

**SBS - SYSTEM
CAF680-2002
SYSTEM DESCRIPTION**

Storno

SBS - SYSTEM CAF680-2002 SYSTEM DESCRIPTION

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CAF680/600-2002.

SECTION 1:

CAF680/600-2002	D113992
CAF680-2002	D113993
CAF680-2002	T114056

SECTION 2:

TE680-2002/08	D113616
TE680-2002/16	D113617
TE680-2002/08	D113655
TE680-2002/16	D113863

SECTION 3:

CAF680-2002	D114055
CAF680-2002	D113927
CAF680-600-2002	T114043

SECTION 4:

TE680-2002	D113295
CAF680-2002	D113649
CAF680-2002/2003	D113267
TE680-2002	T112199
RP680-2002/2	D113264
PS680-6241	D113537
PS680-6241	I 114052
PS680-6241	X113538
FN680-2002	D110476
FN680-2002	X110477
CB680-2002	D114385
DLG115-139	D111173
ID680-2002a/b	D114166
ID680-2002	D113340
SU680-2002a	D112107
SU680-2002	T112234
SU680-2002/01a	D116009

SU680-2002/01a	I 115945
SU680-2002/01a	X115045
SU680-2002/01a	I 116005
SU680-2002/01a	I 115853
RP680-2002/10	D115057
RP680-2002/10	I 114662
RP680-2002/10	X114663

SECTION 5:

AA6811	37.600-E1
AA6811	37.587-E1
AA6811	D400867/2
AA6811	X400877
AA6811	37.588
CR681	D400739/2
CR681	X400861
DU680-2002/1	T115346
DU680-2002/1	D110520
DU680-2002/ 1	D113509
DU680-2002/1	X110521
DU680-2002/2a	D110518
DU680-2002/2a	D110968
DU680-2002/2a	X110519
HU680-2003	D113709
HU680-2003	D113734
HU680-2003	X113730
HU680-2003	T115348
LA681	36.162
LA681	D400767/2
LA681	X400759/4
PG681	D109658
PG681	X112555
PS603	37.645-E1
PS603	D400746/4
PS603	X400752/3
PS603-2002	D116059

CAF680/600-2002.

PS603-2002	X116060
PS604	37.646
PS604	D400790
PS604	X400862
RP680-2002/02	D110203
RP680-2002/02	D113487
RP680-2002/02	X110322
RP680-2002/02	
RP680-2002/06	D111296
RP680-2002/06	D113403
RP680-2002/06	X113256
RP680-2002/06	T115434
RP680-2002/07a	D113164
RP680-2002/07a	D113425
RP680-2002/07a	X113165
RP680-2002/08	D113197
RP680-2002/08	D113424
RP680-2002/08	X113286
RP680-2002/08	D113183
RP680-2002/09	D114074
RP680-2002/09	D113426
RP680-2002/09	X113273
RP680-2003/03	D111871
RP680-2003/03	D113421
RP680-2003/03	X113255
ST684	36.163-E1
ST684-2003	D113324
ST684	X400865
TR6811a	37.744
TR6811a	37.745
TR6811a	D401024
TR6811a	X401061
TR6811a	37.746
TT680-2002	D111382
TT680-2002	D113504
TT680-2002	X113263
TT680-2002	T115345
TT680-2003	D111453
TT680-2003	D113505
TT680-2003	X113272

TT680-2003	T115344
TU680-2002	D110516
TU680-2002	D113503
TU680-2002	X110517

SECTION 6:

CP680-2003	D113699
DA681	36.671
DA681	D400821/2
DA681	X400851
DA680-6232	D112857
DA680-6232/01	D112901
DA680-6232/01	X113140
DA680-6232/02	X113141
DA680-6232/02	D112902
RP680-2003/04	D113702
RP680-2003/04	D113754
RP680-2003/04	X113731

SECTION 7:

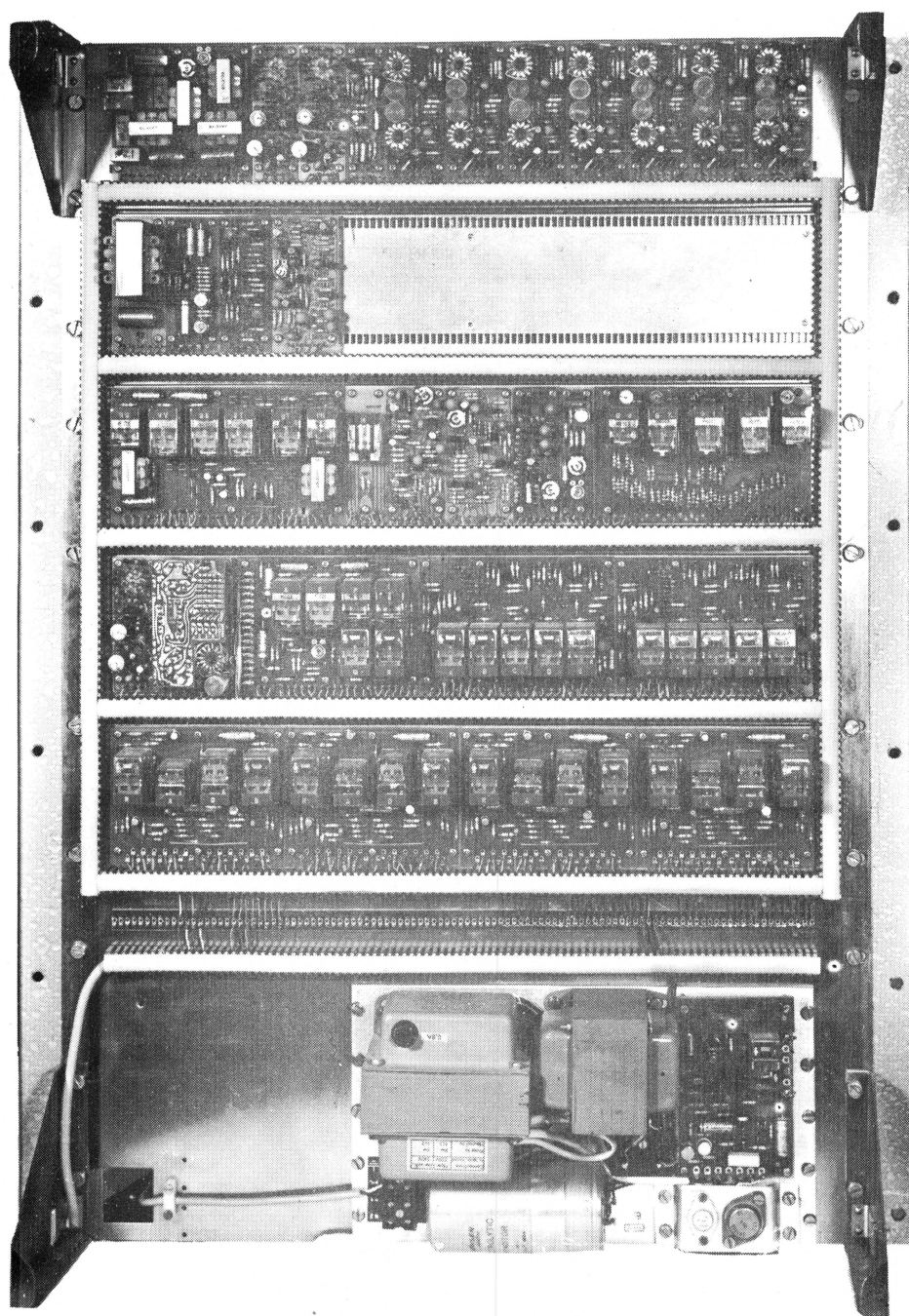
CB601-2003/02	T114028
CB601-2003/02	D112889
CB601-2003/02	D113972
CB601-2003/02	D114134
CB601-2003/02	D114135
CB601-2003/02	X114092
CB601-2003/02	K304549
CB601-2002/02a	
CB601-2003/02b	C304551
CAF680-600-2002	
AA602	37.405
AA602b	D400836/3
AA602b	X400677/5
RP600-2003	D112687
RP600-2003	D113419
RP600-2003	X113245
SR684	D400912/3
SR684	X400975/2
SR684	D400989

CAF680/600-2002.

SR6841	D401056
SR6841	X400059
SU600-2002	D110180
SU600-2002	D113579
SU600-2002	X110181
TT682, TT687	37.485-E1
TT681, TT682, TT683	D400771/3
TT681, TT682, TT683	X400751/2

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TE680-2002

SECTION 1

SBS-system

Shared VHF/UHF Base Station

A SBS-system (Shared Base Station) is a mobile radio telephone system comprising only one base station to which several groups of users are connected.

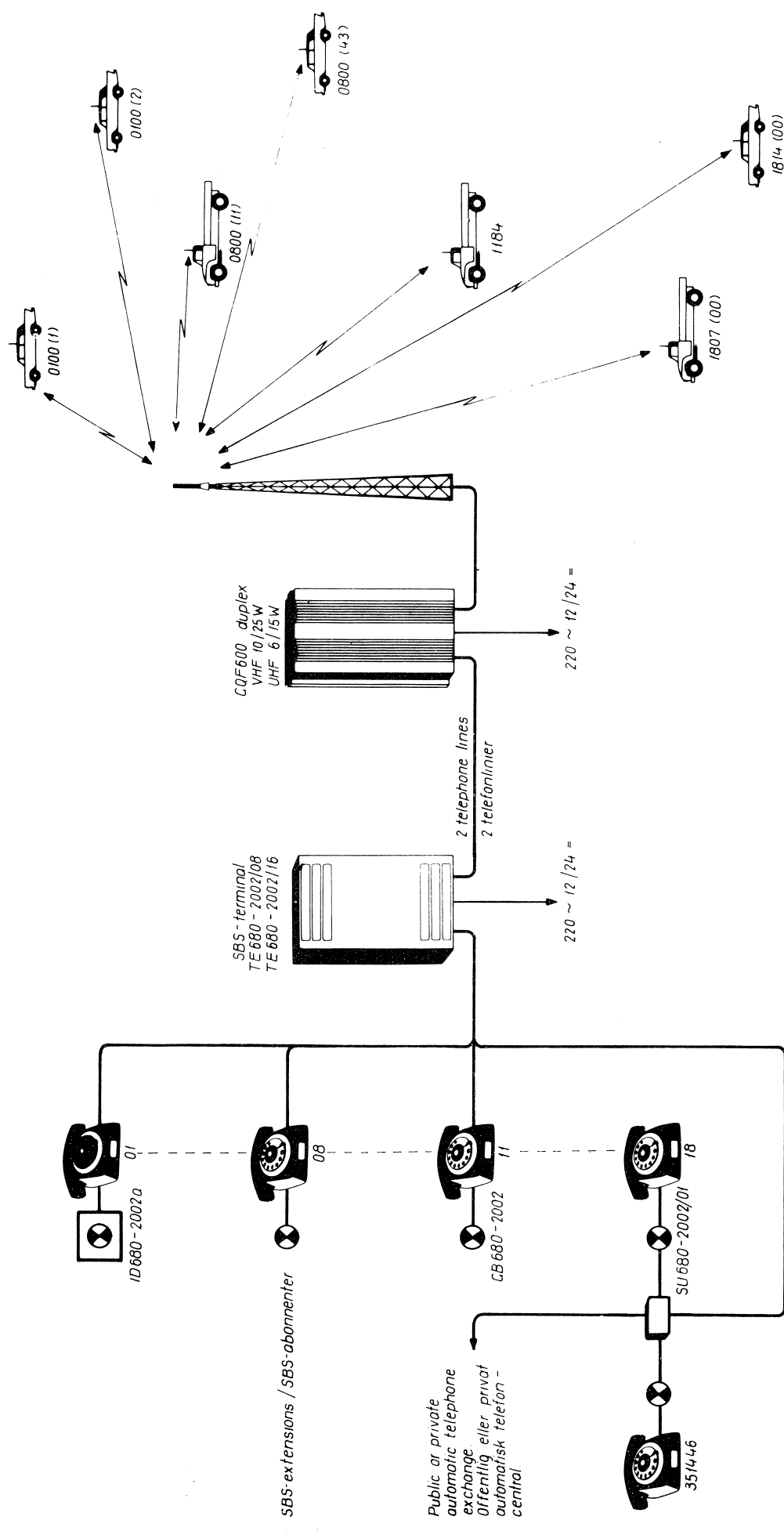
A conventional radio telephone system comprises a base station with a number of associated mobile stations. Where many such systems are operating within a confined geographical area, the lack of frequencies will make it necessary for several mobile schemes to operate on the same frequency, which invariably will result in interference and undesired interception.

Such drawbacks can be overcome if a number of users, each with their group of mobile stations, are connected to a SBS-system. Besides elimination of interference and interception, the employment of the SBS-system also means, that initial as well as running expenses incurred in operating the system are shared among the users. An additional advantage is the increased frequency economy, which will permit the use of more systems within the same area.

A SBS-system will accommodate up to 18 extensions with a number of mobile stations which, for the reason of congestion, should not exceed 100.

The SBS-subscribers may be a number of entirely independent users or organisations, a number of departments within one organisation, or a combination thereof.

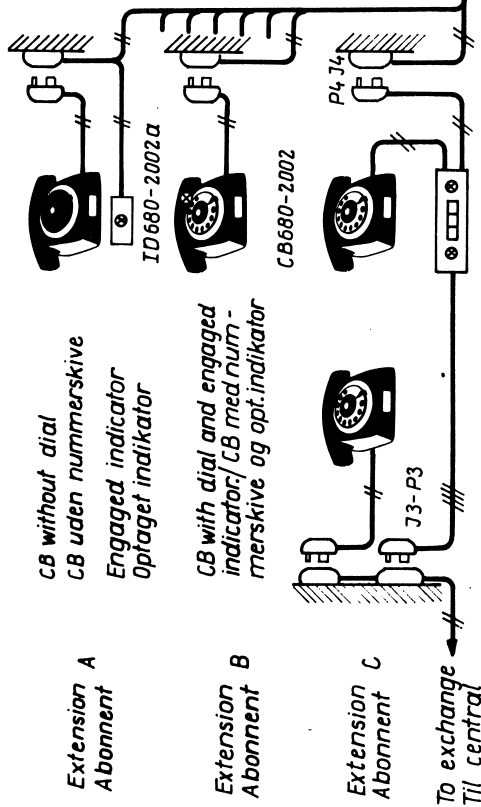
Normally, the permission to operate a radio telephone system is granted to an individual, who will then be registered as the owner and thus be responsible to the PTT administration. Therefore, in cases where a SBS-system involves a number of individual users, an exemption from current regulations must be granted by the administration.



TE/08 and TE/16 are equipped with interface units for connection of 8 and 16 extensions respectively.
 Både terminal enheder kan udstyres med 2 yderligere interface enheder, (Exten 9 og 10)
 TE/08 og TE/16 er udstyret med kredse for tilslutning af henholdsvis 8 og 16 telefonabbonnenter
 Begge terminalenheder kan udstyres med yderligere 2 abonnentkredse. (Abn. 9 og 10)

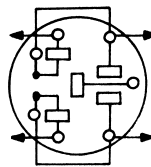
		Model / Type 08 / 16 2.1.70	godk. 0/1 komp. liste	KODE SBS-SYSTEM, LAY-OUT / OVERSIGT CAF 680/600-2002	TEGN NR. 0113992
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EXTENSIONS/ABONNENTER

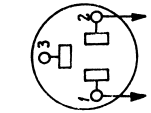


SU680-2002/01

J3



J4

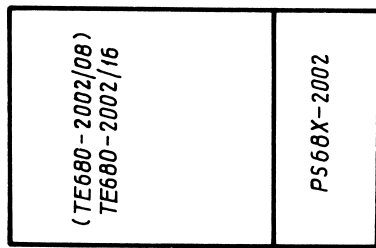


- J3 41.5022 (297.264)
- P3 41.5020 (297.261)
- J4 41.5016 (297.230)
- P4 41.5015 (297.229)

Note: LME type Dialog is used as telephone apparatus. The apparatus is delivered either with, or without dial and "Star blinker" for visual engaged indication. Alternatively, a separate engaged indicator in a plastic box, ID680-2002a, can be used. If connection of conversations to and from the teleph. netw. is desired, the conn. unit SU680-2002/01 (dialog with bottom-section) should be used. Permission from the Teleph. Comp. for connections to or from the public teleph. netw. is required. Som telefonapp. anvendes LME type dialog. Apparatet leveres med eller uden nummerskive og stjerneblikker for visuel opt. markering.

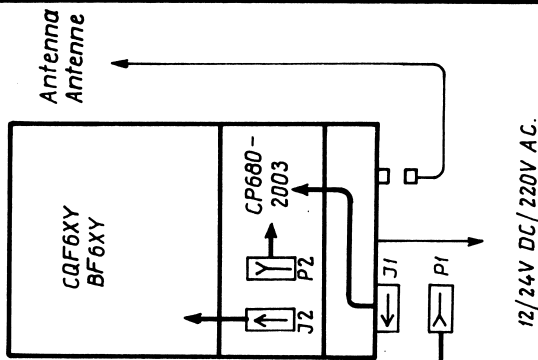
Alternativt kan anvendes løs opt. markering i plastikboks, der benævnes ID680-2002a. Ønskes gennemsit. af samtaler til og fra telefonnettet anv. gennemsit. enh. SU680-2002/01 (dialog med undersektion). Gennemsit. af samt. til eller fra det offentlige telefonnet kræver telefonsekskabernes godkendelse.

TERMINAL EQUIPMENT/TERMINALENHED

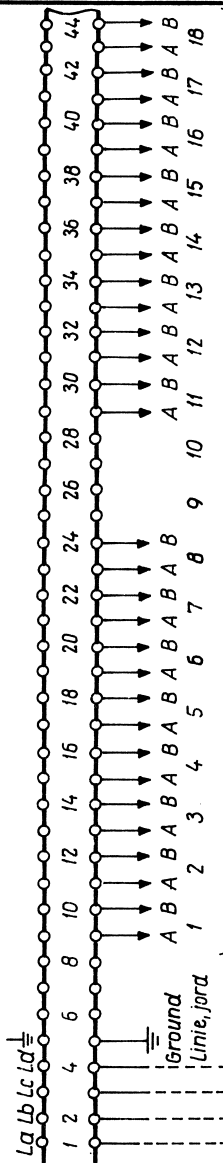


TEL. LINES / LINIER

BASE STATION / BASISSTATION

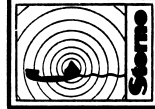


Soldering terminal board in TE680-2002/Loddeterminalrække i TE680-2002



Extension lines/ Abonnementlinier

TE680-2002/08 for max. 8 extensions/abonnter. (1-8)
TE680-2002/16 for max. 16 extensions/abonnter. (1-8 + 11-18).



Kontrollert af
2. 1. 1970
godk. 06
komp. liste

CABLING LAY OUT/MONTERINGSOVERSIGT
SBS-SYSTEM CAF680-2002

KODE

D 113993

SBS-System Type CAF680-2002.

System Description.

Shared VHF/UHF Base Station

A SBS-system (Shared Base Station) is a mobile radio telephone system comprising only one base station to which several groups of users are connected.

A conventional radio telephone system comprises a base station with a number of associated mobile stations. Where many such systems are operating within a confined geographical area, the lack of frequencies will make it necessary for several mobile schemes to operate on the same frequency, which invariably will result in interference and undesired interception.

Such drawbacks can be overcome if a number of users, each with their group of mobile stations, are connected to a SBS-system. Besides elimination of interference and interception, the employment of the SBS system also means, that initial as well as running expenses incurred in operating the system are shared among the users. An additional advantage is the increased frequency economy, which will permit the use of more systems within the same area.

A SBS-system will accommodate up to 18 extensions with a number of mobile stations which, for the reason of congestion, should not exceed 100.

The SBS-subscribers may be a number of entirely independent users or organisations, a number of departments within one organisation, or a combination thereof.

Normally, the permission to operate a radio telephone system is granted to an individual, who will then be registered as the owner and thus be responsible to the PTT administration. Therefore, in cases where a SBS-system involves a number of individual users, an exemption from current regulations must be granted by the administration.

Design and Function.

Employed in a mobile VHF/UHF scheme, the SBS-system enables a total of 18 extensions, each with their mobile group, to share a common base station.

A duplex-station of the CQF600 series with control panel type CP680-2003 are used as a base station. The base station is controlled over a SBS terminal unit TE680-2002, as shown in drawing D113392, System Lay-out.

The terminal unit is available in two versions designated TE680-2002/08 and TE680-2002/16, respectively. TE/08 and /16 both employ the same basic equipment, and are mounted on a 20-module chassis for 19" rack mounting or wall mounting. The only difference between the two terminal units is the interface facility for 8 and 16 extensions, respectively. However, TE/16 uses a separately mounted power supply unit.

It applies to both terminal units, that still two extensions can be connected or - if required - add-on units for special functions can be fitted.

The circuitry employed in both terminal units renders system lay-out most versatile. Thus, the operational features of the radio system largely depends upon the design of the mobile equipment which, according to requirements, can be adapted for speech privacy, selective calling, group calls, audible or visible call indication, talk-through operation (repeater function) for car-to-car traffic, etc.

Extensions are connected to the system by a normal subscriber's set over a 2-wire line to the SBS terminal. By means of a through-connection unit placed under the telephone set radio-communication can be put through to the public network. This may be done over a private telephone exchange. Then facility for through-connection to the public network, however, requires permission from the telephone administrations.

In principle, the terminal units are so designed, that communication can be established only between SBS-subscribers and their associate mobile groups. The mobile stations, however, can be provided with facilities for calling other SBS-subscribers and mobile groups. In a special version the terminal unit can be so modified, that SBS-subscribers are able directly to dial all mobile stations (individually or by groups). See description and the table under "Alternative Principles for Calling" T112199 and D113264.

Base-to Mobile Call.

Selective calling from SBS-subscribers to mobile stations in the system is based on the use of 4-tone sequence signalling.

The 1st and 2nd tone of the signal form group codes for the 18 SBS-subscriber groups, which is the maximum number that can be accomodated. By

lifting the handset of the telephone set, the group code of the subscriber concerned is automatically set up in the terminal unit.

The 3rd and 4th tone of the signal is used to form 1 group call code and 99 individual call codes (01-99) within each mobile group.

In the basic lay-out of a SBS-system, group calls are automatically transmitted by lifting the handset. In such a lay-out, the SBS-subscriber is equipped with a non-dial telephone set, while mobile stations within each group are equipped with sequence tone receivers, which open the loudspeaker in all vehicles in the group, when a call code from own extension is received. Individual call of one vehicle within the called group is then made by a subsequent identification call (voice call). This principle is illustrated in drawing D113992, SBS System Lay-out, for subscriber group 01.

If SBS-subscribers are equipped with a dial telephone set and the mobiles are equipped with a sequence tone receiver for reception of group as well as individual call codes, subscribers can - after transmission of the automatic group call - make individual, selective calls simply by dialling the number of the mobile station.

This principle makes it possible to sound the horn of the called vehicle, if communication has not been established after automatic transmission of the group call and the subsequent voice call.

An individual, selective call made by dialling, may be used to actuate a special lamp indicator circuit to notify the driver, that he has been called during his absence. This principle is illustrated for subscriber group 08.

Further, by simple means the terminal unit may be so modified, that an automatic group call is not transmitted by lifting the handset. SBS-subscribers will then have to use dial telephone sets.

Individual as well as group calls are then - after a dialling tone has been received - made by dialling the appropriate 2-digit number.

Mobile station can be equipped with tone receivers for reception of selective calling only or with receivers which will also accept group calls (code 00). These two principles are illustrated in the SBS System Lay-out for subscriber groups 11 and 18.

Terminal unit TE680-2002, which is designed for connection of 8 extensions - or in a special version for 10 - can be used either for automatic transmission of group calls or for selective calling by dialling. The principle finally

chosen will then apply to all subscribers connected to the system.

Terminal unit TE680-2002/16 allows for three system combinations:

- 1) Extension groups 1-8 (10) and 11-18 can be made to operate with different system features. Thus, in principle, it is possible to establish a system which - by use of one base station - enables the connected groups of subscribers to operate on the functional principles shown in the SBS System Lay-out drawing.
- 2) As also applies to TE/08, all subscribers in the system can use automatic transmission of group calls, or
- 3) All subscribers can use selective calling by dialling.

Mobile-to-Base Call.

Selective calling of extensions under the base station is based on the use of 2-tone signalling. 7 frequencies are employed, enabling a total of 21 2-tone combinations. 18 of these combinations are used for selective calling of extensions under the system. 1 combination is used for establishing repeater function for car-to-car traffic, while 2 combinations are used for special signalling purposes.

Table D113649 shows the tone frequencies employed and their combinations for selective calling.

When placing a call, the tone signal transmitted will be converted into normal ringing tone in the subscriber's set. Ringing continues as long as the tone signal is transmitted.

Calling of other mobiles in the system is initially established by transmitting the special tone combination which switches the normal operation of the base station into that of a repeater mode. This talk-through signal is then followed by a normal group tone call. At the termination of this call, a sequence tone group call is automatically transmitted to the mobile group under that subscriber group, the tone combination of which was transmitted, after the talk-through signal.

Normally, the called mobile group will be own group, but may - depending upon the type of mobile control box used - also be one of the other groups in

the system. The group call is followed by a voice call to the station or stations desired.

Traffic and Special System Functions.

When a call has been made by a SBS-subscriber, all other subscribers will receive engaged indication, and a busy-tone is heard when lifting the handset.

Depending upon the mobile equipment employed, mobile stations of groups other than that of the calling subscriber, and such mobile stations under the calling subscriber's group which may not be included in the call, can get visual engaged indication.

During call and conversation SBS-extensions and mobile stations with engaged indication will be blocked.

A subscriber with engaged indication may signify that he wants to make a priority call. By lifting the handset off hook for 10 sec., a weak intermittent tone signal will be superimposed on the conversation in progress, indicating that urgent traffic is waiting. After 10 sec. the handset must be replaced until engaged indication ceases.

To ensure optimum capacity utilization, the system incorporates a speech time limitation device, which automatically disconnects the service after transmission of a notification signal. To suit the amount of traffic handled by the system, the time allotted to conversation can be adjusted to a fixed period between 1 and 4 minutes, while the notification period is fixed at 15 sec.

The system can be supplied without time limitation features, but this is not recommended, because the system loses the inherent safeguard against misuse or blocking in case of unintended removal of a subscriber's handset.

The speech time limitation feature ensures, that a subscriber - which has been connected unintentionally, and consequently causes engaged indication - will be disconnected when the allotted time period has elapsed, and the system will then be free to other subscribers. The subscriber thus disconnected will automatically be in system again after the handset has been replaced.

A call made by a mobile station to a SBS-subscriber will actuate the engaged indicator at all subscribers not included in the call. Further, all mobile stations - including the calling one - will show visual engaged indication (lamp

indication).

If the called subscriber does not answer the mobile call, automatic disconnection will take place 15 seconds after the call was initiated.

When the call is answered within a time period of 15 seconds, the SBS-system establishes connection for the allotted time period.

Subscriber's telephone sets equipped with automatic group call facility will - when the handset is lifted to answer a mobile call - automatically transmit a group call to all vehicles within the mobile group of the appropriate subscriber. This permits the mobile group to listen in on the traffic going on.

Automatic disconnection without prior notification will take place in car-to-car traffic if the carrier from the communicating mobile stations has not been received at the base station for a period of 15 seconds. Fixed speech time limitation is not applied to car-to-car traffic. During car-to-car traffic, the SBS-subscriber in the called group can listen in on and break into the traffic by lifting his handset.

When establishing talk-through traffic, ringing voltage will not be applied to the SBS-subscriber's set.

As regards system facilities, the SBS-system can to a large extent be adapted to meet special requirements from our customers. Some examples of special facilities are over-riding facility for certain subscribers, night extension for a particular subscriber to answer night calls from all mobile groups, and metering facilities for all subscribers.

Technical Specification for Equipment used in SBS-systems.

Lay-out of the SBS-system is shown in drawings D113992 and D113993. The audio frequency levels employed are given in AF Level Plan, D113927.

Base Station.

All types of fixed duplex stations of the CQF600 series with associated duplex filters and antenna system can be used as base stations in the SBS-system.

The radio system operates in the VHF or UHF bands with a channel spacing of 50, 25 or 20 kHz.

Semi-duplex operation is employed with duplex operation from the base

station, and 2-frequency simplex operation from mobile units. Full duplex operation between base station and mobiles is possible.

Base stations are available for operation from 220 V AC or from a 12 V or 24 V DC power supply unit. However, with 25 W output power, the station must operate from 220 V AC or from a 24 V DC stabilized power unit.

The base station is remotely controlled from the SBS terminal over two telephone lines connected to the control panel in the transmitter/receiver cabinet, Type CP680-2003.

The system meets the most stringent requirements laid down by the PTT administration and the telephone companies in respect of operating conditions applying to rented telephone lines.

Remote Control Lines.

The maximum permissible loop resistance and level attenuation of the two remote control lines is 1500Ω and 10dB respectively. In a system design without talk-through facility, the maximum loop resistance may be 2000Ω , corresponding to a total line length of approx. 10 km.

Terminal Equipment.

The terminal equipment can be supplied in two versions, both using the same basic design of electronic control units.

Terminal unit Type TE680-2002/08 comprises interface-circuits for connection of 8 extensions and a built-in power supply unit in a 20-module chassis for 19" rack mounting or wall mounting.

Terminal unit Type TE680-2002/16 comprises 16 circuits for connection of extensions housed in the same type of chassis as TE/08. The power supply unit is housed in a separate cabinet.

Both units can be supplied in special versions fitted with circuits for two additional extensions, or - if required - with add-on units for special system requirements.

Like the base station, the terminal equipment can operate from 220 V AC mains or from a 12/24 V battery.

Extension Lines.

Private or rented 2-wire lines are used for connecting SBS-subscribers to the system. Employing the line voltage of 24 V supplied from the terminal unit, lines with a maximum loop resistance of 800Ω can be used.

To maintain the nominal line current of approx. 23 mA through extension lines longer than 6 km and with a loop resistance above 800Ω , the terminal unit can be provided with an additional power source.

Max. line current is 25 mA. The ringing voltage applied to extension lines is 60 V AC $\pm 10\%$, 48 ± 7 Hz.

Extension Telephone Set.

SBS subscribers use LME telephone set Type DIALOG. This set is supplied with or without a dial. Type CB680-2002 is a dial set incorporating a "star-blinker" for visual engaged indication. In stead of the "star-blinker" a detached engaged indicator Type ID680-2002a mounted in a plastic box can also be used.

Through-connection unit Type SU680-2002/01 (DIALOG with sub-unit) is used where through-connection to and from a private telephone network is desired.

Mobile and Portable Stations.

Standard mobile and portable stations of the Stornophone 600 series can be used in the system. This also applies to Storno Pocket Station Type CQP500, although with limited signalling facilities.

The mobile control equipment to be employed depends upon the functional features desired.

Control Box Type CB601 fitted with sequence tone receiver and double tone transmitter can be used where speech privacy is not required between mobile stations. This control box permits calls to be made to one subscriber under the base station only (not to mobiles).

Control box CB601 is available in a special version with subunit CA681, which provides calling facilities for 5 subscribers or 4 subscribers and talk-through calling.

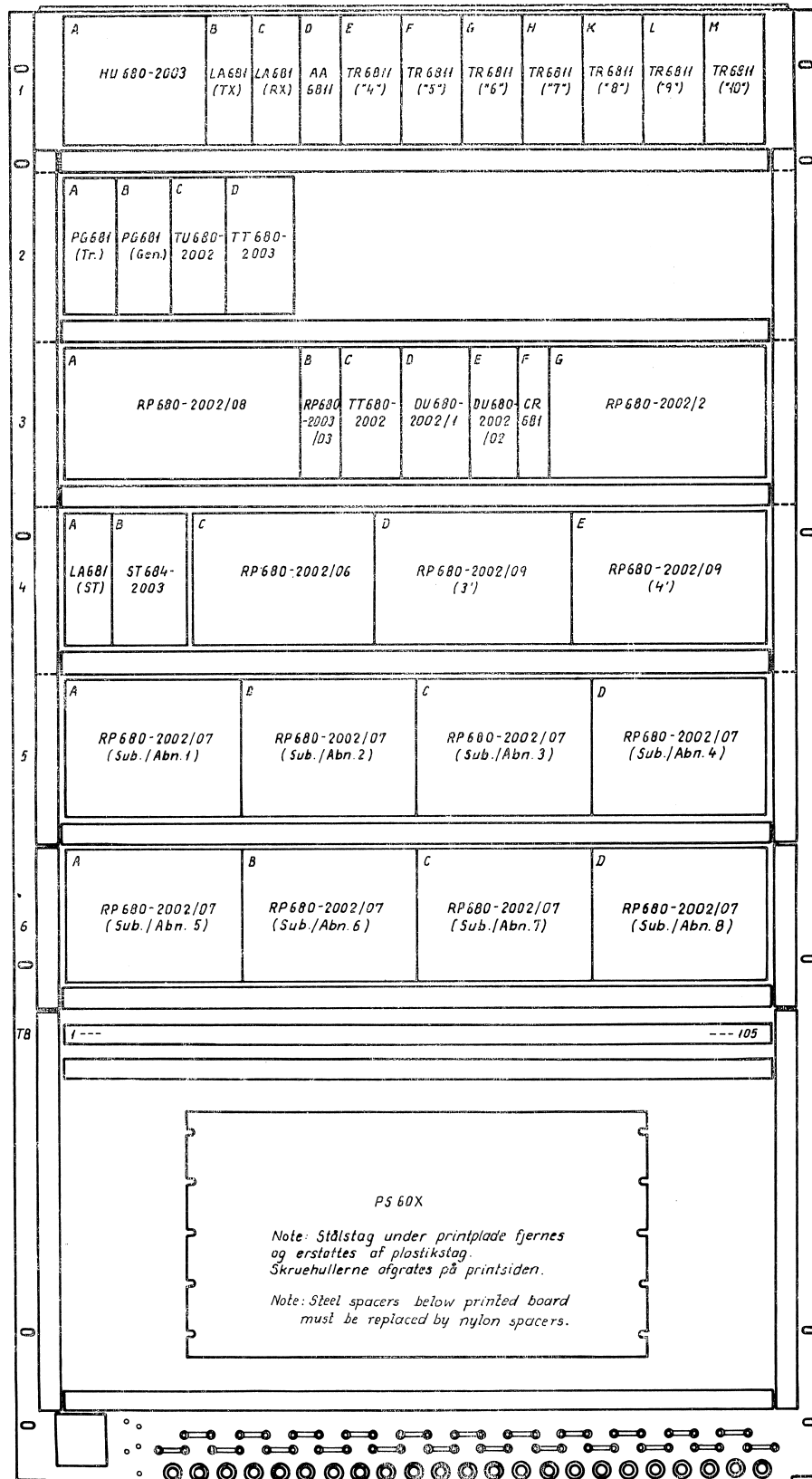
Standard type CQL600 also has calling facility for one subscriber only, but can be supplied in a special version for calling of a maximum of 10 subscri-

bers and their associated mobile groups.

Where speech privacy between mobile stations is required, control box Type CB601-2003/02a (or b) is used. This box has calling facilities for a maximum of 10 (or 11) SBS-subscribers including their associated mobile groups. See detailed description T114028.

In most cases, control boxes with special functions can be produced by modifications or add-on units to CB680-2003/02.

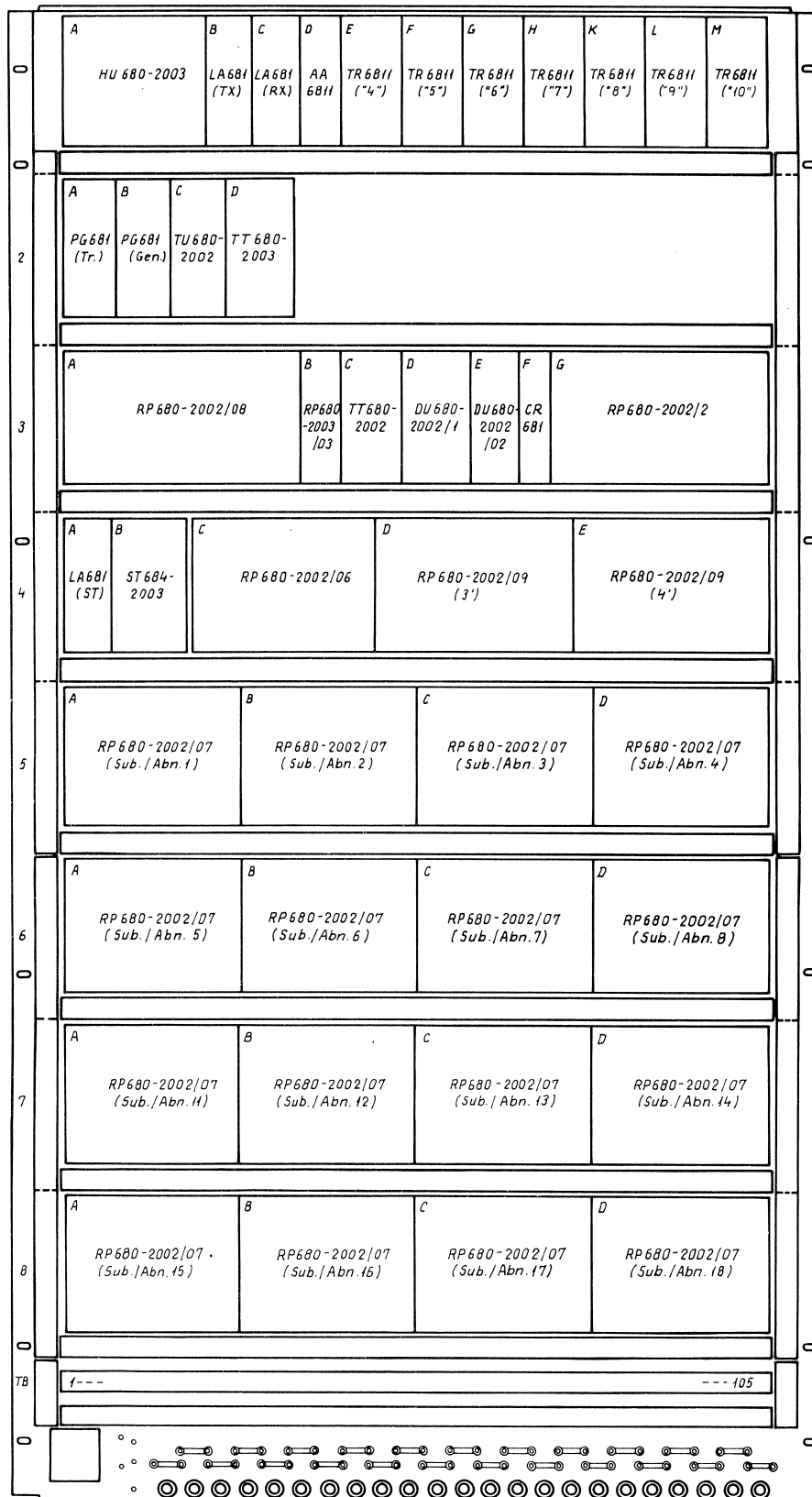
SECTION 2



konst.-/tegn.
06/AMH
30.9.69
godk.
08
komp. liste

INSTALLATION LAY-OUT / PLACERINGSOVERSIGT

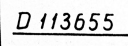
TE 680-2002/08

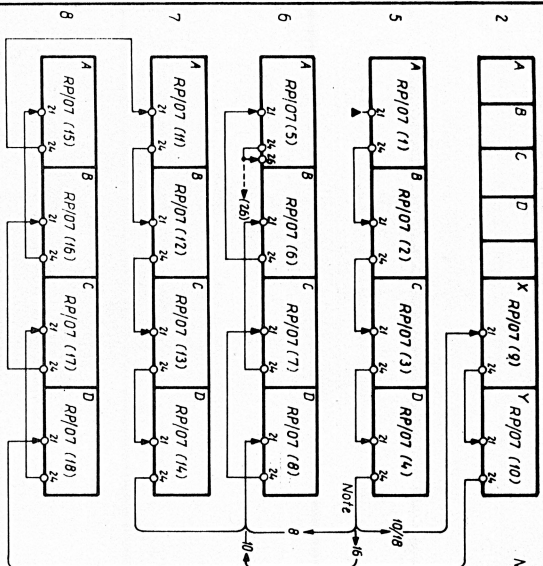


konstr./legn.
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30.9.69
gokk. OG
komp. liste

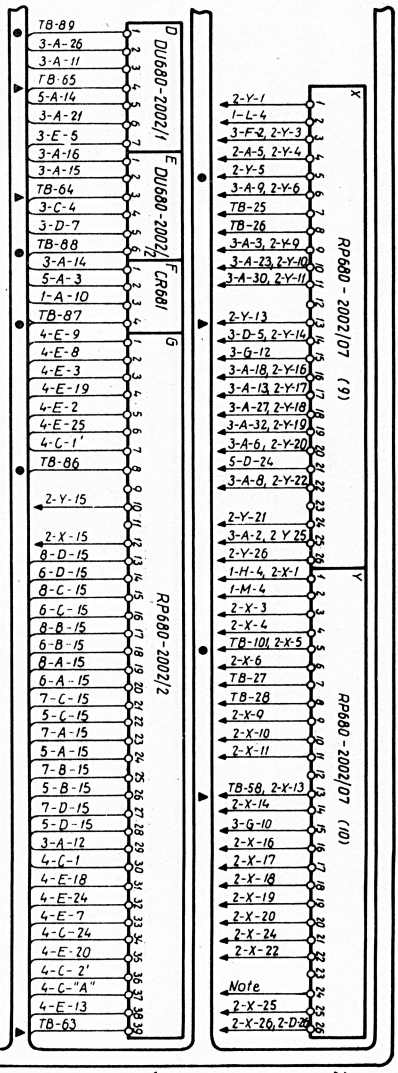
INSTALLATION LAY-OUT / PLACERINGSOVERSIGT

TE 680-2002/16



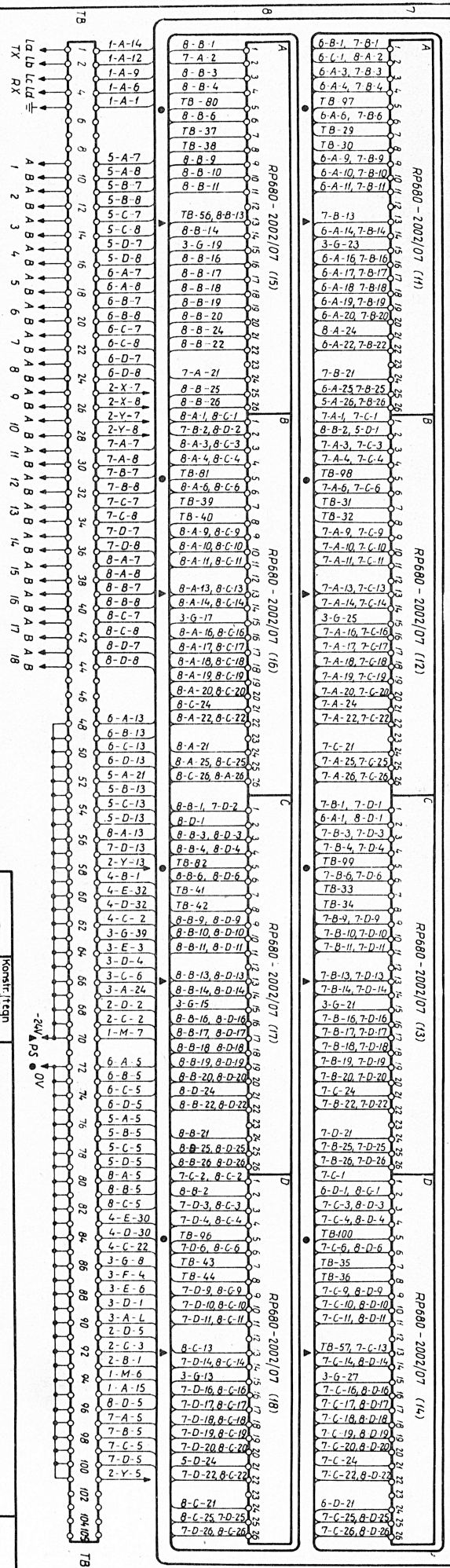


Note: Principle in wiring for loop connection between 8/16 and 18 subscriber panels respectively. If the subscriber number exceeds 8, the connection between 5D-24 and 6-D-21 is removed. The new loop connection between these solder terminals must be made as shown.



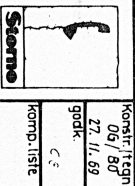
The number of subscribers for TE108 and TE116 may be increased with subscriber panels 9 and 10 if sufficient mounting space is available on mounting chassis number 2 (Additional cabling shown with arrows)

Units on mounting chassis number 1-6 are wired acc. to cabling diagram for TE 680-2002/08 dwg. D113655 size A3 and dwg. D113680 size A2.



Lines to CDF/Inner HI CDF

Subscriber lines / Adornment/Inner



Modul: TEGN
06/ 80
ggdk.
C 3
Homo: iste

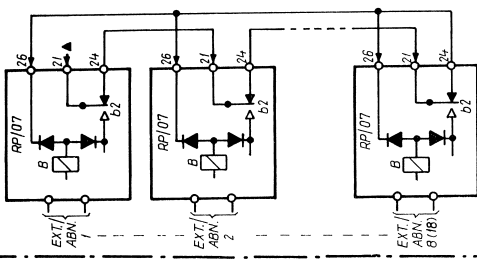
CABLEFORM
KABLING
TE680-2002/16

TEGN. NR
D 113863E

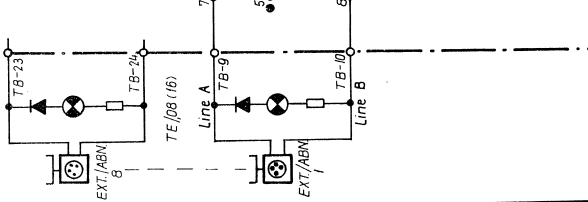
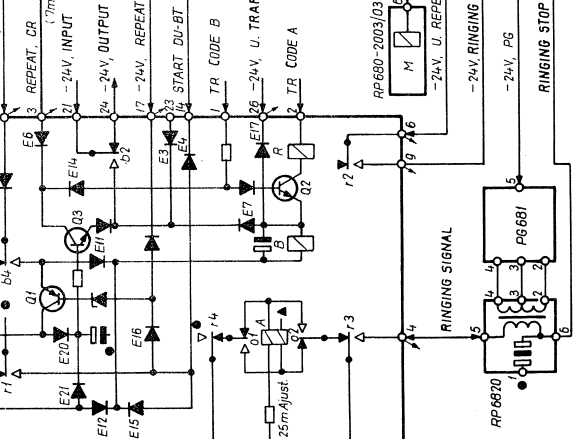
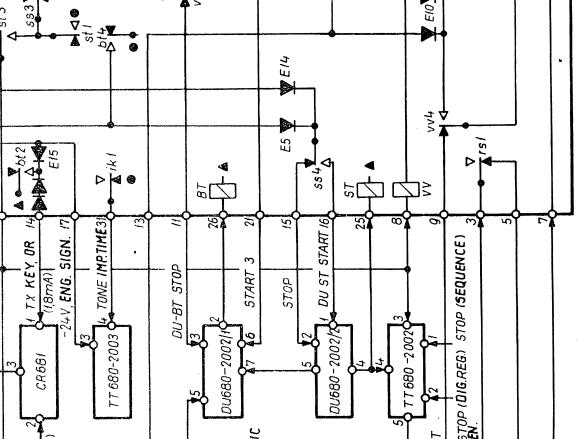
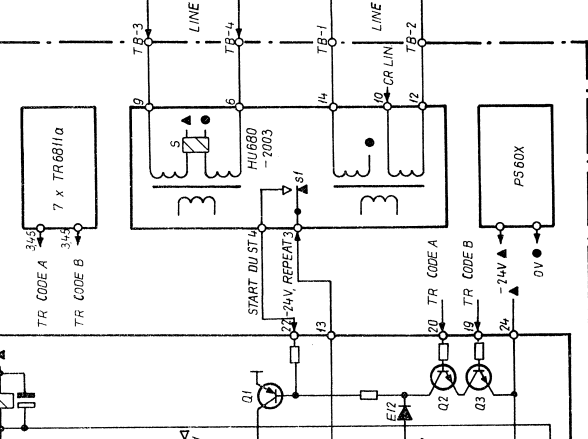
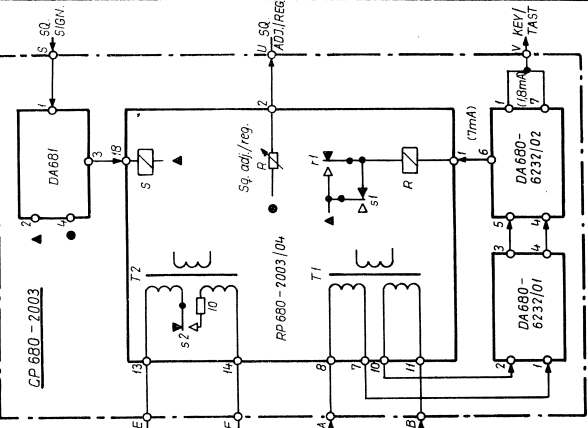
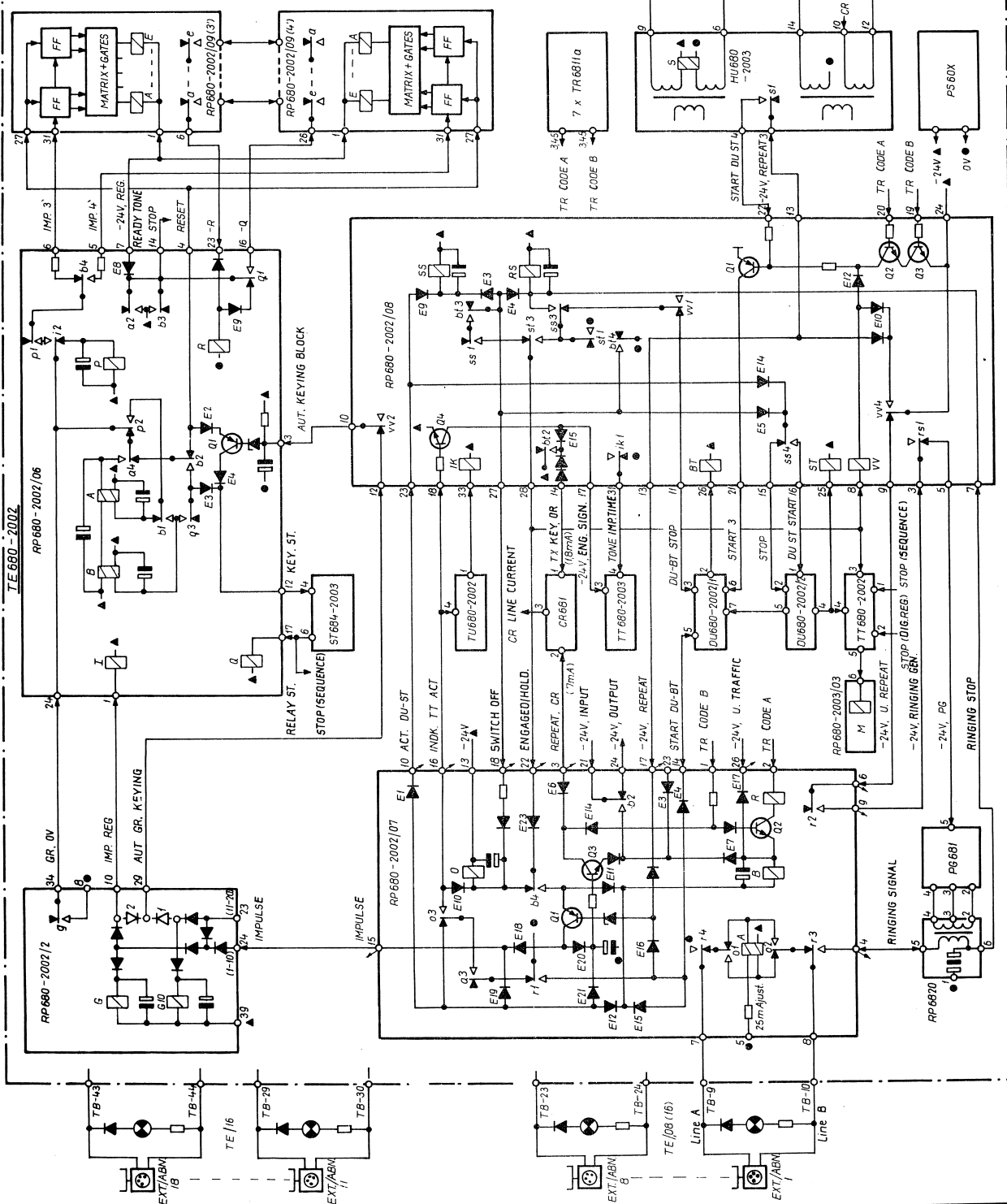
SECTION 3

ABN NR.	TONE A (Hz)	TONE B (Hz)
1	1400	1530
2	1400	1670
3	1400	2000
4	1400	2200
5	1400	2400
REP.	1400	1830
6	1830	1530
7	1830	1670
8	1830	2000
9	1830	2200
10	1830	2400
11	1670	1530
12	2200	1530
13	2400	1530
14	2000	1530
15	1670	2000
16	2200	2000
17	2400	2000
18	2200	2400
19	1670	2200
20	1670	2400

Table showing double tone combinations for subscriber and repeater calls



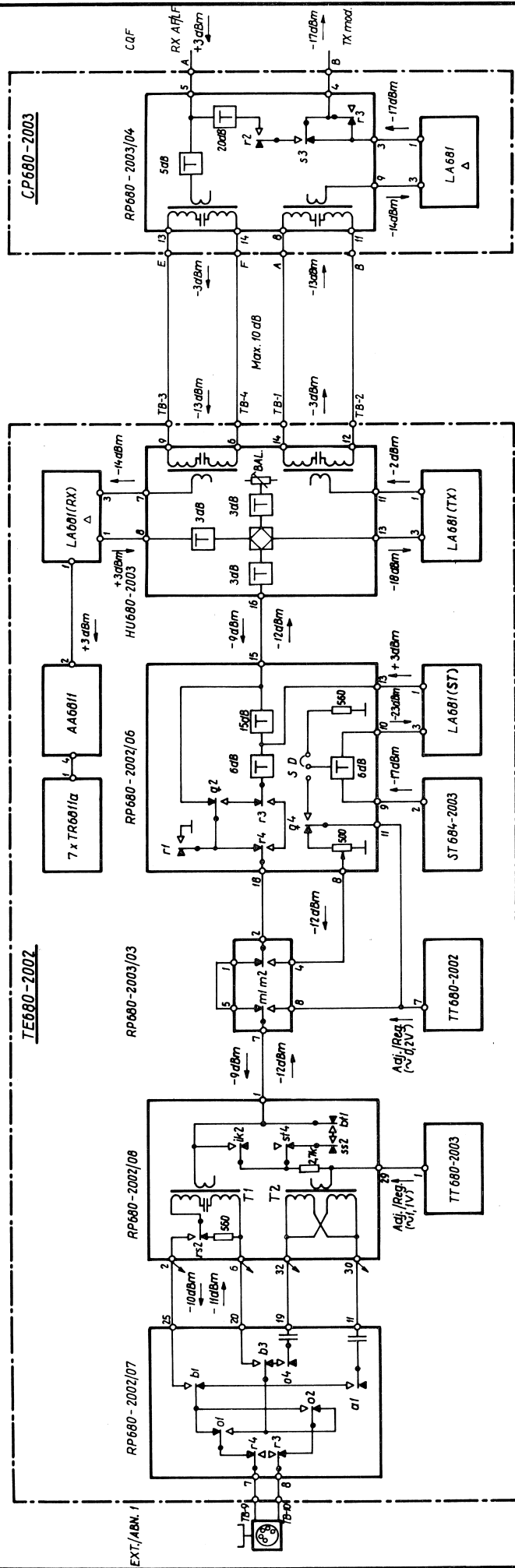
Principle used for voltage supply to 'engaged' relay in subscriber panels.



DUPLEX SBS-SYSTEM
LAY-OUT DC FUNCTIONS/DC FUNKTIONSSKEMA
CAF 600-2002

KONSTR./TECH.
08 / EBN
600K.
KOMP. LISTE

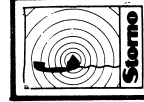
TE680-2002



The TX-input and the RX-output levels indicated on the level diagram correspond to 70% frequency deviation at 1000 Hz. All levels are indicated for an attenuation of 10 dB in the remote control lines. In case of less than 10 dB line attenuation, adjust the LA681's marked Δ . The line input level must not exceed -3 dBm, corresponding to 70% frequency deviation. In order to equalize the line response, the LA681 marked Δ can be adjusted from a linear response to a 3, 6 or 9 dB response at 3000 Hz with respect to 1000 Hz. All levels are measured with a VTVM $R_i > 1 M\Omega$. The clear tone level at the subscribers receiver is adjusted by a potentiometer (R13) in TT680-2002. The clear tone level towards the base station transmitter is then adjusted by a potentiometer (R13) in RP680-2002/06. The level of the engaged signal is adjusted by a potentiometer (R21) in TT680-2003. Max. attenuation in the extension lines are 6 dB.

