STORNOPHONE 800U
PERSONAL RADIOTELEPHONE
TYPE CQP833U
TYPE CQP834U
68-88MHz

Contents

11 - 77 Service Coordination
1st Edition

Storno

CQP830U
TECHNICAL SPECIFICATIONS

Specifications are based on the measuring metheds prescribed in ETA publications RS152A and RS204A GPO specification W6771, and CEPT specifications. Figures given in backets are quaranteed values.

GENERAL

Frequency Range
68 - 88 MHz

Channe Separation
CQP833U: 20/25kHz
CQP834U: 12.5 kHz

Max. Frequency Deviation
CQP833U: ± 4kH or ± 5kHz
CQP834U: ± 2.5kHz

Modulation Frequency Range
CQP833U: 300 - 3000Hz
CQP834 300 - 2400Hz

VHF Bandwidth
1,0 MHz

Number of Channels
2, 4, 8 or 12 channels

Antenna Impedance
Multiwire connector: 50 Ω

Temperature Range

Operating range: -25°C to + 55°C
Functioning: -30°C to + 60°C

TRANSMITTER

RF Power Output
Measured at V_B =11 V (BU806-BU807) and 25°C. Degradation under extreme conditions according to CEPT.
CQP830U 1 W 0.1 - 1.0 W ± 1 dB

CQP830U 3 W 1.0 - 3.0 W ± 1 dB

Crystal Frequincy Range
17,0 MHz to 22,0 MHz

Crystal Frequency calculation

$$fx=\frac{fant}{4}$$

Frequency Stability
Conforms with the Authorities' specification.

Spurious Radiation, CEPT
less than 0,2µ W

Side Band noise, MPT
CQP834U: 1µ W (10µW)

Side Band Noise, CEPT
CQP833U: - 80dB (-70dB)
CQP834U: - 70dB (-60dB)

Tone Input Modulation Sensitivity
terminal voltage for 0.6 xΔf_{max}; 1kHz
110mV

Modulation Frequency Characteristic, CEPT
relative to 1000Hz 6dB/ octave
CQP833U: +0/ - 2.5dB (+1/-3dB) 300 - 3000Hz
CQP834U: +0/ -2.5dB (+1/ -3dB) 300 - 2400Hz

Modulation Distortion, CEPT
measured with de-emphasis
2% (10%)

FM Hum and Noise, CEPT
CQP833U: - 50dB (-40dB)
CQP834U: - 45dB (-40dB)

RECEIVER

Sensitivity, EIA
e. m. f. for 12dB SINAD
0.5µV at 25°C (1µV)

Sensitivity, CEPT
e. m. f. for 20dB S/N
0.7µV at 25°C (1.2µV)

Squelch Sensitivity, EIA
0.4µV at 25°C (1µV)

Crystal Frequency Range
89.4 MHz to 109.4M MHz

Crystal Frequency Calculation

f_{ant} + 21.4MHz

Frequency Stability
Conforms with Authorities' specifications

Modulation Pass Band, EIA
measured at 25°C
CQP833U: ±7kHz (± 5 kHz)
CQP834U: ±4kHz (±2.5kHz)

Adjacent Channel Selectivity, EIA
measured at 25°C
CQP833U: 85dB (80dB)

Adjacent Channel Selectivity, CEPT
CQP833U: 65dB (60dB)

Adjacent Channel Selectivtty, GPO
CQP834U: 3/15mV e. m. f. (2/10 mV e. m. f.)

Spurious Selectivity, CEPT
70dB (70dB)

Intermodulation Attenuation, EIA
70dB (65dB)

Intermodulation Attenuation, CEPT
CQP813U: 75dB (70dB)

Blocking, (GPO)
150mV (100mV)

Spurious Radiation, CEPT
Less than 2nW

AF Output Power
Measuring conditions:
R_L=25Ω; distortion 10%:1kHz; V_B=11V
500mW (400mW)

Af Output Power, CEPT
($\Delta f = 0.7 \times \Delta f_{max}$; 1kHz; distortion < 10%)
250mW (200mW)

Af Distortion
(measured at $\Delta f = \frac{2}{3} \times \Delta f_{max}$; 1kHz; 300mW; 25°C)
2% (7%)

AF Frequency Characteristic, CEPT
relative to 1000Hz. -6dB/ octave
+0 dB/- 1.5 dB (+1 dB/-3 dB)

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SUPPLY VOLTAGE AND CURRENT DRAIN

Nominal Supply Voltage

11 V

Supply Voltage Range

9.6 V to 13.5 V

Transmitter Current Drain

(less tone equipment at nominal supply)

1 W: 350 mA (380 mA)
3 W: 750 mA (800 mA)

Receiver Current Drain

(less tone equipment at nominal supply)

Standby: 6.5 mA (7.5 mA)
Receive, AF output 250 mW: 65 mA (80 mA)

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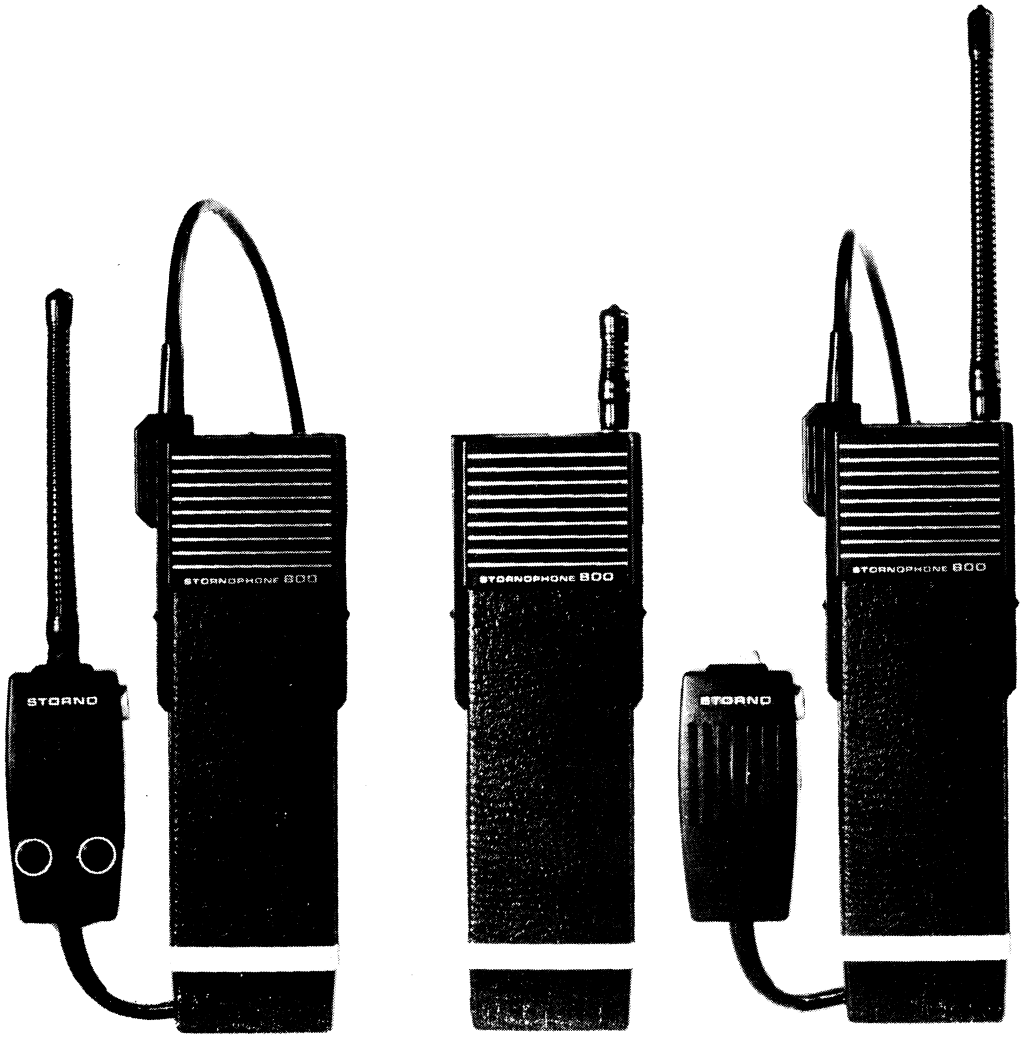
STORNOPHONE 800U

GENERAL DESCRIPTION AND OPERATING INSTRUCTIONS



The STORNOPHONE 800 U portable radiotelephone is a universal combination transmitter and receiver for FM radio communication service on fixed, crystal controlled frequencies.

The CQP800U may be either local controlled or remote controlled, and can be fitted with 2, 4, 8, or 12 channels plus optional tone signalling equipment, according to individual customer requirements.

A complete radiotelephone unit consists of four sections, beginning from the bottom these are:

1) the battery
2) the transmitter and receiver modules
3) the tone equipment
4) the control head

Local control

Local controlled sets have all of their operating controls as well as the speaker/microphone and the antenna connector placed in the control head, itself, and is fastened to the top of the radio-telephone.

Remote control

On remote controlled radios a control unit containing the transmitter key, tone key, and loudspeaker/squelch buttons, the speaker/microphone and an earphone socket, is connected to the set by means of a cable. Connecting the control unit automatically operates a switch which transfers the functions of the control head to the control unit.

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Control units with the following functions are available:

CB804 Contains loudspeaker/microphone, transmitter key, and a combined dial light-squelch cancelling button.

CB805 Contains loudspeaker/microphone, transmitter key, tone key I, tone key II, a combined dial light-squelch cancel-loudspeaker in/out button, call indicator, and earphone socket.

CB812 Contains loudspeaker/microphone, transmitter key, tone key I, tone key II, a combined dial light-squelch cancel-loudspeaker in/out-button, call indicator, and a threaded antenna socket. The unit is used for equipment operating in the 146 - 174 MHz band.

CB831 Contains loudspeaker/microphone, transmitter key, tone key I, tone key II, a combined dial light-squelch cancel-loudspeaker in/out-button, call indicator, and a threaded antenna socket. The unit is used for equipment operating in the 68 - 88 MHz band.

CB861 Contains loudspeaker/microphone, transmitter key, tone key I, tone key II, a combined dial light-squelch cancel-loudspeaker in/out-button, call indicator, and a threaded antenna socket. The unit is used for equipment operating in the 420-470 MHz band.

A comparison of the various models is presented in the table below:

Type	CQP833U	CQP834U
4 m band (VHF)	68 - 88 MHz	
Channel spacing	20/25 kHz	12.5 kHz
Number of channels	accomodation for 2, 4, 8, or 12 channels	
Output power	0.1 to 1.0 W or 1.0 to 3.0 W	
Type	CQP813U	CQP814U
2 m band (VHF)	146 - 174 MHz	
Channel spacing	20/25 kHz	12.5 kHz
Number of channels	accomodation for 2, 4, 8, or 12 channels	
Output power	0.1 to 1.0 W or 1.0 to 3.0 W	
Type	CQP863U	
0.7 m band (UHF)	420 - 470 MHz	
Channel spacing	20/25 kHz	
Number of channels	accomodation for 2, 4, 8, or 12 channels	
Output power	0.1 to 1.0 W or 1.0 to 3.0 W	

The length of a particular equipment will depend upon the number of channels, battery size, whether it includes tone equipment or not.

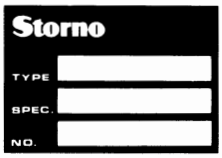
Type specification is as follows:

Specification	code
0.1 - 1.0 W RF output power	1
1.0 - 3.0 W RF output power	3
Universal control head	C8
2 channels	X2
4 channels	X4
8 channels	X8
12 channels	X12
Tone equipment	T

Thus a 3 W, four-channel radiotelephone with universal control head and selective calling would be designated:

3 C8 X4 T

For easy identification, each equipment has a type plate such as the one pictured below, showing the type and specification.

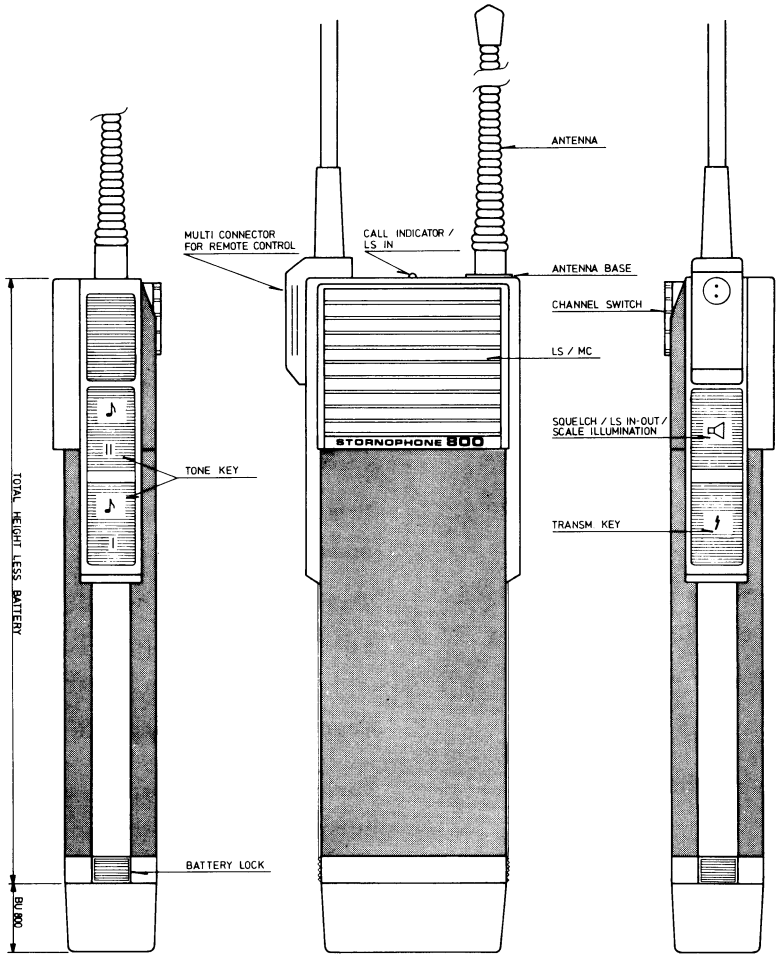


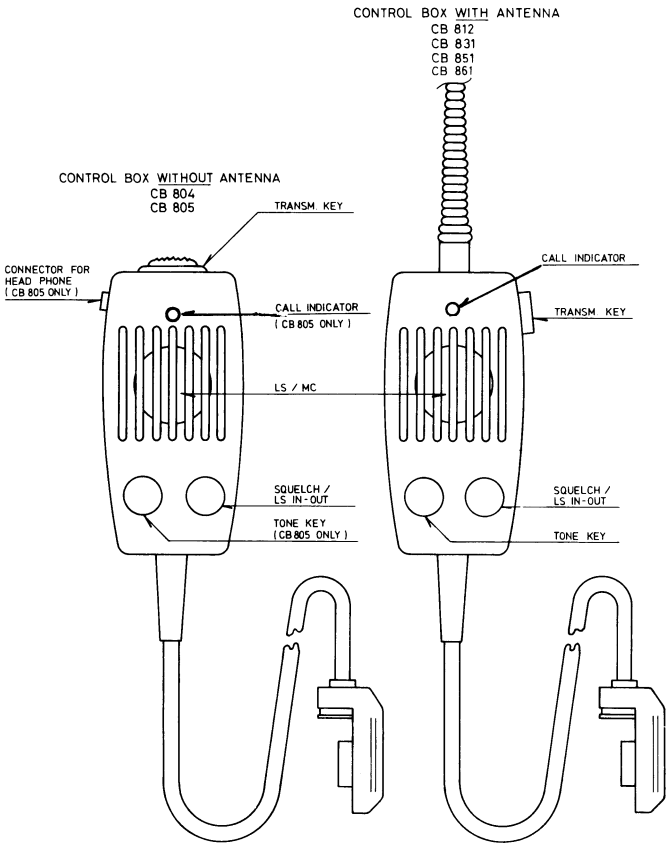
OPERATING INSTRUCTIONS

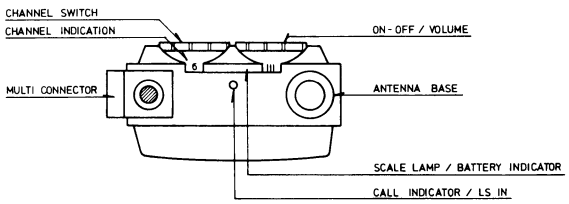
Local controlled equipments are fitted with CP808 control heads which interconnect with the various transmitter and receiver modules, channel switch an tone equipment, where applicable, via an internal wiring harness.

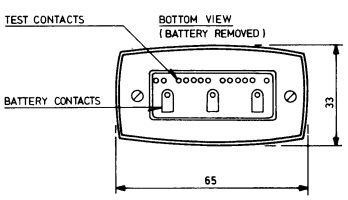
The following functions are incorporated in the CP808:

1. push button for keying the transmitter
2. push button for tone keying, tone I
3. push button for tone keying, tone II
4. push button for squelch cancelling - LS in/out -dial light
5. dial-type knob for volume control and on/off switch
6. 12-position dial-type channel knob
7. call indicator
8. hinged lid for access to the antenna tuning circuit
9. socket for remote control unit
10. socket cover
11. threaded antenna socket


ANTENNA
MULTI CONNECTOR FOR REMOTE CONTROL
CALL INDICATOR / LS IN
ANTENNA BASE
CHANNEL SWITCH
LS / MC
STORNOPHONE 800
SQUELCH / LS IN-OUT / SCALE ILLUMINATION
TONE KEY
TRANSM KEY
TOTAL HEIGHT LESS BATTERY
BATTERY LOCK
BU 800


CONTROL BOX WITH ANTENNA
CB 812
CB 831
CB 851
CB 861
CONTROL BOX WITHOUT ANTENNA
CB 804
CB 805
TRANSM KEY
CONNECTOR FOR HEAD PHONE (CB 805 ONLY)
CALL INDICATOR (CB 805 ONLY)
CALL INDICATOR
TRANSM KEY
LS / MC
SQUELCH / LS IN-OUT
TONE KEY (CB 805 ONLY)
SQUELCH / LS IN-OUT
TONE KEY


CHANNEL SWITCH
CHANNEL INDICATION
ON-OFF / VOLUME
MULTI CONNECTOR
ANTENNA BASE
SCALE LAMP / BATTERY INDICATOR
CALL INDICATOR / LS IN


TEST CONTACTS
BOTTOM VIEW (BATTERY REMOVED)
BATTERY CONTACTS
33
65

Before switching the set on, ensure that the antenna and battery are properly connected.

Receiving (without selective calling)

Turn the radiotelephone on by turning the volume control counter clockwise.

If no signal can be heard, the volume control can be set by pressing the squelch cancelling button while adjusting the volume control for the desired sound level, using the background noise for sound.

Set the channel selector to the channel to be used and release the squelch cancelling button. Any traffic on that channel will now be heard from the loudspeaker.

Receiving (with selective calling)

Adjusting the sound level is done as in the sets without tone equipment except that it is necessary to press the SQ/LS button momentarily to switch on the loudspeaker before opening the squelch circuit.

After the setting of the volume control again press the SQ/LS button momentarily to switch off the loudspeaker.

Transmitting (without selective calling)

When the channel is clear, simply press the transmitter key button and speak with a normal voice into the loudspeaker, which functions as a microphone when transmitting.

Transmitting (with selective tone receiver)

To initiate a call, turn on the loudspeaker with the LS IN/OUT button; do not transmit until the channel is free.

Press the transmitter key and speak into the loudspeaker/microphone.

To return to stand by, turn off the loudspeaker again with the LS IN/OUT button.

Transmitting (with selective tone transmitter)

Turn on the loudspeaker with the LS IN/OUT button, do not transmit until the channel is free.

Press the tone key button. When the connection is made, use the ordinary transmitter key button when transmitting (when the tone key is activated the microphone is blocked).

When no longer in use, switch the radiotelephone off by turning the volume control completely clockwise, i.e. the O on the dial is visible.

ACCESSORIES

Antennas

The following antennas are developed for use with the STORNOPHONE 800 U series radiotelephones and can be attached to either the control head or the control unit.

AN834	200 mm Heliflex Antenna	68 - 88 MHz.
AN815	500 mm Whip Antenna and 146 - 174 MHz.	68 - 88 MHz
AN816	150 mm Heliflex Antenna	146 - 174 MHz.
AN864	46 mm Heliflex Antenna	420 - 470 MHz.
AN865	155 mm Whip Antenna	420 - 470 MHz.

All antennas are fitted with a threaded bolt that fits the antenna socket on the control head and on control units type CB812, CB831, and CB861.

Batteries

To power the equipment the following battery types are available:

BU802/BU808	nickel-cadmium (NiCd) battery, 10.8 V, 225 mAh.
BU807	nickel-cadmium (NiCd) battery, 10.8 V, 450 mAh.

The batteries are encased in a high-impact cast plastic cassette with snap action locks, automatically securing the battery when slid into place.

Battery Chargers

Available battery chargers:

CU801 Charging unit with two outlets for BU802, automatic type.

CU802 Charging unit with ten outlets for BU802, automatic type.

CU804 Charging unit with one outlet. A switch selects high or low charging current as to charge the different battery types.

CU805 Charging unit with six outlets and built-in timer; for all types of batteries.

The battery chargers can be operated from either a 110 V or a 220 V AC mains.

Earphone

In conjunction with control unit CB805 an earphone, HP801, is available for use in areas where high background noise is encountered. The earphone is supplied complete with cable, connector and ear hanger. Plugging in the earphone does not disconnect the built-in speaker. The lower positions of the volume control are intended as settings for earphone reception.

