

CONTROL EQUIPMENT
TYPE CAF687

Storno

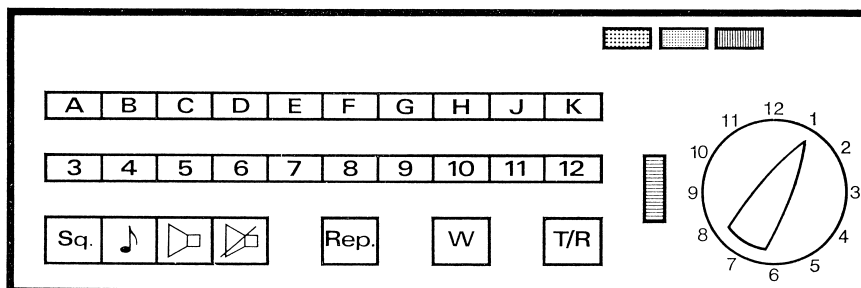
CONTROL EQUIPMENT
TYPE CAF687

OPERATING INSTRUCTIONS

Storno Base Station

Duplex with tone calling

Types CB 684 and CB 686 Control desk



Yellow lamp indicates that power is applied.



Green lamp is switched on when you are called.



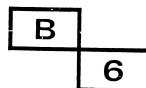
Red lamp glows when you transmit.



Channel switch. Indicates which channel is in use for transmission and reception.



Loudspeaker volume control.



Selection of calling numbers for mobile stations (numerals may be provided in both lines of buttons).



Tone button. To be used at first calling.



Loudspeaker cut-in. Before making a call, press this button to check if the channel is clear.



Loudspeaker cut-out. Press this button on termination of call. This will cut out the loudspeaker so that you will not be disturbed by calls not intended for you.



Repeater button. If the base station is equipped for operation as a repeater station – that is, for car-to-car communication via the base station, press this button to switch to repeater operation. You can monitor the traffic in the loudspeaker.



Squelch button. If the received signal is very weak, reception can often be improved by depressing the squelch button.



This button is used to switch the telephone desk set between base station and telephone line.

In position T = up, the telephone desk set is used as an ordinary telephone desk set and in position R = down, the telephone desk set is used to control the base station.

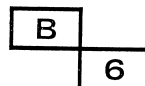


This button is used to connect a telephone subscriber with a car.

Base station (operator) to cars:



Press button to cut in loudspeaker. Check if channel is clear.



Depress call number of the car.



Depress tone call button. Red lamp will glow, and call will be transmitted. Await answer from called car.



Switch this button to position R = down, lift the handset and speak and listen. The red lamp glows. The loudspeaker is automatically cut out when the handset is lifted from the hook.



Cut out loudspeaker on termination of call and replace handset on hook.

Car to base station (operator):



Green lamp glows and bell rings. Loudspeaker is automatically cut in. Call from car is heard in loudspeaker.



Switch this button to position R = down, lift the handset from the hook and answer the call.



Cut out loudspeaker on termination of call replace handset on hook.

Operator to telephone subscriber:



Switch this button to position T = up. Lift the handset from hook and follow the normal telephone call procedure. In case of a call from a car during the operator's telephone conversation, the call is indicated by a bell and the green lamp. On termination of the call the handset is replaced on hook.

Telephone subscriber to base station (operator):

A call from a telephone subscriber is indicated by the telephone bell. (T/R button in position T) or by the radio alarm bell (T/R button in position R).



Switch this button to position T = up, lift the handset from the hook and answer the call as usual. On termination of the call handset is replaced on hook.

Call from car to telephone subscriber:

The call is heard in the loudspeaker.



The green lamp glows and the bell rings. The loudspeaker is automatically cut in. Call from car is heard in loudspeaker.



Switch this button to position R = down, lift handset from hook and answer the call.



Switch this button to position T = up, call the desired telephone subscriber and inform the subscriber.



Press this button down.



Switch this button to position R = down, replace the handset on hook and car is connected with subscriber. The red lamp glows. The conversation is monitored in the loudspeaker.



On termination of call this button is depressed.



Depress this button.

Telephone subscriber to car:

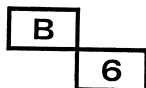
Call from a telephone subscriber is indicated by the telephone bell. (T/R button in position T) or by the radio alarm bell (T/R button in position R).



Switch this button to position T = up, lift the handset from hook and answer the call.



Cut in loudspeaker and check that the channel is clear.



Press down the number of the car.



Press down the tone button, red lamp glows and call is transmitted. Await answer from the called car.



Press down the W button.



Switch this button to position = down. Inform the called car. Replace handset on hook and subscriber is connected to car. The conversation is monitored in the loudspeaker.



On termination of call this button is depressed.



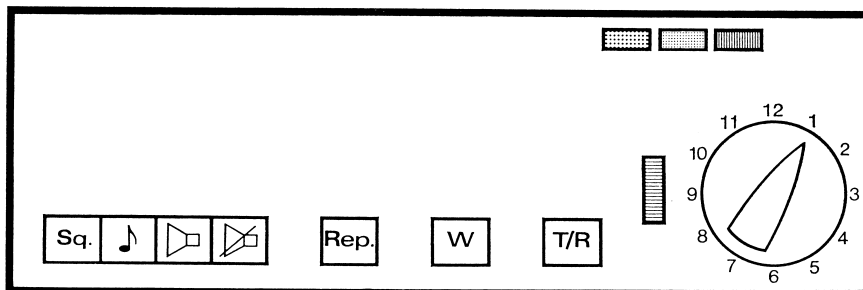
Depress this button.

OPERATING INSTRUCTIONS

Storno Base Station

Duplex

Types CB 684 and CB 686 Control desk



Yellow lamp indicates that power is applied.



Red lamp glows when you transmit.



Channel switch. Indicates which channel is in use for transmission and reception.



Loudspeaker volume control.



Repeater button. If the base station is equipped for operation as a repeater station – that is, for car-to-car communication via the base station, press this button to switch to repeater operation. You can monitor the traffic in the loudspeaker.



Squelch button. If the received signal is very weak, reception can often be improved by depressing the squelch button.



This button is used to switch the telephone desk set between base station and telephone line.

In position T = up, the telephone desk set is used as an ordinary telephone desk set and in position R = down, the telephone desk set is used to control the base station.



This button is used to connect a telephone subscriber with a car.

Base station (operator) to cars:



Switch this button to position R = down, lift the handset and speak and listen. The red lamp glows. The loudspeaker is automatically cut out when the handset is lifted from the hook.

**Car to base station
(operator):**



Switch this button to position R = down, lift the handset from the hook and answer the call.

**Operator
to telephone subscriber:**



Switch this button to position T = up. Lift the handset from hook and follow the normal telephone call procedure. In case of a call from a car during the operator's telephone conversation, the call is heard in the loudspeaker. On termination of the call the handset is replaced on hook.

**Telephone subscriber
to base station (operator):**

A call from a telephone subscriber is indicated by the telephone bell. (T/R button in position T) or by the radio alarm bell (T/R button in position R).



Switch this button to position T = up, lift the handset from the hook and answer the call as usual. On termination of the call handset is replaced on hook.

**Call from car
to telephone subscriber:**

The call is heard in the loudspeaker.



Switch this button to position R = down, lift handset from hook and answer the call.



Switch this button to position T = up, call the desired telephone subscriber and inform the subscriber.



Press this button down.



Switch this button to position R = down, replace the handset on hook and car is connected with subscriber. The red lamp glows. The conversation is monitored in the loudspeaker.



On termination of call this button is depressed.

Telephone subscriber to car:

Call from a telephone subscriber is indicated by the telephone bell. (T/R button in position T) or by the radio alarm bell (T/R button in position R).



Switch this button to position T = up, lift the handset from hook and answer the call.



Press down the W button.



Switch this button to position = down. Inform the called car. Replace handset on hook and subscriber is connected to car. The conversation is monitored in the loudspeaker.



On termination of call this button is depressed.

CB686 Control Desk

Application

The control box CB686 is designed for duplex operation of a radio station type CQF600.

The box is used for extended local control where the distance between the control point and radio equipment does not exceed 100 meters and also with remote control systems where the distance between the control point and the radio equipment can be up to 10 kms. (6 miles).

Selective calling units can be added to the control box if required. These units are described in a separate handbook.

Operating Instructions

See the first pages of this handbook for details.

Construction

The bottom cover of the control box is removed by unscrewing four screws, after which, the top cover can be removed and laid by the side of the unit. The top cover cannot be completely removed as it is attached by a cable which connects the loudspeaker.

In extended local systems, the control box is connected to the radio station via a wall mounting connector and in remote systems, the box is connected to a terminal unit. In either system, the connection is made by 2 meters of 26 way cable which is terminated with a multiplug at the free end, and at a terminal board in the box. The terminal board and the free plug are marked in an identical manner for ease of identification. The control box contains the following sub-units:

Loudspeaker Amplifier AA602

Audio Amplifier (microphone) AA681

Relay Panel RB686

Alarm Circuit AC681

The following units are added if selective calling is used:

Tone generator TG68x or SG68x

Tone receiver TR68x or SR68x.

Circuit Description

Each function is described below in terms of a DC current analysis.

Current path for "Loudspeaker in"

0V RX (Terminal K) - L3.7 - "LS IN" contact - L3.6 - Terminal 4 (TR68x). This permits the loudspeaker amplifier AA602 a/b to amplify signals received from the line amplifier AA681 and energize the loudspeaker.

Current path for "Loudspeaker out"

0V RX (Terminal K) - L4.7 - "LS OUT" contact - L4.6 - terminal 2 (TR68x). This prevents the output from AA681 from reaching the loudspeaker amplifier AA602a/b.

Current path for repeater

-24V -C - L6.7 - Repeater switch - L6.6 - terminal Z. The appropriate switching is carried out in the panel fitted to the base station.

Current path for Squelch

0V RX (Terminal K) - L1.7 - Squelch contact - L1.6 - RB9 - terminal U. The squelch adjustment potentiometer is short circuited thus opening the squelch system.

Calls from Mobiles

The sequence of events that occurs when a call is received from a mobile is described below, both with and without selective calling.

AF current path with selective calling

AF input from line: Terminals A and E - RB27/RB28 - 6dB pad - hybrid transformer - 3dB pad - transformer T2 - contact 1 (Relay L not energized) - RB12/RB21 - Amplifier AA681 terminal 1 - AA681 terminal 4 - Tone receiver TR68x terminal 7. Tone receiver operates on receipt of correct code.

DC current path for bell

Tone receiver terminal 6 - RB7 - Diode - RB6 - AC681 terminal 1.

0V RX (Terminal K - AC681 terminal 4/5 - AC681 terminal 2 - terminal AA.

AF current path without selective calling

AF signal from AA681 terminal 4 - Volume control potentiometer - AA601a/b terminal 3 - AA601a/b terminal 2/4 - loudspeaker.

Call to telephone subscriber

T/R button in position T (released). The handset on the telephone is lifted and the subscriber is dialled through the exchange in the normal manner.

The telephone is connected to the exchange as follows:- Operators telephone - Terminals JJ/MM - L10, 12/15 - contacts T - L10, 11/14 - L8, 13/16 - terminals HH/CC - exchange.

Call from telephone subscriber

If the T/R button is in position T (released), the operators telephone is connected to the exchange as above. If the T/R button is in position R (depressed), the operators telephone is disconnected but the bell is activated as shown below, indicating that the radio operator is being called via the exchange.

Current path for Ringing voltage

Exchange - Terminals HH - L10.9 - T/R contact - L10.10 - RB3 - T1 - L8.16 - Terminal CC. The ringing voltage appearing across T1 is rectified and fed to the AC681 which causes the bell to operate via terminal AA.

Current path for Modulation

The operator releases the T/R button to speak to the subscriber and the AF current path is as described above under call to telephone subscriber.

Channel Switching

Extended Local Control: Switch contacts 1-8 apply power directly to the transmitter and receiver terminals via the common conductor DD.

Remote Control: Maximum 4 channels. The appropriate relays in TE68x are activated for channels 2, 3 and 4.

Current Path: 0V RX - terminal DD - channel switch - terminals J.N.T. - relays in TE68x.

Tone Generator

Relay V switches the tone generator into the modulating circuit. When the tone generator is activated, relay V remains energized as long as a tone signal is being transmitted.

DC Current path for keying: 0V RX (terminal K) - TG12 - contact v (Relay V energized) - TG13 - terminal V.

Current path for AF modulation: Tone generator terminal 2 - TG7 - contact v (Relay V energized) - TG6 - RB30 - RB29 - terminal B. Tone generator terminal 3 - RB24 - terminal F.

Tone Receiver

The tone receiver is activated on reception of the correct tone combination. Check that the potential at terminal 1 in the circuit diagram of the tone receiver is approx. -2 volts.

Call Lamp (green)

This lamp is connected to terminal 1 of the tone receiver. It is lit when the tone receiver is activated. Consequently, it is always alight when the speaker is operative. The lamp is used only in conjunction with TR68x or SR68x.

On/Off Lamp (yellow)

The on/off lamp is connected to -24V in the power supply via terminal Y.

Transmit Indicator Lamp (red)

This lamp indicates that the transmitter is keyed. It is connected to -TX (terminal R) and is controlled by the transmit relay in the power supply (extended local control) or by a relay in TE6xx (remote control).

Alarm Circuit AC681

The alarm circuit is activated when terminal 1 receives a potential of approx. -15 volts from the tone receiver or the ringing circuit.

Calls to mobile stations

The sequence of events that occur when a call is made to a mobile from the operators telephone is described below, both with and without selective calling.

a) From the Operators Telephone

AF current path with selective calling: The tone generator output is derived from terminal 2.
TG2 - TG7 - contact v (Relay V energized)
- TG6 - RB30 - RB29 Terminal B. Terminal TG3 is connected to terminal F.

DC current path with selective calling: -C (-24V)
- L2.7 - tone button - L2.6 - TG4 - TG3 - 0V TX.
0V RX-TG12 - contact v (Relay V energized) - TG13-RB11 - terminal V.

AF current path without selective calling: Handset on the operators telephone is lifted off the hook and the T/R button is set to position R (depressed).
Handset - terminals JJ/MM - L10, 15/12 - switch position R - L10, 16/13-RB17/19 - contacts 1 (relay L energised) - 3dB pad - hybrid transformer - RB24/29 - terminals F and B.

DC Current path without selective calling:

0V RX - RB8 - Relay L - RB19 - L10, 13 - R - L10.12 - terminal MM - operators telephone - terminal JJ - L10.15 - R - L10.16 - RB17 - relay L-RB18 - -C. Relay L operates.
0 RX - RB8 - contact 1 (relay L energised) - RB11 - terminal V (keying).

b) From a telephone subscriber

The push button W is depressed. T/R button is set to position R (depressed) and the operators handset is on the rest.

AF current path (transmitting): Terminals HH and CC - L8, 16/13 - W switch - L8, 15/12 - RB22/14 - 3dB pad - hybrid transformer - RB24/29 - terminals F and B.

DC current path (keying): 0V RX - RB8 - contact 1 (relay L de-energized) - RB13 - L8.6 - W switch - L8.7 - L10.6 - R switch - L10.7 - RB5 - diode - RB11 - terminal V.

AC current path (receiving): Terminals A and E - 6dB pad - hybrid transformer - 3dB pad - RB14/22 - L8 12/15 - W - L8 13/16 - terminals HH and CC.

Monitoring: Transformer T2 - RB12/21 - AA681 - volume control - AA602a/b - loud-speaker.

Monitoring with selective calling: 0V RX - RB8 - contact 1 (Relay L de-energized) - RB13 - L8.6 - W switch - L8.7 - L10.6 - R switch - L10.7 - RB5 - diode - RB4 - L3.6 - terminal 4 on TR68x.

DATA

Output Amplifier

Max. 2 watts for 70% modulation at 1000 Hz.

Operating Voltage

-24 volts \pm 5%.