De på niveaudiagrammet angivne TX-ind og RX-udgangsniveauer er målt ved 70% frekvenssving og 1000 Hz. Alle niveauer er angivet for en fjernstyringsliniedæmpning på 10 dB. I tilfælde, hvor liniedæmpningen er mindre end 10 dB, justeres linie-forsærkerne LA681's markeret Δ . Maks. dæmpning i abonnentlinierne er 6 dB. Liniernes indgangsniveau må ikke overstige -3 dBm ved 70% frekvenssving. Til modforvrængning af linierne er der i linieforsærkerne markeret Δ indbygget et modforvrængningsled. Dette kan strappes fra ret frekvensgang til 3, 6 eller 9 dB modforvrængning ved 3000 Hz i forhold til 1000 Hz.

Alle niveauer måles med en VTVM $R_i > 1 M\Omega$. Klarfoneniveauet i abonnenttelefonerne justeres med potentiometer (R13) i TT680-2002. Klarfoneniveau mod basissationens sender justeres dernæst med et potentiometer (R13) i RP680-2002/06. Niveau af tonesignal for oplaget markerede abonnenter indstilles med et potentiometer (R21) i TT680-2003.



Konstr./tegn.
OG/BG
8/12.69
gskk
CE
komp. liste

DUPLEX SBS-SYSTEM LEVEL PLAN/NIVEAUSKEMA CAF 680-2002

D 113927
TE680 NR.

SBS-SYSTEM, CAF680/600-2002.

Shared VHF/UHF Base Station.

SBS Duplex-system - Theory of Operation.

This description comprises the three possible modes of operation which can be employed in a SBS duplex system. These modes of operation are described in the following three sections, each of which is divided into sub-sections:

1. Base-to-Mobile Call.
2. Mobile-to-Base Call.
3. Talk-through Call (Car-to-Car-Operation).

Sub-sections are designated capitals and small letters, respectively, those with capitals giving a brief description of main functions of the system, while those designated small letters discuss in detail the theory of operating applying to circuits in the terminal unit and in the control panel of the base station.

To make the detailed circuit description as clear as possible, the text refers to two schematic drawings only (D113927 and D114055), which show the AC and DC-functions of the base station.

Designation of units and relay contacts are used in a simplified form. Thus, the unit RP680-2002/07a is designated RP/07a, ST684-2003 is designated ST, and TT680-2003 is designated TT3. Likewise, terminal 6 of unit RP680-2003 is in the text simply designated RP/03-6. Change-over contacts of relays, which appear in the diagrams with the relay letter designation and contact numbers, will be discussed here as follows, and A-relay with four change-over contacts being used as an example: a 5, 6, 7 = a 1, a 8, 9, 10 = a 2, a 11, 12, 13 = a 3 and a 14, 15, 16 = a 4.

1. Base-to-Mobile Call.

1A. When a subscriber lifts his handset, the associated extension circuit is activated, which causes:

1. Other subscribers to be blocked, and the engaged indicator ("star-blinker") to operate.
2. The engaged-tone generator to start.
3. Blocking of the ringing circuit.
4. Initiation of selective group call.
5. Activation of the speech timing unit.
6. Keying of the transmitter over the remote control system.
7. Dialling tone to be transmitted to the calling subscriber.

1a. By lifting an extension handset, a loop connection is established over the extension line to extension circuit RP/07a and 8, causing the A-relay to operate. 0 volt is applied over r 1, a 3 and o 3 via:

- 1) E19 to term. 15 (pulse), from where it is fed to one of the terminals 9 - 28 in group code selector RP/2 (term. 24 for ext. 1). 0 volt thereupon passes through the diode-matrix to term. 10 (pulse reg.) and to some of the G-relays.

Depending upon the originating extension, the contact sets of the G-relays set up the 1st and 2nd digit of the 4-digit code from the sequence tone generator. From RP/2-10, 0 volt is applied to RP/06-1, causing relay I to operate. The I-relay operates a little in advance of the G-relay, which on operating pass 0 volt via term. 34 to RP/06-24 (GR, 0 V). From here 0 volt is applied via p2, a4 and b2 to RP/06-4 (Reset), and via E2 to the emitter of Q1.

From RP/06-4 0 volt is fed to the two registers RP/09-27, causing their electronic counter circuits to be reset.

If 0 volt is not applied to RP/06-3 (Aut. GR-key block.), 0 volt on the emitter of Q1 will cause Q1 to conduct, which results in 0 volt being fed via E4 to ST-4 (key, ST), and the sequence tone generator ST684-2003 will be keyed. This function is applied to automatic group call by lifting the extension handset. Suppose a diode be connected either to strap-ping 1 or 2 in RP/2, then 0 volt will - at the same time as

being applied to the I-relay in RP/06 - also be fed from RP/2-29 (Aut. GR-key) to RP/08-12, over vv2 to RP/08-10 (Aut. GR-key, block), and from there to RP/06-3. 0 volt will then be applied to the base circuit of Q1, and thus Q1 will cut off, as 0 volt is applied to the emitter of Q1. In result, the sequence generator will not be keyed by lifting the extension handset.

- 2).... E12 to the B-relay, which operates. Now, contact b2 feeds -24 V term. 21 through E7 to the B-relay, and through E3 to term. 23, to which a speech timing unit can be connected. -24 V now disappears from term. 24 (as also from term. 26) with the result, that all other subscribers' hold relays and ringing relays cannot be activated. A AF-path is established from the extension line over contacts b1 and b3 to term.s 25 (AF-A) and 20 (AF-B).

These terminals are connected to corresponding terminals in RP/8. The connection from E23 to the 0-relay is switched over by contact b4 to the emitter of Q1, and via E11 to the B-relay.

- 3).... E21 to the base circuit of Q3, which then switches ON. From the collector of Q3, -24 V is fed to E14, causing Q2 to cut off so that tone calls, if any, from mobile stations under the mobile group of the appropriate subscriber, cannot activate the ringing relay R. -24 V is also fed via E6 to term. 3 (Repeat, CR).

In systems requiring facilities for all mobile units within a group to listen on the two-way communication, when a group call has been made, term. 3 is connected to term. 2 of the constant current regulator. This causes a 7 mA control current to flow through line 1 between the SBS terminal and CP680-2003 in the CQF600 cabinet to RP680-2003/4, by which the transmitter is keyed to 0 volt from DA/02-1 or 7, and by which the repeater circuit is being initiated thereby, that the R-relay operates at 0 volt from DA/02-6.

- 4).... E1 to RP/07a-10 (Act. DU-ST). Term. 10 is connected to RP/08-23. 0 volt applied to E9 will operate relay SS. Thus

0 volt is also applied to term. 16 (DU-ST, start) via E2 and ss4. DU680-2002/2a is activated upon which relay ST in RP/08 operates. Thereupon, relay ST remains operated by DU/2a during the speech time period allotted to the system, (adjustable within approx. 1 - 4 min.). Now, RS operates at 0 volt over st1 and ss3. The termination of T1 in R1 (560Ω) is disconnected and is instead connected over rs2 to term. 2 (AP-A). At the same time as relay ST was operated by DU/2a, 0 volt was applied to DU/1-7 (start 1) from term. 5 of DU/2. Approx 50 - 100 msec. after keying of DU/1, relay BT operates. This relay remains operated as long as relay ST is activated by DU/2, and after the signal from DU/2 has ceased, it is still held for 15 sec. by DU/1. Contact bt4 applies 0 volt to term. 28 (Engaged/time delay). This terminal is connected to term. 22 in all extension circuits.

In the activated extension circuit 0 volt is fed via E23, b4 and E11 to the B-relay, which then operates. 0 volt is also fed to the emitter of Q1. This, however, has no effect upon initiation of a call. In all other extension circuits the same 0 voltage is applied via b4 to the O-relays, which then operate. Change-over of contacts o1 and o2 causes reversal of the line polarity from the A-relays in non-activated extension circuits. This reversal of line polarity actuates the "star-blinkers" (visual engaged indication) at all other extensions.

In RP/08 bt2 applies -24 V via two diodes to term. 14 (TX-key, CR). Term. 14 leads to CR681 term. 1. This causes CR681 to feed a line current of 1,8 mA through line 1. In CP, 0 volt from DA/02-1 or -7 is applied to keying terminal V.

On activating the SBS-system, engaged-tone generator TT680-2003 is started by -24 V from bt2 via E15 to RP/08-17 and hence to TT3-3. The intermittent tone signal (425 Hz) with tone pulses of 175 msec. duration and intervals of 470 msec. is transmitted to RP/08-29, from where it passes via T2 over term.s 30 and 32 to all extension terminals 11 and 19.

If a subscriber with engaged indication lifts his handset an engaged signal will be transmitted over the a-, b-, o- and r-contacts in RP/07a to the subscriber concerned.

A diall.-tone signal from TT680-2002 term. 7 is fed to RP/03-8 and hence over m1, RP/03-7, RP/08-1, T1 and RP/08-2 to the extension circuit connected. This signal is also fed via RP/06-11, q4, RP/06-8, RP/03-4, m2 and RP/06-18 and on through RP/06, HU, line 1 and CP for modulation of the transmitter.

TT2 starts at 0 volt from DU/2a-4. As 0 volt about 50 - 100 m sec. later is applied from RP/08-28 to TT2-3, activation terminal TT2-4 will be blocked.

The diall.-tone generator can now be stopped by applying 0 volt to term. 1 stop (sequence) - which happens by transmission of automatic group call - or by applying 0 volt to term. 2, stop (digit reg.) - which happens on reception of the first dial pulse when calling a number.

On starting TT2, -24 V from term. 5 is fed to RP/03-6, causing the M-relay to operate. Contacts m1 and m2 of this relay then switches the clear-tone towards extension and transmitter, respectively. The M-relay is released, when an end-signal is sent to TT2.

When the SBS-terminal is engaged, a tone call which may come in from a mobile station cannot activate the ringing relays, R, in non-activated extension circuits, since -24 V, which are normally supplied from term. 26 via E17 and Q2, are switched off. Nor can the R-relay in the activated extension circuit be activated, if a mobile tone call for that extension is coming in, since Q2 is cut off by -24 V from Q3 via E14.

- 1B. The group call (4-digit sequence signal) set up automatically in the SBS-terminal is fed from the call generator into the AF-circuit, so - besides modulating the transmitter - it will also be heard in the receiver of the extension.
- 1b. The automatically transmitted group call will be transmitted only when 0 volt is not applied to term. 3 in RP/06. Then, as previously described, by lifting the handset, 0 volt is attained from the collector of Q1 in RP/06. The 4-tone sequence transmitter ST684-2003 is then keyed via E4 RP/06-12 and ST-4. After keying, relay Q is operated at 0 volt from ST-6 (Relay ST).

As long as Q is operated, the AF path is changed so, that the sequence tone signal from the sequence transmitter after amplification in LA681 (ST) is transmitted towards the AF-input circuit of the transmitter and the subscriber's receiver from RP/06-15 (AF RX/TX) and RP/06 (AF subs.) respectively.

140 msec. after keying, the transmission of the 4 tones in sequence - each of 70 msec. duration - commences. Approx. 420 msec. after keying, the Q-relay releases. Communication is established after transmission of the group selective tone call.

- 1C. The loudspeaker of mobile stations in the called group will open, and the engaged lamp will be switched on. Moreover, an attention signal of 1 sec. duration will be received. In mobile groups not included in the call, the engaged lamp is switched on, indicating that the radio system is being used by another group in the system.

Further, the loudspeaker and the keying circuit in the mobile stations of such groups will be blocked. After a group call, the subscriber will use a voice call for identification of the wanted mobile station.

- 1c. To be able to receive a group call, mobile stations must either be equipped with sequence tone receiver SR6841, which will accept group as well as individual calls, or all stations must be equipped with sequence tone receiver SR684, the coding of which must be set up in all vehicles for the common group call combination. Thus, in the latter case only group calls will be accepted, not individual calls. The engaged lamp will be switched on immediately the mobile station receives the carrier. Simultaneously, 0 volt is switched off from SU600-2002 term. 3 of the tone keying button, thus preventing calls to be made. In the mobile group, which accepts the proper sequence tone combination, the sequence receiver will cause:

- 1) Activation of the call lamp.
- 2) Restore keying possibility.
- 3) Switching off of the engaged lamp.
- 4) Suspension of speaker blocking, so that the voice call from the calling subscriber to the desired mobile station will be heard in the speaker.

In vehicles within the group, which were not included in the voice call, the mobile operators can, by depressing the LS-OUT button, restore their stations to the same functional condition as that applying

to mobile groups not being called.

- 1D. After a group call transmitted automatically and followed by a voice call, the subscriber can - if no answer is received from the wanted mobile station - dial the call code of the vehicle (the two latter digits of the 4-digit individual call code). In the code selector unit the dial pulses are converted into the call code of the vehicle, and is then transmitted. The call is heard in the subscriber's receiver as well as in the speaker of the mobile station. By this procedure a special indicator circuit can be activated in the called vehicle, which circuit, for example, can be used for sounding the horn for a brief period. Also, activation of the call lamp can be maintained after the subscriber has disconnected by replacement of the handset. This serves to indicate that this particular vehicle has been called.

In systems without automatic group call the group number (dial 0-0) and the vehicle number are both dialled in a similar way. A standard SBS-terminal TE680-2002/16 is so designed, that 8 (10) of the groups can be fitted with automatic group call, whereas the remaining 8 groups will not have this facility. This arrangement is made by mounting a diode between the strapping terminals marked 1 in group code selector RP680-2002/2. If the automatic group call facility is not required at all, a diode is mounted between the strapping terminals marked 2. (In both cases the diode is mounted with the cathode towards term. 29).

- 1d. When making a call the subscriber dials the 2-digit number of the wanted mobile unit on his dial telephone set.
- The first break pulse transmitted causes line-relay A in the extension circuit to release. At the moment a2 breaks the 0 volt connection from RP/2 to RP/06-1 (IMP REG), the I-relay releases. 0 volt from RP/06-24 (GR, 0 V) is supplied via contact i2 to the P-relay, which then operates. 0 volt applied over p2, a4 and b2 to the Reset-Terminals of the registers and to the emitter of Q1 is disconnected and instead connected via p2 and b1 to one coil of the A-relay. A operates and thus applies -24 V over a2, E8 and term. 7 to RP/09-1 (-24 V Reg) in the two registers RP680-2002/09.

Further, -24 V are fed via q1 and E9 to the R-relay which operates, and contact r1 then connects 0 volt to the AF-signal line. This causes a blocking of the rather strong pulses generated by dialling, thus

preventing these pulses from modulating the transmitter. When the I-relay operates again and at each consecutive time during the first pulse train, 0 volt-pulses are applied over i2 and b4 to RP/06-6 (IMP 3').

These pulses are fed to the register for the 3rd digit (RP/09 (3')-3) as counting pulses. The pulses received are registered by relays A, B, C, D and E, which are operated by 5 transistor-gates connected to the electronic counter. The relays remain operated after reception of the last digit pulse. The 3rd digit of the sequence generator is then determined by the relay contact sets, which are connected to coil-terminals on the tone oscillator in the sequence generator.

The P-relay releases after reception of the last pulse in the 3rd digit of the sequence code. 0 volt is applied via p2 and a4 to the second coil of the A-relay, which coil is connected in series with the corresponding coil of the B-relay. The A-relay thus remains operated, while the B-relay is now also operated. Now, contact b3 likewise applies -24 V to the registers and to the R-relay for AF-blocking.

On reception of the 1st break-pulse in the pulse train forming the 4th digit of the sequence code, the I-relay releases as before, while P operates and remains operated during the whole pulsing period. 0 volt is applied over p2 and b1 to one coil of the B-relay, while the A-relay releases. When the I-relay operates again - and at each consecutive time - 0 volt is applied over i2, p1, b4 and RP/06-5 (IMP 4') to term. 31 (IMP) in the register for the 4th digit. The number dialled is thereby registered in RP/09 for the 4th digit.

After the 2nd digit pulse train has ceased, the P-relay releases. 0 volt is applied over p2, a4, b2, E3 and RP/06-12 (key, ST) to the keying terminal of the sequence generator. During the activation period (420 ms), the keyed sequence generator applies 0 volt to RP/06-17, causing relay Q to operate. 0 volt for holding of the B-relay is then applied over contact q3, which results in the register-relays also being held by -24 V from b3.

Since the employment of sequence tone coding does not permit the transmission of two identical tones after each other, it must be checked whether a call number consisting of two identical digits has been dialled. This is done by applying -24 V over q1 to term. 16 (-Q).

From this terminal -24 V are connected through contact sets to the two registers, which - in case two identical digits have been registered - feed -24 V back to term. 23 (-R) in RP/06. This causes the R-relay to be maintained operated during the sequence transmission. Through contact r2, the tone for the registered 4th digit will then be replaced by the repeat-tone "R". The principle of this function is illustrated in drawing D113267.

During transmission of the sequence tone signal blocking of the AF-path is suspended thereby, that the signal towards the subscriber's end is fed over the contacts r3 and r4 in RP/06, while blocking towards the transmitter end is suspended by opening of the q2 contact. The sequence tone signal from the sequence tone generator is amplified in LA681 (ST) and fed through two attenuation networks to restore it to normal level towards remote control line for transmitter modulation and towards the extension line, respectively.

The tones, each of 70 msec. duration, are transmitted 140 msec. after keying took place, and ceases 420 msec. after.

After transmission of the tones, relay Q releases, and thereupon the operated relays in the registers. This also applies to the R-relay, when relay B releases (delayed drop out). See relay function diagram for RP680-2002/06, D111296.

The sequence generator is not keyed when 0 volt from b2 is applied to Q1 (if this is not cut off), since the keying circuit of the generator cannot be re-triggered until approx. 100 msec. after removal of the trigger level. On the other hand, 0 volt applied to terminal 4 causes resetting of the electronic counters in the registers, upon which the code selector unit is ready again to receive a new dialling call.

Due to relatively fast circuit operation, it is possible to dial the numbers of several vehicles successively without pauses between the calls. Three vehicles, for example, may thus be called by dialling a 6-digit number.

To ensure that the AF-path is not blocked during dialling, - if, for example, only 1 or 3 digits are dialled - the subscriber can by listening satisfy himself, whether a sequence tone signal is transmitted after dialling.

Instructions for removal of the selective tone call in the direction of

extension lines are given in the diagram for RP/06.

1E. Lay-out of the mobile control equipment can to a large extent be adapted to the user's requirements. All units should, however, be provided with a secrecy circuit, so that other groups can neither be intercepted nor interfered with by keying of a mobile transmitter during the activation period of the SBS-system. In groups where mobile units are equipped with group call receivers, it is possible for all mobile stations within the group to listen in to the two-way communication between the subscriber and one of the mobiles.

1e. After the subscriber has lifted his hand set (this also applies in case of a preceeding mobile call for a subscriber), -24 V is applied from RP/07-3 to CR-2. A current of 7 mA then flows through line 1 to RP/04 in CP680-2003.

The transmitter is keyed at 0 volt from DA/02-1, and the R-relay operates at 0 volt from DA/02-6. Like s1, contact r1 connects -24 V to the R-relay.

When the called mobile station answers the subscriber's call, DA681 is activated by the squelch signal, which causes relay S to operate (this, however, only affects car-to-car communication). Contact r1 then causes the R-relay to remain operated even if s1 breaks for the -24 V relay.

The AF-signal demodulated in the receiver of the CQF-station is transmitted in the normal way over line 2 to the subscribers receiver, and via a 20 dB attenuation network and contacts r2 and r3 to the AF-input of the transmitter modulator at the correct level. Thus, the signal received from a mobile station will be re-transmitted from the base station to other vehicles in the group. During re-transmission of the received signal contacts r3 and s3 break for any signal which may come from line 1.

1F. After end of the conversation, disconnection takes place when the subscriber replaces his handset.

1f. The A-relay releases on breaking of the line loop.

Contact a2 breaks for 0 volt to term.s 10 (Act. DU-ST) and 15 (Pulse), and to Q3 and relay B. This causes the relays in group code selector

RP/2 and in pulse control panel RP/06 to release. Q3 causes the 7 mA line current to cease.

Approx. 100 msec. after 0 volt was removed from term. 10 (Act. DU-ST) relay SS in RP/08 releases. A stop-pulse is fed over contact bt4, E5 and ss4 to term. 15 (DU-ST stop). At the same time a stop-pulse at 0 volt is fed over st1, ss3 and vv1 to term. 1 (DU-BT, stop). Relays RS, ST and BT release. Keying of the transmitter ceases as contact bt2 breaks for -24 V to CR term. 1. T1 is terminated in R1 when rs2 closes. Contact bt4 breaks for 0 volt to term. 28 (Engaged/ Timehold). After approx. 100 msec. the B-relay and all 0-relays in RP680-2002/07a release.

On closing of o1 and o2 the line polarity applied to telephone sets with engaged indication is reversed, thereby cancelling the "star-blinker" engaged indication. The SBS-system is now ready to handle a new call.

- 1G. In systems with limited speech time, the timing units DU680-2002/1 and -/2a will disconnect the established communication if the allotted speech time has been exceeded. This, however, will not happen until notification has been given in the form of an intermittent tone signal applied to the AF-circuit for a period of 15 sec.

If the handset is replaced within the elapse for the 15 sec. period, the "star-blinker" will show engaged indication. It is not possible during the disconnection-period to prolong the speech time by replacing the handset and lifting it immediately again.

If the handset is not replaced within 15 sec., the subscriber will be disconnected and instead receive an engaged tone signal. Immediately after disconnection the SBS-system is available for other subscriber groups.

- 1g. Delay unit DU680-2002/2a, which serves to allot subscribers a pre-determined speech time, can be adjusted for time periods between approx. 1 min. and 4 min.

At elapse of the allotted speech time - after communication has been established - the 0 volt potential disappears from DU/2a term.s 4 and 5. This causes the ST-relay to release and suspends holding of DU680-2002/1, the time delay function of which then starts. DU/1 is

adjusted to give a time delay of 15 sec. (adjustable ± 7 sec. approx.)

The engaged signal from TT3-1 is now fed from RP/08-29 (engaged signal) via 2,7 Ω , st4, ss2 and bt1 to RP/08-1 (AF subs.). The engaged signal will thus be audible at a low level to all communicators.

As ST released, 0 volt was fed over bt4, st3, ss1 and bt3 to term. 27 (Disconnection).

0 volt is also connected over E3 and E4 for holding of relays SS and RS. 0 volt from term. 27 leads to term. 18 in all subscriber circuits.

The O-relay in the activated subscriber circuit will then operate after approx. 40 msec. 0 volt is also applied to the O-relay over o3 and E10, so that the O-relay remains operated and thus gives the subscriber a continuous engaged indication (provided he does not replace his handset within elapse of the 15 sec. notification signal period). As the O-relay operated, the "star-blinker" was switched to engaged indication through the reversal of current in the extension line caused by contacts o1 and o2.

In RP/08 relays RS and SS were maintained operated during the 15 sec. - period, when their initial holding current was removed as contact st1 broke the 0 volt connection via ss3 to relay RS, and as 0 volt from the subscriber circuit term. 10 to RP/08 term. 23 was disconnected by contact o3.

15 sec. after the notification signal was applied DU/1's activation of the BT relay ceases, and the relay releases. Thereby contact bt4 breaks the holding current for the B-relay and the O-relays in the extension circuits (RP/07a-22), and the relays release after approx. 0,1 sec.

Relays RS and SS also release approx. 0,1 sec. after opening of contacts bt4 and bt3.

The system is now disconnected. Subscribers, who previously had engaged indication can now make calls, even if the subscriber who used the system has not hung up.

- 1H. When conversation is going on, other subscribers will receive a flashing engaged indication, and a busy-tone (intermittent tone) is heard in the receiver when lifting the handset.

The system is so designed, that a subscriber with engaged indication can signify, that he wants to use the network. This is done by lifting the handset, which causes the normal busy-tone (175 msec. tone and 470 msec. interval) to be heard in the receiver. After the handset has been off hook for 10 sec. the interval period between tonepulses is altered to 825 msec.

This signal is then superimposed at low level on the established conversation for 5 sec. to indicate, that another subscriber has an urgent call to make, and wants to use the radio system, why the conversation going on should be cut short.

15 sec. after the handset was lifted, normal engaged signal is again received. Thus, a subscriber with engaged indication will not be able to get through prior to other subscribers by leaving his handset off hook, because his own extension circuit would then be blocked by constant engaged indication, whereas the network will be available to other subscribers as soon as the established conversation is over. Moreover, the system has provisions for an over-riding facility, which permits preference subscribers to be connected directly to the system without previous notification. In such case, the talking subscriber immediately receives an engaged signal.

- 1h. If a subscriber with engaged indication lifts his handset, the A-relay in that extension circuit operates. 0 volt is applied over r1, a2 and o3 to term. 16 (subs. hold, TT act.). From here 0 volt is connected to TU680-2002, term. 4 and to RP/08, term. 18 (TT act.).

10 sec. later relay 1K is operated by 0 volt from TU-1 for 5 sec. Contact ik 1 breaks for 0 volt to TT3-4 (Tone pulsing time), which causes tone intervals to be altered from 470 msec. to 825 msec.

The altered tone signal is fed from RP/08, term. 29 (Busy-signal) over 2,7 k Ω and contact ik 2 to RP/08-1 (AF subs.). After 5 sec. the 1K-relay releases automatically, which causes the subscriber with engaged indication again to receive the busy-tone.

The subscriber who wants to use the system must first replace his handset to cause the O-relay to release, then he must wait until the engaged indication from the "star-blinker" has been cancelled, before he lifts his handset again.

If the SBS-system becomes disengaged while the subscriber concerned still has his handset off hook, a busy-tone will still be received by that subscriber.

Activation of TT680-2003 is then maintained by -24 V from transistor Q4 in RP/08, since operation of Q4 is maintained by 0 volt from RP/07-16 (TT act.).

2. Mobile-to-Base Call.

- 2A. The mobile station initiates a call by transmitting the subscriber's tone code (double-tone, simultaneous). The tone call is received by the base station and passed on to the SBS-terminal unit. Here 2 out of 7 tone receivers are activated. The output signal from these receivers activates a ringing circuit, and a ringing voltage is fed to the called extension set. The ringing circuit is provided with ringing stop.

At the same time as ringing occurs, the extension circuit concerned is activated and held via a pre-timed holding circuit for 15 sec. to allow the subscriber sufficient time to answer the call. During this period other subscribers receive engaged indication.

Ringing continues as long as the call button in the mobile station is actuated. Thus, the call button makes signalling possible. The transmitter is keyed on reception of the call tone signal, thereby causing activation of the engaged lamp in all other mobile stations.

- 2a. During a mobile call the SBS-terminal receives a double-tone signal. From HU680-2003, term. 7 (AF RX, LA in) this signal is fed to LA681 (RX), term. 3. The signal is amplified in LA to an output level of +3 dBm, which - from term. 1 - is fed to term. 2 (AF in) of AA6811, which is the common amplifier for the 7 tone receivers.

The tone signal, which is fed from this terminal to tone receivers TR6811 a, term. 1 (AF in), activates after approx. 350 msec. two of these receivers, from where 0 potential is now fed from term. 3, 4 and 5.

As appears from the diagram for selective calling, D113649, the two output signals will be fed only to one of the extension circuits, RP680-2002/07a, connected to the system.

In that extension circuit where the 0 volt potential at the same time is applied to term.s 2 and 1 (TR-code A and B), transistor Q2 will operate and cause the R-relay to operate.

From contact r1, 0 volt passes via E15 for activation of relay B, and via E4 to term. 14 (start DU-BT). This terminal is connected to DU680-2002/1, term. 5 (start 2). On activation of DU/1, 0 volt from term. 2 is applied to RP/08-26, causing the BT-relay to operate.

BT is maintained operated by DU/1 for 15 sec. From contact bt2 -24 V are applied to term. 14 (TX-key., CR), which causes CR681 to feed a line current of 1,8 mA to the CP for keying of the base station transmitter.

Via E15 -24 V are also applied to RP/08-17 (-24 V, eng. sign.) starting the engaged-tone generator TT680-2003.

From contact bt4 0 volt is applied to term. 28 (Engaged/Time-hold.), which causes the B-relay in the called extension circuit to hold, while the O-relays in all other extension circuits operate.

In RP/07a r2 connects -24 V to RP/08-3 (-24 V ringing generator). From here -24 V is connected over rs1 to the ringing generator PG681, term. 5. The ringing generator now starts and transmits ringing voltage from transformer panel RP6820, term. 5 to the extension circuit, term. 4. From here the ringing voltage is applied over contact r3 to term. 8 (line-B). At the same time, term. 7 (line-A) is connected to 0 volt over contact r4.

Mobile stations are able to make several tone keying transmissions, which makes it possible to signify a certain person at the subscriber (e.g., by 1, 2 or more tone transmissions in succession).

2B. When a subscriber answers a call by lifting his handset, extension hold condition of that circuit is then established, (holding time being determined by DU680-2002/2a), and the sequence of operation is thereupon as described under Section 1.

2b. On lifting the handset during application of ringing voltage, the establishment of the loop circuit will cause relay RS in RP/08 to operate at 0 volt from term. 7 in the extension circuit (current path: 0 volt, r4, term. 7, extension line and extension set, term. 8, r3, term. 4, through RP6820 to RP/08-7 and relay RS to -24 V). Contact rs1 then breaks for -24 V to the ringing generator, PG681, which ceases for -24 V to the ringing generator, PG681, which ceases to supply ringing voltage.

The R-relay remains operated as long as the mobile operator transmits tone signals. As the tone signal ceases, R releases and cannot be operated again, since Q2 is cut off by -24 V from Q3.

Q3 switches "ON" as r1 connects 0 volt over a3, (which closed when

the A-relay was operated by connection to the line over r3 and r4), 03 and E21 to the base circuit of Q3. The sequence of operation is then as described under Section 1.

In extension circuits where automatic group call is transmitted on lifting the handset, such transmission also takes place when answering a mobile call, because the A-relay operates. It applies to such subscribers, that they can neither listen nor speak until the group sequence call has been transmitted. This happens immediately after the mobile tone call has ceased. When lifting the handset - after having received a ringing signal - the group call is heard immediately after hook off.

- 2C. If a subscriber does not answer a call within the fixed time period, the net will be disengaged, and a new call must be made. At automatically timed disconnection, engaged indication is cancelled at all non-called subscribers, and the engaged lamp is switched off in all mobile stations, indicating that the system is free.
- 2c. 15 sec. after the first transmitted tone call, the time-hold relay, BT in RP/08, releases. Contact bt4 breaks the holding current for the B and O-relays in the extension circuits, and the relays release after approx. 0,1 sec.

Keying of the transmitter ceases as contact bt2 breaks for -24 V to CR681.

3. Talk-through Call. (Car-to-Car operation).

3A. Talk-through traffic, i.e., car-to-car communication, is the third mode of operation offered by the SBS-system. In this mode any car in the system can make group calls to vehicles in a wanted mobile group (normally, however, only to vehicles within own mobile group).

A talk-through call does not cause ringing of the extension set of the called group. However, the extension concerned does not receive engaged indication during the period in which the SBS-system is operating in the talk-through mode, and the subscriber can therefore listen in to and break into the car-to-car communication going on. On the other hand, all other subscribers receive engaged indication.

3a. In mobile stations fitted with talk-through facility, the control box is provided with two tone call buttons (one conventional call button and one talk-through button).

When making a call, the mobile operator first actuates the talk-through button, thereby transmitting a special double-tone combination composed of tone "4" = 1400 Hz and tone "7" = 1830 Hz.

From tone receivers TR1 and TR-4 0 volts will be applied to term. 20 and 19 (TR-code A and B) in RP/08. Q2 and Q3 then switches ON and connect -24 V to the base resistor of Q1. Q1 switches ON and connects 0 volt to term. 21 (Start DU-BT), which is connected to DU/1-6 (Start 3). DU/1 is then activated, and relay BT thus operates.

Contact bt4 applies 0 volt to term. 28 (Engaged/Time-hold.). From here, 0 volt is applied to term. 22 in all extension circuits. The O-relays in all extension circuits are operated and causes engaged indication in all extension sets.

From RP/08-28 0 volt is also applied to RP/08-8. Relay VV then operates from -24 V from E12. Being thus operated, the VV-relay remains operated from -24 V from E10 over its own contact vv4.

As relay VV was operated, contact vv1 broke the connection to RP/08-11 (DU-BT, stop). This prevents a SBS-subscriber from disconnecting the established communication by replacing his handset when the car-to-car traffic is going on.

Contact vv2 also broke the connection between term. s 12 and 10. This

is done to enable the transmission of an automatic group call at a talk-through call for mobile groups, in which case the SBS-extension of the group does not transmit automatic group call by lifting the handset.

The transmitter was keyed as contact bt2 applied -24 V to term. 14 (TX-key, CR), and this causes the engaged lamp in all other mobile stations to light.

After transmission of the "Talk-through Signal", the SBS-system remains activated for 15 sec. by DU/1. Within this period the calling mobile operator must then transmit a normal tone call. This is done by actuating the subscriber call button normally used.

On receiving the two tones in the SBS-terminal, 0 volt will be applied from two of the tone receivers to the extension circuit of the called group, term. 2 and 1 (TR-code A and B).

The R-relay in this extension circuit operates, whereupon the B-relay is operated. As contact b4 breaks for 0 volt to the O-relay, this relay drops out. Thereby the engaged indication in the extension set of the called group is cancelled, and the subscriber can now be switched in on the established car-to-car communication.

As relay R in RP/07a was operated, contact r1 applied 0 volt via E16 to the base circuit of Q1. This causes cut off of the -24 V, which contact vv4 of the VV-relay applied to the extension circuit, term. 17 (-24 V, repeat), so that Q1 cannot switch ON by connection of 0 volt over contact b4 to the emitter, as long as the R-relay remains operated.

The R-relay drops out at the end of the mobile tone call. On breaking, contact r1 suspends the previous cut off condition of Q1, which now switches ON. From the collector of Q1 0 volt is applied via E18 to term. 15 (Pulse). As described under Section 1, this will cause operation of relays in group selector RP/2, and keying of the sequence generator, so that an automatic group call in the form of a 4-tone sequence signal is transmitted.

1st and 2nd digits are determined by the activated G-relays in the group selector, while the 3rd and 4th digits are permanently set up in the two registers, RP/09, to tone "O" and tone "R", respectively.

0 volt from Q1 is also applied via E20 to the base circuit of Q3. Q3 switches ON and applies -24 V via E14 to the base circuit of Q2 for cut off of Q2, so that a new tone call, if any, from the mobile station cannot operate the R-relay. Q3 also applies -24 V to term.3 (Repeat., CR). CR681 then produces a current of 7 mA in line 1.

In the control panel 0 volt is applied from DA/02-6 to RP/04-1. Since relay S was activated by DA681 at the tone call, relay R cannot operate until contact s1 applies -24 V to the relay. The reason for this is, that the squelch signal from the receiver in CQF600 remains on after reception of the carrier has ceased for a period of 0,1 to 0,5 sec., depending upon the adjustment of the squelch control potentiometer.

The AF level diagram shows, that if the R-relay operated immediately at the connection of 0 volt from DA/02-6, the first tones of the group sequence tone signal might not be fed to the AF-input of the transmitter, if the squelch relay S because of the squelch delay had not yet dropped out. Relay S does not release until the end of the squelch signal, and -24 V is applied by s1 to the R-relay, which operates. At the following activation of the S-relay, the connection of -24 V to the R-relay is maintained over contact r1.

From the above it will then appear, that the first part of the sequence tone signal will be fed to the transmitter over r3, then for a brief over r3 and s3, whereas the latter part is fed solely over s3.

In systems without communication privacy among the groups (without engaged lamp, etc.) a selective call can be transmitted to a SBS-station which is already engaged. Such a call will not be accepted by the SBS-terminal, since the Q2-transistors in extension circuits with engaged indication are not supplied with -24 V from term. 26. Nor will a call to the already engaged extension circuit be possible, since Q2 is cut off by -24 V from Q3 via E14 to the base circuit. If Q2 were not cut off, a brief calling signal might cause the pulse control circuit, RP/06, to admit one pulse to the register for the 3rd digit, which again would cause, that the AF connection to the subscriber would be blocked by the R-relay in RP/06.

- 3B. When a mobile operator has made a talk-through call, a selective group call with sequence tones will be transmitted from the base station. This transmission opens the loudspeakers in the called mobile group, and the calling mobile operator can use a voice call for the desired mobile station. The SBS-system will then be held for 15 sec. after reception of the carrier from both mobile stations has ceased.
- 3b. Whenever a carrier is received from a mobile station, the squelch amplifier, DA681 in CP680-2003, is activated, causing the S-relay in RP/04 to operate. Then contact s2 establishes a DC-loop towards HU680-2003. The current produced in line 2 operates relay S in the line panel of the SBS-terminal, HU680-2003, whenever a carrier from a mobile station is received. Contact s1 then applies -24 V from term. 3 (-24 V, repeat.) to RP/08-22 (Act. DU-BT, sq.), which leads to the base circuit of Q1. Q1 switches ON and applies 0 volt to term. 21 and term. 6 (start 3) in DU/1.

Every time 0 volt is applied to term. 6 of DU/1, the delay network is reset. The timing function is thus started each time reception of the carrier from a mobile ceases (resetting of DU/1 ceases), and is interrupted and reset at each succeeding reception of the carrier from mobiles.

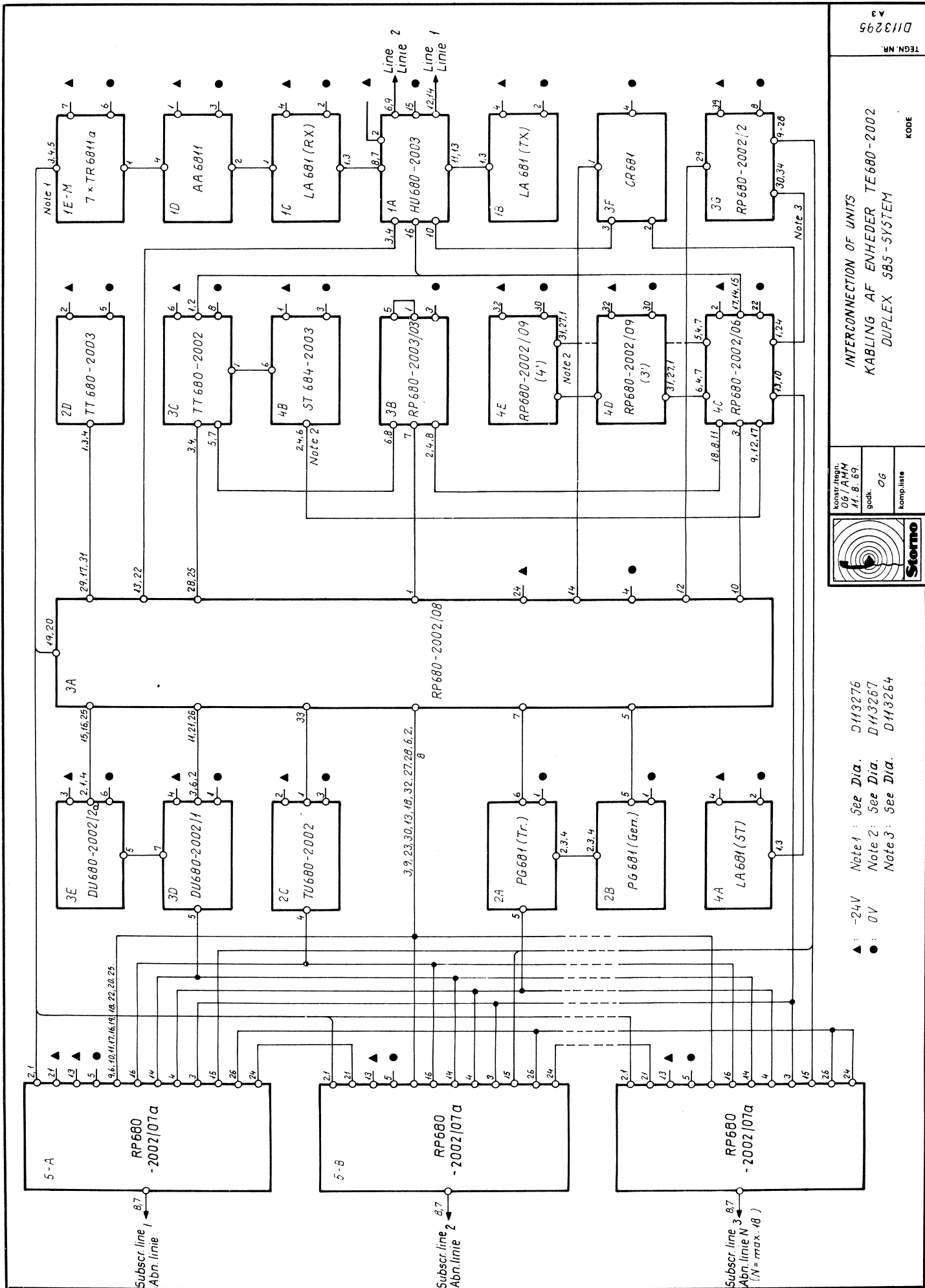
Communication between mobile stations is established by repeater operation over the base station thereby, that the signal from the receiver is fed to the AF-input of the transmitter via an attenuation network and the contacts r2 and s3 in RP/04. The signal fed to the transmitter is attenuated 20 dB in the network, so to obtain the correct modulation level.

Thus, car-to-car communication is carried out as simplex traffic (press-to-talk communication).

- 3C. 15 sec. after the last reception of the carrier from one of the communicating mobile stations, the SBS-system is cleared down automatically.

- 3c. If DU/1 does not receive a reset-signal from Q1 in RP/08 within the 15 sec. period, DU/1 breaks the holding current for relay BT. Contact bt4 breaks for 0 volt to term. 28 and term. 8 in RP/08, causing the B-relay and the O-relays in the extension circuits and the VV-relay in RP/08 to drop out. Then the R-relay in RP/04 drops out, upon which the SBS-system is cleared down and ready for accepting a new call.

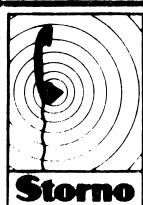
SECTION 4



TONEMODTAGER TONE RECEIVER		1	2	3	4	5	6	7
PLACERING I TE PLACE IN TE		1E	1F	1G	1H	1K	1L	1M
TONEFREKVENSI TONE FREQUENCY		1400 Hz	1530 Hz	1670 Hz	1830 Hz	2000 Hz	2200 Hz	2400 Hz
TONEUMMER TONE NUMBER		"4"	"5"	"6"	"7"	"8"	"9"	"10"
TE/08	A1	1	●	●				
	A2	2	●		●			
	A3	3	●			●		
	A4	4	●				●	
	A5	5	●					●
	A6	Rep.	●		●			
	B1	6		●	●			
	B2	7		●	●			
	B3	8			●	●		
	B4	9			●		●	
TE/16	B5	10			●			●
	C1	11		●	●			
	C2	12		●			●	
	C3	13		●				●
	C4	14		●		●		
	D1	15			●	●		
	D2	16				●	●	
	D3	17				●		●
	E1	18					●	●
	S1	19			●		●	
	S2	20			●			●

Udgangsterminalerne 3,4,5 fra de 7 TR 6811a forbindes iflg. skemaet til abonnentkredsene RP 680-2002/07 term. 1 og 2, samt til RP 680-2002/08's terminaler 19 og 20.

The output terminals 3,4 and 5 from the 7 TR 6811a are connected according to this table to the subscriber panels RP 680-2002/07 terminals 1 and 2, and to the terminals 19 and 20 on RP 680-2002/08.



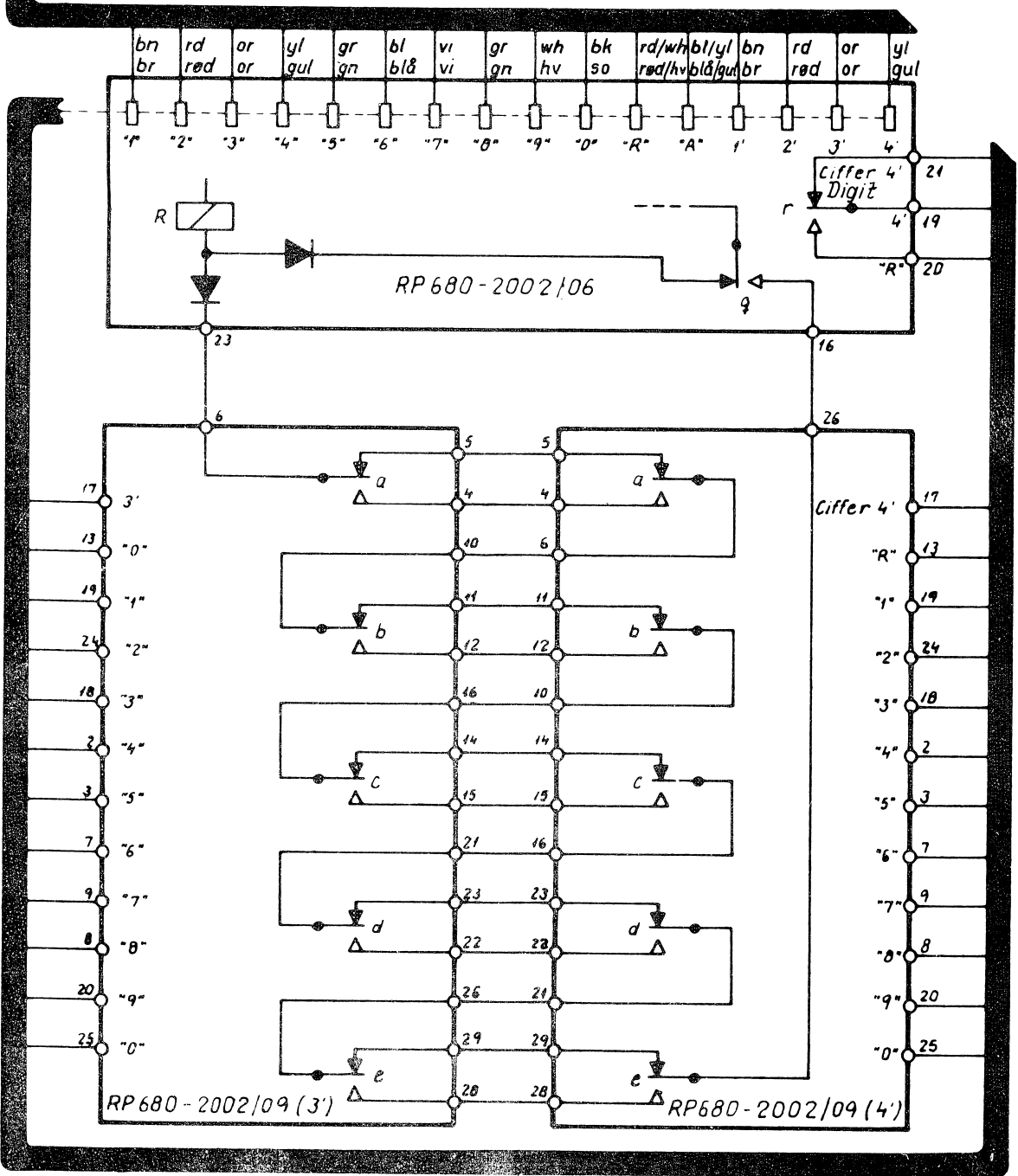
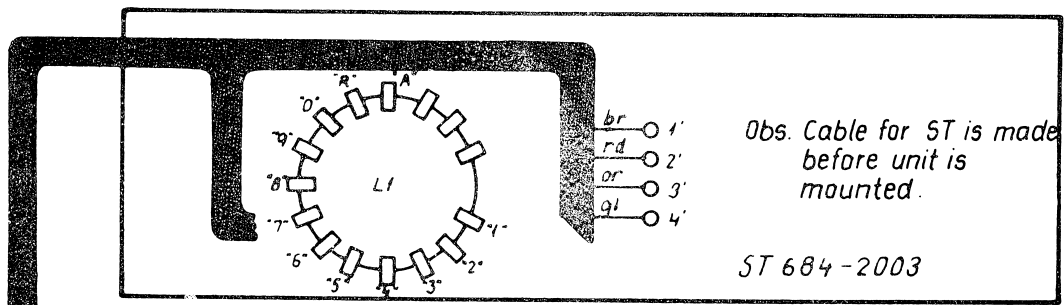
konstr./tegn.
DG/AMM
8.10.69
godk.
KJ
komp.liste

SKEMA OVER DOBBELTTONEKOMBINATIONER
FOR SELEKTIVE OPKALD TIL SBS - BASESTATION CAF 680-2002
TABLE SHOWING DOUBLE-TONE COMBINATIONS
FOR SELEKTIVE CALLS TO SBS - BASESTATION
CAF 680-2002

TEGN. NR.

0113649

A 4



konstr. Regn.
06 / AMM
7. 8. 69.
godk.
06
komplete

CABLING SCHEMATIC DIAGRAM FOR CHECK
OF IDENTICAL DIGITS IN RP/09, AND FOR
TONE TERMINAL CONNECTIONS FROM ST 684-2003
CAF 680-2002/2003

KODE

TEGN. NR
D113267E
A4

Alternative Call Principles for SBS-systems.

The SBS-system is intended for use by several, entirely independent users, a number of departments within one organization - or a combination thereof.

Each subscriber in a SBS-system can communicate with his own mobile group and vice versa. Selective calling of mobile stations is based on the use of a 4-tone sequence signal, where the 1st and 2nd tone are set up as a group code when lifting the subscriber's handset. The 3rd and 4th code are used to form 1 group code and 99 individual call codes within each mobile group.

Since technical administrations of municipal authorities are showing an increasing interest in SBS-systems for the purpose of establishing common municipal radio networks with possibilities for inter-communication between the connected groups, an alternative coding system for selective calling from the base station has been worked out.

1. Coding of the 1st and 2nd tone is fixed and applies to all mobile stations in the system.
2. The 3rd and 4th tone are coded as follows:
 - a) 01, 02, 09, 10, 12, 18 and 19 constitute 18 group call codes.
 - b) 11, 20, 21, 98 and 99 constitute 81 individual mobile station numbers.
 - c) 00 can be used as a common call code for all mobile stations.

Function.

On lifting the SBS-subscriber's handset, the 3rd and 4th digit are automatically combined into the call code of the mobile group under the subscriber, who makes the call. Thus, if there is no requirement for one or more (max. 10) subscribers to be able to call other mobile groups than their own, this arrangement means, that group calls can be made automatically. Such subscribers will be equipped with a non-dial telephone set.

SBS-subscribers equipped with dial telephone sets can - after lifting the handset without group calls being automatically transmitted - dial any mobile group wanted. Likewise, they can dial individual - and if so desired - several vehicles within these groups.

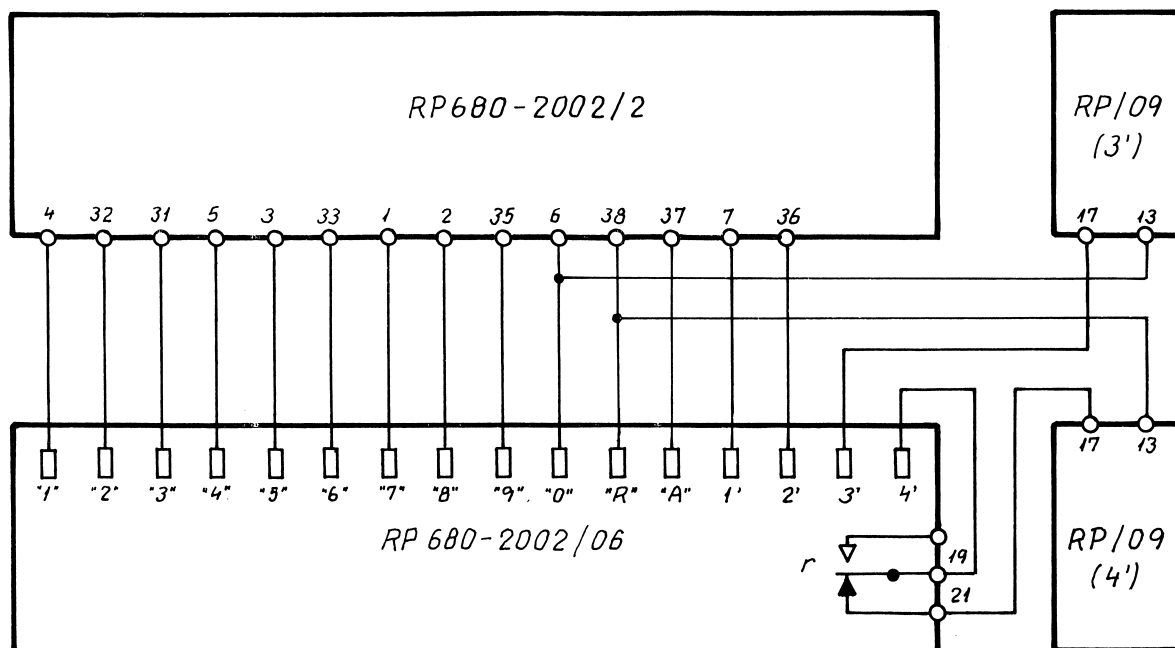
All SBS-subscribers - a total of 18 - and all mobile groups can be called from mobile stations. However, since the Subscriber/Mobile-selector carries only 11 positions, each vehicle will not be able to call more than 11 subscribers.

Summary.

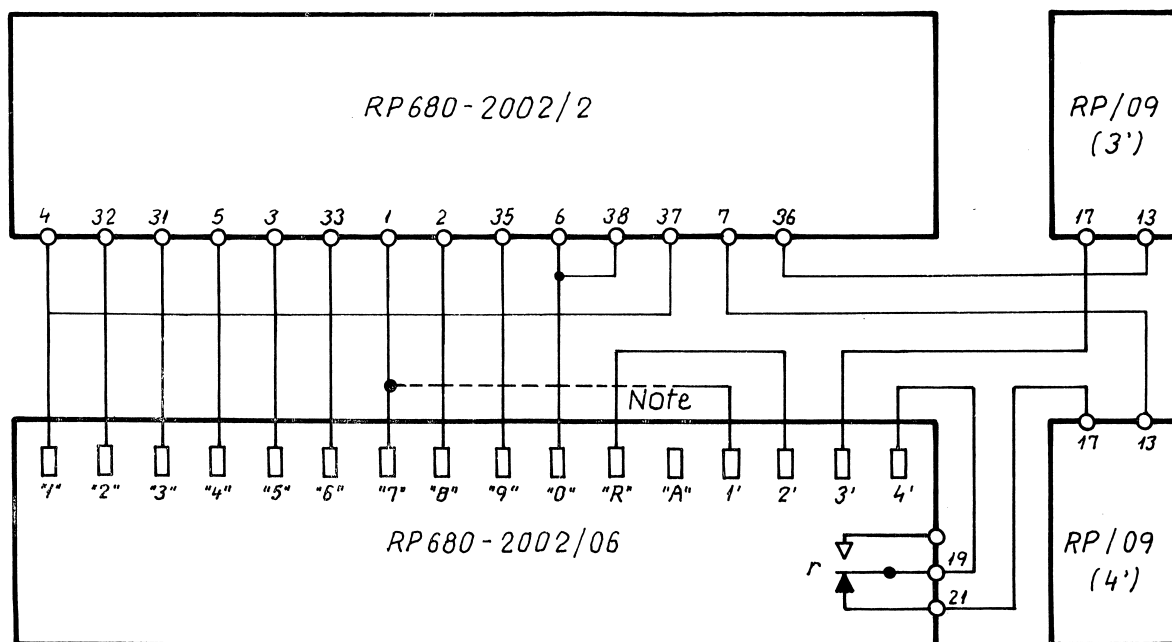
By using this calling principle a SBS-system will accomodate a total of 18 subscriber-mobile groups with a maximum of 81 mobile stations, which can be distributed arbitrarily among the number of groups involved.

SBS-subscribers can call all mobile stations individually or by groups. Mobile stations can call 11 SBS-subscribers and make group calls to the associated 11 mobile groups.

