STORNO RADIOCOMMUNICATION

FIXED RADIO STATION
MODEL STORNOPHONE 600
TYPE CQL611F
TYPE CQL612F
TYPE CQL613F
TYPE CQL614F
146-174MHz

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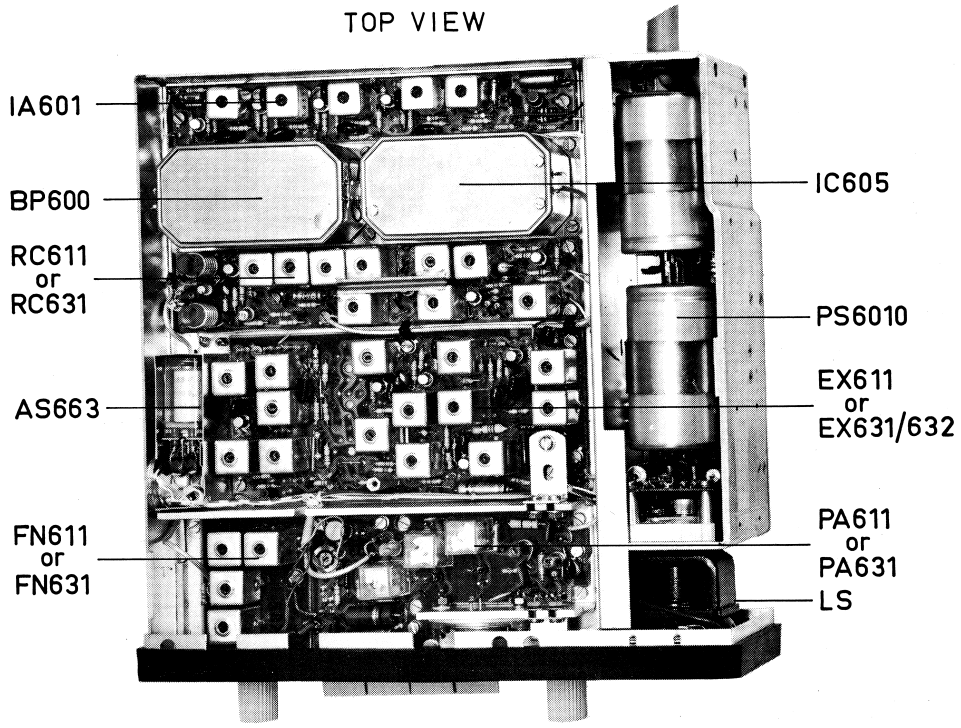
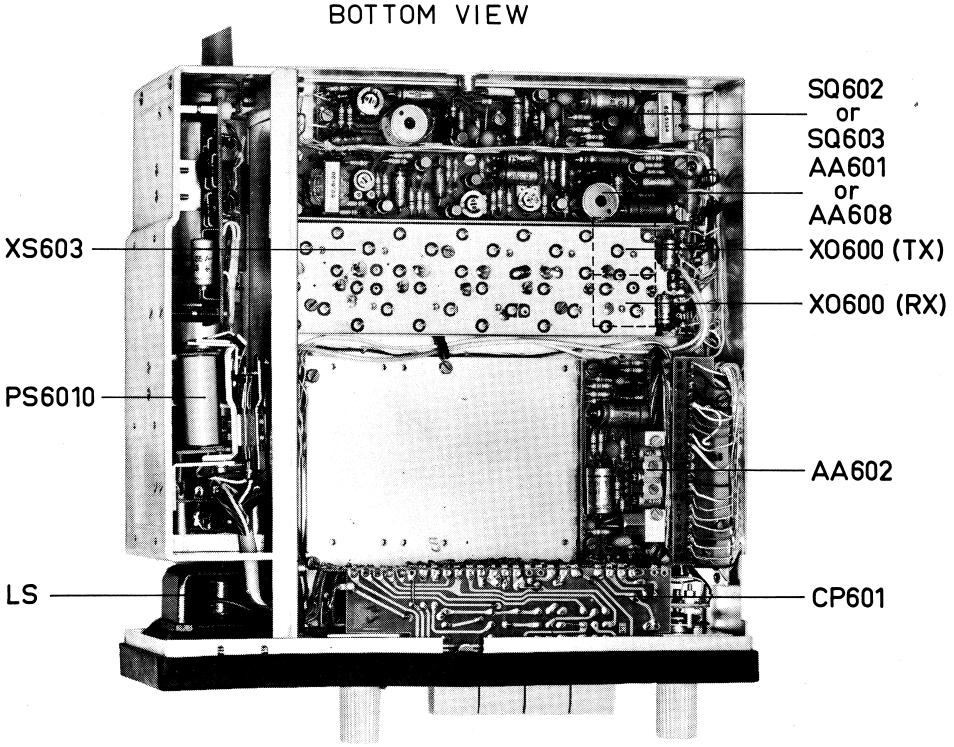
TOP VIEW



BOTTOM VIEW



FIXED RADIOTELEPHONE CQL610F & CQL630F

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GENERAL SPECIFICATIONS

Type	CQL600F: Fixed local controlled radiostation CQL600F: Spec. K: Extended local controlled radiostation			
	CQL611F	CQL612F	CQL613F	CQL614F
Frequency Range	146-174 MHz	146-174 MHz	146-174 MHz	146-174 MHz
Min. Channel Separation	50 kHz	25 kHz	20 kHz	12.5 kHz
Max. Frequency Swing	±15 kHz	±5 kHz	±4 kHz	±2.5 kHz
Mode of Operation	Simplex			
Frequency Stability	Meets government specifications			
Max. Bandwidth	1000 kHz			
Antenna Impedance	50 ohms nominal			
Number of RF Channels	Max. 6 channels			
Dimensions	230 x 230 x 70 mm			
Weight	4.2 kilos			

TRANSMITTER SPECIFICATIONS

RF Power Output	10 watts, provision for reduced power
Modulation Response	CQL611F, CQL612F, CQL613F: 6dB/octave preemphasis characteristic from 300 to 3000 Hz, +0.5dB/-1.5dB relative to 1000 Hz. CQL614F: 6dB/octave preemphasis characteristic from 300 to 2500 Hz, +0.5dB/-1.5dB relative to 1000 Hz. By performing a restrapping operation the modulation response can be altered to 6dB/octave from 300 to 1000 Hz and flat in the range 1000-3000 Hz for CQL611F. CQL612F, and CQL613F, and from 1000 to 2500 Hz for CQL614F.
Modulation Sensitivity	Nominal 110mV for 70% of maximum permissible frequency swing at 1000 Hz
AF Input Impedance	600 ohms nominal
FM Noise	CQL611F: 50dB below standard test modulation CQL612F: 44dB below standard test modulation CQL613F: 42dB below standard test modulation CQL614F: 40dB below standard test modulation
Spurious Outputs	Less than 2×10^{-7} watts

RECEIVER SPECIFICATIONS

Sensitivity	0.35μV for 20dB signal-to-noise ratio (1/2 emf.)
Squelch	Electronic, adjustable
AF Response	CQL611F, CQL612F, CQL613F: 6dB/octave from 300 to 3000 Hz, +0/-2dB relative to 1000 Hz. CQL614F: 6dB/octave from 300 to 2600 Hz, +0/-2dB relative to 1000 Hz.
Adjacent Channel Selectivity	Better than 80 dB (EIA two-signal-method)
Undesired Radiation	Less than 2×10^{-9} watts
Intermodulation	67 dB
Spurious Response Radiation	Better than 80 dB
Output Power	2 watts, only 1 watt with built-in speaker
AF Load Impedance	20 to 50 ohms

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POWER SUPPLY SPECIFICATIONS

Supply Voltage, to external Transformer	220V AC ±20%, 50 Hz
Voltage from Transformer to Power Supply Unit PS6010	38V AC, 50 Hz
Output Voltage from PS6010	-24V DC ±2.5%
Current Consumption at 220V AC incl. external Transformer.	Stand-by: 10-15VA Transmission: 45-55VA

Specifications subject to alterations without notice.

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CHAPTER I. GENERAL DESCRIPTION

A. Design Details

Introduction

The STORNOPHONE 600L type CQL600F is a fixed transmitter/receiver combination for VHF/UHF FM radio communication in one of the frequency ranges 68-88 MHz, 146-174 MHz, and 420-470 MHz.

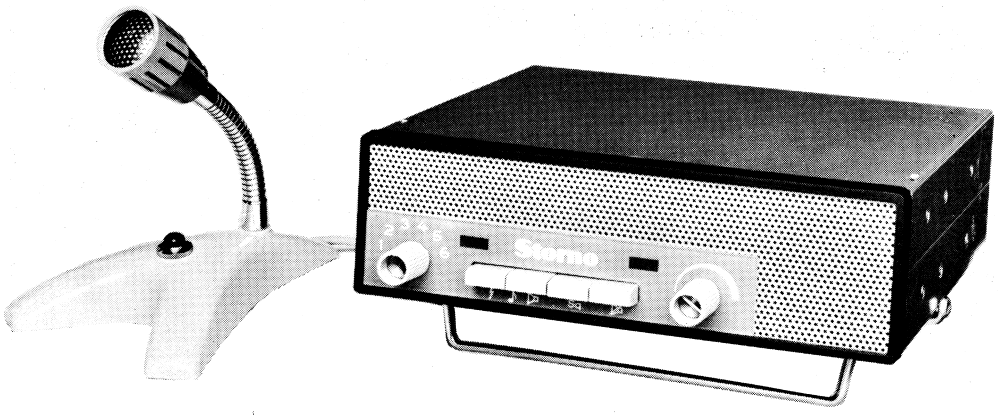
This manual contains a detailed description of the radio telephone CQL600F and the standard accessories which are available, Because we at Storno are constantly processing the experience we gain during the production, testing, and operation of our radiotelephones, minor modifications and corrections will be made at regular intervals. These will be listed on a separate sheet, which will be placed first in this manual.

Standard Versions

The radio telephones CQL600F and CQL600F spec. K are intended for simplex operation and they are operated from 220V AC, 50 Hz via an external power transformer.
The maximum number of RF channels and the transmitter power output can be seen from the below table.

Type	Number of Channels	Transm. Output Δ
CQL610F	6	10 watts
CQL630F	6	10 watts
CQL661F	6	6 watts
CQL662F	2	6 watts
CQL663F	2	6 watts

Δ Provision for reduced power



Local Controlled Versions

The local controlled radiostation type CQL600F comprises the following parts:

A cabinet which houses the transmitter, receiver, power supply, and control panel type CP601.

A desk stand for mounting the radio cabinet.

An antenna connector for the antenna cable and a 6-poled connector for the microphone cable.

An external power transformer (Storno code no. 60.5147).

A desk microphone with transmit button, type MC605.

The radiostation is designed for operation with a 50-ohms antenna of which various types can be supplied by Storno.
The local controlled radiostation is available in the following versions:

Type	Frequency Range	Channel Separation
CQL611F	146-174 MHz	50 kHz
CQL612F	146-174 MHz	25 kHz
CQL613F	146-174 MHz	20 kHz
CQL614F	146-174 MHz	12,5 kHz
CQL631F	68-88 MHz	50 kHz
CQL632F	68-88 MHz	25 kHz
CQL633F	68-88 MHz	20 kHz
CQL634F	68-88 MHz	12,5 kHz
CQL661F	420-470 MHz	50 kHz
CQL662F	420-470 MHz	25 kHz
CQL663F	420-470 MHz	20 kHz

Extended Local Controlled Versions

The extended local controlled radiostation type CQL600F spec. K comprises the following parts:

A cabinet which houses the transmitter, receiver, power supply, and a junction panel type RP602.

A mounting plate with hardware and screws for mounting the cabinet.

A multi-wire connector for the control cable and an antenna connector for the antenna cable.

An external power transformer (Storno code no. 60.5147).

The radiostation must be operated from a control equipment type CAF611, the control box of which can be placed up to 100 metres from the transmitter/receiver cabinet. The control equipment is covered by a separate manual.

Furthermore the radiostation must be operated with a 50-ohms antenna.

The extended local controlled radiostation is available in the same versions as the local controlled station.

Construction

The radiotelephone is housed in a drawer-type cabinet consisting of an outer section designed as a housing, and an inner section that is similar to a drawer. The two sections are held together by a number of screws on the right-hand and rear sides of the cabinet.
The outer section is a box made of 2-mm aluminium sheet.
The drawer section, of cadmium-plated steel sheet, carries all radio circuits. Besides serving as a chassis for the units of the radiotelephone, the drawer divides the interior of the cabinet into three mutually screened compartments. Thus, a vertical wall in the right-hand side of the cabinet separates the power supply section and the loudspeaker from the other radio sections. A horizontal wall through the middle divides the cabinet into two sections the upper one of which contains all RF and IF modules except for the oscillators; these are located in the lower section together with the audio modules and the control panel.

In the CQL600F radiostation the front panel of the drawer section carries the controls etc. and the loudspeaker, whereas the front panel of the CQL600F spec. K radiostation carries a multi-wire connector only.

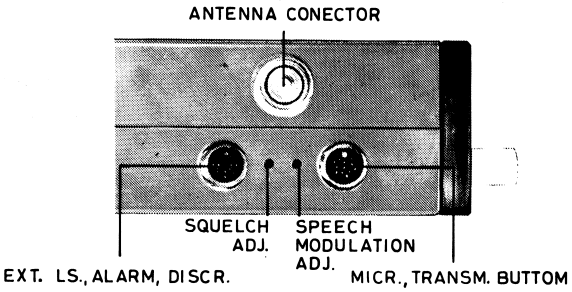
The cable to the power transformer is led through the rear of the cabinet.

There are three connectors on the left-hand side of the cabinet for:

Microphone with transmit button, type MC605

Antenna cable (BNC connector)

External loudspeaker and testpoint for discriminator measurement.

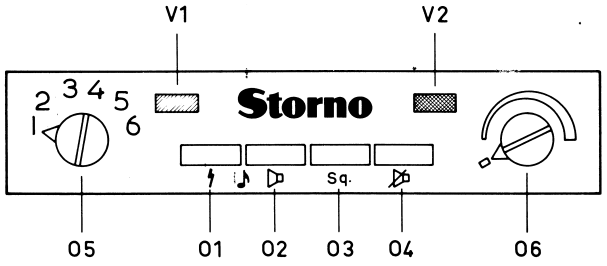


The cabinet also has two holes through which it is possible to adjust:

Squelch function
Speech modulation.

Operation

The controls etc. provided on the Type CP601 Control Panel are accessible on the front panel of the cabinet, on which they are located as shown in the sketch. Number and letter designations, identical with those used in the circuit diagrams, cover the following functions:



01	Self-releasing push-button.	Transmit/tone button(+)
02	Self-releasing push-button.	"Speaker In". This button in conjunction with a built-in tone receiver, cuts in the loudspeaker. In some versions, this button functions as a tone button (++).
03	Self-locking double-push releasing push-button.	Cuts out the squelch function.
04	Self-releasing push-button.	"Speaker Out". This button, in conjunction with a built-in tone receiver, cuts out the loudspeaker.
05	Control knob.	Channel selector. (The selector may be used for switching between different tone combinations when a tone transmitter is installed in the radio station, see section "Tone Equipment").
06	Control knob.	Combined on/off switch and volume control.
V1	Red lamp.	Transmit pilot lamp.
V2	Green lamp.	Indicates reception of selective call.

(+)
If a tone generator is used, a tone call can be transmitted only by pressing the button 01, causing both the tone generator and the station transmitter to be operated. If tone calls are not desired in subsequent traffic, the radiotelephone must be operated from an external transmit button such as a steering-wheel switch or microphone switch.

(++)
If a tone generator is used in a station not equipped with an external transmit button, a restrapping operation in the control panel is required, which calls for tone calls to be transmitted by pressing the buttons 01 and 02 simultaneously. Subsequent traffic in which the use of tone calls is not desired is handled by means of transmit button 01 only.

The circuits of the various control functions are covered in detail by the description of CP601 in Chapter II.

The extended local controlled radio station type CQL600F spec. K is operated from the control box of the control equipment type CAF611 and the operation will be dealt with in the technical manual covering this equipment.

Tone Equipment

Tone equipment to permit operation in selective calling systems can easily be installed in the Stornophone 600L/F, in which space has been left for the tone transmitter, tone receiver, and alarm circuit.
If the radio station is supplied with a tone transmitter for transmission of various tone combinations, the channel selector can easily be changed into a selector for switching between a maximum of six different tone calls.

By so doing no channel switching function can be performed, and consequently the radio station can be provided with only one RF channel.
In the extended local controlled radio station the tone equipment will be incorporated in the control box.
Descriptions, circuit diagrams etc. of tone equipment is covered in a separate technical manual.

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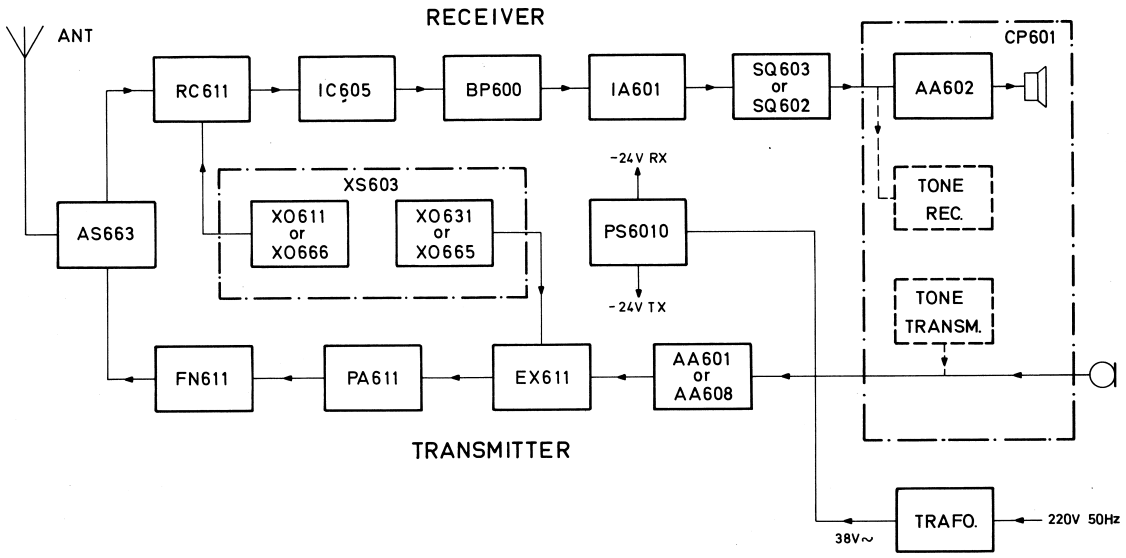
CHAPTER II. THEORETICAL CIRCUIT ANALYSIS

A. General Description, 146-174 MHz Equipment



Both the receiver and the transmitter are divided into a number of subunits each of which is built on printed wiring boards. This division has been made in order to make the equipment easily accessible for adjustments and repairs, and follows strictly logical lines.

The receiver and transmitter use silicon transistors throughout, resulting in less dependence on ambient temperature and in greater reliability.

Receiver Section

The receiver is a double conversion superheterodyne using intermediate frequencies of 10.7 MHz and 455 kHz. The necessary selectivity is obtained by means of two bandpass filters.

The receiver is composed of these modules:

Receiver converter with RF amplifier and 1st mixer	RC611
Crystal oscillator (1-6 pcs.)	
In CQL611F, CQL613F, and CQF614F	XO611
In CQL612F the type of oscillator is depending on government specifications	XO611 or XO666
IF converter with 10.7 MHz bandpass filter and 2nd mixer	IC605
455 kHz IF filter	
In CQL611F	BP608
In CQL612F	BP609
In CQL613F	BP6010
In CQL614F	BP6012
455 kHz IF amplifier and discriminator	IA601
Squelch and audio amplifier	
In CQL611F, CQL612F, and CQL613F	SQ603
In CQL614F	SQ602

The receiver moreover comprises an audio output amplifier, Type AA602. However, this unit is located in control panel CP601 and will be described in connection with the latter.
The RF and IF modules of the receiver are located in the top section of the cabinet except for the oscillators. These are located in the bottom section together with the audio units.

Transmitter Section

The transmitter is phase modulated. Its output frequency is twelve times the crystal oscillator frequency.

Phase modulation is performed at the fundamental frequency.
A maximum of six crystal oscillators - one for each frequency channel - can be provided. The transmitter is composed of the following subunits:

Audio amplifier	
In CQL611F, CQL612F, and CQL613F	AA601
In CQL614F	AA608
Crystal oscillator (1-6 pcs.)	
In CQL611F, CQL613F, and CQL614F	XO631
In CQL612F the type of oscillator is depending on government specifications.	XO631 or XO665
Exciter and modulator	EX611
RF power amplifier	PA611
Antenna filter	FN611

The following subunits are common to the receiver and transmitter sections:

Antenna shift unit	AS663
Crystal oscillator panel with space for 6 receiver oscillators and 6 transmitter oscillators	XS603

Control Panel (in CQL600F)

Control panel CP601 contains all controls and circuits required for operating a local controlled radiotelephone and checking its performance. It also accomodates the following subunits:

Audio output amplifier	AA602
Tone transmitter (if provided)	TT680
Tone receiver (if provided)	TR680 or SR680
Alarm circuit (if provided)	AC683

Junction Panel RP602 (in CQL600F spec.K)

Junction panel RP602 is used in extended local controlled radiotelephones. The panel contains a multi-wire connector for the control cable and a terminal board for connection of the internal cabling of the radiotelephone.
The audio output amplifier AA602, tone equipment, and all controls for the radio station will be contained in the control box.

Power Supply Section

The power supply section consists of a power transformer (Storno type no. 60.5147) located outside the transmitter/receiver cabinet and a power supply unit type PS6010 which is housed in the cabinet.
The transformer input voltage of 220V AC, 50 Hz is transformed into 38V AC which is supplied to the power supply unit PS6010, where it is converted into 24-volt stabilized DC for the transmitter/receiver section.

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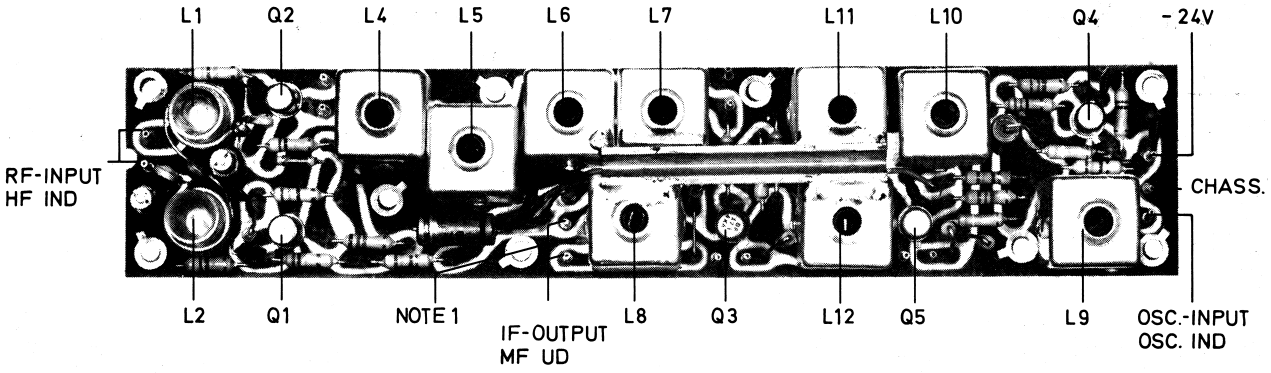
Receiver Converter RC611



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

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

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

Mode of Operation

Signal Frequency Amplifier

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

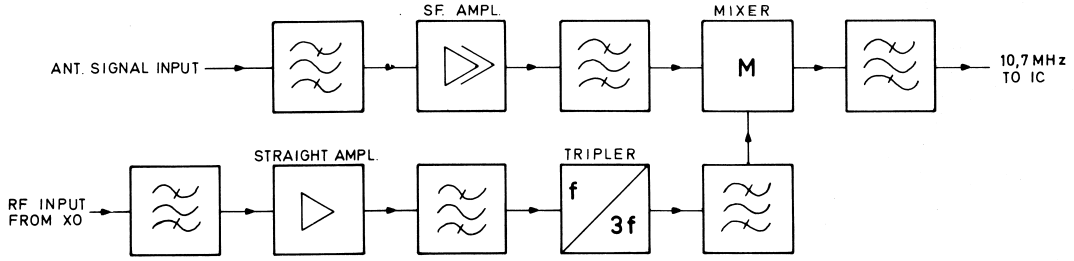
Mixer

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

(See circuit diagram of the RC611 receiver converter at the back of this manual).

Amplifier and Tripler

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



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

Technical Specifications

Frequency Range

146 - 174 Mc/s.

Gain

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

Input Impedance

Nominal: 50 ohms.

Crystal Frequency Calculation

For 146 - 160 Mc/s range:

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

For 156 - 174 Mc/s range:

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

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

Dimensions

160 x 32 mm.

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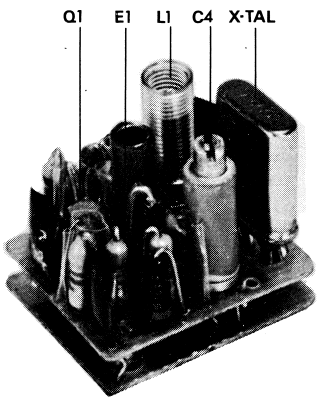
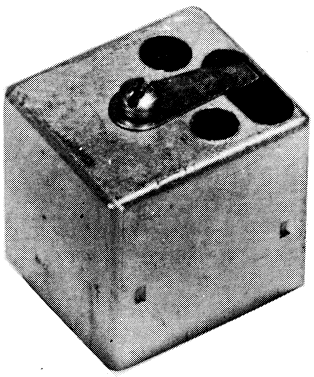
Receiver Oscillator Unit XO611





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

Load Impedance

50 ohms.

Power Output

Approx. 1 mW.

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Receiver Oscillator Unit XO662

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 uses a parallel-resonant Colpitts circuit. It is followed by a multiplier stage which quadruples the crystal frequency. The oscillator is started up by connecting the CHANNEL SHIFT terminal to chassis through the channel selector. A diode in series with the -24V supply prevents any flow of undesired current in the unit.
A capacitance diode E, biased by a temperature-dependent voltage, compensates for frequency variations at high and low temperatures. The degree of compensation is adjusted with potentiometer R10. Frequency adjustment is performed with trimmer capacitors C10 and C11. The RF output of the oscillator is fed via the crystal oscillator panel to the receiver converter.

Technical Specifications

Coverage

For crystal: 11.37 - 14.23 MHz.
For output voltage: 45.5 - 56.9 MHz.

Frequency Pulling

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

Frequency Stability

Against voltage variations of -24V ± 2.5%: Better than $\pm 1.5 \times 10^{-6}$.
In temperature range -25°C to +80°C: Better than $\pm 5 \times 10^{-6}$.

Load Impedance

50 ohms.

Output Voltage

170 mV/50 ohms.

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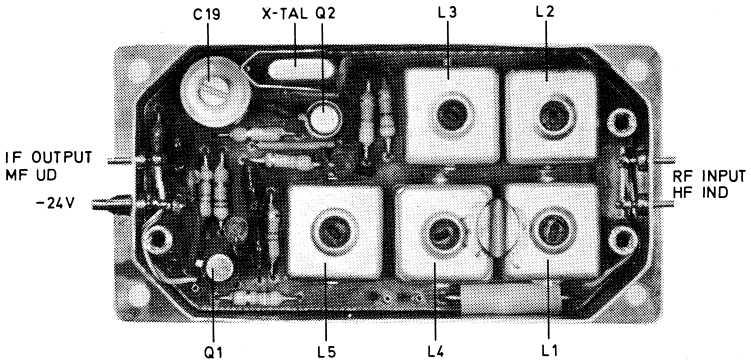
IF Converter IC605



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

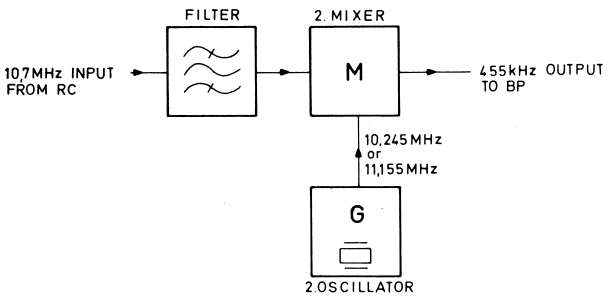
Coil filter
Oscillator
Mixer.

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

Mode of Operation

Coil Filter

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



Oscillator

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

Mixer

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

Technical Specifications

Input Frequency

10.7 MHz.

Output Frequency

455 kHz.

Input Impedance

910 ohms // 20 pF.

Output Impedance

3.8 k ohms // 480 pF.

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Bandwidth

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

Bandpass Ripple

0 dB.

Oscillator Frequency

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

fx = 10.7 MHz + 0.455 MHz = 11.155 MHz.

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

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

68-88 MHz

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

146 - 174 MHz

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

420 - 470 MHz

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

Crystal Specification

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

Oscillator Frequency Pulling Range

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

Available Power Gain

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

Centre Frequency Variation

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

Dimensions

80 x 40 x 29 mm.

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IF Filters BP608, BP609, BP6010, and BP6012

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

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

Technical Specifications

Input Frequency

10.7 MHz.

Output Frequency

455 kHz.

Generator Impedance

3.9 k ohms // 480 pF.

Load Impedance

1 k ohm // 480 pF.

Bandwidth

BP608 At 6 dB attenuation relative to 455 kHz: Greater than ± 15 kHz.
At 80 dB attenuation relative to 455 kHz: Less than ± 28 kHz.

BP609 At 6 dB attenuation relative to 455 kHz: Greater than ± 6.5 kHz.
At 80 dB attenuation relative to 455 kHz: Less than ± 18.5 kHz.

BP6010 At 6 dB attenuation relative to 455 kHz: Greater than ± 5.7 kHz.
At 80 dB attenuation relative to 455 kHz: Less than ± 16 kHz.

BP6012 At 6 dB attenuation relative to 455 kHz: Greater than ± 3.5 kHz.
At 65 dB attenuation relative to 455 kHz: Less than ± 8.0 kHz.

Insertion Loss

BP608 Less than 3 dB

BP609 Less than 7 dB

BP6010 Less than 8 dB

BP6012 Less than 9 dB

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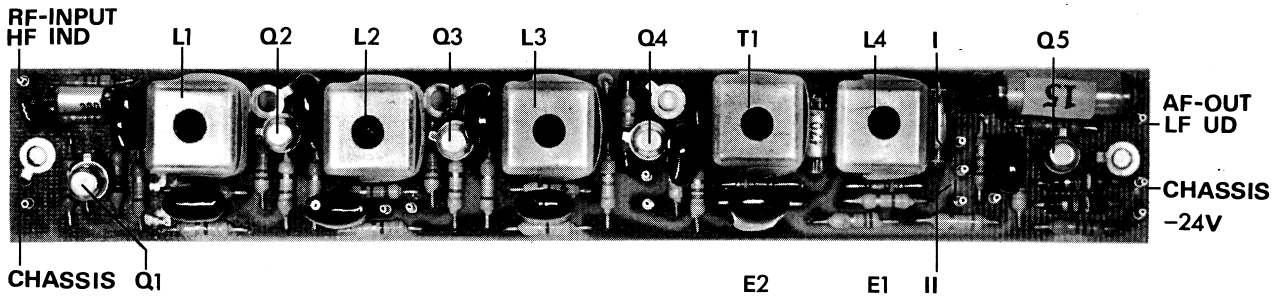
IF Amplifier IA601



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

Four IF Amplifier Stages
Discriminator
Output Amplifier

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

Mode of Operation

IF Amplifier Stages

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

Discriminator and Output Amplifier

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

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

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

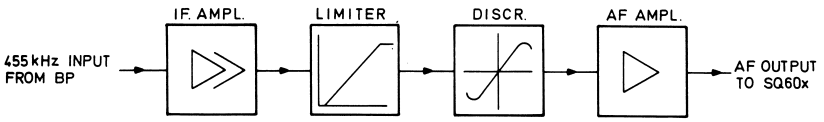
Technical Specifications

Intermediate Frequency

455 kc/s.

Max. Frequency Swing

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



37.389-E1

Storno

IF Bandwidth

±20 kc/s at 3 dB attenuation.

Generator Impedance

1 k ohm/0.25 mH.

Input Impedance

1 k ohm // 480 pF.

Output Impedance

340 ohms.

Discriminator Bandwidth

Linear to ±20 kc/s.

Discriminator Slope

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

Discriminator Centre Frequency Stability

±1 kc/s.

Gain

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

Audio Output Level

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

Demodulation Characteristic

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

Distortion

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

Min. Load Impedance

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

Current Drain

10 mA.

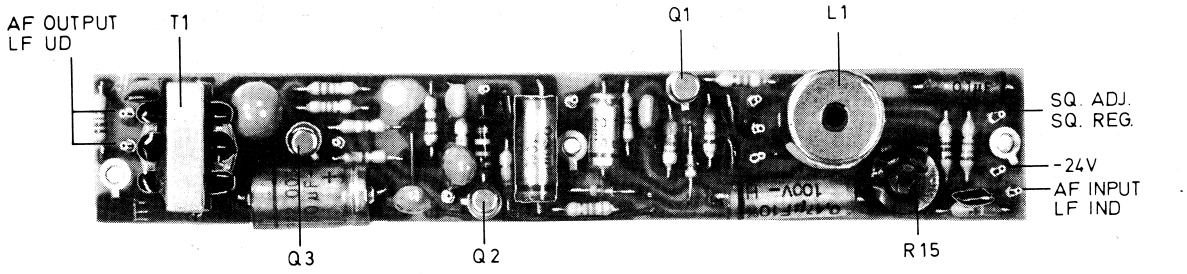
Dimensions

160 x 24 mm.

37.389-E1

Storno

Squelch and Audio Amplifiers SQ602 and SQ603



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

Noise Amplifier
Noise Rectifier
Audio Amplifier

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

Mode of Operation

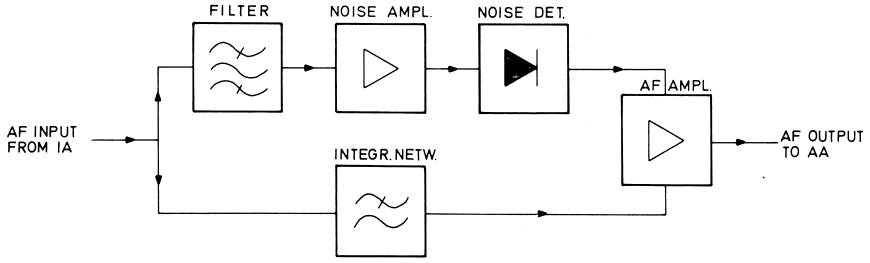
Audio Amplifier

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

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

Squelch Circuit

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



37.568-E1

Storno

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

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

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

(see notes on diagram).

