# TONE EQUIPMENT FOR STORNOPHONE 600

CONTENTS

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# CHAPTER 1. TONE SYSTEMS

## Introduction

This manual covers the types of tone equipment which are available as standard accessories for radio stations of the STORNOPHONE 600 series - that is, Type CQF600 fixed radio stations with associated Type CAF600 control systems and Type CQM600 and Type CQL600 mobile stations.

Our objective in preparing this manual was to illustrate, through text and diagrams, the design and operating principles of the equipment in order to facilitate installation and service.

## Application

Tone equipment is used primarily for selective calls from the base station to mobile stations. This permits the base station to call only one mobile station at a time: each call begins with a tone code signal that will be received only by the station being called; the other mobiles will not be disturbed by the call.

Tone equipment may also be used for calls from mobile stations to the base station, in which case each call is indicated by an acoustic signal and a light signal at the base-station control desk. In an extended version of the system a lamp indicator board at the operating position permits identification of the calling mobile unit.

Moreover, tone equipment may be used for the transmission of functions from a control desk to a fixed station, and for transmitting special functions from mobile stations to fixed stations - starting up a repeater station is a case in point.

The complete range of tone signalling systems and associated standard units is tabulated below.

The different types of call systems are described in the subsequent sections.

| SYSTEM | TONE FREQUENCIES, Hz | TONE RECEIVER | | TONE TRANSMITTER | | TONE GENERATOR FOR CONTROL DESK | |
|---|---|---|---|---|---|---|---|
| | | TYPE | Number of Combinations | TYPE | Number of Combinations | TYPE | Number of Combinations |
| SINGLE TONE | 1060, 1160, 1270, 1400, 1530, 1670, 1830, 2000, 2200, 2400, 2600, 2900 | TR681 | 12 | TT681 | 12 | | |
| | 825, 1010, 1240, 1435, 1520, 1750, 1860, 1980, 2000, 2135, 2280, 2450 (special frequencies) | TR683 | 12 | TT683 | 12 | | |
| DOUBLE TONE | Tone a: 1060, 1160, 1270, 1400, 1530, 1670, 1830, 2000, 2200, 2400, 2600, 2900<br>Tone b: 1060, 1160, 1270, 1400, 1530, 1670, 1830, 2000, 2200, 2400, 2600, 2900 | TR682 | 66 | TT682 | 66 | TG682<br>TG689 | 64<br>1 |
| | Tone a: 1060, 1160, 1270, 1400, 1530, 1670, 1830, 2000, 2200, 2400, 2600, 2900<br>Tone b: 615, 675, 735, 805, 885, 970 | TR687 | 72 | TT687 | 72 | TG687 | 60 |
| TONE SEQUENCE 4 DIGITS | Digit: 1 2 3 4 5 6<br>Freq.: 1060, 1160, 1270, 1400, 1530, 1670<br>Digit: 7 8 9 0 rep. alarm<br>Freq.: 1830, 2000, 2200, 2400, 2600, 2800 | SR684<br>SR6842 (Note) | 10000<br>90-91 | ST684 | 10000 | SG684 | 100 |

Note: With Group Call Feature

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## Single-tone System

This system is used primarily for tone calls from mobile stations to a base station. It comprises a TT681 tone transmitter, which is installed in all mobile radiotelephones of the system. In CQM600 installations, the TT681 tone transmitter is mounted in the control box (CB60x) of the station; in a locally controlled CQL600 station, it is mounted inside the station cabinet. The tone transmitter is operated by depressing a tone call button for approx. 1 second.

A TR681 tone receiver is also used. This is installed in the control desk of the fixed radio station.

Both tone transmitter and tone receiver must operate on the same tone frequency. 12 different tone frequencies inside the frequency range 1060 Hz to 2900 Hz are available.

The choice of tone frequency should be made only after having made sure that no near-by radio stations that happen to operate on the same VHF frequency use the same or almost the same tone frequency. The difference should be greater than $\pm$9%.

Storno manufactures tone equipment for use in countries employing different tone sequences. Type designations are: TT683 tone transmitter and TR683 tone receiver, with frequencies inside the range 825 Hz to 2450 Hz.

## Double-tone System

This system finds application chiefly for tone calls from a base station to mobile stations though it is also occasionally used for tone calls in the opposite direction.

The double-tone system uses the same twelve tone frequencies as those used in the single-tone system, the difference being that two tones are always transmitted simultaneously.

A total of 64 different call combinations are possible with the twelve tones.

A system for selective calls from a base station to mobile stations incorporates a TG682 tone generator mounted in the base station control desk, and a TR682 tone receiver which is mounted in the mobile station.

The TG682 tone generator can be installed in all types of control equipment. It consists of a chassis carrying the tone transmitter circuit, the type designation of which is TT682, and two rows of push-buttons with 10 buttons in each. In either row of buttons, pressing a button or group of buttons will release a previously depressed button, permitting only one button in the top row and one in the bottom row to be depressed at any particular time.

Since general numbering of the mobile stations of such a system is undesirable, car designations (tone signalling frequencies) are composed of a letter (A to K in the top row) and a figure (3 to 12 in the bottom row). The 2 x 10 push-buttons provide a maximum of 64 different calls, so a maximum of 64 mobile stations can be accomodated in this system.

SYSTEM WITH MAX. CAPACITY OF 64 CALLS

| Hz | 1060 | 1160 | 1270 | 1400 | 1530 | 1670 | 1830 | 2000 | 2200 | 2400 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1270 | A-3 | B-3 | | | | | | | | |
| 1400 | A-4 | B-4 | C-4 | | | | | | | |
| 1530 | A-5 | B-5 | C-5 | D-5 | | | | | | |
| 1670 | A-6 | B-6 | C-6 | D-6 | E-6 | | | | | |
| 1830 | A-7 | B-7 | C-7 | D-7 | E-7 | F-7 | | | | |
| 2000 | A-8 | B-8 | C-8 | D-8 | E-8 | F-8 | G-8 | | | |
| 2200 | A-9 | B-9 | C-9 | D-9 | E-9 | F-9 | G-9 | H-9 | | |
| 2400 | A-10 | B-10 | C-10 | D-10 | E-10 | F-10 | G-10 | H-10 | I-10 | |
| 2600 | A-11 | B-11 | C-11 | D-11 | E-11 | F-11 | G-11 | H-11 | I-11 | K-11 |
| 2900 | A-12 | B-12 | C-12 | D-12 | E-12 | F-12 | G-12 | H-12 | I-12 | K-12 |

The 2900 Hz tone is not permitted in Sweden, limiting the maximum capacity of the system to 54 calls.

To call a mobile station from the control desk of a fixed radio station, the operator first cuts in the loudspeaker by depressing the "Loudspeaker IN" button in order to make sure that the channel is clear. Then he depresses the buttons for the letter/numeral combination of the mobile station he wishes to call and thereafter transmits it by depressing the tone call button for approx. 1 second.

The TR682 tone receiver is installed in the mobile station. In CQM600 stations, it is mounted in the control box; in a locally controlled CQL600 station, it is housed in the station cabinet.

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When a mobile station receives its specific tone combination, the following things happen: the loudspeaker cuts in automatically and the call lamp is turned on; also a bell (if one is provided) rings, or the vehicle horn is sounded. The call lamp remains on whereas the acoustic signal is sounded only as long as the tone signal is being received. If the vehicle driver is not in the car the lamp will tell him on his return that he was called during his absence.

A bell or horn cannot be connected directly to the tone receiver. This requires installation of a Type AC682 amplifier and relay. This unit is housed in a small can, which is mounted in an easily accessible place under the dashboard. The front panel of the can carries a switch which makes it possible to cut out the bell or horn alarm system.

Units of the double-tone system may also be used for tone calls from mobile stations to the base-station control desk. Since there is a choice of 64 different signals, the chances of interference from other systems are far less than when using single-tone calls. Double-tone systems permit interference-free operation of a number of radio stations on the same frequency.

A TT682 tone transmitter is used. This, like the TT681 single-tone transmitter, can be installed in the mobile stations without further modifications.

The tone receiver in the base-station control desk is a Type TR682. This is installed in the same manner as the TR681 single-tone receiver and performs the same functions.

In areas with a high density of VHF systems, where the above-mentioned 64-tone combination system is inadequate, a supplementary system may be used which, in addition to using 10 tones in the range 1060 Hz - 2400 Hz, uses 6 tones in the range 615 Hz - 970 Hz. These 6 + 10 tones yield a total of 60 possible calls.

This system may serve as a supplement to the 64-call system, meaning that the two systems may be used from their respective fixed stations

SYSTEM WITH MAX. CAPACITY OF 60 CALLS

| Hz | 1060 | 1160 | 1270 | 1400 | 1530 | 1670 | 1830 | 2000 | 2200 | 2400 |
|---|---|---|---|---|---|---|---|---|---|---|
| 615 | A-13 | B-13 | C-13 | D-13 | E-13 | F-13 | G-13 | H-13 | I-13 | K-13 |
| 675 | A-14 | B-14 | C-14 | D-14 | E-14 | F-14 | G-14 | H-14 | I-14 | K-14 |
| 735 | A-15 | B-15 | C-15 | D-15 | E-15 | F-15 | G-15 | H-15 | I-15 | K-15 |
| 805 | A-16 | B-16 | C-16 | D-16 | E-16 | F-16 | G-16 | H-16 | I-16 | K-16 |
| 885 | A-17 | B-17 | C-17 | D-17 | E-17 | F-17 | G-17 | H-17 | I-17 | K-17 |
| 970 | A-18 | B-18 | C-18 | D-18 | E-18 | F-18 | G-18 | H-18 | I-18 | K-18 |

even if the latter operate on the same frequency inside the same service area.

The TG687 tone generator is mechanically and electrically identical with the TG682 except that it has 10 tones in the range 1060 Hz - 2400 Hz and 6 tones in the range 615 Hz - 970 Hz. The 2 x 10 push-buttons may be used to transmit a total of 60 tone combinations. The buttons carry letter or numeral designations. The top row carries letters A to K whilst the bottom row carries numerals 13 to 18. TR687 tone receivers are used in mobile stations. Installation and functions are as described for the TR682.

Just like the TR681, TR683, TR682, and TR687 tone receivers, the TT681, TT683, TT682, and TT687 tone transmitters are designed so that tone combinations can be altered by merely shifting one lead on each tone coil. For example, the TR682 can be wired for each of the 64 tone combinations by merely shifting four leads.

## Combinations of Single-tone and Double-tone Systems

Tone units are designed so that users have a choice between straight single-tone or double-tone systems and a combination of both. For example, it is possible (and necessary if the system includes portable stations) to use single-tone calls from mobile stations to fixed stations and double-tone calls from the fixed station to the mobiles.

## Tone Sequence System

The recent explosive advances in the selective calling sector have made it necessary to develop a system providing a very large number of different calls. Also, it has been realized that the base

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station operator should be able to identify the mobiles calling him.

The tone sequence system developed by Storno consists in transmitting four different tone signals in rapid succession. Each of the digits 1, 2 ..... 9, 0 corresponds to a certain tone frequency; in other words, the system uses ten different frequencies. The duration of each transmitted tone is 0.07 second, and fundamentally there are no pauses between tones. The complete transmission of the four tones lasts 0.3 second or less.

Since the tone receiver is incapable of indicating a number if two or more of its digits are identical (example: 7444), a so-called repeater tone has been introduced which is inserted instead of any digit that is a repetition of a preceding tone frequency. For example, the number 7444 will be represented by tone frequencies corresponding to 7, 4, repeater tone, 4.

The tone sequence system has four digits, providing a maximum capacity of 10,000 numbers. The tone frequencies used are inside the range 1060 Hz - 2400 Hz except for the repeater tone frequency, which is 2600 Hz. The frequencies are the same as those used in single-tone and double-tone systems.

## Selective Calls

The tone-sequence system is used for selective calls in the same manner as the single-tone and double-tone systems. Equipment for this system comprises a tone transmitter, a tone generator, and a 4-digit tone receiver.

The SG684 tone generator is specifically intended for installation in any of the type CB68x control desks. Physically similar to the TG682 tone generator, it has two rows of push-buttons with 10 buttons in each. Each row is numbered 1, 2 ..... 9, 0, making it possible to select between 100 numbers on the control desk. However, since the system accomodates 100 x 100 numbers, this feature is utilized by locking the first two tone-generator digits. Interference-free calls can then be accomplished by taking care that the first two digits are different in all systems operating on the same radio frequency. Thus the theoretical maximum capacity will be 100 radiotelephone systems with 100 selective calls each.

The first two digits are selected and set at the factory. The factory staff also sees to it that no two systems will use the same system number. However, the numbers can be altered very easily; each change of numbers merely requires rewiring of two tone-coil leads. A mobile operator calls the control desk by depressing the "Loudspeaker IN" button to make sure that he has a clear channel. Then he selects the two digit numbers on the two rows of push-buttons by depressing one number in each row and thereafter he transmits the call by briefly pressing the tone call button.

## SR684 Tone Sequence Receiver

This tone receiver is installed in the control box of the mobile station (in CQM600 stations) or inside the station cabinet (in CQL600 stations). Operating principles, including the alarm bell, horn, etc. are identical with those of the TR682 tone receiver. The SR684 has provision for four digits and may therefore form part of systems with up to 10,000 selective calls. The SR684 can be restrapped for any desired 4-digit number by merely shifting four leads.

## SR6842 Tone Sequence Receiver

This tone receiver is identical with the SR684 but has provision for group calls. It can receive two different calls, both of them 4-digit ones. Calls are registered in different ways in the mobile stations:

1) Individual calls: loudspeaker is cut in; call lamp is turned on; bell or horn alarm is sounded (this requires an AC682 alarm circuit).

2) Group calls: loudspeaker is cut in.

The numbering system for group calls is based on a division of all available numbers into nine groups with 90 numbers in each group. A selective call number consists of a group number (the first two digits) and an individual 2-digit number whilst the group call number consists of a group number (the first two digits) followed by the digits 00.

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A group number is shared by all mobile stations of the group (a maximum of 91 numbers). Group numbers can be any number from 01 to 99 except numbers whose second digit is 0.

Individual numbers can be any number from 11 to 99 except that numbers whose first digit is 0 cannot be used.

If the SR6842 is used with the SG684 tone sequence receiver in the control desk, in which case only the last two digits of calls can be varied, there will be a choice of two different types of group calls:

1) A maximum of 90 mobile stations may be gathered in one group, and vehicles may either be called individually, or all vehicles may be called simultaneously (general call).
2) By reducing the total number of cars to 81 it is possible to divide the mobile stations into nine groups with nine cars in each. In the SG684 tone generator, the first and fourth digits are locked, permitting only the second and third digits to be varied by means of the push-buttons. The first row of push-buttons (second digit) selects the group within the numbers 1 ..... 9. The second row of push-buttons (third digit) selects the individual number of the mobile station within the numbers 1 ..... 9. To make a group call, the operator depresses the group number in the first row of push-buttons and the digit 0 in the other row of push-buttons.

Group calls with facilities exceeding those listed under 1) and 2) above require specially designed control desks.

The tone frequencies corresponding to the digits can easily be altered by shifting four leads in the unit. The unit can be installed in the control box of the mobile station (in CQM600 stations) or in the station cabinet (in CQL600 stations).

## Identification System

The identification system permits the base-station operator to read on the control desk the number of the mobile station calling the control centre.

In this system, each mobile station is equipped with an ST684 tone sequence transmitter which will transmit a 4-digit tone signal each time the transmitter is switched on. To the control desk is connected a decoder which can receive calls from mobile stations and control a 4-digit lamp indicator board. The number of the mobile station is displayed on the board directly in front of the operator. The decoder includes provision for holding the number display until the mobile-station carrier ceases or the circuit is cleared manually.

Introducing the identification system in a radio network can result in many advantages: the operator is certain that he is communicating with the right mobile station; time is saved because the mobile operator need not state his number or name before he begins to speak; interference from other radio networks can be prevented; and traffic discipline can be improved. Still another advantage of the identification system is that it permits introducing, in a relatively simple manner, a distress call facility which permits such calls to trigger off alarm devices at the control centre and hold the number display until it is released manually.

A special version of the tone sequence generator can be combined with data transmission from vehicles, in which case the digits furnished by the tone generator can be made dependent on manually operated switches or on mechanical devices.
The ST684 tone sequence generator is installed in the control box of the mobile station (in CQM600 stations) or in the station cabinet (in CQL600 and CQF600 stations). The numbers of the tone generator can be altered by simply restrapping four leads. The tone sequence transmitter can also be used for calls from the mobile station in the same manner as described for the TT681 and the TT682 above. In this case it is strapped so that it will be activated only when the tone call button is pressed.

The tone receiver used in the control desk is the SR684 tone sequence receiver, which provides the same functions in the control desk as those provided by the TR681 and the TR682.

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## Decoder

These units are only partly standardized. They must be adapted individually to the system in question and to the conditions under which they are to operate. Specific types and specifications of such types cannot be given on a basis of the present design. Storno's System Department should be consulted in all cases where use of a decoder and a lamp indicator board is contemplated.

## Combinations of Single-tone, Double-tone, and Tone Sequence Systems

It is possible to combine the three tone systems described. In mobile stations, the choice of combination is governed by mechanical considerations.
These combinations may be used:

TT68x and TR68x
ST684 and SR684
TT68x and SR684

On the other hand, this combination cannot be used:

ST684 and TR68x.

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# CHAPTER 2. TONE UNITS

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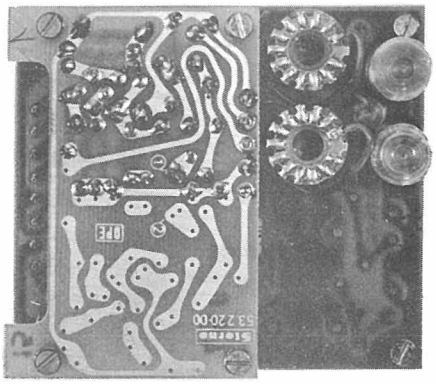
# TR681 and TR683 Tone Receivers



The tone receiver unit is built on two printed wiring boards which are bolted together with their top (components) sides facing each other.

The unit consists of these circuits:

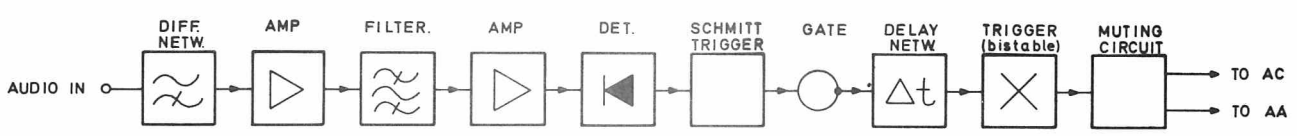
- Differentiator
- Amplifier
- Selective amplifier
- Detector
- Schmitt trigger and gate circuit
- Delay circuit
- Bistable trigger (multivibrator)
- Muting circuit.

The TR681 and TR683 are selective single-tone receivers for use with tone call systems.

On reception, for not less than 0.7 sec., of the particular call tone to which the tone receiver is tuned, the radio receiver's audio output amplifier, normally muted, opens up automatically. The audio output stage can be opened up manually by depressing the "Loudspeaker IN" button on the control box, thereby allowing the receiver channel to be monitored for traffic. Monitoring the receiver channel - and hence also operation of the tone receiver - is necessary every time the user wishes to switch on the transmitter, due to the fact that the earth return path of the transmit relay goes through the tone-receiver muting circuit.

Another push-button on the control box, marked "Loudspeaker OUT", permits muting the audio output stage, thereby suppressing interference from other traffic; only calls to that particular station can be received.

When muting is removed from the audio output stage, a green pilot lamp on the control box shows light, and the end of the tone call will be heard through the loudspeaker. Additional alarm functions (if desired) can be provided by connecting an alarm circuit (AC68x) to the control box, making it possible to sound a car horn, bell, etc. The tone receiver frequency can easily be altered - the coils of the resonant circuits of the unit have taps for different frequencies so that rewiring one pair of leads is all that is required to switch the tone receiver to another frequency (see also circuit diagram).





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The two types of tone receivers (TR681 and TR683) are constructionally identical. The difference lies in their tone sequences, different tone coils being provided in the two units (see under technical specifications).

## Mode of Operation

Differentiator and Amplifier

The tone signal is fed through three DC coupled amplifier stages. The first two stages differentiate and clip the signal whilst the last stage, operating in a grounded-collector configuration, drives the following bandpass filter.

Selective Amplifier Stage and Detector

The selective circuits of the unit are a bandpass filter consisting of a series resonant circuit (L1, C6) and a parallel-resonant circuit (L2, C8) with mutual capacitive coupling via capacitor C7. Frequency changing is accomplished by using different taps on coils L1 and L2. The filter works into an emitter follower stage, the output of which is fed to a detector.

Schmitt Trigger

The Schmitt trigger comprises transistors Q5 and Q6. It serves the purpose of activating the following delay circuit when the detector output voltage reaches a certain level. The trigger level is temperature stabilized.

Gate Circuit and Delay Circuit

When the Schmitt trigger is operated, the gate circuit (E4) shuts off the voltage for the delay circuit, composed of transistors Q7 and Q8. Q7 operates in the actual delay circuit whilst Q8 acts as a switch for the following bistable trigger.

Bistable Trigger (Multivibrator)

The bistable trigger is a flip-flop circuit using transistors Q9 and Q10. If Q8 of the preceding stage becomes conductive, transistor Q10 will draw such a high value of base current that Q9 and Q10 will saturate due to the mutual positive feedback.

Transistor Q10 - when in this condition - provides a direct DC path to chassis for the pilot lamp and transmit relay via terminal 1 and also furnishes control voltage for the following muting circuit. However, the trigger circuit transistors can also be made conductive manually by applying base current to Q9 through resistor R35. This is accomplished by connecting terminal 4 to terminal 5 via an external pair of contacts ("Loudspeaker IN" button).

Likewise, the transistors can be cut off by connecting terminal 2 to terminal 3 through an external pair of contacts ("Loudspeaker OUT") button).

Muting Circuit

The muting circuit serves the purpose of opening up and cutting off the receiver's output amplifier. If trigger-circuit transistor Q10 is cut off, the muting circuit transistor will receive base bias, thereby causing it to provide a very low impedance and so short-circuit the audio signal to earth. If trigger-circuit transistor Q10 saturates, no base bias will be applied to the muting-circuit transistor which consequently cuts off, thus providing an impedance of 22 k ohms as viewed from the collector (terminal 8) - in other words, resistor R38. This will remove the short circuit from across the audio signal, thereby causing the output amplifier to open up.

## Adjustment

The tone receiver is factory-preadjusted and requires no subsequent readjustment.

## Data

Input Impedance

6 k ohms.

Frequency Range

12-tone frequency sequence.

For TR681:

1060 Hz, 1160 Hz, 1270 Hz, 1400 Hz, 1530 Hz, 1670 Hz, 1830 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2900 Hz.


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For TR683:
825 Hz, 1010 Hz, 1240 Hz, 1435 Hz, 1520 Hz, 1750 Hz, 1860 Hz, 1980 Hz, 2000 Hz, 2135 Hz, 2280 Hz, and 2450 Hz.

Centre Frequency Variation
At 3 dB attenuation with respect to $f_o$ = Less than 0.5%.

Minimum Tone Input Level
550 mV ±1 dB at 1060 Hz (for TR681) and 1010 Hz (for TR683).

Normal Level
1.1 V.

Delay
700 msec. ±100 msec.

Audio Attenuation
Audio attenuation with respect to 1 W/1000 Hz at output of AA602 at "Loudspeaker OUT": 55 dB.

Current Drain
Without signal, at "Loudspeaker OUT": 32 mA.
With signal: 42 mA.


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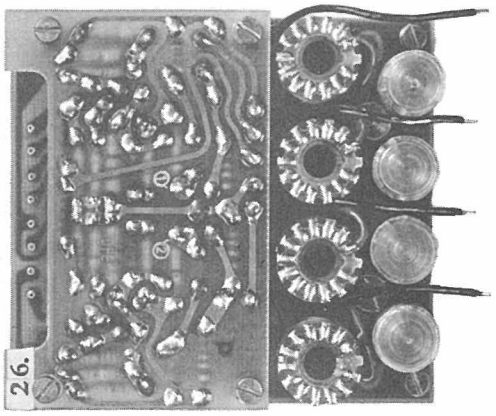
# TR682, TR685, and TR687 Tone Receivers




The tone receiver unit is built on two printed wiring boards which are bolted together with their top (components) sides facing each other.

The unit consists of the following circuits:

- Differentiator
- Amplifier
- Two identical selective amplifiers
- Two identical detectors
- Two identical Schmitt triggers
- Gate circuit
- Delay circuit
- Bistable trigger (multivibrator)
- Muting circuit

The above-mentioned types of tone receivers are double-tone receivers for use with tone call systems.

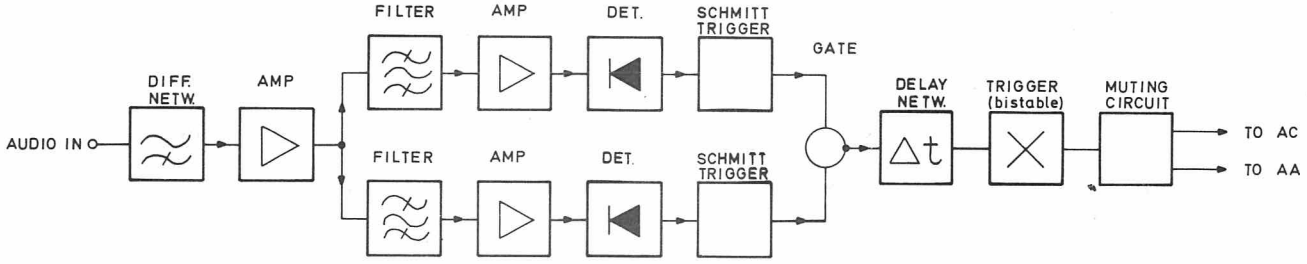
On receiving simultaneously, for not less than 0.7 sec., the two call tones to which it is tuned, the double-tone receiver opens up the radio receiver's audio output amplifier, which is normally muted. The audio output stage can be opened up manually by depressing the "Loudspeaker IN" button on the control box, thereby allowing the receiver channel to be monitored for traffic.

Monitoring the receiver channel - and hence also operation of the tone receiver - is necessary every time the user wishes to switch on the transmitter, due to the fact that the earth return path of the transmit relay goes through the tone receiver muting circuit.

Another push-button on the control box, marked "Loudspeaker OUT", permits muting the output stage, thereby suppressing interference from other traffic, and only calls to that particular station can be received.

When muting is removed from the audio output stage, a green pilot lamp on the control box shows light, and the end of the tone call will be heard over the loudspeaker. Additional alarm functions (if desired) can be provided by connecting an alarm circuit (AC68x) to the control box, making it possible to sound a car horn, bell, etc.

The tone-receiver frequencies can easily be altered - the coils of the resonant circuits of the unit have taps for different frequencies, so that rewiring one pair of leads for each frequency is all that is required (see circuit diagram).



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The three types of tone receivers (TR682, TR685, and TR687) are constructionally identical. The difference lies in their tone sequences, different tone coils being provided in them (see under technical specifications).

## Mode of Operation

Differentiator and Amplifier

The tone signal is fed through three DC coupled amplifier stages. The first two stages differentiate and clip the signal whilst the last stage, operating in a grounded-collector configuration, drives the following bandpass filter.

Because the unit contains two identical sound channels, each of which consists of a selective amplifier, a detector, and a Schmitt trigger, only one channel will be described.

Selective Amplifier Stage and Detector

The selective circuits of the unit are bandpass filters. Each of these consists of a series resonant circuit (L1, L6) and a parallel resonant circuit (L2, C8) with mutual capacitive coupling via capacitor C7. Frequency shifting is accomplished by using different taps on coils L1 and L2. The filter works into an emitter follower stage, which in turn is followed by a detector.

Schmitt Trigger

The Schmitt trigger comprises transistors Q5 and Q6. It serves the purpose of activating the following delay circuit when the voltage from the detector reaches a certain level. The trigger level is temperature stabilized.

Gate Circuit and Delay Circuit

When both Schmitt triggers are activated, the gate circuit (E4 and E12) shuts off the voltage for the delay circuit, composed of transistors Q7 and Q8. Q7 operates in the actual delay circuit whilst Q8 acts as a switch for the following bistable trigger.

Bistable Trigger (Multivibrator)

The bistable trigger is a flip-flop circuit using transistors Q9 and Q10. If Q8 of the preceding stage becomes conductive, transistor Q10 will draw such a high value of base current that transistors Q9 and Q10 will saturate due to the mutual positive feedback.

Transistor Q10 - when in this condition - provides a direct DC path to chassis for the pilot lamp and transmit relay via terminal 1 and provides control voltage for the following muting circuit. However, the trigger circuit transistors can also be made conductive manually by feeding base current to Q9 through resistor R35. This is accomplished by connecting terminal 4 to terminal 5 via an external pair of contacts ("Loudspeaker IN" button). Likewise, the transistors can be cut off by connecting terminal 2 to terminal 5 through an external pair of contacts ("Loudspeaker OUT" button).

Muting Circuit

The muting circuit serves the purpose of opening up and cutting off the receiver's output amplifier.

If trigger-circuit transistor Q10 is cut off, the muting circuit transistor will receive base bias, thereby causing it to provide a very low impedance and so short-circuit the audio signal to earth. If trigger-circuit transistor Q10 saturates, no base bias will be applied to the muting-circuit transistor which consequently cuts off, thus providing an impedance of 22 k ohms as viewed from the collector (terminal 8) - in other words, resistor R38. This will remove the short circuit from across the audio signal, thereby causing the output amplifier to open up.

## Adjustment

The tone receiver is factory-preadjusted and requires no subsequent readjustment.

## Data

Input Impedance

6 k ohms.

Frequency Range

For TR682: Two 12-tone frequency sequences.

For TR685: Two 10-tone frequency sequences.

For TR687: One 12-tone and one 6-tone frequency sequence.



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Frequency Sequence for TR682:

1060 Hz, 1160 Hz, 1270 Hz, 1400 Hz, 1530 Hz, 1670 Hz, 1830 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2900 Hz.

Frequency Sequence for TR685:

Sequence I: 370Hz, 450Hz, 550Hz, 675Hz, 825Hz, 1010Hz, 1224Hz, 1552Hz, 1860Hz, and 2280Hz.

Sequence II: 370Hz, 450Hz, 550Hz, 675Hz, 825Hz, 1010Hz, 1224Hz, 1552Hz, 1860Hz, and 2280Hz.

Frequency Sequence for TR686:

370 Hz, 450 Hz, 550 Hz, and 675 Hz.

Frequency Sequence for TR687:

Sequence I: 1060Hz, 1160Hz, 1270Hz, 1400Hz, 1530Hz, 1670Hz, 1830Hz, 2000Hz, 2200Hz, 2400Hz, 2600Hz, and 2900Hz.

Sequence II: 615Hz, 675Hz, 735Hz, 805Hz, 885Hz, and 970Hz.

Centre Frequency Variation

At 3 dB attenuation with respect to $f_o$ =
Less than 0.5%.

Min. Tone Input Level

550 mV ±1 dB at 1060 Hz or nearest frequency.

Normal Level

1.1 V.

Delay

700 msec. ±100 msec.

Audio Attenuation

Audio attenuation with respect to 1 W/1000 Hz.
at output of AA602 at "Loudspeaker OUT": 55 dB.

Current Drain

Without signal, at "Loudspeaker OUT": 34 mA.
With signal : 44 mA.


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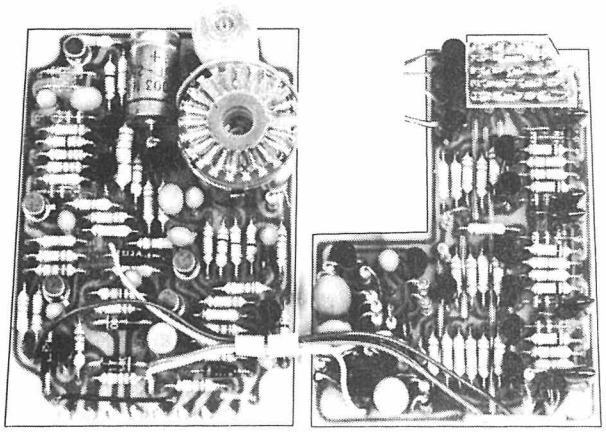
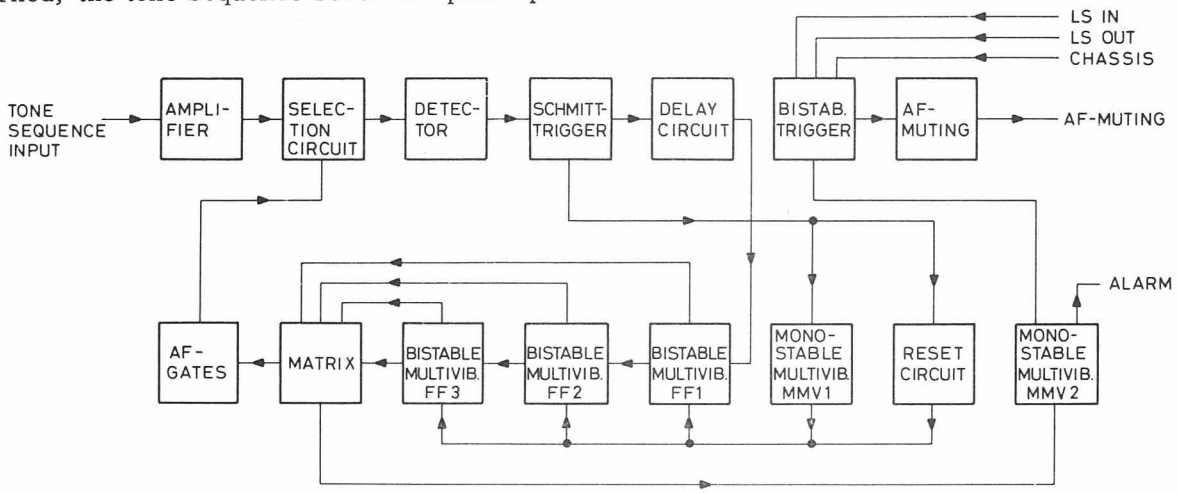
# SR684 Tone Sequence Receiver



The tone sequence receiver is built on two printed wiring boards which are clamped together with their component sides facing each other.
The unit consists of the following stages:

A differentiator
An amplifier
A selection circuit
A detector
A Schmitt trigger
An opening circuit (gate)
A delay circuit
A bistable trigger
A muting circuit
A monostable multivibrator, MMV1
A monostable multivibrator, MMV2
A counter chair, FF1, FF2, and FF3
A diode matrix
AF gates.

On receiving a tone sequence signal to which it is turned, the tone sequence receiver opens up the radio receiver's audio output amplifier, which is normally muted. The audio output amplifier can be opened up manually thereby allowing the receiver channel to be monitored for traffic.
Monitoring the receiver channel - and hence also operation of the tone receiver - is necessary every time the user wishes to switch on the transmitter, due to the fact that the earth return path of the transmit relay goes through the muting circuit of the sequence tone receiver.
When the call is over the audio output amplifier is muted again so as to suppress interference from other traffic, and only calls to that particular station can be received.
When muting is removed from the audio output stage, a green pilot lamp on the control unit shows light. If desired, additional alarm functions can be provided by connecting an alarm circuit (AC680) to the tone sequence receiver, making it possible to sound a car horn, bell etc.
The frequencies of the tone sequence receiver



may easily be changed to another tone sequence as the tone coil is provided with taps for different frequencies.
Since the tone sequence receiver cannot detect two identical tone frequencies that are received successively the tone coil has a tap for a frequency of 2600 Hz which is used as repeat tone if the call number for which the tone sequence receiver is set contains two successive identical digits (frequency impulses). In case the use of this tone frequency is not allowed another frequency of 970 Hz may be selected as repeat tone.

Examples of call numbers and associated codings:

Call number 2254 will be coded as:
2 - repeat tone - 5 - 4 (2R54).

Call number 2222 will be coded as:
2 - repeat tone - 2 - repeat tone (2R2R).

## Mode of Operation

Non-operated condition

In order to understand how the tone receiver functions we first have to look at its non-operated condition with the loudspeaker cut off. Without input signal to Schmitt trigger Q5/Q6 the first transistor is off and the second transistor is on, and in the delay circuit Q7 is on and Q8 is off. In the reset circuit Q24 is off, and its negative collector potential will reset the three flip-flops FF1, FF2, and FF3, thus Q21, Q18, and Q16 will be on, and Q20, Q19, and Q17 will be off. In the diode matrix the diodes a17, a19, b17, c20, d19, u19, and u20 will be cut off whereas b21, c18, d21, and u16 will be conductive. In this condition the matrix will cause the AF gate Q12 to go on and cut off Q13, Q14, and Q15.
The monostable multivibrator MMV1 is in its stable condition with Q22 on and Q23 off.
The monostable multivibrator MMV2 is in its stable condition too with Q25 off and Q26 on.
In the bistable trigger Q9, Q10, both transistors will be off and consequently the blocking transistor Q11 will be on thus short-circuiting the AF signal to the output amplifier.

Operation on reception of a 4-tone call

On receiving the first tone of the tone sequence signal for which the receiver is set, the tone signal is passed from the input terminals through the amplifier stage and the selection circuit to the detector. From the detector the rectified output voltage is applied to the Schmitt trigger thereby activating it, that is to say Q5 goes on and Q6 goes off. The resulting negative pulse is fed to the delay circuit where the state of the transistors Q7 and Q8 will be maintained until C11 is discharged (approx. 25 msec.) whereupon Q7 will go off and Q8 will go on. A higher negative potential will now appear on the collector of Q8 but this voltage will not activate the counter chain thanks to its input diodes.
The negative voltage on the collector of Q6 is applied to the base of Q24 which goes on, and so reset voltage is no longer applied to the counter chain.
All other circuits will remain in their non-operated condition.
When the first tone ceases the Schmitt trigger will revert to its non-operated condition, and the collector voltage of Q6 will become more positive. The delay circuit will soon revert to its non-operated condition. Transistors Q24 will turn off and re-establish the reset voltage.
However, the monostable multivibrator MMV1 will be triggered by the positive pulse applied through C23 and E26 so that Q22 will be off and Q23 will be on, thus short-circuiting the reset voltage. MMV1 will not revert to its non-operated condition until a delay of 30 msec., accomplished by capacitor C24, has expired.
When the delay circuit returns to its non-operated condition its transistor Q8 will be off which means that a higher positive voltage will appear on the collector of the transistor. This voltage is applied to the counter chain through capacitors and diodes thereby switching FF1 and FF2. Now the diode matrix will make AF gate Q13 conductive so that the receiver is ready for reception of the second tone. This tone should be received before MMV1 reverts to its non-operated condition, otherwise the reset voltage will no longer be short-circuited resulting in resetting of the counter chain.

The operation is repeated during reception of the succeeding tones constituting the tone sequence signal. The setting of the counter chain will change on termination of each tone and cut in the coil tap for the next tone to be received.
When the last tone in the signal ceases the diodes u16, u19, and u20 in the matrix will be cut off

thereby providing bias for transistor Q25 in the monostable multivibrator MMV2, the output of which will change for a period of 1,2 sec. As the alarm circuit, if any, is connected to the multivibrator output, the alarm will remain activated during this period. The negative voltage obtained on the collector of Q26 while the multivibrator is activated is applied to Q9 and Q10. Q10 will draw such a high value of base current that Q9 and Q10 will saturate due to the mutual positive feedback. In this condition Q9 and Q10 will cut off the muting-circuit transistor Q11 thereby causing the output amplifier to open up.
The two transistors (Q9, Q10) will remain saturated until the loudspeaker is cut out manually by means of push button "LS out".

## Circuit Analysis

### Input Amplifier

The amplifier comprising transistors Q1, Q2, and Q3 serves the purpose of providing the desired pre-emphasis.
If the signal level exceeds the activating level by +7dB limiting of the amplitude will occur. An RC-network (C3, R11) is inserted to cut off all frequencies above the tone frequency range used.
Transistor Q3 is coupled as an emitter follower characterized by a low output impedance (approx. 4 Ω) which is required for operation of the succeeding filter.

### Selective Amplifier

The selective circuits of the tone receiver are constituted by a bandpass filter consisting of a tone coil L1 with 13 taps for various frequencies, and a capacitor C7.
The filter, which is capable of delivering a constant voltage within the entire tone frequency range, works into an emitter follower stage, Q4, the output of which is fed to a detector.

### Detector

The detector comprises two diodes (E1, E2) which detects and doubles the tone signal.

### Schmitt Trigger

The Schmitt trigger comprising transistors Q5 and Q6 is controlled by the rectified voltage from the detector.

When no voltage is applied Q5 will be off and Q6 will be on. When a voltage exceeding a certain level is applied from the detector, the trigger will switch thereby causing Q5 to go on and Q6 to go off.

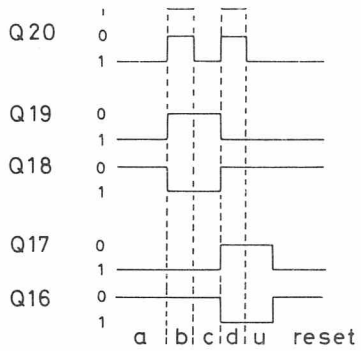
### Delay Circuit

The delay circuit uses transistor Q7, which operates as an integrator, and Q8 which acts as a switch serving the purpose of converting the saw-tooth voltage from the integrator to square wave pulses.
When Q6 in the Schmitt trigger is on diode E4 will be drawing current and Q7 will be on.

When Q6 is off diode E4 will become non-conductive, and as soon as C11 has been charged through R27 (approx. 25 msec.) Q7 will go off and Q8 will go on.

### Counter Chain

The counter chain uses three identical bistable multivibrators FF1, FF2, and FF3. FF1 operates FF2 which, in its turn, operates FF3.
The three multivibrators control the diode matrix by either making the diodes conducting or non-conducting.




1= denotes negative voltage

### Diode Matrix and AF Gates

The purpose of the diode matrix and the AF gates is to cut in the coil taps in the prearranged succession. A coil tap is cut in when one of the transistors in the gate circuit goes on. This happens when the three flip-flops make the transistors base-diodes in the matrix non-conductive thereby allowing the transistor to draw base current.
If just one of the base-diodes is conducting the base bias will be short-circuited and the transis-

Tone Sequence Signal

4 tones of 70 msec. ±15 msec. each
Time between tones: >15 msec.