Tone Equipment

The radio set can be fitted with tone equipment which is contained in a separate panel placed between the control head and the transmitter/receiver circuitry. Incorporating tone equipment into an existing radio set increases the total length of the unit and requires a new, longer casing. Tone signalling sub-units for CQP800U are as follows:

TT801 single or double tone transmitter, tone frequencies from 885 Hz to 2900 Hz.

TT802 single or double tone transmitter, tone frequencies from 1010 Hz to 3047 Hz.

ST801 four or five tone sequential tone transmitter, tone frequencies from 885 Hz to 2800 Hz.

ST802 four or five tone sequential tone transmitter, tone frequencies from 960 Hz to 2110 Hz.

SR801 four or five tone sequential tone receiver, tone frequencies from 885 Hz to 2900 Hz. (can also be coded for use as a double tone receiver).

SR802 four or five tone sequential tone receiver, tone frequencies from 960 Hz to 2110 Hz.

TQ802 three, four, or five tone sequential tone transmitter/receiver, tone frequencies from 885 Hz to 2800 Hz. By means of a plug-in module, SU808, the TQ802 can detect group calls.

TQ803 three, four, or five tone sequential tone transmitter/receiver, tone frequencies from 960 Hz to 2110 Hz. By means of a plug-in module, SU808, the TQ803 can detect group calls.

Carrying Devices

The following devices are available for carrying the CQP800U:

CK801a carrying harness for all types of equipment, mounting hardware, short and long straps, belt and clamps.

CK802 screw mounted pocket clip.

CK803a shoulder strap with retainer for remote control unit. (for remote control, only).

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CQP830U
CIRCUIT DESCRIPTION

Transmitter Circuit (see block diagram)

The transmitter is built up of several modules, each of which is completely enclosed (shielded) and has connector pins protruding from the bottom of the module. All the modules are then mounted onto a mother board. The transmitter section consists of the following modules:

XO812	Crystal Oscillator
AA802	Modulation Amplifier
FN803	Modulation Filter for 20/25 kHz channel separation
or	
FN804	Modulation Filter for 12.5 kHz channel separation
PM811	1st Phase Modulator
PM831	2nd Phase Modulator
FD831	1st Frequency Doubler
FD832	2nd Frequency Doubler
BP831	Band Pass Filter
PA831	1st Power Amplifier
PA832 (1 W)	2nd Power Amplifier and Antenna Switch
or	
PA834 (3 W)	2nd Power Amplifier and Antenna Switch
FN831	Antenna Filter
AD801	ADC Circuit
VR801	Voltage Regulator

Modulation Amplifier AA802 and FN803/FN804

The Modulation Amplifier function is carried out by the Modulation Amplifier, AA802 in conjunction with a Modulation Filter, FN803 or FN804. The microphone signal is applied to an operational amplifier, the degree of negative feedback, and thus the amplifier gain, can be adjusted by means of an external resistor. Microphone sensitivity can then be adjusted to suit individual requirements. In radio sets with built-in tone transmitters or sequential tone transmitters, the microphone amplifier is disabled by the tone key.

The amplified AF signal is applied to a limiter via a differentiating network. The limiter is likewise an operational amplifier utilising negative feedback. Following the limiter is an integration network and an active lowpass filter where the active element is another operational amplifier. The active filter removes any harmonics of the original input signal that arise during limiting action, and it also keeps the frequency excursions within the tolerances required for the channel spacing used in the particular equipment. An extra limiter is inserted between the integration network and the active lowpass filter to prevent strong input signals of low frequencies from overloading the filter.

Transmitter Oscillator XO812

The transmitter exciter signal is generated by a crystal, Colpitts-type oscillator operating on the crystal's fundamental frequency, which will be in the range of 17 to 22 MHz. The oscillator starts when the channel selector completes the circuit path to chassis ground. The collector circuit is tuned by a variable capacitance diode which also detunes the resonant circuit whenever the channel switch breaks the ground connection. Thus several oscillators can be tied in parallel without mutual, loading effects. The output signal is capacitively taken off the tank circuit. The maximum number of channels is 12, with all oscillators placed in an oscillator panel.

Phase Modulator PM811/PM831

The PM811 Phase Modulator consists of an input- and an output buffer plus a phase modulator stage. The exciter signal from the oscillator is fed to the input buffer stage. This amplifier, with following π network, ensures a constant sine wave signal to the phase modulator. The modulator is a transistor amplifier stage where the modulating audio signal is applied to the emitter, which is RF decoupled. The modulation signal varies the transconductance (g_m) of the amplifier and thus the phase angle (φ) of the RF signal at its output. To function properly, the modulator must work into a constant load and is therefore followed by a buffer stage whose output signal is applied to an additional phase modulator, PM831, whose circuitry is similar to PM811. The output from PM831 is taken off from a capacitive voltage divider and works into a buffer amplifier at the input of FD831.

Multiplier Chain FD831 and FD832

The multiplier chain consists of two frequency doubler stages, FD831 and FD832. In addition to the input buffer, the FD831 module also includes an amplifier whose output is tuned to the second harmonic of the input frequency. The FD832 module has only one amplifier, a doubler whose two output LC circuits likewise are tuned to the second harmonic of the input frequency. The final frequency is thus four times the oscillator frequency.

Band Pass Filter BP831

To ensure suppression of the undesired harmonics that arise in the frequency multiplying process, the multiplier chain is terminated by a double tuned band pass filter, the BP831.

Power Amplifier PA831 and PA832 or PA834

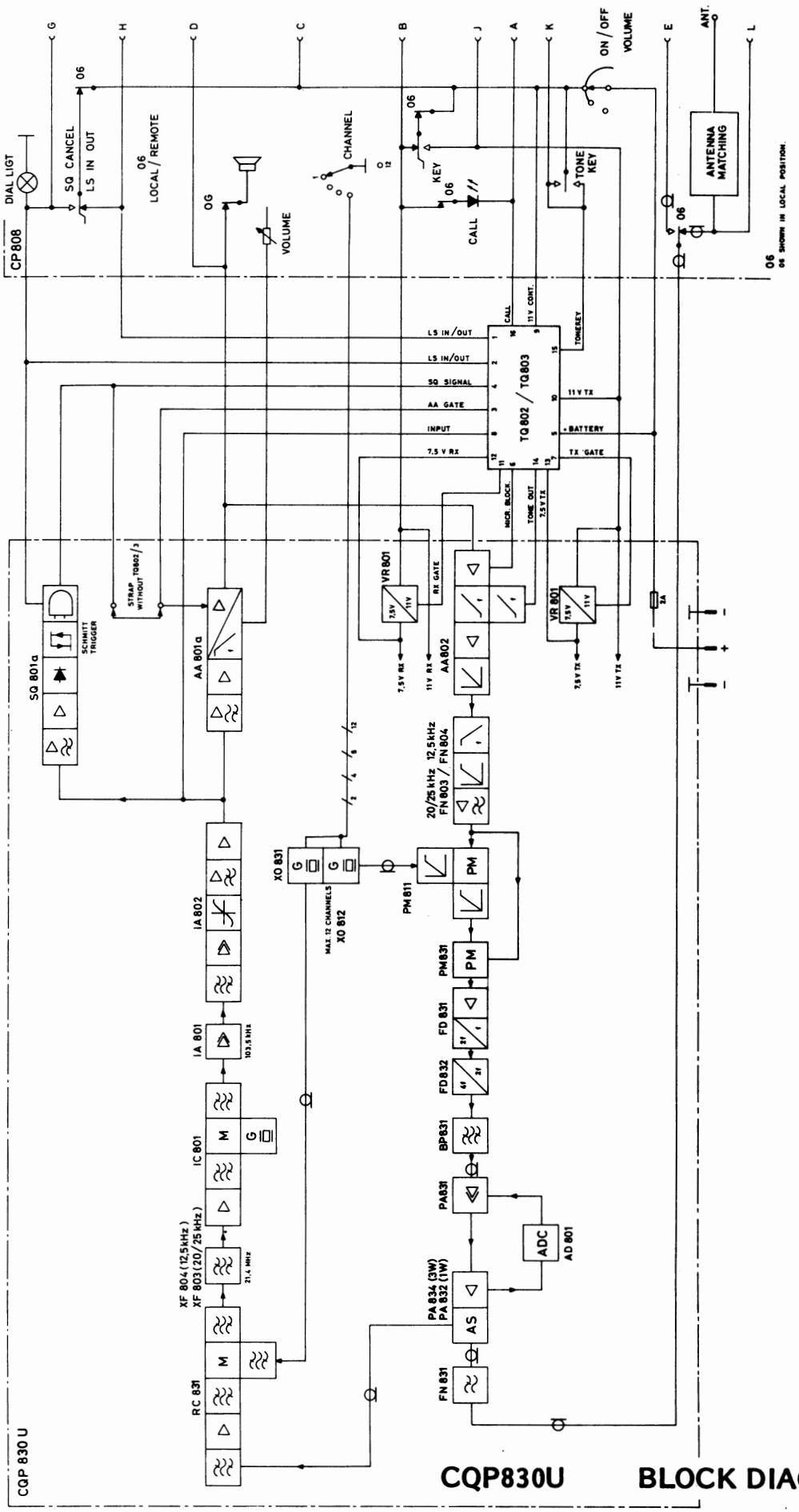
The output power from the multiplier chain (approx. 10 mW) is amplified to the required antenna power (0.1 to 1.0 W or 1.0 to 3.0 W) in a three-stage amplifier composed of the PA831 and PA832 (1 W) or PA834 (3 W) modules.

PA831 contains two amplifier stages. The collector voltage to the first transistor is supplied via the ADC Circuit, and is variable. If more gain is required to drive the following PA832/PA834 the collector supply (ADC) voltage will rise. On the other hand, if the drive signal is more than enough, the ADC voltage will drop.

PA832/PA834 contains the transmitter final amplifier plus a circuit for electronically switching the antenna between the transmitter and the receiver. Collector current for the second transistor in PA831 passes through the switching diodes, whereby they can be considered to be virtual short circuits. This connects the Power Amplifier output to the antenna while short circuiting the receiver input. When receiving, the diodes become reverse biased, effectively isolating the transmitter from the antenna while connecting the antenna to the receiver input.

ADC Circuit AD801

The transmitter output current is kept very nearly constant by means of the ADC Circuit. The voltage drop across a small resistor in the output transistor's collector return is monitored by the ADC stage, which then regulates the collector voltage to the first transistor amplifier in the PA831 stage with the net effect of cancelling any variations and thus keeping the RF output at a constant value. The amount of current through the output stage, and thus the output power, can be set by means of a resistor mounted on the mother board.



CQP830U BLOCK DIAGRAM

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Antenna Filter FN831

A nine-pole, lowpass filter having a cutoff frequency of 90 MHz is inserted between the transmitter output and the antenna. The filter suppresses any harmonics created in PA832/PA834.

Receiver Circuit (see block diagram)

The receiver is a double conversion superheterodyne using intermediate frequencies of 21,4 MHz and 103,5 kHz. Channel selectivity is achieved by means of a crystal filter in the first IF circuit. The radiotelephone can be fitted with up to 12 channels, one oscillator per channel. All the oscillators are arranged in parallel on a special oscillator panel which also contains the transmitter oscillators.
The receiver employs an electronic squelch circuit whose threshold can be set with a resistor on the mother board. There is a pushbutton for cancelling the squelch on the control head or on the control unit, whichever is used.

The receiver consists of the following modules:

RC831	Receiver Converter
XO831	Crystal Oscillator
XF803	Crystal Filter for 20/25 kHz channel separation
or	
XF804	Crystal Filter for 12.5 kHz channel separation
IC801	IF Converter
IA801	1st IF Amplifier
IA802	2nd IF Amplifier and Discriminator
SQ801a	Squelch Circuit
AA801	AF Amplifier
VR801	Voltage Regulator

Receiver Converter RC831

The RC831 converts the frequency of the antenna signal to the 1st IF frequency of 21,4 MHz. The incoming signal path from the antenna is through the Antenna Filter, FN831, and then via the antenna switching circuit in PA832/PA834 to the input of the RC831. The signal then passes through a two-element bandpass filter to a field effect transistor (J-FET) operating as a grounded gate amplifier. After amplification, the signal passes through a three-element VHF filter consisting of L3, L4, and L5. This filter is what mainly determines the r.f. selectivity of the converter. The signal is taken off at a 50 Ω tap and fed to the mixer via L6, a transformer that serves as an adjustment for achieving optimal sensitivity/gain. The local oscillator signal from the XO module(s), after passing through a two-element band pass filter, is applied to the mixer transistor is also a J-FET, this time in a grounded source configuration.
The IF signal is taken off via a combination autotransformer/L network to match the impedance of the following crystal filter.

Oscillator XO831

The local oscillator signal of 90 to 110 MHz is generated in the Hartley type crystal oscillator where the transistor operates as a grounded base amplifier, the oscillator starts when the channel selector switch completes the emitter circuit path to chassis ground. The collector circuit is tuned by a variable capacitance diode which also detunes the resonant circuit whenever the channel switch breaks the ground connection. Thus several oscillators can be tied in parallel without mutual loading effects. The output signal is capacitively taken off the tank circuit.

The local oscillator signal frequency lies 21,4 MHz over the antenna frequency and the formula for calculating the crystal frequency is therefore:

$f_x = f_a + 21.4$ MHz

(where f_x = crystal frequency and f_a = antenna frequency).

Crystal Filter XF803 and XF804

The Crystal Filter unit comprises an eight-pole monilithic crystal filter and an impedance match-

ing transformer for matching the output to the impedance of the following IF converter. Practically all of the receiver selectivity is achieved in the crystal filter.

XF803 is employed in equipment with 20/25 kHz channel spacing.
XF804 is employed in equipment with 12.5 kHz channel spacing.

IF Converter IC801

The first IF frequency (21.4 MHz) is converted to the second IF frequency (103.5 kHz) in this module, which contains an amplifier, a mixer, and an oscillator. The output signal is taken off from a center tap on the coil in the mixer transistor's collector circuit and applied to an intermediate frequency amplifier, IA801.

IF Amplifier and Discriminator IA801 and IA802

The first Intermediate Frequency Amplifier, IA801, consists of two differential amplifiers in cascade. The output signal is applied to the second Intermediate Frequency Amplifier, IA802, which contains a 103.5 kHz bandpass filter, a quadrature detector, a lowpass filter and an audio frequency amplifier.

The IF amplifier, detector and AF amplifier are all included in one integrated circuit.

The balanced quadrature detector has excelent AM suppression and contains only one tuned circuit. Inserted between the detector and the AF amplifier is an active lowpass filter which removes any superimposed IF signal. The detector bandwidth and the audio amplifier output voltage can be regulated by means of two external resistors on the mother board (AF output at 1000 Hz = 110 mV).

LF Amplifier AA801a

The audio frequency signal from IA802 is fed to the AA801a AF Amplifier where it becomes amplified to the desired audio power level. First the signal passes through an active highpass filter that rejects any low frequencies (noise). Next comes an integrated circuit containing two separate amplifiers which make up the preamplifier and output stage. The volume control is inserted between these two amplifiers.

The preamplifier also operates as an active lowpass filter suppressing frequencies above 3000 Hz and the output amplifier gives the required receiver de-emphasis (integration).

The Squelch Circuit can block the AF signal path by grounding the squelch terminal (5). When the squelch output goes positive again, the audio amplifier will operate normally.

Squelch Circuit SQ801a

The receiver Squelch Circuit operates automatically, according to the noise content of the antenna signal. Weak signals contain greater noise than acceptable signal levels. The output AF signal from IA802 is also present at the input to SQ801a, where it must first pass through an active highpass filter that suppresses frequencies under 7 kHz. Higher frequencies become amplified, then detected and whenever the signal-to-noise ratio is objectionable, the detected noise signal will be sufficient to turn off the audio amplifier.

With an acceptable signal strength at the antenna the noise content will be too low to trigger the squelch, and the positive collector supply (+ V_{cc}) will be available to the audio amplifier's gating terminal allowing it to operate normally. An external resistor sets the squelch to open the path for a signal-to-noise ratio of $\geq$ 12 dB SINAD. A pushbutton on the control head/control unit allows manual cancelling of the squelch function.

Power Supply and Voltage Regulator VR801

Because of variations in the battery voltage as the battery discharges, two VR801 type Voltage Regulators are employed to supply many of the transmitter and receiver circuits in the CQP800 with a constant 7.5 V potential. The regulators are short circuit protected.

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CQP830/830U

ADJUSTMENT PROCEDURE

The following measuring instruments are required for tracing faults in and making adjustments to the transmitter/receiver circuits:

Control Unit C35	code 95B0363 including
Test cable SI801	code 41.0200
Test cable adaptor SI803	code 41.0206
Measuring adaptor SI805	code 41.0221
Antenna alignment unit TS-D37	code 95B0555
RF Test probe	code 95.0059
DC ampere meter	10 mA/100 mA/1 A
DC Voltmeter	Zin = >0.5 MΩ
AC Voltmeter	Zin = >2 MΩ// 50 pF
FM signal generator	68 - 88 MHz
AF generator	Z_{out} = 600 Ω
RF Wattmeter	0 - 3 W
Deviation meter	
Distortion meter	
Oscilloscope	
Power supply	0 - 20 V/1A
	Preset current
	limiter 0 - 1 A
Frequency counter	
Trimming tools:	17.0035-10 (17.0053-00) 17.0012-00

OPERATING CONTROL UNIT C35

The control unit and test cable C35 are designed for testing and adjusting STORNOPHONE 800/800U. The instruments connect to the unit and remain connected during the procedure.

The front panel of the unit is divided into three parts.

1. The TEST CONTROLS are used to control the radio circuits.
2. The BFO is a 21.4 MHz crystal controlled oscillator.
3. The INSTRUMENT TERMINAL is used for measuring instrument connections.

Connections on the rear panel.

TEST PLUG	34-way connector for the test cable.
POWER SUPPLY	Jacks for power supply.
CURRENT MONITOR.	Jacks for current monitor.

Connections on the front panel.

RF PROBE	Jacks for RF probe.
DCVM	Jacks for DC voltmeter.
AF PROBE	BNC connector for AF probe.

Probe consists of shielded leads to be connected whenever measuring of audio is desired.

DEVM (AF)	BNC connector for the AF output of the deviation meter.
ACVM	BNC connector for AF voltmeter, distortiometer and oscilloscope.
MOD INPUT	BNC connector for AF generator.

Toggle Switches

SQ OFF	Disables the squelch circuit of the receiver (loudspeaker continously open).
KEY	Switches the transmitter on, the receiver off, and connects the AF generator input jack to the LS/MICR switch.
TONE KEY	Transmitter key for radio sets with tone transmitter.
RX GATE	Switches the receiver's +7.5 V on/off.
TX GATE	Switches the transmitter's +7.5 V on/off.

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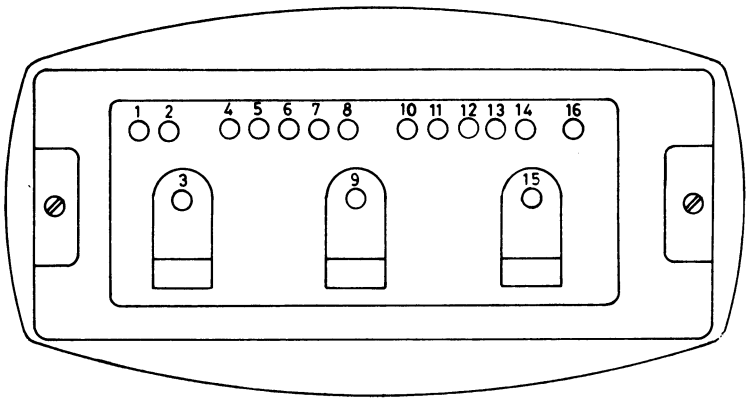
ON-OFF	21.4 MHz crystal controlled BFO on/off.
LINE OUT LS/MICR	Switches the AC voltmeter between the LINE OUT and the LS/MICR.
ACVM switch	Switches the AC voltmeter between the LINE OUT - LS/MICR switch and DEVM (AF) -AF PROBE switch.
DEVM switch	Switches the AC voltmeter input between the DEVM (AF) and the AF PROBE (AC voltmeter).
DCVM switch	6-position DC voltmeter switch. 1. SUPPLY voltage 2. RX +7.5 V stabilized RX voltage. 3. RC Receiver converter test point. 4. TX +7.5 V stabilized TX voltage. 5. ADC voltage. 6. RF PROBE
AMPLITUDE	BFO output attenuator.

Test point	Function
1	+7.5 V TX stabilized
2	+7.5 V RX regulator gate.
3	DC ground (connected to point 15)
4	ADC voltage
5	Audio output - microphone input
6	Tone Key
7	+7.5 V TX regulator gate
8	$+V_B$ Battery voltage measured after the fuse.
9	+11 V Battery
10	+11 V TX
11	+7.5 V RX stabilized
12	Squelch disable
13	Receiver converter test point
14	21.4 MHz BFO signal input
15	DC ground (connected to point 3)
16	Discriminator and Receiver line output.



