



skanti

INSTRUCTION MANUAL

SSB RECEIVER
Type R5000

AND

POWER PACKS

P5010 , 5011 AND 5012

2000 20-10-77
910 000 10. 4.udg.

R 5000, P 5010, P 5011 and P 5012

INSTRUCTION MANUAL

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1. Introduction

- 1.1. The R5000 marine and general purpose receiver is designed for use in a marine radio station. The receiver has synthesized operation in the frequency range 10 kHz to 29.9999 MHz.

The receiver is designed for reception of type F1, A1, A2, A2H, A3, A3H and upper-sideband A3A and A3J signals. It is fully transistorized, and widespread use is made of integrated circuits. These features, in connection with the fact that no crystal ovens are used, cause the receiver to be ready for operation immediately after having been switched on.

Depending on the power pack installed in it, the receiver can be powered from a 24 V battery or from AC voltages normally occurring in practice.

The dimensions match a 19-inch standard rack, and the receiver is intended for mounting in the same cabinet with the T5000 transmitter. When so mounted, the receiver and transmitter in conjunction with the exciter and the transmitter power pack constitute the TRP5000 Transmitter/receiver combination. The receiver is also available as a separate cabinet model.

Because we are constantly processing the experience gained during the production and operation of our equipment, it is possible for minor modifications to occur relative to the information given in this instruction manual. Wherever practicable, however, any corrections will be listed on a correction sheet on the back of the front cover of this manual.



FRONT PANEL AND OPERATING CONTROLS
R 5000

2. Operating instructions

2.1. Tuning to 500 kHz and 2182 kHz

1. Set BAND-switch to 500 kHz or 2182kHz
2. Turn SENSITIVITY fully clockwise
3. Adjust VOLUME for a convenient volume.

NOTE: When the BAND-switch is set to 500 kHz or 2182 kHz the mode A3/A3H-AGC ON is automatically selected, and the MODE-switch can therefore be set to any position.

2.2. Tuning to an SSB Station in the Coastal Telephony Band

1. Set BAND-switch to 1.6-4 MHz
2. Set MODE-switch to A3J/A3A- AGC ON
3. Turn SENSITIVITY fully clockwise
4. Adjust VOLUME for a convenient volume
5. Select the desired frequency with the keyboard
6. Set PRESELECTOR for maximum level
7. Adjust CLARIFIER for natural-sounding speech, when the desired station is modulated.

NOTE: Under certain circumstances it can be advantageous to use manual gain control of the receiver either in addition to the automatic gain control (A3J/A3A-AGC ON) or with the automatic gain control switched off (A3J/A3A-AGC OFF). This is done by turning the SENSITIVITY control anticlockwise until best reception is obtained and has the effect of reducing background noise coming up in speech pauses.

2.3. Tuning to an SSB Station in the Duplex Ranges

1. Set BAND-switch to the desired HF-band
2. Set MODE-switch to A3J/A3A-AGC ON
3. Turn SENSITIVITY fully clockwise
4. Adjust VOLUME for a convenient volume
5. Select the desired frequency with the keyboard
6. Adjust CLARIFIER for natural-sounding speech when the desired station is modulated.

NOTE: Under certain circumstances it can be advantageous to use manual gain control of the receiver either in addition to the automatic gain control (A3J/A3A-AGC ON) or with the automatic gain control switched off (A3J/A3A-AGC OFF). This is done by turning the SENSITIVITY control anticlockwise until best reception is obtained and has the effect of reducing background noise coming up in speech pauses.

2.4. Tuning to an AM Station

1. Set BAND-switch to the desired band (use the LP-filter .01-1.6 MHz or one of the Preselector Bands)
2. Set MODE-switch to A3/A3H-AGC ON
3. Turn SENSITIVITY fully clockwise
4. Adjust VOLUME for a convenient volume
5. If the exact frequency of the station is known, select this with the keyboard. Otherwise select a nearby frequency with the keyboard and use the TUNING control to find the desired station
6. Set PRESELECTOR for maximum level if one of the Preselector Bands is used.