Power Consumption

6 watts (including tone equipment).

Temperature Range

-30°C to +60°C.

Installation

The control unit is designed for desk use. The unit should not be covered with papers and other objects. The unit is connected to a wall mounted connector or to a terminal box, depending on the system.

Setting up

After the equipment is installed correctly, the levels in and out of the control box should be set in accordance with the level diagram in the handbook. It should not be necessary to make further adjustments.

AF Amplifier Unit AA681a

Application

Amplifier unit AA681a consists of an automatic volume controlled AF amplifier which maintains a constant output level for varying input voltages between 0.4 and 7.7 volts.

Furthermore the unit contains an extra separate amplifier.

Mode of Operation

The automatic volume controlled amplifier consists of these stages:

An input stage with a pre-emphasis network

An amplifier stage

A rectifier stage (AVC).

The input stage (Q1) operates as an emitter-follower having a high input impedance. Resistor R4 and the capacitors C2 and C3 constitute the succeeding pre-emphasis network. A strapping arrangement allows the pre-emphasis to be set to one of the below values:

The AF output is taken from the collector of Q3 to terminal 4 of the unit. The upper cut-off-frequency of the entire amplifier is determined by capacitor C6.

From the collector of Q3 part of the AF signal is applied to the base of Q4 which works as a rectifier as the base signal controls the collector dc-voltage. The controlled d. c. voltage is applied to the AVC-diodes E1 and E2.

Imagine that the amplifier input level increases, then the output level and the signal applied to the base of Q4 will at first increase. This will cause a rise of the Q4 collector-voltage and of the current through the AVC-diodes, the a. c. resistance of which will consequently decrease.

Because of the voltage divider formed by R5 - E1, E2 the signal applied to the base of Q2 will decrease and so will the amplifier output, and a stable condition will occur.

The time constant is determined by C9 and the resistance of the diodes. By means of potentiometer R13 the output level can be adjusted from -4 dBm to +3 dBm.

The extra AF amplifier consisting of transistor Q5 and Q6 operates as a traditional amplifier stage with negative feed-back.

The amplification can be adjusted by means of potentiometer R19.

Data

Supply Voltage

-24V $\pm 5\%$.

Current Consumption (total)

18 mA ± 2 mA.

Input Impedance

AVC-amplifier: 100 k Ω .

Extra amplifier: 600 $\Omega \pm 20\%$.

Output Impedance

AVC-amplifier: 600 $\Omega \pm 20\%$.

Extra amplifier: 600 $\Omega \pm 20\%$.

Max. Input

AVC amplifier: 7.7 volts.

Output

AVC amplifier: For a 1.23 volt input adjustable between -4 and +3 dBm.

Extra amplifier: Max. output 0 dBm.

Automatic Volume Control

For a 1.23 volt input: +16dB/-10dB.

Delay of AVC

At -4dBm output: 20 msec.

At +3dBm output: 60 msec.

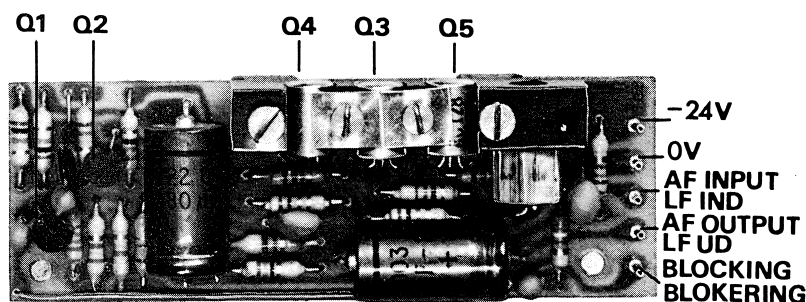
Amplification

Extra amplifier: Adjustable between -4dB and +20dB.

Frequency Range

Extra amplifier: 300-3000 Hz.

Audio Output Amplifier AA602



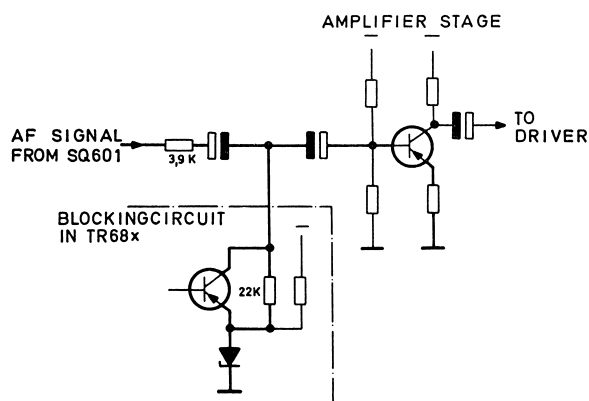
The audio output amplifier is built on a wiring board. It consists of these stages:

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

The audio output amplifier is a transformer-less 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 is fed to the output stage via the pre-amplifier stage and the driver stage, both of which receive negative feedback voltage from the output stage. Temperature compensation of the output stage is accomplished by biasing a 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 transformer-less, 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

Technical SpecificationsSupply Voltage

24 V $\pm 5\%$.

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 $R_{\text{cable}} = 0$ 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.

Line Amplifier LA681

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

Attenuator
Equalizer
Amplifier stage

The line amplifier serves the purpose of amplifying or attenuating the input signal. Its frequency response can be altered by means of a system of straps.

Mode of Operation

Attenuator

An attenuator in the input circuit can be adjusted to provide either gain or attenuation between +28dB and -20dB in steps of 2dB.

The overall resistance of R1, R2, R3, R4, R5, and R6 provides an input impedance of 600 ohms. Taps between the resistors permit reducing the impedance in steps of 10 dB. Resistors R7, R8, R9, R10, and R11 in combination with the input impedance of transistor Q1 form an additional voltage divider which permits further gain or attenuation adjustment in steps of 2 dB.

Equalizer

Transistor Q1 employs frequency-dependent negative feedback. The frequency response can be altered through a system of straps in the emitter circuit of Q1.

Without straps inserted, the emitter circuit will consist solely of resistor R15. This provides flat frequency response between 300 and 3400 Hz.

With terminals A and B strapped together, R18 and C4 are connected in parallel with R15, producing a 3 dB rise at 3000 Hz.

With terminals A and C strapped together, R17 and C3 are connected in parallel with R15, producing a 6 dB rise at 3000 Hz.

With both of the above-mentioned straps inserted, the frequency response is raised 9 dB at 3000 Hz.

By altering the frequency response as described it is possible to compensate the line capacitance for line lengths of 0.4 km, 8 km, and 12 km, respectively.

Resistors R17 and R18 in the two strap circuits serve the purpose of limiting the gain at very high frequencies.

Amplifier

The amplifier is composed of transistors Q2 and Q3, which are directly coupled to each other and provide a voltage gain of 15.

Distortion is minimized through heavy negative feedback (R21 and R24). The amount of feedback increases with frequency, due to capacitor C6, in order to reduce gain at very high frequencies.

Temperature compensation for variations in the gain provided by transistor Q2 is effected by diode E2, whose temperature coefficient corresponds to that of the diode represented by the emitter and base of the transistor.

There is DC negative feedback from the emitter of transistor Q3, via resistor R23.

The output impedance of the unit is largely determined by resistor R27.

Data

Supply Voltage

24V \pm 5%.

Temperature Range

-30°C to +80°C.

Gain

Max. 28 dB \pm 1 dB.

The attenuator permits gain adjustment from +28 dB to -20 dB in steps of 2 dB.

Harmonic Distortion

Less than 1%.

Crosstalk from Supply Voltage

Less than 30 dB from 300 to 3000 Hz.

Frequency Response

Without straps: Flat from 300 Hz to 3400 Hz ± 1 dB.

Strap A-B: +3 dB at 3000 Hz.

Strap A-C: +6 dB at 3000 Hz.

Straps A-B and A-C: +9 dB at 3000 Hz.

Input Impedance

600 ohms $\pm 20\%$.

Output Impedance

600 ohms $\pm 20\%$.

Output Voltage

Max. output voltage is 0 dBm with the amplifier terminated in 600 ohms in parallel with 0.5 μ F.

Dimensions

28 x 80 mm.

RE681a Repeater Unit

The RE681a repeater unit is built on a printed wiring board. It consists of these main circuits:

DC amplifier with relay
Timer circuit

The repeater unit is a sub-unit in control systems where the base station operates in duplex and repeater function is desired.

The repeater unit, which handles the transfer of the receiver audio signal to the transmitter modulation input and switches the transmitter on and off, is used where:

- a) the repeater function is controlled solely by the squelch circuit; and where
- b) the repeater function is controlled both by the squelch circuit and by a tone signal.

Mode of Operation

a) Squelch-controlled repeater function

If the repeater function is controlled solely by a squelch signal, terminals 1 and 2 in the circuit diagram of the RE681a should be strapped together and a potential of -24 volts applied to output terminal 5. The latter condition is met by pressing the repeater button provided on the control box.

If a squelch signal is now applied to output terminal 1, transistors Q1, Q2, and Q3 will become operative, and since relay M is already in the operated condition, Q3 will be capable of operating the transmit relay (in the transmitter) in time with the received squelch signal.

The received audio signal is now fed to terminal 3 of the repeater unit and from there via terminal 7 to the transmitter.

If the repeater button on the control box is not depressed, audio signal from the control-box microphone will be fed to terminal 8 and from there via terminal 7 to the modulation terminals of the transmitter.

The timer circuit performs no function when the repeater unit is operated in this manner.

b) Squelch-and-tone controlled repeater function

If the repeater function is controlled both by a squelch signal and by a tone signal, the strap between terminals 1 and 2 should be removed and output terminal 9 connected to tone-receiver terminal 1 the potential of which changes from -24 volts to 0 volts on reception of the correct tone or combination of tones. Moreover, -24 volts is applied to output terminal 15, causing relay M to be operated when the tone receiver feeds 0 volts to terminal 9. A squelch signal received at terminal 1 will cause transistors Q1, Q2, and Q3 to become conductive. This, in conjunction with the fact that relay M is connected to chassis potential via the tone receiver, enables Q3 to operate the transmit relay (in the transmitter) in time with the received squelch signal.

When the signal from the receiver disappears, the timer circuit after some delay - depending on its time constant - will cut out the tone receiver, corresponding to the Speaker Out button on the control box being depressed. If the mobile-station operator wishes to switch on the repeater unit again, the squelch signal must once more be accompanied by a tone call.

Adjustments

The time constant of the timer circuit is adjustable with potentiometer R8.

Data

Operating Voltage

-24 volts $\pm 5\%$.

Squelch Level

Squelched: -19 volts
Unsquelched: -8 volts
Unsquelching level: -16 volts

Time Delay

15-45 sec.

Temperature Range

-30°C to +60°C.

Power Supply Unit PS681

General

The power supply PS681 is built on a single chassis plate which incorporates a printed circuit board, wiring and consists of the following main circuit elements:

Transformer, rectifiers and filters
Voltage regulator
Fusing circuit

The PS681 is normally supplied from AC mains. The unit converts the nominal AC input of 220V, 50 to 60 Hz, into a stabilised DC output of 24V.

The power supply can readily be modified for emergency operation from a suitable battery unit. A switch is then provided which in the case of mains failure permits the change over to DC input.

Circuit Description

Transformer, rectifiers and filters

The mains transformer is enclosed in a metal housing which also contains the fuse holder and fuse link.

The primary circuit comprises four input leads: 0V, 220V, 240V and earth. The Transformer core and electrostatic screen are internally connected to the earth lead.

Two secondary windings are provided viz. the 30V main and 15V auxiliary. Full wave bridge circuits are used for rectification and are followed by DC smoothing filters.

Voltage regulator

The electronic regulator consists of the series transistor Q1, control transistor Q2 and amplifier Q3. These transistors are silicon NPN type.

A part of the stabilised output voltage is taken from the voltage divider and applied to the base of the amplifier transistor Q3. The emitter of Q3 is held at a constant potential provided by

the reference diode E8. The collector of the amplifier transistor is connected to the base of the control transistor Q2.

Regulation is performed by comparing a sample of the output voltage with the reference. Any difference voltage present is amplified by Q3 and controls the series transistor Q1. Compound connexion of Q1 and Q2 is used to provide the necessary current gain.

If the output voltage increases, the collector current of the amplifier transistor will increase. This will cause a decrease in the base voltage of the control transistor and also in the base voltage of the series transistor Q1. Consequently the voltage drop across Q1 will rise and the output voltage will decrease.

The adjustment of the output voltage to -24V is carried out by means of the potentiometer R17.

Fusing circuit

The fusing circuit acts as an electronic excess current fuse.

The circuit comprises two transistors, Q4 and Q5, in a complementary bistable network. Under normal conditions the two transistors are cut off. The diode E7 is biased in the reverse direction and the voltage regulator stabilises the output voltage as described above.

When the current flowing through resistor R3 exceeds a predetermined value, transistors Q4 and Q5 are switched on. Diode E7 then conducts and drives Q1 and Q2 into cut off condition which causes the output voltage to disappear.

Resetting is carried out by disconnecting the mains supply for approximately 15 seconds to allow the storage capacitor C1 to discharge.

Any units connected to the PS681 are protected against excessive output voltage which may be generated due to failure of the series regulator.

A Zener diode E9 is provided which will limit the output voltage to approximately -30V. In the

event of failure of the stabilising circuits, the diode will be overloaded and destroyed. The output current will be interrupted either by the electronic fusing circuit or the fuse link in the mains transformer.

Specifications

Supply voltage

220V or 240V, 50 to 60 Hz.

Permissible variation of supply voltage

220V terminals, 176V min., 242V max.

240V terminals, 192V min., 264V max.

Output voltage

-24, 0V stabilised.

Variation in output voltage

for maximum variations of supply voltage, load current and temperature: $\pm 0.6V$.

Output current

0.6A max.

Output voltage ripple

$\leq 10 \text{ mV}_{\text{p-p}}$

Input current

220 mA max.

Power input

at $V_{\text{in}} = 220V$ and for $I_{\text{out}} = 0.6A$: 28VA

Protection

fuse link in the mains transformer: 0.25A.

operating point of the electronic excess current fuse: 750 mA $\pm 5\%$.

excess output voltage operating point: $-30V \pm 10\%$.

