q3 - Q5 adjustment.

Place probe in pos. [33] . Tune L8 and L9 for max. indication - repeat procedure for absolute maximum. Indication ca. 4 V.

Place probe in pos. [34] . Tune L10 and L11 for max. indication - repeat procedure for absolute maximum. Indication ca. 4 V.

Connect DC voltmeter (10 V range) between supply terminal (- 24 V) and pos. (35) . At high frequency end of band adjust C37 approx. 1/2 in.

At low frequency end of band adjust C37 completely in. At other parts of the band, interpolate adjustment of C37 accordingly (C37 is fine tuned later).

Now tune L12 and L13 for maximum voltmeter indication. Indication approx. 6 V.

This completes the tuning of the multiplier chain upto and including the VHF frequency stage Q5.

Tripler Stage Q6 and Output Stage Q7 Adjustment

Turn variable resistor R45 fully counter clockwise (minimum resistance in circuit).

Retain voltmeter between supply voltage (- 24 V) and pos. (35) .

Rough tune C42 for dip in voltmeter indication (35) . Tune C43 for maximum current consumption. Fine tune C42 and C43 for maximum current consumption.

Tune C46 and C47 for maximum HF output power. C46 and C47 interact and should be tuned successively to absolute maximum output.

Adjust coupling between L14 and L15 by bending hair pin coil L15 towards L14 with an insulated rod until maximum output is attained. Fine tune C42, C43, C46, and C47 for maximum RF output.

Note output power attained. Increase C37 slightly and retune C42 and L13 for maximum output. If new maximum is greater than former, then increase C37 further, retune C42 and L13 until absolute maximum output is attained. If new maximum is less than former, then decrease C37 and use same procedure.

Repeat the last four procedures until no further increase in output can be attained. Exciter unit EX662 is now correctly adjusted.

Measurements

Output Power

Output power delivered to 50 Ω is typically 500 mW at low end of band, and 400 mW at high end of band.

Requirement:

Minimum 350 mW with supply voltage of 24 V.

With level control fully counter clockwise the output is noted again.

Requirement:

Less than 100 mW.

Supply Current

Supply current is measured at nominal supply voltage 24 V. Consumption is dependant upon HF output and is typically 100 mA.

Requirement:

Less than 130 mA. Measured at full output.

Adjustment of Power Amplifier Stage PA663 (20W)

First replace the signal lead between the exciter unit and the input of PA663.

Connect a wattmeter to the output of the transmitter by means of a short 50 Ω coaxial cable.

The following procedure is then followed:

General

In order to begin trimming PA663 it is necessary to rough trim the input filter unit 15.0226-00.

This is facilitated by using probe 95.059, equipped with two tips made of 1mm ϕ tinned - copper wire.

Place the probe directly between base - emitter of Q1. With the input power applied, and - 24 V supply connected, tune input filter 15.0226-00 and trimmer C7 to maximum probe indication. Remember that the height of the tuning caps in filter 15.0226-00 is approximately the same when each resonator is tuned to the same frequency; this will ease finding a path through the filter. Place the remainder of the trimmers in the half engaged position.

Fine Tuning

With filter 15.0226-00 rough tuned as described, the remainder of the trimming process can be done by observing total current consumption and output power.

Tune filter 15.0226-00 and capacitor C7 to maximum current consumption.

Tune C12 and C13 to maximum consumption. These trimmers interact, and it is necessary to readjust C12 and retrim C13 for maximum consumption again. This process is repeated until absolute maximum is observed.

Trim C22 and C24 to maximum consumption. Increase C23 and retrim C22 and C24 to maximum consumption. If this maximum is greater than the former continue increasing C23 and retrimming C22 and C23 until an absolute maximum is attained. If new maximum is less than former then decrease C23 and retrim C22, C23 until an absolute maximum is attained.

NB!

During this process rough tune output network C34, C35 for maximum RF output in order to keep power dissipation to a minimum.

Trim C34 and C35 for maximum output.

Two positions may be found in the case of C35, the correct one is with C35 least engaged. Again C34 and C35 interact some what, and the process of giving C35 a slightly altered value and retrimming C34 for maximum RF output should be continued until an absolute maximum is attained.

Repeat the last four processes this time using maximum RF output as indicator, until absolute maximum output is acheived.

Measurements

Connect the millivoltmeter successively to measuring points (1), (2), (3), and chassis. Make sure that the probe does not disturb the tuning condition (i.e. observe output power). Measure voltages in measuring points (1), (2), (3), and RF output level.

Requirements:

Measuring point (1) is typically 20 mV and may not exceed 25 mV.

Measuring point (2) is typically 80 mV and may not exceed 120 mV.

Measuring point (3) is typically 180 mV and may not exceed 200 mV.

Output power is typically 25 W and must not be less than 22 W.

In the event of measuring points (1), (2) or (3) being exceeded reduce RF input accordingly and retrim. (RF input is adjusted by means of variable resistor R45 in EX662).

Adjustment of Power Amplifier Stage PA664 (12W)

First replace the signal lead between the exciter unit and the input of PA664.

Connect a wattmeter to the output of the transmitter by means of a short 50 Ω coaxial cable.

The following procedure is then followed:

General

In order to begin trimming PA664 it is necessary to rough trim the input filter unit 15.0226-00. This is facilitated by using probe 95.059, equipped with two tips made of 1 mm ϕ tinned copper wire. Place the probe directly between base - emitter Q1. With the input power applied, and -24 V supply connected, tune input filter 15.0226-00 and trimmer C7 to maximum probe indication. Remember that the height of the tuning caps in filter 15.0226-00 is approximately the same when each resonator is tuned to the same frequency; this will ease finding a path the filter. Place the remainder of the trimmers in the half engaged position.

Filter Tuning

With filter 15.0226-00 rough tuned as described, the remainder of the trimming process can be done by observing total current consumption and output power.

Tune filter 15.0226-00 and capacitor C7 to maximum current consumption.

Tune C12 and C13 to maximum consumption. These trimmers interact, and it is necessary to readjust C12 and retrim C13 for maximum consumption again. This process is repeated until an absolute maximum is observed.

Trim C22 and C23 for maximum RF output. These trimmers interact, readjust C23 and retrim C22 until an absolute maximum is achieved.

The last three processes should be repeated, this time using maximum RF output as indicator, until absolute maximum output is achieved.

Measurements

Connect the millivoltmeter successively to measuring points (1) and (2) and chassis. Make sure that the probe does not disturb the tuning condition (i.e. observe output power). Measure voltages in measuring points (1) and (2) and RF output level.

Requirements:

Measuring point (1) is typically 20 mV and may not exceed 25 mV.

Measuring point (2) is typically 80 mV and may not exceed 120 mV.

Output power is typically 12 W and must not be less than 10 W.

In the case of measuring points (1) or (2) exceeding their maximum allowable values decrease RF input level by means of variable resistor R45 in exciter unit EX662.

Antenna Filter FN661

Because of the simplicity of this unit electrical testing is not necessary.

Transmitter Oscillators

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.
In this case the transmitter should be aligned first, because the frequency is most easily measured at the transmitter output.
A frequency counter is required for making the exact adjustment.

Alignment of Oscillator XO631

Connect a frequency counter and a wattmeter to the output of the transmitter via an attenuation network, Storno type D52.

Turn on the transmitter.

Adjust the frequency by means of trimmer capacitor C4 in the oscillator unit selected.

Requirements

$\frac{\Delta f}{fo} \leq \pm 0.5 \times 10^{-6}$.

Adjustment of Oscillator XO663 and Oscillator Panel XS663

Connect a frequency counter and a wattmeter to the output of the transmitter via an attenuation network, Storno type D52.

Turn on the transmitter.

Before adjustment is initiated the radio station should warm up for at least five minutes.

Adjust the frequency coarsly by means of trimmer capacitor C1 (channel 1) or C2 (channel 2) located in XS663.

Requirements

$\frac{\Delta f}{fo} \leq \pm 2 \times 10^{-6}$.

If this accuracy of the oscillator frequency cannot be obtained, change capacitor C8 (channel 1) or C6 (channel 2) of 5.6 pF as follows:

a) If the frequency is too high replace the capacitor by 10 pF.

b) If the frequency is too low the capacitor should be omitted.

Readjust the oscillator frequency by means of trimmer capacitor C3 in the oscillator unit selected.

Requirements

$\frac{\Delta f}{fo} \leq \pm 0.2 \times 10^{-6}$.

Owing to ageing of crystal and oscillator the radio station should remain in Stand-by position for at least 48 hours after which the frequency should be readjusted.

The oven temperature of oscillator panel XS663 is adjusted at the factory, making subsequent readjustment unnecessary.

Adjustment of Oscillator XO665

Connect a frequency counter and a wattmeter to the output of the transmitter via an attenuation network, Storno type D52.

Turn on the transmitter.

Adjust the frequency by means of trimmer capacitor C5 in the oscillator unit selected.

Requirements

$\frac{\Delta f}{fo} \leq \pm 0.5 \times 10^{-6}$.

Modulation Adjustment AA601

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

Set potentiometer R28 at mid-scale.

Connect a standard receiver, a distortion meter, and a dummy load to the output of the transmitter via a 40 dB attenuation network, Storno type D52.

Connect an audio voltmeter and a tone generator to the modulation input of AA601 (terminals 2 and 3 on the terminal board of the transmitter cabinet).

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

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

CQF661: $\Delta F_{max.} = \pm$ 15 kHz.
CQF662: $\Delta F_{max.} = \pm$ 5 kHz.
CQF663: $\Delta F_{max.} = \pm$ 4 kHz.

Adjust, by means of potentiometer R29 in AA601, the frequency swing so that it will not exceed the maximum value ($\Delta F_{max.}$) anywhere inside the frequency range 300 - 3000 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 Hz 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 Hz) 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 (use a 750 μ sec. de-emphasis network).

Adjustment of Antenna Branching Filter BF661

Switch the radio station to a channel in the centre of its channel coverage range.

Set the trimmer capacitors $C5_1$, $C5_2$, $C6_1$, and $C6_2$ at minimum capacitance.

Adjustment of the Transmitter Section for Isolation of the Receiving Frequency

Connect a 50 Ω signal generator, set to the receiving frequency, to J3.

Connect the receiver to J1.

Connect a 50 Ω load to J2.

Adjust the trimmer capacitors $C1_2$, $C2_2$, $C3_2$, $C4_2$, and $C5_2$ for minimum signal at the receiver input.

Adjustment of the Receiver Section for Isolation of the Transmitting Frequency

Connect a 50 Ω wattmeter to J3.

Connect the transmitter to J1.

Connect a 50 Ω standard receiver, set to the transmitting frequency, to J2.

Turn on the transmitter.

Adjust the trimmer capacitors $C6_2$, $C7_2$, $C8_2$, $C9_2$, and $C10_2$ for minimum signal to the receiver.

Adjustment of the Transmitter Section for Minimum Attenuation of the Transmitting Frequency

Connect a 50 Ω wattmeter to J3.

Connect the transmitter to J1.

Connect a 50 Ω load to J2.

Turn on the transmitter.

Increase the coupling to L6 by means of trimmer capacitor $C6_1$. At the samt time readjust $C6_2$ for resonance until minimum insertion loss is obtained. Insertion loss after the first adjustment: approx. 2.5 dB.

Adjustment of the Receiver Section for Minimum Attenuation of the Receiving Frequency

Connect a 50 Ω signal generator, set to the receiving frequency, to J3.

Connect the receiver to J2.

Connect a 50 Ω load to J1.

Increase the coupling to L5 by means of trimmer capacitor $C5_1$. At the same time readjust $C5_2$ for resonance until minimum insertion loss is obtained.

Insertion loss after the first adjustment: approx. 2.5 dB.

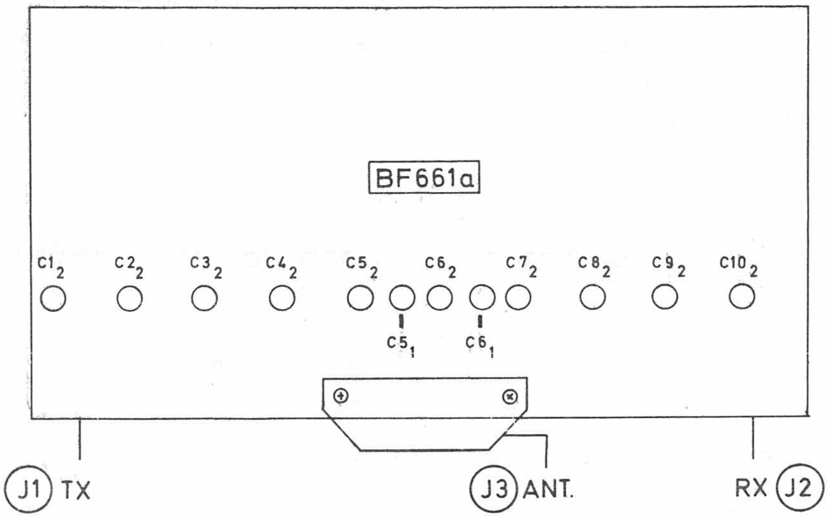
Repeat

The adjustments of the transmitter and receiver sections including adjustments for minimum insertion losses.

Insertion losses after this adjustment: approx. 2 dB.

In case the couplings of the filter ($C5_1$ and $C6_1$) are increased too much, the necessary isolations cannot be obtained.

When the adjustments of the filter are completed, the transmitter output stage should be adjusted for maximum power output, and the input stage of the receiver should be adjusted for maximum sensitivity.



ADJUSTMENT PROCEDURE

BF663, BF664, BF665, BF666

The Antenna Branching Filter is factory tested, but must be adjusted to the working frequencies when installed with the radiotelephone.

PRE-ADJUSTMENTS

Instruments
Signal generator 406-470 MHz; 50 ohm.
Test receiver with zero indicator,
3 x 10 dB Attenuator pads, 50 ohm.

TEST SET-UP

Connect the test receiver through a 10 dB attenuator pad to the TX-connector and tune it to the TX-frequency.

Connect the Signal generator through a 10 dB attenuator pad to the ANT-connector and adjust the frequency for maximum deflection on the test receiver's signal strength indicator.

Adjust resonator L1 and L2 for minimum on the signal strength indicator.

Connect the test receiver through a 10 dB attenuator pad to the RX-connector and tune it to the RX-frequency.

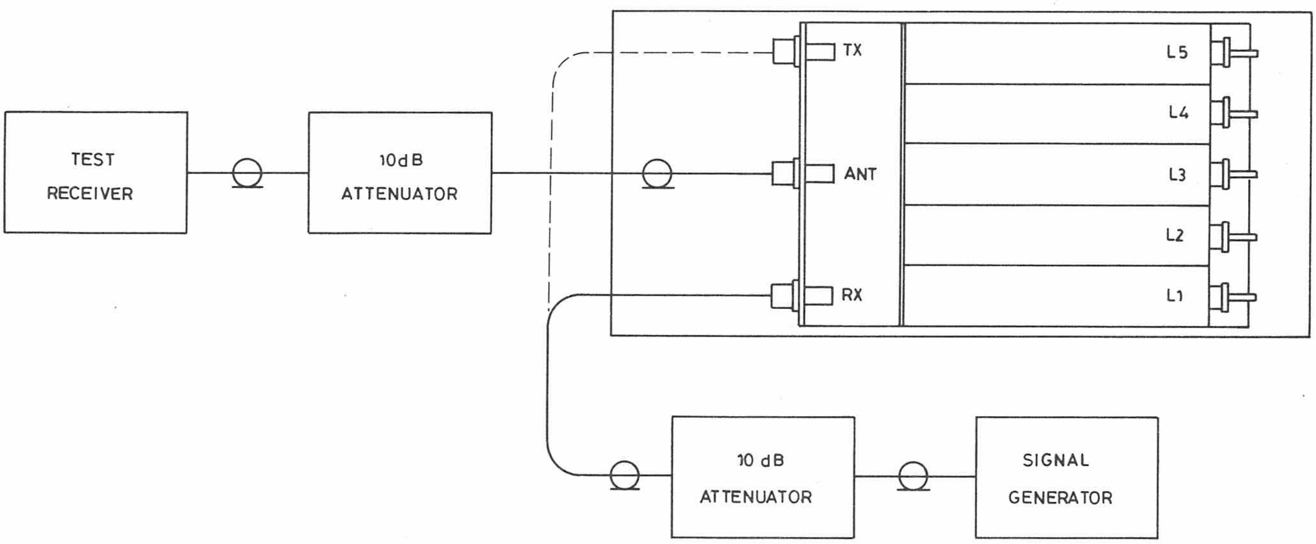
Adjust the signal generator to the RX-frequency or for maximum deflection on the test receiver's signal strength indicator.

Adjust resonator L3, L4, and L5 for minimum deflection on the signal strength indicator.

Repeat the adjustment procedure several times until the optimum minima and maxima are found.

This concludes the adjustments of BF663 and BF664. The locking screws on the resonator adjustors are tightened in their positions and the filter is connected to the radiotelephone TX and RX.

TEST SET-UP



BF665 AND BF666

FINAL ADJUSTMENT

Instruments
40 dB Attenuator pad 30 W (only used if wattmeter rating is below 30 W) 10 dB Attenuator pad 50 W
Testreceiver 812-940 MHz
Wattmeter (30 W)
RF notch filter

TEST SET-UP

Connect the TX-output (through a 40 dB attenuator) to the wattmeter.

Key the transmitter and record the RF power level (P_1).

Connect the TX-output to the DC661 input.

Connect the ANT-connector to the wattmeter.

Key the transmitter and adjust C1, C2 and C5 on the DC661 for maximum RF output.

Connect the ANT-connector through an attenuator and RF notch filter to the test receiver. Tune the Notch Filter to the transmitter frequency and the Test Receiver to the 2nd harmonic of the transmitter frequency.

Adjust C6 on DC661 for minimum deflection on the test receiver's signal strength indicator.

Connect the ANT-connector to the wattmeter.

Reverse the connecting cables to DC661. Key the transmitter and adjust C3 and C4 for minimum deflection on the wattmeter.

Restore the cable connections to DC661

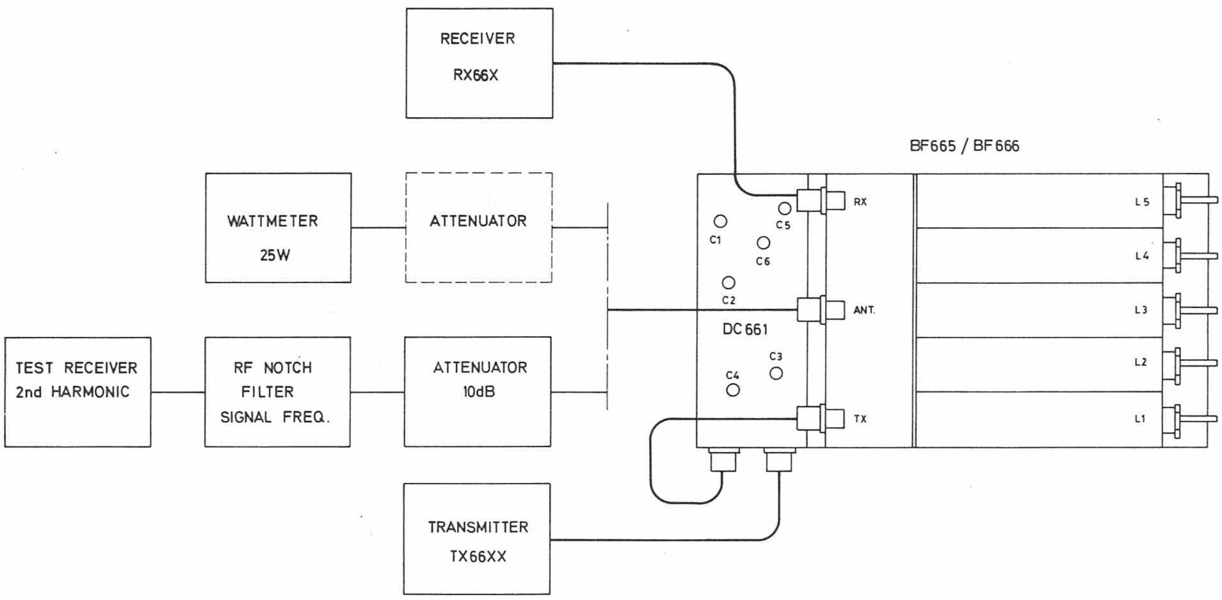
Key the transmitter and record the RF power level (P_2)

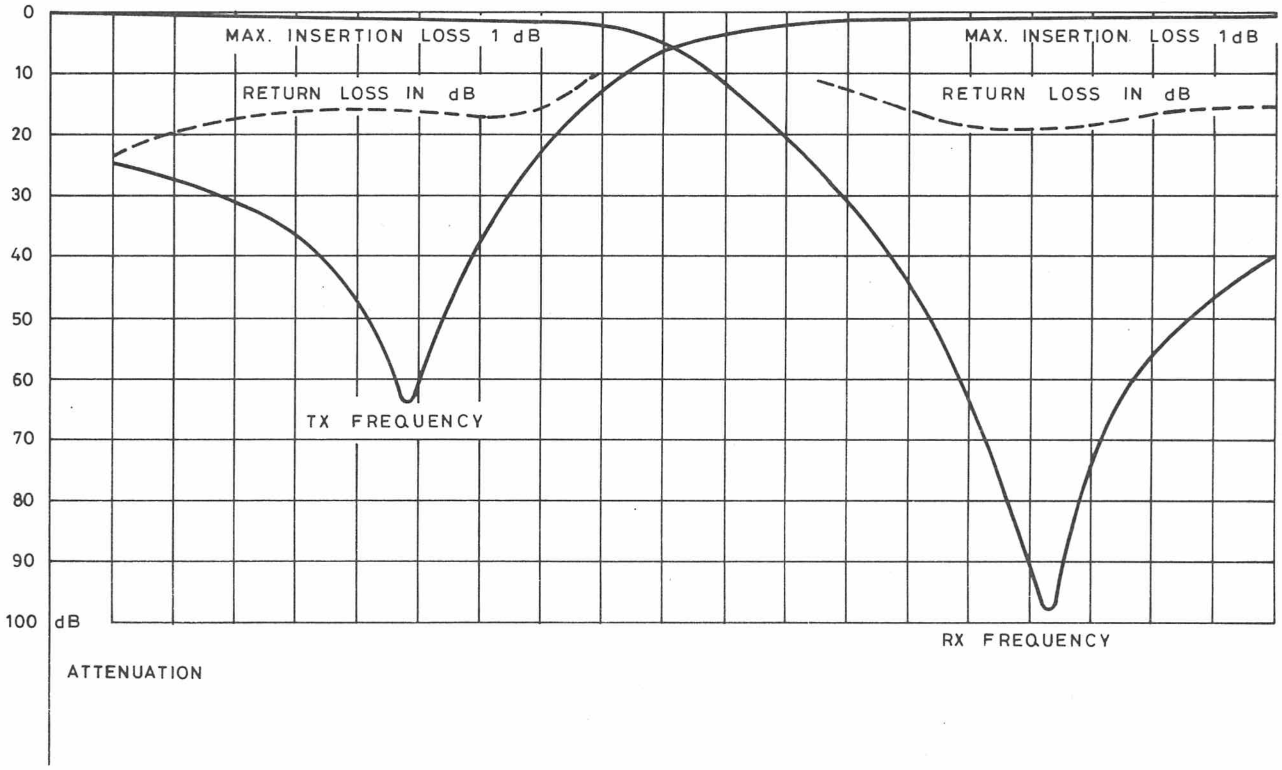
Repeat the adjustments until the difference in the power level recorded without (P_1) and with (P_2) the Branching Filter is less than 2 dB.

Connect the RX-connector to the receiver and the DC661 to the transmitter output.

This concludes the final adjustment of BF665 and BF666.

TEST SET-UP





DUPLEXER ATTENUATION VS FREQUENCY
(BF663 - BF664 - BF665 - BF666)

ADJUSTMENT PROCEDURE

BF663b, BF664b, BF665b, BF666b

The Antenna Branching Filter is factory tested, but must be adjusted to the working frequencies when installed with the radiotelephone.

PRE-ADJUSTMENTS

Instruments
Signal generator 406-470 MHz; 50 ohm.
Test receiver with zero indicator,
3 x 10 dB Attenuator pads, 50 ohm.

TEST SET-UP

Connect the test receiver through a 10 dB attenuator pad to the TX-connector and tune it to the TX-frequency.

Connect the Signal generator through a 10 dB attenuator pad to the ANT-connector and adjust the frequency for maximum deflection on the test receiver's signal strength indicator.

Adjust resonator L1 and L2 for minimum on the signal strength indicator.

Connect the test receiver through a 10 dB attenuator pad to the RX-connector and tune it to the RX-frequency.

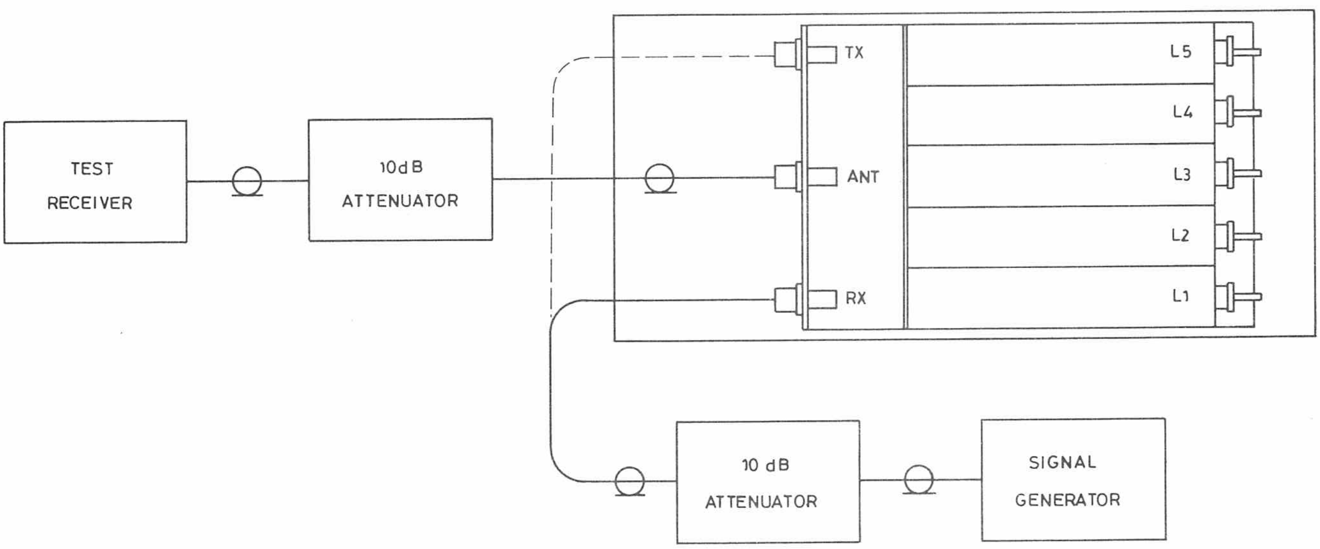
Adjust the signal generator to the RX-frequency or for maximum deflection on the test receiver's signal strength indicator.

Adjust resonator L3, L4, and L5 for minimum deflection on the signal strength indicator.

Repeat the adjustment procedure several times until the optimum minima and maxima are found.

This concludes the adjustments of BF663b and BF664b. The locking screws on the resonator adjustors are tightened in their positions and the filter is connected to the radiotelephone TX and RX.

TEST SET-UP



BF665b AND BF666b

FINAL ADJUSTMENT

Instruments
40 dB Attenuator pad 30 W (only used if wattmeter rating is below 30 W) 10 dB Attenuator pad 50 W
Testreceiver 812-940 MHz
Wattmeter (30 W)
RF notch filter

TEST SET-UP

Connect the TX-output (through a 40 dB attenuator) to the wattmeter.

Key the transmitter and record the RF power level (P_1).

Connect the TX-output to the DC661 input.

Connect the ANT-connector to the wattmeter.

Key the transmitter and adjust C1, C2 and C5 on the DC661 for maximum RF output.

Connect the ANT-connector through an attenuator and RF notch filter to the test receiver. Tune the Notch Filter to the transmitter frequency and the Test Receiver to the 2nd harmonic of the transmitter frequency.

Adjust C6 on DC661 for minimum deflection on the test receiver's signal strength indicator.

Connect the ANT-connector to the wattmeter.

Reverse the connecting cables to DC661.
Key the transmitter and adjust C3 and C4 for minimum deflection on the wattmeter.

Restore the cable connections to DC661

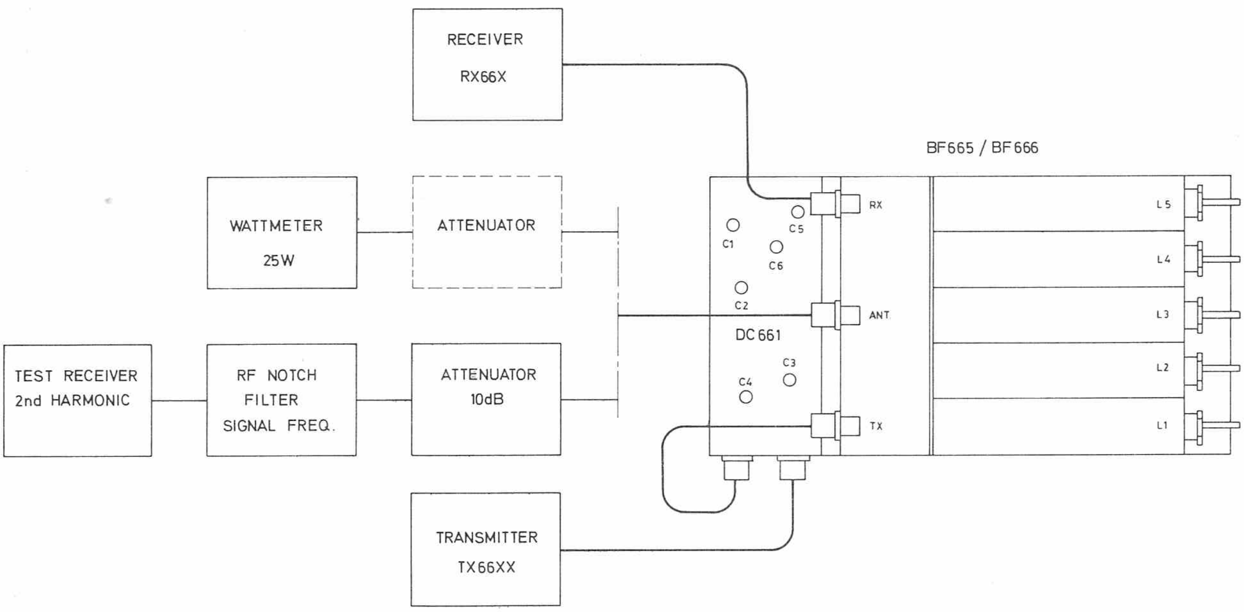
Key the transmitter and record the RF power level (P_2)

Repeat the adjustments until the difference in the power level recorded without (P_1) and with (P_2) the Branching Filter is less than 2 dB.

Connect the RX-connector to the receiver and the DC661 to the transmitter output.

This concludes the final adjustment of BF665b and BF666b.

TEST SET-UP



ADJUSTMENT PROCEDURE

BF667 / BF6611 and BF668 / BF6612
BF669 / BF6613 and BF6610 / BF6614

The Antenna Branching Filter is factory tested, but must be adjusted to the working frequencies when installed with the radiotelephone.

PRE-ADJUSTMENTS

Instruments
Signal generator 406-470 MHz; 50 ohm.
Test receiver with zero indicator,
3 x 10 dB Attenuator pads, 50 ohm.

TEST SET-UP

Connect the test receiver through a 10 dB attenuator pad to the RX-connector and tune it to the TX-frequency.

Connect the Signal generator through a 10 dB attenuator pad to the ANT-connector and adjust it to the TX-frequency or for maximum deflection on the test receiver's signal strength indicator.

Adjust resonator L1 and L2 for minimum on the signal strength indicator.

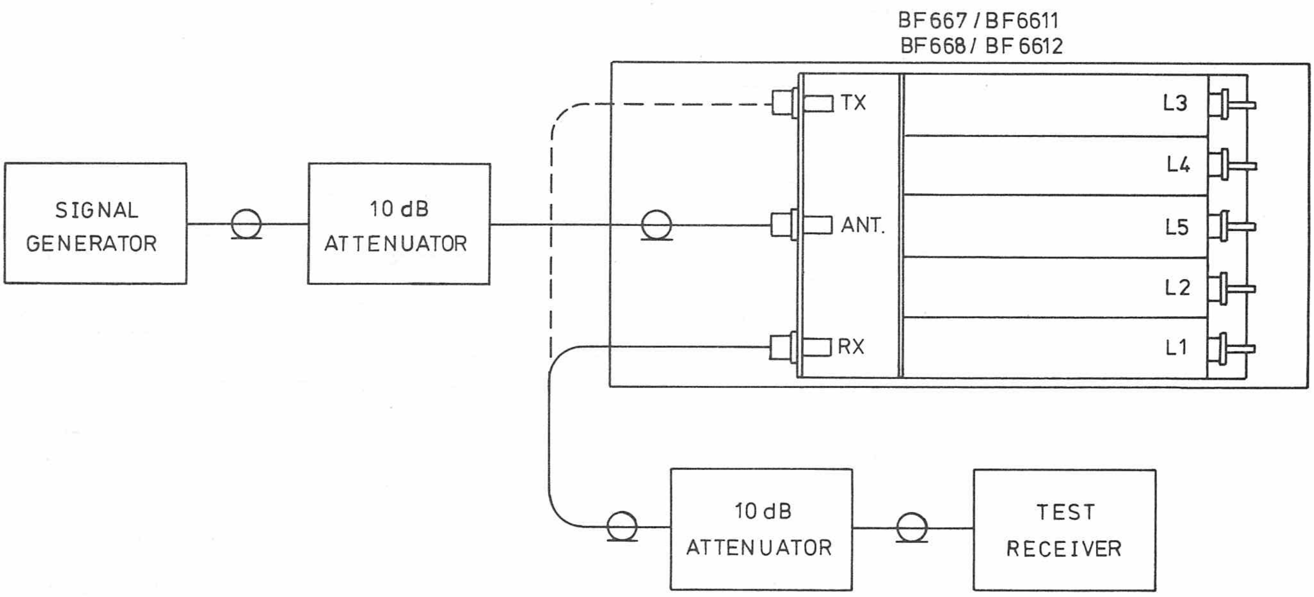
Connect the test receiver through a 10 dB attenuator pad to the TX-connector and tune it to the RX-frequency.