BOTTOM VIEW

CQP800 TEST POINT LOCATION

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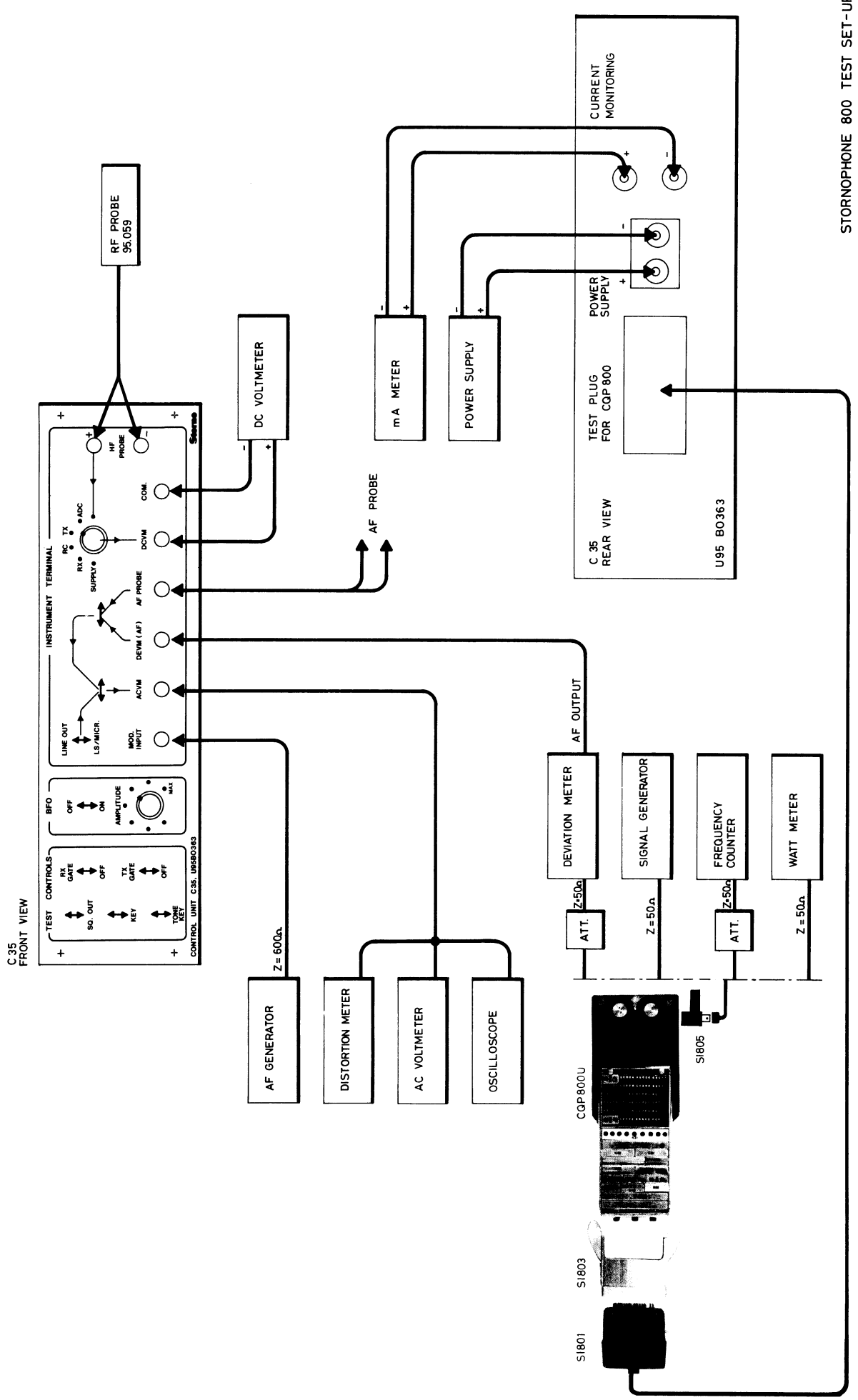
STORNOPHONE 800 TEST SET-UP

D402.537



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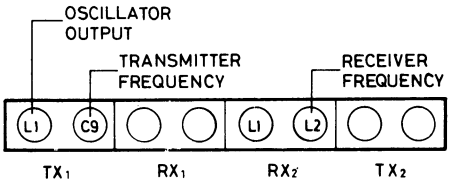
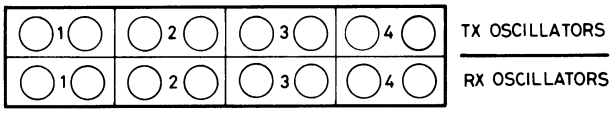
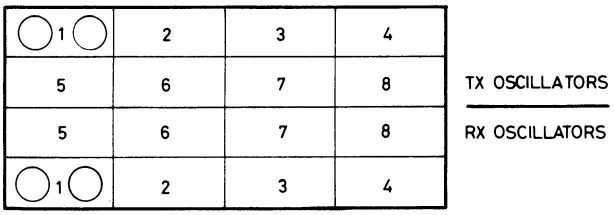
LOCATION OF OSCILLATORS



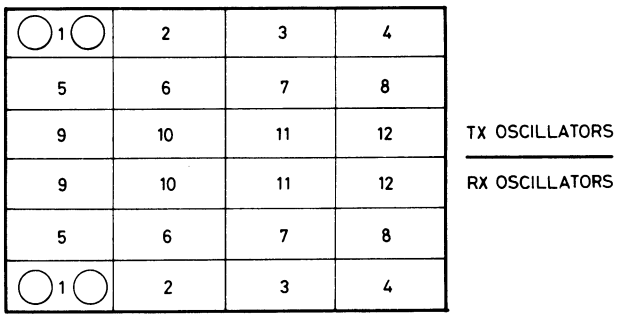
2 CHANNELS (CH803)



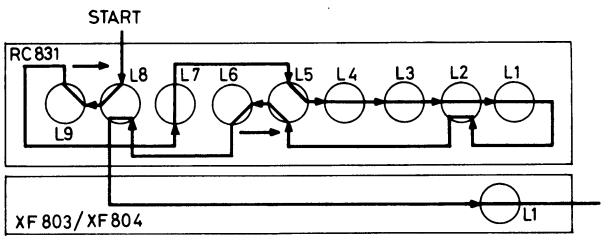
4 CHANNELS (CH804)



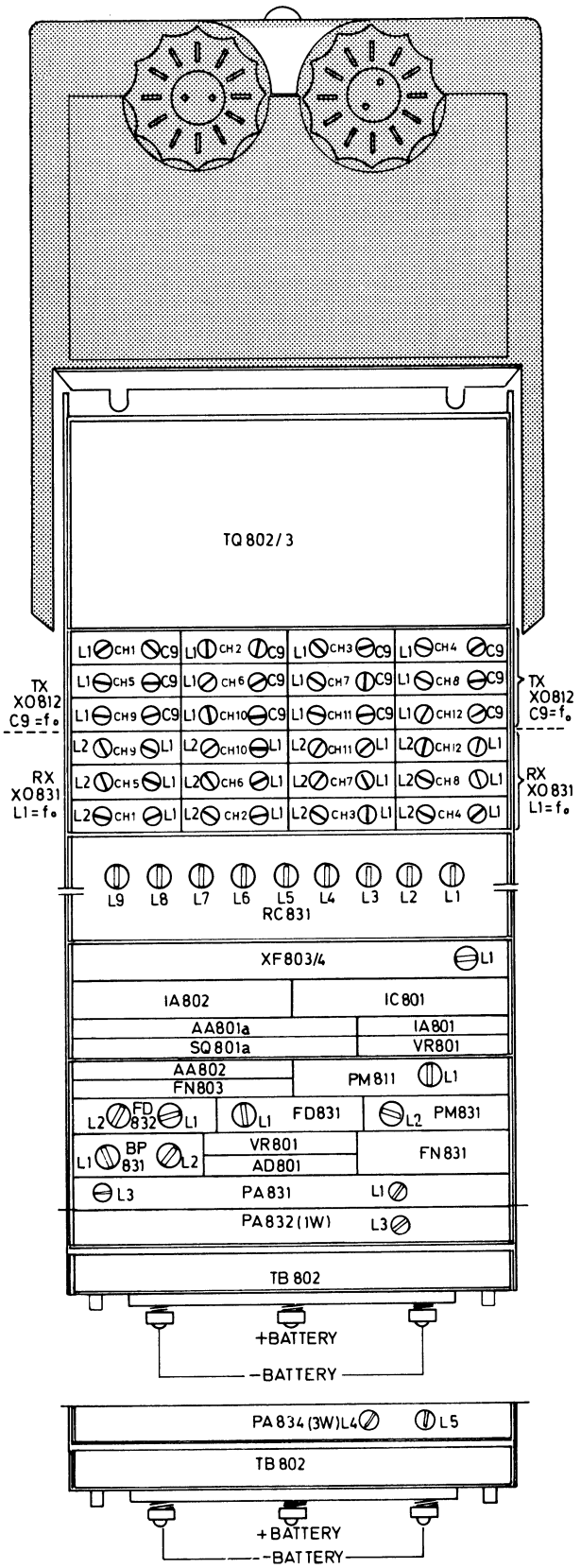
8 CHANNELS (CH 805)



12 CHANNELS (CH806)



RC831 L8, L9 : Maximum voltage (Vgs)
L1, L2, L3, L4, L5, L6 : Maximum sensitivity
L7 : Minimum distortion
XF800 L1 : Minimum distortion



60.332-E1

TRANSMITTER ADJUSTMENT

For location of components see page 11.

Before starting adjustment of the transmitter, check the resistor (R6) located between pin 4 and 6 of AD801.

approx. 6.8 kΩ for 0.1 to 0.5 W output power.
approx. 4.7 kΩ for 1 W output power.
approx. 2.7 kΩ for 3 W output power.

A second resistor R7 is paralleled with R6 for fine adjustment of the output power.

Checking Supply Voltage and Current Drain.

1. Select the channel closest to the center frequency, if more than one.
   Set the DCVM switch to SUPPLY.
   Connect a wattmeter to the antenna connector.
   Adjust the power supply to 11 V.
   Set the current limiter to 1 A.
2. KEY the transmitter.
   Read the current drain on the mA meter.
   Current drain without output: approx. 70 mA.
   Current drain with output, < 800 mA.
3. Unplug the oscillator and read the current drain.
   Requirement: < 75 mA.
4. Set the DCVM switch to TX.
   Read the TX stabilized voltage.
   Requirement: 7.5 V ±0.15 V.

Crystal Oscillator Output Adjustment

5. Set the DCVM switch to RF PROBE
   KEY the transmitter.
   Connect the RF probe to pin 2 on PM811 and hold the probe's metal housing against chassis.
   Adjust L1 in XO812 for maximum DC voltage, approx. 0.8 V.
   Repeat the adjustment on all channels.

Adjustment of Frequency Multipliers and Power Amplifiers.

Select center transmitting channel, if more than one.
Set the tuning slugs in PM811, PM831, FD831, FD832, BP831, and PA831 to the approximate position.

High frequency (> 78 MHz) = outer position.
Low frequency (< 78 MHz) = inner position.
Medium frequency (∿ 78 MHz) = middle position.

KEY the transmitter.

6. Adjust the following coils for maximum current drain as seen on the mA meter.

   L1 in FD831
   L1 and L2 in FD832
   L1 and L2 in BP831
   L1 and L3 in PA831

   Adjust L3 in PA832 / L4 and L5 in PA834 for maximum power output.

7. Set DCVM switch to ADC.
   Adjust L1 in FD831 for minimum ADC voltage.
   Adjust L1 and L2 in FD832 for minimum ADC voltage.
   Adjust L1 and L2 in BP831 for minimum ADC voltage.
   Adjust L1 and L3 in PA831 for maximum power output.
   Adjust L3 in PA832 / L4 and L5 in PA834 for maximum power output.
   Repeat the adjustments under 6 for minimum ADC voltage and maximum power output until no further improvement is obtainable.

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8. The output power level can be adjusted by connecting a resistor, R7, in parallel with R6 (see page 11).
   The value of R7 is chosen in the following manner:

Nominal Output Power W	Select R7 for total TX current consumption mA	Power Output Requirement W
0.5	220 $^{+20}/_{-0}$	0.5 W ± 1 dB
1	350 $^{+30}/_{-0}$	1.0 W ± 1 dB
3	750 $^{+50}/_{-0}$	3.0 W ± 1 dB

   The current adjustment must be made with the power stages fine trimmed for maximum output.
   Check the output power on all channels.

9. Read the ADC voltage.
   Requirement: < 10 V
   Typical ADC voltage at 1 W: 5 V.
   Typical ADC voltage at 3 W: 8 V.

Transmitter Frequency Adjustment.

10. Connect a frequency counter through an attenuator to the antenna connector.
    Set the KEY switch down.
    Adjust C9 in XO812 to the channel frequency.
    Repeat the adjustment on all channels.
    Requirement at 25° ± 0.5 x 10^{-6}.

Checking and Adjustment of Modulator

11. Connect the deviation meter through an attenuator to the antenna connector.
    Set the DEVM (AF) - AF PROBE switch to DEVM (AF).
    Set the ACVM switch to DEVM (AF).
    Establish a connection from the output of FN803/804 (pin 7) to the inputs of PM811 (pin 4) and PM831 (pin 3). (see fig. page 11).
    KEY the transmitter.
    Set the AF generator to 1000 Hz and adjust the output to give a transmitter frequency deviation of approx. ± 3 kHz.
    The output should be below clipping level as seen at the AF output of the deviation meter.
    Adjust L2 in PM811 and L2 in PM831 for minimum distortion.
    Remove the connection from FN803/804 to the modulator inputs.

12. Set the tone generator output to 6 mV.
    Check that Δ f max. is not exceeded at frequencies between 300 Hz and 3000 Hz.
    If necessary adjust R11//R10 - R13 (see page 11).
    Set the tone generator output to 0.7 x Δ f max. at 1000 Hz.

    ±3.5 kHz for 25 kHz channel spacing.
    ±2.8 kHz for 20 kHz channel spacing.
    ±1.75 kHz for 12.5 kHz channel spacing.

    Check the total harmonic distortion at the output of the deviation meter.

    Requirement: THD < 7% (without de-emphasis).

RECEIVER ADJUSTMENTS

For location of components see page 11.

Supply voltage and current drain

Before making adjustments to the receiver circuits check the discriminator bandwidth resistor between pin 1 and pin 3 of IA802.

CQP833-R1 = 5.6 kΩ
CQP834-R1 = 27 kΩ

1. Set the DCVM switch to SUPPLY.
   Adjust the power supply to 11 V.
   Set the current limiter to 0.1 A.

2. Read the current drain

   I_{total}: < 100 mA

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3. Set the DCVM switch to RX.
Read the stabilized RX voltage.
Requirement: 7.5 V ± 0.15 V.

Adjustment of Receiver.

4. Set the trimming slugs in L1, L2, L3, and L4 in RC831 to the outer position for frequencies below 78 MHz.
Set the slugs to the inner position for frequencies above 78 MHz.
Set slugs in L5, L6, L7, L8, and L9 in RC831 to the middle position.
Set the DCVM switch to RC.

Crystal Oscillator Output Adjustment

Crystal oscillator XO831 is factory adjusted for maximum output into 50 Ω, and output coil L1 is not to be touched.
If the oscillator has been detuned disconnect the coaxial cable from XO831 to RC831 at RC831 (terminal 20) and terminate it with a 47 Ω resistor.
Set the DCVM switch to RF PROBE. Tune L1 in XO831 to maximum output as measured with the RF probe connected across the 47 Ω resistor.
Repeat the adjustment on all channels.
Set the channel selector to the channel closest to the center frequency, if more than one.
Adjust L8 in RC831 for maximum DC voltage.
Adjust L9 in RC831 for maximum DC voltage.
Adjust L8 in RC831 for maximum DC voltage.
Set the RX Gate switch to OFF to disable the receiver oscillator; the DC voltage should fall at least 0.1 V.

5. Set the signal generator to the receiver frequency.
Modulate the generator with 1 kHz to a frequency deviation of 0.7 x Δ f max.

±3.5 kHz for 25 kHz channel spacing.
±2.8 kHz for 20 kHz channel spacing.
±1.75 kHz for 12.5 kHz channel spacing.

Set SQ OUT switch down.
Set LINE OUT - LS/MICR down.
Set ACVM switch to LS/MICR.
Adjust the signal generator output to 12 dB SINAD.
Turn the volume switch to the 2nd position (II).
(approx. 0.5 on the ACVM, no clipping).
As the receiver sensitivity increases during the adjustment, the signal generator output must be reduced to maintain 12 dB SINAD.
Adjust L7 in RC831 for best signal to noise ratio at approx. 12 dB SINAD.
Detune L5.
Adjust L4 in RC831 for minimum distortion.
This is the ONLY adjustment of L4.
The following coils are adjusted for best signal to noise ratio in this order:

L3, RC831
L2, RC831
L1, RC831
L2, RC831
L5, RC831
L6, RC831

Repeat the adjustment of L5 and L6 until no further improvement is obtained.
Readjust L8 in RC831 for maximum voltage on DCVM (approx. 2.0 V).
Readjust L3 in RC831 for best signal to noise ratio.

6. Set the signal generator output to approx. 100 µV e.m.f.
Adjust L7 in RC831 and L1 in XF803/804 for minimum distortion.

Receiver Sensitivity Measurement

EIA (Electronic Industrie's Association) standard definition:
The SINAD sensitivity of a receiver is the minimum signal that will provide at least 50% of the receiver's rated audio output power with 12 dB signal + noise + distortion to noise + distortion.

Method of Measurement

The purpose of the measurement is to define the ratio of one condition to another.

The first condition is the one where a modulated RF-signal drives the receiver into full limiting. The audio output is measured with the distortion

meter (in the CAL position) and, disregarding the amplitude of the audio, this is adjusted to read 100 on the meter scale; this is our reference condition consisting of signal + noise + distortion, where 'signal' is the modulation on the RF, 'noise' is the lowest possible amount achieved from that particular receiver, when receiving a strong carrier, and 'distortion' is the modulation being slightly distorted in passing through the receiver.

The second condition is the one where the signal (modulation) is removed with a notch filter and the RF-signal is lowered in amplitude until the remaining noise and distortion increases to 12 dB below the first condition, as read on the distortion meter scale. This corresponds to a reading of 25%, 25 being 12 dB below 100, which was our reference condition.
(100 - 6 dB = 50, 50 - 6 dB = 25).

In practice our first condition is achieved by feeding a minimum of 1000 µV of RF-signal modulated with 1000 Hz at 0.7 x Δ f max. to the receiver. The audio output (which must be at least 50% of the receiver's audio rating) is measured with the distortion meter in position CAL and adjusted with potentiometer ADJ. FSD. to a reading of 100.
The notch filter is then inserted in series with the audio by pressing one of the buttons marked in %.
The meter needle immediately drops to indicate a low value, this being the receiver's inherent audio distortion.
By backing off the attenuator of the RF-generator, thereby lowering the RF-input to the receiver, the noise will eventually increase; the attenuator being adjusted for a reading on the distortion meter scale of 25%.

At this stage it must be ensured that the increased noise and the signal (with the notch filter switched out while checking) still equals 100 on the meter scale.

The RF-generator's calibrated attenuator now shows the value of RF-signal required to achieve a 12 dB ratio between signal + noise + distortion and noise + distortion, i.e. 12 dB SINAD sensitivity.

7. The sensitivity must be minimum 1.0 µV e.m.f.
   Typical value: 0.5 µV e.m.f.

   Changing the supply voltage from 9.6 V to 13.5 V should not influence the sensitivity obtained at 11 volt.
   If more than one channel is provided, the sensitivity check should be repeated on all channels.

Oscillator Frequency Adjustment.

8. Set the signal generator to the receiver frequency using the frequency counter.
   Remove the signal generator modulation and set the output to approx. 100 µV e.m.f.
   Turn the BFO on.
   Adjust BFO AMPLITUDE to produce a clear beat tone.
   Set ACVM switch to LINE OUT.
   Adjust L2 in XO831 for zero beat as seen on the oscilloscope.

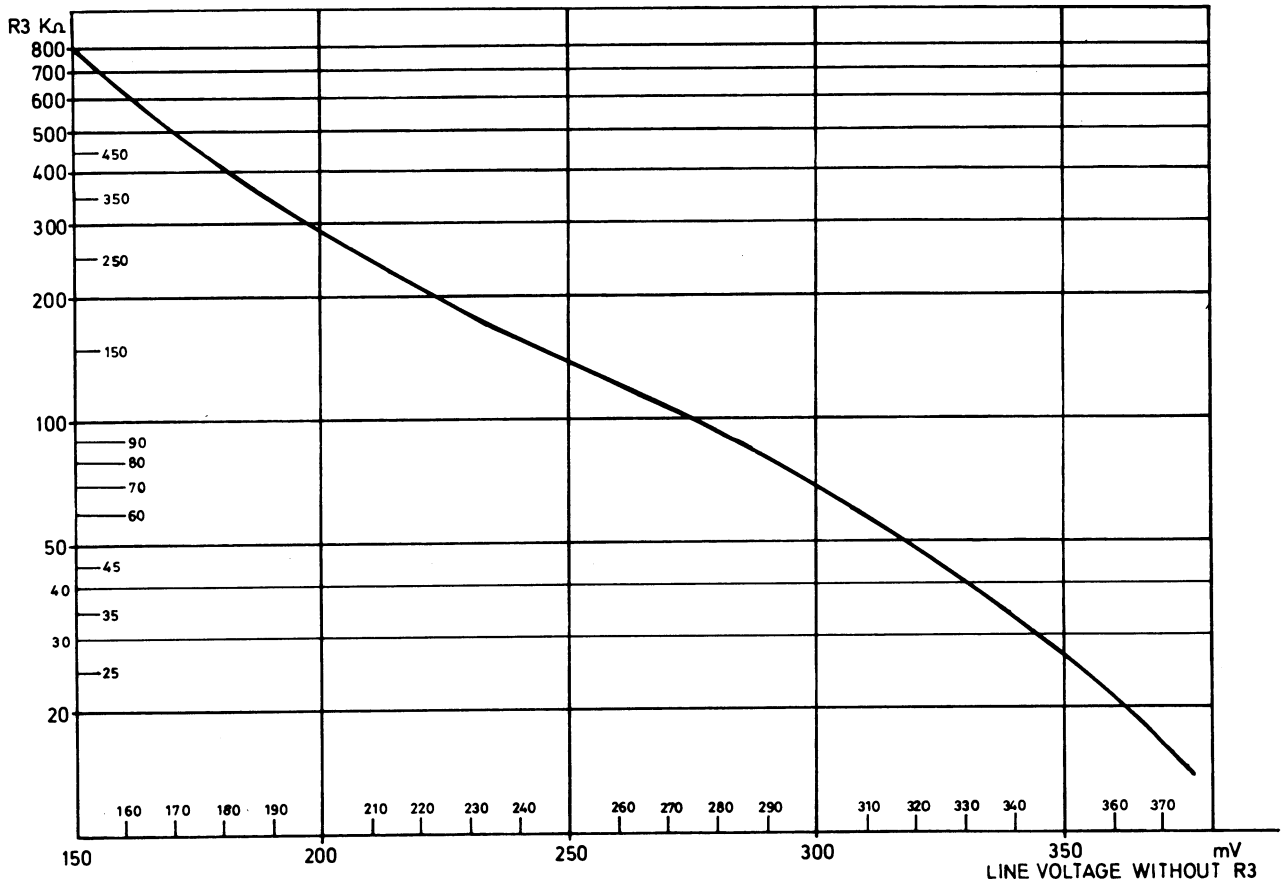
   If more than one channel is provided the adjustment should be repeated on all channels.
   When adjustments are completed, turn the BFO OFF.