Tone Frequencies

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

Frequency Stability

Better than ±1%

Maximum Current between Terminal 1 and 0 volt

100 mA

Alarm Function

Square-wave voltage, 0V to -12V

AF Attenuation

> 50 dB

Dimensions

80 x 56 x 29 mm

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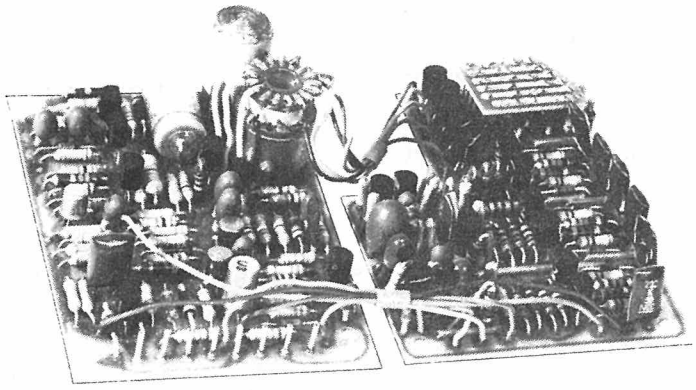
# SR685 and SR6851 Tone Sequence Receivers

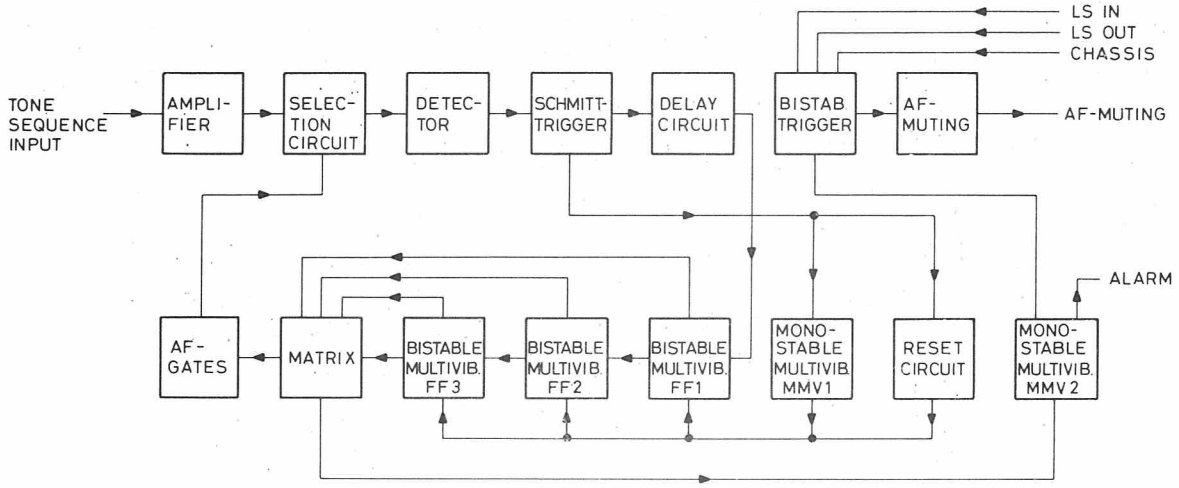


Tone sequence receivers SR685 and SR6851 are constructionally and operationally identical. The difference lies in their tone sequences as different tone coils are being provided in the two receivers. The tone sequence receiver is built on two printed wiring boards which are clamped together with their component sides facing each other.
It consists of these circuits:

Differentiator
Amplifier
Selection Circuit
Detector
Schmitt trigger
Opening circuit (gate)
Delay circuit
Bistable trigger
Muting circuit
Monostable multivibrator MMV1
Monostable multivibrator MMV2
Counter chain, FF1, FF2, and FF3
Diode matrix
AF gates.

On receiving a tone sequence signal to which it is tuned, the tone sequence receiver opens up the radio receiver's audio output amplifier, which is normally muted. The audio output amplifier can be opened up manually thereby allowing the receiver channel to be monitored for traffic. Monitoring the receiver channel - and hence also operation of the tone receiver - is necessary every time the user wishes to switch on the transmitter, due to the fact that the earth return path of the transmit relay goes through the muting circuit of the sequence tone receiver.

When the call is over the audio output amplifier is muted again so as to suppress interference from other traffic, and only calls to that particular station can be heard.
When the muting of the audio output amplifier ceases, a green pilot lamp on the control unit shows light. If desired, additional alarm functions can be provided by connecting an alarm circuit, AC680, to the tone sequence receiver, making it possible to sound a car horn, bell etc.



The frequencies of the tone sequence receiver may easily be changed to another tone sequence as the tone coil is provided with taps for different frequencies. Since the tone sequence receiver cannot detect two identical tone frequencies that are received successively the tone coil has a tap for a frequency, which is used in case the tone combination of the receiver contains two successive tones that are identical.
In tone sequence receiver type SR685 a frequency of 2600 Hz is used as repeat tone. In case the use of this tone frequency is not allowed another frequency of 970 Hz may be selected as repeat tone.

Examples of call numbers and associated codings:

Coding of call number 22544: 2 - repeat tone - 5 - 4 - repeat tone (2R54R).

Coding of call number 22222: 2-repeat tone - 2-repeat tone - 2 (2R2R2).

## Mode of Operation

Non-operated Condition

In order to understand how the tone receiver functions we first have to look at its non-operated condition with the loudspeaker cut off.

Without input signal to Schmitt trigger Q6/Q7, the first transistor is off and the second transistor is on, and in the delay circuit Q8 is on and Q9 is off. In the reset circuit Q26 is off, and its negative collector potential will reset the three flip-flops FF1, FF2, and FF3, in other words Q23, Q20, and Q18 will be on, whereas Q22, Q21, and Q19 will be off. In the diode matrix the diodes a22, b21, c22, d19, e19, and e21 will be cut off while a18, b23, c20, d23, a18, a20, and u23 will be conductive. This condition of the diode matrix will cause the AF gate Q13 to go on and cut off Q14, Q15, Q16, and Q17.
The monostable multivibrator MMV1 is in its stable condition with Q24 on and Q25 off. The monostable multivibrator MMV2 is in its stable condition too with Q28 off and Q27 on.
In the bistable trigger Q9, Q10, both transistors will be off and consequently the blocking transistor Q11 will be on thus short-circuiting the AF signal to the output amplifier.

Operation on reception of a 5-tone call

When the first tone of the tone sequence signal for which the receiver is set, is received, the tone signal passes from the input terminals through the amplifier stage and the selection circuit to the detector. From the detector the rectified signal is applied to the Schmitt trigger thereby activating it, i.e. Q6 goes on and Q7 goes off. The resulting negative pulse is fed to the delay circuit where the state of the transistors Q8 and Q9 will be maintained until C11 is discharged (approx. 25 msec.) whereupon Q8 will go off and Q9 will go on. A higher negative potential will now appear on the collector of Q8 but this voltage will not activate the counter chain thanks to its input diodes.
The negative voltage on the collector of Q7 is applied to the base of Q26 which goes on and so reset voltage is no longer applied to the counter chain. All other circuits will remain in their non-operated condition.

When the first tone ceases the Schmitt trigger will revert to its non-activated condition, and the collector voltage of Q7 will become more positive. The delay circuit will soon revert to its non-operated condition. Transistor Q26 will go off and re-establish the reset voltage.
However, the monostable multivibrator MMV1 will be triggered by the positive pulse applied through C23 and E18 so that Q24 will go off and Q25 will go on, thus short-circuiting the reset voltage. MMV1 will not revert to its non-operated condition until a delay of approx. 30 msec., accomplished by capacitor C24 has expired.

When the delay circuit reverts to its non-operated condition its transistor Q9 will be off which means that a higher positive potential will appear on the collector of the transistor. This voltage is applied to the counter chain through capacitors and diodes thereby switching FF1 and FF2. Now the diode matrix will make AF gate Q14 conductive so that the receiver is ready for reception of the second tone.
This tone should be received before MMV1 reverts to its non-operated condition, otherwise the reset voltage will no longer be short-circuited resulting in resetting of the counter chain.

The operation is repeated during reception of the succeeding tones constituting the tone sequence signal. The setting of the counter chain will change on termination of each tone and cut in the tap for the next tone to be received.
When the last tone in the signal ceases the diodes U18, U20, and U23 in the matrix will be cut off thereby providing bias for transistor Q27 in the monostable multivibrator MMV2, the output of which will change for a period of approx. 1.2 sec. As the alarm circuit, if any, is connected to the multivibrator output, the alarm will remain activated during this period. The negative voltage that appears on the collector of Q28 while the multivibrator is activated is applied to Q10 and Q11. Q11 will draw such a high value of base current that Q10 and Q11 will saturate due to the mutual positive feedback. In this condition Q10 and Q11 will cut off the muting-circuit transistor Q12 thereby causing the output amplifier to open up.
The two transistors (Q10, Q11) will remain saturated until the loudspeaker is cut out manually by means of push-button "LS out".

## Circuit Analysis

Input Amplifier

The amplifier comprising transistors Q1, Q2, and Q3 serves the purpose of providing the desired pre-emphasis.
If the signal level exceeds the activating level by +7dB limiting of the amplitude will occur. An RC-network (C3, R11) is inserted to cut off all frequencies above the tone frequency range used.
Transistor Q3 is coupled as an emitter follower characterized by a low output impedance (approx. 4Ω) which is required for operation of the succeeding filter.

Selective Amplifier

The selective circuits of the tone receiver are constituted by a bandpass filter consisting of a tone coil L1 with 13 taps for various frequencies, and a capacitor C7.
The filter, which is capable of delivering a constant voltage within the entire tone frequency range, works into an emitter follower stage, Q4, the output of which is fed to a detector.

Detector

The detector comprises two diodes (E2, E3) which detect and doubles the tone signal.

Schmitt Trigger

The Schmitt Trigger comprising transistors Q6 and Q7 is controlled by the rectified voltage from the detector.
When no signal is applied Q6 will be off and Q7 will be on. When a voltage exceeding a certain level is applied from the detector the trigger will switch thereby causing Q6 to go on and Q7 to go off.

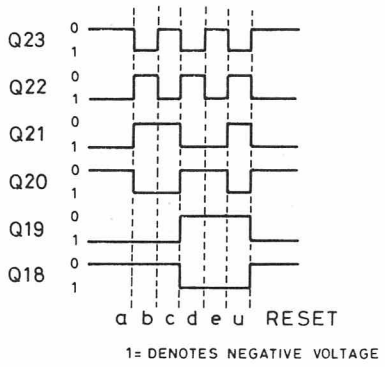
Delay Circuit

The delay circuit uses transistor Q8, which operates as an integrator, and Q9 which acts as a switch serving the purpose of converting the saw-tooth voltage from the integrator to square wave pulses.
When Q7 in the Schmitt trigger is on diode E5 will be drawing current and Q8 will be on.

When Q7 is off diode E5 will become non-conductive, and as soon as C12 has been charged through R27 (approx. 25 msec.) Q8 will go off and Q9 will go on.

Counter Chain

The counter chain uses three identical bistable multivibrators FF1, FF2, and FF3. FF1 operates FF2 which, in its turn, operates FF3.
The three multivibrators control the diode matrix by either making the diodes conducting or non-conducting.



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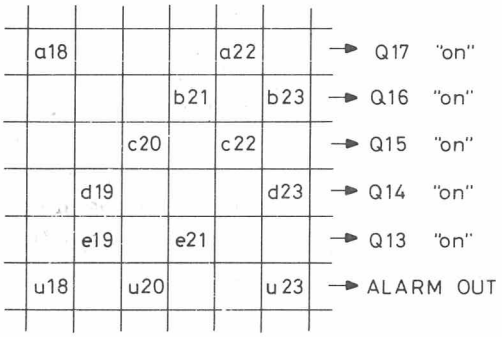
Diode Matrix and AF Gates

The diode matrix and the AF gates serve the purpose of cutting in the coil taps in the pre-arranged succession. A coil tap is cut in when one of the transistors in the gate circuit goes on.
This occurs when the three flip-flops make the transistor's base-diodes in the matrix non-conductive thereby allowing the transistor to draw base current.
If any of the base-diodes are conductive the base bias will be short-circuited and the transistor will be off. Thanks to the construction of the matrix only one of the gate transistors can be on at a time.
In order to have the voltage patterns from the flip-flops converted in such a way that the proper sequence of tones can be received, the diode matrix has this appearance:




Reset Circuit and Monostable Multivibrator MMV1

The reset circuit and the monostable multivibrator MMV1 consist of transistors Q26, Q24, and Q25. When Q26 is off its collector will have a negative voltage which resets the counter chain. The multivibrator serves the purpose of short-circuiting this voltage in the intervals between the tones and in case of interruptions of the tone signal.
Both of these circuits are controlled by the Schmitt trigger.

Monostable Multivibrator MMV2

This multivibrator comprises transistors Q27 and Q28. It serves the purpose of activating the bistable trigger and in doing so cancel the muting of the AF output amplifier, and delivering a negative voltage to the alarm circuit, if any.
When activated the multivibrator will remain in its instable condition for approx. 1.2 second.

Bistable Trigger

The bistable trigger consisting of transistors Q10 and Q11 is controlled by MMV2 and the buttons "LS in" and "LS out" located on the control unit. When a negative voltage from MMV2 is applied to the base of Q11 this transistor will start to draw current which will result in a voltage drop across resistor R40, thereby providing base bias for Q10 which goes on and makes Q11 saturate. This condition where both Q10 and Q11 are on can only be altered by applying 0V from terminal 2 (LS out) to the base of Q11.
Cancelling of the muting and thus cutting in the loudspeaker can be performed manually by applying 0V from terminal 4 (LS in) to the base of Q10 and so activate the trigger.
When the trigger is activated Q11 and E7 will provide a direct DC path to chassis for the pilot lamp and transmit relay via terminal 1 and provide control voltage for the muting circuit. This ensures that the operator will always open up the loudspeaker before keying the transmitter.

Muting Circuit

The muting circuit which is controlled by the bistable trigger consists of Q12 and E10. The circuit serves the purpose of opening up and cutting off the receiver's output amplifier.
If the bistable trigger is in its non-operated condition muting-circuit transistor Q12 will provide a very low impedance and so short-circuit the audio signal to chassis.
When the trigger switches no base bias will be applied to the muting-circuit transistor which consequently cuts off, thus providing an impedance of 22 kΩ as viewed from the collector (terminal 8) - in other words, resistor R45.
This will remove the short-circuit from across the audio signal, thereby causing the output amplifier to open up.

## Technical Specifications

Supply Voltage

24V ± 5%

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Current Drain
70 mA

Temperature Range
$-25^{o}C$ to $+60^{o}C$

Input Impedance
$\geq$ 6 kΩ

Input Sensitivity
-3dBm at 1000 Hz.
The sensitivity increases with the frequency according to an RC function with $f_c$ = 1000 Hz

Nominal Input Level
3dBm at 1000 Hz

Tone Sequence Signal
5 tones of 70 msec. ±15 msec. each.
Time between tones: >15 msec.

Tone Frequencies, SR685
970 Hz, 1060 Hz, 1160 Hz, 1270 Hz, 1400 Hz, 1530 Hz, 1670 Hz, 1830 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2800 Hz

Tone Frequencies, SR6851 (CCIR)
1124 Hz, 1197 Hz, 1275 Hz, 1358 Hz, 1446 Hz, 1540 Hz, 1640 Hz, 1747 Hz, 1860 Hz, 1981 Hz, and 2110 Hz

Frequency Stability
Better than ±1%

Maximum Current between Terminal 1 and 0 Volt
100 mA

Alarm Function
Square-wave voltage, 0 to -12V

AF Attenuation
> 50 dB

Dimensions
80 x 56 x 29 mm.

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# Tone Sequence Receiver SR6841

## Application

The SR6841 tone sequence receiver is intended for reception of 4- or 5-tone sequence calls. The tone sequence receiver is built on two wiring boards which are clamped together by means of three tie-rods and associated screws. Integrated circuits have been used in the receiver circuits wherever possible.
By means of a strapping arrangement the tone receiver can be set for one of the following combinations:

4- or 5-tone sequence reception
4- or 5-tone sequence reception with 1 digit for group call
4- or 5-tone sequence reception with 2 digits for group call.

When used for reception of individual calls the receiver supplies a control voltage for external alarm function (e. g. car horn or bell) and lamp indication. Furthermore it cuts in the loudspeaker. These locking functions can only be cut off manually.

When used for reception of group calls the receiver cuts in the loudspeaker only. This is cut off automatically when the carrier wave is no longer received.

## Construction

A detector circuit (E10, E11) which detects and doubles the tone signal.

A schmitt-trigger using transistors $Q_n$ and $Q_o$ which are part of integrated circuit ME2. The trigger controls a reset circuit and a Schmitt-trigger via a delay circuit.

A delay circuit (R39, C17).

A Schmitt-trigger using transistors $Q_p$ and $Q_r$, which are part of integrated circuit ME3.

An inverter consisting of a three-input NAND gate, G2, which is part of the integrated circuit ME7. The gate serves the purpose of inverting the output from the preceeding Schmitt-trigger before it is applied as clock-pulse to flip-flop FF1 in the counter chain.

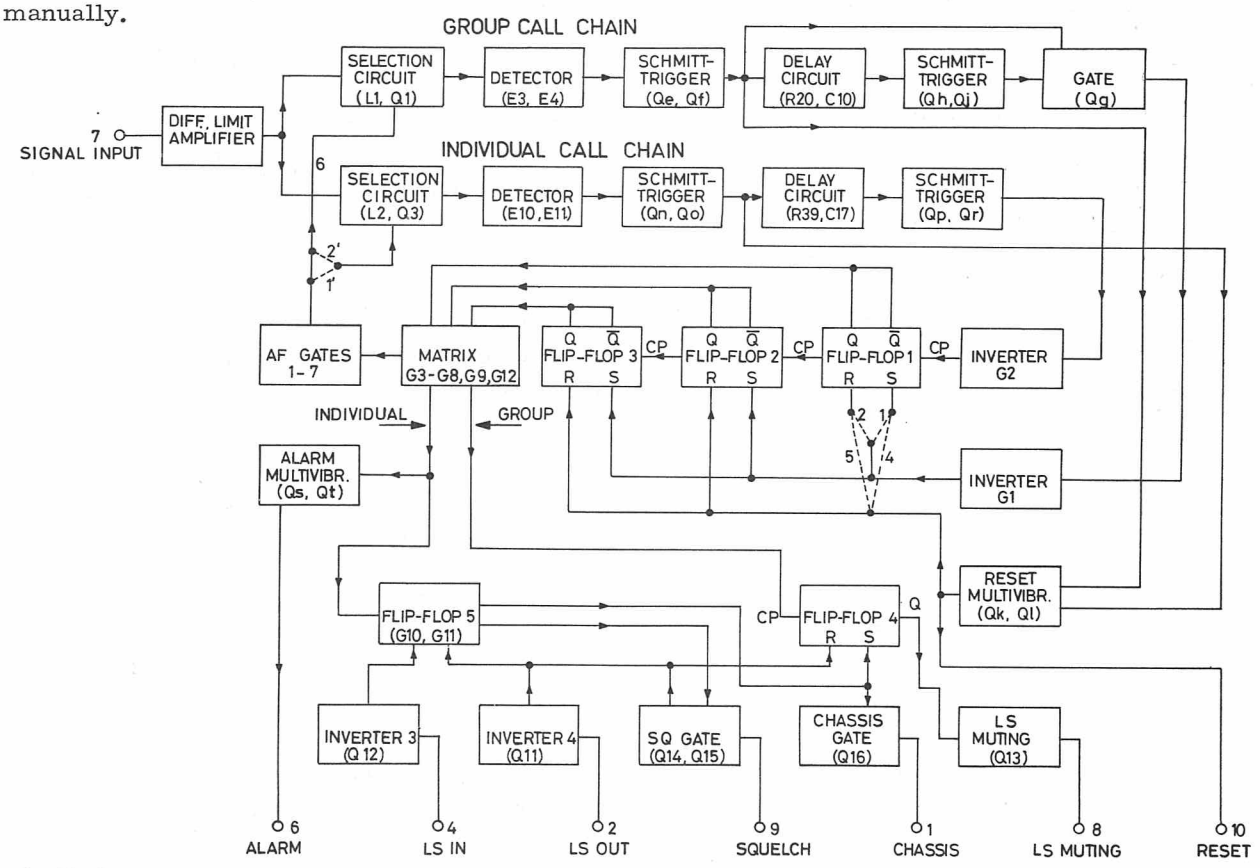


Fig. 1

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Beginning from the signal input terminal, the tone sequence receiver comprises the following circuits:

A combined differentiator, limiter, and amplifier stage comprising the integrated amplifier ME1.

Then follow two circuit chains for processing individual calls and group calls respectively. These two chains are almost identical.

The individual call chain comprises:

A selection circuit whose resonance frequency is determined by a tone coil, L2, with taps for various frequencies. Setting for one of these frequencies is performed by selecting the associated coil tap via an AF gate.

The group call chain comprises:

A selection circuit whose resonance frequency is determined by a tone coil, L1, with taps for various frequencies. Setting for one of these frequencies is performed by selecting the associated coil tap via an AF gate.

A detector circuit (E3, E4) which detects and doubles the tone signal.

A Schmitt-trigger using transistors $Q_e$ and $Q_f$ which are part of the integrated circuit ME4. The trigger controls a reset circuit and a Schmitt-trigger via a delay circuit.

A delay circuit (R20, C10).

A Schmitt-trigger using transistors $Q_h$ and $Q_j$ which are part of integrated circuit ME5.

A gate, $Q_g$, which is part of integrated circuit ME5, and a diode, E7. The gate and the diode ensure that the Schmitt-trigger output is not applied to the counter chain until the tone ceases.

An inverter comprising a three-input NAND gate, G1, which is part of integrated circuit ME10. The gate inverts the output from the preceeding Schmitt-trigger before it is applied to the counter chain.

The call chains are followed by these circuits:

A reset multivibrator comprising transistors $Q_k$ and $Q_l$ which are parts of integrated circuit ME6. The reset operation is controlled by the outputs from the Schmitt-triggers $Q_n$, $Q_o$ in the individual call chain, and $Q_e$, $Q_f$ in the group call chain.

A counter chain consisting of flip-flop FF1, in integrated circuit ME8, and FF2 and FF3 in ME9. The flip-flops which have CP, R, and S inputs are working in an asynchronous arrangement.

A matrix comprising eight three-input NAND gates, contained in integrated circuits in groups of three. The gates G3-G8 operate seven AF gates (transistors Q4-Q10), which in turn select the taps on tone coils L1 and L2 in the selection circuits.
Gate G9 controls the loudspeaker muting circuit, and gate G12 operates the locking circuits.

In addition the tone sequence receiver is provided with the following locking circuits:

An alarm circuit using transistors $Q_s$ and $Q_t$, which are part of integrated circuits ME6 and ME3. This circuit is controlled by the matrix (gate G12).

Circuit for lamp indication consisting of gates G10 and G11, which are part of integrated circuit ME7, and transistor stage Q16.

The two gates constitute a bistable stage.

The lamp indication circuit is operated by the matrix (gate G12). When the circuit is activated it provides chassis connection for the tone call lamp.

Loudspeaker muting circuit consisting of gates G10, G11, flip-flop FF4 which is part of integrated circuit ME8, and transistor stage Q13. During individual calls this circuit is controlled by gate G12, and during group calls by gate G9 in the matrix.
On receiving a tone sequence call for which the receiver is set, Q13 opens up the loudspeaker.

Circuit for cutting the loudspeaker in and off manually, comprising transistor stages Q12 and Q11, which in this case control the loudspeaker muting circuit.

Circuit for cutting off the loudspeaker automatically when the carrier ceases. The circuit consists of the transistor stages Q14 and Q15 which,

when the carrier stops, are biased from the squelch unit in the radio station, thereby causing them to draw current and cut off the loudspeaker via FF4 and the loudspeaker muting circuit.

## Mode of Operation

Designations indicating voltage levels:

"0" = -5 volt
"1" = 0 volt.

These levels are measured with respect to chassis of the radio station, but not with respect to chassis of the tone receiver wiring board.

If a tone sequence call is received the sequences and frequencies of which are identical to those for which the selection circuits of the tone receiver are set, the following occurs:

The first tone is fed from input terminal 7 to the differentiator and limiter $Q_a$. Limiting occurs when diodes E1 and E2 start to draw current. Capacitor C3 and resistor R4 provide a frequency dependent negative feedback network which ensures proper differentiation and preemphasis of the signal. Then follows an amplifier $Q_b$, $Q_c$ which operates in a configuration with negative feedback and grounded-collector output.
From the amplifier the signal is passed to selection circuit C13, L2 in the individual call chain. In the non-operated condition the coil tap for reception of 1st tone is selected by the associated AF gate.

In tone sequence receivers strapped for 5-tone calls, AF gate a (Q4) will be activated and the associated coil tap selected.

In tone sequence receivers strapped for 4-tone calls, AF gate b (Q5) will be activated and the associated coil tap selected.

Transistor Q3 operates as a Q-multiplier with positive feedback from a winding in the collector to the primary side of the tone coil, thereby neutralizing part of the coil loss. The detector E10, E11 rectifies and doubles the signal before it is passed to Schmitt-trigger $Q_n/Q_o$.

Condition of counter circuit, matrix, and AF gates without signal to the receiver.

In order to understand how these circuits operate we first look at their non-operated condition, that is when no tone signal is applied to the tone sequence receiver.

Without input signal to Schmitt-trigger $Q_n/Q_o$ the first transistor is off and the second transistor is on, giving the output "0". The "0" state is applied to the input of reset multivibrator $Q_k/Q_l$, causing $Q_k$ to go off and $Q_l$ to go on, and the multivibrator output will be "0". This output is applied to the R line of flip-flops FF2 and FF3 in the counter chain (terminal 1 on FF2 and terminal 13 on FF3). The non-operated condition of FF1 depends on whether the tone receiver is strapped for 4-tone calls or 5-tone calls.

In receivers for 4-tone sequence calls strap designated 4 is inserted (see diagram), and the S input to FF1 will be "0".

In receivers for 5-tone sequence calls strap designated 5 is inserted (see diagram) and the R input to FF1 (terminal 13) will be "0".

The Q outputs of the flip-flops are marked with the letters r, t, and v, and the $\overline{Q}$ outputs are marked s, u, and w.

In tone receivers strapped for reception of 5-tone sequence calls the R line input is "0", which sets the $\overline{Q}$ outputs s, u, w tc state "1", that is "1" on all inputs on NAND gate G3 (in ME10) which is on and has output "0", thereby opening AF gate a (Q4) which in turn selects the associated tap on coil L2, and the selection circuit is set for the 1st tone frequency.

In tone receivers strapped for reception of 4-tone sequence calls, state "0" is applied to the S input on FF1 whose Q output, marked r, will be "1". Thus all three inputs on NAND gate G4 (in ME11) will be "1", and as the gate is in the on condition the output is "0", this opens AF gate b (Q5) which in turn selects the associated tap on coil L2, and the selection circuit is set for the 1st tone frequency.

Schmitt-trigger $Q_p/Q_r$ has output "0" which is fed to input terminal 9 on gate G2. The other inputs (terminal 10 and 11) on the gate are "1" and the output is "1".

Schmitt-trigger $Q_e/Q_f$ in the group call chain has output "0" which would have caused a "1" output from the following stage $Q_g$ if diode E7 had not been inserted. The diode serves the

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purpose of preventing the output of $Q_g$ from becoming "1" until the output of Schmitt-trigger $Q_h/Q_j$ becomes "1", which cannot be obtained until a group tone call has passed L1 and Q1 in the group call chain.

Locking circuits (FF4, G9, G10, G11, and G12 with associated circuits).
The gates G10 and G11 are coupled in a flip-flop arrangement.

The operation of the locking circuits is divided into three section:

a) Non-operated condition
b) Loudspeaker cut in manually
c) Loudspeaker cut off manually (without signal applied to the radiotelephone receiver).

a. Non-operated condition.

The non-operated condition is conditional on the following connections being made to the terminals of the locking circuits:

Terminal 2 (LS OUT): Must not be activated.
Terminal 4 (LS IN): Must not be activated.
Terminal 9 (SQ): -19.7V supplied from SQ600 in the station receiver (without signal applied to the receiver).

Outputs from locking circuits to terminals in non-operated condition:

Terminal 1 (LAMP CHASSIS):
Output "0" as transistor Q16 is off.

Terminal 8 (LS BLOCKING):
Output "1" as transistor Q13 is on.

Terminal 6 (ALARM): Output "1".

From the Q outputs of FF1, FF2, and FF3 "0" is applied to one or more of the inputs on gate G9, consequently the gate output is "1".
"0" is applied to all inputs on G10, as transistors Q14 and Q15 are on (negative voltage is supplied to terminal 9 from station receiver), and the G10 output is "1".

The output of gate G11 is "0" as its input terminal 3 is "1" (Q12 is off), input terminal 5 is "1" (as not all of the inputs to G12 are "1"), and input terminal 4 is "1" (as the G10 output is "1").

The output of gate G10 is "1" if just one of its inputs is "0".

Because of a short delay in circuit C28, Q15, R52 the inputs on G10 will maintain their "0" state for a longer period than the inputs on G11, thereby ensuring a correct operation of FF5, which consists of the two gates in question.

The "1" output from G10 is fed to the base of transistor Q16 which is off and keeps the tone call lamp turned off.

"1" is applied to the inputs on flip-flop FF4 except for the R input (terminal 1) which is "0". Consequently the state of the R input determines the output on terminal 5 of the FF4, which is "0" in the non-operated condition. "0" is applied to the base of Q13 which is on and provides blocking of the loudspeaker via terminal 8 (LS BLOCKING).

b. Loudspeaker cut in manually

By cutting in the loudspeaker manually, "1" is applied to terminal 4 of the sequence tone receiver, causing Q12 to draw current and supply "0" state to input 3 on gate G11, the output of which changes to "1". From the output of G11 "1" is fed to input 2 on gate G10, and as Q15 is still on, "1" is fed to the other two inputs of G10. Output of G10 changes to "0", which is fed partly to the base of transistor Q16, causing it to draw current and light the external tone call lamp, partly to the input terminal 4 on FF4 thereby changing its Q output (terminal 5) from "0" to "1" which in turn makes Q13 go off, removing the muting of the loudspeaker via terminal 8.
The manual opening of the loudspeaker does not affect gate G12, and the "1" output from Schmitt-trigger $Q_s/Q_t$ to terminal 6 (ALARM) is maintained.

c. Loudspeaker cut off manually

By cutting off the loudspeaker manually, state "1" is supplied to tone receiver terminal 2 thereby causing Q11 to go on and supply "0" to the R input (terminal 1) on FF4. The Q output changes to "0", transistor Q13 goes on and muting of the loudspeaker is established. Output "0" from Q11 is also fed to the collector of Q15, which is still on, and to input 1 and 13 of gate G10. When one of the inputs to G10 is "0", the output will be "1". This output is fed to base of Q16, which goes off thereby turning off the tone call lamp.

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Operation on reception of 5-tone individual call

Strap marked 5 should be inserted.

On reception of the 1st tone a rectified signal is applied to Schmitt-trigger $Q_n/Q_o$ thereby activating it, that is to say $Q_n$ is on and $Q_o$ is off, and the trigger output becomes "1". This "1" state is fed to delay circuit E13, R39, C17 which delays the "1" input to the following Schmitt-trigger by approx. 25 msec. $Q_p/Q_r$ is activated - $Q_p$ is on and $Q_r$ is off - and the trigger output, which is "1" is fed to NAND gate G2 thereby changing the last of its "0" inputs to "1". Consequently the output of the gate will be "0" and so will the CP input on FF1.

Furthermore $Q_n/Q_o$ supplies "1" to the input of reset multivibrator $Q_k/Q_l$ thus terminating the reset function, giving an output of "1" from $Q_k/Q_l$.

When the tone ceases the outputs from $Q_n/Q_o$ and $Q_p/Q_r$ change to "0", and gate G2 will have output "1" which is used as a clock-pulse to flip-flop FF1, thereby causing its outputs to change state (this only happens on the trailing edge of the pulse where the voltage level goes from "0" to "1"), and now a new combination of output states from the counter elements is obtained. This changing combination of counter outputs is repeated during reception of all five tones.

When the last tone ceases the combination of counter outputs will be: r, u, v = "1". As these three "1" states are connected to the inputs on gate G12 the output of the latter will change to "0", which is applied to the input of Schmitt-trigger $Q_s/Q_t$ through diode E21. The "0" input to the Schmitt-trigger will cause a change of the trigger output, and thus terminal 6 (ALARM) from "1" to "0" for a period determined by C33 and R55, approx. 1.2 sec.

Output "0" from G12 is also fed to input terminal 5 on gate G11 whose output changes from "0" to "1". This will cause input 2 on gate G10 to change to "1". As signal is applied to the radiotelephone's receiver, transistor Q15 will be off, and input 1 and 13 on gate G10 will have "1" via R52. As all three inputs on the gate are "1" its output will change to "0" which is fed to the S input on FF4 and the base of Q16. "0" to the S input on FF4 sets the Q output (terminal 5) to "1". This state is applied to the base of Q13 which turns off and opens up the loudspeaker via terminal 4 (LS IN). The "0" state on the base of Q16 makes the transistor conduct and provide a current path for the tone call lamp, which lights.

This condition can only be cancelled manually (se subsection "c. Loudspeaker cut off manually").

4-TONE INDIVIDUAL CALL

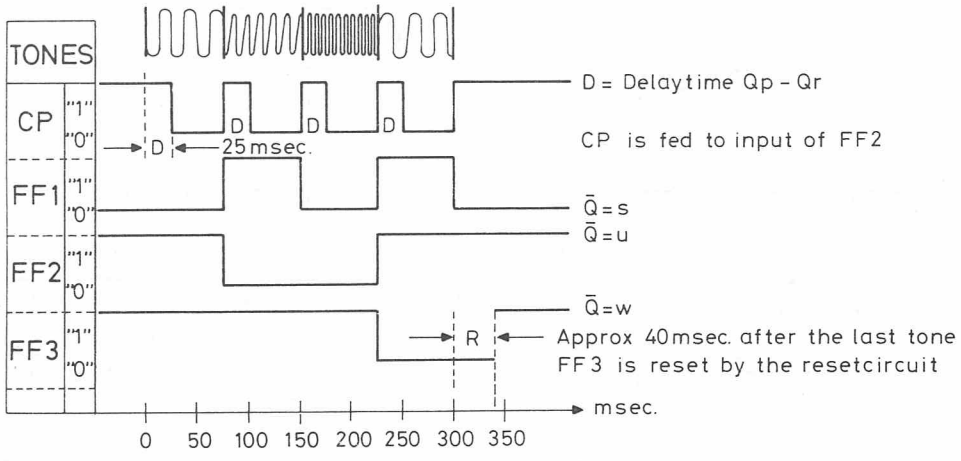


Fig. 2

Operation on reception of 5-tone call with 2-tone group call

Straps marked 2 and 5 should be inserted.

The operation of the tone sequence receiver during reception of the first three tones, which constitute the individual call, is described in the preceeding section.

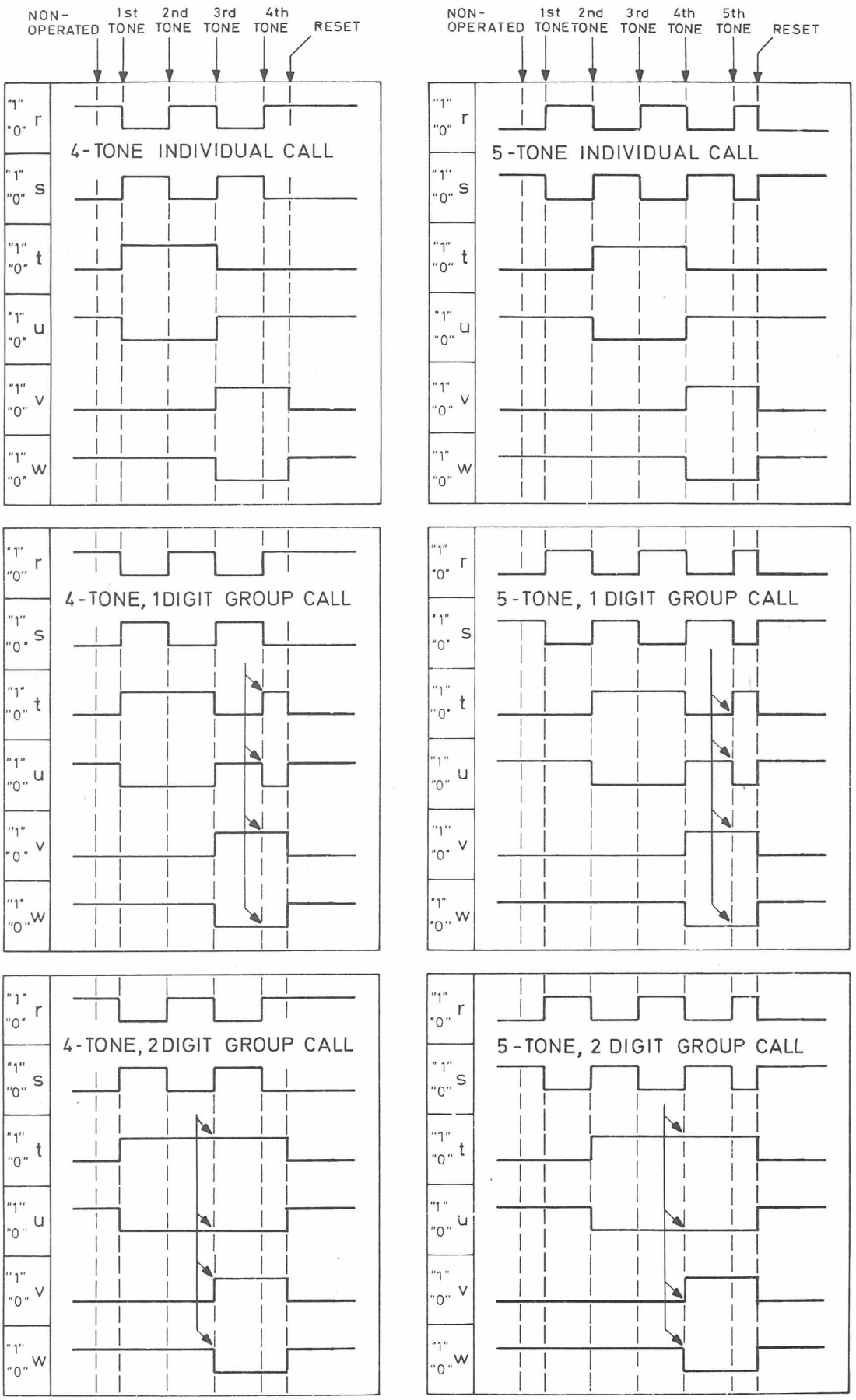


Fig. 3

↘ GATE G1 IN THE GROUP CALL CHAIN CHANGES
↘ THE STATE OF THE FLIP-FLOPS

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4-TONE INDIVIDUAL CALL

| | | r | s | t | u | v | w |
|---|---|---|---|---|---|---|---|
| NON-OPERATED | "1" | ● | | | ● | | ● |
| | "0" | | ● | ● | | ● | |
| 1st TONE | "1" | | ● | ● | | | ● |
| | "0" | ● | | | ● | ● | |
| 2nd TONE | "1" | ● | | ● | | | ● |
| | "0" | | ● | | ● | ● | |
| 3rd TONE | "1" | | ● | | ● | ● | |
| | "0" | ● | | ● | | | ● |
| 4th TONE | "1" | ● | | | ● | ● | |
| | "0" | | ● | ● | | | ● |

r.u.v = "1"

5-TONE INDIVIDUAL CALL

| | | r | s | t | u | v | w |
|---|---|---|---|---|---|---|---|
| NON-OPERATED | "1" | | ● | | ● | | ● |
| | "0" | ● | | ● | | ● | |
| 1st TONE | "1" | ● | | | ● | | ● |
| | "0" | | ● | ● | | ● | |
| 2nd TONE | "1" | | ● | ● | | | ● |
| | "0" | ● | | | ● | ● | |
| 3rd TONE | "1" | ● | | ● | | | ● |
| | "0" | | ● | | ● | ● | |
| 4th TONE | "1" | | ● | | ● | ● | |
| | "0" | ● | | ● | | | ● |
| 5th TONE | "1" | ● | | | ● | ● | |
| | "0" | | ● | ● | | | ● |

r.u.v = "1"

4-TONE, 1 DIGIT GROUP CALL

| | | r | s | t | u | v | w |
|---|---|---|---|---|---|---|---|
| NON-OPERATED | "1" | ● | | | ● | | ● |
| | "0" | | ● | ● | | ● | |
| 1st TONE | "1" | | ● | ● | | | ● |
| | "0" | ● | | | ● | ● | |
| 2nd TONE | "1" | ● | | ● | | | ● |
| | "0" | | ● | | ● | ● | |
| 3rd TONE | "1" | | ● | | ● | ● | |
| | "0" | ● | | ● | | | ● |
| 4th TONE | "1" | ● | | ● | | ● | |
| | "0" | | ● | | ● | | ● |

r.t.v = "1"

5-TONE, 1 DIGIT GROUP CALL

| | | r | s | t | u | v | w |
|---|---|---|---|---|---|---|---|
| NON-OPERATED | "1" | | ● | | ● | | ● |
| | "0" | ● | | ● | | ● | |
| 1st TONE | "1" | ● | | | ● | | ● |
| | "0" | | ● | ● | | ● | |
| 2nd TONE | "1" | | ● | ● | | | ● |
| | "0" | ● | | | ● | ● | |
| 3rd TONE | "1" | ● | | ● | | | ● |
| | "0" | | ● | | ● | ● | |
| 4th TONE | "1" | | ● | | ● | ● | |
| | "0" | ● | | ● | | | ● |
| 5th TONE | "1" | ● | | ● | | ● | |
| | "0" | | ● | | ● | | ● |

r.t.v = "1"

4-TONE, 2 DIGIT GROUP CALL

| | | r | s | t | u | v | w |
|---|---|---|---|---|---|---|---|
| NON-OPERATED | "1" | ● | | | ● | | ● |
| | "0" | | ● | ● | | ● | |
| 1st TONE | "1" | | ● | ● | | | ● |
| | "0" | ● | | | ● | ● | |
| 2nd TONE | "1" | ● | | ● | | | ● |
| | "0" | | ● | | ● | ● | |
| 3rd TONE | "1" | | ● | ● | | ● | |
| | "0" | ● | | | ● | | ● |
| 4th TONE | "1" | ● | | ● | | ● | |
| | "0" | | ● | | ● | | ● |

r.t.v = "1"

5-TONE, 2 DIGIT GROUP CALL

| | | r | s | t | u | v | w |
|---|---|---|---|---|---|---|---|
| NON-OPERATED | "1" | | ● | | ● | | ● |
| | "0" | ● | | ● | | ● | |
| 1st TONE | "1" | ● | | | ● | | ● |
| | "0" | | ● | ● | | ● | |
| 2nd TONE | "1" | | ● | ● | | | ● |
| | "0" | ● | | | ● | ● | |
| 3rd TONE | "1" | ● | | ● | | | ● |
| | "0" | | ● | | ● | ● | |
| 4th TONE | "1" | | ● | ● | | ● | |
| | "0" | ● | | | ● | | ● |
| 5th TONE | "1" | ● | | ● | | ● | |
| | "0" | | ● | | ● | | ● |

r.t.v = "1"

Fig. 4

If the frequency of the fourth tone corresponds to the frequency for which the selection circuit in the group call chain is set, the receiver operates in the following way:

The output of Schmitt-trigger $Q_e/Q_f$ switches to "1" and keeps the state of reset circuit $Q_k/Q_l$ via diode E5. Gate $Q_g$ will draw current and have output "0". Furthermore Schmitt-trigger $Q_h/Q_j$ will be activated via a delay network, R20, C10, and the output of the trigger changes to "1". When the tone ceases, the output state of Schmitt-trigger $Q_e/Q_f$ switches to "0" thereby removing the base bias to $Q_g$ and so changing the output of the gate to "1". Because of R18, output "1" on Schmitt-trigger $Q_h/Q_j$ is maintained for few milliseconds during which diode E7 and thus the gate cannot draw current. Consequently output "1" on gate $Q_g$ is maintained until the output state on trigger $Q_h/Q_j$ changes to "0".