Adjust the signal generator to the RX-frequency or for maximum deflection on the test receiver's signal strength indicator.

Adjust resonator L3, L4, and L5 for minimum deflection on the signal strength indicator.

Repeat the adjustment procedure several times until the optimum minima and maxima are found.

This concludes the adjustments of BF667/-6611 and BF668/-6612. The locking screws on the resonator adjustors are tightened in their positions and the filter is connected to the radiotelephone TX and RX.



BF669 / BF6613 and BF6610 / BF6614

FINAL ADJUSTMENT

Instruments

40 dB Attenuator pad 30 W (only used if wattmeter rating is below 30 W) 10 dB Attenuator pad 50 W
Testreceiver 812-940 MHz
Wattmeter (30 W)
RF notch filter

TEST SET-UP

Connect the TX-output (through a 40 dB attenuator) to the wattmeter.

Key the transmitter and record the RF power level (P_1).

Connect the TX-output to the DC661 input.

Connect the ANT-connector to the wattmeter.

Key the transmitter and adjust C1, C2 and C5 on the DC661 for maximum RF output.

Connect the ANT-connector through an attenuator and RF notch filter to the test receiver. Tune the Notch Filter to the transmitter frequency and the Test Receiver to the 2nd harmonic of the transmitter frequency.

Key the transmitter and adjust C6 on DC661 for minimum deflection on the test receiver's signal strength indicator.

Connect the ANT-connector to the wattmeter.

Reverse the connecting cables to DC661.
Key the transmitter and adjust C3 and C4 for minimum deflection on the wattmeter.

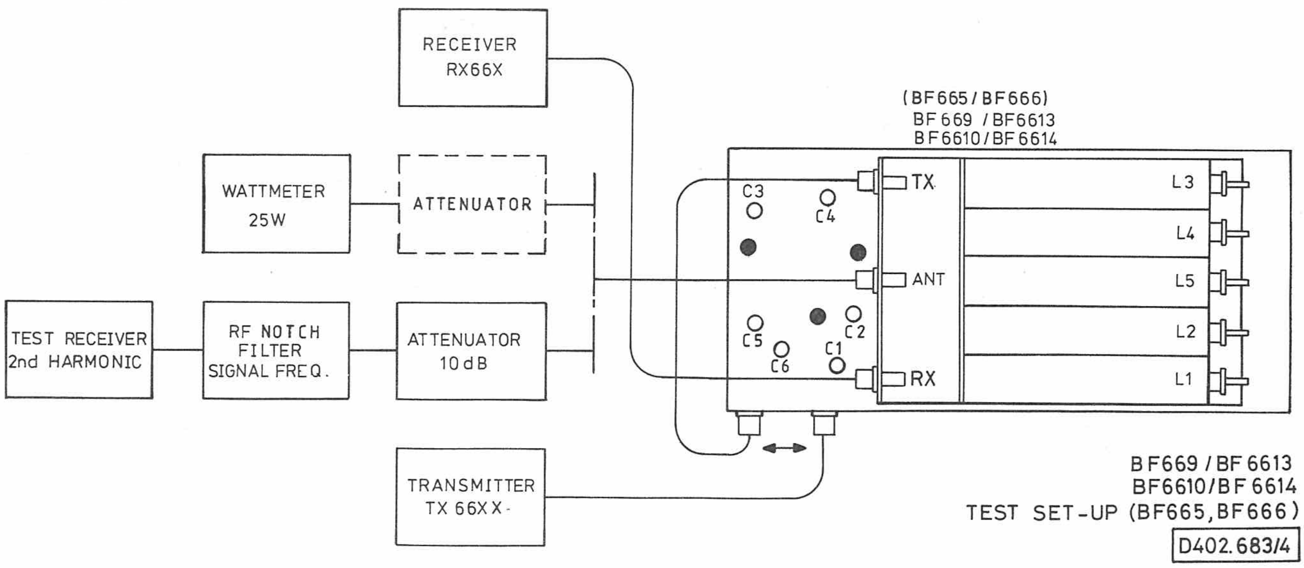
Restore the cable connections to DC661

Key the transmitter and record the RF power level (P_2).

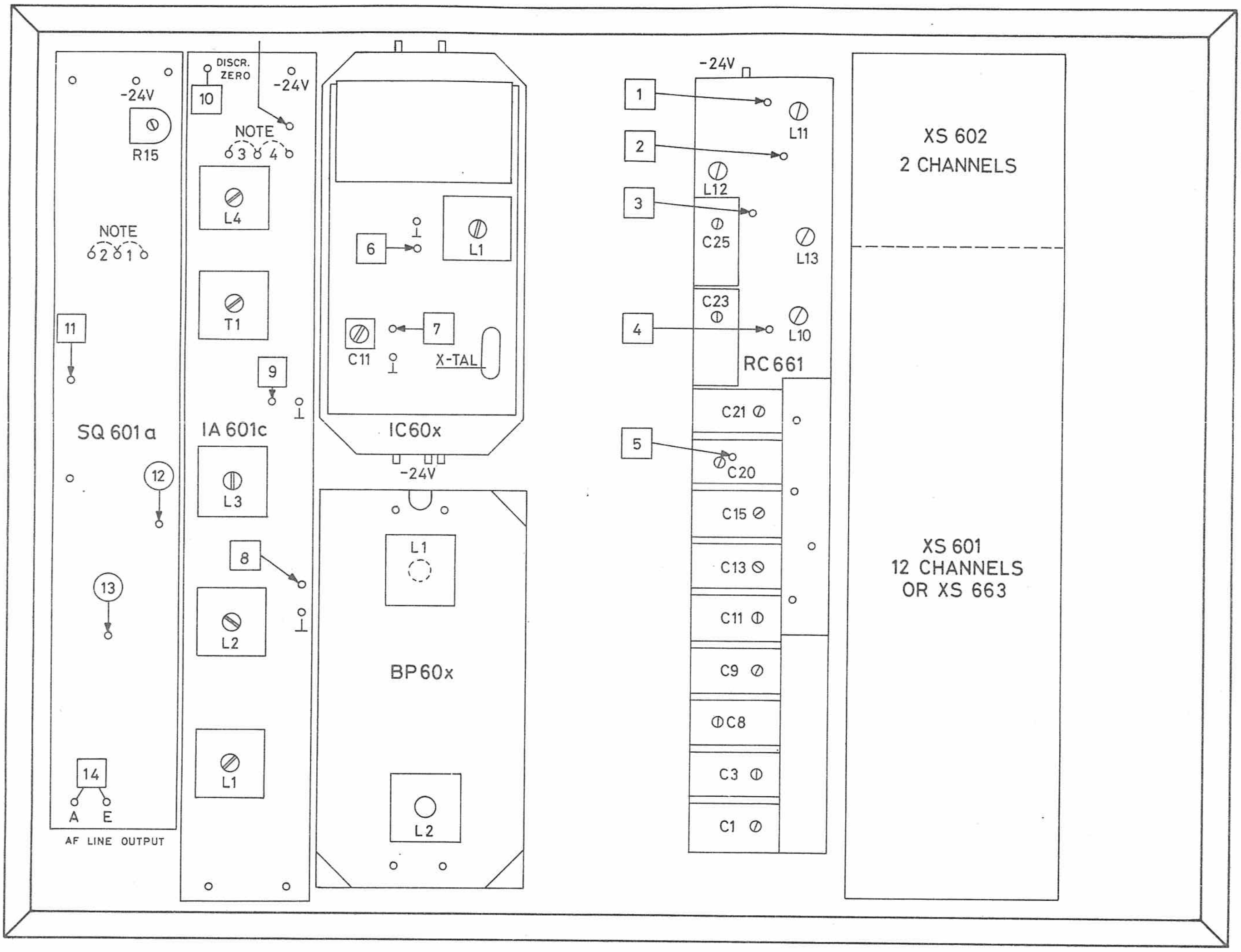
Repeat the adjustments until the difference in the power levels recorded (P1) without and (P_2) with the Branching Filter is less than 2 dB.

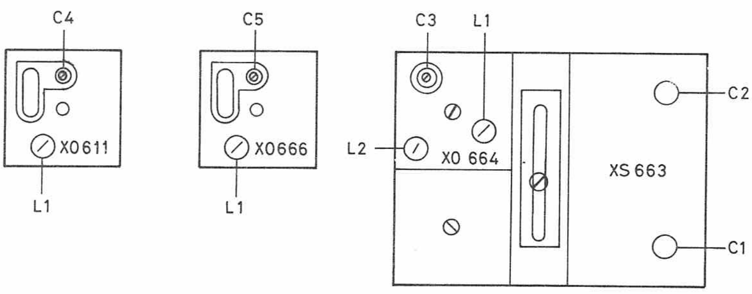
Connect the RX-connector to the receiver and the DC661 to the transmitter output.

This concludes the final adjustment of BF669/-6613 and BF6610/-6614.



BF669 / BF 6613
BF6610/BF 6614
TEST SET-UP (BF665,BF666)
D402.683/4





NOTES:

1 : 20/25 KHz CHANNEL SEPARATION.

2 : 50 KHz CHANNEL SEPARATION.

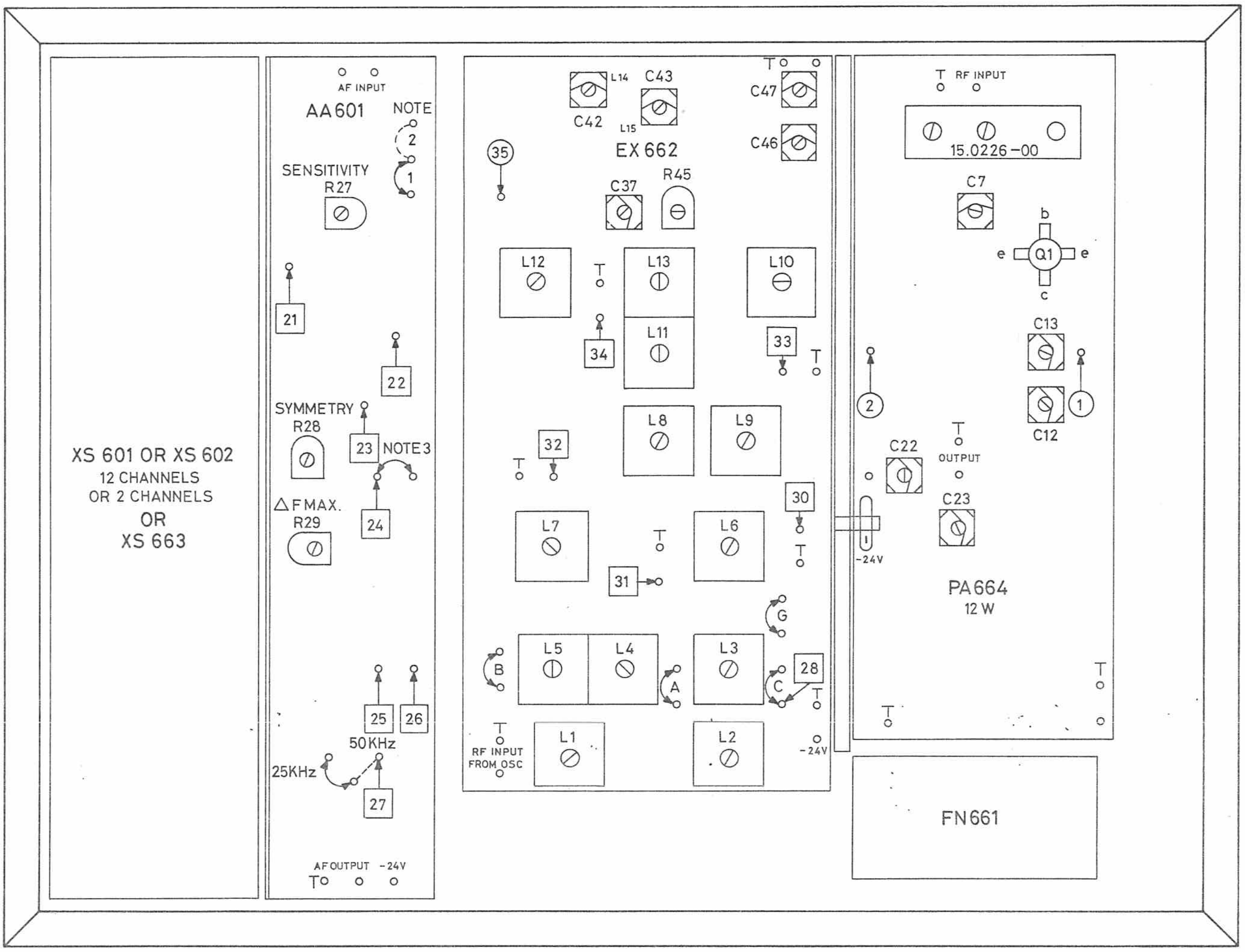
3 : 20/25 KHz CHANNEL SEPARATION.

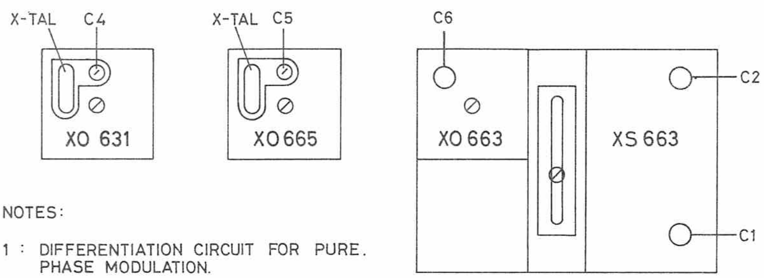
4 : 50 KHz CHANNEL SEPARATION.

LOCATION OF ADJUSTABLE COMPONENTS AND TESTPOINTS.

RX 661, RX 662, RX 663

D402.419



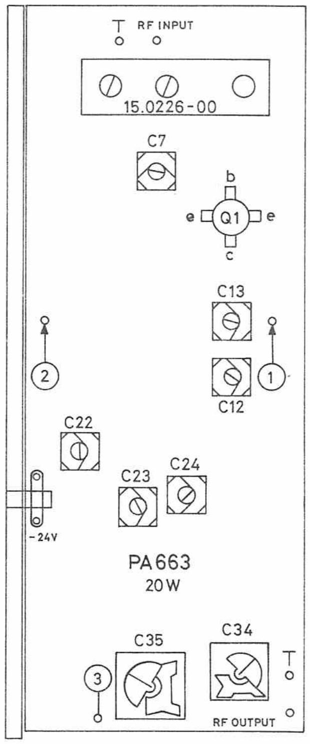


NOTES:

1 : DIFFERENTIATION CIRCUIT FOR PURE. PHASE MODULATION.

2 : DIFFERERTIATION CIRCUIT FOR MIXED PHASE AND FREQUENCY MODULATION.

3 : REMOVED WHEN MEASURING WITHOUT INTEGRATION.

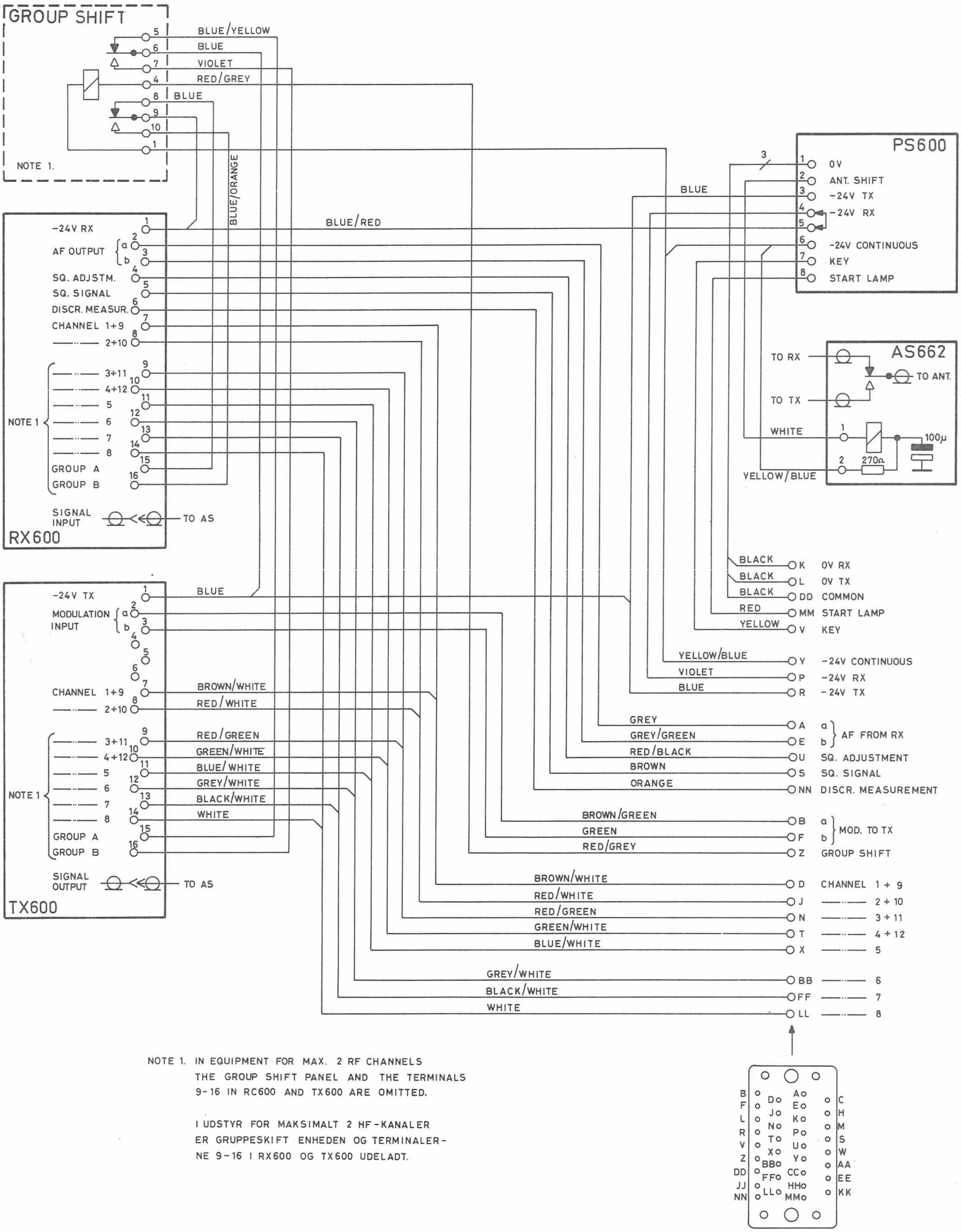


LOCATION OF ADJUSTABLE COMPONENTS AND TEST POINTS
TX668 , TX669 , TX 6610 , TX 6611.

D402.418

Storno

CHAPTER V. DIAGRAMS AND ELECTRICAL PARTS LISTS



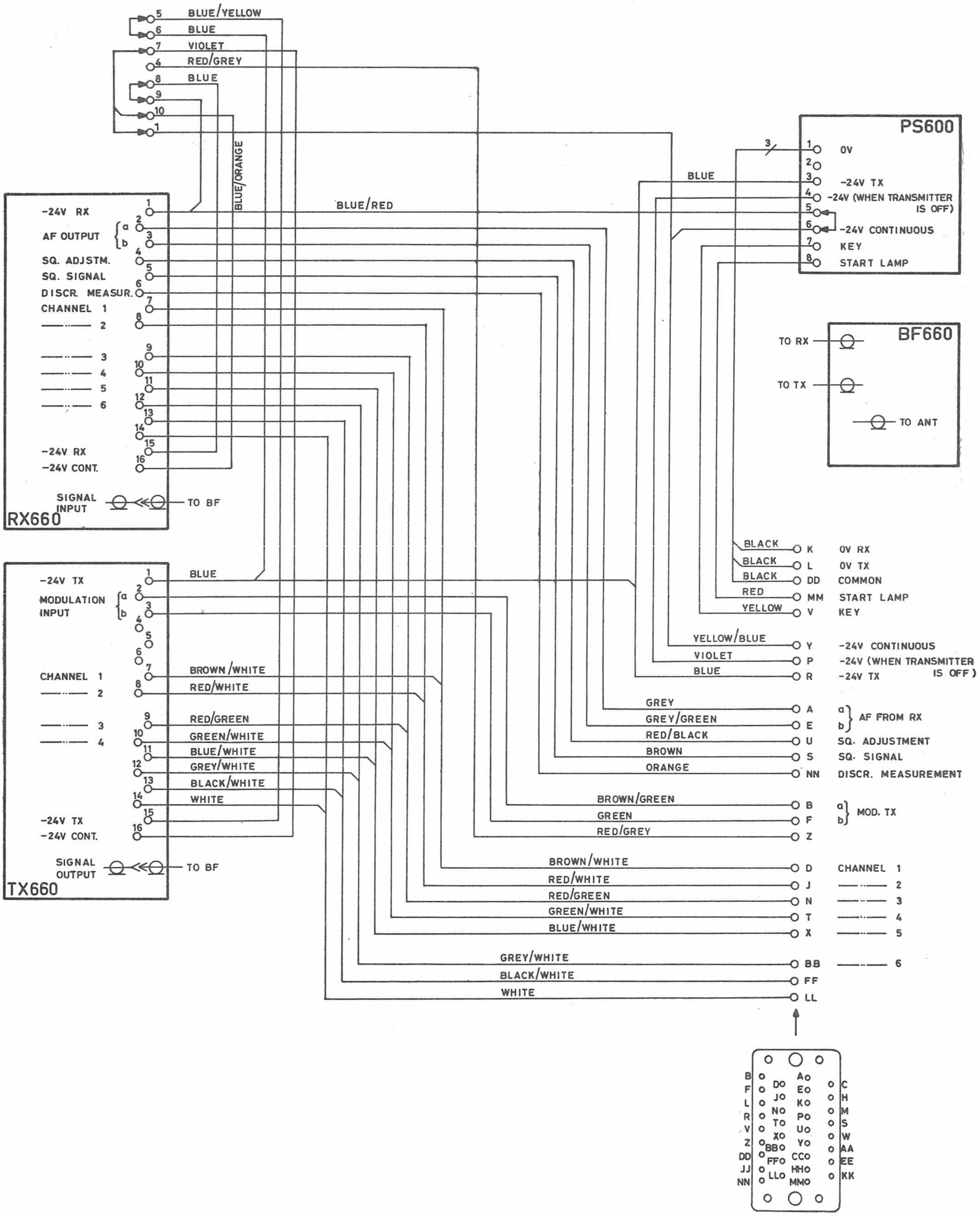
NOTE 1. IN EQUIPMENT FOR MAX. 2 RF CHANNELS THE GROUP SHIFT PANEL AND THE TERMINALS 9-16 IN RC600 AND TX600 ARE OMITTED.

I UDSTYR FOR MAKSIMALT 2 HF-KANALER ER GRUPPESKIFT ENHEDEN OG TERMINALERNE 9-16 I RX600 OG TX600 UDELADT.

CABLE FORM
KABLINGSDIAGRAM

CQF610, CQF630, CQF661 SIMPLEX

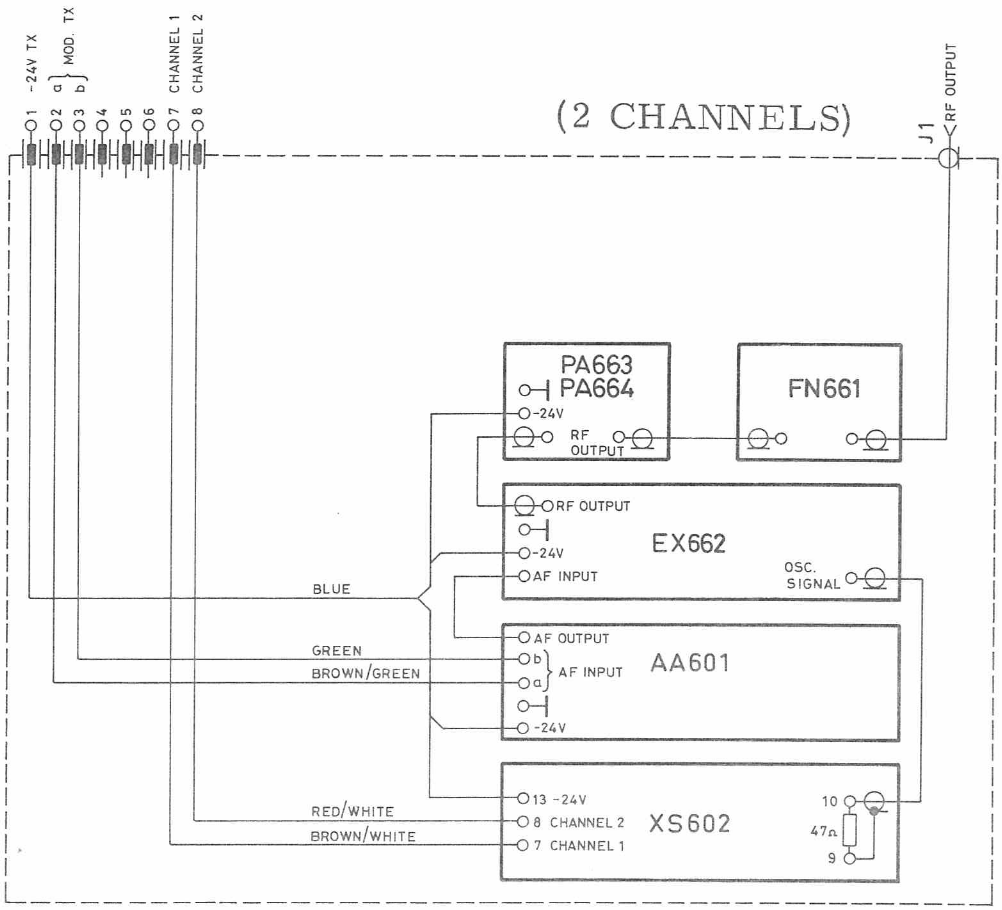
D400.749/4

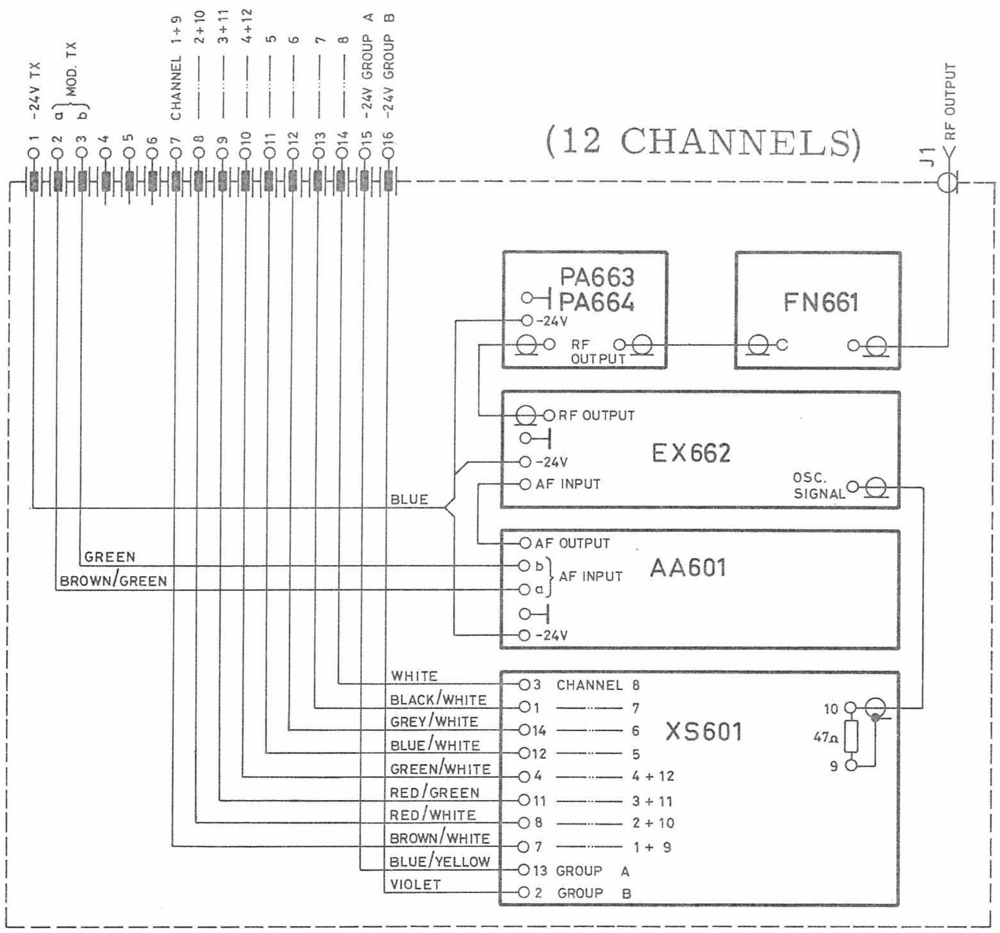


CABLE FORM
KABLINGSDIAGRAM

CQF662, CQF663 DUPLEX

D401.040

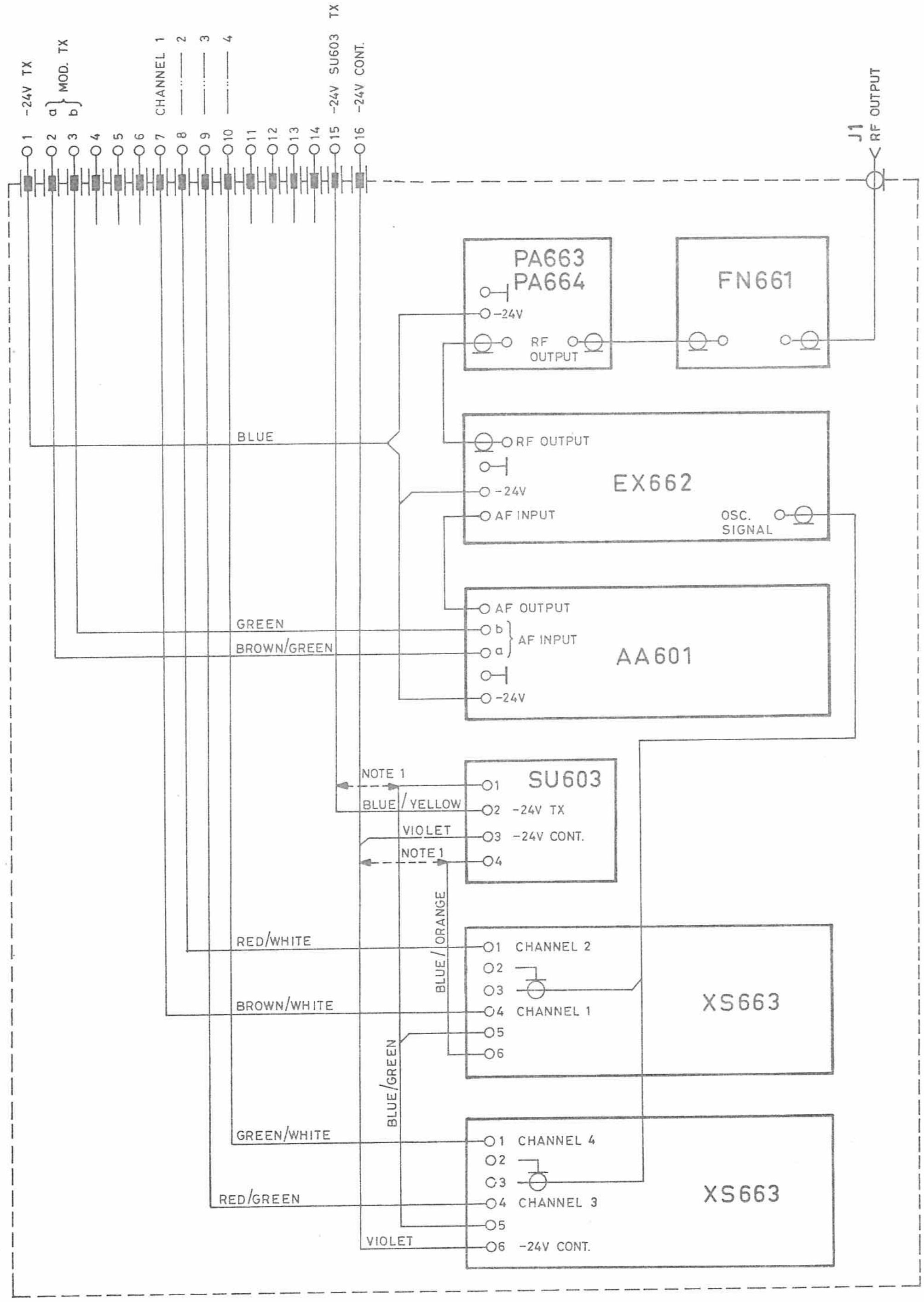




CABLE FORM
KABLINGSDIAGRAM

TX668, TX6610

D402.109



NOTE 1: WHEN SU603 IS OMITTED THE WIRES 1-2 AND 3-4 ARE STRAPPED RESPECTIVELY.

NOTE 1: NÅR SU603 ER UDELADT STRAPPES LEDNINGERNE 1 OG 2 SAMT 3 OG 4.