2.5. Operating Controls and Their Functions

| | |
|-------------|--|
| SENSITIVITY | Manual adjustment of receiver RF gain |
| VOLUME | Manuel adjustment of receiver AF gain. |

The MODE switch has six positions:

| | |
|-----------------|---|
| F1/A1-AGC OFF | Reception of unmodulated signals and telex signals. Automatic gain control inoperative. |
| A3/A3H-AGC OFF | Reception of double and single-sideband modulation with full carrier. Automatic gain control inoperative. |
| A3J/A3A-AGC OFF | Reception of single-sideband modulation with suppressed or reduced carrier. Automatic gain control inoperative. |
| A3J/A3A-AGC ON | Reception of single-sideband modulation with suppressed or reduced carrier. Automatic gain control operative. |
| A3/A3H-AGC ON | Reception of double and single-sideband modulation with full carrier. Automatic gain control operative. |
| F1/A1-AGC ON | Reception of unmodulated signals and telex signals. Automatic gain control operative. |

| | |
|--------|---|
| DIMMER | Varies the illumination of the meter and the brightness of the display between full intensity and light extinguished. |
|--------|---|



| | |
|--------|---|
| ON/OFF | Disconnects the local speaker. |
| PHONES | Connection for headphones. Disconnects the local speaker. |

The BAND switch has 16 positions:

| | |
|---|---|
| 500 kHz | Fixed tuned bandpass filter. |
| 2182 kHz | Fixed tuned bandpass filter. |
| .01-1.6 MHz | Low pass filter. |
| .06-.18, .18-.53, .53-1.6, 1.6-4, 4-12, 12-30 MHz | Tunable band pass filters. |
| 4, 6, 8, 12, 16, 22, 25 MHz | Fixed tuned band pass filters, covering the maritime HF duplex and telex frequencies. |
| PRESELECTOR TUNING | Tuning control for the tunable band pass filters. |
| CLARIFIER | For accurate tuning to frequency. |
| TUNING | For continuous tuning of the receiving frequency. With the MODE switch in position A3/A3H the tuning is in steps of 1 kHz, in any other position of the MODE switch it is in 100 Hz steps. |
| KEYBOARD | For selection of the wanted receiving frequency. The C key clears the display, while the LOCK key disables the TUNING knob. |

3. Installation

Correct installation of the equipment is important for good results. Antenna and earth connections must be installed with the greatest care, especially where duplex telephony is desired.

3.1. Mounting the Cabinet

The R5000 cabinet is intended for table-top mounting. The drawing on page 3-3 show the drilling plan for the necessary holes.

3.2. Disassembling the Receiver

To open the receiver, remove the four front panel screws. Pull the chassis out of the cabinet and remove the connectors. The power pack is mounted in the bottom of the receiver cabinet. To remove the power pack, take off the top plate, remove the cables to the permanent installation and remove the power switch from the front plate. The power pack may now be lifted out, after loosening five screws.

3.3. Connection to the Permanent Installation

Check that the correct power pack is installed, and that the power pack (if for AC) is set for the correct mains voltage. Cable connections for installation of the R5000 appear on the drawings on the pages 8-91, 8-93 and 8-95.

3.4. Earth Connection

The receiver earth terminals are located at the back of the receiver cabinet and should be connected to earth using a length of 2.5 sqmm wire. This wire should be connected to a separate earth screw, which must not be shared by any other equipment. The earth lead should be run as far from the transmitter earth lead as is practicable.

Other cables should be run as far away from the receiver earth leads as possible and under no circumstances parallel with it, closer than 0.2 m.

3.5. Antenna

Length: 7-30 metres. The receiving antenna should be brought in by a length of coaxial cable, which should be as short as possible, especially in the case of short antennas.

In order to minimize duplex noise, the transmitting and receiving antennas should be kept as far away from each other as possible. Stays, wires, steel masts etc. should either be earthed effectively or insulated.

Likewise in order to minimize duplex noise, every other electrical installation such as cable braidings (screens) and instruments should be earthed effectively, and the instruments in question should be fitted with noise-interference suppression devices.

The Antennas should be suspended well in the clear, away from objects whose influence on the antennas may vary, such as derricks etc. Insulators should be of the best type having low leakage even when wet.