Technical Specifications

Input Impedance

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

Output Impedance

At 1000 c/s: 600 ohms.

Nominal Load Impedance

600 ohms.

Audio Output Level

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

Frequency Characteristic (PM)

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

Frequency Characteristic (FM)

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

Distortion

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

Output Noise Attenuation

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

Squelch Sensitivity

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

Squelch Hang

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

Channel Separation

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

Delay

Approx. 50 msec.

Current Drain

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

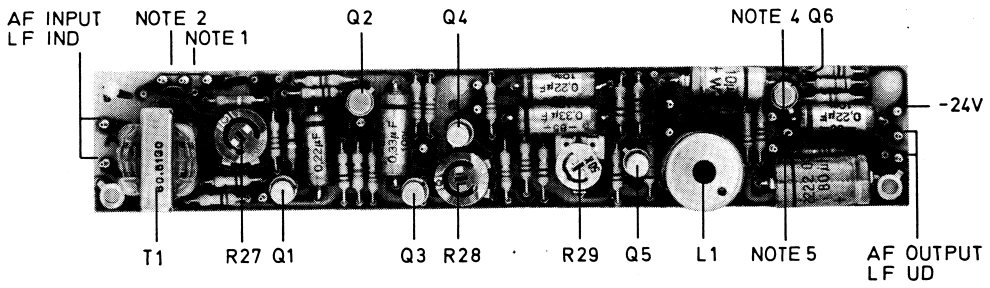
Dimensions

148 x 24 mm.

37.568-E1

Storno

Audio Amplifiers AA601 and AA608



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

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

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

Mode of Operation

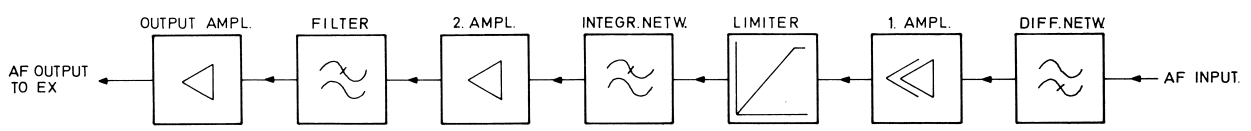
Differentiating Network

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

1st Amplifier and Limiter

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

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



37.569-E1

Storno

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

Integrating Network

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

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

2nd Amplifier and Splatter Filter

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

Output Amplifier

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

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

Technical Specifications

Current Drain

13 mA.

Clipping Level (1000 Hz)

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

Minimum Input Voltage for Clipping (1000 Hz)

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

Maximum Output Voltage (1000 Hz)

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

Harmonic Distortion (1000 Hz)

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

Frequency Response:

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

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

Input Impedance

600 ohms. Input impedance is floating.

Output Impedance

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

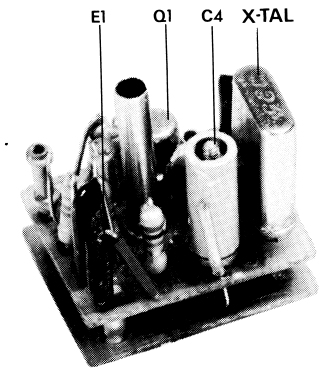
Dimensions

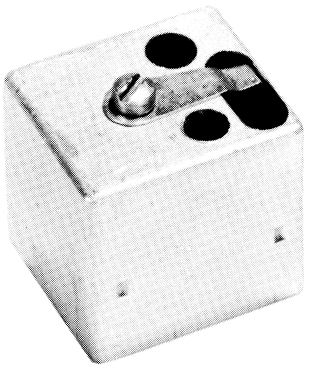
160 x 28 mm.

37.569-E1

Storno

Transmitter Oscillator Unit X0631





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

Mode of Operation

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

Technical Specifications

Crystal Frequency Range

11.3 - 14.66 Mc/s.

Frequency Pulling

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

Frequency Stability

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

Load Impedance

25 ohms.

Power Output

Approx. 80 μW.

37.376-E1

Storno

Transmitter Oscillator Unit X0661

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 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. 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 MHz.

Frequency Pulling

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

Frequency Stability

For voltage variations within 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

25 ohms.

Power Output

Approx. 25 microwatts.

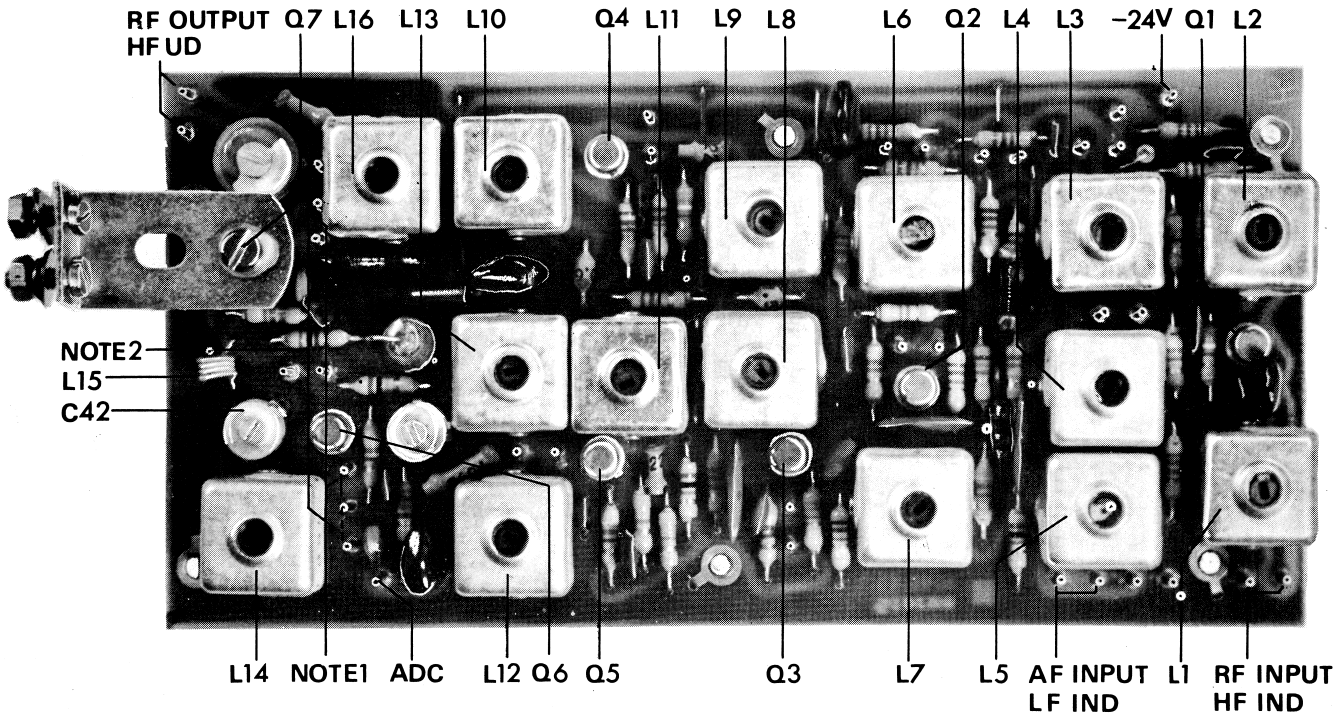
Crystal

Type 98-16.

37.559-E1

Storno

Exciter EX611



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

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

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

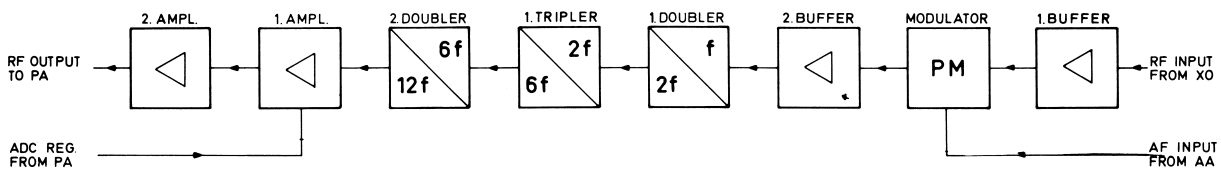
Mode of Operation

1st Buffer

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

Phase Modulator

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



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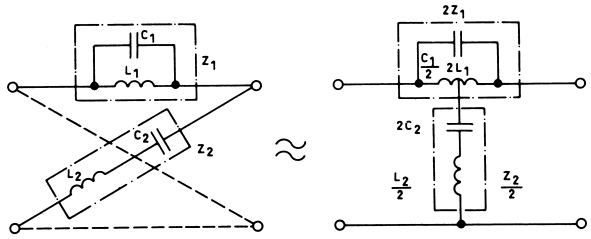
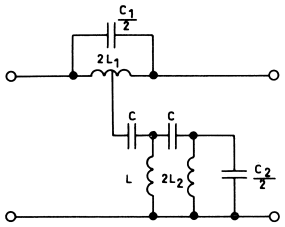
Storno

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



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



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

2nd Buffer

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

Frequency Multipliers

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

Power Amplifiers

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

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

Technical Specifications

Frequency Range

146-174 Mc/s.

Frequency Multiplication Factor

12.

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Storno

Crystal Frequency Bands

12.16 - 14.50 Mc/s.

Power Output

700 mW.

Power Input

40 μW.

Generator Impedance

50 ohms.

Load Impedance

50 ohms.

Audio Input Impedance

At 1000 c/s: 10 k ohms.

Modulation

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

Modulation Sensitivity

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

Modulation Distortion

Measured without de-emphasis: 5%.

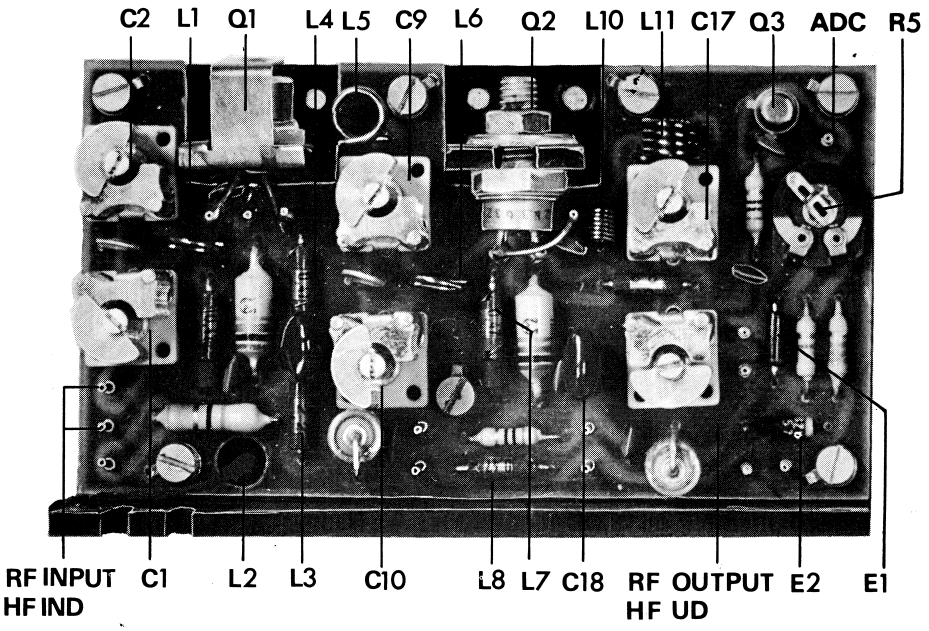
Dimensions

68 x 140 x 25 mm.

37.377-E1

Storno

RF Power Amplifier PA611



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

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

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

ADC Circuit (Automatic Drive Control Circuit)

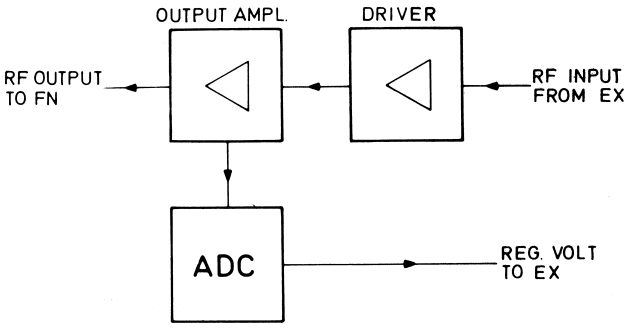
This circuit consists of one transistor stage operating as a DC amplifier. The transistor base receives, via a potentiometer, a reference voltage which is produced by a zener diode. There is a DC path from the emitter of this transistor to the emitter of the output stage of the power amplifier unit,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

Mode of Operation

Driver Stage and Output Stage

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

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



Storno

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

Technical Specifications

Frequency Range

146 - 174 Mc/s.

Power Output

10 W. Adjustable by means of the ADC circuit.

Current Drain

750 mA at 10 watts power output.

Input Impedance

50 ohms.

Output Impedance

50 ohms.

Gain

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

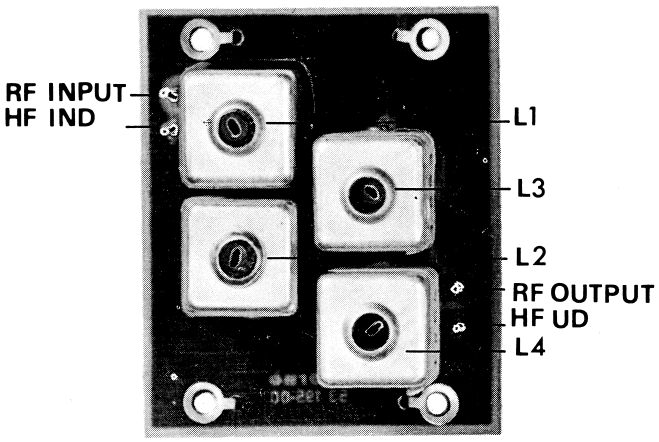
Dimensions

56 x 160 x 29 mm.

37. 379-E1

Storno

Antenna Filter FN611



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

Technical Specifications

Frequency Range

146 - 174 Mc/s.

Input Impedance

50 ohms.

Output Impedance

50 ohms.

Bandwidth (3 dB)

72 Mc/s.

Insertion Loss

146 - 174 Mc/s: 0.4 dB.

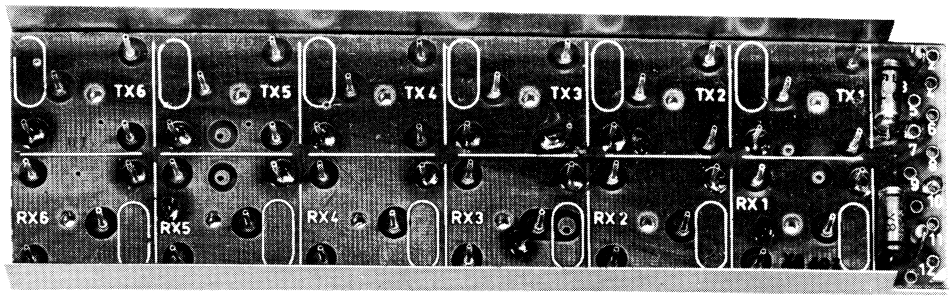
Dimensions

52 x 44 mm.

37.381-E1

Storno

Crystal Oscillator Panel XS603



The crystal oscillator panel consists of a wiring board with conductors on both sides, and a screen.
The wiring board has plug pins for up to six receiver-oscillator units and six transmitter-oscillator units.
In order to ensure that the proper oscillators - and hence also the proper frequencies - are provided for the channels, the pin sets of the wiring board are marked with channel numbers 1-6 for the oscillators of the receiver and transmitter, respectively.

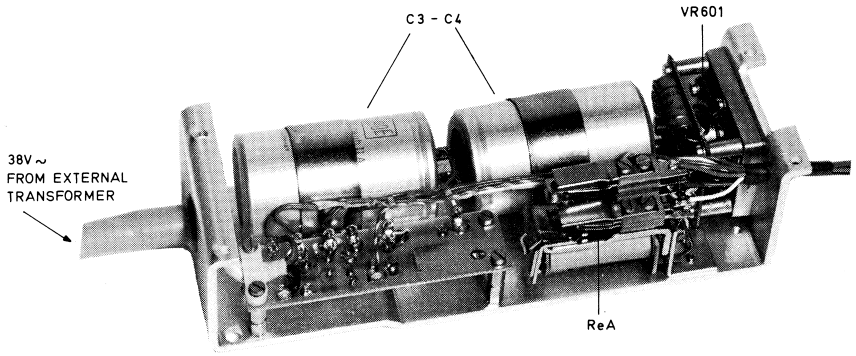
Mode of Operation

Crystal switching is performed with the channel selector. It is done electronically by closing or opening the supply voltage leads for the individual transmitter and receiver oscillators.

37.560-E1

Storno

Power Supply Unit PS6010



The power supply unit is built on an aluminium chassis and two wiring boards. It consists of these units:

Bridge rectifier and filter.
Series regulator.
Electronic protective circuit.
Transmit relay.

The power supply serves the purpose of converting 38 volts AC into 24-volts stabilized DC for the transmitter and receiver sections.

Mode of Operation

Bridge Rectifier and Filter

The diodes E8 - E11 form a bridge-type silicon rectifier, which is followed by a filter consisting of the charging capacitors C3 and C4. The supply voltage to tone equipment etc. (-24 volt continuously) is stabilized by diode E7 and capacitor C5 to avoid voltage variations when the voltage is switched between the receiver and the transmitter.

Series Regulator

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

Electronic Protective Circuit

This circuit cuts off the output current in the case of short-circuits or overloads. It operates on the principle of registering the voltage across a zener diode E1, which gives base bias to transistor Q4. If the output voltage of the power supply decrease to about 0 volt, in case of short-circuits, the voltage across zener diode E1 will drop. This will make transistor Q4 saturate thereby causing Q1 and Q2 to cut off.
This condition is stable even if the fault which caused the protective circuit to function disappears The circuit is reset by removing the main voltage and cutting it in again after approx. 15 seconds, when the charging capacitors will be sufficiently discharged. In order to protect the transmitter-receiver sections against over-voltage in the case of defects in the series regulator, a zener diode across the output of the regulator circuit prevents the voltage from exceeding a certain potential (approx. 30 volts).

37.675-E1

Storno

Transmit Relay

The transmit relay (Re A) is powered by the stabilized 24-volt supply. It serves the purpose of switching the supply voltage back and forth between the receiver and transmitter sections and secure that the transmit relay will release before the antenna shift relay on completion of a transmission.
When the transmit relay is operated, the antenna shift relay (located outside the power supply unit) is energized via the DC path through diode E6 and the transmit button to earth. This occurs simultaneously with the operation of the transmit relay, but since the operating time of the antenna shift 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 due to the fact that the latter relay remains operated via contact set a2 of the transmit relay.

Technical Specifications

Supply Voltage
38V AC, 50 Hz.

Supply Current
2, 2A RMS.

Output Voltage
-24V ± 2.5 %.

Output Voltage Ripple
Max. 15 mV p-p.

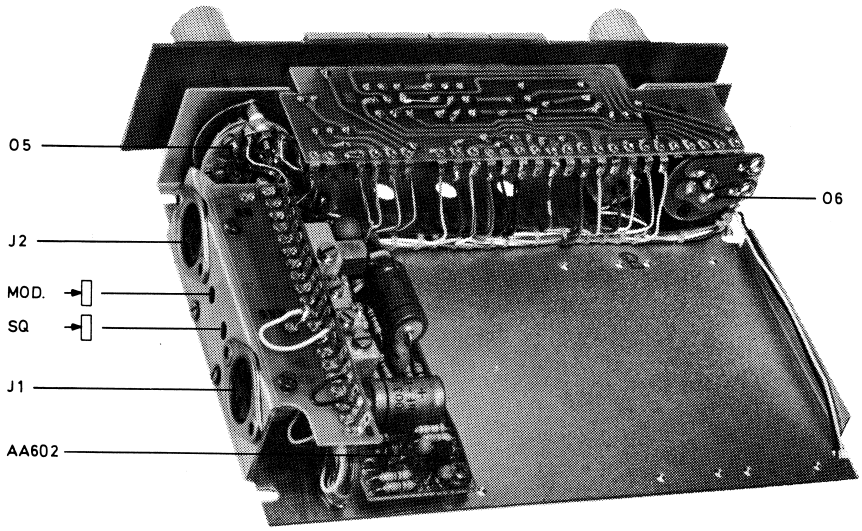
Output Current
Max. 1, 6A.

Type of Service
50% duty-period.

37.675-E1

Storno

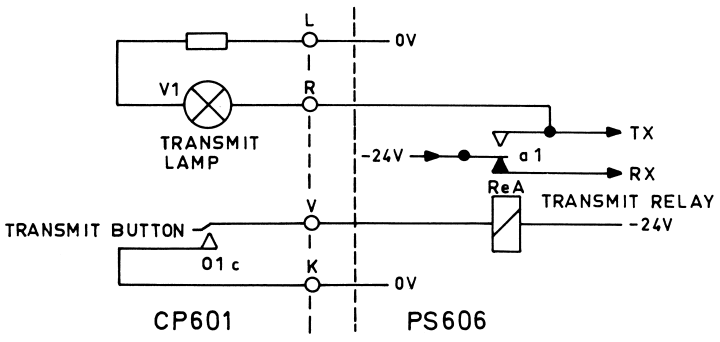
Control Panel CP601



General

Control panel CP601 consists of a metal chassis on which all controls are mounted, a wiring board, and a terminal board.
The panel is intended for use with Type CQL600 radiotelephones. In locally controlled equipment it will always be mounted in the transmitter/receiver cabinet. For remote control it will be mounted in a separate cabinet, Type CA605.
The control panel contains all circuits required for operation of the radiotelephone.

Functions



01. Transmit Button

The transmit button is a self-releasing push-button. When it is pressed, the transmit relay is operated, causing voltage to be applied to the transmitter section and to the transmit lamp V1 on the control panel.

However, if the control panel incorporates a tone transmitter, the button will also function as a tone transmit button as it will simultaneously switch on the tone transmitter and the station transmitter. In this event an external switch is required for turning on the transmitter when the use of tone calls is not desired.

02. "Speaker In"

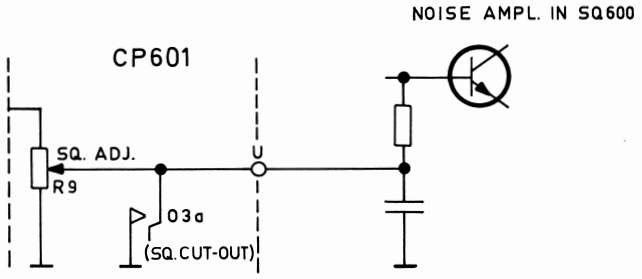
This is a self-releasing push-button. It is used only if the control panel incorporates tone equipment.
If a tone receiver is provided in the panel, this button is used to cut in the loudspeaker. If both a tone receiver and a tone transmitter are incorporated in the panel, and the radiotelephone has no external transmit button, it will be possible - after restrapping the control panel - to use this button for the transmission of tone calls, in which case buttons 01 and 02 should be depressed simultaneously, thereby switching on the radiotelephone transmitter and the tone transmitter. Where the use of tone calling is not desired, the 01 button is used alone.

03. Squelch Cut-out

This self-locking double-pressure-releasing push-button permits cutting out the squelch function as sketched below.

37.562-E1

Storno



04. "Loudspeaker Out"

This is a self-releasing push-button. It is used only in conjunction with a tone receiver, for cutting out the loudspeaker.

05. Channel Selector

The channel selector is a rotary switch. It has six positions, one for each channel that can be provided. Switching between channels is performed by connecting the desired transmitter oscillator and receiver oscillator to earth, thereby applying operating voltage to them. If less than six channels are provided, the unused positions of the channel selector will be connected to the preceding one of the channels in use, so that this channel will be cut-in even if the channel selector happens to be set at a channel for which crystals are not provided.

06. Combined On/Off Switch and Volume Control

This knob is a combined on/off switch and volume control. To switch off the radiotelephone, turn the knob fully left. Volume adjustment is continuous. A dial indication is provided.

V1. Red Transmit Indicator Lamp

This lamp turns on when transmit button 01 is pressed.

V2. Green Lamp for Selective Calling

This lamp indicates that a selective call is being received. It is provided in the control panel only if a tone receiver is used.

In addition to the above-mentioned control functions, the control panel carries a 1-watt 50-ohm loudspeaker.

Besides, the panel carries the connector sockets specified below:

J1. Socket for connection of an external 15 - 20 ohm loudspeaker, providing 2 watts of audio output, and for connection of an alarm circuit. Also for discriminator check measurement.

J2. Socket for connection of microphone, switch, or handset.

Two holes in the chassis between sockets J1 and J2 permit adjustment of:

The squelch potentiometer. To tighten the squelch, turn clockwise.

Potentiometer for speech modulation control. To increase the gain, turn anti-clockwise.

Selective Functions

Cutting the Loudspeaker In and Out

When using selective calling the loudspeaker will be open during incoming calls. On completion of a call, the loudspeaker can be cut out by depressing the button 04, so that only calls intended for the station operator can cut in the loudspeaker. To monitor the channel for traffic, the operator will cut in the loudspeaker by pressing the button 02. This should always be done before switching on the transmitter, for which reason the tone receiver unit incorporates a circuit to prevent the transmitter from being switched on before the button 02 has been depressed and the loudspeaker cut in.
For other selective functions see the Tone Equipment Manual.

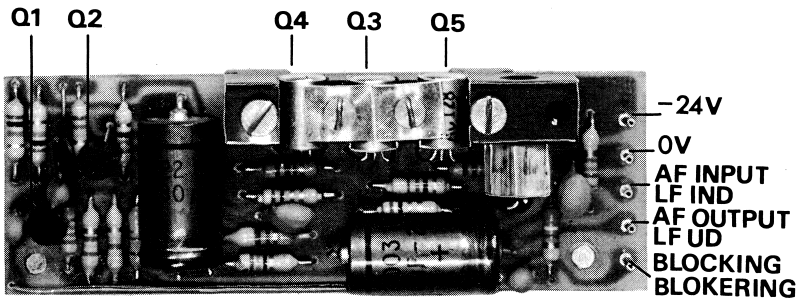
Built-in Units

The control panel houses the receiver audio output amplifier, AA602, which is described separately in this Chapter.
The control panel will also accomodate a tone transmitter and tone receiver, also an alarm circuit. Diagram D400.842 shows how these units are installed in the control panel, whilst descriptions and diagrams of the tone equipment are contained in a separate manual covering tone equipment for the STORNOPHONE 600.

37.562-E1

Storno

Audio Output Amplifier AA602



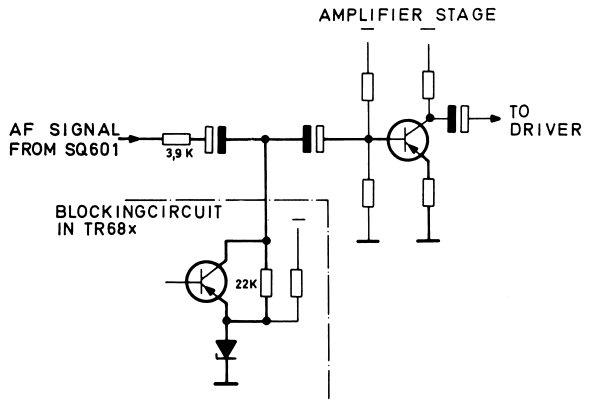
The audio output amplifier is built on a wiring board. It consists of these stages:

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

The audio output amplifier is a transformerless push-pull amplifier which is capable of delivering 2 watts of power output. This unit is located in the control box.

Mode of Operation

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



The signal if fed to the output stage via the pre-amplifier stage and the driver stage, both of which receive negative feedback voltage from the output stage. Temperature compensation of the output stage is accomplished by biasing a transistor connected between the bases of the output transistors. The type of compensation employed is base-emitter voltage compensation. The output stage operates in Class B push-pull in a common-collector circuit. It is transformerless, with a loudspeaker load of approx. 15 ohms.

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

Reducing the Input Sensitivity

If a reduction in the output amplifier sensitivity is desired, a 1/8-watt resistor (see table below for resistance value) may be inserted between terminal 3 of the unit and the wiring board in CB60x.

INPUT SENSITIVITY FOR 2 WATTS OUTPUT	RESISTANCE VALUE
+3 dBm	22 k ohms
0 dBm	12 k ohms
-3 dBm	6.8 k ohms
-6 dBm	2.7 k ohms
-9 dBm	0 ohms

37.405-E1

Storno

Technical Specifications

Supply Voltage
24 V ±5%.

Resistance in Power Supply Cable
R_{cable}: max. 14 ohms.

Current Drain
At 24V:	without signal	20 mA
	at 2 watts output	175 mA
	blocked	20 mA

Power Output
Max. 2 watts.

Loudspeaker Impedance
15 ohms.

Input Impedance
6.5 k ohms.

Input Sensitivity
For 2 watts into 15 ohms and R_{cable} = 0 ohms.
Better than -9 dBm.

Frequency Response
Measuring level 1W (ref. 1000 c/s): 300 - 3000 c/s +0.5 dB -1.5 dB.

Distortion
Less than 5%.

Hum and Noise
Attenuated 60 dB.

Blocking
Earthing the blocking lead through tone receiver TR68x or 1.5-ohm resistor: 50 dB.

Dimensions
28 x 80 mm.

37.405-E1

CHAPTER III. ACCESSORIES

Storno

Fixed Microphone MC601

Microphone MC601a

The MC601a microphone is designed for fixed mounting and a speaking distance of approx. 30 - 40 cm. The microphone housing contains a 600-ohm microphone cartridge and a Type AA604 50-dB amplifier with integrated circuits. This microphone may be used with the CB601 control box.

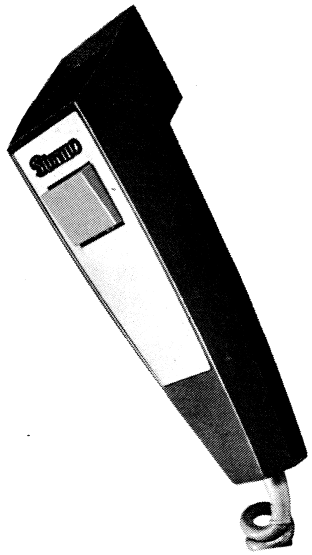
Fixed Microphones MC602, MC603, MC604

Microphones MC602a, MC603a, and MC604a

These microphones are identical with the Type MC601a in regard to technical details and operation; however, they have goosenecks of different lengths.

MC602a	11-cm gooseneck
MC603a	21-cm gooseneck
MC604a	41-cm gooseneck

Fist Microphone MC606



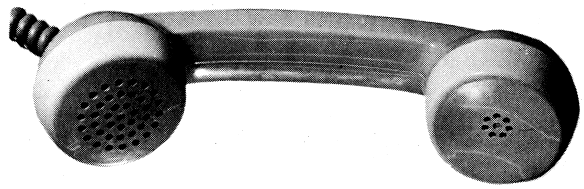
Microphone MC606a

The MC606a microphone is a fist microphone. A transmit button is provided on the housing. The MC606 microphone contains a 600-ohm dynamic microphone cartridge and a Type AA606 50-dB integrated amplifier.
The fist microphone is used with the CB601 control box.

37.409-E1

Storno

Handset MT601



Handset MT601

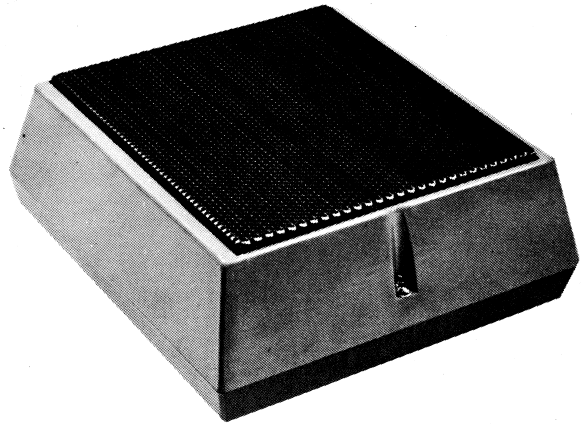
The MT601 handset is a conventional handset with transmit key. It contains a telephone cartridge and a microphone cartridge with a built-in amplifier.
The MT601 handset may be used with the CB601 control box.

Handset MT602

Handset MT602

The MT602 handset is a watertight handset with transmit button. It contains a telephone cartridge and a microphone cartridge with a Type AA605 one-stage transistor amplifier which provides approx. 20 dB gain. The MT601 handset may be used with either the CB601 or the CB602 control box.

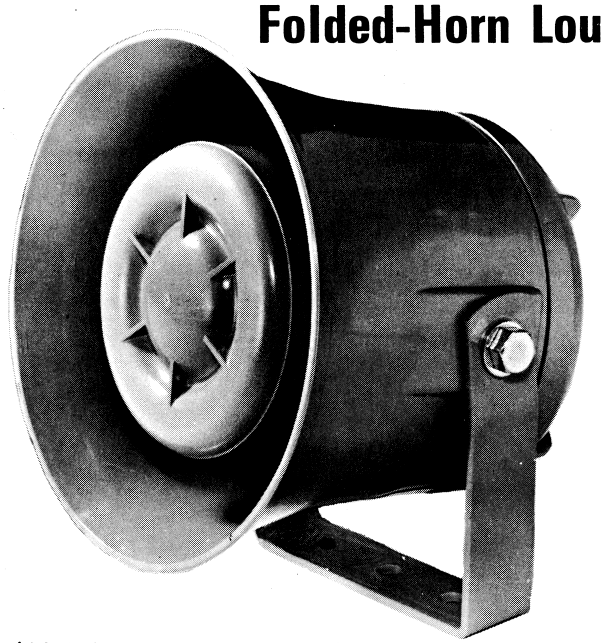
Loudspeaker LS601



Loudspeaker LS601a

The Type LS601a loudspeaker is a 2-watt 15-ohm loudspeaker mounted in a plastic housing. It may be mounted wherever convenient (mounting hardware is supplied). It can also be mounted on the CB601 control box.

Folded-Horn Loudspeaker LS602



Folded-Horn Loudspeaker LS602

The Type LS602 folded-horn Loudspeaker is a watertight high-efficiency loudspeaker with pronounced directional properties. For this reason it is excellently suited for outdoor mounting, for instance in conjunction with motorcycle installations.