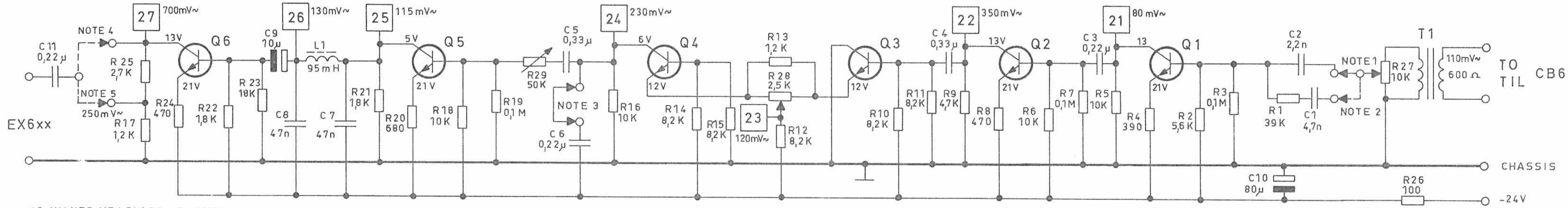
CABLE FORM
KABLINGSDIAGRAM

TX669, TX6611

D402.110

Storno

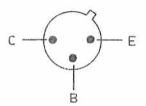
3. AMPLIFIER	2. AMPLIFIER	INTEGRAT. CIRCUIT	LIMITER	1. AMPLIFIER	DIFFERENTIATOR
3. FORSTÆRKER	2. FORSTÆRKER	INTEGRAT. LED	BEGRÆNSER	1. FORSTÆRKER	DIFFERENTIATIONSLED



AC VALUES MEASURED AT 1000Hz
AC VÆRDIER MÅLT VED 1000Hz

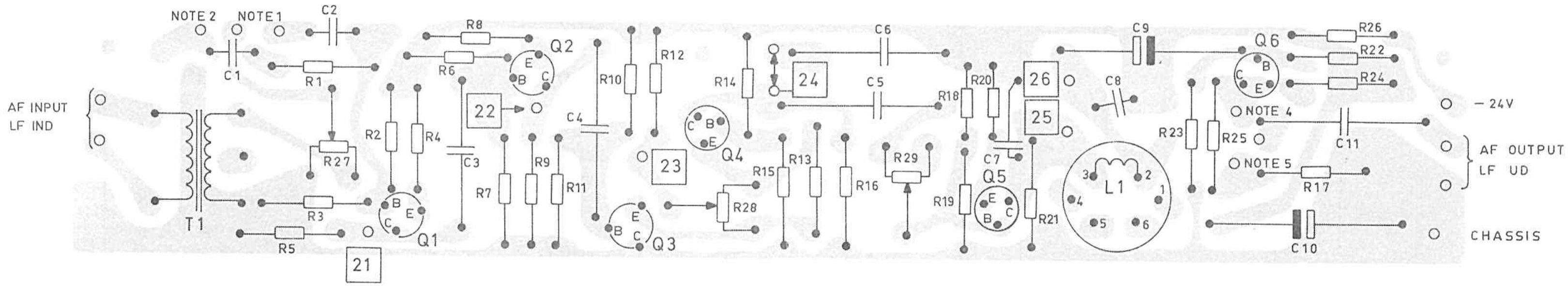
NOTE 1. DIFFERENTATION CIRCUIT FOR PURE PHASE MODULATION
NOTE 2. DIFFERENTATION CIRCUIT FOR MIXED PHASE AND FREQUENCY MODULATION.
NOTE 3. THE SHORTING LINK IS REMOVED AT MEASUREMENTS WHERE INTEGRATION IS UNWANTED.
NOTE 4. CONNECTION FOR 50kHz AND 25kHz IN 4 METER AND 50kHz CHANNEL SEPARATION IN 2 METER 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

Storno

TYPE	NO.	CODE	DATA	
		10.1189-01	AF Amplifier	
	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	76.5073	0,1 uF 10% polyest	100V
	C5	73.5104	4.7 uF 10% elco	100V
	C6	76.5094	0.47 uF 20% polyest	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	73.5104	4.7 uF 10% elco	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	80.5244	390 ohm 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

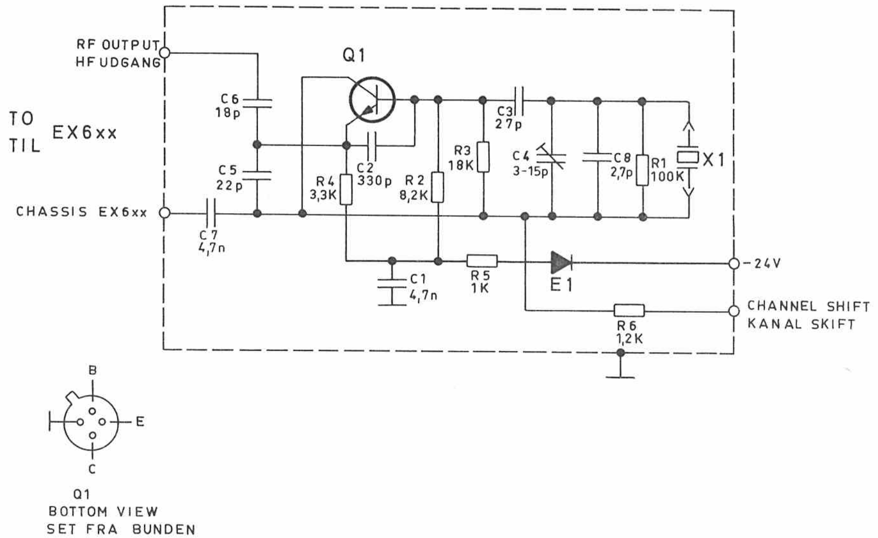
TYPE	NO.	CODE	DATA
	Q4	99.5143	Transistor BC108
	Q5	99.5143	Transistor BC108
	Q6	99.5143	Transistor BC108

AF-AMPLIFIER
LF-FORSTÆRKER

AA601a

X400.683/4

Storno

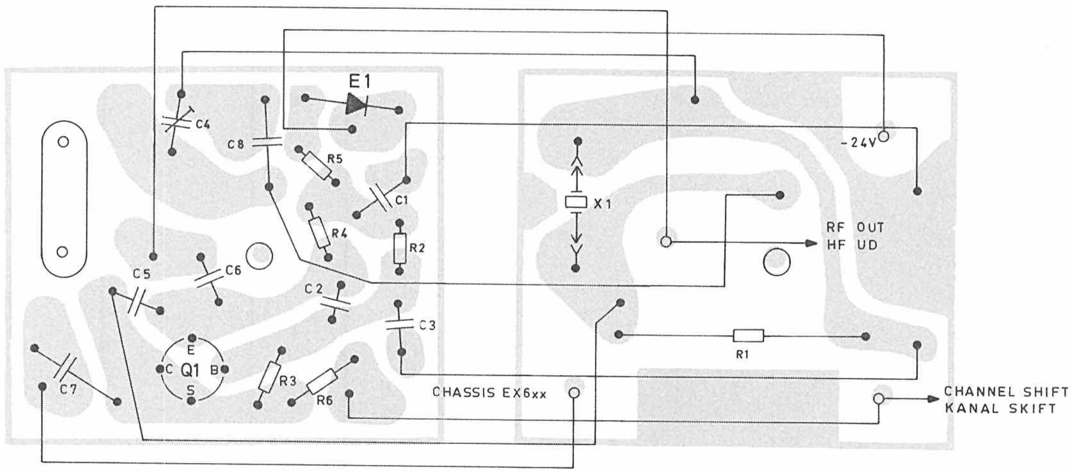


UPPER PRINTED WIRING BOARD VIEWED FROM COMPONENT SIDE

ØVERSTE TRYKTE KREDSLØB SET FRA KOMPONENTSIDEN

LOWEST PRINTED WIRING BOARD VIEWED FROM COMPONENT SIDE

NEDERSTE TRYKTE KREDSLØB SET FRA KOMPONENTSIDEN



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

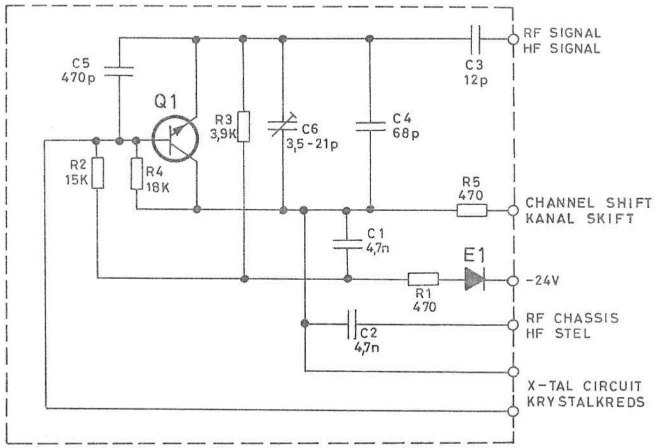
Storno

TYPE	NO.	CODE	DATA

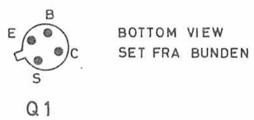
CRYSTALOSCILLATOR FOR TX. XO631

X400.680/2

Storno



TO
TIL XS663

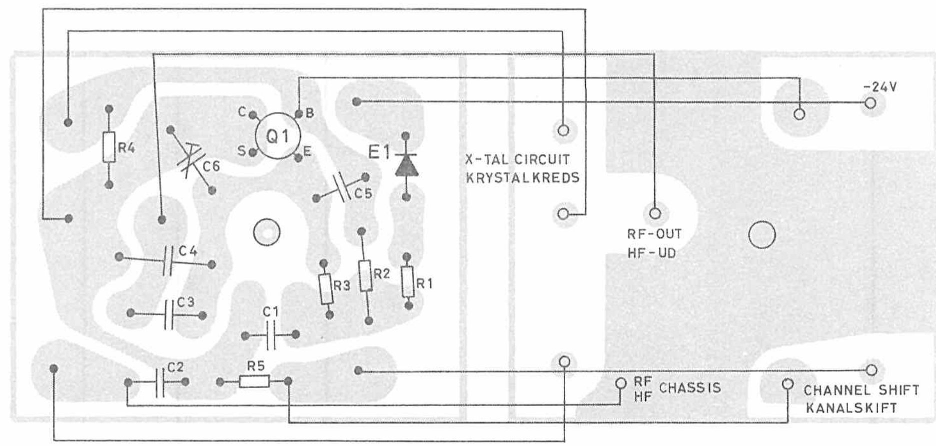


UPPER PRINTED WIRING BOARD
VIEWED FROM COMPONENT SIDE

ØVERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN

LOWEST PRINTED WIRING BOARD
VIEWED FROM COMPONENT SIDE

NEDERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN



CRYSTAL OSCILLATOR
KRYSTAL OSCILLATOR

XO663

D400.786/2

Storno

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	74.5136	12 pF 5% ceram N150 DI	125V
	C4	76.5101	68 pF 2, 5% polystyr. TB	125V
	C5	76.5065	470 pF 5% polystyr. TB	30V
	C6	78.5033	3, 5/21 pF ceram NPO TB	500V
	R1	80.5245	470 Ω 5% carbon film	1/8W
	R2	80.5263	15 kΩ 5% carbon film	1/8W
	R3	80.5256	3, 9 kΩ 5% carbon film	1/8W
	R4	80.5264	18 kΩ 5% carbon film	1/8W
	R5	80.5245	470 Ω 5% carbon film	1/8W
	E1	99.5028	Diode 1N914	
	Q1	99.5177	Transistor BF166	

Storno

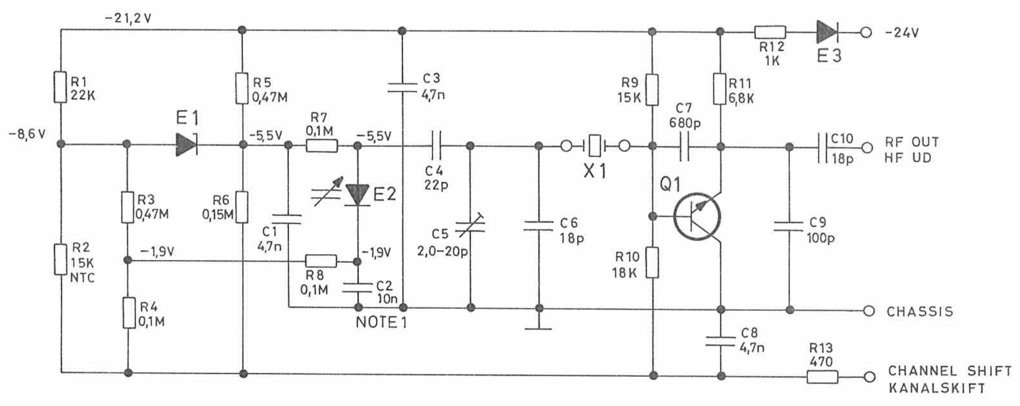
TYPE	NO.	CODE	DATA

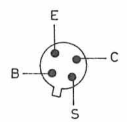
CRYSTAL OSCILLATOR
KRYSTAL OSCILLATOR

XO663

X401.027

Storno



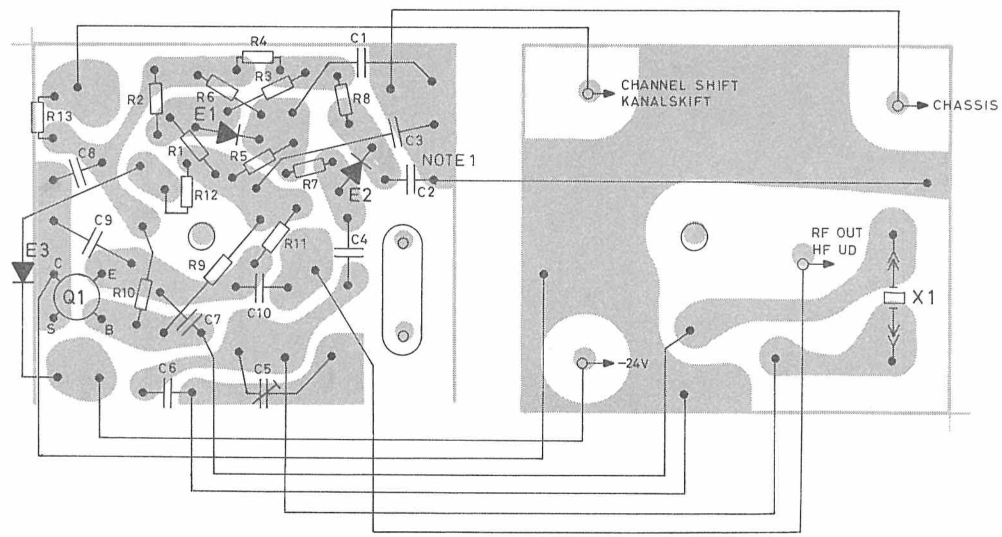


UPPER PRINTED WIRING BOARD
VIEWED FROM COMPONENT SIDE

ØVERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN

LOWEST PRINTED WIRING BOARD
VIEWED FROM COMPONENT SIDE

NEDERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN



NOTE 1 :
C2 TO BE MOUNTED ON THE SOLDER SIDE OF THE UPPER PWB

C2 ISÆTTES PÅ LODDESIDEN AF ØVERSTE PRINT

CRYSTAL OSCILLATOR
KRYSTAL OSCILLATOR

XO665

D400.991/3

TYPE	NO.	CODE	DATA	
	C1	76.5061	4.7 nF 10% polyest. FL	50V
	C2	74.5109	10 nF Ceram II PL FL	20V
	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	

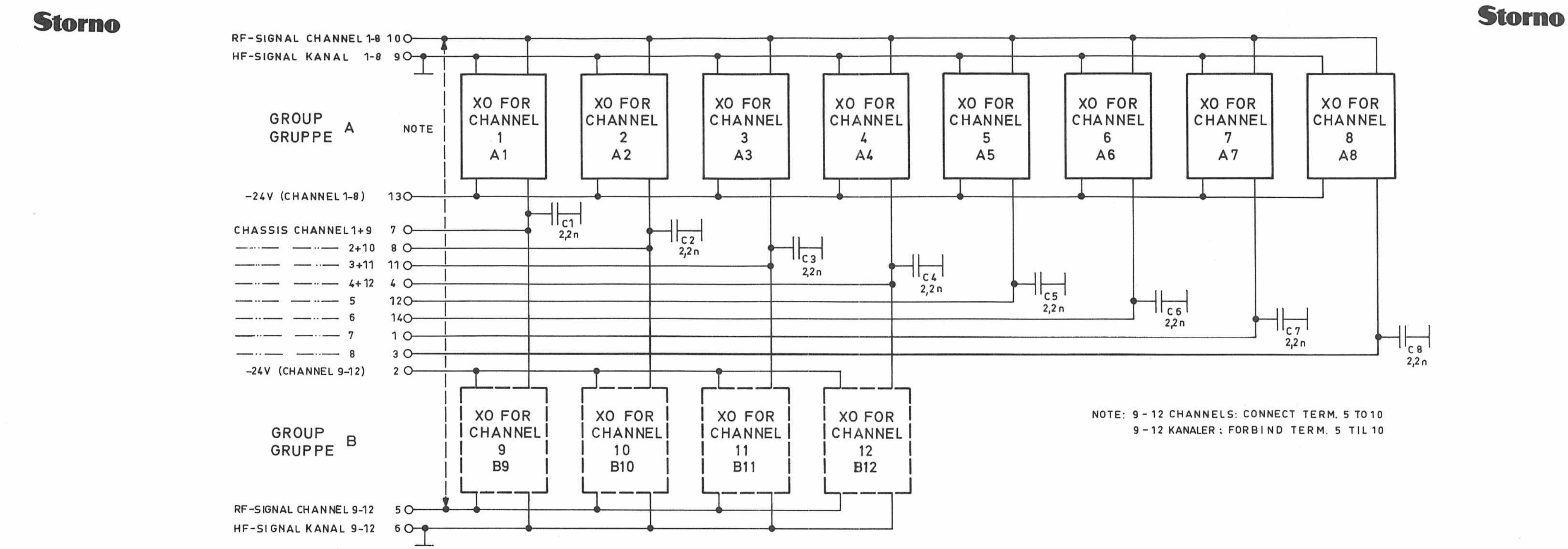
Storno

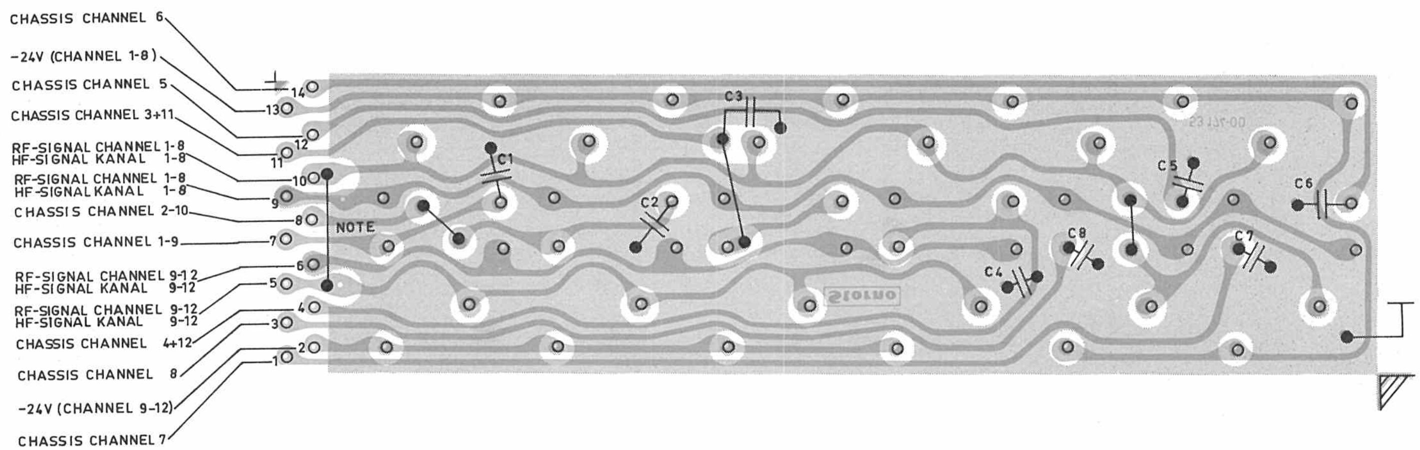
TYPE	NO.	CODE	DATA

CRYSTAL OSCILLATOR
KRYSTALOSCILLATOR

XO665

X401.038/2

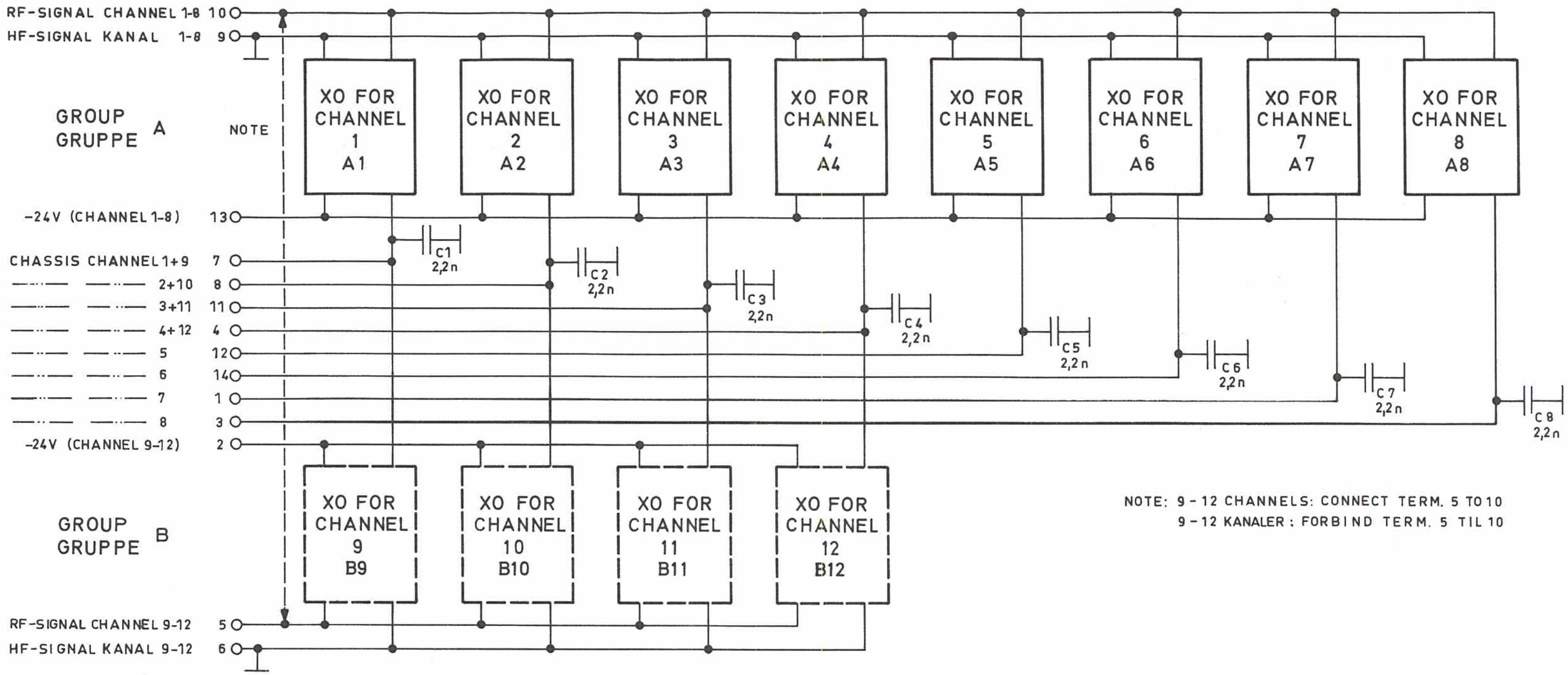




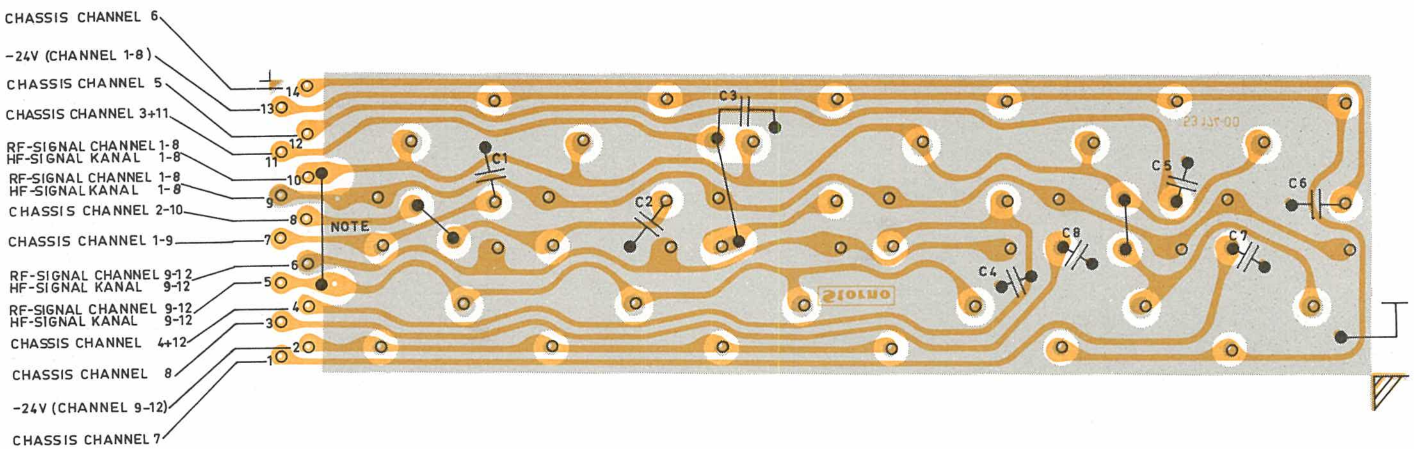
CRYSTAL OSCILLATOR PANEL XS601

D400.722

Storno



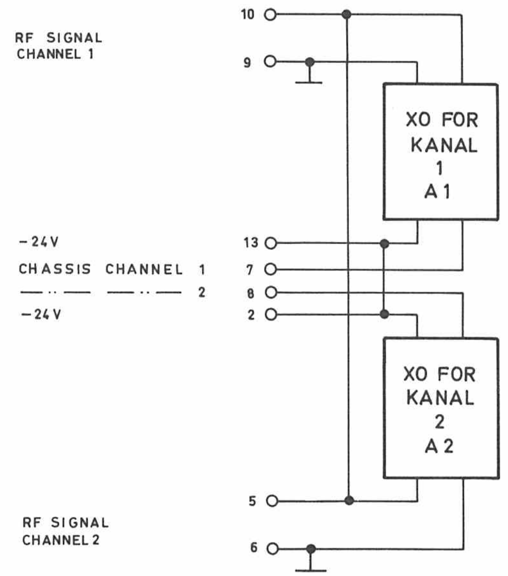
NOTE: 9-12 CHANNELS: CONNECT TERM. 5 TO 10
9-12 KANALER: FORBIND TERM. 5 TIL 10

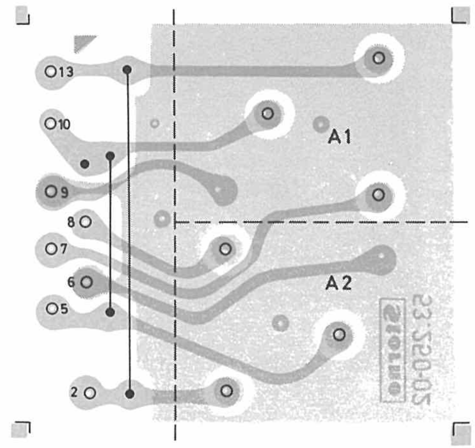


CRYSTAL OSCILLATOR PANEL XS601

D400.722

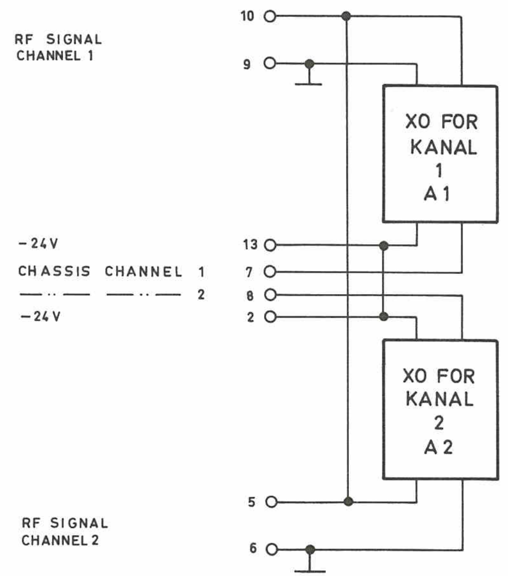
Storno

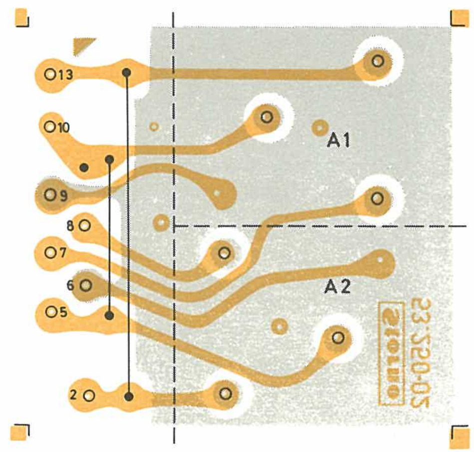




CRYSTAL OSCILLATOR PANEL XS602

D400.819/2

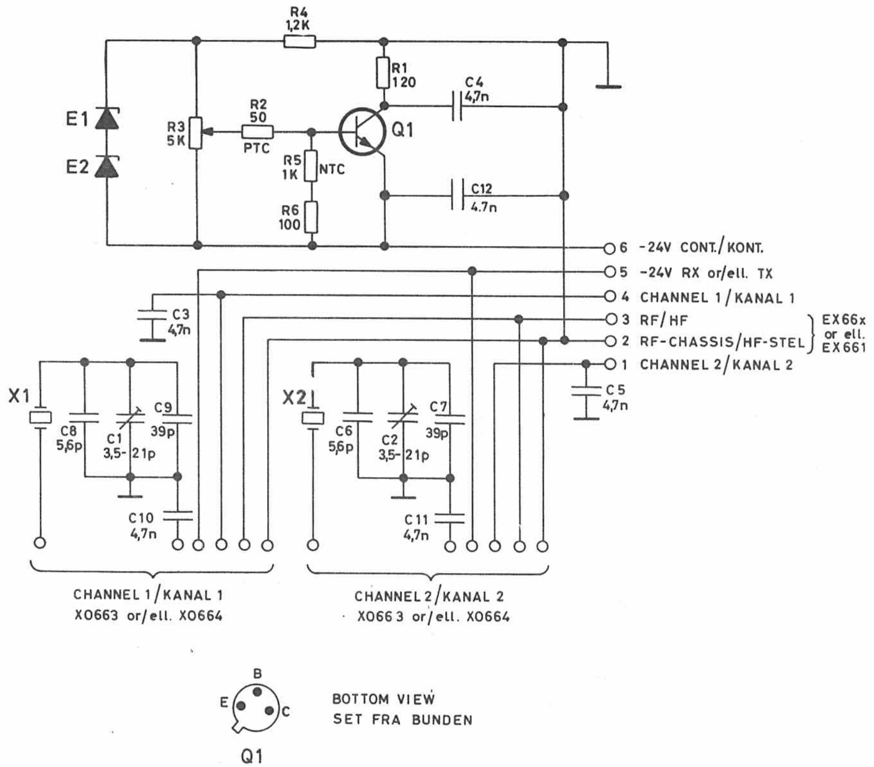


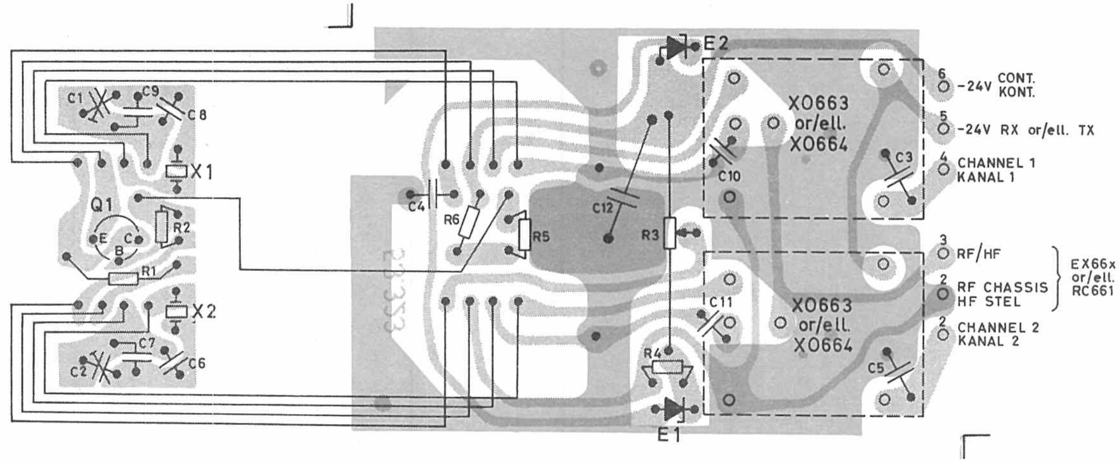


CRYSTAL OSCILLATOR PANEL XS602

D400.819/2

Storno





PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

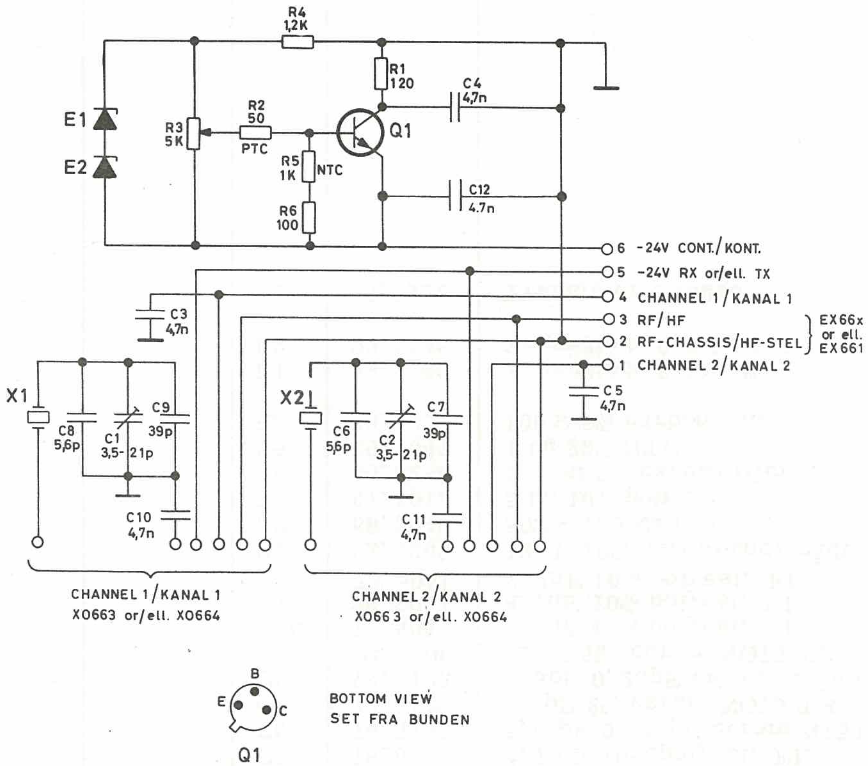
CRYSTAL SHIFT UNIT
KRYSTALSKIFTEENHED

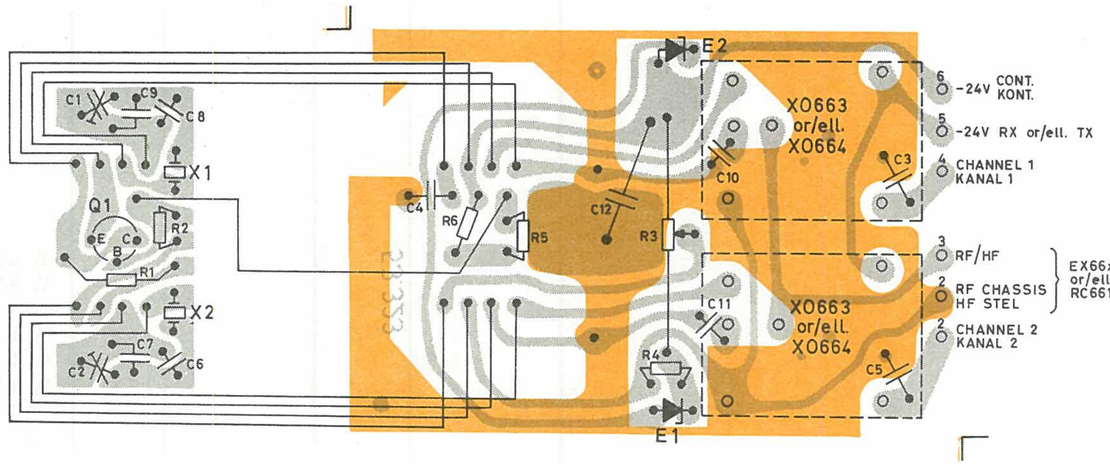
XS663

D400.792/3

Storno

Storno





PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

CRYSTAL SHIFT UNIT
KRYSTALSKIFTEENHED

XS663

D400.792/3

Storno

TYPE	NO.	CODE	DATA	
	C1	78.5033	3,5/21pF ceram NPO TB	500V
	C2	78.5033	3,5/21pF ceram NPO TB	500V
	C3	76.5061	4,7 nF 10% polyest. FL	50V
	C4	76.5061	4,7 nF 10% polyest. FL	50V
	C5	76.5061	4,7 nF 10% polyest. FL	50V
	C6	74.5132	5,6 pF 0,25 pF ceram N150 DI	250V
	C7	74.5117	39 pF 2% ceram NO75 TB	
	C8	74.5132	5,6pF 0,25pF ceram N150 DI	250V
	C9	74.5116	33 pF 5% ceram NO75 TB	250V
	C10	76.5061	4,7nF 10% polyest. FL	50V
	C11	76.5061	4,7nF 10% polyest. FL	50V
	C12	76.5061	4.7nF 10% polyest. FL	50V
	R1	82.5202	120 Ω 10% wirewound/trådv.	1 W
	R2	89.5046	50Ω - 100 kΩ PTC	25 V
	R3	87.5015	5 kΩ 10% potm.	0,5W
	R4	80.5250	1,2 kΩ 5% carbon film	1/8 W
	R5	89.5047	1 kΩ 20% NTC	0,1 W
	R6	80.5037	100 Ω 5% carbon film	0,1 W
	E1	99.5146	Zenerdiode 6,9V 5%	0,275 W
	E2	99.5146	Zenerdiode 6,9V 5%	0,275 W
	Q1	99.5128	Transistor 2N3053	