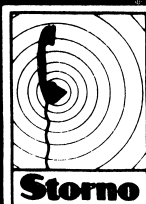
*Normal cabling for SBS-system with max. 20 subscriber groups.
Normal kabling for SBS-system med max. 20 abt.- grupper.*



*Cabling for alternative call principle acc.to T112199.
Kabling for alternativt opkaldsprincip iflg. beskrivelse T112199.*



*1' must be strapped to first zone "X" in the selected zone sequence code.
Note: 1' strappes til 1. tone "X" i den aktuelle sekvenskode.*



konstr./tegn.
OG/AMM
7.8.69.
godk.
OG
komp.liste

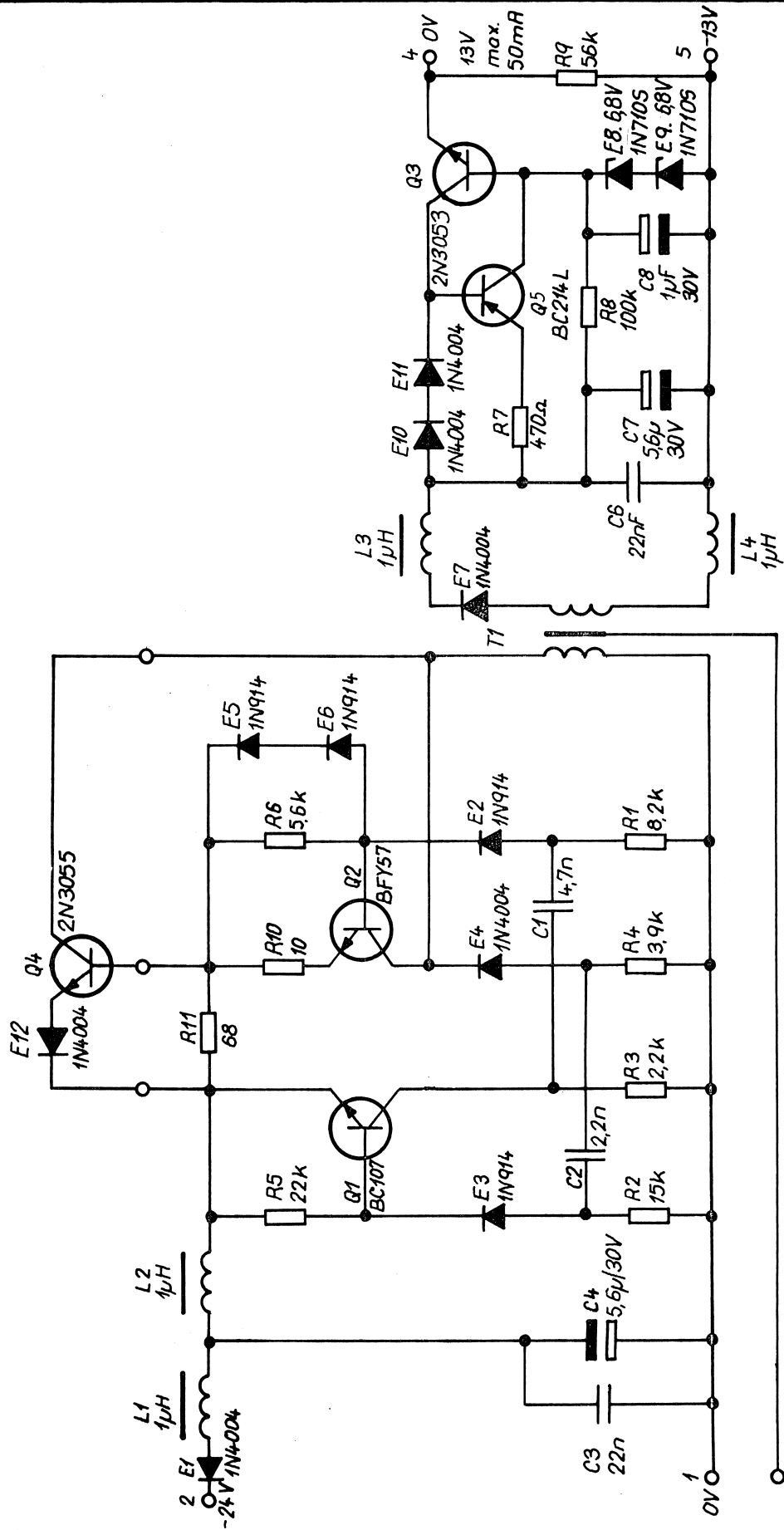
KABLINGSPRINCIP FOR TONESPOLETELSLUTNING
TIL GRUPPEKODESELEKTOR RP680-2002/2.
CAF 680-2002

CABLING, SCHEMATIC DIAGRAM FOR TONE COIL CONNEC-
TION TO GROUP CODE SELECTOR RP680-2002/2.
CAF 680-2002

TEGN. NR.

D113264

A 4



T1
75wind
45wind
Tråd Q2^ø cu
wire 0,2^ø cu

konstr./tegn.
KJe/SL
13.10.69.
godk.
Jbe
komp./tegn.
P. J. J. 10.52
X113538

POWER SUPPLY
STRØMFORSYNING PS680-6241

KODE

TEGN. NR.
D113537
A 4

no	code	data	no	code	data
C1	76.5061	4,7nF	Q2	99.5172	BFY57 transistor
C2	76.5059	2,2nF	Q3	99.5128	2N3053 -
C3	76.5071	22nF	Q4	99.5171	2N3055 -
C4	73.5113	5,6μF/30V	Q5	99.5144	BC214L -
C6	76.5071	22nF	T1		75/46W 0,2 ⁰ transformer
C7	73.5113	5,6μF/30V			
C8	73.5114	1μF/30V			
R1	80.5260	8,2kΩ 1/8W			
R2	80.5263	15kΩ -			
R3	80.5253	2,2kΩ -			
R4	80.5256	3,9kΩ -			
R5	80.5265	22kΩ -			
R6	80.5258	5,6kΩ -			
R7	80.5245	470Ω -			
R8	80.5273	100kΩ -			
R9	80.5270	56kΩ -			
R10	80.5225	10Ω -			
R11	80.5235	68Ω -			
R12					
E1	99.5020	1N4004 diode			
E2	99.5028	1N914 -			
E3	99.5028	1N914 -			
E4	99.5020	1N4004 -			
E5	99.5028	1N914 -			
E6	99.5028	1N914 -			
E7	99.5020	1N4004 -			
E8	99.5146	6,8V zenerdiode			
E9	99.5146	- - - - -			
E10	99.5020	1N4004 diode			
E11	99.5020	- - -			
E12	99.5020	- - -			
L1 -					
L4	63.5009	1μH			
Q1	99.5121	BC107 transistor			

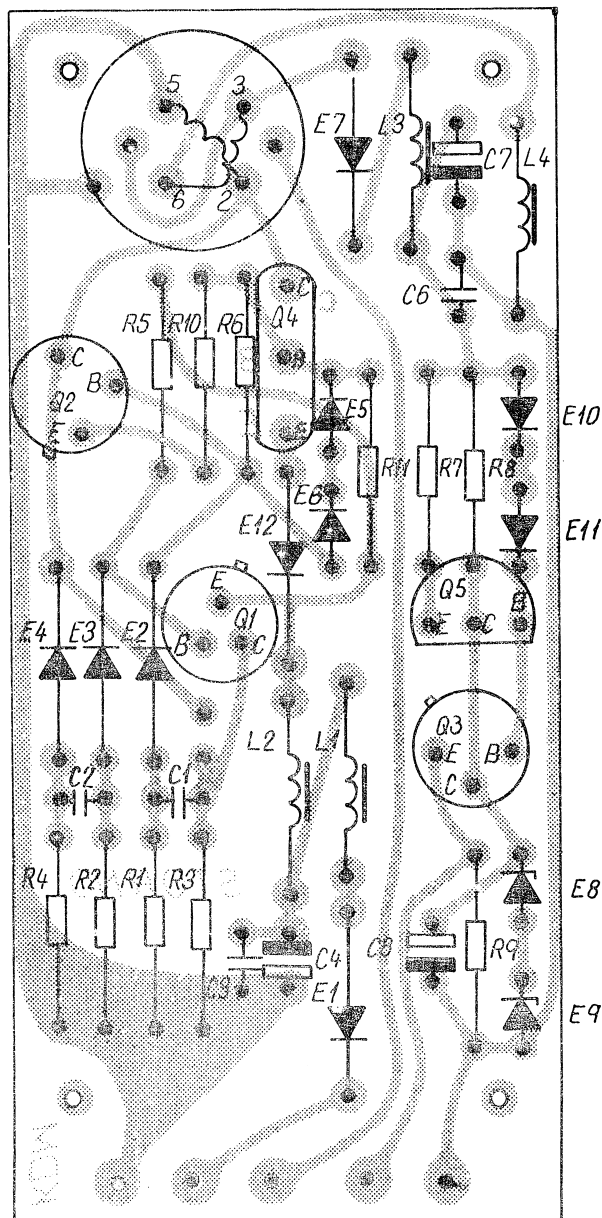


udatová
KJe/SL
13.10.69
kontrola
JGc
Lih. dílo
D113537

PART LIST
STYKLISTE

PS680-6241

13.10.69
X113538
1 of 1



Printed circuit seen from component side
Trykt kredsløb set fra komponentsiden.



konstr./tegn.
KDM / SL
26.8.70.
godk.
KEM
kompliste
D 113537
X 113538

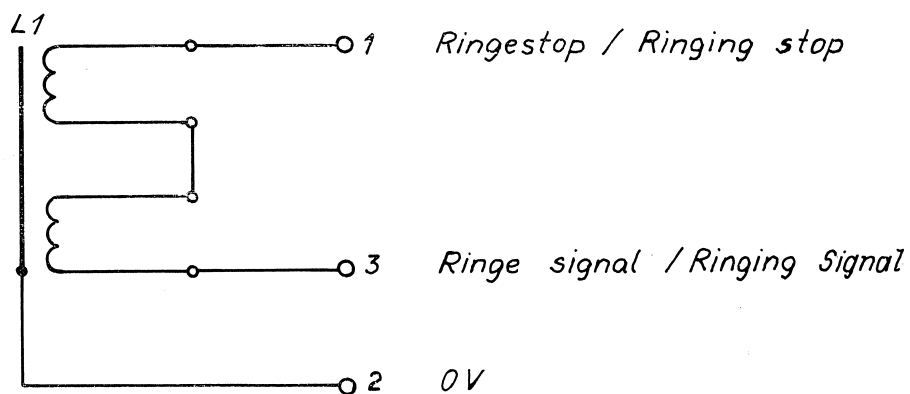
LAY-OUT FOR
PLACERINGSTEGNING FOR
PS 680-6241

KODE

TEGN NR

I 114052

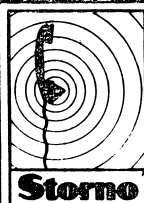
A 4



Drasselspole : 5H, 200 Ω og 30mA

Choke coil : 5H, 200 Ω and 30mA

JS. type 1.25p - 12.277 Storno 60.5142



konstr./tegn.
OG / JAS
14.12.67

godk.

MB

komp.liste
X 110477

FILTER KREDSLØB
FILTER NETWORK

FN 680 - 2002

KODE

TEGN. NR.

D 110476

A 4

no	code	data	no	code	data
L1	60.5142	(JS. type 1. 25p-12.277) Drosselspole 2 vikl. a 1,25 H, 100Ω og 30mA/ Choke, 2 windings each of 1 1,25 H, 100Ω and 30mA.			

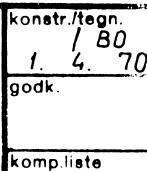


14.12.67
 kontrol af
JB
 1110476

FILTER KREDSLØB
 FILTER NETWORK

FN680-2002

X110477
 af



TELEFONAPPARAT,
TYPE CB680-2002 (DIALOG)
SUBSCRIBER TELEPHONE SET

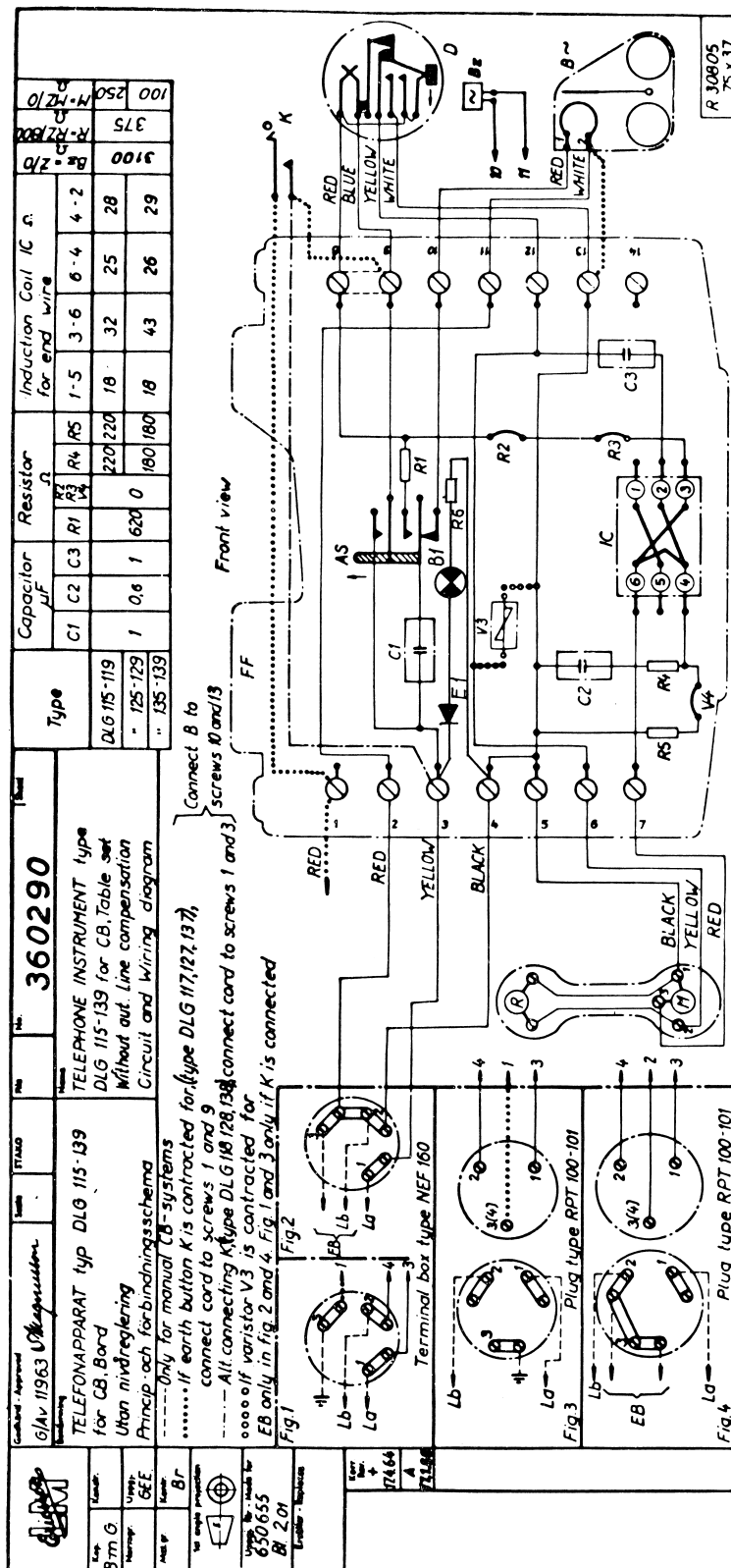
KODE

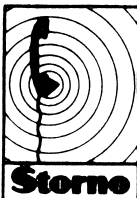
TEGN. NR.

D 114385

A4

R6	80.5259	6,8 k Ω	1/8W
E1	99.5020	1N4004	Diode
B1	Star Indicator/ Blinker 300		





konstr./tegn.
KJc / JWA
13.5.68
godk.
M3.
komp. lste

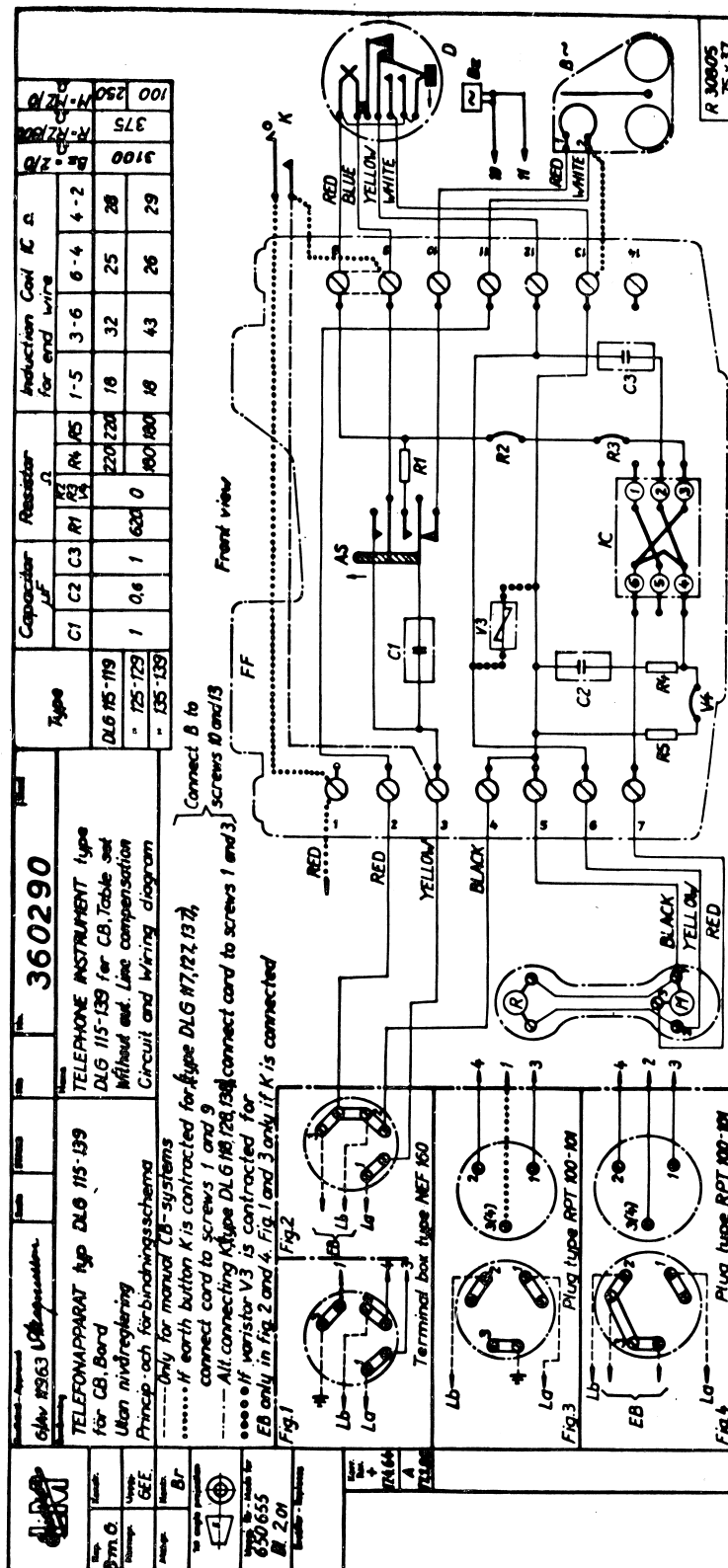
TELEFONAPPARAT, DIALOG TYPE DLG 115 - 139.

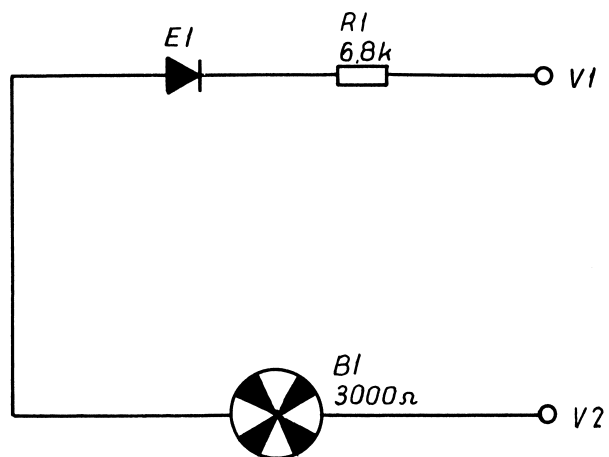
KODE

TEGN. NR.

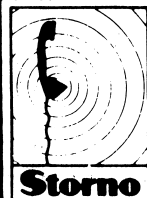
D111173

A4





R1 : 80.5259 6,8kΩ 1/8W
 E1 : 99.5020 1N4004
 B1 : Star indicator/blinker 3000Ω 2 mA.
 (Fabr. Eugen Sasse K. -G.)



konstr./tegn.
 KEM/EBH
 23.3.70.
 godk.
 KEM
 komp.liste

INDICATOR BOX
 INDIKATORBOKS

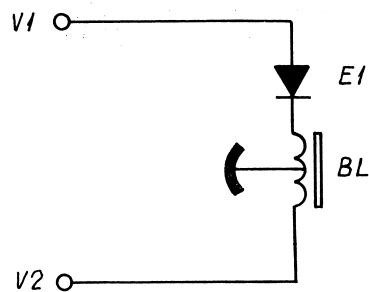
ID 680-2002a/b

KODE

TEGN. NR.

D114166

A4



E1 : Diode 1N4004 (99.5020)
BL : Blinker 3k Ω 2mA (Fabr. Eugen Sasse KG)
(BL : Star indicator 3k Ω 2mA (Fabr. Eugen Sasse KG))

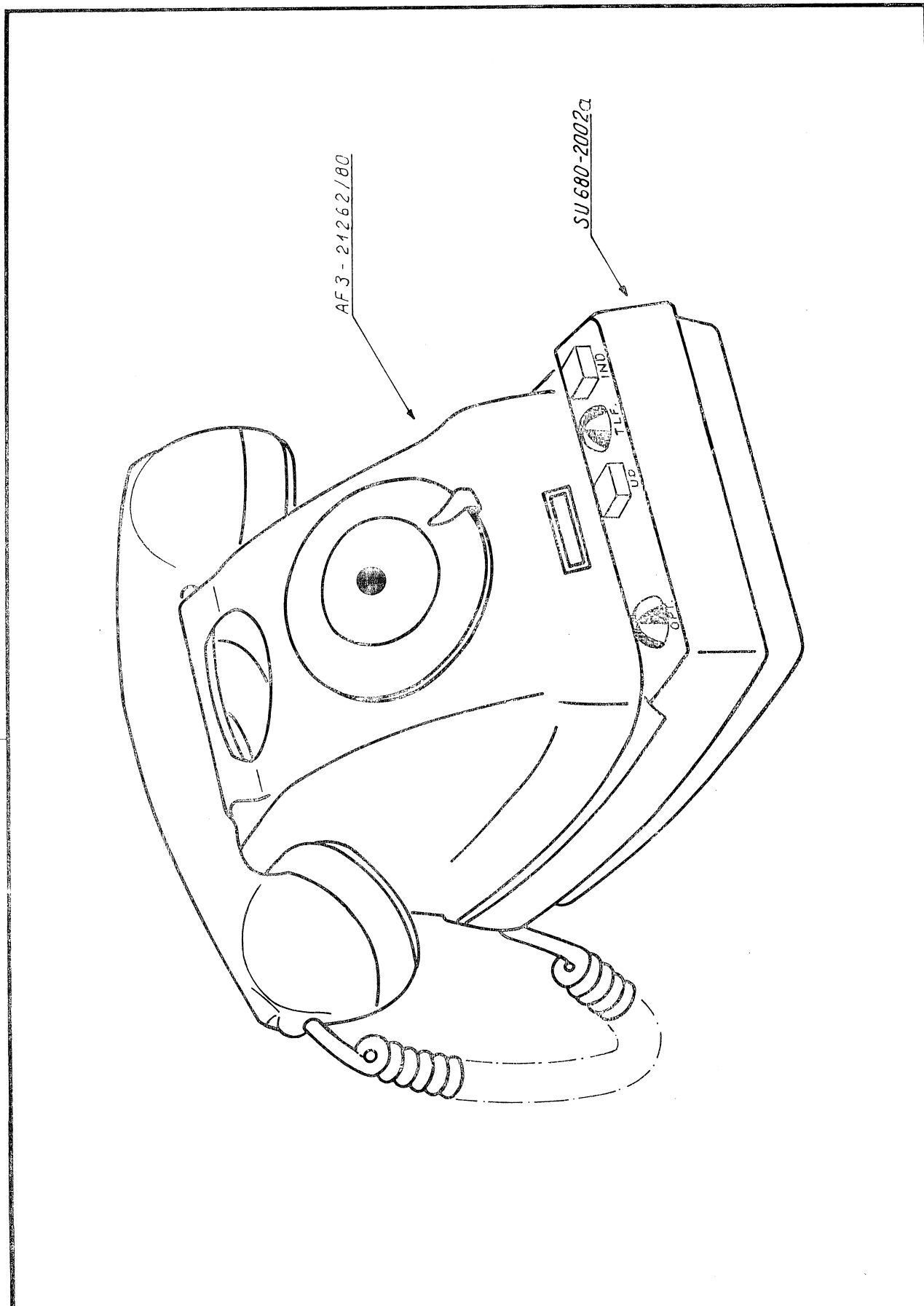


konstr./tegn.
 SEL/AMM
 18.8.69
 godk.
 komp.liste

JUNCTION BOX ID 680-2002

KODE

TEGN. NR.
 D113340
 A 4



konstr./tegn.
NN/AMM
22.10.68.
godk.
ky
komp.liste

SBS - GENNEMSTILLINGSBOX SU680-2002α
SBS-SWITCH UNIT FOR THROUGH-CONNECTION

KODE

TEGN.NR.

D442107

A4

SBS Through-connection Box SU680-2002/01.

In conjunction with the extension set of a SBS-subscriber and that of a subscriber under a private telephone exchange, a radio telephone call can be put through to other subscribers by means of Through-connection Box Type SU680-2002/01.

Construction.

The through-connection box is designed as a console placed under the SBS telephone set and fitted with three push buttons and two "star-blinkers". One button marked (T/R) is used for establishing through-connection, while the other marked (X) is for disconnection. The third button may be used for special purposes. The two starblinkers are used as indicators for through-connection and engaged condition respectively.

Engaged Indication.

When the system is engaged, this is also indicated by a normal busy-tone, which is heard when lifting the handset. Visual indication is then switched off temporarily. During call and conversation, the system is blocked to other subscribers for traffic and listening in.

Priority Call.

A subscriber with engaged indication can signify a priority call by lifting his handset off hook for about 10 seconds. During that period a weak intermittent tone will be superimposed on the conversation, indicating that urgent traffic is waiting. Thereupon the handset should be replaced until engaged indication ceases.

Through-connection.

Through-connection can be established from a subscriber under the private telephone exchange, who wants to be put through to a radio channel.

Likewise, a radio call from a mobile station can be put through to a subscriber under the exchange. A request for through-connection is received over

one of the two telephone sets, and the call is passed on over the second telephone set. When this call is answered, the through-connection button is depressed, and through connection is indicated by a flashing signal. The telephone set under the exchange is then disconnected, and the handset can be replaced. The extension set connected to the radio system makes it possible to listen in, but not to break in. Replacement and lifting of this handset will not interfere with the conversation.

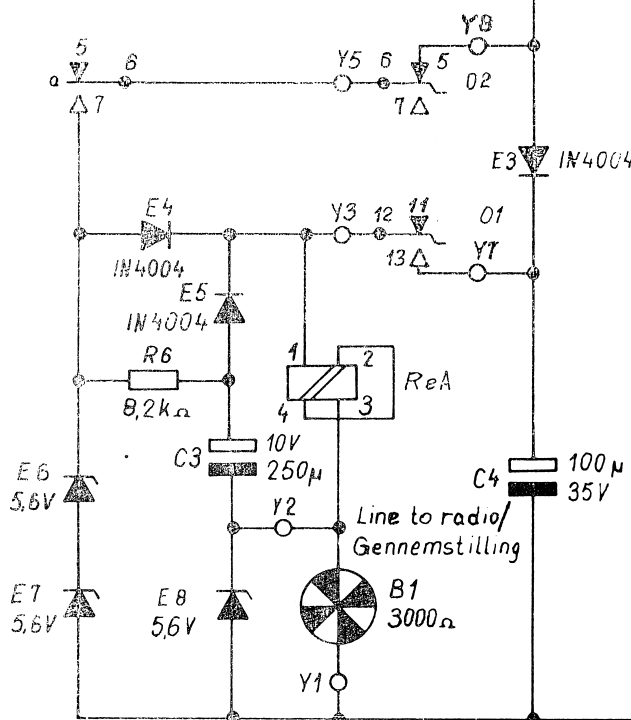
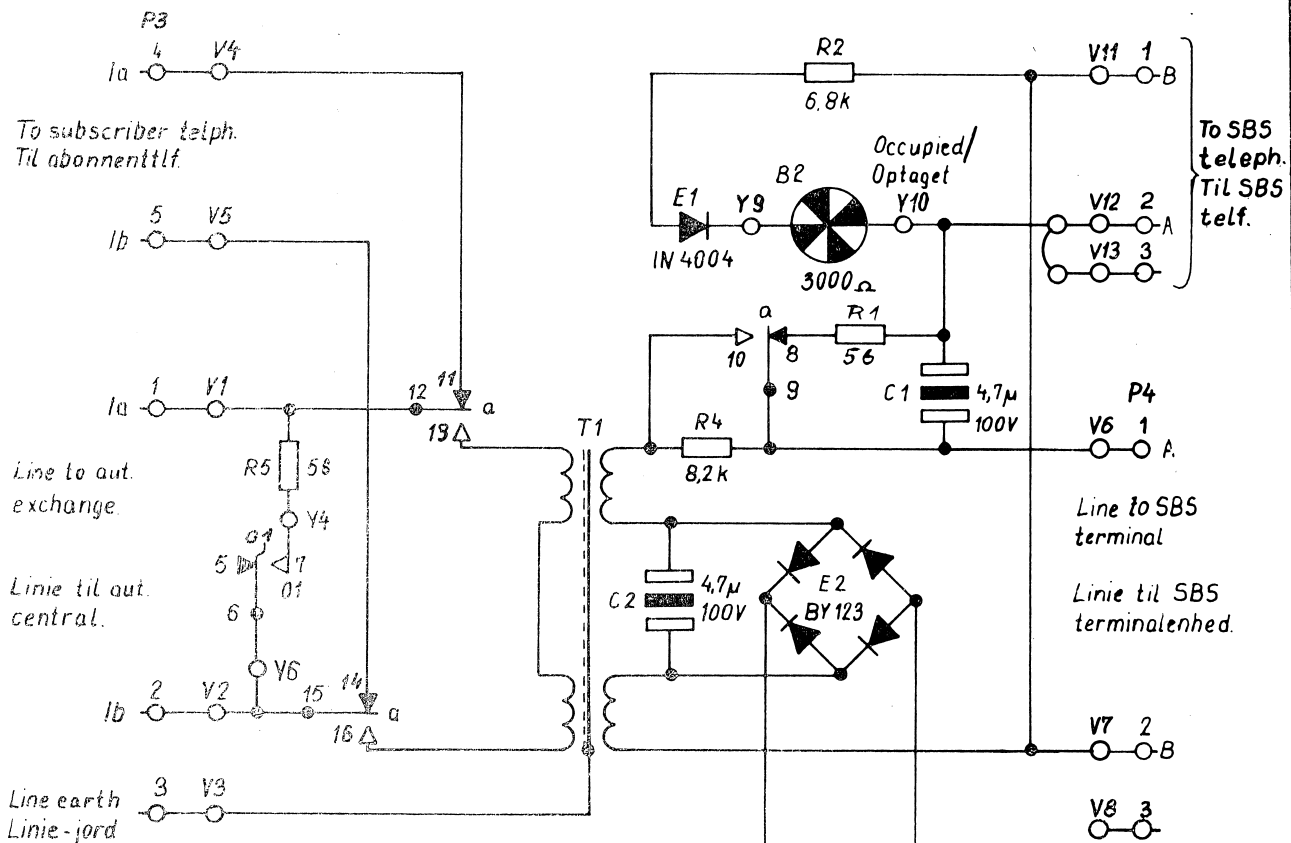
Disconnection.

Disconnection of a radio channel after communication established solely with the extension set of the radio system takes place when the handset is replaced.

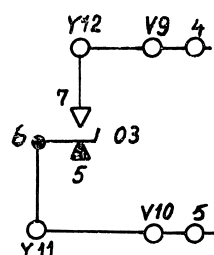
After a through-connection, disconnection of the radio channel as well as the line connection is done by depressing the through-connection button.

If one or both handsets remains off hook during disconnection, the connection or connections concerned will be maintained until the handsets are replaced. This form for local disconnection, however, requires frequent listening in to check, whether communication is terminated.

Disconnection of a through-connected call can also be made by transmitting from the mobile station a signal identical to the call signal. This method disconnects the radio channel as well as the PBX extension, provided that both handsets be replaced. When using this method, the end-of-communication signal will cause the extension set of the radio system to ring.



B1, 01: Line to radio / Gennemstilling.
 02: Clear down / Nedbrydning.
 B2: Occupied / Optaget.



03: Available switch.
 Disponibel kontakt

rettet d. 4.2.71

	konstr./tegn. HSH/KF 5.2.71.	SBS-SWITCH UNIT FOR LINE TO RADIO CONNECTION SBS-GENNEMSTILLINGSBOKS SU680-2002/01a	TEGN. NR. D115009 A 4
	godk. KOF		
	komplette		
	N115045.		

no	code	data	no	code	data
C1	73.5007	4,7 μ F -10 +100% elko 100V			
C2	73.5007	4,7 μ F -10 +100% elko 100V			
C3	73.5072	250 μ F -20 +50% elko 10V			
C4	73.5071	100 μ F -10 +50% elko 35V			
R1	80.5234	56 Ω 5% carbon film 1/8W			
R2	80.5259	6,8k Ω 5% carbon film 1/8W			
R3					
R4	80.5260	8,2k Ω 5% carbon film 1/8W			
R5	80.5234	56 Ω 5% carbon film 1/8W			
R6	80.5260	8,2k Ω 5% carbon film 1/8W			
T1	60.5097	Trafo 0,32P nr. 8867/4			
E1	99.5020	diode 1N4004			
E2	99.5150	rectifier bridge BY179			
E3	99.5020	diode 1N4004			
E4	99.5020	diode 1N4004			
E5	99.5020	diode 1N4004			
E6	99.5114	zenerdiode 5,6 V 5%			
E7	99.5114	zener 5,6 V 5%			
E8	99.5114	zener 5,6 V 5%			
ReA	58.5061	relay 24V V23154-DO556 -B110			



udars of
KDM/LF
11.9.70
kontrol of
KEM
tjrh diagr

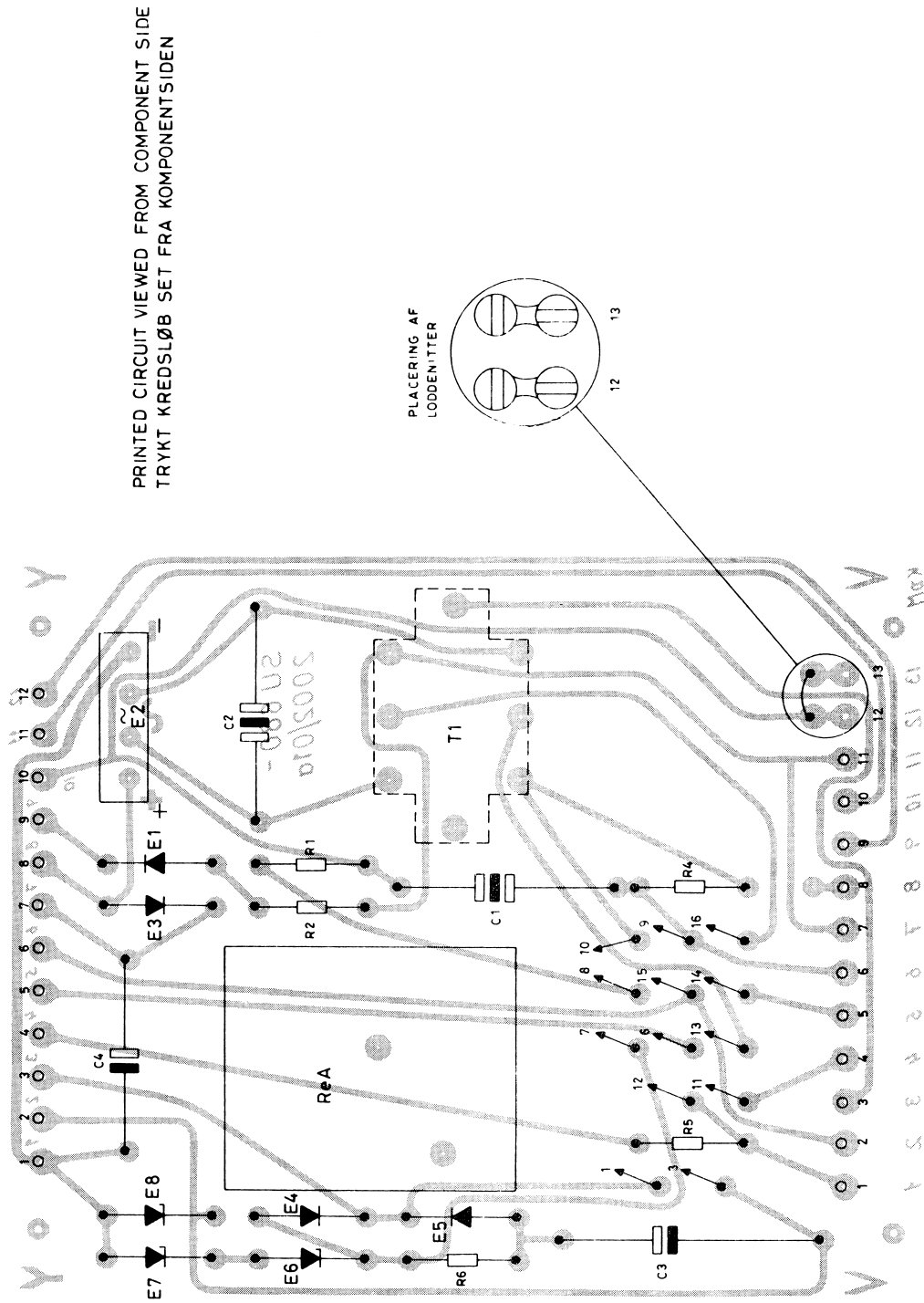
Part list

Stykliste

SU680-2002/01

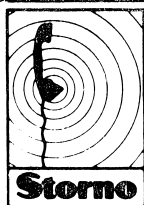
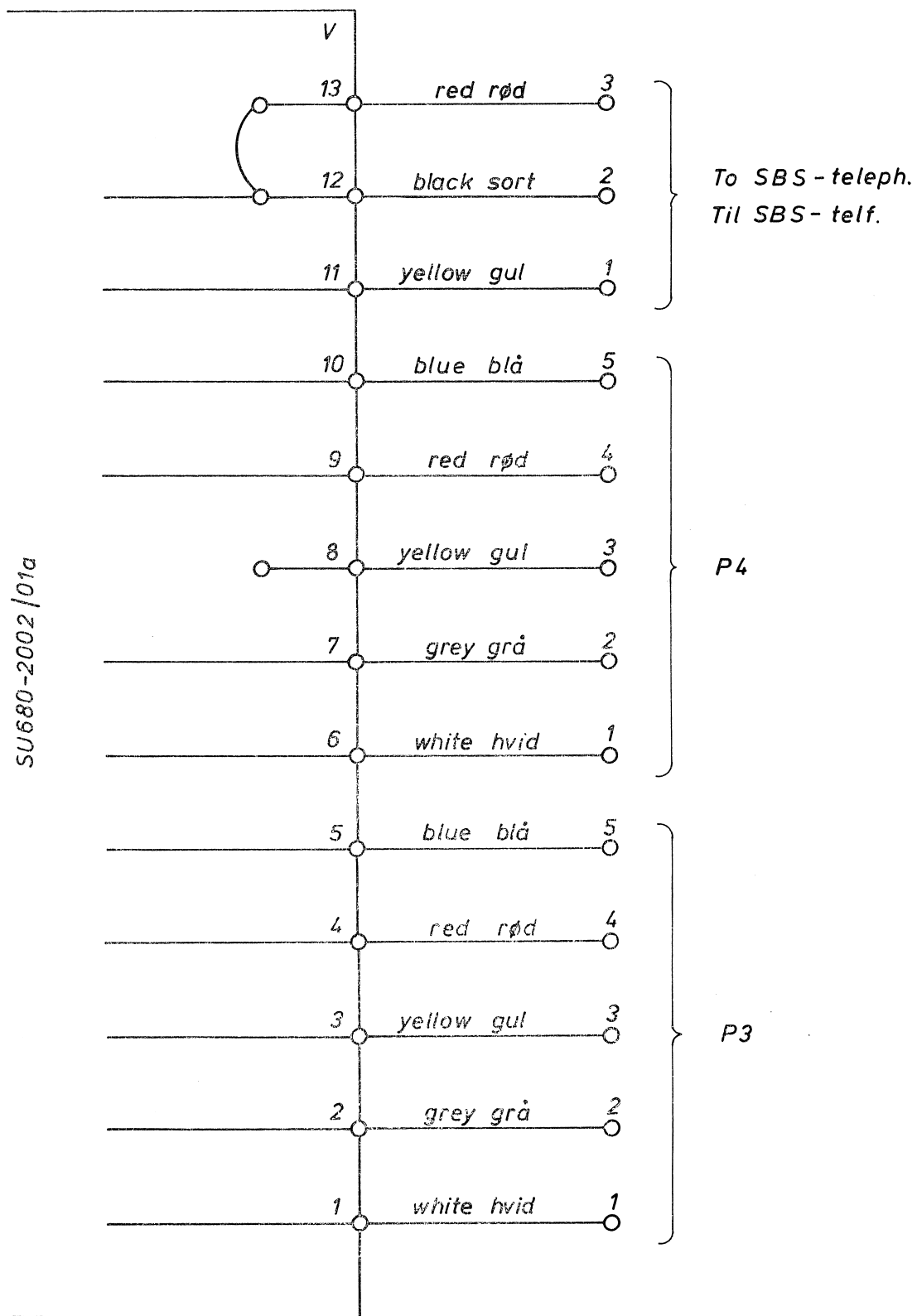
comp list
X115045
diag no

of



THROUGH CONNECTION BOX
GENNEMSTILLINGSBOX

SU680-2002/01a



konstr./tegn.
KDM/KF
3.2.71
godk.
KET7
komp.liste

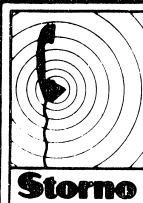
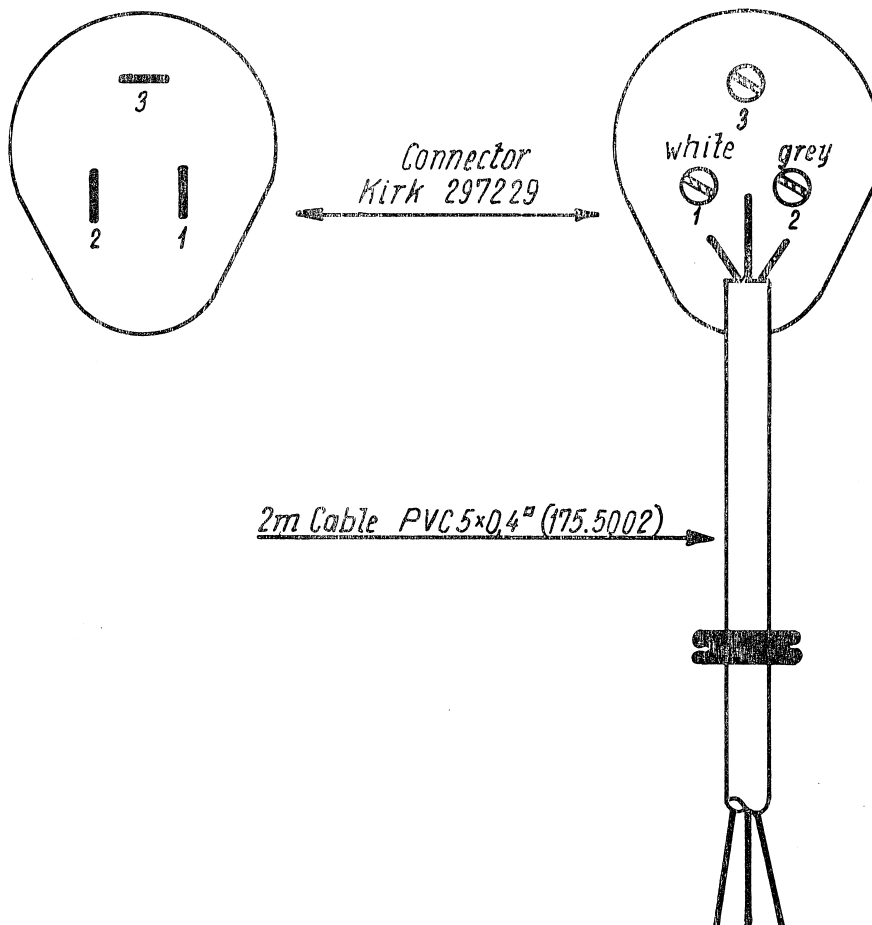
KABELOVERSIGT TIL SU680 2002/01a

KODE

TEGN.NR.

I 116005

A 4



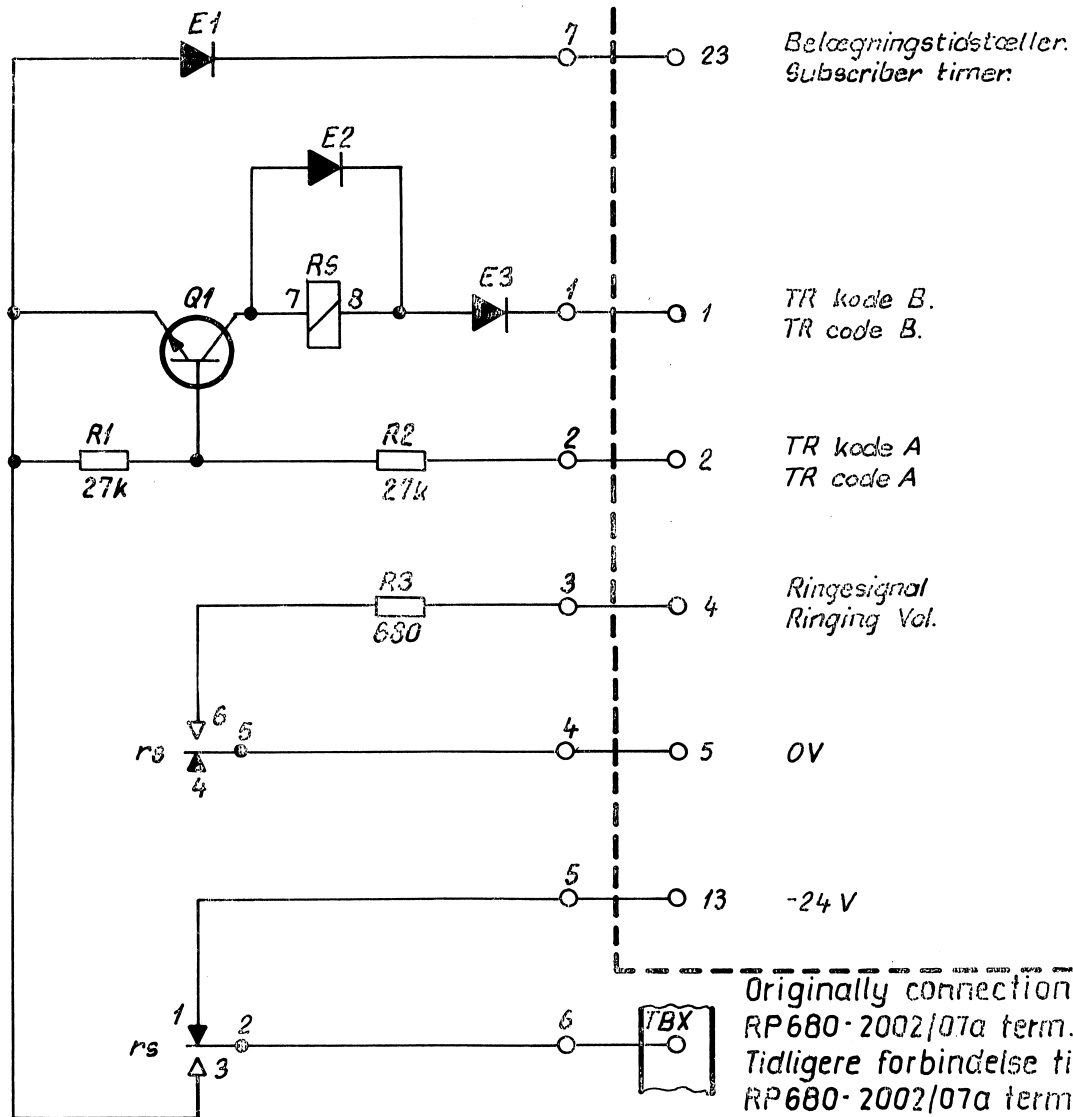
konstr./tegn.
KDM
29.12.70
godk.
KEM
komp.liste

MONTERING AF 3POLET TELEFONSTIK
SU 680-2002/0/a

KODE

TEGN. NR.
I 115853
A 4

ABONNENT KREDS
SUBSCRIBER PANEL
RP 680-2002/07a



konstr./tegn.
NN/SL
24.8.70
godk.

komp.liste
X114663
1114662

RINGING STOP PANEL
RINGESTOPPANEL
For/Til: SL 680-2002 RP 680-2002/10

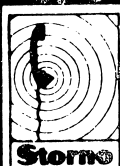
KODE

TEGN. NR.

D115057

A 4

no	code	data	no	code	data
R1	80.5266	27k Ω 5% carbon film 1/8W			
R2	80.5266	27k Ω 5% carbon film 1/8W			
R3	80.5247	680 Ω 5% carbon film 1/8W			
E1	99.5028	Diode 1N914			
E2	99.5020	Diode 1N4004			
E3	99.5028	Diode 1N914			
Q1	99.5121	Trans. BC107			
ReRS		Relay 850 Ω 24 V ITT PZ-2 type A2425			

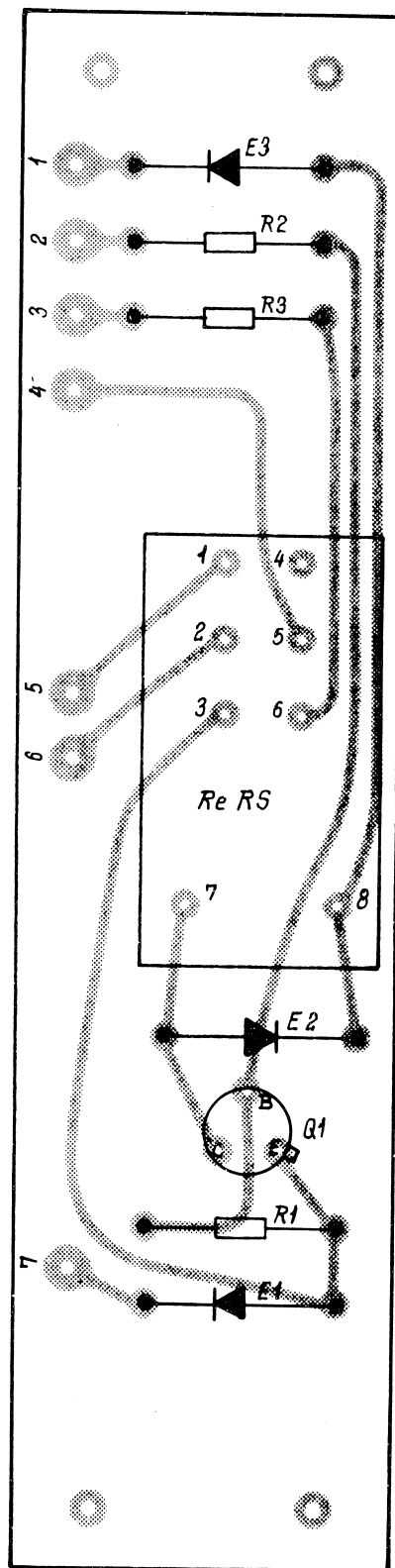


udarb of
 KEM/HN
 8.10.70
 kontrol of
 KEM
 Třih diagr
 1114662

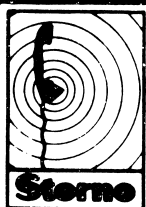
Part list
 Stykliste

RP680-2002/10

komp list
 X114663
 blad no 1 of 1



Printed circuit viewed from component side.
Trykt kredsløb set fra komponentsiden.



konstr./tegn.
KEM/KG
1.6.70
godk.
KEM
komp.liste
X114663

Placerings-tegning RP680-2002/10
PRINTED CIRCUIT LAY-OUT

KODE

TEGN. NR.
I114662

A4

SECTION 5

AF-Amplifier AA6811

Description.

AF-amplifier type AA6811 is designed for use with one or more tone receivers type TR6811.

Type AA6811 is a 3-stage amplifier, the two first stages of which are DC-coupled and serve to compensate for the de-emphasis in a conventional receiver (phase modulation). These stages also limit the amplitude of signals fed to TR6811 to a value of not more than 7dB above the normal trigger level.

Frequency compensation is accomplished through negative feedback in the stages. C2 emphasizes frequencies on the RC-principle with $f_0 = 1$ kHz. C3 and R3 reduce amplification of frequencies above the operating range of the tone receiver.

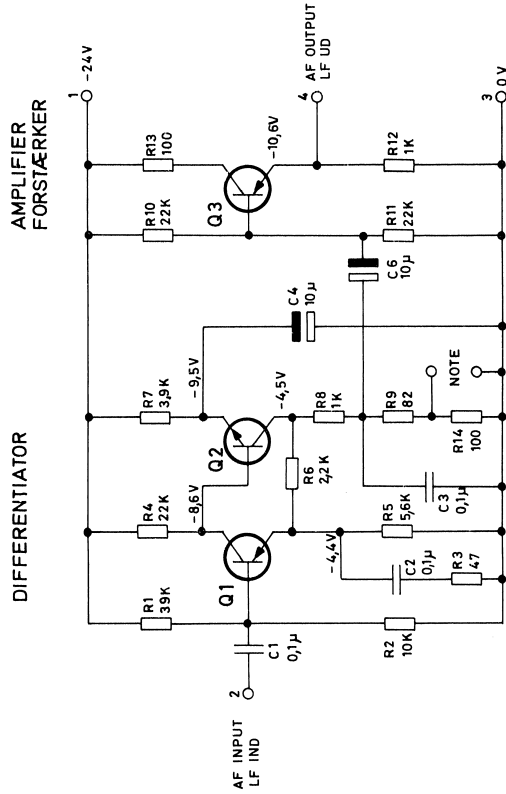
The amplitude is limited in Q2, and a tapping on the collector resistor provides a suitable output level. The magnitude of this level will depend upon the type of the following receiver, whether it is designed for single-tone or double-tone handling. When single-tone handling is chosen, R14 shall be strapped.

The 3rd stage is an emitter follower, which provides the low output impedance of approx. 4Ω , which is required to match the coil filter in the input of the tone receiver.

AA6811
Specification.

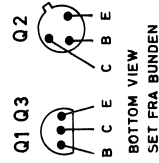
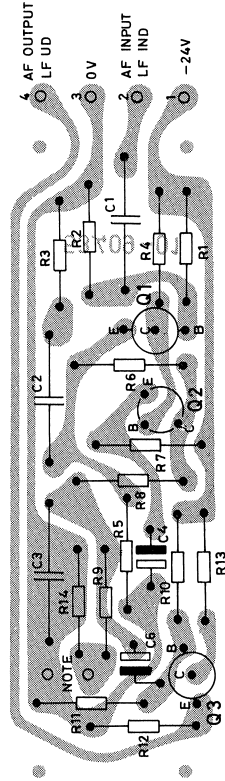
Typical values at 24V

- | | |
|--|----------------|
| 1. <u>Input impedance:</u> | 6k Ω . |
| 2. <u>Output impedance:</u> | 4 Ω . |
| 3. <u>Frequency response</u> | |
| Amplification increases with frequency within the range 1000-3000Hz according to a RC-function with a transition frequency about 1000Hz. | |
| 4. <u>Gain at 1000Hz</u> | |
| With strapping (single tone) | -18dB. |
| Without strapping (multi-tone) | -11dB. |
| 5. <u>Max. output voltage:</u> | 345mV. |
| 6. <u>Max output power:</u> | 30mW. |
| 7. <u>Current drain:</u> | 17mA. |
| 8. <u>Temperature range</u> | |
| Working range: | -25° to +50°C. |
| Operating range: | -30° to +60°C. |
| 9. <u>Dimensions:</u> | 80 x 24mm. |



NOTE: WHEN RECEIVING 1 TONE R14 IS SHORT-CIRCUITED
VED MODTAGNING AF 1 TONE STRÆPPES R14

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



AF-AMPLIFIER
LF-FORSTÆRKER

AA6811

D400.867/2

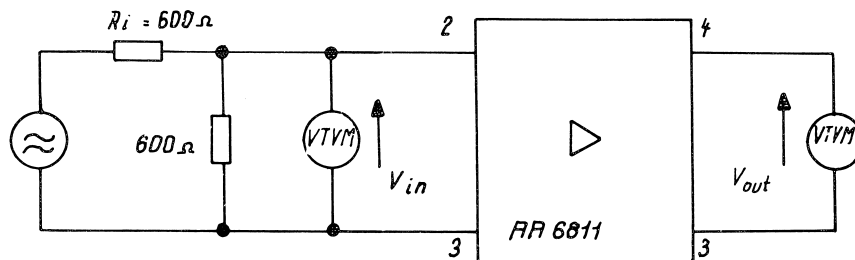
AA6811

Test Instructions.