Technical Data

Impedance: 20 ohms
Power capacity: 10 watts
Lower limiting frequency: 560 c/s
Dimensions: 150-mm dia. x 140 mm.

37.409-E1

Storno

CHAPTER IV. INSTALLATION
A. General

Introduction

It is of great importance that installation is carried out carefully and in accordance with the enclosed instructions. Careless or incorrect installation may disastrously impair the performance of the equipment and will substantially increase the risk of breakdowns.
It is therefore recommended that the installation personnel study and follow the instructions given in this chapter.
If an installation job involves problems that cannot be solved through a study of this manual, please contact STORNO.

Unpacking

On receipt of any consignment from STORNO, all items should be unpacked and checked against the packing list and - if possible - the invoice. Also check for possible damage during transport.
STORNO should immediately be notified if goods are damaged or not as ordered.
When dispatching equipment to STORNO in case of complaints, repairs, etc. the original packing should be used whenever possible.

Main Units

A standard radiotelephone station consists of these main units:

A CA605 station cabinet containing transmitter section, receiver section, power supply section, control panel, and loudspeaker.

A MC605 Microphone with keybutton.

A power transformer. Storno type 60.5147.

The following additional items are required for installing the radiotelephone and making it ready for operation:

A desk stand. Storno type 11.727.

An antenna cable.

An antenna connector.

A microphone connector. Storno type 41.5093.

An antenna. Several types are available.

Also available are various types of accessories such as: External loudspeaker, handset, modification kit for converting the radiotelephone for remote control, and - in case of radiotelephones with built-in tone equipment - alarm circuit and alarm bell etc.
An instruction sheet or folder is supplied with each accessory and each large installation component.

Standard Directions

Before starting work, the siting of the radiotelephone and its cabling should be selected on a basis of the following factors:

Operation should be straightforward and easy.

The radiotelephone should be easily accessible for service, and its cabling should be placed so as to provide room for connectors etc.

Cabling should be as short as practicable, and the cables should be adequately relieved of stress - especially at critical points such as entries and sharp bends.

Soldering

When soldering cables in the units of the station, for remotely controlled operation, the use of a soldering iron of 20- to 25-watts rating is recommended whereas soldering to connector terminals requires a soldering iron at a somewhat higher rating though not more than 65 watts. When installing the antenna connector, the antenna cable screen braid should be soldered securely into place. Moreover, when fitting connectors to coaxial cables, the soldering job should be done as quickly as possible, followed by cooling in alcohol, in order to prevent the cable dielectric from melting.

Temperature

The equipment should be installed in a place that will permit the heat given off through the cabinet surface to be drained away by the ambient air, whose temperature should be inside the range -15°C to +50°C for continuous operation, although the equipment will operate inside the range -30°C to +60°C over limited time intervals such as hot summer days or cold winter nights.

B. Installation of Local Controlled Equipment

Cabinet

The CQL600F is intended for placing in a desk stand and therefore it must be sited in a way that permits easy connection of antenna- and power supply cables.

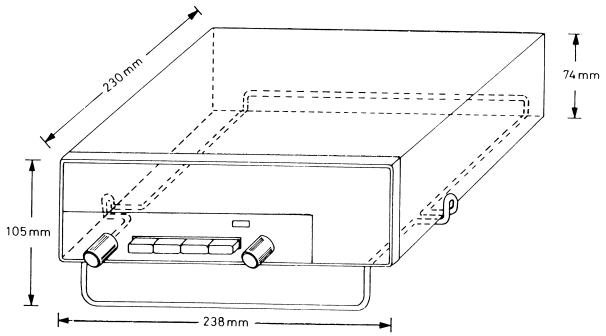
Parts required for the installation:

A radiotelephone CQL600F and a desk stand, Storno type 11.727.

A power transformer, Storno type 60.5147.

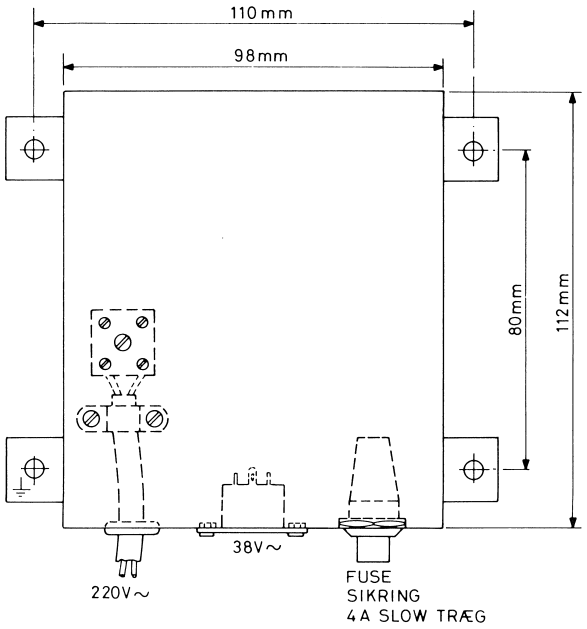
A microphone type MC605 (Code number 96.065).

A microphone connector, Storno type 41.5093.

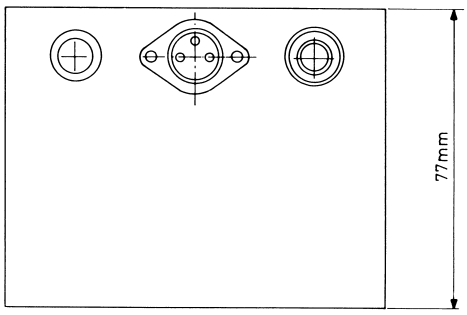


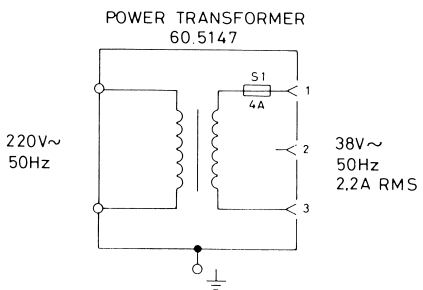
Installation of Power Transformer 60.5147

The transformer has a two meter mains lead terminating in a plug and consequently it must be located close to a plug socket delivering a mains voltage at 220 volts AC. The dimensions of the transformer and the placing of its screw holes is shown in the sketch below.



In choosing the proper place in which to mount the transformer ensure that there is sufficient room for fuse replacement and connection at the plug from the radiostation. In case of installations requiring earthing, the earth lead may be connected to the transformer by one of its fastening screws in a way that provides a good electrical connection. Connect the three-contact plug on the power supply cable leading to the radiostation to the transformer receptacle.





Antenna Connector and Antenna Cable

Fit the UG88/U antenna connector to the antenna cable as described.
Cut end of cable even. Remove 8 mm of PVC jacket. Do not use tools that may nick the strands of the braid.

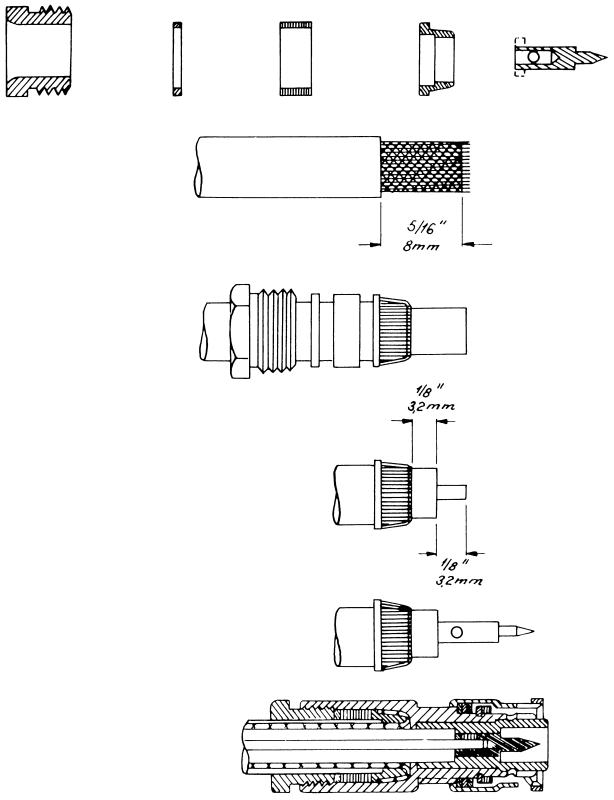
Comb out braid. Pull wires out across cable end. Slide components of connector on the cable in sequence indicated.

Comb braid over cone, taking care that wires do not cross each other. Cut braid wires off as shown. Remove 3.2 mm of insulation without nicking centre conductor. Do not use wire stripper.

Tin centre conductor of cable and the contact. Solder carefully. Do not use soldering paste. Cool with alcohol. Remove resin and excess tin, using sharp knife. Make sure that contact is straight and located in centre.

Push connector body on to cable end. Screw coupling ring on and tighten, using adjustable spanner.

If a "crimp"-type antenna connector is used (STORNO type 41.5148), the fitting operation requires a crimping tool (Erma 29010) and associated accessories.



Procedure

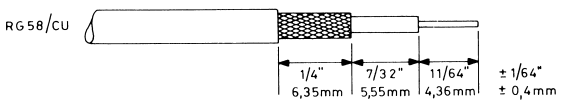
Strip cable as shown in sketch. Avoid nicking strands of braid and centre conductor.

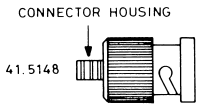
Slide crimping tube and connector housing on to cable in sequence shown.

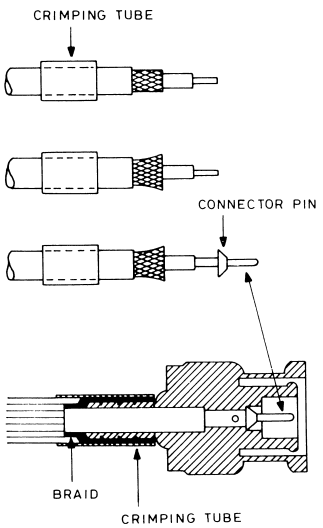
Slide connector pin in over the centre conductor and secure it, using crimping tool.

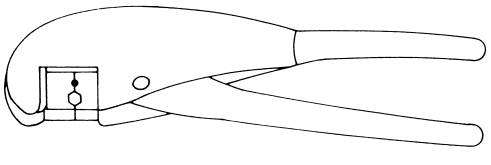
Slide connector housing into place over the pin as shown.

Bring bared cable braid out over connector housing sleeve. Slide crimping tube up to connector housing and crimp it on to the sleeve and braid, using crimping tool.





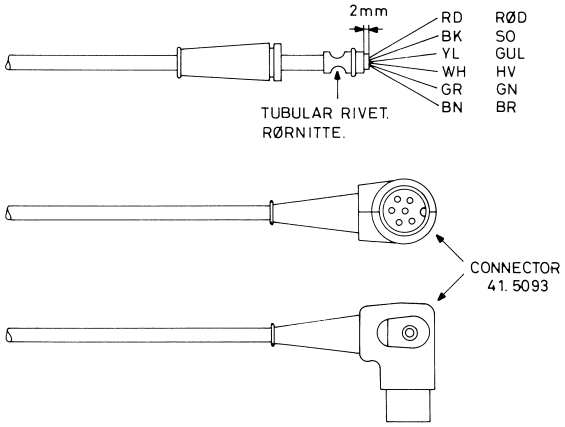


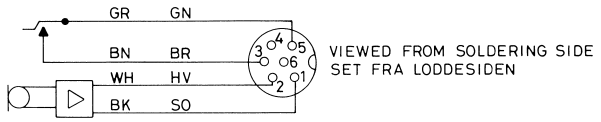


"ERMA" CRIMPING TOOL
NR 29010/29271

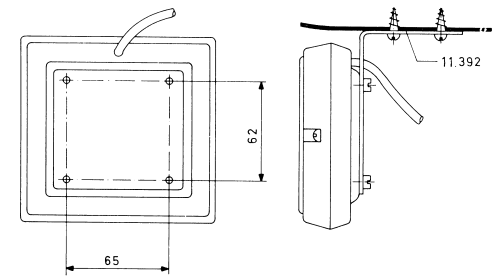
Desk Microphone MC605

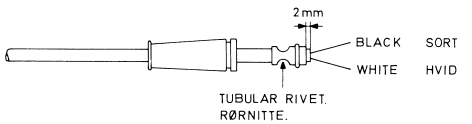
The microphone cable should be soldered to a 6-contact connector (STORNO type 41.5093) as shown in sketch.

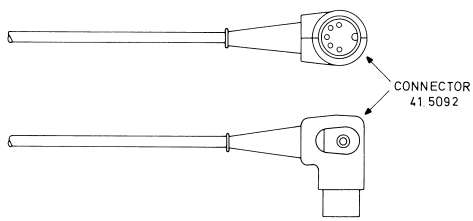


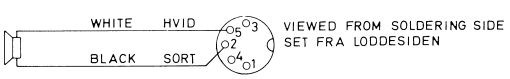


External Loudspeaker LS601









The loudspeaker should be mounted by means of the hardware and screws supplied.
A 5-contact connector STORNO type 41.5092) should be mounted on the loudspeaker cable as shown in the sketch.

NOTE: When connecting an external loudspeaker it is necessary to unsolder and insulate the leads of the built-in loudspeaker.

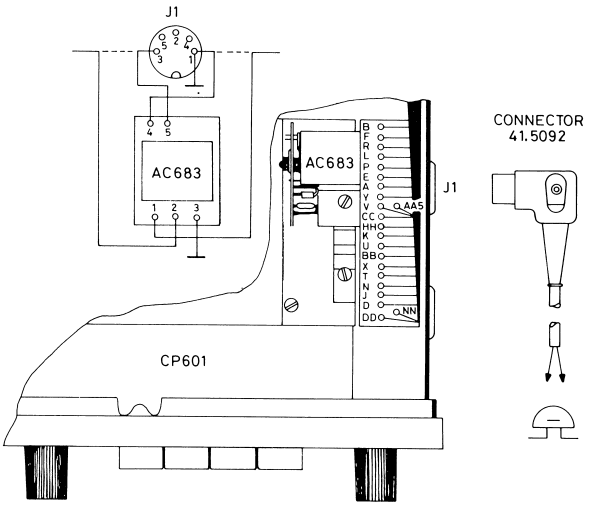
Installation of Alarm Circuit and Alarm Bell

In cases where audible indication of selective tone calls to a radiostation with built-in tone receiver is required, the radio equipment may be supplied with an alarm circuit and an alarm bell.

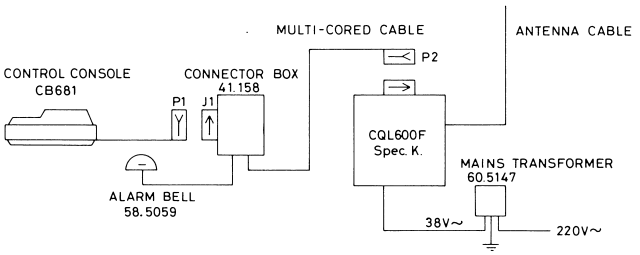
The following items are required for this installation:

Alarm Circuit AC683 (Storno code no. 10.1874).
Alarm Bell (Storno code no. 58.5059).
5-contact connector (Storno code no. 41.5092).

If both external loudspeaker and alarm bell are used, these accessories will be connected to the radiostation by the same connector.
The installation of the alarm circuit is shown in the sketch.



C. Installation of Remote Controlled Equipment

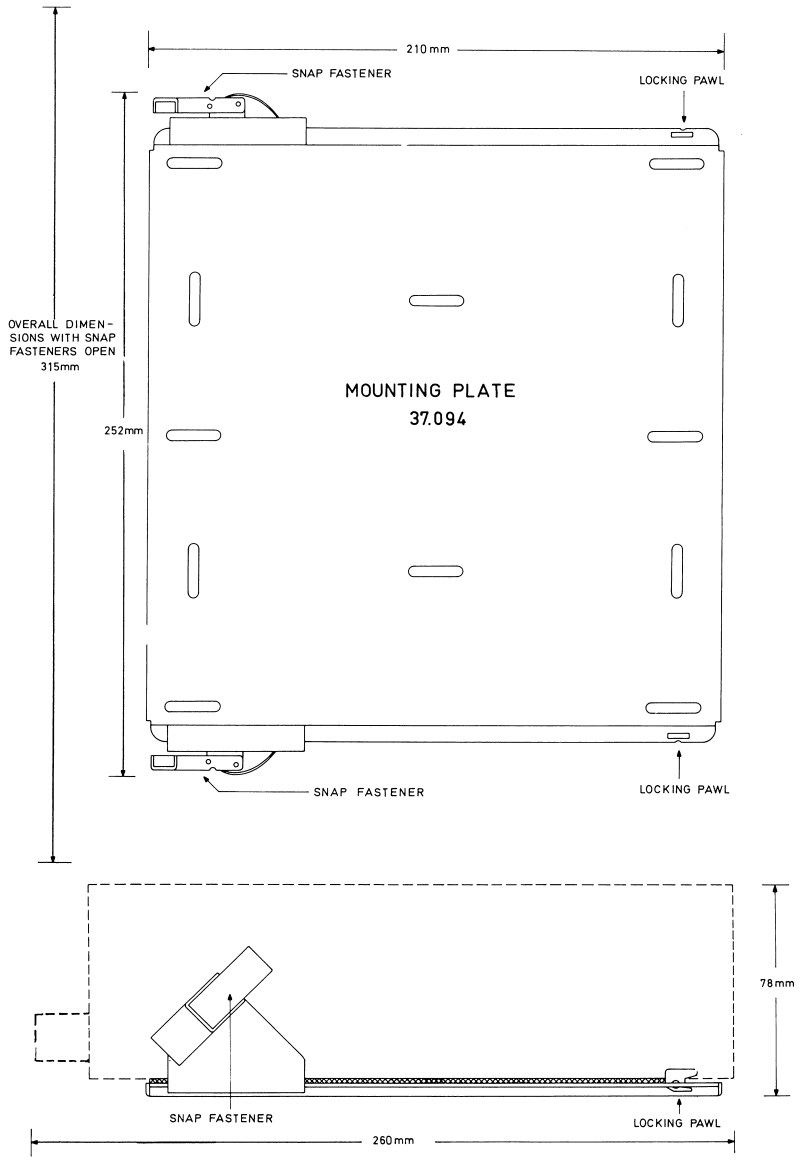


The remote controlled equipment type CQL600F spec. K is used in conjunction with control equipment type CAF611, which permits the operating site to be placed up to 100 metres from the radio-station. Description and diagrams for the CAF611 control equipment will be contained in a separate handbook.

Installation of Station Cabinet

The cabinet is installed by means of the installation kit (Storno type 37.094), which comprises these parts:

Mounting plate with snap fasteners and locking pawls.
6 self-cutting screws, 3.9 x 6.5 BZ.
Mounting hardware.



The mounting plate, to which the station cabinet is held by two snap fasteners at the front and two locking pawls at the back, may be secured both on top of the cabinet and below it. This makes it possible to mount the equipment either suspended - under the ceiling or on a wall - or standing, on a desk or shelf etc.
The mounting plate has a large number of screw holes in it that makes it possible to secure it with screws at all or any points that may be deemed expedient, depending on the nature of the material to which it is to be secured. The exact number of screws to be used depends on the nature of the material to which the mounting plate is to be secured and on the location of the screws on the mounting plate, but a minimum of four screws should be used, spaced as far apart and placed as near to the corners of the mounting surface as possible. If the equipment is to be mounted in a sloping position, the mounting hardware should be cut into suitable lengths, which should thereafter be bent to the desired angle.
To secure the cabinet to the mounting plate, bring the two locking pawls on the plate into the cutouts on the top or bottom of the cabinet and thereafter bring the two snap fasteners into engagement with the cutouts in the sides of the cabinet and snap them shut.

The procedure for connecting antenna cable, antenna connector and power transformer is described in Section B.

D. Conversion to Remote Control

General

The locally controlled radiotelephone can be converted for remote control if desired. The only component required for this purpose is:

A Junction Panel RP602 (Storno No. 10.2143).

Remove CP601 control panel from the station cabinet

Unsolder the loudspeaker leads and insulate the ends.

Next the leads from the power supply unit should be unsoldered from the station on/off switch in the control panel.

Unsolder the station cabling from the control panel terminal board.

Take off the channel selector knob and the on/off and volume-control knob.

Remove the control panel from the station chassis (4 screws) and take out the panel.

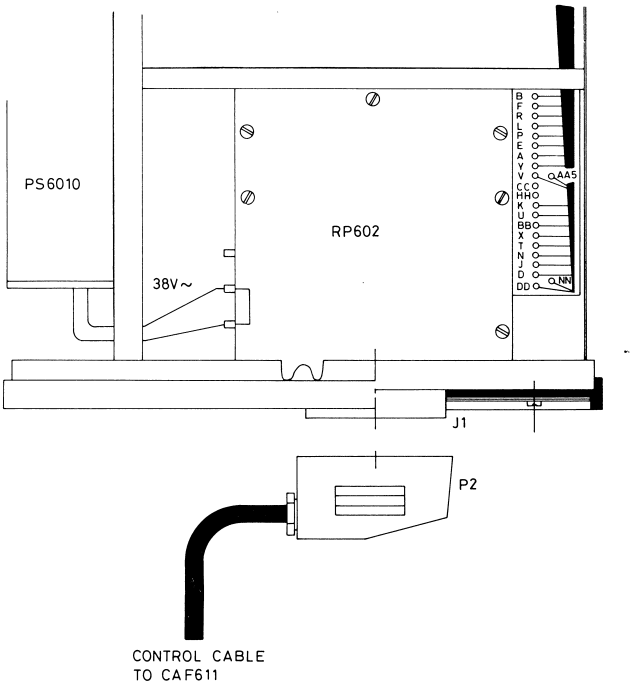
Mount Junction Panel RP602 in the Station Cabinet

Mount the junction panel in the space previously occupied by the control panel. Secure with 4 screws.

Solder the station cabling to the junction panel terminal board.

Solder the loosened leads from the power supply unit to the two short-circuited terminals located on the left side of the junction panel.

From now on the station can only be turned off by disconnecting the 220 volt ac. supply voltage to the station.



Cable connections in RP602

Terminal	Colour	Terminal	Colour
B	brown-green	U	red-black
F	green	BB	grey-white
R	blue	X	white-blue
L	black	T	white-green
P	red-blue	N	red-green
E	grey-green	J	red-white
A	grey	D	brown-white
Y	yellow-blue	DD	black
V	yellow	NN	orange
K	black		

Secure the front plate of the junction panel to the station cabinet, using two screws.

E. Testing Installed Equipment

Checking the Equipment before Starting Up

When the CQL600F has been installed in accordance with the directions given in the former sections of this chapter, check:

that the power supply cable from the radiostation has been correctly connected to the connector on the power transformer.

that mains voltage is connected to the power transformer.

that the fuseholder carries the correct fuse (4 amps.).

that both the antenna and the antenna connector have been correctly connected to the equipment; and

that the channel selector has been set to the desired channel.

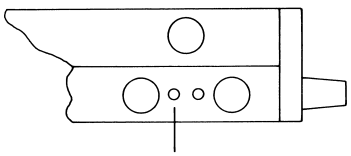
Starting the Equipment

For remote controlled equipment the operating instructions given in the CAF611 handbook should be followed.

Local controlled Equipment

To start the equipment, advance the volume control to its mid-scale position. It will then be ready to receive.

Depress the "SQUELCH" button. A strong hiss should now be heard in the loudspeaker. Release the "SQUELCH" button. This should cause the hiss to stop. If it does not, the squelch circuit should be tightened by turning the squelch adjustment potentiometer, accessible through a hole in the left side of the cabinet, in a clockwise direction until the hiss stops.

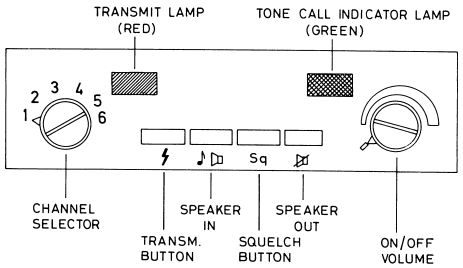


Equipment with Built-in Tone Receiver

If a tone receiver is provided in the equipment, the "SPEAKER IN" button must be depressed before the hiss can be heard, and the green lamp should now light.

Depressing the "SPEAKER OUT" button should cause the hiss to stop.
Releasing the "SQUELCH" button should also cause the hiss to stop.

The "SPEAKER IN" button must be depressed before the transmitter can be turned on.



Operating the Transmitter

The transmitter can be controlled either from the built-in transmit button or from an external transmit button such as a microphone button.
The red transmitter lamp should glow while the transmit button is kept depressed.

Equipment with Built-in Tone Transmitter

Tone calls are transmitted by depressing the built-in transmit button, which will switch on both the VHF/UHF transmitter and the tone transmitter. In subsequent transmissions, where no tone calls are required, the equipment is controlled from an external transmit button (e. g. microphone button).

If the tone transmitter is employed for identification, a tone code is transmitted each time the carrier is switched on, whether this is done with an external transmit button or with the built-in one.

If the tone transmitter is employed in a radiotelephone not equipped with an external transmit button, it is necessary to restrap control panel CP601 (see circuit diagrams for installation of tone equipment in CP601). Tone calls will then be made by simultaneously depressing the station's "TRANSMIT" button and "SPEAKER IN" button. For subsequent calls, where tone calls are not to be transmitted, only the transmit button should be depressed.

Checking with a Substation

Call a substation. If the CQL600F radiotelephone has both a tone transmitter and a tone receiver, these should be tested as follows:

Depress the "SPEAKER IN" button. Monitor the channel for traffic.

Depress the tone button on the control panel, causing a tone call to be transmitted.

If the substation answers the call, the tone transmitter is functioning satisfactorily.

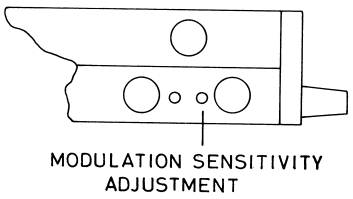
Ask the substation to transmit a tone call. Then depress the "SPEAKER OUT" button.
OUT" button.

When the call from the substation is received, the green call lamp will show light; the horn or bell of the alarm circuit (if one is provided) will sound; and the tone call will be heard in the loudspeaker.

Answer the substation by switching on the transmitter by means of the external transmit button (e. g. microphone button).

Adjusting Modulation Sensitivity

The modulation sensitivity should be adjusted to watch the operator's voice. This is done by altering the setting of the sensitivity control, potentiometer R1, accessible through a hole in the left side of the station cabinet. Use an insulated alignment tool.



If the operator is speaking into the microphone from a large distance or if his voice level is too low, and also under condition of high ambient noise, there is a risk that the transmitter's signal-to-noise ratio will be too poor. The best cure is to reduce the speaking distance.

Microphone sensitivity should not be increased beyond the point where the frequency swing caused by the ear's own noise (that is without speech) is $0.05 \times \Delta F_{max.}$ To increase the modulation sensitivity, turn R1 in an anti-clockwise direction.

Storno

CHAPTER V. SERVICE

A. Maintenance

Preventive Service Inspections

When a CQL600/CQL600F (spec. K) has been properly installed and checked for satisfactory operation it should not thereafter be left to itself until breakdowns begin to occur. Every equipment should be inspected at regular intervals and readjusted if necessary. The frequency of such routine inspections will depend on the conditions under which the equipment is operated and on the total number of operating hours, but twelve months is the maximum time that should be permitted to elapse from one preventive service inspection to the next.

Thanks to the application of conservative design principles, the CQL600/CQL600F (spec. K) may be expected to have long life. Easy service and fault finding were two other important design considerations. All significant currents and voltages are specified in the circuit diagrams. On each circuit diagram is printed a screen picture of the wiring board, showing the diagram symbols of the individual components.

Moreover, all modules have easily accessible test points to permit rapid checking of the 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.

Readings at Test Points

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

CQL611, CQL612, CQL613, and CQL614

Point	Unit	Instr.	Measurement
1	RC611	Probe A	10-30 mV ●
2	RC611	Probe A	30-80 mV ●◆
3	RC611	Probe B	0.6-1.2V
4	RC611	Probe B	0.3-0.8V
7	IC605	Probe B	0.2-0.8V
8	IA601	Probe A	0.3-2.0 μV □
10	IA601	AF-voltm.	12.5kHz: 0.45-0.6V ■ 20 kHz: 0.8-1.0V 25 kHz: 0.9-1.1V 50 kHz: 1.3-1.4V
14	SQ600	AF-voltm.	1.1V ■
27	AA601/608	AF-voltm.	0.25-1.0V ▲
30	EX611	Probe B	0.5-1.4V
32	EX611	Probe B	1.0-1.6V
33	EX611	Probe C	3.0-5.0V
34	EX611	Probe C	2.0-6.5V
35	EX611	Probe B	1.5-5.0V
36	PA611	Probe D	15-20V ○
(37)	PA611	mA-instr.	10W: 150-300 mA ✱ 6W: 50-150 mA
(38)	PA611	mA-instr.	10W: 500-800 mA ✱ 6W: 300-500 mA

CQL 631, CQL 632, CQL 633, and CQL 634

Point	Unit	Instr.	Measurement
[1]	RC631	Probe A	5-20 mV ●
[2]	RC631	Probe A	10-40 mV●◆
[3]	RC631	Probe B	0.4-1.0V
[4]	RC631	Probe B	0.4-1.0V
[7]	IC605	Probe B	0.2-0.8V
[8]	IA601	Probe A	0.3-2.0 μV □
[10]	IA601	AF-voltm.	12.5 kHz: 0.45-0.6V■ 20 kHz: 0.8-0.9V 25 kHz: 0.9-1.1V 50 kHz: 1.3-1.4V
[14]	SQ600	AF-voltm.	1.1V ■
[27]	AA601/608	AF-voltm.	0.5-1.0V▲
[30]	EX63x	Probe B	0.5-0.9V
[32]	EX63x	Probe B	1.4-1.8V
[33]	EX63x	Probe C	2.6-5.0V
[35]	EX63x	Probe B	0.3-0.8V
[36]	PA631	Probe D	14-16V○
(37)	PA631	DC-voltm.	10W: 0.2-0.45V *
(38)	PA631	DC-voltm.	10W: 0.6-0.85V *

● Antenna signal-EMF for 10 μA
◆ Without oscillatorsignal
□ Antenna signal-EMF for 40 μA
■ Antenna signal 1 μV EMF, 0.7 x ΔF and 1000 Hz
▲ Frequency deviation 0.7 x ΔFmax and 1000 Hz
○ Measured across a 47 Ω resistor
* Measured at nominal output power

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

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 20kΩ/V. RF signal measurements may be made with a multimeter in conjunction with a STORNO Type 95,089 RF probe. Audio-frequency signal measurements require the use of a vacuum-tube voltmeter.

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 comprise the operations specified below:

1) Inspect (visually) transistors, diodes etc. Fasten any components that may have worked loose.

2) Check the supply voltage. It should not be outside these values:
CQL600F/CQL600F spec. K:
220 VAC ±20%.

CQL600
6.3V ±20%, 12.6V ±20%, and 25,2V ±20%.

3) Check cable connections, fuse box, battery (look for corroded joints; top up with distilled water if necessary). 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 base station 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 personnel who have the necessary measuring instruments etc. at their disposal and have previously studied the operating principles of the STORNOPHONE 600L.

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

Such faults are easily corrected by soldering a short end of wire across the broken place on the board. 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 lcnger 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 CQL600/CQL600F (spec. K) 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 STORNOPHONE 600L should perform adjustments and repairs. Each individual radiotelephone is checked and tested before being dispatched from the factory. In the absence of any special agreements. The Testing Department has:

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

When the installation has been completed and its proper execution checked, the transmitter modulation sensitivity should be adjusted so that it is suitable for the voice of the operator. This adjustment is performed through a hole in the side of the cabinet. In case that the microphone is placed some distance away from the operator, the voice is low, and the ambient noise level is high, there is a risk that the signal-to-noise ratio of the transmitter modulation may be too poor.

Caution: The greatest care should be shown when measuring currents, voltages etc. in the circuits of the STORNOPHONE 600L as even brief short circuits, such as may be caused by the test prods of a measuring instrument, may in certain cases cause permanent damage to a transistor.

STORNOPHONE 600L

This adjustment procedure applies to the following radiotelephones:

CQL611 (146-174 MHz), 50 kHz channel separation
CQL612 (146-174 MHz), 25 kHz channel separation
CQL613 (146-174 MHz), 20 kHz channel separation
CQL614 (146-174 MHz), 12.5kHz channel separation
CQL631 (68-88 MHz), 50 kHz channel separation
CQL632 (68-88 MHz), 25 kHz channel separation
CQL633 (68-88 MHz), 20 kHz channel separation
CQL634 (68-88 MHz), 12.5kHz channel separation

Directions for the adjustment of the TR68x tone receiver and the TT68x tone transmitter are also given.

Measuring Equipment

While adjustments are being performed, the STORNOPHONE 600L should be connected to a power supply via a standard installation cable, fuseholders, and fuse.

The power supply should be adjusted to deliver the voltage for which the voltage straps of the equipment have been set.

CQL600

For 6-volt operation: 6.3 volts (as measured at the fuseholders located outside the station cabinet in the battery lead.

For 12-volt operation: 12.6 volts (as measured at the fuseholders located outside the station cabinet in the battery lead.

For 24-volt operation: 25.2 volts (as measured at the fuseholders located outside the station cabinet in the battery lead.

CQL600F/CQL600F spec. K:

38VAC, 50 Hz from an external mains transformer, (Storno type 60.5147).

The following instruments are required:

A power supply rated at 5.0-33 V/15 A.

A signal generator, for 146-174 MHz (CQL610) or 68-88 MHz (CQL630).

A crystal controlled signal generator for 455 kHz (e. g. STORNO-sweepgenerator type L20).

An audio voltmeter.

A distortion meter.

A standard receiver with calibrated discriminator.

A wattmeter, 0-10 watts/0-25 watts.

A dummy load.

A tone generator.

An RF probe (STORNO Type 95.089).

A multimeter, 20 k ohms per volt.

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

A milliammeter, 0 - 500 milliamps.

An ammeter, 0 - 1 amp.

With these instruments available, the STORNO-PHONE 600 can always be restored to operating condition.

RECEIVER ALIGNMENT

In case of divergence between the test-point readings of the Test report and the check measurements made on the units, the equipment can be checked on the lines laid down in the following alignment procedure

Before starting the alignment of the receiver, first check the internal supply voltage, -24 volts. If necessary, adjust it for the correct value. In type CQL600 adjust potentiometer R18 in power supply unit PS606 (the potentiometer is accessible through a hole in the wiring board of the PS606). In type CQL600F/CQL600F spec. K adjust potentiometer R8 in PS6010.