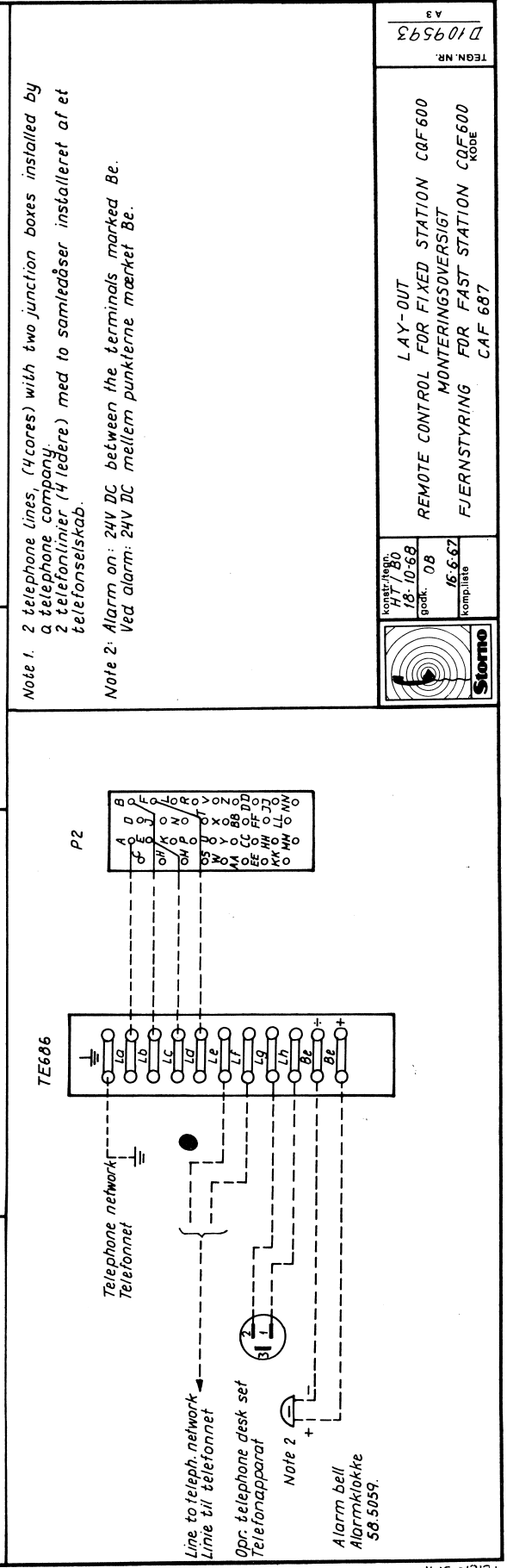
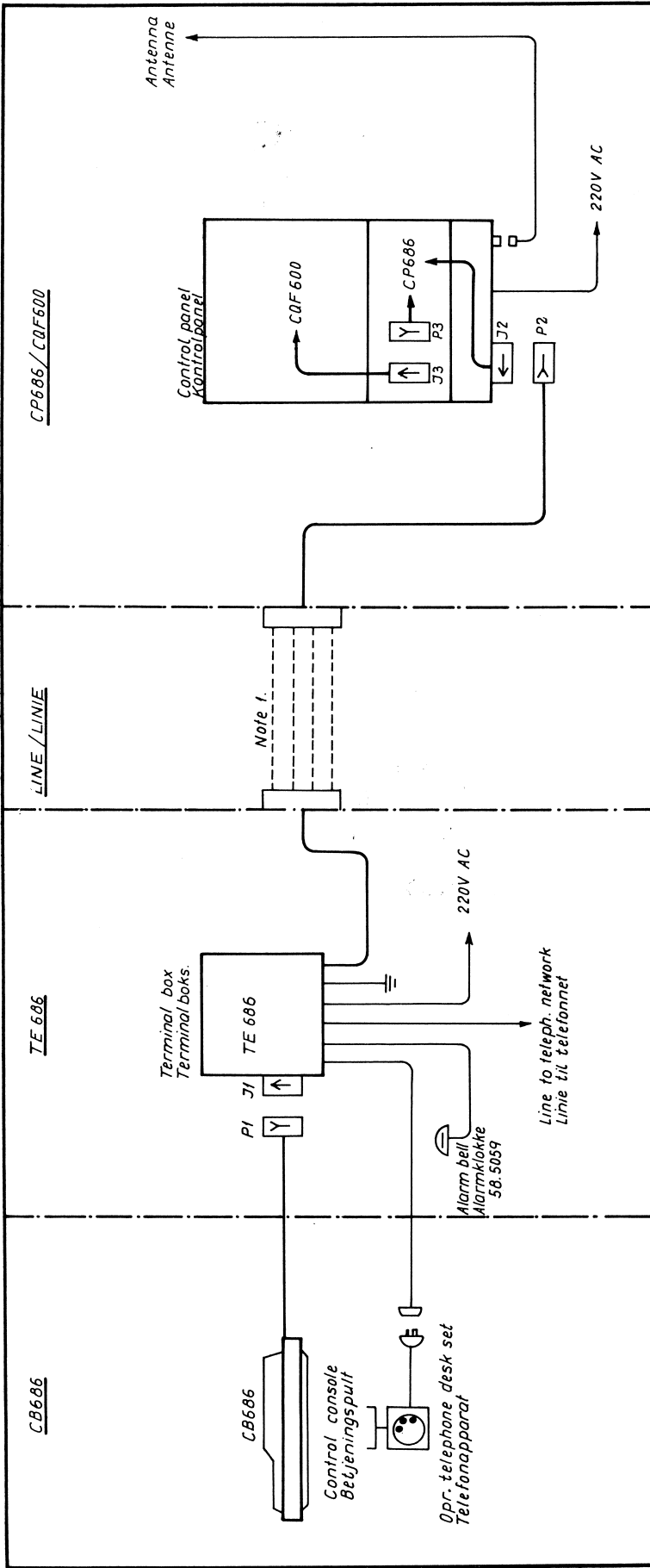
Ambient temperature range

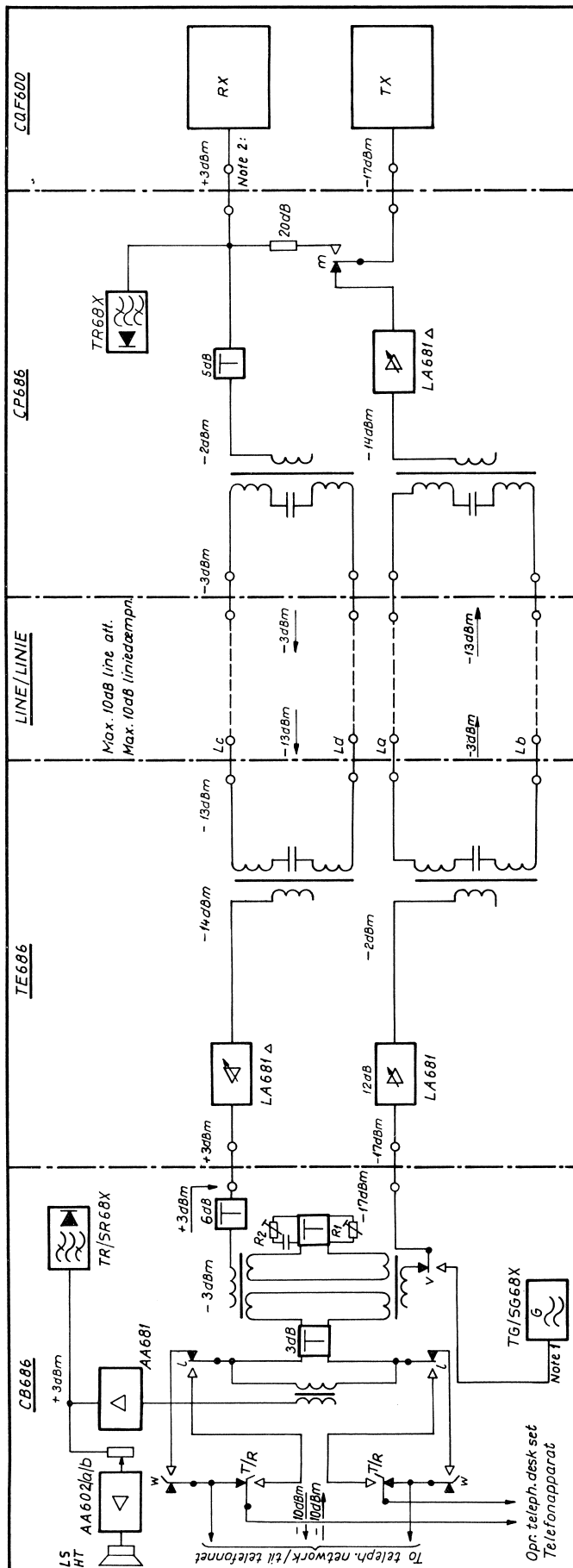
specified: -25°C to $+70^{\circ}\text{C}$

permissible: -30°C to $+80^{\circ}\text{C}$.

Insulation

The mains transformer meets standards of power transformer, Class 2, according to CEE Publ. no. 15.





The TX input and the RX output levels indicated on the level diagram correspond to 70% frequency deviation at 1000 Hz.

All levels are indicated for a line attenuation of 10 dB.

In case of less than 10 dB line attenuation, adjust the LA681 marked Δ . The LA681 marked Δ can be adjusted from 20 dB attenuation to 28 dB amplification. The levels of CB686 and CQF600 are independent of the line attenuation. The line input level must not exceed -3 dBm corresponding to 70% frequency deviation. In order to equalize the line response, the LA681 marked Δ can be adjusted from a response at 3000 Hz with respect to 1000 Hz. Linear to a +3, +6, or +9 dB response at 3000 Hz with respect to 1000 Hz.

Adjust the hybrid balance with R1 and R2 placed in CB686 to max. hybrid attenuation from 300 Hz to 3000 Hz.

All levels are measured with a VTVM $R_i > 1M\Omega$.

Max. loop resistance in line 2000g.

De på niveaudiagrammet angivne TX ind- og RX udgangsniveauer er målt ved 70% frekvenssving og 1000 Hz.

Alle niveauer er angivet for en linedæmpning på 10 dB.

I tilfælde hvor linedæmpningen er mindre end 10 dB justeres LA681 mærket Δ .

LA681 kan justeres fra 20 dB dæmpning til 28 dB forstærkning. De angivne niveauer

er for CB686 og CQF600 er uafhængige af linedæk-

må ikke overstige -3 dBm ved 70% frekvenssving.

Til modforvængning af linien er der i LA681 mærket Δ indbygget et modforvængnings-

led. Dette kan strappes fra ret frekvensgang til 3, 6, eller 9 dB modforvrængning

ved 3000 Hz i forhold til 1000 Hz.

uster R1 og R2 i CB686 til max. garfjeldpømpning i

Alle tilveauer er malt med et rørvolt
May. sløifemodstand i linien 20000.

Note 1: Single tone generator and sequence tone generator, adjust the level at 1000 Hz (1060 Hz) to -17 dBm and 70% frequency deviation.

Double tone generator, adjust the level, for each tone, at 1000 Hz (1060 Hz) to -23 dBm and 35% frequency deviation.

Enkelttonegenerator og sekvens tonegenerator, juster niveauet ved 1000 Hz (1060 Hz) til -17 dBm og 70% frekvenssving.

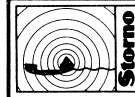
Dobbelttonegenerator, juster niveauet, juster tone for sig, ved 1000 Hz (1060 Hz) til -23 dBm og 35% frekvenssving.

Note 2: Single tone and sequence tone, +3 dBm at 1000 Hz (1060 Hz) at 70% frequency deviation.

Double tones, -3 dBm, for each tone, at 1000 Hz (1060 Hz) at 35% frequency deviation.

Enkelt tone og sekvenstone, +3 dBm ved 1000 Hz (1060 Hz) ved 70% frekvensvigning

Dobbelttone, -3 dBm, hver tone for sig, ved 1000 Hz (1060 Hz) ved



konstr./tegn.
HT / B0
18-10-68
godk. OB
15-6-67
comp.lleste

AUDIO FREQUENCY LEVELS
REMOTE CONTROL EQUIPMENT
NIVEAUSKEMA
FJERNSTYRING
CAF 687

KODE

TEGN.NR.

Kont., tekst.

Cable 26 cores/kabel 26 ledere

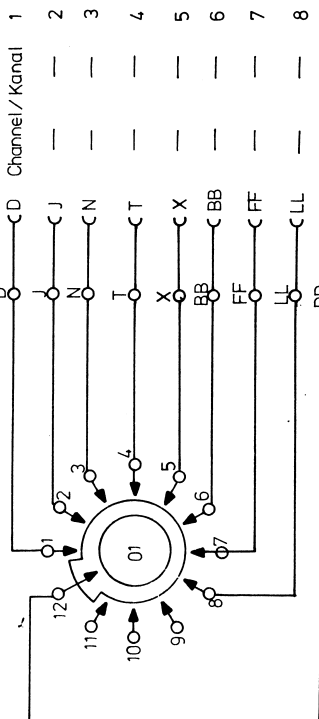
P1

V

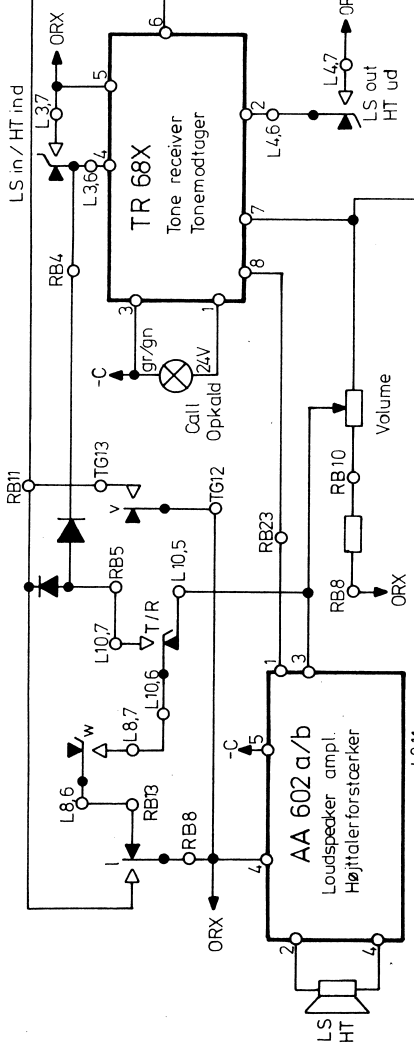
C V

Key/Tast

Channel selector: in pos. 12
Kanalvælger: i pos. 12



LS in / HT ind



LS out HT ud

Volume

AA 602 a/b

Loudspeaker ampl.
Højttalerforstærker

LS HT

ORX

Start 24V

Key/Tast

ORX

ORX

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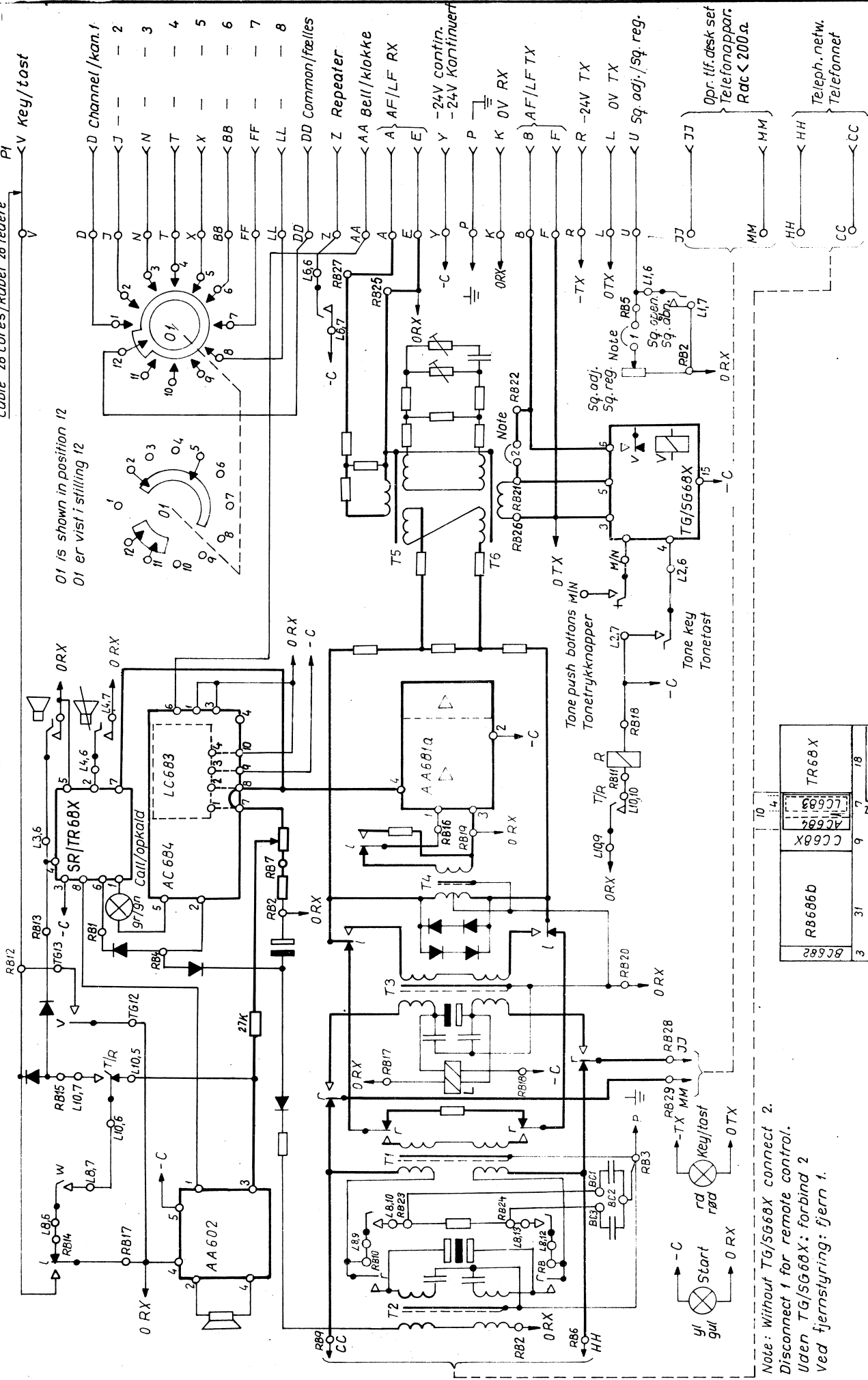
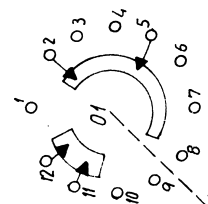
ORX

ORX

Cable 26 cores/kabel 26 ledere

PI V key/tost

01 is shown in position 12
01 er vist i stilling 12



Note: Without TG/SG68X connect 2.
Disconnect 1 for remote control.
Uden TG/SG68X: forbind 2
ved fjernstyring: fjern 1.