1 Instruments required

- 1 ea power supply unit 24V (25mA).
- 1 ea VT-voltmeter (PH-6012).
- 1 ea tone generator (iIP-200cd).
- 1 ea resistor 600Ω , 1/8W

2. Test Set-up



3. Measurements and Test.

3.1 Testing of amplification (single-tone).

Strap R14 and adjust V_{in} at 1000Hz to 550mV. Measure V_{out} , and remove strapping over R14.

Requirement: $V_{out} = 75mV \pm 1dB$.

3.2 Testing of amplification (multi-tone)

Adjust V_{in} at 1000Hz to 550mV. Measure V_{out} .

Requirement: $V_{out} = 165mV \pm 1dB$

3.3 Testing of frequency response (single-tone).

Strap R14 and adjust V_{in} to 70mV. On the amplifier output measure the deviation relative to 1000Hz in the range up to 3000Hz.

Requirement: See enclosed graph paper I.

3.4 Testing of frequency response (multi-tone).

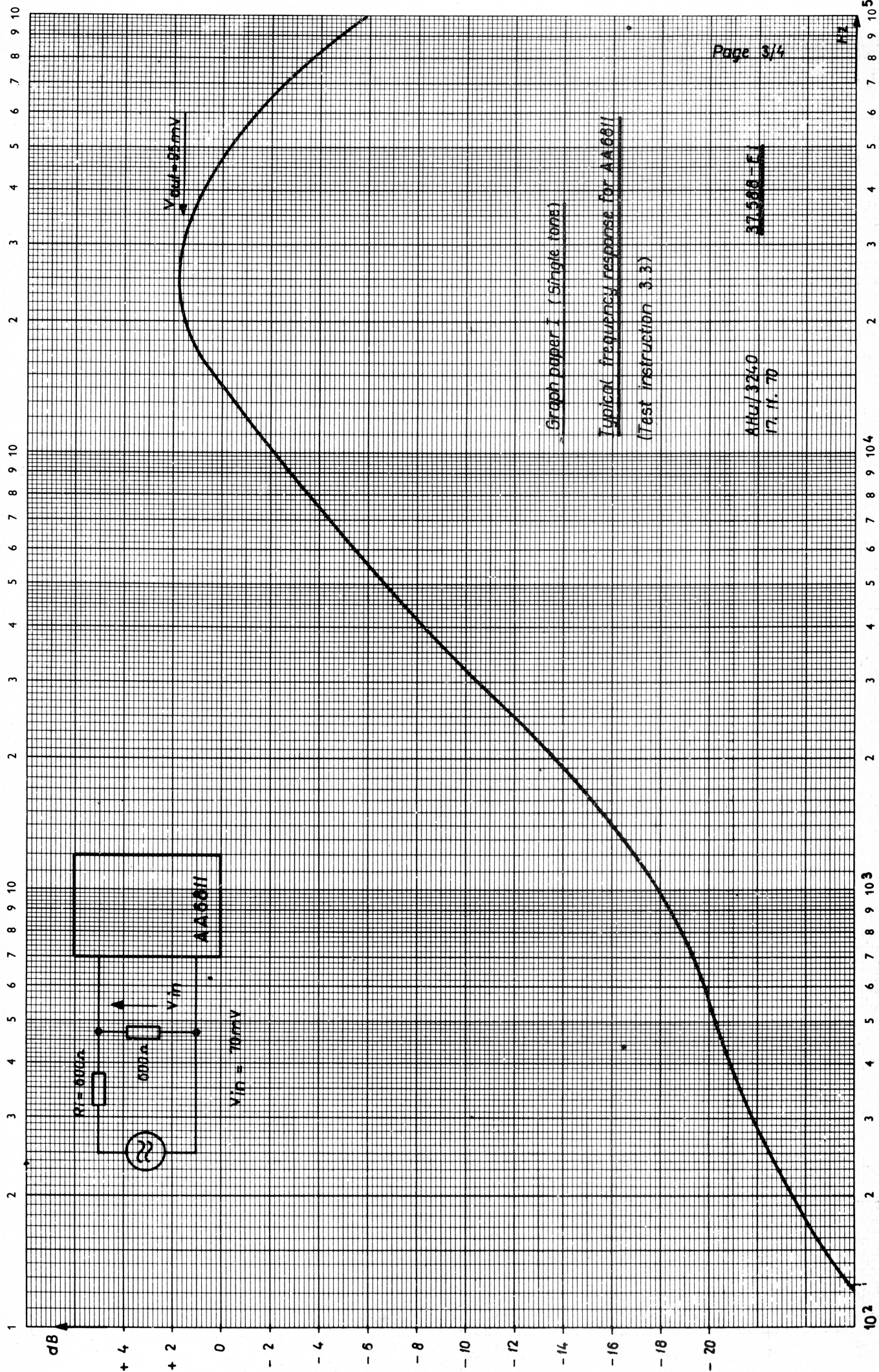
Remove strapping across R14 and adjust V_{in} to read 85mV. On the amplifier output measure the deviation relative to 1000Hz within the range 1000 to 3000Hz.

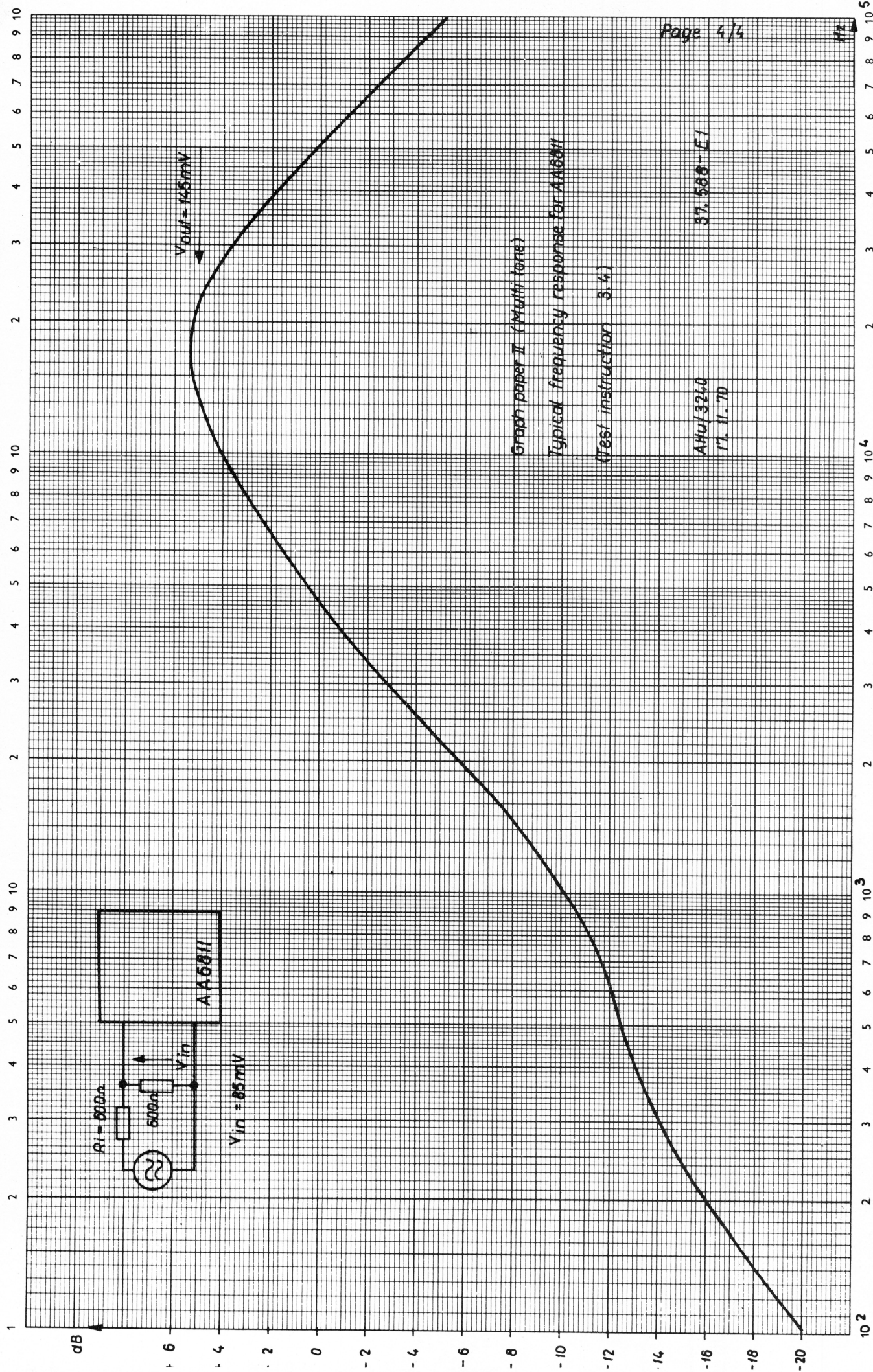
Requirement: See enclosed graph paper II.

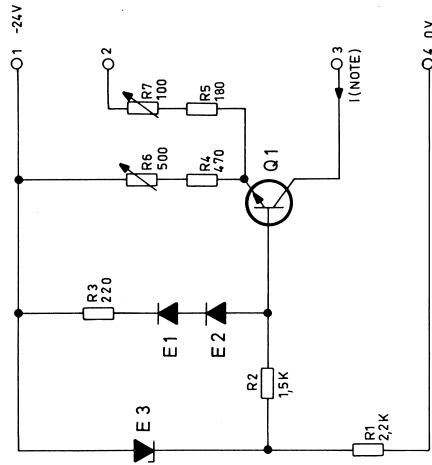
3.5 Check of current drain.

Measure current consumption at -24V.

Requirement: 17mA \pm 1,5mA.







Transistor BF110

NOTE.

I₁ (term. 1 not connected to term. 2).

I = 1, 8 mA +0/-10%.

I₂ (term. 1 connected to term. 2).

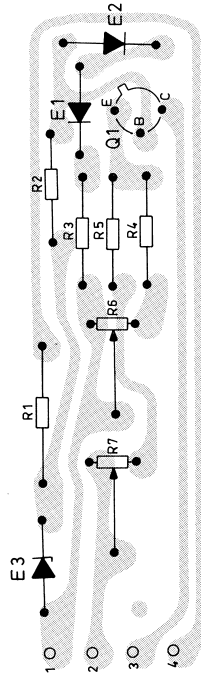
I = 7 mA +0/-10%.

I₁ (term. 1 ikke forbundet med term. 2).

I = 1, 8 mA +0/-10%.

I₂ (term. 1 forbundet til term. 2).

I = 7 mA +0/-10%.



CONSTANT-CURRENT REGULATOR
KONSTANTSTRØMHOLDER

CR681

Delay unit DU680-2002/1.

1. General

DU680-2002/1 is an electronic DU where the time delay is adjustable. The unit consists of several stages which are activated by 3 different "Start" terminals and can be reset by a quick acting "stop" terminal. The delay is started respectively stopped by the connection of 0V for a minimum of 10ms to the following terminals: Terminal "start 2": 0V on term. 5 causes an immediate 0V signal on the output term. 2. The output signal remains 0V and the term. 5 is inactive during the delay period.

Terminal "start 3": 0V on term. 6 causes an immediate 0V signal on the output term. 2. The delay period, however, begins only when the 0V signal on term. 6 is removed.

If term. 6 is activated again during the delay period, the delay period is zero-set. When the 0V signal on term. 6 is removed the delay period begins again.

Terminal "start 1": Input term. 7 is connected to a timing circuit which causes a delay in the activation of the output from the delay circuit. The delay in the 0V output signal from term. 2 is nominal 50ms (40-75ms).

Terminal "stop": 0V on term. 3 for min. 10ms will stop the delay function and thus the output function.

2. Data.

Supply voltage:	-24V $\pm 5\%$.
Current consumption: standby	22mA.
activated	32mA.
Output function, 0V:	max. load 100mA.
Time delay: nom.	15sec. ± 7 sec.
adjustm. toler	± 2 sec.
Temperature range:	operating -30 to +60°C.
Mechanical dimensions:	40 x 80mm.
Change in delay time:	Consult diagram D110520.
Note. When DU680-2002/1 is used in TE680-2003 potentiometer R ₁₄ is changed from 50k Ω to 250k Ω (Storno code:86.5056)	

3. Theory of operation:

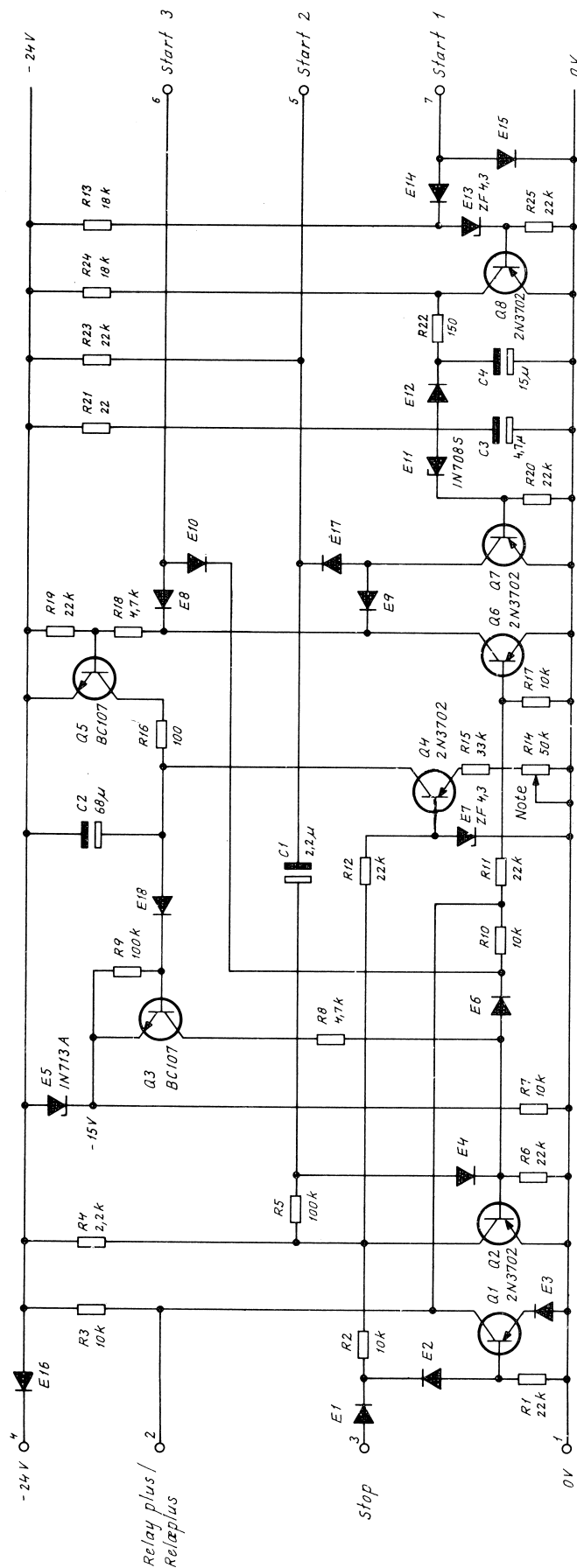
The transistors Q_1 and Q_2 form a bistable stage. Due to the diode E_3 , Q_2 is ON and Q_1 is OFF after connection to the supply voltage.

When one of the input terminals have been activated Q_1 switches ON and Q_2 switches OFF. Q_4 being a part of a constant current generator, receives its base voltage from Q_2 and its collector current charges C_2 linearly as regards time.

After expiration of the delay time, adjusted by means of R_{14} , C_2 is charged to a threshold voltage equal to the sum of the voltage across the zener diode E_5 (9,1V), V_{BE} from Q_3 and the voltage across E_{18} . Now Q_3 begins to conduct.

The collector current from Q_3 is fed to the base of Q_2 through R_8 . Q_2 conducts and Q_1 is blocked. A relay connected to term. 2 would be deenergized. The voltage on Q_1 's collector causes Q_6 and Q_5 to conduct. Q_5 discharges C_2 through R_{16} . Now the unit can be activated again.

If the delay unit is activated from term. 7 (start 1), transistor Q_8 is blocked. The capacitor C_4 is charged through R_{22} and R_{24} . When the voltage across C_4 reaches app. 8V, Q_7 starts conducting. In this manner the actual timing circuit is activated with a time delay of app. 50ms. Q_5 is kept conducting by a supply of 0V through Q_7 and E_9 in a manner not charging C_2 by the current from Q_4 . The charging of C_2 begins only when the start activation has ceased. When Q_8 switches ON, C_4 is decharged through R_{22} . In case of a repeated activation, C_2 is discharged after 50ms in a manner providing the timing period to begin again when the activation has ceased.



Delay time T_D adjusted to
 Forsinkelsestiden T_D justeres til 15 sek. \pm 2 sek. med R14
 $T_D \approx 15 \text{ sec.} \pm 7 \text{ sec.}$
 $T_D \approx 0-14 \text{ sec.}$ (R15 = 220 Ω)
 $T_D \approx 8-70 \text{ sec.}$ (R14 = 250 k Ω)
 All diodes / alle dioder : 111914



Konstr. tegning
 08 / JWA
 3. 1. 67
 godk.
 KOMP. liste
 X110521

DELAY - UNIT
 TIDSFORSINKELSESENHED

DU 680 - 2002 / 1

KODE

TEGN. NR.
 D110520
 A3

no	code	data	no	code	data
C1	73.5102	2,2 μ F 20% tantal 35 V	E13	99.5116	Zenerdiode 4,3 V
C2	73.5106	68 μ F 20% tantal 15V	E14-18	99.5228	Diode 1N914
C3	73.5126	4,7 μ F 20% tantal 35V	Q1-2	99.5144	Transistor BC214L
C4	73.5105	15 μ F 20% tantal 15V	Q3	99.5121	- BC107
R1	80.5265	22k Ω 5% 1/8 W	Q4	99.5144	- BC214 L
R2	80.5261	10k Ω 5% 1/8W	Q5	99.5121	- BC107
R3	80.5261	10k Ω 5% 1/8W	Q6-8	99.5144	- BC214 L
R4	80.5253	2,2k Ω - -			
R5	80.5273	100k Ω - -			
R6	80.5265	22k Ω - -			
R7	80.5261	10k Ω - -			
R8	80.5257	4,7k Ω - -			
R9	80.5273	100k Ω - -			
R10	80.5261	10k Ω - -			
R11	80.5265	22k Ω - -			
R12	80.5265	- - -			
R13	80.5264	18k - -			
R14	86.5040	50k Ω pot. lin. 0,1W			
R15	80.5267	33k Ω 5% 1/8W			
R16	80.5237	100 Ω - -			
R17	80.5261	10k Ω - -			
R18	80.5257	4,7k Ω - -			
R19	80.5265	22k Ω - -			
R20	80.5265	22k Ω - -			
R21	80.5229	22 Ω - -			
R22	80.5239	150 Ω - -			
R23	80.5265	22k Ω - -			
R24	80.5264	18k Ω - -			
R25	80.5265	22k Ω - -			
E14	99.5028	Diode 1N914			
E5	99.5042	Zenerdiode 9,1V			
E6	99.5028	Diode 1N914			
E7	99.5116	Zenerdiode 4,3V			
E8-10	99.5228	Diode 1N914			
E11	99.5114	Zenerdiode 5,6V			
E12	99.5228	Diode 1N914			



udarb of
OG/HNI
3.1.68
kontrol
D110520

Parts list
Stykliste

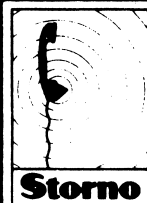
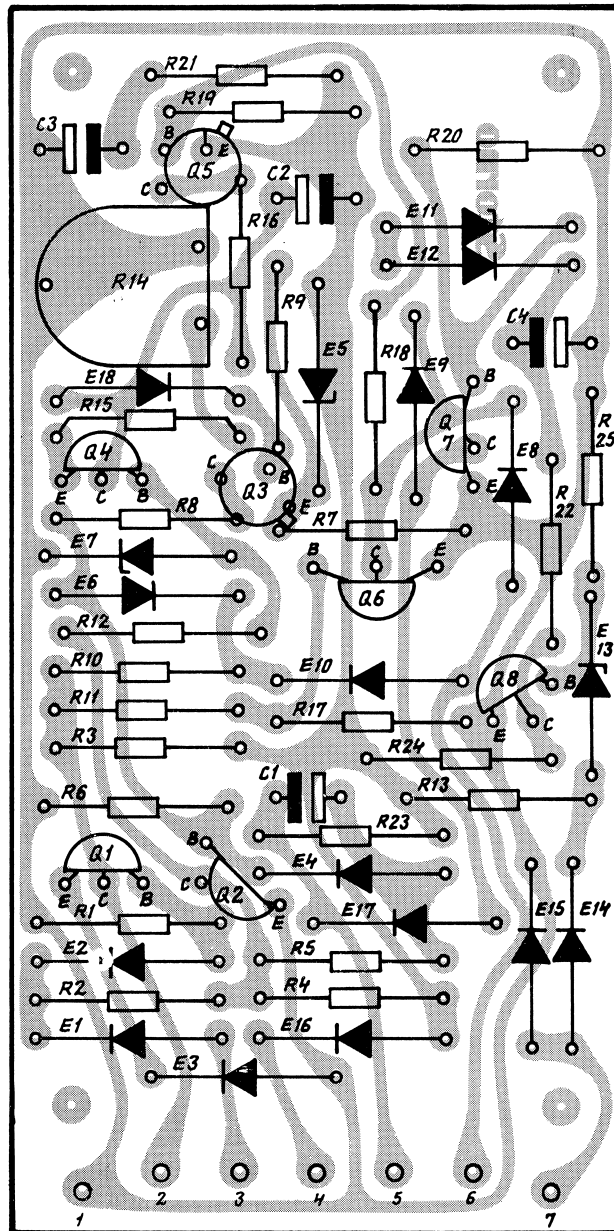
DU680-2002/1

comp list

X110521

blad no of

PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



konstr./tegn.
OG / JWA
17.9.69
godk.
OG
komp.liste
X110521
D110520

DELAY - UNIT
TIDSFORSINKELSESENHED

DU680 - 2002 / 1
KODE

TEGN. NR.

D113509

A 4



konstr./tegn.
T.F./BO
29-12-67
godk.
MB
komp.liste
X 110519

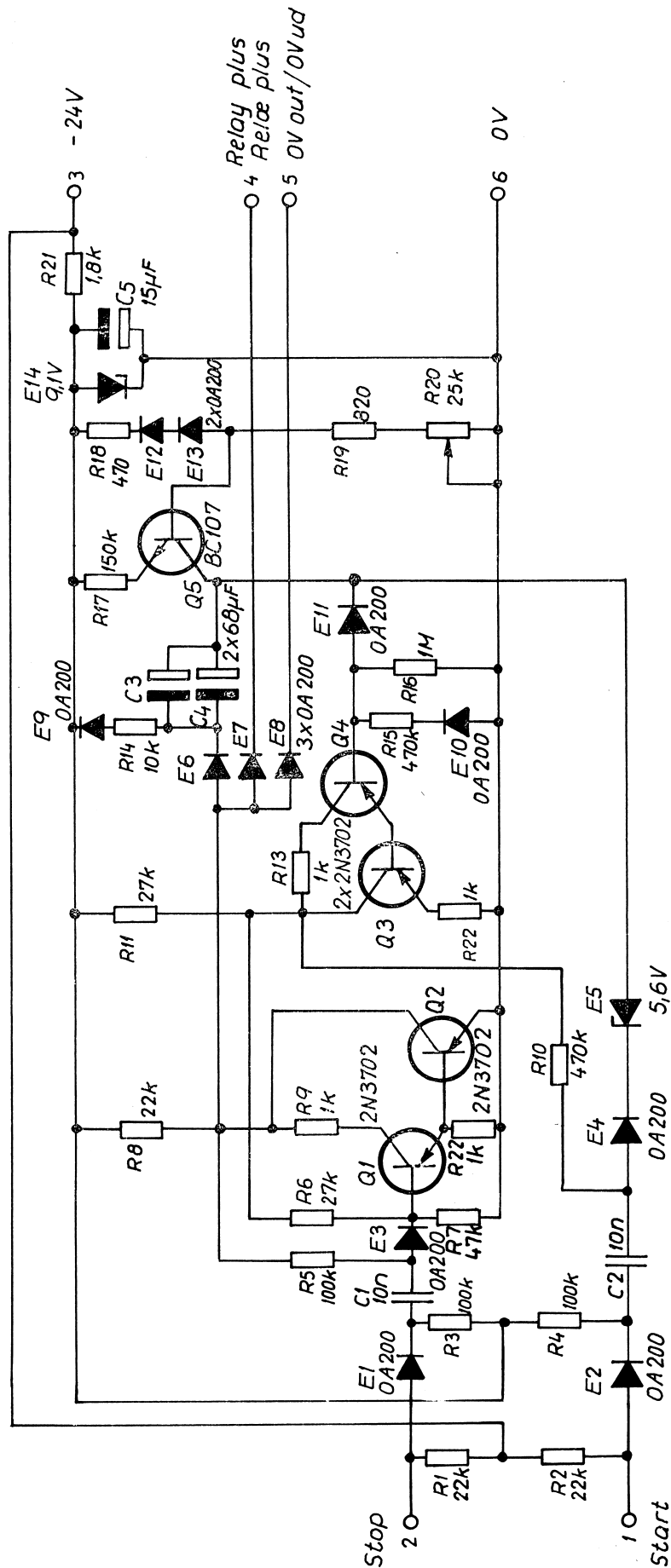
DELAY UNIT TIDSFORSINKELSESENHED DU680-2002/2a

KODE

TEGN. NR.

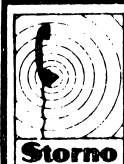
D 110518

A 4



ref. let 28-5-70

no	code	data	no	code	data
R1	80.5265	22k 1/8W 5%	E12	99.5028	OA200, diode
R2	80.5265	22k - -	E13	-	- -
R3	80.5273	100k - -	E14	99.5042	9,1V, zenerdiode
R4	-	100k - -	Q1	99.5144	2N3702, transistor
R5	-	100k - -	Q2	-	- -
R6	80.5266	27k - -	Q3	-	- -
R7	80.5269	47k - -	Q4	-	- -
R8	80.5265	22k - -	Q5	99.5121	BC107 -
R9	80.5249	1k - -			
R10	80.5281	470k - -			
R11	80.5266	27k - -			
R12	80.5249	1k - -			
R13	-	1k - -			
R14	80.5261	10k - -			
R15	80.5281	470k - -			
R16	80.5285	1MΩ - -			
R17	80.5275	150k - -			
R18	80.5245	470Ω - -			
R19	80.5284	820Ω - -			
R20	86.5044	25k pot. 0,1W			
R21	80.5452	1,8k 1/4W 5%			
R22	80.5249	1k 1/8W 5%			
C1	76.5070	10nF 10% polyest. 50V			
C2	-	10nF 10% polyest. 50V			
C3	73.5106	68μF 20% tantal 15V			
C4	-	- - - -			
C5	73.5105	15μF - - -			
E1	99.5028	OA200, diode			
E2	-	- -			
E3	-	- -			
E4	-	- -			
E5	99.5114	5,6V, zenerdiode			
E6	99.5028	OA200, diode			
E7	-	- -			
E8	-	- -			
E9	-	- -			
E10	-	- -			
E11	-	- -			



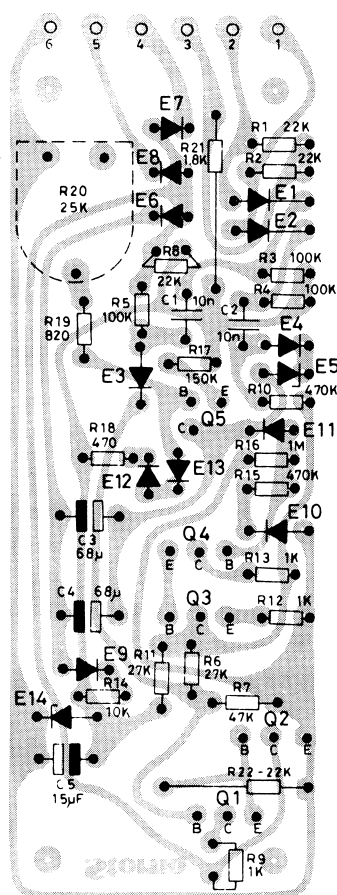
udarb of
OG/INI
3.1.68
kontrol of
MB
tith diag
D110518

PART LIST
STYKLISTE

DU 680-2002 '2a

Comp list
X110519

diag no of

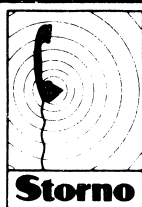
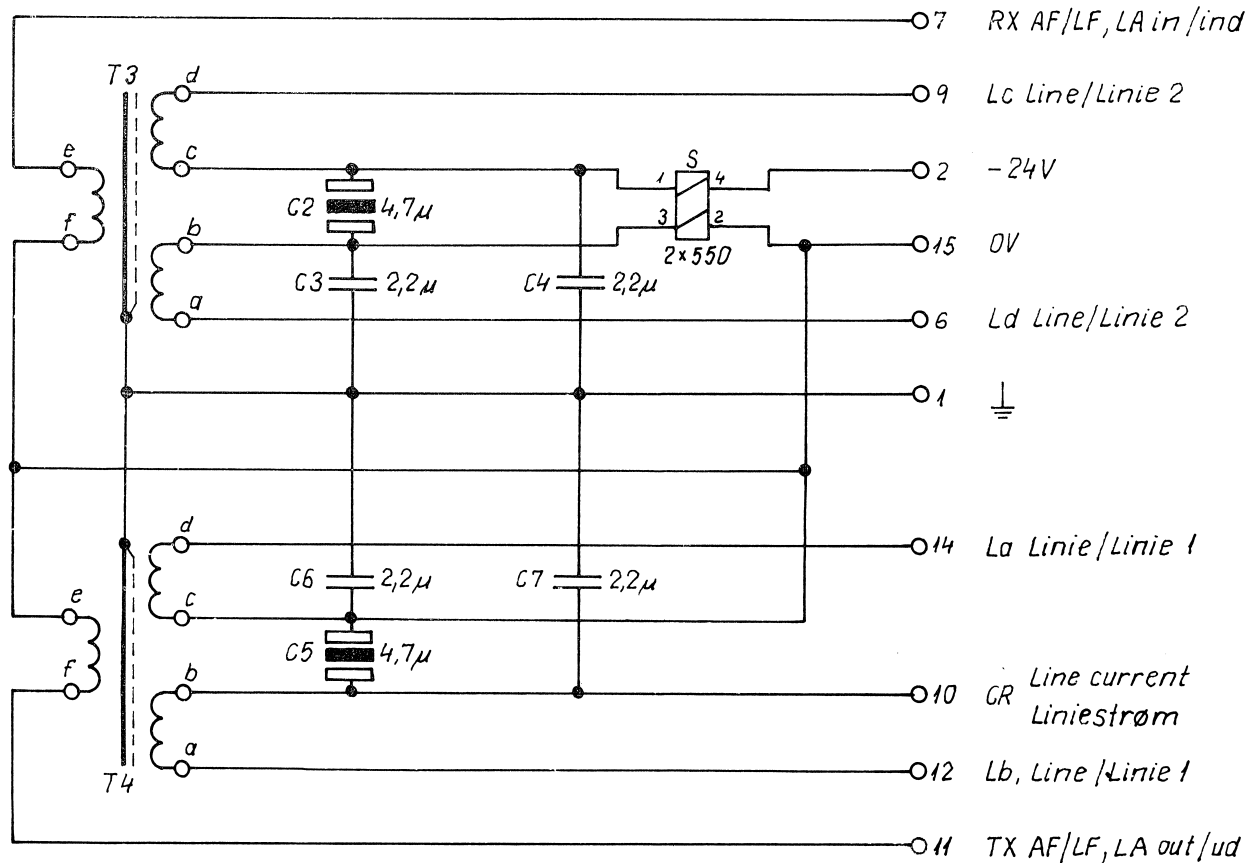
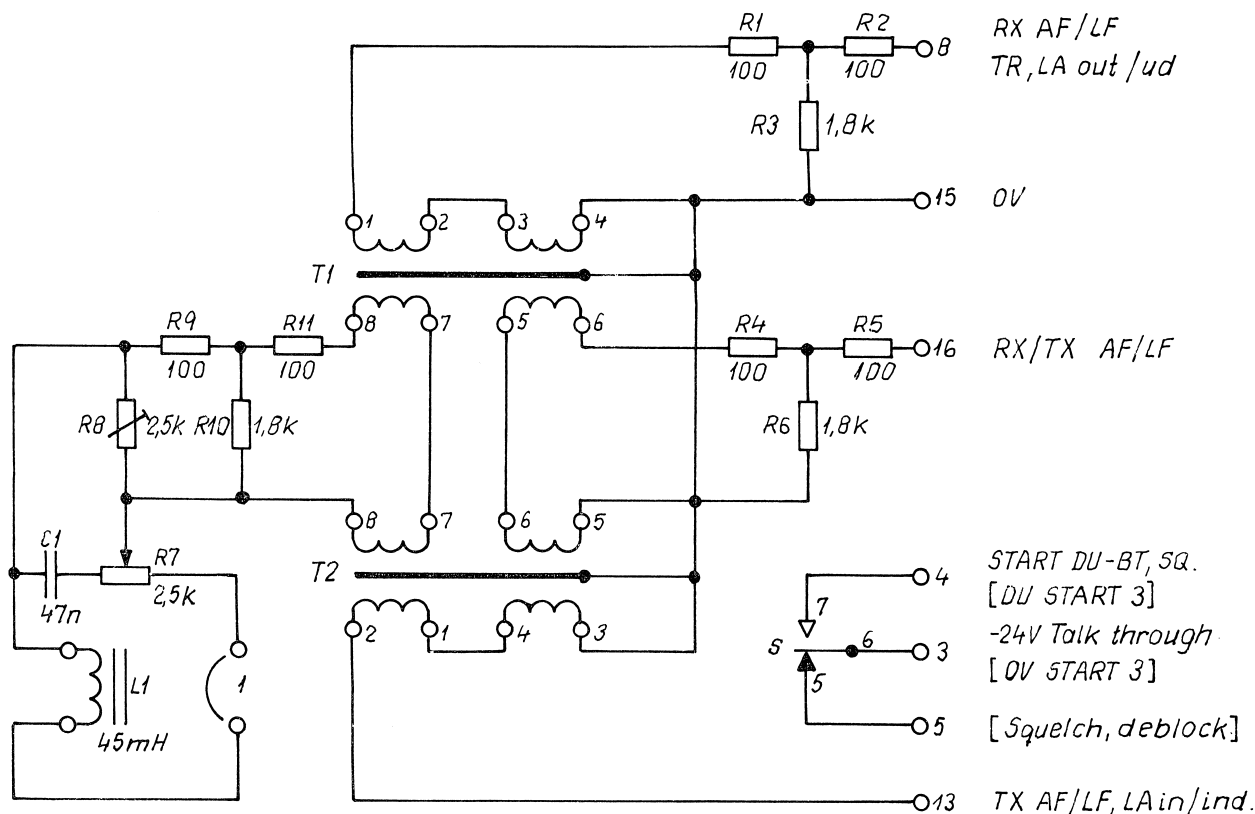


PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

DELAY UNIT
TIDSFORSINKELSESENHED

DU680-2002/2a

D110.968



konstr./tegn.
 OG/AMM
 23.10.69.
 godk.
 OG
 komp.liste
 X113730

HYBRID-AND LINE CIRCUIT
 GAFFEL - OG LINIEKREDS
 HU 680-2003

KODE

TEGN NR.

D113709

A 4

no	code	data	no	code	data
C1	76.5072	47nF 10% polyest. 50V	T3	60.5097	Transformer, AF 150/150/600Ω
C2	73.5007	4,7μF -10+100% elko 100V (Bi-pol)	T4	60.5097	Transformer, AF 150/150/600Ω
C3	76.5081	2,2μF 5% polyest. FL63V			
C4	76.5081	2,2μF 5% polyest. FL63V			
C5	73.5007	4,7μF -10+100% elko 100V (Bi-pol)			
C6	76.5081	2,2μF 5%polyest. FL63V			
C7	76.5081	2,2μF 5% polyest. FL63V			
R1	80.5237	100Ω 5% carbon film 1/8W			
R2	80.5237	100Ω 5% carbon film 1/8W			
R3	80.5252	1,8kΩ 5% carbon film 1/8W			
R4	80.5237	100 Ω 5% carbon film 1/8W			
R5	80.5237	100 Ω 5% carbon film 1/8W			
R6	80.5252	1,8kΩ 5% carbon film 1/8W			
R7	86.5043	2,5kΩ 20% trim. car- bon film 1/10W			
R8	86.5043	2,5kΩ 20% trim. car- bon film 1/10W			
R9	80.5237	100Ω 5% carbon film 1/8W			
R10	80.5252	1,8kΩ 4% carbon film 1/8W			
R11	80.5237	100Ω 5% carbon film 1/8W			
L1	60.5144	Coil with iron core 0mAdc 45mH			
ReS	58.5060	Relay 24V 2x550Ω 21- 21			
T1	60.5106	Transformer, AF 150/150/300/300Ω			
T2	60.5106	Transformer, AF 150/150/300/300Ω			



CC/LF
13.10.70
kontrol at
till diagr

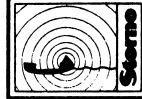
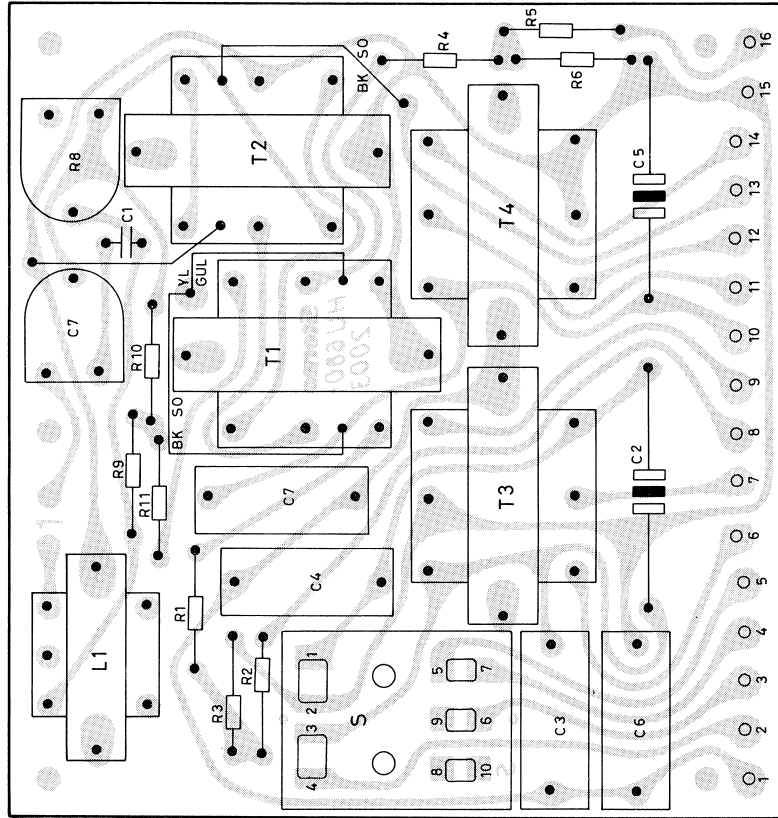
Parts list

Stykliste

HU680-2003

comp list
X113730
blad no 1 of 1

PRINTED CIRCUIT SEEN FROM PRINT SIDE
TRYKT KREDSLØB SET FRA PRINTSIDEN



Konst. Høy.
16 / 10. 89
28. 10. 89
gode. 05
Kont. Høy.
16 / 10. 89
28. 10. 89
gode. 05

HYBRID - AND LINE - CIRCUIT
GAFFEL - OG LINIEKREDS
HU 680 - 2003

KODE

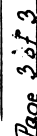
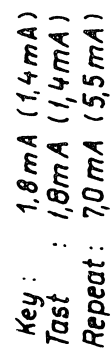
TEGN. NR.
D113734
A 3

CP680-2003 and HU680-2003

Test procedure.

1. The test set-up shown is used.
2. By means of the shown external decade resistance box adjust the line current to 1,4mA. A second decade resistance box is connected to DA680-6232/02 as R41. Adjust "R41" until lamp V1 "Key" is illuminated. Replace "R41" with nearest std. resistor. Interchange lines A and B and repeat the adjustment for R19.
3. Adjust the line current to 5,5mA and insert the second decade resistance box as R28 in DA680-6232/02. Adjust "R28" until relay R is energized. Replace "R28" with nearest std. value resistor.
4. Check the functions described in 2 and 3 with 1,8 and 7,0mA line current.
5. Without line current connect 0V to term. S on connector P2 (corresponding to term. 1 on DA681) . Relay S on RP680-2003/04 as well as relay S on HU680-2003 must operate.
6. Adjust for 7,0mA line current in line 1. Lamp V1 must illuminate.
7. Remove 0V from terminal S (on P2). Both S relays must be released and relay R must operate.
8. Connect 0V again to terminal S. Both S relays must be energized and relay R must stay energized.
9. Without line current connect a tone generator (level= 0dBm, f = 1kHz), to term. A and E on P2. Check levels to be in accordance with those shown on the level plan.
10. Connect a VTVM to term. 11 and 15 on the HU-unit. Adjust the hybrid balance potentiometers R₇ and R_g for minimum deflection on the VTVM app. -50dBm.
11. Adjust for 7,0mA line current in line 1 and connect a VTVM to term. B and E on P2. Connect 0V to term S. Relay S on the RP/04 will operate and the VTVM must show app. -20dBm.
12. Without line current, connect tone generator with 0dBm output to term. 16 and 15 on the HU-unit. Check the following levels: app. -6,5 dBm between term. 11 and 15 on the HU-unit, app. -10dBm between term. 9

- and 6 on the RP/04 unit and -20dBm between terminals B and E on P2.
13. Connect 0V to term. S on P2. Relay S will operate and output level between term. B and E on P2 must not change. (Tone generator connected as in 12).



Line Amplifier LA681

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

Attenuator

Equalizer

Amplifier stage

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

Mode of Operation

Attenuator

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

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

Equalizer

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

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

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

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

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

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

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

Amplifier

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

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

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

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

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

Data

Supply Voltage

24V \pm 5%.

Temperature Range

-30°C to +80°C.

Gain

Max. 28 dB \pm 1 dB.

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

Harmonic Distortion

Less than 1%.

Crosstalk from Supply Voltage

Less than 30 dB from 300 to 3000 Hz.

Frequency Response

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

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

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

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

Input Impedance

600 ohms $\pm 20\%$.

Output Impedance

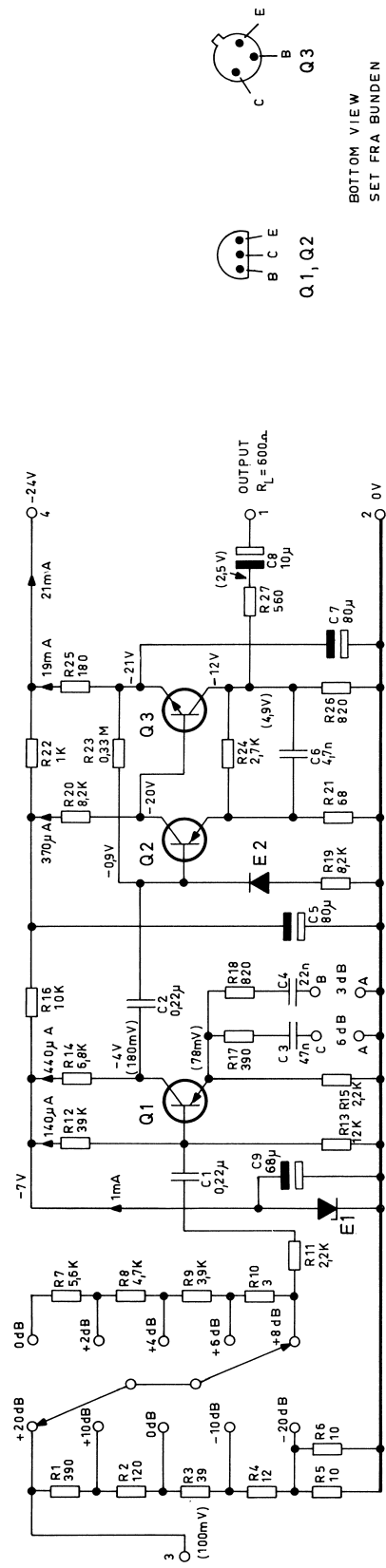
600 ohms $\pm 20\%$.

Output Voltage

Max. output voltage is 0 dBm with the amplifier terminated in 600 ohms in parallel with $0.5 \mu\text{F}$.

Dimensions

28 x 80 mm.



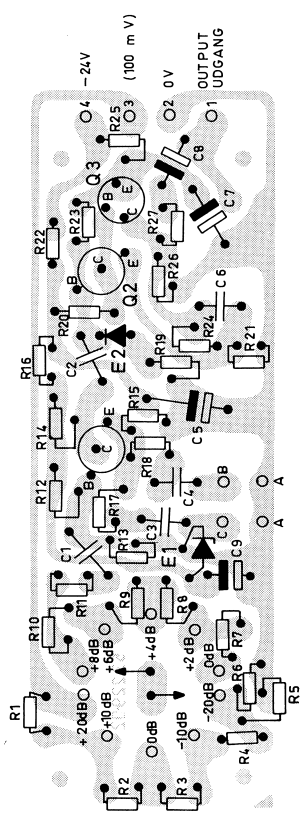
BOTTOM VIEW
SET FRA BUNDEN

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

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

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

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

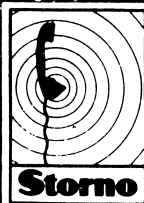


LINE AMPLIFIER LINIEFORSTÆRKER

PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

LA681

D400.767/2



konstr./tegn.
HJ/JAS
4.7.67
godk.
KAT
16.8.67.
komp.liste

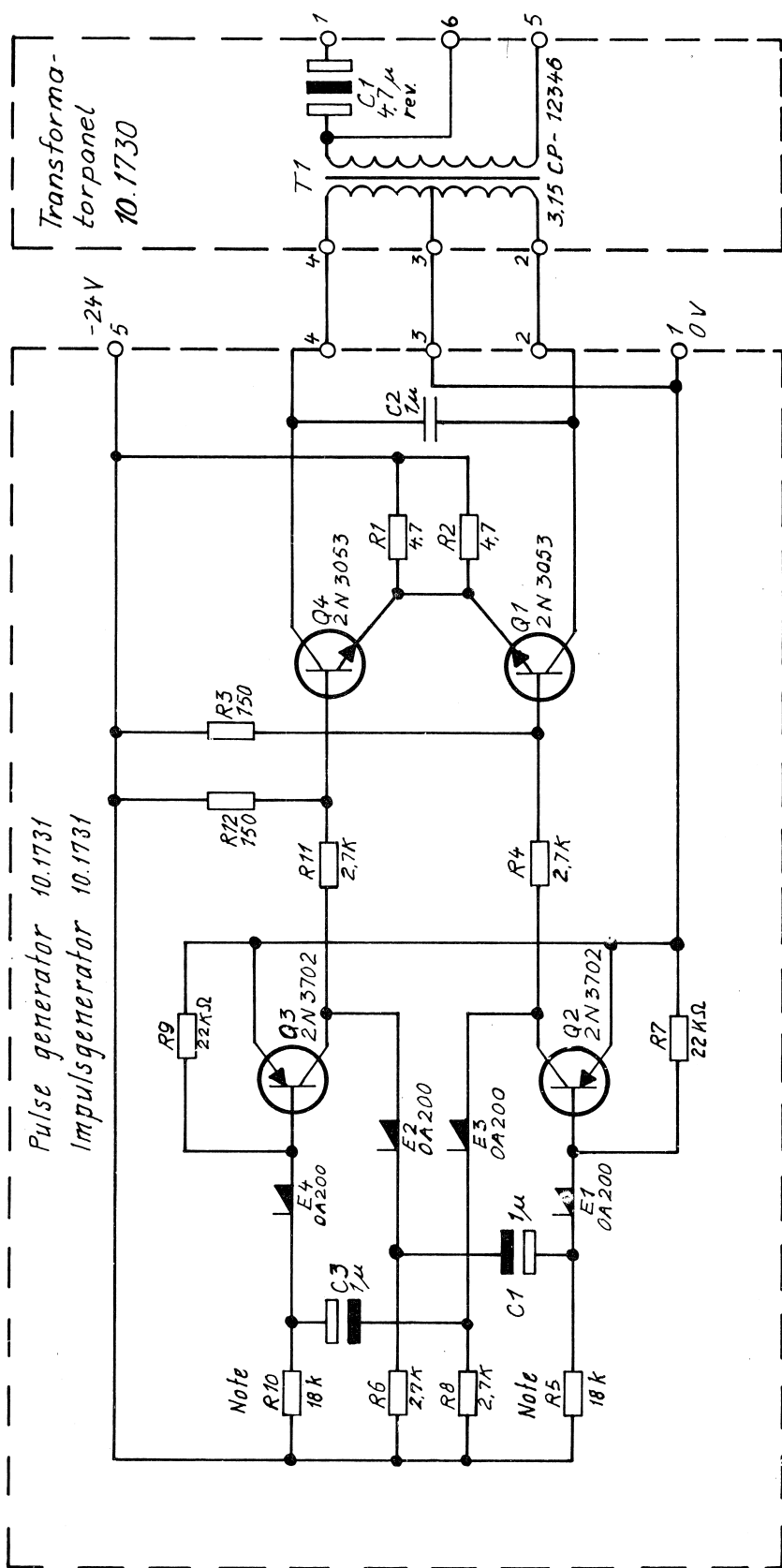
RINGING GENERATOR
Ringegenerator PG 681
(10.1732)

KODE

TEGN.NR.

D 109658

A4



Note :
Adjust R5 and R10 to a pulse frequency of 40 Hz \pm 20%
Juster R5 og R10 til en impulsfrekvens på 40 Hz \pm 20%

no	code	data	no	code	data
C1	73.5114	1 μ F 20% tantal 30V			
C2	76.5078	1 μ F 10% polyest TB100V			
C3	73.5114	1 μ F 20% tantal 30V			
C4	73.5007	5 μ F bipolar 100V			
E1	99.5028	diode 1N914 si			
E2	- " -	- " -			
E3	- " -	- " -			
E4	- " -	- " -			
Q1	99.5128	2N3053 transistor			
Q2	99.5144	2N3702 transistor			
Q3	99.5144	2N3702 transistor			
Q4	99.5128	2N3053 transistor			
R1	80.5221	4,7 Ω 5% kull. 1/8W			
R2	80.5221	4,7 Ω 5% kull. 1/8W			
R3	80.5239	150 Ω 5% kull. 1/8W			
R4	81.5054	2,7k 5% kull. 1/2W			
R5	80.5264	18k 5% kull. 1/8W			
R6	80.5254	2,7k 5% kull. 1/8W			
R7	80.5265	22k 5% kull. 1/8W			
R8	80.5254	2,7k 5% kull. 1/8W			
R9	80.5265	22k 5% kull. 1/8W			
R10	80.5264	18k 5% kull. 1/8W			
R11	81.5054	2,7k 5% kull. 1/2W			
R12	80.5239	150 Ω 5% kull. 1/8W			
T1	60.5143	impulstransformator			



udarb of
KJa/BHAN
12-2-69
kontrol of
MB
11h diag

Ringegenerator
Stykliste

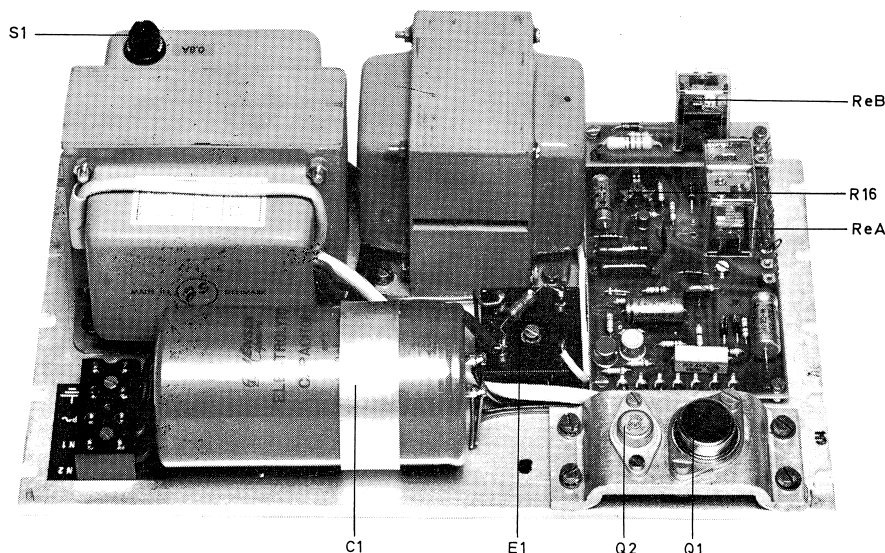
PC681

Comp list

X112555

of

Power Supply Unit PS603



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

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

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

Mode of Operation

Power Transformer

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

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

Rectifier and Filter

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

Series Regulator

The series regulator is composed of three transistors, a voltage amplifier Q3, a current amplifier Q2, and a series transistor Q1. The base of amplifier transistor Q3 receives, via potentiometer R16, a portion of the output voltage, which it compares with the reference voltage across the zener diode E6 in the emitter circuit of the transistor. The loop consisting of transistors Q3, Q2, and Q1 will oppose any change in output voltage by regulating the voltage across series transistor Q1 at a value that will keep the output voltage constant.

Electronic Protective Circuit

This circuit cuts off the output current in the case of short-circuits or overloads. It operates on the principle of registering the voltage across a resistor R5, inserted in the collector circuit of

series transistor Q1. If the voltage across R5 increases to a value corresponding to approx. 2.5A or more, transistor Q5 will saturate, causing transistors Q1 and Q2 to cut off.

This condition is stable even if the fault which caused the protective circuit to function disappears. The circuit is reset by removing the mains voltage and cutting it in again after approx. 15 seconds, when capacitor C1 will be sufficiently discharged.

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

Transmit Relay

In addition to contacts for switching between the receiver and transmitter, the transmit relay has a pair of contacts which, in conjunction with diode E4, are used for switching the antenna in simplex operation of the radio station.

When the transmit relay is operated, terminal 7 is connected to chassis, resulting in the simultaneous operation of relay A in the power supply unit and the antenna switching relay, which is placed outside the power supply unit.

The antenna switching relay is now held by relay-A contacts 14-15. On the transmit button being released, relay A will release before the antenna switching relay. This arrangement protects the transmitter from being powered without also being connected to the antenna connector.

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

Technical Specifications

Supply Voltage

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

Current Consumption

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

Output Voltage

24V \pm 2.5%.

Ripple less than 10 mV p-p.

Output Current

Max. 1.9A.

Loss

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

Type of Service

Continuous.