Also check that the straps in receiver converter RC6x1, intermediate-frequency amplifier IA601 and squelch and audio amplifier SQ600 are in accordance with the channel separation in use (see circuit diagrams of the respective units).

Alignment of Low IF Channel and Discriminator, IC605, and IA601

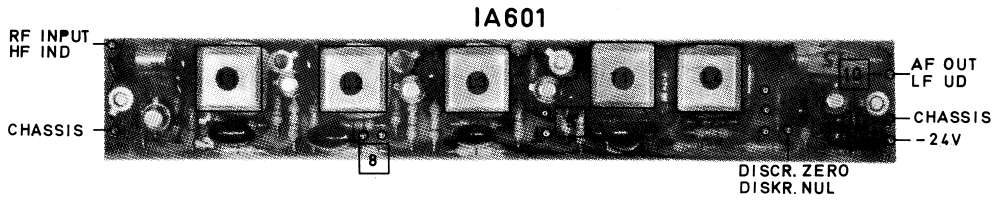


Fig. 1

Apply a 455 kHz signal (approx. 10 μV) to the input of BP60x without cutting off the connection between IC605 and BP60x.

Connect RF probe and multimeter at testpoint [9].

Adjust coils L1, L2, and L3 in IA601 for maximum meter reading, approx. 20 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 tap marked "Discriminator Zero".

Adjust coil L4 (discriminator secondary) for zero 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.

Linearity at ± 15 kHz: 2.5 μA per kHz.

Low-IF block filter BP60x is aligned and artificially aged at the factory, making subsequent realignment unnecessary.

Alignment of Signal Frequency Amplifier and High IF Channel, RC6x1 and XO6xx

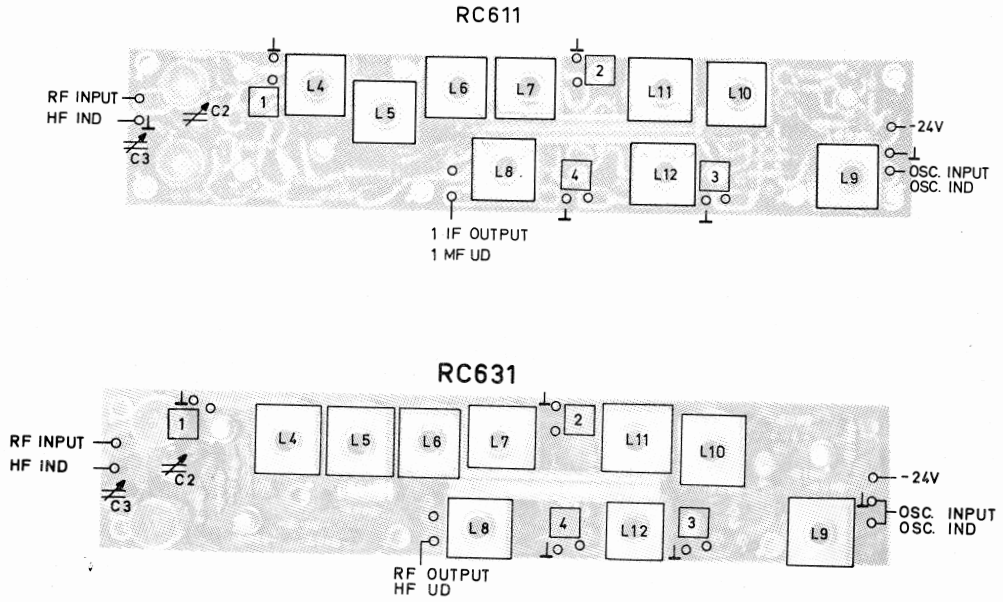


Fig. 2

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

CQL63x: $fx = \frac{fsig + 10.7}{2}$ MHz

CQL61x:

146-160 MHz: $fx = \frac{fsig + 10.7}{3}$ MHz

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

Connect RF probe and multimeter at testpoint [3].

Adjust coil L1 in the used oscillator unit XO6xx for maximum meter reading.

Adjust coils L9 and L10 in RC6x1 for maximum meter reading (see values on the Test report).

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

Adjust coils L11 and L12 in RC6x1 for maximum meter reading (see values on the Test report).

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

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

Adjust trimmer capacitor C2 and C3 and coil L4 in RX6x1 for maximum meter reading.

Adjust coil L5 in RC6x1 for minimum meter reading.

Adjust coil L6 in RCx1 for maximum meter reading.

Adjust coil L7 in RCx1 for minimum meter reading.

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

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

Readjust coils L4, L5, L6, L7, and L8 in RC6x1 for maximum meter reading. The level should be so low that limiting does not occur (below 200μA)

Adjustment of High IF Oscillator, X06xx

The oscillator unit is adjusted before leaving the factory. However, if a frequency counter is available, the oscillator can be adjusted by means of a trimmer capacitor C4 in the unit, with the frequency counter connected at test point [3] in RC6x1 via a capacitor. The oscillator must be adjusted to frequency with an accuracy better than 1×10^{-6}.

Checking the Oscillator in IC 605

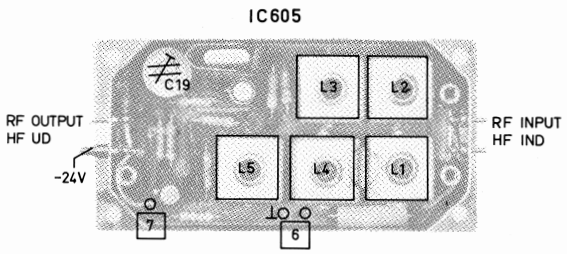


Fig. 3

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

Filter Matching, Sensitivity, and Audio Level Adjustment, IC 605, IA 601, and SQ 603/602

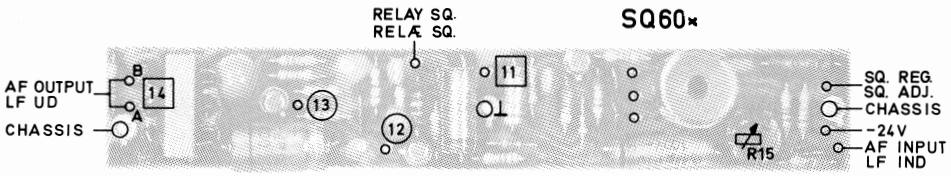


Fig. 4

Connect the signal generator to the antenna input of RC6x1 and set it to the signal frequency. Set the frequency swing to 70% of the maximum permissible limit:

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

The modulation frequency should be 1000 Hz. The RF level should be 100-1000 μV.

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

Adjust Coil L8 in RC6x1 and coils L1, L2, L3, L4, and L5 in IC605 for maximum meter reading. The RF level should be so low that limiting does not occur (below 200 μA).

Connect the distortion meter and the audio voltmeter at test point [10] in IA601.

Audio level at test point [10] should be approx.

0.5V for 12.5 kHz channel separation.
1.0V for 25/20 kHz channel separation.
1.35V for 50 kHz channel separation.

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 distortion meter 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.

Carefully adjust the input filter in RC6x1 for best possible signal-to-noise ratio. It should be possible to obtain a 12-dB signal-to-noise ratio for an electromotive force of 0.8 μV.

Connect the audio voltmeter and the distortion meter at test point [14] in SQ600 (at output terminals) or the terminals A and E in Control Panel CP601.

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

Adjust, by means of potentiometer R15 in SQ600, the output level for 3 dBm, corresponding to 1.1V across a 600Ω load.
Distortion less than 3.5%.

NOTE: The 600Ω load is located in CP601, where it serves as level control.

Squelch Sensitivity

Keep the signal generator connected to the antenna input of RC6x1 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.

The squelch function is activated by depressing button 03 on CP601.

Check that the squelch control is working, that is, it must be capable of cutting in the receiver output and turning it off again in the absence of an incoming RF-signal.
The squelch control is located on the control panel CP601 (potentiometer R9).

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

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

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

Maximum signal-to-noise ratio in the speech channel: 20 dB, typical.

TRANSMITTER ALIGNMENT

Check that the straps in units EX6xx, PA6x1 and AA601/608 are in accordance with the channel separation in use and the frequency band in use (see circuit diagrams).

Transfer the signal lead connecting exciter EX6xx to power amplifier PA6x1 to the 47-ohm load resistor in PA6x1, test point [36] which loads the exciter during adjustments.

The transmitter must be operated under carrier-on conditions during the subsequent adjustments. This is accomplished by depressing the transmit button or by connecting terminals J2/3 and J2/5 together in control panel CP601.

Set the ADC control potentiometer (R4 in PA631 and R5 in PA611) at mid-scale.

Alignment of Exciter EX6xx

Alignment of the exciter should be performed <u>without</u> modulating signal from AA601/608.

EX611 (in CQL611, CQL612, CQL613, and CQL614)

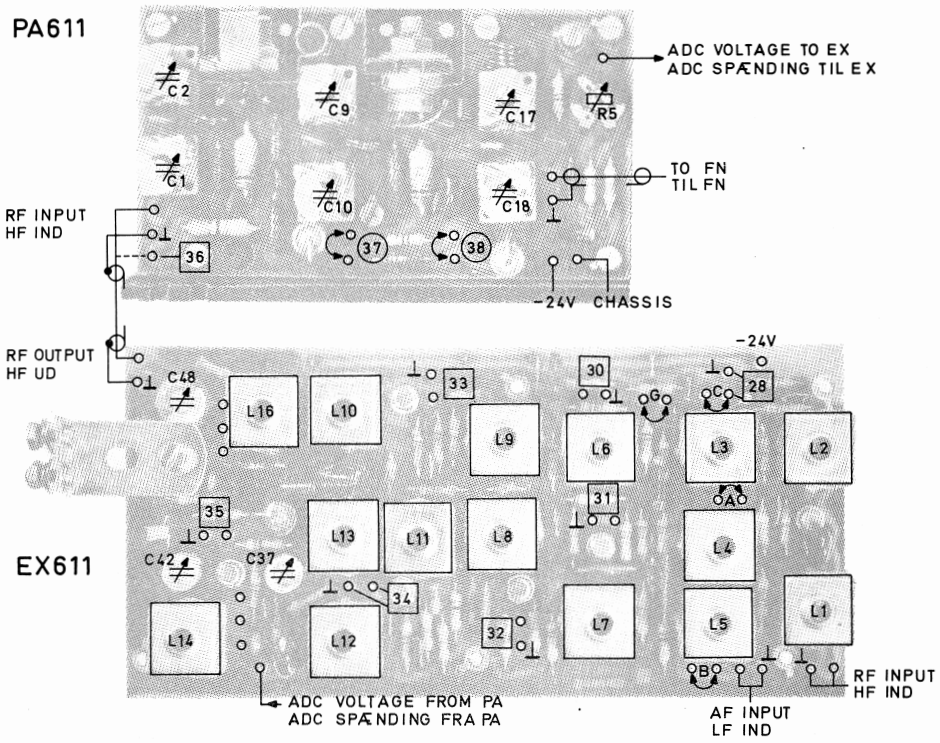


Fig. 5

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

Connect RF probe and multimeter at test point [30].

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

Insert straps marked G and A.

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

Insert straps marked G and B instead.

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

Insert straps marked G and C instead.

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

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

Remove straps.

Repeat alignment of coils L2 and L6 for maximum reading approx. 0.5V.

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

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

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

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

Connect RF probe and multimeter at test point [34].

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

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

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

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

Adjust coils L14 and L16 as well as trimmer capacitors C42 and C48 for maximum meter reading, approx. 15V.

EX631, and EX632 (in CQL631, CQL632, CQL633, and CQL634)

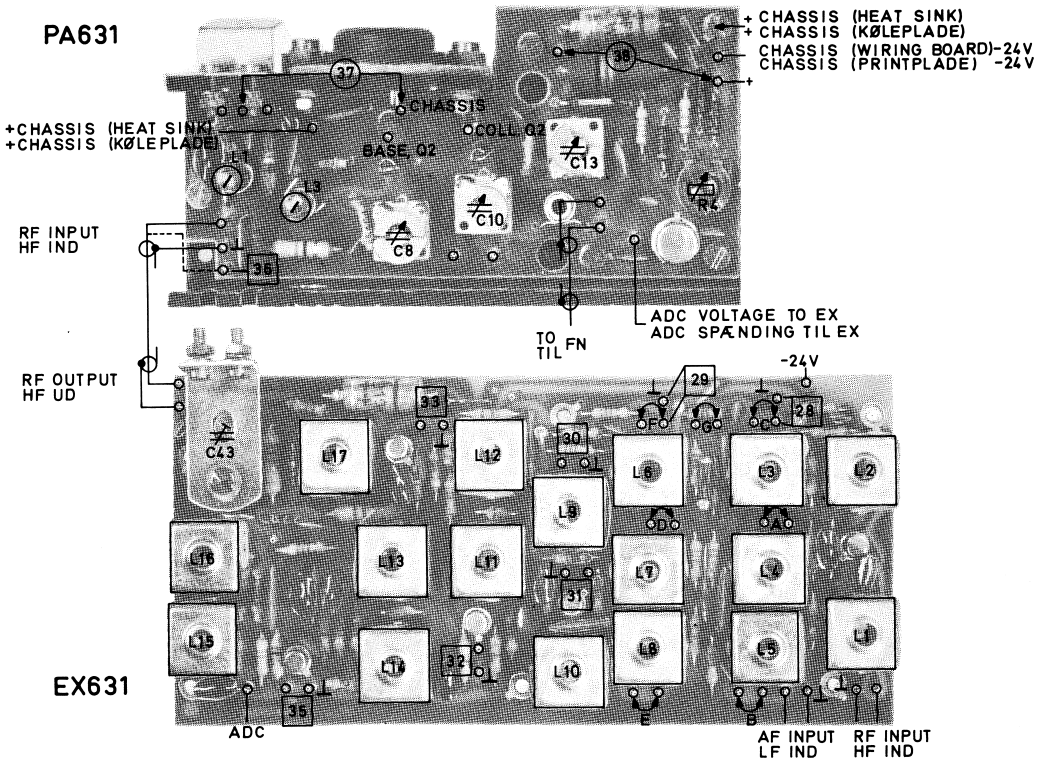


Fig. 6

Connect RF probe and multimeter at test point 30.

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

Insert straps marked G and A.

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

Insert straps marked G and B instead.

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

Insert straps marked G and C instead.

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

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

Remove straps.

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

Adjustment of 2nd Modulator in EX631

Connect RF probe and multimeter at test point 30.

Insert straps marked G and D.

Adjust coil L6 for maximum meter reading, approx. 0.5V.

Insert straps marked G and E.

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

Insert straps marked G and F.

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

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

Remove straps.

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

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

Adjust coil L10 for maximum meter reading, approx. 1.0V.

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

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

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

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

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

Adjust coils L15, L16, and L17 and trimmer capacitor C43 for maximum meter reading, approx. 15V.

Release the transmit button or remove strap between terminals J2/3 and J2/5.

Adjustment of Power Amplifier Stage, PA6x1

First, the signal lead from the exciter should be transferred from the load resistor to the input of PA6x1.

Connect a dummy load across the output of power amplifier PA6x1.

PA611 (in CQL611, CQL612, CQL613, and CQL614)

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

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

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

Depress the transmit button

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

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

Readjust trimmer capacitors C17 and C18 for maximum power output.

Again adjust the ADC potentiometer for 10 watts power output.

At full power output, the current at test point (37), as measured with the milliammeter, should be less than 300 mA, and the current at test point (38), as measured with the 1-amp. meter, should be less than 800 mA.

CAUTION: Sometimes, in the low end of the frequency band, the transmitter may deliver more than 15 watts of power output. Since the resulting current drain will cause permanent damage to the PS606 power supply unit, care should be taken that the power output will at no time while aligning the transmitter exceed 15 watts (or 1 amp.) as measured at (38).

PA631 (in CQL631, CQL632, CQL633, and CQL634)

Back off the ADC potentiometer, R4, (anti-clockwise).

Depress the transmit button

Carefully advance the ADC potentiometer, adjusting coils L1 and L3 and trimmer capacitors C8, C10 and C13 for maximum power output.

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

Readjust trimmer capacitors C10 and C13 for maximum power output.

Again adjust the ADC potentiometer for 10 watts power output.

At full power output, the voltage at test point (37) should be less than 0.48V, corresponding to a maximum driver emitter current of 320 mA. The voltage at test point (38) should be less than 0.8V, corresponding to a maximum power-amplifier collector current of 800 mA.

Adjusting the Power Amplifier for 6 Watts Power output, PA6x1

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

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

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

In PA631: Readjust trimmer capacitors C10 and C13 for maximum power output.

Adjust the ADC potentiometer for 5 watts power output.

Again readjust the trimmer capacitors for maximum power output.

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

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

PA611: (37) less than 180 mA.

(38) less than 500 mA.

PA631: (37) less than 180 mA, corresponding to 0.27 V.

(38) less than 500 mA, corresponding to 0.5V.

Antenna Filter FN6x1

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

Crystal Oscillator X0631

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

In this case the transmitter should be aligned first, because the frequency is most easily measured at the transmitter output. The frequency accuracy should be better than 1×10^{-6}.

Modulation Adjustment, AA601/AA608

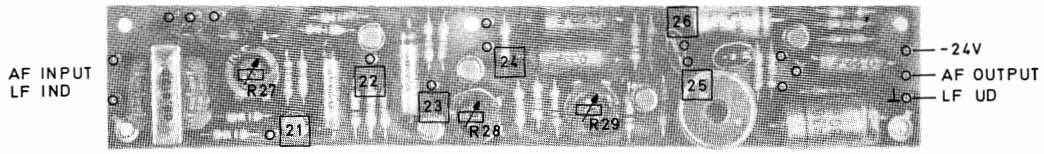


Fig. 7

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

Set potentiometer R28 at mid-scale.

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

Connect audio voltmeter and tone generator to terminals B and F in control panel CP601 modulation input of the transmitter).

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.

CQL611 and CQL631: ΔF max. = ± 15 kHz
CQL612 and CQL632: ΔF max. = ± 5 kHz
CQL613 and CQL633: ΔF max. = ± 4 kHz
CQL614 and CQL634: ΔF max. = ± 2.5 kHz

Adjust, by means of potentiometer R29 in AA601/608 the frequency swing so that it will not exceed the maximum value (ΔF 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.

UNITS IN CONTROL PANEL CP601

Checking the AA602 Audio Output Amplifier

Connect the signal generator to the antenna input of the receiver and set it to the signal frequency at a frequency swing that is 70% of the maximum permissible swing at 1000 Hz.

Connect a 15-ohm 3-watt load resistor across the output terminals of the AA602 output amplifier. Also connect an audio voltmeter across the same terminals.

Turn the volume control of the control panel fully open. The voltage across the load should be at least 6.3 V.

Tone Receiver TR68x

This unit is adjusted before leaving the factory and requires no subsequent readjustment.

Tone Transmitter TT68x

Connect an audio voltmeter to the output of the tone transmitter and connect a standard receiver to the antenna output of the transmitter section.

Adjust the coil of the tone transmitter for a tone frequency of 1060 c/s.

Apply power to the tone transmitter.

Adjust, by means of the alignment potentiometer of the tone transmitter unit, the tone transmitter output level for 110 mV, corresponding to a measuring level of -17 dBm.

If a two-tone transmitter is used, each transmitter section should deliver only half the voltage specified above. This is performed by short-circuiting one of the tone-coils and thus cut out one of the oscillators. Then adjust the output level for 55 mV.

Check the frequency swing at 1060 c/s.

Adjust the tone transmitter coil for the desired tone frequency. Recheck the frequency swing.

Frequency swing for single-tone transmitter: 70% +1, -2 dB of maximum frequency swing.

Frequency swing for two-tone transmitter: 35% for each tone.

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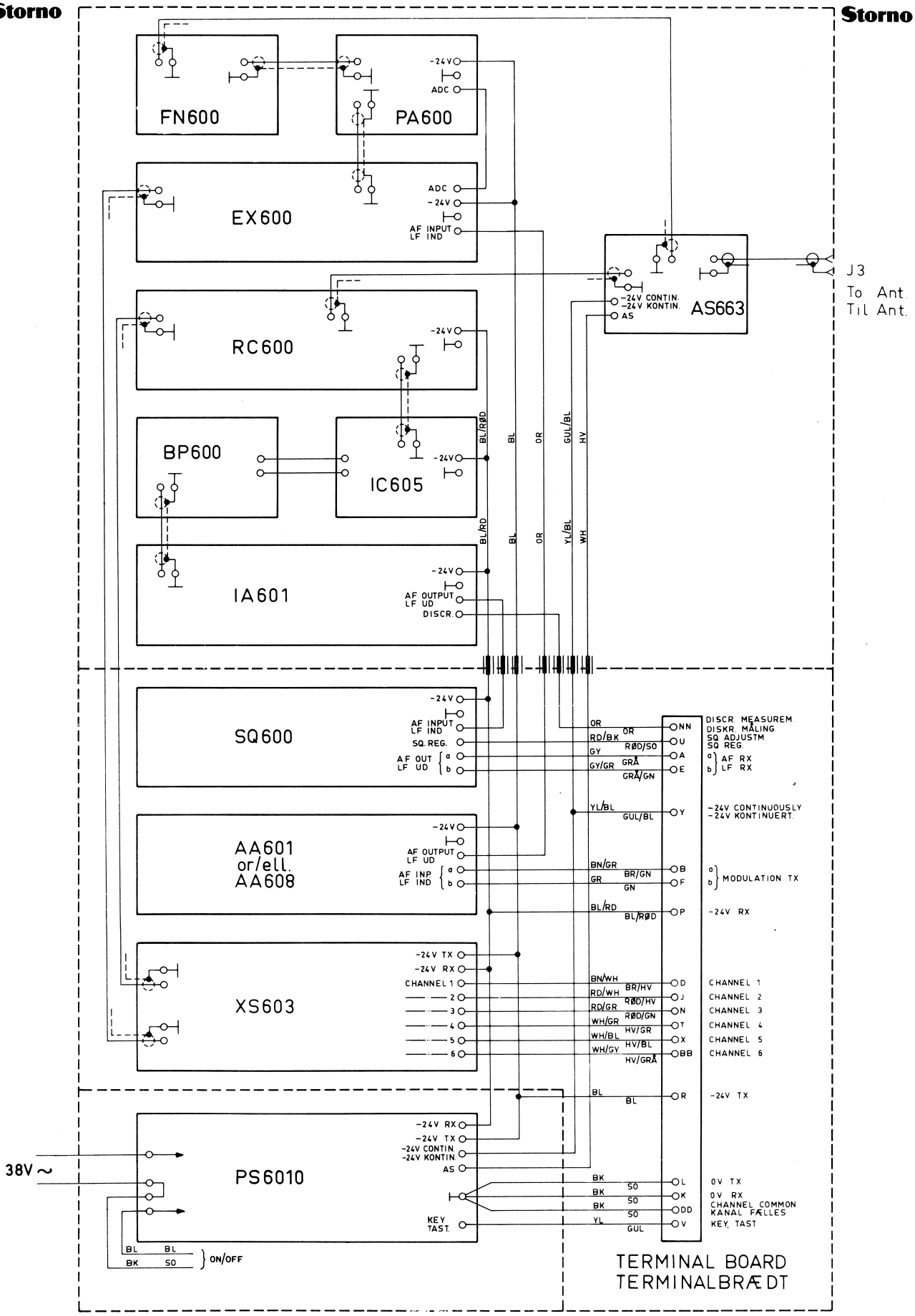
CHAPTER VI. DIAGRAMS AND PARTS LISTS

The diagrams and schematics of the radiotelephone station STORNOPHONE 600 are to be found on the pages following. The component designation in each modular unit starts at R1, C1, L1 etc., for what reason special care should be devoted in filling out the spare part order form. All information concerning each component in question can be found in the parts lists and should be stated together with the type designation of the modular unit.

Furthermore - specification of equipment type and possible production number will ease the handling of the order at Storno and minimize the risk of erroneous delivery. The last page in this manual contains alterations and modifications of the equipment.

Storno

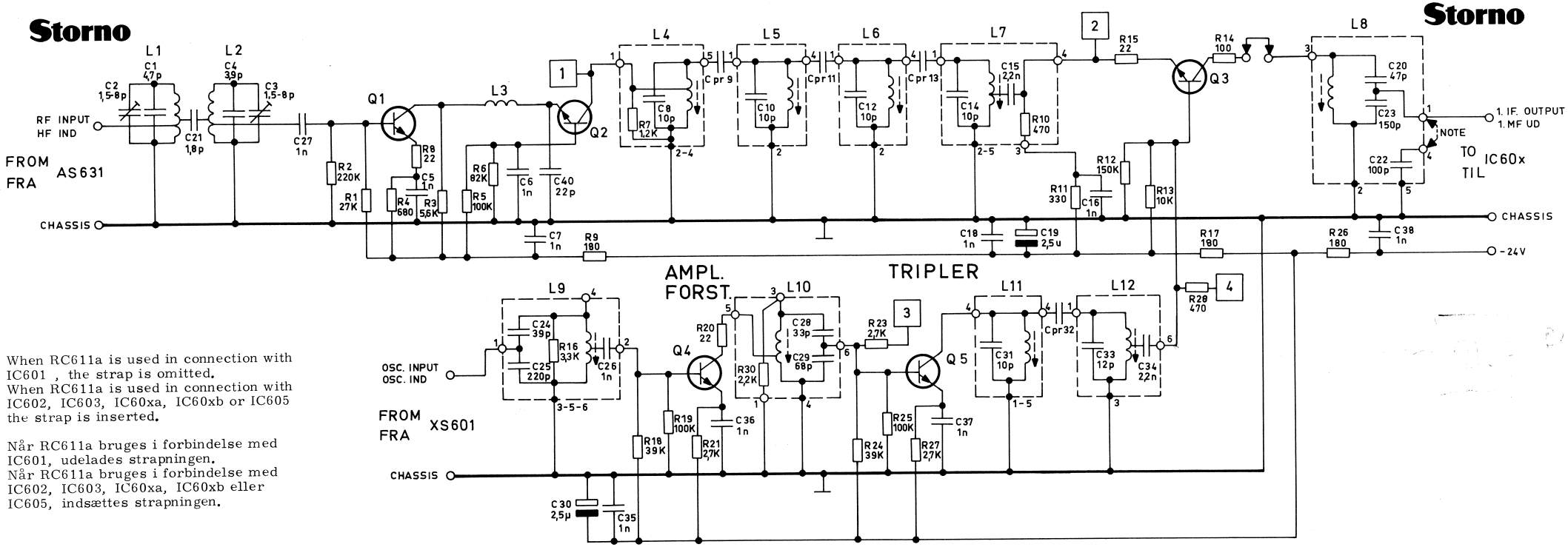


CABLE FORM
KABLINGSDIAGRAM

CQL610F CQL630F

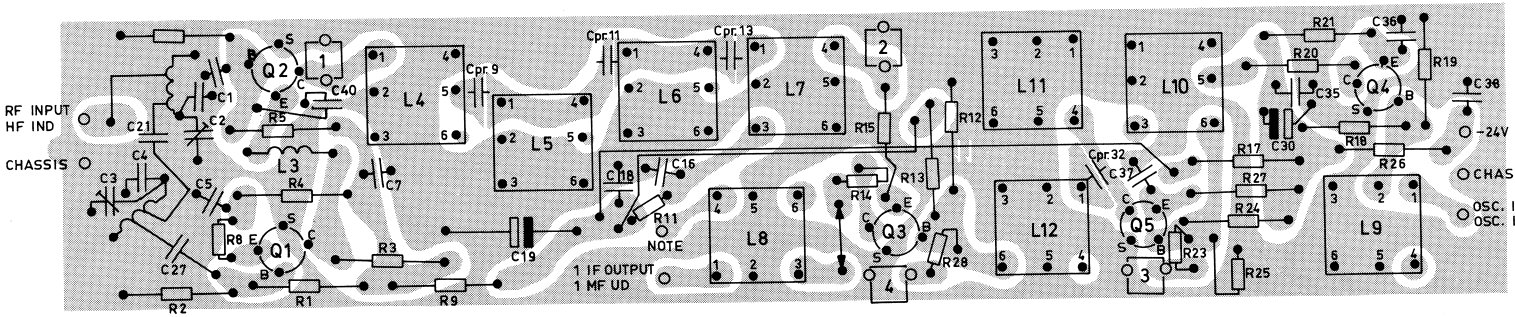
D400.984/2

SF. MX.



Note: When RC611a is used in connection with IC601 , the strap is omitted.
When RC611a is used in connection with IC602, IC603, IC60xa, IC60xb or IC605 the strap is inserted.

Når RC611a bruges i forbindelse med IC601, udelades strapningen.
Når RC611a bruges i forbindelse med IC602, IC603, IC60xa, IC60xb eller IC605, indsættes strapningen.



RECEIVER CONVERTER
MODTAGER KONVERTER

RC611a

D400.833/2

TYPE	NO.	CODE	DATA	
	C1	74.5131	4, 7pF ± 0, 25pF N150 DI	500V
	C2	78.5034	1, 5-8pF trimmer NPO TB	125V
	C3	78.5034	1, 5-8pF trimmer NPO TB	125V
	C4	74.5130	3, 9pF ± 0, 25pF N150 DI	500V
	C5	74.5155	1nF -20 +50% ceram. PL	63V
	C6	74.5155	1nF -20 +50% ceram. PL	63V
	C7	74.5155	1nF -20 +50% ceram. PL	63V
	C8	74.5110	10pF ± 0, 5pF ceram. NO75 TB	250V
	C9		print capacitance/printkapacitet	
	C10	74.5110	10pF ± 0, 5pF ceram. NO75 TB	250V
	C11		print capacitance/printkapacitet	
	C12	74.5110	10pF ± 0, 5pF ceram. NO75 TB	250V
	C13		print capacitance/printkapacitet	
	C14	74.5110	10pF ± 0, 5pF ceram. NO75 TB	250V
	C15	76.5059	2, 2nF 10% polyest. FL	50V
	C16	74.5155	1nF -20 +50% ceram. PL	63V
	C18	74.5155	1nF -20 +50% ceram. PL	63V
	C19	73.5064	2, 5µF -10 +50% elco	70V
	C20	74.5118	47pF ± 2% ceram. NO75 TB	250V
	C21	74.5126	1, 8pF ± 0, 25pF N150 BD	250V
	C22	76.5079	100pF 5% polystyr. TB	125V
	C23	76.5062	150pF 5% polystyr. TB	125V
	C24	74.5117	39pF 2% ceram. TB	250V
	C25	76.5063	220pF 5% polystyr.	125V
	C26	74.5059	1nF 10% polyest. FL	50V
	C27	74.5155	1nF -20 +50% ceram. PL	63V
	C28	74.5116	33pF 2% ceram. NO75 TB	250V
	C29	74.5144	68pF 2% ceram. NO75 TB	250V
	C30	73.5064	2, 5µF -10 +50% elco	70V
	C31	74.5110	10pF ± 0, 5pF ceram. NO75 TB	250V
	C32		print capacitance/printkapacitet	
	C33	74.5141	12pF ± 0, 5pF ceram. NO75 TB	250V
	C34	76.5059	2, 2nF 10% polyest. FL	50V
	C35	74.5155	1nF -20 +50% ceram. PL	63V
	C36	74.5155	1nF -20 +50% ceram. PL	63V
	C37	74.5155	1nF -20 +50% ceram. PL	63V
	C38	74.5155	1nF -20 +50% ceram. PL	63V
	C40	74.5106	22 pF ± 0, 5 pF NO75 TB	160V
	R1	80.5266	27kΩ 5% carbon film	1/8W
	R2	80.5277	0, 22MΩ 5% carbon film	1/8W
	R3	80.5258	5, 6kΩ 5% carbon film	1/8W
	R4	80.5247	680kΩ 5% carbon film	1/8W
	R5	80.5273	0, 1MΩ 5% carbon film	1/8W
	R6	80.5272	82kΩ 5% carbon film	1/8W
	R7	80.5250	1, 2kΩ 5% carbon film	1/8W
	R8	80.5259	22Ω 5% carbon film	1/8W
	R9	80.5240	180Ω 5% carbon film	1/8W
	R10	80.5045	470Ω 5% carbon film	1/10W