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Output "1" from gate $Q_g$ is passed to input 9 on inverter G1, causing the inverter output to change to "0". The "0" state is applied to the R-input on flip-flop FF1, via strap marked 2. This changes the output states on the flip-flop so that output marked r becomes "0" and output marked s becomes "1".

Output "0" from gate G1 is also applied to the s inputs on FF2 and FF3 which causes their outputs to change so that the Q outputs (t and v) become "1" and the $\overline{Q}$ outputs (u and w) becomes "0". The settings of the flip-flops are illustrated in fig. 2 and 3.

When C10 has discharged, the state on input 9 of G1 will change to "0", and the resulting "1" output cancels the set-function to FF2 and FF3. The 5th tone is passed through the selection circuit containing coil L2, which is set for the tone frequency by connecting the associated coil tap to chassis through gate G8, Q10. The signal is passed on to the individual call chain, where it provides a clock-pulse to flip-flop FF1. This results in the following setting of the counter elements:

Output r, t, v = "1".

These outputs are inverted in gate G9, and output "0" from the gate is fed to the CP input on FF4.

When $Q_k/Q_l$ resets the flip-flops FF1, FF2, and FF3, the output of gate G9 will return to its "1" state, which in turn changes the Q output on FF4 (terminal 5) to "1" and cancels the loudspeaker muting via Q13. As long as signal is applied to the radiotelephone's receiver, transistor Q15 will be off, and "1" state is passed via R52 to inputs 1 and 13 on gate G10, maintaining its output state. "1" is also applied to the R input on FF4.

When the carrier to the radiotelephone's receiver ceases, Q15 will go on and pass "0" to the R input on FF4 which causes the output to return to its "0" state and thus reestablish loudspeaker muting.

## Technical Specifications

Supply Voltage
-24V ±5%.

Current Consumption
85 mA.

Temperature Range
$-25^{o}$C to $+60^{o}$C.

Input Impedance
$\geq$ 6 kΩ.

Nominal Input Level on Terminal 7
+3 dBm at 1 kHz.

Tone Sequence Signal
4 or 5 tones of 70 msec. each ±15 msec.
Intervals between the tones: $\geq$ 15 msec.

Tone Frequencies

| Coil terminal | Frequency (Hz) |
|---|---|
| 1 | 970 |
| 2 | 1060 |
| 3 | 1160 |
| 4 | 1270 |
| 5 | 1400 |
| 6 | 1530 |
| 7 | 1670 |
| 8 | 1830 |
| 9 | 2000 |
| 10 | 2200 |
| 11 | 2400 |
| 12 | 2600 |
| 13 | 2800 |
| 14 | Start |
| 15 | Feedback winding |
| 16 | Feedback winding |

Frequency Stability
$\frac{\Delta f}{\Delta f_o} \leq \pm 1\%$.

Max. Current to Chassis (terminal 1)
100 mA.

Max. Current to Chassis (alarm function, terminal 6)
5 mA, Period: >1 sec.

AF Attenuation
Better than 50 dB.

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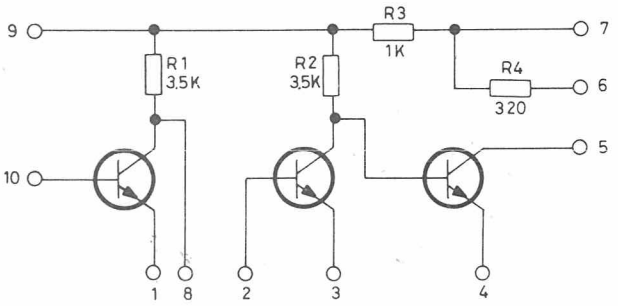
# Integrated Circuits used in SR6841

## Introduction

The following types of integrated circuits are used in tone sequence receiver SR6841:

Amplifier circuit
Triple three-input positive NAND gate (TTL series)
Dual D-type edge-triggered flip-flop (TTL series).

### Amplifier Circuit




### Logic Elements

Two types of integrated logic elements are used in SR6841, NAND gates and flip-flops.
Only two conditions or states can occur on the inputs and outputs of these elements, either 0V or -5V. In the description of the tone receiver these conditions are denoted in the following way:

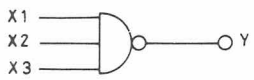
"1" = 0 volt
"0" = -5 volt.

Both voltage levels are measured with respect to chassis of the radio station, not chassis of the tone receiver wiring board.

### Triple Three-input NAND Gates

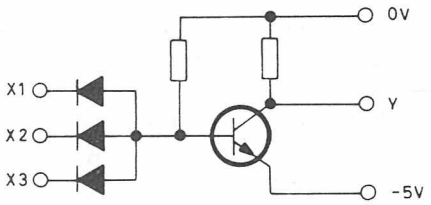
ME7, ME10, ME11, and ME12.

Symbol:




X1, X2, and X3 are inputs.
Y is output.

Simplified diagram:




If all inputs are "1" the output will be "0".
If one or more inputs are "0" the output will be "1".

Truth table:

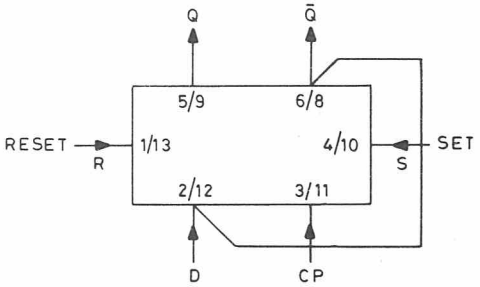
| X1 | X2 | X3 | Y |
|---|---|---|---|
| 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 |

Each integrated Circuit contains three NAND gates.

### Dual D-type Edge-triggered Flip-flops

ME8 and ME9.

Symbol:




D is connected to CP.

Each integrated circuit contains two flip-flops.

Q and $\overline{Q}$ are outputs.
If output Q is "1", output $\overline{Q}$ will be "0" and vice versa.

R, S, D, and CP are inputs.

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The R and S inputs are always used to preset the state of output Q and $\overline{Q}$.

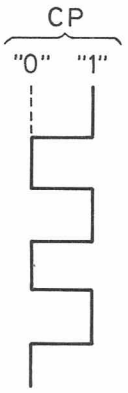
R = "0" ⟶ Q = "0" and $\overline{Q}$ = "1"
S = "0" ⟶ Q = "1" and $\overline{Q}$ = "0".

The reset circuit thus serves the purpose of supplying R and S inputs that will preset the Q and Q outputs of the flip-flop to the desired state.

The state of the outputs Q and $\overline{Q}$ can only be changed by changing the R and S inputs from "0" to "1".

The CP input may be looked upon as a switch function. Every time the CP input changes from a negative to a positive potential - and only then, the state of the Q and $\overline{Q}$ outputs will change.

| CP | Q | $\overline{Q}$ |
|---|---|---|
| "1" | "0" | "1" |
| "0" | "0" | "1" |
| "1" | "1" | "0" |
| "0" | "1" | "0" |
| "1" | "0" | "1" |
| "0" | "0" | "1" |



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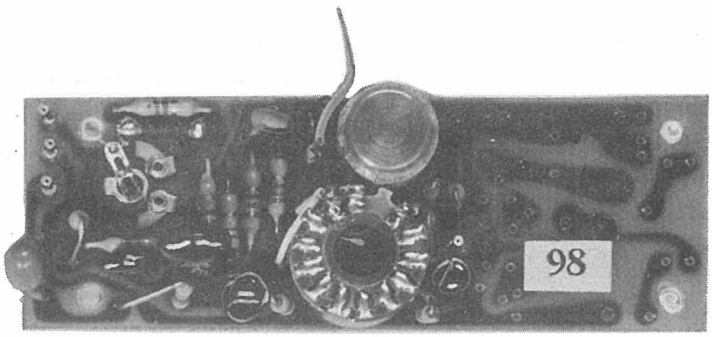
# TT681 and TT683 Tone Transmitters




This type of tone transmitter is built on a printed wiring board. It consists of these circuits:

Tone oscillator
De-emphasis network
Amplifier

The TT681 and TT683 are single-tone transmitters for use in tone call systems.

The two types are constructionally identical. The difference lies in their tone sequences, different tone coils being provided in the two units (see under technical specifications). The frequency of the tone transmitter can easily be altered: the oscillator coil has taps for 12 different frequencies so that the change from one frequency to another merely requires rewiring of one lead (see circuit diagram).

## Mode of Operation

### Tone Oscillator

The tone oscillator is a Hartley oscillator with an amplitude limiter consisting of two diodes inserted in the emitter circuit of the transistor.

The oscillator may - as mentioned above - be wired for 12 different frequencies.

### De-emphasis Network

The oscillator is followed by a potentiometer for output level adjustment, and a de-emphasis network.

De-emphasis is performed in order to obtain constant frequency swing in tone transmissions regardless of the tone frequency in use.

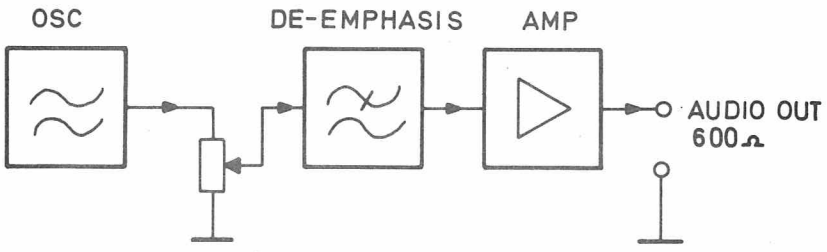
### Amplifier

The tone generator output stage is an emitter follower.

This stage provides an impedance match between the tone oscillator and the transmitter modulation input.

## Adjustment

The frequencies of the tone transmitter are factory preset and require no readjustment.





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With the tone transmitter strapped for the 1060 Hz tone frequency (for the TT681) or for 1010 Hz (for the TT683), adjust the alignment potentiometer for an output voltage of 110 mV, corresponding to a measuring level of -17 dB.

## Data

Output Impedance

600 ohms

Output Level

At 1060 Hz, TT681)
At 1010 Hz, TT683) 110 mV

Frequency Range

12 tones inside the frequency range
1060 - 2900 Hz (for TT681)
825 - 2450 Hz (for TT683)

Tone Sequence for TT681

1060 Hz, 1160 Hz, 1270 Hz, 1400 Hz, 1530 Hz, 1670 Hz, 1830 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2900 Hz.

Tone Sequence for TT683

825 Hz, 1010 Hz, 1240 Hz, 1435 Hz, 1520 Hz, 1750 Hz, 1860 Hz, 1980 Hz, 2000 Hz, 2135 Hz, 2280 Hz, and 2450 Hz.

Frequency Accuracy

Deviation from remaining tone frequencies of the standard sequence with unit adjusted at 1060 Hz (TT681) or 1010 Hz (TT683): Better than 0.5%.

Frequency Stability

Better than 1%.

Distortion

Less than 3%.

Current Drain

2.5 mA.


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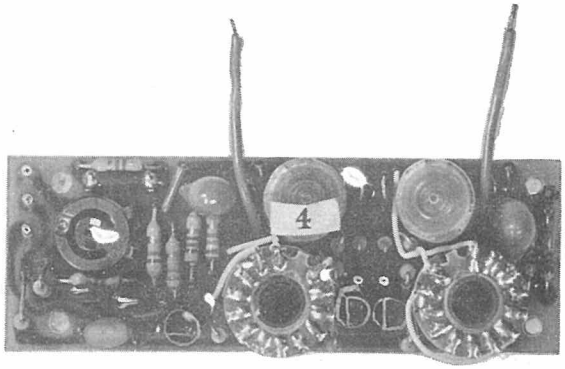
# TT682 and TT687 Tone Transmitters



This type of tone transmitter is built on a printed wiring board. It consists of these circuits:

2 tone oscillators
De-emphasis network
Amplifier

The TT682 and TT687 are two-tone transmitters delivering two simultaneous tones. They are used in tone call systems.

The two types are constructionally identical. The difference lies only in their tone sequences, different tone coils being provided in the two units (see under technical specifications).

The frequencies of the tone transmitter can easily be altered: the oscillator coil has taps for 12 different frequencies so that the change from one frequency to another merely requires rewiring of one lead for each frequency to be altered (see circuit diagram).

## Mode of Operation

### Tone Oscillators

The two tone oscillators are identical. They are Hartley oscillators with an amplitude limiter consisting of two diodes inserted in the emitter circuit of each transistor. The oscillators may - as mentioned above - be wired for 12 different frequencies.

### De-emphasis Network

The oscillator is followed by a potentiometer for output level adjustment, and a de-emphasis network.

De-emphasis is performed in order to obtain constant frequency swing in tone transmissions regardless of the tone frequency in use.

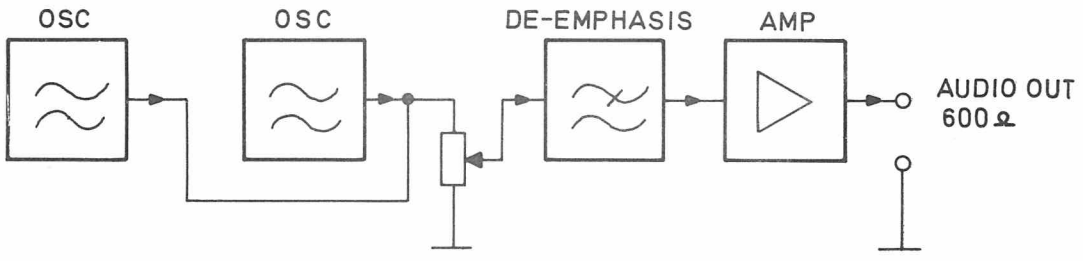
### Amplifier

The tone transmitter output stage is an emitter follower.

This stage provides an impedance match between the tone oscillator and the transmitter modulation input.

## Adjustment

The frequencies of the tone transmitter are factory preset and require no readjustment.





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Output Level Adjustment

Short-circuit one tone coil so that only one oscillator will operate (in the TT687, the tone coil should be short-circuited for 6 tones in the range 615 - 970 Hz).

Strap the other tone coil for 1060 Hz. Adjust the potentiometer for an output voltage of 55 mV.

## Data

Output Impedance
600 ohms.

Output Level
At 1060 Hz with one tone coil short-circuited: 55 mV.

Frequency Range
For TT682: 12 tones inside the frequency range 1060 - 2900 Hz.
For TT687: One tone coil with 12 tones in the frequency range 1060 - 2900 Hz.
One tone coil with 6 tones in the frequency range 615 - 970 Hz.

Tone Sequence for TT682
1060 Hz, 1160 Hz, 1270 Hz, 1400 Hz, 1530 Hz, 1670 Hz, 1830 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2900 Hz.

Tone Sequence for TT687
One coil: As tone sequence for TT682.
Other coil: 615 Hz, 675 Hz, 735 Hz, 805 Hz, 885 Hz, and 970 Hz.

Frequency Accuracy
Deviation from remaining tone frequencies of standard tone sequence with unit adjusted at 1060 Hz: Better than 0.5%.

Frequency Stability
Better than 1%.

Distortion
Less than 3%.

Current Drain
3.5 mA.


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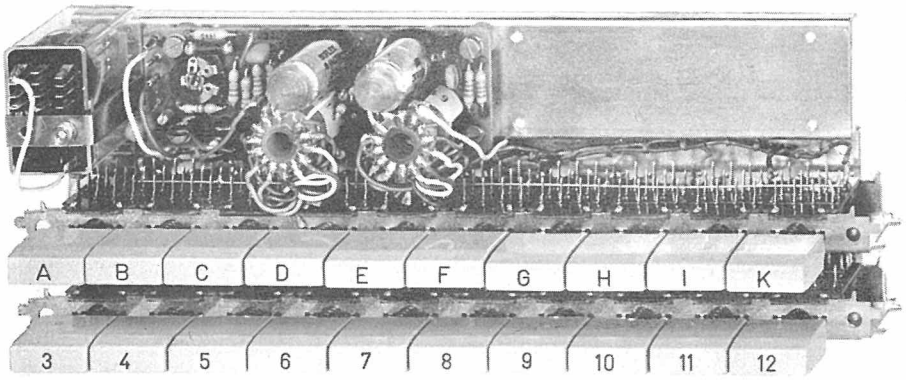
# TG682 Tone Generator




## Application

The TG682 double-tone generator is used for transmitting selective calls from a fixed VHF/UHF radio station to mobile stations.

## Functions

The TG682 performs the following functions:

It delivers a positive voltage for switching the transmitter on.

It re-routes the modulation path to the transmitter.

It delivers a maximum of 64 different tone combinations through manual operation of 2 x 10 push-buttons.

## Construction

The TG682 double-tone generator, intended for installation in a control desk of the CB680 series (CB681, CB684, or CB686), consists of the following sub-units:

TT682 double-tone transmitter
2 rows of push-buttons with 10 buttons in each
Relay with four switching functions.

## Mode of Operation

Tone Transmitter

See description of TT682.

Coding

The TT682 double-tone transmitter is designed to provide two simultaneous tone frequencies. The two tone frequencies are cut in by means of two rows of push-buttons.

In either row of push-buttons, pressing any button or group of buttons will release a previously depressed button, and the buttons depressed will remain in their positions until a new number is depressed.

The top row of push-buttons carries letters A-K and comprises frequencies from 1060 Hz to 2400 Hz inclusive.

The bottom row of push-buttons carries digits 3-12 and comprises frequencies from 1270 Hz to 2900 Hz inclusive.

Example of Coding

Buttons "B" and "8" are depressed.
B-8 = 1160 Hz and 2000 Hz.
1160 Hz: point "A" adjacent to coil L2 - N2, 15 - button B - N2, 16 - terminal 2 on tone coil L2.
2000 Hz: point "B" adjacent to coil L1 - M6, 15 - button 8 - M6, 16 - terminal 8 on tone coil L1.

Start

When the tone call button is depressed, a potential of -24 volts will be present at terminal 4, causing relay V to operate. -24 volts from terminals 15 and 16 is applied to tone transmitter terminal 1, thereby switching on the tone transmitter.



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Transmit

0 volts at terminal 12 is applied to the transmitter on/off circuit via terminal 13 (with relay V operated).

Modulation

The tone signal from terminal 2 on the TT682 is fed to the transmitter modulation circuit. In control desks where re-routing of the modulation path is necessary, relay-V contacts 5, 6, 7, 8, 9, 10 are used.

## Data

Operating Voltage

-24 volts ±5%.

Frequency Accuracy

Better than 0.5%.

Current Drain (incl. of relay V)

30 mA.

Frequency Response

Falling, 4 dB per octave.

Output Impedance

600 ohms ±20%.

Tone Frequencies

1060 Hz, 1160 Hz, 1270 Hz, 1400 Hz, 1530 Hz, 1670 Hz, 1830 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2900 Hz.

Temperature Range

-30 to +60°C.

Frequency Stability

Better than 1%.

Distortion

Less than 3%.

Output Level

At one tone and 1060 Hz: -23 dBm ±2 dB.

## Installation

The TG682 is mounted in the control box (CB681, CB684, or CB686) and soldered to the existing cabling of the latter (see circuit diagrams of TG682 and the control box used).

## Check

The output level should be checked.

## Adjustment

R21 in the TT682 should be adjusted for an output level of -23 dBm for one tone and 1060 Hz.


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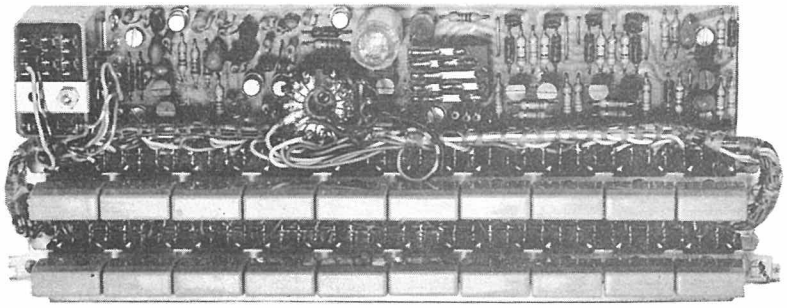
# SG684 Tone Sequence Generator



## Application

The SG684 tone sequence generator is used for transmitting selective calls from a fixed VHF/UHF radio station to mobile stations.

## Functions

The SG684 performs the following functions:

It delivers a positive voltage for switching the transmitter on.

It re-routes the modulation path to the transmitter.

It delivers 100 different tone combinations (selected out of a total of 10,000 possible tone combinations through manual operation of 2 x 10 push-buttons.

## Construction

The tone sequence generator, intended for installation in a control desk of the CB680 series (CB681, CB684, or CB686), consists of the following sub-units:

10.1718 Tone sequence unit 10.1718.

2 rows of push-buttons with 10 buttons in each

Relay with four switching functions.

## Mode of Operation

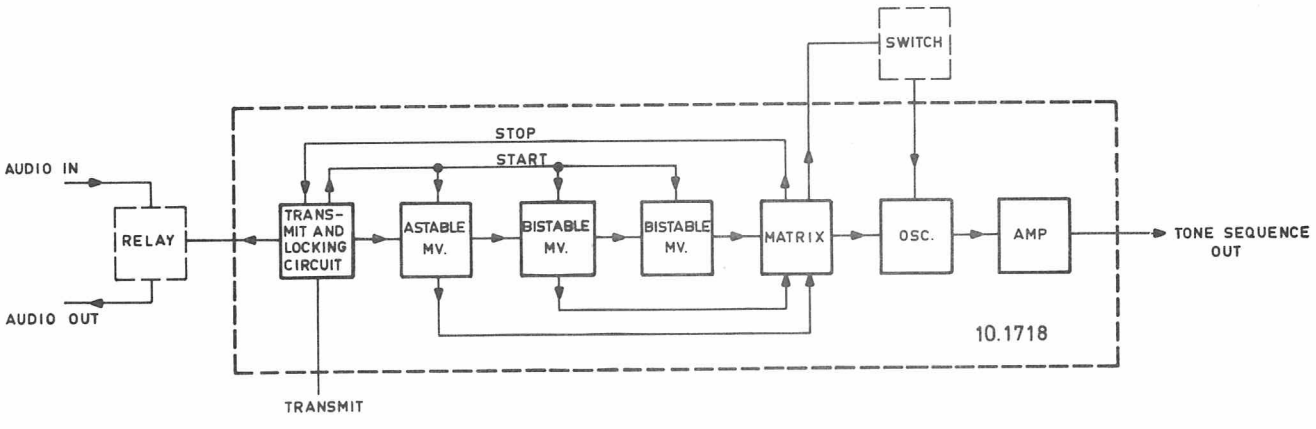
GENERAL

When the tone call button is depressed, the tone sequence generator transmits 6 consecutive impulses each of which has a duration of 70 msec.

The first two impulses are unmodulated. The four following impulses are modulated; two of them are permanently adjusted for fixed tone frequencies whilst the other two can be selected at will by means of push-button switches. This provides 10 x 10 combinations.

A relay blocks the passage of voice modulation during the transmission of the tone sequence.

After the transmission of the six sequence impulses - approx. 420 msec. - a cutout pulse is





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transmitted, causing the generator to return to its inactive condition even if the tone call button is kept depressed.
The entire tone sequence will be transmitted even if the tone call button is depressed for less than 420 msec.

## TONE SEQUENCE UNIT 10.1718

The tone sequence unit is built on a printed wiring board. It consists of these circuits:

Transmit and locking circuit
Astable multivibrator
Two bistable multivibrators (flip-flop circuits)
Diode matrix
Oscillator
Oscillator amplifier

### Transmit and Locking Circuit

The transmit and locking circuit uses transistors Q1, Q2, and Q3. It serves the purpose, in conjunction with a relay, of applying 0 volts to the transmit relay while the impulses are being transmitted. The transmit and locking circuit also supplies control voltage for the astable multivibrator and the two flip-flop circuits.

When the circuit is in its non-operated condition, transistors Q1, Q2, and Q3 are cut off, and C1 is neutral with respect to the minus potential. When the tone transmit button is depressed, terminal 4 is short-circuited, and diode E2 and capacitor C1 will cause a positive impulse to be applied to the base of Q2, which will consequently draw current. This will in turn cause Q1 to become operative, and current will flow through voltage divider R3, R4. As a result of this, positive bias will be applied to the base of Q2, so that a stable condition will exist - in other words, there will be a flip-flop action.

Negative voltage from the emitter of Q2 is fed through diode E2 and terminal 5 to the transmit relay, V, which is locked during the entire tone sequence.

When Q2 is conductive, zener diode E6 will receive voltage through resistor R9. This voltage will bring the astable multivibrator and hence also the two flip-flop circuits out of their non-operated condition. On completion of the tone sequence, the base of Q3 receives a cutout pulse from the matrix, causing the transistor to short-circuit, and no current will flow through Q1. Q2 cuts off, and the transmit and locking circuit is back in its non-operated condition.

### Astable Multivibrator

The astable multivibrator consists of transistors Q4 and Q5 and their associated components.
The multivibrator produces square-wave impulses having a repetition time of 140 msec.

In the non-operated condition, transistor Q4 is "on" and Q5 is "off". Capacitor C6 is kept charged by the fixed negative voltage between R11 and R12. On the application of voltage, transistor Q5 will go "on" and Q4 will go "off" because C7 acts as a short circuit, permitting Q5 to draw a high value of current, determined by R14, R15, and R16.

When transistor Q5 goes "off", capacitor C6 will feed a positive impulse to the base of Q4. Transistor Q4 will be cut off for a time whose length will be determined by C10 and C6 and by the voltage at the junction of R11 and R12. After this time, Q5 will go "off" and Q4 will go "on", The time during which Q5 is in the "off" condition is determined by C7, R16, and by the voltage at the junction of R14 and R15.

Diodes E8 and E9 have been inserted in the interests of rapid voltage switching. A differentiated square-wave impulse is fed via C8 and C9 to the bases of Q6 and Q7.

### Bistable Multivibrators (Flip-Flop Circuits)

The bistable multivibrators, which are identical, comprise transistors Q6, Q7, and Q8, Q9 with their associated components.

In their non-operated condition, transistors Q6 and Q8 are "on" and Q7 and Q9 are "off" because only Q6 and Q8 can draw base current.

When voltage is applied, Q6 remains in the "on" condition because its base bias, controlled by the collector-emitter voltage of Q7, is not changed. Q7 remains in the "off" condition since the potential at the collector of Q6 is low.

Switching requires application of a control impulse. This is accomplished by cutting off the conductive transistor.


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When the voltage at the input (C8 and C9) moves in the positive direction, a positive impulse will be applied to the bases of Q6 and Q7, causing the conductive transistor to pass into the "off" condition, and switching occurs. When the voltage at the input (C8 and C9) moves in the negative direction, the negative impulse will have no influence on account of diodes E10 and E11.

The repetition frequency will be halved.

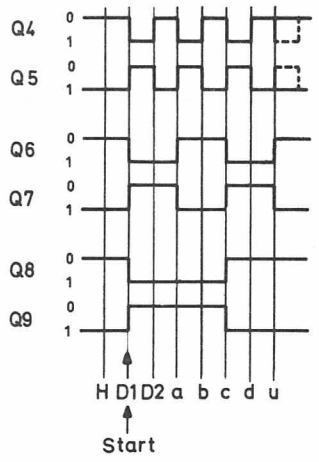
## Diode Matrix

The diode matrix comprises diodes E14 to E26 inclusive, resistors R33 to R37, and transistors Q11 to Q14.

The matrix serves the purpose of controlling transistors Q11 to Q14 and, in so doing, cutting in the desired coil taps in a predetermined sequence.

The oscillator (Q10) cuts in when one of the transistors Q11 to Q14 is in the "on" condition. This occurs when the matrix diodes are cut off so that the transistors can receive base current through resistors R33 - R37. If only one of the diodes is conductive, the base potential of the transistor in question will be so high that the transistor is in the "off" condition. The diode potentials are controlled by the three multivibrators.

Collector potentials are shown in the diagram below.




"1" DENOTES NEGATIVE VOLTAGE

In order to have these voltage patterns converted in such a manner that the tones will be transmitted in the proper sequence, the diode matrix has this appearance:

| | | | | | | |
|---|---|---|---|---|---|---|
| a4 | | | a7 | | | → Q11 "on" |
| | b5 | | b7 | b8 | | → Q12 "on" |
| c4 | | | | | c9 | → Q13 "on" |
| | d5 | d6 | | | d9 | → Q14 "on" |
| u4 | | | u7 | | u9 | → CUTOUT |

## Oscillator

The oscillator comprises transistors Q10 and Q15 and their associated components.

The oscillator uses a Hartley circuit, with a level clipper (Q15) connected across the tuned circuit. Transistor Q10 functions as an amplifier; it receives positive feedback through the feedback winding. The level at which clipping occurs is determined by the difference between the voltage at the base of Q15 and the voltage drop across diodes E27 and E28. The oscillator output level is adjusted by altering the value of resistor R46.

The emitters of transistors Q11 to Q14 inclusive connect to the junction of E27, C14, and R43. This point is negative with respect to chassis in order to secure effective cutoff of those of transistors Q11 - Q14 which are not active.

Diodes E27 and E28 also serve the purpose of improving temperature stability.

Transistors Q11 to Q14 inclusive must have collector impedances that do not exceed 25 ohms in order to accomplish the same output signal amplitude (±0.5 dB) when they are connected to the same coil tap.

## Oscillator Amplifier

The oscillator amplifier consists of transistors Q16 and Q17 with their associated components.

The amplifier is a two-stage DC-coupled amplifier which serves the purpose of providing an oscillator signal of the desired output level, impedance, and frequency characteristic.

Transistor Q16 has high input impedance so that the circuit will not load the oscillator.

Capacitor C16 in conjunction with the output impedance of Q16 and the input impedance of Q17 provides the desired frequency characteristic.



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CODING

The SG684 tone sequence generator, as mentioned above, is designed to deliver six consecutive impulses each of which has a duration of 70 msec. The first two of these six impulses are unmodulated whilst the last four are modulated. The first two impulses serve as a time of preparation for the fixed transmitter and the mobile receiver.

Each one of the last four impulses can be modulated with 12 different tone frequencies.
Since tone sequence receivers in the mobile stations cannot detect two identical tone frequencies that are transmitted consecutively, it is necessary to code the tone sequence generator according to a special system.

The 12 different tone frequencies are used as follows:

| Frequency: | 1060 Hz | 1160 Hz | 1270 Hz | 1400 Hz | 1530 Hz |
|---|---|---|---|---|---|
| Number: | 1 | 2 | 3 | 4 | 5 |

| 1670 Hz | 1830 Hz | 2000 Hz | 2200 Hz | 2400 Hz | 2600 Hz | 2800 Hz |
|---|---|---|---|---|---|---|
| 6 | 7 | 8 | 9 | 0 | R | A |

"R": repeater tone
"A": alarm tone (not used)

The last four impulses of the sequence, referred to below as digits, should be coded as follows:

Digit "1" and digit "2" are coded by means of straps on the tone coil (in tone sequence unit 10.1718).

Digit "3" and digit "4" are coded manually by means of the twenty push-buttons.

Example 1. First Two Digits Identical (e.g. 22):

Coding: 2R.
Digit "1" (brown lead) to terminal 2 on tone coil (in tone sequence unit 10.1718).
Digit "2" (red lead) to terminal 11 on tone coil (in tone sequence unit 10.1718).
Digits "3" and "4" are coded manually by means of the push-buttons (no strapping).

Example 2. First Two Digits Different (e.g. 21):

Coding: 21.
Digit "1" (brown lead) to terminal 2 on tone coil (in tone sequence unit 10.1718).
Digit "2" (red lead) to terminal 1 on tone coil (in tone sequence unit 10.1718).
Digits "3" and "4" are coded manually by means of the push-buttons.

On the rows of push-buttons, the two push-buttons marked No. 1 should be strapped (see circuit diagram of SG684).

Examples of Selected and Transmitted Numbers

Selected number: 5555. Transmitted number:5R5R
Selected number: 5155. Transmitted number:515R
Selected number: 5115. Transmitted number:51R5.

CODE CIRCUIT

The description of the code circuit is preceded by two examples:

Example 1. Number 5566

Coding: 5R6R.
Digit "1" (brown lead) to terminal 5 on tone coil.
Digit "2" (red lead) to terminal 11 on tone coil.
Digit "3" (green/brown lead) - N6, 7 - N6, 6/N6, 5 - (blue lead) to terminal 6 on tone coil.
Digit "4" (yellow/brown lead) - M6, 7 - M6, 6/M6, 5 - (green/white lead) - N6, 15 - N6, 16/N6, 11 - (pink lead) to terminal 11 (R) on tone coil.

Example 2. Number 5666

Coding: 56R6 (strap push-buttons marked 6)
Digit "1" (brown lead) to terminal 5 on tone coil.
Digit "2" (red lead) to terminal 6 on tone coil.
Digit "3" (green/brown lead) - N6, 7 - N6, 6/N6, 14 - (pink lead) to terminal 11 (R) on tone coil.
Digit "4" (yellow/brown lead) - M6, 16 - M6, 15/M6, 14 - (red/grey lead) - N6, 9/N6, 8 - (blue lead) to terminal 6 on tone coil.

Start

When the tone call button on the control box is depressed, -24 volts will be present at terminal 4, causing relay V to operate. 0 volts TX is applied to tone-generator terminal 4, causing the tone generator to start.

A flip-flop circuit in the tone generator applies tone transmit voltage, -24 volts, to terminal 5 during the impulse sequence (420 msec.), and


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relay V is kept operated during this interval (see also circuit description of tone sequence unit 10.1718).

Tone Transmit

Current path: 0 volts TX - contacts 12 and 13 (relay V operated).

Modulation

Tone signal from terminal 2 on tone sequence unit 10.1718 is fed to the transmitter modulation circuit. In control boxes where re-routing of the modulation path is necessary, relay V contacts 5, 6, 7, 8, 9, 10 are used.

## Data

Operating Voltage
-24 volts ±5%.

Temperature Range
$-30^{o}C$ to $+60^{o}C$.

Frequency Stability
Better than ±1%.

Frequency Accuracy
Better than 0.5%.

Current Drain
Stand-by: 14 mA.
Operation: 52 ma.

Frequency Response
Falling, 4 dB per octave.

Tone Frequencies
1060 Hz, 1160 Hz, 1270 Hz, 1400 Hz, 1530 Hz, 1670 Hz, 1830 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2800 Hz.

Output Impedance
600 ohms ±20%.

Output Level (1060 Hz)
-17 dBm ±2 dB.

Impulse Sequences
2 impulses (unmodulated) of 70 msec.
±15 msec. each.
4 impulses (modulated) of 70 msec.
±15 msec. each.
Max. time between impulses: 15 msec.

## Installation

The SG684 tone generator is mounted in the control desk (CB681, CB684 or CB686) and soldered to the existing cabling of the latter (see circuit diagrams of SG684 and the control box used).

## Check

Straps should be checked against circuit diagram of SG684.

## Adjustment

Not required.



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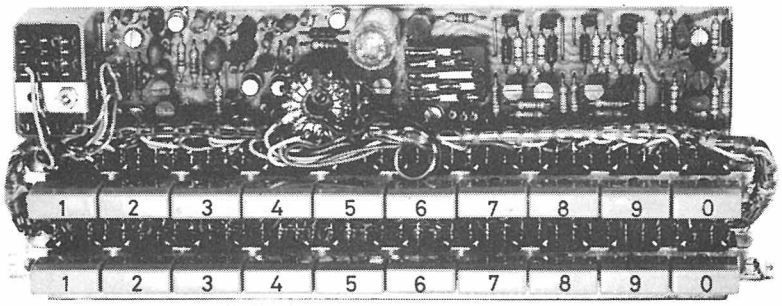
# SG685 Tone Sequence Generator




## Application

The SG685 tone sequence generator is intended for transmitting selective calls from a fixed VHF/UHF radio station to mobile stations.

## Functions

The tone sequence generator performs the following functions:

It delivers a positive voltage for switching the transmitter on.

It re-routes the modulation path to the transmitter.

It delivers 100 different tone combinations (selected out of 100,000 possible tone combinations) through manual operation of 2 x 10 push-buttons.

## Construction

The tone sequence generator which is intended for installation in a control desk of the CB680 series (CB681, CB684, or CB686) consists of the following sub-units:

10.2132 Tone sequence transmitter

2 rows of push-buttons with 10 buttons in each

A relay with four switching functions.

## Mode of Operation

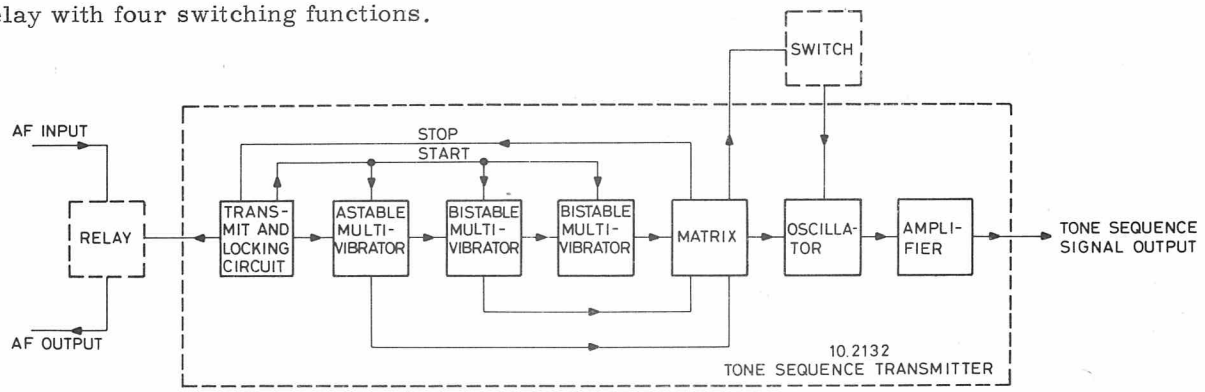
### General

When the tone call button is depressed the tone sequence generator transmits 7 consecutive impulses each of which has a duration of 70 msec. The first two impulses are unmodulated. The five following impulses are modulated; three of them are permanently adjusted for fixed tone frequencies, whilst the other two can be selected at will by means of push-button switches. This provides 10 x 10 combinations.

A relay blocks the passage of voice modulation during the transmission of the tone sequence.

After the transmission of the seven sequence impulses - approx. 490 msec. - a cutout pulse is transmitted, causing the generator to return to its inactive condition even if the tone call button is kept depressed.

The entire tone sequence will be transmitted even if the tone call button is depressed for less than 490 msec.



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## Tone Sequence Transmitter 10.2132

The tone sequence transmitter is built on a printed wiring board. It consists of these circuits:

Transmit and locking circuit
Astable multivibrator
Two bistable multivibrators (flip-flop circuits)
Diode matrix
Oscillator
Oscillator amplifier.

## Transmit and Locking Circuit

The transmit and locking circuit consists of transistors Q1, Q2, and Q3. It serves the purpose, in conjunction with a relay, of applying 0 volts to the transmit relay while the impulses are being transmitted. The transmit and locking circuit also supplies control voltage for the astable multivibrator and the two flip-flop circuits.

When the circuit is in its non-operated condition, transistors Q1, Q2, and Q3 are cut off, and C1 is neutral with respect to the minus potential. When the tone transmit button is depressed, terminal 4 is short-circuited, and diode E2 and capacitor C1 will cause a positive impulse to be applied to the base of Q2, which will consequently draw current. This will in turn cause Q1 to become operative, and current will flow through voltage divider R3, R4. As a result of this, positive bias will be applied to the base of Q2, so that a stable condition will exist - in other words, there will be a flip-flop action.

Negative voltage from the emitter of Q2 is fed through diode E3 and terminal 5 to the transmit relay, V, which is locked during the entire tone sequence.

When Q2 is conductive, zener diode E6 will receive voltage through resistor R9. This voltage will bring the astable multivibrator and hence also the two flip-flop circuits out of their non-operated condition. On completion of the tone sequence, the base of Q3 receives a cutout pulse from the matrix, causing the transistor to short-circuit, and no current will flow through Q1. Q2 cuts off, and the transmit and locking circuit is back in its non-operated condition.

## Astable Multivibrator

The astable multivibrator consists of transistors Q4 and Q5 and their associated components. The multivibrator produces square-wave impulses having a repetition time of 140 msec.

In the non-operated condition, transistor Q4 is "on" and Q5 is "off". Capacitor C6 is kept charged by the fixed negative voltage between R11 and R12. On the application of voltage, transistor Q5 will go "on" and Q4 will go "off" because C7 acts as a short circuit, permitting Q5 to draw a high value of current, determined by R14, R15, and R16.

When transistor Q5 goes "off", capacitor C6 will feed a positive impulse to the base of Q4. Transistor Q4 will be cut off for a time whose length will be determined by R10 and C6 and by the voltage at the junction of R11 and R12. After this time, Q5 will go "off" and Q4 will go "on". The time during which Q5 is in the "off" condition is determined by C7, R16, and by the voltage at the junction of R14 and R15.

Diodes E8 and E9 have been inserted in the interests of rapid voltage switching. A differentiated square-wave impulse is fed via C8 and C9 to the bases of Q6 and Q7.

## Bistable Multivibrators (Flip-Flop Circuits)

The bistable multivibrators, which are identical, comprise transistors Q6, Q7, and Q8, Q9 with their associated components.

In their non-operated condition, transistors Q6 and Q8 are "on" and Q7 and Q9 are "off" because only Q6 and Q8 can draw base current.

When voltage is applied, Q6 remains in the "on" condition because its base bias, controlled by the collector-emitter voltage of Q7, is not changed. Q7 remains in the "off" condition since the potential at the collector of Q6 is low.

Switching requires application of a control impulse. This is accomplished by cutting off the conductive transistor.

When the voltage at the input (C8 and C9) moves in the positive direction, a positive impulse will be applied to the bases of Q6 and Q7, causing the

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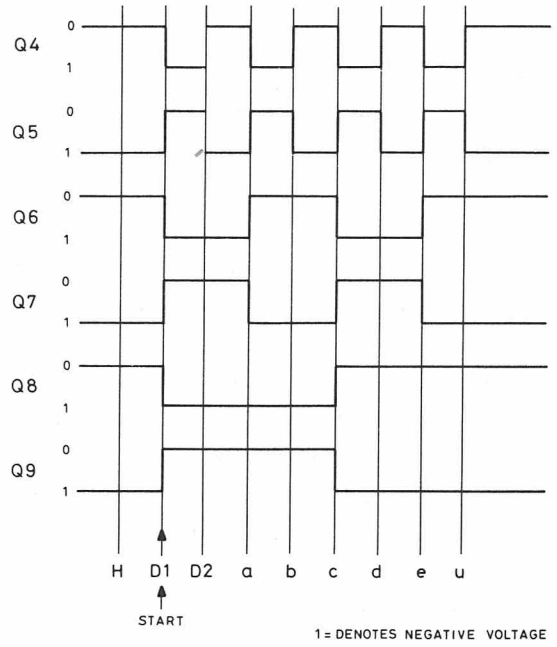
conductive transistor to pass into the "off" condition, and switching occurs. When the voltage at the input (C8 and C9) moves in the negative direction, the negative impulse will have no influence on account of diodes E10 and E11.

The repetition frequency will be halved.