BC682	3	31	9	7	18	AA681a
RB686b						AC684
LC683						TR68X
AA602						



Model Type
KHO/BO
19.12.68
Book

CONTROL CONSOLE
BETJENINGSPULT

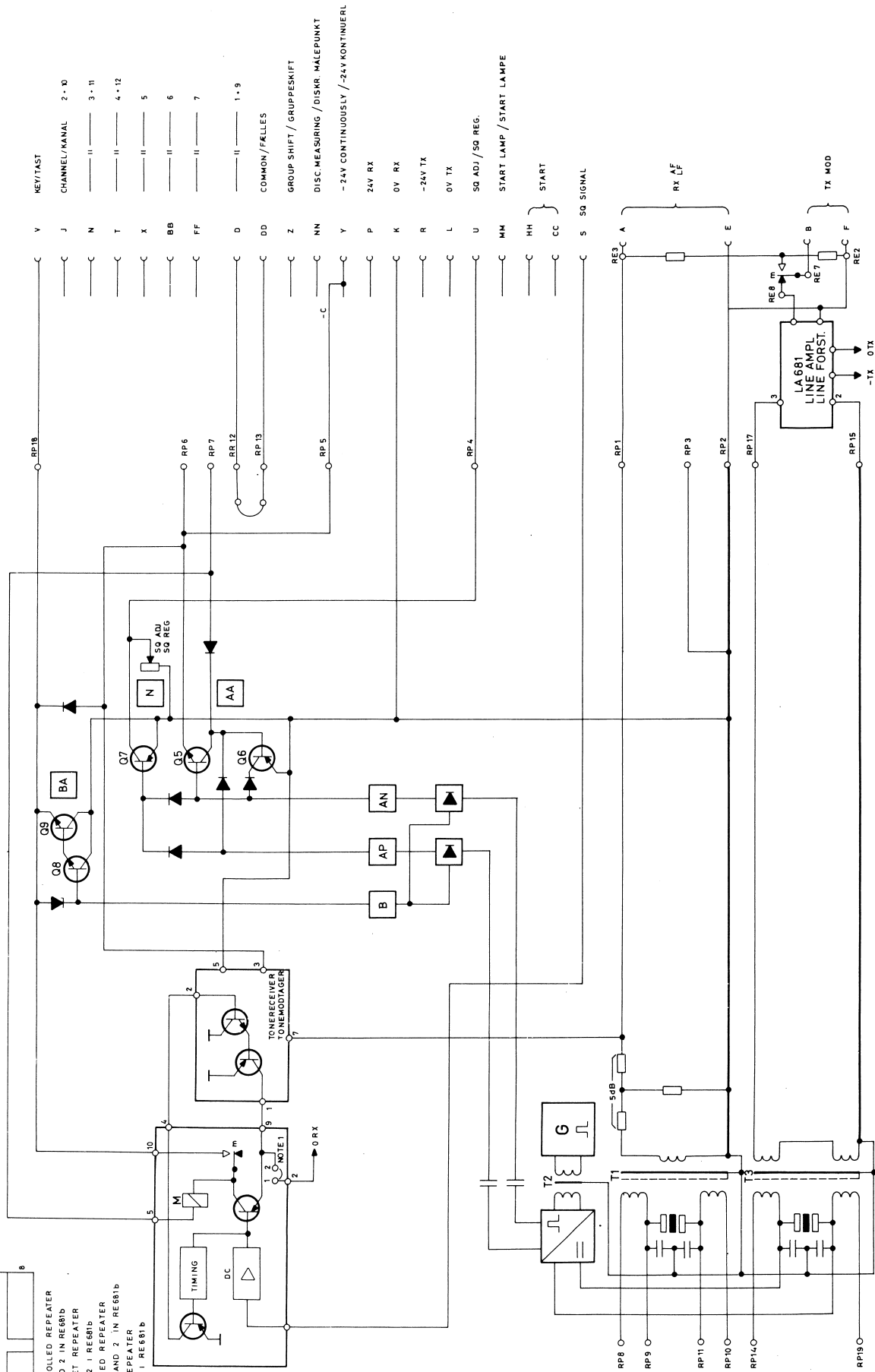
CB686a

CODE

TEGN NR
D 112437
A3

27	7	9	18	3
RP686	LA681	RE681b	TR68X	

NOTE 1 SQUELCH CONTROLLED REPEATER
CONNECT 1 AND 2 IN RE681b
SQUELCH STYRET REPEATER
FORBIND 1 OG 2 I RE681b
TONE CONTROLLED REPEATER
DISCONNECT 1 AND 2 IN RE681b
TONESTYRET REPEATER
FJERN 1 OG 2 I RE681b

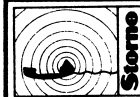


CONTROL PANEL CP686
1 CHANNEL WITH REPEATERFUNKTION
DUPLEX
REMOTE CONTROL EQUIPMENT
FJERNSTYRING

TYPE OF RELAY RELÆTYPE	STORNO NO.	MANUFACTURES NO. FABRIKANTENS NR.	DIAGRAM	COIL RESISTANCE SPOLEMODSTAND	COIL SPOLENS VIND- NUMBER OF TURNS	ACTIVATING AMP. VINDINGER AMP. TURNS VED TRÆK	ACTIVATING mA. mA VED TRÆK	NORMAL OPERAT. AMP. VINDINGER AMP. TURNS UNDER DRIFT	NORM. OPERAT. mA UNDER DRIFT	SWITCHING OFF AMP. VINDINGER AMP. TURNS VED FALD.	SWITCHING OFF mA VED FALD.	MAX. LOAD IN CONTACTS. PA KONTAKTER	NUMB. OF SHIFT FUNCT. ANT. SKIFTEFUNKT.	NUMBER OF COILS. ANTAL SPOLER.
Polarized relay	58.5057	Siemens (170a Tbv 6702/41)	A	85	3200	7 - 17	2,2 - 5,4	25	7,8	6 - 17	1,86 - 5,40	100V 1A 30W	2	1
Polariseret relæ	58.5058	Siemens (170a Tbv 6702/10)	A	1100	11000	7 - 17	0,64 - 1,54	25	2,27	6 - 17	0,55 - 1,54	100V 1A 30W	2	1
Polarized relay	58.5029	Siemens (154c 65426/93a)	B	2500	11000	65	5,9	80	7,3	15	1,36	100V 1A 30W	2	1
Polariseret relæ	58.5062	Siemens (154c 65722/93a)	B	1700	9900	65	6,6	80	8,1	15	1,5	100V 1A 30W	2	1
Telephone type relay	58.5055	Siemens (154d 65721/93a)	C	890	7300	100	13,7	120	16,5	30	4,1	100V 1A 30W	4	1
Kamrelæ	58.5060	Siemens (154d 65721/93a)	C	890	7300	100	13,7	120	16,5	30	4,1	100V 1A 30W	4	1
Telephone type relay	58.5061	Siemens (154d 65721/93a)	D	2 x 550	2 x 3500	65	9,3	80	11,4	15	2,14	100V 1A 30W	2	2
Kamrelæ			D	2 x 550	2 x 3500	65	9,3	80	11,4	15	2,14	100V 1A 30W	2	2
Telephone type relay			E	2 x 265	2 x 2900	100	17,5	120	20,7	30	5,18	100V 1A 30W	4	2
Kamrelæ			E	2 x 265	2 x 2900	100	17,5	120	20,7	30	5,18	100V 1A 30W	4	2

REMOTE CONTROL FUNCTIONS/EJERNSTYRINGSFUNKTIONER

Line current, loop, 2000 a Liniestram, sløjfe, 2000 a	Polarity core Ia (Ic) Polaritetsleder Ia (Ic)	Functions / funktioner Without / uden Repeater With / med Repeater
0		Sq. opening Sq. åbning Sq. opening Sq. åbning
1,8 mA	+	Chan. 1 listen Kan. 1 lytte Listen Lytte
1,8 mA	-	Chan. 2 listen Kan. 2 lytte Repeater Repeater
7,0 mA	+	Chan. 1 Key Kan. 1 tast Key Tast
7,0 mA	-	Chan. 2 Key Kan. 2 tast Key Tast

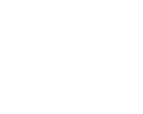
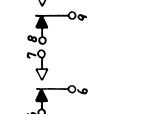
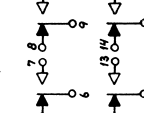
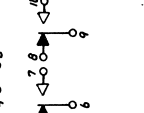
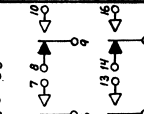
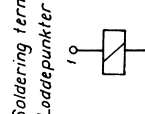
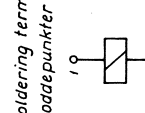
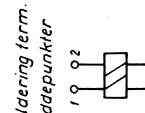
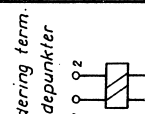
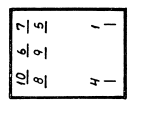
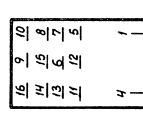
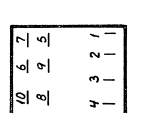
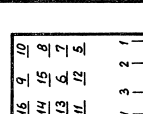


konstr./tegn.
HT / 80
9.9.66
godk. HT
9.5.67
komplette

LAY OUT FOR RELAYS/RELEVERSIGT
Relays used in control equipment type CAF600
Relæ som bruges i styringsudstyr type CAF600

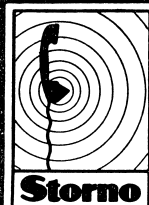
KODE

TEGN. NR.
D 108493



TR685: 1224 og 1552 ret. 1240, 1520 / SR6842 fjernet 7.11.68

System	Tone frequency / c/s Hz	Tone receiver Tonemodtager		Tone transmitter Tonesender		Tone generator for control console. Tonegenerator til betjeningspult.	
		Type	Number of combinations Antal kombi- nationer.	Type	Number of combinations Antal kombi- nationer	Type	Number of calls. Antal opkald
Single tone Enkelttone	1060 1160 1270 1400 1530 1670 1830 2000 2200 2400 2600 2900	TR681	12	TT 681	12		
	825 1010 1240 1435 1520 1750 1860 1980 2000 2135 2280 2450. (Spec. freq./spec. frekv.)	TR683		TT 683			
	Tone a: 1060 1160 1270 1400 1530 1670 1830 2000 2200 2400 2600 2900	TR682	66	TT 682	66	TG 682 TG 689	64 1
	Tone b: 1060 1160 1270 1400 1530 1670 1830 2000 2200 2400 2600 2900						
Double tone Dobbelttone	Tone a: 370 450 550 675 825 1010 1240 1520 1860 2280	TR685	45				
	Tone b: 370 450 550 675 825 1010 1240 1520 1860 2280						
	Tone a: 1060 1160 1270 1400 1530 1670 1830 2000 2200 2400 2600 2900	TR687	72	TT 687	72	TG 687	60
	Tone b: 615 675 735 805 885 970						
Sequence tone Sekvenstone 4 digits 4 cifre	Digit/ciffer: 1 2 3 4 5 6 Freq./frekv.: 1060 1160 1270 1400 1530 1670 Digit/ciffer: 7 8 9 0 rep. alarm Freq./frekv.: 1830 2000 2200 2400 2600 2900	SR684	10000	ST 684	10000	SG 684	100



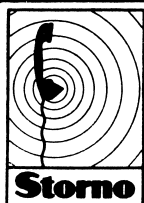
konstr./tegn.
HT / 80
26.9.67
godk. HT
20.10.67
komp.liste

LAY-OUT
TONE EQUIPMENT FOR CQM600 AND CQF600
OVERSIGHT
TONEUDSTYR FOR CQM600 OG CQF600

TEGN. NR.

D 110058

A 4



konstr./tegn.
HT/IGH
22.8.66
godk. HT
10.5.67
komp.liste

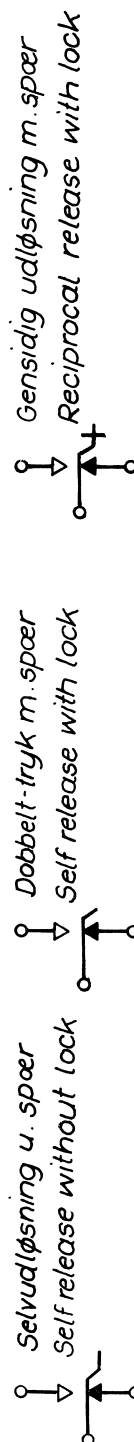
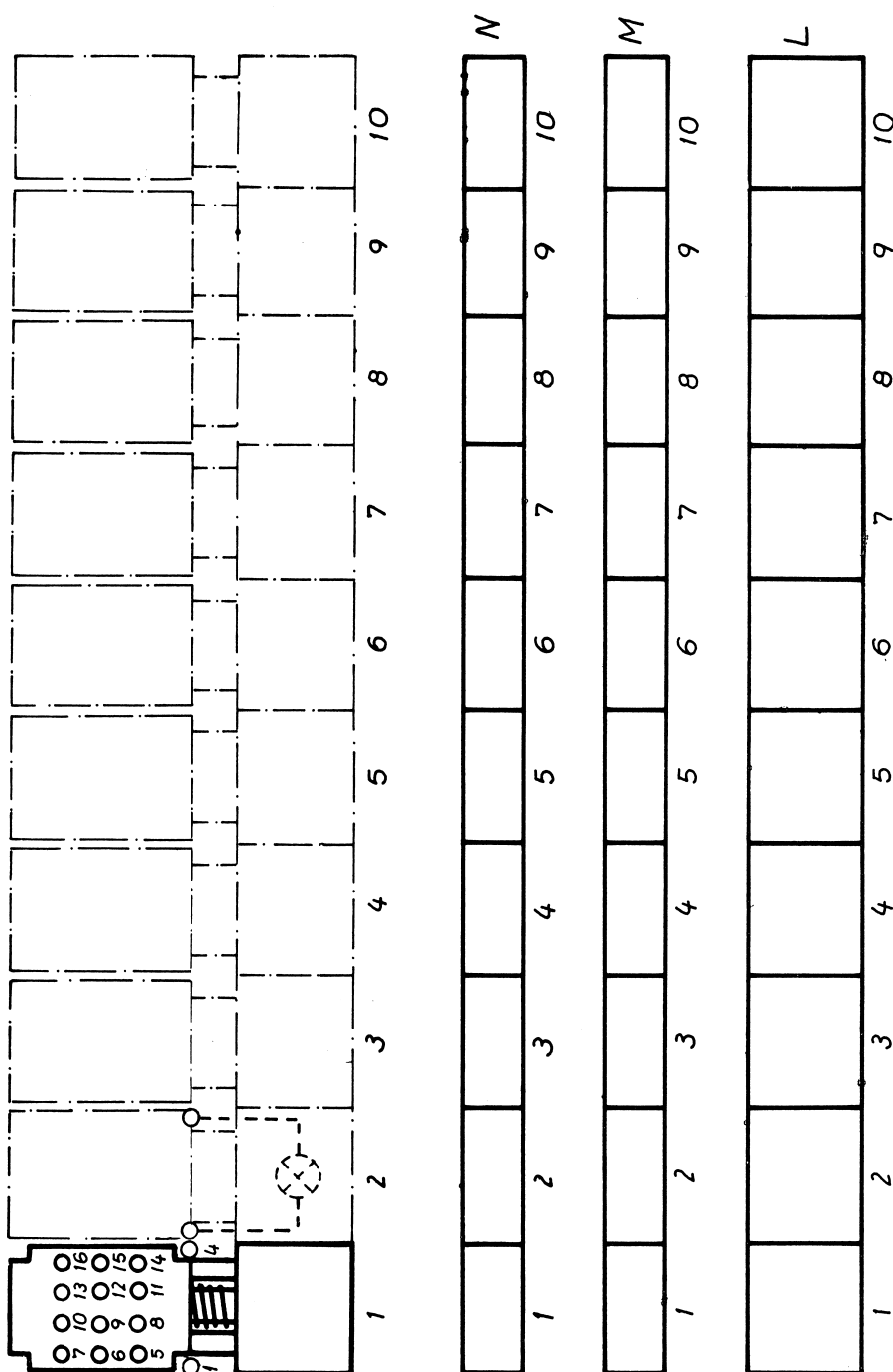
POSITION OF PUSH BUTTONS WITH
SOLDERING TAGS.
PLACERING AF TRYKKNAPPER MED
KONTAKTFLIGE
CB 68X