Checking Receiver Audio Line Output.

Modulate the signal generator with 1 kHz and 0.7 x Δ f max.

±3.5 kHz for 25 kHz channel spacing.
±2.8 kHz for 20 kHz channel spacing.
±1.75 kHz for 12.5 kHz channel spacing.

9. Set the signal generator output to approx. 100 µV e.m.f.
   Switch the ACVM to LINE OUT.
   Read the AF Line voltage.
   Requirement: 110 mV $^{+1}_{-0}$ dB.



If necessary change resistor value (R3) in parallel with R2 (IA802, pin 5-6) until 110 mV is obtained. (see page 11).
The graph page 9 indicates the value of the resistor, which should be the closest higher standard value.

Checking the AF Frequency Response.

10. Set the signal generator output to approx. 100 µV e.m.f.
Set LINE OUT - LS/MICR switch down.
Turn the volume switch to the 3rd position (III).
Read the AF voltage on the ACVM (reference)
Set the modulation frequency to 300 Hz.
AF voltage: +9 dB ± 2 dB rel. to 1000 Hz.
Set the modulation frequency to 3000 Hz.
AF voltage: -10 dB ± 2 dB rel. to 1000 Hz.

11. Turn the volume switch to the 4th position (IIII).
Check the total harmonic distortion at 1000 Hz.
Requirement:
CQP833, THD = < 7%
CQP834, THD = < 8%

Adjustment and Checking of the Squelch Function.

12. Modulate the signal generator with 1 kHz and 0.7 x Δ f max.
Set the volume to the 4th position (IIII).
Set the SQ OUT switch up.
Increase the RF-generator output until the signal opens the squelch.
Requirement: 10 to 12 dB SINAD.
Decrease the value of R4 if SINAD is less than 10 dB.
Increase the value of R4 if SINAD is more than 12 dB.

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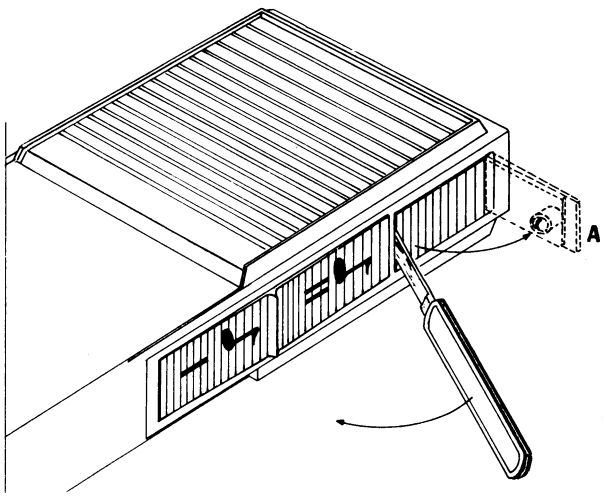
Checking the Overall Receiver Current Drain.

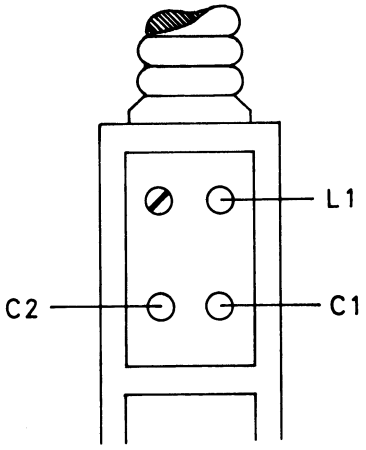
13. Set the DCVM switch to SUPPLY.
    Set the supply voltage to 11 V.
    Disconnect the signal generator.
    Read the current drain on the mA meter.
    Requirement: < 7.5 mA + current drain of tone equipment.
    Set the SQ OUT switch down.
    Set the volume switch to the 4th position (IIII).
    Read the durrent drain on the mA meter.
    Requirement: < 100 mA.

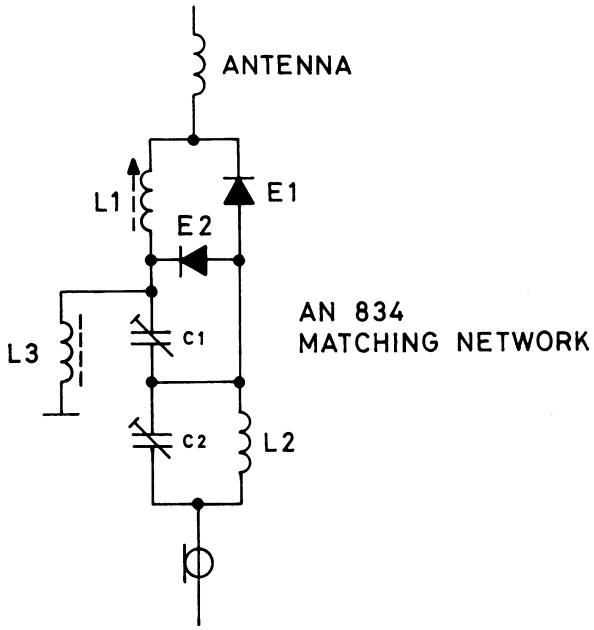
Antenna Network Adjustment

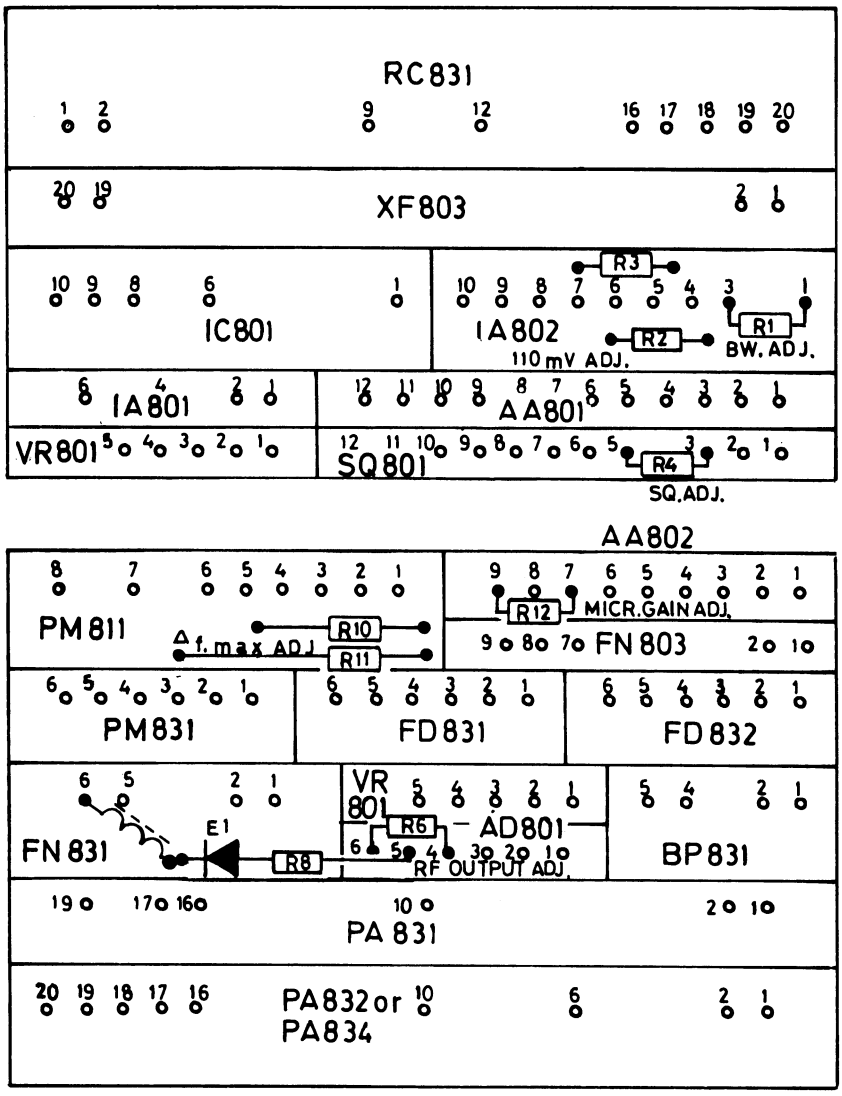
1. Mount cabinet and loudspeaker panel in position.
2. Screw antenna AN834 in position.
3. Clip antenna alignment unit TS-D37, code 95B0555, in remote control multiplug.
4. Raise hinged cover "A" on control head CP808 and remove rubber gasket, thus giving access to the matching network's variable components.
5. This network contains TX/RX switching diodes and necessitates separate adjustment for transmitter and receiver.
6. Power equipment by means of battery (f.ex. BU807) and hold in normal operating position. Key transmitter.
7. Adjust C2 for maximum indication on TS-D37. Release transmitter key.
8. Connect signal generator to TS-D37.



9. Open squelch and adjust signal generator level to threshold value (approximately 12 dB SINAD).
10. Adjust C1/L1 for best signal/noise ratio - decrease signal generator level accordingly for clearest tuning indication. The normal position for L1 is in the maximum position. At extreme frequencies (RX ≅ 88 MHz or TX ≅ 68 MHz) L1 will have lower values. C1 is the main receiver adjustment.
11. Repeat procedure 7 - 10 for absolute optimum adjustment.
12. Note that transmitter adjustment affects receiver adjustment, but not vice - versa, and that adjustment should always begin with the transmitter first.
13. This completes the antenna network adjustment. Replace gasket and snap cover "A" back into position.






RC831
XF803
IC801
IA802
R3
R1
R2
BW. ADJ.
110 mV ADJ.
IA801
AA801
VR801
SQ801
R4
SQ.ADJ.
AA802
PM811
Δf. max ADJ
R10
R11
R12
MICR.GAIN ADJ.
FN803
PM831
FD831
FD832
FN831
E1
R8
VR 801
AD801
R6
RF OUTPUT ADJ.
BP831
PA831
PA832 or PA834

SUMMARY
TRANSMITTER ADJUSTMENT
CQP830U

	TEST	ADJUST	INSTRUMENT	READING
1	Supply voltage	Power supply	Voltmeter	11 V
2	Current drain		mA meter	70 - 800 mA
3	Current drain without oscillator		mA meter	< 75 mA
4	Oscillator output	XO812 - L1	95.059 + VM	maximum
6	Current drain	FD831 - L1 FD832 - L1, L2 BP831 - L1, L2 PA831 - L1, L3	mA meter	maximum
7	Power output ADC voltage	FD831 - L1 FD832 - L1, L2 BP831 - L1, L2 PA831 - L1, L3 PA832 - L3 or PA834 - L4, L5	Voltmeter Wattmeter	minimum ADC voltage < 10 V 0.1 W } maximum power 1 - 3 W } output
8	Current drain		mA meter	approx. 0.5 W - < 240 mA approx. 1 W - < 380 mA approx. 3 W - < 800 mA
9	Frequency	XO812 - C9	Frequency Counter	$f_{ant} \pm 0.5 \times 10^{-6}$
10	Modulator	PM811 - L2 PM831 - L2	AF generator Deviation meter Distortion meter	minimum distortion
11	6 mV AF input Modulation distortion	R13 R11 - R10	AF Generator Deviation meter Distortion meter	0.7 x Δ Fmax., f_{mod} = 1 kHz THD = < 7%
12	Antenna network	C2	TS-D37 code 95B0555	maximum indication

SUMMARY
RECEIVER ADJUSTMENT
CQP830U

	TEST	ADJUST	INSTRUMENT	READING
1	Supply voltage	Power supply	DC voltmeter	11 V
2	Current drain	Check	mA meter	< 100 mA
3	+ 7.5 V RX	Check	Voltmeter	+ 7.5 V ± 0.15 V
4	RC test point without oscillator	RC831 - L8, L9	DC voltmeter	maximum - 0.1 V
5	Receiver sensitivity	RC831 - L7, L4 L3, L2, L1, L2 L5, L6	RF Generator Distortion meter	minimum distortion
		RC831 - L8 L3	DC voltmeter Distortion meter	maximum minimum
6		RC831 - L7 XF800 - L1	RF Generator (high output)	minimum distortion
7	Sensitivity	Check		< 1.0 µV e.m.f.
8	Frequency	XO831 - L2	RF Generator 21.4 MHz BFO Oscilloscope	zero beat
9	Line output	IA802 (R3)	RF Generator AC voltmeter	110 mV AF
10	AF response	Volume to 3rd position (III)	RF Generator AC Voltmeter	300 Hz: + 9 ± 2 dB 1000 Hz: 0 dB 3000 Hz: -10 ± 2 dB
11	Distortion	Check	Distortion meter	CQP833: < 7% CQP834: < 8%
12	Squelch	R4	RF Generator	opens at 10 - 12 dB SINAD
13	Current drain	Volume to pos. 4 (IIII)	mA meter	no signal, Sq. off < 7.5 mA no signal, Sq. on < 100 mA
14	Antenna network	C1, L1	TS-D37 code 95B0555	Best signal/noise ratio

GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

Resistors (R)


Resistor


Resistor with fixed tap


Variable resistor


Resistor with movable tap

Varistor (voltage-dependent resistor)

Temperature-dependent resistor with negative temperature coefficient


Light-sensitive resistor (Photosensitive resistor)

Capacitors (C)


Capacitor


Variable capacitor


Trimmer capacitor


Feedthrough capacitor


Electrolytic capacitor

Coils (L)

RF coil, air core


Coupled RF coils, air core

RF coil with core


RF coil with adjustable core


AF choke

Transformers (T)

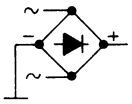

Transformer with adjustable RF cores


Transformer with iron core


Transformer with screen connected to chassis

Diodes (E)


Diode


Bridge rectifier


Series-connected stabilizer diodes within one case


Light-sensitive diode (Photosensitive diode)


Light-emitting diode


Zener diode (unidirectional)


Zener diode (bidirectional)


Tunnel diode


Varactor diode (capacitance diode)


Controlled rectifier, PNPN (N-thyristor)


Controlled rectifier, NPNP (P-thyristor)

Transistors (Q)


Transistor, PNP

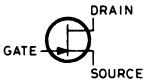

Transistor, NPN


Light-sensitive transistor


Unipolar transistor with N-type base

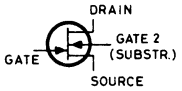

Unipolar transistor with P-type base

Junction Field Effect Transistors (JFET)



N-channel JFET


P-channel JFET



N-channel dual gate JFET


P-channel dual gate JFET

N-channel JFET tetrode

P-channel JFET tetrode

Insulated Gate Field Effect Transistors (IGFET or MOS)

N-channel IGFET (MOS)

P-channel IGFET (MOS)

N-channel dual gate IGFET (MOS)

P-channel dual gate IGFET (MOS)

Integrated Circuits (IC)

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

Gates

AND gate

OR gate

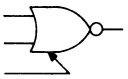
NAND gate

NOR gate

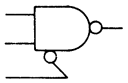
GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

Gates, continued

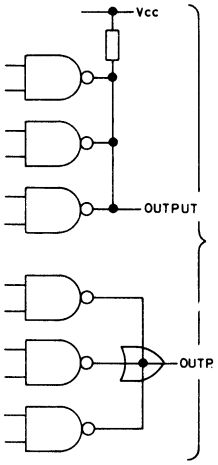
Exclusive OR gate



NOR gate with expander input (high)



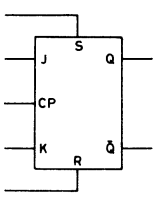
NAND gate with expander input (low)

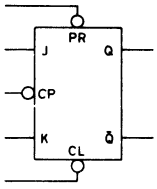


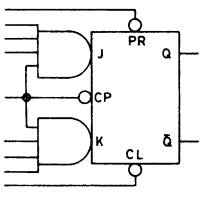
Wired OR (combined OR outputs) (presentation at top is used in detailed diagrams; presentation below is used in functional diagrams)

Flip-flops

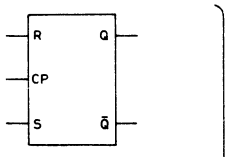
Abbreviations used: S = Set
R = Reset
CP = Clock Pulse
PR = Preset
CL = Clear

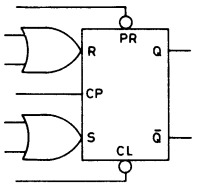




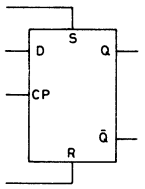


J-K Flip-flops



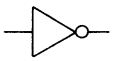


R-S Flip-flops



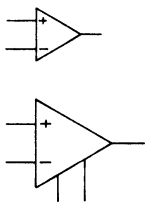
D Flip-flop

Inverters



Inverter

Operational Amplifiers

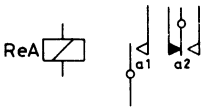


Operational amplifiers

Relays (RE)

Single-coil relay

Dual-coil relay



Relay with make contacts and change-over contacts

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

Polarized relay

Coil for slow-release relay

Coil for slow-acting relay

Contacts

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

Make contacts

Break contacts

Change-over contacts

Change-over contacts, centre off

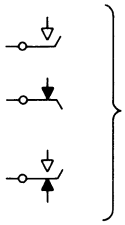
Make contacts, delayed operation

Make contacts, delayed release

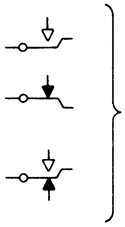
Mechanically coupled make contacts

Switches and Keys (O)

On/off switch



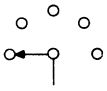
Locking keys or switches; push on, push off



Non-locking self-releasing keys or switches

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

Self-releasing switch (overcurrent switch etc.)



Rotary switch

GRAPHICAL SYMBOLS USED IN STORNO CIRCUIT DIAGRAMS

Lamps (V)

Indicator lamp

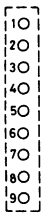
Neon lamp

Fuses and Cut-outs (S)

Fuse

Circuit-breaker

Tag Strips (KL)



Tag strip - dashed frame may be wholly or partly omitted

Batteries (BT)

Battery

Feedthrough Filters (F)

Feedthrough filter

Ferrite Beads (FB)

Ferrite bead

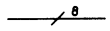
Crystals (X)

Crystal

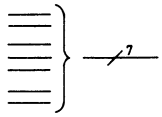
Cables and Wires (W)

Usual conductor

Three conductors

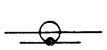


Eight conductors



Shift from multiple-line to single-line presentation

Screened wire

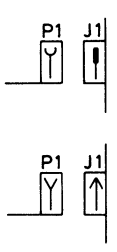


Coaxial cable

Connectors (J and P)

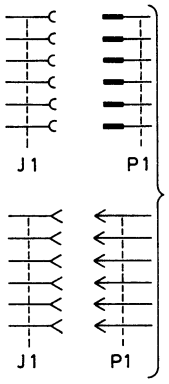
Female connector (socket). Lower symbol discontinued

Male connector (plug). Lower symbol discontinued



Schematic symbols for multi-wire connectors. (Upper symbol will gradually supersede lower symbol)

Multi-wire connectors are always designated "J" when permanently mounted on a cabinet or unit etc., "P" when fitted to cables

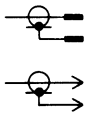


Detail symbols for multi-wire connectors. (Upper symbol will gradually supersede lower symbol)

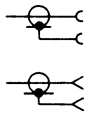
Where both connectors are fitted to cables, male connector is designated "P" and female connector "J"

Coaxial plug

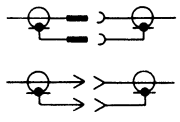
Coaxial socket



Coaxial plug for floating screen



Coaxial socket for floating screen



Coaxial plug with mating socket

Loudspeakers (LS)

Loudspeaker

Telephones (TEL)

Telephone

Single headphone (earphone)

Double headphone (headset)

Microphones (M)

Meters etc.