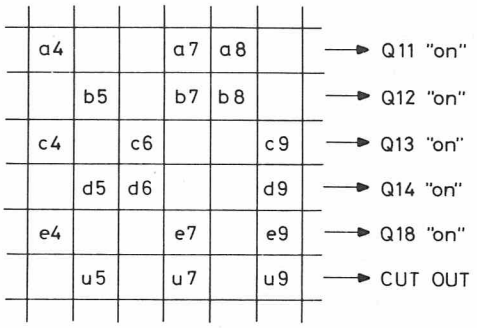
## Diode Matrix

The diode matrix comprises diodes E14 to E26 and E31 to E35, resistors R33 to R37 besides R55, transistors Q11 to Q14 besides Q18.
The matrix serves the purpose of controlling the gate transistors and, in so doing, cutting in the desired coil taps in a predetermined sequence.
The oscillator (Q10) cuts in when one of the gate transistors is in the "on" condition. This occurs when the matrix diodes are cut off so that the transistors can receive base current through resistors R33-R37 and R55. If only one of the diodes is conductive, the base potential of the transistor in question will be so high that the transistor is in the "off" condition. The diode potentials are controlled by the three multivibrators.

Collector potentials are shown in the diagram below.




In order to have these voltage patterns converted in such a manner that the tones will be transmitted in the proper sequence, the diode matrix has this appearance:




## Oscillator

The oscillator comprises transistors Q10 and Q15 and their associated components.

The oscillator uses a Hartley circuit, with a level clipper (Q15) connected across the tuned circuit. Transistor Q10 functions as an amplifier; it receives positive feedback through the feedback winding. The level at which clipping occurs is determined by the difference between the voltage at the base of Q15 and the voltage drop across diodes E27 and E28. The oscillator output level is adjusted by altering the value of resistor R46.

The emitters of Q11 to Q14 inclusive and Q18 connect to the junction of E27, C14, and R43. This point is negative with respect to chassis in order to secure effective cutoff of those of the gate transistors which are not active.
Diodes E27 and E28 also serve the purpose of improving temperature stability.

Transistors Q11-Q14 and Q18 must have collector impedances that do not exceed 25 ohms in order to accomplish the same output signal amplitude (± 0.5 dB) when they are connected to the same coil tap.

## Oscillator Amplifier

The oscillator amplifier consists of transistors Q16 and Q17 with their associated components.

The amplifier is a two-stage DC-coupled amplifier which serves the purpose of providing an oscillator signal of the desired output level, impedance, and frequency characteristic.

Transistor Q16 has high input impedance so that the circuit will not load the oscillator.

Capacitor C16 in conjunction with the output impedance of Q16 and the input impedance of Q17 provides the desired frequency characteristic.

## CODING

The SG685 tone sequence generator, as mentioned above, is designed to deliver seven consecutive impulses each of which has a duration of 70 msec. The first two of these seven impulses are unmodulated whilst the last five are modulated. The first two impulses serve as a time of preparation for the fixed transmitter and the mobile receiver. Each of the last five impulses can be modulated with 12 different tone frequencies.

Since tone sequence receivers in the mobile stations cannot detect two identical tone frequencies that are transmitted consecutively, it is necessary to code the tone sequence generator according to a special system.

The 12 different tone frequencies are used as follows:

| Frequency: | 1060 Hz | 1160 Hz | 1270 Hz | 1400 Hz | 1530 Hz |
|---|---|---|---|---|---|
| Number: | 1. | 2. | 3. | 4. | 5. |
| 1670 Hz | 1830 Hz | 2000 Hz | 2400 Hz | 2600 Hz | 2800 Hz |
| 6. | 7. | 9. | 0. | R. | A. |

"R": Repeater Tone
"A": Alarm Tone (not used).

The last five impulses of the sequence, referred to below as digits, should be coded as follows:

Digits "1", "2", and "3" are coded by means of straps on the tone coil (in tone sequence transmitter 10.2132).

Digit "4" and digit "5" are coded manually by means of the twenty push-buttons.

### Example 1. First Three Digits Identical (e.g. 222xx)

Coding: 2R2xx.
Digit "1" (brown lead) to terminal 2 on the tone coil (in tone sequence transmitter 10.2132).
Digit "2" (red lead) to terminal 11 on the tone coil (in tone sequence transmitter 10.2132).

Digit "3" (orange lead) to terminal 2 on the tone coil (in tone sequence transmitter 10.2132).
Digits "4" and "5" are coded manually by means of the push-buttons.
On the row of push-buttons, the two push-buttons marked No. 2 should be strapped (see circuit diagram of SG685).

### Example 2. First Three Digits Different (e.g. 486xx)

Coding: 486xx.
Digit "1" (brown lead) to terminal 4 on the tone coil (in tone sequence transmitter 10.2132).
Digit "2" (red lead) to terminal 8 on the tone coil (in tone sequence transmitter 10.2132).
Digit "3" (orange lead) to terminal 6 on the tone coil (in tone sequence transmitter 10.2132).
Digits "4" and "5" are coded manually by means of the push-buttons.
On the rows of push-buttons, the two push-buttons marked No. 6 should be strapped (see circuit diagram of SG685).

### Example of Selected and Transmitted Numbers

Selected number: 55555. Transmitted number: 5R5R5.
Selected number: 51555. Transmitted number: 515R5.
Selected number: 51155. Transmitted number: 51R5R.

## CODE CIRCUIT

The description of the code circuit is preceded by two examples:

### Example 1. Number 55666

Coding: 5R6R6 (push-buttons marked No. 6 should be strapped).
Digit "1" (brown lead) to terminal 5 on the tone coil.
Digit "2" (red lead) to terminal 11 on the tone coil.
Digit "3" (orange lead) to terminal 6 on the tone coil.
Digit "4" (green/brown lead) - N6,7 - N6,6/N6,14 - (pink lead) to terminal 11 on the tone coil.
Digit "5" (yellow/brown lead) - M6,16 - M6,15/M6,14 (red/grey lead) - N6,9/N6,8 - (blue lead) to terminal 6 on the tone coil.

### Example 2. Number 56666

Coding: 56R6R.
Digit "1" (brown lead) to terminal 5 on the tone coil.
Digit "2" (red lead) to terminal 6 on the tone coil.
Digit "3" (orange lead) to terminal 11 on the tone coil.

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Digit "4" (green/brown lead) - N6,7 - N6,6/N6,5 - (blue lead) to terminal 6 on the tone coil.
Digit "5" (yellow/brown lead) - M6,7 - M6,6/M6,5 - (green/white lead) - N6,15/N6,16 - N6,11 (pink lead) to terminal 11 on the tone coil.

Start

When the tone call button on the control unit is depressed, -24 volts will be present at terminal 4, causing relay V to operate. 0 volts TX is applied through the contacts 12 and 13 of relay V to tone-generator terminal 4, causing the tone generator to start.
A flip-flop circuit in the tone generator applies tone transmit voltage, -24 volts, to terminal 5 during the impulse sequence (490 msec.), and relay V is kept operated during this interval (see also circuit description of tone sequence transmitter 10.2132).

Tone Transmit

Current path: 0V TX - contacts 12 and 13 (relay V operated).

Modulation

The tone signal from terminal 2 on tone sequence transmitter 10.2132 is applied to the transmitter modulation circuit. In control units where rerouting of the modulation path is necessary, relay V contacts 5,6,7,8,9, and 10 are used.

## Technical Specifications

Operating Voltage
-24 volts ± 5%

Temperature Range
-30°C to +60°C

Frequency Stability
Better than ± 1%

Frequency Accuracy
Better than 0.5%

Current Drain
Stand-by: 14mA
Operation: 53mA

Frequency Response
Falling 4dB per octave

Tone Frequencies
1060 Hz, 1160 Hz, 1270 Hz, 1400 Hz, 1530 Hz, 1670 Hz, 1830 Hz, 2000 Hz, 2200 Hz, 2400 Hz, 2600 Hz, and 2800 Hz.

Output Impedance
600 Ω ± 20%

Output Level (1060 Hz)
-17dBm ± 2 dB

Impulse Sequence
2 impulses (unmodulated) of 70 msec. ± 15 msec. each.
5 impulses (modulated) of 70 msec. ± 15 msec. each.
Max. time between impulses: 15 msec.

## Installation

The SG685 tone generator is mounted in the control desk (CB681, CB684 or CB686) and soldered to the existing of the latter (see circuit diagrams of SG685 and the control desk used).

## Check

Straps should be checked against circuit diagram of SG685.

## Adjustment

Not required.

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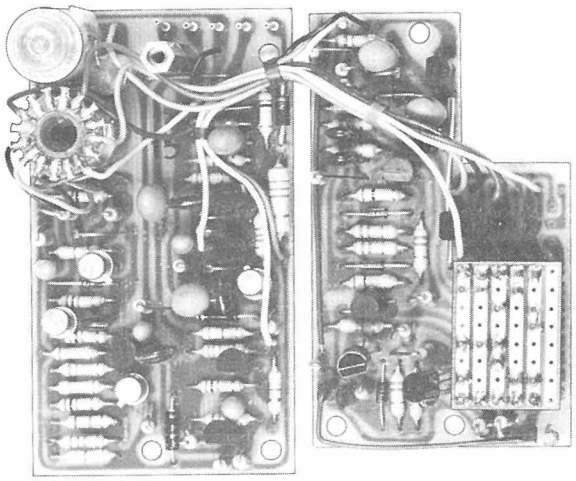
# Tone Sequence Transmitter ST684



## Application

Tone sequence transmitter ST684 is used as a selective calling unit in mobile radiotelephones forming part of an identification system. However, the tone sequence transmitter may also be used for conventional selective calls.

## Functions

The tone sequence transmitter performs the following functions:

It short-circuits the voice modulation path to the transmitter during transmission of tone calls.

It transmits a combination of tones consisting of four consecutive tones, each of them selected from a 12-tone frequency series inside the frequency range 1060-2800 Hz.

## Construction

The tone sequence transmitter is built on two wiring boards which are clamped together with the component sides facing each other, by means of four tie-rods and associated screws.

It comprises the following circuits:

Transmit and locking circuit
Astable multivibrator
Two bistable multivibrators (flip-flop circuits)
Diode matrix
Oscillator
Oscillator amplifier
AF gate and amplifier.

## Mode of Operation

General

When the tone-call button is pressed, the tone sequence transmitter gives off six consecutive pulses of 70 msec. duration each. The two initial pulses are unmodulated. The subsequent four pulses are modulated by a series of pre-set tones selected from a total of twelve available tone frequencies.

An AF gate short-circuits the voice modulation during the tone sequence. After transmission of the six sequence pulses - approx. 420 msec. - a release pulse is transmitted, causing the transmitter to return to its non-operated condition even if the tone-call button remains depressed.

The entire tone sequence will be transmitted even if the button is pressed for less than 420 msec.

Transmit and Locking Circuit

The transmit and locking circuit uses transistors Q1, Q2, and Q3. In the non-operated condition, these transistors are switched off, and capacitor C1 is neutral with respect to the minus potential.

When the transmit contact is connected to chassis, diode E2 and capacitor C1 will cause a positive-going pulse to reach the base of Q2, which will consequently draw current. This causes Q1 to switch on, and current will flow through voltage divider R3, R4. As a result of this, positive bias will be applied to the base of Q2, and a stable condition sets in - in other words, a flip-flop function results.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The transmit relay, connected between terminals 1 and 4, is kept connected to chassis potential via E3, Q1, and E4 during the tone sequence.

When Q2 is on, current will flow through resistor R9 to zener diode E6. The resulting voltage across E6 will throw the multivibrators out of their non-operated condition and activate the AF gate, Q18.

On completion of the sequence, the base of Q3 receives a release pulse from the matrix, thereby switching Q3 on, with the following consequences: the base of Q1 is short-circuited to chassis; current ceases to flow through voltage divider R3, R4; Q2 switches off. The transmit and locking circuit is now back in its non-operated condition.

Astable Multivibrator

The astable multivibrator consists of transistors Q4 and Q5 and their associated components. The multivibrator generates square-wave pulses with a repetition time of 140 msec.

In the non-operated condition, transistor Q4 is on and Q5 is off. Capacitor C6 is kept charged via R10 and R12.

When voltage is applied to it, transistor Q5 switches on, and Q4 switches off because C7 acts as a short-circuit, permitting Q5 to draw a high value of base current, determined by R14, R15, R16.

When transistor Q5 switches on, capacitor C6 will feed a positive pulse to the base of Q4. Transistor Q4 will be cut off during an interval determined by R10 and C6 and by the voltage at the junction of R11 and R12. At the end of this interval, Q5 will switch off and Q4 on. The length of the interval during which Q5 is switched off is determined by C7, R16 and by the voltage at the junction of R14, R15.

Diodes E8 and E9 ensure rapid voltage switch-over. A differentiated square-wave pulse if fed to the bases of Q6 and Q7 via C8 and C9.

Bistable Multivibrators (Flip-flop Circuits)

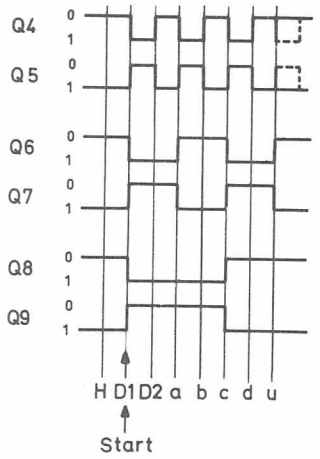
The bistable multivibrators are identical. They comprise transistors Q6, Q7 and Q8, Q9 and their associated components.
In the non-operated condition, transistors Q6 and Q8 are on and Q7 and Q9 are off as only Q6 and Q8 can receive base current.
When voltage is applied, Q6 remains on because its base bias, controlled by the collector-emitter voltage of Q7, remains unchanged. Q7 remains off due to the fact that the potential at the collector of Q6 is low.

A control pulse is required to accomplish switch-over. This is obtained by cutting off the conductive transistor.

When the voltage at the input, C8 and C9, moves in a positive direction, a positive pulse is applied to the bases of Q6 and Q7, causing the conductive transistor to cut off and a switch-over to occur.
When the voltage at the input, C8 and C9, moves in a negative direction, the negative pulse will have no influence, due to diodes E10 and E11. The repetition frequency will be halved.

Diode Matrix

The diode matrix comprises diodes E14-E26, resistors R33-R37, and transistors Q11-Q14. The matrix performs the function of controlling transistors Q11-Q14 and hence switching the desired coil taps into the circuit in a previously determined sequence. Oscillator Q10 is in operation when one of the transistors Q11-Q14 is on. This condition obtains when the matrix diodes are cut off, permitting the transistors to draw base current through resistors R33-R37. If only one of the diodes is conductive, the base potential of the transistor concerned will be large enough to switch on the transistor. The diode potentials are controlled by the three multivibrators. Collector potentials are diagrammed below.




"1" DENOTES NEGATIVE VOLTAGE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In order to have these voltage patterns translated in such a manner that the tones will be transmitted in the proper sequence, the diode matrix has this appearance:

| | | | | | | |
|---|---|---|---|---|---|---|
| a4 | | | a7 | | | → Q11 "on" |
| | b5 | | b7 | b8 | | → Q12 "on" |
| c4 | | | | | c9 | → Q13 "on" |
| | d5 | d6 | | | d9 | → Q14 "on" |
| u4 | | | u7 | | u9 | → CUT OUT |

Oscillator

The oscillator comprises transistors Q10 and Q15 and their associated components.

A Hartley oscillator is used, with voltage clipping across the tank circuit, performed by level clipper Q15.

Transistor Q10 functions as an amplifier;; it receives positive feed-back through the reaction winding.

Clipping is determined by the difference between the base voltage at Q15 and the voltage drop across diodes E27 and E28. The oscillator output level is adjusted by varying the value of resistor R46. The emitters of Q11-Q14 are connected to the junction of E27, C14, and R43. This point is negative with respect to chassis so that the inactive transistors can be effectively cut off.

Diodes E27 and E28 also help to improve temperature stability. In order to obtain the same output signal level (± 0.5 dB) when connected to the same coil tap, transistors Q11-Q14 should have a collector impedance that does not exceed 25 ohms.

Oscillator Amplifier

The oscillator amplifier comprises transistors Q16 and Q17 and their associated components.

The amplifier is a two-stage DC-coupled amplifier. It steps the oscillator signal up to the desired level and provides the desired output impedance and frequency characteristic.

Transistor Q16 has high input impedance so that the circuit will not load the oscillator.

Capacitor C16 together with the output impedance of Q16 and the input impedance of Q17 provides the desired frequency characteristic.

AF Gate

The AF gate comprises transistors Q18 and Q19 and their associated components. When the tone sequence transmitter is inoperative, Q18 is off and voice modulation is fed via C17 to the base of Q19. Transistor Q19 amplifies the signal to the desired level.

When the tone sequence transmitter is operated, negative bias is applied to the base of Q18, causing Q18 to switch on and so short-circuit the voice modulation. The tone sequence is taken off across R59, which is the common collector resistor of transistors Q17 and Q19.

## Data

Supply Voltage

-24V ± 5%.

Temperature Range

$-30^{\circ}C$ to $+60^{\circ}C$.

Frequency Stability

Better than ± 1%.

Frequency Accuracy

Better than 0.5%.

Battery Drain

Stand-by: 25mA ± 2mA.
Tone-call button depressed: 41mA ± 3mA.

Frequency Response

Falling, 4 dB per octave.

Tone Frequencies

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

Output Impedance

600 ohms ± 20 %.

Output Level (at 1060 Hz)

-17 dBm ± 2 dBm.



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Pulse Sequences

2 pulses (unmodulated), 70 msec ±15 msec each.
4 pulses (modulated), 70 msec ±15 msec each.
Max. time between pulses: 15 msec.

## Installation

In the CQM600 mobile radiotelephone, the tone sequence transmitter is mounted in the control box - Type CB601 or Type CB602.

In the CQL600 mobile radiotelephone, the tone sequence transmitter is mounted in the control panel (CP601) of the radio cabinet if the radiotelephone is locally controlled. If the radiotelephone is remotely controlled, the tone sequence transmitter is mounted in the control box (CB603).



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# CHAPTER 3. CIRCUIT DIAGRAMS AND PARTS LISTS

DIFFERENTIATOR | AMPLIFIER / FORSTÆRKER | SELECTIVE AMPL. / SELEKTIV FORST. | DETECTOR / DETEKTOR | SCHMITH GATE / TRIGGER | DELAY CIRCUIT / FORSINK. KREDSLØB | TRIGGER / (BISTAB.) | BLOCKING CIRCUIT. / BLOKERINGSKREDSLØB

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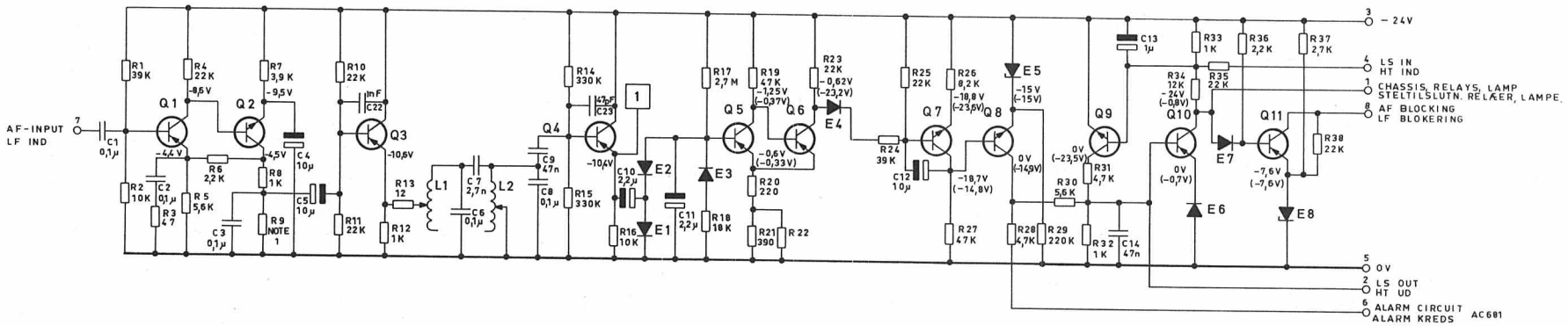



DC-VOLTAGES WITHOUT PARENTHESES
MEASURED WITHOUT SIGNAL AND LS OUT

DC-VOLTAGES WITHIN PARENTHESIS
MEASURED WITH SIGNAL AND LS IN
V IN = 1,1V f = 1060 Hz (TR681) OR 1010Hz (TR683)

DC-SPÆNDINGER UDEN PARENTES MÅLT
UDEN SIGNAL OG HT UD
DC-SPÆNDINGER I PARENTES MÅLT
MED SIGNAL OG HT IND
V IND = 1,1V f = 1060 Hz (TR681) ELLER 1010Hz (TR683)

NOTE 1 : IN TR681 IS R9 = 82Ω
IN TR683 IS R9 = 120Ω
NOTE 1 : I TR681 ER R9 = 82Ω
I TR683 ER R9 = 120Ω

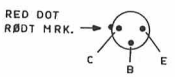
L1, L2

TOP VIEW
SET FRA OVEN

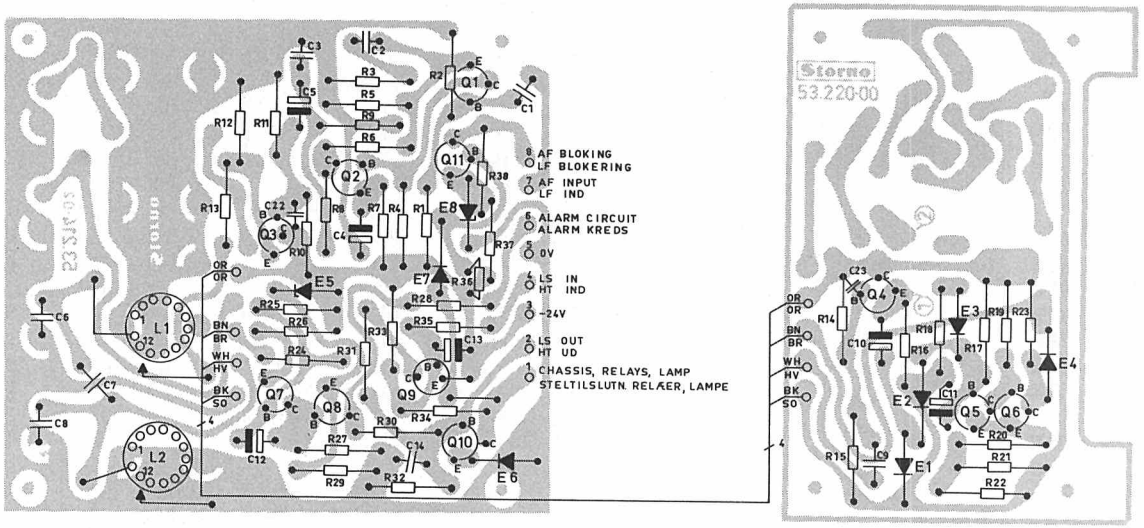
| TERM. | TR681 FREQ. | TR683 FREQ. |
|---|---|---|
| 1 | 1060 Hz | 925 Hz |
| 2 | 1160 Hz | 1010 Hz |
| 3 | 1270 Hz | 1240 Hz |
| 4 | 1400 Hz | 1435 Hz |
| 5 | 1530 Hz | 1520 Hz |
| 6 | 1670 Hz | 1750 Hz |
| 7 | 1830 Hz | 1860 Hz |
| 8 | 2000 Hz | 1980 Hz |
| 9 | 2200 Hz | 2000 Hz |
| 10 | 2400 Hz | 2135 Hz |
| 11 | 2600 Hz | 2280 Hz |
| 12 | 2900 Hz | 2450 Hz |


Q1, Q3, Q4, Q5, Q6, Q10
BOTTOM VIEW
SET FRA BUNDEN


Q2, Q7, Q8, Q9
BOTTOM VIEW
SET FRA BUNDEN




Q11
BOTTOM VIEW
SET FRA BUNDEN




PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN




PRINTED CIRCUIT VIEWED FROM
SOLDERING SIDE
TRYKT KREDSLØB SET FRA
LODDESIDEN

# TONE RECEIVER
# TONE MODTAGER

## TR681, TR683

D400.788/5

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| TR681 | | 10.1192-00 | Single tone receiver |
| TR683 | | 10.1481-00 | Single tone receiver |
| | C1 | 76.5073 | 0.1 uF 10% polyest. TB 100 V |
| | C2 | 76.5073 | 0.1 uF 10% polyest. TB 100 V |
| | C3 | 76.5073 | 0.1 uF 10% polyest. TB 100 V |
| | C4 | 73.5109 | 10 uF 20% tantal 15 V |
| | C5 | 73.5109 | 10 uF 20% tantal 15 V |
| | C6 | 76.5068 | 0.1 uF 1% polystyr. TB 30 V |
| | C7 | 76.5019 | 2.7 nF 5% polystyr. TB 125 V |
| | C8 | 76.5068 | 0.1 uF 1% polystyr. TB 30 V |
| | C9 | 76.5072 | 47 nF 10% polyest. FL 50 V |
| | C10 | 73.5102 | 2.2 uF 20% tantal 35 V |
| | C11 | 73.5102 | 2.2 uF 20% tantal 35 V |
| | C12 | 73.5109 | 10 uF 20% tantal 15 V |
| | C13 | 73.5114 | 1 uF 20% tantal 30 V |
| | C14 | 76.5072 | 47 nF 10% polyest FL 50 V |
| | C22 | 74.5155 | 1 nF -20+50% ceram PL 63 V |
| | C23 | 74.5186 | 47 pF 10% ceram PL 25 V |
| | R1 | 80.5268 | 39 k ohm 5% carbon film 1/8 W |
| | R2 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R3 | 80.5233 | 47 ohm 5% carbon film 1/8 W |
| | R4 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R5 | 80.5258 | 5.6 k ohm 5% carbon film 1/8 W |
| | R6 | 80.5253 | 2.2 k ohm 5% carbon film 1/8 W |
| | R7 | 80.5256 | 3.9 k ohm 5% carbon film 1/8 W |
| | R8 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| TR681 | R9 | 80.5236 | 82 ohm 5% carbon film 1/8 W |
| TR683 | R9 | 80.5238 | 120 ohm 5% carbon film 1/8 W |
| | R10 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R11 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R12 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R13 | 80.5226 | 12 ohm 5% carbon film 1/8 W |
| | R14 | 80.5279 | 0.33 M ohm 5% carbon film 1/8 W |
| | R15 | 80.5279 | 0.33 M ohm 5% carbon film 1/8 W |
| | R16 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R17 | 80.5490 | 2.7 M ohm 5% carbon film 1/4 W |
| | R18 | 80.5264 | 18 k ohm 5% carbon film 1/8 W |
| | R19 | 80.5269 | 47 k ohm 5% carbon film 1/8 W |
| | R20 | 80.5241 | 220 ohm 5% carbon film 1/8 W |
| | R21 | 80.5244 | 390 ohm 5% carbon film 1/8 W |
| | R22 | 80.52xx | Adjusted/tilpasset |
| | R23 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R24 | 80.5268 | 39 k ohm 5% carbon film 1/8 W |
| | R25 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R26 | 80.5260 | 8.2 k ohm 5% carbon film 1/8 W |

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| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | R27 | 80.5269 | 47 k ohm 5% carbon film 1/8 W |
| | R28 | 80.5261 | 10 k ohm 5% Carbon film 1/8 W |
| | R29 | 80.5277 | 0.22 M ohm 5% carbon film 1/8 W |
| | R30 | 80.5251 | 1.5 k ohm 5% carbon film 1/8 W |
| | R31 | 80.5254 | 2.7 k ohm 5% carbon film 1/8 W |
| | R32 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R33 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R34 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R35 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R36 | 80.5453 | 2.2 k ohm 5% carbon film 1/8 W |
| | R37 | 80.5254 | 2.7 k ohm 5% carbon film 1/8 W |
| | R38 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| TR681 | L1 | 61.840 | Coil/spole |
| TR683 | L1 | 61.928 | Coil/spole |
| TR681 | L2 | 61.840 | Coil/spole |
| TR683 | L2 | 61.928 | Coil/spole |
| | E1 | 99.5136 | Diode AA119 |
| | E2 | 99.5136 | Diode AA119 |
| | E3 | 99.5028 | Diode 1N914 |
| | E4 | 99.5028 | Diode 1N914 |
| | E5 | 99.5042 | Zenerdiode 9.1 V 5% 1/4 W |
| | E6 | 99.5020 | Diode 1N4004 |
| | E7 | 99.5020 | Diode 1N4004 |
| | E8 | 99.5075 | Zenerdiode BZY61 7.6 V 5% 0.275 W |
| | Q1 | 99.5144 | Transistor BC214L |
| | Q2 | 99.5143 | Transistor BC108 |
| | Q3 | 99.5144 | Transistor BC214L |
| | Q4 | 99.5144 | Transistor BC214L |
| | Q5 | 99.5144 | Transistor BC214L |
| | Q6 | 99.5144 | Transistor BC214L |
| | Q7 | 99.5143 | Transistor BC108 |
| | Q8 | 99.5143 | Transistor BC108 |
| | Q9 | 99.5121 | Transistor BC107 |
| | Q10 | 99.5144 | Transistor BC214L |
| | Q11 | 99.5142 | Transistor AC128 |

# TONE RECEIVER
# TONEMODTAGER

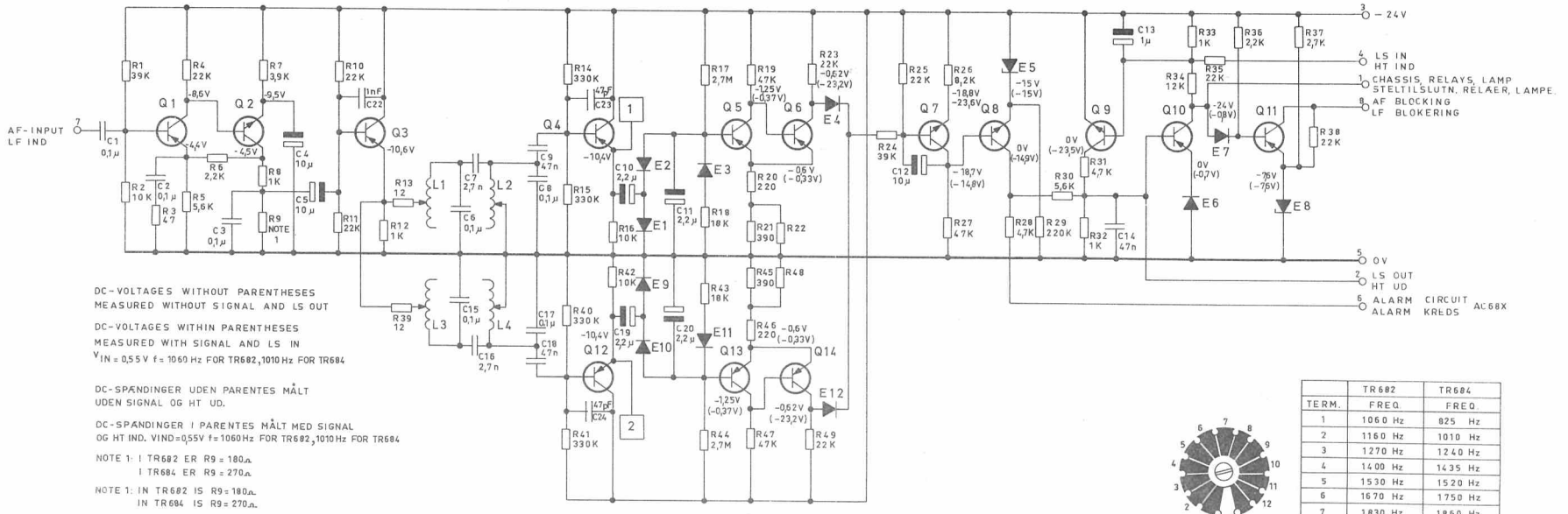
## TR681, TR683

X400.789/5

Storno

DIFFERENTIATOR | AMPLIFIER FORSTÆRKER | SELECTIVE AMPL. SELEKTIV FORST. | DETECTOR DETEKTOR | SCHMITH TRIGGER | GATE | DELAY CIRCUIT FORSINK. KREDSLØB | TRIGGER (BISTAB.) | BLOCKING CIRCUIT BLOKERINGS KREDSLØB

Storno




DC-VOLTAGES WITHOUT PARENTHESES
MEASURED WITHOUT SIGNAL AND LS OUT

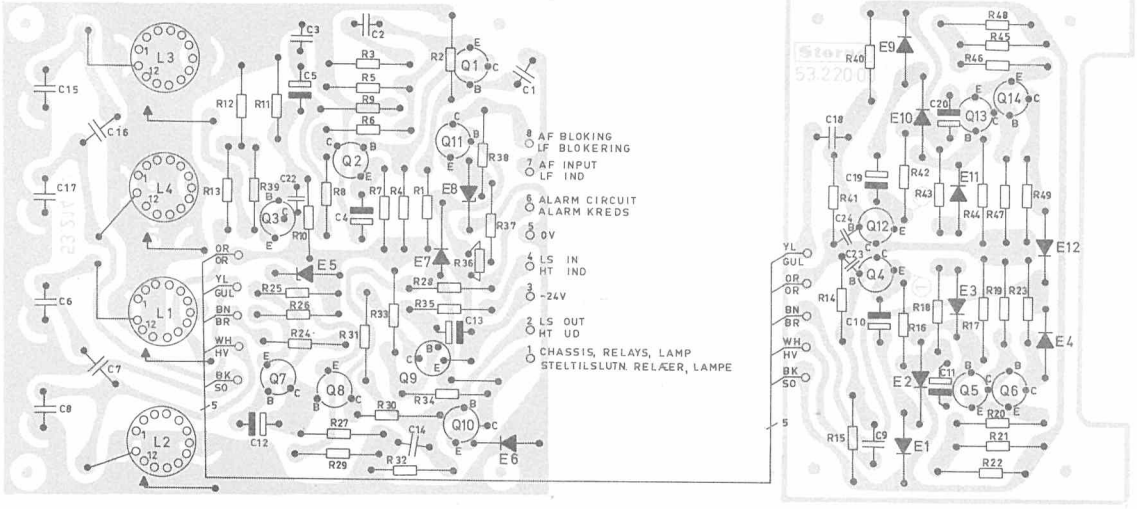
DC-VOLTAGES WITHIN PARENTHESES
MEASURED WITH SIGNAL AND LS IN
$V_{IN}$ = 0,55 V f = 1060 Hz FOR TR682, 1010 Hz FOR TR684

DC-SPÆNDINGER UDEN PARENTES MÅLT
UDEN SIGNAL OG HT UD.

DC-SPÆNDINGER I PARENTES MÅLT MED SIGNAL
OG HT IND. VIND=0,55V f=1060Hz FOR TR682, 1010Hz FOR TR684

NOTE 1: I TR682 ER R9 = 180Ω
I TR684 ER R9 = 270Ω

NOTE 1: IN TR682 IS R9 = 180Ω
IN TR684 IS R9 = 270Ω




PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

PRINTED CIRCUIT VIEWED FROM SOLDERING SIDE
TRYKT KREDSLØB SET FRA LODDESIDEN



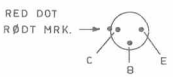
L1, L2, L3, L4

TOP VIEW
SET FRA OVEN

| | TR682 | TR684 |
|---|---|---|
| TERM. | FREQ. | FREQ. |
| 1 | 1060 Hz | 825 Hz |
| 2 | 1160 Hz | 1010 Hz |
| 3 | 1270 Hz | 1240 Hz |
| 4 | 1400 Hz | 1435 Hz |
| 5 | 1530 Hz | 1520 Hz |
| 6 | 1670 Hz | 1750 Hz |
| 7 | 1830 Hz | 1860 Hz |
| 8 | 2000 Hz | 1980 Hz |
| 9 | 2200 Hz | 2000 Hz |
| 10 | 2400 Hz | 2135 Hz |
| 11 | 2600 Hz | 2280 Hz |
| 12 | 2900 Hz | 2450 Hz |


Q1, Q3, Q4, Q5, Q6, Q10, Q12, Q13, Q14
BOTTOM VIEW
SET FRA BUNDEN


Q2, Q7, Q8, Q9
BOTTOM VIEW
SET FRA BUNDEN




Q11
BOTTOM VIEW
SET FRA BUNDEN

# TONE RECEIVER
# TONE MODTAGER

## TR682, TR684

D400.763/4

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| TR682 | | 10.1191-00 | Double tone receiver |
| TR684 | | 10.1482-00 | Double tone receiver |
| | C1 | 76.5073 | 0.1 uF 10% polyest TB 100 V |
| | C2 | 76.5073 | 0.1 uF 10% polyest TB 100 V |
| | C3 | 76.5073 | 0.1 uF 10% polyest TB 100 V |
| | C4 | 73.5109 | 10 nF 20% tantal 15 V |
| | C5 | 73.5109 | 10 uF 20% tantal 15 V |
| | C6 | 76.5068 | 0.1 uF 1% polystyr TB 30 V |
| | C7 | 76.5019 | 2.7 nF 5% polystyr TB 125 V |
| | C8 | 76.5068 | 0.1 uF 1% polystyr TB 30 V |
| | C9 | 76.5072 | 47 nF 10% polyest FL 50 V |
| | C10 | 73.5102 | 2.2 uF 20% tantal 35 V |
| | C11 | 73.5102 | 2.2 uF 20% tantal 35 V |
| | C12 | 73.5109 | 10 uF 20% tantal 15 V |
| | C13 | 73.5114 | 1 uF 20% tantal 30 V |
| | C14 | 76.5072 | 47 nF 10% polyest FL 50 V |
| | C15 | 76.5068 | 0.1 uF 1% polystyr TB 30 V |
| | C16 | 76.5019 | 2.7 nF 5% polystyr TB 125 V |
| | C17 | 76.5068 | 0.1 uF 1% polystyr TB 30 V |
| | C18 | 76.5072 | 47 nF 10% polyest FL 50 V |
| | C19 | 76.5102 | 2.2 uF 20% tantal 35 V |
| | C20 | 76.5102 | 2.2 uF 20% tantal 35 V |
| | C22 | 74.5155 | 1 nF -20+50% ceram PL 63 V |
| | C23 | 74.5186 | 47 pF 10% ceram PL 25 V |
| | R1 | 80.5268 | 39 k ohm 5% carbon film 1/8 W |
| | R2 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R3 | 80.5233 | 47 ohm 5% carbon film 1/8 W |
| | R4 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R5 | 80.5258 | 5.6 k ohm 5% carbon film 1/8 W |
| | R6 | 80.5253 | 2.2 k ohm 5% carbon film 1/8 W |
| | R7 | 80.5256 | 3.9 k ohm 5% carbon film 1/8 W |
| | R8 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| TR682 | R9 | 80.5240 | 180 ohm 5% carbon film 1/8 W |
| TR684 | R9 | 80.5242 | 270 ohm 5% carbon film 1/8 W |
| | R10 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R11 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R12 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R13 | 80.5226 | 12 ohm 5% carbon film 1/8 W |
| | R14 | 80.5279 | 0.33 M ohm 5% carbon film 1/8 W |
| | R15 | 80.5279 | 0.33 M ohm 5% carbon film 1/8 W |
| | R16 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R17 | 80.5490 | 2.7 M ohm 5% carbon film 1/8 W |
| | R18 | 80.5264 | 18 k ohm 5% carbon film 1/8 W |
| | R19 | 80.5269 | 47 k ohm 5% carbon film 1/8 W |
| | R20 | 80.5241 | 220 ohm 5% carbon film 1/8 W |
| | R21 | 80.5244 | 390 ohm 5% carbon film 1/8 W |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| TR682 | R22 | 80.5240 | 180 ohm 5% carbon film 1/8 W |
| TR684 | R22 | 80.5242 | 270 ohm 5% carbon film 1/8 W |
| | R23 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R24 | 80.5268 | 39 k ohm 5% carbon film 1/8 W |
| | R25 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R26 | 80.5260 | 8.2 k ohm 5% carbon film 1/8 W |
| | R27 | 80.5269 | 47 k ohm 5% carbon film 1/8 W |
| | R28 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R29 | 80.5277 | 0.22 M ohm 5% carbon film 1/8 W |
| | R30 | 80.5251 | 1.5 k ohm 5% carbon film 1/8 W |
| | R31 | 80.5254 | 2.7 k ohm 5% carbon film 1/8 W |
| | R32 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R33 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R34 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R35 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R36 | 80.5453 | 2.2 k ohm 5% carbon film 1/4 W |
| | R37 | 80.5254 | 2.7 k ohm 5% carbon film 1/8 W |
| | R38 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R39 | 80.5226 | 12 ohm 5% carbon film 1/8 W |
| | R40 | 80.5279 | 0.33 M ohm 5% carbon film 1/8 W |
| | R41 | 80.5279 | 0.33 M ohm 5% carbon film 1/8 W |
| | R42 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R43 | 80.5264 | 18 k ohm 5% carbon film 1/8 W |
| | R44 | 80.5490 | 2.7 M ohm 5% carbon film 1/8 W |
| | R45 | 80.5244 | 390 ohm 5% carbon film 1/8 W |
| | R46 | 80.5241 | 220 ohm 5% carbon film 1/8 W |
| | R47 | 80.5269 | 47 k ohm 5% carbon film 1/8 W |
| TR682 | R48 | 80.5240 | 180 ohm 5% carbon film 1/8 W |
| TR684 | R48 | 80.5242 | 270 ohm 5% carbon film 1/8 W |
| | R49 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| TR682 | L1 | 61.840 | Coil/spole |
| TR684 | L1 | 61.928 | Coil/spole |
| TR682 | L2 | 61.840 | Coil/spole |
| TR684 | L2 | 61.928 | Coil/spole |
| TR682 | L3 | 61.840 | Coil/spole |
| TR684 | L3 | 61.928 | Coil/spole |
| TR682 | L4 | 61.840 | Coil/spole |
| TR684 | L4 | 61.928 | Coil/spole |
| | E1 | 99.5136 | Diode AA119 |
| | E2 | 99.5136 | Diode AA119 |

# TONE RECEIVER
# TONEMODTAGER

## TR682, TR684

X400.738/5

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | E3 | 99.5028 | Diode 1N914 |
| | E4 | 99.5028 | Diode 1N914 |
| | E5 | 99.5042 | Zenerdiode 9.1 V 5% 1/4 W |
| | E6 | 99.5020 | Diode 1N4004 |
| | E7 | 99.5020 | Diode 1N4004 |
| | E8 | 99.5075 | Zenerdiode BZY61 7.6 V 5% 0.275 W |
| | E9 | 99.5136 | Diode AA119 |
| | E10 | 99.5136 | Diode AA119 |
| | E11 | 99.5028 | Diode 1N914 |
| | E12 | 99.5028 | Diode 1N914 |
| | Q1 | 99.5144 | Transistor BC214L |
| | Q2 | 99.5143 | Transistor BC108 |
| | Q3 | 99.5144 | Transistor BC214L |
| | Q4 | 99.5144 | Transistor BC214L |
| | Q5 | 99.5144 | Transistor BC214L |
| | Q6 | 99.5144 | Transistor BC214L |
| | Q7 | 99.5143 | Transistor BC108 |
| | Q8 | 99.5143 | Transistor BC108 |
| | Q9 | 99.5121 | Transistor BC107 |
| | Q10 | 99.5144 | Transistor BC214L |
| | Q11 | 99.5142 | Transistor AC128 |
| | Q12 | 99.5144 | Transistor BC214L |
| | Q13 | 99.5144 | Transistor BC214L |
| | Q14 | 99.5144 | Transistor BC214L |

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

TONE RECEIVER
TONEMODTAGER

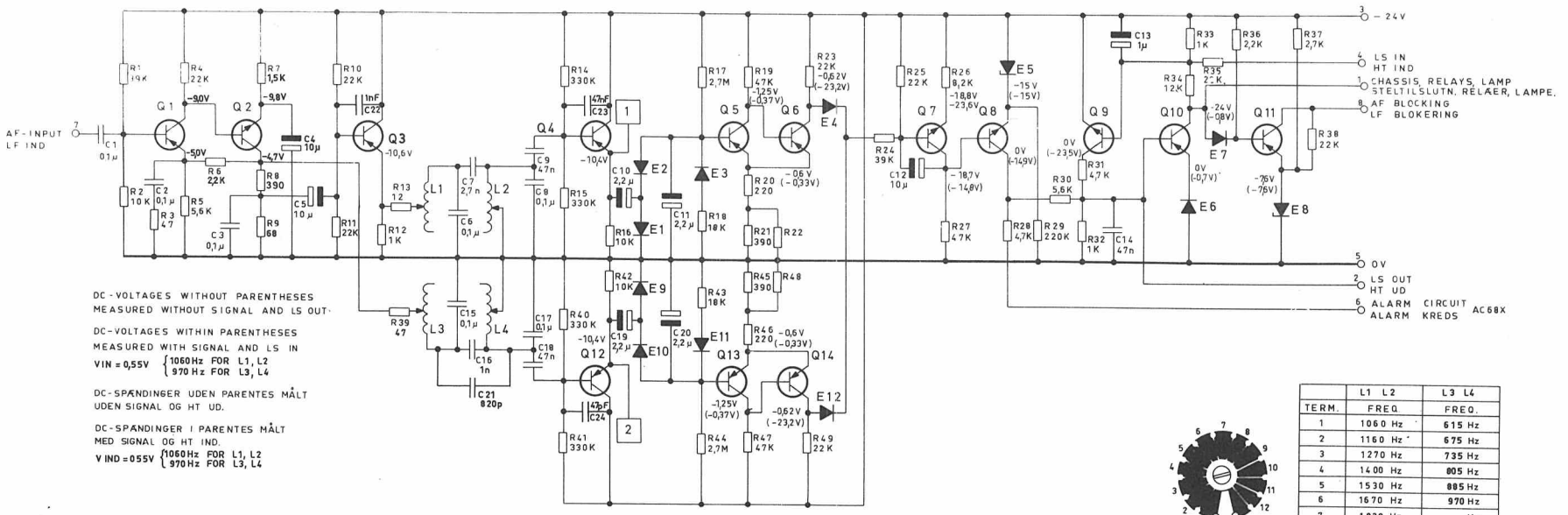
TR682, TR684

X400.738/5

Storno

DIFFERENTIATOR | AMPLIFIER / FORSTÆRKER | SELECTIVE AMPL. / SELEKTIV FORST. | DETECTOR / DETEKTOR | SCHMITH TRIGGER | GATE | DELAY CIRCUIT / FORSINK. KREDSLØB | TRIGGER (BISTAB.) | MUTING CIRCUIT / BLOKERINGS KREDSLØB

Storno

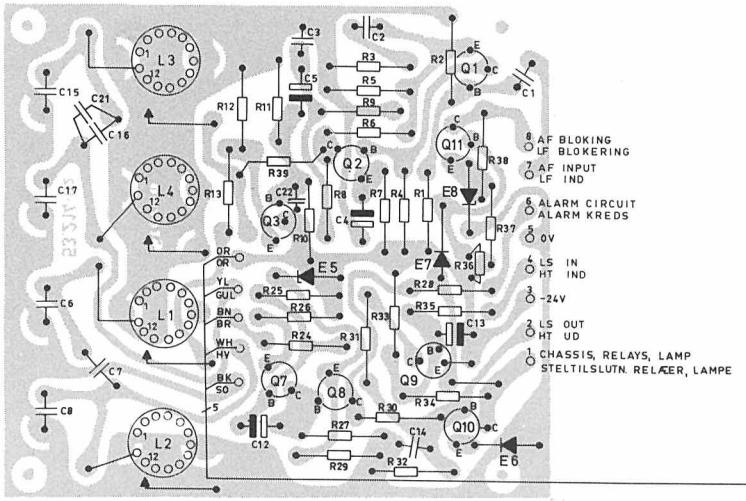



DC-VOLTAGES WITHOUT PARENTHESES
MEASURED WITHOUT SIGNAL AND LS OUT.