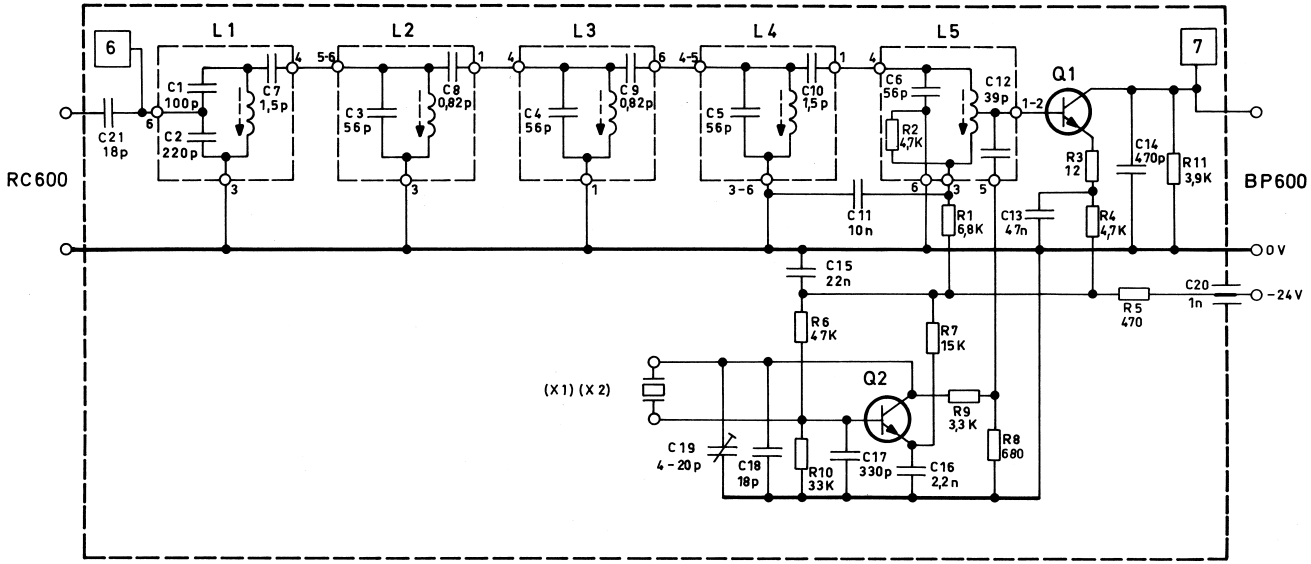
TYPE	NO.	CODE	DATA	
	R11	80.5243	330Ω 5% carbon film	1/8W
	R12	80.5275	0, 15MΩ 5% carbon film	1/8W
	R13	80.5261	10kΩ 5% carbon film	1/8W
	R14	80.5237	100Ω 5% carbon film	1/8W
	R15	80.5229	22Ω 5% carbon film	1/8W
	R16	80.5055	3, 3kΩ 5% carbon film	1/10W
	R17	80.5240	180Ω 5% carbon film	1/8W
	R18	80.5268	39kΩ 5% carbon film	1/8W
	R19	80.5273	0, 1MΩ 5% carbon film	1/8W
	R20	80.5229	22Ω 5% carbon film	1/8W
	R21	80.5254	2, 7kΩ 5% carbon film	1/8W
	R23	80.5254	2, 7kΩ 5% carbon film	1/8W
	R24	80.5268	39kΩ 5% carbon film	1/8W
	R25	80.5273	0, 1MΩ 5% carbon film	1/8W
	R26	80.5240	180Ω 5% carbon film	1/8W
	R27	80.5254	2, 7kΩ 5% carbon film	1/8W
	R28	80.5245	470Ω 5% carbon film	1/8W
	R30	80.5253	2. 2kΩ 5% carbon film	1/10W
	L1	62.759	RF coil/HF-spole 146-174MHz	
	L2	62.758	RF coil/HF-spole 146-174MHz	
	L3	62.659	RF choke/HF-drosselspole	
	L4	61.1034	RF coil/HF-spole (C8, R7)	
	L5	61.868-01	RF coil/HF-spole (C10)	
	L6	61.869-01	RF coil/HF-spole (C12)	
	L7	61.870-01	RF coil/HF-spole (C14, C15, R10)	
	L8	61.871-01	RF coil/HF-spole (C20, C21, C22, C23)	
	L9	61.872-01	RF coil/HF-spole (C24, C25, C26, R16)	
	L10	61.1033	RF coil/HF-spole (C28, C29, R30)	
	L11	61.874-02	RF coil/HF-spole (C31)	
	L12	61.875-02	RF coil/HF-spole (C33, C34)	
	Q1	99.5177	Transistor BF166	
	Q2	99.5118	Transistor BF115	
	Q3	99.5168	Transistor BF173	
	Q4	99.5166	Transistor BF167	
	Q5	99.5166	Transistor BF167	

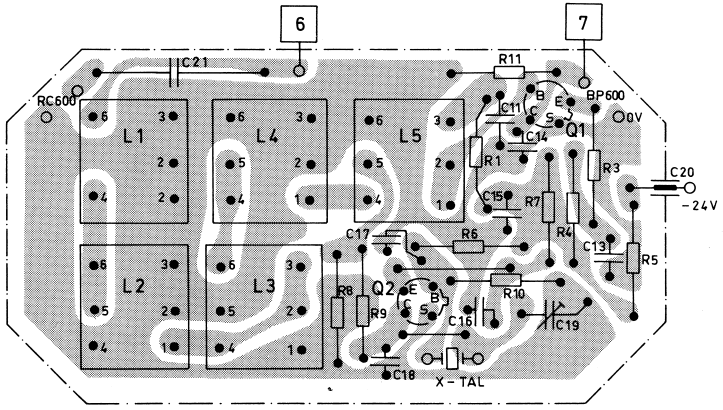
RECEIVER CONVERTER
MODTAGER KONVERTER

RC611a

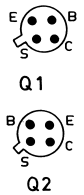
X400.888/2

Storno





VIEWED FROM COMPONENT SIDE
SET FRA KOMPONENTSIDEN



BOTTOM VIEW
SET FRA BUNDEN

IF-CONVERTER
MF-KONVERTER

IC605

D400.775/2

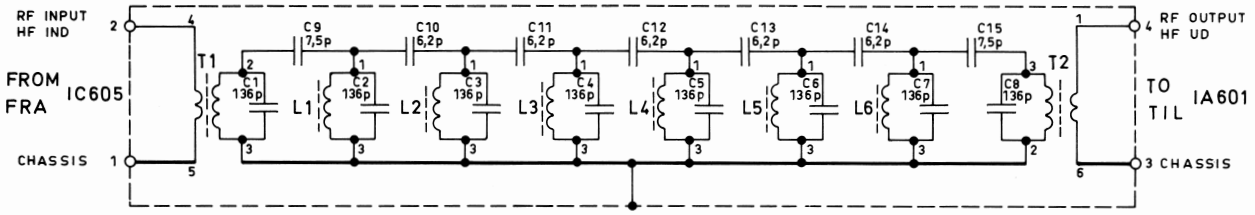
TYPE	NO.	CODE	DATA	
	C1	76.5079	100 pF 5% polystyr. TB	125V
	C2	76.5063	220 pF 5% polystyr. TB	125V
	C3	74.5177	56 pF 2% ceram N150 TB	250V
	C4	74.5177	56 pF 2% ceram N150 TB	250V
	C5	74.5177	56 pF 2% ceram N150 TB	250V
	C6	74.5177	56 pF 2% ceram N150 TB	250V
	C7	74.5125	1.5pF ± 0,25 pF ceram N150 BD	250V
	C8	74.5122	0,82pF ± 0,1pF ceram P100 BD	250V
	C9	74.5122	0,82pF ± 0,1pF ceram P100 BD	250V
	C10	74.5125	1,5 pF ± 0,25 pF ceram N150 BD	250V
	C11	76.5070	10 nF 10% polyest. FL	50V
	C12	74.5117	39 pF 2% ceram NO75 TB	250V
	C13	76.5072	47 nF 10% polyest. FL	50V
	C14	76.5065	470 pF 5% polystyr. TB	125V
	C15	76.5171	22 nF 10% polyest. FL	50V
	C16	76.5059	2,2 nF 10% polyest. FL	50V
	C17	76.5064	330 pF 5% polystyr. TB	125V
	C18	74.5138	18 pF 5% ceram N150 DI	125V
	C19	78.5131	4/20 pF ceram trimmer N470 DI	100V
	C20	74.5167	1 nF -20+80% ceram II FT	300V
	C21	74.5138	18 pF 5% ceram N150 DI	125V
	R1	80.5259	6,8 kΩ 5% carbon film	1/8W
	R2	80.5257	4,7 kΩ 5% carbon film	1/8W
	R3	80.5226	12 Ω 5% carbon film	1/8W
	R4	80.5257	4,7 kΩ 5% carbon film	1/8W
	R5	80.5245	470 Ω 5% carbon film	1/8W
	R6	80.5269	47 kΩ 5% carbon film	1/8W
	R7	80.5263	15 kΩ 5% carbon film	1/8W
	R8	80.5247	680 Ω 5% carbon film	1/8W
	R9	80.5255	3,3 kΩ 5% carbon film	1/8W
	R10	80.5267	33 kΩ 5% carbon film	1/8W
	R11	80.5256	3,9 kΩ 5% carbon film	1/8W
	L1	61.998	Coil/spole 10,7 MHz (C1-C2-C7)	
	L2	61.999	Coil/spole 10,7 MHz (C3-C8)	
	L3	61.1000	Coil/spole 10,7 MHz (C4-C9)	
	L4	61.1001	Coil/spole 10,7 MHz (C5-C10)	
	L5	61.1002	Coil/spole 10,7 MHz (C6-C12-R2)	
	X1	98.5004	Crystal/Krystal 98-8 10,2450 MHz	
	X2	98.5005	Crystal/Krystal 98-8 11,1550 MHz	
	Q1	99.5177	Transistor BF166	
	Q2	99.5166	Transistor BF167	

TYPE	NO.	CODE	DATA

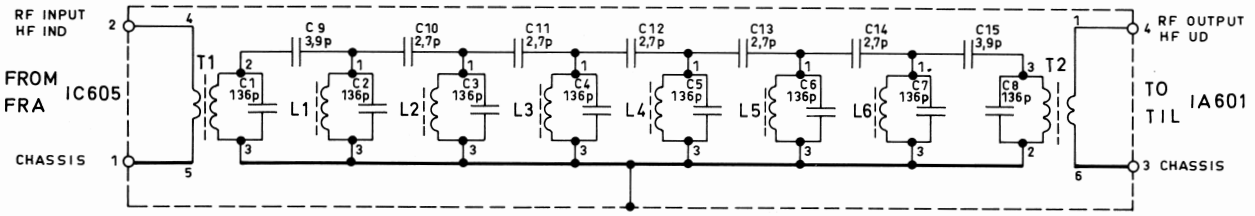
IF CONVERTER
MF KONVERTER

IC605

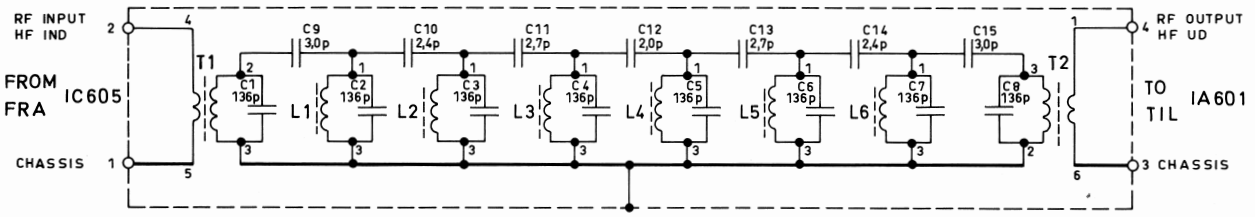
X400.815/3



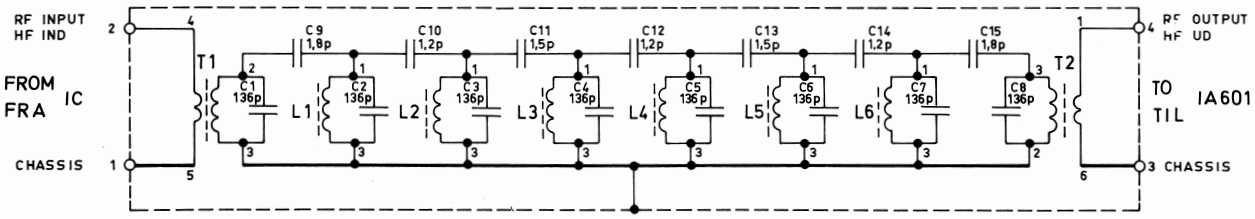
BP608 D400.806



BP609 D400.807



BP6010 D400.808



BP6012 D400.860/2

BAND-PASS FILTER BP608, BP609,
BÅNDPASFILTER BP6010, BP6012

TYPE	NO.	CODE	DATA	
			BP608	
	C1-8	74.5144	68 pF 2% ceram NO75 TB	250V
	C9	74.5179	7,5 pF 0,25 pF ceram N150 DI	250V
	C10	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C11	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C12	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C13	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C14	74.5170	6,2 pF 0,25pF ceram N150 DI	250V
	C15	74.5179	7,5 pF 0,25pF ceram N150 DI	250V
	L1	61.885-01	Coil/spole 455 kHz	
	L2	61.885-01	Coil/spole 455 kHz	
	L3	61.885-01	Coil/spole 455 kHz	
	L4	61.885-01	Coil/spole 455 kHz	
	L5	61.885-01	Coil/spole 455 kHz	
	L6	61.885-01	Coil/spole 455 kHz	
	T1	61.1009	Coil/spole 455 kHz	
	T2	61.1010	Coil/spole 455 kHz	
			BP609	
	C1-8	74.5144	68 pF 2% ceram NO75 TB	250V
	C9	74.5130	3,9 pF 0,25pF ceram N150 DI	250V
	C10	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C11	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C12	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C13	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C14	74.5128	2,7 pF 0,25pF ceram N150 DI	250V
	C15	74.5130	3,9 pF 0,25pF ceram N150 DI	250V
	L1	61.819-01	Coil/spole 455 kHz	
	L2	61.819-01	Coil/spole 455 kHz	
	L3	61.819-01	Coil/spole 455 kHz	
	L4	61.819-01	Coil/spole 455 kHz	
	L5	61.819-01	Coil/spole 455 kHz	
	L6	61.819-01	Coil/spole 455 kHz	
	T1	61.979-01	Coil/spole 455 kHz	
	T2	61.979-01	Coil/spole 455 kHz	
			BP6010	
	C1-8	74.5144	68 pF 2% ceram NO75 TB	250V
	C9	74.5172	3 pF 0,25 pF ceram N150 DI	250V
	C10	74.5178	2,4 pF 0,25 pF ceram N150 DI	250V
	C11	74.5128	2,7 pF 0,25 pF ceram N150 DI	250V
	C12	74.5174	2 pF 0,25 pF ceram N150 DI	250V
	C13	74.5128	2,7 pF 0,25 pF ceram N150 DI	250V

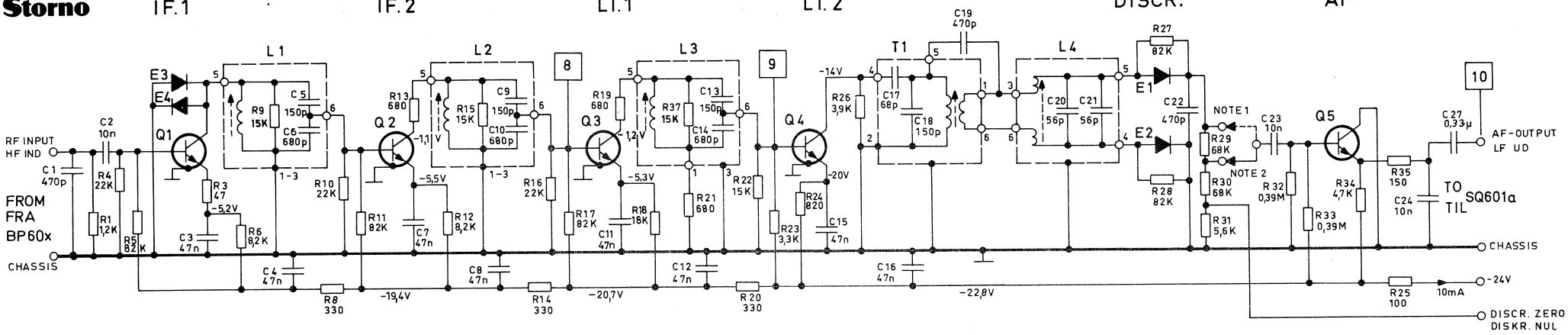
Storno

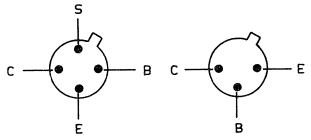
TYPE	NO.	CODE	DATA	
	C14	74.5178	2,4 pF 0,25 pF ceram N150 DI	250V
	C15	74.5172	3 pF 0,25 pF ceram N150 DI	250V
	L1	61.819-01	Coil/spole 455 kHz	
	L2	61.819-01	Coil/spole 455 kHz	
	L3	61.819-01	Coil/spole 455 kHz	
	L4	61.819-01	Coil/spole 455 kHz	
	L5	61.819-01	Coil/spole 455 kHz	
	L6	61.819-01	Coil/spole 455 kHz	
	T1	61.979-01	Coil/spole 455 kHz	
	T2	61.980-01	Coil/spole 455 kHz	
			BP6012	
	C1-8	74.5144	68 pF 2% ceram NO75 TB	250V
	C9	74.5126	1,8 pF 0,25 pF ceram N150 DI	250V
	C10	74.5124	1,2 pF 0,25 pF ceram N150 DI	250V
	C11	74.5125	1,5 pF 0,25 pF ceram N150 DI	250V
	C12	74.5124	1,2 pF 0,25 pF ceram N150 DI	250V
	C13	74.5125	1,5 pF 0,25 pF ceram N150 DI	250V
	C14	74.5124	1,2 pF 0,25 pF ceram N150 DI	250V
	C15	74.5126	1,8 pF 0,25 pF ceram N150 DI	250V
	L1	61.819-01	Coil/spole 455 kHz	
	L2	61.819-01	Coil/spole 455 kHz	
	L3	61.819-01	Coil/spole 455 kHz	
	L4	61.819-01	Coil/spole 455 kHz	
	L5	61.819-01	Coil/spole 455 kHz	
	L6	61.819-01	Coil/spole 455 kHz	
	T1	61.1048	Coil/spole 455 kHz	
	T2	61.1049	Coil/spole 455 kHz	

BAND-PASS FILTER BP608, BP609,
BÅNDPASFILTER BP6010, BP6012

X400.879/2

Storno IF.1 IF.2 LI.1 LI.2 DISCR. AF **Storno**

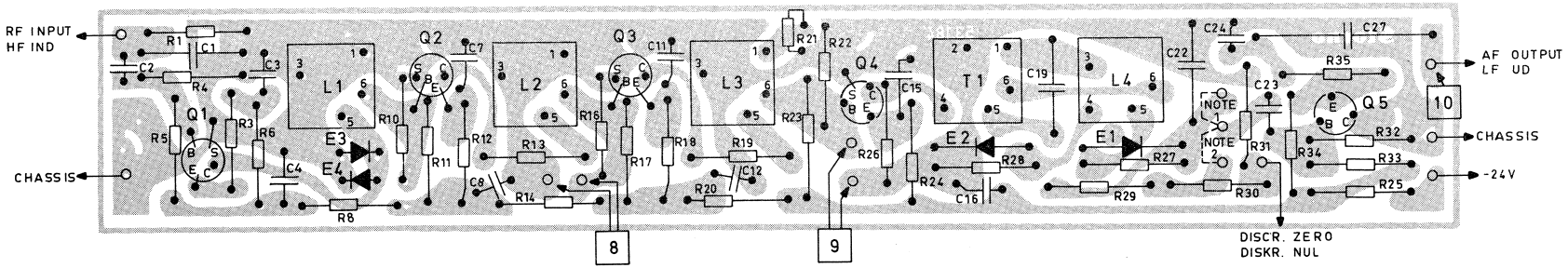




NOTE 1. CONNECTION FOR ±4kHz OR ±5kHz FREQ. DEVIATION
NOTE 2. CONNECTION FOR ±15kHz FREQ. DEVIATION

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

D401.042/2

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	76.5075	0,33 μF 10% polyest. TB	100V
	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

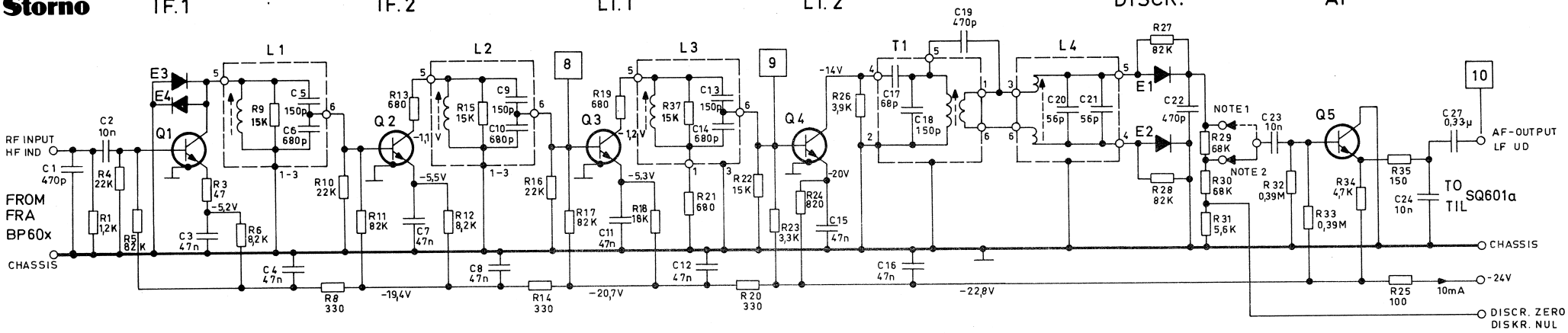
TYPE	NO.	CODE	DATA	
	R25	80.5237	100 Ω 5% carbon film	1/8W
	R26	80.5256	3,9 kΩ 5% carbon film	1/8W
	R27	80.5272	82 kΩ 5% carbon film	1/8W
	R28	80.5272	82 kΩ 5% carbon film	1/8W
	R29	80.5271	68 kΩ 5% carbon film	1/8W
	R20	80.5271	68 kΩ 5% carbon film	1/8W
	R31	80.5258	5,6 kΩ 5% carbon film	1/8W
	R32	80.5280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

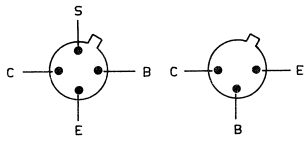
IF-AMPLIFIER
MF-FORSTÆRKER

IA601c

X400.797/2

Storno IF.1 IF.2 LI.1 LI.2 DISCR. AF **Storno**





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

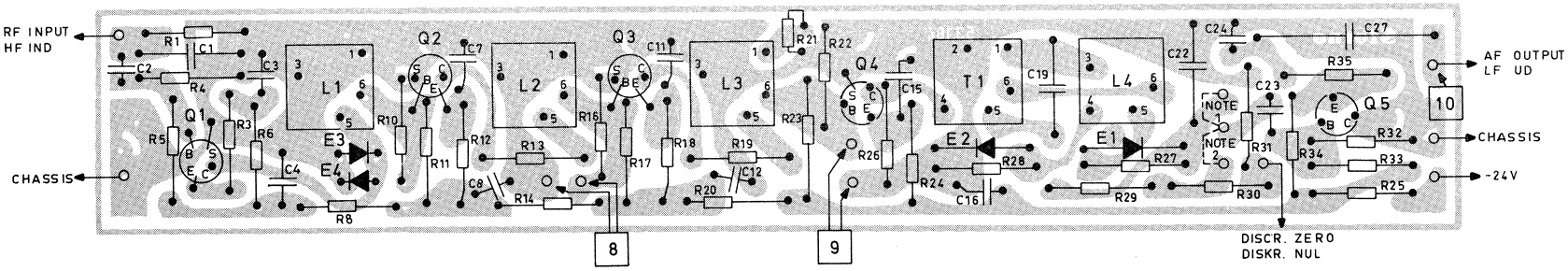
NOTE 2. CONNECTION FOR ±15kHz FREQ. DEVIATION

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

D401.042/2

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	76.5075	0,33 μF 10% polyest. TB	100V
	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	

IF-AMPLIFIER
MF-FORSTÆRKER

IA601c

X400.797/2

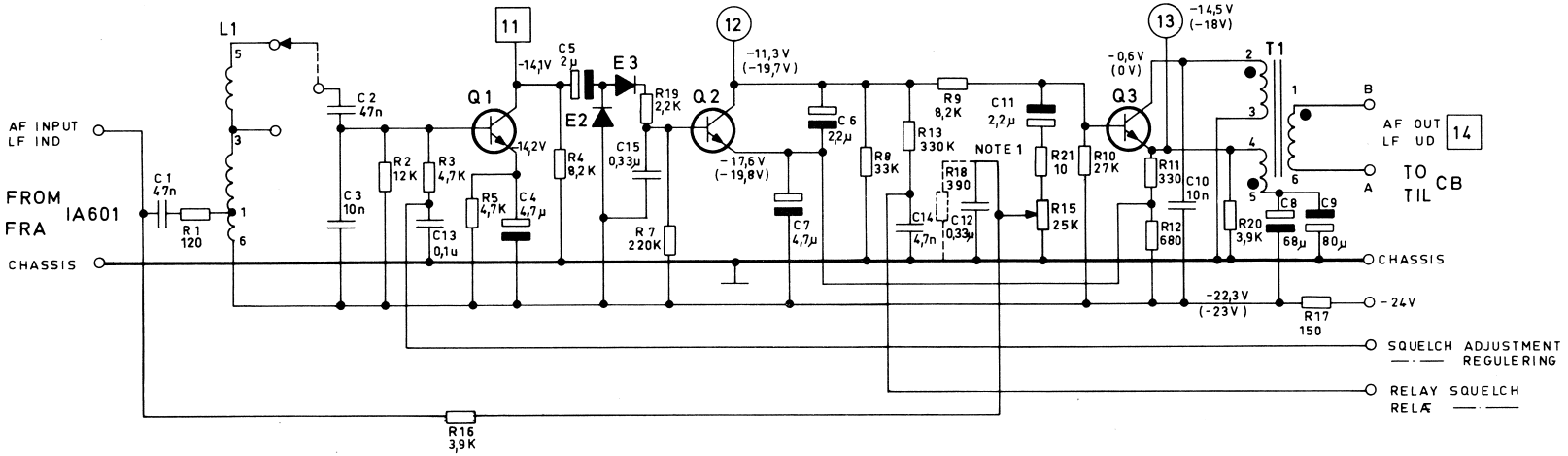
Storno

NOISE AMP
STØJFORST.

NOISE DETECTOR
STØJDETEKTOR

AF AMP
LF FORST

Storno

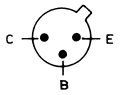


NOTE 1. IF FM IS USED INSTEAD OF PM, C12 IS REPLACED BY R18(390Ω)

NOTE 1. VED FM UDBYTTES C12 MED R18(390Ω)

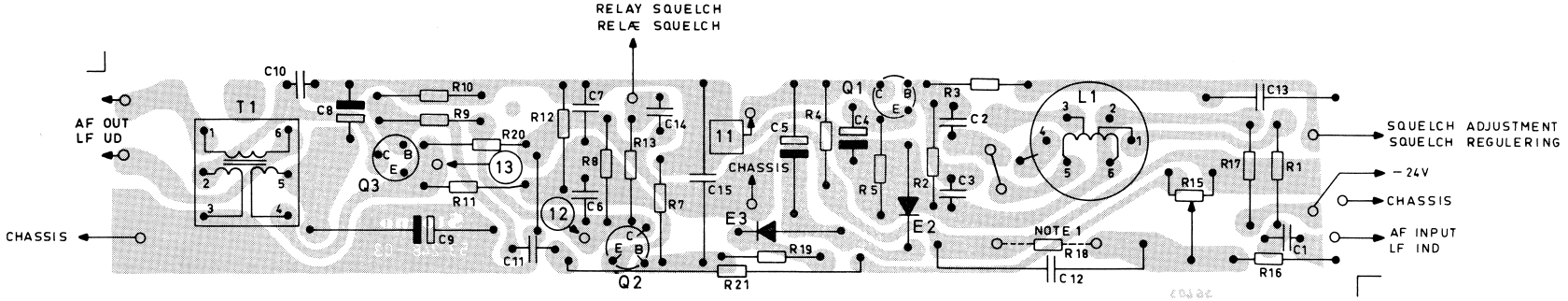
DC VOLTAGES WITHOUT PARENTHESES ARE MEASURED WITH SQUELCH OFF (AF-SIGNAL OUT).
DC VOLTAGES IN PARENTHESES ARE MEASURED WITH SQUELCH ON (NO AF-SIGNAL OUT).
SQUELCH REGULATOR ADJUSTED TO 10KΩ.

DC SPÆNDINGER UDEN PARENTES MÅLT VED SQUELCH OFF (LF-SIGNAL UD).
DC SPÆNDINGER I PARENTES MÅLT VED SQUELCH ON (INTET LF-SIGNAL UD).
SQUELCH REG. INDSTILLET TIL 10KΩ.



Q1, Q2 Q3
BOTTOM VIEW
SET FRA BUNDEN

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF-AMPLIFIER AND SQUELCH
LF-FORSTÆRKER OG SQUELCH

SQ 602

D400.844

TYPE	NO.	CODE	DATA	
	C1	76.5072	47 nF 10% polyest.	50V
	C2	76.5072	47 nF 10% polyest.	50V
	C3	76.5070	10 nF 10% polyest. FL	50V
	C4	73.5103	4,7 µF 20% tantal	15V
	C5	73.5102	2,2 µF 20% tantal	35V
	C6	73.5102	2,2 µF 20% tantal	35V
	C7	73.5103	4,7 µF 20% tantal	15V
	C8	73.5106	68 µF 20% tantal	15V
	C9	73.5110	80 µF -10 +50% elco	25V
	C10	76.5070	10 nF 10% polyest. FL	50V
	C11	73.5102	2.2 µF 20% tantal	35V
	C12	76.5075	0.33 µF 10% polyest. TB	100V
	C13	76.5073	0,1 µF 10% polyest. TB	100V
	C14	76.5061	4,7 nF 10% polyest. FL	50V
	C15	76.5075	0,33 µF 10% polyest. TB	100V
	R1	80.5238	120 Ω 5% carbon film	1/8W
	R2	80.5262	12 kΩ 5% carbon film	1/8W
	R3	80.5257	4,7 kΩ 5% carbon film	1/8W
	R4	80.5260	8,2 kΩ 5% carbon film	1/8W
	R5	80.5257	4,7 kΩ 5% carbon film	1/8W
	R7	80.5277	0,22 MΩ 5% carbon film	1/8W
	R8	80.5267	33 kΩ 5% carbon film	1/8W
	R9	80.5260	8,2 kΩ 5% carbon film	1/8W
	R10	80.5266	27 kΩ 5% carbon film	1/8W
	R11	80.5243	330 Ω 5% carbon film	1/8W
	R12	80.5247	680 Ω 5% carbon film	1/8W
	R13	80.5279	0,33 MΩ 5% carbon film	1/8W
	R15	86.5044	25 kΩ 20% potm. Lin.	0,1W
	R16	80.5256	3,9 kΩ 5% carbon film	1/8W
	R17	80.5239	150 Ω 5% carbon film	1/8W
	R19	80.5253	2.2 kΩ 5% carbon film	1/8W
	R20	80.5256	3,9 kΩ 5% carbon film	1/8W
	R21	80.5225	10 Ω 5% carbon film	1/8W
	L1	61.816	Coil/spole	
	T1	60.5134	Transformer 2400 Ω/600 Ω	
	E2	99.5028	Diode 1N914	
	E3	99.5028	Diode 1N914	
	Q1	99.5143	Transistor BC108	
	Q2	99.5121	Transistor BC107	
	Q3	99.5121	Transistor BC107	

Storno

TYPE	NO.	CODE	DATA

AF-AMPLIFIER AND SQUELCH
LF-FORSTÆRKER OG SQUELCH

SQ602

X400.845/2

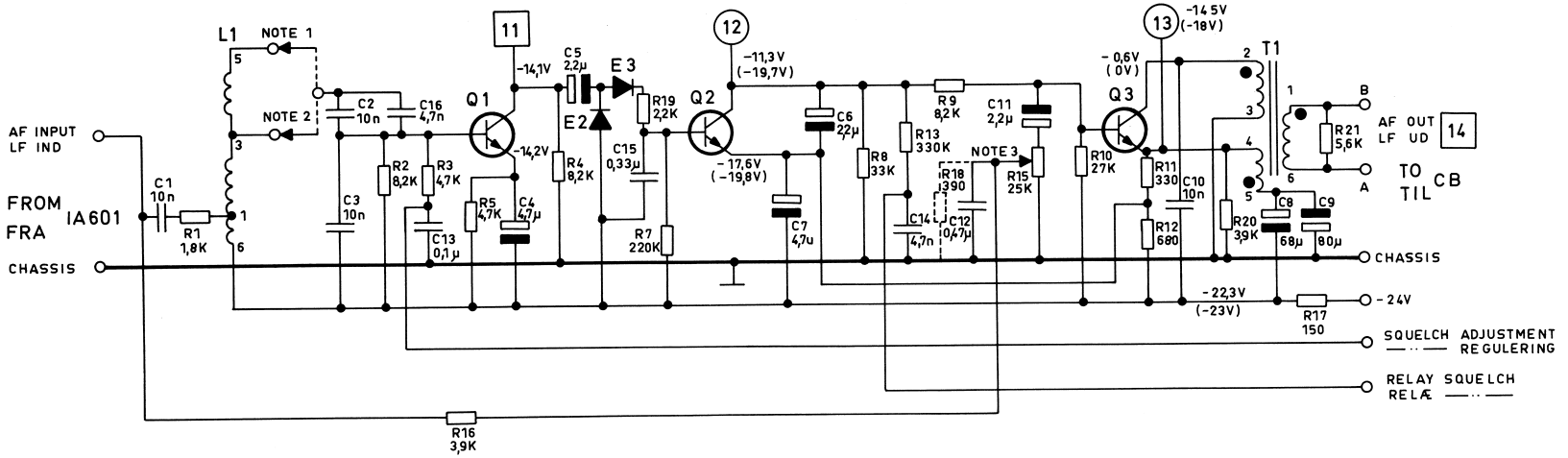
Storno

NOISE AMP
STØJFORST.

NOISE DETECTOR
STØJDETEKTOR

AF AMP
LF FORST

Storno

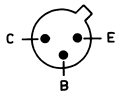


NOTE 1. CONNECTED IF 20 OR 25KHz CHANNEL SEPARATION IS USED.
NOTE 2. CONNECTED IF 50KHz CHANNEL SEPARATION IS USED.
NOTE 3. IF FM IS USED INSTEAD OF PM, C12 IS REPLACED BY R18 (390Ω)

NOTE 1. STRAPPES VED 20 25KHz KANALAFSTAND.
NOTE 2. STRAPPES VED 50KHz KANALAFSTAND.
NOTE 3. VED FM UDBYTTES C12 MED R18 (390Ω)

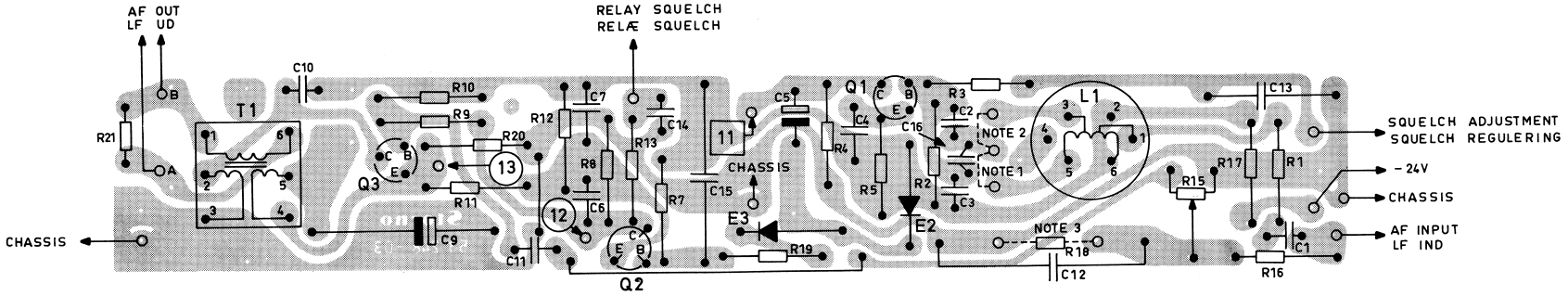
DC VOLTAGES WITHOUT PARENTHESES ARE MEASURED WITH SQUELCH OFF (AF-SIGNAL OUT).
DC VOLTAGES IN PARENTHESES ARE MEASURED WITH SQUELCH ON (NO AF-SIGNAL OUT).
SQUELCH REGULATOR ADJUSTED TO 15KΩ.