Indicating instrument

Balancing instrument

Inkwriter, recording instrument

Test Points

DC test point

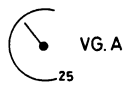
AC test point

Replaceable Connections

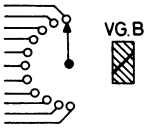
Cross-field connection (jumper)

Strap

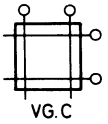
Selectors (VG)



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



Detail symbol for rotary selector



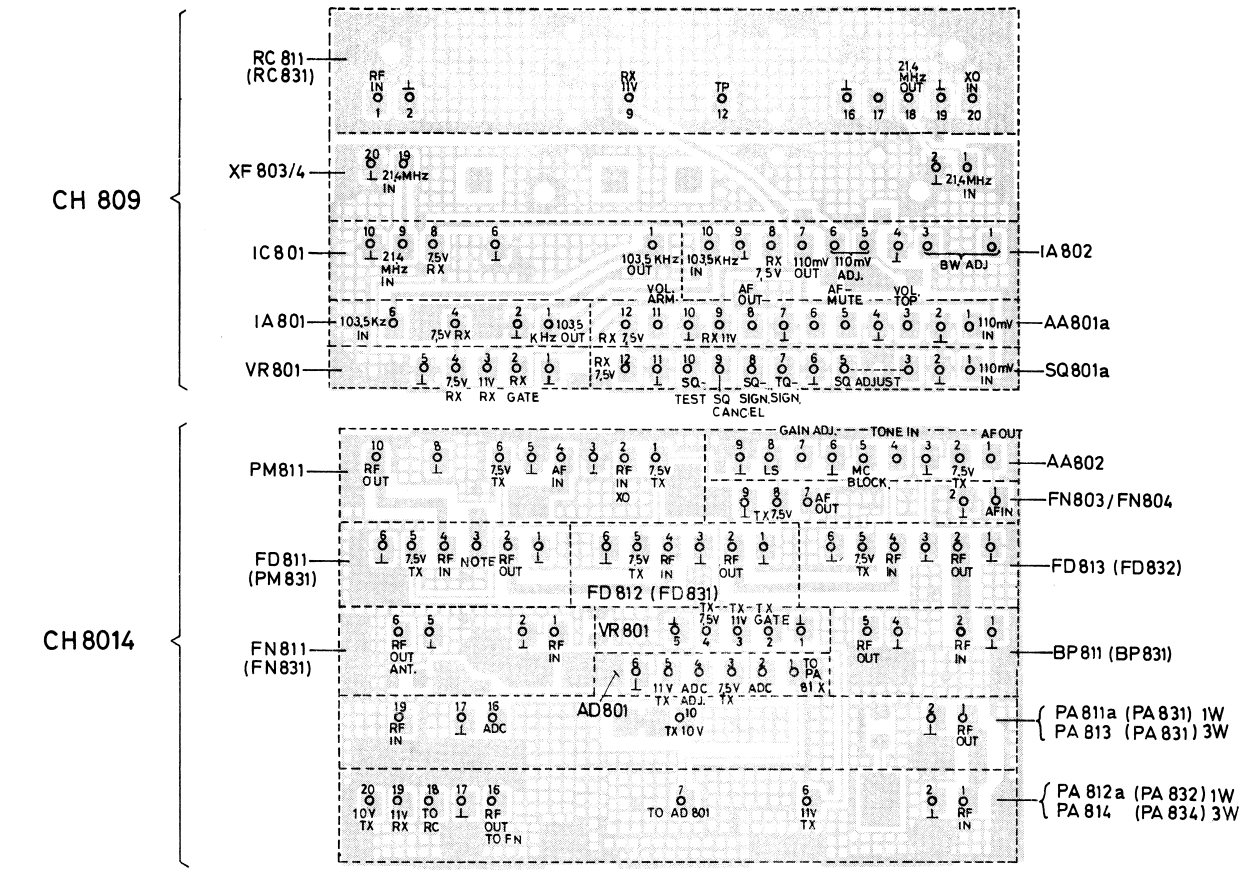
Co-ordinate selector

Storno

TYPE	Nº	CODE	DATA
TX833	1W	10.3592	Transmitter unit 1.0W-20/25kHz
TX833	3W	10.3593	Transmitter unit 3.0W-20/25kHz
TX834	1W	10.3594	Transmitter unit 1.0W-12.5kHz
TX834	3W	10.3595	Transmitter unit 2.0W-12.5kHz
			Transmitter subunits
		10.2688	AA802 Modulation amplifier
		10.2691	AD801 ADC circuit
		10.3037	BP831 Band pass filter
		10.3505	CH8014 Chassis
		10.3035	FD831 Frequency doubler
		10.3036	FD832 Frequency doubler
TX833		10.2694	FN803 Modulation filter 20/25kHz
TX834		10.2695	FN804 Modulation filter 12.5kHz
		10.3038	FN831 Antenna filter
		10.3039	PA831 Power amplifier
		10.3040	PA832 Power amplifier
		10.3416	PA834 Power amplifier
		10.2676	PM811 Phase modulator
		10.3034	PM831 Phase modulator
		10.1690	VR801 Voltage regulator
RX833		10.3337	Receiver unit 20/25kHz
RX834		10.3435	Receiver unit 12.5kHz
			Receiver subunits
		10.2687-01	AA801a Audio amplifier
		10.3228	CH809 Chassis
		10.2685	IA801 IF amplifier
		10.2808	IA802 IF amplifier/detector
		10.2686	IC801 IF converter
		10.3033	RC831 Receiver converter
		10.2689-01	SQ801a Squelch circuit
		10.2690	VR801 Voltage regulator
RX833		10.2692	XF803 Crystal filter 20/25kHz
RX834		10.2693	XF804 Crystal filter 12.5kHz

Storno

TYPE	Nº	CODE	DATA	
			Componets mounted on TX/RX	
CQP833U	R1	80.5058	5.6kohm 5% carbon film	1/10W
CQP834U	R1	80.5066	27kohm 5% carbon film	1/10W
	R2	80.5081	470kohm 5% carbon dilm	1/10W
	R3	80.50xx	Adj. 110mV	
	R4	80.50xx	Adj. Squelch	
	R6	80.5057	4.7kohm 5%	1/10W
	R7	80.50xx	Adj. ADC	
	R8	80.5048	820ohm 5% carbon film	1/10W
	R10	8050xx	Adj. Deviation	
	R11	80.50xx	Adj. Deviation	
	R12	80.5054	2.7kohm 5% carbon film	1/10W
	R13	80.50xx	Adj. Deviation	
	C1	74.5279	4.7nF 20% ceram	50V
	L1	61.5014	2.2uH 20% RF choke	0.5A
	E1	99.5257	2.1V Stab. diode	
		10.3587	TB802 Terminal board	
	C1-C6	74.5277	1nF 20% ceram 50V	
	Fb	65.5102	Ferrite bead	
	S1	92.5117	Fuse 2A	
		10.3375	CB808 Control head	
		10.2710	CH803 Chassis, 2 channels	
		10.2711	CH804 Chassis, 4 channels	
		10.2712	CH805 Chassis, 8 channels	
		10.2714	CH806 Chassis, 12 channels	
		10.2709	XO812 Transmitter oscillator	
		10.3067	XO831 Receiver oscillator	

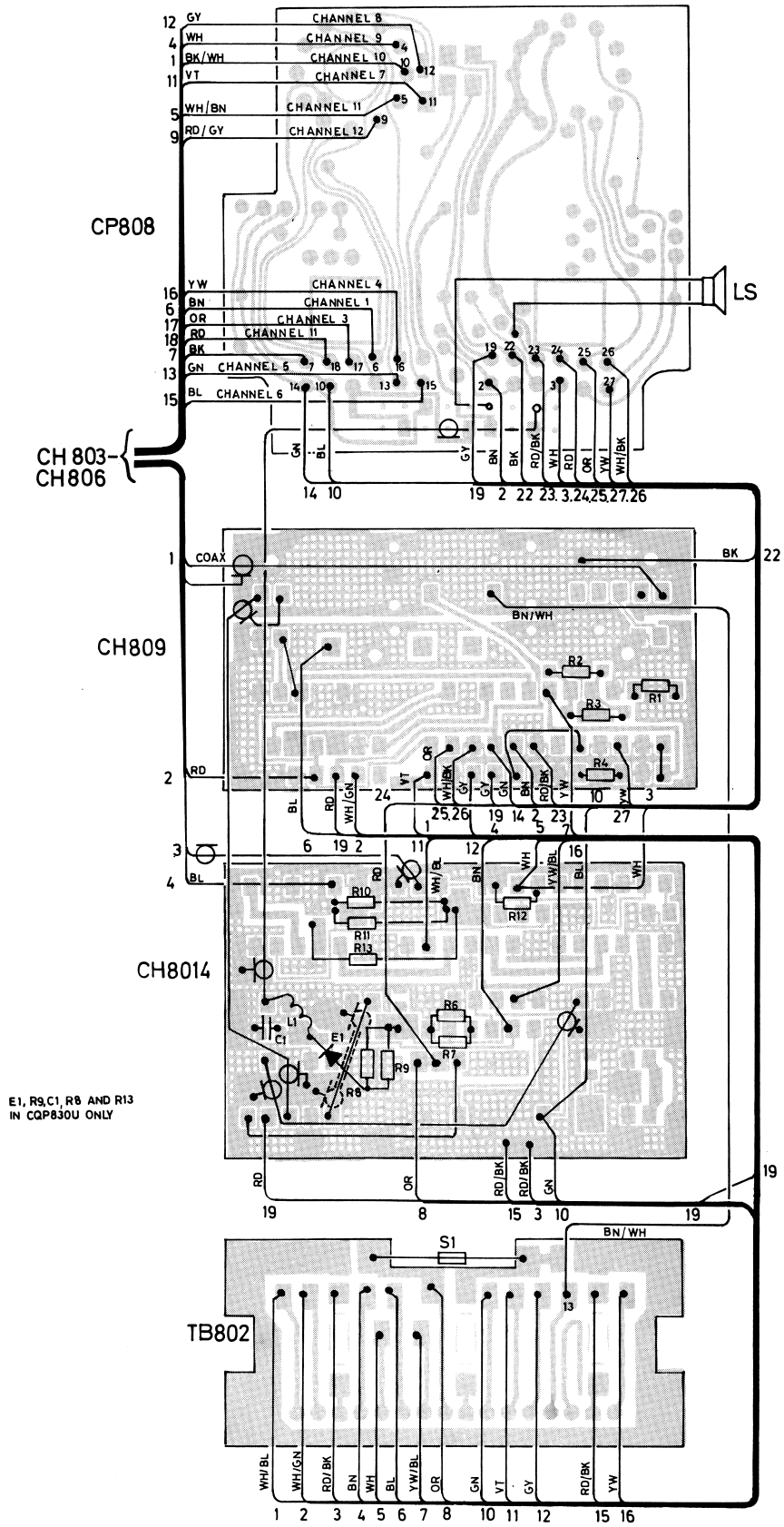


NOTE: IN FD811, TERM.3 IS AT GROUND POTENTIAL
IN PM831, TERM.3 IS THE AF INPUT TERMINAL

PIN LOCATION CQP810U, CQP830U

D402.473

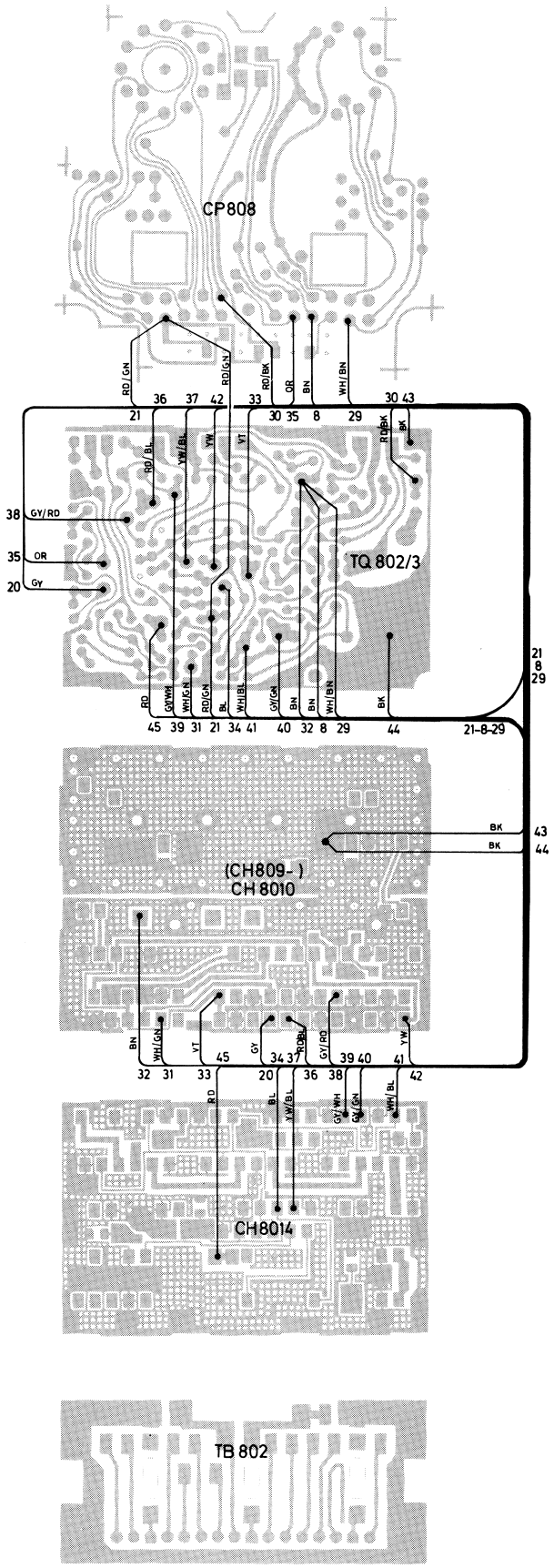
Storno



WIRING DIAGRAM CQP810U, CQP830U

D402.471/3

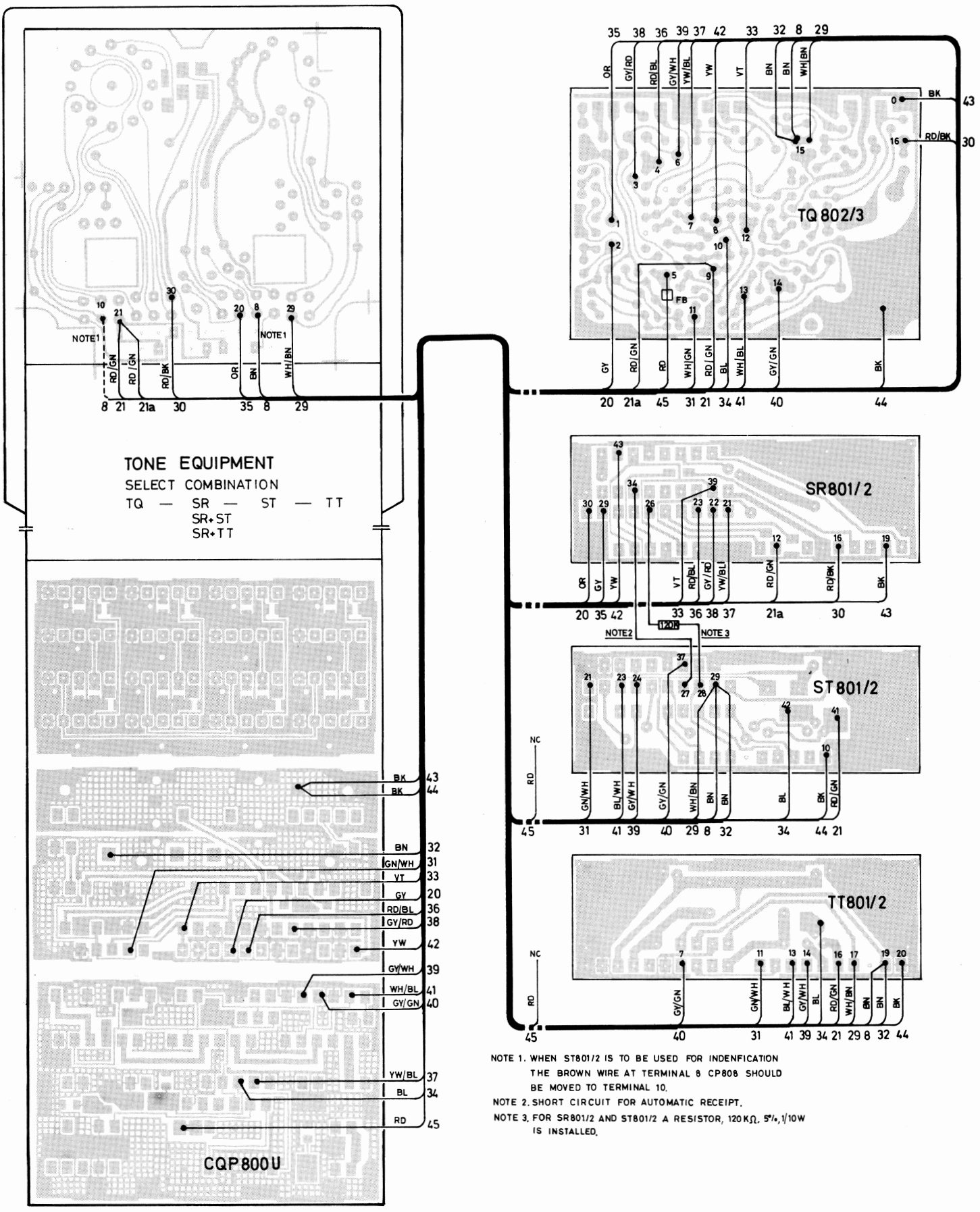
Storno



TONE EQUIPMENT WIRING DIAGRAM CQP800U

D402.472

Storno



NOTE 1. WHEN ST801/2 IS TO BE USED FOR INDENFICATION THE BROWN WIRE AT TERMINAL 8 CP808 SHOULD BE MOVED TO TERMINAL 10.

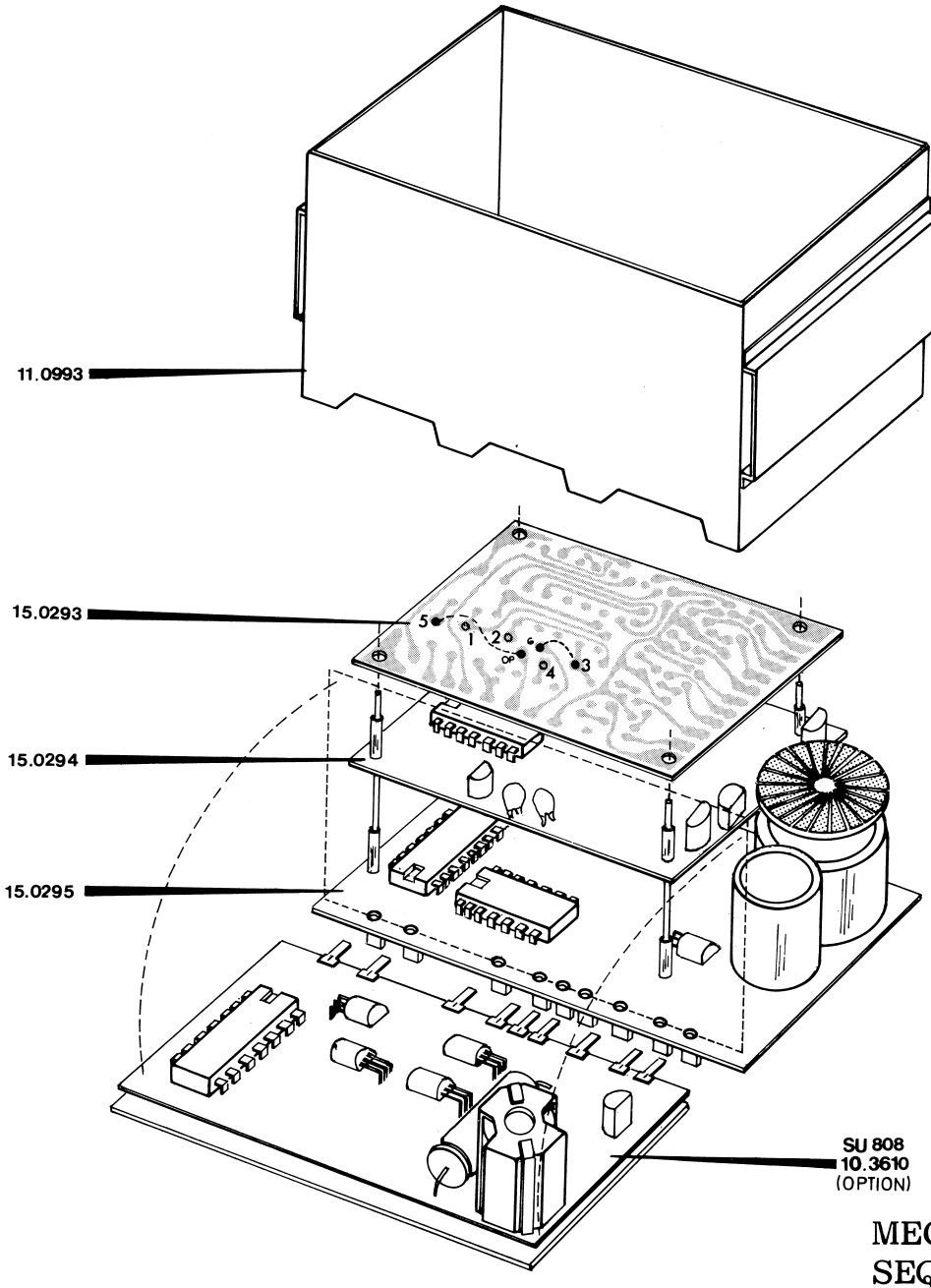
NOTE 2. SHORT CIRCUIT FOR AUTOMATIC RECEIPT.

NOTE 3. FOR SR801/2 AND ST801/2 A RESISTOR, 120KΩ, 5%, 1/10W IS INSTALLED.