Temperature

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

Working range: -25°C to $+65^{\circ}\text{C}$

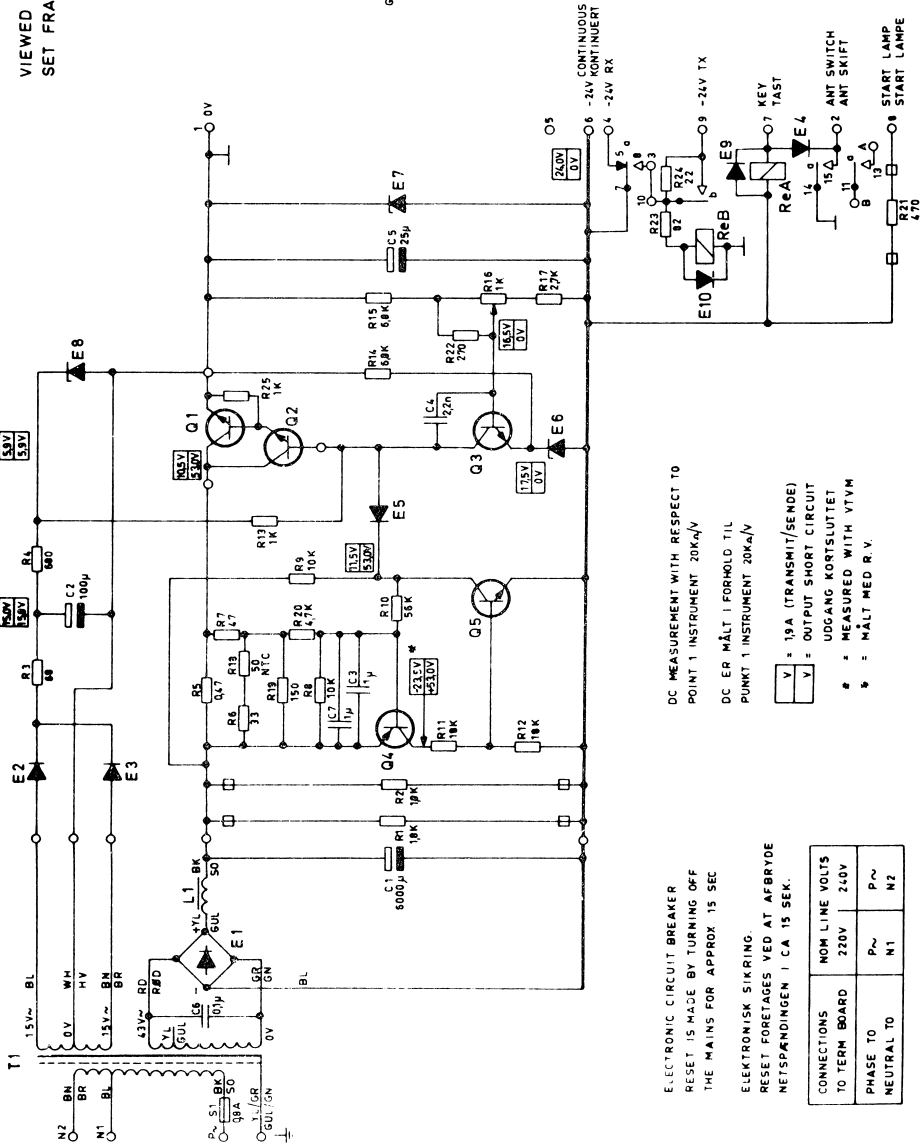
Function range: -30°C to $+75^{\circ}\text{C}$.

Weight

4.8 kilos.

Dimensions

275mm x 150mm x 88mm.



VIEWED FROM COMPONENT SIDE
SET FRA KOMPONENTSIDEN

ELECTRONIC CIRCUIT BREAKER
RESET IS MADE BY TURNING OFF
THE MAINS FOR APPROX 15 SEC

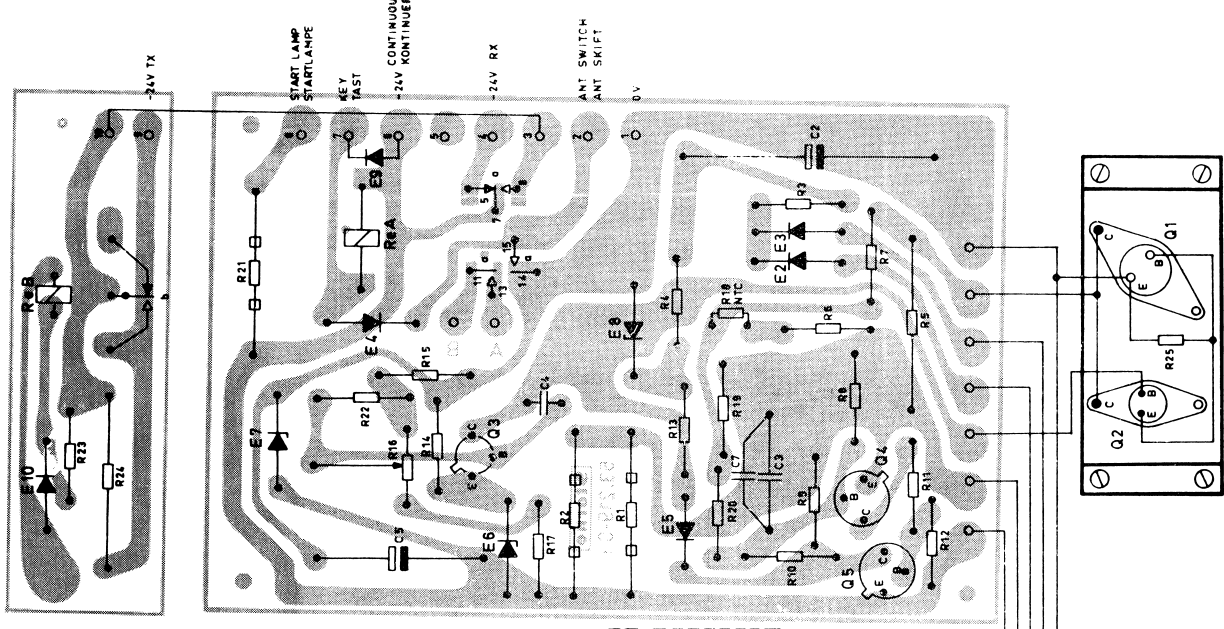
ELEKTRONISK SIKRING
RESET FØRSETTES VED AT AFBRYDE
NETSPÆNDINGEN I CA 15 SEK.

CONNECTIONS TO TERM BOARD	NOM LINE VOLTS 220V	2.0V
PHASE TO NEUTRAL TO	P~	N2

DC MEASUREMENT WITH RESPECT TO
POINT 1 INSTRUMENT 20K Ω /V

DC ER MÅLT I FØRHOUD TIL
PUNKT 1 INSTRUMENT 20K Ω /V

V = 1.8A (TRANSMIT/SENDE)
V = OUTPUT SHORT CIRCUIT
= UDGANG KORTSLUTTET
* = MÅLT MED R.V.



POWER SUPPLY UNIT STRØMFORSYNINGSENHED

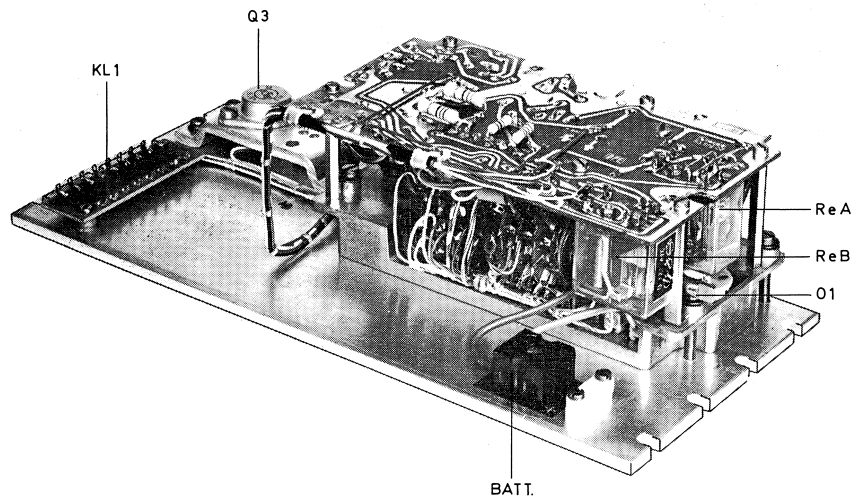
TYPE	NO.	CODE	DATA
C1	73.5111	6000 μ F -10 +50% elco	75/90V
C2	73.5071	100 μ F -10 +50% elco	35V
C3	76.5089	1 μ F 10% polycarb. FL	100V
C4	76.5059	2,2 nF 10% polyester. FL	50V
C5	73.5107	25 μ F -10 +100% elco	35V
C6	76.5073	0,1 μ F 10% polyester. TB	100V
C7	76.5089	1 μ F 10% poly. carb. fl.	100V
R1	84.5001	1,8 k Ω 5% wirewound	5,5W
R2	84.5001	1,8 k Ω 5% wirewound	5,5W
R3	80.5235	68 Ω 5% carbon film	1/8W
R4	80.5247	680 Ω 5% carbon film	1/8W
R5	83.5501	0,47 Ω 10% wirewound	3 W
R6	80.5231	33 Ω 5% carbon film	1/8W
R7	80.5233	47 Ω 5% carbon film	1/8W
R8	80.5261	10 k Ω 5% carbon film	1/8W
R9	80.5261	10 k Ω 5% carbon film	1/8W
R10	80.5270	56 k Ω 5% carbon film	1/8W
R11	80.5264	18 k Ω 5% carbon film	1/8W
R12	80.5264	18 k Ω 5% carbon film	1/8W
R13	80.5249	1 k Ω 5% carbon film	1/8W
R14	80.5259	6,8 k Ω 5% carbon film	1/8W
R15	80.5259	6,8 k Ω 5% carbon film	1/8W
R16	86.5045	1 k Ω potm. carbon film Lin.	0,15W
R17	80.5254	2,7 k Ω 5% carbon film	1/8W
R18	89.5004	50 Ω 10% NTC	1 W
R19	80.5239	150 Ω 5% carbon film	1/8W
R20	80.5257	4,7 k Ω 5% carbon film	1/8W
R21	84.5005	470 Ω 5% wirewound	5,5W
R22	80.5242	270 Ω 5% carbon film	1/8W
R23	80.5236	82 Ω 5% carbon film	1/8W
R24	81.5029	22 Ω 5% carbon film	1/2W
L1	60.5136	Filter coil/filterspole 2A 60mH 0,5 Ω	
T1	60.5135	Transformer 220V 100VA 50 Hz	
ReA	58.5052	Relay/relæ 24V 700 Ω 21-21	
ReB	58.5068	Relay/relæ 24V 920 Ω 21	
S1	92.5068	Fuse/sikring 0,8A	
E1	99.5174	Rectifier/ensretter 3A 100V 70°C	
E2	99.5020	Diode 1N4004	
E3	99.5020	Diode 1N4004	
E4	99.5020	Diode 1N4004	
E5	99.5028	Diode OA200	
E6	99.5146	Zenerdiode 6,9V 5%	275 mW

TYPE	NO.	CODE	DATA
E7	99.5132	Zenerdiode 30V 5%	200mW
E8	99.5146	Zenerdiode 6,9V 5%	275mW
E9	99.5020	Diode 1N4004	
E10	99.5020	Diode 1N4004	
Q1	99.5171	Transistor 2N 3055	
Q2	99.5193	Transistor 2N 3054	
Q3	99.5121	Transistor BC 107	
Q4	99.5173	Transistor 2S 301	
Q5	99.5172	Transistor BFY57	
FC	65.5061	Ferroxcube beads/ferritperler 60 MHz	

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS 603
-2002

Power Supply Unit PS604



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

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

- DC converter with voltage switch
- Series regulator
- Starter and transmit relay

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

Mode of Operation

DC Converter

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

The converter frequency is between 1 and 4 kHz.

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

An inductance between the bases of the two transistors is so dimensioned that its core will saturate before that of the transformer. This arrangement protects the transistors from excessive peak currents.

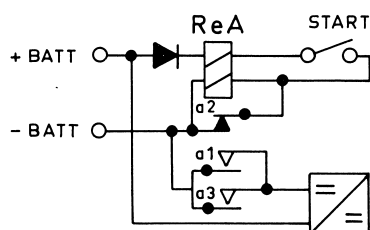
The transformer secondary has a main winding with taps for matching, and an auxiliary winding. The main winding connects to a bridge rectifier. The secondary auxiliary winding is used to furnish a positive auxiliary voltage for the following series regulator and also powers the starter lamp of the radio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

Series Regulator

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

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

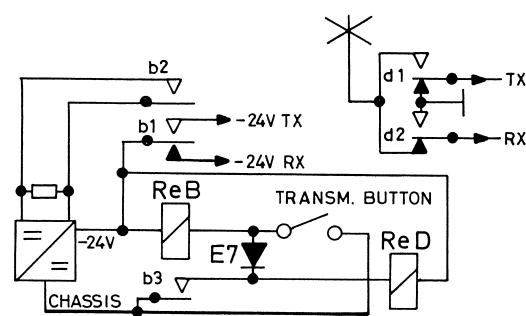
Starter Relay



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

Transmit Relay (function in simplex operation)

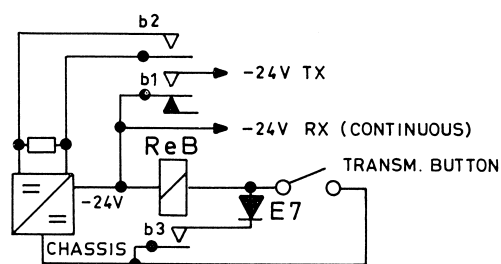
Transmit relay (Re. B) is operated from the control box or control equipment. This relay switches the supply voltage back and forth be-



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

On switching to receive, the transmit relay will be de-energized before the antenna relay because the latter relay remains operated via contact set b3 of the transmit relay.

(function in duplex operation)



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

Technical Specifications

Supply Voltages

Measured at input terminals

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

Output Voltage

Regulated, -24V.

Output Voltage Fluctuation

For temperature and load fluctuations.

Less than $\pm 0.6V$.

Current Consumption, typical

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

Output Load

Receive: max. 0.5A.

Transmit: max. 1.6A.

Output Voltage Ripple

Less than 10 mV p-p.

Converter Frequency

1-4 kHz.

Temperature Range

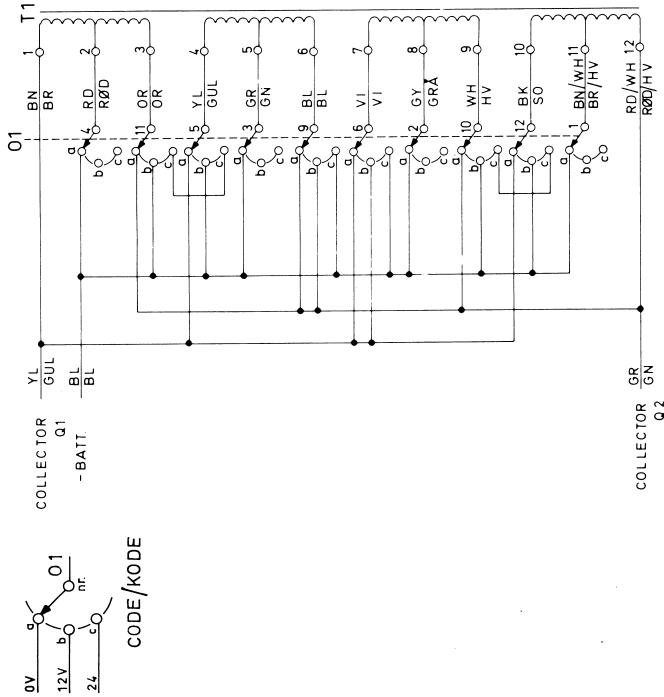
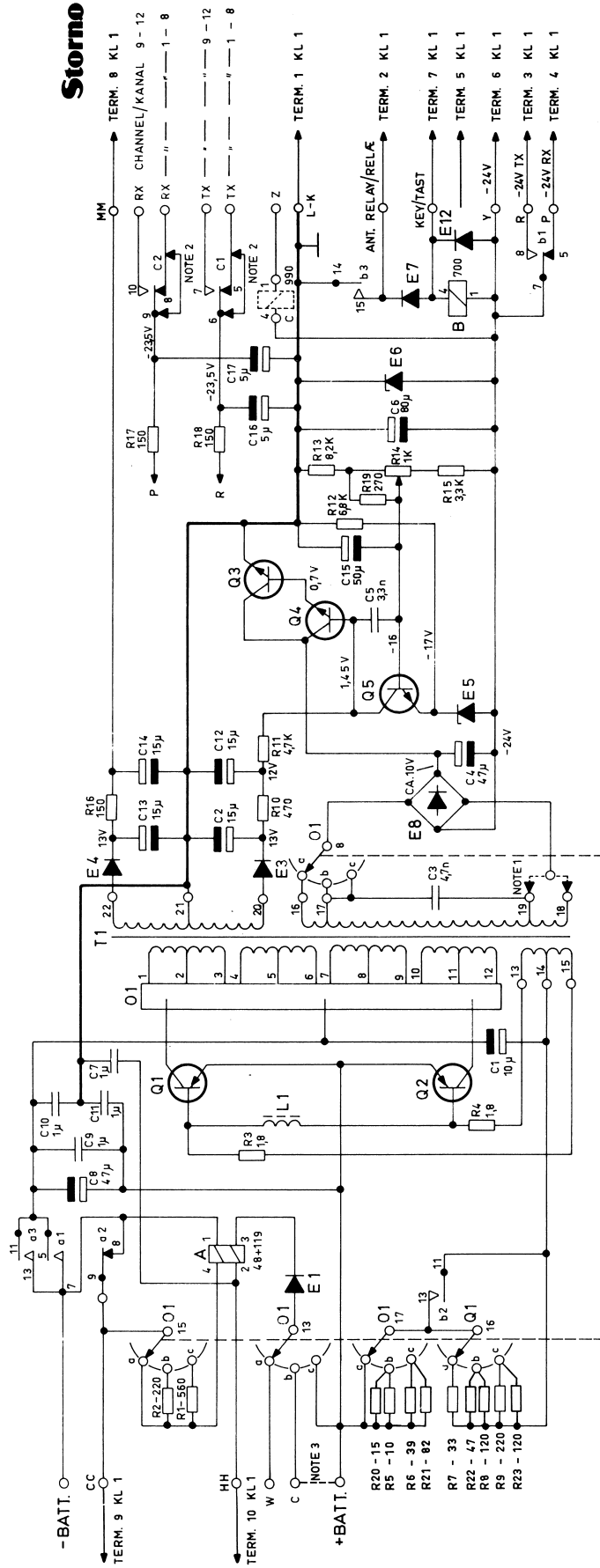
Ambient temperature:

Working range: $-25^{\circ}C$ to $+70^{\circ}C$.

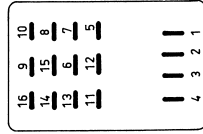
Function range: $-30^{\circ}C$ to $+80^{\circ}C$.

Storno

Storno



- Note 1.** Normal supply voltage: Connect E8-11 to term. 18 on T1.
High supply voltage: Connect E8-11 to term. 19 on T1.
- Normal driftspænding: Forbind E8-11 til terminal 18 på T1.
Høj driftspænding: Forbind E8-11 til terminal 19 på T1.
- Note 2.** Group switching relay C is inserted if more than 8 frequency channels are provided.
If relay C is omitted two strappings will be made (as shown).
- Grupperelæ C er isat, hvis anlægget er bestykket med mere end 8 frekvenskanaler.
Er relæ C udeladt, indlægges de viste to strapninger.
- Note 3.** Connection for operating on 12 V.
Forbindelse ved 12 V drift.



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

POWER SUPPLY UNIT STRØMFORSYNINGSENHED

PS604

D400.790/4

TYPE	NO.	CODE	DATA
C1	73.5100	10 μ F -10/+100 % elco	35 V
C2	73.5105	15 μ F \pm 20 % tantal	15 V
C3	76.5061	4, 7 nF 10 % polyester. FL	50 V
C4	73.5101	47 μ F -10/+100 % elco	75/90 V
C5	76.5060	3, 3 nF 10% polyester. FL	50 V
C6	73.5110	80 μ F -10/+50% elco	25 V
C7	76.5078	1 μ F 10 % polyester. TB	100 V
C8	73.5101	47 μ F -10/+100 % elco	75/90 V
C9	76.5078	1 μ F 10% polyester. TB	100 V
C10	76.5078	1 μ F 10% polyester. TB	100 V
C11	76.5078	1 μ F 10% polyester. TB	100 V
C12	73.5105	15 μ F \pm 20% tantal	15 V
C13	73.5105	15 μ F \pm 20% tantal	15 V
C14	73.5105	15 μ F \pm 20% tantal	15 V
C15	73.5030	50 μ F -10/+100% elco	25 V
C16	73.5064	2 μ F -10/+100% elco	70 V
C17	73.5064	2 μ F -10/+100% elco	70 V
R1	82.5046	560 Ω 5% carbon film	1 W
R2	81.5041	220 Ω 5% " "	1/2 W
R3	84.5022	1, 8 Ω 10% wirewound	5 W
R4	84.5022	1, 8 Ω 10% " "	5 W
R5	84.5019	10 Ω 10% " "	5, 5 W
R6	81.5032	39 Ω 5% carbon film	1/2 W
R7	81.5031	33 Ω 5% " "	1/2 W
R8	80.5438	120 Ω 5% " "	1/4 W
R9	80.5441	220 Ω 5% " "	1/4 W
R10	80.5245	470 Ω 5% " "	1/8 W
R11	80.5257	4, 7 k Ω 5% " "	1/8 W
R12	80.5259	6, 8 k Ω 5% " "	1/8 W
R13	80.5260	8, 2 k Ω 5% " "	1/8 W
R14	86.5045	1 k Ω potm. lin. carbon film	0, 15 W
R15	80.5255	3, 3 k Ω 5% carbon film	1/8 W
R16	80.5239	150 Ω 5% " "	1/8 W
R17	80.5239	150 Ω 5% " "	1/8 W
R18	80.5239	150 Ω 5% " "	1/8 W
R19	80.5242	270 Ω 5% " "	1/8 W
R20	81.5027	15 Ω 5% " "	1/2 W
R21	81.5036	82 Ω 5% " "	1/2 W
R22	80.5433	47 Ω 5% " "	1/4 W
R23	80.5438	120 Ω 5% " "	1/4 W
L1	61.803	Coil/spole	
T1	60.5133	Transformer 6-12-24V/24V 70VA 1-3kHz	
ReA	58.5053	Relay/Relæ 6V 48 + 119 Ω 1-1-2	
ReB	58.5052	Relay/Relæ 24V 700 Ω 21-21	

TYPE	NO.	CODE	DATA
	ReC	58.5055	Relay/Relæ 24V 890 Ω 21-21-21-21
	01	47.367	Selector/omskifter
	E1	99.5020	Diode 1N4004
	E3	99.5020	Diode 1N4004
	E4	99.5020	Diode 1N4004
	E5	99.5146	Zenerdiode 6,9V 5% 0,275 W
	E6	99.5132	Zenerdiode 30V 5% 0,2 W
	E7	99.5020	Diode 1N4004
	F8	99.5174	Rectifier 3A 100V
	E12	99.5020	Diode 1N4004
	Q1	99.5126	Transistor 2N2492
	Q2	99.5126	Transistor 2N2492
	Q3	99.5130	Transistor 40251
	Q4	99.5128	Transistor 2N3053
	Q5	99.5121	Transistor BC107

POWER SUPPLY UNIT
STRØMFORSYNINGSENHED

PS604

X400.862/2

no	code	data	no	code	data
C1	73.5030	50 μ F -10%+100% 25V			
C2	73.5030	50 μ F -10%+100% 25 V			
C3	73.5107	25 μ F -10%+100% 35V			
C4	73.5030	50 μ F -10%+100% 25V			
C5	73.5107	25 μ F -10%+100% 35V			
R1	80.5235	68 Ω 5% 1/8 W			
R2	80.5235	68 Ω 5% 1/8 W			
R3	80.5233	47 Ω 5% 1/8W			
R4	80.52351	68 Ω 5% 1/8W			
R5	80.5233	47 Ω 5% 1/8W			
E1-52	99.5028	Diode, OA200			
ReG1	58.5055	V23154-DO721-B110			
ReG2	58.5055	V23154-DO721-B110			
ReG4	58.5062	V23154-CO722-B104			
ReG7	58.5055	V23154-DO721-B110			
ReG10	58.5062	V23154-CO722-B104			



udarb af
OG/INI
7.12.67
kontroll af
JB
tíð drögi
D110203

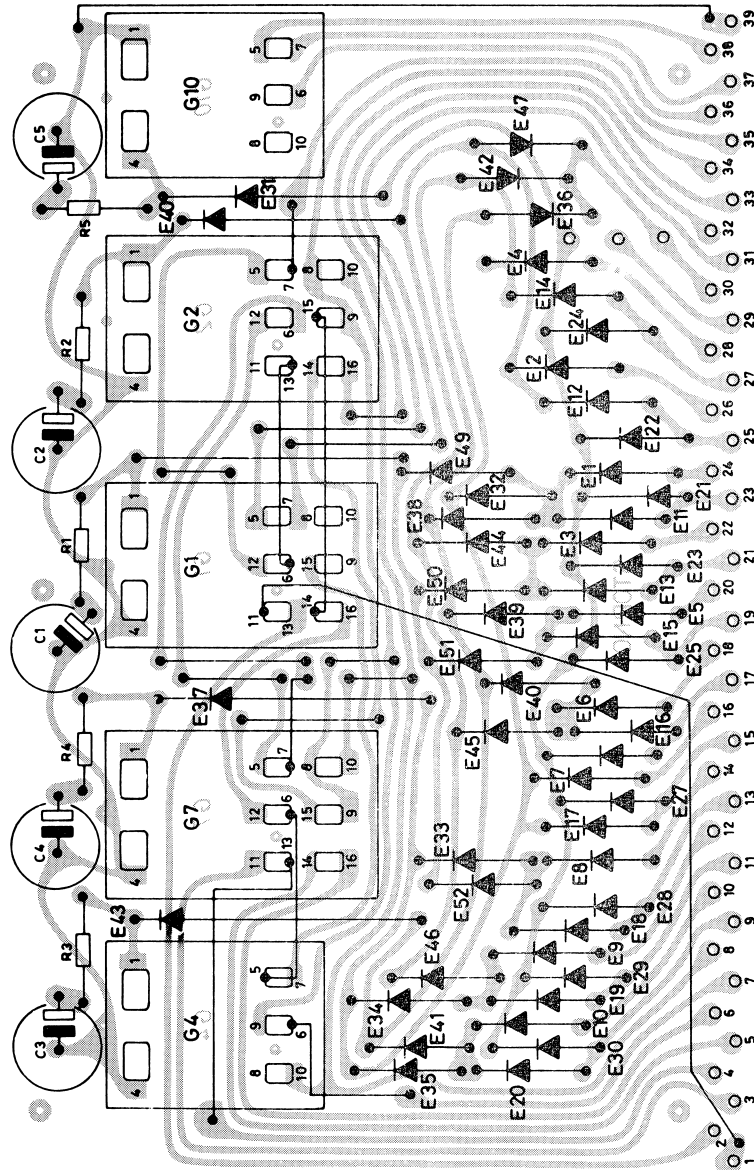
GRUPPEKODESELEKTOR
GROUP CODE SELECTOR
PARTS LIST/STYKLISTE

RP680-2002/02

Storno list
X110322

blad no af

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



GROUP CODE SELECTOR RP680-2002/2
GRUPPEKODESELEKTOR

no	code	data	no	code	data
C1	73.5107	25 μ F -10+100% elko 35V	ReQ	58.5055	Relay 24V 890 Ω 21-21, 21-21 A
C2	73.5107	- - - - -	ReR	58.5055	- - - - -
C3	73.5100	10 μ F -10+100% elko TB 35V	Q1	99.5144	BC 214 L
C4	73.5100	10 μ F -10+100% elko TB 35V			
C5	73.5107	25 μ F -10+100% elko 35V			
C6	73.5089	0,1 μ F 20% tantal 35V			
R1	80.5249	1k Ω 5% carbon film 1/8W			
R2	80.5236	82 Ω - - - - -			
R3	80.5236	- - - - -			
R4	80.5236	- - - - -			
R5	80.5236	- - - - -			
R6	80.5265	22k Ω - - - - -			
R7	80.5265	- - - - -			
R8	80.5249	1k Ω - - - - -			
R9	80.5265	22k Ω - - - - -			
R10	80.5232	39 Ω - - - - -			
R11	80.5234	56 Ω - - - - -			
R12	80.5248	820 Ω - - - - -			
R13	86.5042	500 Ω 20% trim. carbon film 0.1W lin.			
R14	80.5246	560 Ω 5% carbon film 1/8W			
R15	80.5240	180 Ω - - - - -			
R16	80.5240	- - - - -			
R17	80.5254	2,7 k Ω - - - - -			
R18	80.5241	220 Ω - - - - -			
R19	80.5241	- - - - -			
R20	80.5241	- - - - -			
R21	80.5265	22k Ω - - - - -			
R22	80.5265	22k Ω - - - - -			
E1	99.5028	1N914 Diode			
E2	99.5028	- - - - -			
E3	99.5028	- - - - -			
E4	99.5028	- - - - -			
E5	99.5146	Zenerdiode 6,8V 5% 0,240W BZY60			
E6	99.5028	1N914 Diode			
E7	99.5028	- - - - -			
E8	99.5020	1N4004 Diode			
E9	99.5028	1N914 Diode			
E10	99.5028	- - - - -			
E11	99.5028	- - - - -			
ReA	58.5061	Relay 24V 2 x 265 Ω 21-21, 21-21			
ReB	58.5061	Relay 24V 2 x 265 Ω 21-21, 21-21			
ReP	58.5062	Relay 24V 1700 Ω 21-21 A			
ReI	58.5062	- - - - -			



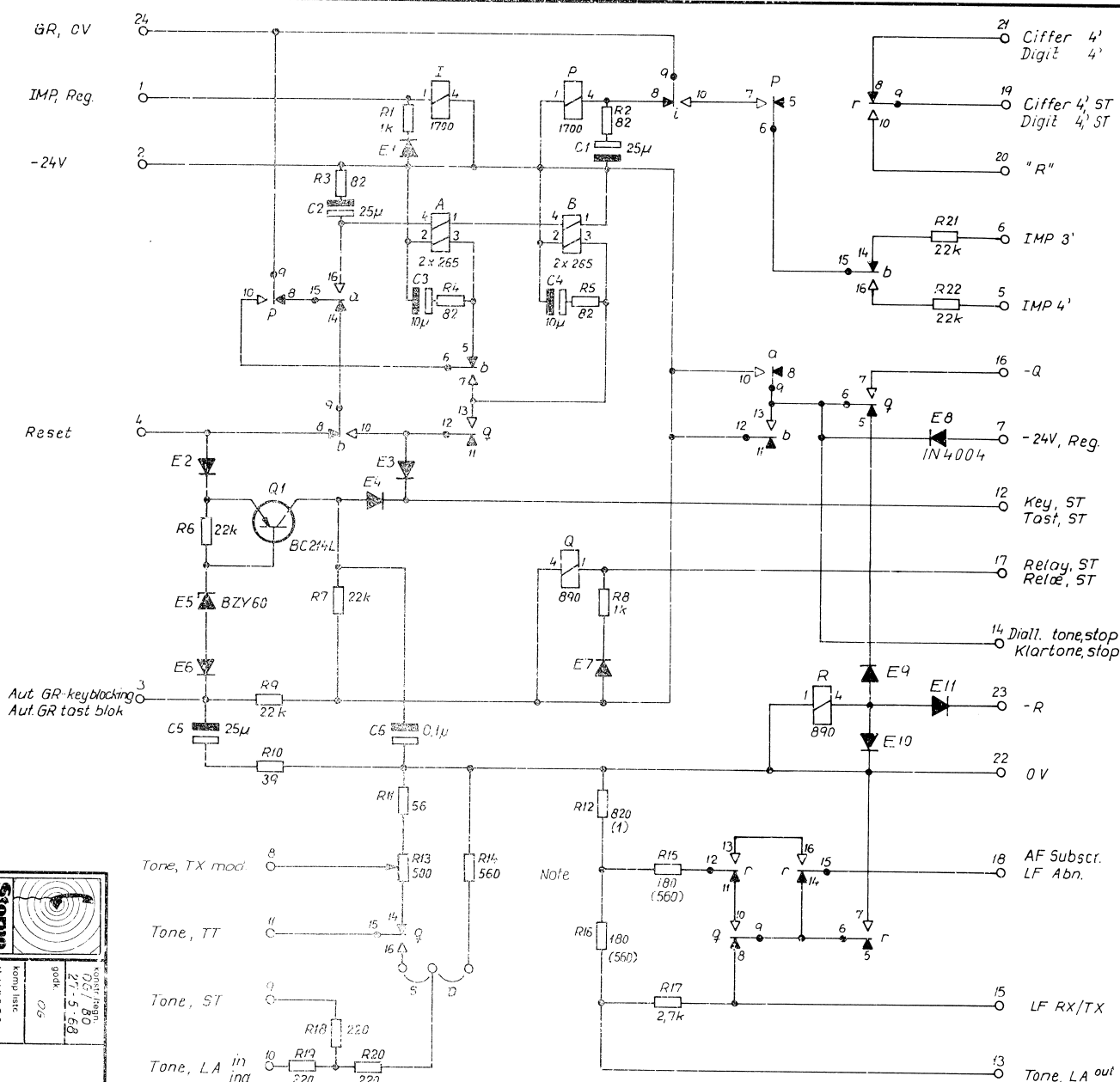
udarb of
OG/SL
11.8.69
kontrol of
00
třih diag
D11/296

PARTS LIST
STYKLISTE

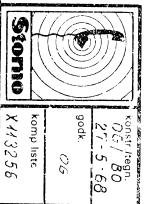
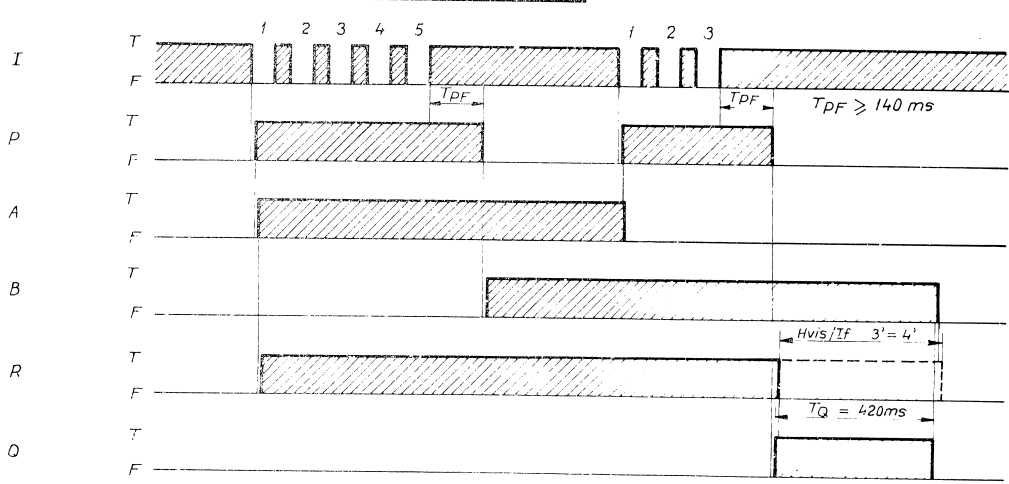
RP680-2002/06

comp list
X113 256
blad no 1 ar 1

Brakket 32.177



Relay Function Plan / Relæ Funktionsskema

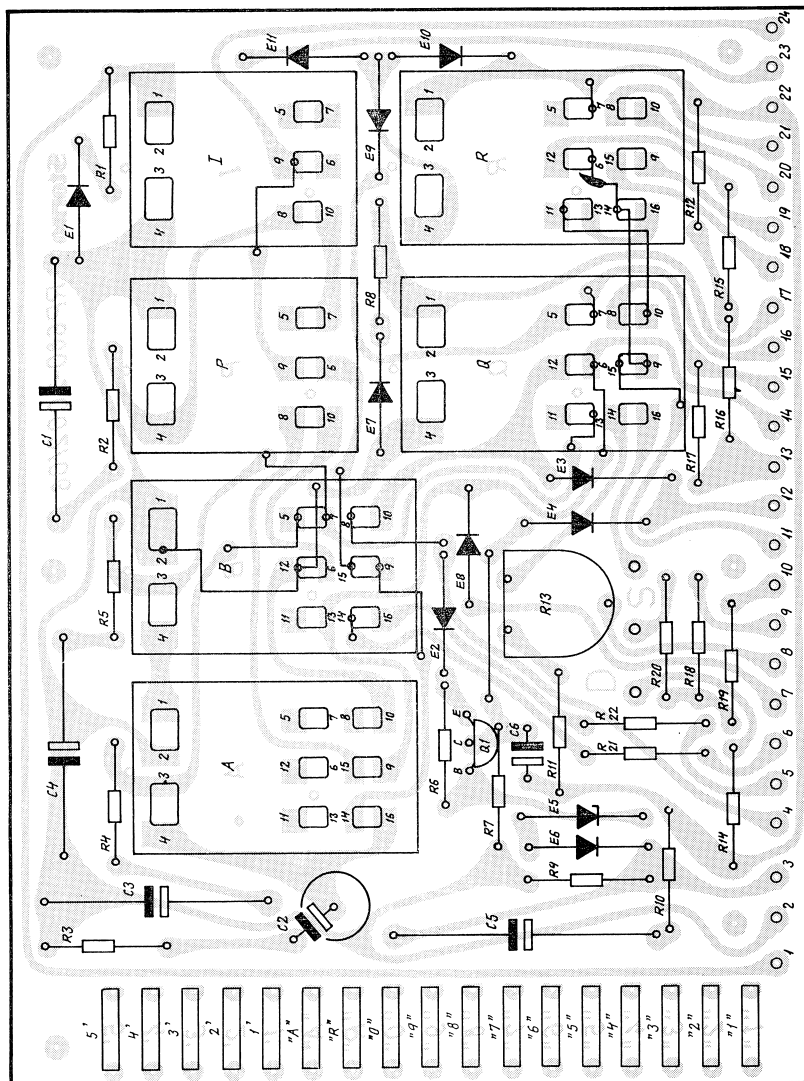


Kontroll. Relæ.
02/80
27.5.68
gode
0/6
Kontroll. list
X112256

PULSE CONTROL PANEL
IMPULSKONTROL PANEL
RP680-2002/16

TEGN. NR.
D 111296
A3

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



MODEL: 06/AMH
28.B.69.
godk. 06
komp. liste
Df11296
X113256

PULSE CONTROL PANEL
IMPULSKONTROLPANEL

RP680-2002/06

KODE

TEIG: NR

D113403

Test procedure.

1. The shown test set-up is used.



2. When the external PS is connected relay I will be energized. Connect term. 24 to 0V.
3. Dial digit 3. The relays are energized as shown on drwg. D111296*
4. When the first digit is dialled lamp L₁ wil illuminate and lamp L₃ will flash in time with the dialling pulses. When the **second** digit is dialled lamp L₄ will flash.
5. When the **second** digit has been dialled L₁ will extinguish and L₂ will be illuminated.
6. Connect term. 16 with 23. Now relay R will be energized, L₂ will extinguish and L₁ will illuminate again.
7. Break the connection between the term. 12 and 17. The Q, B and R relays will be released and L₁ will extinguish.
8. Repeat 3 and 7.

* Impulse control panel RP680-2002/06

Test procedure.

1. The shown test set-up is used.



2. When the external PS is connected relay I will be energized. Connect term. 24 to 0V.
3. Dial digit 3. The relays are energized as shown on drwg. D111296*
4. When the first digit is dialled lamp L₁ wil illuminate and lamp L₃ will flash in time with the dialling pulses. When the **second** digit is dialled lamp L₄ will flash.
5. When the **second** digit has been dialled L₁ will extinguish and L₂ will **be illuminated**.
6. Connect term. 16 with 23. Now relay R will be energized, L₂ will extinguish and L₁ will illuminate again.
7. Break the connection between the term. 12 and 17. The Q, B and R relays will be released and L₁ will extinguish.
8. Repeat 3 and 7.

* Impulse control panel RP680-2002/06

no	code	data	no	code	data
C1	73.5114	1 μ F 20% tantal 35V			
C2	73.5114	- - - - -			
C3	73.5030	50 μ F -10+100% elko 25V			
C4	73.5030	- - - - -			
C5	73.5114	1 μ F 20% tantal 35V			
R1	80.5246	560 Ω 5% carbon film 1/8W			
R2	80.5265	22k Ω - - - - -			
R3	80.5266	27k Ω - - - - -			
R4	80.5230	27 Ω - - - - -			
R5	80.5230	- - - - -			
R6	80.5249	1k Ω - - - - -			
R7	80.5265	22k Ω - - - - -			
R8	80.5230	27 Ω - - - - -			
R9	80.5265	22k Ω - - - - -			
R10	80.5265	22k Ω - - - - -			
R11	80.5230	27 Ω - - - - -			
R12	80.5266	27k Ω - - - - -			
R13	80.5265	22k Ω - - - - -			
R14	80.52xx	just. 0-1k Ω 1/4-1/2W			
R15	80.5244	390 Ω 5% kull 1/8W			
E1 -	99.5028	Diode 1N914			
E13					
E14	99.5123	Diode AA117			
E15 -	99.5028	Diode 1N914			
E25					
E26	99.5146	Zenerdiode 6,8V 5% 0,25W			
Q1	99.5142	Transistor AC128			
Q2	99.5121	Transistor BC107			
Q3	99.5121	- - - - -			
ReA	58.5032	Relay 12V 2 x 140 Ω 21-21			
ReO	58.5055	Relay 24V 890 Ω 21-21, 21-21			
ReB	58.5055	- - - - -			
ReR	58.5055	- - - - -			



utg. av
12.8.69
kontroll av
06
till diag
0113164

PART LIST
STYKLISTE

RP680-2002/07a

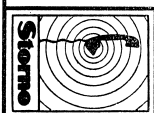
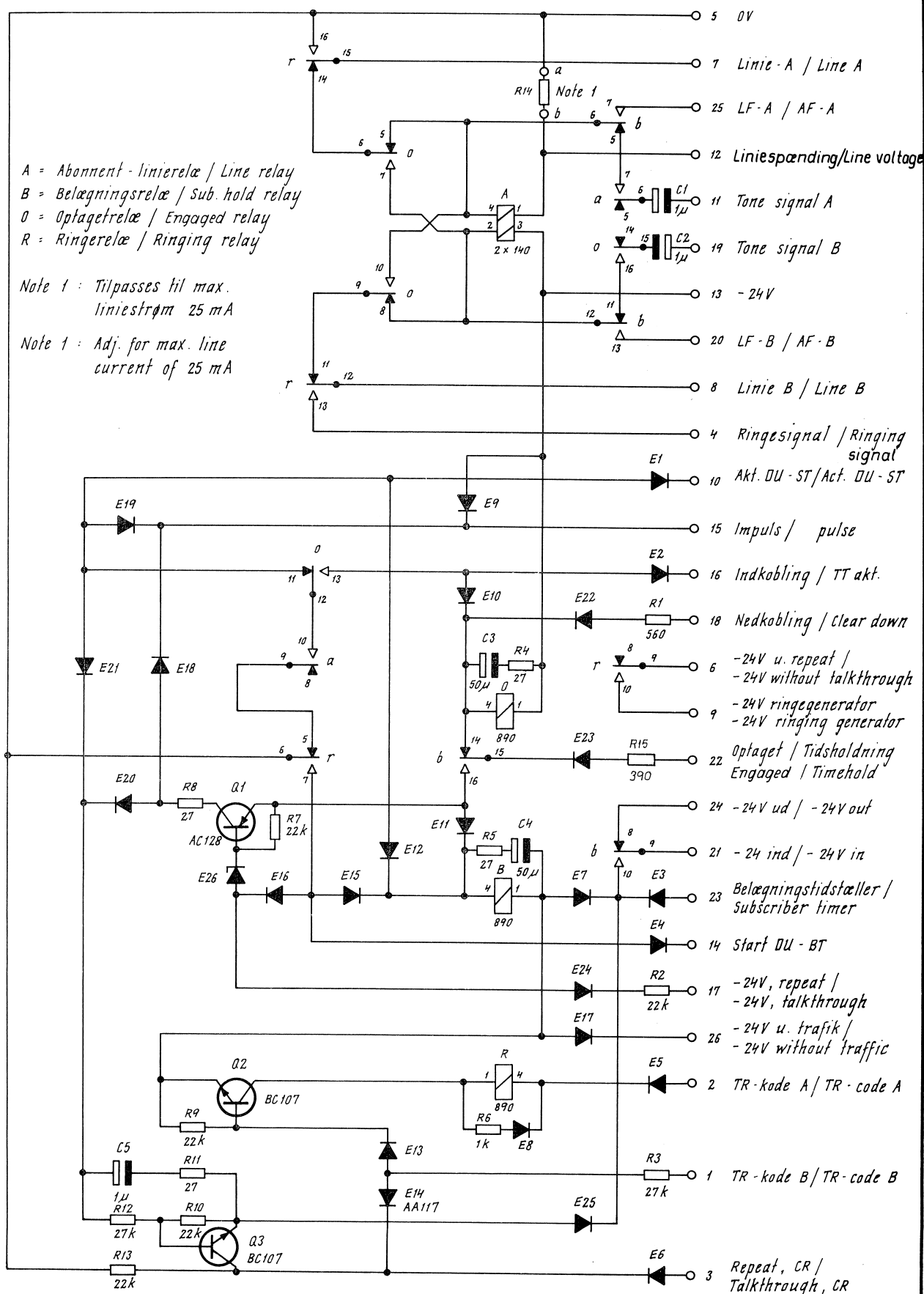
comp liste
X113165

blad no 1 av 1

A = Abonnent-linierelæ / Line relay
 B = Belægningsrelæ / Sub. hold relay
 O = Optagetrelæ / Engaged relay
 R = Ringerelæ / Ringing relay

Note 1 : Tilpasses til max.
 liniestrøm 25 mA

Note 1 : Adj. for max. line
 current of 25 mA



Konst. frek.
 05 / 7MA
 16, 6 - 69
 spæk.
 OG
 komp. liste
 X113165

ABONNENTKREDS
 SUBSCRIBER PANEL

RP680 - 2002 / 07a

KODE

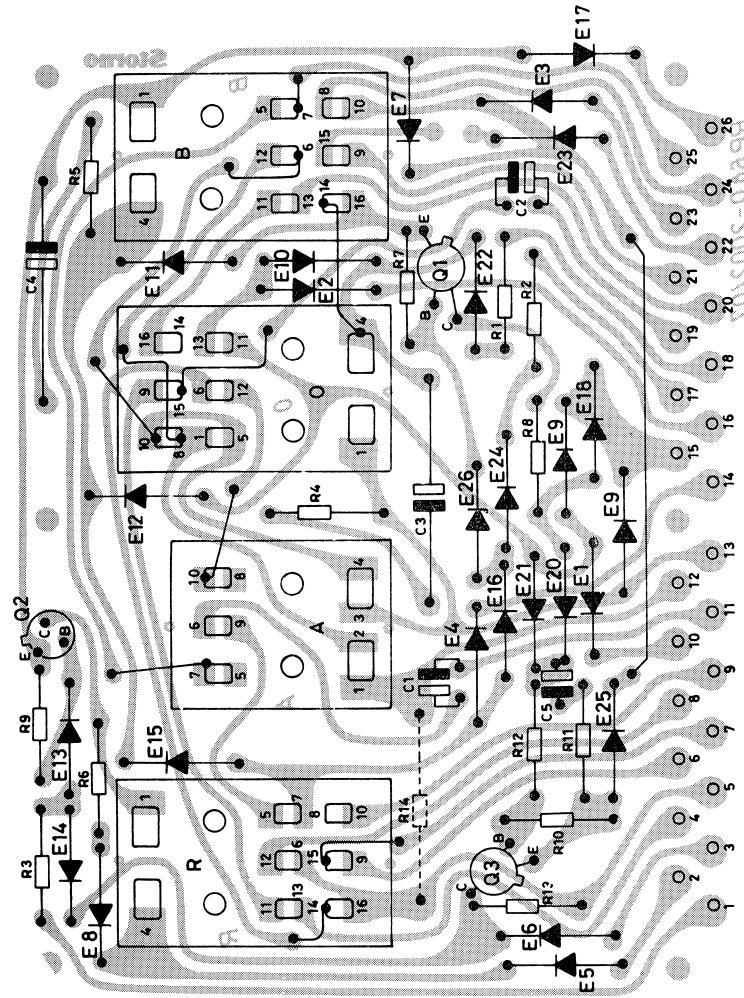
TEGN. NR.

0113164

A 3

Diodes : 1N914
 Diodes : 1N914

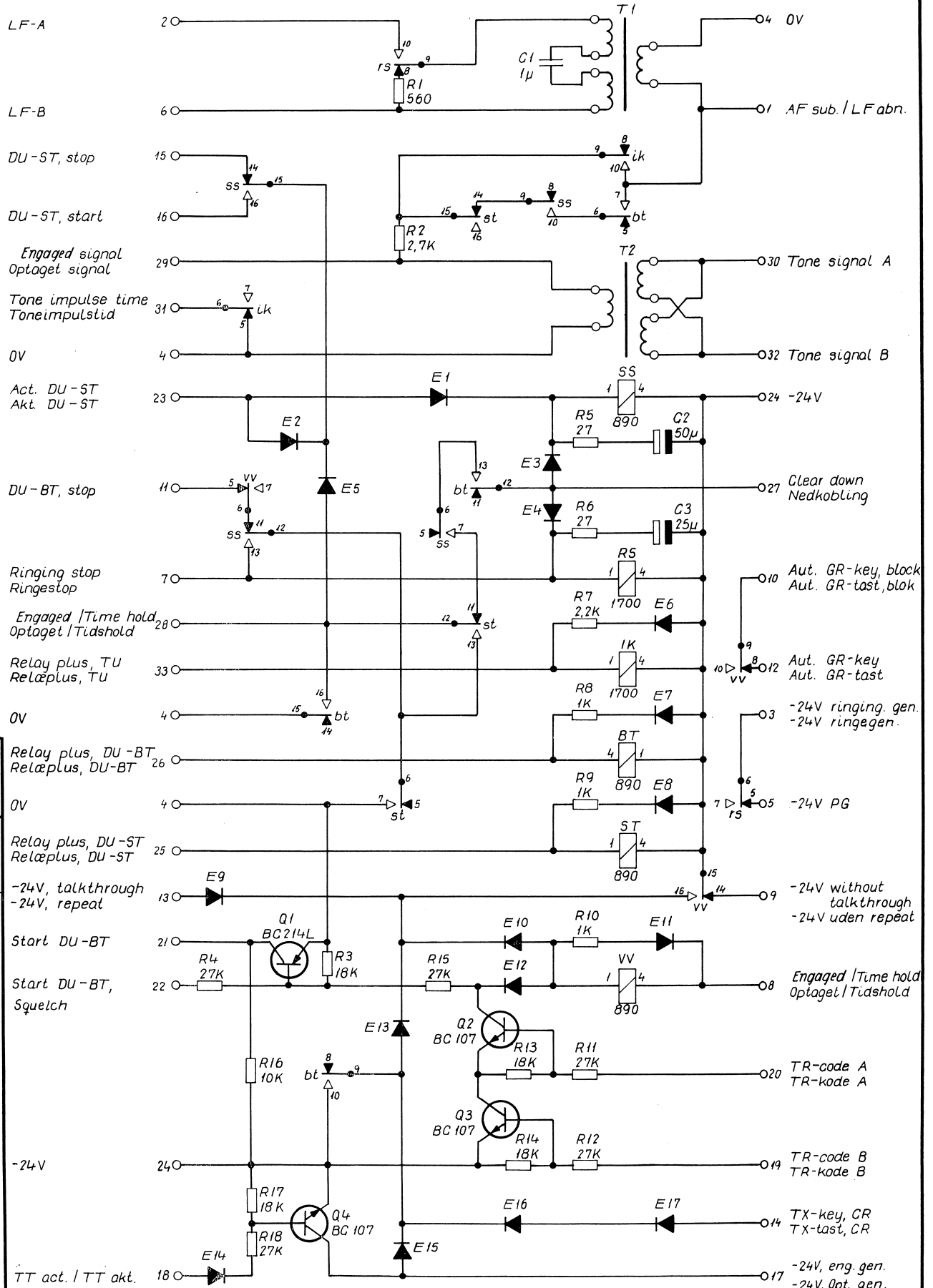
PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



SUBSCRIBER
ABONNENTKREDS

RP680-2002/07

0113.425



All diodes / Alle dioder = 1N914

RS = Ringing stop relay / Ringestoprelæ.

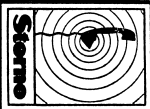
ST = Conversation time relay / Samtaleleidsrelæ.

BT = Engaged time relay / Belægningsstidsrelæ.

SS = Conv. start-stop relay / Samtale start-slut-relæ.

IK = Preference relay / Indkoblingsrelæ.

BT = Engaged time relay / Vogn til vogn samtalerelæ.



konst. legh.
08 / EBH
27.6.69
godk.
06
kompl.
X 113286

RELAY PANEL
RELAPANEL
RP680 2002/08

KODE

TEGN. NR.