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 15KΩ.



Q1, Q2, Q3
BOTTOM VIEW
SET FRA BUNDEN

PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF AMPLIFIER AND SQUELCH
LF FORSTÆRKER OG SQUELCH

SQ603

D400.803/3

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	4,7 µF 20% tantal	15V
	C5	73.5102	2,2 µF 20% tantal	35V
	C6	73.5102	2,2µF 20% tantal	35V
	C7	73.5103	4,7µF 20% tantal	15V
	C8	73.5106	68µF 20% tantal	15V
	C9	73.5110	80µF -10/+50% elco	25V
	C10	76.5070	10nF 10% polyest. FL	50V
	C11	73.5102	22µF 20% tantal	35V
	C12	76.5076	0,47uF 20% polyest. TB	100V
	C13	76.5073	0,1µF 10% polyest. TB	100V
	C14	76.5061	4,7nF 10% polyest. FL	50V
	C15	76.5075	0,33µF 10% polyest. TB	100V
	C16	76.5061	4,7nF 10% polyest. FL	50V
	R1	80.5252	1.8k 5% carbon film	1/8W
	R2	80.5260	8,2 k 5% carbon film	1/8W
	R3	80.5257	4,7k 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

SQ603

X400.804/3

Storno

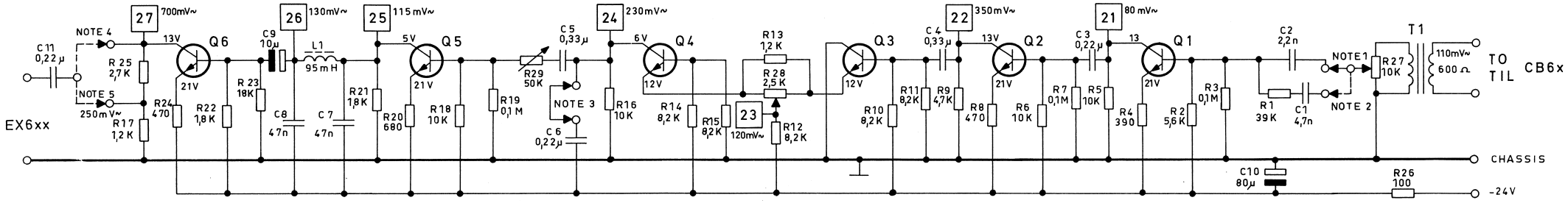
Storno

3. AMPLIFIER — 2. AMPLIFIER — INTEGRAT. CIRCUIT — LIMITER

3. FORSTÆRKER — 2. FORSTÆRKER — INTEGRAT. LED — BEGRÆNSER

1. AMPLIFIER — DIFFERENTIATOR

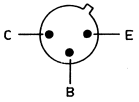
1. FORSTÆRKER — DIFFERENTIATIONSLED



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

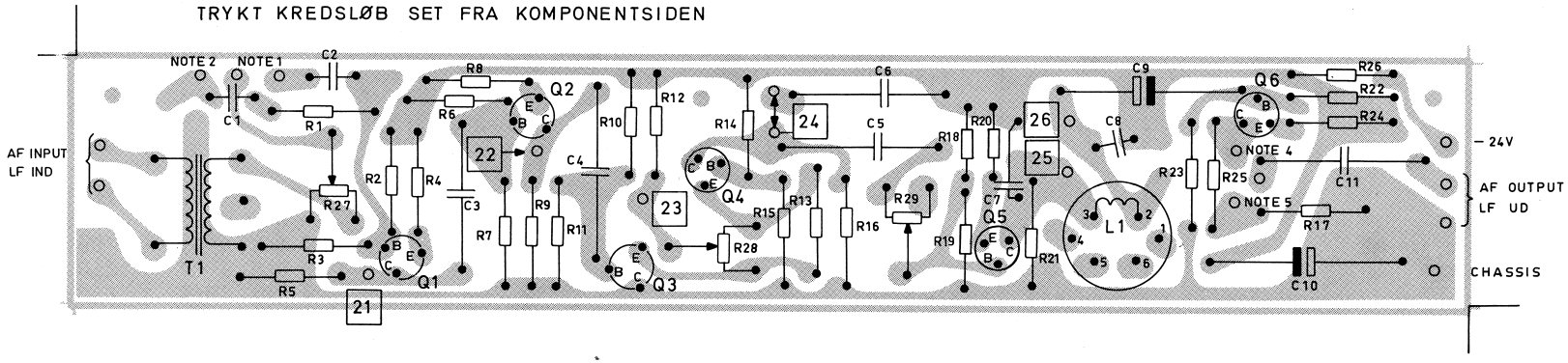
NOTE 1. DIFFERENTATION CIRCUIT FOR PURE PHASE MODULATION
NOTE 2. DIFFERENTATION CIRCUIT FOR MIXED PHASE AND FREQUENCY MODULATION.
NOTE 3. THE SHORTING LINK IS REMOVED AT MEASUREMENTS WHERE INTEGRATION IS UNWANTED.
NOTE 4. CONNECTION FOR 50kHz AND 25kHz IN 4 METER AND 50kHz CHANNEL SEPARATION IN 2 METER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

D400.671/3

TYPE	NO.	CODE	DATA	
	C1	76.5061	4,7nF 10% polyest. FL	50V
	C2	76.5059	2,2nF 10% polyest. FL	50V
	C3	76.5074	0,22uF 10% polyest. TB	100V
	C4	76.5075	0,3uF 10% polyest. TB	100V
	C5	76.5075	0,3uF 10% polyest. TB	100V
	C6	76.5074	0,22uF 10% polyest. TB	100V
	C7	76.5072	47nF 10% polyest. FL	50V
	C8	76.5072	47nF 10% polyest. FL	50V
	C9	73.5001	10uF -10 +50% elco	25V
	C10	73.5110	80uF -10 +50% elco	25V
	C11	76.5074	0,22uF 10% polyest. TB	100V
	R1	80.5268	39kΩ 5% carbon film	1/8W
	R2	80.5258	5,6kΩ 5% carbon film	1/8W
	R3	80.5273	100kΩ 5% carbon film	1/8W
	R4	80.5244	390Ω 5% carbon film	1/8W
	R5	80.5261	10kΩ 5% carbon film	1/8W
	R6	80.5261	10kΩ 5% carbon film	1/8W
	R7	80.5273	100kΩ 5% carbon film	1/8W
	R8	80.5245	470Ω 5% carbon film	1/8W
	R9	80.5257	4,7kΩ 5% carbon film	1/8W
	R10	80.5260	8,2kΩ 5% carbon film	1/8W
	R11	80.5260	8,2kΩ 5% carbon film	1/8W
	R12	80.5260	8,2kΩ 5% carbon film	1/8W
	R13	80.5250	1,2kΩ 5% carbon film	1/8W
	R14	80.5260	8,2kΩ 5% carbon film	1/8W
	R15	80.5260	8,2kΩ 5% carbon film	1/8W
	R16	80.5261	10kΩ 5% carbon film	1/8W
	R17	80.5250	1,2kΩ 5% carbon film	1/8W
	R18	80.5261	10kΩ 5% carbon film	1/8W
	R19	80.5273	100kΩ 5% carbon film	1/8W
	R20	80.5247	680Ω 5% carbon film	1/8W
	R21	80.5252	1,8kΩ 5% carbon film	1/8W
	R22	80.5252	1.8kΩ 5% carbon film	1/8W
	R23	80.5264	18 kΩ 5% carbon film	1/8W
	R24	80.5245	470Ω 5% carbon film	1/8W
	R25	80.5254	2,7kΩ 5% carbon film	1/8W
	R26	80.5237	100Ω 5% carbon film	1/8W
	R27	86.5039	10kΩ 20% trim lin	0,1W
	R28	86.5043	2,5kΩ 20% trim lin	0,1W
	R29	86.5040	50 kΩ 20% trim lin	0,1W
	L1	61.824	Filter coil/Filterspole	95 mH
	T1	60.5130	Transformator LF600/1000Ω	
	Q1	99.5143	Transistor BC108	
	Q2	99.5143	Transistor BC108	
	Q3	99.5143	Transistor BC108	

Storno

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

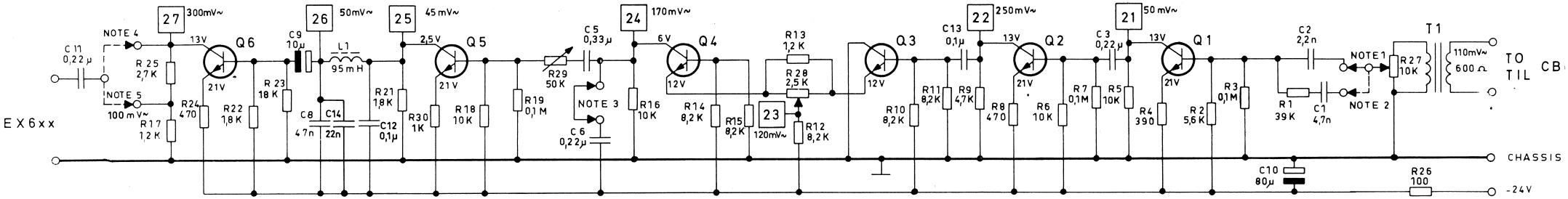
AF-AMPLIFIER
LF-FORSTÆRKER

AA601

X400.683/3

3. AMPLIFIER | 2. AMPLIFIER | INTEGRAT. CIRCUIT | LIMITER | 1. AMPLIFIER | DIFFERENTIATOR

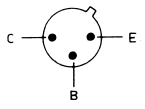
3. FORSTÆRKER | 2. FORSTÆRKER | INTEGRAT. LED | BEGRÆNSER | 1. FORSTÆRKER | DIFFERENTIATIONSLED



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

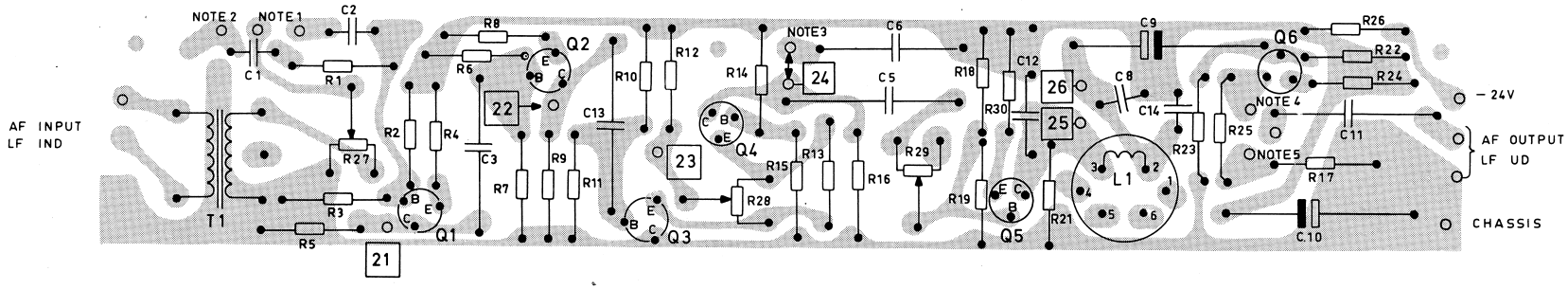
NOTE 1. DIFFERENTATION CIRCUIT FOR PURE PHASE MODULATION
NOTE 2. DIFFERENTATION CIRCUIT FOR MIXED PHASE AND FREQUENCY MODULATION.
NOTE 3. THE SHORTING LINK IS REMOVED AT MEASUREMENTS WHERE INTEGRATION IS UNWANTED.
NOTE 4. CONNECTION FOR 12,5kHz CHANNEL SEPARATION IN 4 METER EQUIPMENT.
NOTE 5 CONNECTION FOR 12,5kHz CHANNEL SEPARATION IN 2 METER EQUIPMENT.

NOTE 1. DIFFERENTIATIONSLED FOR REN FASEMODULATION
NOTE 2. DIFFERENTIATIONSLED FOR BLANDET FASE-OG FREKVENS-MODULATION.
NOTE 3. VED MÅLINGER HVOR INTEGRATION ER UØNSKET FJERNES STRAPNINGEN.
NOTE 4. TILSLUTNING FOR 12,5kHz KANALAFSTAND I 4 METER ANLÆG.
NOTE 5 TILSLUTNING FOR 12,5kHz KANALAFSTAND I 2 METER ANLÆG



BOTTOM VIEW
SET FRA BUNDEN

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF-AMPLIFIER
LF-FORSTÆRKER

AA608

D400.838

TYPE	NO.	CODE	DATA
	C1	76.5061	4,7nF 10% polyest. FL 50V
	C2	76.5059	2,2nF 10% " FL 50V
	C3	76.5074	0,22µF 10% " TB 100V
	C5	76.5075	0,33µF 10% " TB 100V
	C6	76.5074	0,22µF 10% " TB 100V
	C8	76.5072	47 nF 10% " FL 50V
	C9	73.5001	10 µF -10/+50% elco 25V
	C10	73.5110	80 µF -10/+50% " 25V
	C11	76.5074	0,22µF 10% polyest. TB 100V
	C12	76.5073	0,1µF 10% " FL 50V
	C13	76.5073	0,1µF 10% " FL 50V
	C14	76.5071	22nF 10% " FL 50V
	R1	80.5268	39 kΩ 5% carbon film 1/8W
	R2	80.5258	5,6kΩ 5% " " 1/8W
	R3	80.5273	0,1MΩ 5% " " 1/8W
	R4	80.5244	390 Ω 5% " " 1/8W
	R5	80.5261	10 kΩ 5% " " 1/8W
	R6	80.5261	10 kΩ 5% " " 1/8W
	R7	80.5273	0,1MΩ 5% " " 1/8W
	R8	80.5245	470 Ω 5% " " 1/8W
	R9	80.5257	4,7kΩ 5% " " 1/8W
	R10	80.5260	8,2kΩ 5% " " 1/8W
	R11	80.5260	8,2kΩ 5% " " 1/8W
	R12	80.5260	8,2kΩ 5% " " 1/8W
	R13	80.5250	1,2kΩ 5% " " 1/8W
	R14	80.5260	8,2kΩ 5% " " 1/8W
	R15	80.5260	8,2kΩ 5% " " 1/8W
	R16	80.5261	10 kΩ 5% " " 1/8W
	R17	80.5250	1,2kΩ 5% " " 1/8W
	R18	80.5261	10 kΩ 5% " " 1/8W
	R19	80.5273	0,1MΩ 5% " " 1/8W
	R21	80.5252	1,8kΩ 5% " " 1/8W
	R22	80.5252	1,8kΩ 5% " " 1/8W
	R23	80.5264	18 kΩ 5% " " 1/8W
	R24	80.5245	470 Ω 5% " " 1/8W
	R25	80.5254	2,7kΩ 5% " " 1/8W
	R26	80.5237	100 Ω 5% " " 1/8W
	R27	86.5039	10 kΩ 20% potentiometer lin. 0,1W
	R28	86.5043	2.5 kΩ 20% " " 0,1W
	R29	86.5040	50 kΩ 20% " " 0,1W
	L1	61.824-01	Filter coil/Filterspole 95 mH
	T1	60.5130	Transformer 600/1000 Ω

Storno

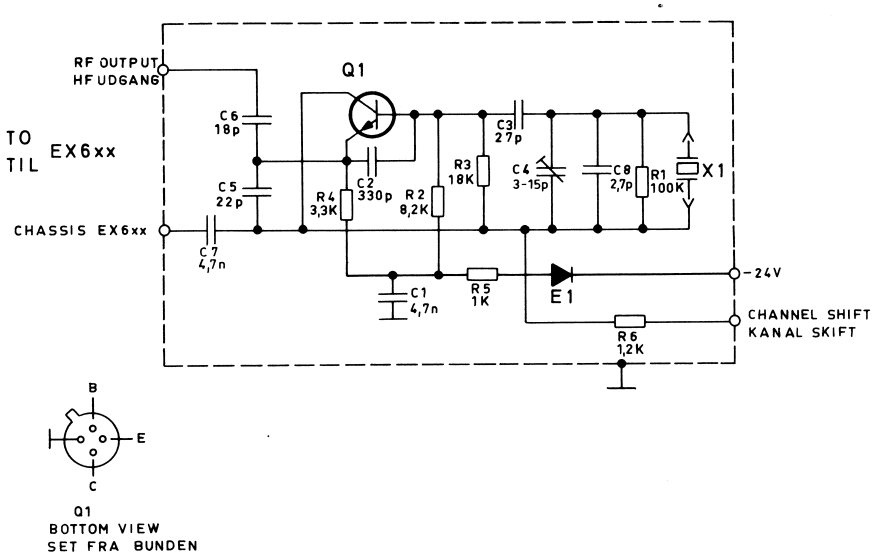
TYPE	NO.	CODE	DATA
	Q1	99.5143	BC108 Transistor
	Q2	99.5143	BC108 Transistor
	Q3	99.5143	BC108 Transistor
	Q4	99.5143	BC108 Transistor
	Q5	99.5143	BC108 Transistor
	Q6	99.5143	BC108 Transistor

AF-AMPLIFIER
LF-FORSTÆRKER

AA608

X400.850

Storno



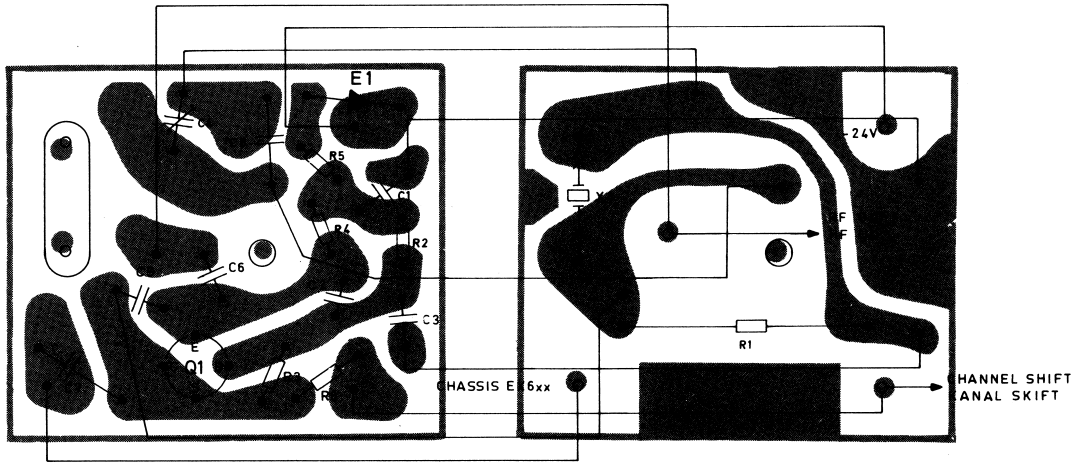
Q1
BOTTOM VIEW
SET FRA BUNDEN

UPPER PRINTED WIRING BOARD VIEWED
FROM COMPONENT SIDE

ØVERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN

LOWEST PRINTED WIRING BOARD VIEWED
FROM COMPONENT SIDE

NEDERSTE TRYKTE KREDSLØB SET
FRA KOMPONENTSIDEN



CRYSTALOSCILLATOR FOR TX.

XO631a

D400.666/3

TYPE	NO.	CODE	DATA
	C1	76.5061	4,7nF ± 10% polyester FL 50V
	C2	76.5105	330pF 2,5% polystyren 30V
	C3	74.5107	27pF ± 0,5pF ceram NO75TB 250V
	C4	78.5032	3-15pF trimmer ceram NPOTB 500V
	C5	74.5106	22 pF ± 0,5pF ceram NO75TB 250V
	C6	74.5142	18 pF ± 0,5pF " NO75TB 250V
	C7	76.5061	4,7nF ± 10% polyester 50V
	C8	74.5128	2,7pF ± 0,25pF ceram N150DI 250V
	R1	80.5273	100 kΩ 5% carbon film 1/8W
	R2	80.5260	8,2 kΩ 5% " " 1/8W
	R3	80.5264	18 kΩ 5% " " 1/8W
	R4	80.5255	3,3kΩ 5% " " 1/8W
	R5	80.5249	1 kΩ 5% " " 1/8W
	R6	80.5250	1,2 kΩ 5% " " 1/8W
	E1	99.5028	Diode OA200
	Q1	99.5118	Transistor BF115
	X1	98.	Crystal

Storno

TYPE	NO.	CODE	DATA

CRYSTALOSCILLATOR FOR TX.

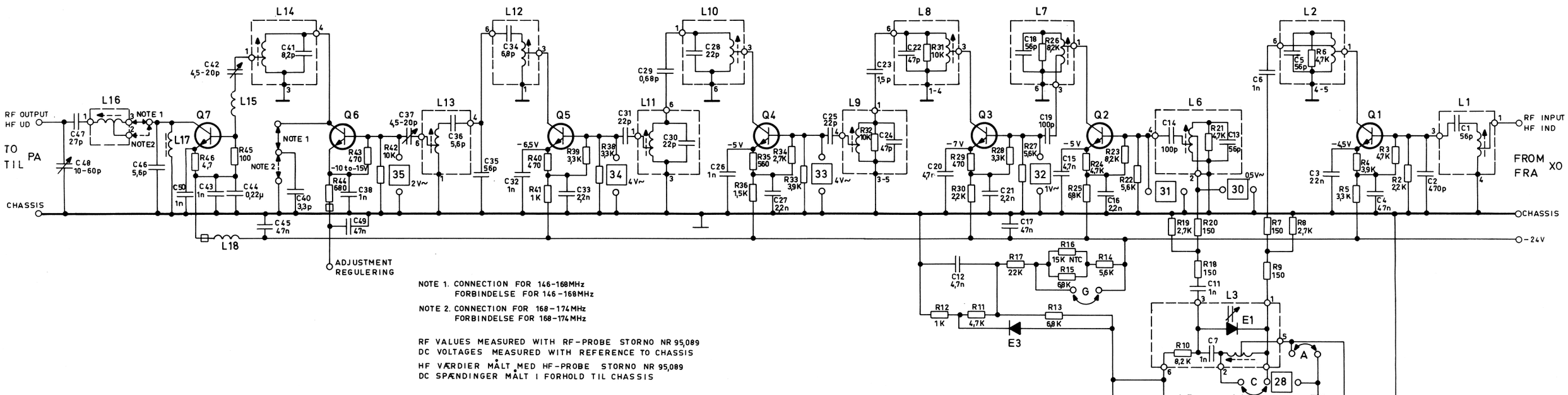
XO631

X400.680/2

Storno

2. PA 1. PA 2. DOUBLER 2. DOBLER TRIPLER 1. DOUBLER 1. DOBLER 2. BUFFER 1. BUFFER

Storno

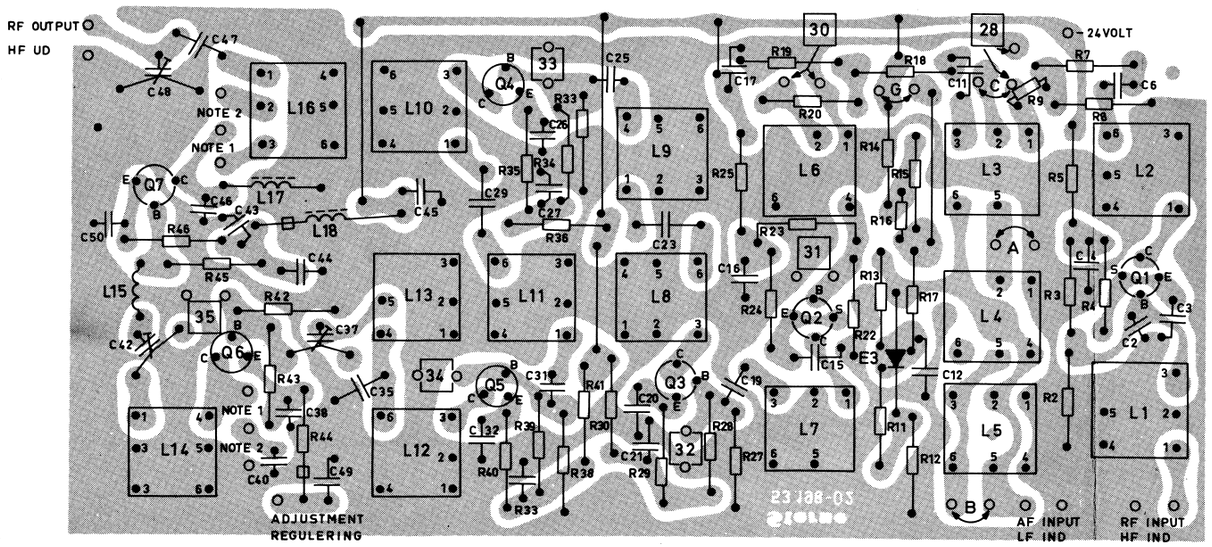


NOTE 1. CONNECTION FOR 146-168MHz
FORBINDELSE FOR 146-168MHz

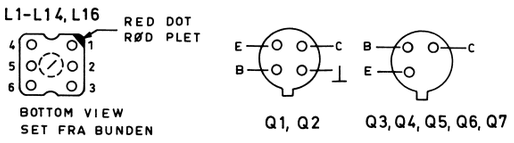
NOTE 2. CONNECTION FOR 168-174MHz
FORBINDELSE FOR 168-174MHz

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

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



MODULATOR



EXCITER
STYRESENDER

EX611

D400.670/3

TYPE	NO.	CODE	DATA	
	C1	74.5111	56pF 2% ceram TB	250V
	C2	74.5161	470pF -20/+50% ceram PL	63V
	C3	76.5071	22nF 10% polyest. FL	50V
	C4	74.5163	2,2nF -20/+50% ceram PL	63V
	C5	74.5111	56pF 2% ceram TB	250V
	C6	74.5155	1 nF -20/+50% ceram PL	63V
	C7	74.5155	1 nF -20/+50% " PL	63V
	C8	74.5136	12pF 5% ceram DI	125V
	C9	74.5135	10pF 5% " DI	125V
	C10	74.5155	1 nF -20/+50% ceram PL	63V
	C11	74.5155	1 nF -20/+50% " PL	63V
	C12	74.5164	4,7nF -20/+50% " PL	63V
	C13	74.5111	56 pF 2% ceram TB	250V
	C14	74.5013	100pF 20% " DI	500V
	C15	74.5164	4.7nF -20/+50% ceram PL	63V
	C16	74.5163	2,2nF -20/+50% " PL	63V
	C17	76.5072	47nF 10% polyest. FL	50V
	C18	74.5111	56pF 2% ceram TB	250V
	C19	74.5013	100pF 20% ceram DI	500V
	C20	74.5164	4.7nF -20/+50% ceram PL	63V
	C21	74.5163	2.2nF -20/+50% " PL	63V
	C22	74.5118	47pF 2% ceram TB	250V
	C23	74.5125	1.5pF ± 0.25pF ceram BO	250V
	C24	74.5118	47 pF 2% ceram TB	250V
	C25	74.5106	22 pF ± 0,5pF ceram TB	250V
	C26	74.5155	1 nF -20/+50% " PL	63V
	C27	74.5163	2,2 nF -20/+50% " PL	63V
	C28	74.5106	22 pF ± 0,5pF " TB	250V
	C29	74.5121	0,68pF ± 0,1pF " BD	250V
	C30	74.5106	22pF ± 0.5pF " TB	250V
	C31	74.5106	22pF ± 0.5pF " TB	250V
	C32	74.5155	1 nF -20/+50% " PL	63V
	C33	74.5163	2.2nF -20/+50% " PL	63V
	C34	74.5133	6.8pF ± 0.25pF " DI	250V
	C35	74.5111	56pF 2% ceram TB	250V
	C36	74.5132	5.6pF ± 0,25pF ceram DI	250V
	C37	78.5026	4.5-20pF Trimmer ceram	100V
	C38	74.5155	1 nF -20/+50% ceram PL	63V
	C39	76.5072	47nF 10% polyest. FL	50V
	C40	74.5129	3.3pF ± 0,25pF ceram DI	250V
	C41	74.5134	8,2pF ± 0,25pF " DI	250V
	C42	78.5026	4.5-20pF Trimmer ceram	100V
	C43	74.5155	1 nF -20/+50% ceram PL	63V
	C44	76.5074	0.22 μF 10% polyest. TB	100V
	C45	76.5072	47nF 10% " FL	50V
	C46	74.5132	5.6pF ± 0.25pF ceram DI	250V
	C47	74.5107	27pF 2% ceram TB	250V
	C48	78.5030	10-60pF Trimmer ceram	250V

Storno

TYPE	NO.	CODE	DATA	
	C49	76.5072	47nF 10% polyest. FL	50V
	C50	74.5155	1 nF -20/+50 ceram PL	63V
	R2	80.5253	2.2 kΩ 5% carbon film	1/8W
	R3	80.5257	4.7 kΩ 5% " "	1/8W
	R4	80.5256	3.9 kΩ 5% " "	1/8W
	R5	80.5255	3.3 kΩ 5% " "	1/8W
	R6	80.5057	4.7 kΩ 5% " "	1/8W
	R7	80.5239	150 Ω 5% " "	1/8W
	R8	80.5254	2,7 kΩ 5% " "	1/8W
	R9	80.5239	150 Ω 5% " "	1/8W
	R10	80.5060	8.2 kΩ 5% " "	1/10W
	R11	80.5257	4.7 kΩ 5% " "	1/8W
	R12	80.5249	1 kΩ 5% " "	1/8W
	R13	80.5259	6.8 kΩ 5% " "	1/8W
	R14	80.5258	5.6 kΩ 5% " "	1/8W
	R15	80.5259	6.8 kΩ 5% " "	1/8W
	R16	89.5010	15 kΩ 10% NTC	0.6W
	R17	80.5265	22 kΩ 5% carbon film	1/8W
	R18	80.5239	150 Ω 5% " "	1/8W
	R19	80.5254	2.7 kΩ 5% " "	1/8W
	R20	80.5239	150 Ω 5% " "	1/8W
	R21	80.5057	4.7 kΩ 5% " "	1/10W
	R22	80.5257	4.7 kΩ 5% " "	1/8W
	R23	80.5260	8.2 kΩ 5% " "	1/8W
	R24	80.5257	4.7 kΩ 5% " "	1/8W
	R25	80.5259	6.8 kΩ 5% " "	1/8W
	R26	80.5060	8.2 kΩ 5% " "	1/10W
	R27	80.5259	6.8 kΩ 5% " "	1/8W
	R28	80.5255	3.3 kΩ 5% " "	1/8W
	R29	80.5245	470 Ω 5% " "	1/8W
	R30	80.5253	2.2 kΩ 5% " "	1/8W
	R31	80.5061	10 kΩ 5% " "	1/10W
	R32	80.5061	10 kΩ 5% " "	1/10W
	R33	80.5256	3.9 kΩ 5% " "	1/8W
	R34	80.5254	2.7 kΩ 5% " "	1/8W
	R35	80.5246	560 Ω 5% " "	1/8W
	R36	80.5251	1.5 kΩ 5% " "	1/8W
	R38	80.5255	3.3 kΩ 5% " "	1/8W
	R39	80.5255	3.3 kΩ 5% " "	1/8W
	R40	80.5245	470 Ω 5% " "	1/8W
	R41	80.5249	1 kΩ 5% " "	1/8W
	R42	80.5261	10 kΩ 5% " "	1/8W

EXCITER
STYRESENDER

EX611

X400.690/4

TYPE	NO.	CODE	DATA
	R43	80.5245	470 Ω 5% carbon film 1/8W
	R44	80.5247	680 Ω 5% " " 1/8W
	R45	80.5237	100 Ω 5% " " 1/8W
	R46	80.5221	4.7 Ω 10% " " 1/8W
	L1	61.825	Coil/spole 12,16-14,5 MHz (C1,)
	L2	61.826	Coil/spole 12,16-14,5 MHz (C5, R6)
	L3	61.827	Coil/spole 12,16-14,5 MHz (C7, R10, E1)
	L4	61.828	Coil/spole 12,16-14,5 MHz (C8, C9)
	L5	61.829	Coil/spole 12,16-14,5 MHz (C10, E2)
	L6	61.846	Coil/spole 12,16-14,5 MHz (C13, C14, R21)
	L7	61.847	Coil/spole 12,16-14,5 MHz (C18, R26)
	L8	61.848	Coil/spole 24, 33-29 MHz (C22, R31)
	L9	61.849	Coil/spole 24, 33-29 MHz (C24, R32)
	L10	61.850	Coil/spole 73-87 MHz (C28)
	L11	61.851	Coil/spole 73.87 MHz (C30)
	L12	61.852	Coil/spole 146-174 MHz (C34)
	L13	61.853	Coil/spole 146-174 MHz (C36)
	L14	61.854	Coil/spole 146-174 MHz (C41)
	L15	62.715	Coil/spole 146-174 MHz
	L16	61.856	Coil/spole 146-174 MHz
	L17	61.5007	Filter coil/Filterspole 15μH 20% 200mA
	L18	63.5008	Filter coil/Filterspole 0,47μH 20% 2.2A
	E1	99.5140	Capacitance diode BA101C
	E2	99.5140	Capacitance diode BA101C
	E3	99.5136	Diode AA119
	Q1	99.5118	Transistor BF115
	Q2	99.5118	Transistor BF115
	Q3	99.5139	Transistor BSX19
	Q4	99.5139	Transistor BSX19
	Q5	99.5139	Transistor BSX19
	Q6	99.5139	Transistor BSX19
	Q7	99.5138	Transistor 2N3866

Storno

TYPE	NO.	CODE	DATA

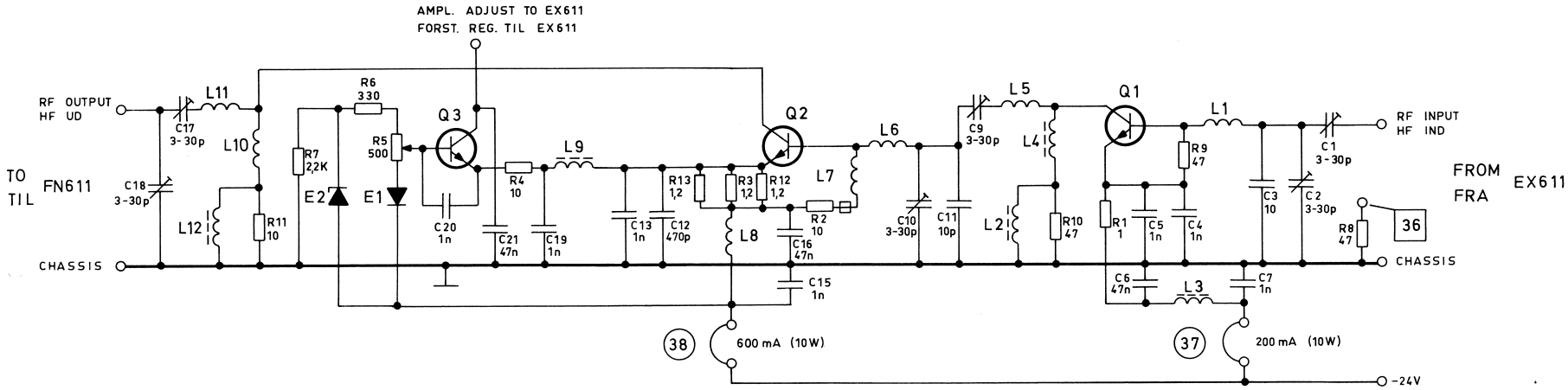
EXCITER
STYRESENDER

EX611

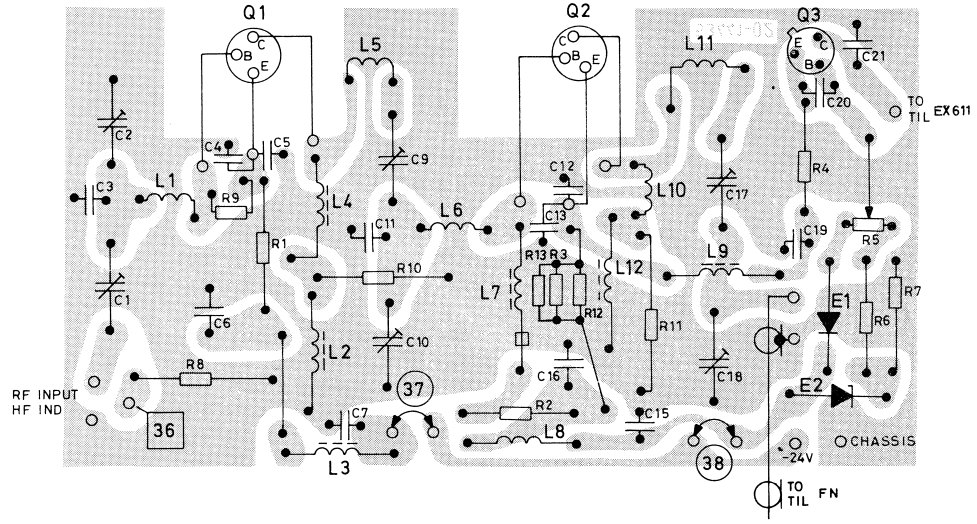
X400.690/4

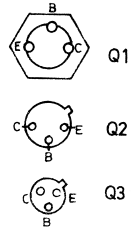
Storno

ADC PA DRIVER



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





BOTTOM VIEW
SET FRA BUNDEN

NOTE 1: THE SHORT CIRCUITS ARE REPLACED BY mA-INSTRUMENTS DURING ADJUSTMENT.