Storno

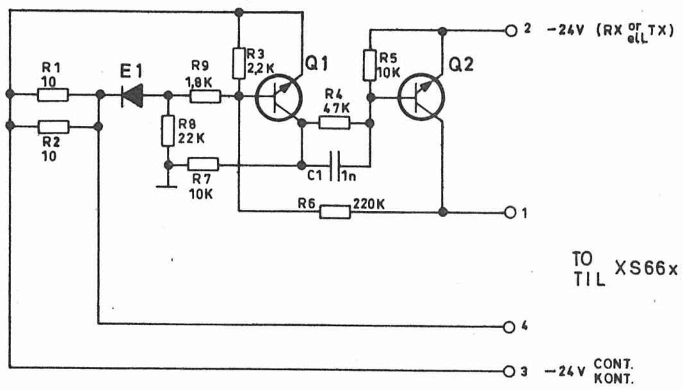
TYPE	NO.	CODE	DATA

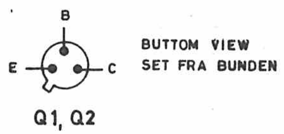
CRYSTAL SHIFT UNIT
KRYSTALSKIFTEENHED

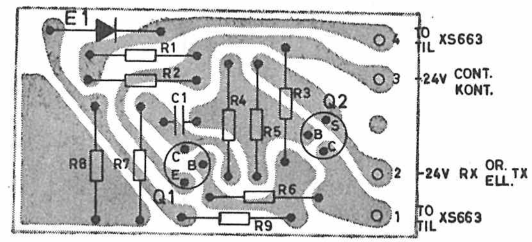
XS663

X401.029/3

Storno







SWITCHING UNIT
OMSKIFTERENHED

SU603

D400.873/3

Storno

TYPE	NO.	CODE	DATA	
	C1	76.5069	1 nF 10% polyest FL	50V
	R1	80.5225	10 Ω 5% carbon film	1/8W
	R2	80.5225	10 Ω 5% carbon film	1/8W
	R3	80.5253	2,2 kΩ 5% carbon film	1/8W
	R4	80.5269	47 kΩ 5% carbon film	1/8W
	R5	80.5261	10 kΩ 5% carbon film	1/8W
	R6	80.5277	0,22 MΩ 5% carbon film	1/8W
	R7	80.5261	10 kΩ 5% carbon film	1/8W
	R8	80.5265	22 kΩ 5% carbon film	1/8W
	R9	80.5252	1,8 kΩ 5% carbon film	1/8W
	E1	99.5178	Diode 1N914	
	Q1	99.5121	Transistor BC107	
	Q2	99.5121	Transistor BC107	

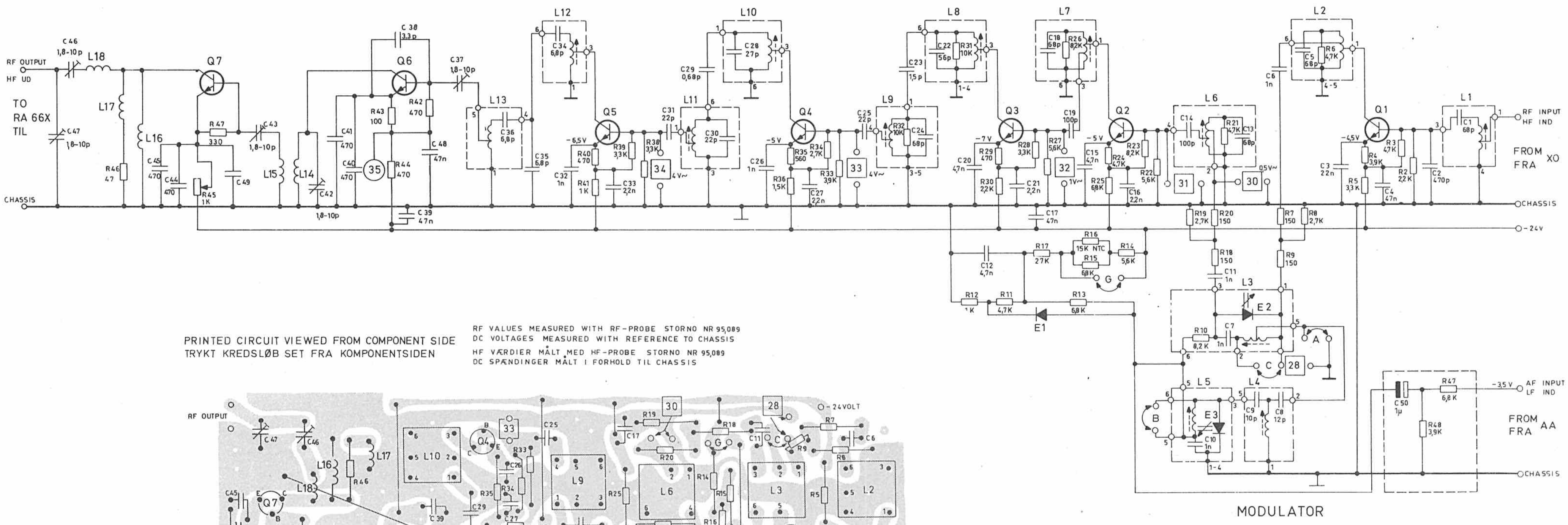
Storno

TYPE	NO.	CODE	DATA

SWITCHING UNIT
OMSKIFTERENHED

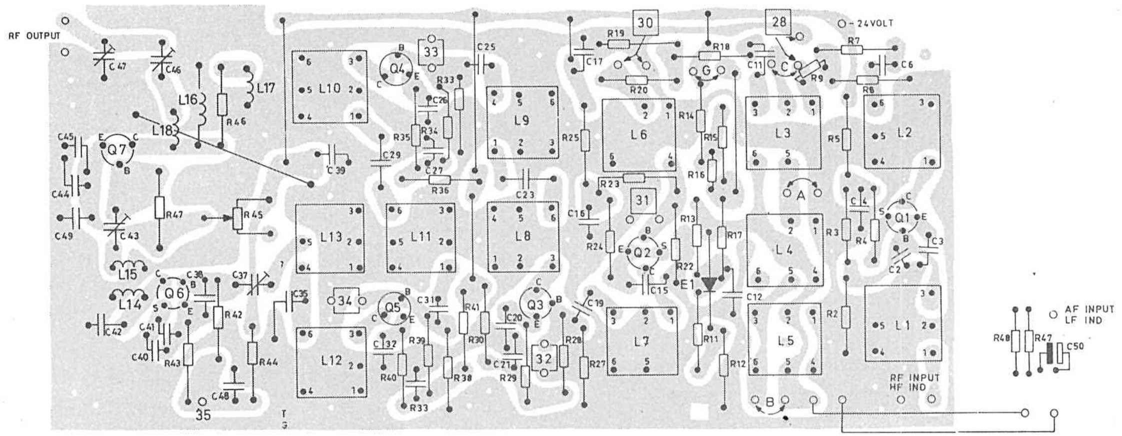
SU603

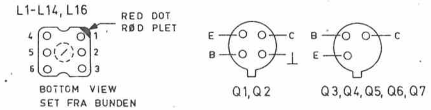
X400.785/2



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

RF VALUES MEASURED WITH RF-PROBE STORNO NR 95,089
DC VOLTAGES MEASURED WITH REFERENCE TO CHASSIS
HF VÆRDIER MÅLT MED HF-PROBE STORNO NR 95,089
DC SPÆNDINGER MÅLT I FORHOLD TIL CHASSIS





EXCITER EX662
D401.988

TYPE	NO.	CODE	DATA				
		10.3069-00	Ex662 Exciter				
	C1	74.5144	68pF	2%	ceram	TB	250V
	C2	74.5161	470pF	-20+50%	ceram		63V
	C3	76.5071	22	±10%	polyest	FL	50V
	C4	76.5072	47nF	±10%	polyest	FL	50V
	C5	74.5144	68pF	2%	ceram	TB	250V
	C6	74.5155	1nF	-20+50%	ceram		63V
	C7	74.5155	1nF	-20+50%	"		63V
	C8	74.5136	12pF	5%	"	DI	125V
	C9	74.5135	10pF	5%	"	DI	125V
	C10	74.5155	1nF	-20+50%	"	PL	63V
	C11	74.5155	1nF	-20+50%	"	PL	63V
	C12	74.5164	4.7nF	-20+50%	"	PL	63V
	C13	74.5144	68pF	2%	"	TB	250V
	C14	74.5013	100pF	20%	"	DI	500V
	C15	74.5164	4.7nF	-20+50%	"	PL	63V
	C16	74.5163	2.2nF	-20+50%	"	PL	63V
	C17	76.5072	47nF	±10%	polyest	FL	50V
	C18	74.5144	68pF	2%	ceram	TB	250V
	C19	74.5013	100pF	±20%	"	DI	500V
	C20	74.5164	4.7nF	-20+50%	"	PL	63V
	C21	74.5163	2.2nF	-20+50%	"	PL	63V
	C22	74.5111	56pF	2%	"	TB	250V
	C23	74.5125	1.5pF	±0.25pF	"	BD	250V
	C24	74.5144	68pF	2%	"	TB	250V
	C25	74.5106	22pF	±0.5 pF	"	TB	250V
	C26	74.5155	1nF	-20+50%	"	PL	63V
	C27	74.5163	2.2nF	-20+50%	"	PL	63V
	C28	74.5107	27pF	±0.5 pF	"	TB	250V
	C29	74.5121	0.68pF	±0.1 pF	"	BD	250V
	C30	74.5106	22pF	±0.5 pF	"	TB	250V
	C31	74.5106	22pF	±0.5 pF	"	TB	250V
	C32	74.5155	1nF	-20+50%	"	PL	63V
	C33	74.5163	2.2nF	-20+50%	"	PL	63V
	C34	74.5134	8.2pF	±0.25pF	"	DI	250V
	C35	74.5144	68pF	±2%	"	TB	500V
	C36	74.5133	6.8pF	±0.25pF	"	DI	250V
	C37	78.5048	1.8 - 10pF		teflon		300V
	C38	74.5129	3.3pF	±0.25pF	ceram	DI	250V
	C39	76.5072	47nF	±10%	polyest	FL	50V
	C40	74.5161	470pF	-20+50%	ceram	PL	63V
	C41	74.5161	470pF	-20+50%	"	PL	63V
	C42	78.5047	1 - 3.5pF		trimmer teflon		300V
	C43	78.5048	1.8 - 10 pF		trimmer teflon		300V
	C44	74.5161	470pF	-20+50%	ceram		63V
	C45	74.5161	470pF	-20+50%	"		63V
	C46	78.5048	1.8 - 10 pF		trimmer teflon		300V

TYPE	NO.	CODE	DATA			
	C47	78.5048	1.8 - 10 pF		trimmer teflon	300V
	C50	73.5114	1µF	20%	tantal	30V
	R2	80.5253	2.2KΩ	5%	carbon film	1/8W
	R3	80.5257	4.7KΩ	5%	"	1/8W
	R4	80.5256	3.9KΩ	5%	"	1/8W
	R5	80.5255	3.3KΩ	5%	"	1/8W
	R6	80.5057	4.7KΩ	5%	"	1/10W
	R7	80.5239	150 Ω	5%	"	1/8W
	R8	80.5254	2.7KΩ	5%	"	1/8W
	R9	80.5239	150 Ω	5%	"	1/8W
	R10	80.5060	8.2KΩ	5%	"	1/10W
	R11	80.5257	47KΩ	5%	"	1/8W
	R12	80.5249	1KΩ	5%	"	1/8W
	R13	80.5259	6.8KΩ	5%	"	1/8W
	R14	80.5258	5.6KΩ	5%	"	1/8W
	R15	80.5259	6.8KΩ	5%	"	1/8W
	R16	89.5010	15KΩ	5%	"	1/8W
	R17	80.5266	27KΩ	5%	"	1/8W
	R18	80.5239	150 Ω	5%	"	1/8W
	R19	80.5254	2.7KΩ	5%	"	1/8W
	R20	80.5239	150 Ω	5%	"	1/8W
	R21	80.5057	4.7KΩ	5%	"	1/8W
	R22	80.5258	5.6KΩ	5%	"	1/8W
	R23	80.5260	8.2KΩ	5%	"	1/8W
	R24	80.5257	4.7KΩ	5%	"	1/8W
	R25	80.5259	6.8KΩ	5%	"	1/8W
	R26	80.5060	8.2KΩ	5%	"	1/8W
	R27	80.5258	5.6KΩ	5%	"	1/8W
	R28	80.5255	3.3KΩ	5%	"	1/8W
	R29	80.5245	2.2KΩ	5%	"	1/8W
	R30	80.5253	2.2KΩ	5%	"	1/8W
	R31	80.5061	10KΩ	5%	"	1/8W
	R32	80.5061	10KΩ	5%	"	1/8W
	R33	80.5256	3.9KΩ	5%	"	1/8W
	R34	80.5254	2.7KΩ	5%	"	1/8W
	R35	80.5246	560 Ω	5%	"	1/8W
	R36	80.5251	1.5KΩ	5%	"	1/8W
	R38	80.5255	3.3KΩ	5%	"	1/8W
	R39	80.5255	3.3KΩ	5%	"	1/8W
	R40	80.5245	470KΩ	5%	"	1/8W
	R41	80.5249	1KΩ	5%	"	1/8W

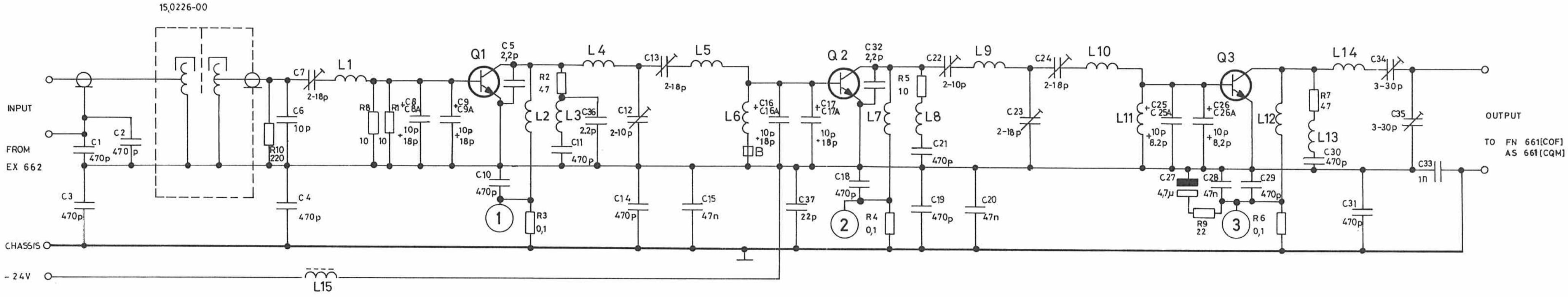
EXCITER EX662

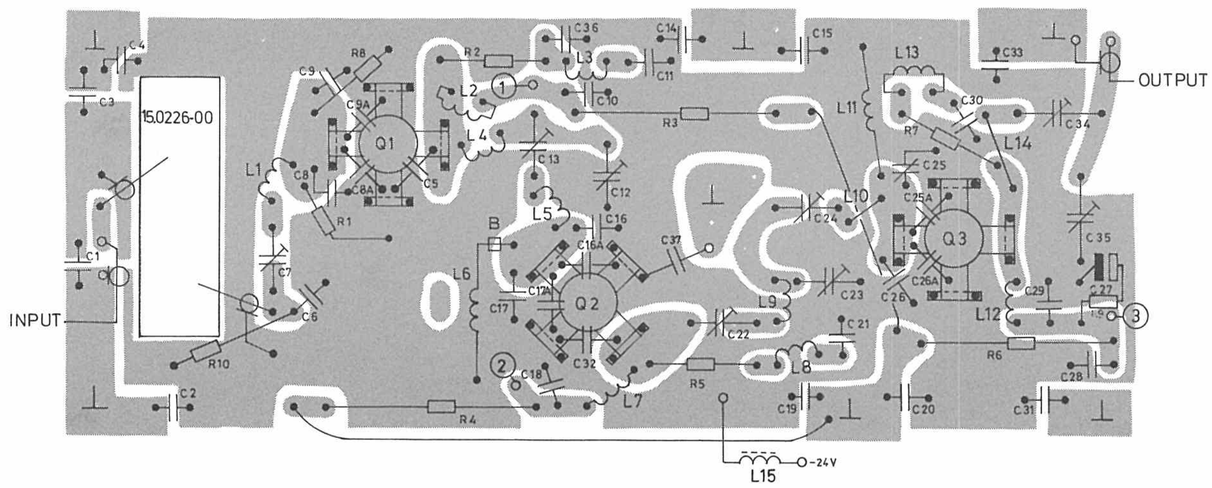
TYPE	NO.	CODE	DATA
		10.3069-00	Ex662 Exciter
	R42	80.5245	470 Ω 5% carbon film 1/8W
	R43	80.5237	100 Ω 5% " 1/8W
	R44	80.5245	470 Ω 5% " 1/8W
	R45	80.5070	1KΩ 5% potentiometer lin. 0.5W
	R46	80.5233	47 Ω 5% carbon film 1/8W
	R47	80.5243	330 Ω 5% " 1/8W
	R48	80.5056	3.9KΩ 5% " 1/8W
	L1	61.0945	RF coil (C1) 11.3 - 14.7 MHz
	L2	61.0946	RF coil (C5, R6) 11.3 - 14.7 MHz
	L3	61.0827-01	RF coil (C7, R10, E2) 11.3 - 14.7 MHz
	L4	61.0828-01	RF coil (C8, 9) 11.3 - 14.7 MHz
	L5	61.0829-01	RF coil (C10, E3) 11.3 - 14.7 MHz
	L6	61.0947	RF coil (C13, R21) 12.16- 14.5 MHz
	L7	61.0948	RF coil (C18, R26) 12.16- 14.5 MHz
	L8	61.0949	RF coil (C22, R31) 24.33- 29 MHz
	L9	61.0950	RF coil (C24, R32) 24.33- 29 MHz
	L10	61.0951	RF coil (C28) 78 - 87 MHz
	L11	61.0851-01	RF coil (C30) 73 - 83 MHz
	L12	61.0952	RF coil (C34) 146 - 174 MHz
	L13	61.1282	RF coil (C36) 146 - 174 MHz
	L14	62.0902	RF coil 420 - 470 MHz
	L15	62.0901	RF hairpin coil 420 - 470 MHz
	L16	62.0650-01	RF choke 0.35 µH
	L17	62.0900	RF coil 420 - 470 MHz
	L18	62.0903	RF coil 420 - 470 MHz
	E1	99.5136	Diode AA119
	E2	99.5140	Cap Diode BA101C
	E3	99.5140	Cap Diode BA101C
	Q1	99.5118	Transistor BF 115
	Q2	99.5118	Transistor BF 115
	Q3	99.5139	Transistor BSX 19
	Q4	99.5139	Transistor BSX 19
	Q5	99.5139	Transistor BSX 19
	Q6	99.5239	Transistor BFY 90
	Q7	99.5298	Transistor BFW 16A or 2N5943

Storno

TYPE	NO.	CODE	DATA

EXCITER EX662



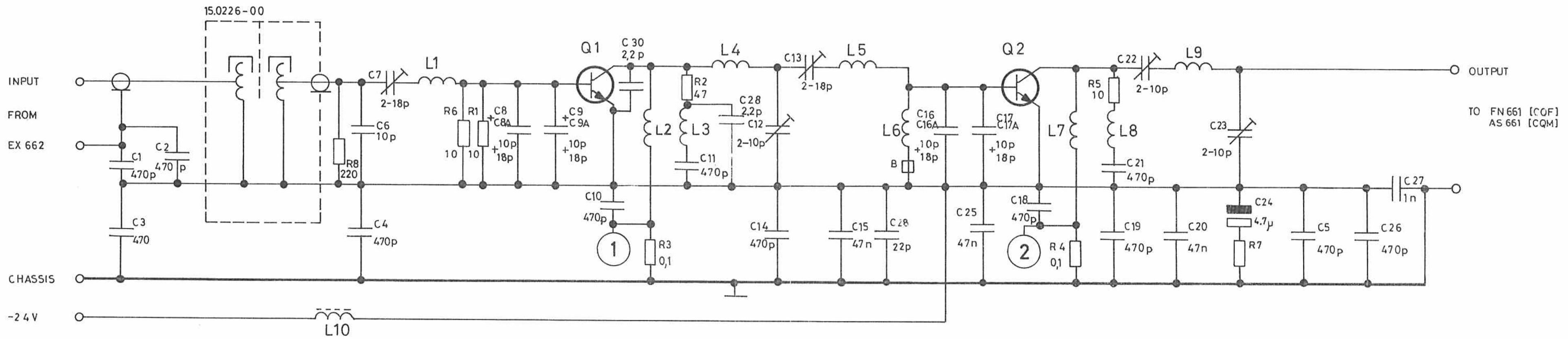


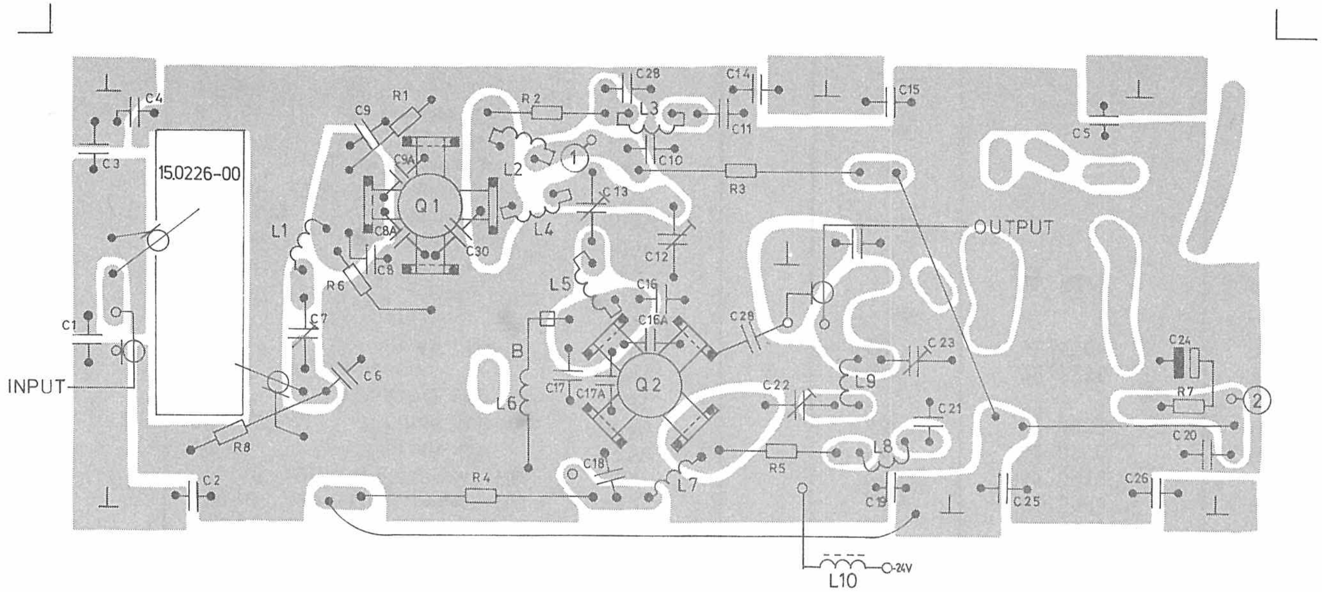
POWER AMPLIFIER
EFFEKTFORSTÆRKER

PA663

D401.984/4

Storno





POWER AMPLIFIER
EFFEKTFORSTÆRKER

PA664

D401.983/3

Storno

Nº	CODE	DATA	
PA664	10.3071	Power Amplifier	
C1	74.5161	470 pF -20/+50% Ceram PL	63V
C2	74.5161	470 pF -20/+50% Ceram PL	63V
C3	74.5161	470 pF -20/+50% Ceram PL	63V
C4	74.5161	470 pF -20/+50% Ceram PL	63V
C5	74.5161	470 pF -20/+50% Ceram PL	63V
C6	74.5135	10 pf 5% Ceram DI	125V
C7	78.5059	2/18 pF Trimm. teflon	300V
C8	74.5135	10 pF 5% Ceram DI	125V
C8A	74.5138	18 pF 5% Ceram	125V
C9	74.5135	10 pF 5% Ceram DI	125V
C9A	74.5138	18 pF 5% Ceram	125V
C10	74.5161	470 pF -20/+50% Ceram PL	63V
C11	74.5161	470 pF -20/+50% Ceram PL	63V
C12	78.5058	2/9 pF Trimm. teflon	300V
C13	78.5059	2/18 pF Trimm. teflon	300V
C14	74.5161	470 pF -20/+50% Ceram PL	63V
C15	76.5072	47 nF ±10% Polyest FL	50V
C16	74.5135	10 pF 5% Ceram DI	125V
C16A	74.5134	8.2 pF 5% Ceram DI	250V
C17	74.5135	10 pF 5% Ceram DI	125V
C17A	74.5134	8.2 pF 5% Ceram DI	250V
C18	74.5161	470 pF -20/+50% Ceram PL	63V
C19	74.5161	470 pF -20/+50% Ceram PL	63V
C20	76.5072	47 nF +10% Polyest FL	50V
C21	74.5161	470 pF -20/+50% Ceram PL	63V
C22	78.5058	2/9 pF Trimm. teflon	300V
C23	78.5058	2/9 pF Trimm. teflon	300V
C24	73.5126	4.7 µF 20% Tantal	35V
C25	76.5172	47 nF ±10% Polyest FL	50V
C26	74.5161	470 pF -20/+50% Ceram PL	63V
C27	74.5155	1 nF -20/+50% Ceram PL	63V
C28	74.5127	2.2 pF /0.25 pF Ceram DI	250V
* C30	74.5127	2.2 pF ±0.25 pF Ceram DI	250V
* FB	65.5061	Ferrite bead Ø3.5x3mm	
R1	80.5225	10 ohm 5% Carbon film	1/8W
R2	80.5233	47 ohm 5% Carbon film	1/8W
R3	82.5208	0.1 ohm Wire wound	1W
R4	82.5208	0.1 ohm Wire wound	1W
R5	80.5425	10 ohm 5% Carbon film	1/4W
R6	80.5225	10 ohm 5% Carbon film	1/8W
* R8	80.5241	220 ohm 5% Carbon film	1/8W

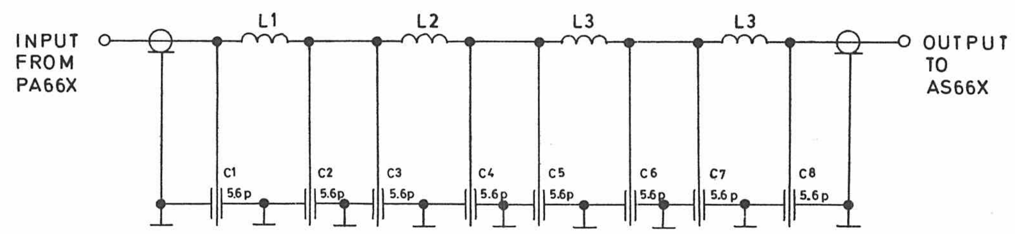
Storno

Nº	CODE	DATA	
L1	62.0908	RF coil	420-470 MHz
L2	62.0909	RF coil	420-470 MHz
L3	62.0910	RF coil	
L4	62.0911	RF coil	420-470 MHz
L5	62.0908	RF coil	420-470 MHz
L6	63.5008	RF choke, 0, 47 µH	
L7	62.0912	RF coil	420-470 MHz
L8	62.0910	RF coil	
L9	62.0909	RF coil	420-470 MHz
Q1	99.5299	Transistor, MRF5174	
Q2	99.5300	Transistor, MRF5176	
	15.0226	Filter unit, Helix.	