3.6. Exchanging the Input Impedance.

The input impedance of the four bands in the PRESELECTOR RANGES 0.06-0.18 MHz, 0.18-0.53 MHz, 0.53-1.6 MHz and 1.6-4 MHz can be altered, if so desired, from a high level to a low level (50 ohm).

| Band | High Impedance | Low Impedance (50 ohm) |
|---------------|---|---|
| 0.06-0.18 MHz | Terminals 202-25 and 202-24 connected | Terminals 202-25 and 202-23 connected |
| 0.18-0.53 MHz | Terminals 202-16, 202-17 and 202-18 connected | Terminals 202-16 and 202-15 connected |
| 0.53-1.6 MHz | Terminals 202-12 and 202-11 connected | Terminals 202-12 and 202-10 connected |
| 1.6-4 MHz | Terminals 202-21, 202-19 and 202-20 connected | Terminals 202-21, 202-19 and 202-22 connected |

3.7. Remote Speaker

A remote speaker may be connected to the terminals at the back of the cabinet. It should have 4 ohms impedance or higher and a power handling capacity of 5W or more.

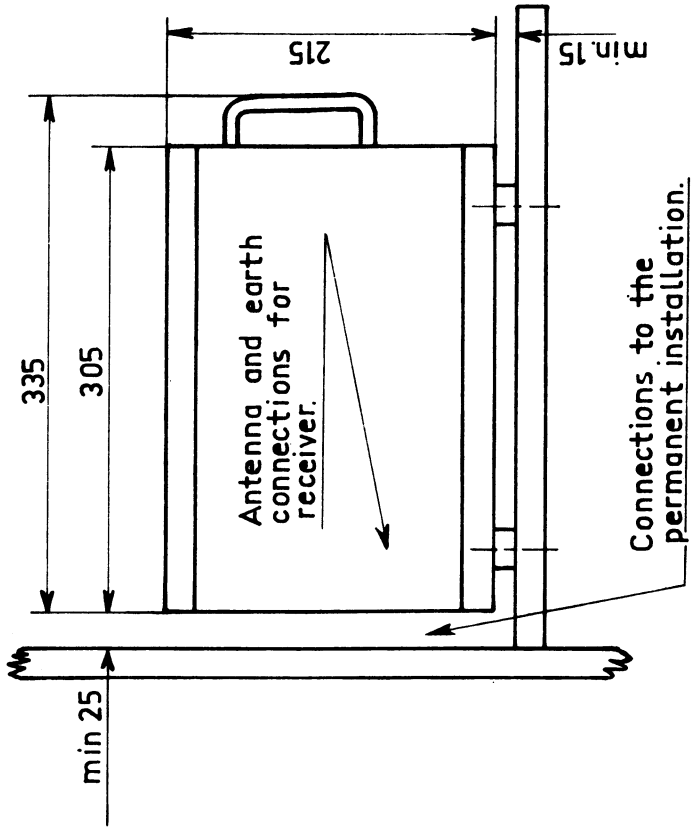
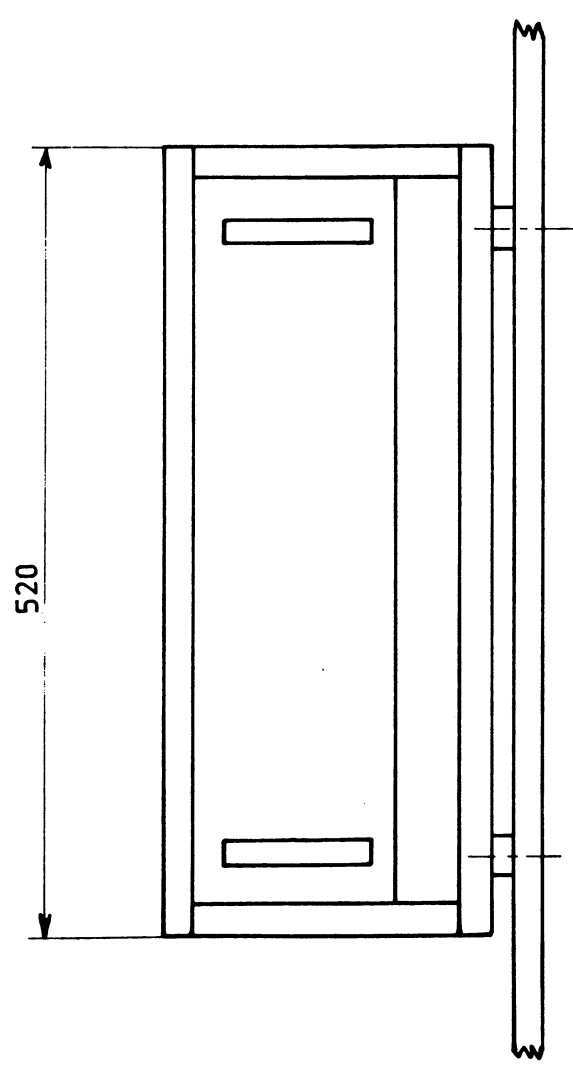
3.8. Muting