NOTE 1: KORTSLUTNINGERNE ERSTATTES AF mA-METRE UNDER JUSTERING

RF POWER AMPLIFIER
HF-EFFEKTFORSTÆRKER

PA611a

D400.669/5

TYPE	NO.	CODE	DATA	
	C1	78.5029	3-30 pF trimmer	300V
	C2	78.5029	3-30 pF "	300V
	C3	74.5135	10 pF 5% ceram N150	125V
	C4	74.5155	1 nF -20 +50% ceram PL	63V
	C5	74.5155	1 nF -20 +50% " PL	63V
	C6	76.5072	47 nF 10% polyest. FL	500V
	C7	74.5155	1 nF -20 +50% ceram PL	63V
	C9	78.5029	3-30 pF trimmer	300V
	C10	78.5029	3-30 pF "	300V
	C11	74.5135	10 pF 5% ceram N150	125V
	C12	74.5161	470 pF -20 +50% ceram PL	63V
	C13	74.5155	1 nF -20 +50% ceram PL	63V
	C15	74.5155	1 nF -20 +50% " PL	63V
	C16	76.5072	47 nF 10% polyest. FL	500V
	C17	78.5029	3-30 pF trimmer	300V
	C18	78.5029	3-30 pF "	300V
	C19	74.5155	1 nF -20 +50% ceram PL	63V
	C20	74.5155	1 nF -20 +50% " PL	63V
	C21	76.5072	47 nF 10% polyest. FL	500V
	R1	80.5213	1 Ω 10% carbon film	1/8W
	R2	80.5225	10 Ω 5% " "	1/8W
	R3	80.5214	1.2 Ω 10% " "	1/8W
	R4	80.5225	10 Ω 5% " "	1/8W
	R5	86.5042	500 Ω 20% potentiometer	0.1W
	R6	80.5243	330 Ω 5% carbon film	1/8W
	R7	80.5253	2.2 kΩ 5% " "	1/8W
	R8	80.5433	47 Ω 5% " "	1/4W
	R9	80.5233	47 Ω 5% " "	1/8W
	R10	80.5233	47 Ω 5% " "	1/8W
	R11	80.5425	10 Ω 5% " "	1/4W
	R12	80.5214	1.2 Ω 10% " "	1/8W
	R13	80.5214	1.2 Ω 10% " "	1/8W
	L1	62.718	RF-coil/HF spole 146-174 MHz	
	L2	63.5007	15 μH 10% choke/drossel	0.5A
	L3	63.5006	2.2 μH 20% " "	0.6A
	L4	63.5008	0.47 μH 20% " "	2 A
	L5	62.719	RF-coil/HF spole 146-174 MHz	
	L6	62.718	RF-coil/HF spole 146-174 MHz	
	L7	63.5008	0.47 μH 20% choke/drossel	2 A
	L8	63.5008	0.47 μH 20% " "	2 A
	L9	63.5006	2.2 μH 20% " "	0.6A
	L10	62.717	RF-coil/HF-spole	
	L11	62.716	RF-coil/HF-spole 146-174 MHz	
	E1	99.5028	OA 200 Diode	
	E2	99.5114	BZY 57 Zenerdiode	

Storno

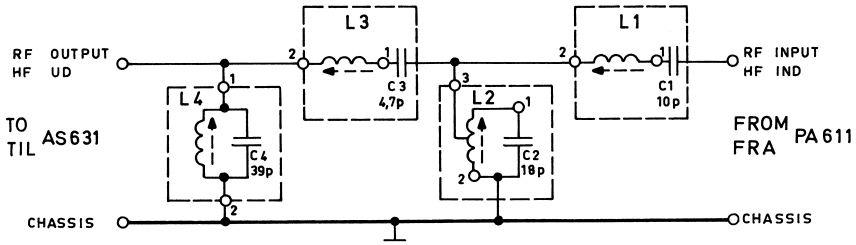
TYPE	NO.	CODE	DATA
	Q1	99.5129	2N3553 Transistor
	Q2	99.5137	2N3632 Transistor
	Q3	99.5121	BC107 Transistor

RF-POWER AMPLIFIER

HF-EFFEKT FORSTÆRKER

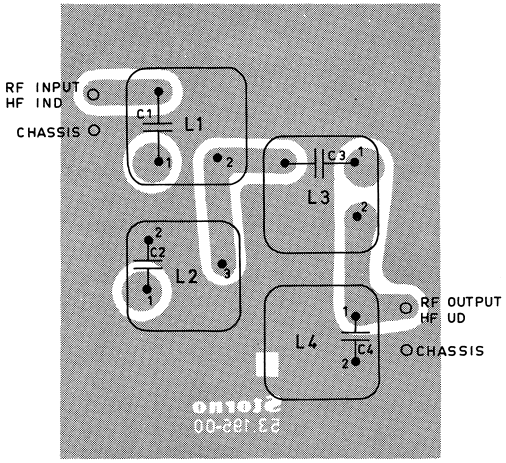
PA611a

X400.678/3

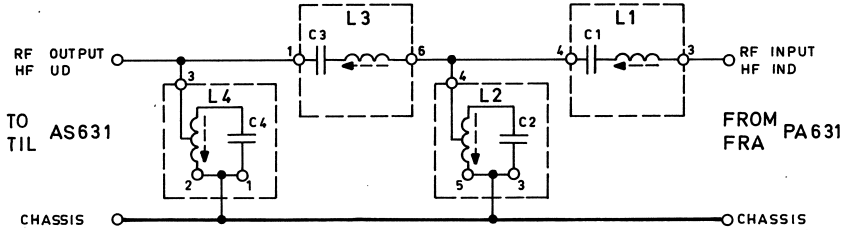


FN611

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

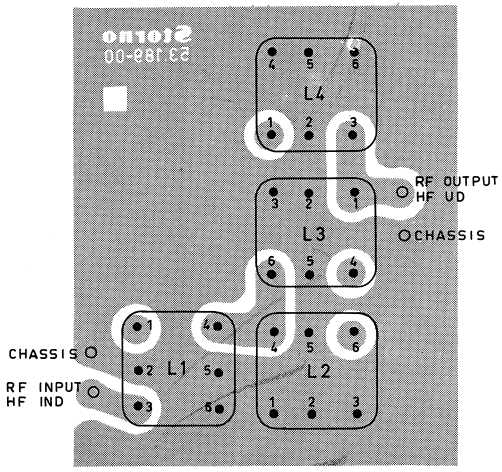


FN611



FN 631

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



FN631

ANTENNA FILTER
ANTENNE FILTER

FN611 FN631

D 400.668/2

TYPE	NO.	CODE	DATA
611	C1	74.5135	10pF 5% ceram. N15 DI 125V
631	C1	74.5106	22pF ±0,5pF " NO75 TB 250V
611	C2	74.5138	18pF 5% " N150 DI 250V
631	C2	74.5117	39pF ±2% " NO75 TB 250V
611	C3	74.5131	4,7pF ±0,25pF " N150 DI 250V
631	C3	74.5141	12pF ±0,5pF " NO75 TB 250V
611	C4	74.5117	39pF ±2% " NO75 TB 250V
631	C4	74.5106	22pF ±0,5pF " NO75 TB 250V
611	L1	61.861	Coil/Spole 146-174 MHz (C1)
631	L1	61.807	Coil/Spole 68-88 MHz (C1)
611	L2	61.862	Coil/Spole 146-174 MHz (C2)
631	L2	61.808	Coil/Spole 68-88 MHz (C2)
611	L3	61.863	Coil/Spole 146-174 MHz (C3)
631	L3	61.809	Coil/Spole 68-88 MHz (C3)
611	L4	61.864	Coil/Spole 146-174 MHz (C4)
631	L4	61.810	Coil/Spole 68-88 MHz (C4)

Storno

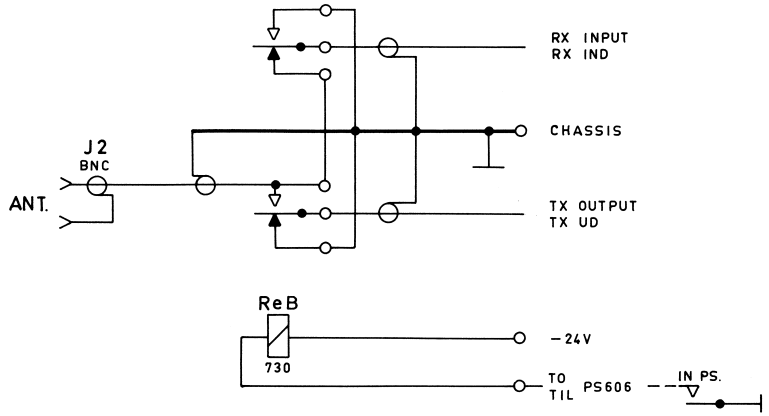
TYPE	NO.	CODE	DATA

ANTENNA FILTER
ANTENNE FILTER

FN611, FN631

X400.689

Storno



ReB: 58.5063 RELAY/RELÆ 24V 730Ω

ANTENNA SHIFT UNIT
ANTENNE SKIFTEENHED

AS663

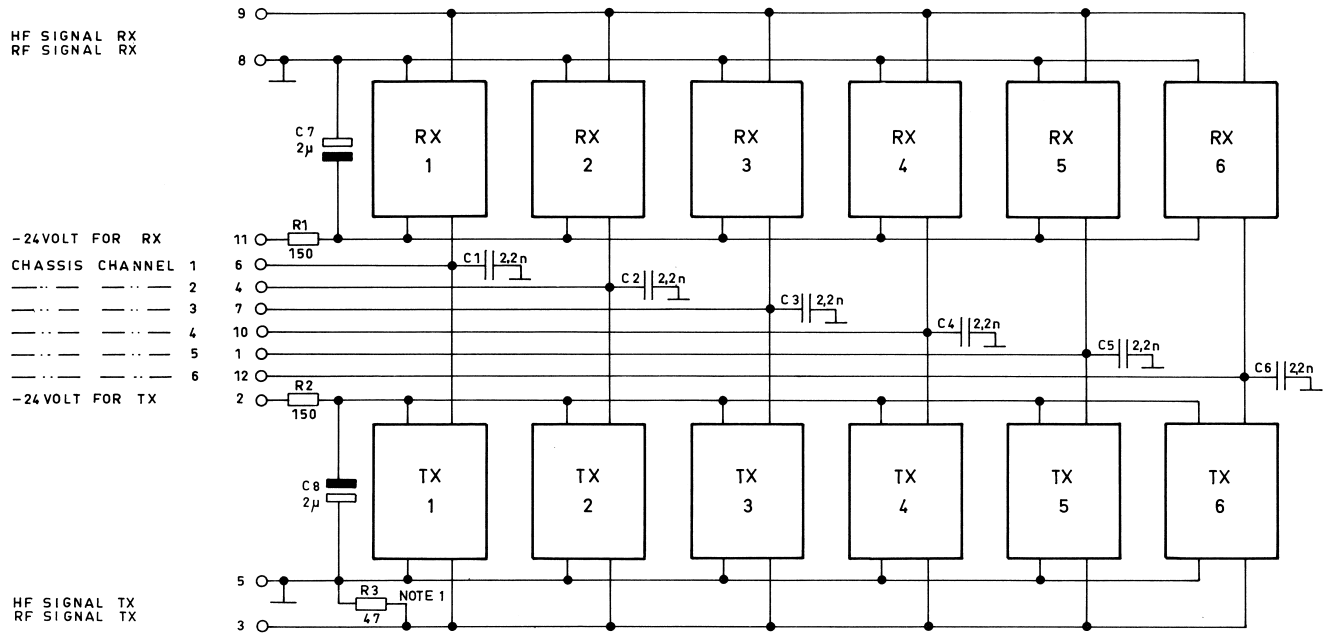
D400.802

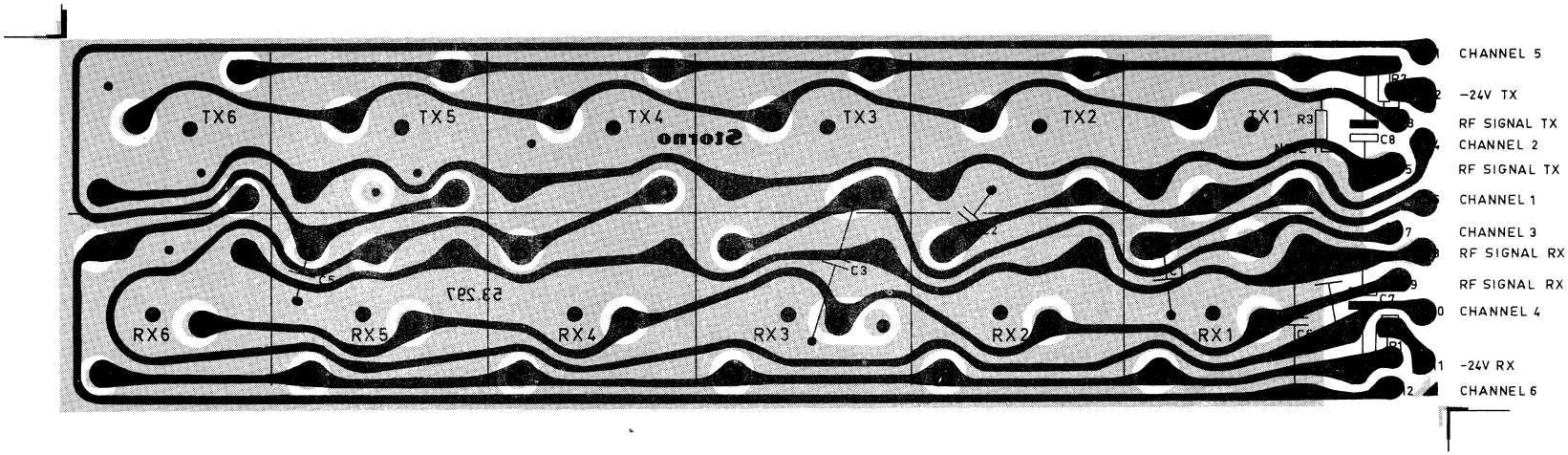
Storno

Storno

NOTE 1 : R3(47Ω) IS ONLY PROVIDED IN CONNECTION WITH TRANSMITTER OSCILLATORS.

R3(47Ω) MONTERES KUN I FORBINDELSE MED SENDEROSCILLATORER.





CRYSTAL SHIFT PANEL
KRYSTALSKIFTEPANEL

XS603

D400.817

Storno

TYPE	NO.	CODE	DATA
	C1	76.5059	2.2 nF 10% polyest. FL 50V
	C2	76.5059	2.2 nF 10% " FL 50V
	C3	76.5059	2.2 nF 10% " FL 50V
	C4	76.5059	2.2 nF 10% " FL 50V
	C5	76.5059	2.2 nF 10% " FL 50V
	C6	76.5059	2.2 nF 10% " FL 50V
	C7	73.5064	2 µF -10/+50% elco TB 70V
	C8	73.5064	2 µF -10/+50% elco TB 70V
	R1	80.5239	150Ω 5% carbon film 1/8W
	R2	80.5239	150Ω 5% " " 1/8W
CQL	R3	80.5033	47 Ω 5% " " 1/10W

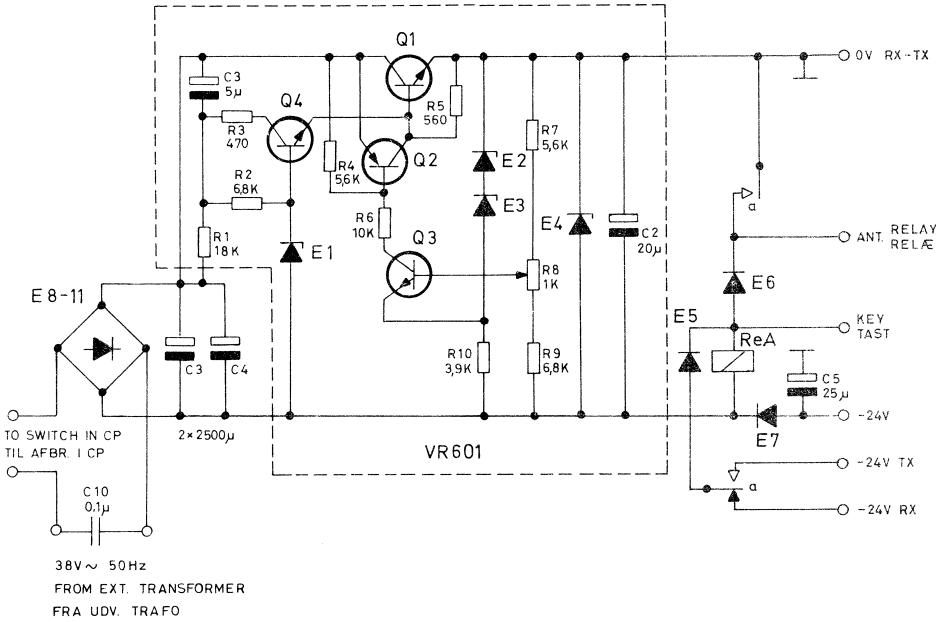
Storno

TYPE	NO.	CODE	DATA

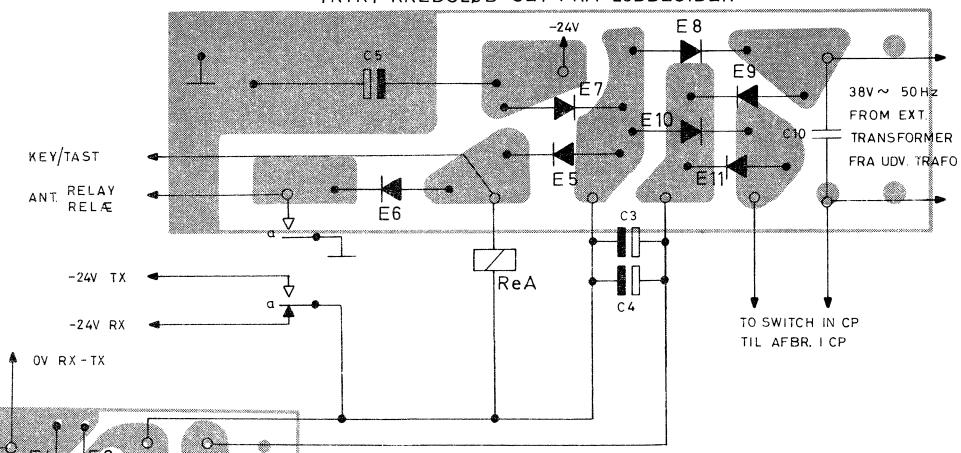
CRYSTAL OSCILLATOR PANEL XS603

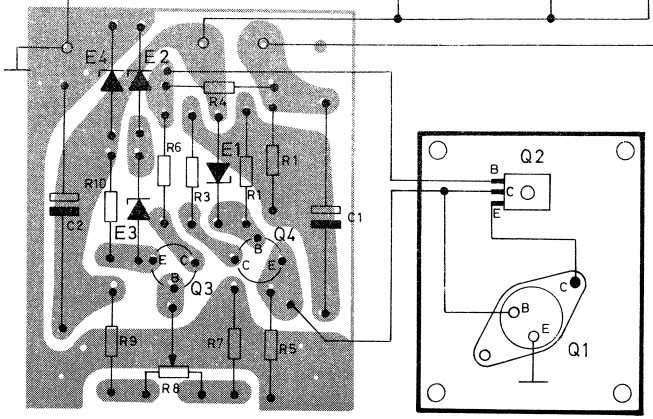
X400.876

Storno



PRINTED CIRCUIT VIEWED FROM SOLDERING SIDE
TRYKT KREDSLØB SET FRA LODDESIDEN





BOTTOM VIEW
SET FRA BUNDEN

Q3, Q4

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS6010

D400.900/2

TYPE	NO.	CODE	DATA
	C1	73.5104	5µF -10 +100% elco/Elko 70V
	C2	73.5120	22µF 20% elco/Elko 25V
	C3	73.5122	2500µF elco/Elko 70/75V
	C4	73.5122	2500µF elco/Elko 70/75V
	C5	73.5107	25µF -10 +100% elco/Elko 35V
	R1	80.5264	18 kΩ 5% carb. film/Kohleschicht 1/8W
	R2	80.5259	6,8kΩ 5% carb. film/Kohleschicht 1/8W
	R3	80.5245	470 Ω 5% carb. film/Kohleschicht 1/8W
	R4	80.5258	5,6 kΩ 5% carb. film/Kohleschicht 1/8W
	R5	80.5246	560 Ω 5% carb. film/Kohleschicht 1/8W
	R6	80.5261	10 kΩ 5% carb. film/Kohleschicht 1/8W
	R7	80.5258	5,6 kΩ 5% carb. film/Kohleschicht 1/8W
	R8	86.5058	1 kΩ 20% potm. /Drehwiderstand 0,1W
	R9	80.5259	6.8 kΩ 5% carb. film/Kohleschicht 1/8W
	R10	80.5256	3,9 kΩ 5% carb. film/Kohleschicht 1/8W
	ReA	58.5072	Relay/Relais 24V 400 Ω
	E1	99.5212	Zenerdiode 22V 5%
	E2	99.5114	Zenerdiode 5,6V 5%
	E3	99.5114	Zenerdiode 5,6V 5%
	E4	99.5222	Zenerdiode 27V 5%
	E5	99.5020	Diode 1N4004
	E6	99.5020	Diode 1N4004
	E7	99.5020	Diode 1N4004
	E8	99.5020	Diode 1N4004
	E9	99.5020	Diode 1N4004
	E10	99.5020	Diode 1N4004
	E11	99.5020	Diode 1N4004
	Q1	99.5171	Transistor 2N3055
	Q2	99.5213	Transistor 2N4919
	Q3	99.5214	Transistor BCY65
	Q4	99.5121	Transistor BC107

Storno

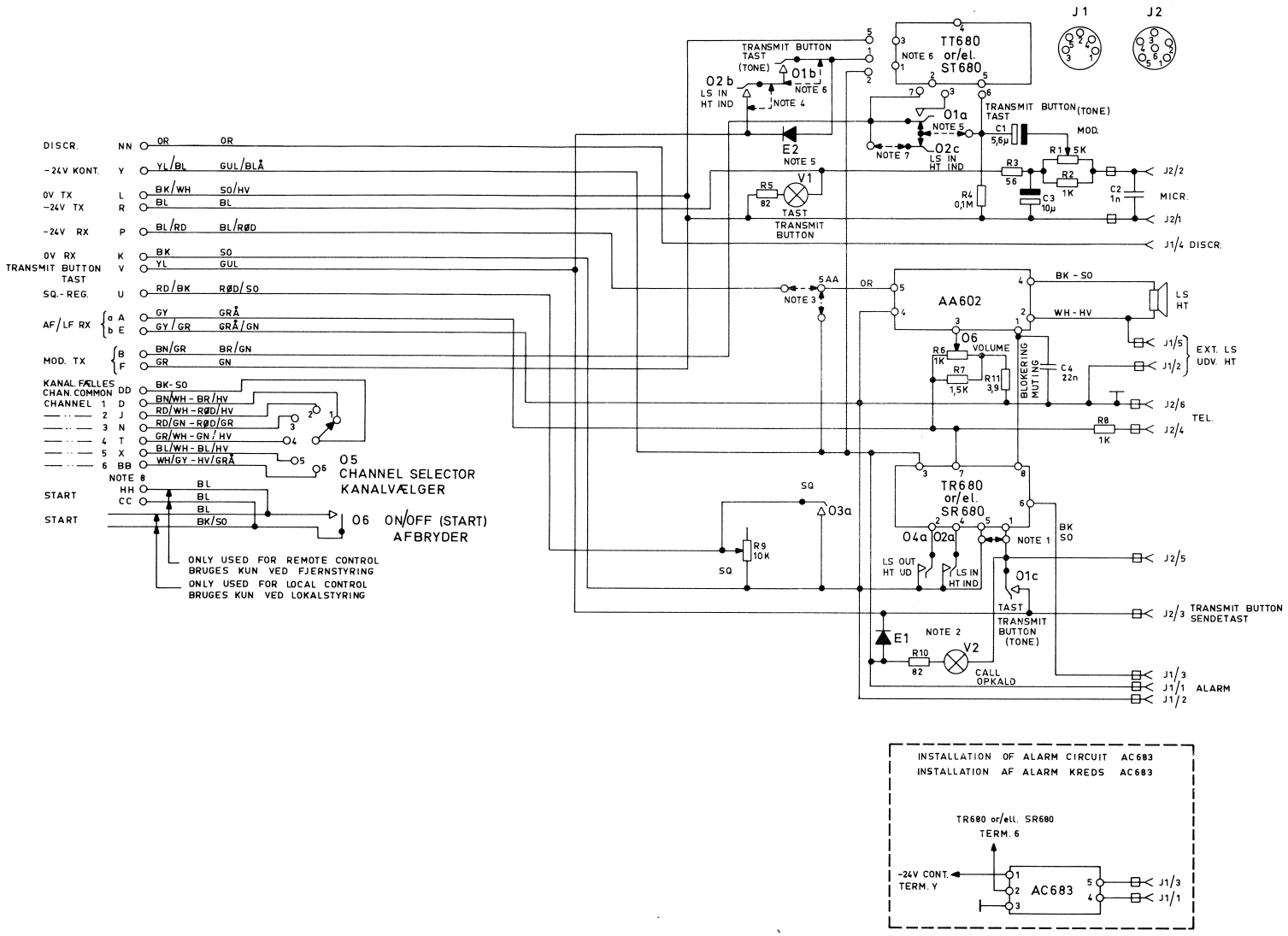
TYPE	NO.	CODE	DATA

POWER SUPPLY UNIT
STROMVERSORGUNG

PS6010

X400.985

Storno



Note 1. When TR680 or SR680 is installed: Remove strap.
När TR680 eller SR680 indmonteres, fjernes strapningen.

Note 2. When TR680 or SR680 is installed: Insert lamp V2 and diode E1.
När TR680 eller SR680 indmonteres, indsættes lampe V2 og diode E1.

Note 3. When no TR680 or SR680 is installed: Connect term. 5 to term. P.
When TR680 or SR680 is installed: Connect term. 5 to term. Y.
När TR680 eller SR680 ikke er indmonteret, forbindes term. 5. til term. P.
När TR680 eller SR680 er indmonteret, forbindes term. 5 til term. Y.

Note 4. a) When TT680 is used for selective calling and no external transmit button is used (for instance microphone switch or handset key): Remove strap.
When external transmit button is used: Insert strap.
b) When ST680 is used for identification: Insert strap.

a) När TT680 eller ST680 benyttes til selektive opkald, og der ikke forefindes udvendig sendetast - mikrofontast eller rattast - fjernes strapningen.
När udvendig tast benyttes, indføres strapningen.
b) Hvis ST680 benyttes til identifikation, indføres strapningen.

Note 5. When ST680 is installed: Remove strap and insert diode E2.
När ST680 indmonteres, fjernes strapningen og diode E2 indsættes.

Note 6. When TT680 is installed:
Connect term. 1 (TT680) to term. 2 (CP601).
Connect term. 2 (TT680) to term. 3 (CP601).
Connect term. 3 (TT680) to term. 1 (CP601).
When ST680 is installed:
Connect term. 1 (ST680) to term. 2 (CP601).
Connect term. 2 (ST680) to term. 7 (CP601).
Connect term. 3 (ST680) to term. 5 (CP601).
Connect term. 4 (ST680) to term. 1 (CP601).
Connect term. 5 (ST680) to term. 6 (CP601).
If ST680 is used for identification: Insert strap across button 01b.

När TT680 indmonteres:
Forbind term. 1 (TT680) til term. 2 (CP601).
Forbind term. 2 (TT680) til term. 3 (CP601).
Forbind term. 3 (TT680) til term. 1 (CP601).
När ST680 indmonteres:
Forbind term. 1 (ST680) til term. 2 (CP601).
Forbind term. 2 (ST680) til term. 7 (CP601).
Forbind term. 3 (ST680) til term. 5 (CP601).
Forbind term. 4 (ST680) til term. 1 (CP601).
Forbind term. 5 (ST680) til term. 6 (CP601).
Hvis ST680 benyttes til identifikation indføres strapningen over 01b.

Note 7. When TT680 is installed and external transmit button is used: Remove strap.
If no external transmit button is used: Insert strap.
När TT680 indmonteres, og der benyttes udvendig sendetast, fjernes strapningen.
Hvis der ikke benyttes udvendig sendetast, indføres strapningen.