POWER AMPLIFIER PA664

X402.135/2

Storno

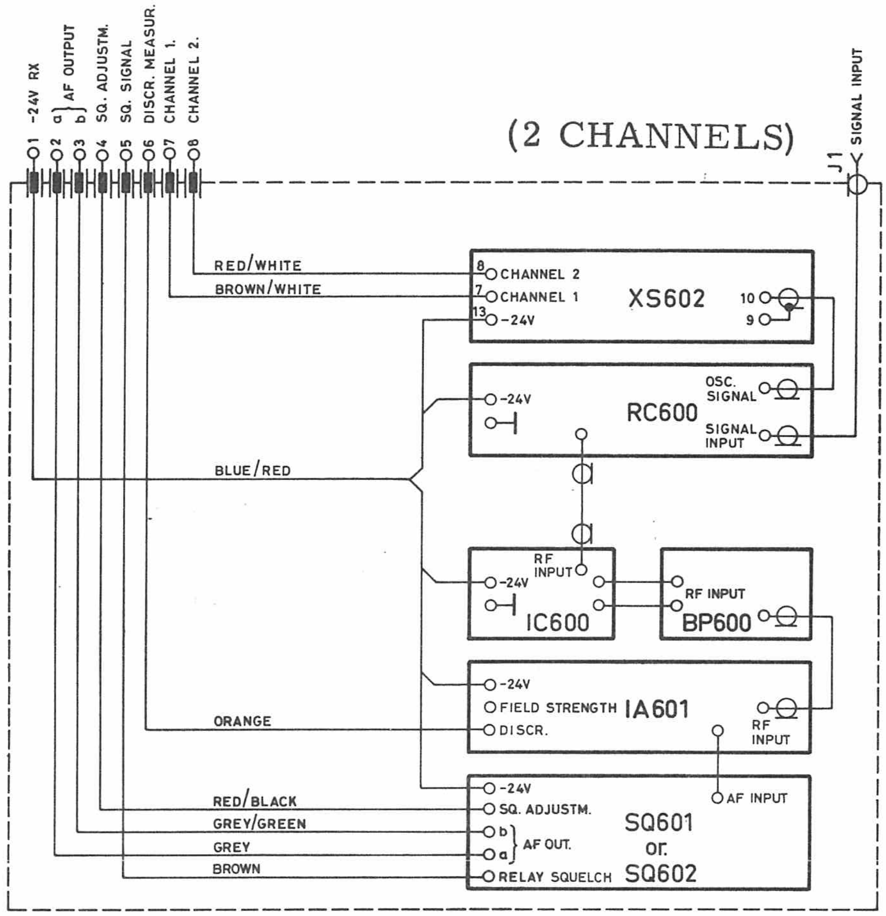


FN661: CODE 10.3072-00

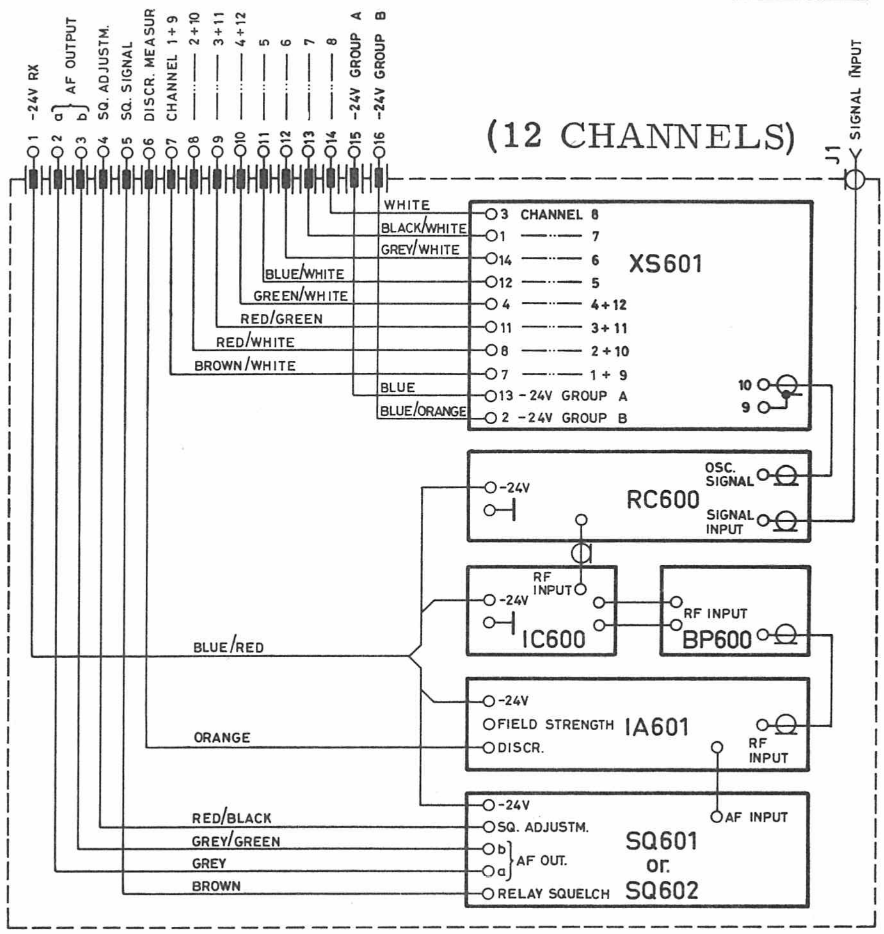
C1-C8:	74.5324	5.6pF ±0.5pF Ceram. FT 400V
L1	62.0904	COIL
L2-L3	62.0905	—"—
L4	62.0904	—"—

ANTENNA FILTER FN661
ANTENNEFILTER

D401.993



D400.756/2

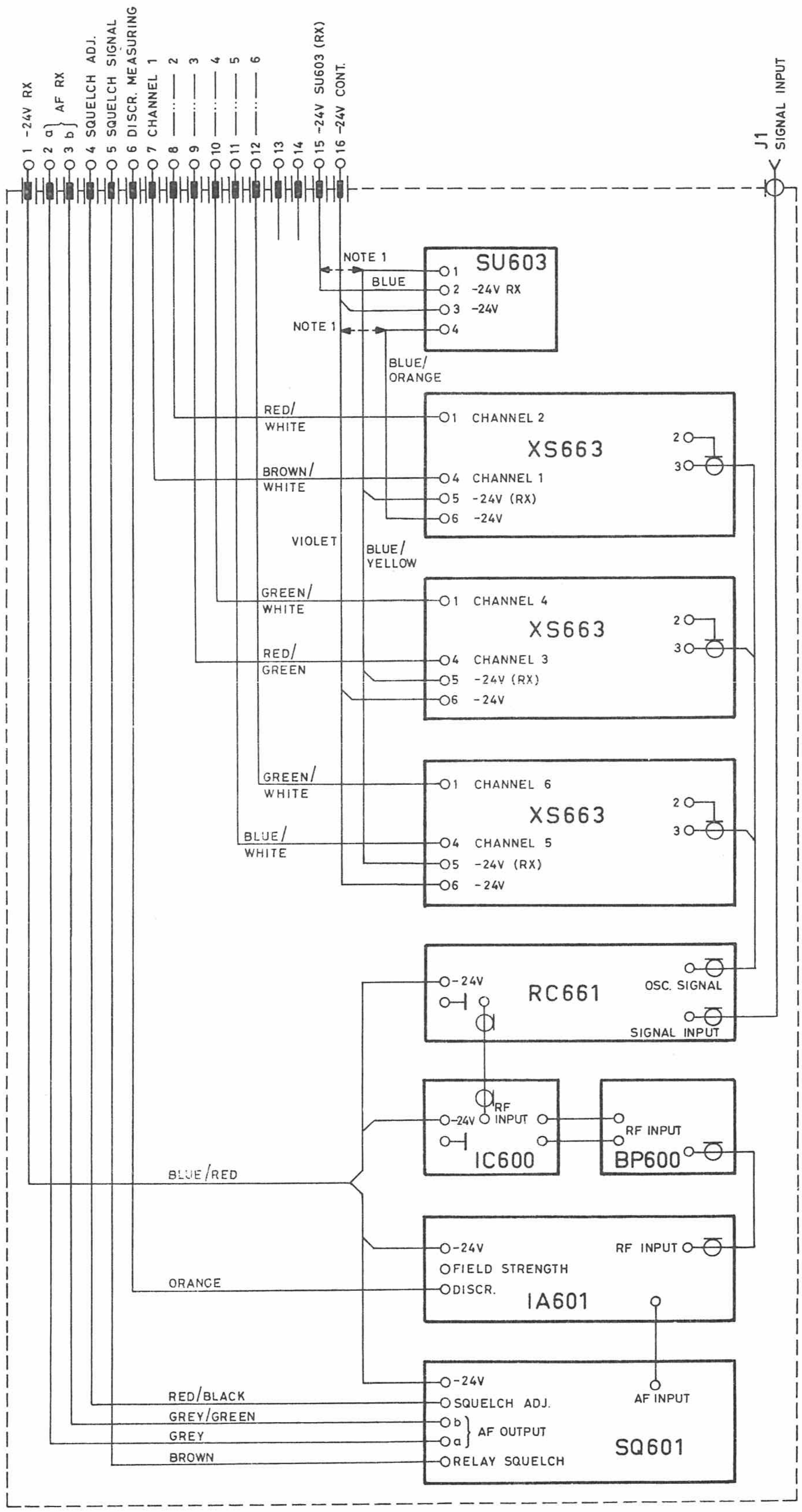


D400.754/2

CABLE FORM

KABLINGSDIAGRAM

RX610, RX630, RX661



NOTE 1: WHEN SU603 IS OMITTED THE WIRES 1-2 AND 3-4 ARE STRAPPED RESPECTIVELY.

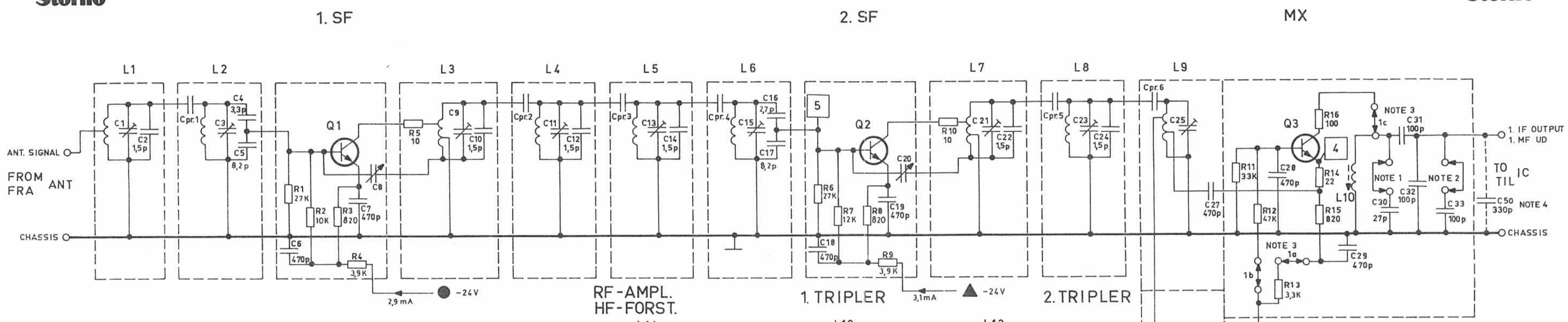
NOTE 1: NÅR SU603 ER UDELADT STRAPPES LEDNINGERNE 1 OG 2 SAMT 3 OG 4.

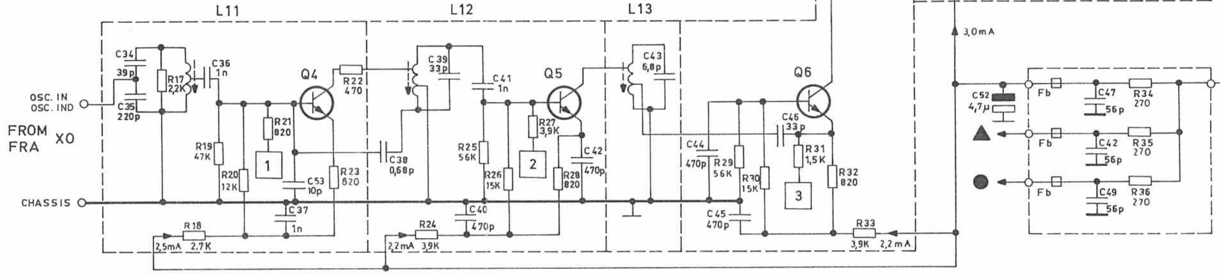
CABLE FORM
KABLINGSDIAGRAM

RX662, RX663

D400.773/2

Storno





NOTE 1: STRAPPING FOR 50 kHz CHANNEL SEPARATION IN CONNECTION WITH IC601

NOTE 2: STRAPPING FOR 25 OR 20 kHz CHANNEL SEPARATION IN CONNECTION WITH IC602, AND IC603 AND FOR 50kHz, 25kHz OR 20kHz CHANNEL SEPARATION IN CONNECTION WITH IC601a, IC602a, OR IC605

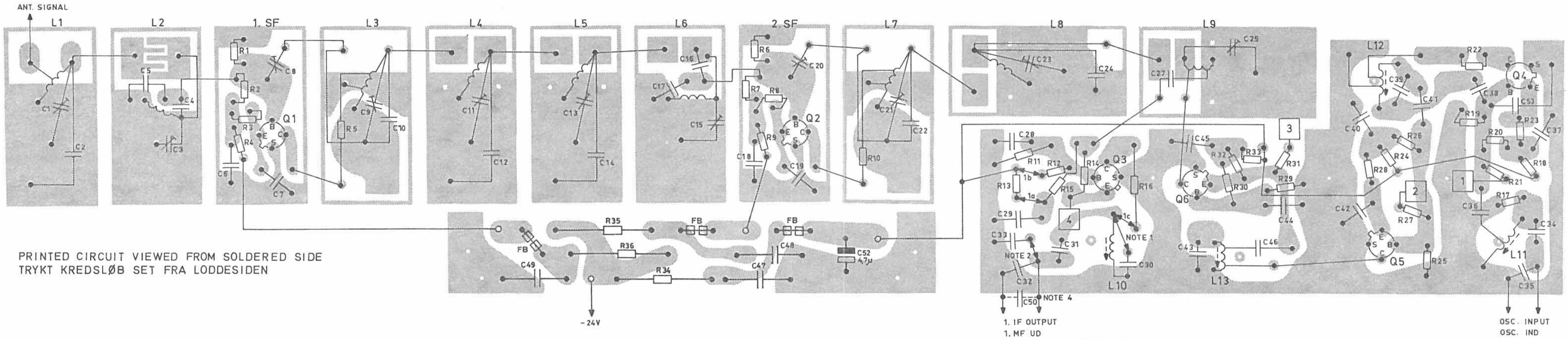
NOTE 3: IN STATIONS WITH ONE RECEIVER CONVERTER UNIT THE STRAPPINGS DESIGNATED 1a, 1b, AND 1c ARE INSERTED
IN STATIONS WITH SWITCHING BETWEN TWO RECEIVER CONVERTERS STRAPPINGS DESIGNATED 1a, 1b AND 1c ARE OMITTED
SEE INSTRUCTION 37.497

NOTE 1: STRAPPES VED 50kHz KANALAFSTAND I FORBINDELSE MED IC601

NOTE 2: STRAPPES VED 25kHz ELLER 20kHz KANALAFSTAND I FORBINDELSE MED IC602 OG IC603 DESUDEN VED 50kHz, 25kHz ELLER 20kHz KANALAFSTAND I FORBINDELSE MED IC601a, IC602a, IC603a OG IC605

NOTE 3: I ANLÆG MED EN MODTAGER KONVERTERENHED ER STRAPNINGERNE MRK. 1a, 1b OG 1c INDFØRT
I ANLÆG MED SKIFT MELLEM TO MODTAGER KONVERTER-ENHEDER FJERNES STRAPNINGERNE 1a, 1b OG 1c.
SE INSTRUKS 37.497

NOTE 4: C50 IS INSERTED IN CQL660 (F)
C50 ISÆTTES I CQL660 (F)



PRINTED CIRCUIT VIEWED FROM SOLDERED SIDE
TRYKT KREDSLØB SET FRA LODDESIDEN

RECEIVER CONVERTER
MODTAGER KONVERTER

RC661a

D400.777/5

Storno

Nº	CODE	DATA	
C1	78.5039	0.8-6.8pF trimmer N150 TB	300V
C2	74.5176	1.5pF +0.25pF ceram N470 BD	250V
C3	78.5039	0.8-6.8pF trimmer N150 TB	300V
C4	74.5129	3.3pF +0.25pF ceram N150 DI	250V
C5	74.5134	8.2pF 5% ceram N150 DI	125V
C6	74.5161	470pF -20/+50% ceram PL	63V
C7	74.5161	470pF -20/+50% ceram PL	63V
C8	78.5038	0.8-3.8pF trimmer N200 TB	300V
C9	78.0010	0.8-6.8pF trimmer N150 TB	300V
C10	74.5175	1.5pF +0.25pF ceram N330 BD	250V
C11	78.5039	0.8-6.8pF trimmer N150 TB	300V
C12	74.5176	1.5pF +0.25pF ceram N470 BD	250V
C13	78.5039	0.8-6.8pF trimmer N150 TB	300V
C14	74.5176	1.5pF +0.25pF ceram N470 BD	250V
C15	78.5039	0.8-6.8pF trimmer N150 TB	300V
C16	74.5128	2.7pF +0.25pF ceram N150 DI	250V
C17	74.5134	8.2pF 5% ceram N150 DI	125V
C18	74.5161	470pF -20/+50% ceram PL	63V
C19	74.5161	470pF -20/+50% ceram PL	63V
C20	78.5038	0.8-3.8pF trimmer N200 TB	300V
C21	78.0010	0.8-6.8pF trimmer N150 TB	300V
C22	74.5175	1.5pF +0.25pF ceram N330 BD	250V
C23	78.0010	0.8-6.8pF trimmer N150 TB	300V
C24	74.5176	1.5pF +0.25pF ceram N470 BD	250V
C25	78.5039	0.8-6.8pF ceram N150 TB	300V
C27	74.5161	470pF -20/+50% ceram PL	63V
C28	74.5161	470pF -20/+50% ceram PL	63V
C29	74.5161	470pF -20/+50% ceram PL	63V
C30	74.5107	27pF 2% ceram NO75 TB	250V
C31	76.5079	100pF 5% polystyr. TB	125V
C32	76.5079	100pF 5% polystyr. TB	125V
C33	76.5079	100pF 5% polystyr. TB	125V
C34	74.5117	39pF 2% ceram NO75 TB	250V
C35	76.5063	220pF 5% polystyr. TB	125V
C36	74.5155	1 nF -20/+50% ceram PL	63V
C37	76.5069	1 nF 10% polyest. FL	50V
C38	74.5121	0.68pF +0.1pF ceram P100 BD	250V
C39	74.5116	33pF 2% ceram NO75 TB	250V
C40	74.5161	470pF -20/+50% ceram PL	63V
C41	74.5155	1 nF -20/+50% ceram PL	63V
C42	74.5116	470pF -20/+50% ceram PL	63V
C43	74.5133	6.8pF +0.25pF ceram N150 DI	250V
C44	74.5161	470pF -20/+50% ceram PL	63V
C45	74.5161	470pF -20/+50% ceram PL	63V
C46	74.5116	33pF 2% ceram NO75 TB	250V

Storno

Nº	CODE	DATA	
C47	74.5111	56pF 2% ceram NO75 TB	250V
C48	74.5111	56pF 2% ceram NO75 TB	250V
C49	74.5111	56pF 2% ceram N075 TB	250V
C50	76.5105	330pF 5% polystyr. TB	125V
C52	73.5126	4,7uF 20% tantal	35V
C53	74.5135	10pF 5% ceram N150 DI	125V
R1	80.5066	27 kOhm 5% carbon film	0.1W
R2	80.5061	10 kOhm 5% carbon film	0.1W
R3	80.5048	820 ohm 5% carbon film	0.1W
R4	80.5056	3.9 kOhm 5% carbon film	0.1W
R5	80.5025	10 ohm 5% carbon film	0.1W
R6	80.5066	27 kOhm 5% carbon film	0.1W
R7	80.5062	12 kOhm 5% carbon film	0.1W
R8	80.5048	820 ohm 5% carbon film	0.1W
R9	80.5056	3.9 kOhm 5% carbon film	0.1W
R10	80.5025	10 ohm 5% carbon film	0.1W
R11	80.5267	33 kOhm 5% carbon film	1/8W
R12	80.5269	47 kOhm 5% carbon film	1/8W
R13	80.5255	3.3 kOhm 5% carbon film	1/8W
R14	80.5229	22 ohm 5% carbon film	1/8W
R15	80.5248	820 ohm 5% carbon film	1/8W
R16	80.5237	100 ohm 5% carbon film	1/8W
R17	80.5253	2.2 kOhm 5% carbon film	1/8W
R18	80.5254	2.7 kOhm 5% carbon film	1/8W
R19	80.5269	47 kOhm 5% carbon film	1/8W
R20	80.5262	12 kOhm 5% carbon film	1/8W
R21	80.5248	820 ohm 5% carbon film	1/8W
R22	80.5245	470 ohm 5% carbon film	1/8W
R23	80.5248	820 ohm 5% carbon film	1/8W
R24	80.5256	3.9 kOhm 5% carbon film	1/8W
R25	80.5270	56 kOhm 5% carbon film	1/8W
R26	80.5263	15 kOhm 5% carbon film	1/8W
R27	80.5256	3.9 kOhm 5% carbon film	1/8W
R28	80.5248	820 ohm 5% carbon film	1/8W
R29	80.5270	56 kOhm 5% carbon film	1/8W
R30	80.5263	15 kOhm 5% carbon film	1/8W
R31	80.5251	1.5 kOhm 5% carbon film	1/8W
R32	80.5248	820 ohm 5% carbon film	1/8W
R33	80.5256	3.9 kOhm 5% carbon film	1/8W

RECEIVER CONVERTER
MODTAGER KONVERTER

RC661a

X400.735/3

Nº	CODE	DATA	
R34	80.5242	270 ohm 5% carbon film	1/8W
R35	80.5242	270 ohm 5% carbon film	1/8W
R36	80.5242	270 ohm 5% carbon film	1/8W
L1	62.0733	RF coil/HF-spole 420-470 MHz	
L2	62.0735	RF coil/HF-spole 420-470 MHz	
L3	62.0733	RF coil/HF-spole 420-470 MHz	
L4	62.0735	RF coil/HF-spole 420-470 MHz	
L5	62.0735	RF coil/HF-spole 420-470 MHz	
L6	62.0735	RF coil/HF-spole 420-470 MHz	
L7	62.0733	RF coil/HF-spole 420-470 MHz	
L8	62.0735	RF coil/HF-spole 420-470 MHz	
L9	62.0734	RF coil/HF-spole 420-470 MHz	
L10	61.0992	IF coil/HF-spole 10,7 MHz	
L11	61.0989	RF coil/HF-spole 45,5-51,5 MHz	
L12	61.0990	RF coil/HF-spole 45,5-51,5 MHz	
L13	61.0991	RF coil/HF-spole 136-154 MHz	
Q1	99.5239	Transistor BFY90	
Q2	99.5239	Transistor BFY90	
Q3	99.5217	Transistor 2N918	
Q4	99.5217	Transistor 2N918	
Q5	99.5217	Transistor 2N918	
Q6	99.5217	Transistor 2N918	

Storno

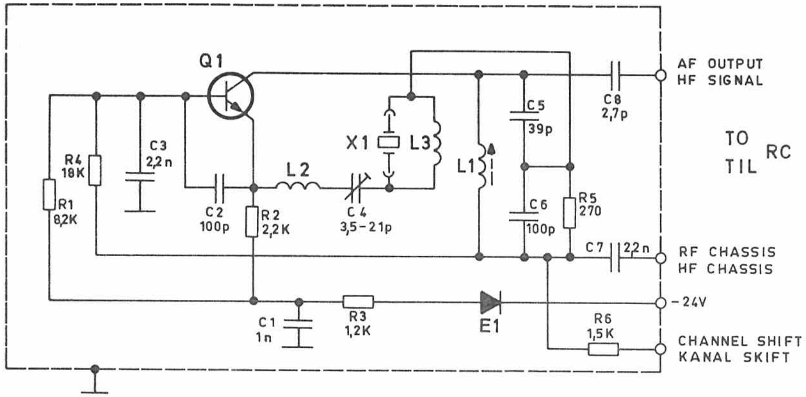
Nº	CODE	DATA

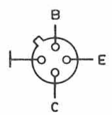
RECEIVER CONVERTER
MODTAGER KONVERTER

RC661a

X400.735/3

Storno





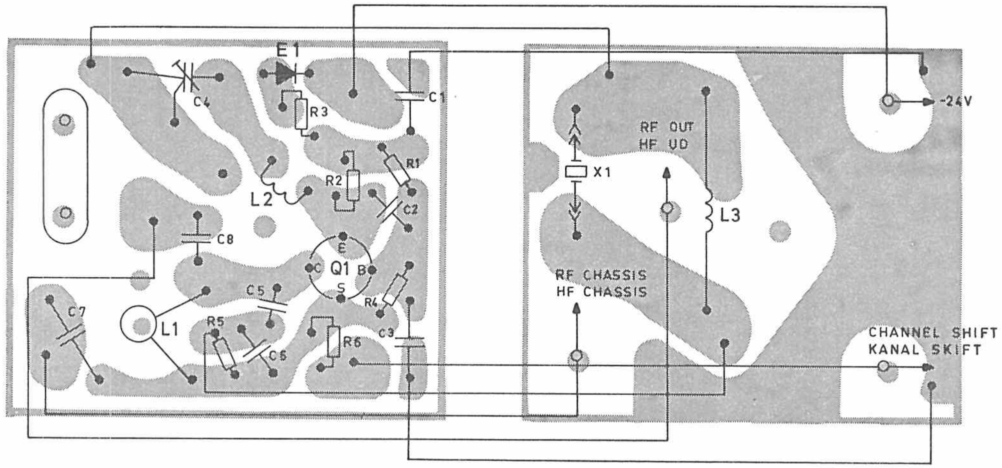
BOTTOM VIEW
SET FRA BUNDEN

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

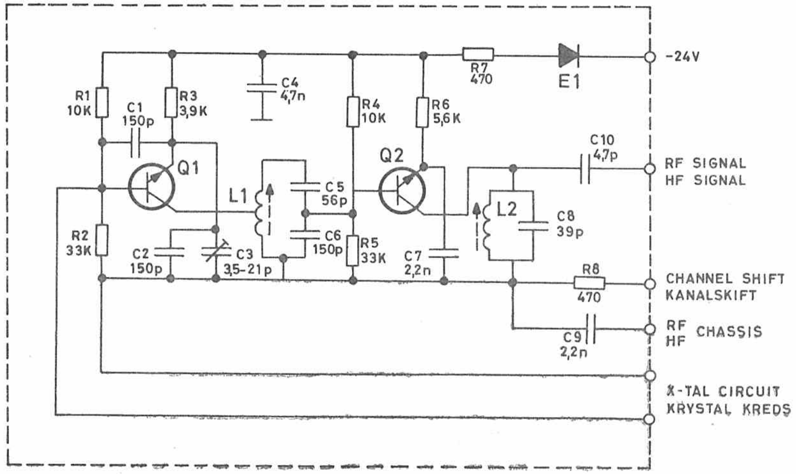
TYPE	NO.	CODE	DATA

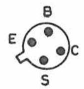
CRYSTALOSCILLATOR FOR RX.

XO611a

X400.686/3

Storno





BOTTOM VIEW
SET FRA BUNDEN

Q1, Q2

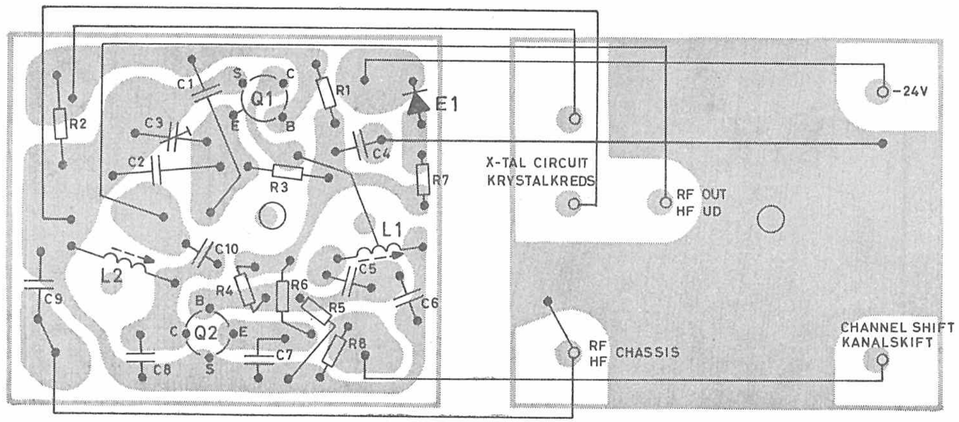
Storno

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

XO664

D400.799/2

Storno

TYPE	NO.	CODE	DATA	
	C1	76.5062	150 pF 5% polystyr. TB	250V
	C2	76.5062	150 pF 5% polystyr. TB	250V
	C3	78.5033	3,5/21pF ceram NPO TB	500V
	C4	76.5061	4,7 nF 10% polyest. FL	50V
	C5	74.5111	56 pF 2% ceram NO75 TB	250V
	C6	76.5062	150 pF 5% polystyr. TB	250V
	C7	76.5059	2,2 nF 10% polyest. FL	50V
	C8	74.5117	39 pF 2% ceram NO75 TB	250V
	C9	76.5059	2,2 nF 10% polyest. FL	50V
	C10	74.5131	4,7 pF 0,25 pF ceram N150	250V
	R1	80.5061	10 kΩ 5% carbon film	0,1W
	R2	80.5067	33 kΩ 5% carbon film	0,1W
	R3	80.5056	3,9 kΩ 5% carbon film	0,1W
	R4	80.5061	10 kΩ 5% carbon film	0,1W
	R5	80.5067	33 kΩ 5% carbon film	0,1W
	R6	80.5058	5,6 kΩ 5% carbon film	0,1W
	R7	80.5045	470 Ω 5% carbon film	0,1W
	R8	80.5045	470 Ω 5% carbon film	0,1W
	L1	61.1016	RF-coil/HF-spole 22.5-25.5 MHz	
	L2	61.1015	RF-coil/HF-spole 45.5 - 51 MHz	
	E1	99.5028	Diode 1N914	
	Q1	99.5177	Transistor BF166	
	Q2	99.5177	Transistor BF166	

Storno

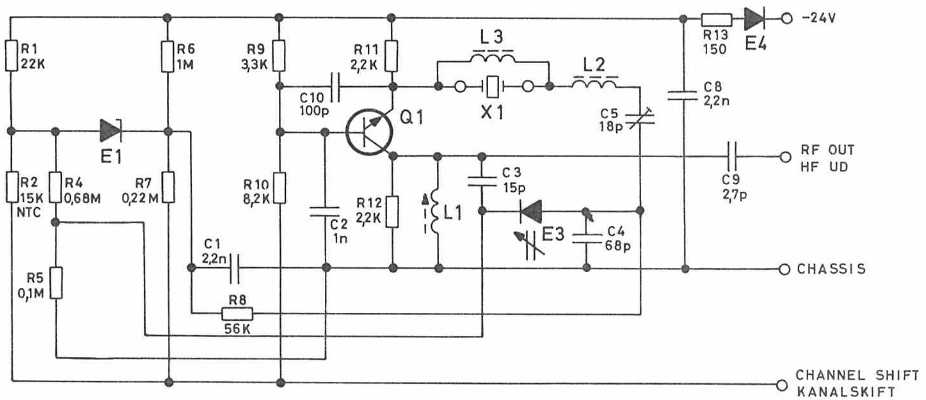
TYPE	NO.	CODE	DATA

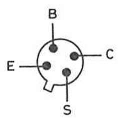
CRYSTAL OSCILLATOR
KRYSTAL OSCILLATOR

XO664

X401.028

Storno





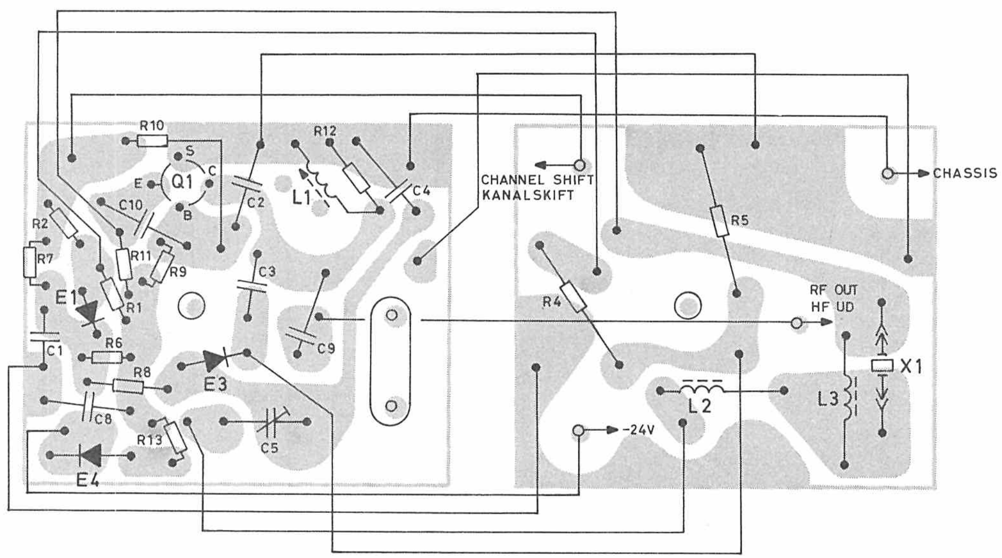
Q1
BOTTOM VIEW
SET FRA BUNDEN

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

Storno

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

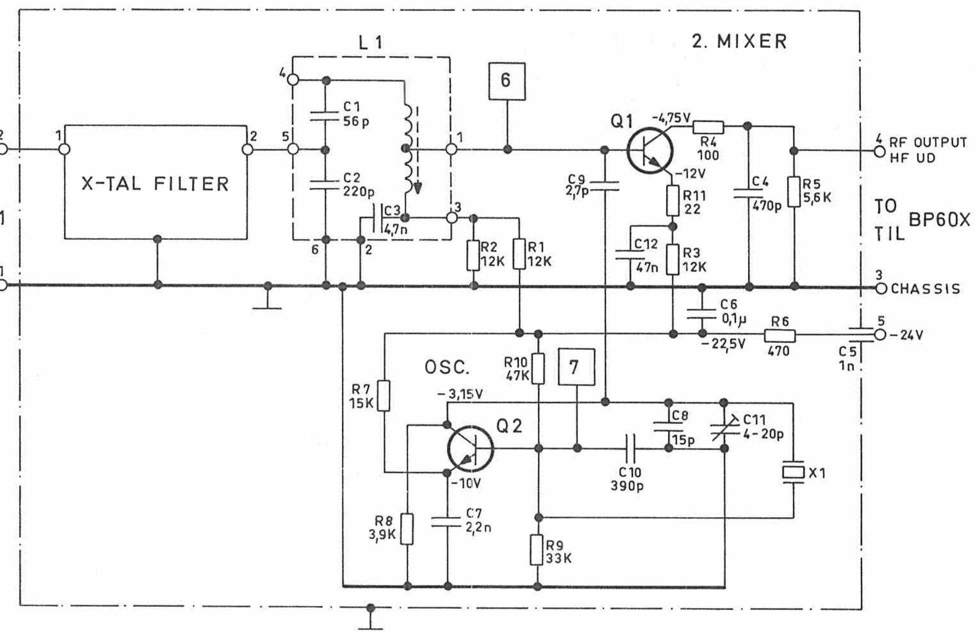
TYPE	NO.	CODE	DATA

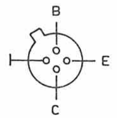
CRYSTAL OSCILLATOR
KRYSTALOSCILLATOR

XO666

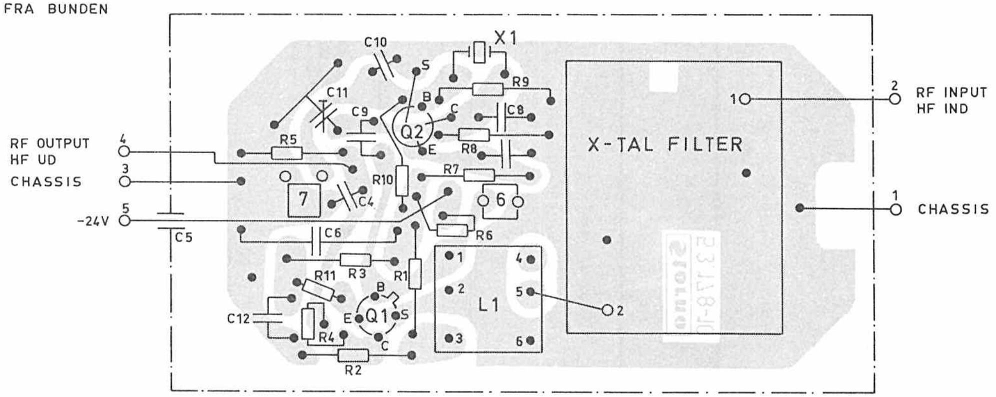
X401.039

 Storno





Q1-Q2
BOTTOM VIEW
SET FRA BUNDEN



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

IF-CONVERTER IC601b, IC602b, IC603b
MF-KONVERTER

D400.664/3

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 BF167	
	Q2	99.5166	Transistor BF167	
	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	