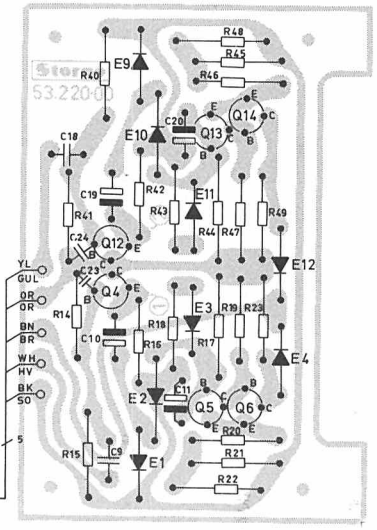
DC-VOLTAGES WITHIN PARENTHESES
MEASURED WITH SIGNAL AND LS IN
VIN = 0,55V {1060Hz FOR L1, L2 / 970 Hz FOR L3, L4

DC-SPÆNDINGER UDEN PARENTES MÅLT
UDEN SIGNAL OG HT UD.

DC-SPÆNDINGER I PARENTES MÅLT
MED SIGNAL OG HT IND.
V IND = 055V {1060Hz FOR L1, L2 / 970Hz FOR L3, L4




PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



PRINTED CIRCUIT VIEWED FROM SOLDERING SIDE
TRYKT KREDSLØB SET FRA LODDESIDEN



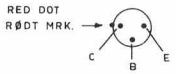
L1, L2, L3, L4

TOP VIEW
SET FRA OVEN

| TERM. | L1 L2 FREQ. | L3 L4 FREQ. |
|---|---|---|
| 1 | 1060 Hz | 615 Hz |
| 2 | 1160 Hz | 675 Hz |
| 3 | 1270 Hz | 735 Hz |
| 4 | 1400 Hz | 805 Hz |
| 5 | 1530 Hz | 885 Hz |
| 6 | 1670 Hz | 970 Hz |
| 7 | 1830 Hz | Hz |
| 8 | 2000 Hz | Hz |
| 9 | 2200 Hz | Hz |
| 10 | 2400 Hz | Hz |
| 11 | 2600 Hz | Hz |
| 12 | 2900 Hz | Hz |


Q1, Q3, Q4, Q5, Q6, Q10, Q12, Q13, Q14
BOTTOM VIEW
SET FRA BUNDEN


Q2, Q7, Q8, Q9
BOTTOM VIEW
SET FRA BUNDEN




Q11
BOTTOM VIEW
SET FRA BUNDEN

# TONE RECEIVER
# TONE MODTAGER

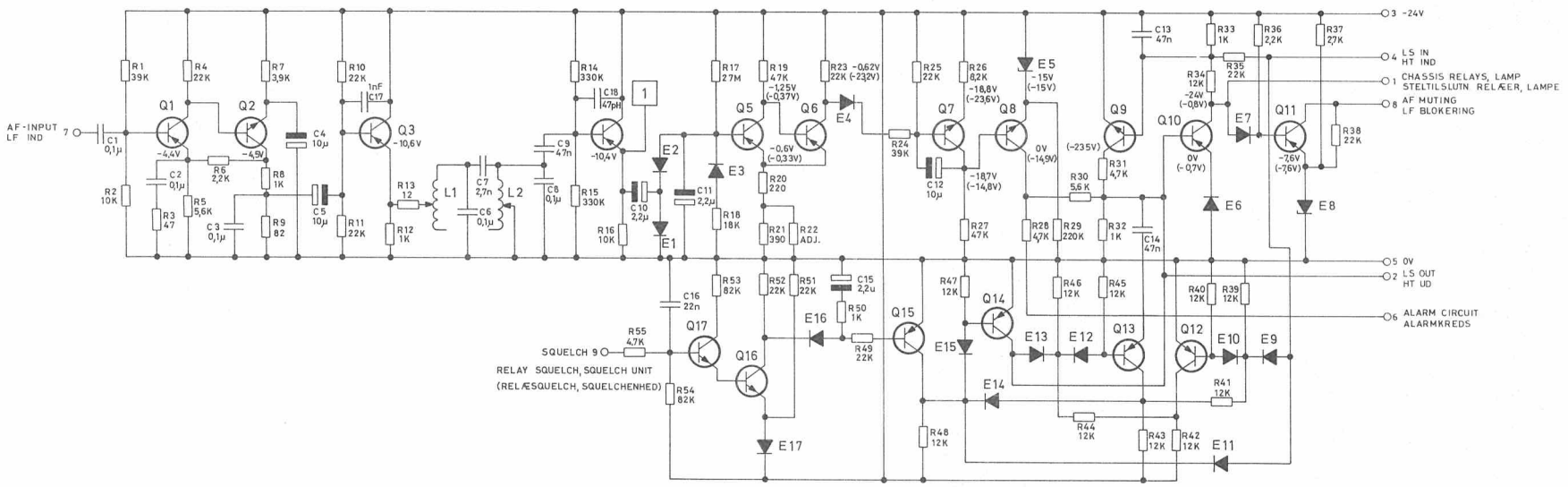
TR687

D 400.911/4

Storno

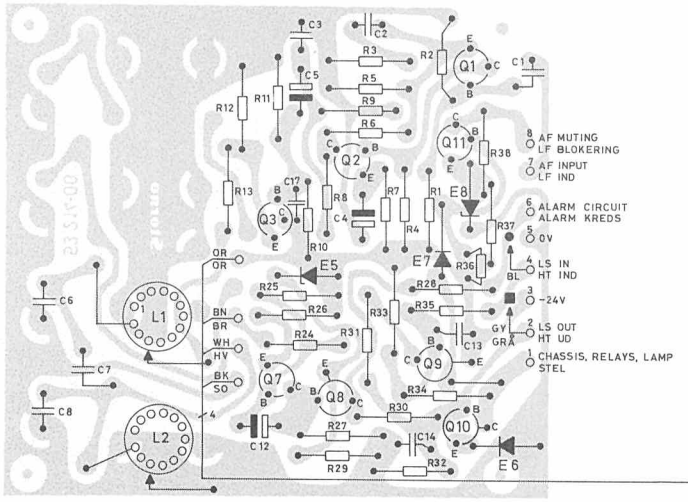
Storno

DIFFERENTIATOR AMPLIER FORSTÆRKER BAND FILTER BÅNDFILTER DETECTOR DETEKTOR SCHMITT TRIGGER DELAY CIRCUIT FORSINK. KREDSLØB TRIGGER (BISTAB) AF MUTING CIRCUIT LF BLOKERINGSKREDSLØB

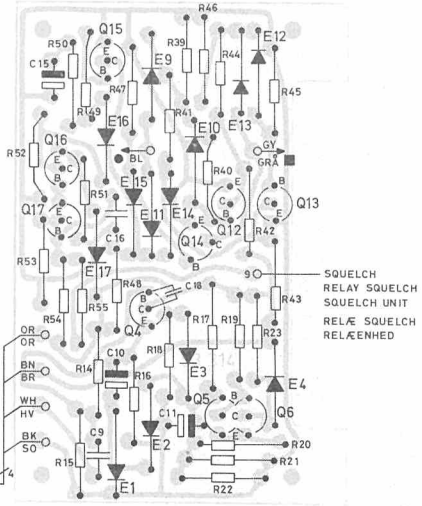



SQUELCH AMPLIFIER
SQUELCH FORSTÆRKER

BISTABLE MULTIVIBRATOR
BISTABIL MULTIVIBRATOR




PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

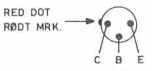



PRINTED CIRCUIT VIEWED FROM SOLDERING SIDE
TRYKT KREDSLØB SET FRA LODDESIDEN


| | L1 L2 |
|---|---|
| TERM. | FREQ |
| 1 | 1060 Hz |
| 2 | 1160 – |
| 3 | 1270 – |
| 4 | 1400 – |
| 5 | 1530 – |
| 6 | 1670 – |
| 7 | 1830 – |
| 8 | 2000 – |
| 9 | 2200 – |
| 10 | 2400 – |
| 11 | 2600 – |
| 12 | 2900 – |


Q1, Q3, Q4, Q5, Q6, Q10
Q12, Q13, Q14, Q15, Q16, Q17
BOTTOM VIEW
SET FRA BUNDEN


Q2, Q7, Q8, Q9
BOTTOM VIEW
SET FRA BUNDEN




Q11
BOTTOM VIEW
SET FRA BUNDEN

# TONE RECEIVER
# TONE MODTAGER

TR6812

D400.987/2

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| TR6812 | | 10.1729-00 | Single Tone Receiver |
| | C1 | 76.5073 | 0.1 uF 10% polyester TB 100 V |
| | C2 | 76.5073 | 0.1 uF 10% polyester TB 100 V |
| | C3 | 76.5073 | 0.1 uF 10% polyester TB 100 V |
| | C4 | 73.5109 | 10 uF 20% tantal 15 V |
| | C5 | 73.5109 | 10 uF 20% tantal 15 V |
| | C6 | 76.5068 | 0.1 uF 1% polystyr. TB 30 V |
| | C7 | 76.5019 | 2.7 nF 5% polystyr. TB 30 V |
| | C8 | 76.5068 | 0.1 uF 1% polystyr. TB 30 V |
| | C9 | 76.5072 | 47 nF 10% polyester FL 50 V |
| | C10 | 73.5102 | 2.2 uF 20% tantal 35 V |
| | C11 | 73.5102 | 2.2 uF 20% tantal 35 V |
| | C12 | 73.5109 | 10 uF 20% tantal 15 V |
| | C13 | 76.5072 | 47 nF 10% polyester FL 50 V |
| | C14 | 76.5072 | 47 nF 10% polyester FL 50 V |
| | C15 | 73.5102 | 2.2 uF 20% tantal 35 V |
| | C16 | 76.5071 | 22 nF 10% polyester FL 50 V |
| | C17 | 74.5155 | 1 nF -20+50% ceram PL 63 V |
| | C18 | 74.5186 | 47 pF 10% ceram PL 25 V |
| | R1 | 80.5268 | 39 k ohm 5% carbon film 1/8 W |
| | R2 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R3 | 80.5233 | 47 ohm 5% carbon film 1/8 W |
| | R4 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R5 | 80.5258 | 5.6 k ohm 5% carbon film 1/8 W |
| | R6 | 80.5253 | 2.2 k ohm 5% carbon film 1/8 W |
| | R7 | 80.5256 | 3.9 k ohm 5% carbon film 1/8 W |
| | R8 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R9 | 80.5236 | 82 ohm 5% carbon film 1/8 W |
| | R10 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R11 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R12 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R13 | 80.5226 | 12 ohm 5% carbon film 1/8 W |
| | R14 | 80.5279 | 0.33 M ohm 5% carbon film 1/8 W |
| | R15 | 80.5279 | 0.33 M ohm 5% carbon film 1/8 W |
| | R16 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R17 | 80.5490 | 2.7 M ohm 5% carbon film 1/4 W |
| | R18 | 80.5264 | 18 k ohm 5% carbon film 1/8 W |
| | R19 | 80.5269 | 47 k ohm 5% carbon film 1/8 W |
| | R20 | 80.5241 | 220 ohm 5% carbon film 1/8 W |
| | R21 | 80.5244 | 390 ohm 5% carbon film 1/8 W |
| | R22 | 80.52xx | adjusted/tilpasset |
| | R23 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R24 | 80.5268 | 39 k ohm 5% c carbon film 1/8 W |
| | R25 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R26 | 80.5260 | 8.2 k ohm 5% carbon film 1/8 W |
| | R27 | 80.5269 | 47 k ohm 5% carbon film 1/8 W |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | R28 | 80.5261 | 10 k ohm 5% carbon film 1/8 W |
| | R29 | 80.5277 | 0.22 M ohm 5% carbon film 1/8 W |
| | R30 | 80.5251 | 1.5 k ohm 5% carbon film 1/8 W |
| | R31 | 80.5254 | 2.7 k ohm 5% carbon film 1/8 W |
| | R32 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R33 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R34 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R35 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R36 | 80.5453 | 2.2 k ohm 5% carbon film 1/4 W |
| | R37 | 80.5254 | 2.7 k ohm 5% carbon film 1/8 W |
| | R38 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R39 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R40 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R41 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R42 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R43 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R44 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R45 | 80.5262 | 12 k ohm 5% carbon film 1/8W |
| | R46 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R47 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R48 | 80.5262 | 12 k ohm 5% carbon film 1/8 W |
| | R49 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R50 | 80.5249 | 1 k ohm 5% carbon film 1/8 W |
| | R51 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R52 | 80.5265 | 22 k ohm 5% carbon film 1/8 W |
| | R53 | 80.5272 | 82 k ohm 5% carbon film 1/8 W |
| | R54 | 80.5272 | 82 k ohm 5% carbon film 1/8 W |
| | R55 | 80.5257 | 4.7 k ohm 5% carbon film 1/8 W |
| | L1 | 61.840 | Coil/spole |
| | L2 | 61.840 | Coil/spole |
| | E1 | 99.5136 | Diode AA119 |
| | E2 | 99.5136 | Diode AA119 |
| | E3 | 99.5028 | Diode 1N914 |
| | E4 | 99.5028 | Diode 1N914 |
| | E5 | 99.5042 | Zenerdiode 9.1 V 5% 1/4 W |
| | E6 | 99.5020 | Diode 1N4004 |
| | E7 | 99.5020 | Diode 1N4004 |
| | E8 | 99.5075 | Zenerdiode 7.6 V 5% 0.275 W |
| | E9 | 99.5028 | Diode 1N914 |
| | E10 | 99.5028 | Diode 1N914 |

# TONE RECEIVER
# TONE MODTAGER

TR6812

X400.990/2

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | E11 | 99.5028 | Diode 1N914 |
| | E12 | 99.5028 | Diode 1N914 |
| | E13 | 99.5028 | Diode 1N914 |
| | E14 | 99.5028 | Diode 1N914 |
| | E15 | 99.5028 | Diode 1N914 |
| | E16 | 99.5028 | Diode1N914 |
| | E17 | 99.5028 | Diode 1N914 |
| | Q1 | 99.5144 | Transistor BC214L |
| | Q2 | 99.5143 | Transistor BC108 |
| | Q3 | 99.5144 | Transistor BC214L |
| | Q4 | 99.5144 | Transistor BC214L |
| | Q5 | 99.5144 | Transistor BC214L |
| | Q6 | 99.5144 | Transistor BC214L |
| | Q7 | 99.5143 | Transistor BC108 |
| | Q8 | 99.5143 | Transistor BC108 |
| | Q9 | 99.5121 | Transistor BC107 |
| | Q10 | 99.5144 | Transistor BC214L |
| | Q11 | 99.5142 | Transistor AC128 |
| | Q12 | 99.5144 | Transistor BC214L |
| | Q13 | 99.5144 | Transistor BC214L |
| | Q14 | 99.5144 | Transistor BC214L |
| | Q15 | 99.5144 | Transistor BC214L |
| | Q16 | 99.5117 | Transistor 2N2924 |
| | Q17 | 99.5117 | Transistor 2N2924 |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

# TONE RECEIVER
# TONE MODTAGER

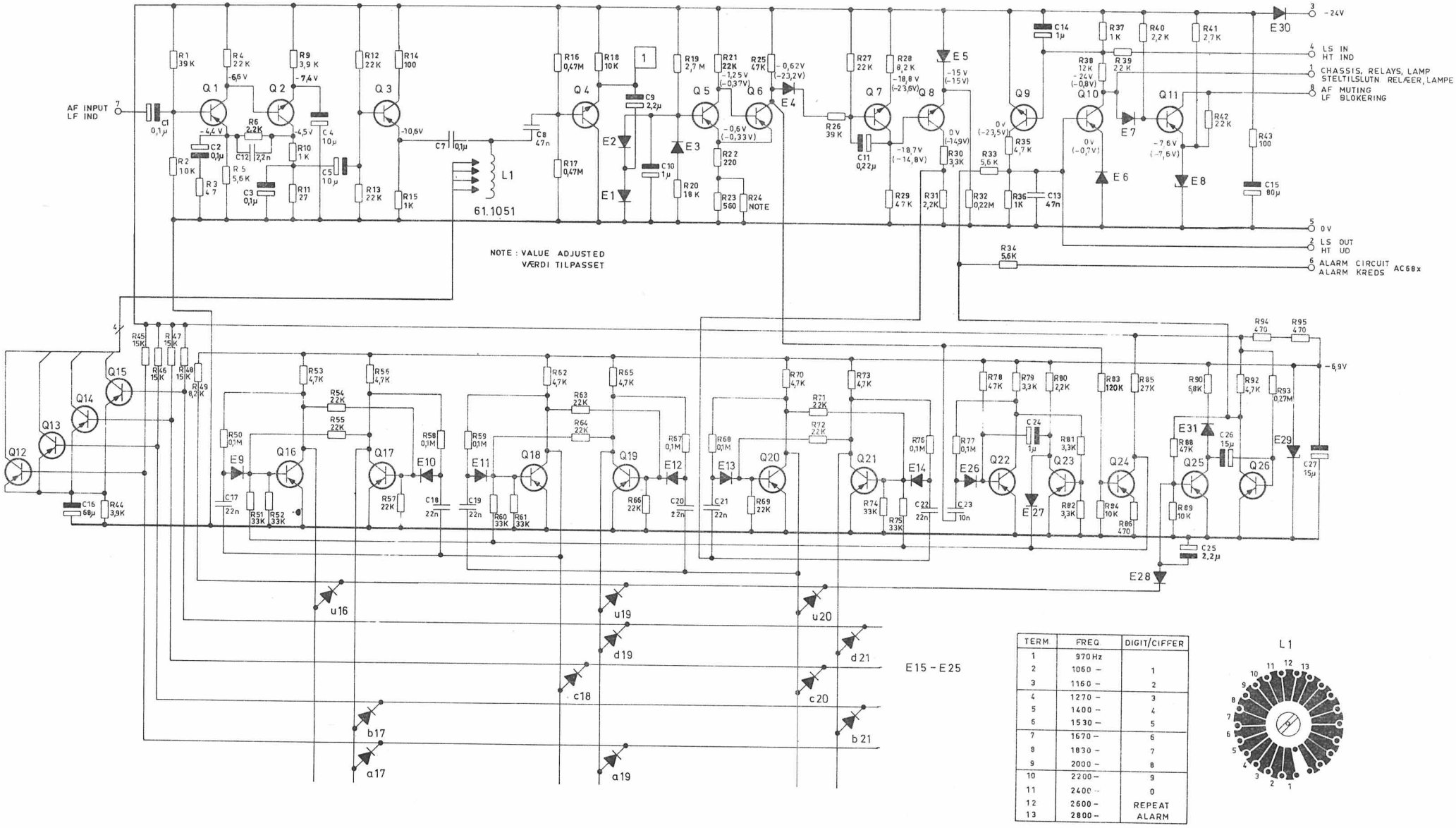
TR6812

X400.990/2

Storno

DIFFERENTIATOR | AMPLIFIER / FORSTÆRKER | SELECTIVE AMPL. / SELEKTIV FORST. | DETECTOR / DETEKTOR | SCHMITT GATE / TRIGGER | DELAY CIRCUIT / FORSINK. KREDSLØB | TRIGGER / (BISTAB.) | MUTING CIRCUIT / BLOKERINGSKREDSLØB

Storno




| TERM | FREQ | DIGIT/CIFFER |
|---|---|---|
| 1 | 970 Hz | |
| 2 | 1060 – | 1 |
| 3 | 1160 – | 2 |
| 4 | 1270 – | 3 |
| 5 | 1400 – | 4 |
| 6 | 1530 – | 5 |
| 7 | 1670 – | 6 |
| 8 | 1830 – | 7 |
| 9 | 2000 – | 8 |
| 10 | 2200 – | 9 |
| 11 | 2400 – | 0 |
| 12 | 2600 – | REPEAT |
| 13 | 2800 – | ALARM |



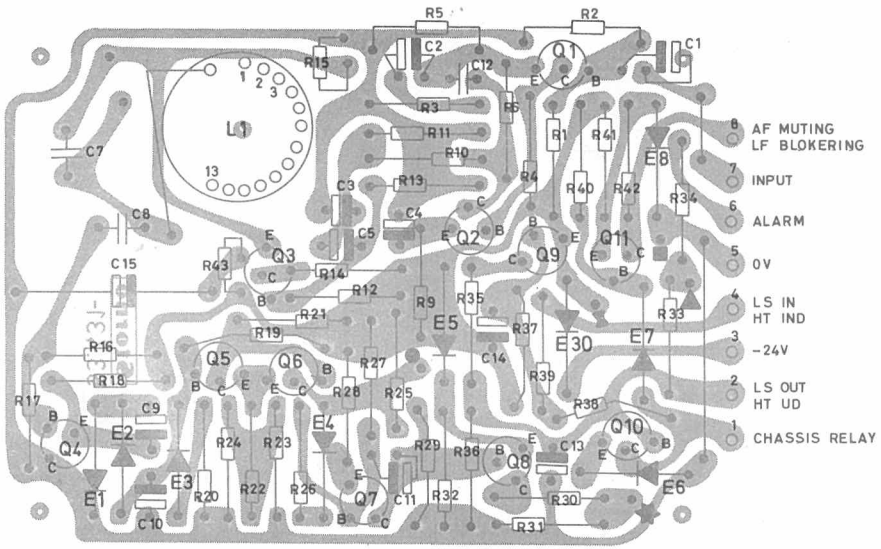

TONE SEQUENCE RECEIVER
SEKVENSTONEMODTAGER

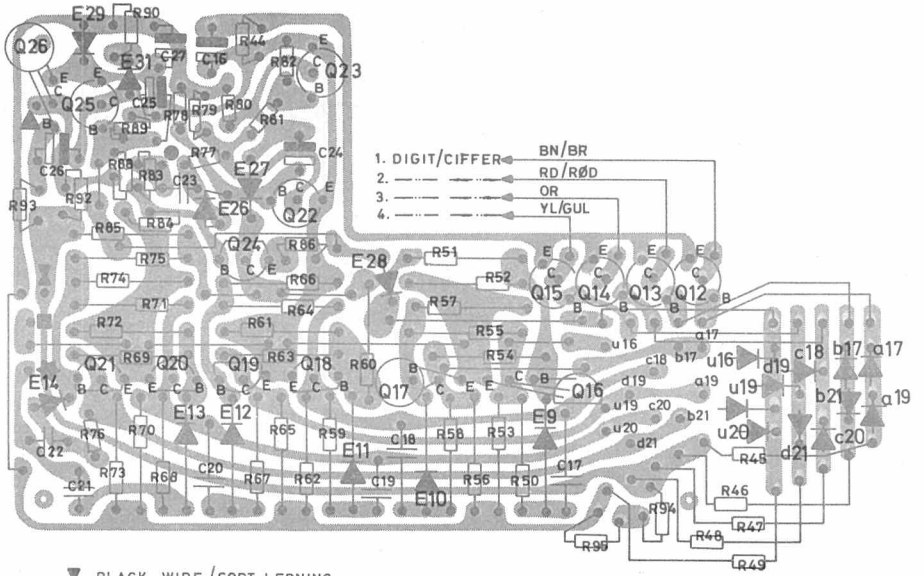
SR684

D400.912/5

Storno

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN




BLACK WIRE / SORT LEDNING
GREEN WIRE / GRØN LEDNING
YELLOW WIRE / GUL LEDNING
RED WIRE / RØD LEDNING
WHITE WIRE / HVID LEDNING

# TONE SEQUENCE RECEIVER
# SEKVENSTONEMODTAGER

SR684

D400.989/2

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | C1 | 73.5089 | 0,1 µF 20% tantal | 35V |
| | C2 | 73.5089 | 0,1 µF 20% " | 35V |
| | C3 | 73.5089 | 0,1 µF 20% " | 35V |
| | C4 | 73.5109 | 10 µF 20% " | 15V |
| | C5 | 73.5109 | 10 µF 20% " | 15V |
| | C7 | 76.5068 | 0,1 µF 1% polystyr. TB | 30V |
| | C8 | 76.5072 | 47 nF 10% polyest. FL | 50V |
| | C9 | 73.5102 | 2.2 µF 20% tantal | 35V |
| | C10 | 73.5114 | 1 µF 20% " | 30V |
| | C11 | 73.5118 | 0.22 µF 20% " | 35V |
| | C12 | 76.5059 | 2.2 nF 10% polyest. FL | 50V |
| | C13 | 76.5072 | 47 nF 10% polyest. FL | 30V |
| | C14 | 73.5114 | 1µF 20% | 30V |
| | C15 | 73.5110 | 80 µF -10/+50% elco | 25V |
| | C16 | 73.5106 | 68 µF 20% tantal | 15V |
| | C17 | 76.5071 | 22 nF 10% polyest. FL | 50V |
| | C18 | 76.5071 | 22 nF 10% " FL | 50V |
| | C19 | 76.5071 | 22 nF 10% " FL | 50V |
| | C20 | 76.5071 | 22 nF 10% " FL | 50V |
| | C21 | 76.5071 | 22 nF 10% " FL | 50V |
| | C22 | 76.5071 | 22 nF 10% " FL | 50V |
| | C23 | 76.5070 | 10 nF 10% " FL | 50V |
| | C24 | 73.5114 | 1 µF 20% tantal | 30V |
| | C25 | 73.5102 | 2.2 µF 20% " | 35V |
| | C26 | 73.5105 | 15 µF 20% " | 15V |
| | C27 | 73.5105 | 15 µF 20% " | 15V |
| | R1 | 80.5268 | 39 kΩ 5% carbon film | 1/8W |
| | R2 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | R3 | 80.5233 | 47 Ω 5% " " | 1/8W |
| | R4 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R5 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R6 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R9 | 80.5256 | 3.9 kΩ 5% " " | 1/8W |
| | R10 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R11 | 80.5230 | 27 Ω 5% " " | 1/8W |
| | R12 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R13 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R14 | 80.5237 | 100 Ω 5% " " | 1/8W |
| | R15 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R16 | 80.5281 | 0,47 MΩ 5% " " | 1/8W |
| | R17 | 80.5281 | 0,47 MΩ 5% " " | 1/8W |
| | R18 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | R19 | 80.5490 | 2.7 MΩ 10% " " | 1/4W |
| | R20 | 80.5264 | 18 kΩ 5% " " | 1/8W |
| | R21 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R22 | 80.5241 | 220 Ω 5% " " | 1/8W |
| | R23 | 80.5246 | 560 Ω 5% " " | 1/8W |

Storno

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | R24 | 80.52xx | Adjusted/tilpasset | 1/8W |
| | R25 | 80.5269 | 47 kΩ 5% carbon film | 1/8W |
| | R26 | 80.5268 | 39 kΩ 5% " " | 1/8W |
| | R27 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R28 | 80.5260 | 8.2 kΩ 5% " " | 1/8W |
| | R29 | 80.5269 | 47 kΩ 5% " " | 1/8W |
| | R30 | 80.5255 | 3.3 kΩ 5% " " | 1/8W |
| | R31 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R32 | 80.5277 | 0.22 MΩ 5% " " | 1/8W |
| | R33 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R34 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R35 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R36 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R37 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R38 | 80.5262 | 12 kΩ 5% " " | 1/8W |
| | R39 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R40 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R41 | 80.5254 | 2.7 kΩ 5% " " | 1/8W |
| | R42 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R43 | 80.5237 | 100 Ω 5% " " | 1/8W |
| | R44 | 80.5256 | 3.9 kΩ 5% " " | 1/8W |
| | R45 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R46 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R47 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R48 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R49 | 80.5260 | 8.2 kΩ 5% " " | 1/8W |
| | R50 | 80.5273 | 0.1 MΩ 5% " " | 1/8W |
| | R51 | 80.5267 | 33 kΩ 5% " " | 1/8W |
| | R52 | 80.5267 | 33 kΩ 5% " " | 1/8W |
| | R53 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R54 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R55 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R56 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R57 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R58 | 80.5273 | 0,1 MΩ 5% " " | 1/8W |
| | R59 | 80.5273 | 0,1 MΩ 5% " " | 1/8W |
| | R60 | 80.5267 | 33 kΩ 5% " " | 1/8W |
| | R61 | 80.5267 | 33 kΩ 5% " " | 1/8W |
| | R62 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R63 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R64 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R65 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |

# TONE SEQUENCE RECEIVER
# SEKVENSTONEMODTAGER

SR684

X400.975/4

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | R66 | 80.5265 | 22 kΩ 5% carbon film 1/8W |
| | R67 | 80.5273 | 0,1 MΩ 5% " " 1/8W |
| | R68 | 80.5273 | 0,1 MΩ 5% " " 1/8W |
| | R69 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R70 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R71 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R72 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R73 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R74 | 80.5267 | 33 kΩ 5% " " 1/8W |
| | R75 | 80.5267 | 33 kΩ 5% " " 1/8W |
| | R76 | 80.5273 | 0,1 MΩ 5% " " 1/8W |
| | R77 | 80.5273 | 0,1 MΩ 5% " " 1/8W |
| | R78 | 80.5269 | 47 kΩ 5% " " 1/8W |
| | R79 | 80.5255 | 3.3 kΩ 5% " " 1/8W |
| | R80 | 80.5253 | 2.2 kΩ 5% " " 1/8W |
| | R81 | 80.5255 | 3.3 kΩ 5% " " 1/8W |
| | R82 | 80.5255 | 3.3 kΩ 5% " " 1/8W |
| | R83 | 80.5274 | 0,12 MΩ 5% " " 1/8W |
| | R84 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | R85 | 80.5266 | 27 kΩ 5% " " 1/8W |
| | R86 | 80.5245 | 470 Ω 5% " " 1/8W |
| | R88 | 80.5269 | 47 Ω 5% " " 1/8W |
| | R89 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | R90 | 80.5259 | 6.8 kΩ 5% " " 1/8W |
| | R92 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R93 | 80.5278 | 0.27 kΩ 5% " " 1/8W |
| | R94 | 80.5245 | 470 Ω 5% " " 1/8W |
| | R95 | 80.5245 | 470 Ω 5% " " 1/8W |
| | L1 | 61.1051 | Coil/spole |
| | E1 | 99.5136 | AA119 Diode |
| | E2 | 99.5136 | AA119 Diode |
| | E3 | 99.5028 | 1N914 Diode |
| | E4 | 99.5028 | 1N914 Diode |
| | E5 | 99.5042 | Zenerdiode 9.1V 5% 1/4W |
| | E6 | 99.5020 | 1N4004 Diode |
| | E7 | 99.5020 | 1N4004 Diode |
| | E8 | 99.5075 | Zenerdiode 7.6V 5% 0.275W |
| | E9-E28 | 99.5028 | 1N914 Diode |
| | E29 | 99.5146 | Zenerdiode 6.9V 5% 0.275W |
| | E30 | 99.5020 | 1N4004 Diode |
| | E31 | 99.5028 | 1N914 Diode |
| | Q1 | 99.5144 | BC214L Transistor |
| | Q2 | 99.5143 | BC108 Transistor |
| | Q3 | 99.5144 | BC214L Transistor |
| | Q4 | 99.5121 | BC107 Transistor |

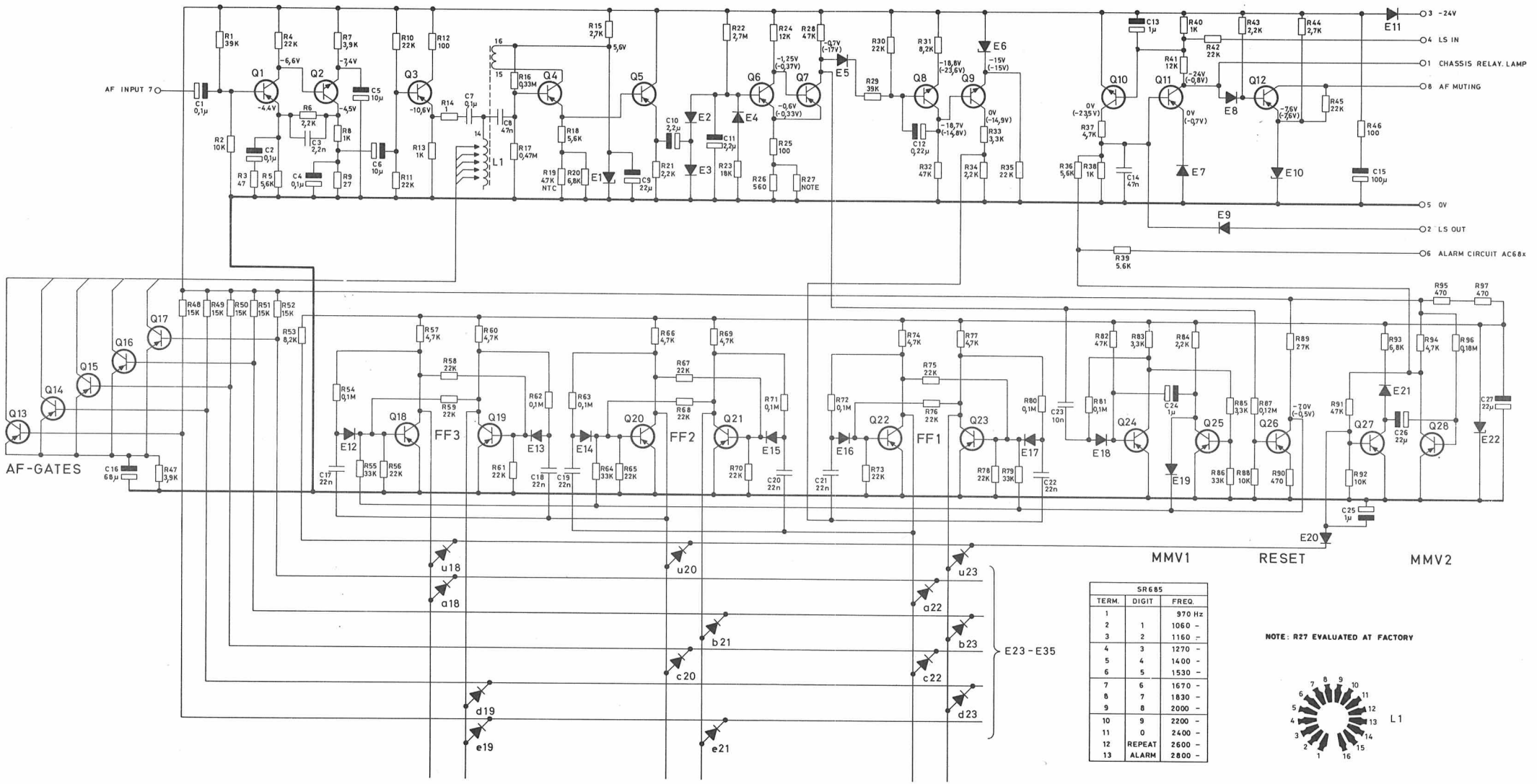
Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | Q5 | 99.5144 | BC214L Transistor |
| | Q6 | 99.5144 | BC214L Transistor |
| | Q7 | 99.5143 | BC108 Transistor |
| | Q8 | 99.5143 | BC108 Transistor |
| | Q9 | 99.5121 | BC107 Transistor |
| | Q10 | 99.5144 | BC214L Transistor |
| | Q11 | 99.5142 | AC128 Transistor |
| | Q12-Q26 | 99.5144 | BC214L Transistor |

# TONE SEQUENCE RECEIVER
# SEKVENSTONEMODTAGER

SR684

X400.975/4




| SR685 | | |
|---|---|---|
| TERM. | DIGIT | FREQ. |
| 1 | | 970 Hz |
| 2 | 1 | 1060 – |
| 3 | 2 | 1160 – |
| 4 | 3 | 1270 – |
| 5 | 4 | 1400 – |
| 6 | 5 | 1530 – |
| 7 | 6 | 1670 – |
| 8 | 7 | 1830 – |
| 9 | 8 | 2000 – |
| 10 | 9 | 2200 – |
| 11 | 0 | 2400 – |
| 12 | REPEAT | 2600 – |
| 13 | ALARM | 2800 – |

NOTE: R27 EVALUATED AT FACTORY

# TONE SEQUENTIAL RECEIVER
# SEKVENSTONEMODTAGER

SR685

D401.241

PREAMPLIFIER/LIMITER

Q-MULTIPLIER

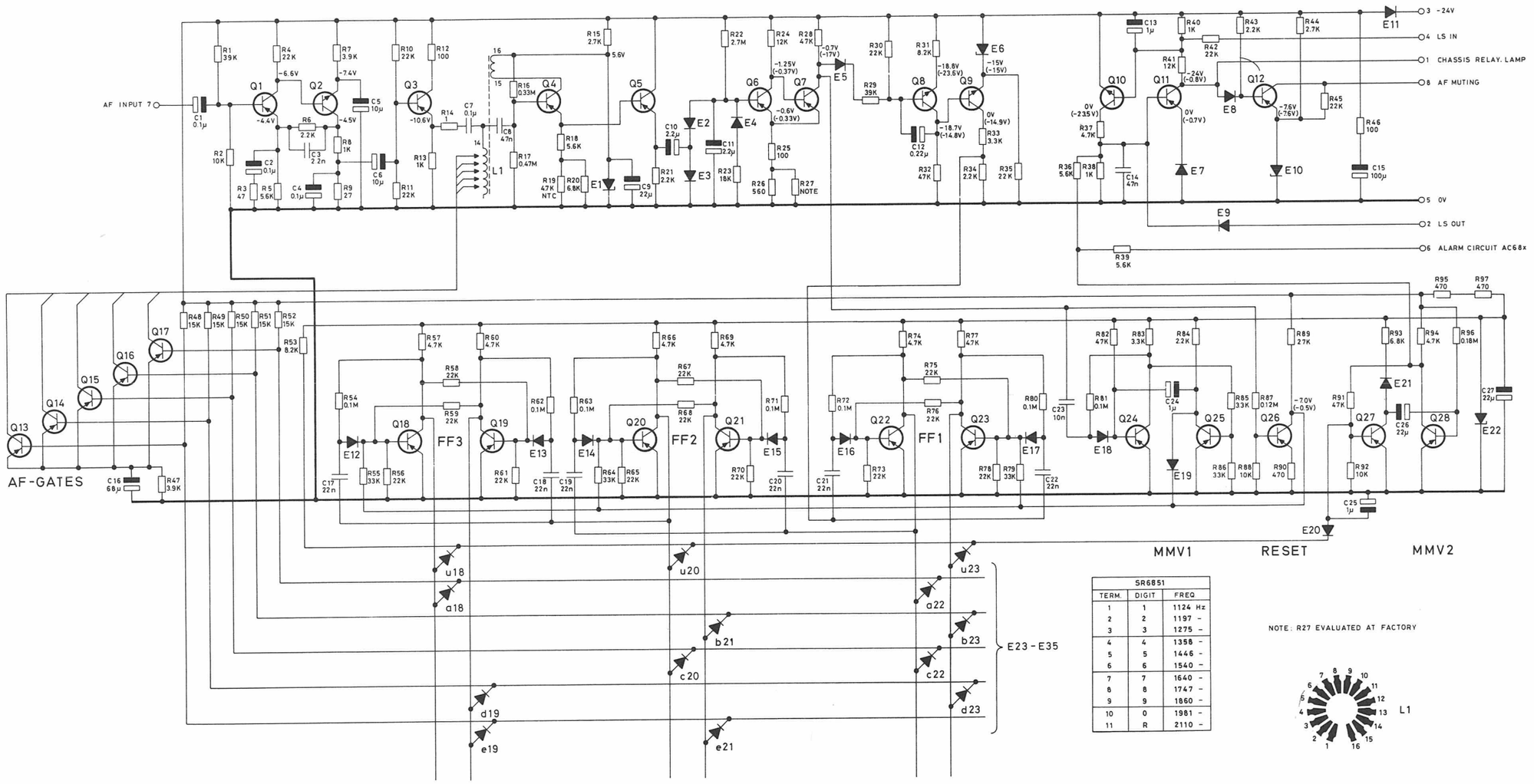
DETECTOR

SCHMITT TRIGGER

DELAY CIRCUIT

TRIGGER (BISTAB.)