TONE EQUIPMENT WIRING CQP800U

D402.561

Storno

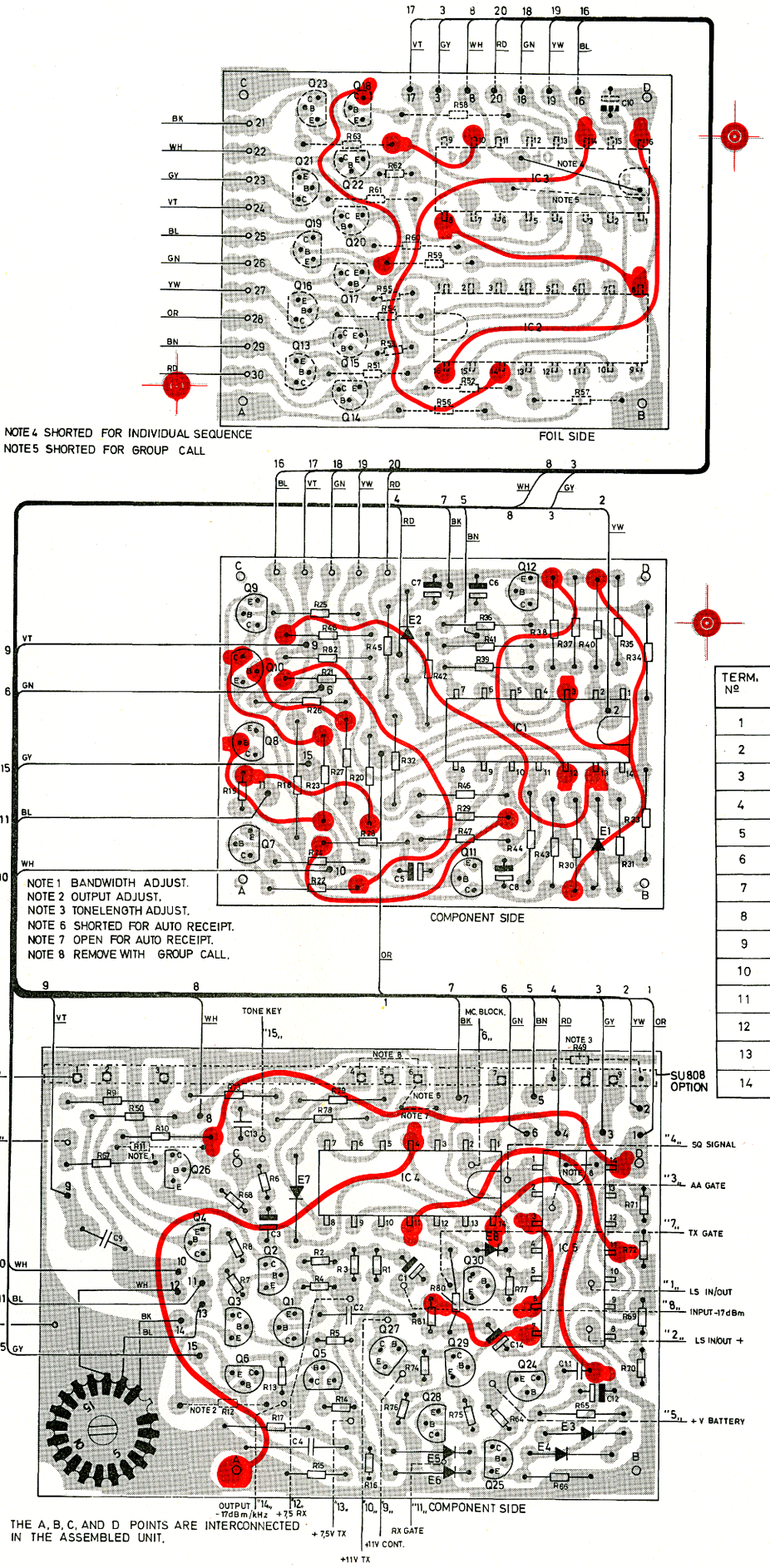


MECHANICAL LAYOUT
SEQUENTIAL TONE UNIT

TQ802-TQ803

D402.514

Storno



TERM. Nº	DIGIT	TQ802 ZVEI Hz	TQ803 CCIR Hz
1	X	885	960
2	Y	970	1062
3	1	1060	1124
4	2	1160	1197
5	3	1270	1275
6	4	1400	1358
7	5	1530	1446
8	6	1670	1540
9	7	1830	1640
10	8	2000	1747
11	9	2200	1860
12	0	2400	1981
13	REPEAT	2600	2110
14	A	2800	

SEQUENTIAL TONE UNIT TQ802, TQ803
Transmitter/Receiver

D402.563

OUTPUT (-17dBm / 1kHz) 14

INPUT (-17dBm) 8

+V BATT. 5

+7,5V RX 12

+7,5V TX 13

0

CALL INDICATOR 16

LS IN/OUT (+) 1

LS IN/OUT 2

TONEKEY 15

+11V CONT 9

+11V TX 10

RX GATE 11

TX GATE 7

AA GATE 3

SQ SIGNAL 4

MIC. BLOCKING 6

SR AMPLIFIER/LIMITER

NOTE 1

NOTE 2

3V

3,8V

1,5V

7,5V

ST OUTPUT AMPLIFIER

15.0294 - 00.

OR

GY

BK

BL

R18 1M

SCHMITT TRIGGER

CLOCK DELAY

CLOCK GEN.

CLEAR DELAY

5,2V

4,8V

4,6V

5,1V

3,7V

4,3V

IC 1a

IC 1b

IC 1c

IC 1d

L 1

15.0295 - 00.

WH

VT

YW

BN

RD

GN

BL

NOTE 3

ST GATES

IC2 ST COUNTER

SR GATES

IC3 SR COUNTER

15.0293-00

NOTE 4

NOTE 5

NOTE 6

NOTE 7

NOTE 8

NOTE 9

ST LATCH

LS IN/OUT LATCH

IC 4b

IC 4a

SU 808 SOCKETS

NOTES

1. BANDWIDTH ADJUST
2. OUTPUT ADJUST
3. TONELENGTH ADJUST
4. SHORTED FOR INDIVIDUAL SEQUENCE CALL.
   INDV. 3: 3-TONE SEQUENCE CALL.
   INDV: 4: 4-TONE SEQUENCE CALL.
   INDV 5: 5-TONE SEQUENCE CALL.
5. SHORTED FOR GROUP CALL.
   GR. 2: GROUP CALL ON 3rd DIGIT
   GR. 3: GROUP CALL ON 4th DIGIT
   GR. 4: GROUP CALL ON 5th DIGIT
6. SHORTED FOR AUTO RECEIPT
7. OPEN FOR AUTO RECEIPT
8. REMOVE WITH GROUP CALL
9. THESE CONNECTIONS ARE TO BE REESTABLISHED FOR OPERATION IN DISMANTLED CONDITION

SPECIAL FACILLITIES, SEE INSTRUCTION NO. 24.520

TERM. Nº	DIGIT	TQ802 Hz	TQ803 CCIR Hz
1	X	885	960
2	Y	970	1062
3	1	1060	1124
4	2	1160	1197
5	3	1270	1275
6	4	1400	1358
7	5	1530	1446
8	6	1670	1540
9	7	1830	1640
10	8	2000	1747
11	9	2200	1860
12	0	2400	1981
13	REPEAT	2600	2110
14	A	2800	

IC1. IC4, IC5

IC2, IC3

Q27

Q1 - Q30

SEQUENTIAL TONE UNIT TQ802, TQ803
Transmitter/Receiver

D 402.315/2

TYPE	Nº	CODE	DATA
TQ802		10.3425-00	Sequential Tone Transmitter/Receiver
TQ803		10.3426-00	Sequential Tone Transmitter/Receiver
	C1	73.5089	0.1 µF 20% tantal 35 V
	C2	76.5109	1 nF 2.5% polystyr TB 25 V
	C3	73.5125	0.47 µF 20% tantal 35 V
	C4	76.5124	2.2 nF 10% ceram PL 63 V
	C5	73.5118	0.22 µF 20% tantal 35 V
	C6	73.5089	0.1 µF 20% " 35 V
	C7	73.5125	0.47 µF 20% " 35 V
	C8	73.5125	0.47 µF 20% " 35 V
	C9	76.5122	47 nF 2% polystyr TB 20 V
	C10	73.5114	1 µF 20% tantal 35 V
	C11	76.5069	1 nF 10% polyest FL 50 V
	C12	73.5114	1 µF 20% tantal 35 V
	C13	74.5346	2.2 nF 10% ceram PL 63 V
	C14	73.5089	0.1 µF 20% tantal 35 V
	R1	80.5075	0.15 MΩ 5% carbon film 0.1 W
	R2	80.5070	56 kΩ 5% " " 0.1 W
	R3	80.5077	0.22 MΩ 5% " " 0.1 W
	R4	80.5071	68 kΩ 5% " " 0.1 W
	R5	80.5066	27 kΩ 5% " " 0.1 W
	R6	80.5055	3.3 kΩ 5% " " 0.1 W
	R7	80.5075	0.15 MΩ 5% " " 0.1 W
	R8	80.5063	15 kΩ 5% " " 0.1 W
	R9	80.5071	68 kΩ 5% " " 0.1 W
	R10	80.5064	18 kΩ 5% " " 0.1 W
	R11	80.50xx	ADJ 5% " " 0.1 W
	R12	80.50xx	ADJ 5% " " 0.1 W
	R13	80.5059	6.8 kΩ 5% " " 0.1 W
	R14	80.5057	4.7 kΩ 5% " " 0.1 W
	R15	80.5054	2.7 kΩ 5% " " 0.1 W
	R16	80.5080	0.39 MΩ 5% " " 0.1 W
	R17	80.5073	0.1 MΩ 5% " " 0.1 W
	R18	89.5074	1 MΩ 2% metal film 0.1 W
	R19	89.5076	15 kΩ 5% NTC 0.5 W
	R20	80.5064	18 kΩ 5% carbon film 0.1 W
	R21	80.5066	27 kΩ 5% " " 0.1 W
	R22	80.5059	6.8 kΩ 5% " " 0.1 W
	R23	80.5084	0.82 MΩ 5% " " 0.1 W
	R24	80.5073	0.1 MΩ 5% " " 0.1 W
	R25	80.5068	39 kΩ 5% " " 0.1 W
	R26	80.5066	27 kΩ 5% " " 0.1 W
	R27	80.5070	56 kΩ 5% " " 0.1 W
	R28	80.5075	0.15 MΩ 5% " " 0.1 W
	R29	80.5071	68 kΩ 5% " " 0.1 W
	R30	80.5046	560 Ω 5% " " 0.1 W

Storno

TYPE	Nº	CODE	DATA
	R31	80.5073	0.1 MΩ 5% carbon film 0.1 W
	R32	80.5076	0.18 MΩ 5% " " 0.1 W
	R33	80.5062	12 kΩ 5% " " 0.1 W
	R34	80.5080	0.39 MΩ 5% " " 0.1 W
	R35	80.5075	0.15 MΩ 5% " " 0.1 W
	R36	80.5066	27 kΩ 5% " " 0.1 W
	R37	80.5078	0.27 MΩ 5% " " 0.1 W
	R38	80.5077	0.22 MΩ 5% " " 0.1 W
	R39	80.5077	0.22 MΩ 5% " " 0.1 W
	R40	80.5061	10 kΩ 5% " " 0.1 W
	R41	80.5075	0.15 MΩ 5% " " 0.1 W
	R42	80.5071	68 kΩ 5% " " 0.1 W
	R43	80.5077	0.22 MΩ 5% " " 0.1 W
	R44	80.5062	12 kΩ 5% " " 0.1 W
	R45	80.5049	1 kΩ 5% " " 0.1 W
	R46	80.5075	0.15 MΩ 5% " " 0.1 W
	R47	80.5079	0.33 MΩ 5% " " 0.1 W
	R48	80.5067	33 kΩ 5% " " 0.1 W
	R49	80.50xx	ADJ 5% " " 0.1 W
	R50	80.5083	0.68 MΩ 5% " " 0.1 W
	R51	80.5054	2.7 kΩ 5% " " 0.1 W
	R52	80.5054	2.7 kΩ 5% " " 0.1 W
	R53	80.5054	2.7 kΩ 5% " " 0.1 W
	R54	80.5054	2.7 kΩ 5% " " 0.1 W
	R55	80.5054	2.7 kΩ 5% " " 0.1 W
	R56	80.5076	0.18 MΩ 5% " " 0.1 W
	R57	80.5078	0.27 MΩ 5% " " 0.1 W
	R58	80.5073	0.1 MΩ 5% " " 0.1 W
	R59	80.5054	2.7 kΩ 5% " " 0.1 W
	R60	80.5054	2.7 kΩ 5% " " 0.1 W
	R61	80.5054	2.7 kΩ 5% " " 0.1 W
	R62	80.5054	2.7 kΩ 5% " " 0.1 W
	R63	80.5054	2.7 kΩ 5% " " 0.1 W
	R64	80.5071	68 kΩ 5% " " 0.1 W
	R65	80.5074	0.12 MΩ 5% " " 0.1 W
	R66	80.5070	56 kΩ 5% " " 0.1 W
	R67	80.5048	820 Ω 5% " " 0.1 W
	R68	80.5061	10 kΩ 5% " " 0.1 W
	R69	80.5074	0.12 MΩ 5% " " 0.1 W
	R70	80.7072	82 kΩ 5% " " 0.1 W
	R71	80.7072	82 kΩ 5% " " 0.1 W
	R72	80.5074	0.12 MΩ 5% " " 0.1 W
	R73	80.5075	0.15 MΩ 5% " " 0.1 W

SEQUENTIAL TONE UNIT TQ802, TQ803
Transmitter/Receiver

X402.531

TYPE	Nº	CODE	DATA
	R74	80.5054	2.7 kΩ 5% carbon film 0.1 W
	R75	80.5042	270 Ω 5% " " 0.1 W
	R76	80.5043	330 Ω 5% " " 0.1 W
	R77	80.5076	0.18 MΩ 5% " " 0.1 W
	R78	80.5066	27 kΩ 5% " " 0.1 W
	R79	80.5067	33 kΩ 5% " " 0.1 W
	R80	80.5061	10 kΩ 5% " " 0.1 W
	R81	80.5078	0.27 MΩ 5% " " 0.1 W
TQ802	L1	61.1337	Tone Coil
TQ803	L1	61.1366	Tone Coil
	E1	99.5237	1 N 4148 Diode
	E2	99.5237	1 N 4148 Diode
	E3	99.5237	1 N 4148 Diode
	E4	99.5237	1 N 4148 Diode
	E5	99.5237	1 N 4148 Diode
	E6	99.5237	1 N 4148 Diode
	E7	99.5237	1 N 4148 Diode
	E8	99.5237	1 N 4148 Diode
	Q1	99.5230	BC308 Transistor
	Q2	99.5230	BC308 "
	Q3	99.5143	BC238 "
	Q4	99.5230	BC308 "
	Q5	99.5230	BC308 "
	Q6	99.5143	BC238 "
	Q7	99.5230	BC308 "
	Q8	99.5115	BC309 "
	Q9	99.5230	BC308 "
	Q10	99.5230	BC308 "
	Q11	99.5143	BC238 "
	Q12	99.5143	BC238 "
	Q13	99.5324	BC338-25 "
	Q14	99.5324	BC338-25 "
	Q15	99.5324	BC338-25 "
	Q16	99.5324	BC338-25 "
	Q17	99.5324	BC338-25 "
	Q18	99.5143	BC238 "
	Q19	99.5324	BC338-25 "
	Q20	99.5324	BC338-25 "
	Q21	99.5324	BC338-25 "
	Q22	99.5324	BC338-25 "
	Q23	99.5324	BC338-25 "
	Q24	99.5230	BC308 "
	Q25	99.5143	BC238 "
	Q26	99.5143	BC238 "
	Q27	99.5337	BC369 "

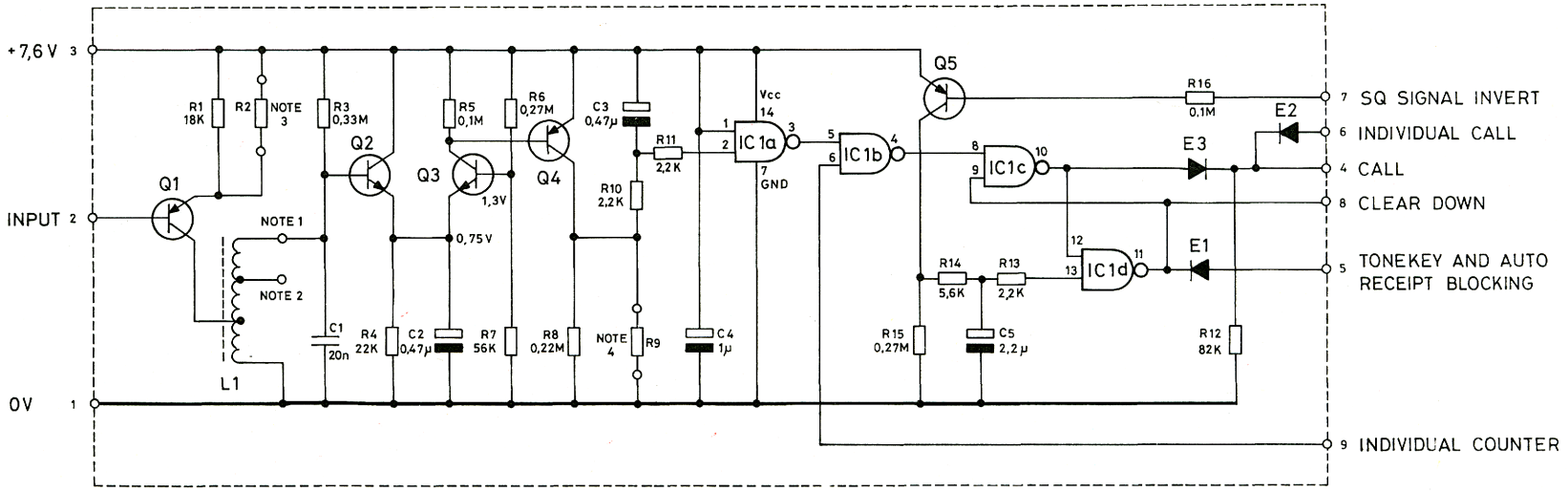
Storno

TYPE	Nº	CODE	DATA
	Q28	99.5143	BC238 Transistor
	Q29	99.5324	BC338-25 "
	Q30	99.5143	BC238 "
	IC1	14.5019	MC3302P quad. comparator
	iC2	14.5052	CD4017 decimal counter/divider
	IC3	14.5052	CD4017 decimal counter/divider
	IC4	14.5098	CD4013 dual D-flip-flop
	IC5	14.5074	CD4001 quad. 2-input NOR

SEQUENTIAL TONE UNIT TQ802, TQ803
Transmitter/Receiver

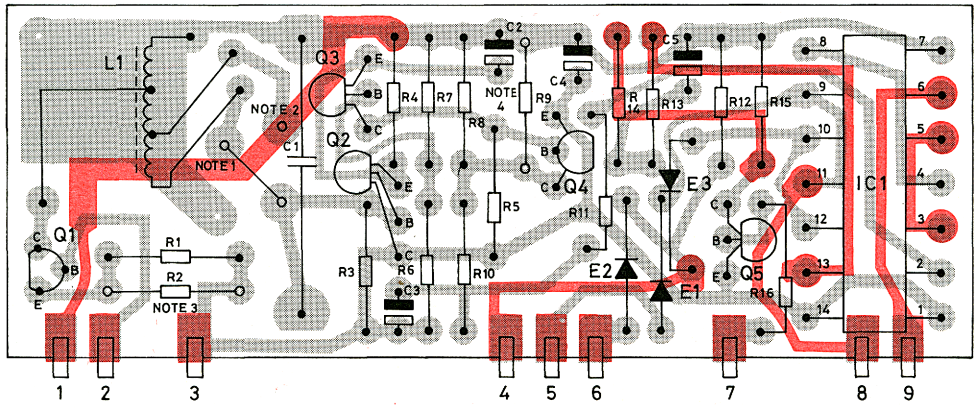
X402.531

Storno



NOTE 1 : 2400 Hz
NOTE 2 : 2800 Hz
NOTE 3 : BANDWIDTH ADJUST.
NOTE 4 : SET UP TIME ADJUST.

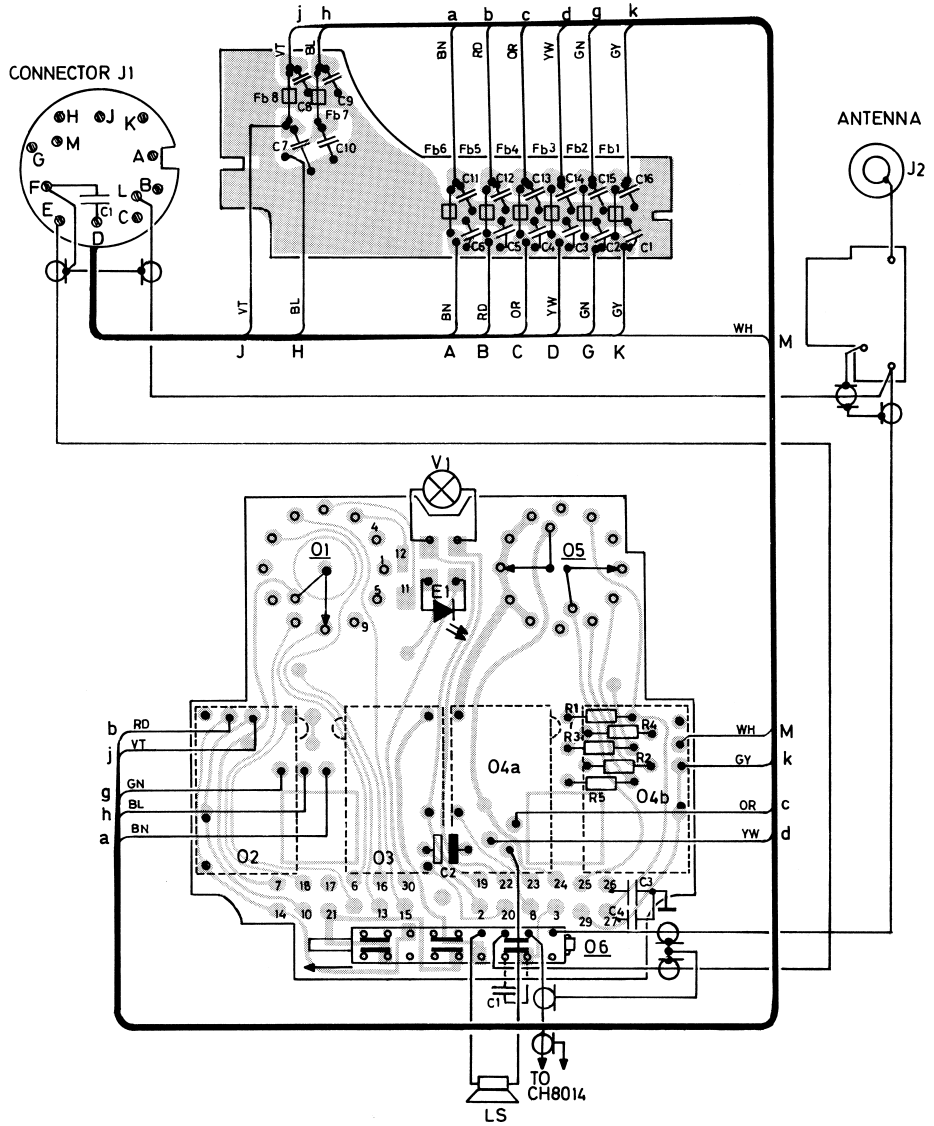
PRINTED CIRCUIT VIEWED FROM COMPONENT SIDE.