Storno

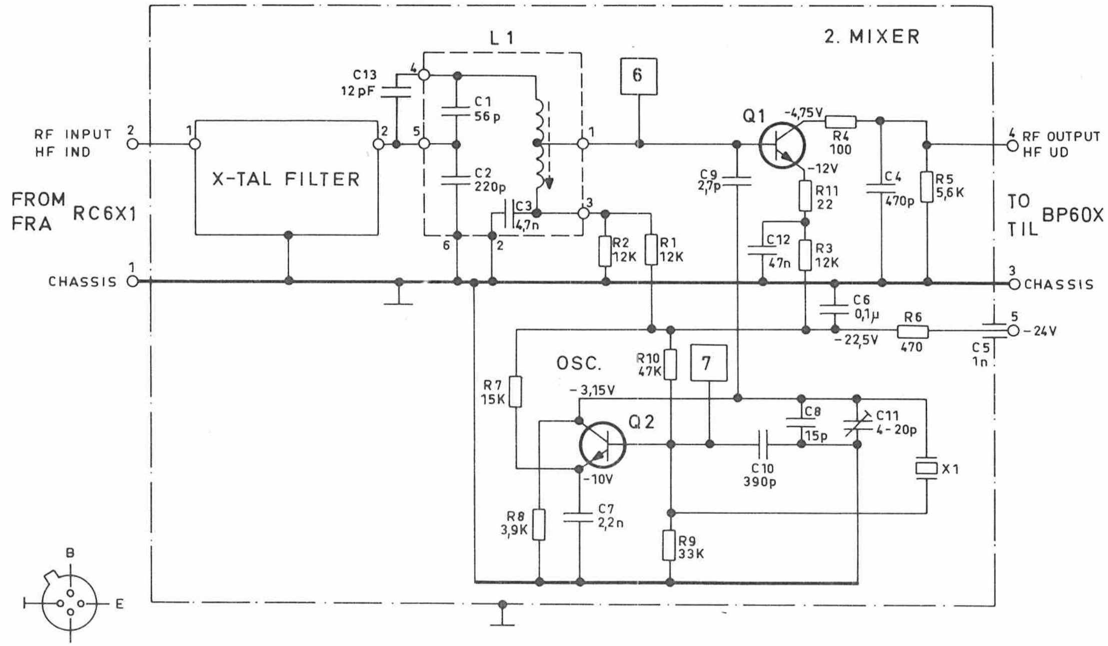
TYPE	NO.	CODE	DATA

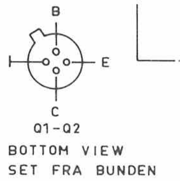
IF-CONVERTER
MF-KONVERTER IC601b, IC602b, IC603b

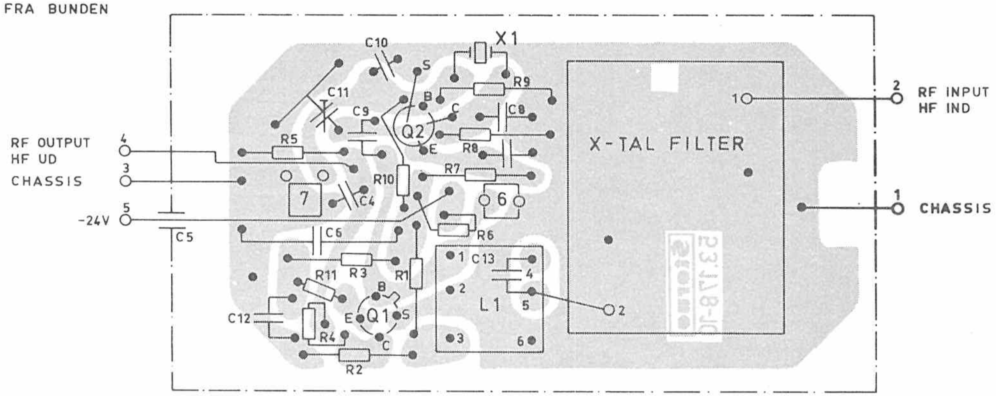
X400.684/3

Storno

Storno







PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

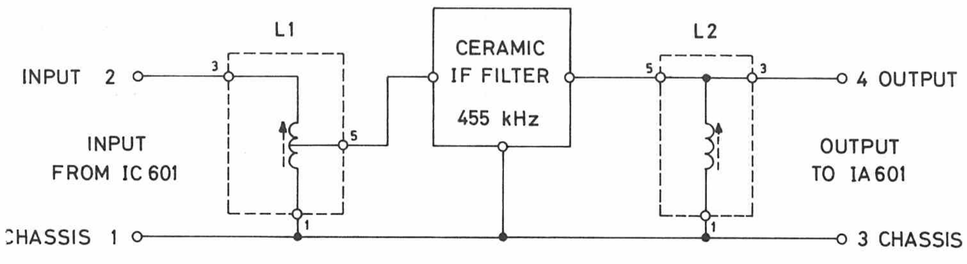
IF-CONVERTER
MF-KONVERTER

IC 607

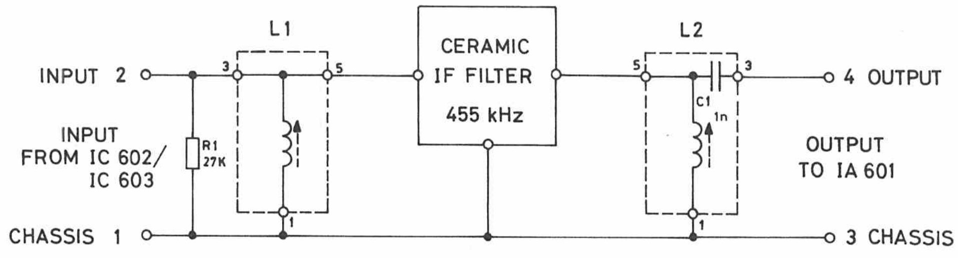
D 402.456

Storno

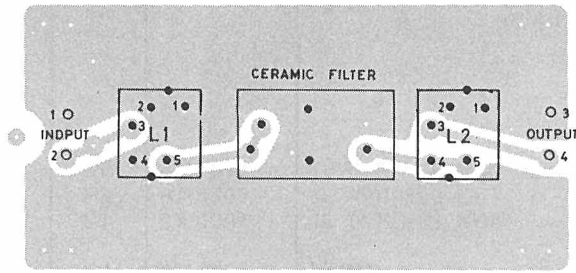
BP 601b



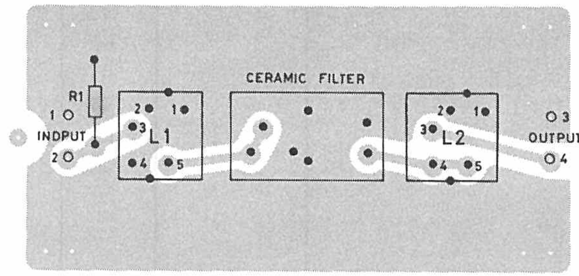
BP 602b



BP 601b



BP 602b



IF FILTERS BP 601b, BP 602b.

D 402.051/2

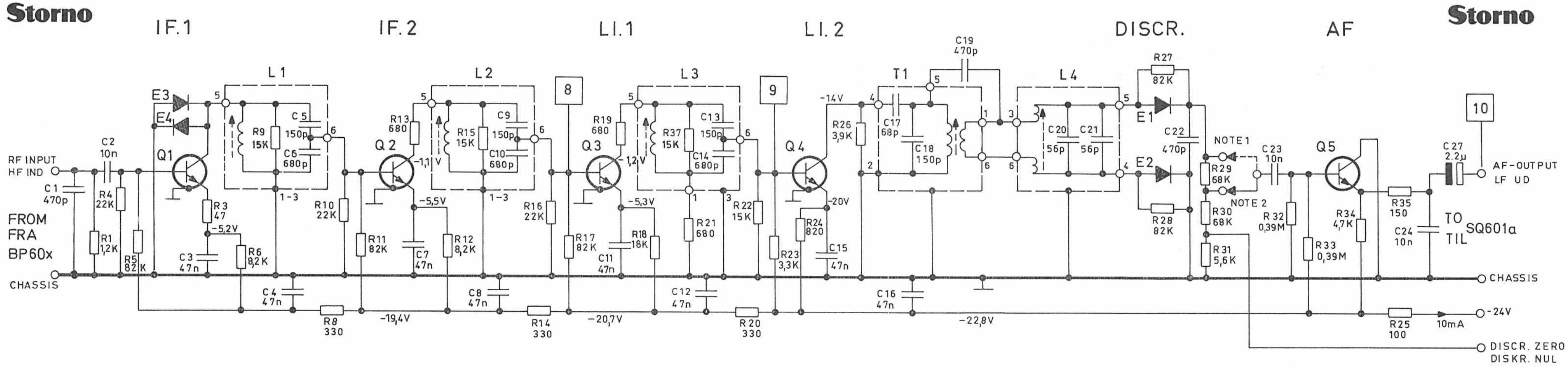
TYPE	NO.	CODE	DATA
BP601b		10.1213-02	455 KHz IF Filter Channel separation 50 KHz
	L1	61.1306	IF coil 455 KHz
	L2	61.1100	IF coil 455 KHz
	CF	69.5013	Ceramic IF filter 50 KHz
BP602b		10.1214-02	455 KHz IF Filter Channel separation 20/25 KHz
	C1	76.5109	1 nF 2.5% polystyr TB 30V
	R1	80.5266	27KΩ 5% carbon film 1/8W
	L1	61.1304	IF coil 455 KHz
	L2	61.1305	IF coil 455 KHz
	CF	69.5014	Ceramic IF filter 20/25 KHz

Storno

TYPE	NO.	CODE	DATA

IF FILTER BP601b, BP602b

X402.157

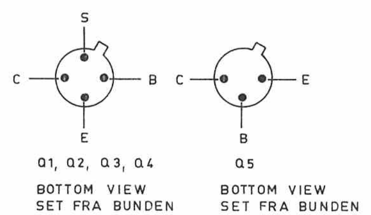


NOTE 1. CONNECTION FOR ±4kHz OR ±5kHz FREQ. DEVIATION

NOTE 2. CONNECTION FOR ±15kHz FREQ. DEVIATION

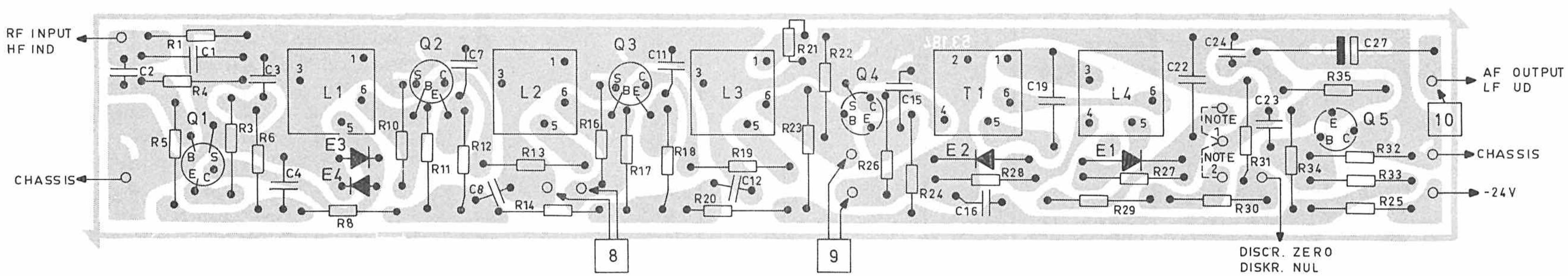
NOTE 1. FORBINDELSE VED ±4kHz ELLER ±5kHz FREKVENSSVING.

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

Storno

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

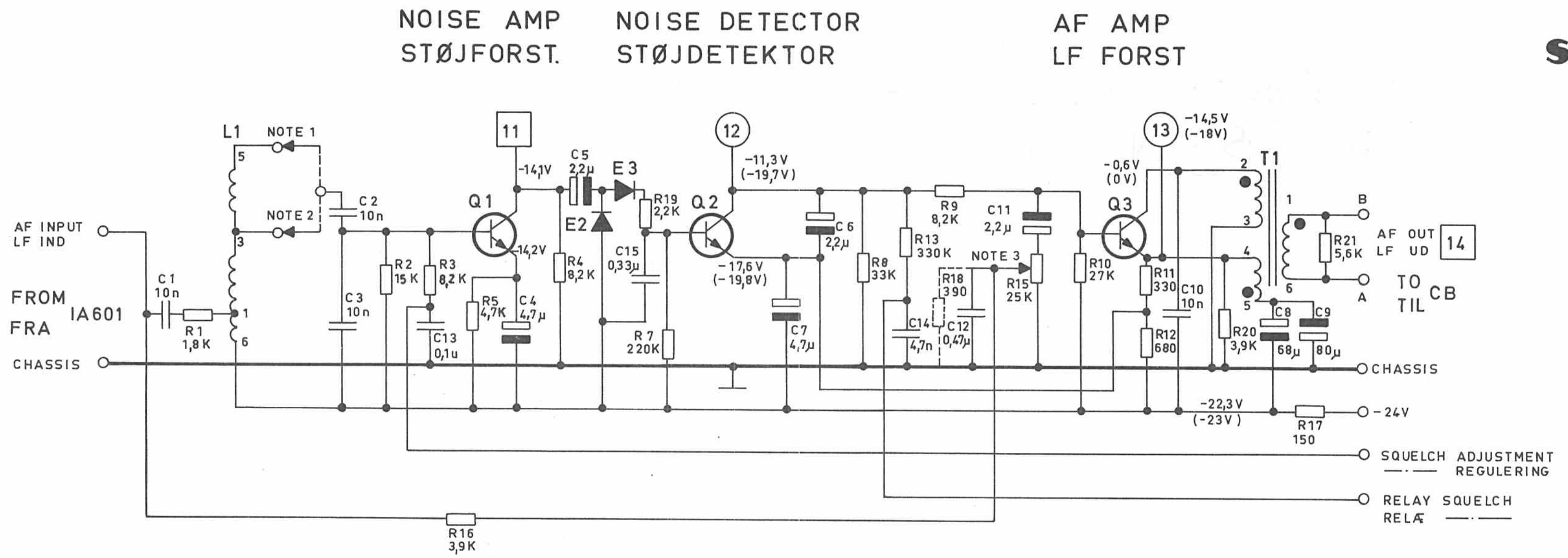
TYPE	NO.	CODE	DATA	
	R25	80.5237	100 Ω 5% carbon film	1/8W
	R26	80.5256	3,9 kΩ 5% carbon film	1/8W
	R27	80.5272	82 kΩ 5% carbon film	1/8W
	R28	80.5272	82 kΩ 5% carbon film	1/8W
	R29	80.5271	68 kΩ 5% carbon film	1/8W
	R20	80.5271	68 kΩ 5% carbon film	1/8W
	R31	80.5258	5,6 kΩ 5% carbon film	1/8W
	R32	80.5280	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	

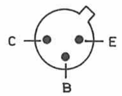
IF-AMPLIFIER
MF-FORSTÆRKER

IA601c

X400.797/5

Storno





Q1, Q2 Q3
BOTTOM VIEW
SET FRA BUNDEN

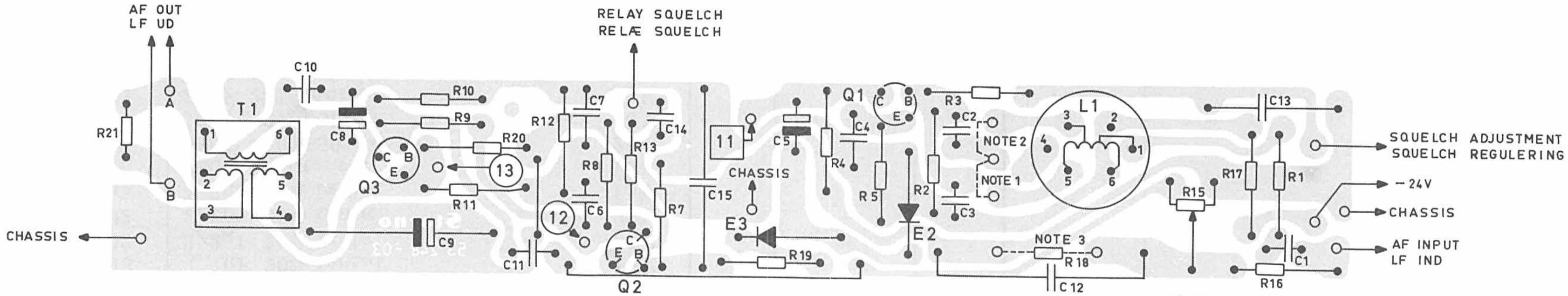
NOTE 1. CONNECTED IF 20 OR 25KHz CHANNEL SEPARATION IS USED.
NOTE 2. CONNECTED IF 50KHz CHANNEL SEPARATION IS USED.
NOTE 3. IF FM IS USED INSTEAD OF PM, C12 IS REPLACED BY R18(390Ω)

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.

PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF-AMPLIFIER AND SQUELCH
LF-FORSTÆRKER OG SQUELCH

SQ601a

D400.661/5

Storno

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	

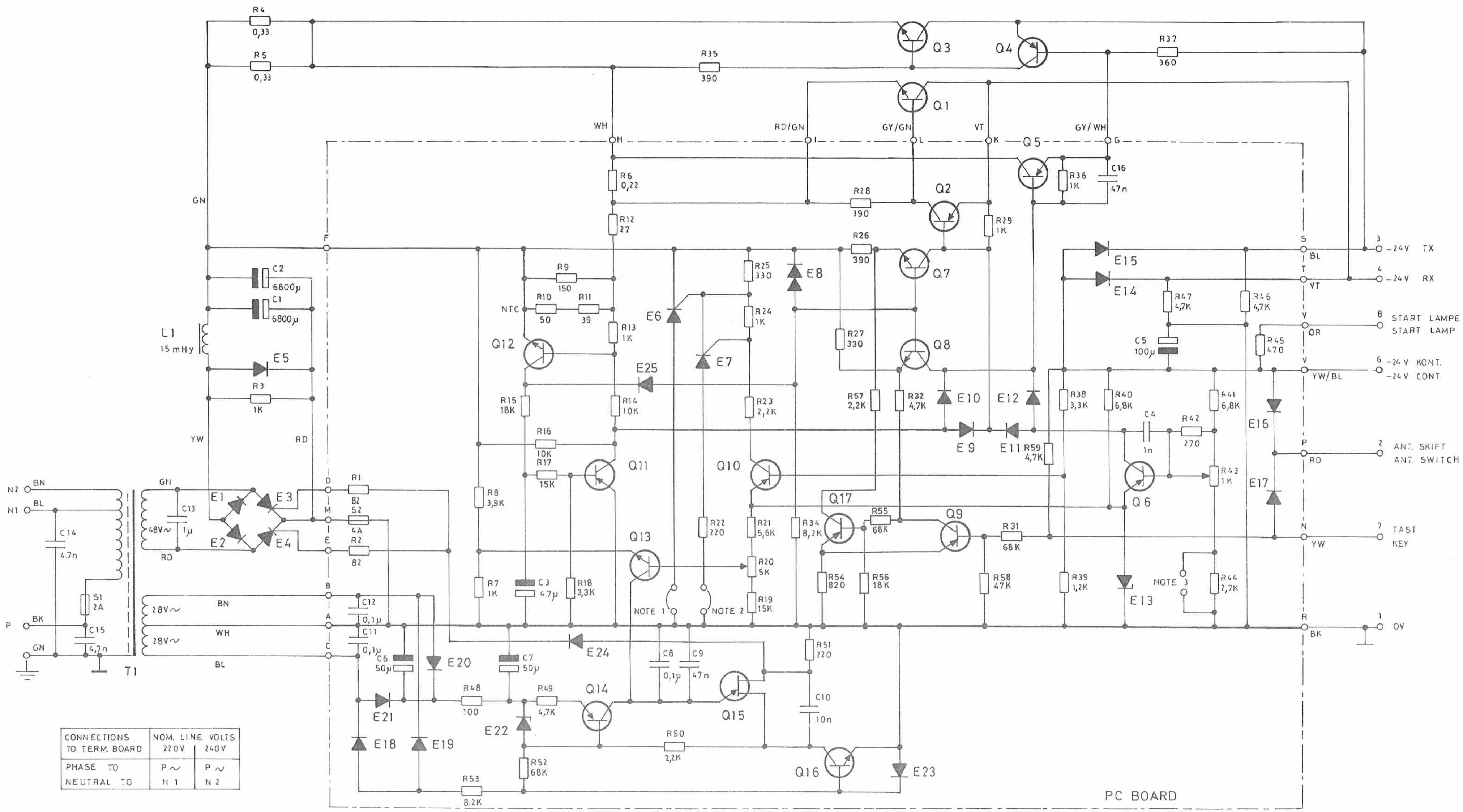
Storno

TYPE	NO.	CODE	DATA

AF-AMPLIFIER AND SQUELCH
LF-FORSTÆRKER OG SQUELCH

SQ601a

X400.682/4



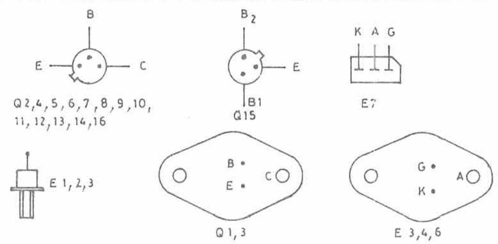
CONNECTIONS TO TERM. BOARD	NOM. LINE VOLTS 220V	240V
PHASE TO	P~	P~
NEUTRAL TO	N 1	N 2

NOTE 1,2,3: FORBINDELSER ÆNDRES KUN UNDER AFPRØVNING

NORMALT BRUG: NOTE 1 OG NOTE 2 KORTSLUTTET NOTE 3 AFBRUDT

NOTE 1,2,3: CONNECTIONS ARE ONLY CHANGED DURING TESTING OPERATION

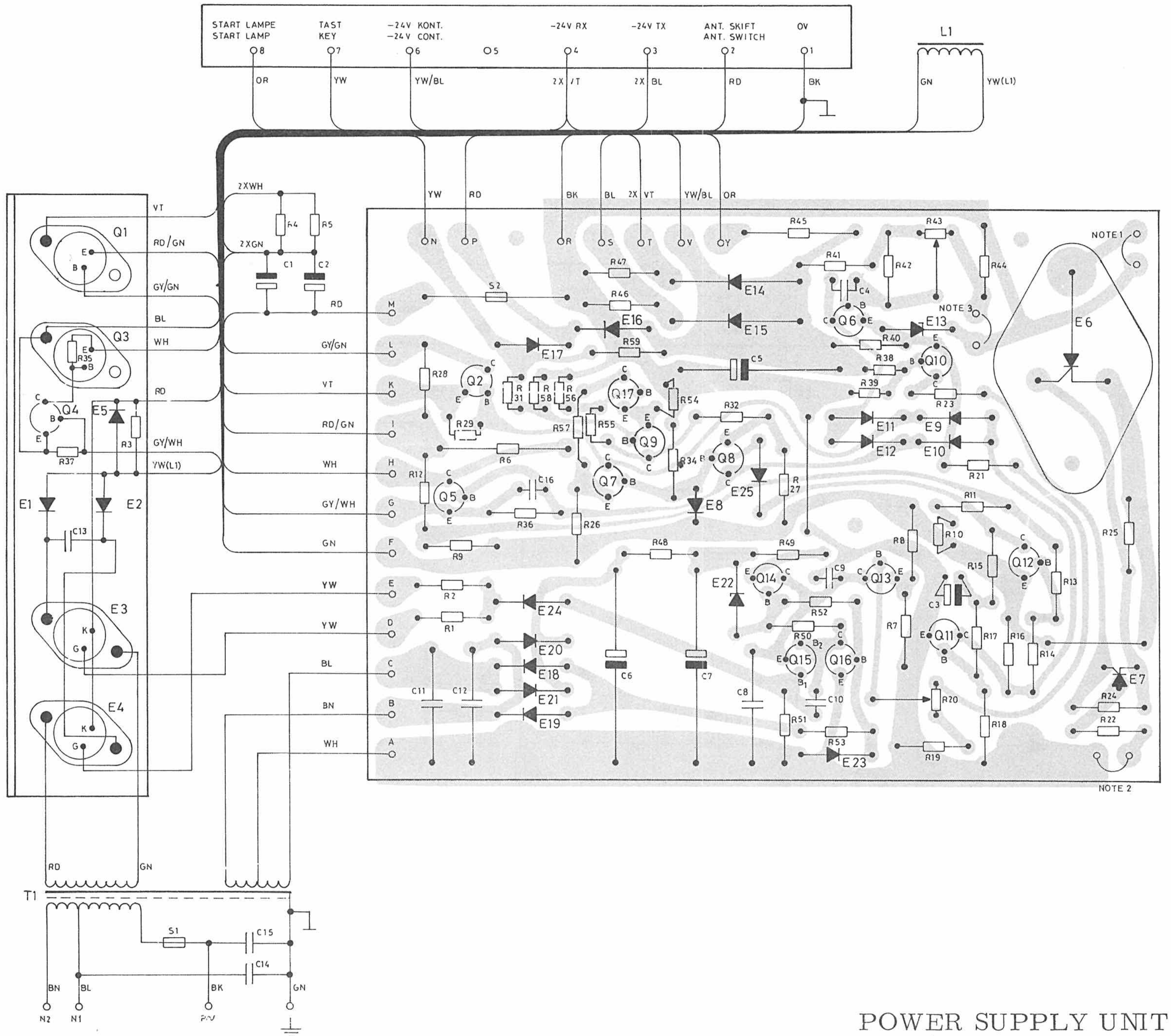
NORMAL OPERATION: NOTE 1 AND NOTE 2 ARE SHORTED NOTE 3 IS OPEN



POWER SUPPLY UNIT
STRØMFORSYNING

PS602b

D401.992/2



POWER SUPPLY UNIT
STRØMFORSYNING

PS602b

D402.1/7

Storno

TYPE	NO.	CODE	DATA
PS602b		10.1352-02	Power Supply Unit
	C1	73.5116	6800 µF -10 +50% elco 50V
	C2	73.5116	6800 µF -10 +50% elco 50V
	C3	73.5126	4.7 µF 20% tantal 35V
	C4	76.5069	1 nF 10% polyest FL 50V
	C5	73.5071	100 µF -10 +50% elco 35V
	C6	73.5117	50 µF -10+100% elco 70V
	C7	73.5117	50 µF -10 +100% elco 70V
	C8	76.5073	0.1 µF 10% polyest FL 100V
	C9	76.5072	47 nF 10% polyest FL 100V
	C10	76.5070	10 nF 10% polyest FL 50V
	C11	76.5073	0.1 µF 10% polyest FL 100V
	C12	76.5073	0.1 µF 10% polyest FL 100V
	C13	76.5078	1 µF 10% polyest 100V
	C14	74.5146	4.7 nF -20 +50% ceram DI 5kV
	C15	74.5146	4.7 nF -20 +50% ceram DI 5kV
	C16	76.5072	47 nF 10% polyest 50V
	R1	80.5236	82 Ω 5% carbon film 1/8W
	R2	80.5236	82 Ω 5% " " 1/8W
	R3	84.5006	1kΩ 5% " " 1/8W
	R4	83.5502	0.33Ω 10% wire wound 4W
	R5	83.5502	0.33Ω 10% wire wound 4W
	R6	82.5205	0.22Ω 10% wire wound 1W
	R7	80.5249	1kΩ 5% carbon film 1/8W
	R8	80.5256	3.9kΩ 5% " " 1/8W
	R9	80.5239	150 Ω 5% " " 1/8W
	R10	89.5004	50 Ω 10% NTC 1W
	R11	80.5232	39 Ω 5% carbon film 1/8W
	R12	80.5230	27 Ω 5% " " 1/8W
	R13	80.5249	1kΩ 5% " " 1/8W
	R14	80.5261	10kΩ 5% " " 1/8W
	R15	80.5264	18 kΩ 5% " " 1/8W
	R16	80.5261	10kΩ 5% " " 1/8W
	R17	80.5263	15 kΩ 5% " " 1/8W
	R18	80.5255	3.3 kΩ 5% " " 1/8W
	R19	80.5263	15kΩ 5% " " 1/8W
	R20	86.5050	5kΩ potentiometer " " 0.1W
	R21	80.5258	5.6kΩ 5% " " 1/8W
	R22	80.5241	220 Ω 5% " " 1/8W
	R23	80.5253	2.2kΩ 5% " " 1/8W
	R24	80.5249	1kΩ 5% " " 1/8W
	R25	80.5243	330 Ω 5% " " 1/8W
	R26	80.5244	390 Ω 5% " " 1/8W
	R27	80.5243	330 Ω 5% " " 1/8W
	R28	80.5244	390 Ω 5% " " 1/8W
	R29	80.5249	1kΩ 5% " " 1/8W

Storno

TYPE	NO.	CODE	DATA
	R30	80.5259	6.8 kΩ 5% carbon film 1/8W
	R31	80.5271	68 kΩ 5% " " 1/8W
	R32	80.5257	4.7 kΩ 5% " " 1/8W
	R33	80.5259	6.8 kΩ 5% " " 1/8W
	R34	80.5260	8.2 kΩ 5% " " 1/8W
	R35	80.5244	390 Ω 5% " " 1/8W
	R36	80.5249	1 kΩ 5% " " 1/8W
	R37	80.5246	500 Ω 5% " " 1/8W
	R38	80.5255	3.3 kΩ 5% " " 1/8W
	R39	80.5250	1.2 kΩ 5% " " 1/8W
	R40	80.5259	6.8 kΩ 5% " " 1/8W
	R41	80.5259	6.8 kΩ 5% " " 1/8W
	R42	80.5242	270 Ω 5% " " 1/8W
	R43	86.5058	1 kΩ potentiometer 0.1W
	R44	80.5254	2.7 kΩ 5% carbon film 1/8W
	R45	82.5207	470 Ω 10% wire wound 1W
	R46	80.5257	4.7 kΩ 5% carbon film 1/8W
	R47	80.5257	4.7 kΩ 5% " " 1/8W
	R48	80.5237	100 Ω 5% " " 1/8W
	R49	80.5257	4.7 kΩ 5% " " 1/8W
	R50	80.5253	2.2 kΩ 5% " " 1/8W
	R51	80.5241	220 Ω 5% " " 1/8W
	R52	80.5271	68 kΩ 5% " " 1/8W
	R53	80.5260	8.2 kΩ 5% " " 1/8W
	R54	80.5248	820 Ω 5% " " 1/8W
	R55	80.5271	68 kΩ 5% " " 1/8W
	R56	80.5264	18 kΩ 5% " " 1/8W
	R57	80.5253	2.2 kΩ 5% " " 1/8W
	R58	80.5269	47 kΩ 5% " " 1/8W
	R59	80.5257	4.7 kΩ 5% " " 1/8W
	L1	60.5140	Filter coil 15 mH 0.27 Ω 3.8A
	T1	60.5139	Mains Transformer 200VA
	S1	92.5088	Fuse / sikring 2A / 250V
	S2	92.5094	Fuse / sikring 4A / 250V
	E1	99.5192	BYX38 Diode
	E2	99.5192	BYX38 Diode
	E3	99.5191	2N3668 Thyristor
	E4	99.5191	2N3668 Thyristor

POWER SUPPLY UNIT PS602b

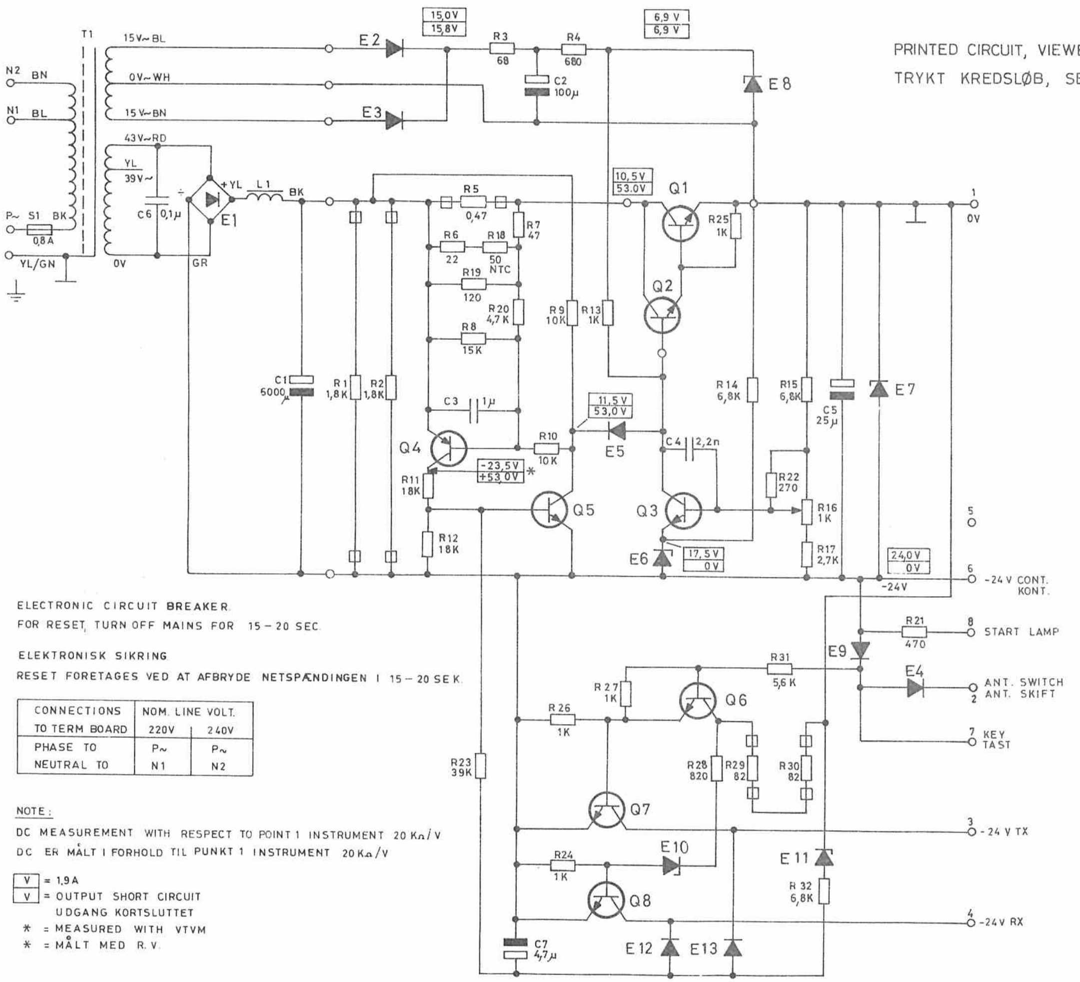
X402.112/2

TYPE	NO.	CODE	DATA
	E5	99.5192	BYX38 Diode
	E6	99.5191	2N3668 Thyristor
	E7	99.5190	C106F2 Thyristor
	E8	99.5209	Stab. diode 1.5V
	E9	99.5028	1N914 Diode
	E10	99.5028	1N914 Diode
	E11	99.5028	1N914 Diode
	E12	99.5028	1N914 Diode
	E13	99.5146	Zenerdiode 6.8V 5% 1/4W
	E14	99.5220	1N5401 Diode
	E15	99.5220	1N5401 Diode
	E16	99.5020	1N4004
	E17	99.5020	1N4004
	E18	99.5020	1N4004
	E19	99.5020	1N4004
	E20	99.5020	1N4004
	E21	99.5020	1N4004
	E22	99.5042	Zenerdiode 9.1V 5% 1/4W
	E23	99.5028	1N914 Diode
	E24	99.5020	1N4004
	E25	99.5028	1N914 Diode
	Q1	99.5171	2N3055 Transistor
	Q2	99.5115	2N2905 A Transistor
	Q3	99.5171	2N3055 Transistor
	Q4	99.5254	MM5006 Transistor
	Q5	99.5251	BC177 Transistor
	Q6	99.5251	BC177 Transistor
	Q7	99.5121	BC107 Transistor
	Q8	99.5121	BC107 Transistor
	Q9	99.5251	BC177 Transistor
	Q10	99.5251	BC177 Transistor
	Q11	99.5251	BC177 Transistor
	Q12	99.5121	BC107 Transistor
	Q13	99.5121	BC107 Transistor
	Q14	99.5251	BC177 Transistor
	Q15	99.5194	2N2646 UTJ Transistor
	Q16	99.5121	BC107 Transistor
	Q17	99.5251	BC177 Transistor

Storno

TYPE	NO.	CODE	DATA

POWER SUPPLY UNIT PS602b



ELECTRONIC CIRCUIT BREAKER.
FOR RESET, TURN OFF MAINS FOR 15 – 20 SEC.