MUTING CIRCUIT




| SR6851 | | |
|---|---|---|
| TERM. | DIGIT | FREQ. |
| 1 | 1 | 1124 Hz |
| 2 | 2 | 1197 – |
| 3 | 3 | 1275 – |
| 4 | 4 | 1358 – |
| 5 | 5 | 1446 – |
| 6 | 6 | 1540 – |
| 7 | 7 | 1640 – |
| 8 | 8 | 1747 – |
| 9 | 9 | 1860 – |
| 10 | 0 | 1981 – |
| 11 | R | 2110 – |

NOTE: R27 EVALUATED AT FACTORY




TONE SEQUENTIAL RECEIVER
SEKVENSTONEMODTAGER

**SR6851**

D401.243

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| SR685 | | 10.2521 | Sequential Tone Receiver | |
| SR6851 | | 10.2522 | Sequential Tone Receiver CCIR | |
| | C1 | 73.5089 | 0.1 µF 20% Tantal | 35V |
| | C2 | 73.5089 | 0.1 µF 20% Tantal | 35V |
| | C3 | 76.5059 | 2.2 nF 10% polyest. FL | 50V |
| | C4 | 73.5089 | 0.1 µF 20% Tantal | 35V |
| | C5 | 73.5109 | 10 µF 20% " | 16V |
| | C6 | 73.5109 | 10 µF 20% " | 16V |
| | C7 | 76.5068 | 0.1 µF 1% polystyr TB | 63V |
| | C8 | 76.5072 | 47 nF 10% polyest. FL | 50V |
| | C9 | 73.5127 | 22 µF 20% Tantal | 16V |
| | C10 | 73.5102 | 2.2 µF 20% Tantal | 35V |
| | C11 | 73.5102 | 2.2 µF 20% Tantal | 35V |
| | C12 | 73.5118 | 0.2 µF 20% Tantal | 35V |
| | C13 | 73.5114 | 1 µF 20% Tantal | 35V |
| | C14 | 76.5072 | 47 nF 10% polyest. FL | 50V |
| | C15 | 73.5071 | 100 µF -10 +100% elco | 35V |
| | C16 | 73.5106 | 68 µF 20% Tantal | 15V |
| | C17 | 76.5071 | 22 nF 10% polyest. FL | 50V |
| | C18 | 76.5071 | 22 nF 10% " FL | 50V |
| | C19 | 76.5071 | 22 nF 10% " FL | 50V |
| | C20 | 76.5071 | 22 nF 10% " FL | 50V |
| | C21 | 76.5071 | 22 nF 10% " FL | 50V |
| | C22 | 76.5071 | 22 nF 10% " FL | 50V |
| | C23 | 76.5070 | 10 nF 10% " FL | 50V |
| | C24 | 73.5114 | 1 µF 20% Tantal | 35V |
| | C25 | 73.5114 | 1 µF 20% " | 35V |
| | C26 | 73.5127 | 22 µF 20% " | 16V |
| | C27 | 73.5127 | 22 µF 20% " | 16V |
| | R1 | 80.5268 | 39 kΩ 5% carbon film | 1/8W |
| | R2 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | R3 | 80.5233 | 47 Ω 5% " " | 1/8W |
| | R4 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R5 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R6 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R7 | 80.5256 | 3.9 kΩ 5% " " | 1/8W |
| | R8 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R9 | 80.5230 1 | 27 Ω 5% " " | 1/8W |
| | R10 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R11 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R12 | 80.5237 | 100 Ω 5% " " | 1/8W |
| | R13 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R14 | 80.5213 | 1 Ω 5% " " | 1/8W |
| | R15 | 80.5254 | 2.7 kΩ 5% " " | 1/8W |
| | R16 | 80.5279 | 0.33 MΩ 5% " " | 1/8W |
| | R17 | 80.5281 | 0.47 MΩ 5% " " | 1/8W |

Storno

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | R18 | 80.5258 | 5.6 kΩ 5% carbon film | 1/8W |
| | R19 | 89.5009 | 4.7 kΩ 20% NTC | 0.6W |
| | R20 | 80.5259 | 6.8 kΩ 5% carbon film | 1/8W |
| | R21 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R22 | 80.5490 | 2.7 MΩ 10% " " | 1/4W |
| | R23 | 80.5264 | 18 kΩ 5% " " | 1/8W |
| | R24 | 80.5262 | 12 kΩ 5% " " | 1/8W |
| | R25 | 80.5237 | 100 Ω 5% " " | 1/8W |
| | R26 | 80.5246 | 560 Ω 5% " " | 1/8W |
| | R27 | 80.52xx | Adjusted/tilpasset | |
| | R28 | 80.5269 | 47 kΩ 5% carbon film | 1/8W |
| | R29 | 80.5268 | 39 kΩ 5% " " | 1/8W |
| | R30 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R31 | 80.5260 | 8.2 kΩ 5% " " | 1/8W |
| | R32 | 80.5269 | 47 kΩ 5% " " | 1/8W |
| | R33 | 80.5255 | 3.3 kΩ 5% " " | 1/8W |
| | R34 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R35 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R36 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R37 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R38 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R39 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R40 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R41 | 80.5262 | 12 kΩ 5% " " | 1/8W |
| | R42 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R43 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R44 | 80.5254 | 2.7 kΩ 5% " " | 1/8W |
| | R45 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R46 | 80.5237 | 100 Ω 5% " " | 1/8W |
| | R47 | 80.5256 | 3.9 kΩ 5% " " | 1/8W |
| | R48 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R49 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R50 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R51 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R52 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R53 | 80.5060 | 8.2 kΩ 5% " " | 1/8W |
| | R54 | 80.5073 | 0.1 MΩ 5% " " | 1/8W |
| | R55 | 80.5267 | 33 kΩ 5% " " | 1/8W |
| | R56 | 80.5065 | 22 kΩ 5% " " | 1/8W |
| | R57 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R58 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R59 | 80.5265 | 22 kΩ 5% " " | 1/8W |

# TONE SEQUENTIAL RECEIVER
# SEKVENSTONEMODTAGER

X400.285

SR685,
SR6851

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | R60 | 80.5257 | 4.7 kΩ 5% carbon film 1/8W |
| | R61 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R62 | 80.5273 | 0.1 MΩ 5% " " 1/8W |
| | R63 | 80.5273 | 0.1 MΩ 5% " " 1/8W |
| | R64 | 80.5267 | 33 kΩ 5% " " 1/8W |
| | R65 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R66 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R67 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R68 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R69 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R70 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R71 | 80.5273 | 0.1 MΩ 5% " " 1/8W |
| | R72 | 80.5273 | 0.1 MΩ 5% " " 1/8W |
| | R73 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R74 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R75 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R76 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R77 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R78 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R79 | 80.5267 | 33 kΩ 5% " " 1/8W |
| | R80 | 80.5273 | 0.1 MΩ 5% " " 1/8W |
| | R81 | 80.5273 | 0.1 MΩ 5% " " 1/8W |
| | R82 | 80.5269 | 47 kΩ 5% " " 1/8W |
| | R83 | 80.5255 | 3.3 kΩ 5% " " 1/8W |
| | R84 | 80.5253 | 2.2 kΩ 5% " " 1/8W |
| | R85 | 80.5255 | 3.3 kΩ 5% " " 1/8W |
| | R86 | 80.5267 | 33 kΩ 5% " " 1/8W |
| | R87 | 80.5274 | 0.12 MΩ 5% " " 1/8W |
| | R88 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | R89 | 80.5266 | 27 kΩ 5% " " 1/8W |
| | R90 | 80.5245 | 470 Ω 5% " " 1/8W |
| | R91 | 80.5269 | 47 kΩ 5% " " 1/8W |
| | R92 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | R93 | 80.5259 | 6.8 kΩ 5% " " 1/8W |
| | R94 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R95 | 80.5245 | 470 Ω 5% " " 1/8W |
| | R96 | 80.5276 | 0.18 MΩ 5% " " 1/8W |
| | R97 | 80.5245 | 470 Ω 5% " " 1/8W |
| SR685 | L1 | 61.1129 | Tone coil |
| SR6851 | L1 | 61.1097 | Tone coil CCIR |
| | E1 | 99.5114 | Zenerdiode 5.6V 5% 1/4W |
| | E2 | 99.5136 | Diode AA119 |
| | E3 | 99.5136 | Diode AA119 |
| | E4 | 99.5028 | Diode 1N914 |
| | E5 | 99.5028 | Diode 1N914 |
| | E6 | 99.5042 | Zenerdiode 9.1V 5% 1/4W |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | E7 | 99.5020 | Diode 1N4004 |
| | E8 | 99.5020 | Diode 1N4004 |
| | E9 | 99.5136 | Diode AA119 |
| | E10 | 99.5075 | Zenerdiode 7.5 5% 1/4W |
| | E11 | 99.5020 | Diode 1N4004 |
| | E12 | 99.5028 | Diode 1N914 |
| | E13 | 99.5028 | Diode 1N914 |
| | E14 | 99.5028 | Diode 1N914 |
| | E15 | 99.5028 | Diode 1N914 |
| | E16 | 99.5028 | Diode 1N914 |
| | E17 | 99.5028 | Diode 1N914 |
| | E18 | 99.5028 | Diode 1N914 |
| | E19 | 99.5028 | Diode 1N914 |
| | E20 | 99.5028 | Diode 1N914 |
| | E21 | 99.5028 | Diode 1N914 |
| | E22 | 99.5146 | Zenerdiode 6.8V 5% 1/4W |
| | E23 | 99.5028 | Diode 1N914 |
| | E24 | 99.5028 | Diode 1N914 |
| | E25 | 99.5028 | Diode 1N914 |
| | E26 | 99.5028 | Diode 1N914 |
| | E27 | 99.5028 | Diode 1N914 |
| | E28 | 99.5028 | Diode 1N914 |
| | E29 | 99.5028 | Diode 1N914 |
| | E30 | 99.5028 | Diode 1N914 |
| | E31 | 99.5028 | Diode 1N914 |
| | E32 | 99.5028 | Diode 1N914 |
| | E33 | 99.5028 | Diode 1N914 |
| | E34 | 99.5028 | Diode 1N914 |
| | E35 | 99.5028 | Diode 1N914 |
| | Q1 | 99.5144 | Transistor BC214L |
| | Q2 | 99.5143 | Transistor BC107 |
| | 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 | 99.5143 | Transistor BC107 |
| | Q9 | 99.5143 | Transistor BC107 |
| | Q10 | 99.5143 | Transistor BC107 |
| | Q11 | 99.5144 | Transistor BC214L |
| | Q12 | 99.5142 | Transistor AC128 |

# TONE SEQUENTIAL RECEIVER
# SEKVENSTONEMODTAGER

SR685,
SR6851

X400.285

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | Q13 | 99.5144 | Transistor BC214L |
| | Q14 | 99.5144 | Transistor BC214L |
| | Q15 | 99.5144 | Transistor BC214L |
| | Q16 | 99.5144 | Transistor BC214L |
| | Q17 | 99.5144 | Transistor BC214L |
| | Q18 | 99.5144 | Transistor BC214L |
| | Q19 | 99.5144 | Transistor BC214L |
| | Q20 | 99.5144 | Transistor BC214L |
| | Q21 | 99.5144 | Transistor BC214L |
| | Q22 | 99.5144 | Transistor BC214L |
| | Q23 | 99.5144 | Transistor BC214L |
| | Q24 | 99.5144 | Transistor BC214L |
| | Q25 | 99.5144 | Transistor BC214L |
| | Q26 | 99.5144 | Transistor BC214L |
| | Q27 | 99.5144 | Transistor BC214L |
| | Q28 | 99.5144 | Transistor BC214L |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

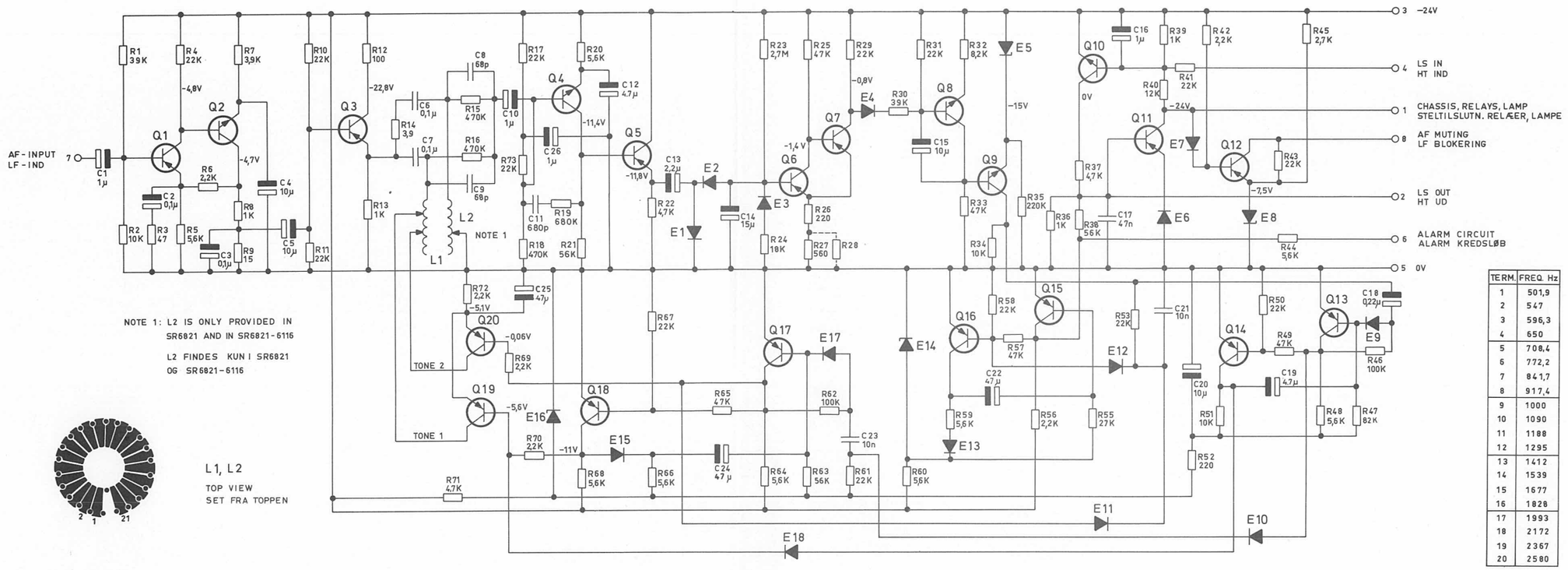
TONE SEQUENTIAL RECEIVER
SEKVENSTONEMODTAGER

X400.285

SR685,
SR6851

DIFFERENTIATOR AMPLIFIER SELECTIVE AMPL. AMPLIFIER DETECTOR SCHMIT GATE DEALAY CIRCUIT TRIGGER MUTING CIRCUIT

FORSTÆRKER SELEKTIVE FORST. FORSTÆRKER DETEKTOR TRIGGER FORSINK. KREDSLØB (BISTAB.) BLOKERINGSKREDSLØB





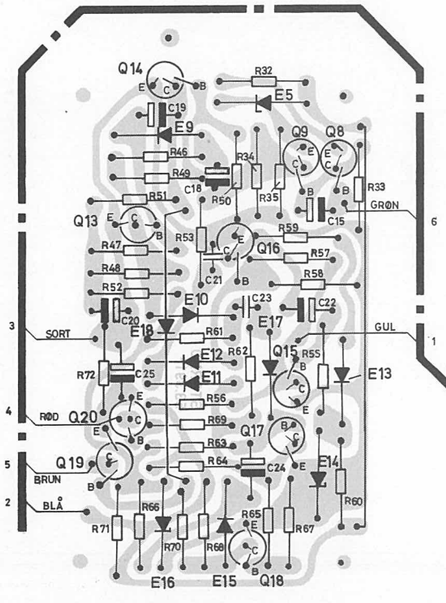


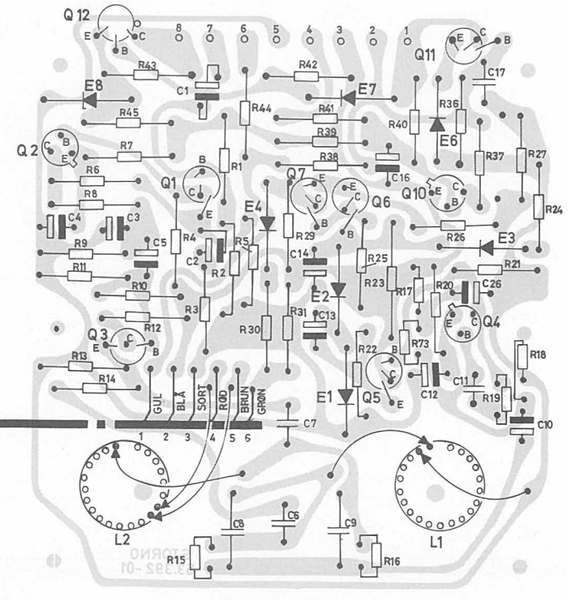
L1, L2

TOP VIEW

SET FRA TOPPEN

| TERM. | FREQ. Hz |
|---|---|
| 1 | 501,9 |
| 2 | 547 |
| 3 | 596,3 |
| 4 | 650 |
| 5 | 708,4 |
| 6 | 772,2 |
| 7 | 841,7 |
| 8 | 917,4 |
| 9 | 1000 |
| 10 | 1090 |
| 11 | 1188 |
| 12 | 1295 |
| 13 | 1412 |
| 14 | 1539 |
| 15 | 1677 |
| 16 | 1828 |
| 17 | 1993 |
| 18 | 2172 |
| 19 | 2367 |
| 20 | 2580 |




TONE SEQUENCE RECEIVER
SEKVENSMODTAGER

SR682, SR6821

D400.883/5

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | C1 | 73.5114 | 1 µF 20% tantal | 30V |
| | C2 | 73.5089 | 0.1 µF 20% " | 35V |
| | C3 | 73.5089 | 0.1 µF 20% " | 35V |
| | C4 | 73.5109 | 10 µF 20% " | 15V |
| | C5 | 73.5109 | 10 µF 20% " | 15V |
| SR6821 | C6 | 76.5068 | 0.1 µF 1% polystyr TB | 30V |
| | C7 | 76.5068 | 0.1 µF 1% " TB | 30V |
| SR6821 | C8 | 76.5101 | 68 pF 2.5% " TB | 30V |
| | C9 | 76.5101 | 68 pF 2.5% " TB | 30V |
| | C10 | 73.5114 | 1 µF 20% tantal | 30V |
| | C11 | 76.5018 | 680 pF 5% polystyr TB | 125V |
| | C12 | 73.5126 | 4.7 µF 20% tantal | 35V |
| | C13 | 73.5102 | 2.2 µF 20% " | 30V |
| | C14 | 73.5105 | 15 µF 20% " | 15V |
| | C15 | 73.5109 | 10 µF 20% " | 15V |
| | C16 | 73.5114 | 1 µF 20% tantal | 30V |
| | C17 | 76.5072 | 47 nF 10% " FL | 50V |
| | C18 | 73.5118 | 0.22 µF 20% tantal | 35V |
| | C19 | 73.5126 | 4.7 µF 20% " | 35V |
| | C20 | 73.5109 | 10 µF 20% " | 15V |
| | C21 | 76.5070 | 10 nF 10% polyest. FL | 50V |
| | C22 | 73.5124 | 47 µF 20% tantal | 15V |
| | C23 | 76.5070 | 10 nF 10% polyest. FL | 50V |
| | C24 | 73.5124 | 47 µF 20% tantal | 15V |
| | C25 | 73.5124 | 47 µF 20% " | 15V |
| | C26 | 73.5114 | 1 µF 20% " | 30V |
| | R1 | 80.5268 | 39 kΩ 5% carbon film | 1/8W |
| | R2 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | R3 | 80.5233 | 47 Ω 5% " " | 1/8W |
| | R4 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R5 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R6 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R7 | 80.5256 | 3.9 kΩ 5% " " | 1/8W |
| | R8 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R9 | 80.5227 | 15 Ω 5% " " | 1/8W |
| | R10 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R11 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R12 | 80.5237 | 100 Ω 5% " " | 1/8W |
| | R13 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| SR6821 | R14 | 80.5220 | 3.9 Ω 5% " " | 1/8W |
| SR6821 | R15 | 80.5281 | 0.47 MΩ 5% " " | 1/8W |
| | R16 | 80.5281 | 0.47 MΩ 5% " " | 1/8W |
| | R17 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R18 | 80.5281 | 0.47 MΩ 5% " " | 1/8W |
| | R19 | 80.5283 | 0.68 MΩ 5% " " | 1/8W |
| | R20 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R21 | 80.5270 | 56 kΩ 5% " " | 1/8W |

Storno

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | R22 | 80.5257 | 4.7 kΩ 5% carbon film | 1/8W |
| | R23 | 80.5490 | 2.7 MΩ 5% " " | 1/4W |
| | R24 | 80.5264 | 18 kΩ 5% " " | 1/8W |
| | R25 | 80.5269 | 47 kΩ 5% " " | 1/8W |
| | R26 | 80.5241 | 220 Ω 5% " " | 1/8W |
| | R27 | 80.5246 | 560 Ω 5% " " | 1/8W |
| | R28 | 80.52xx | Adjusted/tilpasset " | 1/8W |
| | R29 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R30 | 80.5268 | 39 kΩ 5% | 1/8W |
| | R31 | 80.5265 | 22 kΩ 5% | 1/8W |
| | R32 | 80.5260 | 8.2 kΩ 5% | 1/8W |
| | R33 | 80.5269 | 47 kΩ 5% | 1/8W |
| | R34 | 80.5261 | 10 kΩ 5% | 1/8W |
| | R35 | 80.5277 | 0.22 MΩ 5% | 1/8W |
| | R36 | 80.5249 | 1 kΩ 5% | 1/8W |
| | R37 | 80.5257 | 4.7 kΩ 5% | 1/8W |
| | R38 | 80.5258 | 5.6 kΩ 5% | 1/8W |
| | R39 | 80.5249 | 1 kΩ 5% | 1/8W |
| | R40 | 80.5262 | 12 kΩ 5% | 1/8W |
| | R41 | 80.5265 | 22 kΩ 5% | 1/8W |
| | R42 | 80.5253 | 2.2 kΩ 5% | 1/8W |
| | R43 | 80.5265 | 22 kΩ 5% | 1/8W |
| | R44 | 80.5258 | 5.6 kΩ 5% | 1/8W |
| | R45 | 80.5254 | 4.7 kΩ 5% | 1/8W |
| | R46 | 80.5273 | 0.1 MΩ 5% | 1/8W |
| | R47 | 80.5272 | 82 kΩ 5% | 1/8W |
| | R48 | 80.5258 | 5.6 kΩ 5% | 1/8W |
| | R49 | 80.5269 | 47 kΩ 5% | 1/8W |
| | R50 | 80.5265 | 22 kΩ 5% | 1/8W |
| | R51 | 80.5261 | 10 kΩ 5% | 1/8W |
| | R52 | 80.5241 | 220 Ω 5% | 1/8W |
| | R53 | 80.5265 | 22 kΩ 5% | 1/8W |
| | R55 | 80.5266 | 27 kΩ 5% | 1/8W |
| | R56 | 80.5253 | 2.2 kΩ 5% | 1/8W |
| | R57 | 80.5269 | 47 kΩ 5% | 1/8W |
| | R58 | 80.5265 | 22 kΩ 5% | 1/8W |
| | R59 | 80.5258 | 5.6 kΩ 5% carbon film | 1/8W |
| | R60 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R61 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R62 | 80.5273 | 0.1 MΩ 5% " " | 1/8W |
| | R63 | 80.5269 | 47 kΩ 5% " " | 1/8W |
| | R64 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |

# TONE SEQUENCE RECEIVER
# SEKVENSTONEMODTAGER

X401.049/3

## SR682, SR6821

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | R65 | 80.5269 | 47 kΩ 5% carbon film 1/8W |
| | R66 | 80.5258 | 5.6 kΩ 5% " " 1/8W |
| | R67 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R68 | 80.5258 | 5.6 kΩ 5% " " 1/8W |
| | R69 | 80.5253 | 2.2 kΩ 5% " " 1/8W |
| | R70 | 80.5253 | 2.2 kΩ 5% " " 1/8W |
| | R71 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R72 | 80.5253 | 2.2 kΩ 5% " " 1/8W |
| | R73 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | L1 | 61.1036 | Coil/spole |
| SR6821 | L2 | 61.1036 | " " |
| | E1 | 99.5136 | AA119 Diode |
| | E2 | 99.5136 | AA119 " |
| | E3 | 99.5028 | 1N914 " |
| | E4 | 99.5028 | 1N914 " |
| | E5 | 99.5042 | Zenerdiode 9.1V 5% 1/4W |
| | E6 | 99.5020 | 1N4004 Diode |
| | E7 | 99.5020 | 1N4004 |
| | E8 | 99.5075 | Zenerdiode 7.6V 5% 0.275W |
| | E9 | 99.5028 | 1N914 Diode |
| | E10 | 99.5028 | 1N914 " |
| | E11 | 99.5028 | 1N914 " |
| | E12 | 99.5028 | 1N914 " |
| | E13 | 99.5028 | 1N914 " |
| | E14 | 99.5114 | Zenerdiode 5.6V 5% 1/4W |
| | E15 | 99.5028 | 1N914 Diode |
| | E16 | 99.5114 | Zenerdiode 5.6V 5% 1/4W |
| | E17 | 99.5028 | 1N914 Diode |
| | E18 | 99.5028 | 1N914 " |
| | Q1 | 99.5144 | BC214L Transistor |
| | Q2 | 99.5143 | BC108 " |
| | Q3 | 99.5144 | BC214L " |
| | Q4 | 99.5121 | BC107 " |
| | Q5 | 99.5144 | BC214L " |
| | Q6 | 99.5144 | BC214L " |
| | Q7 | 99.5144 | BC214L " |
| | Q8 | 99.5117 | 2N2924 " |
| | Q9 | 99.5117 | 2N2924 " |
| | Q10 | 99.5121 | BC107 " |
| | Q11 | 99.5144 | BC214L " |
| | Q12 | 99.5142 | AC128 " |
| | Q13 | 99.5144 | BC214L " |
| | Q14 | 99.5144 | BC214L " |
| | Q15 | 99.5144 | BC214L " |
| | Q16 | 99.5144 | BC214L " |

Storno

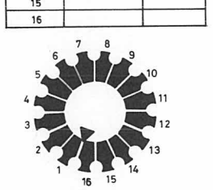
| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | Q17 | 99.5144 | BC214L Transistor |
| | Q18 | 99.5144 | BC214L " |
| | Q19 | 99.5144 | BC214L " |
| | Q20 | 99.5144 | BC214L " |

# TONE SEQUENCE RECEIVER
# SEKVENSTONEMODTAGER

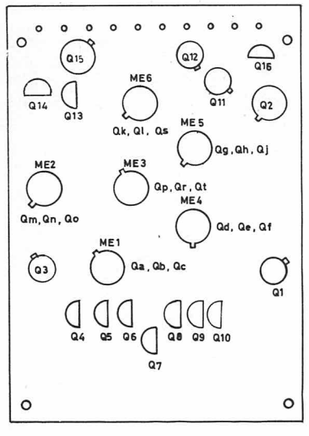
X401.049/2

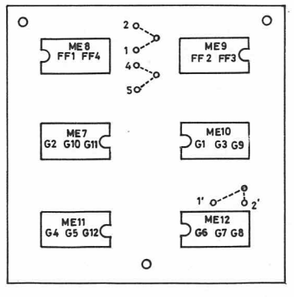
SR682, SR6821

| TERM. | FRQ. | DIGIT. |
|---|---|---|
| 1 | 970 Hz | X |
| 2 | 1060 – | 1 |
| 3 | 1160 – | 2 |
| 4 | 1270 – | 3 |
| 5 | 1400 – | 4 |
| 6 | 1530 – | 5 |
| 7 | 1670 – | 6 |
| 8 | 1830 – | 7 |
| 9 | 2000 – | 8 |
| 10 | 2200 – | 9 |
| 11 | 2400 – | 0 |
| 12 | 2600 – | REPEAT |
| 13 | 2800 – | ALARM |
| 14 | | |
| 15 | | |
| 16 | | |




L1, L2







# TONE SEQUENCE RECEIVER
# SEKVENSTONEMODTAGER

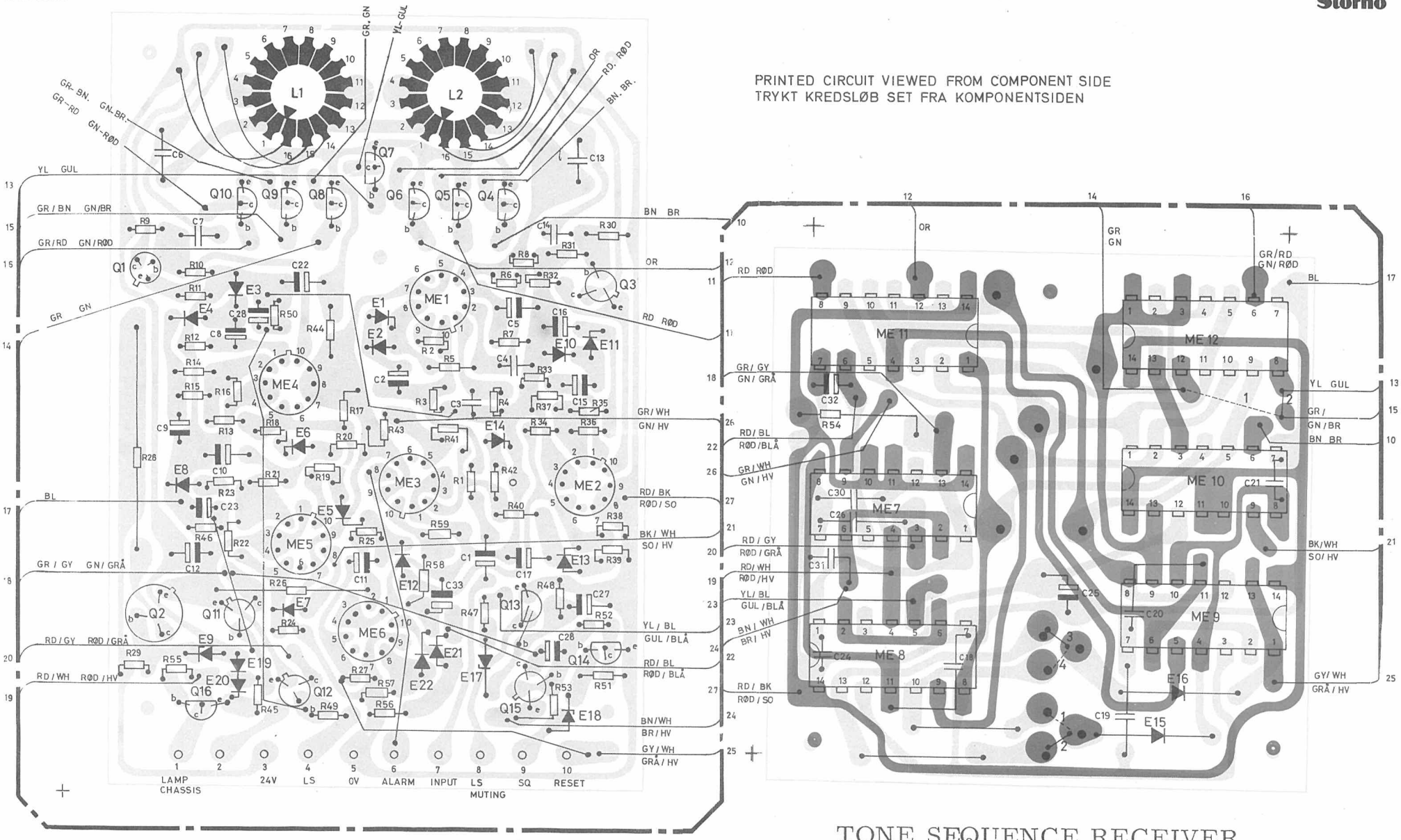
SR6841a

D401.056/2

Storno

Storno

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

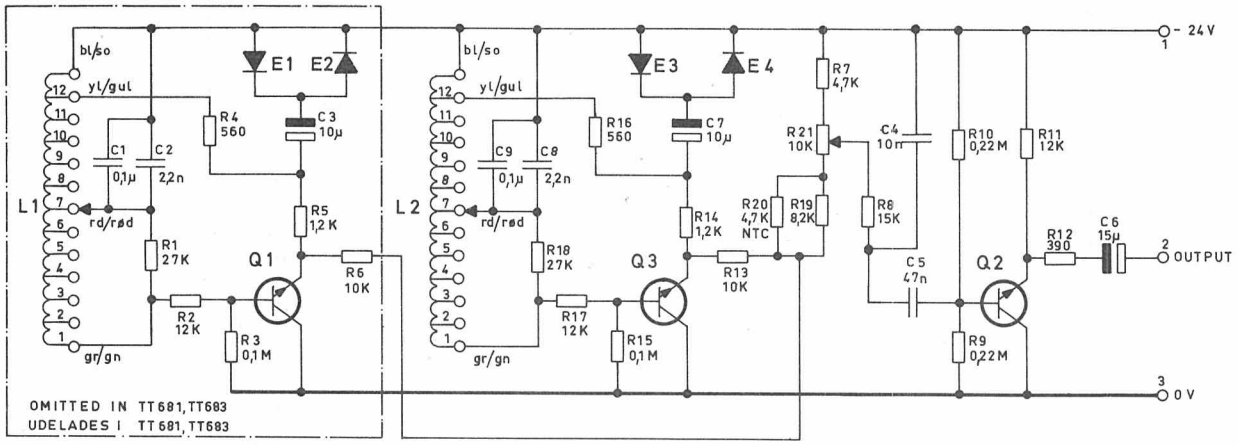


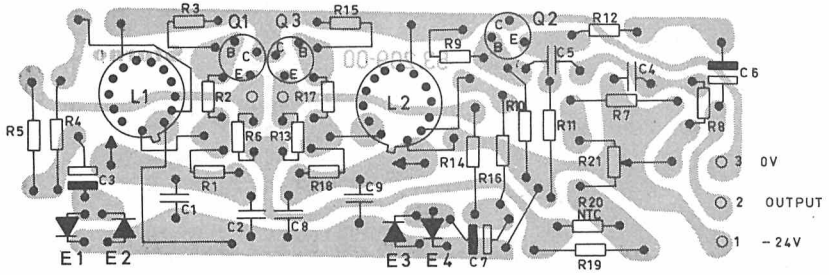

# TONE SEQUENCE RECEIVER
# SEKVENSTONEMODTAGER

SR6841a

D401.142/3

Storno




PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN


L1, L2

TOP VIEW
SET FRA OVEN

| | TT681, TT682 | TT683 |
|---|---|---|
| TERM. | FREQ. | FREQ. |
| 1 | 1060 Hz | 825Hz |
| 2 | 1160 Hz | 1010 Hz |
| 3 | 1270 Hz | 1240Hz |
| 4 | 1400 Hz | 1435Hz |
| 5 | 1530 Hz | 1520 Hz |
| 6 | 1670 Hz | 1750 Hz |
| 7 | 1830 Hz | 1860 Hz |
| 8 | 2000 Hz | 1980 Hz |
| 9 | 2200 Hz | 2000 Hz |
| 10 | 2400 Hz | 2135 Hz |
| 11 | 2600 Hz | 2280Hz |
| 12 | 2900 Hz | 2450Hz |


BOTTOM VIEW
SET FRA BUNDEN

Q1, Q2, Q3

# TONE TRANSMITTER
# TONE SENDER

## TT681, TT682, TT683

D400.771/3

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | C1 | 76.5068 | 0, 1µF 1% polystyr TB | 30V |
| | C2 | 76.5059 | 2, 2nF 10% polyest. FL | 50V |
| | C3 | 73.5109 | 10µF ± 20% tantal | 15V |
| | C4 | 76.5070 | 10nF 10% polyest. FL | 50V |
| | C5 | 76.5072 | 47nF 10% polyest. FL | 50V |
| | C6 | 73.5105 | 15µF 20% tantal | 15V |
| | C7 | 73.5109 | 10µF ± 20% tantal | 15V |
| | C8 | 76.5059 | 2, 2nF 10% polyest. FL | 50V |
| | C9 | 76.5068 | 0, 1µF 1% polystyr. TB | 30V |
| | R1 | 80.5266 | 27k 5% carbon film | 1/8W |
| | R2 | 80.5262 | 12k 5% " " | 1/8W |
| | R3 | 80.5273 | 100k 5% " " | 1/8W |
| | R4 | 80.5246 | 560Ω 5% " " | 1/8W |
| | R5 | 80.5250 | 1, 2k 5% " " | 1/8W |
| | R6 | 80.5261 | 10k 5% " " | 1/8W |
| | R7 | 80.5257 | 4, 7k 5% " " | 1/8W |
| | R8 | 80.5263 | 15k 5% " " | 1/8W |
| | R9 | 80.5277 | 220k 5% " " | 1/8W |
| | R10 | 80.5277 | 220k 5% " " | 1/8W |
| | R11 | 80.5262 | 12k 5% " " | 1/8W |
| | R12 | 80.5244 | 390Ω 5% " " | 1/8W |
| | R13 | 80.5261 | 10k 5% " " | 1/8W |
| | R14 | 80.5250 | 1, 2k 5% " " | 1/8W |
| | R15 | 80.5273 | 100k 5% " " | 1/8W |
| | R16 | 80.5246 | 560Ω 5% " " | 1/8W |
| | R17 | 80.5262 | 12k 5% " " | 1/8W |
| | R18 | 80.5266 | 27k 5% " " | 1/8W |
| | R19 | 80.5260 | 8, 2k 5% " " | 1/8W |
| | R20 | 89.5009 | 4, 7k 20% NTC | 0, 6W |
| | R21 | 86.5039 | 10k potm. lin. | 0, 1W |
| | E1 | 99.5028 | Diode OA 200 | |
| | E2 | 99.5028 | Diode OA 200 | |
| | E3 | 99.5028 | Diode OA 200 | |
| | E4 | 99.5028 | Diode OA 200 | |
| | L1 | 61.840 | Tonespole | |
| | L2 | 61.840 | Tonespole | |
| TT683 | L2 | 61.928 | Tonespole | |
| | Q1 | 99.5117 | Transistor 2N2924 | |
| | Q2 | 99.5117 | Transistor 2N2924 | |
| | Q3 | 99.5117 | Transistor 2N2924 | |

Storno

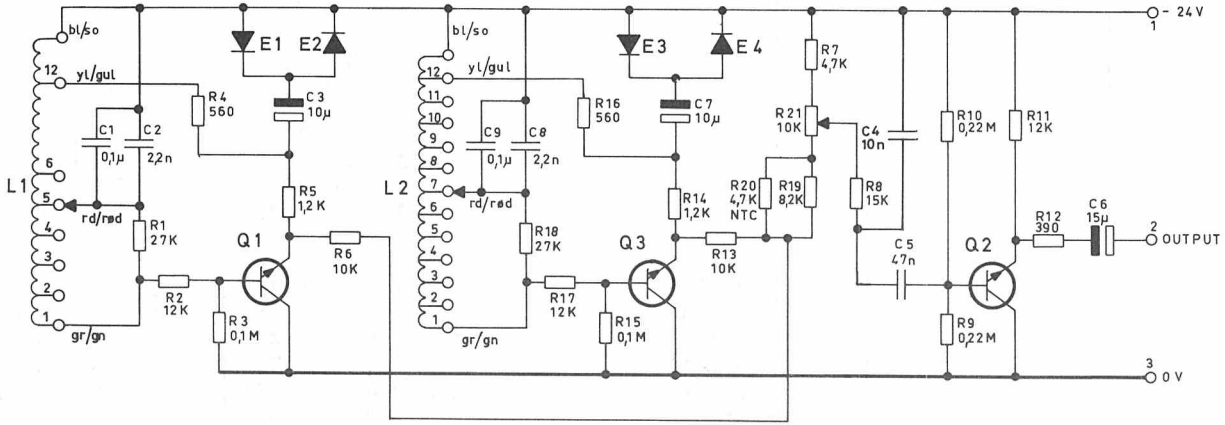
| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

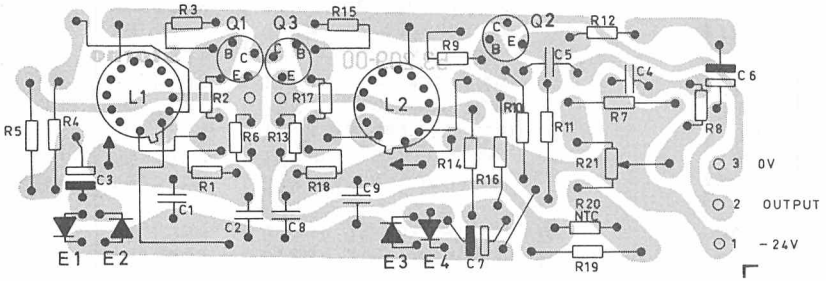
# TONE TRANSMITTER
# TONE SENDER

X400.751/2

## TT681, TT682, TT683

Storno

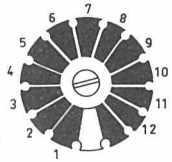



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN


BOTTOM VIEW
SET FRA BUNDEN

Q1, Q2, Q3




L1, L2

TOP VIEW
SET FRA OVEN

| TERM. | L2 FREQ. | L1 FREQ. |
|---|---|---|
| 1 | 1060 Hz | 615 Hz |
| 2 | 1160 Hz | 675Hz |
| 3 | 1270 Hz | 735Hz |
| 4 | 1400 Hz | 805Hz |
| 5 | 1530 Hz | 885Hz |
| 6 | 1670 Hz | 970Hz |
| 7 | 1830 Hz | |
| 8 | 2000 Hz | |
| 9 | 2200 Hz | |
| 10 | 2400 Hz | |
| 11 | 2600 Hz | |
| 12 | 2900 Hz | |