D 113197

A 3

no	code	data	no	code	data
C1	76.5078	1 μ F 10% polyest. FL 100V			
C2	73.5030	50 μ F -10+100% elko 25V			
C3	73.5107	25 μ F -10+100% elko 35V			
R1	80.5246	560 Ω 5% carbon film 1/8W			
R2	80.5254	2,7k Ω - - - -			
R3	80.5264	18k Ω - - - -			
R4	80.5266	27k Ω - - - -			
R5	80.5230	27 Ω - - - -			
R6	80.5230	- - - - -			
R7	80.5253	2,2k Ω - - - -			
R8	80.5249	1k Ω - - - -			
R9	80.5249	- - - - -			
R10	80.5249	- - - - -			
R11	80.5266	27k Ω - - - -			
R12	80.5266	- - - - -			
R13	80.5264	18k Ω -- - - -			
R14	80.5264	- - - - -			
R15	80.5266	27k Ω - - - -			
R16	80.5261	10k Ω - - - -			
R17	80.5264	18k Ω - - - -			
R18	80.5266	27k Ω - - - -			
E1 - E17	99.5028	Diode 1N914			
Q1	99.5144	Transistor BC214L			
Q2	99.5121	Transistor BC107			
Q3	99.5121	- - - - -			
Q4	99.5121	- - - - -			
ReSS	58.5055	Relay 24V 890 Ω 21-21, 21-21			
ReRS	58.5062	Relay 24V 1700 Ω 21-21,			
ReIK	58.5062	- - - - -			
ReBT	58.5055	Relay 24V 890 Ω 21-21, 21-21			
ReST	58.5055.	- - - - -			
ReW	58.5055	- - - - -			
T1	60.5097	Transformer AF 150/150/600 Ω			
T2	60.5097	- - - - -			



udarb at
CG/SI
12.8.69
kontrol at
06
11th diag
D/13/97

PART LIST

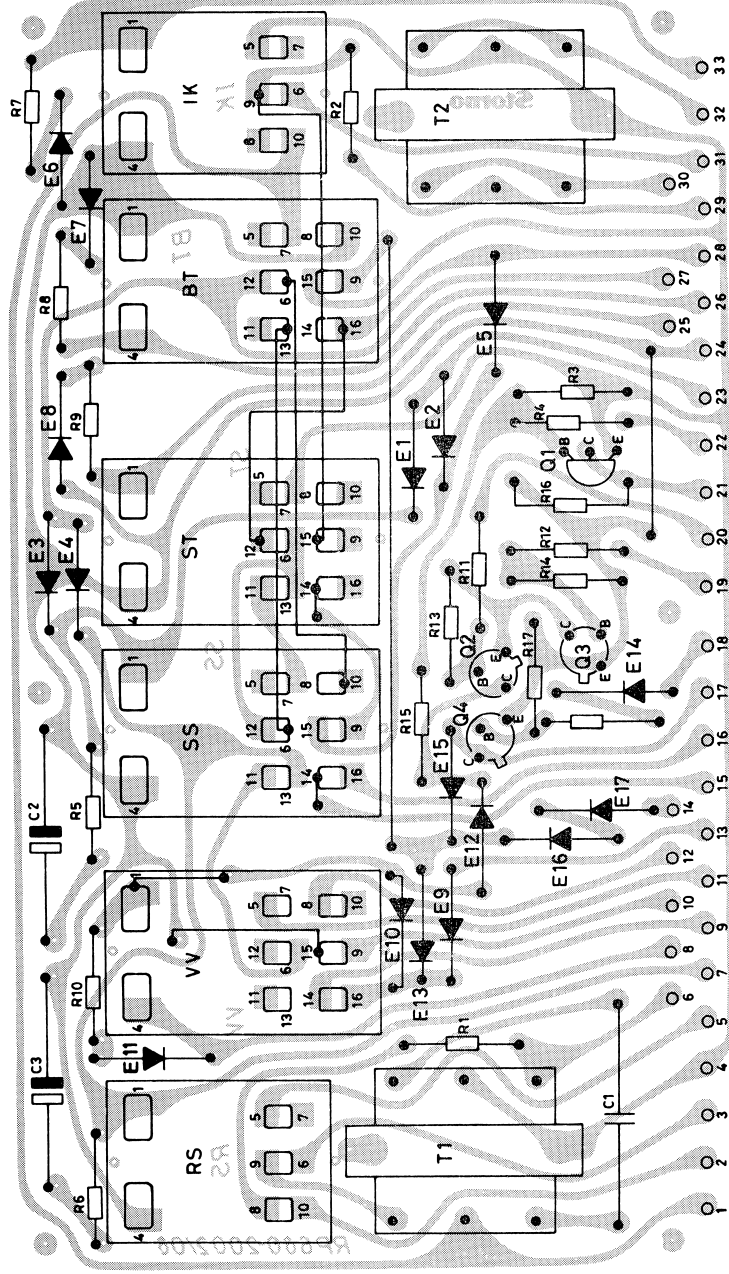
STYKLISTE

RP680-2002-08

Emp list
X113286

blue no 1 of 1

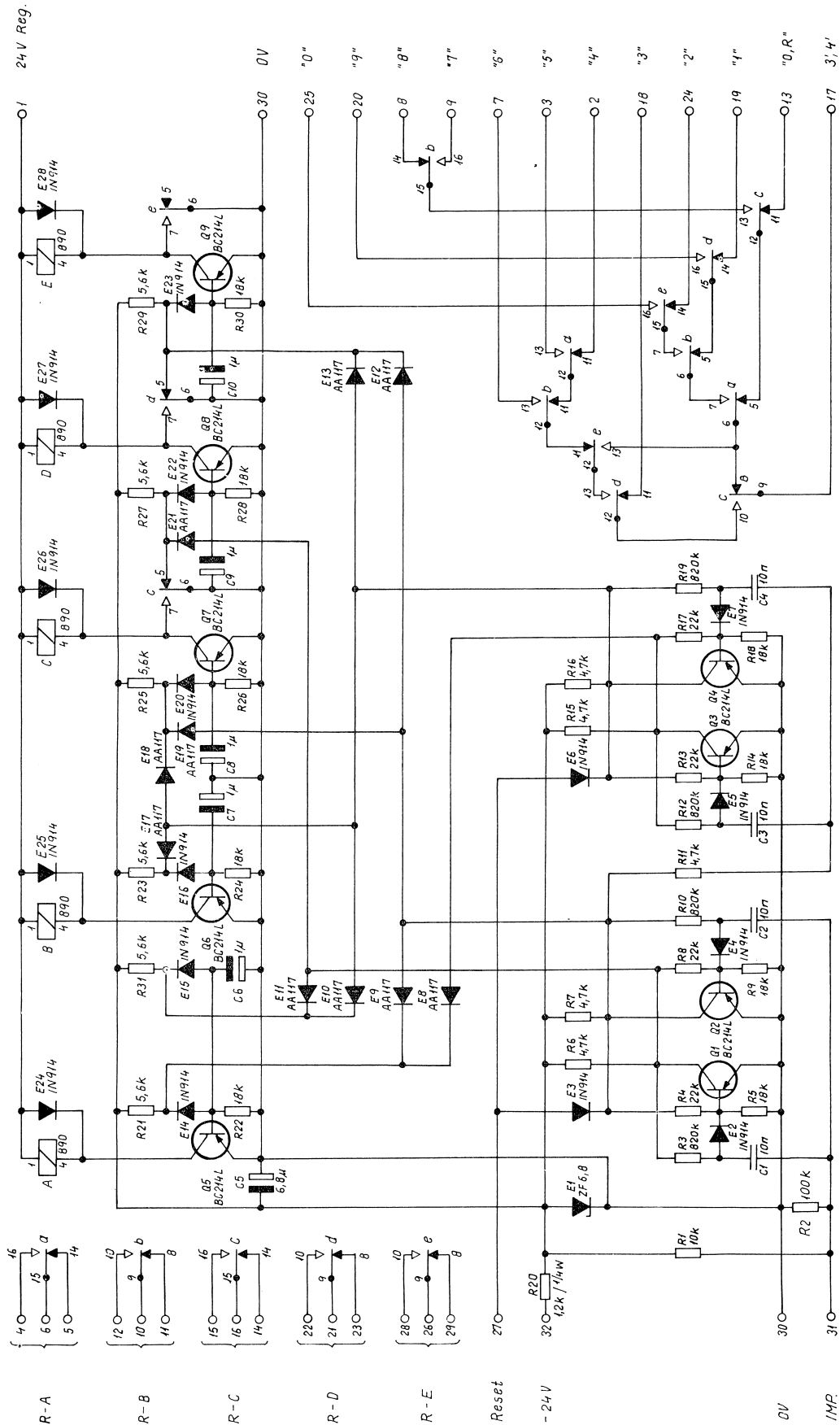
PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



RELAY PANEL
RELÆPANEL

RP680-2002/08

D113.424

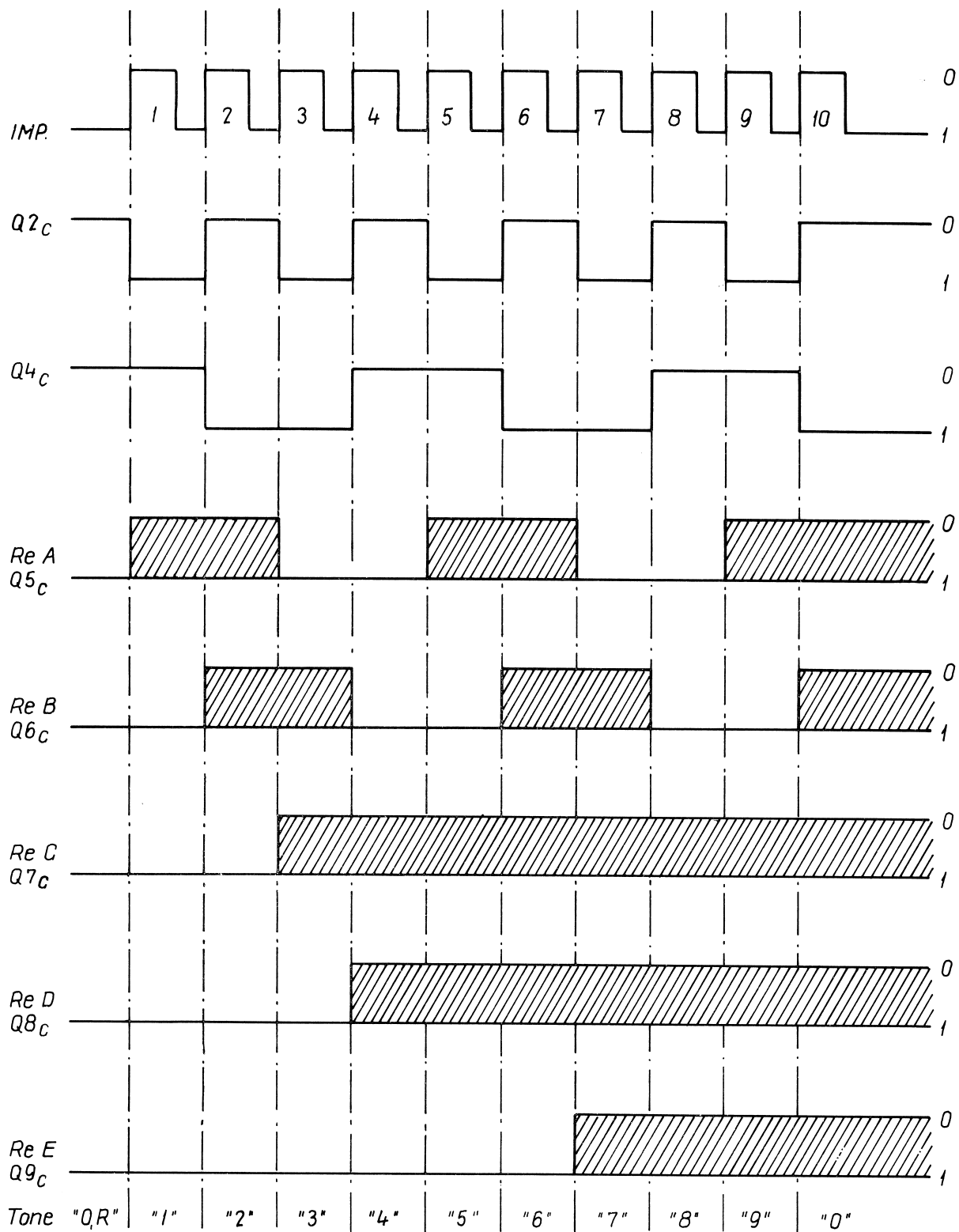


konstr./desig.
OG/AMM
23.6.69.
grobk. OG
kompliste
X113273

TELLERREGISTER FOR NUMMERSKIVEIMPULSER
COUNTING REGISTER FOR DIALLING PULSES
RP680-2002/09

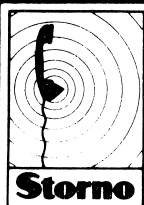
KODE

D113183
A3



0 = 0V, transistor ON, Relay energized / Relæ aktiveret.

1 = Negative voltage / Negativ spænd., Relay de-energized / Relæ uaktiveret.



konstr./tegn.
OG / EBH
20.1.70
godk.
OG
komp.liste

SIGNAL WAVEFORMS FOR COUNTING REGISTER
IMPULSSKEMA FOR TÆLLEREGISTER
RP 680-2002/09

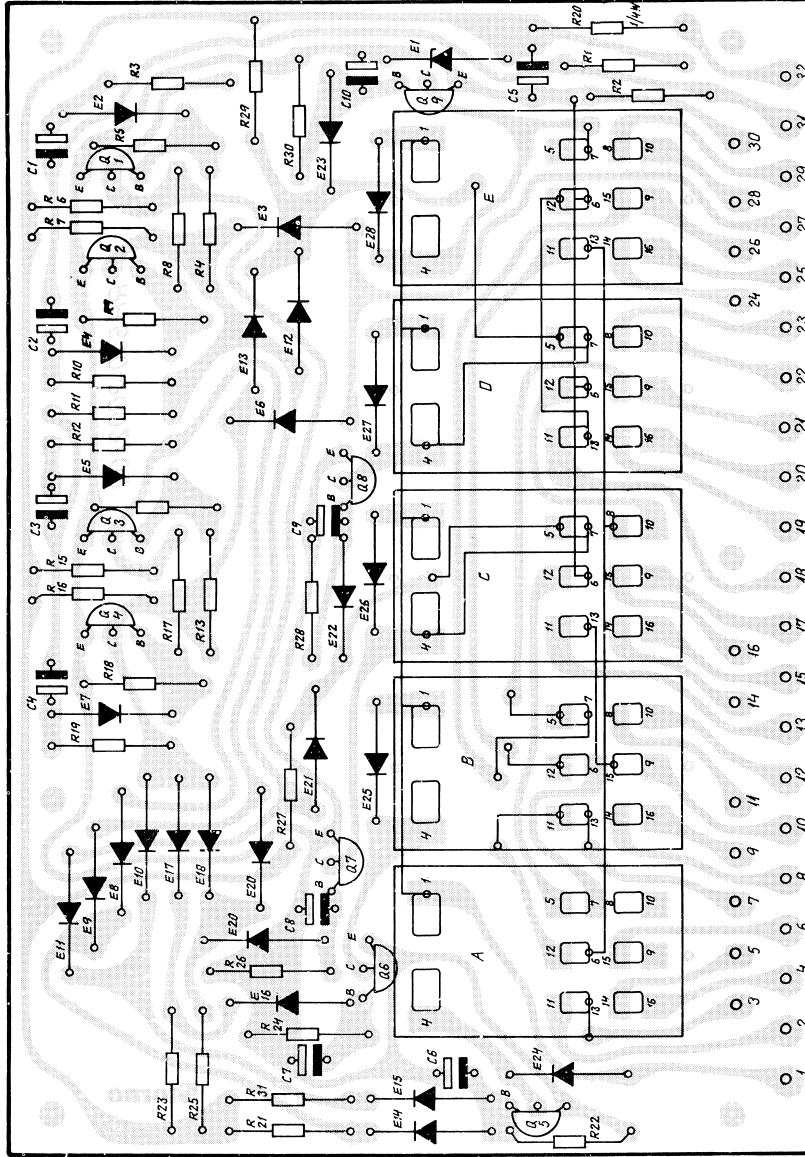
KODE

TEGN. NR.

D114074

A4

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



Antal tegn
06/AMH
9.9.83

Antal tegn
06

Antal tegn
06

Antal tegn
06

Antal tegn
06/AMH
9.9.83

Antal tegn
06

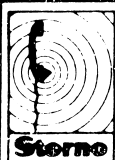
Antal tegn
06

Antal tegn
06

TÆLLERREGISTER FOR NUMMERKVEIMPULSER
COUNTING REGISTER FOR DIALING PULSES
RP 680 - 2002/09

D113426

no	code	data	no	code	data
C1	76.5070	10nF 10% polyester FL 50V	E22- E28	99.5028	diode 1N914
C2	76.5070	- - - - -	Q1-	99.5144	Transistor BC214L
C3	76.5070	- - - - -	Q9		
C4	76.5070	- - - - -	Re		
C5	73.5106	68μF 20% tantal 15V	A		
C6	73.5114	1μF 20% tantal 35V	B		
C7	73.5114	- - - - -	C	58.5055	Relay 24V 890Ω 21-21, 21-21
C8	73.5114	- - - - -	D		
C9	73.5114	- - - - -	E		
C10	73.5114	- - - - -			
R1	80.5261	10kΩ 5% carbon film 1/8W			
R2	80.5273	100kΩ - - - -			
R3	80.5284	820kΩ - - - -			
R4	80.5265	22kΩ - - - -			
R5	80.5264	18kΩ - - - -			
R6	80.5257	4,7kΩ - - - -			
R7	80.5257	- - - - -			
R8	80.5265	22kΩ - - - -			
R9	80.5264	18kΩ - - - -			
R10	80.5284	820kΩ - - - -			
R11	80.5257	4,7kΩ - - - -			
R12	80.5284	820kΩ - - - -			
R13	80.5265	22kΩ - - - -			
R14	80.5264	18kΩ - - - -			
R15	80.5257	4,7kΩ - - - -			
R16	80.5257	- - - - -			
R17	80.5265	22kΩ - - - -			
R18	80.5264	18kΩ - - - -			
R19	80.5284	820kΩ - - - -			
R20	80.5450	1,2kΩ - - -1/4W			
R21	80.5258	5,6kΩ - - -1/8W			
R22	80.5264	18kΩ - - - -			
R23	80.5258	5,6kΩ - - - -			
R24	80.5264	18kΩ - - - -			
R25	80.5258	5,6kΩ - - - -			
R26	80.5264	18kΩ - - - -			
R27	80.5258	5,6kΩ - - - -			
R28	80.5264	18kΩ - - - -			
R29	80.5258	5,6kΩ - - - -			
R30	80.5264	18kΩ - - - -			
R31	80.5258	5,6kΩ - - - -			
E1	99.5146	Zenerdiode 6,8V 5% 0,250W			
E2- E7	99.5028	diode 1N914			
E8- E13	99.5123	diode AA117			
E14- E16	99.5028	diode 1N914			
E17- E19	99.5123	diode AA117			
E20	99.5028	diode 1N914			
E21	99.5123	diode AA117			



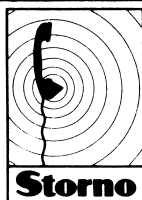
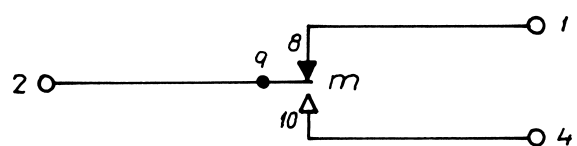
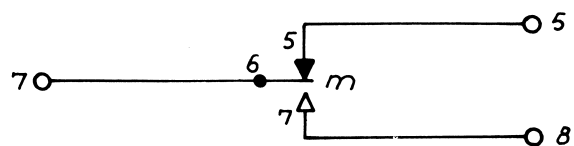
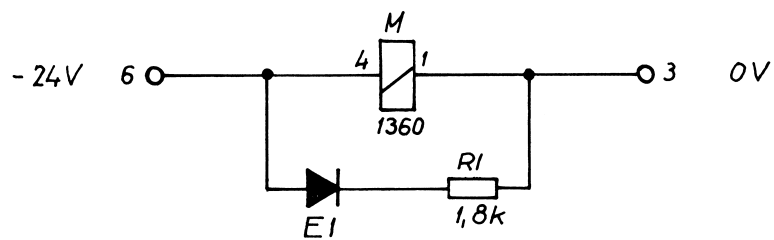
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PARTS LIST
STYKLISTE

RP680-2002/09

FORM LIST
X 113273

Blad no 1 of 1



konstr./tegn.
 OG/ 80
 18-9-68
 godk.
 OG
 komp.liste
 X113255

RELAY PANEL
 RELÆPANEL

RP680 - 2003/03

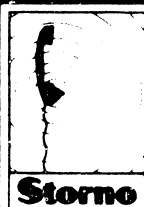
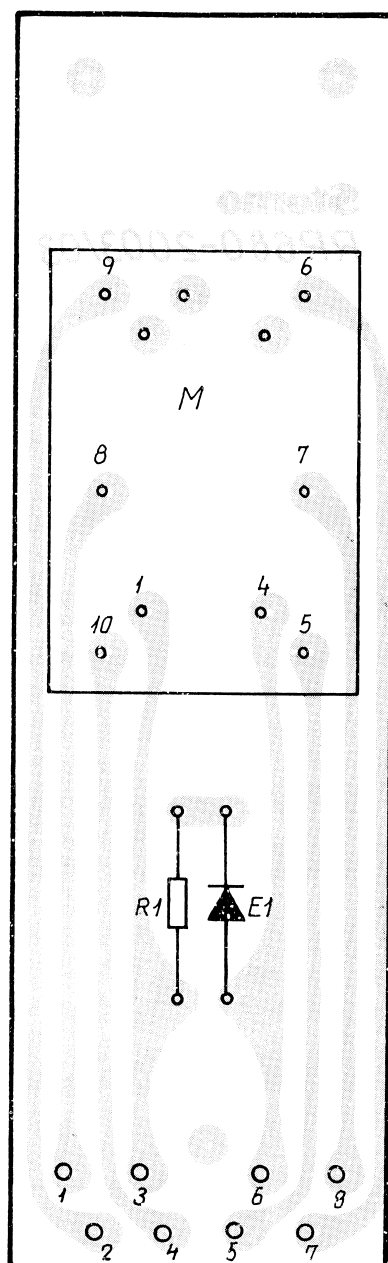
KODE

TEGN. NR.

D111871

A4

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
 TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



konstr./tegn
 OG / AMM
 3. 9. 69.
 godk.
 OG
 komp. liste
 D118771
 X113255

RELAY PANEL, RELÆPANEL
 RP 680-2003/03

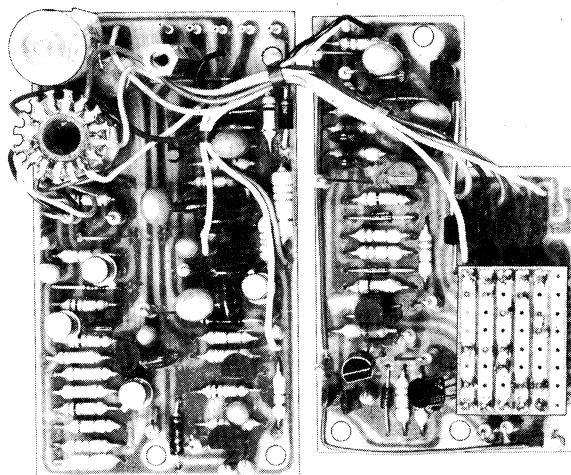
KODE

TEGN NR

D113421

A 4

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.

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 is 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.

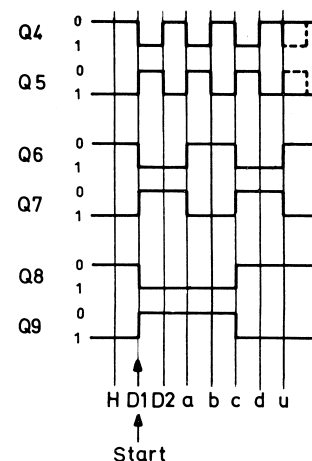
A control pulse is required to accomplish switch-over. This is obtained by cutting off the conductive transistor.

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

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 $\pm 5\%$.

Temperature Range

-30°C to +60°C.

Frequency Stability

Better than $\pm 1\%$.

Frequency Accuracy

Better than 0.5%.

Battery Drain

Stand-by: 14 mA ± 1 mA.

Tone-call button depressed: 30 mA ± 2 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, 2800 Hz.

Output Impedance

600 ohms $\pm 20\%$.

Output Level (at 1060 Hz)

-17 dBm ± 2 dBm.

Pulse Sequences

2 pulses (unmodulated), 70 msec \pm 15 msec each.

4 pulses (modulated), 70 msec \pm 15 msec each.

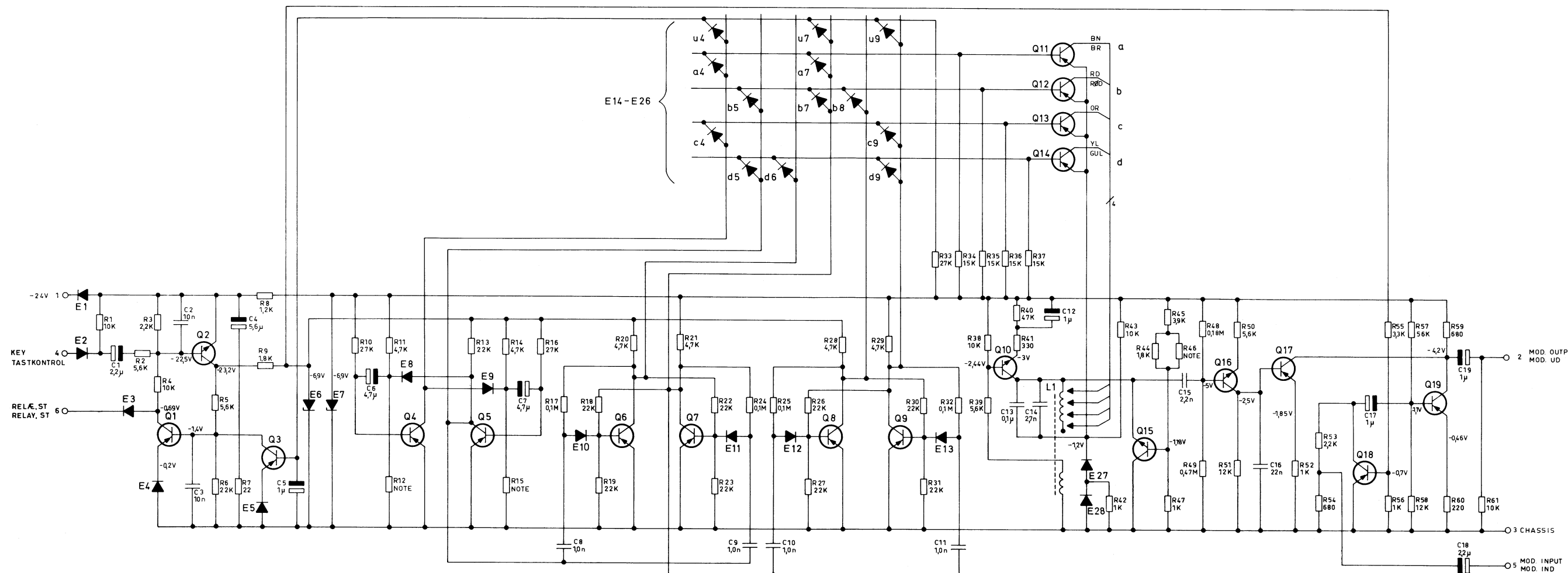
Max. time between pulses: 15 msec.

Installation

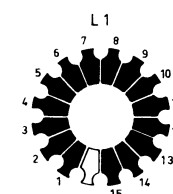
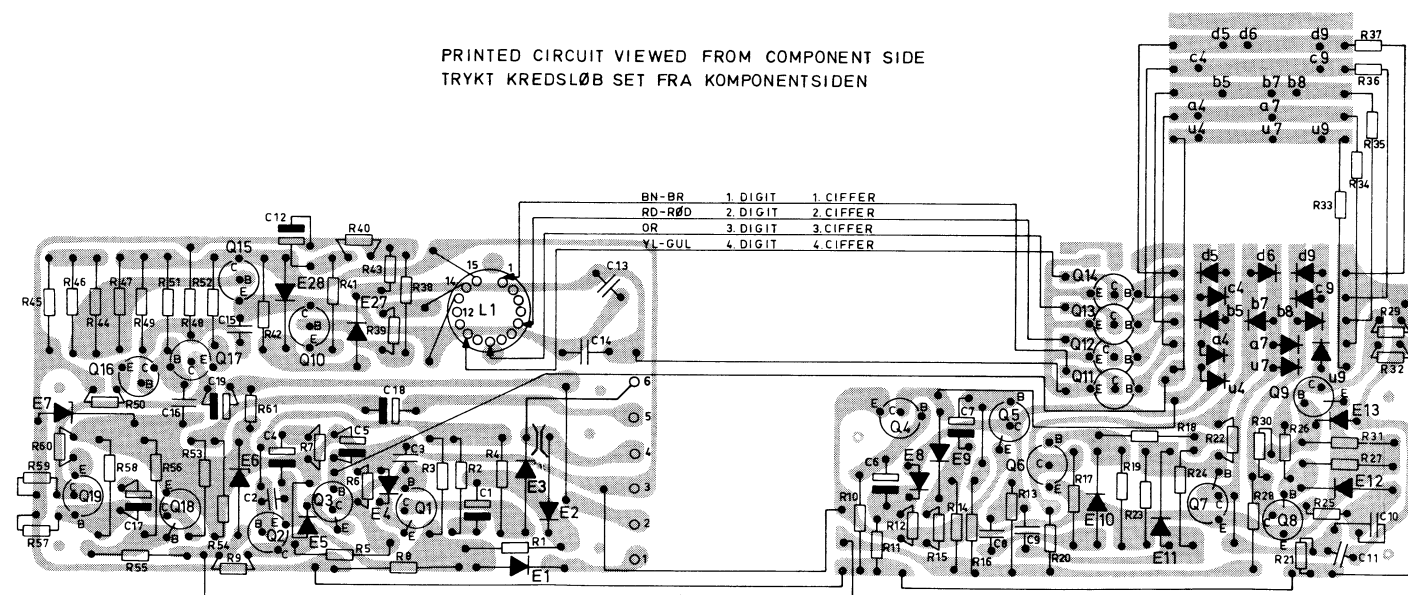
In the CQM600 mobile radiotelephone, the tone

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).



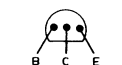
PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



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

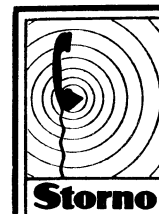
Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q9
Q11, Q12, Q13, Q14, Q17, Q18, Q19



BOTTOM VIEW
SET FRA BUNDEN



BOTTOM VIEW
SET FRA BUNDEN



konstr.itegn.
OG/AMM
25.8.69.
godk.
OG
komp.liste
X400 865

tone sequence unit
sekvenstoneenhed

ST684-2003

KODE

TEGN. NR.
D113.324
A3

Storno

TYPE	NO.	CODE	DATA
	C1	73.5102	2,2 μ F 20% Tantal
	C2	76.5070	10 nF 10% Polyester, FL
	C3	76.5070	10 nF 10% Polyester, FL
	C4	73.5126	4,7 μ F 20% Tantal
	C5	73.5114	1 μ F 20% Tantal
	C6	73.5103	4,7 μ F 20% Tantal
	C7	73.5103	4,7 μ F 20% Tantal
	C8	76.5069	1 nF 10% Polyester, FL
	C9	76.5069	1 nF 10% Polyester, FL
	C10	76.5069	1 nF 10% Polyester, FL
	C11	76.5069	1 nF 10% Polyester, FL
	C12	73.5114	1 μ F 20% Tantal
	C13	76.5068	0,1 μ F 1% Polystyr. TB
	C14	75.5019	2,7 nF 5% Polystyr. TB
	C15	76.5059	2,2 nF 10% Polystyr. FL
	C16	76.5071	22 nF 10% Polyester, FL
	C17	73.5114	1 μ F 20% Tantal
	C18	73.5102	2,2 μ F 20% Tantal
	C19	73.5114	1 μ F 20% Tantal
	R1	80.5261	10 k Ω 5% Carbon film
	R2	80.5258	5,6 k Ω 5% " "
	R3	80.5253	2,2 k Ω 5% " "
	R4	80.5261	10 k Ω 5% " "
	R5	80.5258	5,6 k Ω 5% " "
	R6	80.5265	22 k Ω 5% " "
	R7	80.5229	22 Ω 5% " "
	R8	80.5450	1,2 k Ω 5% " "
	R9	80.5252	1,8 k Ω 5% " "
	R10	80.5266	27 k Ω 5% " "
	R11	80.5257	4,7 k Ω 5% " "
	R12	80.52xx	adjusted/tilpasset
	R13	80.5265	22 k Ω 5% Carbon film
	R14	80.5257	4,7 k Ω 5% " "
	R15	80.52xx	adjusted/tilpasset
	R16	80.5266	27 k Ω 5% Carbon film
	R17	80.5273	0,1 M Ω 5% " "
	R18	80.5265	22 k Ω 5% " "
	R19	80.5265	22 k Ω 5% " "
	R20	80.5257	4,7 k Ω 5% " "
	R21	80.5257	4,7 k Ω 5% " "
	R22	80.5265	22 k Ω 5% " "
	R23	80.5265	22 k Ω 5% " "
	R24	80.5273	0,1 M Ω 5% " "
	R25	80.5273	0,1 M Ω 5% " "
	R26	80.5265	22 k Ω 5% " "
	R27	80.5265	22 k Ω 5% " "
	R28	80.5257	4,7 k Ω 5% " "

Storno

TYPE	NO.	CODE	DATA
	R29	80.5257	4,7 k Ω 5% Carbon film
	R30	80.5265	22 k Ω 5% " "
	R31	80.5265	22 k Ω 5% " "
	R32	80.5273	0,1 M Ω 5% " "
	R33	80.5263	15 k Ω 5% " "
	R34	80.5263	15 k Ω 5% " "
	R35	80.5263	15 k Ω 5% " "
	R36	80.5263	15 k Ω 5% " "
	R37	80.5266	27 k Ω 5% " "
	R38	80.5261	10 k Ω 5% " "
	R39	80.5258	5,6 k Ω 5% " "
	R40	80.5269	47 k Ω 5% " "
	R41	80.5243	330 Ω 5% " "
	R42	80.5249	1 k Ω 5% " "
	R43	80.5261	10 k Ω 5% " "
	R44	80.5252	1,8 k Ω 5% " "
	R45	80.5256	3,9 k Ω 5% " "
	R46	80.52xx	adjusted/tilpasset
	R47	80.5249	1 k Ω 5% Carbon film
	R48	80.5276	0,18 M Ω 5% " "
	R49	80.5281	0,47 M Ω 5% " "
	R50	80.5258	5,6 k Ω 5% " "
	R51	80.5262	12 k Ω 5% " "
	R52	80.5249	1 k Ω 5% " "
	R54	80.5247	680 Ω 5% " "
	R55	80.5255	3,3 k Ω 5% " "
	R56	80.5249	1 k Ω 5% " "
	R57	80.5270	56 k Ω 5% " "
	R58	80.5273	0,1 M Ω 5% " "
	R59	80.5247	680 Ω 5% " "
	R60	80.5242	270 Ω 5% " "
	R61	80.5261	10 k Ω 5% " "
	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

STONE SEQUENCE UNIT
SEKVENSTONEENHED

ST684

X400.865/2

Storno

TYPE	NO.	CODE	DATA
	E8- E28	99. 5028	Diode OA200
	Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19	99. 5144 99. 5121 99. 5144 99. 5144 99. 5144 99. 5144 99. 5144 99. 5144 99. 5144 99. 5143 99. 5144 99. 5144 99. 5144 99. 5144 99. 5143 99. 5143 99. 5144 99. 5144 99. 5144	Transistor BC214L Transistor BC107 Transistor BC214L Transistor BC214L Transistor BC214L Transistor BC214L Transistor BC214L Transistor BC214L Transistor BC214L Transistor BC108 Transistor BC214L Transistor BC214L Transistor BC214L Transistor BC214L Transistor BC108 Transistor BC108 Transistor BC214L Transistor BC214L Transistor BC214L

Storno

TYPE	NO.	CODE	DATA

TONE SEQUENCE UNIT
SEKVENSTONEENHED

ST684

X400. 865/2

Tone Receiver TR6811a.

Description.

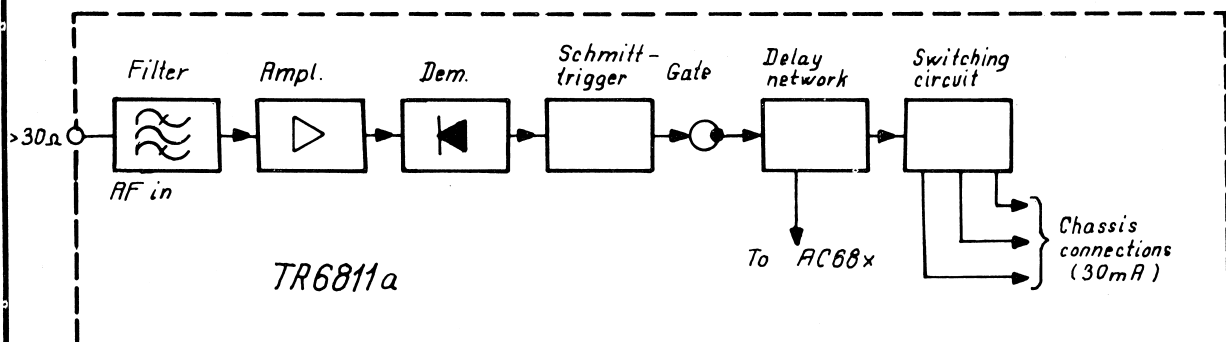
1. General.

TR6811a is a selective tone receiver, which - in conjunction with AA6811 - is used in tone calling systems employed by the CQF600 series radio telephone systems.

The function of TR6811a is to respond to the reception of a tone (pre-selected from a total of 12 fixed frequencies).

The call tone activates the tone receiver after a time period, which is permanently adjusted (250m sec.). On activation the three diode output are connected to chassis, and a DC signal is applied to an alarm circuit, if used. This condition ceases shortly after the end of the tone signal.

The unit is built up as shown in the below block diagram:



2. Principle of Operation.

2.1 Filter.

The first circuit element is a band-pass filter, consisting of a series circuit with capacitive coupling to a parallel circuit, both circuits being tuned to one of the twelve frequencies available. A series resistor of 12Ω is inserted in the input, which is to be connected to a generator impedance of approx. 40Ω . This resistor serves two purposes:

1. To render the Q-factor of the circuits more stable.
2. To isolate the filter from other parallel-coupled units.

2.2 Amplifier.

The filter is connected to an emitter-follower, which provides a high load impedance (100k Ω) to the filter, and a low generator impedance to the following signal demodulator.

2.3 Demodulator.

The signal demodulator is designed as a voltage-doubler rectifier, so that even a very low AF-level in the filter will activate the Schmitt-trigger following the demodulator.

2.4 Schmitt-trigger.

The Schmitt-trigger employs a minimum number of components. The common emitter resistor provides for compensation of deviations in the current gain of the transistors employed. Temperature stabilization of the trigger is achieved by means of a diode E3 inserted in the base of the 1st transistor.

2.5 Gate Circuit.

After the Schmitt-trigger follows a gate-circuit in the form of a diode gate, the function of which is to activate the following delay network.

2.6 Delay Network.

The delay network comprises two transistors, the latter of which performs the keying function proper. The time-integrator, the first transistor, can be adjusted to various time periods by replacement of C7. The time delay is determined by R13, C7 and the current gain of the transistor. The time delay network is restored in about 1/5 of the time for activation (determined by R12).

Q5 performs the deying function. The emitter potential is fixed, determined by the Zener voltage across E5. When conducting, Q5 supplies a negative voltage across the collector resistor, which can activate an alarm circuit. At the same time, it activates a switching circuit Q6.

2.7 Switching Circuit.

When conducting, the switching circuit causes chassis connection to the three diode outputs. This function can be utilized for activation of lamps or relays (max. permissible current drain is 30mA at each diode output).

TR6811a
Specification.

Typical values at 24V

1. Input impedance: $> 30\Omega$.
Within the range 1000 to 2900Hz
2. Frequency range: (12 tones)
One of the following frequencies:
1060Hz, 1160Hz, 1270Hz, 1400Hz,
1530Hz, 1670Hz, 1830Hz, 2000Hz,
2200Hz, 2400Hz, 2600Hz, 2900Hz.
3. Frequency accuracy: $< 0, 3\%$.
Deviation of f_0 for the remaining
tone frequencies, when the unit is
adjusted for 1060Hz.
4. Filter band with:
At 3dB attenuation rel. to f_0 $\frac{f_n}{f_0} = 0.978$.
5. Center frequency variation. $< 0, 5\%$.
At 3dB attenuation rel. to f_0 within
temperature range -30 to +60°C.
6. Sensitivity: 85mV.
Trigger level within the range
1000Hz to 2900Hz.
7. Input level: 170mV.
Trigger level inclusive 6dB allowance
8. Delay: 250m sec.
9. Current drain:
Without signal 4mA.
With signal 8mA.
10. Max. load:
Current drain at term. 3, 4 and 5 $\leq 30\text{mA}$ at each term.

11. Temperature range:

Working range

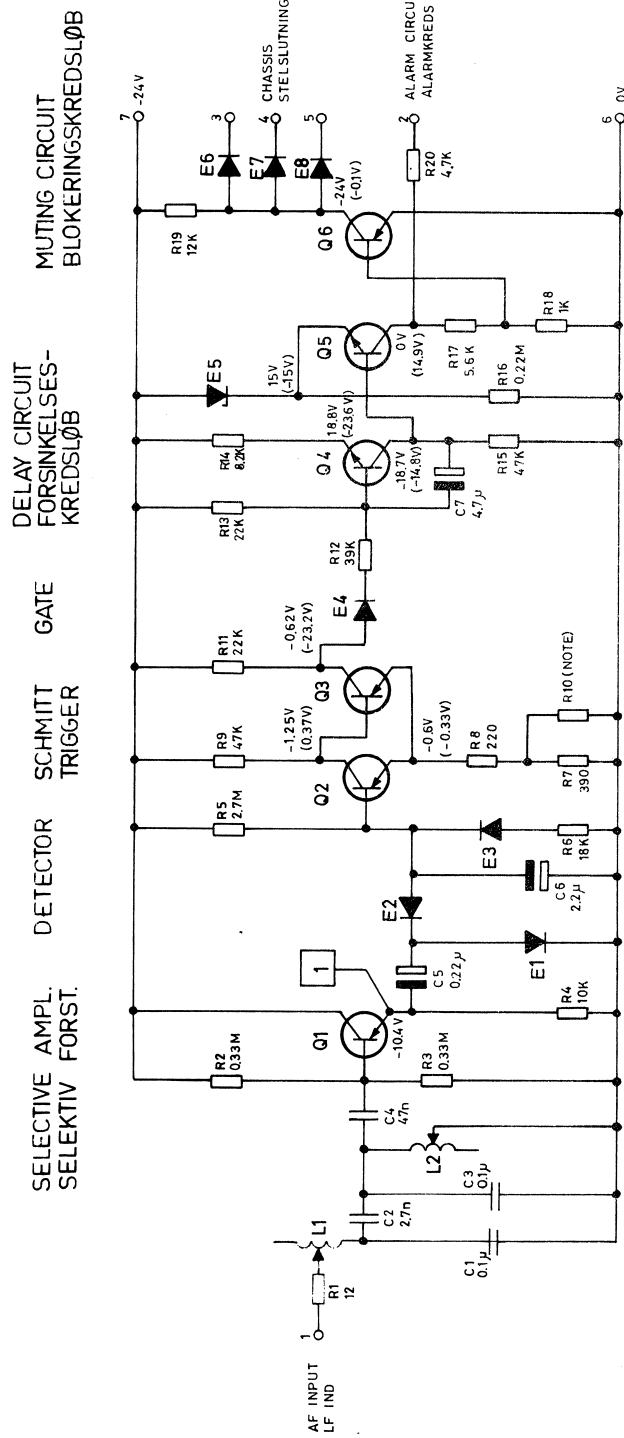
-25 to +50°C.

Operating range

-30 to 60°C.

12. Dimensions:

80 x 36mm.

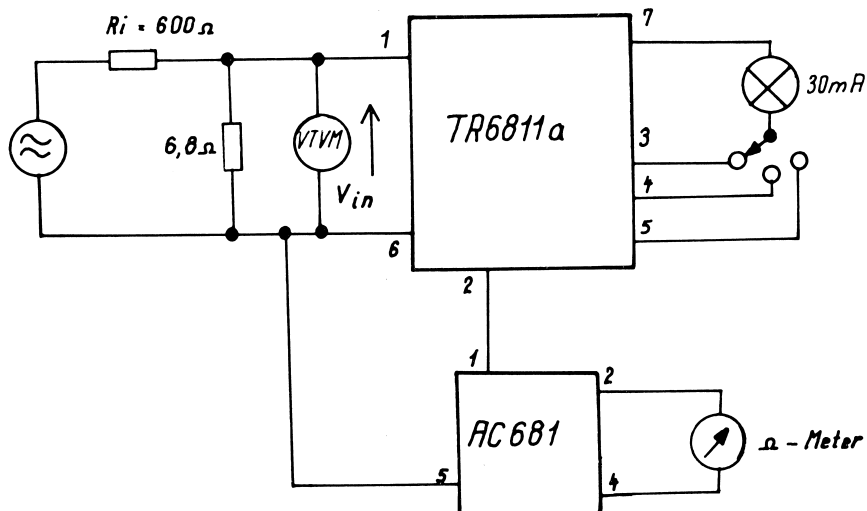


TR6811a.
Test Instructions.

1. Instruments required.

- 1 ea power supply 24V (150mA).
- 1 ea VT-voltmeter (PH-6012)
- 1 ea tone generator (HP-200 cd)
- 1 ea resistor 100Ω $1/8W$
- 1 ea resistor $6,8\Omega$ $1/8W$
- 1 ea alarm circuit AC681
- 1 ea frequency counter (1000 to 3000Hz)
- 1 ea resistor-decade max. $1k\Omega$ (Danbridge)

2. Test set-up.



3. Alignment and adjustment.

Set-up as under para. 2.

3.1 Solder connecting leads for tone coils L1 and L2 for 1060Hz (term. start and 1).

3.2 Using the frequency counter adjust the tone generator to 1060Hz, and adjust V_{in} to read 170mV. Connect the VT-voltmeter over R4 (test point 1).

3.3 Shunt L2 with 100 Ω , which causes the VT-voltmeter reading to drop about 45dB. Then align L1 for max. deflection of the VT-voltmeter over R4, and remove the 100 Ω resistor over L2.

3.4 Shunt L1 with 100 Ω , which causes the VT-voltmeter reading to drop about 20dB. Then align L2 for max. deflection of the VT-voltmeter over R4, and remove the 100 Ω resistor over L1.

3.5 Repeat as under 3.3 and 3.4

3.6 Seal cores in L1 and L2 with liquid silicone rubber.

3.7 Change VT-voltmeter to the TR input and adjust V_{in} to 85mV.

3.8 Insert R10 in form of the resistor cascade. Adjust the decade to a high ohmic value, and decrease until the tone receiver is just activated. Then insert the standard value nearest to the R10 reading (R10 approx. 100 Ω).

3.9 Decrease V_{in} to 0V. Then increase V_{in} slowly, checking that the tone receiver is activated when V_{in} = 85mV.

4. Testing of frequency accuracy.

Connect L1 and L2 for 1060Hz (term. start and 1). Adjust tone generator for max. VT-voltmeter deflection at test point 1, while maintaining V_{in} below the activation level of the tone receiver.

Using the frequency counter, check the frequency of the tone generator. All other tone frequencies are checked in the same way.

Requirement: Max. deviation: 0,3%.

6. Testing of trigger level.

If carried out simultaneously with the testing under 4 above, this test is quickly made, since the tone frequencies are tuned with the frequency counter connected to the tone generator for each tapping on L1 and L2. For each tone frequency measure the value of V_{in} at which the tone receiver is activated and deactivated.

Requirement: Activation level: $85\text{mV} \pm 1\text{dB}$

De-activation level: $60\text{mV} \pm 1\text{dB}$.

7. Testing of delay.

Connect L1 and L2 for one of the 12 tone frequencies, and adjust V_{in} at the same frequency until the tone receiver is positively activated. Measure the time period from the moment the tone signal was applied until the tone receiver is activated.

Requirement: Delay: $250\text{m sec.} \pm 50\text{m sec.}$

8. Checking the activation of the alarm circuit.

With the alarm circuit AC681 (term. 1) connected to the tone receiver (term. 2) measure the DC-voltage on TR term. 2 at $V_{in} <$ and $V_{in} >$ the level of activation.

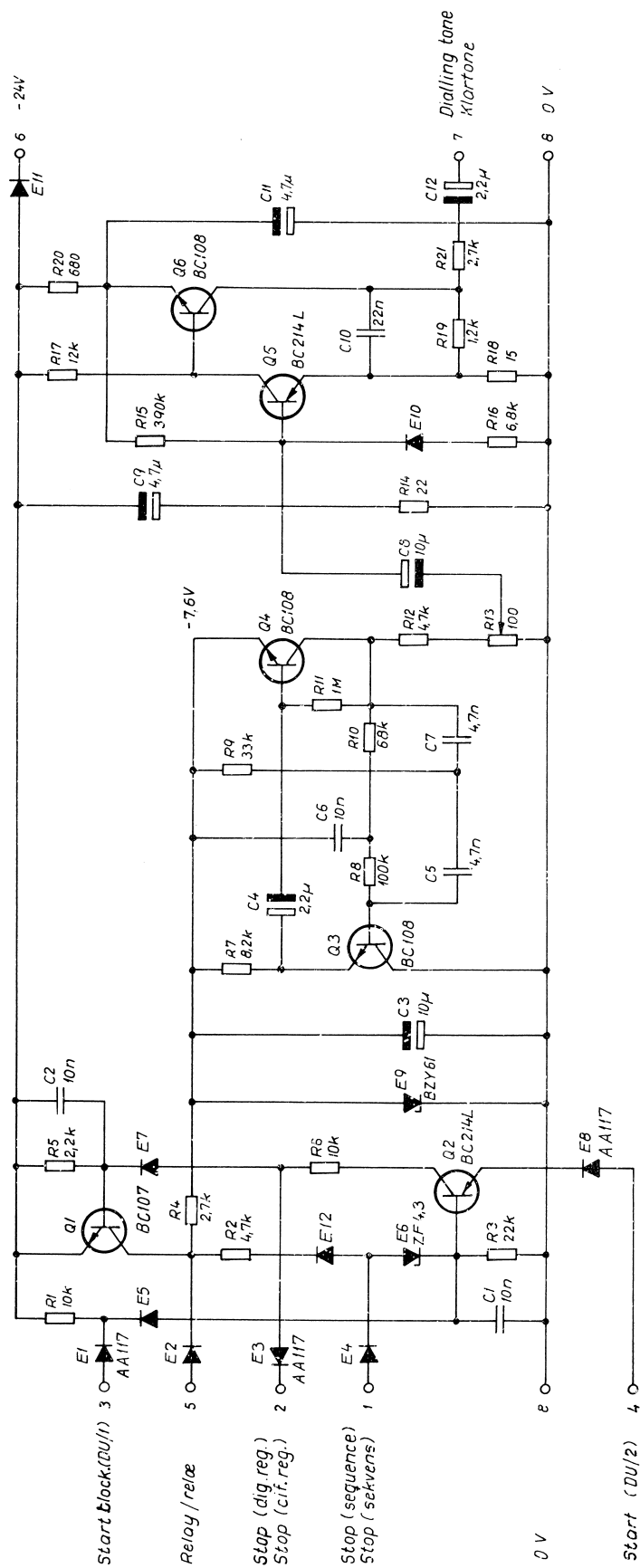
Requirement: DC = 0V at $V_{in} <$ activation level

DC $\geq 8,5\text{V}$ at $V_{in} >$ activation level.

9. Cheeking the chassis connections.

Apply a load of 30mA (lamp) between -24V and the following terminals, one at a time, : 3, 4, and 5.

Requirement: Chassis connection at $V_{in} > 85\text{mV}$.



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DIALLING TONE GENERATOR TT-680-2002
KLARTONEGENERATOR

KODE

TEGN. NR.

D 111382
A3

no	code	data	no	code	data
C1	76.5070	10nF 10% polyest FL 50V	E9	99.5075	Zenerdiode 7, 5V 5% 0, 25W
C2	76.5070	- - - - -	E10	99.5028	Diode 1N914
C3	73.5109	10µF 20% tantal 15V	E11	99.5028	- - - -
C4	73.5102	2, 2µF 20% tantal 35V	E12	99.5028	- - - -
C5	76.5061	4, 7nF 10% polyest. FL 50V	Q1	99.5121	Transistor BC107
C6	76.5070	10nF 10% polyest. FL 50V	Q2	99.5144	Transistor BC214L
C7	76.5061	4, 7nF 10% polyest. FL 50V	Q3	99.5143	Transistor BC108
C8	73.5109	10µF 20% tantal 15V	Q4	99.5143	Transistor BC108
C9	73.5126	4, 7 µF 20% tantal 35V	Q5	99.5144	Transistor BC214L
C10	76.5071	22nF 10% polyest. FL 50V	Q6	99.5143	Transistor BC108
C11	73.5126	4, 7 µF 20% tantal. 35V			
C12	73.5102	2, 2µF 20% tantal 35V			
R1	80.5261	10kΩ 5% carbon film 1/8W			
R2	80.5257	4, 7kΩ - - - -			
R3	80.5265	22kΩ - - - -			
R4	80.5254	2, 7kΩ - - - -			
R5	80.5253	2, 2kΩ - - - -			
R6	80.5261	10kΩ - - - -			
R7	80.5260	8, 2kΩ - - - -			
R8	80.5273	100kΩ - - - -			
R9	80.5267	33kΩ - - - -			
R10	80.5271	68kΩ - - - -			
R11	80.5285	1MΩ - - - -			
R12	80.5257	4, 7kΩ - - - -			
R13	86.5051	100Ω 20% trim. carbon film 0, 1W lin.			
R14	80.5229	22Ω 5% carbon film 1/8W			
R15	80.5280	390kΩ 5% carbon film 1/8W			
R16	80.5259	6, 8kΩ - - - -			
R17	80.5262	12kΩ - - - -			
R18	80.5227	15Ω - - - -			
R19	80.5250	1, 2kΩ - - - -			
R20	80.5247	680Ω - - - -			
R21	80.5254	2, 7kΩ - - - -			
E1	99.5123	Diode AA117			
E2	99.5028	Diode 1N914			
E3	99.5123	Diode AA117			
E4	99.5028	Diode 1N914			
E5	99.5028	- - - -			
E6	99.5116	Zenerdiode 4, 3V 5% 0, 25W			
E7	99.5028	Diode 1N914			
E8	99.5123	Diode AA117			



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PARTS LIST

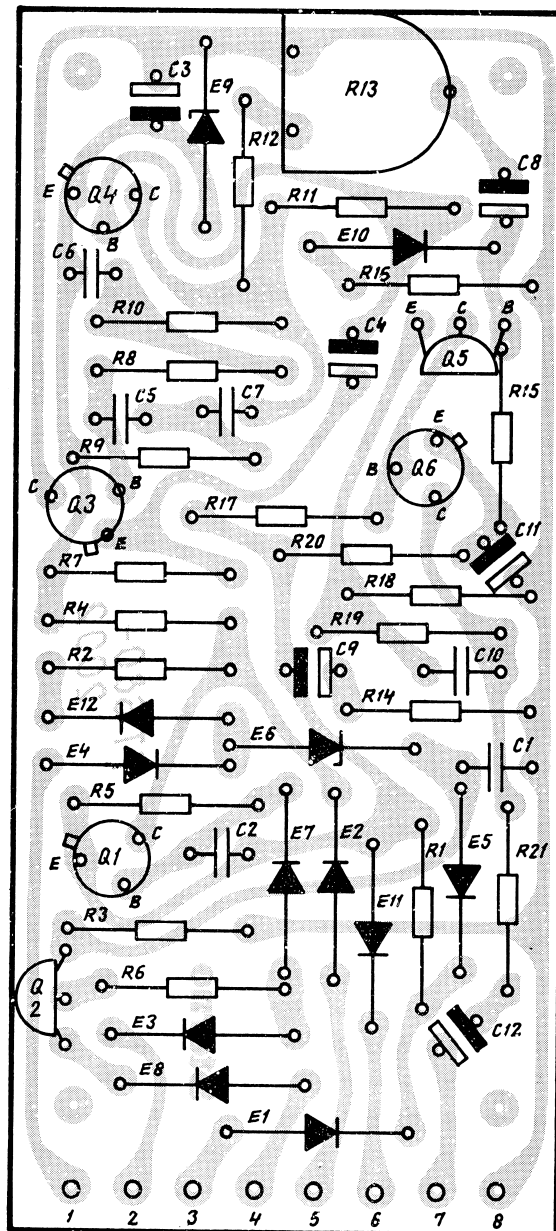
STYKLISTE

TT680-2002

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PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



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DIALLING TONE GENERATOR
KLARTONEGENERATOR

TT680 - 2002
KODE

TEGN. NR.

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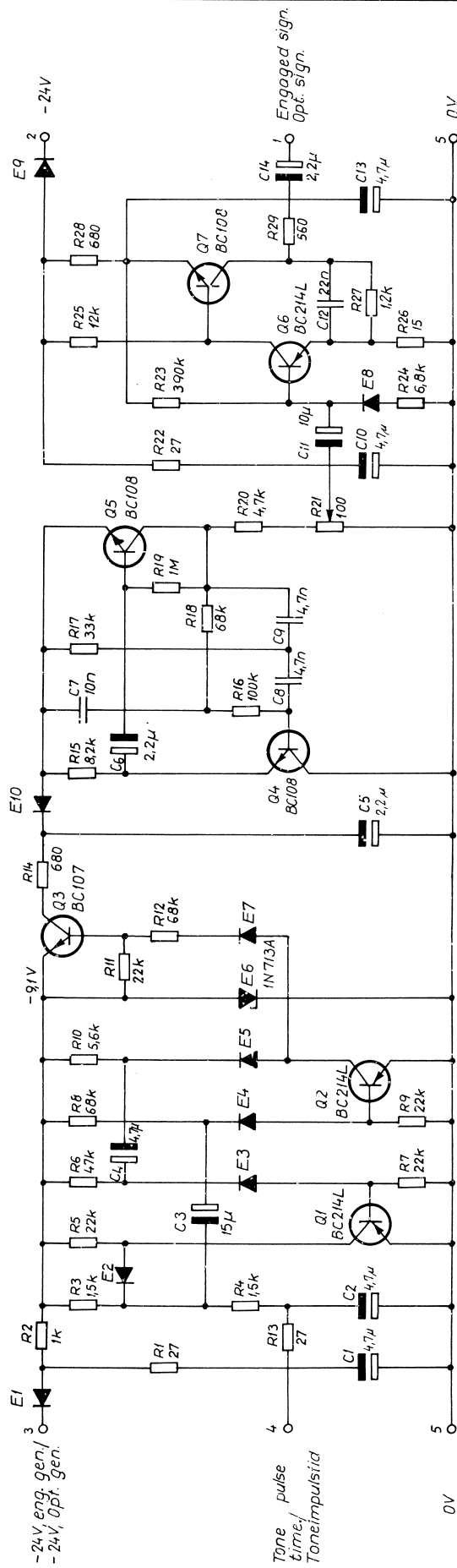
A 4

TT680-2002
Test procedure.

1. Connect 0V to term. 8 and -24V to term. 6. Connect a 330Ω resistor to term. 7 and 8.
2. Connect an oscilloscope to term. 7 and 8.
3. Connect 0V to term. 3 and next also to term. 4. The TT must not begin to oscillate.
4. Connect 0V to term. 4 and next to term. 3. The scope must show a sinusoidal signal with $f = 425\text{Hz}$ equiv. to period time $t_p \simeq 2,35\text{ms}$. (The potentiometer R_{13} must be turned to max. output signal).
5. Connect a 24V lamp to 0V and to term. 5. The lamp must illuminate.
6. The lamp must extinguish when either:
 - a) 0V is connected to term. 4,
 - b) or 0V is connected to term. 1,
 - c) or -24V is connected to term. 2,

Not: The lamp must illuminate again when 4 is repeated.

7. Measure the max. tone output signal with R_{13} turned to max. signal:
 $U_{\text{max.}} \simeq 1,4V_{\text{pp}}$. In normal usage in a system with $R_B \simeq 300\Omega$ the max. output signal will be $1V_{\text{pp}}$ and the normal dialling tone level will be $0,5V_{\text{pp}}$ corresponding with approximately $0,35V_{\text{pp}}$ across the desk set when connected through a 600Ω line.
8. Check $I_{\text{std.by}} \simeq 11\text{mA}$ and
 $I_{\text{act.}} \simeq 22,5\text{mA}$.



$t_{TONE} = 175\text{ ms}$
 $t_{PAUSE} = 470\text{ ms}$ (term. 4-5 kortsl.) (term. 4-5 open)
 $t_{PAUSE} = 825\text{ ms}$ (term. 4-5 åben.) (term. 4-5 strapped)



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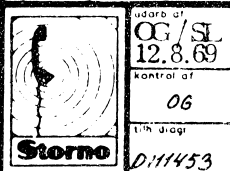
ENGAGED TONE GENERATOR
 OPTAGET TONEGENERATOR
 TT 680-2003

KODE

TEGN. NR.