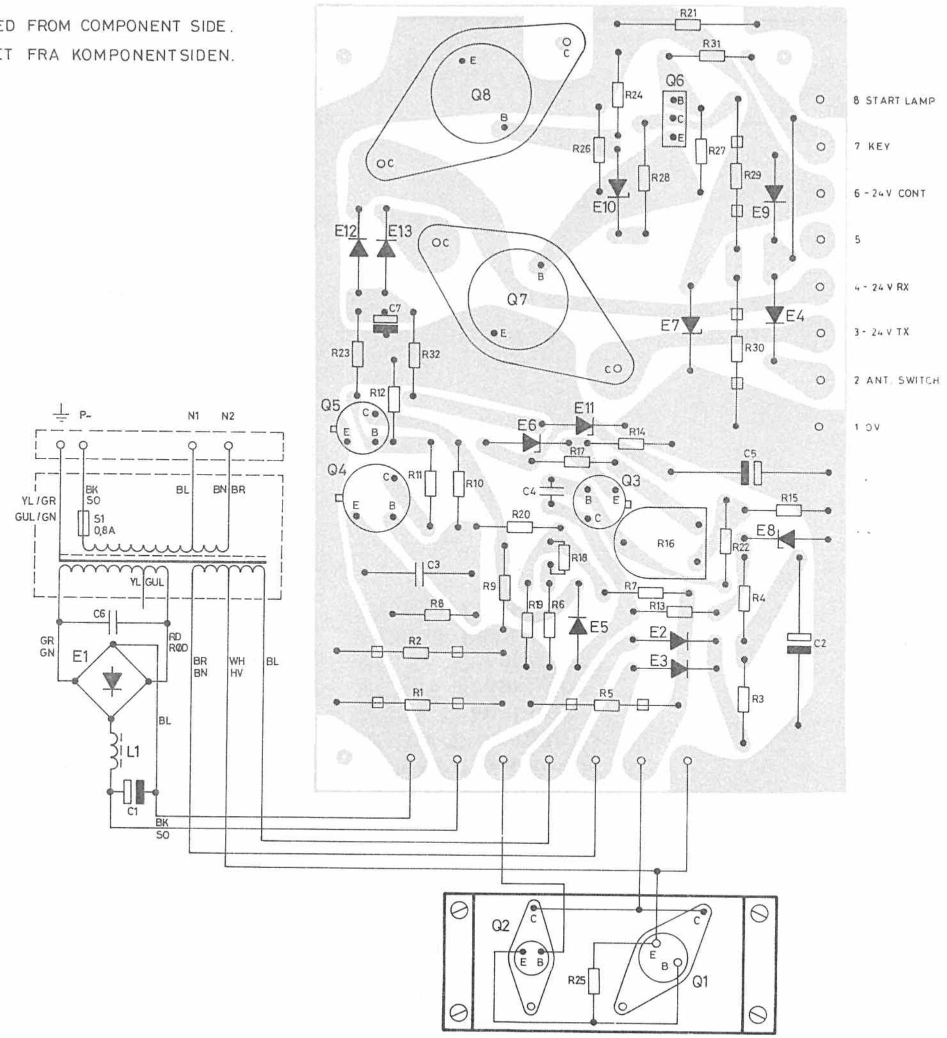
ELEKTRONISK SIKRING
RESET FORETAGES VED AT AFBRYDE NETSPÆNDINGEN I 15 – 20 SEK.

CONNECTIONS TO TERM BOARD	NOM. LINE VOLT. 220V	240V
PHASE TO	P~	P~
NEUTRAL TO	N1	N2

NOTE:
DC MEASUREMENT WITH RESPECT TO POINT 1 INSTRUMENT 20 KΩ/V
DC ER MÅLT I FORHOLD TIL PUNKT 1 INSTRUMENT 20 KΩ/V

V = 1,9A
V = OUTPUT SHORT CIRCUIT UDGANG KORTSLUTTET
* = MEASURED WITH VTVM
* = MÅLT MED R.V.

PRINTED CIRCUIT, VIEWED FROM COMPONENT SIDE.
TRYKT KREDSLØB, SET FRA KOMPONENTSIDEN.



POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS603a

D 401.721/2

Storno

TYPE	NO.	CODE	DATA	
PS603a		10.1240-01	Power Supply Unit	
	C1	73.5111	6000 µF -10+50% elco	75/90 V
	C2	73.5071	100 µF -10+50% elco	35 V
	C3	76.5089	1 µF 10% polycarb. FL	100 V
	C4	76.5059	2.2 nF 10 polyest FL	50 V
	C5	73.5107	25 µF -10+100% elco	35 V
	C6	76.5073	0.1 µF 10% polyest TB	100 V
	C7	73.5126	4.7 µF 20% tantal	35 V
	R1	84.5001	1.8 KΩ 5% wirewound	5.5 W
	R2	84.5001	1.8 KΩ 5% -	5.5 W
	R3	80.5235	68 Ω 5% carbon film	1/8 W
	R4	80.5247	680 Ω 5% -	1/8 W
	R5	83.5501	0.47 Ω 10% wirewound	4 W
	R6	80.5229	22 Ω 5% carbon film	1/8 W
	R7	80.5233	47 Ω 5% -	1/8 W
	R8	80.5263	15 KΩ 5% -	1/8 W
	R9	80.5261	10 KΩ 5% -	1/8 W
	R10	80.5261	10 KΩ 5% -	1/8 W
	R11	80.5264	18 KΩ 5% -	1/8 W
	R12	80.5264	18 KΩ 5% -	1/8 W
	R13	80.5249	1 KΩ 5% -	1/8 W
	R14	80.5259	6.8 KΩ 5% -	1/8 W
	R15	80.5259	6.8 KΩ 5% -	1/8 W
	R16	86.5058	1 KΩ 20% potentiometer lin.	0.1 W
	R17	80.5254	2.7 KΩ 5% carbon film	1/8 W
	R18	89.5004	50 Ω 10% NTC	1 W
	R19	80.5238	120 Ω 5% carbon film	1/8 W
	R20	80.5257	4.7 KΩ 5% -	1/8 W
	R21	82.5207	470 Ω 10% wirewound	1 W
	R22	80.5242	270 Ω 5% carbon film	1/8 W
	R23	80.5268	39 KΩ 5% -	1/8 W
	R24	80.5249	1 KΩ 5% -	1/8 W
	R25	80.5249	1 KΩ 5% -	1/8 W
	R26	80.5249	1 KΩ 5% -	1/8 W
	R27	80.5249	1 KΩ 5% -	1/8 W
	R28	80.5448	820 Ω 5% -	1/4 W
	R29	84.5224	82 Ω 5% wirewound	4 W
	R30	84.5224	82 Ω 5% -	4 W
	R31	80.5258	5.6 KΩ 5% carbon film	1/8 W
	R32	80.5259	6.8 KΩ 5% -	1/8 W
	L1	60.5136	Filter choke 60 mH 2A	0.5 Ω
	T1	60.5135	Mains transformer 100 VA	50 Hz
	E1	99.5174	Rectifier 100 V 3 A	
	E2	99.5020	1N4004 Diode	

Storno

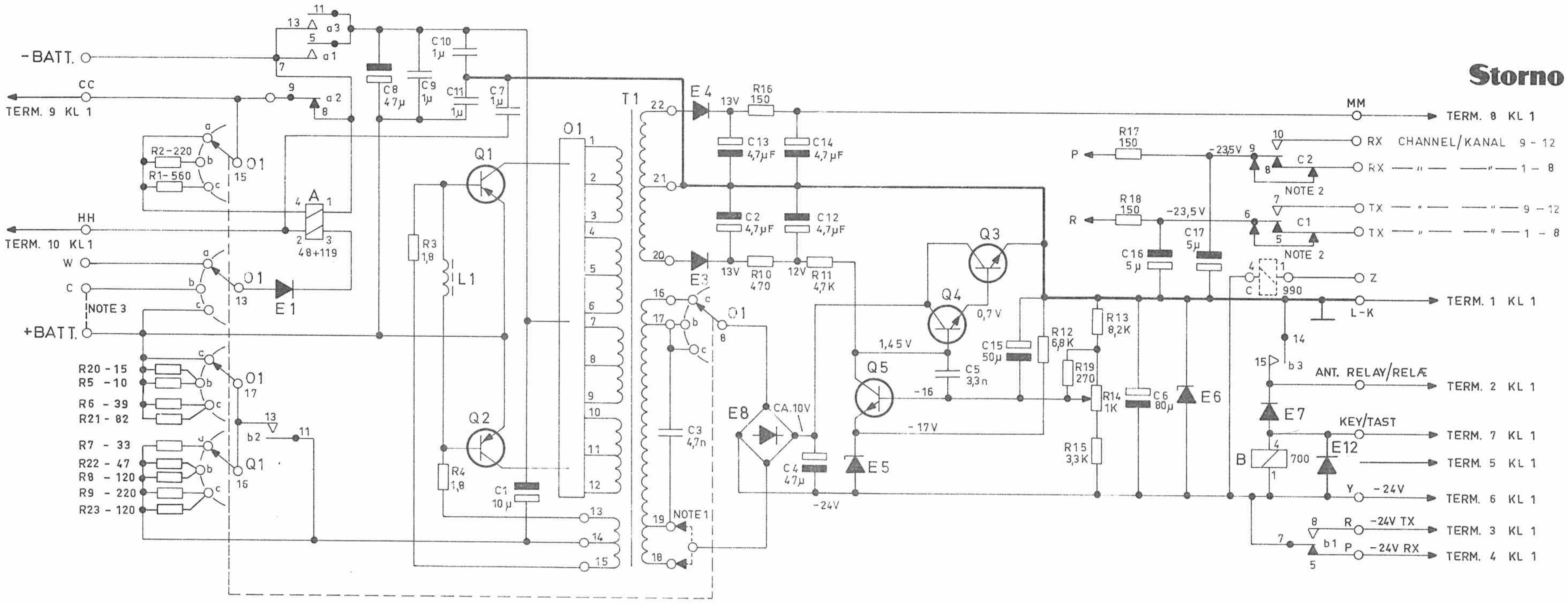
TYPE	NO.	CODE	DATA	
	E3	99.5020	1N4004 Diode	
	E4	99.5020	1N4004 Diode	
	E5	99.5028	1N914 Diode	
	E6	99.5146	Zenerdiode 6.8 V 5%	1/4 W
	E7	99.5132	Zenerdiode 30 V 5%	1/4 W
	E8	99.5146	Zenerdiode 6.8 V 5%	1/4 W
	E9	99.5020	1N4004 Diode	
	E10	99.5114	Zenerdiode 5.6 V 5%	1/4 W
	E11	99.5205	Zenerdiode 15 V 5%	1/4 W
	E12	99.5028	1N914 Diode	
	E13	99.5028	1N914 Diode	
	Q1	99.5171	2N3055 Transistor	
	Q2	99.5193	2N3054 Transistor	
	Q3	99.5121	BC107 Transistor	
	Q4	99.5173	2S301 Transistor	
	Q5	99.5214	BCY65 Transistor	
	Q6	99.5235	BD135 Transistor	
	Q7	99.5171	2N3055 Transistor	
	Q8	99.5171	2N3055 Transistor	

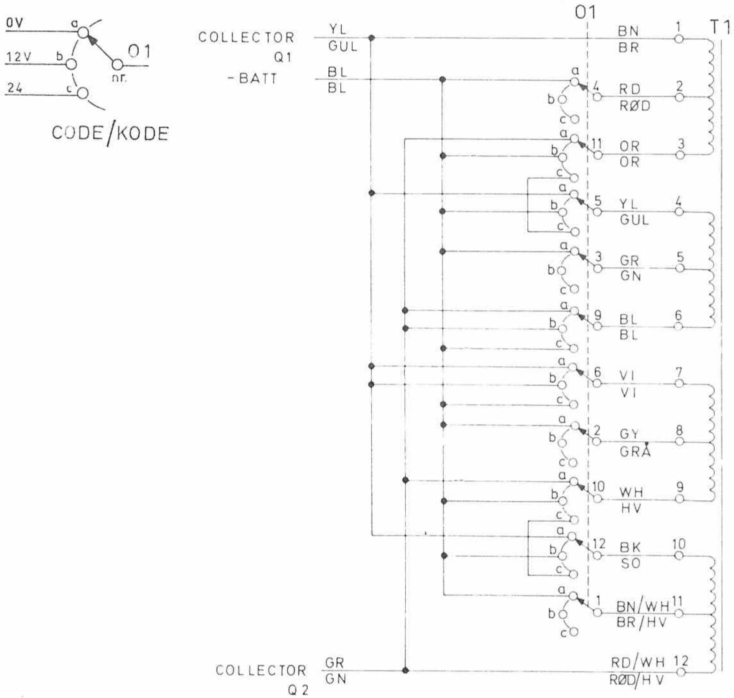
POWER SUPPLY UNIT
STRØMFORSYNING

PS603a

X401.796

Storno





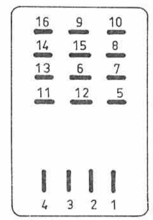
Note 1. Normal supply voltage: Connect E8-11 to term. 18 on T1.
High supply voltage: Connect E8-11 to term. 19 on T1.

Normal driftspænding: Forbind E8-11 til terminal 18 på T1.
Høj driftspænding: Forbind E8-11 til terminal 19 på T1.

Note 2. Group switching relay C is inserted if more than 8 frequency channels are provided.
If relay C is omitted two strappings will be made (as shown).

Gruppeskifterelæ C er isat, hvis anlægget er bestykket med mere end 8 frekvenskanaler.
Er relæ C udeladt, indlægges de viste to strapninger.

Note 3. Connection for operating on 12 V.
Forbindelse ved 12 V drift.



RELAY/RELÆ A-B-C
BOTTOM VIEW
SET FRA BUNDEN

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS604

D400.790/5

TYPE	NO.	CODE	DATA	
	C1	73.5100	10 µF -10/+100 % elco	35 V
	C2	73.5105	15 µF ± 20 % tantal	15 V
	C3	76.5061	4,7 nF 10 % polyest. FL	50 V
	C4	73.5101	47 µF -10/+100 % elco	75/90 V
	C5	76.5060	3,3 nF 10% polyest. FL	50 V
	C6	73.5110	80 µF -10/+50% elco	25 V
	C7	76.5078	1 µF 10 % polyest. TB	100 V
	C8	73.5101	47 µF -10/+100 % elco	75/90 V
	C9	76.5078	1 µF 10% polyest. TB	100 V
	C10	76.5078	1 µF 10% polyest. TB	100 V
	C11	76.5078	1 µF 10% polyest. TB	100 V
	C12	73.5105	15 µF ± 20% tantal	15 V
	C13	73.5105	15 µF ± 20% tantal	15 V
	C14	73.5105	15 µF ± 20% tantal	15 V
	C15	73.5030	50 µF -10/+100% elco	25 V
	C16	73.5064	2 µF -10/+100% elco	70 V
	C17	73.5064	2 µF -10/+100% elco	70 V
	R1	82.5046	560 Ω 5% carbon film	1 W
	R2	81.5041	220 Ω 5% " "	1/2 W
	R3	84.5022	1,8 Ω 10% wirewound	5 W
	R4	84.5022	1,8 Ω 10% "	5 W
	R5	84.5019	10 Ω 10% "	5,5 W
	R6	81.5032	39 Ω 5% carbon film	1/2 W
	R7	81.5031	33 Ω 5% " "	1/2 W
	R8	80.5438	120 Ω 5% " "	1/4 W
	R9	80.5441	220 Ω 5% " "	1/4 W
	R10	80.5245	470 Ω 5% " "	1/8 W
	R11	80.5257	4,7 kΩ 5% " "	1/8 W
	R12	80.5259	6,8 kΩ 5% " "	1/8 W
	R13	80.5260	8,2 kΩ 5% " "	1/8 W
	R14	86.5045	1 kΩ potm. lin. carbon film	0.15 W
	R15	80.5255	3,3 kΩ 5% carbon film	1/8 W
	R16	80.5239	150 Ω 5% " "	1/8 W
	R17	80.5239	150 Ω 5% " "	1/8 W
	R18	80.5239	150 Ω 5% " "	1/8 W
	R19	80.5242	270 Ω 5% " "	1/8 W
	R20	81.5027	15Ω 5% " "	1/2 W
	R21	81.5036	82 Ω 5% " "	1/2 W
	R22	80.5433	47 Ω 5% " "	1/4 W
	R23	80.5438	120 Ω 5% " "	1/4 W
	L1	61.803	Coil/spole	
	T1	60.5133	Transformer 6-12-24V/24V 70VA 1-3kHz	
	ReA	58.5053	Relay/Relæ 6V 48 + 119Ω 1-1-2	
	ReB	58.5052	Relay/Relæ 24V 700 Ω 21-21	

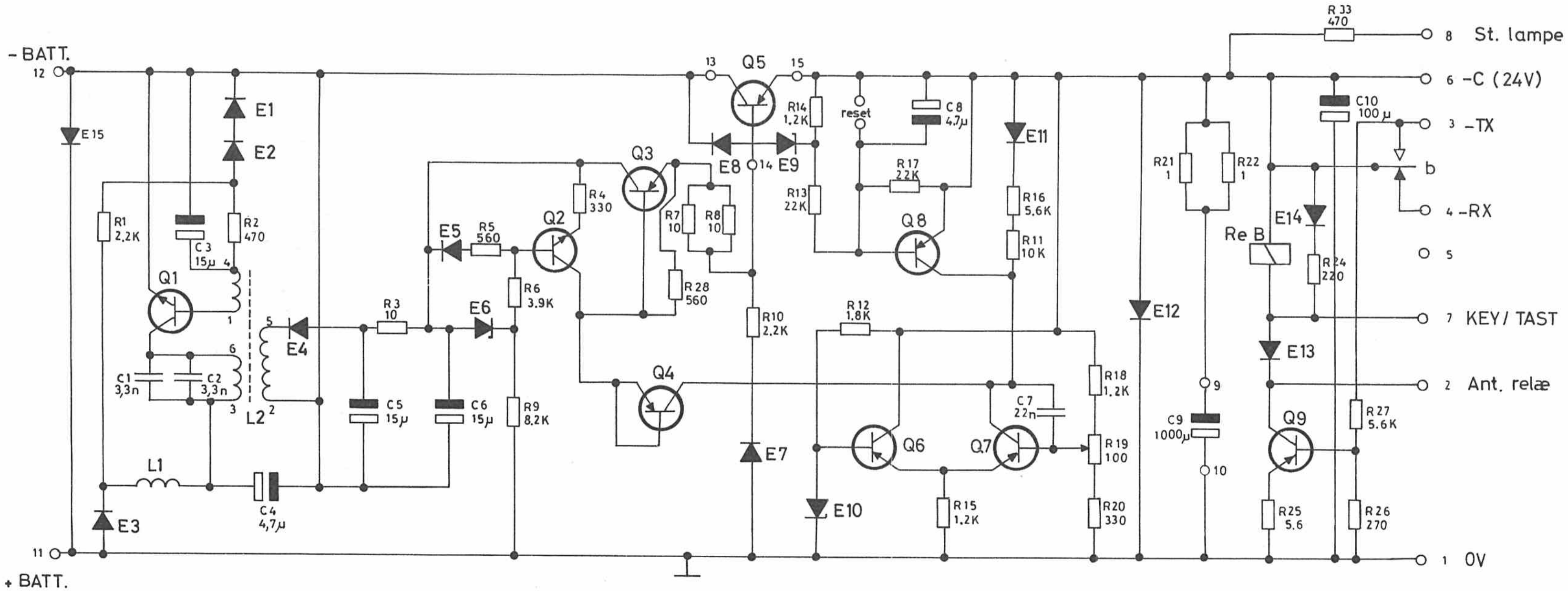
TYPE	NO.	CODE	DATA
	ReC	58.5055	Relay/Relæ 24V 890 Ω 21-21-21-21
	01	47.367	Selector/omskifter
	E1	99.5020	Diode 1N4004
	E3	99.5020	Diode 1N4004
	E4	99.5020	Diode 1N4004
	E5	99.5146	Zenerdiode 6,9V 5% 0,275 W
	E6	99.5132	Zenerdiode 30V 5% 0,2 W
	E7	99.5020	Diode 1N4004
	E8	99.5174	Rectifier 3A 100V
	E12	99.5020	Diode 1N4004
	Q1	99.5126	Transistor 2N2492
	Q2	99.5126	Transistor 2N2492
	Q3	99.5130	Transistor 40251
	Q4	99.5128	Transistor 2N3053
	Q5	99.5121	Transistor BC107

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS604

X400.862/2

Storno



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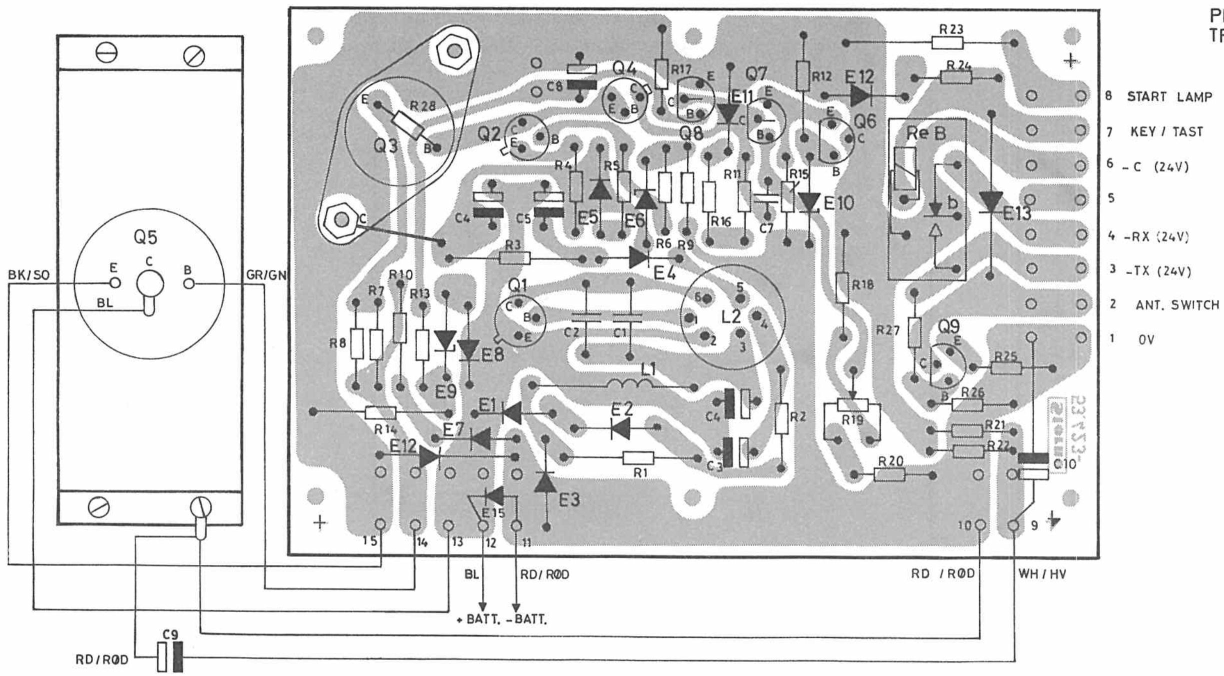


PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS605

D401.264/3

Storno

NO	CODE	DATA	
PS605	10.1353	Power Supply Unit	
C1	76.5020	3,3 nF 5% polystyr TB	160V
C2	76.5020	3,3 nF 5% polystyr TB	160V
C3	73.5105	15 uF 20% tantal	15V
C4	73.5126	4,7 uF 20% tantal	35V
C5	73.5105	15 uF 20% tantal	15V
C6	73.5105	15 uF 20% tantal	15V
C7	76.5071	22 nF 10% polyest. FL	50V
C8	73.5103	4,7 uF 20% tantal	15V
C9	73.5115	1000 uF -10/+100% elco	50V
C10	73.5071	100 uF elco	40V
R1	81.5053	2,2 kOhm 5% carbon film	1/2W
R2	80.5445	470 Ohm 5% carbon film	1/4W
R3	81.5025	10 Ohm 5% carbon film	1/2W
R4	80.5243	330 Ohm 5% carbon film	1/8W
R5	80.5246	560 Ohm 5% carbon film	1/8W
R6	80.5256	3,9 kOhm 5% carbon film	1/8W
R7	80.5225	10 Ohm 5% carbon film	1/8W
R8	80.5225	10 Ohm 5% carbon film	1/8W
R9	80.5260	8,2 kOhm 5% carbon film	1/8W
R10	80.5453	2,2 kOhm 5% carbon film	1/4W
R11	80.5261	10 kOhm 5% carbon film	1/8W
R12	80.5452	1,8 kOhm 5% carbon film	1/4W
R13	80.5265	22 kOhm 5% carbon film	1/8W
R14	81.5050	1,2 kOhm 5% carbon film	1/2W
R15	80.5250	1,2 kOhm 5% carbon film	1/8W
R16	80.5258	5,6 kOhm 5% carbon film	1/8W
R17	80.5265	22 kOhm 5% carbon film	1/8W
R18	80.5450	1,2 kOhm 5% carbon film	1/4W
R19	86.5051	100 Ohm 20% potm. carb. film	0, 1W
R20	80.5243	330 Ohm 5% carbon film	1/8W
R21	80.5213	1 Ohm 5% carbon film	1/8W
R22	80.5213	1 Ohm 5% carbon film	1/8W
R23	84.5005	470 Ohm 10% wirewound/trådvik.	5, 5W
R24	80.5241	220 Ohm 5% carbon film	1/8W
R25	80.5222	5,6 Ohm 5% carbon film	1/8W
R26	80.5242	270 Ohm 5% carbon film	1/8W
R27	80.5258	5,6 kOhm 5% carbon film	1/8W
R28	80.5246	560 Ohm 5% carbon film	1/8W
L1	61.5005	1 mH 10% choke/drossel 150 mA	
L2	61.1032	Converter transformer	

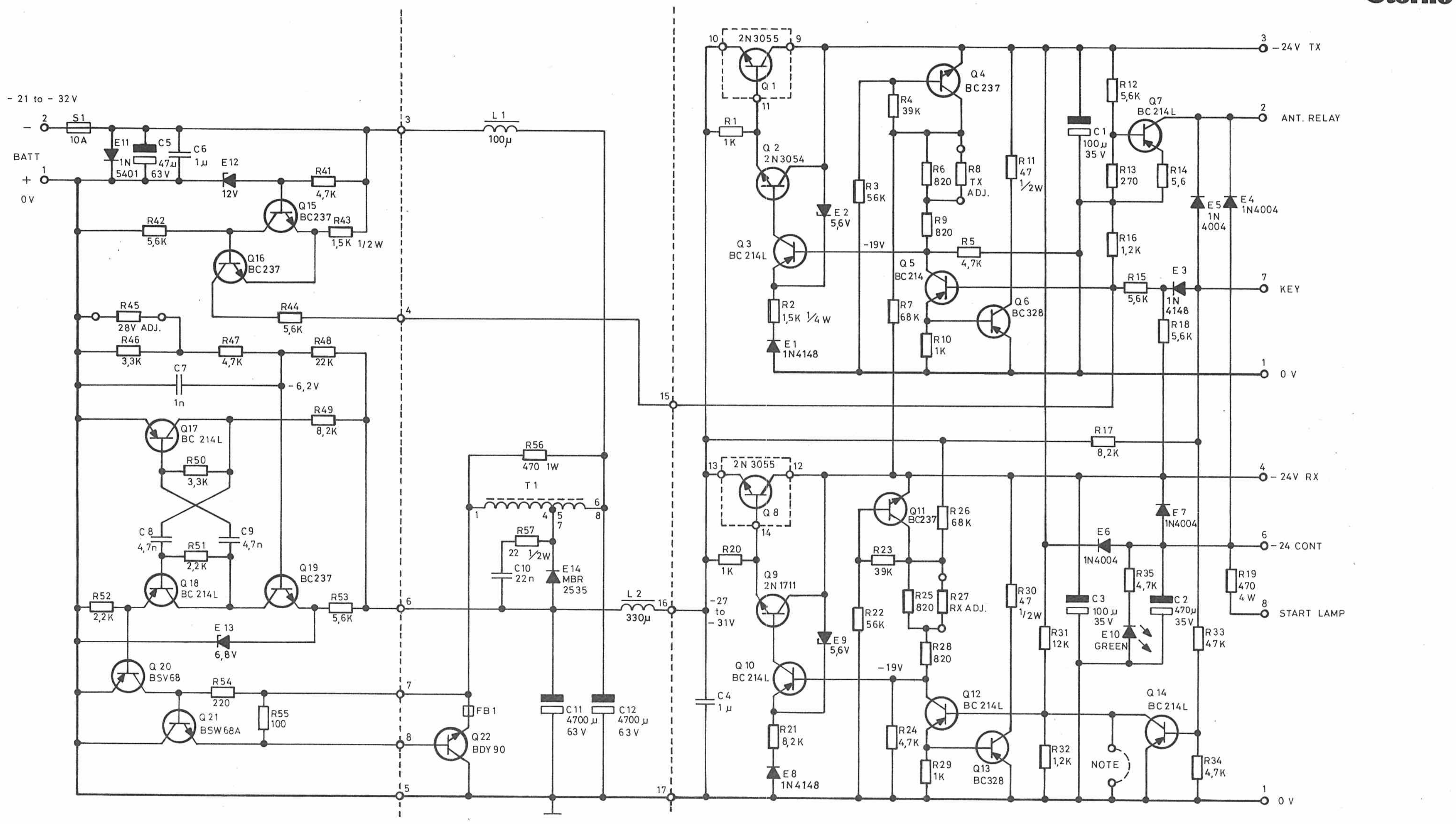
Storno

NO	CODE	DATA	
ReB	58.5068	Relay/Relæ 24V 970 Ohm, 21	
E1	99.5237	Diode 1N4148	
E2	99.5237	Diode 1N4148	
E3	99.5237	Diode 1N4148	
E4	J706282P1	Diode BY201/2, MR812	
E5	99.5237	Diode 1N4148	
E6	99.5114	Zenerdiode 5,6V 5%	0,4W
E7	99.5237	Diode 1N4148	
E8	99.5237	Diode 1N4148	
E9	99.5114	Zenerdiode 5,6V 5%	0,4W
E10	99.5114	Zenerdiode 5,6V 5%	0,4W
E11	99.5237	Diode 1N4148	
E12	99.5020	Diode 1N4004	
E13	99.5020	Diode 1N4004	
E14	99.5237	Diode 1N4148	
E15	99.5220	Diode 1N5401	
Q1	J706592P1	Transistor BSW68A	
Q2	99.5121	Transistor BC237	
Q3	99.5207	Transistor AD131	
Q4	99.5106	Transistor AC125	
Q5	99.5126	Transistor 2N2492	
Q6	99.5144	Transistor BC214L/BC257	
Q7	99.5144	Transistor BC214L/BC257	
Q8	99.5144	Transistor BC214L/BC257	
Q9	99.5144	Transistor BC214L/BC257	