# TONE TRANSMITTER
# TONE SENDER

TT687

D400.854/2

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | C1 | 76.5068 | 0, 1uF 1% polystyr. TB | 30V |
| | C2 | 76.5059 | 2, 2nF 10% polyest. FL | 50V |
| | C3 | 73.5109 | 10uF ±20% tantal | 15V |
| | C4 | 76.5070 | 10nF 10% polyest. FL | 50V |
| | C5 | 76.5072 | 47nF 10% polyest. FL | 50V |
| | C6 | 73.5105 | 15uF 20% tantal | 15V |
| | C7 | 73.5109 | 10uF ±20% tantal | 15V |
| | C8 | 76.5059 | 2, 2nF 10% polyest. FL | 50V |
| | C9 | 76.5068 | 0, 1uF 1% polystyr. TB | 30V |
| | R1 | 80.5266 | 27k 5% carbon film | 1/8W |
| | R2 | 80.5262 | 12k 5% carbon film | 1/8W |
| | R3 | 80.5273 | 100k 5% carbon film | 1/8W |
| | R4 | 80.5246 | 560Ω 5% carbon film | 1/8W |
| | R5 | 80.5250 | 1, 2k 5% carbon film | 1/8W |
| | R6 | 80.5261 | 10k 5% carbon film | 1/8W |
| | R7 | 80.5257 | 4, 7k 5% carbon film | 1/8W |
| | R8 | 80.5263 | 15k 5% carbon film | 1/8W |
| | R9 | 80.5277 | 220k 5% carbon film | 1/8W |
| | R10 | 80.5277 | 220k 5% carbon film | 1/8W |
| | R11 | 80.5262 | 12k 5% carbon film | 1/8W |
| | R12 | 80.5244 | 390Ω 5% carbon film | 1/8W |
| | R13 | 80.5261 | 10k 5% carbon film | 1/8W |
| | R14 | 80.5250 | 1, 2k 5% carbon film | 1/8W |
| | R15 | 80.5273 | 100k 5% carbon film | 1/8W |
| | R16 | 80.5246 | 560Ω 5% carbon film | 1/8W |
| | R17 | 80.5262 | 12k 5% carbon film | 1/8W |
| | R18 | 80.5266 | 27k 5% carbon film | 1/8W |
| | R19 | 80.5260 | 8, 2k 5% carbon film | 1/8W |
| | R20 | 89.5009 | 4, 7k 20% NTC | 0, 6W |
| | R21 | 86.5039 | 10k potm. lin. | 0, 1W |
| | E1 | 99.5028 | Diode OA 200 | |
| | E2 | 99.5028 | Diode OA 200 | |
| | E3 | 99.5028 | Diode OA 200 | |
| | E4 | 99.5028 | Diode OA 200 | |
| | L1 | 61.1005 | Tonespole | |
| | L2 | 61.840 | Tonespole | |
| | Q1 | 99.5117 | Transistor 2N2924 | |
| | Q2 | 99.5117 | Transistor 2N2924 | |
| | Q3 | 99.5117 | Transistor 2N2924 | |

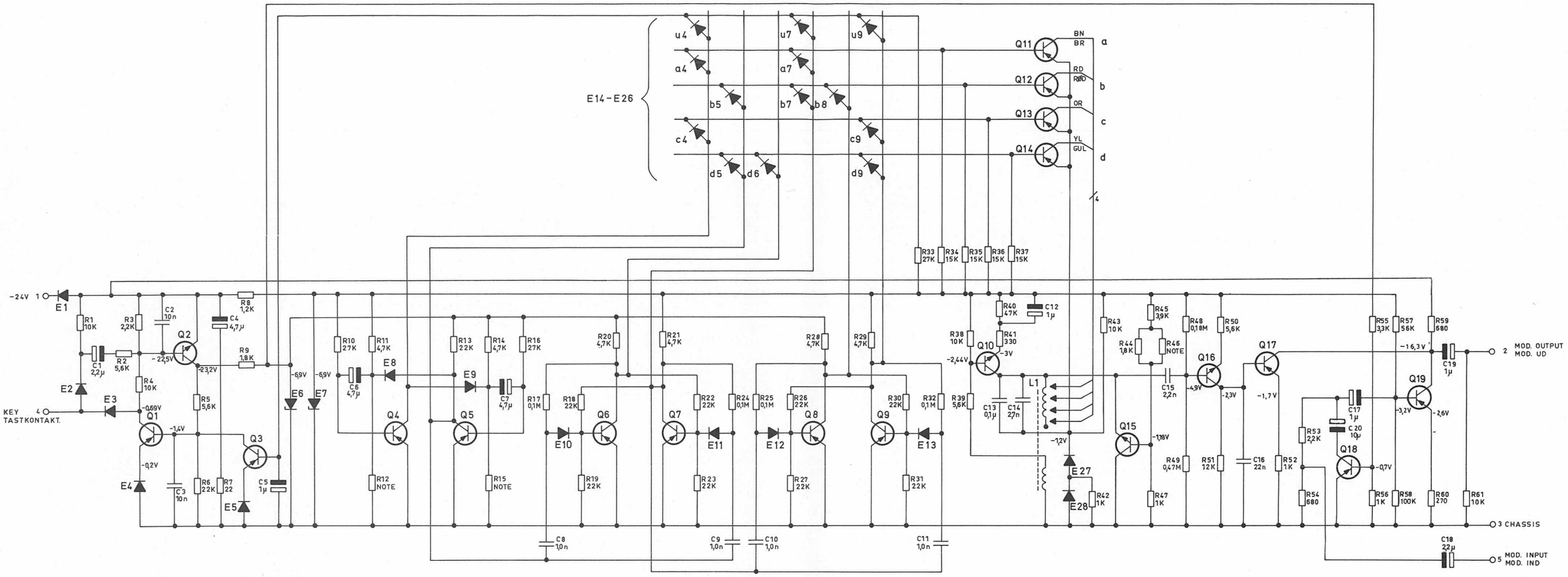
Storno

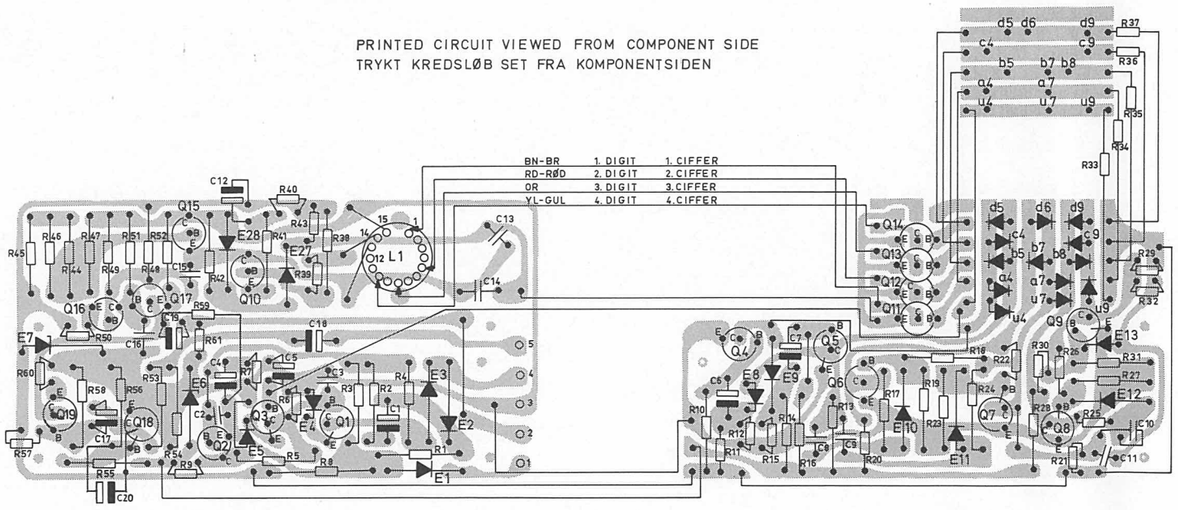
| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

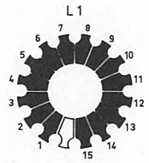
# TONE TRANSMITTER
# TONE SENDER

X400.856

TT687




| TERM. | FREQ. | DIGIT/CIFFER |
|---|---|---|
| 1 | 1060 Hz | 1 |
| 2 | 1160 – | 2 |
| 3 | 1270 – | 3 |
| 4 | 1400 – | 4 |
| 5 | 1530 – | 5 |
| 6 | 1670 – | 6 |
| 7 | 1830 – | 7 |
| 8 | 2000 – | 8 |
| 9 | 2200 – | 9 |
| 10 | 2400 – | 0 |
| 11 | 2600 – | REPEAT |
| 12 | 2800 – | ALARM |

NOTE : VALUES ADJUSTED
VÆRDIER TILPASSET

Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9
Q11, Q12, Q13, Q14, Q17, Q18, Q19


BOTTOM VIEW
SET FRA BUNDEN

Q2, Q10, Q15, Q16


BOTTOM VIEW
SET FRA BUNDEN

# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

ST684

D400.847/3

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | C1 | 73.5102 | 2.2 µF 20% Tantal | 35V |
| | C2 | 76.5070 | 10 nF 10% Polyest. FL | 50V |
| | C3 | 76.5070 | 10 nF 10% Polyest. FL | 50V |
| | C4 | 73.5126 | 4.7 µF 20% Tantal | 35V |
| | C5 | 73.5114 | 1 µF 20% Tantal | 30V |
| | C6 | 73.5103 | 4.7 µF 20% Tantal | 20V |
| | C7 | 73.5103 | 4.7 µF 20% Tantal | 20V |
| | C8 | 76.5069 | 1 nF 10% Polyest. FL | 50V |
| | C9 | 76.5069 | 1 nF 10% Polyest. FL | 50V |
| | C10 | 76.5069 | 1 nF 10% Polyest. FL | 50V |
| | C11 | 76.5069 | 1 nF 10% Polyest. FL | 50V |
| | C12 | 73.5114 | 1 µF 20% Tantal | 30V |
| | C13 | 76.5068 | 0.1 µF 1% Polystyr. TB | 63V |
| | C14 | 75.5019 | 2.7 nF 5% Polystyr. TB | 125V |
| | C15 | 76.5059 | 2.2 nF 10% Polystyr. FL | 50V |
| | C16 | 76.5071 | 22 nF 10% Polyest. FL | 50V |
| | C17 | 73.5114 | 1 µF 20% Tantal | 30V |
| | C18 | 73.5102 | 2.2 µF 20% Tantal | 35V |
| | C19 | 73.5114 | 1 µF 20% Tantal | 30V |
| | R1 | 80.5261 | 10 kΩ 5% Carbon film | 1/8W |
| | R2 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R3 | 80.5253 | 2.2 kΩ 5% " " | 1/8W |
| | R4 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | R5 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R6 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R7 | 80.5229 | 22 Ω 5% " " | 1/8W |
| | R8 | 80.5450 | 1.2 kΩ 5% " " | 1/4W |
| | R9 | 80.5252 | 1.8 kΩ 5% " " | 1/8W |
| | R10 | 80.5266 | 27 kΩ 5% " " | 1/8W |
| | R11 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R12 | 80.52xx | adjusted/tilpasset | 1/8W |
| | R13 | 80.5265 | 22 kΩ 5% Carbon film | 1/8W |
| | R14 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R15 | 80.52xx | adjusted/tilpasset | 1/8W |
| | R16 | 80.5266 | 27 kΩ 5% Carbon film | 1/8W |
| | R17 | 80.5273 | 0.1 MΩ 5% " " | 1/8W |
| | R18 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R19 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R20 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R21 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |
| | R22 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R23 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R24 | 80.5273 | 0,1 MΩ 5% " " | 1/8W |
| | R25 | 80.5273 | 0,1 MΩ 5% " " | 1/8W |
| | R26 | 80 5265 | 22 kΩ 5% " " | 1/8W |
| | R27 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R28 | 80.5257 | 4.7 kΩ 5% " " | 1/8W |

Storno

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | R29 | 80.5257 | 4.7 kΩ 5% Carbon film | 1/8W |
| | R30 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R31 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R32 | 80.5273 | 0.1 MΩ 5% " " | 1/8W |
| | R33 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R34 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R35 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R36 | 80.5263 | 15 kΩ 5% " " | 1/8W |
| | R37 | 80.5266 | 27 kΩ 5% " " | 1/8W |
| | R38 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | R39 | 80.5258 | 5.6 kΩ 5% " " | 1/8W |
| | R40 | 80.5269 | 47 kΩ 5% " " | 1/8W |
| | R41 | 80.5243 | 330 Ω 5% " " | 1/8W |
| | R42 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R43 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | R44 | 80.5252 | 1.8 kΩ 5% " " | 1/8W |
| | R45 | 80.5256 | 3.9 kΩ 5% " " | 1/8W |
| | R46 | 80.52xx | adjusted/tilpasset | 1/8W |
| | R47 | 80.5249 | 1 kΩ 5% Carbon film | 1/8W |
| | R48 | 80. 276 | 0,18 MΩ 5% " " | 1/8W |
| | R49 | 80.5281 | 0,47 MΩ 5% " " | 1/8W |
| | R50 | 80. 258 | 5,6 kΩ 5% " " | 1/8W |
| | R51 | 80.5262 | 12 kΩ 5% " " | 1/8W |
| | R52 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R54 | 80.5247 | 680 Ω 5% " " | 1/8W |
| | R55 | 80.5255 | 3,3 kΩ 5% " " | 1/8W |
| | R56 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R57 | 80.5270 | 56 kΩ 5% " " | 1/8W |
| | R58 | 80.5273 | 0,1 MΩ 5% " " | 1/8W |
| | R59 | 80.5247 | 680 Ω 5% " " | 1/8W |
| | R60 | 80.5242 | 270 Ω 5% " " | 1/8W |
| | R61 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | L1 | 61.994 | Coil/Spole | |
| | E1 | 99.5020 | Diode 1N4004 | |
| | E2 | 99.5028 | Diode OA200 | |
| | E3 | 99.5028 | Diode OA200 | |
| | E4 | 99.5028 | Diode OA200 | |
| | E5 | 99.5028 | Diode OA200 | |
| | E6 | 99.5146 | Zenerdiode BZY60 | |
| | E7 | 99.5 46 | Zenerdiode BZY60 | |

# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

ST684

X400.865/2

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | E8-E28 | 99.5028 | Diode OA200 |
| | Q1 | 99.5144 | Transistor BC214L |
| | Q2 | 99.5121 | Transistor BC107 |
| | 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 |
| | Q9 | 99.5144 | Transistor BC214L |
| | Q10 | 99.5143 | Transistor BC108 |
| | Q11 | 99.5144 | Transistor BC214L |
| | Q12 | 99.5144 | Transistor BC214L |
| | Q13 | 99.5144 | Transistor BC214L |
| | Q14 | 99.5144 | Transistor BC214L |
| | Q15 | 99.5143 | Transistor BC108 |
| | Q16 | 99.5143 | Transistor BC108 |
| | Q17 | 99.5144 | Transistor BC214L |
| | Q18 | 99.5144 | Transistor BC214L |
| | Q19 | 99.5144 | Transistor BC214L |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

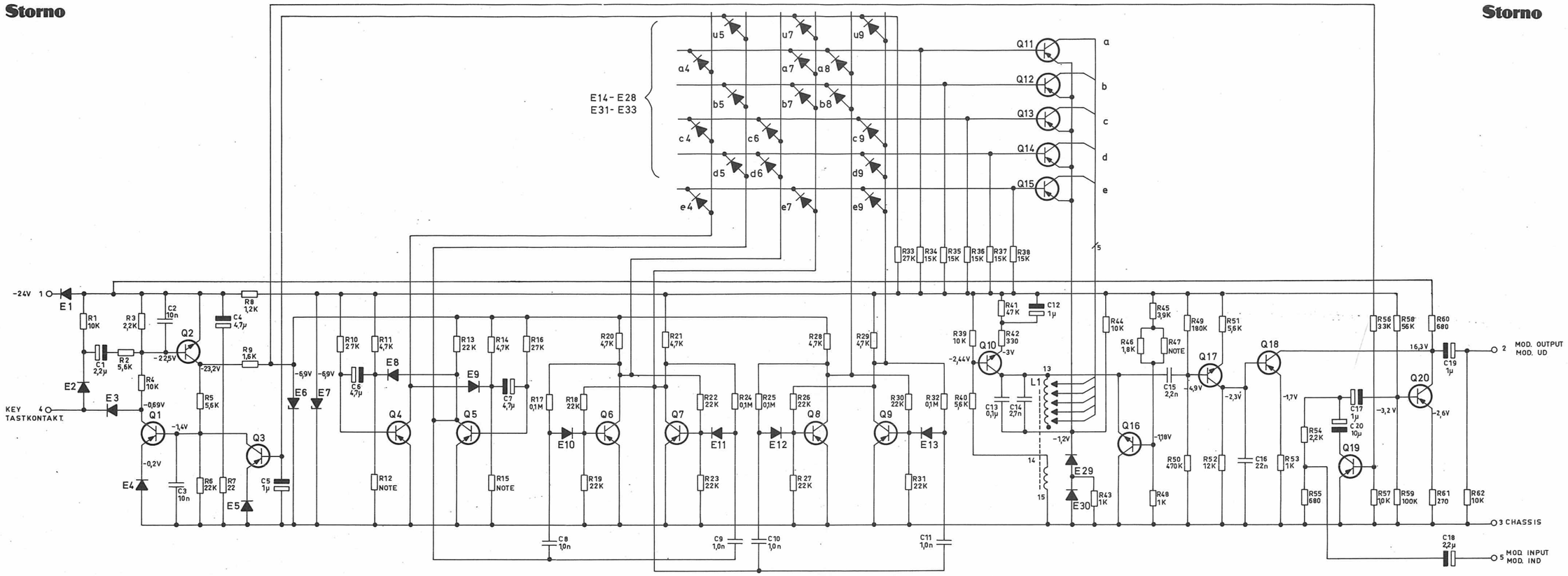
TONE SEQUENCE UNIT
SEKVENSTONEENHED

ST684

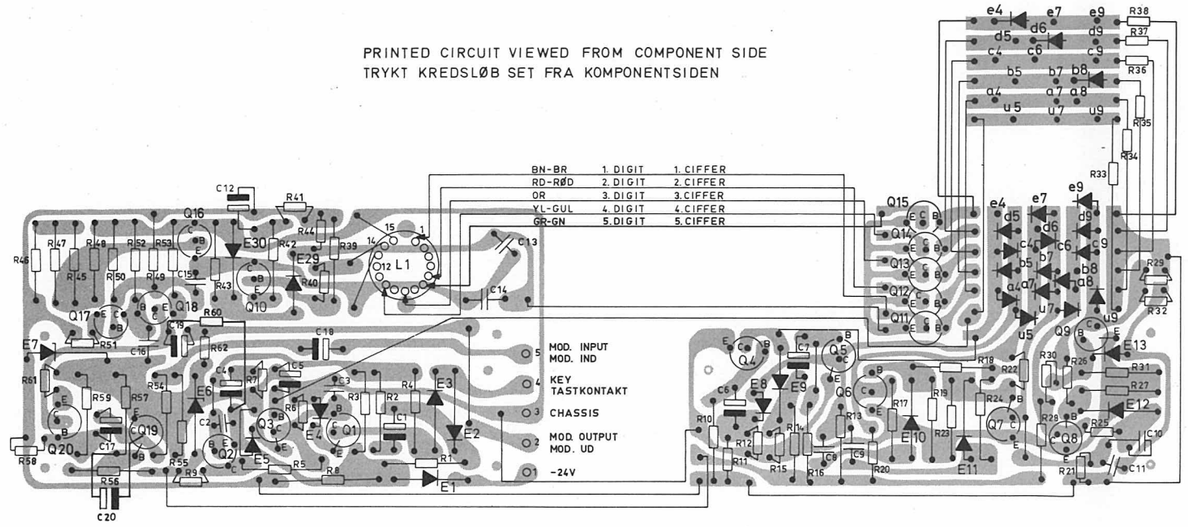
X400.865/2

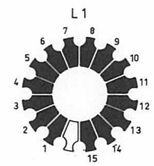
Storno

Storno




PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN




| TERM. | FREQ. | DIGIT/CIFFER |
|---|---|---|
| 1 | 1060 Hz | 1 |
| 2 | 1160 – | 2 |
| 3 | 1270 – | 3 |
| 4 | 1400 – | 4 |
| 5 | 1530 – | 5 |
| 6 | 1670 – | 6 |
| 7 | 1830 – | 7 |
| 8 | 2000 – | 8 |
| 9 | 2200 – | 9 |
| 10 | 2400 – | 0 |
| 11 | 2600 – | REPEAT |
| 12 | 2800 – | ALARM |

NOTE : VALUES ADJUSTED
VÆRDIER TILPASSET

Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9 Q2, Q10, Q16, Q17
Q11, Q12, Q13, Q14, Q15, Q18, Q19, Q20


BOTTOM VIEW
SET FRA BUNDEN


BOTTOM VIEW
SET FRA BUNDEN

# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

ST685

D400.848/5

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | C1 | 73.5102 | 2.2 µF 20% Tantal 35V |
| | C2 | 76.5070 | 10 nF 10% Polyest. FL 50V |
| | C3 | 76.5070 | 10 nF 10% Polyest. FL 50V |
| | C4 | 73.5126 | 4.7 µF 20% Tantal 35V |
| | C5 | 73.5114 | 1 µF 20% Tantal 30V |
| | C6 | 73.5103 | 4.7 µF 20% Tantal 20V |
| | C7 | 73.5103 | 4.7 µF 20% Tantal 20V |
| | C8 | 76.5069 | 1 nF 10% Polyest. FL 50V |
| | C9 | 76.5069 | 1 nF 10% Polyest. FL 50V |
| | C10 | 76.5069 | 1 nF 10% Polyest. FL 50V |
| | C11 | 76.5069 | 1 nF 10% Polyest. FL 50V |
| | C12 | 73.5114 | 1 µF 20% Tantal 30V |
| | C13 | 76.5068 | 0.1 µF 1% Polystyr. TB 63V |
| | C14 | 75.5019 | 2.7 nF 5% Polystyr. TB 125V |
| | C15 | 76.5059 | 2.2 nF 10% Polyest. FL 50V |
| | C16 | 76.5071 | 22 nF 10% Polyest. FL 50V |
| | C17 | 73.5114 | 1 µF 20% Tantal 30V |
| | C18 | 73.5102 | 2,2 µF 20% Tantal 35V |
| | C19 | 73.5114 | 1 µF 20% Tantal 30V |
| | C20 | 73.5109 | 10µF 20% Tantal 30V |
| | R1 | 80.5261 | 10 kΩ 5% Carbon film 1/8W |
| | R2 | 80.5258 | 5.6 kΩ 5% " " 1/8W |
| | R3 | 80.5253 | 2.2 kΩ 5% " " 1/8W |
| | R4 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | R5 | 80.5258 | 5.6 kΩ 5% " " 1/8W |
| | R6 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R7 | 80.5229 | 22 Ω 5% " " 1/8W |
| | R8 | 80.5450 | 1.2 kΩ 5% " " 1/4W |
| | R9 | 80.5252 | 1.8 kΩ 5% " " 1/8W |
| | R10 | 80.5266 | 27 kΩ 5% " " 1/8W |
| | R11 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R12 | 80.52xx | adjusted/tilpasset 1/8W |
| | R13 | 80.5265 | 22 kΩ 5% Carbon film 1/8W |
| | R14 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R15 | 80.52xx | adjusted/tilpasset 1/8W |
| | R16 | 80.5266 | 27 kΩ 5% Carbon film 1/8W |
| | R17 | 80.5273 | 0,1 MΩ 5% " " 1/8W |
| | R18 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R19 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R20 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R21 | 80.5257 | 4.7 kΩ 5% " " 1/8W |
| | R22 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R23 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R24 | 80.5273 | 0,1 MΩ 5% " " 1/8W |
| | R25 | 80.5273 | 0,1 MΩ 5% " " 1/8W |
| | R26 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R27 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R28 | 80.5257 | 4.7 kΩ 5% " " 1/8W |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | R29 | 80.5257 | 4.7 kΩ 5% Carbon film 1/8W |
| | R30 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R31 | 80.5265 | 22 kΩ 5% " " 1/8W |
| | R32 | 80.5273 | 0,1 M1 5% " " 1/8W |
| | R33 | 80.5266 | 27 kΩ 5% " " 1/8W |
| | R34 | 80.5263 | 15 kΩ 5% " " 1/8W |
| | R35 | 80.5263 | 15 kΩ 5% " " 1/8W |
| | R36 | 80.5263 | 15 kΩ 5% " " 1/8W |
| | R37 | 80.5263 | 15 kΩ 5% " " 1/8W |
| | R38 | 80.5266 | 27 kΩ 5% " " 1/8W |
| | R39 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | R40 | 80.5258 | 5.6 kΩ 5% " " 1/8W |
| | R41 | 80.5269 | 47 kΩ 5% " " 1/8W |
| | R42 | 80.5243 | 330 Ω 5% " " 1/8W |
| | R43 | 80.5249 | 1 kΩ 5% " " 1/8W |
| | R44 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | R45 | 80.5256 | 3.9 kΩ 5% " " 1/8W |
| | R46 | 80.5254 | 2.7 kΩ 5% " " 1/8W |
| | R47 | 80.52xx | adjusted/tilpasset 1/8W |
| | R48 | 80.5249 | 1 kΩ 5% Carbon film 1/8W |
| | R49 | 80.5276 | 0.18 MΩ 5% " " 1/8W |
| | R50 | 80.5281 | 0,47 MΩ 5% " " 1/8W |
| | R51 | 80.5258 | 5,6 kΩ 5% " " 1/8W |
| | R52 | 80.5262 | 12 kΩ 5% " " 1/8W |
| | R53 | 80.5249 | 1 kΩ 5% " " 1/8W |
| | R54 | 80.5253 | 2,2 kΩ 5% " " 1/8W |
| | R55 | 80.5247 | 680 Ω 5% " " 1/8W |
| | R56 | 80.5255 | 3.3 kΩ 5% " " 1/8W |
| | R57 | 80.5249 | 1 kΩ 5% " " 1/8W |
| | R58 | 80.5270 | 56 kΩ 5% " " 1/8W |
| | R59 | 80.5273 | 0.1 MΩ 5% " " 1/8W |
| | R60 | 80.5247 | 680 Ω 5% " " 1/8W |
| | R61 | 80.5242 | 270 Ω 5% " " 1/8W |
| | R62 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | L1 | 61.994 | Coil/Spole |
| | E1 | 99.5020 | Diode 1N4004 |
| | E2 | 99.5028 | Diode OA200 |
| | E3 | 99.5028 | Diode OA200 |
| | E4 | 99.5028 | Diode OA200 |
| | E5 | 99.5028 | Diode OA200 |

# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

ST685

X400.866/4

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | E6 | 99.5146 | Zenerdiode BZY60 |
| | E7 | 99.5146 | Zenerdiode BZY60 |
| | E8-E33 | 99.5028 | Diode 1N914 |
| | Q1 | 99.5144 | Transistor BC214L |
| | Q2 | 99.5121 | Transistor BC107 |
| | Q3 | 99.5144 | Transistor BC214L |
| | Q4 | 99.5144 | Transistor BC214L |
| | Q5 | 99.5144 | Transisotr BC214L |
| | Q6 | 99.5144 | Transistor BC214L |
| | Q7 | 99.5144 | Transistor BC214L |
| | Q8 | 99.5144 | Transistor BC214L |
| | Q9 | 99.5144 | Transistor BC214L |
| | Q10 | 99.5143 | Transistor BC108 |
| | Q11 | 99.5144 | Transistor BC214L |
| | Q12 | 99.5144 | Transistor BC214L |
| | Q13 | 99.5144 | Transistor BC214L |
| | Q14 | 99.5144 | Transistor BC214L |
| | Q15 | 99.5144 | Transistor BC214L |
| | Q16 | 99.5143 | Transistor BC108 |
| | Q17 | 99.5144 | Transistor BC214L |
| | Q18 | 99.5144 | Transistor BC214L |
| | Q19 | 99.5144 | Transistor BC214L |
| | Q20 | 99.5144 | Transistor BC214L |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

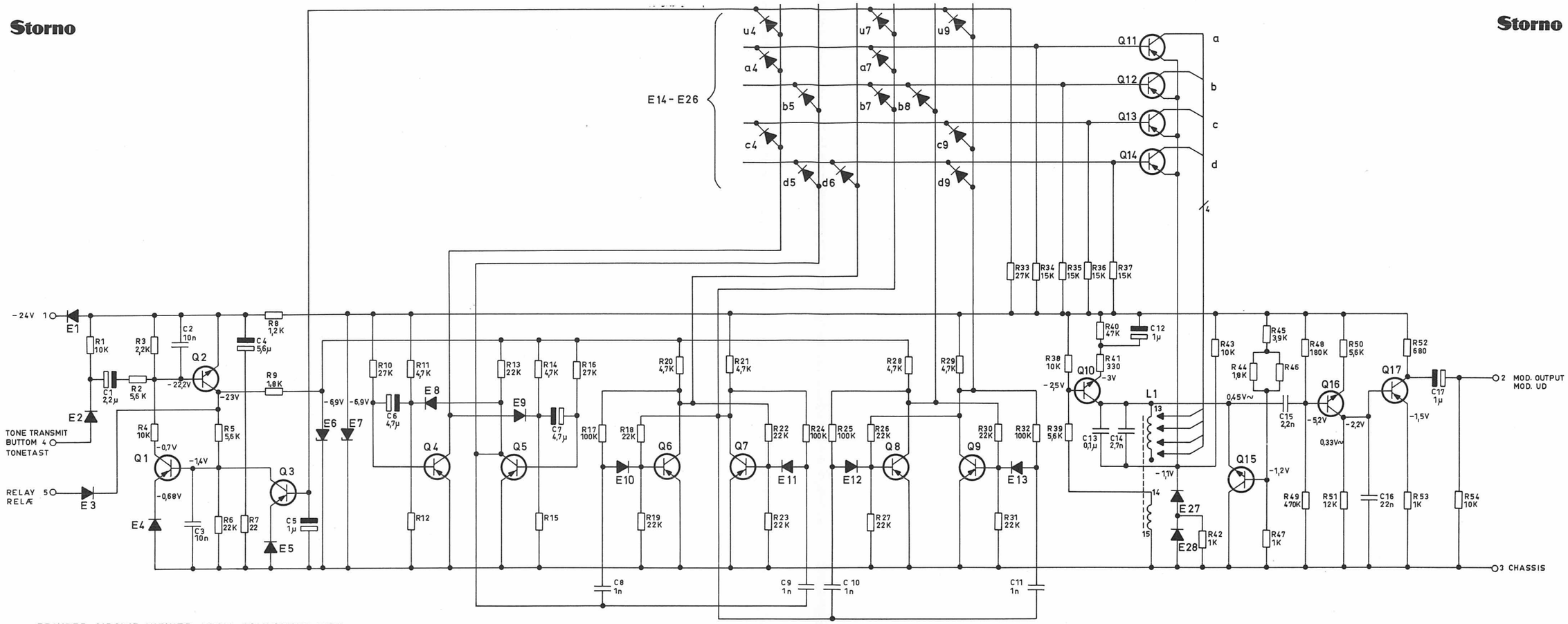
# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

ST685

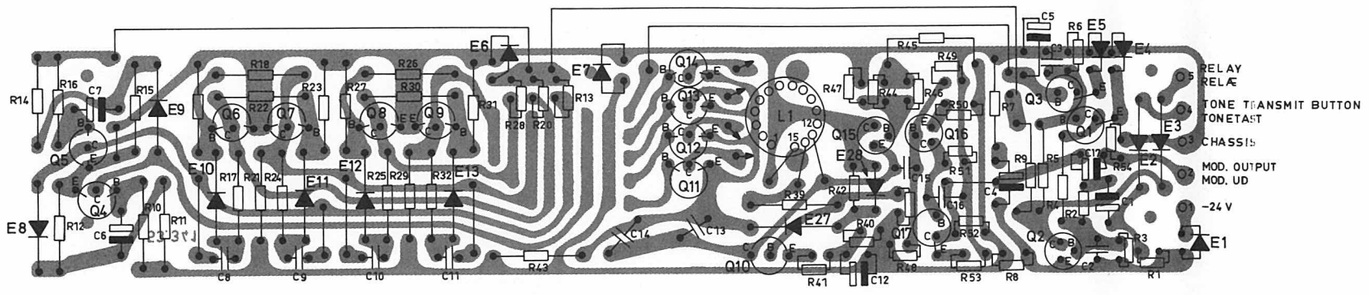
X400.866/5

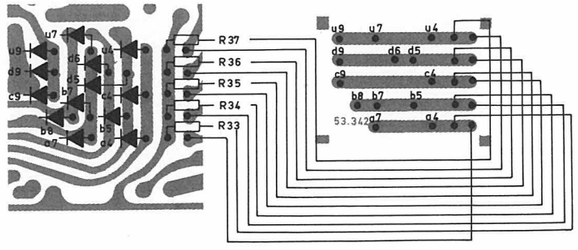
Storno

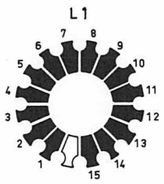
Storno




PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN




| TERM. | FREQ. | DIGIT/CIFFER |
|---|---|---|
| 1 | 1060 Hz | 1 |
| 2 | 1160 – | 2 |
| 3 | 1270 – | 3 |
| 4 | 1400 – | 4 |
| 5 | 1530 – | 5 |
| 6 | 1670 – | 6 |
| 7 | 1830 – | 7 |
| 8 | 2000 – | 8 |
| 9 | 2200 – | 9 |
| 10 | 2400 – | 0 |
| 11 | 2600 – | REPEAT |
| 12 | 2800 – | ALARM |

Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q11, Q12, Q13, Q14, Q17


BOTTOM VIEW
SET FRA BUNDEN

Q2, Q,10,Q15, Q16


BOTTOM VIEW
SET FRA BUNDEN

# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

10.1718

D400.839/2

Storno

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | C1 | 73.5102 | 2.2µF 20% Tantal | 35V |
| | C2 | 76.5070 | 10nF 10% Polyest. FL | 50V |
| | C3 | 76.5070 | 10nF 10% Polyest. FL | 50V |
| | C4 | 73.5113 | 5,6 µF 20% Tantal | 35V |
| | C5 | 73.5114 | 1 µF 20% Tantal | 30V |
| | C6 | 73.5103 | 4.7µF 20% Tantal | 20V |
| | C7 | 73.5103 | 4.7µF 20% Tantal | 20V |
| | C8 | 76.5069 | 1 nF 10% Polyest. FL | 50V |
| | C9 | 76.5069 | 1 nF 10% Polyest. FL | 50V |
| | C10 | 76.5069 | 1 nF 10% Polyest. FL | 50V |
| | C11 | 76.5069 | 1 nF 10% Polyest. FL | 50V |
| | C12 | 73.5114 | 1 µF 20% Tantal | 30V |
| | C13 | 76.5068 | 0.1µF 1% Polystyr. TB | 63V |
| | C14 | 75.5019 | 2.7nF 5% Polystyr. TB | 125V |
| | C15 | 76.5059 | 2.2nF 10% Polyest. FL | 50V |
| | C16 | 76.5071 | 22 nF 10% Polyest. FL | 50V |
| | C17 | 73.5114 | 1 µF 20% Tantal | 30V |
| | R1 | 80.5261 | 10 kΩ 5% Carbon film | 1/8W |
| | R2 | 80.5258 | 5.6kΩ 5% " " | 1/8W |
| | R3 | 80.5253 | 2.2kΩ 5% " " | 1/8W |
| | R4 | 80.5261 | 10 kΩ 5% " " | 1/8W |
| | R5 | 80.5258 | 5.6kΩ 5% " " | 1/8W |
| | R6 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R7 | 80.5229 | 22 Ω 5% " " | 1/8W |
| | R8 | 80.5450 | 1.2 kΩ 5% " " | 1/4W |
| | R9 | 80.5252 | 1.8kΩ 5% " " | 1/8W |
| | R10 | 80.5266 | 27 kΩ 5% " " | 1/8W |
| | R11 | 80.5257 | 4.7kΩ 5% " " | 1/8W |
| | R12 | 80.52xx | adjusted/tilpasset | 1/8W |
| | R13 | 80.5265 | 22kΩ 5% Carbon film | 1/8W |
| | R14 | 80.5257 | 4.7kΩ 5% " " | 1/8W |
| | R15 | 80.52xx | adjusted/tilpasset | 1/8W |
| | R16 | 80.5266 | 27kΩ 5% Carbon film | 1/8W |
| | R17 | 80.5273 | 0,1MΩ 5% " " | 1/8W |
| | R18 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R19 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R20 | 80.5257 | 4.7kΩ 5% " " | 1/8W |
| | R21 | 80.5257 | 4.7kΩ 5% " " | 1/8W |
| | R22 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R23 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R24 | 80.5273 | 0,1MΩ 5% " " | 1/8W |
| | R25 | 80.5273 | 0,1MΩ 5% " " | 1/8W |
| | R26 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R27 | 80.5265 | 22 kΩ 5% " " | 1/8W |
| | R28 | 80.5257 | 4.7kΩ 5% " " | 1/8W |
| | R29 | 80.5257 | 4.7kΩ 5% " " | 1/8W |
| | R30 | 80.5265 | 22 kΩ 5% " " | 1/8W |

Storno

| TYPE | NO. | CODE | DATA | |
|---|---|---|---|---|
| | R31 | 80.5265 | 22kΩ 5% Carbon film | 1/8W |
| | R32 | 80.5273 | 0,1MΩ 5% " " | 1/8W |
| | R33 | 80.5266 | 27kΩ 5% " " | 1/8W |
| | R34 | 80.5263 | 15kΩ 5% " " | 1/8W |
| | R35 | 80.5263 | 15kΩ 5% " " | 1/8W |
| | R36 | 80.5263 | 15kΩ 5% " " | 1/8W |
| | R37 | 80.5263 | 15kΩ 5% " " | 1/8W |
| | R38 | 80.5261 | 10kΩ 5% " " | 1/8W |
| | R39 | 80.5258 | 5.6kΩ 5% " " | 1/8W |
| | R40 | 80.5269 | 47kΩ 5% " " | 1/8W |
| | R41 | 80.5243 | 330Ω 5% " " | 1/8W |
| | R42 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R43 | 80.5261 | 10kΩ 5% " " | 1/8W |
| | R44 | 80.5252 | 1.8kΩ 5% " " | 1/8W |
| | R45 | 80.5256 | 3.9kΩ 5% " " | 1/8W |
| | R46 | 80.52xx | adjusted/tilpasset | 1/8W |
| | R47 | 80.5249 | 1 kΩ 5% Carbon film | 1/8W |
| | R48 | 80.5276 | 0,18MΩ 5% " " | 1/8W |
| | R49 | 80.5281 | 0,47MΩ 5% " " | 1/8W |
| | R50 | 80.5258 | 5,6kΩ 5% " " | 1/8W |
| | R51 | 80.5262 | 12kΩ 5% " " | 1/8W |
| | R52 | 80.5247 | 680Ω 5% " " | 1/8W |
| | R53 | 80.5249 | 1 kΩ 5% " " | 1/8W |
| | R54 | 80.5261 | 10kΩ 5% " " | 1/8W |
| | L1 | 61.994 | Coil/Spole | |
| | E1 | 99.5020 | Diode 1N4004 | |
| | E2 | 99.5028 | Diode OA200 | |
| | E3 | 99.5028 | Diode OA200 | |
| | E4 | 99.5028 | Diode OA200 | |
| | E5 | 99.5028 | Diode OA200 | |
| | E6 | 99.5146 | Zenerdiode BZY60 | |
| | E7 | 99.5146 | Zenerdiode BZY60 | |
| | E8-E28 | 99.5028 | Diode OA200 | |
| | Q1 | 99.5144 | Transistor BC214L | |
| | Q2 | 99.5121 | Transistor BC107 | |
| | Q3 | 99.5144 | Transistor BC214L | |
| | Q4 | 99.5144 | Transistor BC214L | |
| | Q5 | 99.5144 | Transistor BC214L | |

# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

10.1718

X400.823/2

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | Q6 | 99.5144 | Transistor BC214L |
| | Q7 | 99.5144 | Transistor BC214L |
| | Q8 | 99.5144 | Transistor BC214L |
| | Q9 | 99.5144 | Transistor BC214L |
| | Q10 | 99.5143 | Transistor BC108 |
| | Q11 | 99.5144 | Transistor BC214L |
| | Q12 | 99.5144 | Transistor BC214L |
| | Q13 | 99.5144 | Transistor BC214L |
| | Q14 | 99.5144 | Transistor BC214L |
| | Q15 | 99.5143 | Transistor BC108 |
| | Q16 | 99.5143 | Transistor BC108 |
| | Q17 | 99.5144 | Transistor BC214L |

Storno

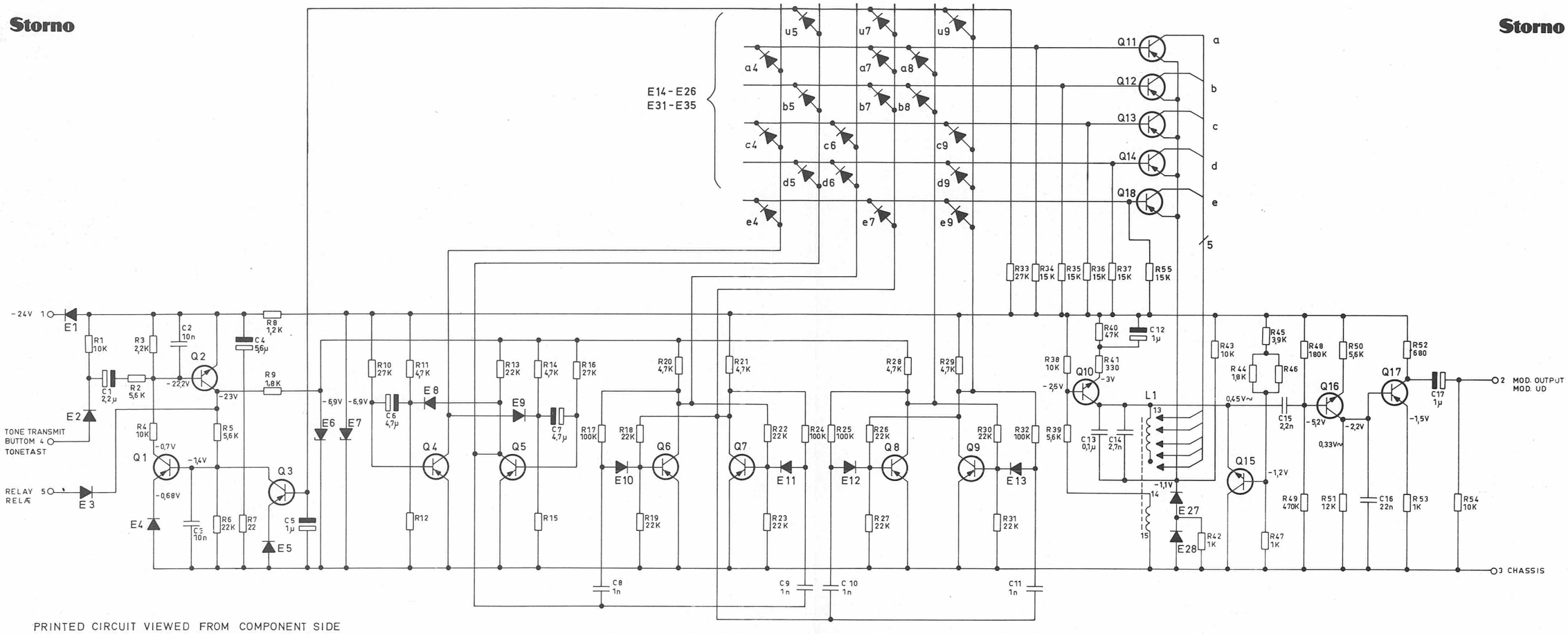
| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