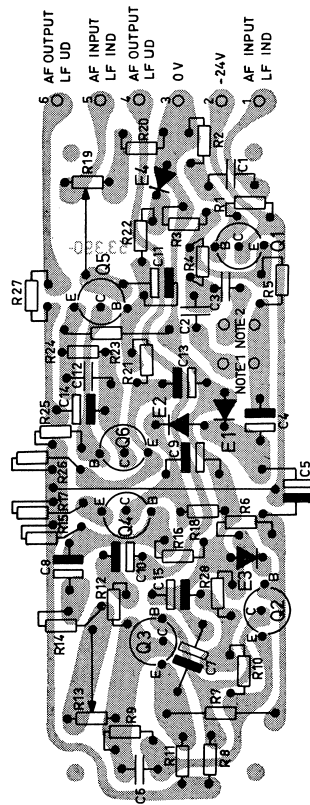
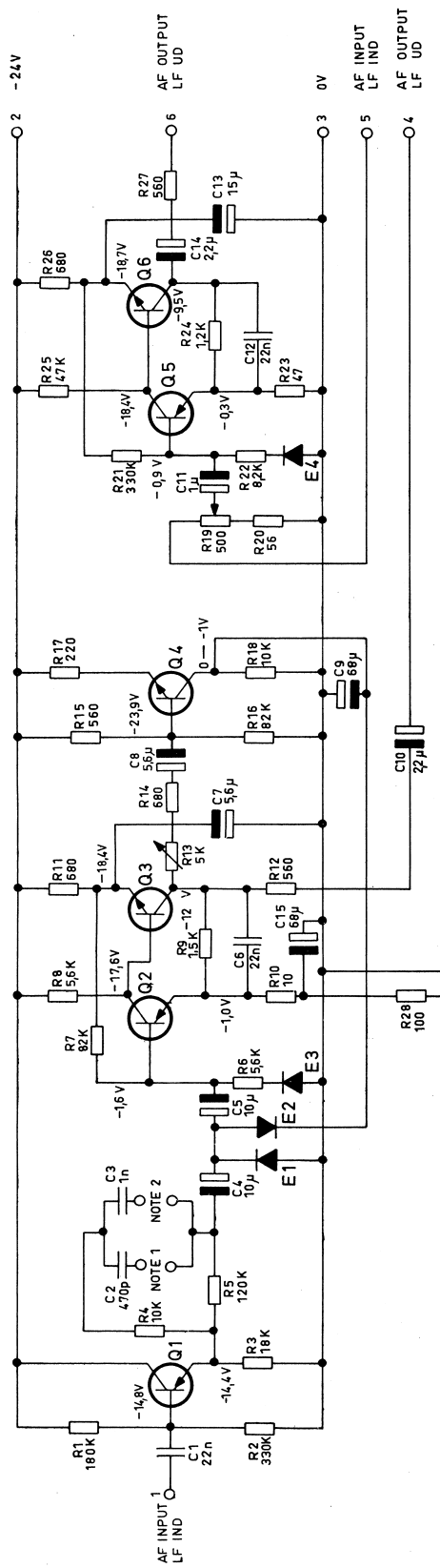
KODE

TEGN. NR.

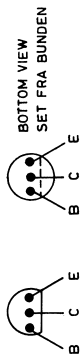
D 108533

A 4





Q1, Q2, Q5 Q3, Q4, Q6



NOTE 1: 3 dB PREEMPHASIS AT 30 kHz
FORBETONING VED 30 kHz
NOTE 2: 6 dB " " " " 30 " "
NOTE 1+NOTE 2: 9 dB " " " " 30 " "

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

AF-AMPLIFIER
LF-FORSTÆRKER

AA681a

D400.903/4

Storno

TYPE	NO.	CODE	DATA	
	C1	76.5071	22 nF 10% polyester. FL	50V
	C2	76.5065	470 pF 5% polystyr. TB	125V
	C3	76.5069	1 nF 10% polyester. FL	50V
	C4	73.5109	10 μ F 20% tantal	15V
	C5	73.5109	10 μ F 20% tantal	15V
	C6	76.5071	22 nF 10% polyester. FL	50V
	C7	73.5113	5.6 μ F 20% tantal	50V
	C8	73.5113	5.6 μ F 20% tantal	50V
	C9	73.5106	68 μ F 20% tantal	50V
	C10	73.5102	2.2 μ F 20% tantal	15V
	C11	73.5114	1 μ F 20% tantal	35V
	C12	76.5071	22 nF 10% polyester. FL	30V
	C13	73.5105	15 μ F 20% tantal	50V
	C14	73.5102	2.2 μ F 20% tantal	15V
	C15	73.5106	68 μ F 20% tantal	35V
	R1	80.5276	0.18 M Ω 5% carbon film	15V
	R2	80.5279	0.33 M Ω 5% "	1/8W
	R3	80.5264	18 k Ω 5% "	1/8W
	R4	80.5261	10 k Ω 5% "	1/8W
	R5	80.5274	0.12 M Ω 5% "	1/8W
	R6	80.5258	5.6 k Ω 5% "	1/8W
	R7	80.5272	82 k Ω 5% "	1/8W
	R8	80.5258	5.6 k Ω 5% "	1/8W
	R9	80.5251	1.5 k Ω 5% "	1/8W
	R10	80.5225	10 Ω 5% "	1/8W
	R11	80.5247	680 Ω 5% "	1/8W
	R12	80.5246	560 Ω 5% "	1/8W
	R13	80.5050	5 k Ω 20% potentiometer lin.	0,1W
	R14	80.5247	680 Ω 5% carbon film	1/8W
	R15	80.5246	560 Ω 5% "	1/8W
	R16	80.5272	82 k Ω 5% "	1/8W
	R17	80.5241	220 Ω 5% "	1/8W
	R18	80.5261	10 k Ω 5% "	1/8W
	R19	86.5042	500 Ω 20% potentiometer lin.	0,1W
	R20	80.5234	56 Ω 5% carbon film	1/8W
	R21	80.5279	0.33 M Ω 5% "	1/8W
	R22	80.5260	8.2 k Ω 5% "	1/8W
	R23	80.5233	47 Ω 5% "	1/8W
	R24	80.5250	1.2 k Ω 5% "	1/8W
	R25	80.5269	47 k Ω 5% "	1/8W
	R26	80.5247	680 Ω 5% "	1/8W
	R27	80.5246	560 Ω 5% "	1/8W
	R28	80.5237	100 Ω 5% "	1/8W
	E1	99.5176	MC 19 Diode	
	E2	99.5176	MC 19 Diode	
	E3	99.5176	MC 19 Diode	

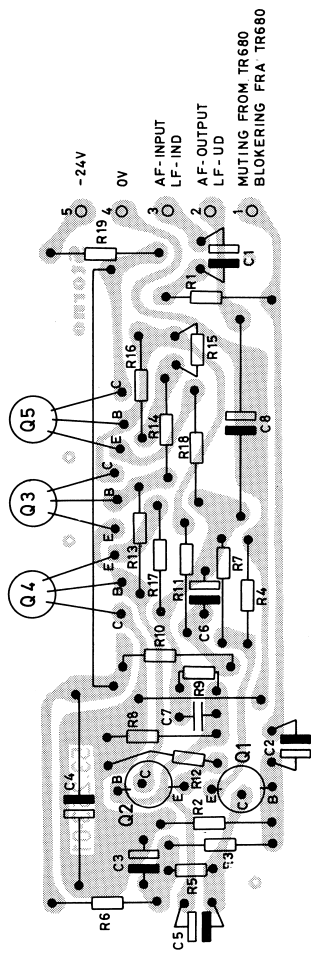
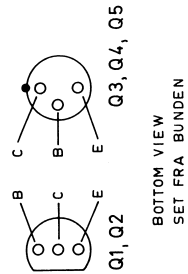
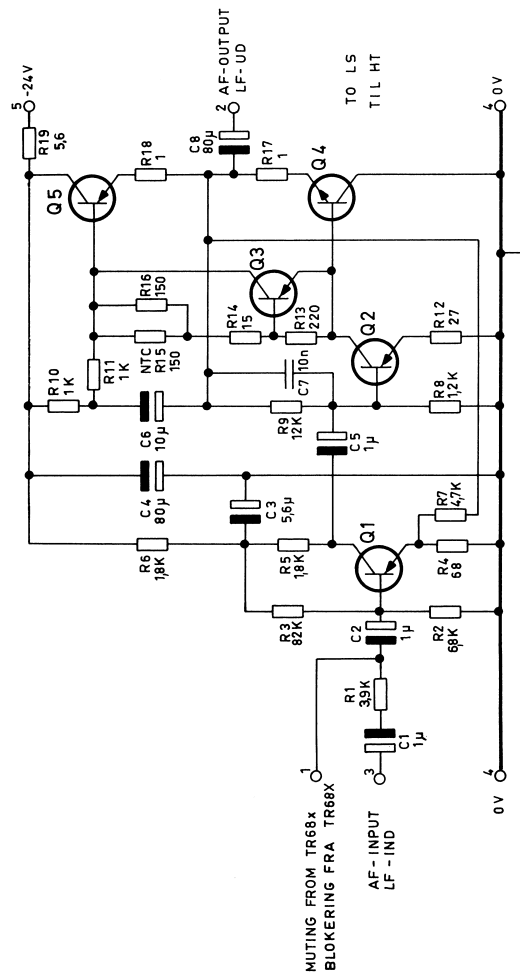
Storno

TYPE	NO.	CODE	DATA
	E4	99.5176	MC 19 Diode
	Q1	99.5144	2N3702 Transistor
	Q2	99.5144	2N3702 Transistor
	Q3	99.5117	2N2924 Transistor
	Q4	99.5117	2N2924 Transistor
	Q5	99.5144	2N3702 Transistor
	Q6	99.5117	2N2924 Transistor

AF-AMPLIFIER
LF-FORSTÆRKER

AA681a

X400.903



AF-AMPLIFIER
LF-FORSTÆRKER

AA602c

D400.836/3

Storno

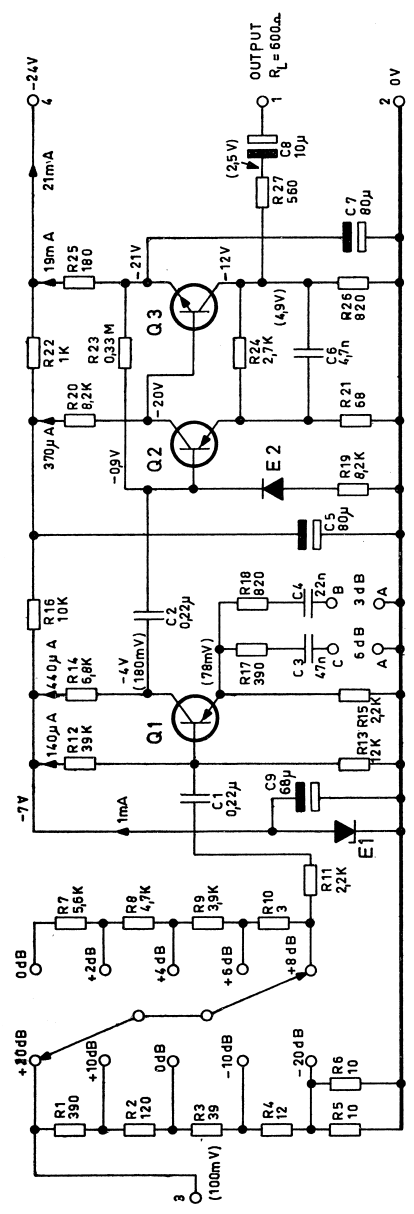
Storno

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

AF-AMPLIFIER
LF-FORSTÆRKER

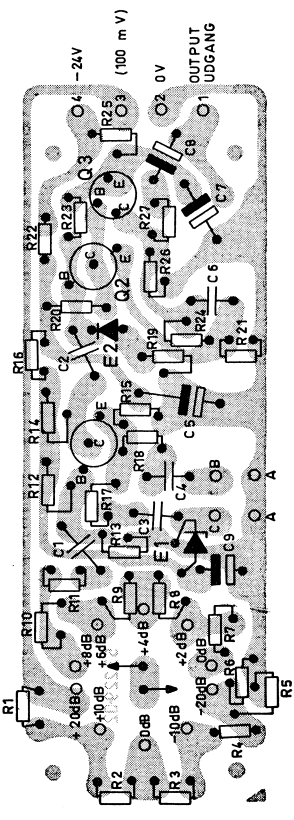
AA602c

X400.677/5



BOTTOM VIEW
SET FRA BUNDEN

Equalizer/Modforvranger: A - B : 3 dB at/ved 3000 Hz
A - C : 6 dB at/ved 3000 Hz
A - B, A - C: 9 dB at/ved 3000 Hz



PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

Amplification/Attenuation: From -20 dB to +28 dB.
Forstærkning/Dæmpning: Fra -20 dB til +28 dB.

The figures indicated in brackets are measurements at 1000 Hz with respect to 100 mV input signal.

Tallene i parentes viser målinger ved 1000 Hz i forhold til et indgangssignal på 100 mV.