Muting terminals are available at the back of the cabinet. The terminals must be connected together in order to mute the receiver.

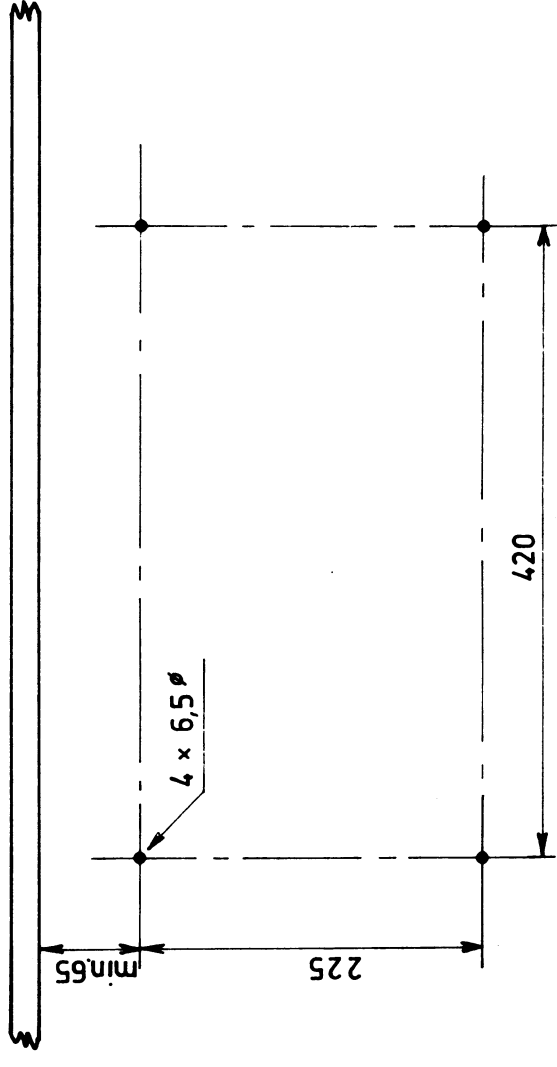
3.9. Replacement of Power Packs

Three different power packs are available for operation of the receiver. Either power pack can be installed in the bottom of the receiver cabinet.

The P5010 is used for 24V battery operation, while the P5011 is used for AC-mains operation. The P5012 is a combined version which can operate from both 24V battery and AC-mains. Replacing a power pack involves no modifications of the receiver.



Horizontal drilling plan for mounting



| Unit : | Appr. Weight : |
|-----------------|----------------|
| R5000,1,2 DC | 23,3 kg |
| R5000,1,2 AC | 24,3 kg |
| R5000,1,2 AC/DC | 25,3 kg |

Dimensions are in mm
Tolerances : ± 1 mm

4. Technical Data

4.1. Receiver R5000

Frequency Range:

Synthesized operation from 10 kHz to 29.9999 MHz

Frequency Presentation:

Fully digital read-out.

Modes of Operation:

A1, A2, A2H, A3, A3H, A3J and F1. Simplex, semiduplex and duplex with built-in duplex filters.