D 111453 A3

no	code	data	no	code	data
C1	73.5126	4,7 μ F 20% tantal 35V	E4	99.5028	Diode 1N914
C2	73.5126	- - - - -	E5	99.5028	- - - -
C3	73.5105	15 μ F 20% tantal 15V	E6	99.5042	Zenerdiode 9,1V 5% 0,250W
C4	73.5126	4,7 μ F 20% tantal 35V	E7	99.5028	Diode 1N914
C5	73.5102	2,2 μ F 20% tantal 35V	E8	99.5028	- - - -
C6	73.5102	- - - - -	E9	99.5028	- - - -
C7	76.5070	10nF 10% polyest. FL 50V	E10	99.5028	- - - -
C8	76.5061	4,7nF 10% polyest. FL 50V	Q1	99.5144	Transistor BC214L
C9	76.5061	- - - - -	Q2	99.5144	- - - -
C10	73.5126	4,7 μ F 20% tantal 35V	Q3	99.5121	Transistor BC107
C11	73.5109	10 μ F 20% tantal 15V	Q4	99.5143	Transistor BC108
C12	76.5071	22nF 10% polyest FL 50V	Q5	99.5143	Transistor BC108
C13	73.5126	4,7 μ F 20% tantal 35V	Q6	99.5144	Transistor BC214L
C14	73.5102	2,2 μ F 20% tantal 35V	Q7	99.5143	Transistor BC108
R1	80.5230	27 Ω 5% carbon film 1/8W			
R2	80.5249	1k Ω - - - -			
R3	80.5251	1,5k Ω - - - -			
R4	80.5251	- - - - -			
R5	80.5265	22k Ω - - - -			
R6	80.5269	47k Ω - - - -			
R7	80.5265	22k Ω - - - -			
R8	80.5271	68k Ω - - - -			
R9	80.5265	22k Ω - - - -			
R10	80.5258	5,6k Ω - - m -			
R11	80.5265	22k Ω - - - -			
R12	80.5271	68k Ω - - - -			
R13	80.5230	27 Ω - - - -			
R14	80.5247	680 Ω - - - -			
R15	80.5260	8,2k Ω - - - -			
R16	80.5273	100k Ω - - - -			
R17	80.5267	33k Ω - - - -			
R18	80.5271	68k Ω - - - -			
R19	80.5285	1M Ω - - - -			
R20	80.5257	4,7k Ω - - - -			
R21	86.5051	100 Ω 20% trim. car- bon film 0,1W lin.			
R22	80.5230	27 Ω 5%			
R23	80.5280	390k Ω - - - -			
R24	80.5259	6,8k Ω - - - -			
R25	80.5262	12k Ω - - - -			
R26	80.5227	15 Ω - - - -			
R27	80.5250	1,2k Ω - - - -			
R28	80.5247	680 Ω - - - -			
R29	80.5246	560 Ω - - - -			
E1	99.5028	Diode 1N914			
E2	99.5028	- - - -			
E3	99.5028	- - - -			

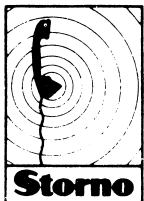
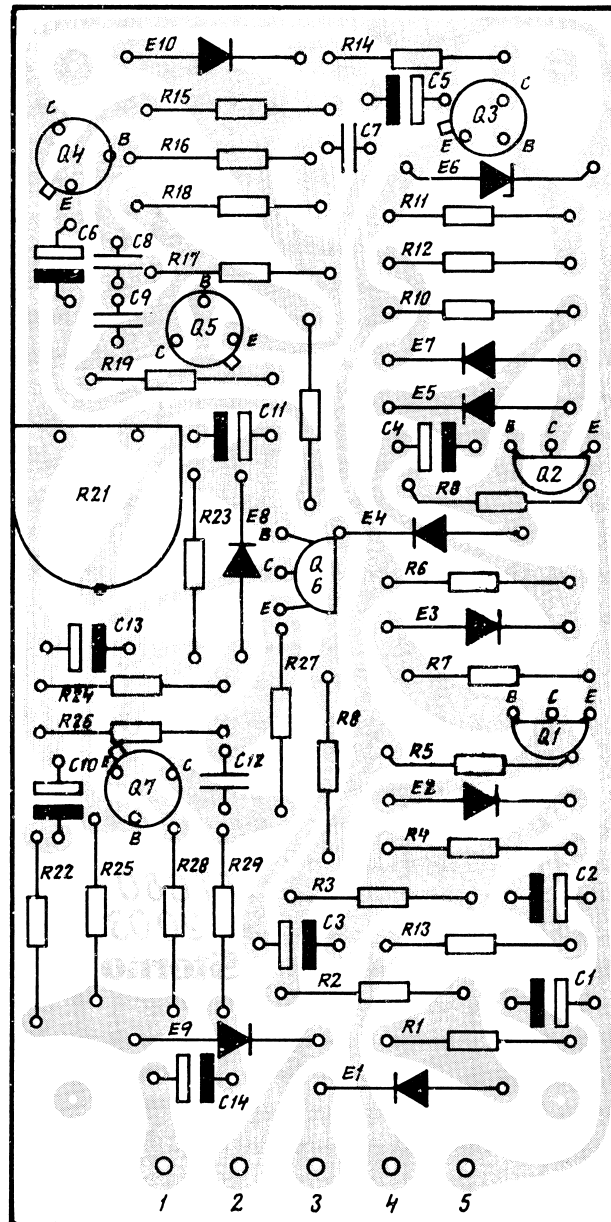


PARTS LIST
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Comp. list
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PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
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ENGAGED TONE GENERATOR
OPTAGET TONEGENERATOR

TT680 - 2003
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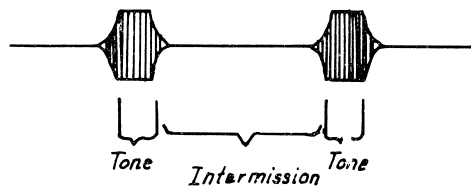
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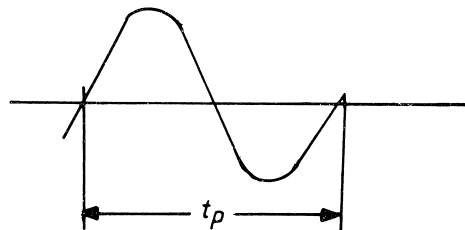
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TT680-2003
Test procedure.

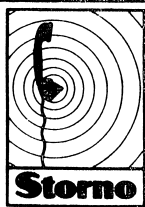
1. Connect 0V to term. 5 and -24V to term. 2. Check $I_{\text{stand by}} \simeq 8\text{mA}$. Connect a 560Ω resistor to term. 1 and 5.
2. Connect an oscilloscope to term. 1 and 5. When term. 3 is connected to -24V check $I_{\text{act.}} \simeq 22,5\text{mA}$ and control that the tone signal has the following appearance:



3. Check $t_{\text{tone}} \simeq 175\text{ms}$ and $t_{\text{interm.}} \simeq 825\text{ms}$ both to be within $\pm 10\%$.
4. Connect 0V to term. 4. The duration of the intermission between the tone bursts is now changed to $t_{\text{interm.}} \simeq 470\text{ms} \pm 10\%$.
5. Connect 0V to the collector of Q_2 (anode of E_5 or E_7). The tone signal will now change to a constant sinusoidal signal where one top is slightly "cut".
6. Adjust potentiometer R21 to max. output $U_{\text{out}} \geq 4,5V_{\text{pp}}$
7. Adjust sweep time on the scope to $0,5\text{ms/cm}$. Check the period time to $t_p \simeq 2,35\text{ms}$. This corresponds to $f = 1/t_p = 425\text{Hz}$.



Rettet d. 9-5-68



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TIMING - UNIT
TIDSFORDELINGSENHED

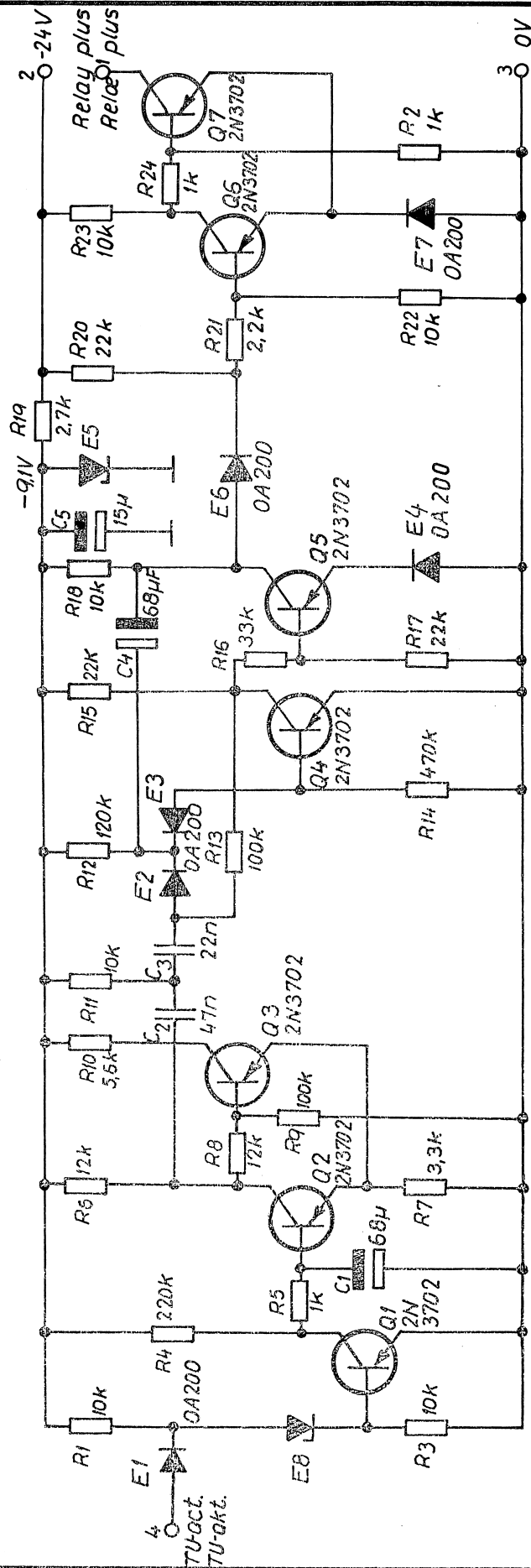
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A 4



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Rettet d 9-5-68

no	code	data	no	code	data
R1	80.5261	10k 5% 1/8 W	Q1	99.5144	BC214L transistor
R2	80.5249	1k - -	Q2	-	- -
R3	80.5261	10k - -	Q3	-	- -
R4	80.5277	220k - -	Q4	-	- -
R5	80.5249	1k - -	Q5	-	- -
R6	80.5262	12k - -	Q6	-	- -
R7	80.5255	3,3k - -	Q7	-	- -
R8	80.5262	12k - -			
R9	80.5273	100k - -			
R10	80.5258	5,6k - -			
R11	80.5261	10k - -			
R12	80.5274	120k - -			
R13	80.5273	100k - -			
R14	80.5281	470k - -			
R15	80.5265	22k - -			
R16	80.5267	33k - -			
R17	80.5265	22k - -			
R18	80.5261	10k - -			
R19	80.5254	2,7k - -			
R20	80.5265	22k - -			
R21	80.5253	2,2k - -			
R22	80.5261	10k - -			
R23	-	10k - -			
R24	80.5249	1 k - -			
C1	73.5106	68 μ F 20% tantal 15 V			
C2	76.5072	47nF 10% polyest.50V			
C3	76.5071	22nF 10% - -			
C4	73.5106	68 μ F 20% tantal 15V			
C5	73.5105	15 μ F - - -			
E1	99.5028	1N914 diode			
E2	-	- -			
E3	-	- -			
E4	-	- -			
E5	99.5042	9,1V, zenerdiode			
E6	99.5028	1N914 diode			
E7	-	- -			
E8	99.5116	4,3 V, zenerdiode			

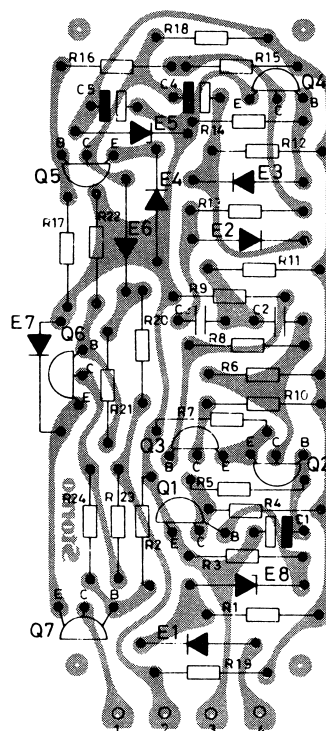


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tjrh diag
D110516

PART LIST
STYKLISTE

TU680-2002

comp list
X110517
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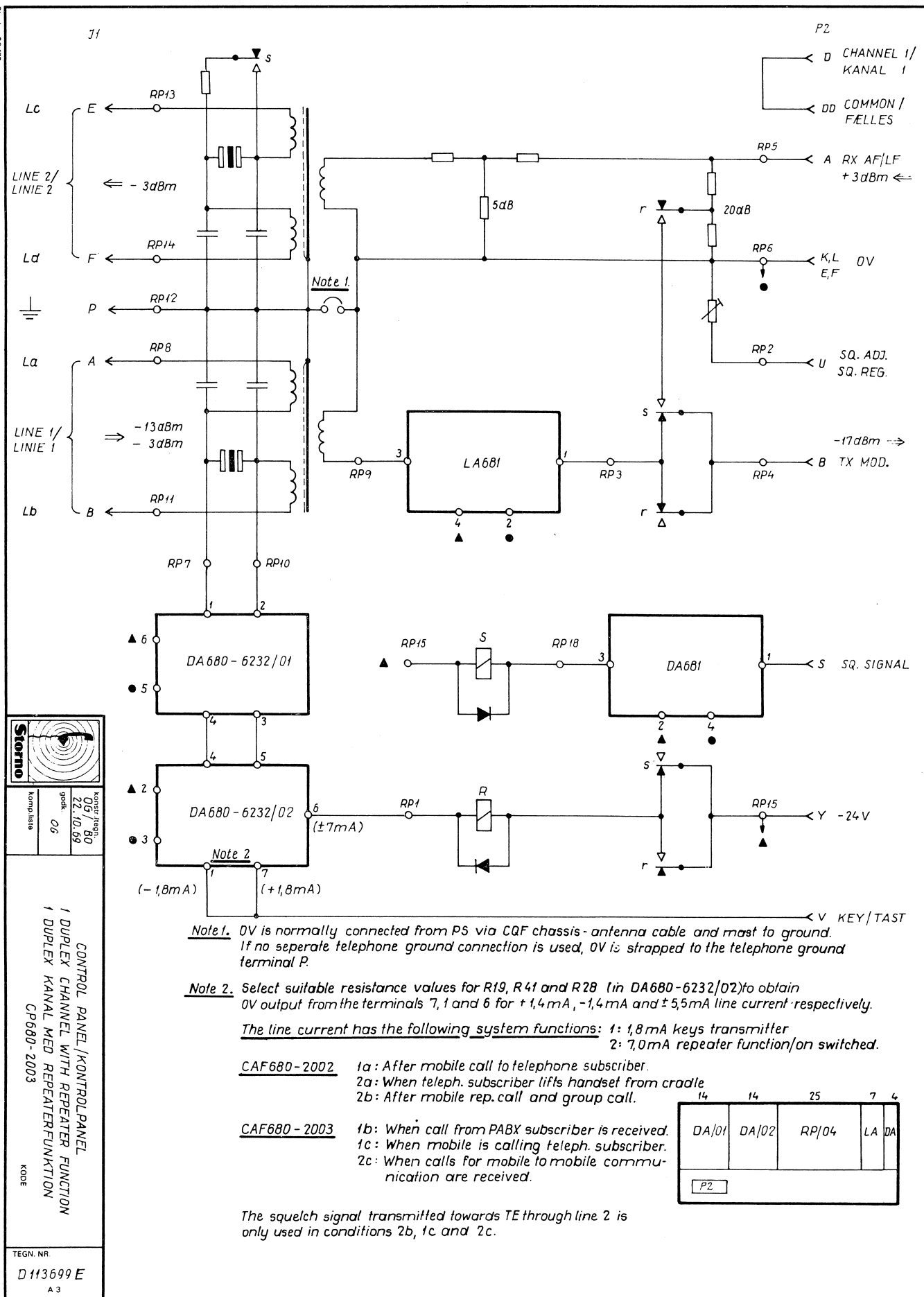


PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

TIMING UNIT
TIDSFORDELINGSENHED

TU680-2002

SECTION 6



Note 1. DV is normally connected from PS via CQF chassis-antenna cable and mast to ground.
If no separate telephone ground connection is used, DV is strapped to the telephone ground terminal P.

Note 2. Select suitable resistance values for R19, R41 and R28 (in DA680-6232/02) to obtain 0V output from the terminals 7, 1 and 6 for +1,4mA, -1,4mA and $\pm 5,5$ mA line current respectively.

The line current has the following system functions: 1: 1,8 mA keys transmitter
2: 7,0 mA repeater function/on switched.

CAF680-2002 1a: After mobile call to telephone subscriber.

2a: When teleph. subscriber lifts handset from cradle
2b: After mobile rep. call and group call. 14

CAF680 - 2003

1b: When call from PABX subscriber is received.
1c: When mobile is calling teleph. subscriber.
2c: When calls for mobile to mobile communication are received.

14	14	25	7
DA/01	DA/02	RP/04	LA DA
P2			

The squelch signal transmitted towards TE through line 2 is only used in conditions 2b, 1c and 2c.

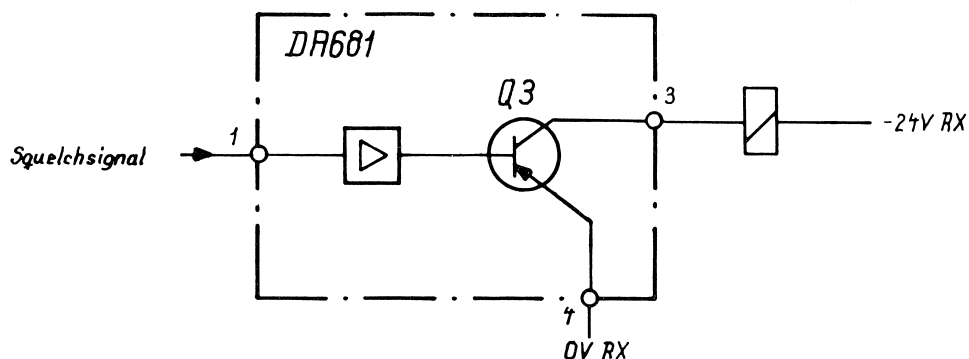
DC-Amplifier DA681

Application.

The function of DC-amplifier 681 is to switch on and off the loudspeaker, depending upon the level of the squelch signal.

Operation.

The squelch signal is fed from the receiver to the DC-amplifier stages Q1 and Q2. The amplified signal is then applied to the base of transistor Q3, the collector of which is connected to -24V via an external relay, which controls switching of the speaker.



At a squelch level between -16V and -8V on terminal 1, transistor Q3 becomes conducting, which causes the relay to operate, and the speaker to be switched on.

A squelch level above -16V cuts off Q3, and the relay releases, switching off the loudspeaker.

Specification.

Squelch levels:

Cut-off	-24V.
Open	-8V.
Opening level	-16V $\pm 20\%$.

Collector current in Q3:

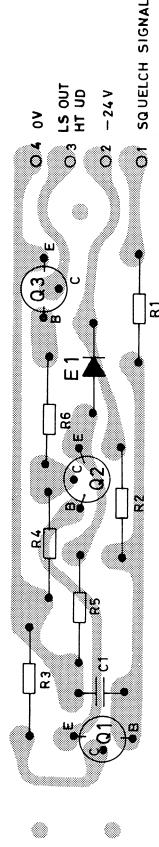
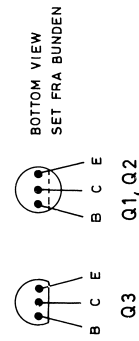
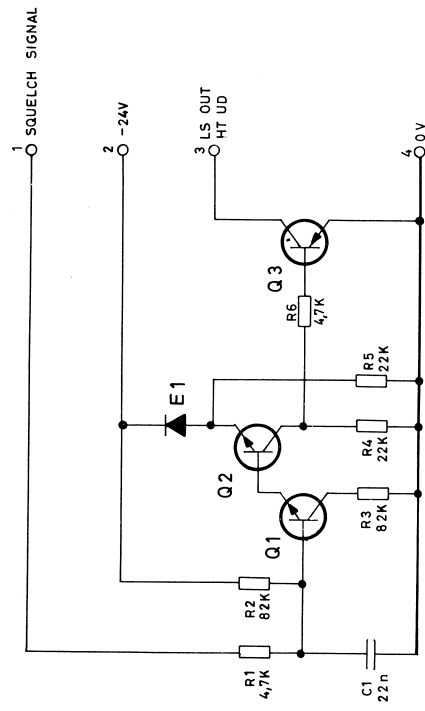
Max. 100mA.

Temperature range:

-30°C to +60°C.

Supply voltage:

-24V $\pm 5\%$.



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN

SQUELCH AMPLIFIER
SQUELCH FORSTÆRKER

DA681

D400:821/2

no	code	data	no	code	data
C1	76.5081	2, 2 μ F 5% polyest. FL 63V	E8-9	99.5028	Diode 1N914
C2	74.5146	4, 7nF -20+50% ceram. II DI 5000V	Q1	99.5181	Transistor 2N3704
C3	74.5146	4, 7nF -20+50% ceram. II DI 5000V	Q2-4	99.5144	Transistor BC214L
C4	74.5146	4, 7nF -20+50% ceram.	T1	60.5130	Transformer
C6	76.5069	1nF 10% polyest. FL 50V			
C7	76.5069	1nF 10% polyest. FL 50V			
R1	81.5036	82 Ω 5% carbon film 1/2W			
R2	81.5036	82 Ω 5% carbon film 1/2W			
R3	84.5006	1 k Ω 10% wirewound 5.5W			
R4	84.5006	1 k Ω 10% wirewound 5.5W			
R5	80.5261	10k Ω 5% carbon film 1/8W			
R6	80.5261	10k Ω 5% carbon film 1/8W			
R7	80.5255	3.3 k Ω 5% carbon film 1/8W			
R9	80.5267	33 k Ω 5% carbon film 1/8W			
R10	80.5259	6.8k Ω 5% carbon film 1/8W			
R11	80.5259	6.8k Ω 5% carbon film 1/8W			
R12	80.5267	33 k Ω 5% carbon film 1/8W			
R13	80.5261	10 k Ω 5% carbon film 1/8W			
R14	80.5261	10k Ω 5% carbon film 1/8W			
E1-4	99.5020	Diode 1N4004			
E5	99.5042	Zener-diode 9.1V 5% 0.25W			
E6	99.5042	Zener-diode 9.1V 5% 0.25W			
E7	99.5114	Zener-diode 5.6V 5% 0.25W			

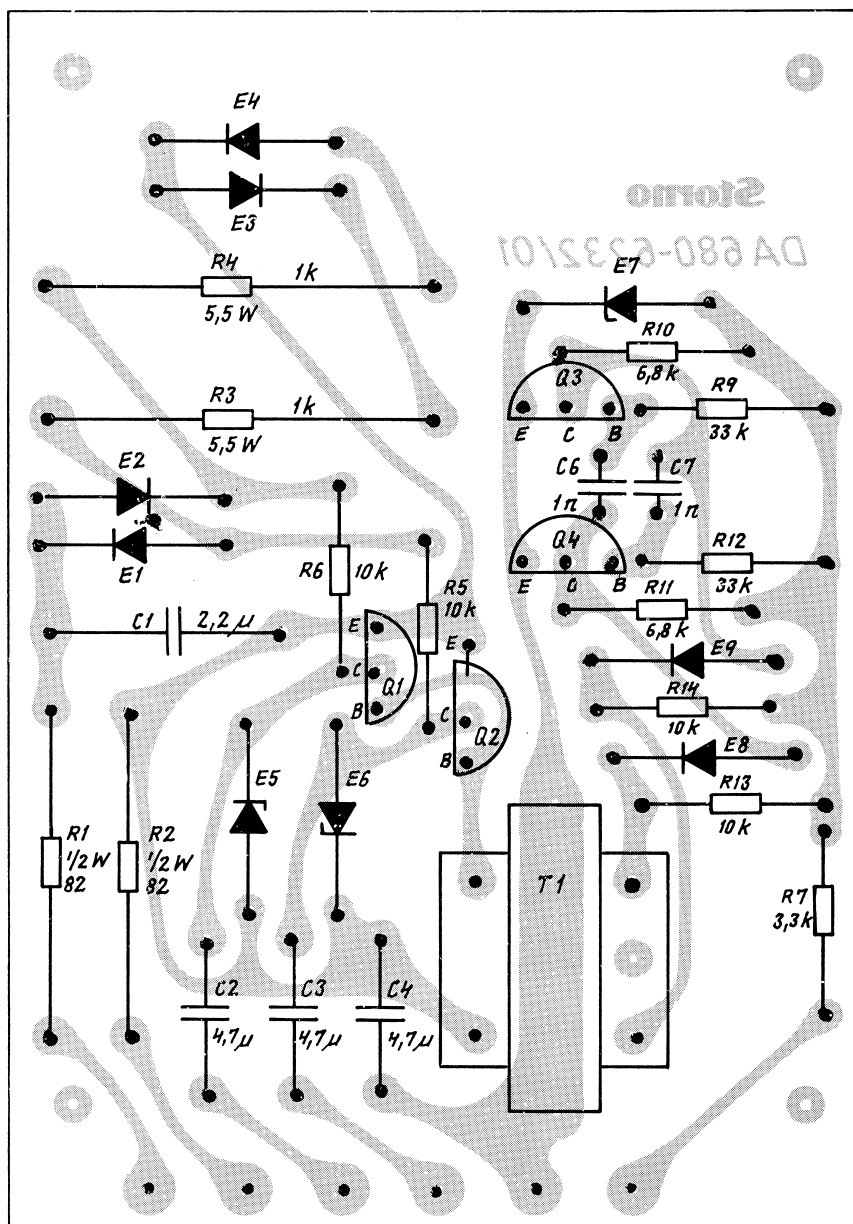


KHo/HNE
 9.10.70
 KHo
 11th diag
 DI12857

PARTS LIST
STYKLISTE

DA680-6232/01

comp list
 X113140
 bag no 1 of 1



Hou / JWA
14 . 4 . 69

NH

Diag. nr. D112857

PLACERINGSTEGNING FOR DA 680 - 6232/01
COMPONENT LOCATION DRAWING FOR " "

1117901

no	code	data	no	code	data
C8-11	73.5114	1 μ F 20% tantal 30V	R38	80.5269	47 k Ω 5% carbon film 1/8W
R8	80.5255	3.3 k Ω 5% carbon film 1/8W	R39	80.5269	47 k Ω 5% carbon film 1/8W
R15	80.5269	47 k Ω 5% carbon film 1/8W	R40	80.5255	3.3 k Ω 5% carbon film 1/8W
R16	80.5269	47 k Ω 5% carbon film 1/8W	R42	80.5265	22 k Ω 5% carbon film 1/8W
R17	80.5255	3.3 k Ω 5% carbon film 1/8W	R43	80.5267	33 k Ω 5% carbon film 1/8W
R18	80.5265	22 k Ω 5% carbon film 1/8W	R44	80.5269	47 k Ω 5% carbon film 1/8W
R20	80.5267	33 k Ω 5% carbon film 1/8W	R45	80.5265	22 k Ω 5% carbon film 1/8W
R21	80.5269	47 k Ω 5% carbon film 1/8W	R46	80.5262	12 k Ω 5% carbon film 1/8W
R22	80.5265	22 k Ω 5% carbon film 1/8W	R47	80.5258	5.6 k Ω 5% carbon film 1/8W
R23	80.5262	12 k Ω 5% carbon film 1/8W	R48	80.5283	680 k Ω 5% carbon film 1/8W
R24	80.5258	5.6 k Ω 5% carbon film 1/8W	R49	80.5269	22 k Ω 5% carbon film 1/8W
R25	80.5283	680 k Ω 5% carbon film 1/8W	R50	80.5265	22 k Ω 5% carbon film 1/8W
R26	80.5265	22 k Ω 5% carbon film 1/8W	E10	99.5123	Diode AA117
R27	80.5265	22 k Ω 5% carbon film 1/8W	E11	99.5123	Diode AA117
R29	80.5267	33 k Ω 5% carbon film 1/8W	E12-17	99.5028	Diode 1N914
R30	80.5270	56 k Ω 5% carbon film 1/8W	E18	99.5123	Diode AA117
R31	80.5269	47 k Ω 5% carbon film 1/8W	E19	99.5123	Diode AA117
R32	80.5265	22 k Ω 5% carbon film 1/8W	E20	99.5028	Diode 1N914
R33	80.5262	12 k Ω 5% carbon film 1/8W	E21	99.5028	Diode 1N914
R34	80.5258	5.6 k Ω 5% carbon film 1/8W	E22	99.5114	Zenerdiode 5.6V 5% 0.25W
R35	80.5283	680 k Ω 5% carbon film 1/8W	Q5-12	99.5144	Transistor BC214L
R36	80.5265	22 k Ω 5% carbon film 1/8W	R19	Adjustment resistors, optimum value selected at factory. Justeringsmodstande isættes ved afprøvningen.	
R37	80.5265	22 k Ω 5% carbon film 1/8W	R28		
			R41		

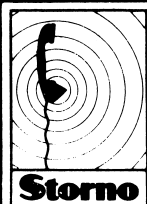
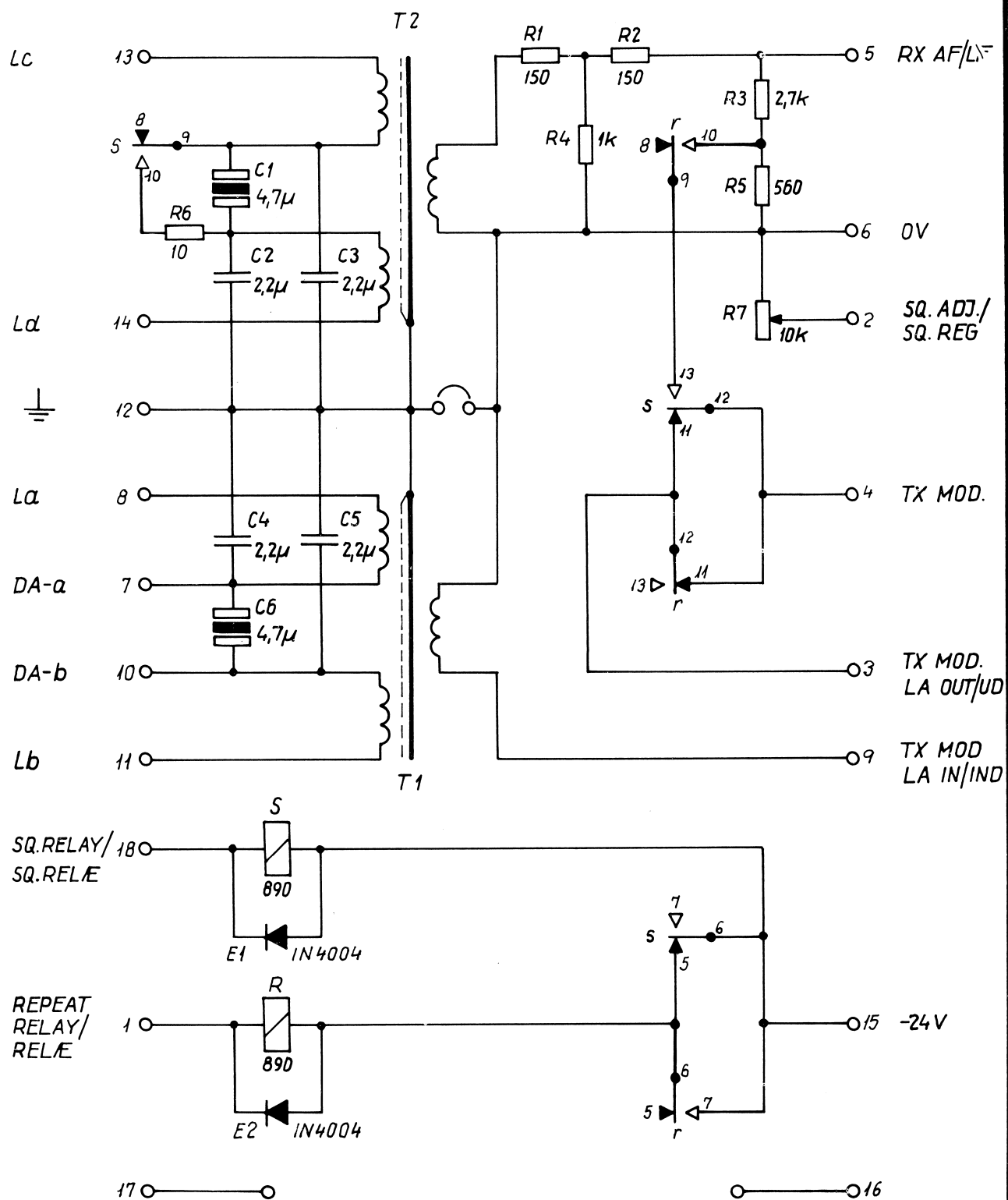


order of
 KFB/HNI
 9.10.70
 control of
RH
 till date
 D112857

PARTS LIST
STYKLISTE

DA680-6232/02

comp list
 X113141
 bid no 1 of 1



konstr./tegn.
06 / 80
22.10.69
godk.
06
komp.liste
X113731

LINE PANEL/LINIE PANEL
RP680-2003/04

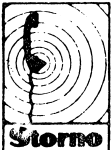
KODE

TEGN. NR.

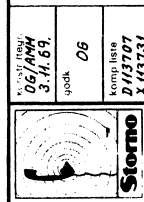
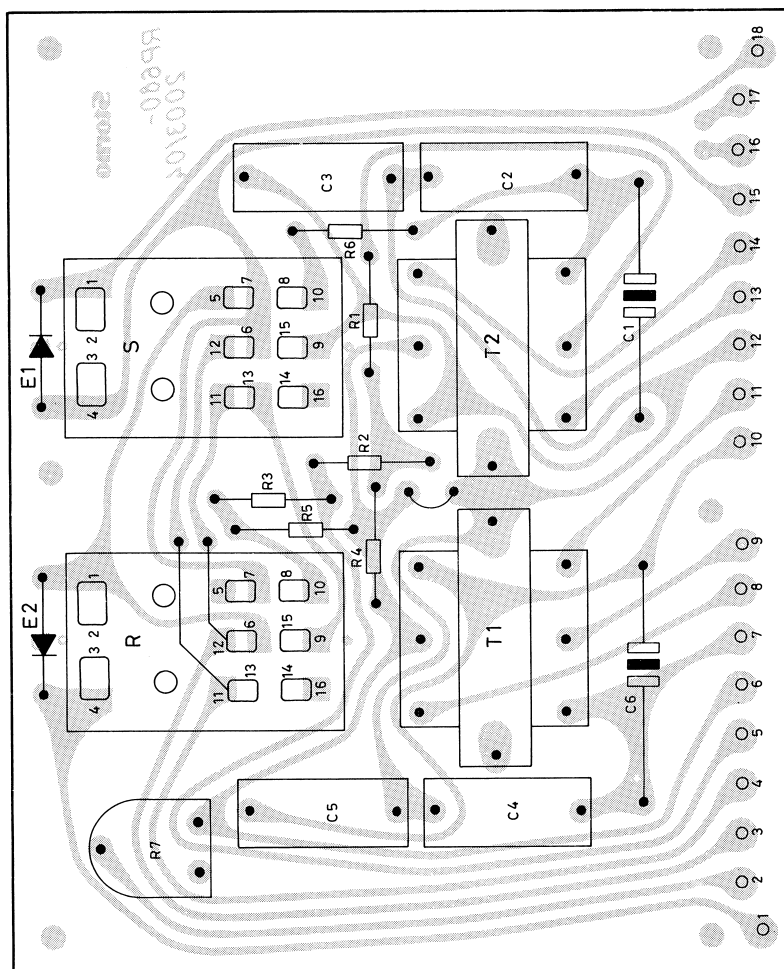
D 113702

A4

no	code	data	no	code	data
C1	73.5007	4,7 μ F -10+100% elko 100V (Bip.)			
C2	76.5081	2,2 μ F 5% polyest.FL63V			
C3	76.5081	- - - - -			
C4	76.5081	- - - - -			
C5	76.5081	- - - - -			
C6	73.5007	4,7 μ F -10+100% elko 100V (Bip.)			
R1	80.5239	150 Ω 5% carb.film 1/8W			
R2	80.5239	150 Ω - - -			
R3	80.5254	2,7k Ω - - -			
R4	80.5249	1k Ω - - -			
R5	80.5246	560 Ω - - -			
R6	80.5225	10 Ω - - -			
R7	86.5039	10k Ω 20% adjust carb.film 0,1W lin.			
E1	99.5028	Diode 1N4004			
E2	99.5028	Diode 1N4004			
ReR	58.5055	Relay 24V 890 Ω 21-21, 21-21			
ReS	58.5055	- - - - -			
T1	60.5097	Transformer AF/ LF, 150/150/600 Ω			
T2	60.5097	- - - - -			

	udarb. of	OG/BHAn	PARTS LIST STYKLISTE RP680-2003/04	comp. list X113731 diad. no at
	kontrol. at	OG		
	titih. diagr.			
	D113702			

PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



LINE PANEL / LINIEPANEL RP680-2003/04

DM3754

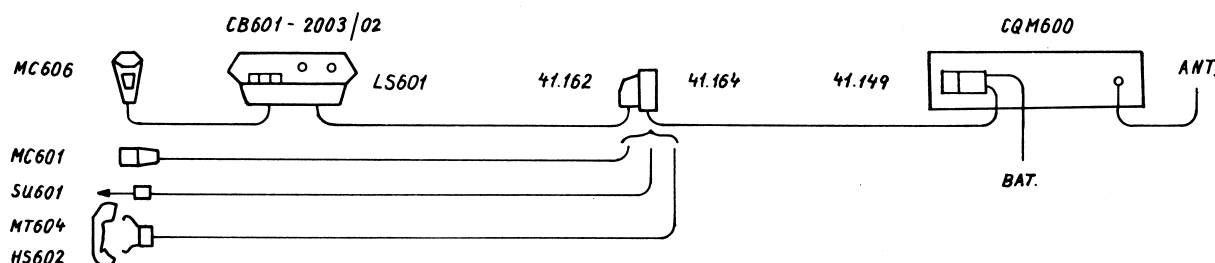
SECTION 7

Control Box CB601-2003/02 (D113972).

General.

The control box type CB601-2003/02 is intended for remote control of the radio equipment CQM600 employed in the system solutions CAF680-2002 and -2003. The box is equipped with the loudspeaker unit LS601 mounted under the control unit itself.

The box unit is mounted under the panel of a vehicle in the same way as stated in the CQM manuals. From the box runs a 1,5m 26 conductor cable which ends in a connector (41.162) intended for connection to a fixed, mounted "wall box" (41.164). The installation cable from the transmitter/receiver cabinet is connected to the wall box as shown on the standard installation cable diagram D400.745. As stated on the unit box diagram, the blue wire is connected to the terminal Y and the black one to P.



Connection of the external control units may be effected direct to the control box or to the terminals in the wall box. To obtain the best possible service, it is recommended to connect a hand-held microphone (MC606) to the box; whereas all other units such as fixed microphones (MC601), steering wheel switch (SU602) or handset with hang-up bracket (MT601 or MT604 m. MT602) should be connected to the wall box.

To a great extent the control box can be used as a mobile control unit in other radio systems, there being a possibility of making a special type of internal cabling between the button switches, the selector with 2 x 12 positions, the connection to the units and the tone units.

In this way the box may, according to requirements, be equipped with special cabling for tone call combinations.

Moreover, space has been reserved on the print plate for the mounting of an extra relay.

Originally the box was made for application in the system 2003. By using the box in a 2002 system where the possibility of calling a maximum of 10 subscribers (sub. 1-10) and of making repeater calls to the same 10 mobile groups is desired, the cabling for CAF680/600-2002 shown on the diagram D113972 is inserted between the tone transmitter, the button switches and the subscriber selector. If the design of the control box includes the sequential tone receiver SR684 for an individual call or for a group call, the control box is termed CB601-2003/02a. If both call possibilities are desired in connection with the application of SR6841, the control box is termed CB601-2003/02b.

System application.

Mobile stations equipped with CB601-2003/02 are called individually from the base station by a 4-tone sequential tone signal. The 3rd and the 4th tones represent the 2-digit call number of the mobile stations, whereas the 1st and the 2nd tones represent tone combinations permanently set. In CAF600-2003, the 1st tone is - to the system - an arbitrarily selected, common tone (not tone "1", however), whereas the 2nd tone must always be tone "1".

In CAF600-2002 the 1st and the 2nd tones are used to indicate which mobile group the mobile stations concerned belong to.

After reception of a call, the green call lamp (V3) is lit and a tone signal of approx. one second (from RP600-2003) is heard in the simultaneously switched on loudspeaker. At the same time as the attention tone signal is heard in the loudspeaker, the transmitter is keyed (the red key lamp flashes), and a reply tone signal (tones "1" and "0") is transmitted back to the base station. The loudspeaker is disconnected and the call lamp is put out at the cessation of the carrier wave from the base station.

Selective tone calls to the base station can only be made if the yellow engaged lamp does not give out light. Tone signalling is composed of 2 of the 7 simultaneously transmitted tone frequencies.

2002: The double tone combinations used for the system 2002 are shown diagrammatically on the drawing D113649. Call to a SBS subscriber is made by setting the subscriber number by means of the selector (01) and then activating the push button marked D. As long as the button is operated, the telephone of the subscriber will ring. Mobile-to-mobile calls are made by activating the T button (for approx. 1 second). The D button is activated

also for one second. When the D button is released, a selective group call is transmitted from the base station to the mobile group set by means of the selector 01. The X button may be employed as a special tone key or as a HT-CUT button (depending upon strapping in CB).

2003: When using CB601-2003/02 in the system 2003, the selector 01 is used for the setting of double tone combinations for automatic number selection of a maximum of 10 pre-selected subscribers who - via an automatic telephone exchange - are connected to the base station of the radio system. The same tone combinations are also employed to transmit - by individual number selection from mobile stations - one digit at a time.

The 3 push buttons of the control box T, D, and X have the following functions:

1. T is pushed when automatic number selection call is desired. The tones "1" and "4" are transmitted. This signal corresponds to the lifting of handsets by normal telephoning, and dialling tone is therefore received from the exchange after the tone call.
2. On activation of the D button, the tone combination set by the selector 01 is transmitted. The 10 positions of the selector correspond to the following tone combinations: 1 = "2" and "8", 2 = "1" and "8", 3 = "4" and "7", 4 = "0" and "7", 5 = "2" and "7", 6 = "1" and "7", 7 = "4" and "6", 8 = "0" and "6", 9 = "2" and "6" and 10(0) = "1" and "6".

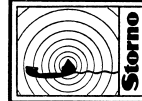
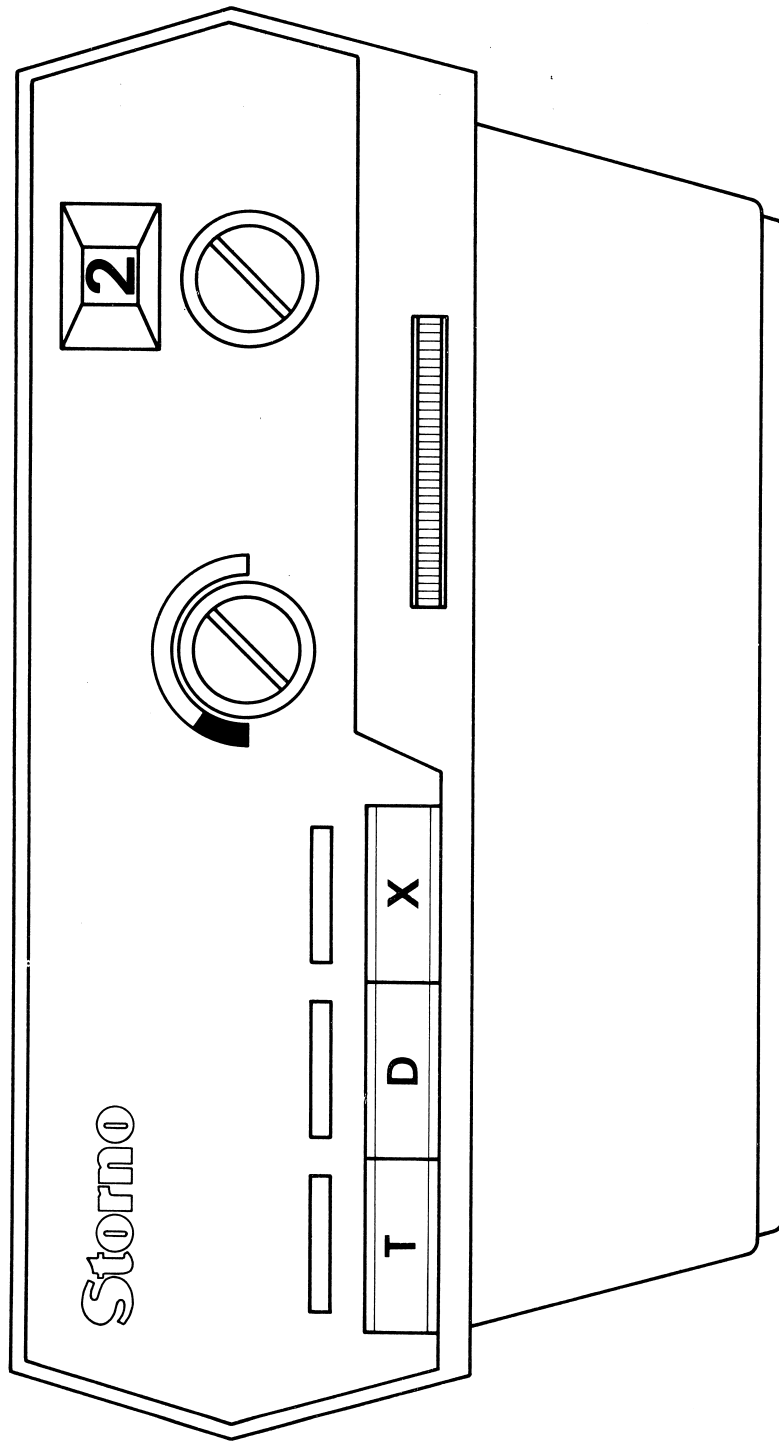
When the D button is released after having been operated for approx. one second, a subscriber number selection will automatically be transmitted in the terminal unit of the base station corresponding to the number of the preselected subscriber dialled on the normal telephone dial. On activating the D button after individual number selection call (1 digit at a time as well as in connection with mobile-to-mobile number selection, the selector setting indicates the shown digit.

3. The connection with the base station can be cancelled ("replacing") by pressing the X button. The tones "0" and "2" are then transmitted.
4. Calling ("lifting") in connection with individual number selection (direct dialling) can be made by simultaneous activation of the T and D buttons which causes the tones "0" and "4" to be transmitted. After reception of the dialling tone from the exchange, one digit at a time may be transmitted by activating the D button. Prior to the transmis-

sion of the subsequent digit, this is being set by means of the digit selector. The D button may only be activated again when a "digit reception signal" (in form of a 3-tone sequential signal) for the preceding digit has been received.

5. Calls to other mobile stations in the 2003 system are made by activating the D and X buttons at the same time (tones "2" and "4"). When the dialling tone is heard, digit transmission for the 2-digit mobile call number is made.

Directions for use for CB601-2003/02 are printed in A3 folders in Danish, English and German. The Danish folder is termed "Operating instructions for the fully automatic VHF/UHF radio telephone system with two-way number selection".

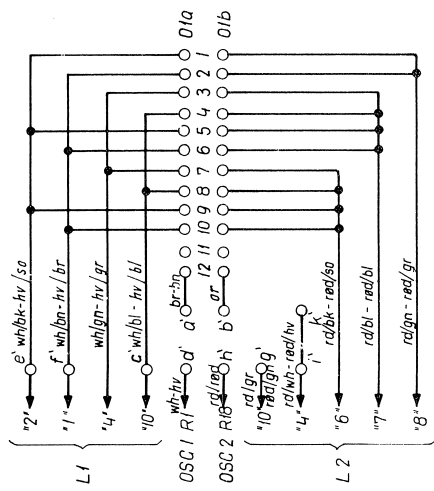


konstr./tegn.
06 / JWA
11 - 4 - 89
godk. 06
komplette

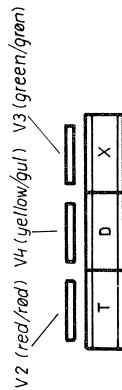
MOBIL MANÖVREBOX
FOR RADIOTELEFONSYSTEM MED
2-VEJES AUTOMAT VALG
MOBILE CONTROL BOX
FOR RADIO TELEPHONE SYSTEM WITH
2-WAY AUTOMATIC DIALLING

CB 601-2003/02
CAF 600-2003 (2002)
CB 601-2003/02
CAF 600-2003 (2002)

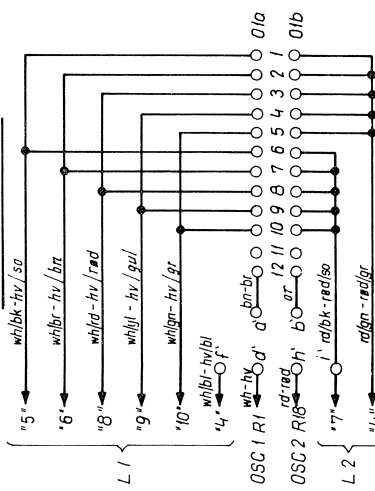
TEGN. NR.
0112889
A 3



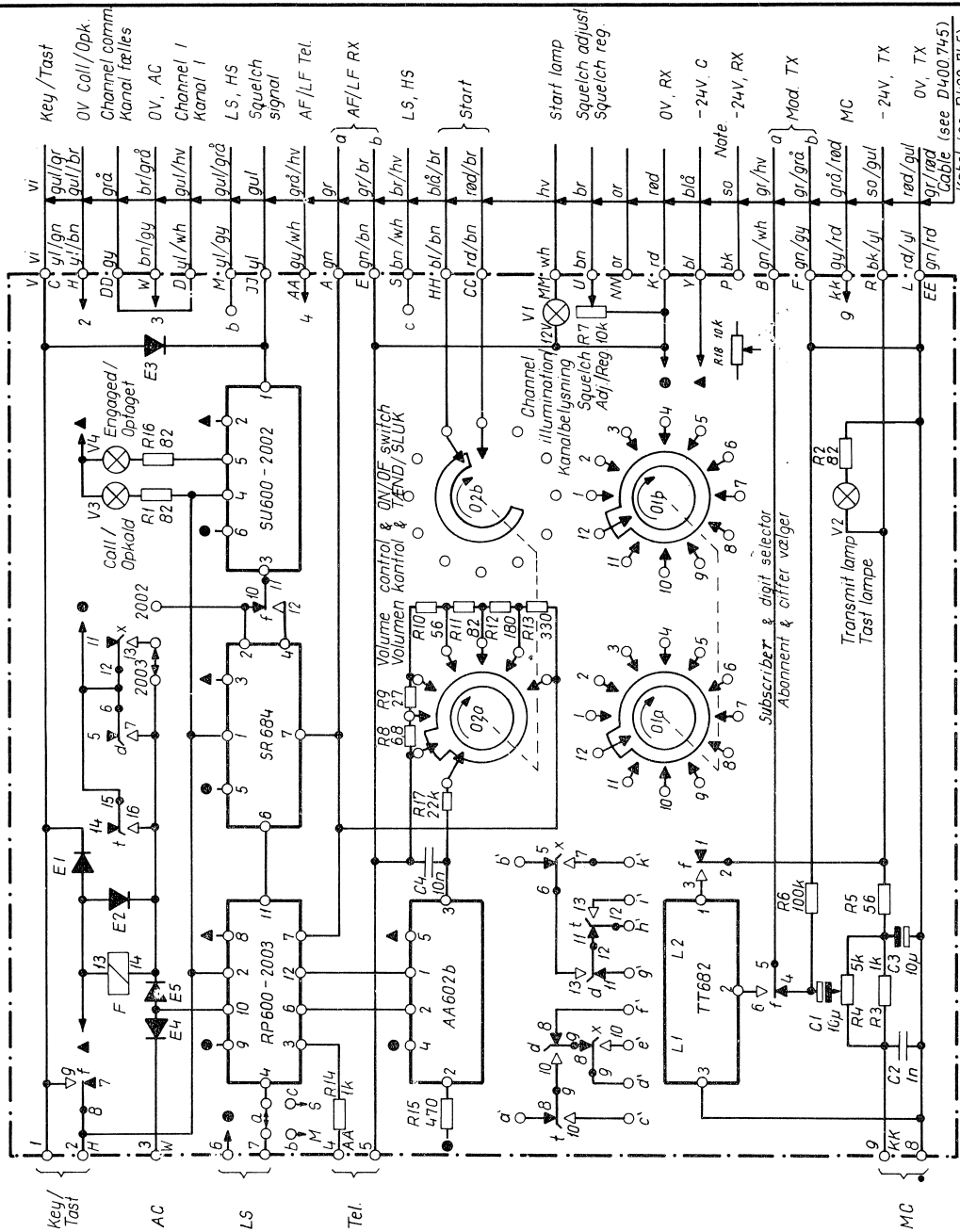
CAF 680/600-2003



CAF 680/600-2002

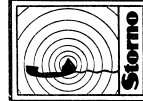


Den viste kabling for CAF 680/600-2002 (SPS-system) er beregnet for opkald til abonnenter +10, samt for repeater opkald (T-knapp). Manøvreboksen benævnes da CB 601-2003/02a. Med multipliged for individuelle - samt gruppeopkald (ved anvendelse af SR 684) benævnes boksen CB 601-2003/02b. X-knappen kan anvendes til HI-UD ved at flytte strøpling, 2003 ↔ X, til X ↔ 2002. Ønskes ikke aut. svarnesignal efter modtaget opkald, fjernes dioden E5.



The shown cabling for CAF 680/600-2002 (SPS-system) is intended for calls to the subscriber +10 and for repeater calls (push button T). In this case the control box is designated CB 601-2003/02a. With the added possibility of individual selective calls as well as group calls (by the use of SR 684 instead of SR 684) the box is designated CB 601-2003/02b. The push button X may be used for LS-out by changing the strap: terminal 13 on push b.X ↔ terminal "2003" to terminal 13 on push b.X ↔ terminal "2002". If no automatic

Note Conn. the blue wire to Y and the black to P Forb. blå ledn. til Y og sort til P.