LINE AMPLIFIER LINIEFORSTÆRKER

LA681

D400767/2

Storno

Storno

TYPE	NO.	CODE	DATA
C1	76.5074	0, 22 μ F 10% polyester. TB	100V
C2	76.5074	0, 22 μ F 10% polyester. TB	100V
C3	76.5072	47nF 10% polyester. FL	50V
C4	76.5071	22nF 10% polyester. FL	50V
C5	73.5110	80 μ F -10 +50% electrol.	35V
C6	76.5061	4, 7nF 10% polyester. FL	50V
C7	73.5110	80 μ F -10 +50% electrol.	35V
C8	73.5109	10 μ F 20% tantal	15V
C9	73.5106	68 μ F 20% tantal	15V
R1	80.5244	390 Ω 5% carbon film	1/8W
R2	80.5238	120 Ω 5% carbon film	1/8W
R3	80.5232	39 Ω 5% carbon film	1/8W
R4	80.5226	12 Ω 5% carbon film	1/8W
R5	80.5225	10 Ω 5% carbon film	1/8W
R6	80.5225	10 Ω 5% carbon film	1/8W
R7	80.5258	5, 6 k Ω 5% carbon film	1/8W
R8	80.5257	4, 7 k Ω 5% carbon film	1/8W
R9	80.5256	3, 9 k Ω 5% carbon film	1/8W
R10	80.5255	3, 3 k Ω 5% carbon film	1/8W
R11	80.5253	2, 2 k Ω 5% carbon film	1/8W
R12	80.5268	39 k Ω 5% carbon film	1/8W
R13	80.5262	12 k Ω 6% carbon film	1/8W
R14	80.5259	6, 8 k Ω 5% carbon film	1/8W
R15	80.5253	2, 2 k Ω 5% carbon film	1/8W
R16	80.5261	10 k Ω 5% carbon film	1/8W
R17	80.5244	390 Ω 5% carbon film	1/8W
R18	80.5248	820 Ω 5% carbon film	1/8W
R19	80.5260	8, 2 k Ω 5% carbon film	1/8W
R20	80.5260	8, 2 k Ω 5% carbon film	1/8W
R21	80.5235	68 Ω 5% carbon film	1/8W
R22	80.5249	1 k Ω 5% carbon film	1/8W
R23	80.5279	330 k Ω 5% carbon film	1/8W
R24	80.5254	2, 7 k Ω 5% carbon film	1/8W
R25	80.5240	180 Ω 5% carbon film	1/8W
R26	80.5448	820 Ω 5% carbon film	1/4W
R27	80.5246	560 Ω 5% carbon film	1/8W
E1	99.5146	Zenerdiode BZY60	
E2	99.5028	Diode OA200	
Q1	99.5144	Transistor 2N3702	
Q2	99.5144	Transistor 2N3702	
Q3	99.5121	Transistor BC107	

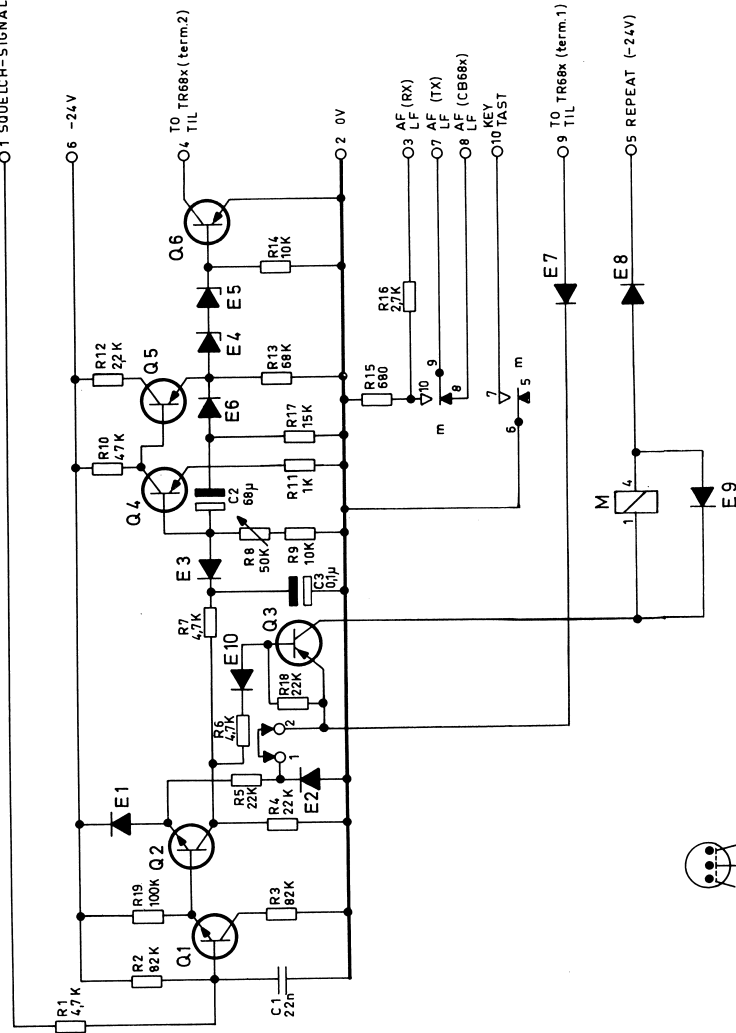
TYPE	NO.	CODE	DATA

LINE AMPLIFIER
LINIEFORSTÆRKER

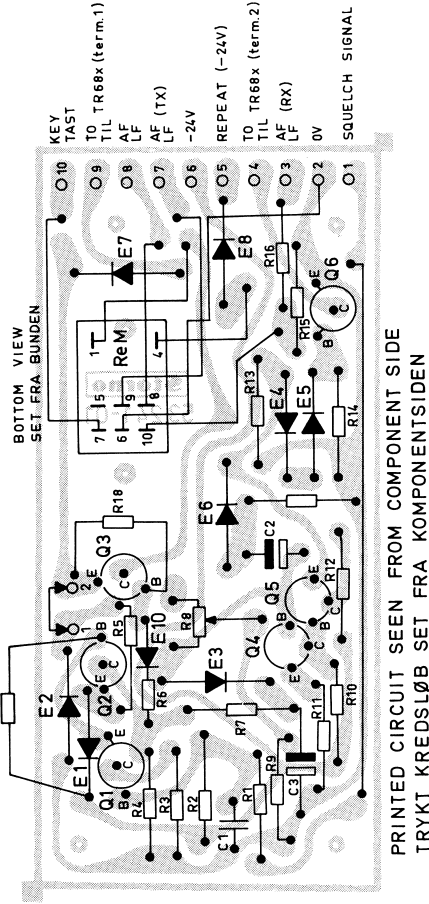
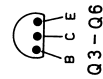
LA681

X400.759/4

÷8 - ÷19 (÷16)



BOTTOM VIEW
SET FRA BUNDEN



PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

REPEATER UNIT
REPEATER ENHED

RE681b

D400.731/4



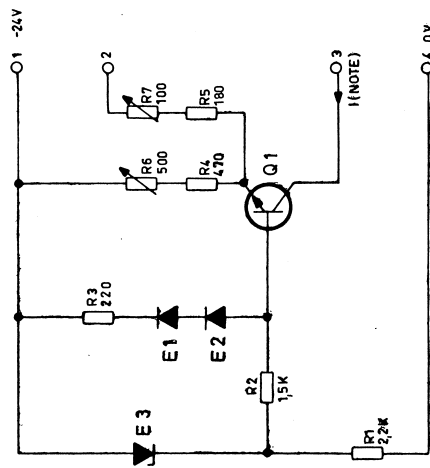
Sorno

Sorno

TYPE	NO.	CODE	DATA
RE68 1b RE68 1b	C1	76. 5071	22nF 10% polyester. FL
	C2	73. 5106	68 μ F 20% tantal
	C3	73. 5089	0. 1 μ F 20% tantal
	R1	80. 5257	4, 7 k Ω 5% carbon film
	R2	80. 5272	82 k Ω 5% carbon film
	R3	80. 5272	82 k Ω 5% carbon film
	R4	80. 5265	22 k Ω 5% carbon film
	R5	80. 5265	22 k Ω 5% carbon film
	R6	80. 5257	4, 7 k Ω 5% carbon film
	R7	80. 5257	4, 7 k Ω 5% carbon film
	R8	86. 5040	50 k Ω 20% potm. Lin.
	R9	80. 5261	10 k Ω 5% carbon film
	R10	80. 5269	47 k Ω carbon film
	R11	80. 5249	1 k Ω 5% carbon film
	R12	80. 5253	2, 2 k Ω 5% carbon film
	R13	80. 5271	68 k Ω 5% carbon film
	R14	80. 5261	10 k Ω 5% carbon film
	R15	80. 5247	680 Ω 5% carbon film
	R16	80. 5254	2, 7 k Ω 5% carbon film
	R17	80. 5263	15 k Ω 5% carbon film
	R18	80. 5265	22 k Ω 5% carbon film
	R19	80. 5273	0. 1 M Ω 5% carbon film
	ReM	58. 5062	relay/relæ 24V 1700 Ω 21-21
	E1	99. 5028	Diode 1N914
	E2	99. 5028	Diode 1N914
	E3	99. 5028	Diode 1N914
	E4	99. 5146	Zenerdiode 6, 9V 5%
	E5	99. 5146	Zenerdiode 6, 9V 5%
	E6	99. 5028	Diode 1N914
	E7	99. 5028	Diode 1N914
	E8	99. 5028	Diode 1N914
	E9	99. 5028	Diode 1N914
	E10	99. 5028	Diode 1N914
	Q1	99. 5117	Transistor 2N2924
	Q2	99. 5117	Transistor 2N2924
	Q3	99. 5144	Transistor 2N3702
	Q4	99. 5144	Transistor 2N3702
	Q5	99. 5144	Transistor 2N3702
	Q6	99. 5144	Transistor 2N3702

REPEATER UNIT RE681b
REPEATER ENHED RE682a

X400. 829/3



Transistor BF110
Bottom view
set frq bunden

NOTE,

I_1 (term. 1 not connected to term. 2).

$I = 1,8 \text{ mA} \pm 0/-10\%$.

I_2 (term. 1 connected to term. 2).

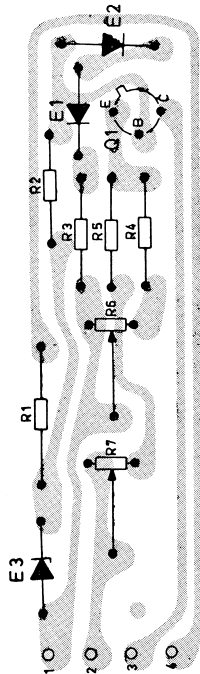
$I = 7 \text{ mA} \pm 0/-10\%$.

I_1 (term. 1 ikke forbundet med term. 2).

$I = 1,8 \text{ mA} \pm 0/-10\%$.

I_2 (term. 1 forbundet til term. 2).

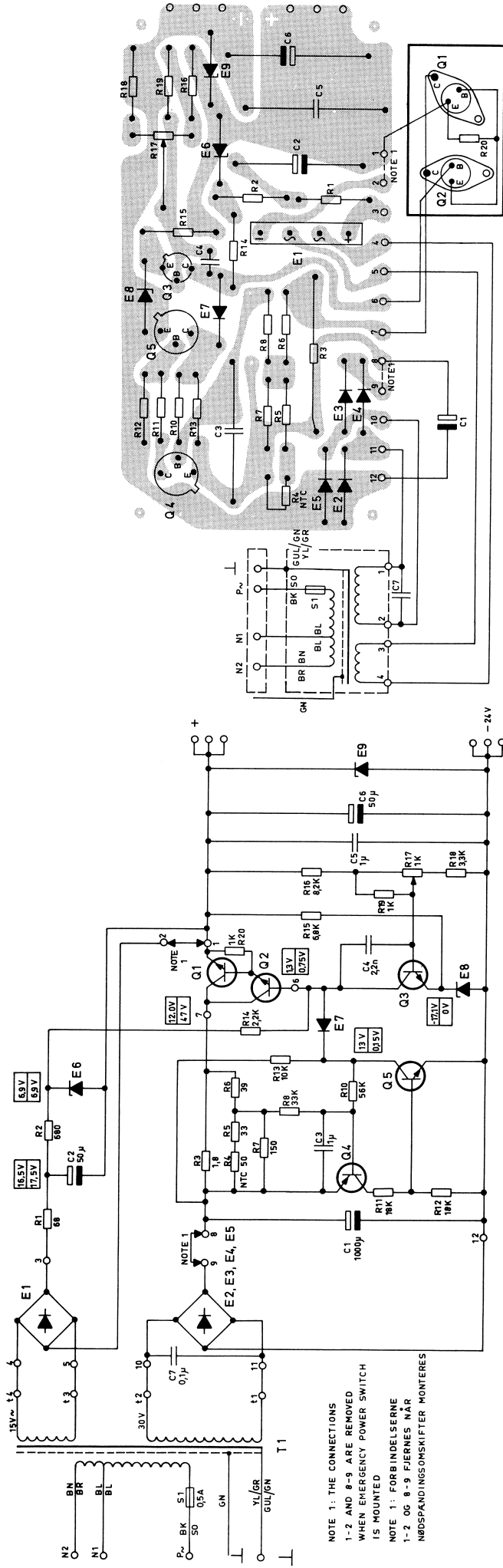
$I = 7 \text{ mA} \pm 0/-10\%$.



CONSTANT-CURRENT REGULATOR
KONSTANTSTRØMHOLDER

CR681

D400.739/2



NOTE 1: THE CONNECTIONS
1-2 AND 8-9 ARE REMOVED
WHEN EMERGENCY POWER SWITCH
IS MOUNTED

NOTE 1: FORBINDELSENE
1-2 OG 8-9 FJERNES NÅR
NØDSPÄNDINGSOMSKIFTER MONTERES

EMERGENCY POWER SWITCH 11.457 (NOT MOUNTED IN STANDARD EQUIPMENT)
NØDSPÄNDINGSOMSKIFTER 11.457 (IKKE MONTERET PÅ STANDARD USTYR)

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

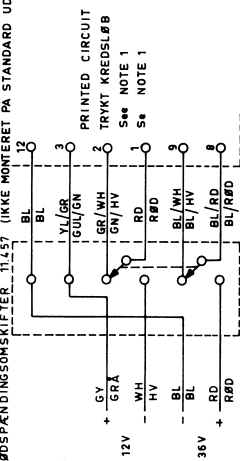
ELEKTRONISK SIKRING

RESET FORETAGES VED AT AFBRYDE NETSPÄNDINGEN I 15-20 SEK.