Selectivity:

A3/A3H: 6 dB at ± 2.7 kHz, 60 dB at ± 10 kHz

A3J/A3A: 6 dB at 350 Hz and 2700 Hz
60 dB at -400 Hz and 3400 Hz

F1/A1 (optional) 6 dB at ± 400 Hz
60 dB at ± 850 Hz

Sensitivity:

Connection made for high input impedance

Max input
for 10 dB SINAD

| | | |
|-------------|-------------|------------|
| 0.1-1.6 MHz | A1 | 4 μ V |
| | A2, A2H, A3 | 18 μ V |

| | | |
|-----------|------------------|-----------|
| 1.6-4 MHz | A1, A3A, A3J, F1 | 1 μ V |
| | A2, A2H, A3, A3H | 4 μ V |

Connection made for low input impedance (50 ohm)

| | | |
|-------------|-------------|-----------|
| 0.1-1.6 MHz | A1 | 2 μ V |
| | A2, A2H, A3 | 9 μ V |

| | | |
|-----------|------------------|-------------|
| 1.6-4 MHz | A1, A3A, A3J, F1 | 0.5 μ V |
| | A2, A2H, A3, A3H | 2.5 μ V |

| | | |
|----------|------------------|-------------|
| 4-30 MHz | A1, A3A, A3J, F1 | 0.5 μ V |
| | A2, A2H, A3, A3H | 2.5 μ V |

1.4 MHz if output (optional)

20 mVpp in 50 ohms.

Audio-Output:

10 mW to phones (400 ohms)
5 W to loudspeaker(s) (4 ohms)
10 dBm to line (600 ohms)

Supply Voltage:

24V battery with P 5010 Power Pack
110/115/120 or 220/230/240V single – or two phase AC 50-60 Hz with P 5011 Power Pack
24V battery and/or 110/115/120 or 220/230/240 single – or two phase AC 50-60 Hz with P 5012 Power Pack

Supply Voltage Variations:

DC: -10 to +30%
Ac: $\pm 10\%$

Consumption:

24V battery: approx. 2A
AC main: approx. VA

The duplex filters bandwidth:

| | |
|----------|----------------------------------|
| »4 MHz« | -1 dB at 4355 kHz and 4445 kHz |
| »6 MHz« | -1 dB at 6500 kHz and 6596 kHz |
| »8 MHz« | -1 dB at 8710 kHz and 8840 kHz |
| »12 MHz« | -1 dB at 13100 kHz and 13350 kHz |
| »16 MHz« | -1 dB at 17230 kHz and 17830 kHz |
| »22 MHz« | -1 dB at 22570 kHz and 23430 kHz |
| »25 MHz« | -1 dB at 25300 kHz and 26300 kHz |

Dimensions:

Height: 215 mm
Width: 520 mm
Depth: 305 mm
Weight: 23.6 kg

5. Technical Description

5.1. Mechanical

The receiver is built on a rugged zinc plated and passivated iron chassis.

The receiver contains 13 printed circuits boards. Six of these, (206), (207), (208), (209), (210) and (212) are plug-in boards, which are placed in a special screened box at the right hand side of the receiver chassis and contains the circuits for the AF-amplifier and the synthesizer. The rest of the circuit boards except (211), (213) and (214) are housed in four screening cans. The can at the left hand side of the top compartment contains the 2nd mixer (203) and the IF-amplifier 205, while the can in the middle contains the IF-filters (204). In the bottom compartment, the screening can contains the Input Filters and 1st Mixer, (202). Finally, in the front compartment behind the front panel, switches and potentiometers are located together with the Filter Board, (213) the Loop 3-Divider (214) and the circuit for the Display and Keyboard, (211). The front panel is electrically insulated from the chassis. This feature permits connecting the chassis to a separate earth when the receiver is mounted in the same rack with the transmitter.

5.2. Circuit Discription, General

Each of the printed circuit boards and also the chassis mounted components in this equipment have been allocated an identification number between (200) and (213). The designation of a component or terminal includes this number as a prefix, e.g. 204R3 (resistor R3 on board (204)) or 204-3 (terminal No. 3 on board (204)).


For convenience in this section and on the circuit diagrams the prefix is omitted except where there is a risk of ambiguity.

The circuit diagram is divided into a wiring diagram on page 8-59 showing inter-connections between the printed circuit boards, and circuit diagrams of the individual printed circuit boards. The mode of operation follows the block diagrams on pages 8-50, 8-51 and 8-52, showing the signal path, the frequency synthesizer and the frequency selection, respectively.