GROUP CALL UNIT SU 808

D 402.407/2

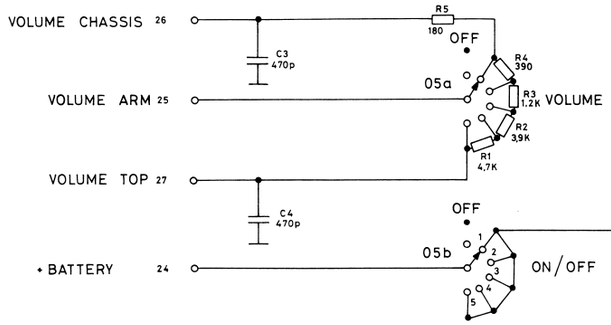
Storno

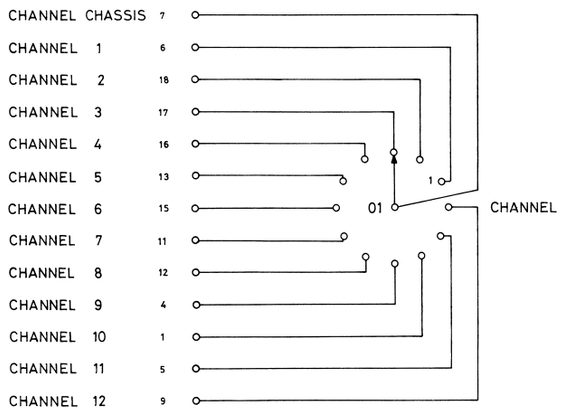


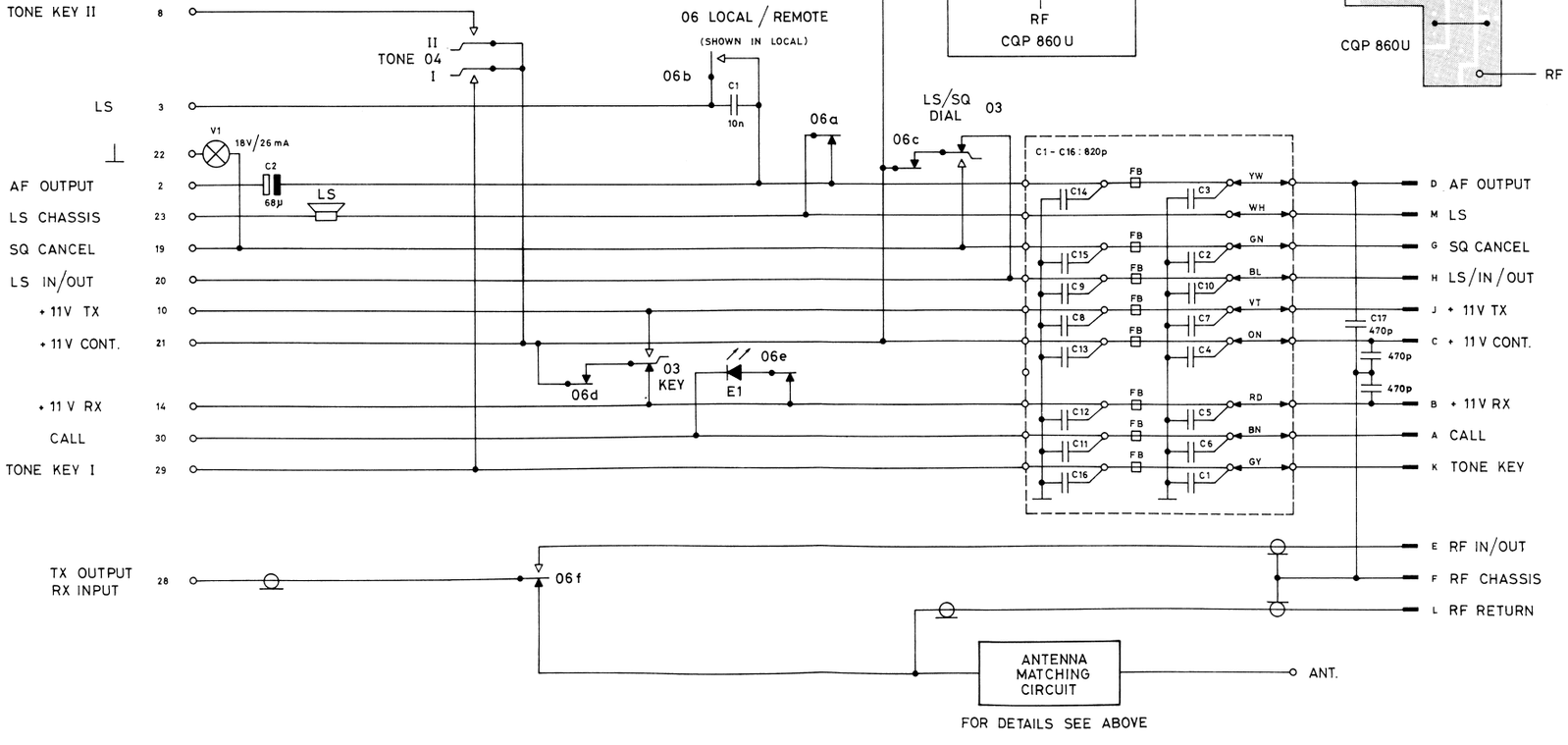
CONTROL HEAD CP808

D402.469

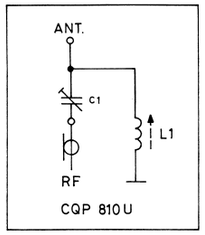
Storno

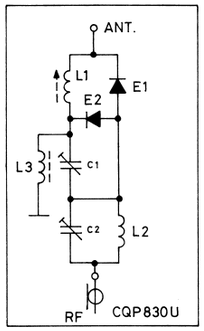


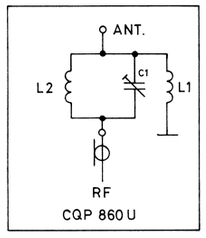


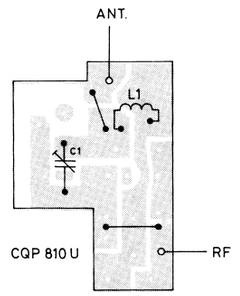


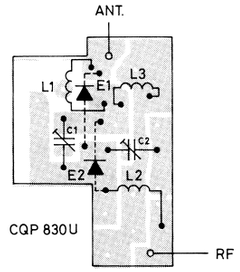
ANTENNA MATCHING CIRCUIT

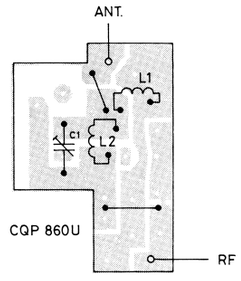












CONTROL HEAD CP808

D 402.595

TYPE	Nº	CODE	DATA	
		10.3375	Control Head CP808	
		15.0314-01	Switch, p.c.b. assembly	
	C1	74.5280	10nF 20% ceram CP	50V
	C2	73.5106	68uF 20% tantal	16V
	C3	74.5312	470pF-20/+80% ceram PL	63V
	C4	74.5312	470pF-20/+80% ceram PL	63V
	R1	80.5057	4.7kohm 5% carbon film	1/10W
	R2	80.5056	3.9kohm 5% carbon film	1/10W
	R3	80.5050	1.2kohm 5% carbon film	1/10W
	R4	80.5044	390ohm 5% carbon film	1/10W
	R5	80.5040	120ohm 5% carbon film	1/10W
	02	47.5092	Microswitch, Key	
	03	47.5092	Microswitch, LS/SQ	
	04	47.5092	Microswitch, Tone	
	06	47.5092	Microswitch, Tone	
		15.0315	Filter, p.c.b. assembly	
	C1-16	74.5314	820pF 20% ceramic	
	Fb	65.5109	Ferrite bead	
	01	47.0626	Rotary switch 1x12	
	05	47.0627	Rotary switch 2x6	
	E1	99.5339	LD 30/11 LED	
	V1	92.5115	Lamp, 18V/26mA	
	LS	97.5037	Loudspeaker	
	J1	41.0218	12-pin Connector, female	
	C17	74.5312	470pF-20+80% ceram PL	63V
	C18	74.5312	470pF-20+80% ceram PL	63V
	C19	74.5312	470pF-20+80% ceram PL	63V
CQP810U		15.0313	Antenna Matching Network 146-174MHz	
	C1	78.5046	2-18pF trimmer N350	300V
	L1	61.1359	RF coil	
CQP830		15.0329	Antenna Matching network 38-88MHz	
	C1	78.5046	2-18pF trimmer N350	300V
	C2	78.5046	2-18pF trimmer N350	300V
	L1	61.1363	RF coil	
	L2	62.0954	RF coil	
	L3	61.5015	3.3uH 20% RF choke	0.7A
	E1	99.5187	BA243 Diode	
	E2	99.5187	BA243 Diode	
CQP860U		15.0327	Antenna Matching Network 420-470MHz	
	C1	78.5046	2-18pF trimmer N350	300V
	L1	62.0948	RF coil	
	L2	62.0947	RF coil	

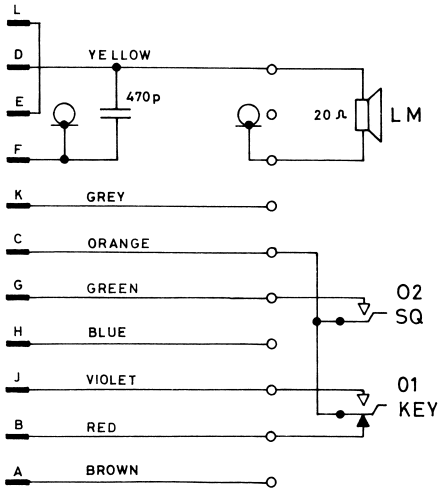
Storno

TYPE	Nº	CODE	DATA

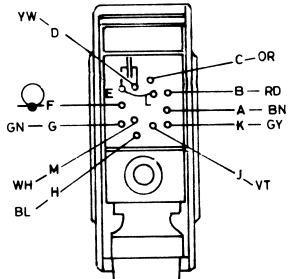
CONTROL HEAD CP808

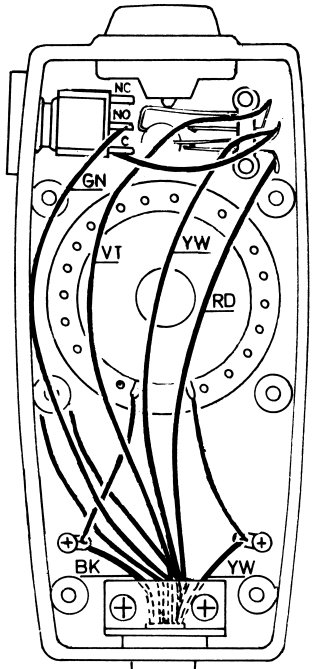
X402.575

Storno



CB 804





CONTROL UNIT CB804

D402.525/2

Storno

TYPE	Nº	CODE	DATA
CB804		10.3602	Control Unit
	01	47.5033	Switch, Key
	02	47.0635	Switch, SQ
	LM	96.5086	Microphone, dynamic 20 Ohm

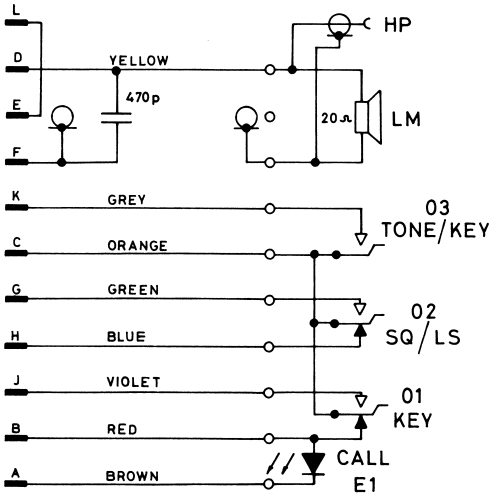
Storno

TYPE	Nº	CODE	DATA

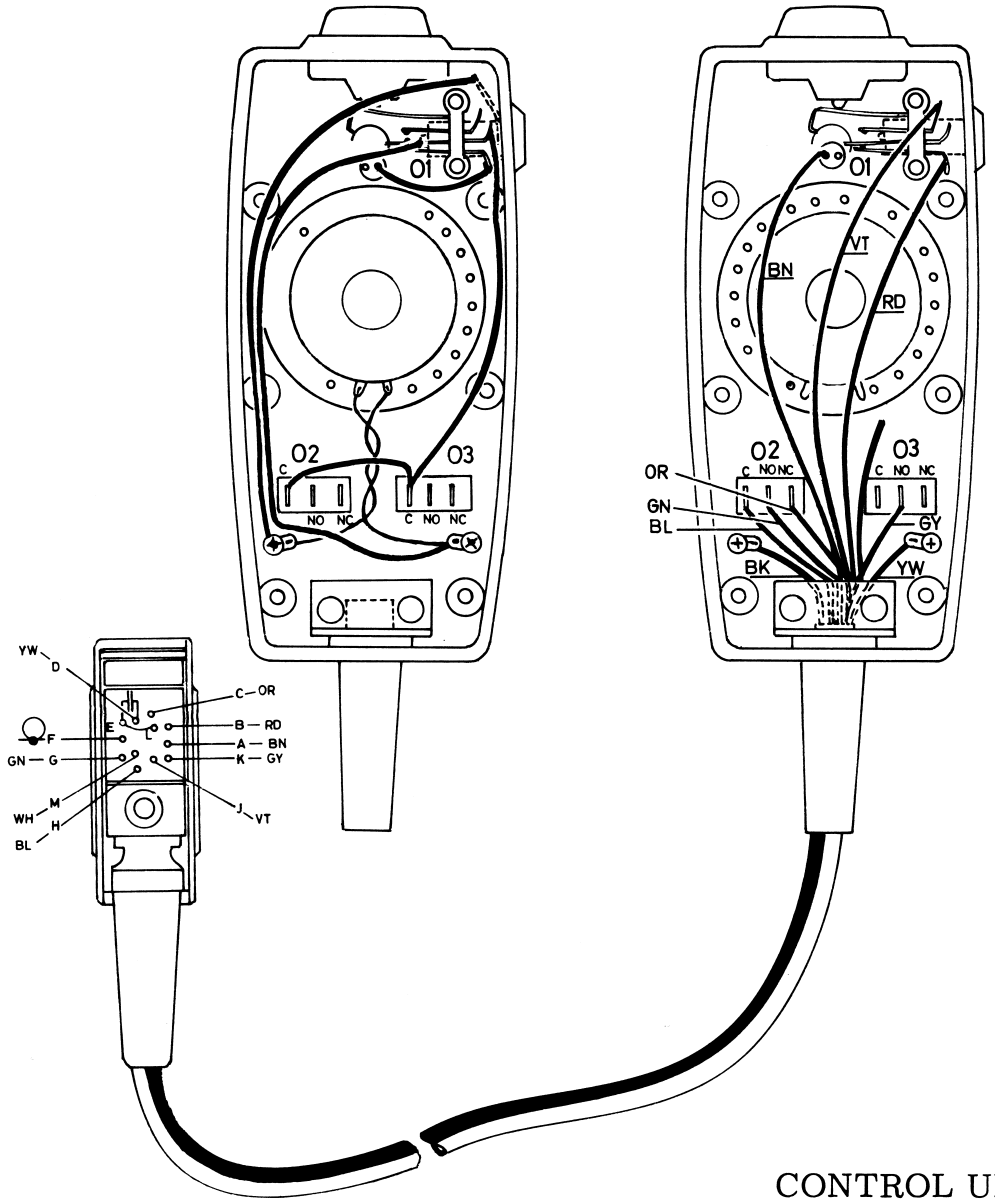
CONTROL UNIT CB804

X402.564

Storno



CB 805



CONTROL UNIT CB805

D 402.526/2

TYPE	Nº	CODE	DATA
CB805		10.3603	Control Unit
	01	47.5033	Switch. Key
	02	47.0635	Switch, SQ/LS
	03	47.0635	Switch, Tone Key
	LM	96.5086	Microphone, dynamic 20 Ohm

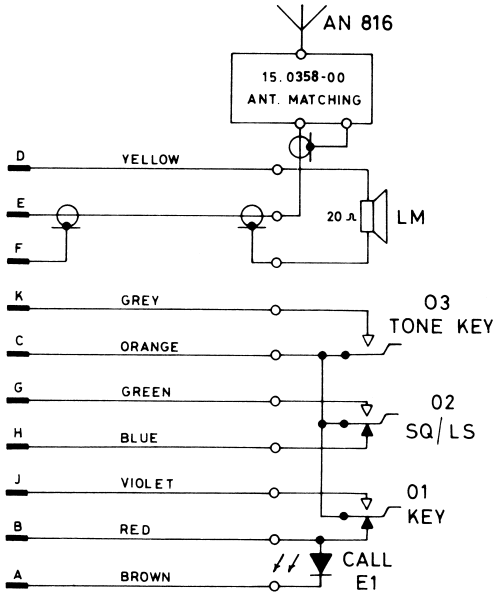
Storno

TYPE	Nº	CODE	DATA

CONTROL UNIT CB805

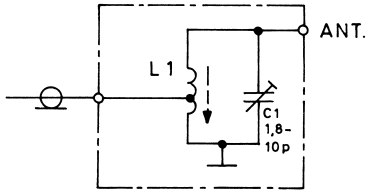
X402.565

Storno

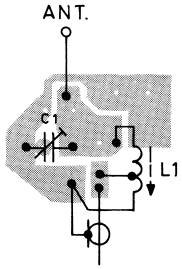


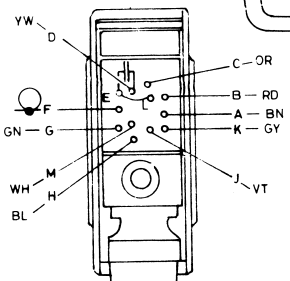
CB 831

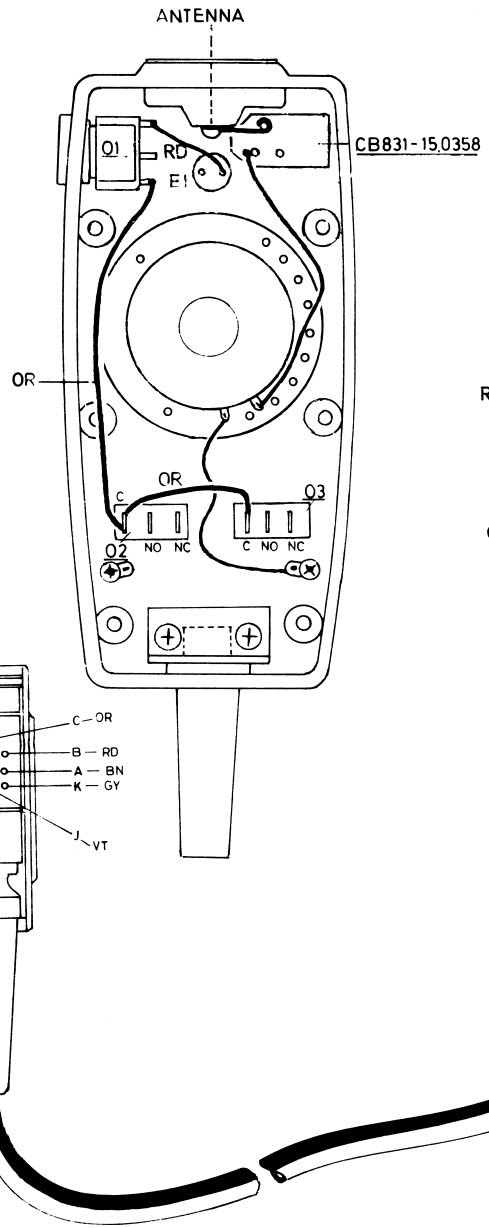
CB 831 (68 - 88 MHz)