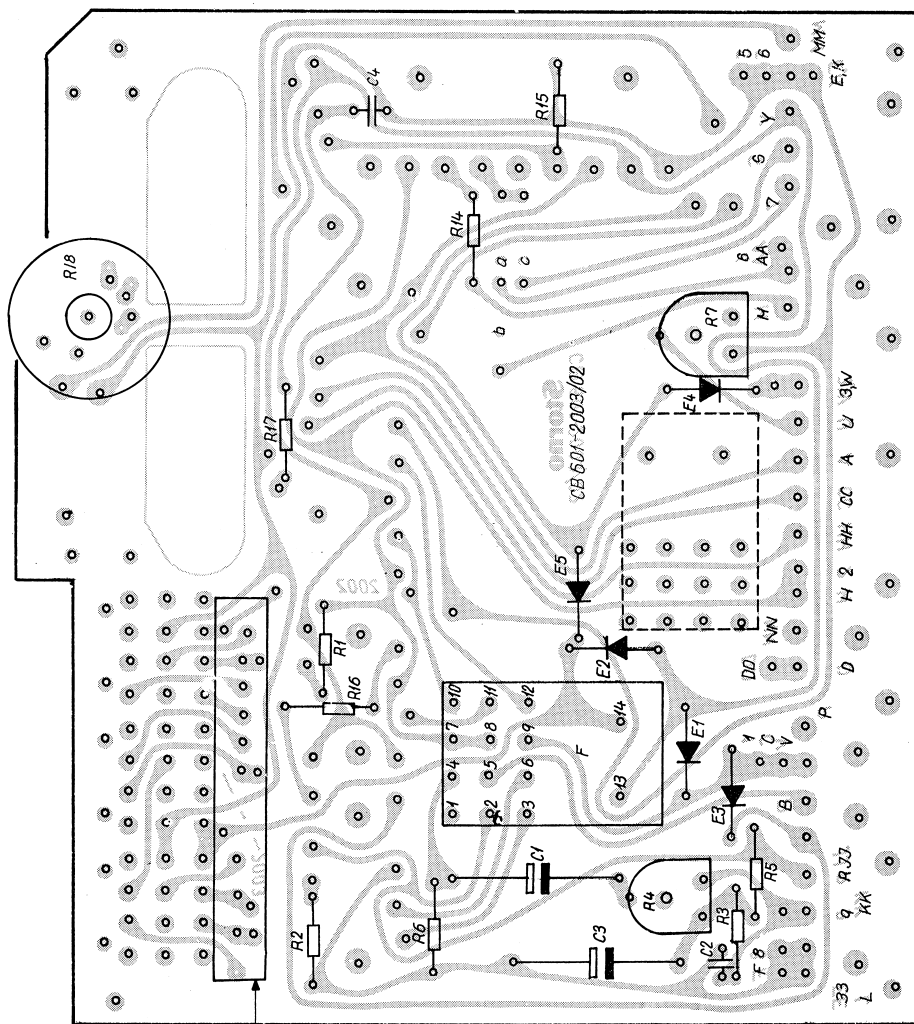


Kopier af EBN 12.12.69 godk. 06 Komplette


CONTROL BOX CB 601-2003/02 MANØVREBOKS

KODE

TEGN. NR. D 113972



Se tegn. K304553
Consult. Drwg. K304553

 Sormo	KORT/ART Hou/SL 26.1.70	BLOCK 08	K. O.P. JENSEN
	COMPONENT LAY-OUT COMPONENT PLACING CB 601 - 2003/02		
	D 114134		

no	code	data	no	code	data
C1	73.5100 1	10 μ F -10+100% elco TB35V	ReF		ITT relay 850 Ω 4 shift PZ4/A2615
C2	76.5069	1nF 10% FL50V polyester	V1	92.5004	Lamp 12V 50mA BA7
C3	73.5100	10 μ F -10+100% elco TB35V	V2	92.5003	Lamp 24V 25mA BA7
C4	76.5070	10nF 10% FL50V polyester	V3	92.5003	Lamp 24V 25mA BA7
			V4	92.5003	Lamp 24V 25mA BA7
R1	80.5236	82 Ω 5% carb. film 1/8W	O1	47.530	Switch-over (tone)
R2	80.5236	82 Ω 5% carb. film 1/8W	O2	47.372	Switch-over (volumen)
R3	80.5249	1k Ω 5% carb. film 1/8W	O3	47.531	Push-button-row
R4	86.5050	5k Ω 20% trim. Var. lin. 0,1 W			
R5	80.5234	56 Ω 5% carb. film 1/8W			
R6	80.5273	100k Ω 5% carb. film 1/8W			
R7	86.5039	10k Ω 20% trim var. lin. 0,15W			
R8	80.5223	6,8 Ω 5% carb. film 1/8W			
R9	80.5230	27 Ω 5% carb. film 1/8W			
R10	80.5234	56 Ω 5% carb. film 1/8W			
R11	80.5236	82 Ω 5% carb. film 1/8W			
R12	80.5240	180 Ω 5% carb. film 1/8W			
R13	80.5243	330 Ω 5% carb. film 1/8W			
R14	80.5249	1k Ω 5% carb. film 1/8W			
R15	80.5245	470 Ω 5% carb. film 1/8W			
R16	80.5236	82 Ω 5% carb. film 1/8W			
R17	80.5265	22k Ω 5% carb. film 1/8W			
R18	86.004	10k Ω var. lin carb. film w/ tast 0,1W			
E1-	99.5020	Diode 1N4004			
E2	99.5020	Diode 1N4004			
E3	99.5028	Diode 1N914			
E4	99.5028	Diode 1N914			
E5	99.5028	Diode 1N914			



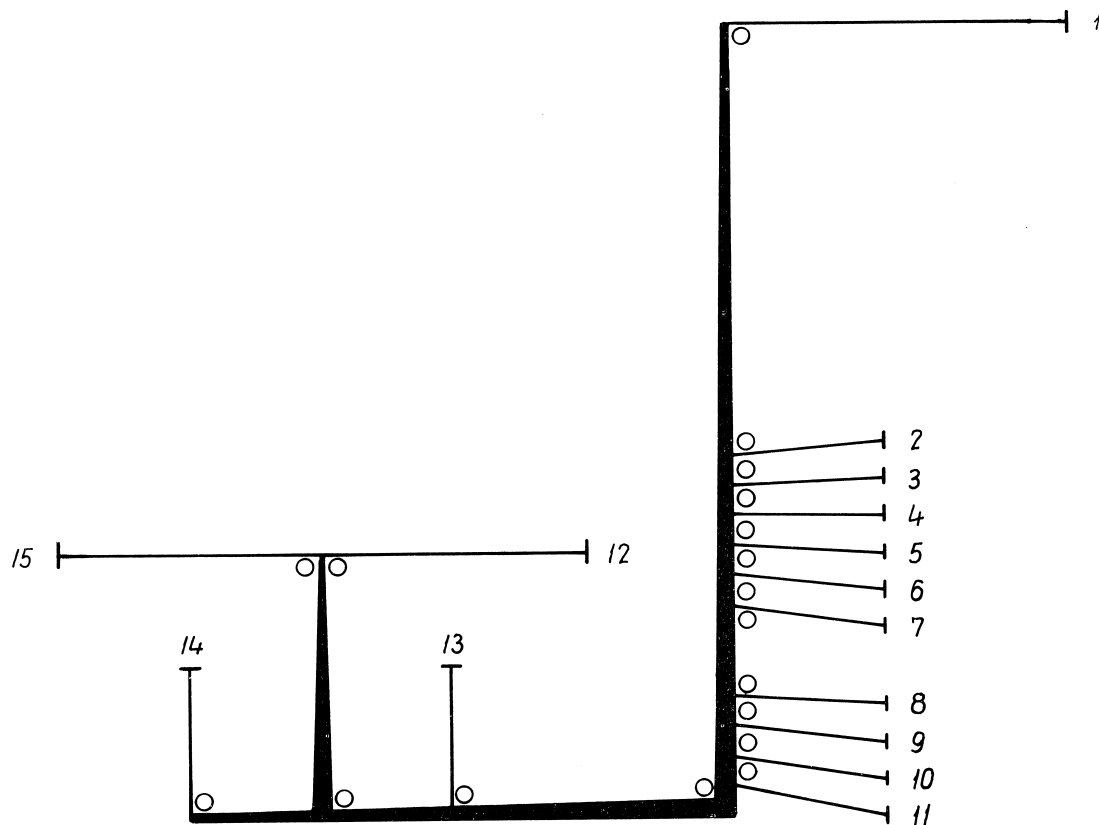
OG/1F
30.11.70
kontrol at
tlf diag

Parts list

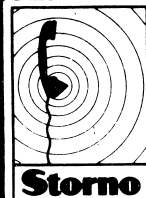
Stykliste

CB601-2003/02

comp list
X114092
blad no 1 of 1



Se kablingsliste C304550 eller C304551
See cable form C304550 or C304551



konstr./tegn.
Hou / EBH
20.1.70.
godk.
OG
komp.liste

CABLE FORM FOR CONTROL BOX
KABLINGSTEGNING
TIL BETJENINGSBOKS CB601-2003/02
CAF 680/600-2003 OG 2002
KODE

TEGN. NR.

K304549

A4

Wire Type Ledningstype	Colour ledningsfarve	From no: fra nr:	To no: til nr:	Remarks Bemærkninger
0,125mm PVC flexibel	white/black hvid/sort	1	15	
-	white/brown hvid/brun	1	15	
-	white/red hvid/rød	1	15	
-	white/yellow hvid/gul	1	15	
-	white/green hvid/grøn	1	15	
-	white/blue hvid/blå	7	15	
-	white hvid	2	14	
-	red rød	8	13	
-	red/black rød/sort	1	9	
-	red/black rød/sort	9	12	
-	red/green rød/grøn	1	12	
-	brown brun	1	11	
-	orange	1	4	
Se kablingstegn. nr. K304549				



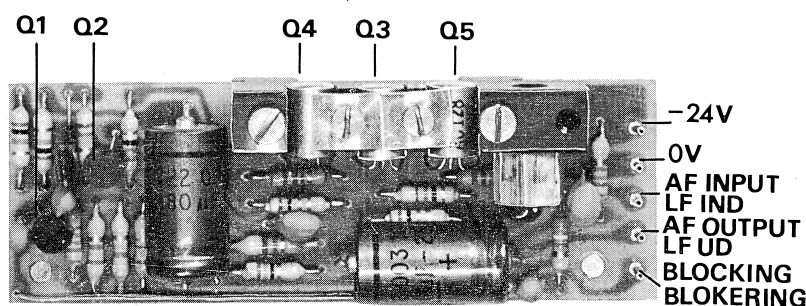
06/EL II
 23.1.70
 06
 Kopp. II 06

Cableform no:
 Kabling nr:

CB601-2002/02a
 CB601-2003/02b
 Type CAF680/600-2002

C304551

Audio Output Amplifier AA602



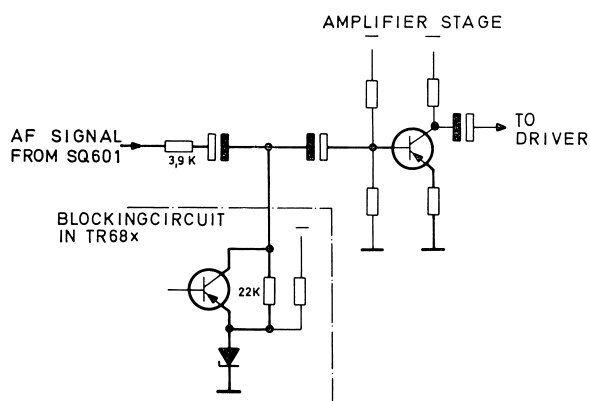
The audio output amplifier is built on a wiring board. It consists of these stages:

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

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

Mode of Operation

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



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

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

Reducing the Input Sensitivity

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

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

Technical SpecificationsSupply Voltage

24 V $\pm 5\%$.

Resistance in Power Supply Cable

R_{cable} : max. 14 ohms.

Current Drain

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

Power Output

Max. 2 watts.

Loudspeaker Impedance

15 ohms.

Input Impedance

6.5 k ohms.

Input Sensitivity

For 2 watts into 15 ohms and $R_{\text{cable}} = 0$ ohms.
Better than -9 dBm.

Frequency Response

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

Distortion

Less than 5%.

Hum and Noise

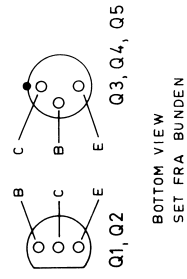
Attenuated 60 dB.

Blocking

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

Dimensions

28 x 80 mm.



BOTTOM VIEW
SET FRA BUNDEN



AA602c

D400.836/3

Storno

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

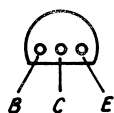
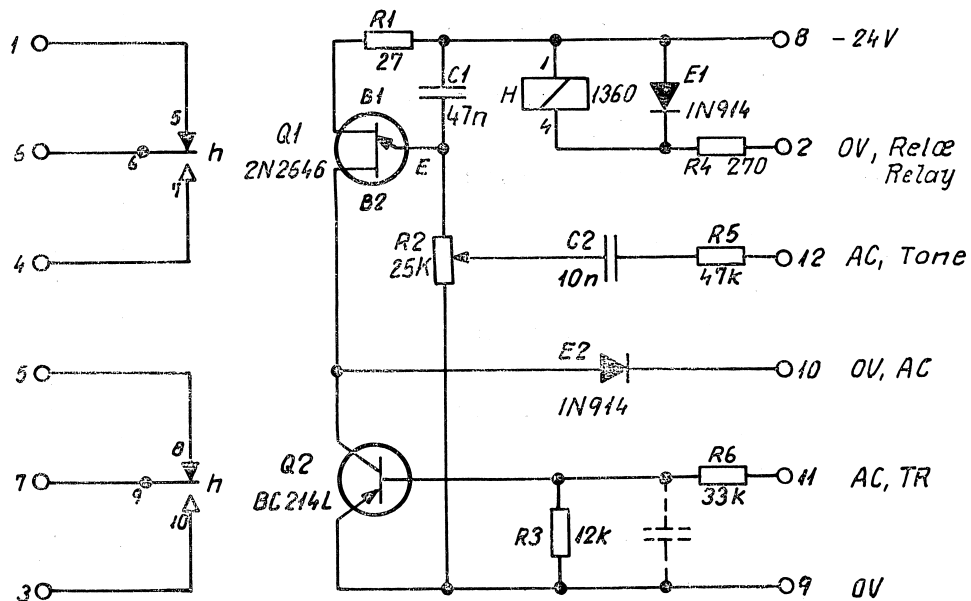
Storno

TYPE	NO.	CODE	DATA

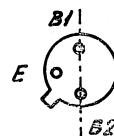
AF-AMPLIFIER
LF-FORSTÆRKER

AA602c

X400.677/5

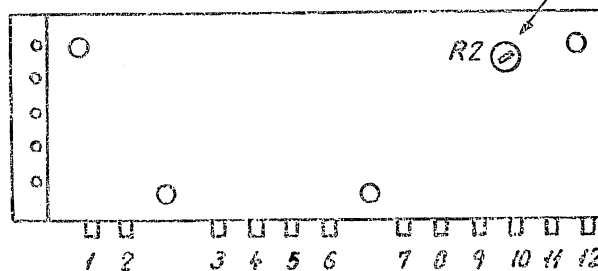


BC214L



2N2646

Signal level adjustment
Justering af signalstyrke



Viewed from printed circuit side, mounted on top of AA602a
Set fra printside, monteret ovenpå AA 602 b

Rev. 23.11.71

	konstr./tegn.
	OG/MG
	28-10-71
	godk.
	OG
	komplette
	X 113245

TONE GENERATOR FOR ACOUSTIC
CALL SIGNAL CB601 (AA602b)
TONEGENERATOR FOR AKUSTISK
OPKALDSSIGNAL CB601 (AA602b)
RP 600-2003

KODE

TECH. NR.
D112687
A4

Ret. den 28/10-71

no	code	data	no	code	data
C1	76.5072	47n 10% polyest. FL50V			
C2	76.5070	10nF 10% polyest. FL50V			
R1	80.5230	27 Ω 5% carbon film 1/8W			
R2	86.5044	25 k Ω 20% trim. carbon film 0,1W lin.			
R3	80.5262	12k Ω 5% carbon film 1/8W			
R4	80.5242	270 Ω 5% carbon film 1/8W			
R5	80.5269	47k Ω 5% carbon film 1/8W			
R6	80.5267	33k Ω 5% carbon film 1/8W			
E1	99.5028	diode 1N914			
E2	99.5028	diode 1N914			
Q1	99.5194	transistor 2N2646 (UNJ)			
Q2	99.5144	transistor BC214L			
ReH	58.5069	Relay 24V 1260 Ω 21-21			



12.10.70
kontrol af
Til drøgt

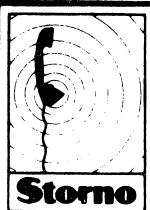
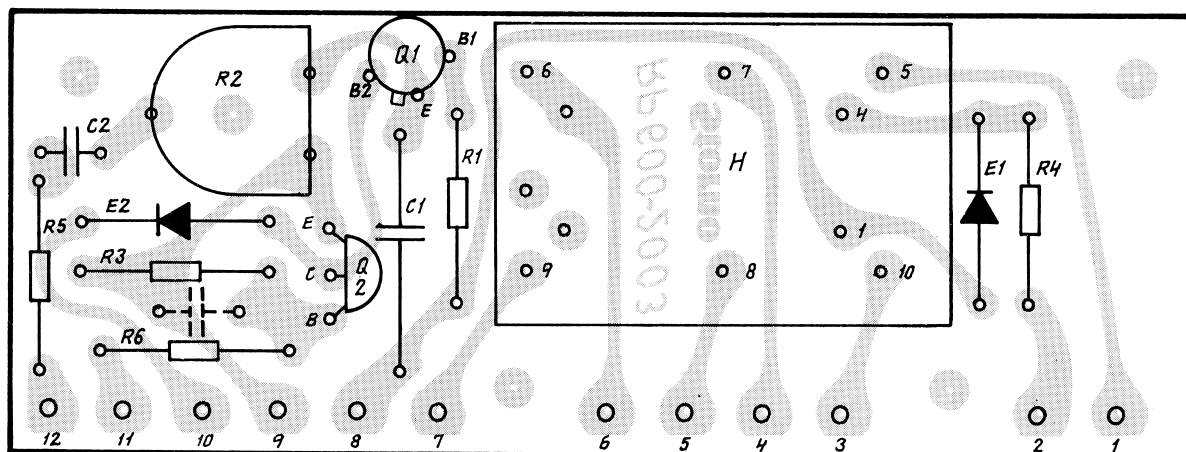
PARTS LIST
Stykliste

RP600-2003

X113245

1 af 1

PRINTED CIRCUIT SEEN FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



konstr./tegn.
OG / JWA
10 9 69
godk.
OG
komp.liste
X113245
D112687

TONE GENERATOR FOR ACCUSTIC
CALL SIGNAL CB601 (AA602b)
TONEGENERATOR FOR AKUSTISK
OPKALDSSIGNAL CB602 (AA602b)
RP600-2003

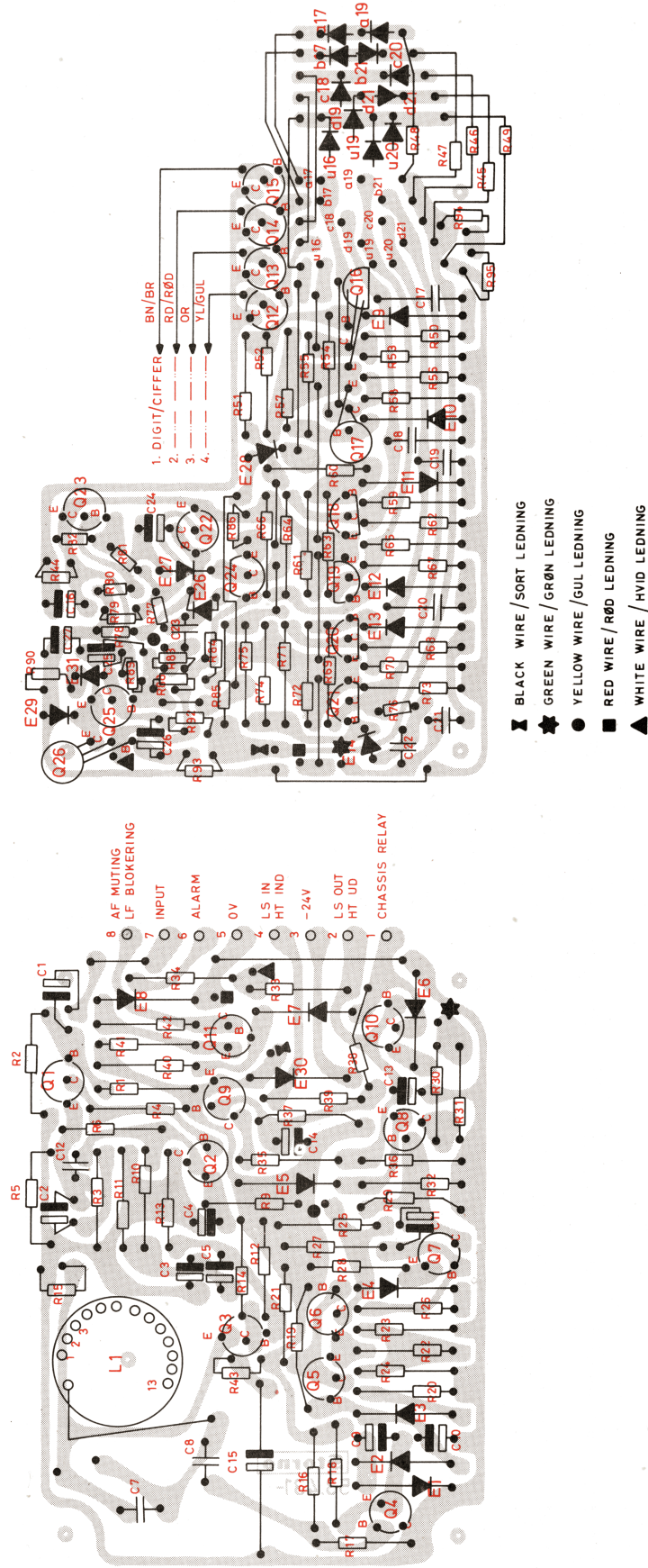
KODE

TEGN. NR.

D113419

A 4

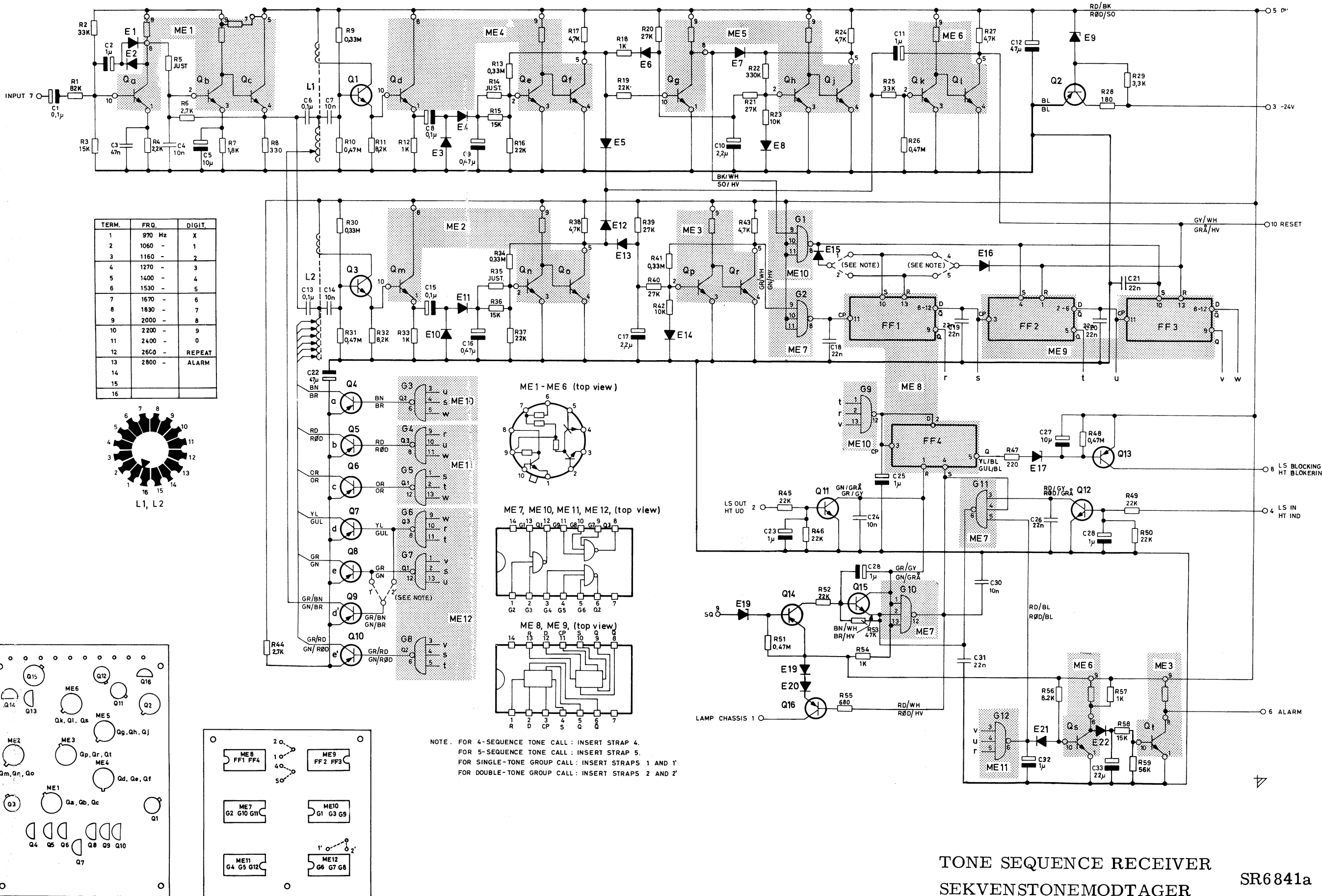
PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



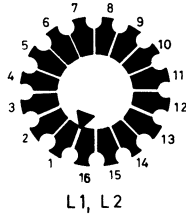
TONE SEQUENCE RECEIVER
SEKVENSTONEMODTAGER

SR684

D400.989



TERM.	FREQ.	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		



NOTE. FOR 4-SEQUENCE TONE CALL: INSERT STRAP 4.
 FOR 5-SEQUENCE TONE CALL: INSERT STRAP 5.
 FOR SINGLE-TONE GROUP CALL: INSERT STRAPS 1 AND 1'
 FOR DOUBLE-TONE GROUP CALL: INSERT STRAPS 2 AND 2'

TONE SEQUENCE RECEIVER
 SEKVENSTONEMODTAGER
 SR6841a

DIFFERENTIATOR

AMPLIFIER

SELECTIVE AMPL.

DETECTOR SCHMITT GATE

DELAY CIRCUIT

TRIGGER

MUTING CIRCUIT

FORSTARKER

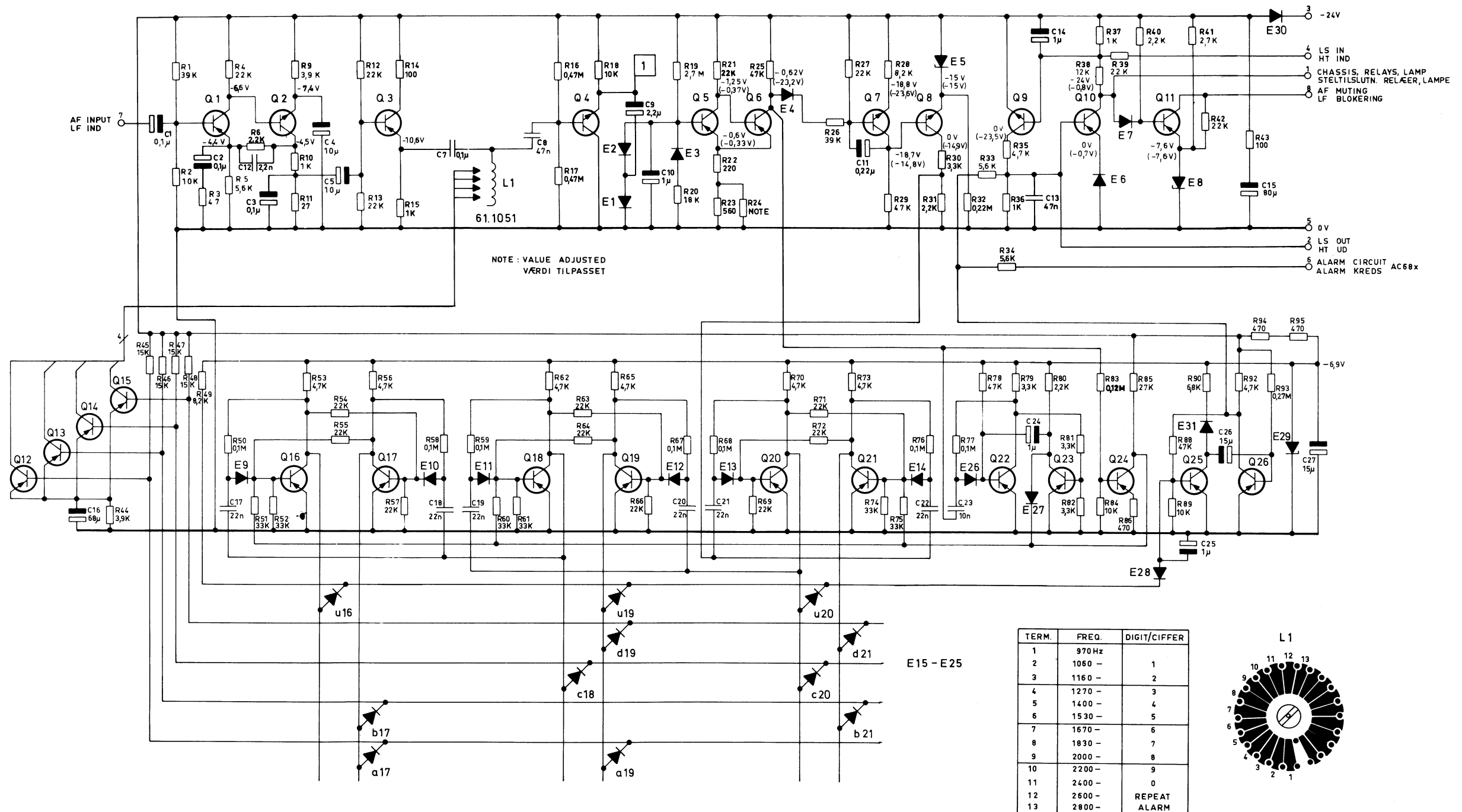
SELEKTIV FORST.

DETEKTOR TRIGGER

FORSINK. KREDSLØB

(BISTAB.)

BLOKERINGSKREDSLØB

TONE SEQUENCE RECEIVER
SEKVENSTONEMODTAGER

SR684

TYPE	NO.	CODE	DATA
	C1	73.5089	0, 1 μ F 20% tantal
	C2	73.5089	0, 1 μ F 20% "
	C3	73.5089	0, 1 μ F 20% "
	C4	73.5109	10 μ F 20% "
	C5	73.5109	10 μ F 20% "
	C7	76.5068	0, 1 μ F 1% polystyr. TB
	C8	76.5072	47 nF 10% polyester. FL
	C9	73.5102	2, 2 μ F 20% tantal
	C10	73.5114	1 μ F 20% "
	C11	73.5118	0, 22 μ F 20% "
	C12	76.5059	2, 2 nF 10% polyester. FL
	C13	76.5072	47 nF 10% polyester. FL
	C14	73.5114	1 μ F 20%
	C15	73.5110	80 μ F -10/+50% elco
	C16	73.5106	68 μ F 20% tantal
	C17	76.5071	22 nF 10% polyester. FL
	C18	76.5071	22 nF 10% " FL
	C19	76.5071	22 nF 10% " FL
	C20	76.5071	22 nF 10% " FL
	C21	76.5071	22 nF 10% " FL
	C22	76.5071	22 nF 10% " FL
	C23	76.5070	10 nF 10% " FL
	C24	73.5114	1 μ F 20% tantal
	C25	73.5114	1 μ F 20% "
	C26	73.5105	15 μ F 20% "
	C27	73.5105	15 μ F 20% "
	R1	80.5268	39 k Ω 5% carbon film
	R2	80.5261	10 k Ω 5% "
	R3	80.5233	47 Ω 5% "
	R4	80.5265	22 k Ω 5% "
	R5	80.5258	5, 6 k Ω 5% "
	R6	80.5253	2, 2 k Ω 5% "
	R9	80.5256	3, 9 k Ω 5% "
	R10	80.5249	1 k Ω 5% "
	R11	80.5230	27 Ω 5% "
	R12	80.5265	22 k Ω 5% "
	R13	80.5265	22 k Ω 5% "
	R14	80.5237	100 Ω 5% "
	R15	80.5249	1 k Ω 5% "
	R16	80.5281	0, 47 M Ω 5% "
	R17	80.5281	0, 47 M Ω 5% "
	R18	80.5261	10 k Ω 5% "
	R19	80.5490	2, 7 M Ω 10% "
	R20	80.5264	18 k Ω 5% "
	R21	80.5265	22 k Ω 5% "
	R22	80.5241	220 Ω 5% "
	R23	80.5246	560 Ω 5% "

TYPE	NO.	CODE	DATA
	R24	80.52xx	Adjusted/tilpasset
	R25	80.5269	47 k Ω 5% carbon film
	R26	80.5268	" "
	R27	80.5265	" "
	R28	80.5260	22 k Ω 5% "
	R29	80.5269	8, 2 k Ω 5% "
	R30	80.5255	47 k Ω 5% "
	R31	80.5253	3, 3 k Ω 5% "
	R32	80.5277	2, 2 k Ω 5% "
	R33	80.5258	0, 22 M Ω 5% "
	R34	80.5258	5, 6 k Ω 5% "
	R35	80.5257	5, 6 k Ω 5% "
	R36	80.5249	4, 7 k Ω 5% "
	R37	80.5249	1 k Ω 5% "
	R38	80.5262	1 k Ω 5% "
	R39	80.5265	12 k Ω 5% "
	R40	80.5253	22 k Ω 5% "
	R41	80.5254	2, 2 k Ω 5% "
	R42	80.5265	2, 7 k Ω 5% "
	R43	80.5237	22 k Ω 5% "
	R44	80.5256	100 Ω 5% "
	R45	80.5263	3, 9 k Ω 5% "
	R46	80.5263	15 k Ω 5% "
	R47	80.5263	15 k Ω 5% "
	R48	80.5263	15 k Ω 5% "
	R49	80.5260	15 k Ω 5% "
	R50	80.5273	8, 2 k Ω 5% "
	R51	80.5267	0, 1 M Ω 5% "
	R52	80.5267	33 k Ω 5% "
	R53	80.5257	33 k Ω 5% "
	R54	80.5265	4, 7 k Ω 5% "
	R55	80.5265	22 k Ω 5% "
	R56	80.5257	22 k Ω 5% "
	R57	80.5265	4, 7 k Ω 5% "
	R58	80.5273	22 k Ω 5% "
	R59	80.5273	0, 1 M Ω 5% "
	R60	80.5267	33 k Ω 5% "
	R61	80.5267	33 k Ω 5% "
	R62	80.5257	33 k Ω 5% "
	R63	80.5265	4, 7 k Ω 5% "
	R64	80.5265	22 k Ω 5% "
	R65	80.5257	22 k Ω 5% "
			4, 7 k Ω 5% "

TONE SEQUENCE RECEIVER
SEKVENSTONEMODTAGER

SR684

X400.975/3

Sorno

TYPE	NO.	CODE	DATA	
	R66	80.5265	22 k Ω 5%	1/8W
	R67	80.5273	0, 1 M Ω 5%	1/8W
	R68	80.5273	" "	1/8W
	R69	80.5265	0, 1 M Ω 5%	1/8W
	R70	80.5265	22 k Ω 5%	1/8W
	R71	80.5257	4, 7 k Ω 5%	1/8W
	R72	80.5265	22 k Ω 5%	1/8W
	R73	80.5257	4, 7 k Ω 5%	1/8W
	R74	80.5267	33 k Ω 5%	1/8W
	R75	80.5267	33 k Ω 5%	1/8W
	R76	80.5273	0, 1 M Ω 5%	1/8W
	R77	80.5273	0, 1 M Ω 5%	1/8W
	R78	80.5269	47 k Ω 5%	1/8W
	R79	80.5255	3, 3 k Ω 5%	1/8W
	R80	80.5253	2, 2 k Ω 5%	1/8W
	R81	80.5255	3, 3 k Ω 5%	1/8W
	R82	80.5255	3, 3 k Ω 5%	1/8W
	R83	80.5274	0, 12 M Ω 5%	1/8W
	R84	80.5261	10 k Ω 5%	1/8W
	R85	80.5266	27 k Ω 5%	1/8W
	R86	80.5245	470 Ω 5%	1/8W
	R88	80.5269	47 Ω 5%	1/8W
	R89	80.5261	10 k Ω 5%	1/8W
	R90	80.5259	6, 8 k Ω 5%	1/8W
	R92	80.5257	4, 7 k Ω 5%	1/8W
	R93	80.5278	0, 27 k Ω 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	

Sorno

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

STONE SEQUENCE RECEIVER
SEKVENSTONEMODTAGER

SR684

X400.975/3

TYPE	NO.	CODE	DATA
SR6841a		10.1914	Sequential Tone Receiver
	C1	73.5089	0.1 μ F 20% Tantal
	C2	73.5114	1 μ F 20% Tantal
	C3	76.5072	47 nF 10% Polyst. FL
	C4	76.5070	10 nF 10% Polyst. FL
	C5	73.5109	10 μ F 20% Tantal
	C6	76.5068	0.1 μ F 1% Polystyr. TB
	C7	76.5070	10 nF 10% Polyst. FL
	C8	73.5089	0.1 μ F 20% Tantal
	C9	73.5125	0.47 μ F 20% Tantal
	C10	73.5102	2.2 μ F 20% Tantal
	C11	73.5114	1 μ F 20% Tantal
	C12	73.5124	47 μ F 20% Tantal
	C13	76.5068	0.1 μ F 1% Polystyr. TB
	C14	76.5070	10 nF 10% Polyst. FL
	C15	73.5089	0.1 μ F 20% Tantal
	C16	73.5125	0.47 μ F 20% Tantal
	C17	73.5102	2.2 μ F 20% Tantal
	C18	76.5071	22 nF 10% Polyst. FL
	C19	76.5071	22 nF 10% Polyst. FL
	C20	76.5071	22 nF 10% Polyst. FL
	C21	76.5071	22 nF 10% Polyst. FL
	C22	73.5124	47 μ F 20% Tantal
	C23	73.5114	1 μ F 20% Tantal
	C24	76.5070	10 nF 10% Polyst. FL
	C25	73.5114	1 μ F 20% Tantal
	C26	76.5071	22 nF 10% Polyst. FL
	C27	73.5109	10 μ F 20% Tantal
	C28	73.5114	1 μ F 20% Tantal
	C29	73.5114	1 μ F 20% Tantal
	C30	76.5070	10 nF 10% Polyst. FL
	C31	76.5071	22 nF 10% Polyst. FL
	C32	73.5114	1 μ F 20% Tantal
	C33	73.5127	22 μ F 20% Tantal
	R1	80.5072	82 k Ω 5% carbon film
	R2	80.5067	33 k Ω 5%
	R3	80.5063	15 k Ω 5%
	R4	80.5053	2.2 k Ω 5%
	R5	80.5061	10 k Ω 5%
	R6	80.5054	2.7 k Ω 5%
	R7	80.5052	1.8 k Ω 5%
	R8	80.5043	330 Ω 5%
	R9	80.5079	0.33 M Ω 5%
	R10	80.5081	0.47 M Ω 5%
	R11	80.5060	8.2 k Ω 5%
	R12	80.5049	1 k Ω 5%

TYPE	NO.	CODE	DATA
	R13	80.5079	0.33 M Ω 5% carbon film
	R14	80.50xx	Adjusted/Tilpasset
	R15	80.5063	15 k Ω 5% carbon film
	R16	80.5065	22 k Ω 5%
	R17	80.5057	4.7 k Ω 5%
	R18	80.5049	1 k Ω 5%
	R19	80.5065	22 k Ω 5%
	R20	80.5066	27 k Ω 5%
	R21	80.5066	27 k Ω 5%
	R22	80.5079	0.33 k Ω 5%
	R23	80.5061	10 k Ω 5%
	R24	80.5057	4.7 k Ω 5%
	R25	80.5066	27 k Ω 5%
	R26	80.5070	56 k Ω 5%
	R27	80.5057	4.7 k Ω 5%
	R28	80.5255	3.3 k Ω 5%
	R29	83.5505	180 Ω 5% wirewound
	R30	80.5079	0.33 M Ω 5% carbon film
	R31	80.5081	0.47 M Ω 5%
	R32	80.5060	8.2 k Ω 5%
	R33	80.5049	1 k Ω 5%
	R34	80.5079	0.33 M Ω 5%
	R35	80.50xx	Adjusted/Tilpasset
	R36	80.5063	15 k Ω 5%
	R37	80.5065	22 k Ω 5%
	R38	80.5057	4.7 k Ω 5%
	R39	80.5066	27 k Ω 5%
	R40	80.5066	27 k Ω 5%
	R41	80.5079	0.33 M Ω 5%
	R42	80.5061	10 k Ω 5%
	R43	80.5057	4.7 k Ω 5%
	R44	80.5054	2.7 k Ω 5%
	R45	80.5065	22 k Ω 5%
	R46	80.5065	22 k Ω 5%
	R47	80.5041	220 Ω 5%
	R48	80.5081	0.47 M Ω 5%
	R49	80.5065	22 k Ω 5%
	R50	80.5065	22 k Ω 5%
	R51	80.5081	0.47 M Ω 5%
	R52	80.5065	22 k Ω 5%
	R53	80.5069	47 k Ω 5%
	R54	80.5049	1 k Ω 5%

TONE SEQUENTIAL RECEIVER
SEKVENSTONEMODTAGER

SR6841a

X401.235/2

Storno

TYPE	NO.	CODE	DATA
R55	R55	80.5047	680 Ω 5%
R56	R56	80.5060	carbon film
R57	R57	80.5049	8.2 kΩ 5%
R58	R58	80.5063	1 kΩ 5%
R59	R59	80.5070	15 kΩ 5%
			56 kΩ 5%
L1	L1	61.1129	Tone coil
L2	L2	61.1129	Tone coil
E1	E1	99.5211	Stabilizer diode 0.8V 5%
E2	E2	99.5211	Stabilizer diode 0.8V 5%
E3	E3	99.5219	Diode AAZ15
E4	E4	99.5219	Diode AAZ15
E5	E5	99.5028	Diode 1N914
E6	E6	99.5219	Diode AAZ15
E7	E7	99.5219	Diode AAZ15
E8	E8	99.5028	Diode 1N914
E9	E9	99.5114	Zenerdiode 5.6V 5%
E10	E10	99.5219	Diode AAZ15
E11	E11	99.5219	Diode AAZ15
E12	E12	99.5028	Diode 1N914
E13	E13	99.5219	Diode AAZ15
E14	E14	99.5028	Diode 1N914
E15	E15	99.5219	Diode AAZ15
E16	E16	99.5219	Diode AAZ15
E17	E17	99.5225	Zenerdiode 3.9V 5%
E18	E18	99.5205	Zenerdiode 15V 5%
E19	E19	99.5028	Diode 1N914
E20	E20	99.5028	Diode 1N914
E21	E21	99.5219	Diode AAZ15
E22	E22	99.5219	Diode AAZ15
Q1	Q1	99.5143	Transistor BC108
Q2	Q2	99.5215	Transistor 2N2905A
Q3	Q3	99.5143	Transistor BC108
Q4	Q4	99.5144	Transistor BC214L
Q5	Q5	99.5144	Transistor BC214L
Q6	Q6	99.5144	Transistor BC214L
Q7	Q7	99.5144	Transistor BC214L
Q8	Q8	99.5144	Transistor BC214L
Q9	Q9	99.5144	Transistor BC214L
Q10	Q10	99.5144	Transistor BC214L
Q11	Q11	99.5143	Transistor BC108
Q12	Q12	99.5143	Transistor BC108
Q13	Q13	99.5144	Transistor BC214L
Q14	Q14	99.5144	Transistor BC214L
Q15	Q15	99.5143	Transistor BC108
Q16	Q16	99.5144	Transistor BC214L

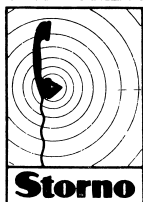
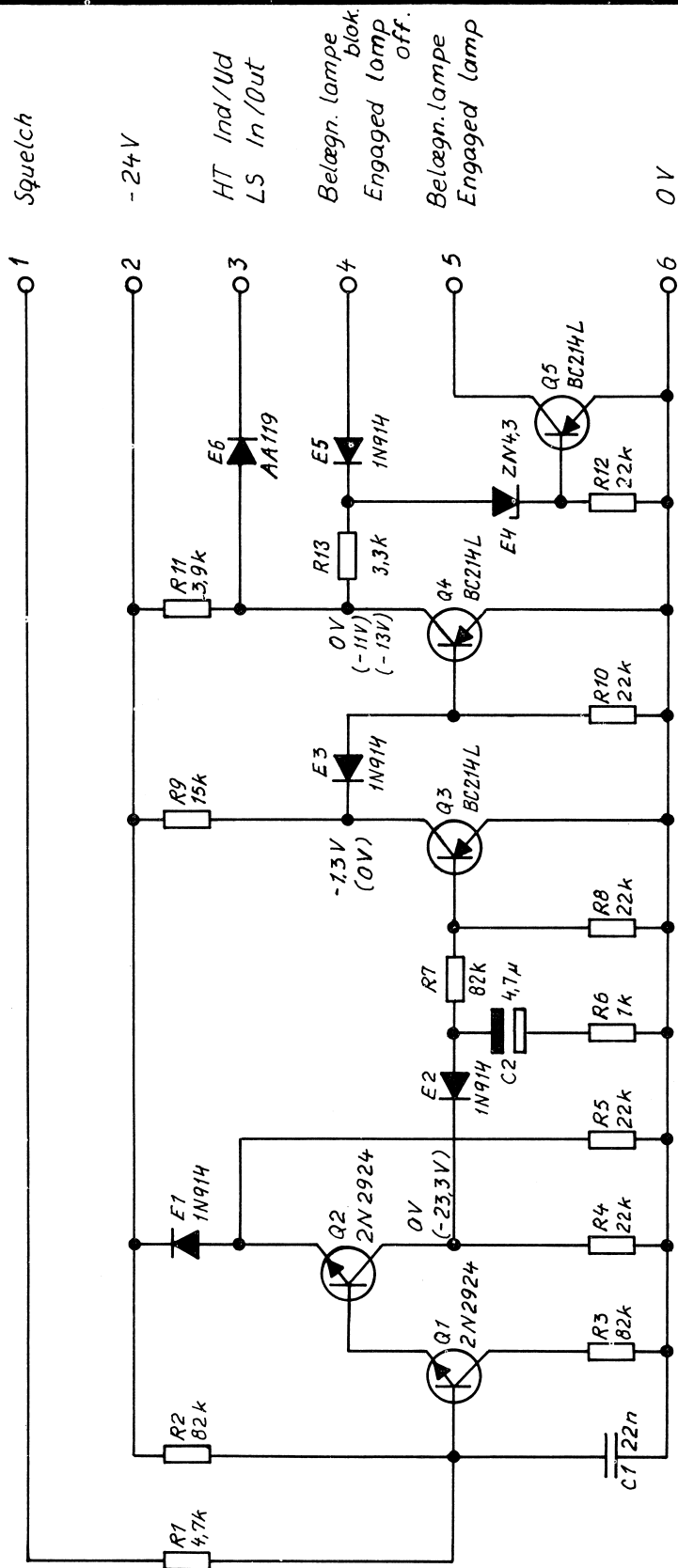
Storno

TYPE	NO.	CODE	DATA
	ME1	14.5003	Amplifier 80dB 10mW
	ME2	14.5003	Amplifier 80dB 10mW
	ME3	14.5003	Amplifier 80dB 10mW
	ME4	14.5003	Amplifier 80dB 10mW
	ME5	14.5003	Amplifier 80dB 10mW
	ME6	14.5003	Amplifier 80dB 10mW
	ME7	14.5004	NAND gate, triple 3-input
	ME8	14.5005	Flip-flop, dual D-type
	ME9	14.5005	Flip-flop, dual D-type
	ME10	14.5004	NAND-gate, triple 3-input
	ME11	14.5004	NAND gate, triple 3-input
	ME12	14.5004	NAND gate, triple 3-input

STONE SEQUENTIAL RECEIVER
SEKVENSTONEMODTAGER

SR6841a

X401.235/2



konstr./tegn.
OG / JAS
23.10.67
godk.
MB
komp.liste
X 110181

OMSKIFTERENHED FOR SAMTALEHEMMELIGHED
SU 600 - 2002
SWITCHING UNIT FOR SECURITY

KODE

TEGN. NR.

D110180

A 4

no	code	data	no	code	data
C1	76.5071	22nF 10% polyest. 50V			
C2	73.5126	4,7 μ F 20% tantal 35V			
R1	80.5257	4,7K Ω 5% 1/8W			
R2	80.5272	82K Ω 5% 1/8W			
R3	80.5272	82K Ω 5% 1/8W			
R4	80.5265	22K Ω 5% 1/8W			
R5	80.5265	22K Ω 5% 1/8W			
R6	80.5249	1K Ω 5% 1/8W			
R7	80.5272	82K Ω 5% 1/8W			
R8	80.5265	22K Ω 5% 1/8W			
R9	80.5263	15K Ω 5% 1/8W			
R10	80.5265	22K Ω 5% 1/8W			
R11	80.5256	3,9K Ω 5% 1/8W			
R12	80.5265	22K Ω 5% 1/8W			
R13	80.5255	3,3k Ω 5% 1/8W			
E1	99.5028	Diode 1N914			
E2	99.5028	Diode 1N914			
E3	99.5028	Diode 1N914			
E4	99.5116	Zenerdiode ZN4,3			
E 5	99.5028	Diode 1N914			
E 6	99.5074	Diode AA119			
Q1	99.5117	Transistor 2N2924			
Q2	99.5117	Transistor 2N2924			
Q3	99.5144	Transistor BC214L			
Q4	99.5144	Transistor BC214L			
Q5	99.5144	Transistor BC214L			

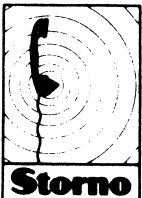
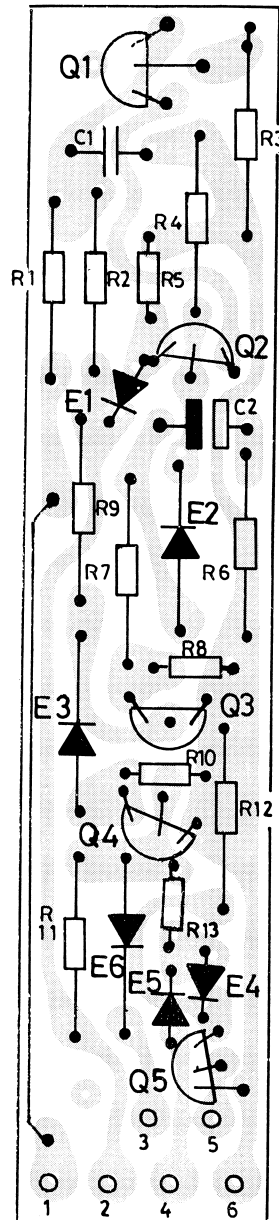


PARTS LIST
STYKLISTE

SU600-2002

comp list
 X110181
 blad no 1 of 1

PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
 TRYKT KREDSLØB SET FRA KOMPONENTSIDE



konstr./tegn.
 OG/EBH
 26.10.70.
 godk.
 M
 komp.liste
 D110180
 X110181

SWITCHING UNIT FOR SECRECY
 OMSKIFTERENHED FOR SAMTALEHEMMELIGHED
 SU600-2002

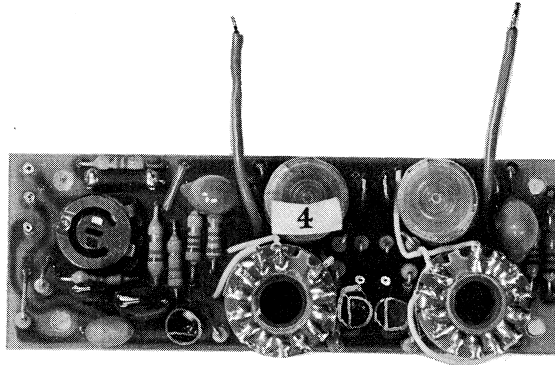
KODE

TEGN. NR.

D113579

A4

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 con-

sisting 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.

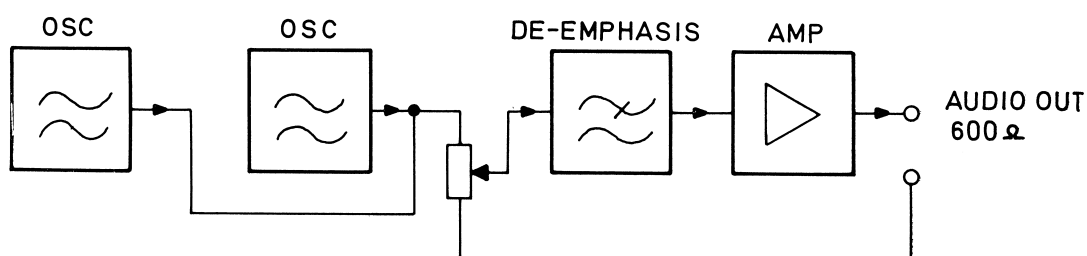
Amplifier

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.



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.

DataOutput 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

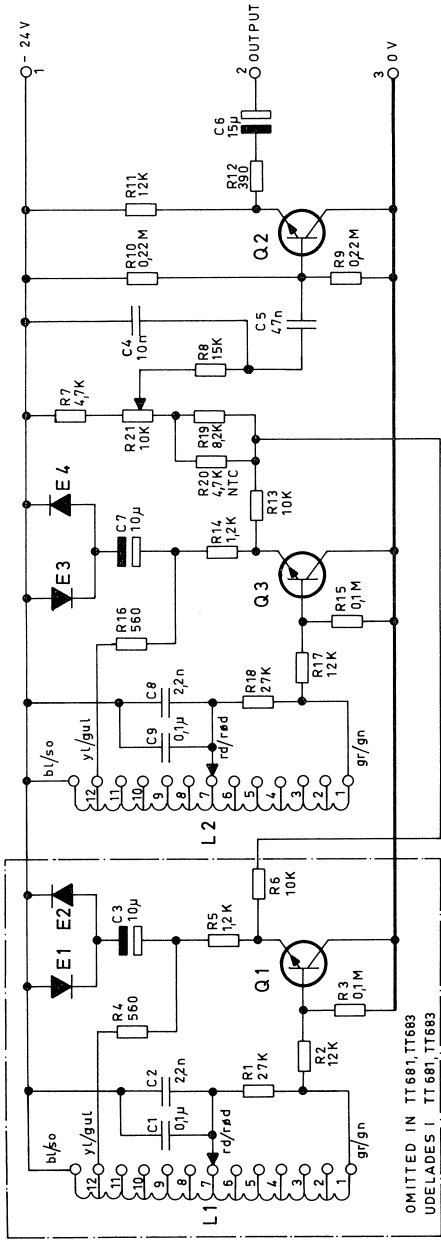
Better than 1%.

Distortion

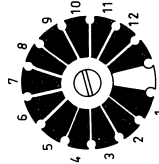
Less than 3%.

Current Drain

3.5 mA.

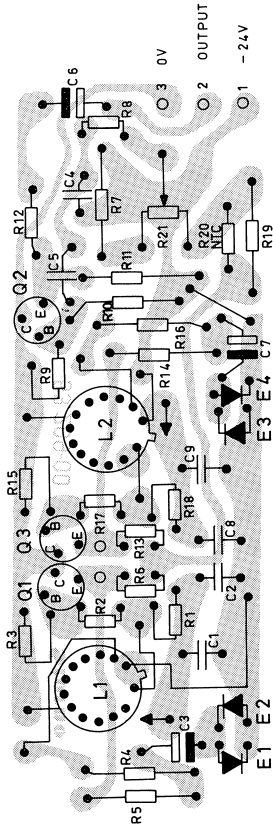


OMITTED IN TT681, TT683
UDELADES I TT681, TT683



L1, L2

TOP VIEW
SET FRA OVEN



PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE
TRYKT KREDSLØB SET FRA KOMPONENTSIDEN



Q1, Q2, Q3

TONE TRANSMITTER
TONE SENDER

TT681, TT682, TT683

Storno

Storno

TYPE	NO.	CODE	DATA
TT683	C1	76. 5068	0, 1 μ F 1% polystyr. TB
	C2	76. 5059	2, 2nF 10% polyester. FL
	C3	73. 5109	10 μ F \pm 20% tantal
	C4	76. 5070	10nF 10% polyester. FL
	C5	76. 5072	47nF 10% polyester. FL
	C6	73. 5105	15 μ F 20% tantal
	C7	73. 5109	10 μ F \pm 20% tantal
	C8	76. 5059	2, 2nF 10% polyester. FL
	C9	76. 5068	0, 1 μ F 1% polystyr. TB
	R1	80. 5266	27k 5% carbon film
	R2	80. 5262	12k 5% "
	R3	80. 5273	100k 5% "
	R4	80. 5246	560 Ω 5% "
	R5	80. 5250	1, 2k 5% "
	R6	80. 5261	10k 5% "
	R7	80. 5257	4, 7k 5% "
	R8	80. 5263	15k 5% "
	R9	80. 5277	220k 5% "
	R10	80. 5277	220k 5% "
	R11	80. 5262	12k 5% "
	R12	80. 5244	390 Ω 5% "
	R13	80. 5261	10k 5% "
	R14	80. 5250	1, 2k 5% "
	R15	80. 5273	100k 5% "
	R16	80. 5246	560 Ω 5% "
	R17	80. 5262	12k 5% "
	R18	80. 5266	27k 5% "
	R19	80. 5260	8, 2k 5% "
	R20	89. 5009	4, 7k 20% NTC
	R21	86. 5039	10k potm. lin.
TT681, TT682,	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
	L2	61. 928	Tonespole
	Q1	99. 5117	Transistor 2N2924
	Q2	99. 5117	Transistor 2N2924
	Q3	99. 5117	Transistor 2N2924

TT681, TT682,
TT683

TT681, TT682,
TT683

X400. 751/2

TT681, TT682,
TT683