5.3. Circuit Summary, Signal Path

The incoming signal is fed via the BAND switch on board (202) to the RF Input Filters. Board (202) also contains the 1st mixer stage, that converts the input signal frequency to the 1st intermediate-frequency 38 MHz by mixing it with a signal from the Frequency Synthesizer. Before leaving board (202), the intermediate-frequency signal passes a crystal filter which determines the double-sideband selectivity of the receiver.

The 1st intermediate-frequency signal is fed to the 2nd mixer on board (203), where it is converted to the 2nd intermediate frequency, 1.4 MHz, by mixing it with a signal derived on the basis of the 11.2 MHz TCXO on board (206) and the 3 MHz clarifier-oscillator on board (203).

The 2nd intermediate-frequency signal is fed to the IF-filters on board  . The selection of the desired filter is carried out by the MODE switch.

On the IF-Amplifier board  the signal is amplified and detected and the audio frequency output is fed to the VOLUME control via an active low-pass filter.

The audio-frequency signal is amplified on plug-in board  , which also contains the line-amplifier and the TCXO.

5.4. Circuit Description, Signal Path Boards

5.4.1. Input Filters

The PRESELECTOR RANGES consist of six bands, each tuned with the variable capacitor C5. The 3 bands from 0.06 MHz to 1.6 MHz consist of the coils T11, T12 and T13 and associated components. The 3 band from 1.6 MHz to 30 MHz consist of six coils which two by two, together with the remaining components, constitute a double band-pass filter. The 2 bands, .18-.53 MHz and 1.6 MHz-4 MHz are, in the positions 500 kHz and 2182 kHz, fixed tuned with capacitors C3 and C1, C2, C4, C6 respectively. In the DUPLEX ranges all circuits are fixed tuned. The seven DUPLEX filters comprise three tuned circuits, and their selectivity is high to provide effective attenuation of one's own transmitter. All the filters in the PRESELECTOR and the DUPLEX range have a balanced output for the mixer.




For the 0.01-1.6 MHz range there is a low pass filter consisting of L4 and C46.

Switching of the filter outputs is performed by a DC voltage which controls the diode switches at the balanced filter outputs.

The 1st mixer, which is double balanced, consists of the matched field effect transistors TR1, TR2, TR3 and TR4. The 38 MHz output is fed to the 2nd mixer via a 38 MHz crystal filter.

5.4.2. 2nd Mixer

This board contains the 2nd mixer, the clarifier oscillator and mixer and finally a 38 MHz input attenuator.

The 2nd mixer consists of field effect transistors TR5 and TR7. The 1.4 MHz output is connected to the IF-Filter board  . The injection signal for the 2nd mixer is obtained by mixing a 33.6 MHz and a 3 MHz signal in the integrated circuit IC1. The 33.6 MHz signal is derived from the TCXO on board  , while the 3 MHz signal is obtained by using part of IC1 as a crystal-oscillator. The frequency of the 3 MHz oscillator can be varied from the CLARIFIER control by means of the variable capacitance diode D1 . The 36.6 MHz output from IC1 is filtered and amplified in TRX before being applied to the 2nd mixer. The 38 MHz input attenuator consists of the PIN-diode D2 and associated components. The current in the PIN-diode is controlled by TR6, the base of which is connected to the AGC-voltage on board  . The 38 MHz input frequency is stepped up in a transformer before being applied to the mixer input.

5.4.3.



IF-Filters

The IF-Filters consist of a 1.4 MHz LSB crystal filter and a 1.4 MHz WIDE filter consisting of the coils L1 and L2 and the capacitors C2, C9 and C11. The selection of the correct filter is made by the MODE switch which controls the diode switches at the filter input and output.

When the BAND Switch is in position 500 kHz or 2182 kHz the 1.4 MHz WIDE filter is automatically selected.


5.4.4.



IF-Amplifier, Detector and AGC

The IF-amplifier consists of transistors TR1 and TR2. A 1.4 MHz band-pass filter connects the amplifier to the signal detector IC1. This integrated circuit contains a balanced mixer and a high-gain limiting amplifier. The signal voltage is applied balanced to the one input port of the mixer, terminals 7 and 9, of the integrated circuit.