ANTENNA MATCHING NETWORK







CONTROL UNIT CB831

D 402.529

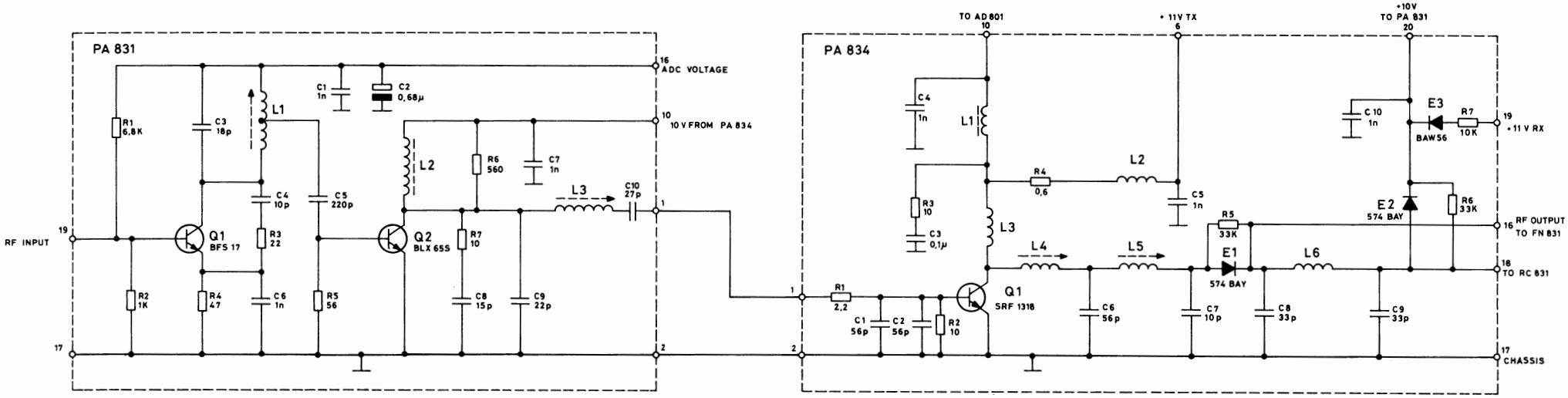
TYPE	Nº	CODE	DATA
CB831		10.3606	Control Unit (68-88 MHz)
	01	47.0635	Switch, Key
	02	47.0635	Switch, SQ/LS
	03	47.0635	Switch, Tone Key
	E1	99.5339	Light Emitting Diode
	LM	96.5086	Microphone, dynamic 20 Ohm
		15.0358	Antenna Matching Network
	C1	78.5048	1.8-10pF trimmer 300V
	L1	61.1377	Coil

Storno

TYPE	Nº	CODE	DATA

CONTROL UNIT CB831

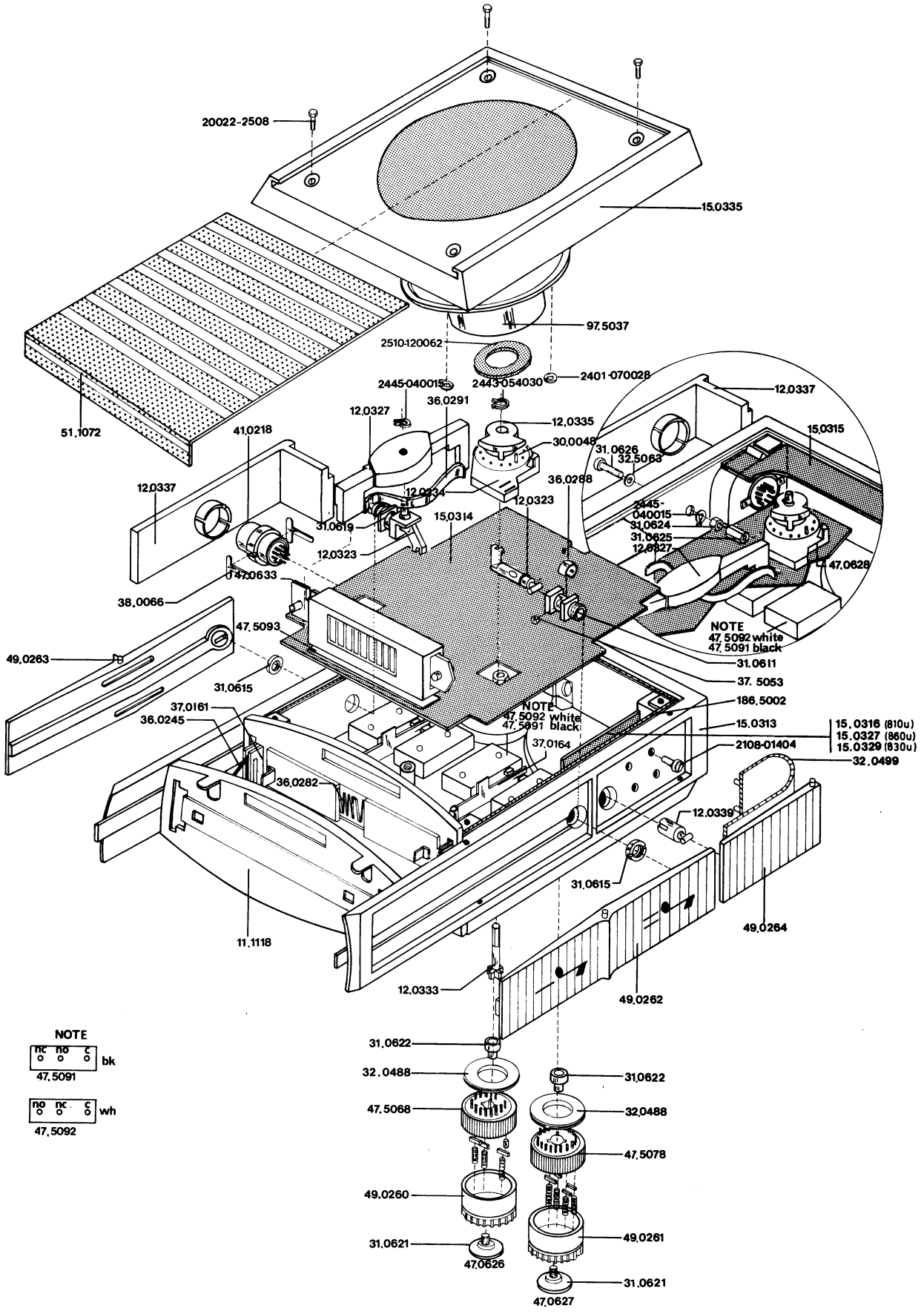
Storno



STORNOPHONE 800
3W TRANSMITTER

CQP 830, CQP 830U

D402.552

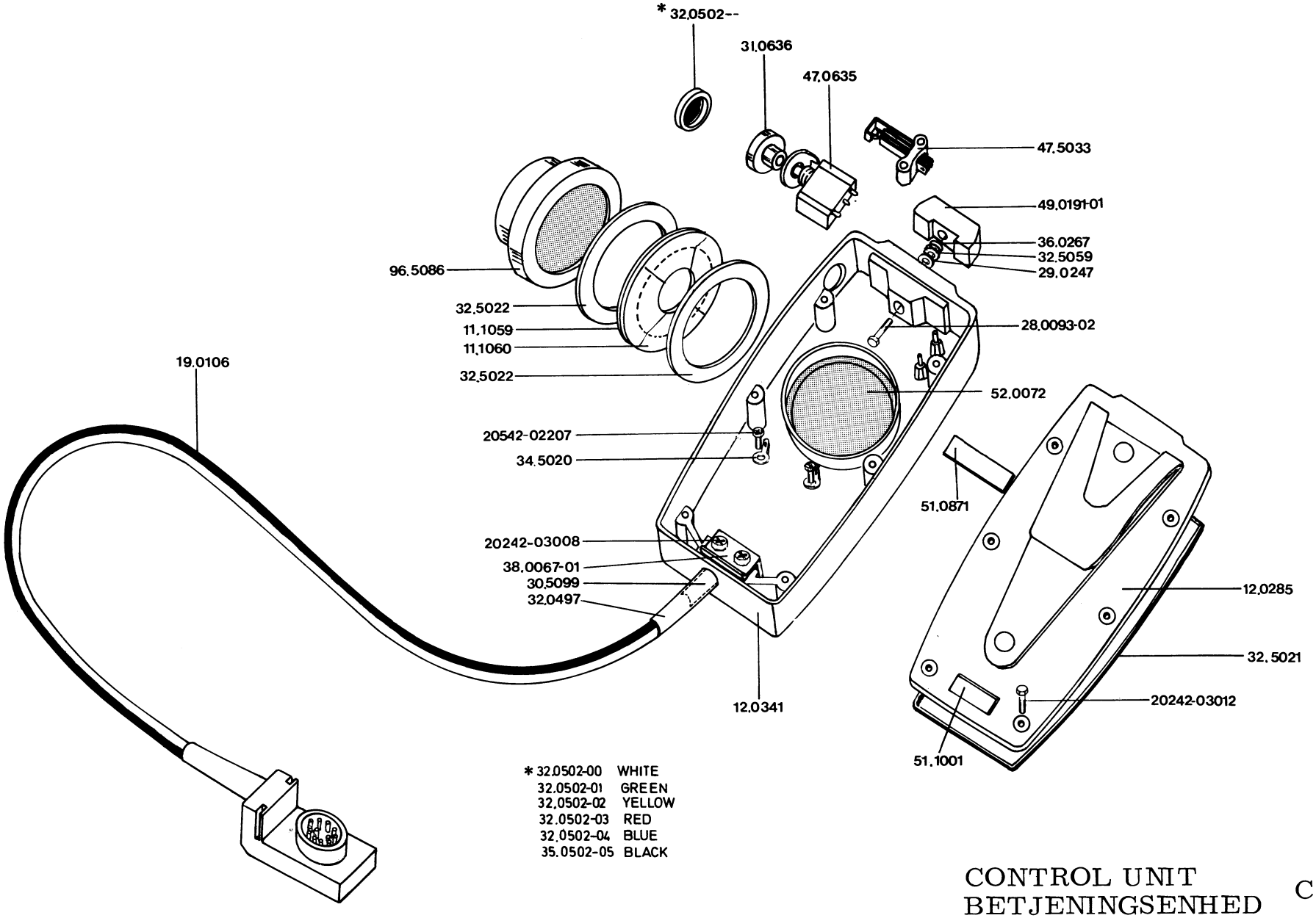


CONTROL HEAD
MECHANICAL LAY OUT

CP808

M405.083

Storno



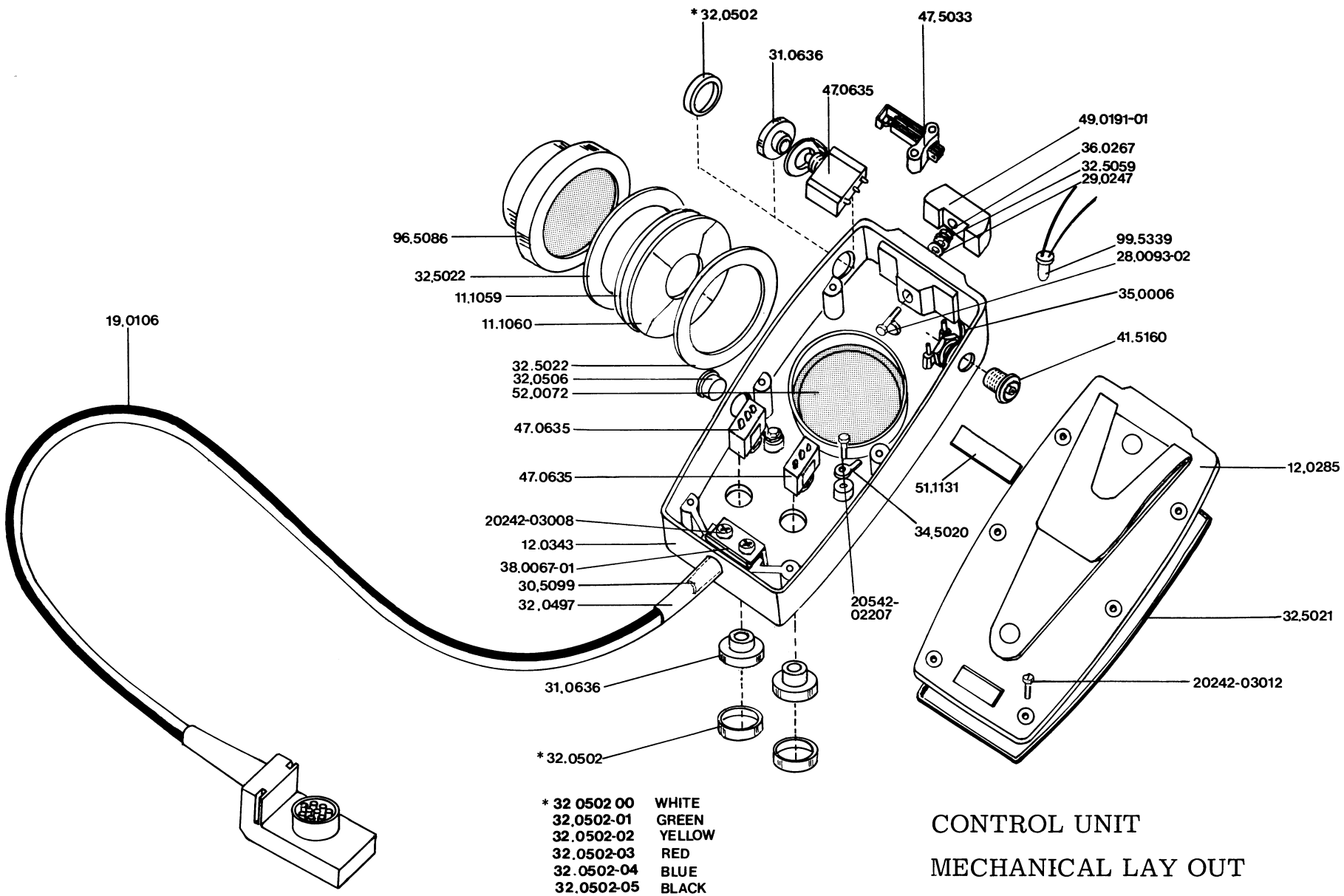
* 32.0502-00 WHITE
32.0502-01 GREEN
32.0502-02 YELLOW
32.0502-03 RED
32.0502-04 BLUE
35.0502-05 BLACK

CONTROL UNIT
BETJENINGSENHED

CB804

M405.086/2

Storno



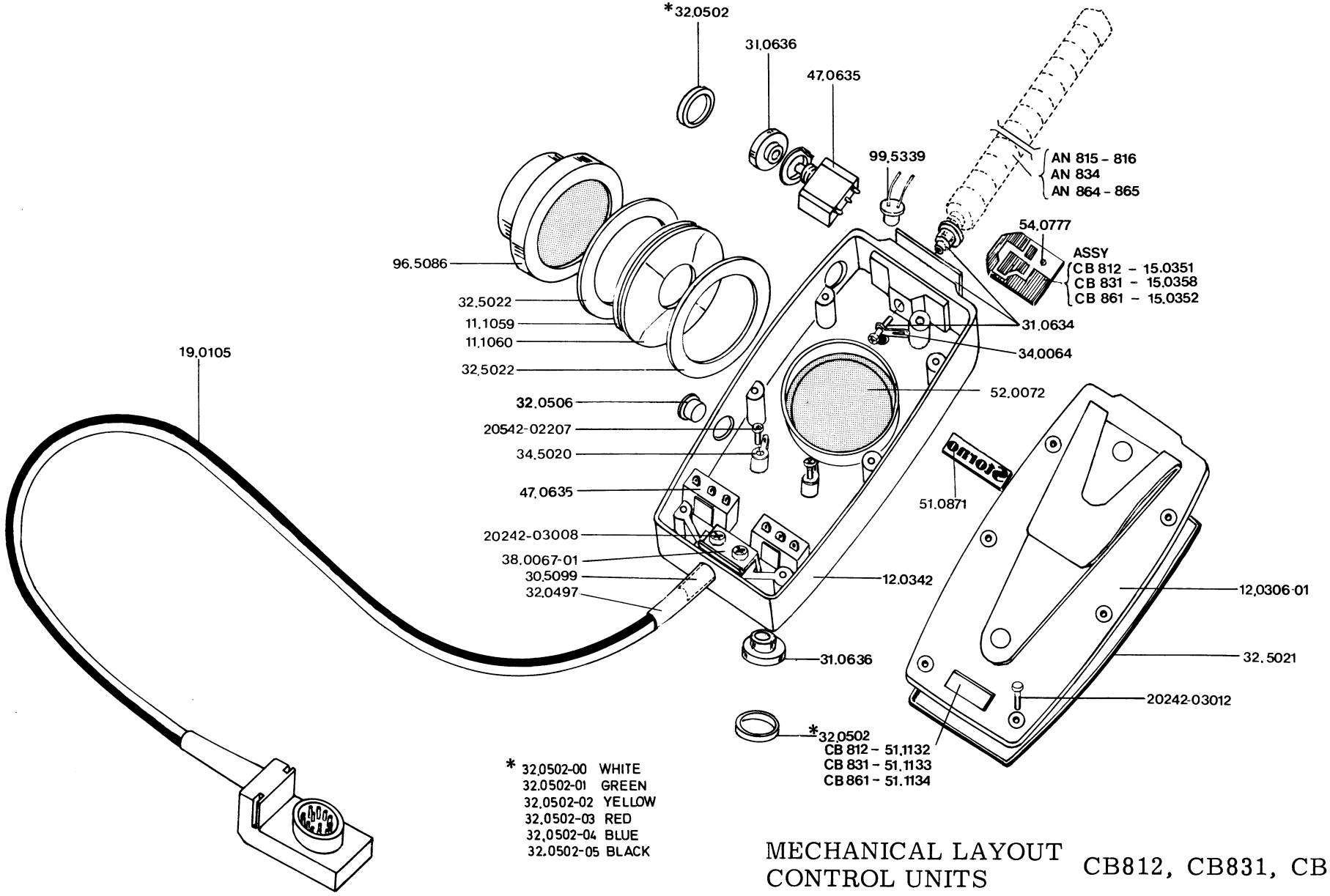
* 32 0502 00	WHITE
32.0502-01	GREEN
32.0502-02	YELLOW
32.0502-03	RED
32.0502-04	BLUE
32.0502-05	BLACK

CONTROL UNIT
MECHANICAL LAY OUT

CB805

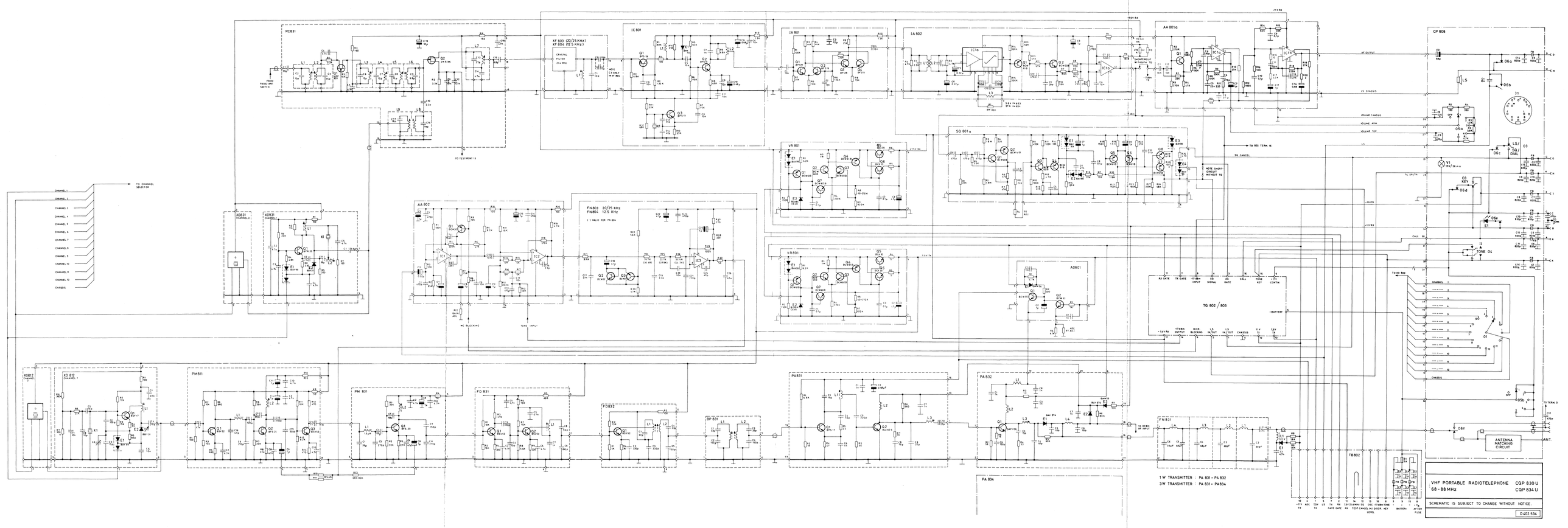
M405.084/2

Storno



MECHANICAL LAYOUT CONTROL UNITS CB812, CB831, CB861

M405.090


RC831
XF 803 (20/25 KHz)
XF 804 (12.5 KHz)
IC 801
IA 801
IA 802
AA 801a
CP 808
AA 802
FN 803 20/25 KHz
FN 804 12.5 KHz
VR 801
SQ 801a
AD831
AD812
XD 812
PM 811
PM 831
FD 831
FD 832
BP 831
PA831
PA 832
PA 834
FN 831
AD801
TQ 802 / 803
TB802
CHANNEL 1
CHANNEL 2
CHANNEL 3
CHANNEL 4
CHANNEL 5
CHANNEL 6
CHANNEL 7
CHANNEL 8
CHANNEL 9
CHANNEL 10
CHANNEL 11
CHANNEL 12
CHASSIS
TO CHANNEL SELECTOR
TO TEST POINT 13
SQ CANCEL
TO TB 802 TERM 16
NOTE SHORT-CIRCUIT WITHOUT TQ
ANTENNA MATCHING CIRCUIT
1 W TRANSMITTER : PA 831 + PA 832
3 W TRANSMITTER : PA 831 + PA 834
VHF PORTABLE RADIOTELEPHONE 68 - 88 MHz
CQP 830 U
CQP 834 U
SCHEMATIC IS SUBJECT TO CHANGE WITHOUT NOTICE.
D 402.534

ALIGNMENT CARD CQP800U