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS605

X401.265/2

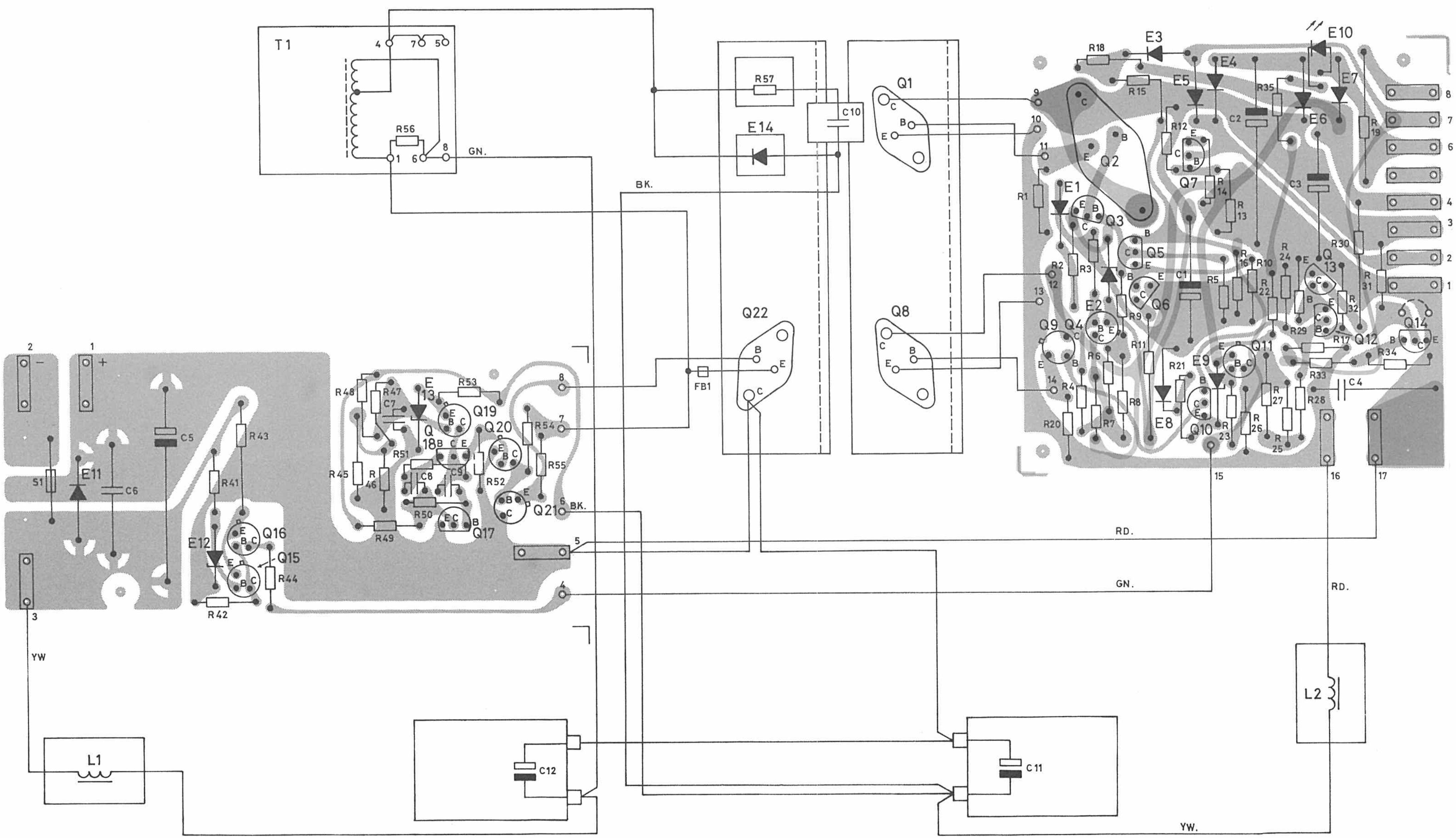


NOTE: OPEN CIRCUIT IN SIMPLEX OPERATION
SHORT CIRCUIT IN DUPLEX OPERATION

POWER SUPPLY PS2605

D402.345/4

Storno



POWER SUPPLY PS2605

D402.538/2

Storno

Nº	CODE	DATA	
PS2605	10.3491-00	Power Supply Unit	
	15.0290-00	Sub.assembly	
	15.0291-00	Sub.assembly	
C1	73.5071	100 uF elco	35V
C2	73.5147	470 uF elco	40V
C3	73.5071	100 uF elco	35V
C4	76.5078	1 uF 10% polyest.	100V
C5	73.5117	47 uF 20% elco	63V
C6	76.5078	1 uF 10% polyest.	100V
C7	76.5069	1 nF 10% polyest.	50V
C8	76.5061	4,7 nF 10% polyest.	50V
C9	76.5061	4,7 nF 10% polyest.	50V
C10	76.5071	22 nF 10% polyest.	50V
C11	73.5163	4700 uF -10+50% elco	63V
C12	73.5163	4700 uF -10+50% elco	63V
R1	80.5249	1 kOhm 5% carbon film	1/8W
R2	80.5251	1,5 kOhm 5% carbon film	1/8W
R3	80.5270	56 kOhm 5% carbon film	1/8W
R4	80.5268	39 kOhm 5% carbon film	1/8W
R5	80.5257	4,7 kOhm 5% carbon film	1/8W
R6	80.5248	820 Ohm 5% carbon film	1/8W
R7	80.5271	68 kOhm 5% carbon film	1/8W
R8	80.52xx	ADJ 5% carbon film	1/8W
R9	80.5248	820 Ohm 5% carbon film	1/8W
R10	80.5249	1 kOhm 5% carbon film	1/8W
R11	81.5033	47 Ohm 5% carbon film	1/8W
R12	80.5258	5,6 kOhm 5% carbon film	1/8W
R13	80.5242	270 Ohm 5% carbon film	1/8W
R14	80.5222	5,6 Ohm 5% carbon film	1/8W
R15	80.5258	5,6 kOhm 5% carbon film	1/8W
R16	80.5250	8,2 kOhm 5% carbon film	1/8W
R17	80.5260	8,2 kOhm 5% carbon film	1/8W
R18	80.5258	5,6 kOhm 5% carbon film	1/8W
R19	84.5004	470 Ohm 5% wire wound	4,2W
R20	80.5239	1 kOhm 5% carbon film	1/8W
R21	80.5260	8,2 kOhm 5% carbon film	1/8W
R22	80.5270	56 kOhm 5% carbon film	1/8W
R23	80.5268	39 kOhm 5% carbon film	1/8W
R24	80.5257	4,7 kOhm 5% carbon film	1/8W
R25	80.5248	820 Ohm 5% carbon film	1/8W
R26	80.5271	68 kOhm 5% carbon film	1/8W

Storno

Nº	CODE	DATA	
R27	80.52xx	ADJ 5% carbon film	1/8W
R28	80.5248	820 Ohm 5% carbon film	1/8W
R29	80.5249	1 kOhm 5% carbon film	1/8W
R30	81.5033	47 Ohm 5% carbon film	1/2W
R31	80.5262	12 kOhm 5% carbon film	1/8W
R32	80.5250	1,2 kOhm 5% carbon film	1/8W
R33	80.5269	47 kOhm 5% carbon film	1/8W
R34	80.5257	4,7 kOhm 5% carbon film	1/8W
R35	80.5257	4,7 kOhm 5% carbon film	1/8W
R41	80.5257	4,7 kOhm 5% carbon film	1/8W
R42	80.5258	5,6 kOhm 5% carbon film	1/8W
R43	81.5051	1,5 kOhm 5% carbon film	1/2W
R44	80.5258	5,6 kOhm 5% carbon film	1/8W
R45	80.52xx	ADJ 5% carbon film	1/8W
R46	80.5255	3,3 kOhm 5% carbon film	1/8W
R47	80.5257	4,7 kOhm 5% carbon film	1/8W
R48	80.5265	22 kOhm 5% carbon film	1/8W
R49	80.5260	8,2 kOhm 5% carbon film	1/8W
R50	80.5255	3,3 kOhm 5% carbon film	1/8W
R51	80.5253	2,2 kOhm 5% carbon film	1/8W
R52	80.5253	2,2 kOhm 5% carbon film	1/8W
R53	80.5258	5,6 kOhm 5% carbon film	1/8W
R54	80.5241	220 Ohm 5% carbon film	1/8W
R55	80.5237	100 Ohm 5% carbon film	1/8W
R56	82.5207	470 Ohm 10% wire wound	1W
R57	81.5029	22 Ohm 5% carbon film	1/2W
L1	61.5048	100 uH choke	0.05Ohm
L2	61.5049	330 uH choke	0,1Ohm
T1	60.5168	Transformer	
E1	99.5028	1N4148 Diode	
E2	99.5114	5,6V 5% Zenerdiode	0,4W
E3	99.5028	1N4148 Diode	
E4	99.5020	1N4004 Diode	
E5	99.5020	1N4004 Diode	
E6	99.5020	1N4004 Diode	
E7	99.5020	1N4004 Diode	
E8	99.5028	1N4148 Diode	

POWER SUPPLY PS2605

X402.493/4

Nº	CODE	DATA	
E9	99.5114	5,6V 5% Zenerdioede	0,4W
E10	99.5314	Green LED 1,9V 10mA	
E11	99.5220	1N5401 Diode	
E12	99.5223	12V 5% Zenerdiode	0,4W
E13	99.5146	6,8V 5% Zenerdiode	0,4W
E14	99.5330	MBR 2535 Diode	
Q1	99.5171	2N3055 Transistor	
Q2	99.5193	2N3054 Transistor	
Q3	99.5144	BC 214L Transistor	
Q4	99.5121	BC 237 Transistor	
Q5	99.5144	BC 214L Transistor	
Q6	99.5305	BC 328 Transistor	
Q7	99.5144	BC 214L Transistor	
Q8	99.5171	2N3055 Transistor	
Q9	99.5216	2N1711 Transistor	
Q10	99.5144	BC 214L Transistor	
Q11	99.5121	BC 237 Transistor	
Q12	99.5144	BC 214L Transistor	
Q13	99.5305	BC 328 Transistor	
Q14	99.5144	BC 214L Transistor	
Q15	99.5121	BC 237 Transistor	
Q16	99.5121	BC 237 Transistor	
Q17	99.5144	BC 214L Transistor	
Q18	99.5144	BC 214L Transistor	
Q19	99.5121	BC 237 Transistor	
Q20	99.5329	BSV 68 Transistor	
Q21	J706932P1	BSW 68A Transistor	
Q22	99.5328	BDY 90 Transistor	
S1	92.5114	Fuse 10 A	

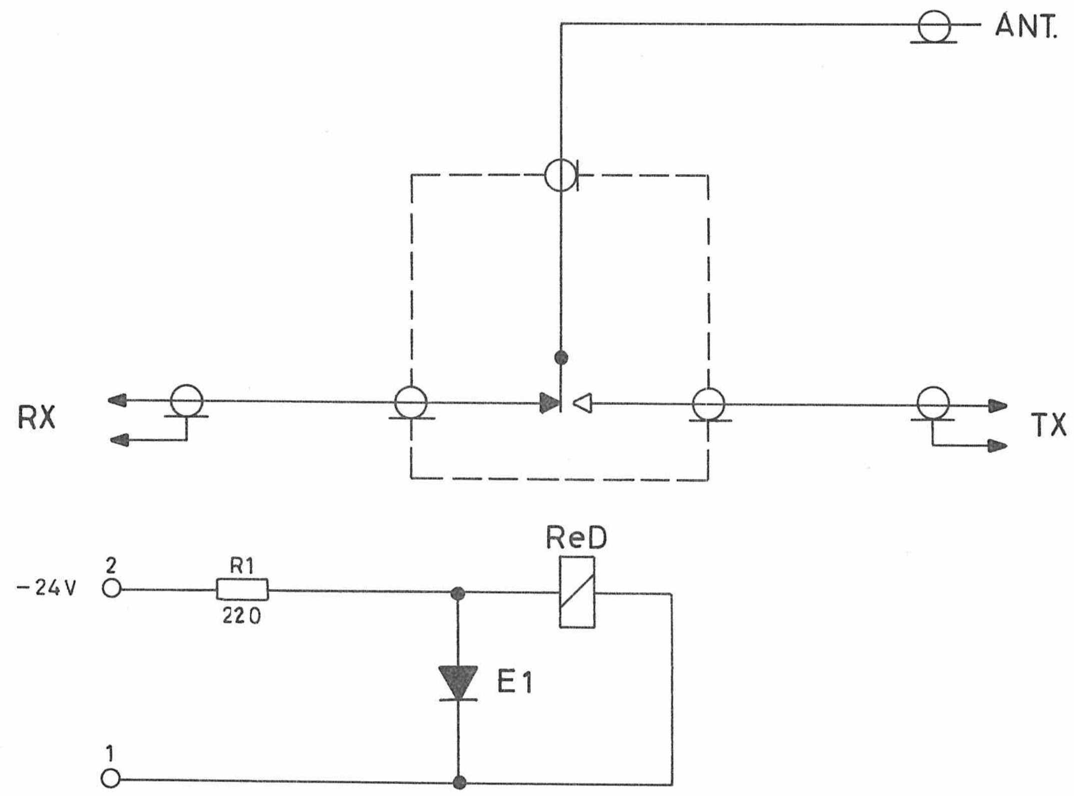
Storno

Nº	CODE	DATA
QTY		MECHANICAL PARTS:
1	65.5040	Ferrite bead
1	11.0505	Chassis plate
1	11.1105	Mounting plate
8	31.0269	Spacer
14	34.0025	Solder terminal
2	34.0036	Solder terminal
17	34.0065	Solder terminal
3	34.5011	Solder lug
1	38.5014	Clamp
2	38.5023	Mounting bracket
1	42.5020	Terminal block
2	46.5017	Fuse holder
1	51.0175	Type-plate, -label
1	51.0504	Insulating plate
2	59.0045	Heat sink
6	59.5007	Insulating bush
1	59.5012	Mounting kit f. D0-4
1	59.5013	Transistor pad
2	99.5018	Insulating washer, mica
8	20022-02610	Screw M2,6x10mm
5	20022-03006	Screw M3x6mm
2	20022-03012	Screw M3x12mm
1	20022-03016	Screw M3x16mm
4	20022-03020	Screw M3x20mm
4	20022-04006	Screw M4x6mm
6	20022-04008	Screw M4x8mm
6	20022-04012	Screw M4x12mm
2	2202-030055	Nut M3
6	2202-040070	Nut M4
1	2202-050080	Washer, Nut M5
6	2401-090043	Washer, 9x4,3x1mm
8	2450-048027	Spring washer, 4,8x2,7x0,3mm
8	2450-060032	Spring washer, 6,0x3,2x0,4mm
16	2450-080043	Spring washer, 8,0x4,3x0,5mm

POWER SUPPLY UNIT PS2605

X402.493/4

Storno



ANTENNE SWITCH UNIT
ANTENNE SKIFTEENHED
AS 662a

D400.882/4

Storno

TYPE	NO.	CODE	DATA	
	E1	99.5020.	IN4004 Diode	
	R1	J706251P29	220 Ω 5% carbon film	1W
	ReD	58.5067	Relay/Relæ 220 Ω	12V

Storno

TYPE	NO.	CODE	DATA

ANTENNE SWITCH UNIT
ANTENNE SKIFTEENHED

AS662a

X401.137/3

GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

Resistors (R)

- Resistor
- Resistor with fixed tap
- Variable resistor
- Resistor with movable tap
- VDR — Varistor (voltage-dependent resistor)
- NTC — 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 (GATE, DRAIN, SOURCE)
- P-channel JFET
- N-channel dual gate JFET (GATE, DRAIN, GATE 2 (SUBSTR.), SOURCE)
- P-channel dual gate JFET
- N-channel JFET tetrode (GATE 1, GATE 2, DRAIN, SOURCE)
- P-channel JFET tetrode

Insulated Gate Field Effect Transistors (IGFET or MOS)

- N-channel IGFET (MOS) (GATE, DRAIN, SUBSTR., SOURCE)
- P-channel IGFET (MOS)
- N-channel dual gate IGFET (MOS) (GATE 1, GATE 2, DRAIN, SOURCE)
- P-channel dual gate IGFET (MOS)

Integrated Circuits (IC)

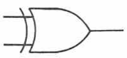
Several integrated circuits contained within one case are designated by one common number followed by an identifying letter (a, b, c etc.). Thus, circuits IC1a, IC1b and IC1c are contained within one case.

Gates

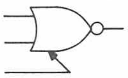
- AND gate
- OR gate
- NAND gate
- NOR gate

GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

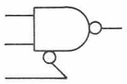
Gates, continued



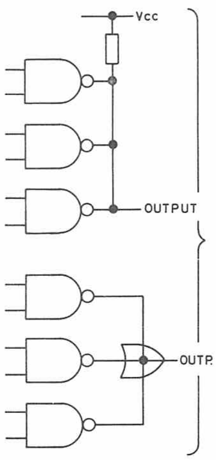
Exclusive OR gate



NOR gate with expander input (high)



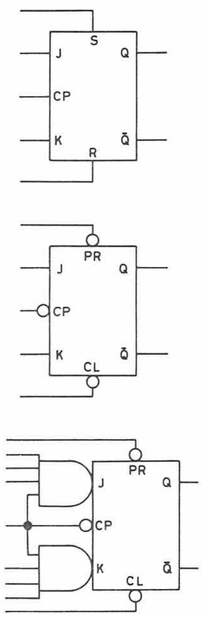
NAND gate with expander input (low)



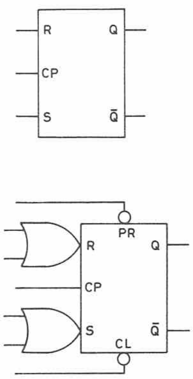
Wired-OR (combined OR outputs) (presentation at top is used in detailed diagrams; presentation below is used in functional diagrams)

Flip-flops

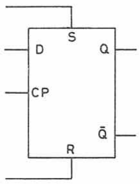
Abbreviations used: S = Set
R = Reset
CP = Clock Pulse
PR = Preset
CL = Clear



J-K Flip-flops

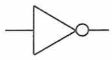


R-S Flip-flops



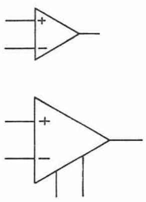
D Flip-flop

Inverters



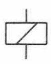
Inverter

Operational Amplifiers

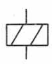


Operational amplifiers

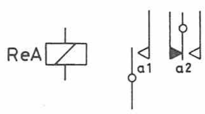
Relays (RE)



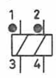
Single-coil relay



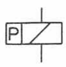
Dual-coil relay



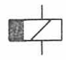
Relay with make contacts and change-over contacts



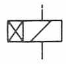
Relay with direction of winding indicated. Dot indicates two coils wound in the same direction



Polarized relay



Coil for slow-release relay



Coil for slow-acting relay

Contacts

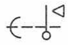
Contacts are always shown in their non-operated positions unless otherwise specified

Make contacts

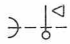
Break contacts

Change-over contacts

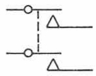
Change-over contacts, centre off



Make contacts, delayed operation

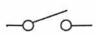


Make contacts, delayed release

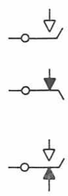


Mechanically coupled make contacts

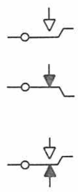
Switches and Keys (O)



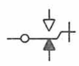
On/off switch



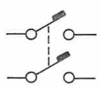
Locking keys or switches; push on, push off



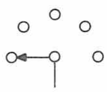
Non-locking self-releasing keys or switches



Locking mutually releasing keys or switches (in row of push-buttons etc.)



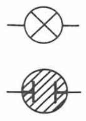
Self-releasing switch (overcurrent switch etc.)



Rotary switch

GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

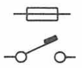
Lamps (V)



Indicator lamp

Neon lamp

Fuses and Cut-outs (S)



Fuse

Circuit-breaker

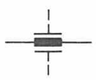
Tag Strips (KL)

Tag strip - dashed frame may be wholly or partly omitted

Batteries (BT)

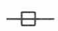
Battery

Feedthrough Filters (F)



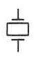
Feedthrough filter

Ferrite Beads (FB)



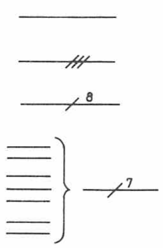
Ferrite bead

Crystals (X)



Crystal

Cables and Wires (W)

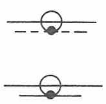


Usual conductor

Three conductors

Eight conductors

Shift from multiple-line to single-line presentation



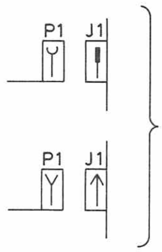
Screened wire

Coaxial cable

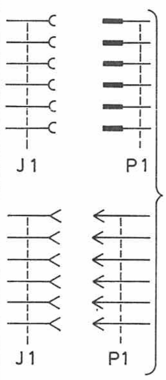
Connectors (J and P)

Female connector (socket). Lower symbol discontinued

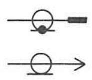
Male connector (plug). Lower symbol discontinued



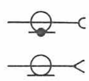
Schematic symbols for multi-wire connectors. (Upper symbol will gradually supersede lower symbol)
Multi-wire connectors are always designated "J" when permanently mounted on a cabinet or unit etc., "P" when fitted to cables



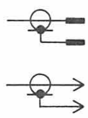
Detail symbols for multi-wire connectors. (Upper symbol will gradually supersede lower symbol)
Where both connectors are fitted to cables, male connector is designated "P" and female connector "J"



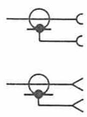
Coaxial plug



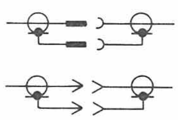
Coaxial socket



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)

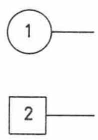
Meters etc.

Indicating instrument

Balancing instrument

Inkwriter, recording instrument

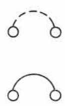
Test Points



DC test point

AC test point

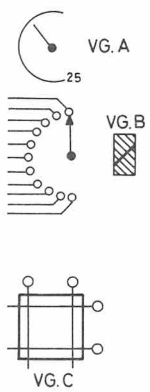
Replaceable Connections



Cross-field connection (jumper)

Strap

Selectors (VG)



Schematic symbol for rotary selector with designation of number of contact points

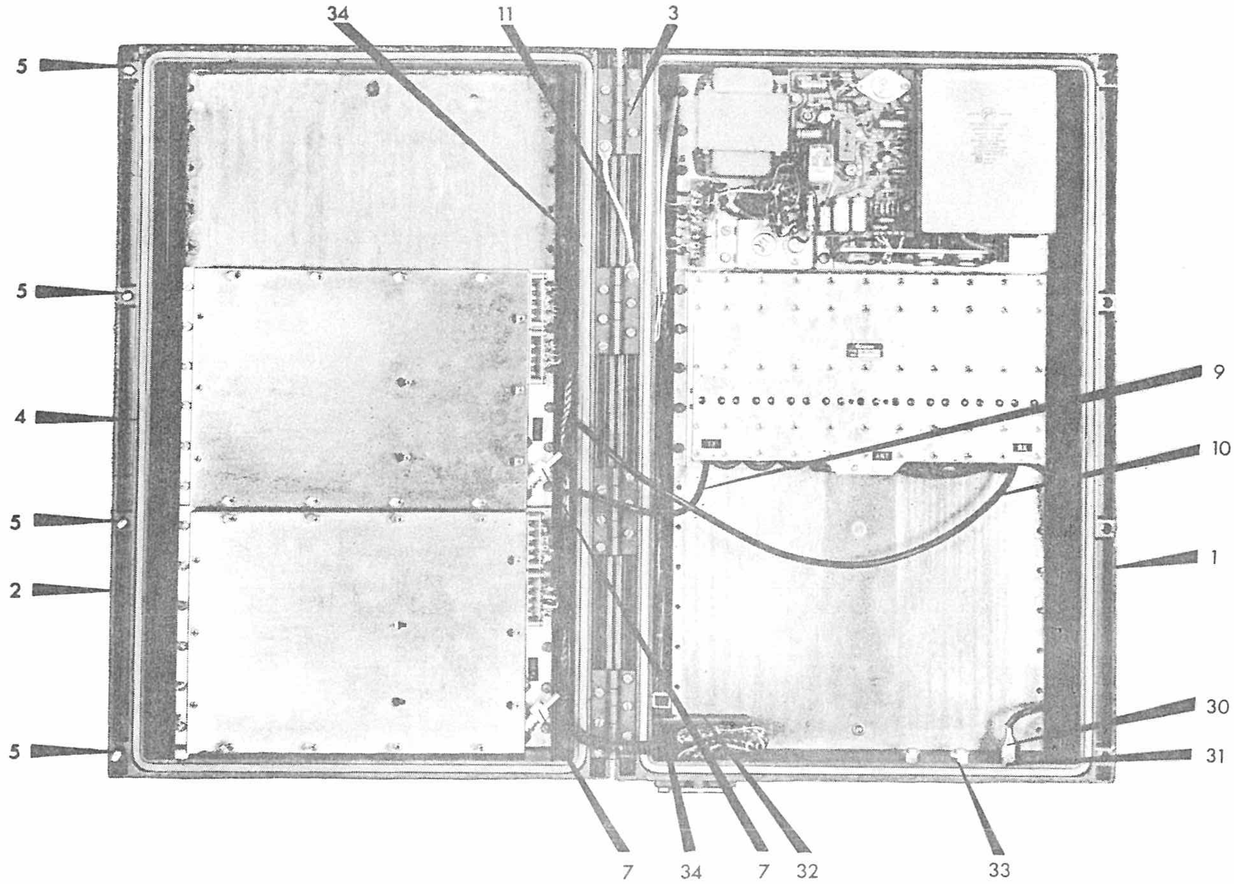
Detail symbol for rotary selector

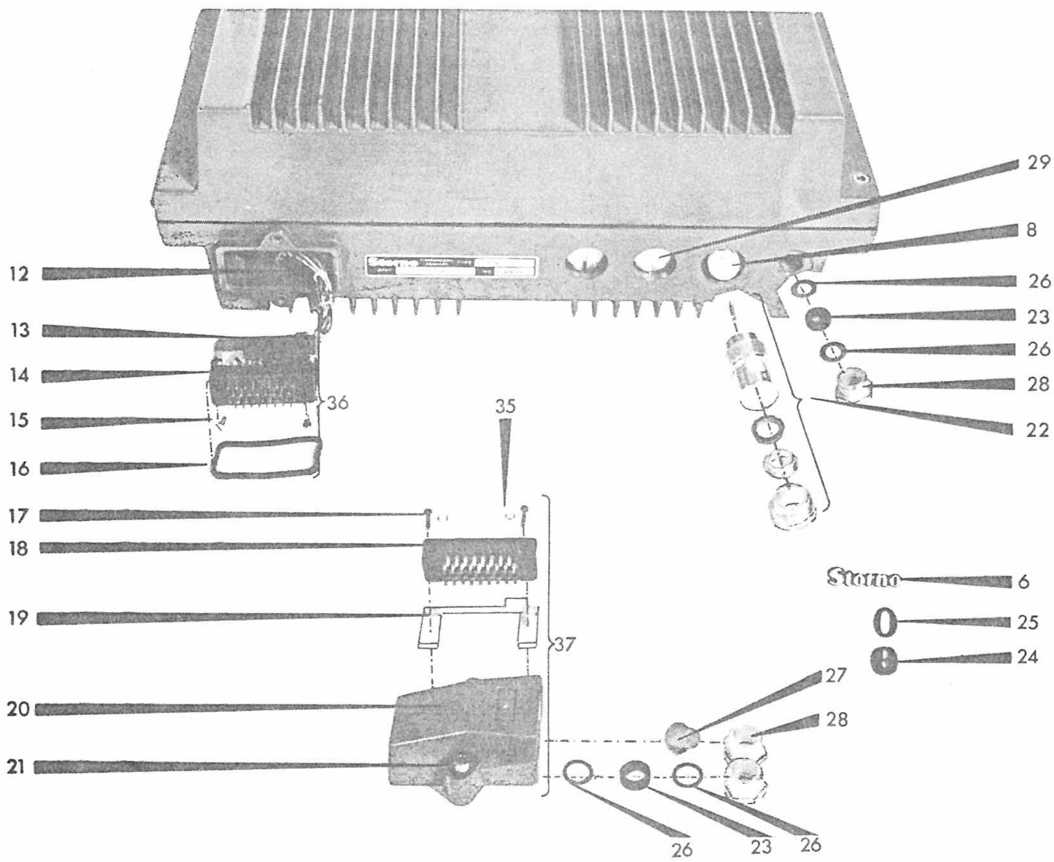
Co-ordinate selector

Storno

CHAPTER VI. MECHANICAL PARTS LISTS

When ordering mechanical parts from Storno please state the code numbers and descriptions given in the parts lists.





RADIO CABINET
FUNKGERÄTESCHRANK

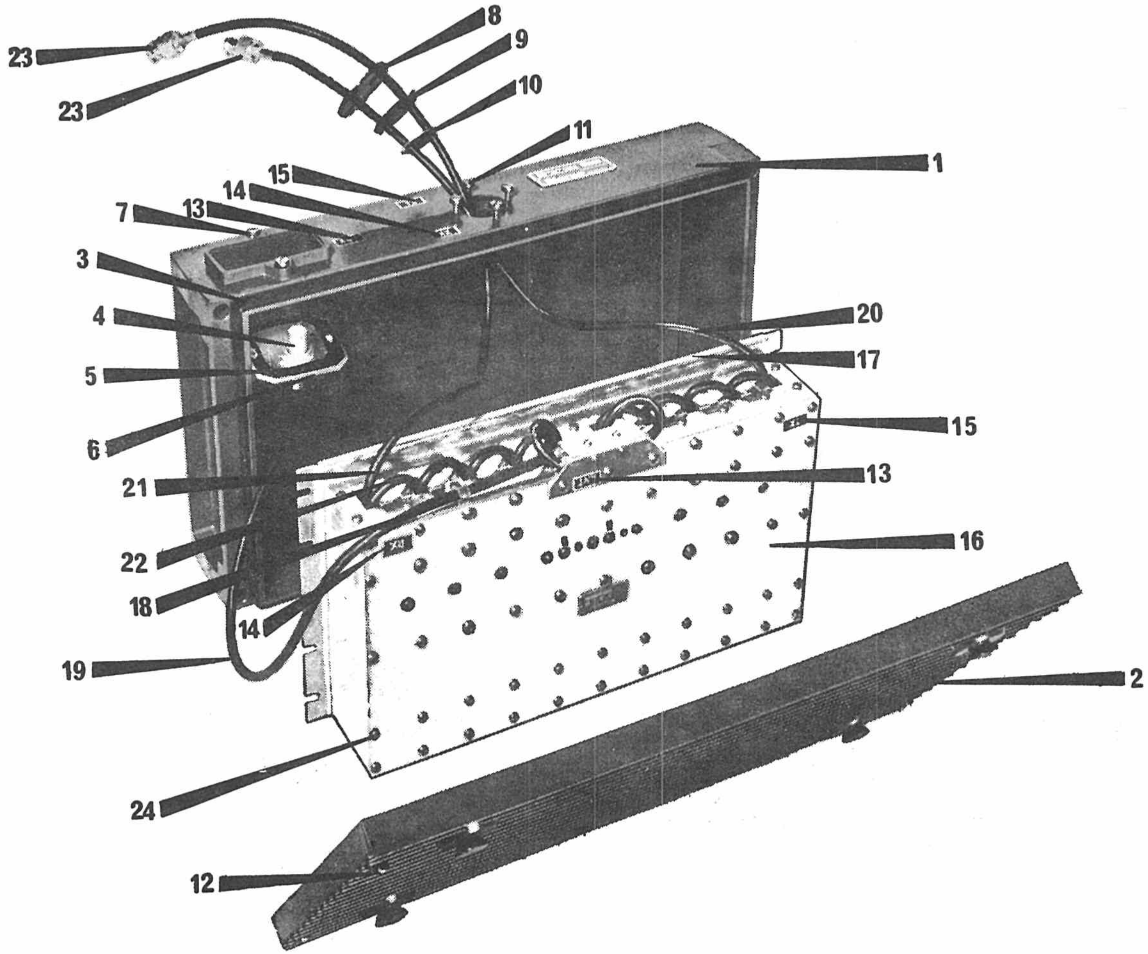
CA602

M 405.002

ITEM	CODE	DESCRIPTION
1	12.076	Cabinet, Rear part Kabinet bagstykke
2	12.099	Cabinet, Front part Kabinet forstykke
3	37.066	Hinge Hængsel
4	32.200-01	Gasket Gummipakning
5	20.033-050.30	Allen Screw M5x30 Skrue
6	51.171	Motif Firmaskilt
7	41.5148	Connector, Type BNC Konnektor, BNC
8	41.5153	Connector, Type N Konnektor, N
9	19.093	TX Coaxial Cable Assembly TX-kabel
10	19.092	RX Coaxial Cable Assembly RX-kabel
11	19.075	Earthing Strap Galvanisk ledningsforbindelse
12	18.485	Cableform Kabling
13	13.031	Code Screen, Female Metalskærm
14	41.5081	34 Way Connector, Male Multikonnektor, han
15	20.412-022.10	Screw BZ2.2x9.5 Skrue
16	32.160	Gasket Pakning
17	20.412-022.10	Screw BZ2.2x9.5 Skrue
18	41.5082	34 Way Connector, Female Multikonnektor, hun
19	13.025	Code Screen, Male Kodeskærm
20	12.053	Connector Housing Hus
21	20.033-040.18	Allen Screw M4x18 Skrue M4x18
22	41.5115	Connector, Type N Antennekonnektor (han) komplet
23	32.157-01	Sealing Ring (Control Cable) Gummiskive
24	32.158	Sealing Ring (Battery Cable) Gummiskive
25	29.174	Fibre Washer Skive
26	29.175-01	Washer Metalskive
27	37.5029	Blanking Piece Plasticprop
28	28.066	Threaded Nipple Gevindstykke

RADIO CABINET CA602

ITEM	CODE	DESCRIPTION
29	29.193	Blanking Screw Blindskrue
30	29.214	Screen Nut Skærmmøtrik
31	31.350	Bush for Item 30 Stag for skærmmøtrik
32	33.239	Bracket Vinkelstykke
33	29.180	Nut Møtrik
34	32.201	Cable Retainer Kabelholder
35	24.50-048.027	Washer Skive
36	41.163	34 Way Connector, Male Multikonnektor, komplet han
37	41.159	34 Way Connector, Female Multikonnektor, komplet hun



BRANCHING FILTER
ANTENNENWEICHE

BF661a, BF662b

M405.007

ITEM	CODE	DESCRIPTION
	90.214-21	Branching Filter Type BF662b Dupleksfilter BF662b komplet
1-15	10.2042	Cabinet CA6012 Kabinet CA6012 komplet
1	12.126	Cabinet Cover Kabinet
2	12.119	Cabinet Base Bund
3	32.150	Gasket Gummipakning
4	41.5149	Connector BNC, Female BNC konnektor (hun)
5	32.256	Gasket Pakning
6	11.642	Connector Bracket Holder for konnektor
7	20.011-040.40	Screw M4 x 40 Skrue M4 x 40
8	11.644	Cover Plate Dæksel
9	32.257	Packing Pakning
10	11.643	Plate Plade
11	20.011-040.08	Screw M4 x 8 Skrue M4 x 8
12	20.033-040.15	Screw M4 x 15 Skrue M4 x 15
13	51.498	Antenna Label Antenne-skilt
14	51.496	RX Label RX-skilt
15	51.495	TX Label TX-skilt
13-24	90.213-01	Branching Filter Type BF661a Dupleksfilter BF661a komplet
13	51.498	Antenna Label Antenne-skilt
14	51.496	RX Label RX-skilt
15	51.495	TX Label TX-skilt
16	11.725	Chassis Chassis
17	11.726	Cover Låg
18	38.5017	Cable Clamp Kabelbøjle
19	19.091	Antenna Cable Antennekabel
20	19.093	TX Cable and Connector TX-kabel med konnektor
21	19.092	RX Cable and Connector RX-kabel med konnektor

BRANCHING FILTER
DUPLEKSFILTER

BF661a, BF662b

ITEM	CODE	DESCRIPTION
22	19.094	Inter Connecting Cable Mellemkabel
23	41.5148	Connector BNC, Male BNC konnektor, (han)
24	20.412-029.07	Screw BZ2.9 x 7 Skrue BZ2.9 x 7