When the detector works as an AM detector the signal voltage is also fed to the amplifier input terminal 14, via D12. This signal is amplified and clipped to constant amplitude and internally connected to the other input port of the balanced mixer where it is mixed with the modulated signal. The difference frequency, which contains the wanted AF-signal, is taken off at the mixer output, terminal 8. The AF-signal is then fed to an active low-pass filter consisting of transistor TR5 and associated components.

In the A1/F1 mode and the A3J/A3A mode D12 is blocked while D11 is conducting and the 1.4 MHz signal from the AF-amplifier, board  is now fed to the amplifier input. The mixer is working in the same manner as before except that now the 1.4 MHz signal is the re-inserted carrier.

Also the sum frequency of the input signals is present at the mixer output. This signal is used for automatic gain control and is taken off across the 2.8 MHz tuned circuit. It is amplified in TR4 and rectified in the AGC detector TR3. The current of TR3 increases for increasing signal level causing the collector voltage to drop. The collector is connected to the bases of the IF-transistors and a lower collector voltage means reduced gain in the If-Amplifier.

The AGC time constants are determined by C2 and C8. The circuit combines a short attack time and a long decay time. The resistor R11 in series with C8, which mainly determines the decay time, prevents short noise pulses from giving a long decay time.

The gain can also be controlled manually by means of the SENSITIVITY control, which in combination with the diode D1 determines the maximum collector voltage of TR3 and with that the highest available gain of the IF-amplifier.

The MODE switch switches off the AGC by disconnecting the emitter current of TR4. The base voltage of the IF transistors is then controlled only by means of the SENSITIVITY control.

5.4.5.



AF-Amplifier

The board contains the AF amplifier, the line amplifier and the TCXO. The AF amplifier is an integrated circuit provided with a built-in thermal limiting circuit and protection against accidental short circuit of the output. The line amplifier consists of the transistors TR1 and TR3. The TXCO frequency 11.2 MHz is amplified in TR2 and TR5 and clipped in TR8. The signal is then divided by 8 to 1.4 MHz in the integrated circuit IC2. From the output of the divider a 1.4 MHz signal is fed to an BNC connector on the FILTER BOARD, 213 , for connection to a SKANTI type E5000 exciter. Another 1.4 MHz signal from the divider is fed to the Mother Board 201 .

The TCXO frequency is amplified in TR5, TR7 and TR8, and the third harmonic is taken off in the filter consisting of coils T2, T3 and associated components. The 33.6 MHz signal is fed to the 2nd MIXER on board 203 .

5.4.6



Filterboard

The Filterboard contains 3 voltage regulators. IC1, IC2 and IC3. IC1 supplies 12 V to the synthesizer, while IC2 supplies 12 V to the other parts of the receiver IC3 supplies 5V to the AF-AMPLIFIER and the synthesizer.

RF filters are inserted in the power supply, muting and AF-output lines in order to suppress noise and interference on these lines.

5.5. Circuit Summary, Frequency Synthesizer

This Frequency Synthesizer consists of two programmable phase locked loops (Loop 1 and Loop 2), the outputs of which are controlling a third (Loop 3) from which the complete synthesized signal is derived and fed to the 1st mixer in the signal path.

The output frequency of Loop 1 is controlled by the 100 Hz, 1 kHz, and 10 kHz information according to the contents of the displays, provided that the receiving mode chosen is not F1/A1. If the F1/A1-mode is chosen the output frequency is decreased by 30 kHz, which means that the final output frequency of the Synthesizer is decreased by 1.5 kHz.

Loop 1 produces an output frequency in 999 steps from 20.000 MHz to 21998 MHz in all modes but F1/A1. In the F1/A1 mode it is from 19.970 MHz to 21.960 MHz. This frequency is divided by 200 and serves as a variable reference frequency for the Loop Translator.