CONTROL PANEL CP601

KONTROL PANEL CP601

D400.824/3

TYPE	NO.	CODE	DATA	
	C1	73.5113	5.6µF 20% Tantal	35V
	C2	76.5069	1 nF 10% polystyr FL	50V
	C3	73.5100	10µF -10/+100% elco	35/40V
	C4	76.5071	22 nF 10% polyest	50V
	R1	86.5050	5 kΩ 20% potentiometer lin.	0.1W
	R2	80.5249	1 kΩ 5% carbon film	1/8W
	R3	80.5234	56Ω 5% " "	1/8W
	R4	80.5273	0.1MΩ 5% " "	1/8W
	R5	80.5236	82 Ω 5% " "	1/8W
	R6	86.5057	1 kΩ 20% potentiometer log. m. afbryder/with switch	0.25W
	R7	80.5251	1.5 kΩ 5% carbon film	1/8W
	R8	80.5249	1 kΩ 5% " "	1/8W
	R9	86.5039	10 kΩ 20% potentiometer lin.	0.1W
	R10	80.5236	82 Ω 5% carbon film	1/8W
	R11	80.5220	3.9 Ω 5% " "	1/8W
	O1, O2 O3, O4	47.448	Push-button section Trykknapprække	
	O5	47.5042	Switch (channel) omskifter (kanal)	
	V1	92.5003	Lamp/Lampe 24V 25mA BA7	
*	V2	92.5003	Lamp/Lampe 24V 25mA BA7	
	J1	41.5090	Socket/stikdåse	
	J2	41.5091	Socket/stikdåse	
*	E1	99.5136	AA119 Diode	
**	E2	99.5020	1N4004 Diode	

* Only installed in connection with tone receiver
* Kun installeret i forbindelse med tonemodtager

** Only installed in connection with tone transmitter ST680
** Kun installeret i forbindelse med tonesender ST680

TYPE	NO.	CODE	DATA

CONTROL PANEL
KONTROL PANEL

CP601

X400.859/4

Storno

Storno

Note 1 In CP without Tone Receiver TR680 or SR680: Insert Strap
I CP uden tonemodtager TR680 eller SR680: Indfør strapning

Note 2 In CP with Tone Receiver TR680 or SR680: Insert Lamp V2 and Diode E1
I CP med tonemodtager TR680 eller SR680: Indfør lampe V2 og diode E1

Note 3 In CP without Tone Receiver TR680 or SR680: Connect Term. 5 (AA602) to Term. P
In CP with Tone Receiver TR680 or SR680: Connect Term. 5(AA602) to Term. Y
I CP uden tonemodtager TR680 eller SR680: Forbind term. 5 (AA602) til term. P
I CP med tonemodtager TR680 eller SR680: Forbind term. 5 (AA602) til term. Y

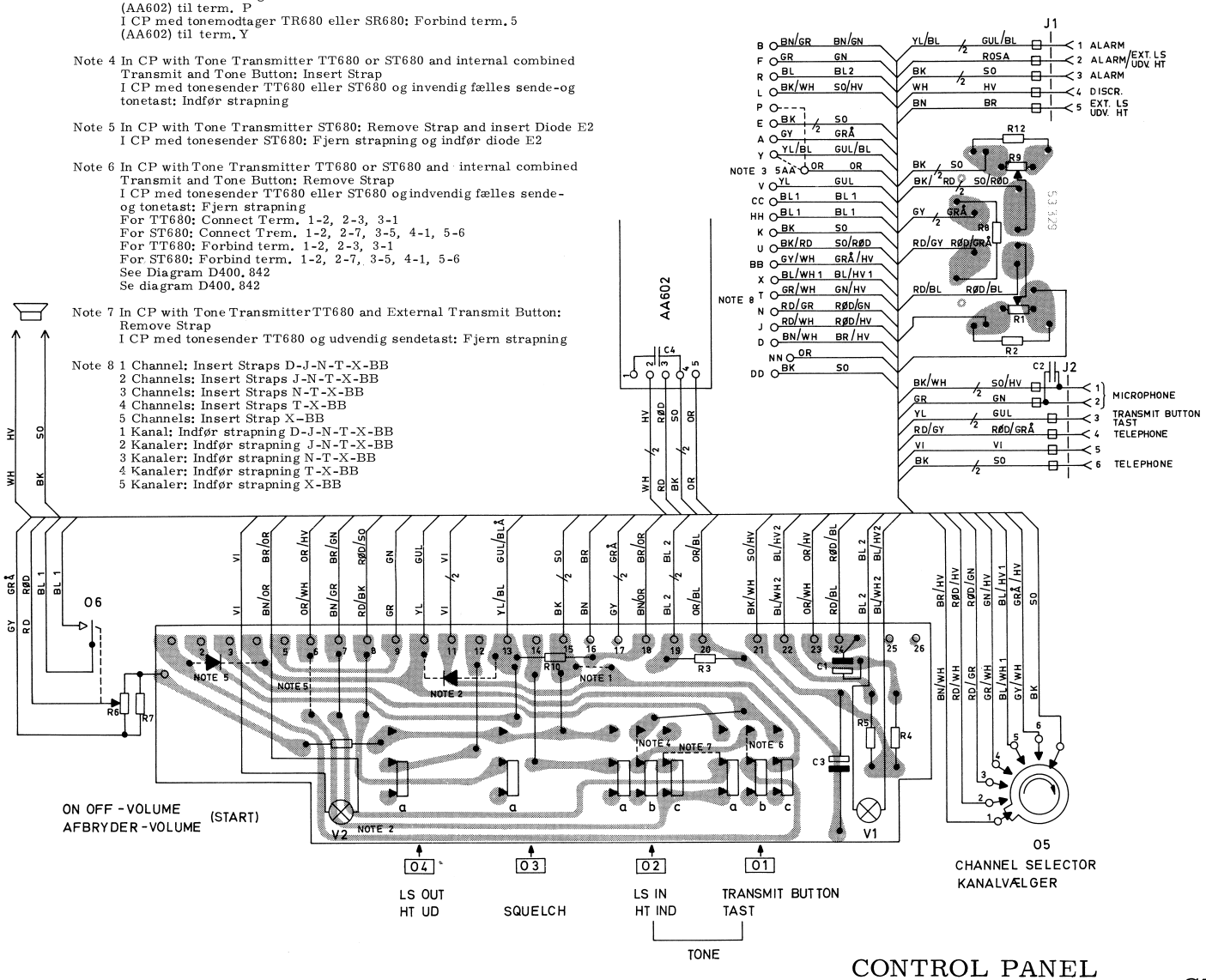
Note 4 In CP with Tone Transmitter TT680 or ST680 and internal combined Transmit and Tone Button: Insert Strap
I CP med tonesender TT680 eller ST680 og invendig fælles sende-og tonetast: Indfør strapning

Note 5 In CP with Tone Transmitter ST680: Remove Strap and insert Diode E2
I CP med tonesender ST680: Fjern strapning og indfør diode E2

Note 6 In CP with Tone Transmitter TT680 or ST680 and internal combined Transmit and Tone Button: Remove Strap
I CP med tonesender TT680 eller ST680 og indvendig fælles sende- og tonetast: Fjern strapning
For TT680: Connect Term. 1-2, 2-3, 3-1
For ST680: Connect Trem. 1-2, 2-7, 3-5, 4-1, 5-6
For TT680: Forbind term. 1-2, 2-3, 3-1
For ST680: Forbind term. 1-2, 2-7, 3-5, 4-1, 5-6
See Diagram D400.842
Se diagram D400.842

Note 7 In CP with Tone Transmitter TT680 and External Transmit Button: Remove Strap
I CP med tonesender TT680 og udvendig sendetast: Fjern strapning

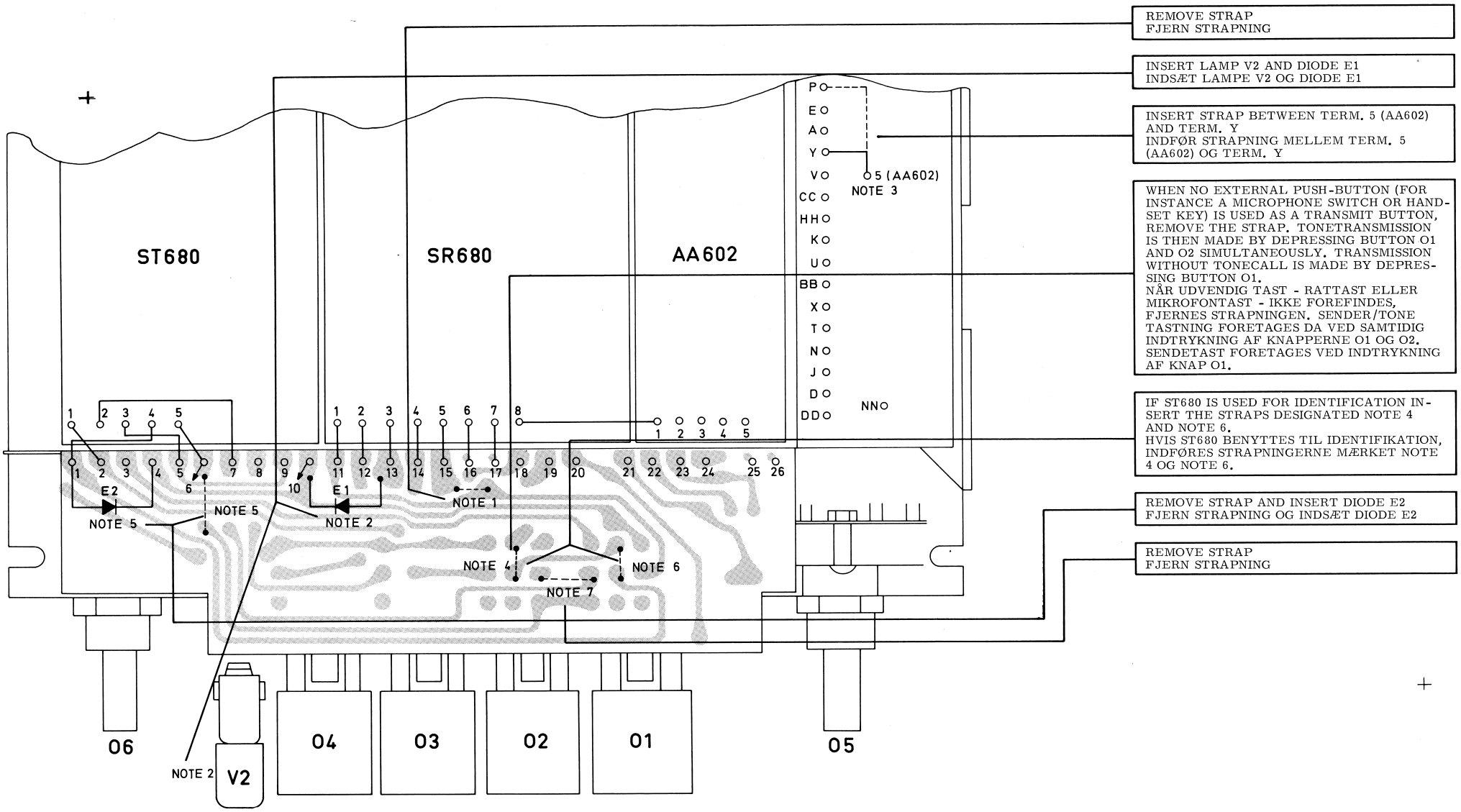
Note 8 1 Channel: Insert Straps D-J-N-T-X-BB
2 Channels: Insert Straps J-N-T-X-BB
3 Channels: Insert Straps N-T-X-BB
4 Channels: Insert Straps T-X-BB
5 Channels: Insert Strap X-BB
1 Kanal: Indfør strapning D-J-N-T-X-BB
2 Kanaler: Indfør strapning J-N-T-X-BB
3 Kanaler: Indfør strapning N-T-X-BB
4 Kanaler: Indfør strapning T-X-BB
5 Kanaler: Indfør strapning X-BB



CONTROL PANEL
BETJENINGSPANEL

CP601

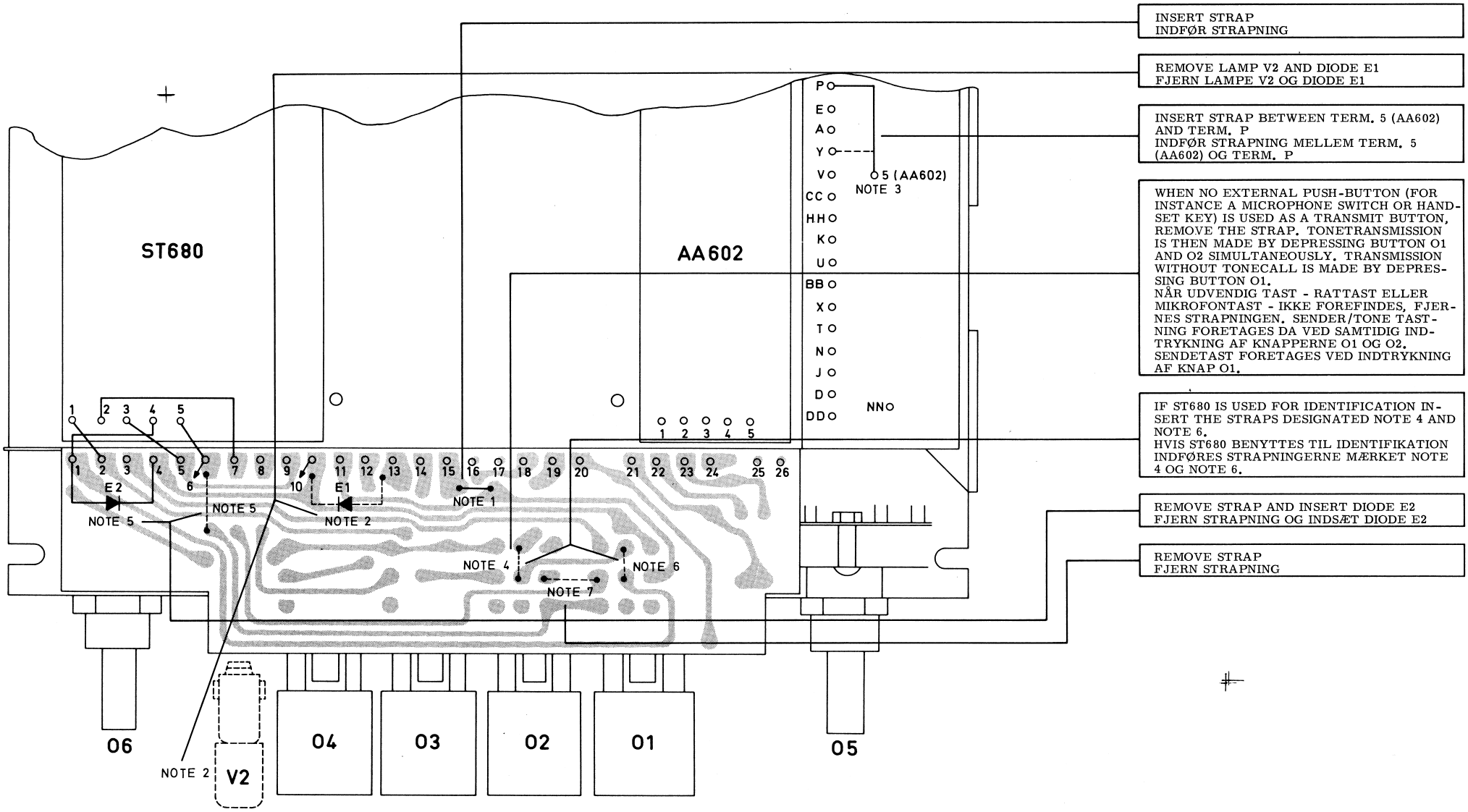
D400.818/2



INSTALLATION OF SR680 AND ST680 IN CP601.

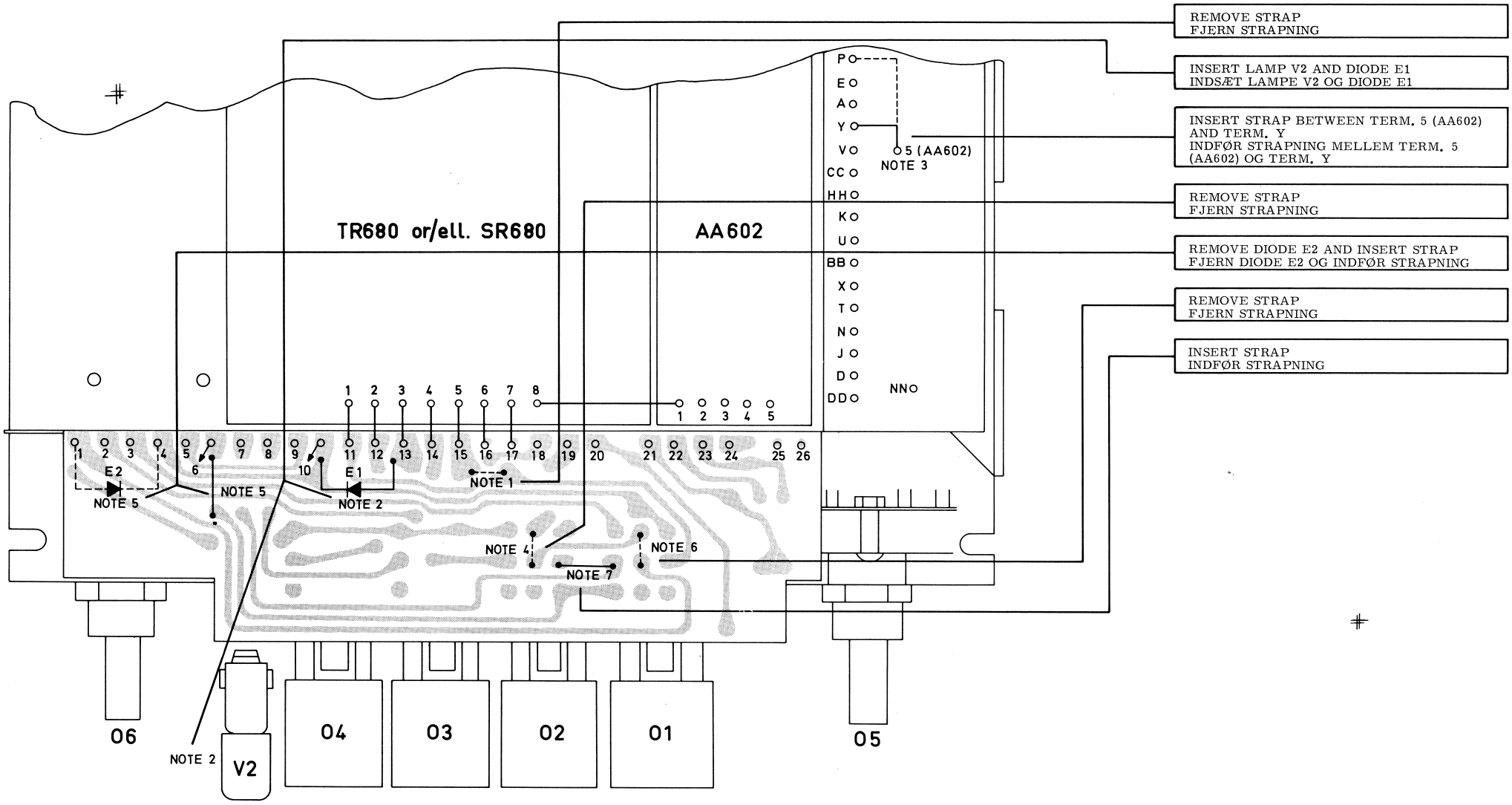
INDBYGNING AF SR680 OG ST680 i CP601.

D400.934



INSTALLATION OF ST680 IN CP601.
INDBYGNING AF ST680 i CP601.

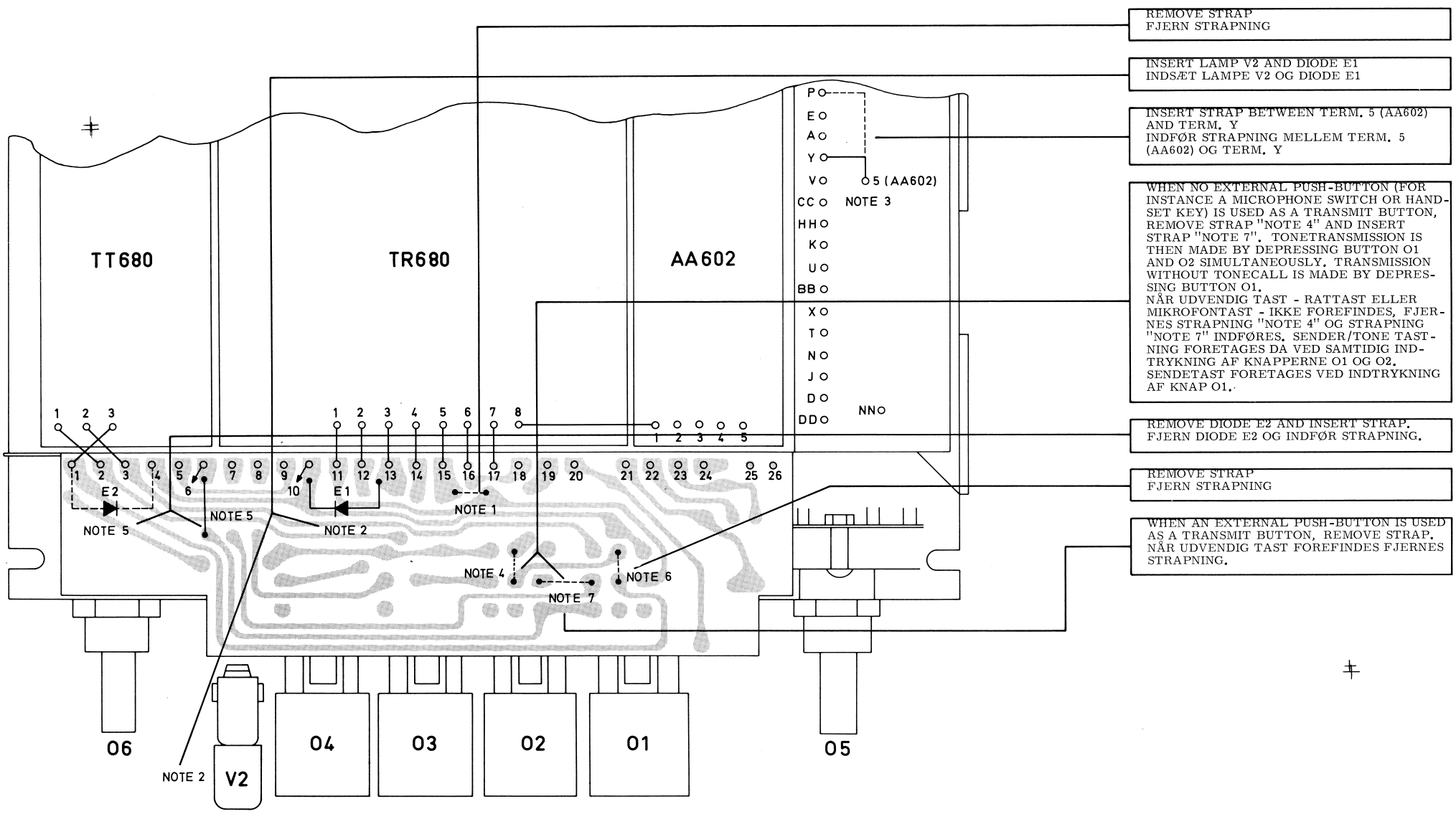
D400.935



INSTALLATION OF TR680 OR SR680 IN CP601.

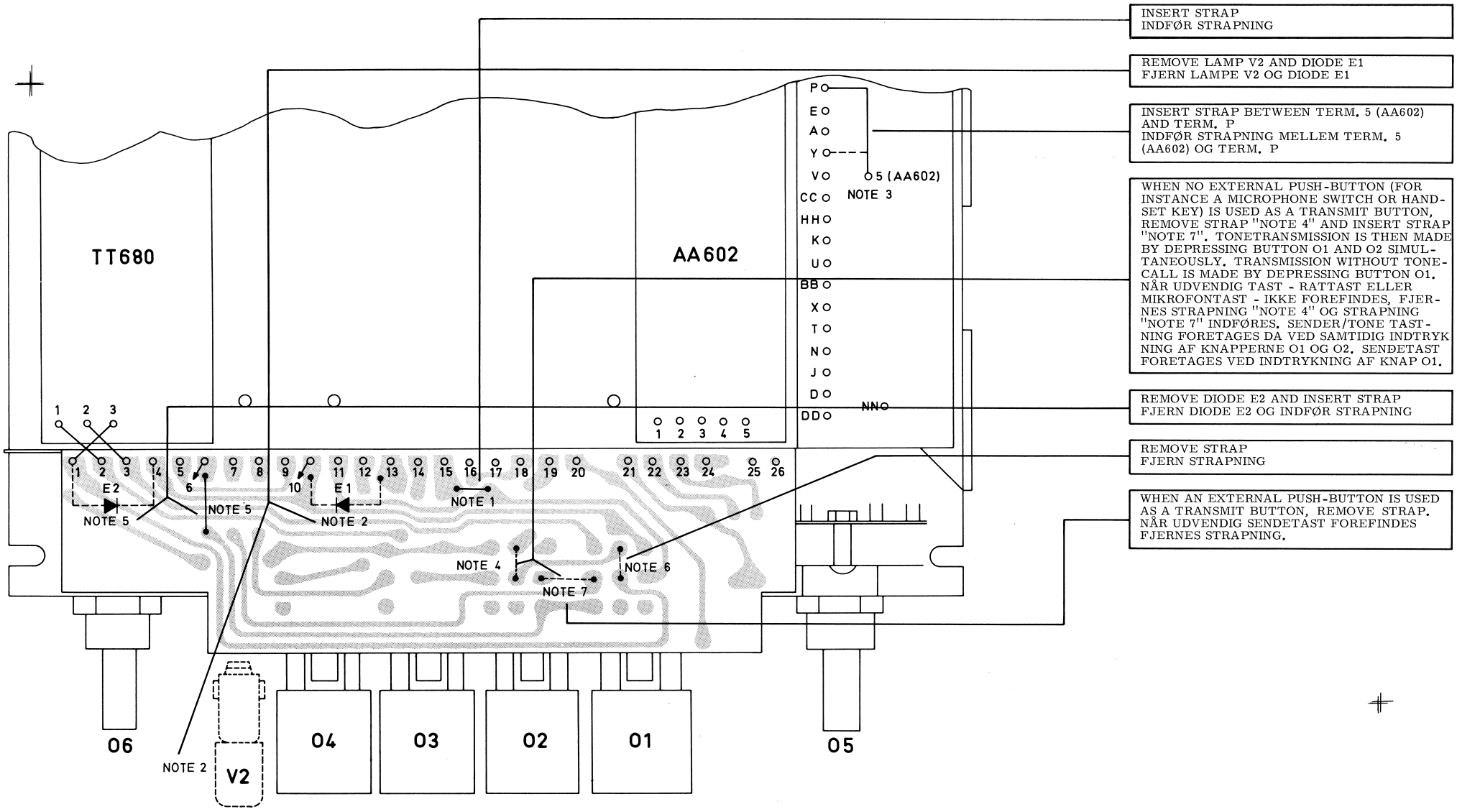
INDBYGNING AF TR680 ELLER SR680 i CP601.

D400.936



INSTALLATION OF TR680 AND TT680 IN CP601.
INDBYGNING AF TR680 OG TT680 i CP601.

D400.937

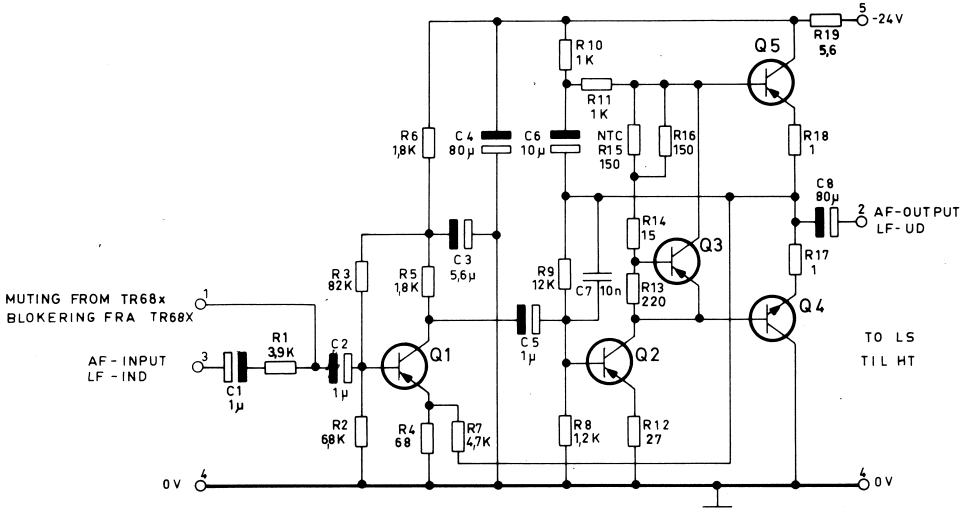


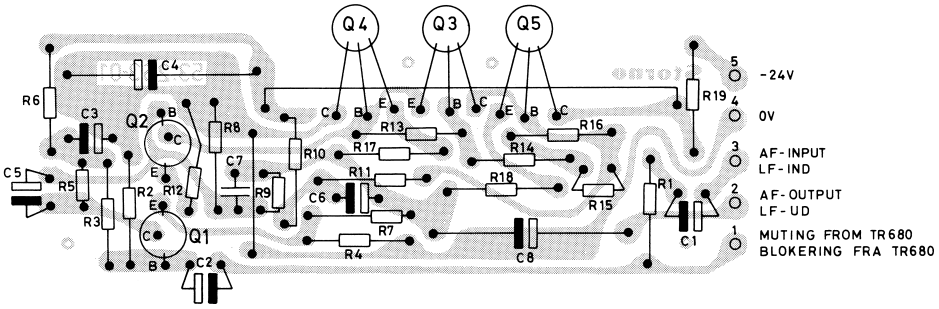
INSTALLATION OF TT680 IN CP601.

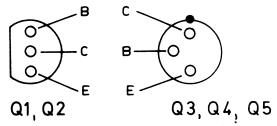
INDBYGNING AF TT680 i CP601.

D400.938

Storno







BOTTOM VIEW
SET FRA BUNDEN

AF-AMPLIFIER
LF-FORSTÆRKER

AA602c

D400.836/3

TYPE	NO.	CODE	DATA	
	C1	73.5114	1 µF 20% Tantal	30V
	C2	73.5114	1 µF 20% "	30V
	C3	73.5113	5.6 µF 20% "	35V
	C4	73.5110	80 µF -10 +50% elco	25V
	C5	73.5114	1 µF 20% Tantal	30V
	C6	73.5109	10 µF 20% "	15V
	C7	76.5070	10 nF 10% polyest FL	50V
	C8	75.5110	80 µF -10 +50% elco	25V
	R1	80.5256	3.9 kΩ 5% carbon film	1/8W
	R2	80.5259	6.8 kΩ 5% " "	1/8W
	R3	80.5272	82 kΩ 5% " "	1/8W
	R4	80.5235	68 Ω 5% " "	1/8W
	R5	80.5252	1.8 kΩ 5% " "	1/8W
	R6	80.5252	1.8 kΩ 5% " "	1/8W
	R7	80.5257	4.7 kΩ 5% " "	1/8W
	R8	80.5250	1.2 kΩ 5% " "	1/8W
	R9	80.5262	12 kΩ 5% " "	1/8W
	R10	80.5249	1 kΩ 5% " "	1/8W
	R11	80.5249	1 kΩ 5% " "	1/8W
	R12	80.5230	27 Ω 5% " "	1/8W
	R13	80.5241	220 Ω 5% " "	1/8W
	R14	80.5227	15 Ω 5% " "	1/8W
	R15	89.5029	150 Ω 10% NTC	0.6W
	R16	80.5239	150 Ω 5% "	1/8W
	R17	80.5213	1 Ω 5% "	1/8W
	R18	80.5213	1 Ω 5% "	1/8W
	R19	81.5102	5.6 Ω 10% wirewound	1/2W
	Q1	99.5144	2N3702 Transistor	
	Q2	99.5144	2N3702 "	
	Q3	99.5106	AC125 "	
	Q4, Q5	99.5165	AC176/128 "	

Storno

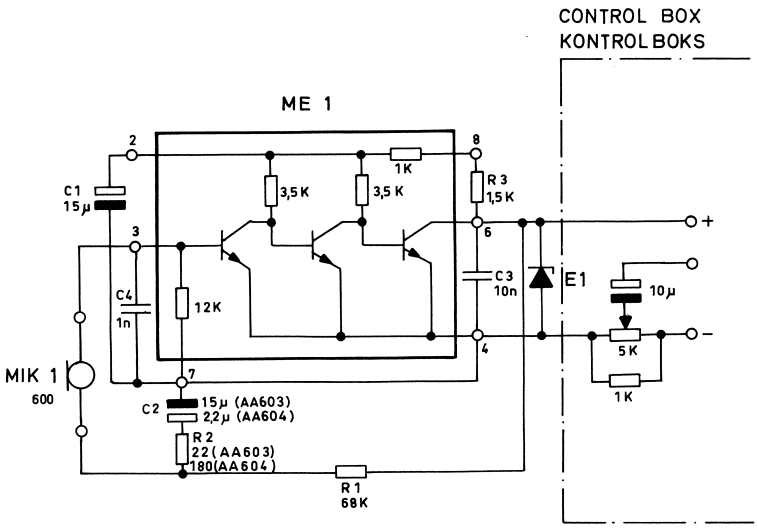
TYPE	NO.	CODE	DATA

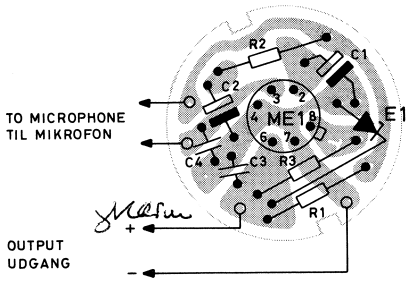
AF-AMPLIFIER
LF-FORSTÆRKER

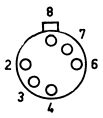
AA602c

X400.677/5

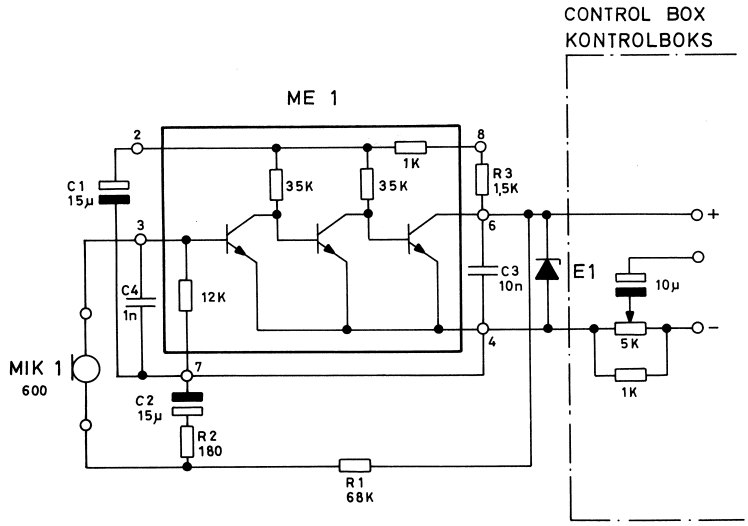
Storno

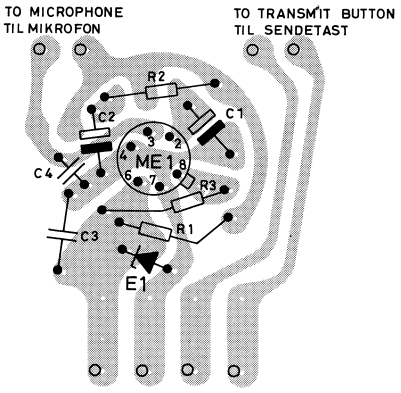


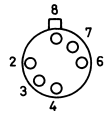




AA603, AA604







AA606

AF-AMPLIFIER
LF-FORSTÆRKER

AA603, AA604, AA606

D400.700/2

TYPE	NO.	CODE	DATA
	C1	73.5105	15 µF 20% tantal 15V
AA603	C2	73.5105	15 µF 20% tantal 15V
AA604	C2	73.5102	2.2 µF 20% tantal 35V
AA606	C2	73.5105	15 µF 20% tantal 15V
	C3	76.5070	1 nF 10% polyest FL 50V
	R1	80.5271	68 kΩ 5% carbon film 1/8W
AA603	R2	80.5229	22 Ω 5% " " 1/8W
AA604	R2	80.5240	180 Ω 5% " " 1/8W
AA606	R2	80.5240	180 Ω 5% " " 1/8W
	R3	80.5251	1.5 kΩ 5% " " 1/8W
	E1	99.5042	Zenerdiode 9,1V 5%
	ME1	14.5001	LF-forstærker 65 dB 40 mW AF-Amplifier

Storno

TYPE	NO.	CODE	DATA

AF-AMPLIFIER
LF-FORSTÆRKER AA603, AA604, AA606

X400.909