TONE SEQUENCE UNIT
SEKVENSTONEENHED

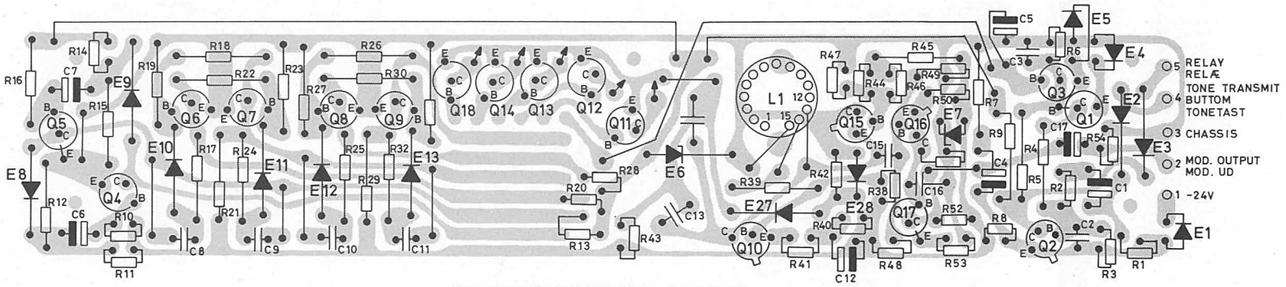
10.1718

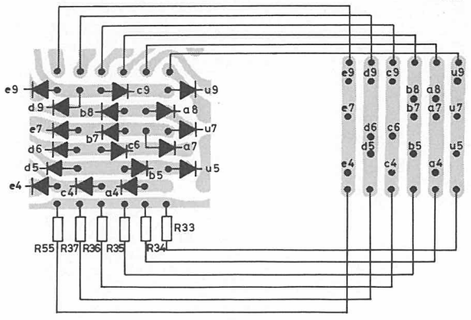
X400.823/2

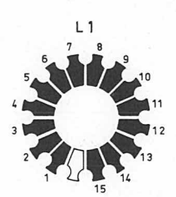
Storno




PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN




| TERM. | FREQ. | DIGIT/CIFFER |
|---|---|---|
| 1 | 1060 Hz | 1 |
| 2 | 1160 – | 2 |
| 3 | 1270 – | 3 |
| 4 | 1400 – | 4 |
| 5 | 1530 – | 5 |
| 6 | 1670 – | 6 |
| 7 | 1830 – | 7 |
| 8 | 2000 – | 8 |
| 9 | 2200 – | 9 |
| 10 | 2400 – | 0 |
| 11 | 2600 – | REPEAT |
| 12 | 2800 – | ALARM |

Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q11, Q12, Q13, Q14, Q17, Q18


BOTTOM VIEW
SET FRA BUNDEN

Q2, Q,10, Q15, Q16


BOTTOM VIEW
SET FRA BUNDEN

# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

10.2132

D401.022

| TYPE | NO. | CODE | DATA | | |
|---|---|---|---|---|---|
| | C1 | 73.5103 | 2.2 µF 20% tantal | | 35V |
| | C2 | 76.5070 | 10 nF 10% polyest. FL | | 50V |
| | C3 | 76.5070 | 10 nF 10% polyest. FL | | 50V |
| | C4 | 73.5113 | 5,6 µF ±20% tantal | | 35V |
| | C5 | 73.5114 | 1 µF 20% tantal | | 30V |
| | C6 | 73.5103 | 4,7 µF 20% tantal | | 15V |
| | C7 | 73.5103 | 4.7 µF 20% tantal | | 15V |
| | C8 | 76.5069 | 1 nF 10% polyest. FL | | 50V |
| | C9 | 76.5069 | 1 nF 10% polyest. FL | | 50V |
| | C10 | 76.5069 | 1 nF 10% polyest. FL | | 50V |
| | C11 | 76.5069 | 1 nF 10% polyest. FL | | 50V |
| | C12 | 73.5114 | 1 µF 20% tantal | | 30V |
| | C13 | 76.5068 | 0.1 µF 1% polystyr TB | | 63V |
| | C14 | 76.5019 | 2,7 nF 5% polystyr TB | | 125V |
| | C15 | 76.5059 | 2,2 nF 10% polyest. FL | | 50V |
| | C16 | 76.5071 | 22 nF 10% polyest. FL | | 50V |
| | C17 | 73.5114 | 1 µF 20% tantal | | 30V |
| | R1 | 80.5261 | 10 kΩ 5% | carbon film | 1/8W |
| | R2 | 80.5258 | 5,6 kΩ 5% | " " | 1/8W |
| | R3 | 80.5253 | 2,2 kΩ 5% | " " | 1/8W |
| | R4 | 80.5261 | 10 kΩ 5% | " " | 1/8W |
| | R5 | 80.5258 | 5,6 kΩ 5% | " " | 1/8W |
| | R6 | 80.5265 | 22 kΩ 5% | " " | 1/8W |
| | R7 | 80.5229 | 22 Ω 5% | " " | 1/8W |
| | R8 | 80.5450 | 1,2 kΩ 5% | " " | 1/4W |
| | R9 | 80.5252 | 1,8 kΩ 5% | " " | 1/8W |
| | R10 | 80.5266 | 27 kΩ 5% | " " | 1/8W |
| | R11 | 80.5257 | 4,7 kΩ 5% | " " | 1/8W |
| | R12 | 80.52xx | 5% | " " | 1/8W |
| | R13 | 80.5265 | 22 kΩ 5% | " " | 1/8W |
| | R14 | 80.5257 | 4,7 kΩ 5% | " " | 1/8W |
| | R15 | 80.52xx | 5% | " " | 1/8W |
| | R16 | 80.5266 | 27 kΩ 5% | " " | 1/8W |
| | R17 | 80.5273 | 100 kΩ 5% | " " | 1/8W |
| | R18 | 80.5265 | 22 kΩ 5% | " " | 1/8W |
| | R19 | 80.5265 | 22 kΩ 5% | " " | 1/8W |
| | R20 | 80.5257 | 4,7 kΩ 5% | " " | 1/8W |
| | R21 | 80.5257 | 4,7 kΩ 5% | " " | 1/8W |
| | R22 | 80.5265 | 22 kΩ 5% | " " | 1/8W |
| | R23 | 80.5265 | 22 kΩ 5% | " " | 1/8W |
| | R24 | 80.5273 | 100 kΩ 5% | " " | 1/8W |
| | R25 | 80.5273 | 100 kΩ 5% | " " | 1/8W |
| | R26 | 80.5265 | 22 kΩ 5% | " " | 1/8W |
| | R27 | 80.5265 | 22 kΩ 5% | " " | 1/8W |
| | R28 | 80.5257 | 4,7 kΩ 5% | " " | 1/8W |
| | R29 | 80.5257 | 4,7 kΩ 5% | " " | 1/8W |
| | R30 | 80.5265 | 22 kΩ 5% | " " | 1/8W |

Storno

| TYPE | NO. | CODE | DATA | | |
|---|---|---|---|---|---|
| | R31 | 80.5265 | 22 kΩ 5% | carbon film | 1/8W |
| | R32 | 80.5273 | 100 kΩ 5% | " " | 1/8W |
| | R33 | 80.5266 | 27 kΩ 5% | " " | 1/8W |
| | R34 | 80.5263 | 15 kΩ 5% | " " | 1/8W |
| | R35 | 80.5263 | 15 kΩ 5% | " " | 1/8W |
| | R36 | 80.5263 | 15 kΩ 5% | " " | 1/8W |
| | R37 | 80.5263 | 15 kΩ 5% | " " | 1/8W |
| | R38 | 80.5261 | 10 kΩ 5% | " " | 1/8W |
| | R39 | 80.5258 | 5,6 kΩ 5% | " " | 1/8W |
| | R40 | 80.5269 | 47 kΩ 5% | " " | 1/8W |
| | R41 | 80.5243 | 330 Ω 5% | " " | 1/8W |
| | R42 | 80.5249 | 1 kΩ 5% | " " | 1/8W |
| | R43 | 80.5261 | 10 kΩ 5% | " " | 1/8W |
| | R44 | 80.5252 | 1,8 kΩ 5% | " " | 1/8W |
| | R45 | 80.5256 | 3,9 kΩ 5% | " " | 1/8W |
| | R46 | 80.52xx | 5% | " " | 1/8W |
| | R47 | 80.5249 | 1 kΩ 5% | " " | 1/8W |
| | R48 | 80.5276 | 180 kΩ 5% | " " | 1/8W |
| | R49 | 80.5281 | 470 kΩ 5% | " " | 1/8W |
| | R50 | 80.5258 | 5,6 kΩ 5% | " " | 1/8W |
| | R51 | 80.5262 | 12 kΩ 5% | " " | 1/8W |
| | R52 | 80.5247 | 680 Ω 5% | " " | 1/8W |
| | R53 | 80.5249 | 1 kΩ 5% | " " | 1/8W |
| | R54 | 80.5261 | 10 kΩ 5% | " " | 1/8W |
| | L1 | 61.994 | spole/coil | | |
| | E1 | 99.5020 | diode 1N4004 | | |
| | E2 | 99.5028 | diode 1N914 | | |
| | E3 | 99.5028 | diode 1N914 | | |
| | E4 | 99.5028 | diode 1N914 | | |
| | E5 | 99.5028 | diode 1N914 | | |
| | E6 | 99.5146 | zenerdiode 6,8V 5% | | 0,250W |
| | E7 | 99.5146 | zenerdiode 6,8V 5% | | 0,250W |
| | E8 | 99.5028 | diode 1N914 | | |
| | E9 | 99.5028 | diode 1N914 | | |
| | E10 | 99.5028 | diode 1N914 | | |
| | E11 | 99.5028 | diode 1N914 | | |
| | E12 | 99.5028 | diode 1N914 | | |
| | E13 | 99.5028 | diode 1N914 | | |
| | E14 | 99.5028 | diode 1N914 | | |
| | E15 | 99.5028 | diode 1N914 | | |
| | E16 | 99.5028 | diode 1N914 | | |

# TONE SEQUENCE UNIT
# SEKVENSTONEENHED

10.2132

X401.120

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | E17 | 99.5028 | diode 1N914 |
| | E18 | 99.5028 | diode 1N914 |
| | E19 | 99.5028 | diode 1N914 |
| | E20 | 99.5028 | diode 1N914 |
| | E21 | 99.5028 | diode 1N914 |
| | E22 | 99.5028 | diode 1N914 |
| | E23 | 99.5028 | diode 1N914 |
| | E24 | 99.5028 | diode 1N914 |
| | E25 | 99.5028 | diode 1N914 |
| | E26 | 99.5028 | diode 1N914 |
| | E27 | 99.5028 | diode 1N914 |
| | E28 | 99.5028 | diode 1N914 |
| | E29 | 99.5028 | diode 1N914 |
| | E31 | 99.5028 | diode 1N914 |
| | E32 | 99.5028 | diode 1N914 |
| | E33 | 99.5028 | diode 1N914 |
| | E34 | 99.5028 | diode 1N914 |
| | E35 | 99.5028 | diode 1N914 |
| | Q1 | 99.5144 | transistor BC214L |
| | Q2 | 99.5121 | transistor BC107 |
| | 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 |
| | Q9 | 99.5144 | transistor BC214L |
| | Q10 | 99.5143 | transistor BC108 |
| | Q11 | 99.5144 | transistor BC214L |
| | Q12 | 99.5144 | transistor BC214L |
| | Q13 | 99.5144 | transistor BC214L |
| | Q14 | 99.5144 | transistor BC214L |
| | Q15 | 99.5143 | transistor BC108 |
| | Q16 | 99.5143 | transistor BC108 |
| | Q17 | 99.5144 | transistor BC214L |

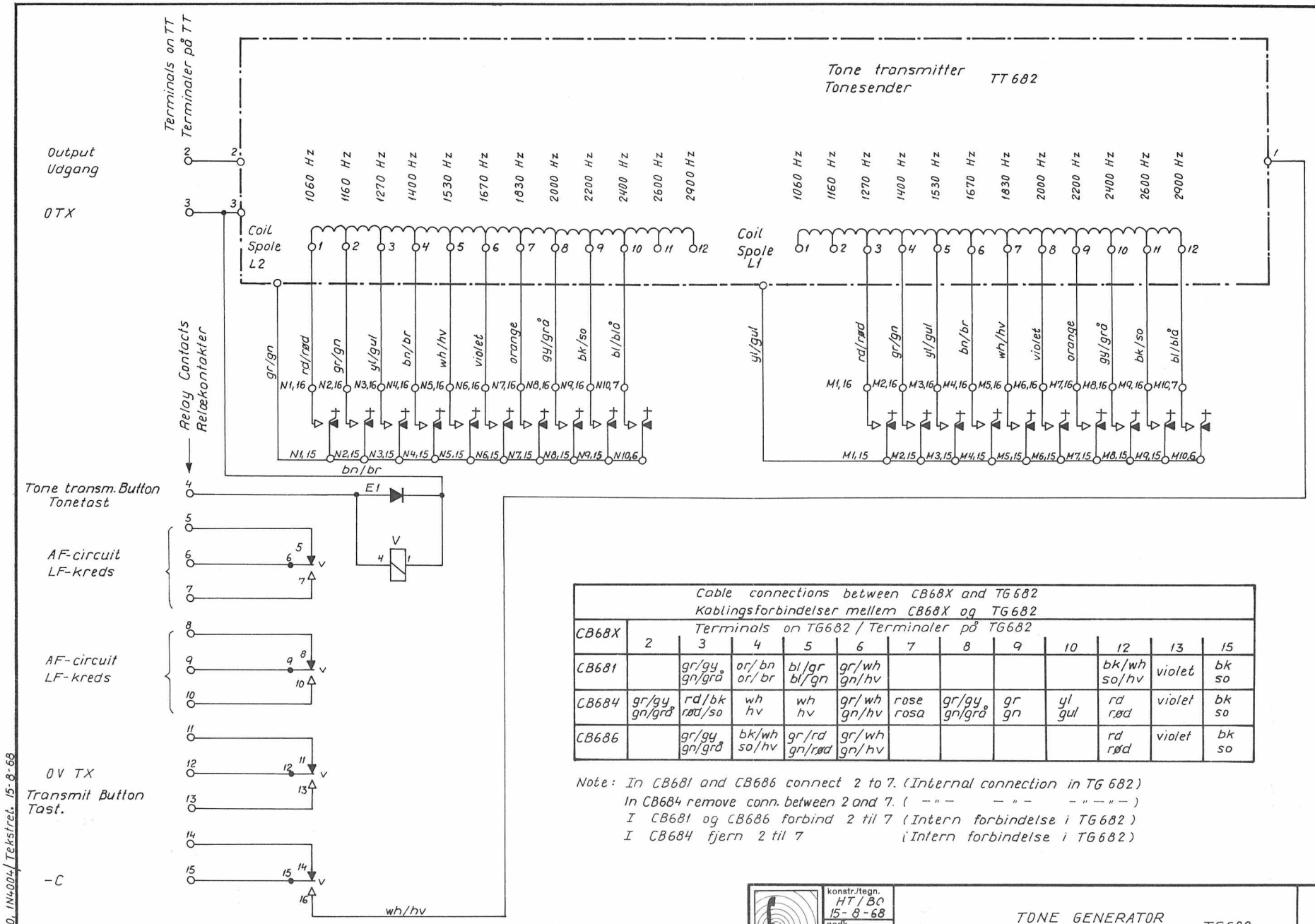
Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

TONE SEQUENCE UNIT
SEKVENSTONEENHED

10.2132

X401.120




Coble connections between CB68X and TG682
Kablingsforbindelser mellem CB68X og TG682

| CB68X | Terminals on TG682 / Terminaler på TG682 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 13 | 15 |
| CB681 | | gr/gy gn/grå | or/bn or/br | bl/gr bl/gn | gr/wh gn/hv | | | | | bk/wh so/hv | violet | bk so |
| CB684 | gr/gy gn/grå | rd/bk rød/so | wh hv | wh hv | gr/wh gn/hv | rose rosa | gr/gy gn/grå | gr gn | yl gul | rd rød | violet | bk so |
| CB686 | | gr/gy gn/grå | bk/wh so/hv | gr/rd gn/rød | gr/wh gn/hv | | | | | rd rød | violet | bk so |

Note: In CB681 and CB686 connect 2 to 7. (Internal connection in TG 682)
In CB684 remove conn. between 2 and 7. ( — " — — " — — " — " — )
I CB681 og CB686 forbind 2 til 7 (Intern forbindelse i TG682)
I CB684 fjern 2 til 7 (Intern forbindelse i TG682)

Storno

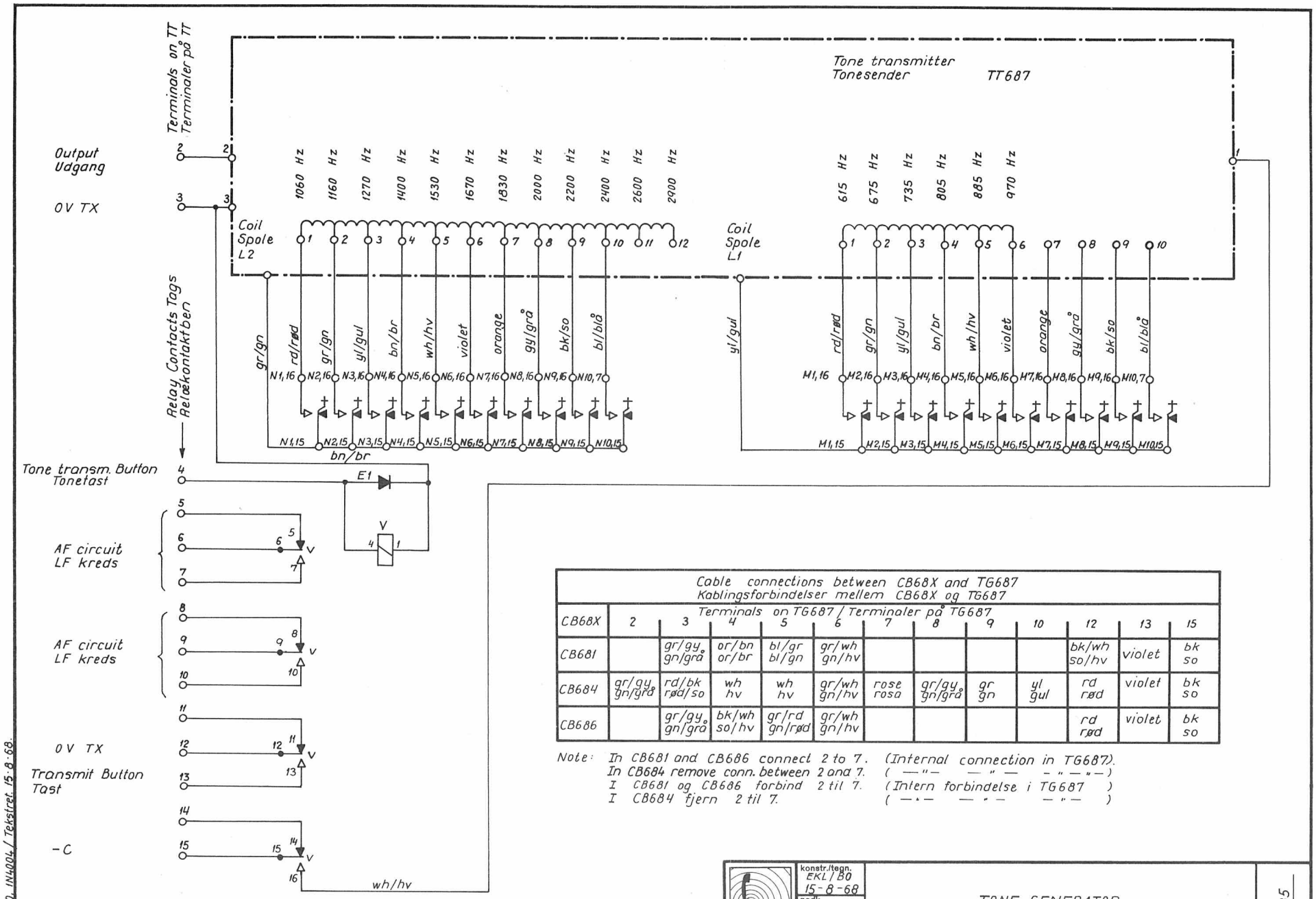
konstr./tegn. HT/BO 15-8-68
godk. 29.6.67
komp.liste

TONE GENERATOR
TONEGENERATOR
TG682

KODE

TEGN. NR. D108491 A3

E1, 99.5020, 1N4004/Tekstret. 15-8-68




Cable connections between CB68X and TG687
Kablingsforbindelser mellem CB68X og TG687

| CB68X | Terminals on TG687 / Terminaler på TG687 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 13 | 15 |
| CB681 | | gr/gy gn/grå | or/bn or/br | bl/gr bl/gn | gr/wh gn/hv | | | | | bk/wh so/hv | violet | bk so |
| CB684 | gr/gy gn/grå | rd/bk rød/so | wh hv | wh hv | gr/wh gn/hv | rose rosa | gr/gy gn/grå | gr gn | yl gul | rd rød | violet | bk so |
| CB686 | | gr/gy gn/grå | bk/wh so/hv | gr/rd gn/rød | gr/wh gn/hv | | | | | rd rød | violet | bk so |

Note: In CB681 and CB686 connect 2 to 7. (Internal connection in TG687).
In CB684 remove conn. between 2 and 7. ( — " — — " — - " - " - )
I CB681 og CB686 forbind 2 til 7. (Intern forbindelse i TG687 )
I CB684 fjern 2 til 7. ( — · — — · — — · — )

Storno

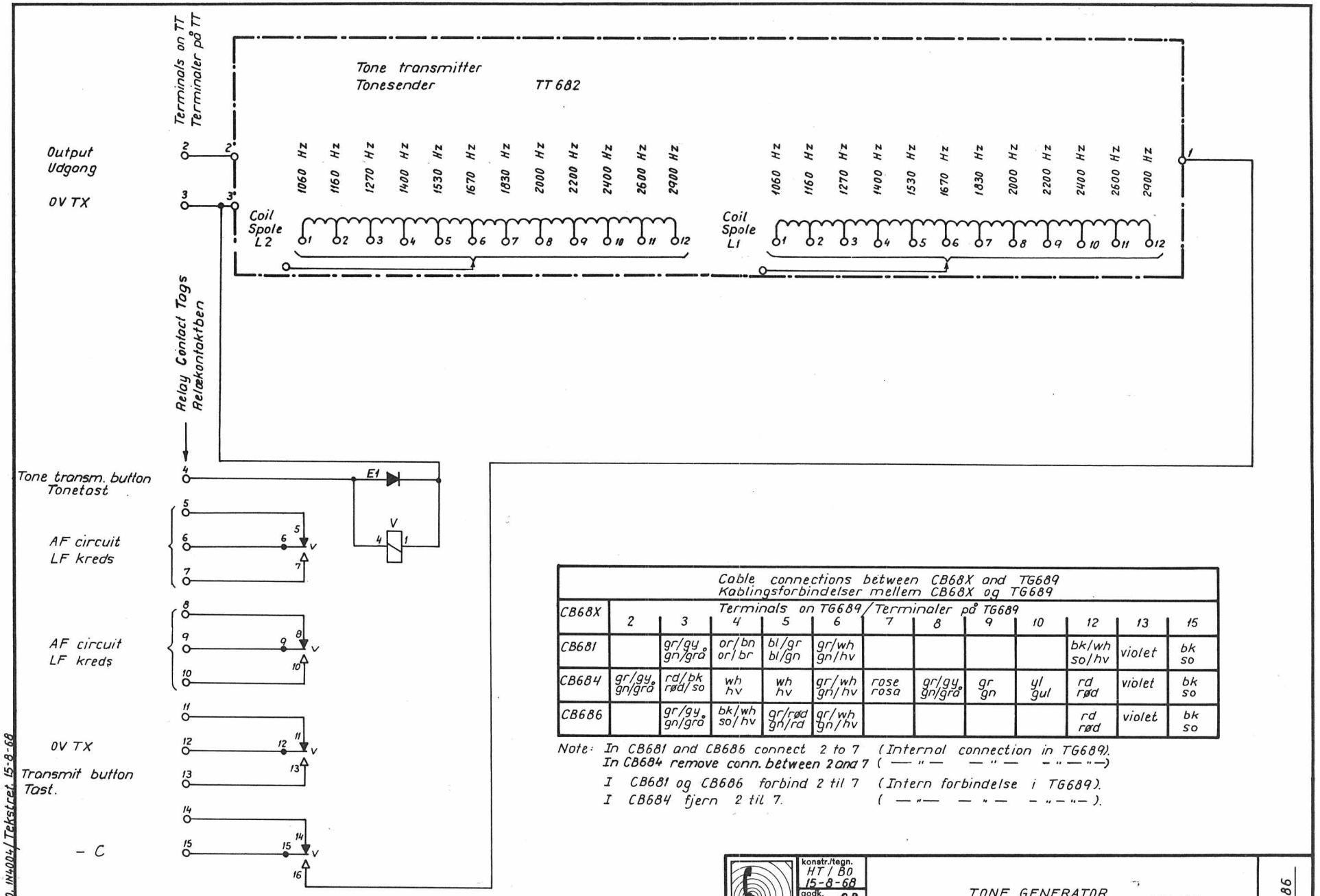
konstr./tegn. EKL / BO 15-8-68
godk. ØB 4-8-67
komp.liste

TONE GENERATOR TG687
TONEGENERATOR

KODE

TEGN. NR. D 109685 A3

E1, 99.5020, IN4004 / Tekstret. 15.8.68.




Coble connections between CB68X and TG689
Kablingsforbindelser mellem CB68X og TG689

| CB68X | Terminals on TG689 / Terminaler på TG689 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 13 | 15 |
| CB681 | | gr/gy gn/grå | or/bn or/br | bl/gr bl/gn | gr/wh gn/hv | | | | | bk/wh so/hv | violet | bk so |
| CB684 | gr/gy gn/grå | rd/bk rød/so | wh hv | wh hv | gr/wh gn/hv | rose rosa | gr/gy gn/grå | gr gn | yl gul | rd rød | violet | bk so |
| CB686 | | gr/gy gn/grå | bk/wh so/hv | gr/rød gn/rd | gr/wh gn/hv | | | | | rd rød | violet | bk so |

Note: In CB681 and CB686 connect 2 to 7 (Internal connection in TG689).
In CB684 remove conn. between 2 and 7 ( — " — — " — - " — " —)
I CB681 og CB686 forbind 2 til 7 (Intern forbindelse i TG689).
I CB684 fjern 2 til 7. ( — " — — " — - " — " — ).

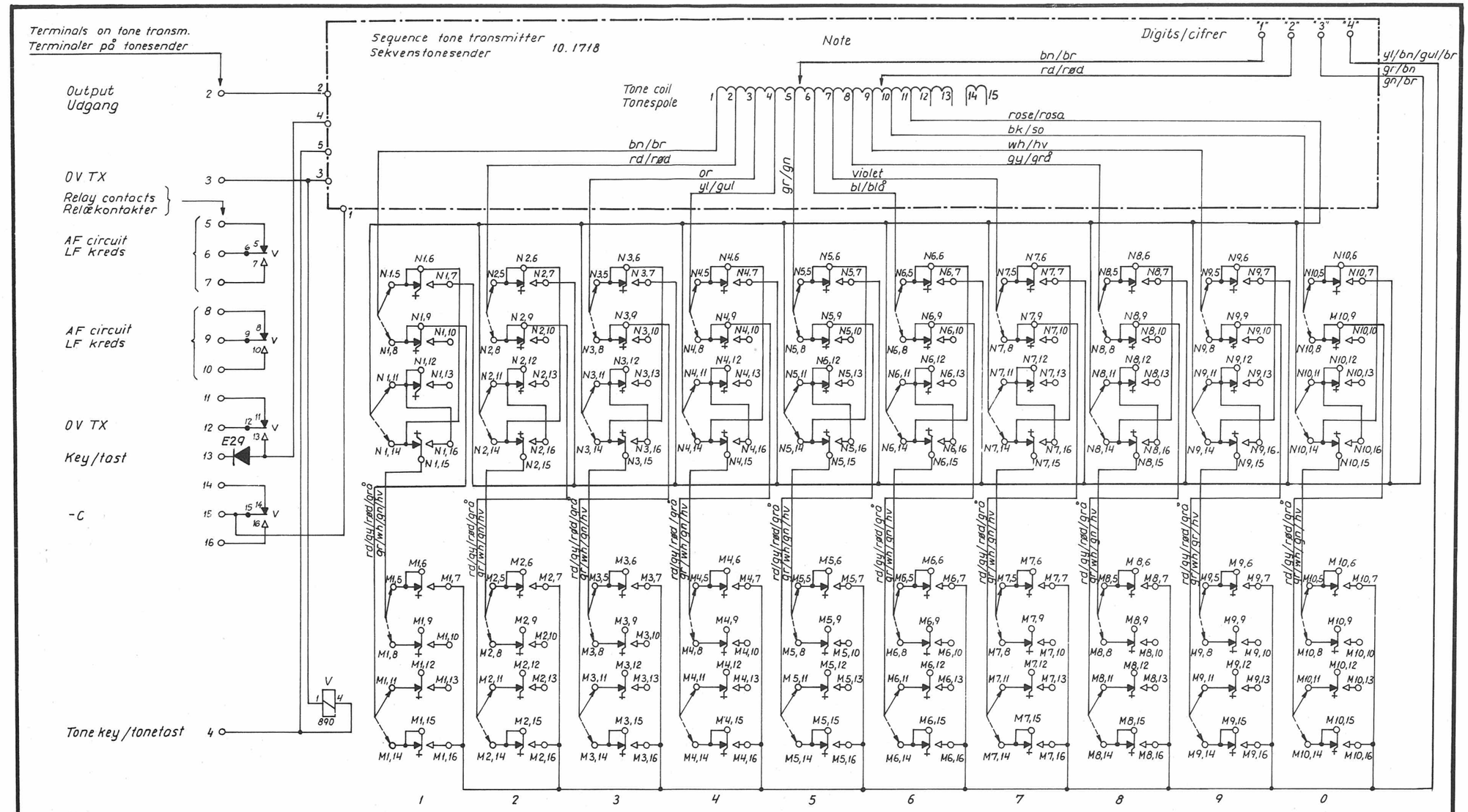
Storno

konstr./tegn. HT / BO 15-8-68
godk. OB 4·8·67
komp.liste

TONE GENERATOR
TONEGENERATOR
TG 689
KODE

TEGN. NR. D109686 A3

El. 925020. IN4004/Tekstret. 15-8-68




Note:

Digit "1"
Digit no. "1" (brown core) must be connected to one of the terminals on the tone coil 1 to 10 (1060 to 2400 Hz).

Digit "2"
Digit no. "2" (red core) must be connected to one of the terminals on the tone coil 1 to 10 (1060 to 2400 Hz).
If digit no. "2" has the same number as digit no. "1", digit no. "2" (red core) must be connected to tone coil terminal no. 11 (repeater tone 2600 Hz.)

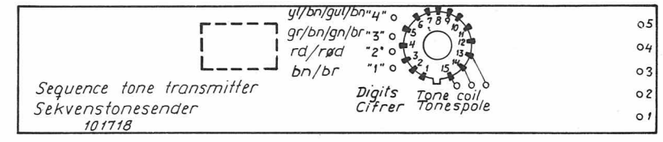
Push-buttons
a) If digit no "1" has the same number as digit no. "2". no changes concerning the straps on the push-buttons is made.

b) If the number for digit no. "1" differs from the number for digit no. "2", the two push-buttons, with the same number as digit no. "2" must be connected as indicated with "dotted line".

Ciffer "1"
Ciffer "1" (brun ledning) skal på tonespolen strappes til et af tonenumrene 1-10 (1060-2400 Hz).

Ciffer "2"
Ciffer "2" (rød ledning) skal på tonespolen strappes til et af tonenumrene 1-10 (1060-2400 Hz), dog skal ciffer "2" (rød ledning) forbindes til tonenummer 11 (repeater tone 2600 Hz) hvis ciffer "2"s nummer er lig ciffer "1"s nummer.

Trykknapper
Strapninger på trykknapper:
a) Hvis nummer for ciffer "1" = nummer for ciffer "2", ingen strapn.
b) Hvis ciffer "1"s nummer er forskellig fra ciffer "2"s nummer skal begge trykknapper med samme nummer som ciffer "2" strappes som vist med punkteret linie.




Cable connections between CB68X and SG684
Kablingsforbindelser mellem CB68X og SG684

| CB68X | Terminals on SG684 / terminaler på SG684 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 13 | 15 |
| CB681 | | gr/gy gn/grå | or/bn or/br | bl/gr bl/gn | gr/wh gr/hv | | | | | bk/wh so/hv | violet | bk so |
| CB684 | gr/gy gn/grå | rd/bk rød/so | wh hv | wh hv | gr/wh gn/hv | rose rosa | gr/gy gn/grå | gr gn | yl gul | rd rød | violet | bk so |
| CB686 | | gr/gy gn/grå | bk/wh so/hv | gr/rd gn/rød | gr/wh gn/hv | | | | | rd rød | violet | bk so |

Note: In CB681 and CB684 connect 2 to 7. (Internal conn. in SG684)
In CB684 disconnect 2 to 7. ( " " " " " " )
I CB681 og CB686 forbind 2 til 7. (Intern forb. i SG684)
I CB684 fjern 2 til 7. ( " " " " " " )

Tone coil
Terminals: 1 2 3 4 5 6 7 8 9 10 11 12
1060 1160 1270 1400 1530 1670 1830 2000 2200 2400 2600 2800

Tonespole
Terminaler: 1 2 3 4 5 6 7 8 9 10 11 12
1060 1160 1270 1400 1530 1670 1830 2000 2200 2400 2600 2800

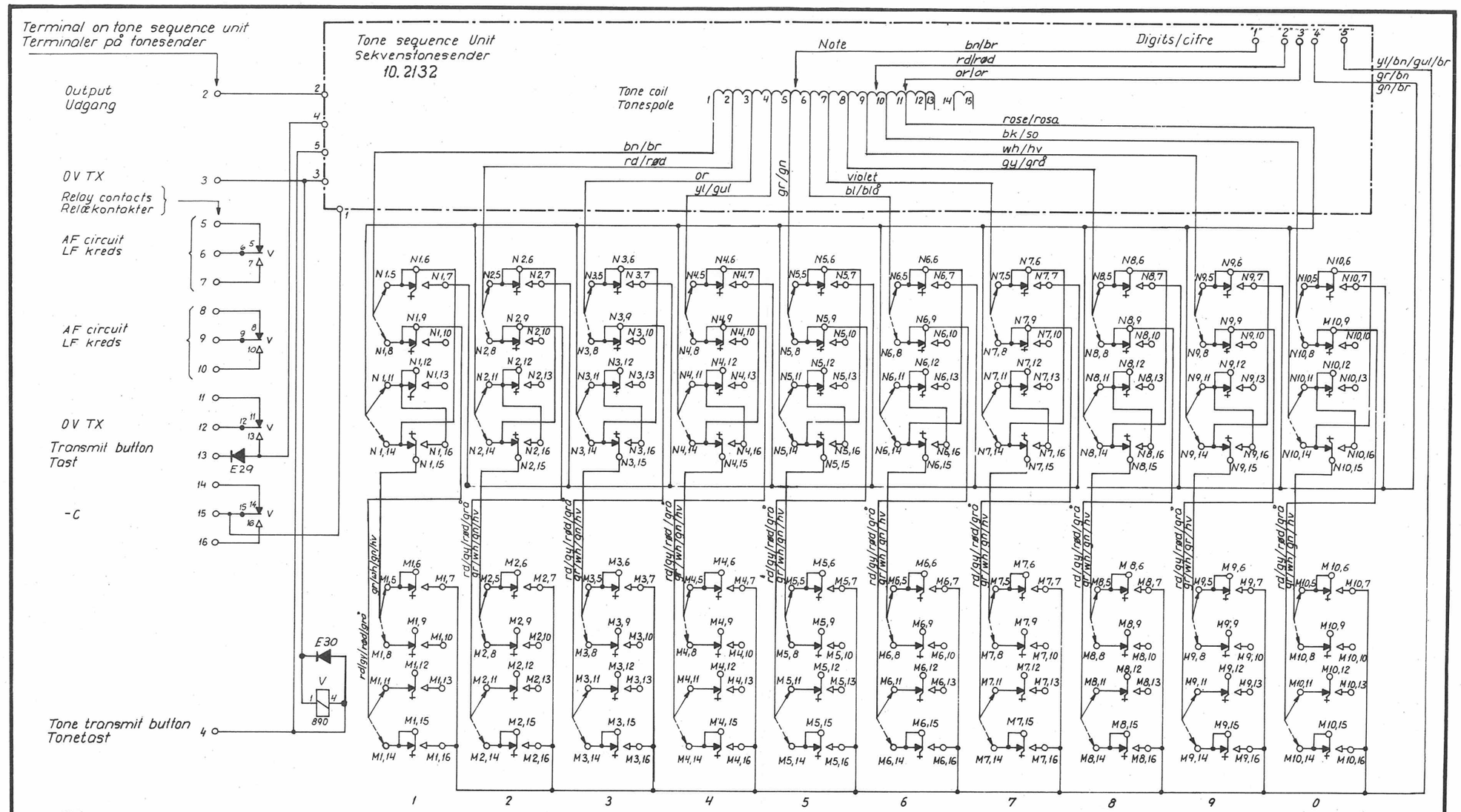
Ret.: Whd.

konstr./tegn HT / BB 17-10-68
godk.
komp.liste

Storno

SEQUENCE TONE GENERATOR
SEKVENSTONEGENERATOR
SG684

TEGN. NR. D109281




Note:

Digit "1"
Digit no. "1" (brown core) should be connected to one of the tone-coil terminals 1 to 10 (1060 – 2400 Hz).

Digit "2"
Digit no. "2" (red core) should be connected to one of the tone-coil terminals 1 to 10 (1060 – 2400 Hz).
If digit no. "2" has the same number as digit no. "1", digit no. "2" (red core) should be connected to tone-coil terminal no. 11 (repeater tone 2600Hz.)

Digit "3"
Digit no. "3" (orange core) should be connected to one of the tone-coil terminals 1 to 10 (1060-2400 Hz). However, digit no. "3" (orange core) should be connected to tone-coil terminal 11 (repeater tone 2600 Hz) if digit no. "3"s no. is equal to "2"s no, but not if digit no. "3" = digit no. "2" = digit no. "1".

Push-buttons
a) if digit no. "1" = digit no. "2" = digit no. "3", both push-buttons with the same no. as digit no. "3" should be connected as indicated by the dotted line on the diagramme.
b) if digit no. "2" = digit no. "3", no connection.
c) if digit no. "2" is different from digit no. "3", both push-buttons with the same no. as digit no. "3" should be connected as indicated by the dotted line on the diagramme.

Tone coil
Terminals: 1 2 3 4 5 6 7 8 9 10 11 12
1060 1160 1270 1400 1530 1670 1830 2000 2200 2400 2600 2800

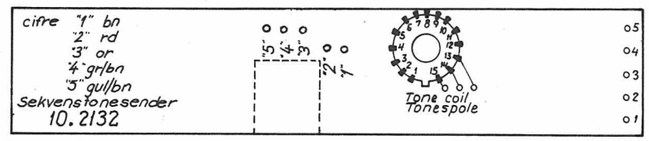
Ciffer "1"
Ciffer "1" (brun ledning) skal på tonespolen strappes til et af tonenumrene 1-10 (1060-2400 Hz).

Ciffer "2"
Ciffer "2" (rød ledning) skal på tonespolen strappes til et af tonenumrene 1-10 (1060-2400 Hz), dog skal ciffer "2" (rød ledning) forbindes til tonenummer 11 (repeater tone 2600 Hz) hvis ciffer "2"s nummer er lig ciffer "1"s nummer.

Ciffer "3"
Ciffer "3" (orange ledning) skal på tonespolen strappes til et af tonenumrene 1-10 (1060-2400 Hz) dog skal ciffer "3" (orange ledning) forbindes til tonenummer 11 (repeater tone 2600 Hz) hvis ciffer "3"s nummer er lig ciffer "2"s nummer, men ikke hvis ciffer "3" = ciffer "2" = ciffer 1.

Trykknapper
a) hvis ciffer "1" = ciffer "2" = ciffer "3", skal begge trykknapper med samme nummer som ciffer "3" strappes som vist med punkteret linie på diagrammet.
b) hvis ciffer "2" = ciffer "3", ingen strapning.
c) hvis ciffer "2" er forskellig fra ciffer "3", skal begge trykknapper med samme nummer som ciffer "3" strappes som vist med punkteret linie på diagrammet.

Tonespole
Terminaler: 1 2 3 4 5 6 7 8 9 10 11 12
1060 1160 1270 1400 1530 1670 1830 2000 2200 2400 2600 2800




Cable connections between CB68X and SG685
Kablingsforbindelser mellem CB68X og SG685

| | Terminals on SG685 / terminaler på SG685 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CB68X | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 13 | 15 |
| CB681 | | gr/gy<br>gn/grå | or/bn<br>or/br | bl/gr<br>bl/gn | gr/wh<br>gr/hv | | | | | bk/wh<br>so/hv | violet | bk<br>so |
| CB684 | gr/gy<br>gn/grå | rd/bk<br>rød/so | wh<br>hv | wh<br>hv | gr/wh<br>gn/hv | rose<br>rosa | gr/gy<br>gn/grå | gr<br>gn | yl<br>gul | rd<br>rød | violet | bk<br>so |
| CB686 | | gr/gy<br>gn/grå | bk/wh<br>so/hv | gr/rd<br>gn/rød | gr/wh<br>gn/hv | | | | | rd<br>rød | violet | bk<br>so |

Note: In CB681 and CB686 connect 2 to 7. (Internal conn. in SG685)
In CB684 remove connec. betw. 2 and 7 ( " " " " " " " " )
I CB681 og CB686 forbind 2 til 7. (Intern forb. i SG685)
I CB684 fjern 2 til 7. ( " " " " " " " " )

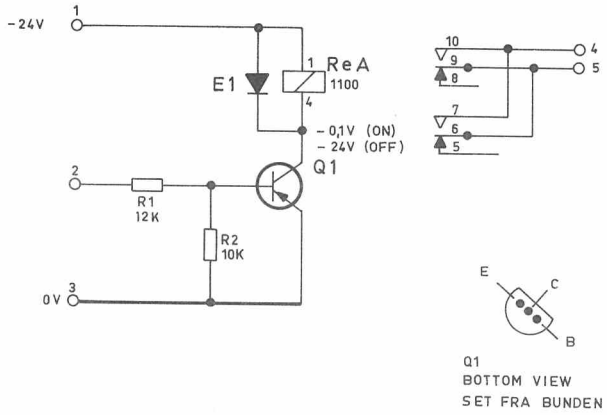
Storno

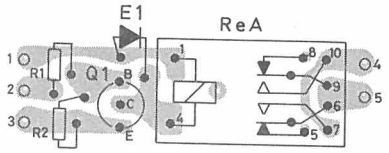
konstr. tegn. HT/ISL 21.4.69
godk.
komp. liste

TONE SEQUENCE GENERATOR
SEKVENSTONEGENERATOR
SG685

TEGN. NR. D112899

Storno




# ALARM CIRCUIT
# ALARM KREDS

AC683a

D400.974/2

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | R1 | 80.5262 | 12 kΩ 5% carbon film 1/8W |
| | R2 | 80.5261 | 10 kΩ 5% " " 1/8W |
| | ReA | 58.5066 | Relay/relæ 1100 Ω 21-21 24 V |
| | E1 | 99.5020 | 1N4004 Diode |
| | Q1 | 99.5144 | BC214L Transistor |

Storno

| TYPE | NO. | CODE | DATA |
|---|---|---|---|
| | | | |

ALARM CIRCUIT
ALARM KREDS

AC683a

X400.979/2