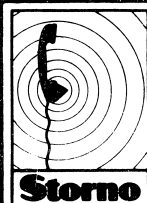
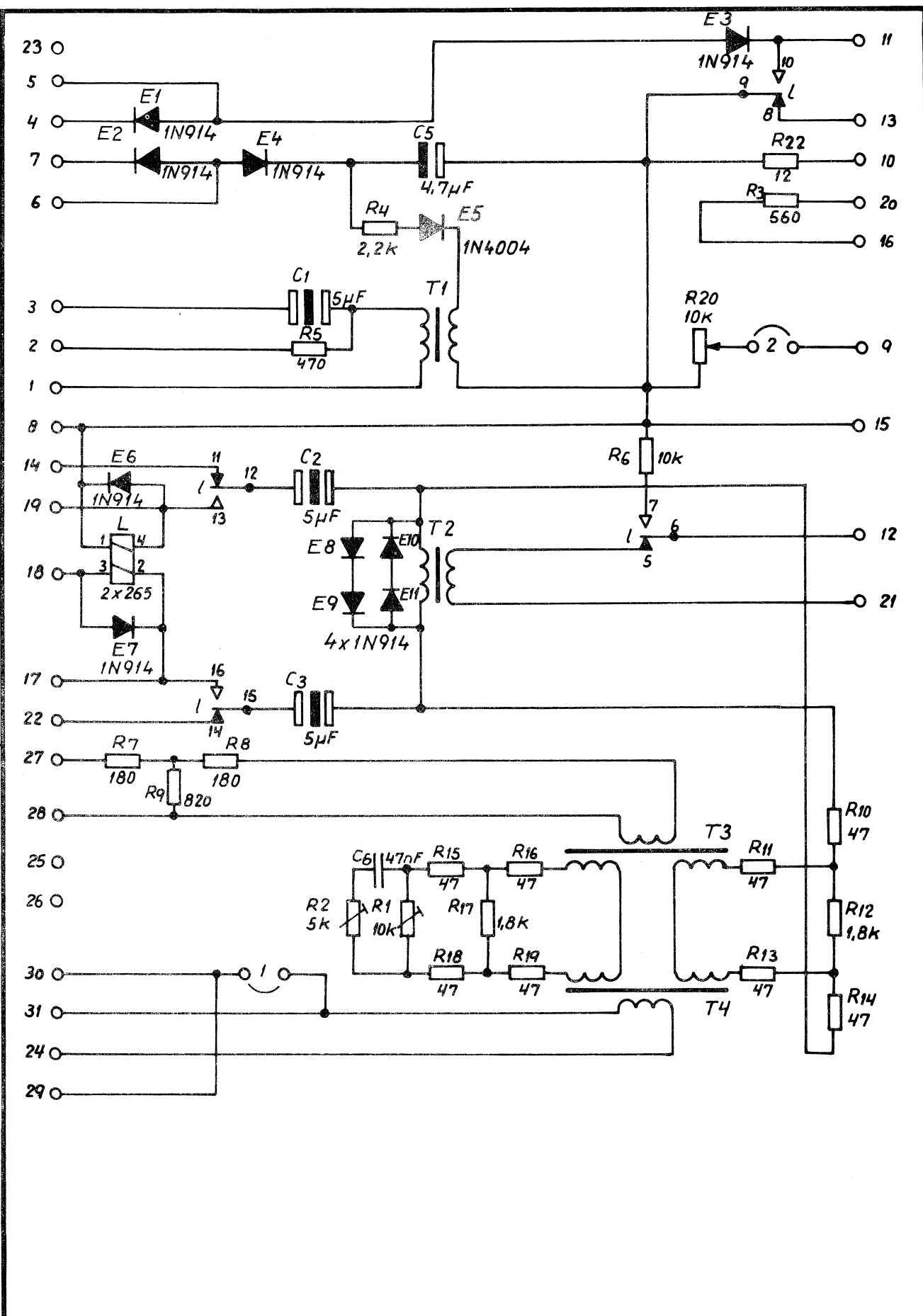
VOLTAGES MEASURED WITH RESPECT TO POINT 1
SPÄNDNINGER MÄLT I FÖRHÖLD TILL PUNKT 1

- V MAINS = 220V. INPUT = 0.6A
- V MAINS = 220V. OUTPUT SHORT-CIRCUIT
- V NET = 220V. IND = 0.6A
- V NET = 220V. UDGANG KORTSLUTTET

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



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



konstr./tegn.
HT 180
20.5.68
godk. HT
21.11.67
komp.liste
X 113095

RELAY PANEL
RELÆPANEL

RB 686a

KODE

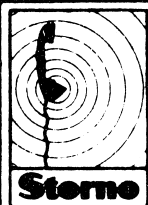
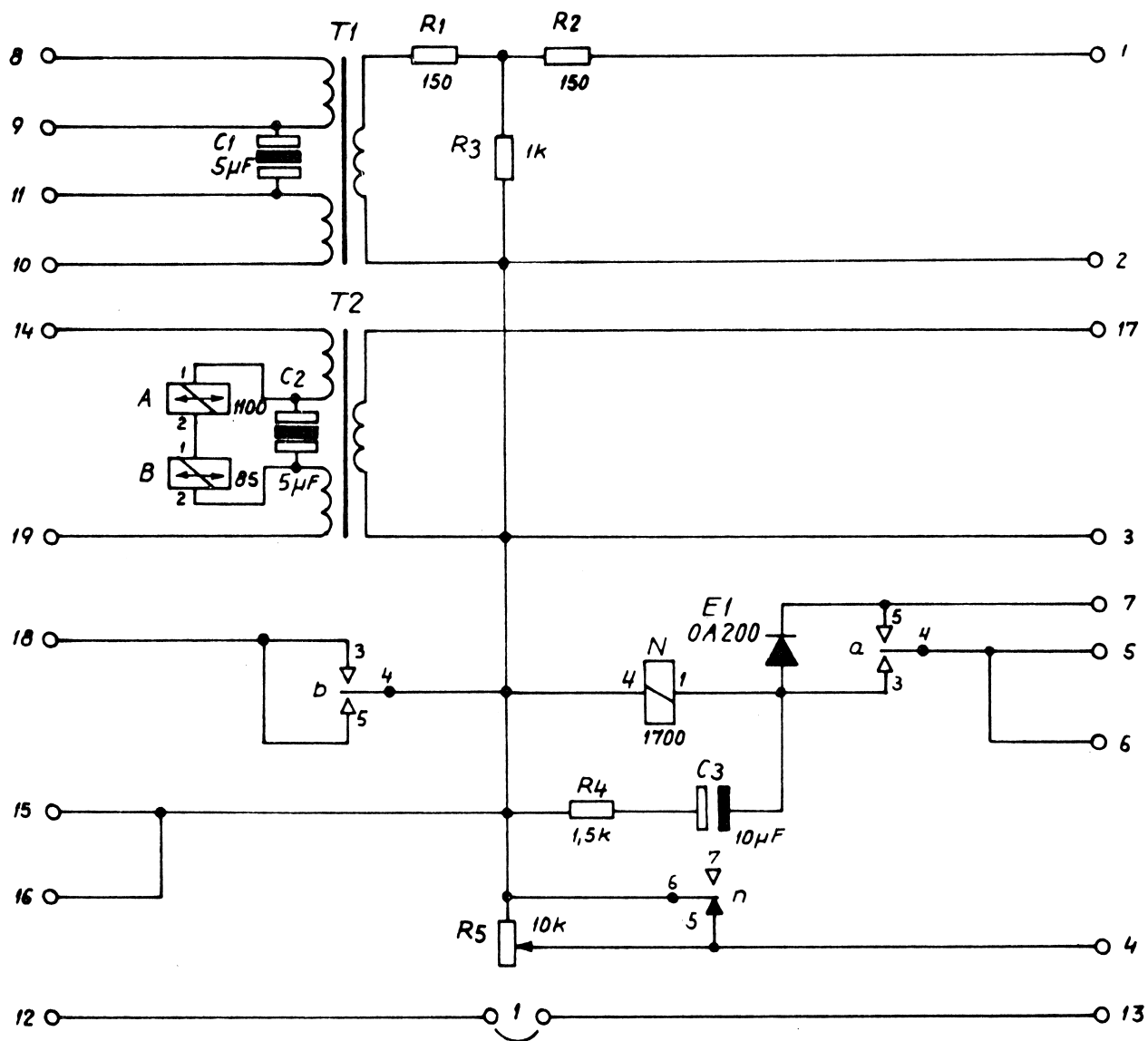
TEGN.NR.

D 113094

A 4

no	code	data	no	code	data
C1	73.5007-00	5µF 100V Bip.	E5	99.5020-00	Diode 1N4004.
C2	73.5007-00	5µF 100V Bip.	E6	99.5028-00	Diode 1N914.
C3	73.5007-00	5µF 100V Bip.	E7	99.5028-00	Diode 1N914.
C4			E8	99.5028-00	Diode 1N914.
C5	73.5103-00	4,7µF 15V.	E9	99.5028-00	Diode 1N914.
C6	73.5072-00	47nF 50V.	E10	99.5028-00	Diode 1N914.
			E11	99.5028-00	Diode 1N914.
R1	86.5039-00	10kΩ pot. 0,1W lin.			
R2	86.5050-00	5kΩ pot. 0,1W lin.			
R3	80.5246-00	560Ω 5%carb.film1/8W	T1	50.5138-00	JS 125 P 3131
R4	80.5453-00	2,2kΩ 5% carb.film1/4W	T2	60.5098-00	JS 0,32 P-8477/2
R5	84.5005-00	470Ω 5% carb.film5/5W	T3	60.5106-00	JS 0,32 P-9237/3
R6	80.5261-00	10kΩ 5% carb.film 1/8W	T4	60.5106-00	JS 0,32 P-9237/3
R7	80.5240-00	180Ω 5% carb.film 1/8W			
R8	80.5240-00	180Ω 5% carb.film 1/8W			
R9	80.5248-00	820Ω 5% carb.film 1/8W	ReL	58.5061-00	Si V23154-D0556-B110.
R10	80.5233-00	47Ω 5% carb.film 1/8W			
R11	80.5233-00	47Ω 5% carb.film 1/8W			
R12	80.5252-00	1,8kΩ 5% carb.film 1/8W			
R13	80.5233-00	47Ω 5% carb.film 1/8W			
R14	80.5233-00	47Ω 5% carb.film 1/8W			
R15	80.5233-00	47Ω 5% carb.film 1/8W			
R16	80.5233-00	47Ω 5% carb.film 1/8W			
R17	80.5252-00	1,8kΩ 5% carb.film 1/8W			
R18	80.5233-00	47Ω 5% carb.film 1/8W			
R19	80.5233-00	47Ω 5% carb.film 1/8W			
R20	86.5039-00	10kΩ pot. 0,1W lin.			
E1	99.5028-00	Diode 1N914.			
E2	99.5028-00	Diode 1N914.			
E3	99.5028-00	Diode 1N914.			
E4	99.5028-00	Diode 1N914.			

18-3-75	REV.	DESING DRAWN	APPR.	COMP. LIST	PART LIST STYKLISTE	RB686a.	DATE
		HT/MLy		D113094			21-11-67
	<div> <div>Storno</div> <div>RADIO COMMUNICATION SYSTEMS</div> </div>						A4 DRWG. NO. X113095



konstr./tegn.
HT/80
13.1.67
godk. OB
15.6.67
komp.liste
X109292

LINE PANEL
LINIEPANEL

RP686

KODE

TEGN. NR.

D109291

A4

no	code	data	no	code	data
C1	73.5007	5pF 100V Bip-			
C2	-	- - -			
C3	73.5100	10µF 35V			
R1	80.5439	150Ω 1/4W			
R2	-	- -			
R3	80.5449	1kΩ -			
R4	80.5451	1,5kΩ -			
R5	86.5039	10kΩ 20% trim. pot.lin.			
ReA	58.5058	Si 170a Tbv 6702/10			
ReB	58.5057	Si 170a Tbv 6702/41			
ReN	58.5062	Si V23154-C0722-B104 (154c 65722/93d)			
T1	60.5097	JS 0,32P 8867-4			
T2	-	- - - -			



HT/EBH
14.6.67
kontrol at 08
15.6.67
T.M. Jurg
D109291

PART LIST
STYKLISTE

RP686

...mp list

X109292
blad no 01

NOTE : IN CP686. CONNECT 1
I CP686. FORBID 1
IN CP687. DISCONNECT 1
I CP687. FJERN 1

Q1. Q2. Q3. Q4.
Q6. Q7. Q8

Q5



BOTTOM VIEW
SET FRA BUNDEN

LINE UNIT
LINE ENHED

D401.177

Storno

TYPE	NO.	CODE	DATA
RP686a		10.1536 47.0553	Line unit/Linieenhed Switching unit/omskifterenhed
	C1	76.5081	2.2 μ F 5% polyester. FL
	C2	76.5081	2.2 μ F 5% " FL
	C3	73.5007	4.7 μ F -10/+100% elco bipol.
	C4	76.5081	2.2 μ F 5% polyester. FL
	C5	74.5146	4.7 nF -20/+50% ceram DI
	C6	74.5146	4.7 nF -20/+50% " DI
	C7	74.5146	4.7 nF -20/+50% " DI
	C8	76.5069	1 nF 10% polyester. FL
	C9	76.5069	1 nF 10% " FL
	C10	73.5071	100 μ F -10/+50% elco
	C11	73.5102	2.2 μ F 20% tantal
	C12	73.5127	22 μ F 20% tantal
	C13	76.5081	2.2 μ F 5% polyester. FL
	C14	76.5081	2.2 μ F 5% " FL
	C15	73.5007	4.7 μ F -10/+100% elco bipol.
	R1	80.5036	82 Ω 5% carbon film
	R2	80.5036	82 Ω 5% " "
	R3	84.5006	1 k Ω 10% wire wound
	R4	84.5006	1 k Ω 10% " "
	R5	80.5261	10 k Ω 5% carbon film
	R6	80.5261	10 k Ω 5% " "
	R7	80.5261	10 k Ω 5% " "
	R8	80.5257	4.7 k Ω 5% " "
	R9	80.5267	33 k Ω 5% " "
	R10	80.5267	33 k Ω 5% " "
	R11	80.5257	4.7 k Ω 5% " "
	R12	80.5261	10 k Ω 5% " "
	R13	80.5255	3.3 k Ω 5% " "
	R14	80.5229	22 Ω 5% " "
	R15	80.5258	5.6 k Ω 5% " "
	R16	80.5258	5.6 k Ω 5% " "
	R17	80.5258	5.6 k Ω 5% " "
	R18	80.5257	4.7 k Ω 5% " "
	R19	80.5226	12 Ω 5% " "
	R20	80.5257	4.7 k Ω 5% " "
	R21	80.5239	150 Ω 5% " "
	R22	80.5249	1 k Ω 5% " "
	R23	80.5239	150 Ω 5% " "
	R24	80.5269	47 k Ω 5% " "
	R25	80.5237	100 Ω 5% " "
	R26	80.5261	10 k Ω 5% " "
	R27	80.5226	12 Ω 5% " "
	R28	86.5039	10 k Ω 20% pot. meter lin.
	R29	80.5249	1 k Ω 5% carbon film

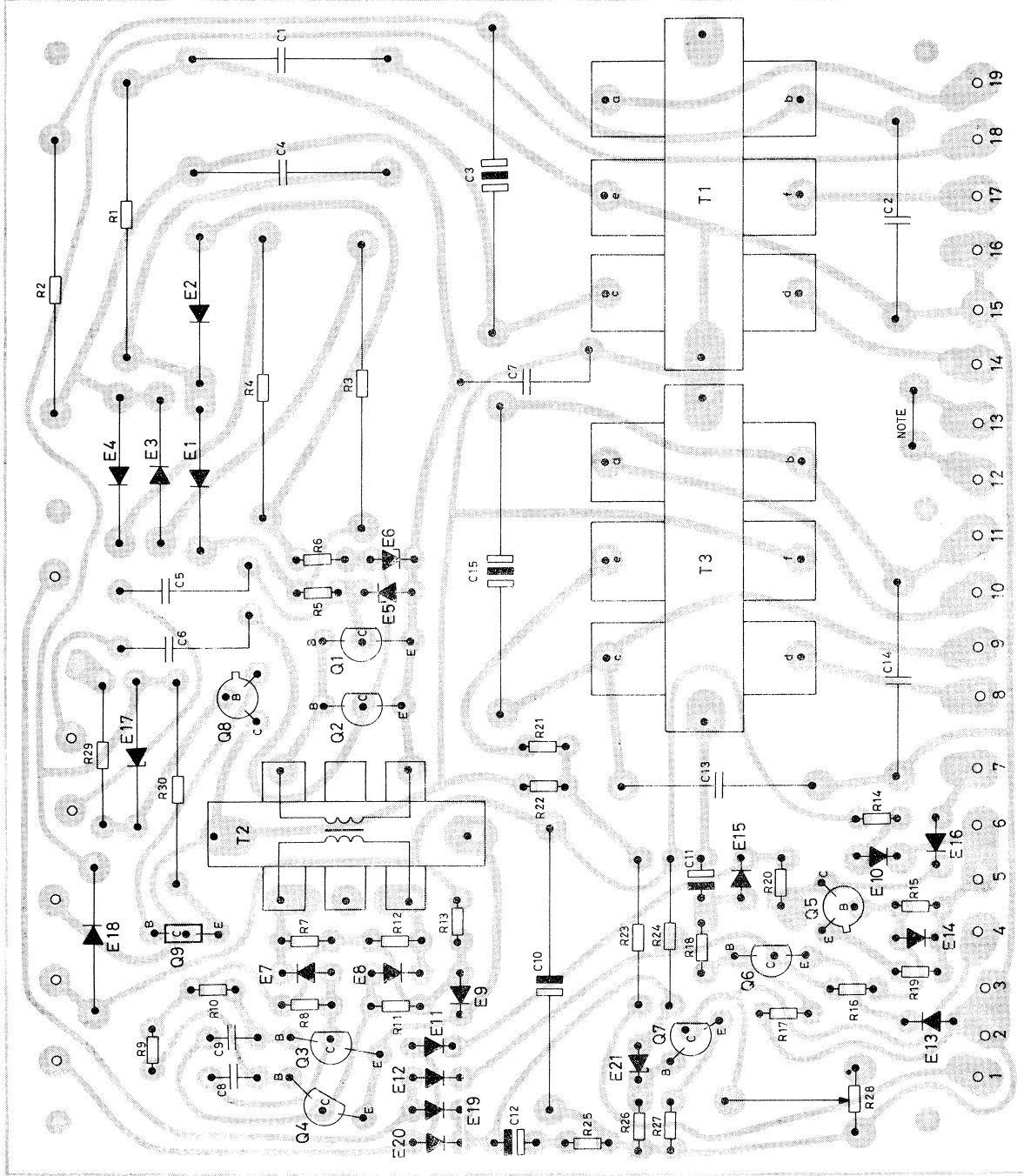
Storno

TYPE	NO.	CODE	DATA
	R30	81.5102	5.6 Ω 10% wirewound
	T1	60.5097	AF transformer 150 Ω -150 Ω /600 Ω
	T2	60.5130	AF transformer 600 Ω /10k Ω
	T3	60.5097	AF transformer 150 Ω -150 Ω /600 Ω
	E1	99.5020	Diode 1N4004
	E2	99.5020	Diode 1N4004
	E3	99.5020	Diode 1N4004
	E4	99.5020	Diode 1N4004
	E5	99.5114	Zenerdiode 9.1V 5%
	E6	99.5114	Zenerdiode 9.1V 5%
	E7	99.5028	Diode 1N914
	E8	99.5028	Diode 1N914
	E9	99.5114	Zenerdiode 5.6V 5%
	E10	99.5020	Diode 1N4004
	E11	99.5028	Diode 1N914
	E12	99.5028	Diode 1N914
	E13	99.5028	Diode 1N914
	E14	99.5209	Stab. diode 1.5V
	E15	99.5028	Diode 1N914
	E16	99.5028	Diode 1N914
	E17	99.5227	Zenerdiode 2.7V 5%
	E18	99.5020	Diode 1N4004
	E19	99.5028	Diode 1N914
	E20	99.5028	Diode 1N914
	E21	99.5114	Zenerdiode 9.1V 5%

LINE UNIT
LINIEENHED

RP686a

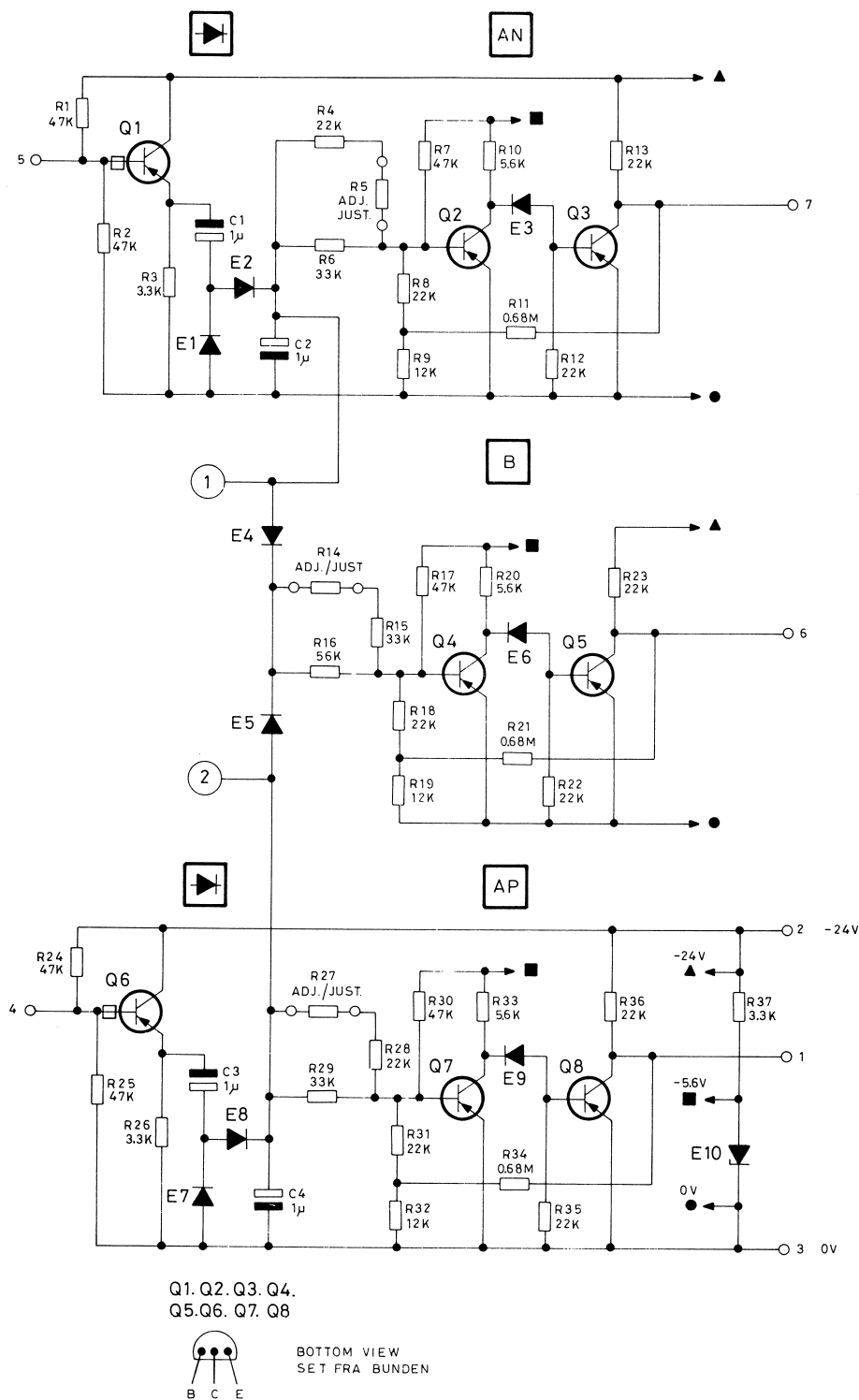
X401.183



LINE UNIT
LINIENHED

RP686a

D401.238



SWITCHING UNIT
OMSKIFTERENHED

47.0553-00

Storno

Storno

TYPE	NO.	CODE	DATA
		47. 0553	Switching unit
C1		73. 5114	1 μ F 20% tantal
C2		73. 5114	1 μ F 20% "
C3		73. 5114	1 μ F 20% "
C4		73. 5114	1 μ F 20% "
			35V
			35V
			35V
			35V
			35V
R1		80. 5269	47 k Ω 5% carbon film
R2		80. 5269	47 k Ω 5% "
R3		80. 5255	3. 3 k Ω 5% "
R4		80. 5265	" "
R5		80. 52xx	22 k Ω 5% "
R6		80. 5267	Adjusted/Tilpasset carbon film
R7		80. 5269	33 k Ω 5% carbon film
R8		80. 5269	47 k Ω 5% "
R9		80. 5262	22 k Ω 5% "
R10		80. 5258	12 k Ω 5% "
R11		80. 5283	5. 6 k Ω 5% "
R12		80. 5265	0. 68 M Ω 5% "
R13		80. 5265	22 k Ω 5% "
R14		80. 52xx	" "
R15		80. 5267	Adjusted/Tilpasset carbon film
R16		80. 5270	33 k Ω 5% carbon film
R17		80. 5269	56 k Ω 5% "
R18		80. 5265	47 k Ω 5% "
R19		80. 5262	22 k Ω 5% "
R20		80. 5258	12 k Ω 5% "
R21		80. 5283	5. 6 k Ω 5% "
R22		80. 5265	0. 68 M Ω 5% "
R23		80. 5265	22 k Ω 5% "
R24		80. 5269	22 k Ω 5% "
R25		80. 5269	47 k Ω 5% "
R26		80. 5255	47 k Ω 5% "
R27		80. 52xx	3. 3 k Ω 5% "
R28		80. 5265	Adjusted/Tilpasset carbon film
R29		80. 5267	22 k Ω 5% carbon film
R30		80. 5269	33 k Ω 5% "
R31		80. 5265	47 k Ω 5% "
R32		80. 5262	22 k Ω 5% "
R33		80. 5258	12 k Ω 5% "
R34		80. 5283	5. 6 k Ω 5% "
R35		80. 5265	0. 68 M Ω 5% "
R36		80. 5265	22 k Ω 5% "
R37		80. 5255	22 k Ω 5% "
			3. 3 k Ω 5% "
E1		99. 5219	Diode AAZ 15
E2		99. 5219	Diode AAZ 15
E3		99. 5028	Diode 1N914

TYPE	NO.	CODE	DATA
	E4	99. 5028	Diode 1N914
	E5	99. 5028	Diode 1N914
	E6	99. 5028	Diode 1N914
	E7	99. 5219	Diode AAZ 15
	E8	99. 5219	Diode AAZ 15
	E9	99. 5028	Diode 1N914
	E10	99. 5114	Zenerdiode 5. 6V
			0. 25W
	Q1	99. 5144	Transistor BC214L
	Q2	99. 5144	Transistor BC214L
	Q3	99. 5144	Transistor BC214L
	Q4	99. 5144	Transistor BC214L
	Q5	99. 5144	Transistor BC214L
	Q6	99. 5144	Transistor BC214L
	Q7	99. 5144	Transistor BC214L
	Q8	99. 5144	Transistor BC214L

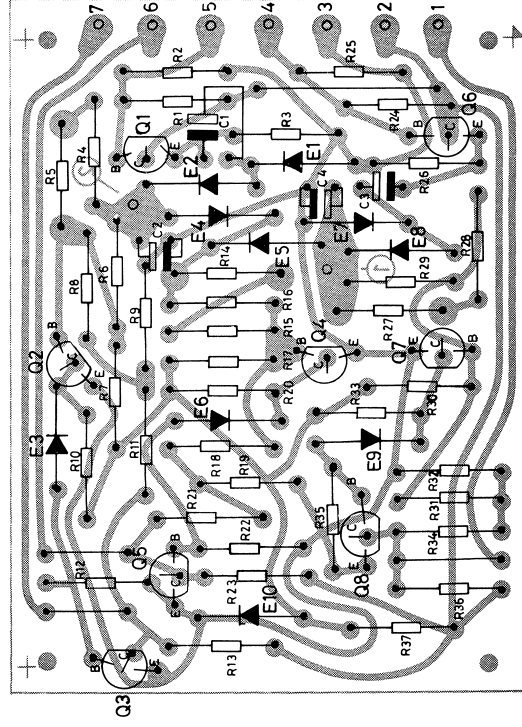
SWITCHING UNIT
OMSKIFTERENHED

47. 0553

X401. 190

Storno

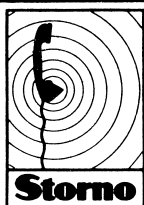
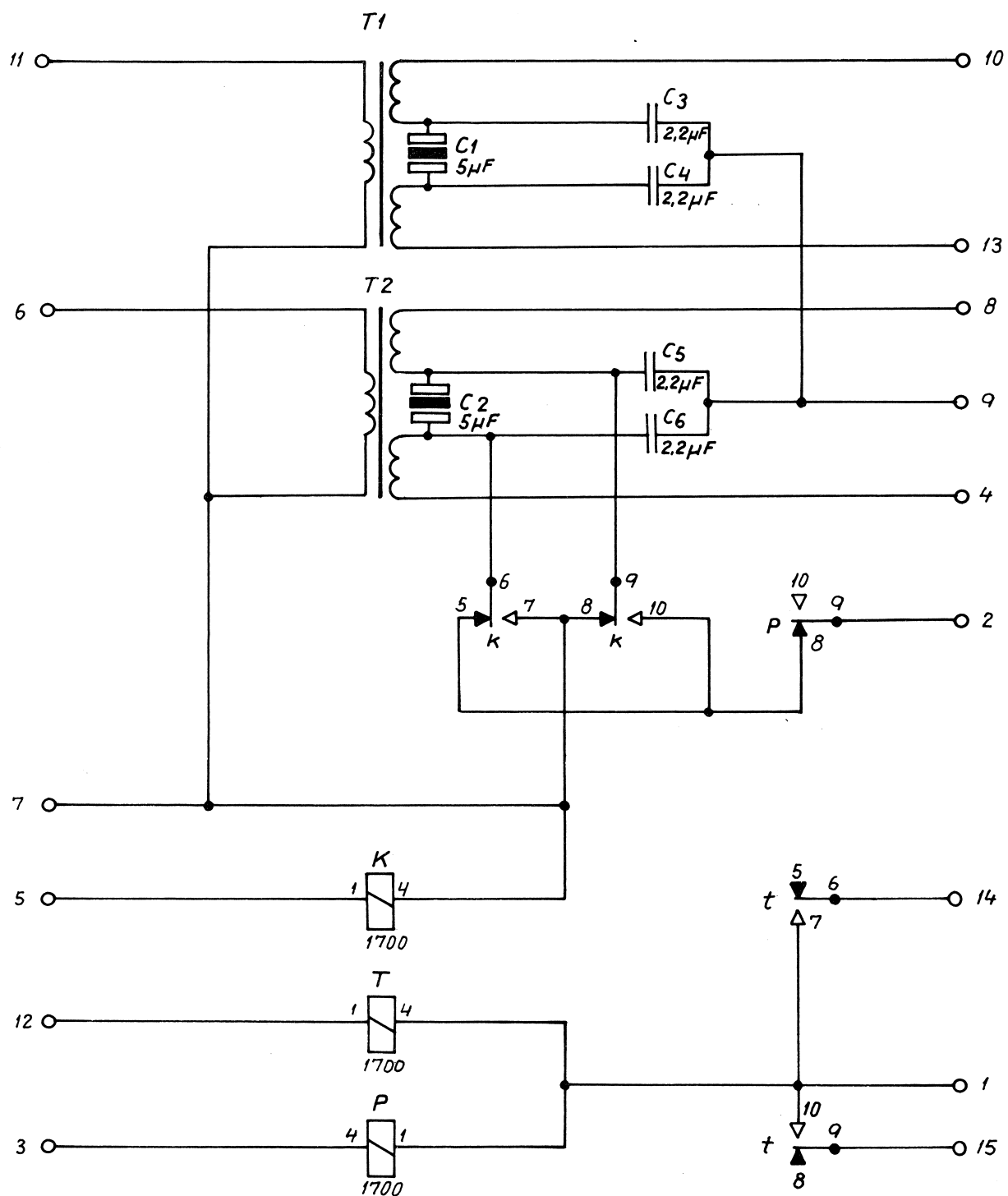
Storno



SWITCHING UNIT
OMSKIFTERENHED

47.0553-00

D401.240/2



konstr./tegn.
HT/BO
3.1.67
godk. OB
4.12.67
komp.liste
X 110419

LINE PANEL
LINIEPANEL

RT686

KODE

TEGN. NR.

D110418

A4

no	code	data	no	code	data
C1	73 5007	5 μ F -10+100% elko 100V 85 ^o (Bip)			
C2	-	- - - -			
C3	76 5081	2,2 μ F 5% polyest.FL 63V			
C4	-	- - - -			
C5	-	- - - -			
C6	-	- - - -			
ReK	58.5062	relæ 24V 1700 Ω 21-21			
ReP	-	- - - -			
ReT	-	- - - -			
T1	60.5097	transformator LF 150/150/600 Ω			
T2	-	- - - -			



udarb af
PL/EBH
5.12.67
kontrol af
5.12.67
tilh. drøge
D110418

PART LIST

RT686

STYKLISTE

comp. liste

X 110419

blad no
af