Independent of the different receiving modes Loop 2 is controlled by the 100 kHz, 1MHz, and 10 MHz information according to the contents of the displays. The output frequency of this loop is variable from 3.70 MHz to 6.69 MHz in 299 steps and is fed to the mixer of the Loop Translator, where it is subtracted from the Synthesizer output frequency divided by 10, and finally compared with the variable reference frequency to this loop by means of Phase/Freq. Detector 3. A Frequency Comparator ensures that the Synthesizer output frequency divided by ten is higher than the output frequency of Loop 2. If this was not the case, it would lead to a stable, unlocked condition of Loop 3.

The Frequency Synthesizer is locked to a 1.4 MHz signal derived from the TCXO, so that the output frequency will exhibit exactly the same stability as specified for the TCXO.

Provided that the 3 loops are locked the following equations, where fvcoi is short for output frequency of VCOi, will become valid:

Assumption: Receiving frequency is (ab,cde.f) kHz.

$$(fvco_3 \div 10) - fvco_2 = (fvco_1 \div 200).$$

$$fvco_3 = 10x(fvco_2 + (fvco_1 \div 200))$$

where

$$fvco_1 = (20000 + (d e f)x2) \text{ kHz and}$$


$$fvco_2 = (3700 + (a b c)x10) \text{ kHz and}$$

$$fvco_3 = 38000.0 \text{ kHz} + a b c d e . f \text{ kHz.}$$

5.6. Circuit Description, Frequency Synthesizer

5.6.1. Frequency Dividers

There are three divider chains, their associated buffer amplifiers, and two phase/freq. detectors are located on this board.

The Reference Divider produces the 2 kHz reference frequency for the Phase/freq. Detector 1, and the 10 kHz reference signal for the Phase/Freq. Detector 2, from a 1.4 MHz signal derived from the TCXO on board .

The variable divider chains are composed of programmable up-counters and their associated external gating logic. The dividing action is accomplished by presetting (programming) these counters with the data blocks corresponding to the contents in the displays, at the end of each counting cycle. The data blocks contain the BCD 9's complement code of the corresponding digit.

In the Loop 1-Divider chain the F1/A1 information is used to control the associated external gating logic. In the F1/A1 mode this chain counts 15 clockpulses less than in any other mode, before concluding a counting cycle, thus the contents of the data blocks are independent of the mode.

The Loop 2-Divider chain counts independent of the receiving mode and adds, by means of the external gating logic, 370 extra clock cycles to what is determined by the three most important digits, before concluding a counting cycle.

The outputs from the variable dividers are led to their respective phase/freq. detectors and are here compared to the fixed reference frequency. In case of a frequency difference the detector will produce a DC error voltage which will adjust the associated VCO to establish the wanted frequency equality.

5.6.2.



Loop Translator

This circuit board contains one half of Loop 3, namely the Frequency Comparator – 200 divider, the Loop 3 Mixer, with its associated 1.5 MHz Low-Pass Filter, and Phase/Freq. Detector 3.

The VCO_1 output frequency is divided by 200 and fed, as a variable reference frequency, to one of the two input ports of Phase/Freq. Detector 3. The output frequency of VCO_3 divided by 10 is fed to the Loop Mixer, whose other injection signal is derived from VCO_2 . The sum frequency from this mixing process is removed in a 13-order 1.5 MHz Low Pass Filter, thus only allowing the difference frequency to pass on via the following Buffer Amplifier, to the other port of Phase/Freq. Detector 3. This detector is almost identical to the detectors mentioned in the description of board 207.

If the VCO_2 output frequency is higher than the Synthesizer output frequency divided by 10 at the beginning of an acquisition of Loop 3, this loop will end in a stable, unlocked condition. To avoid this these two frequencies are compared. If the frequency of VCO_2 is the highest then the monostable multivibrator IC? is triggered by the latch following the two divider chains and via the Phase/Freq. Detector 3, the frequency of VCO_3 is forced to rise, thus pulling Loop 3 out of this unwanted condition.

The output pulse from the detector is smoothed by means of a simple RC-filter before leaving this circuit board.

5.6.3.



VCO_1 and VCO_2

The Loop Filter and Voltage Controlled Oscillator of both Loop 1 and Loop 2 are located on this board.

Both of these filters are active 3rd order low pass types with an integrated function incorporated. The purpose of the loop filters is to remove the pulses from the output of the Phase/Freq. Detector and allow only the DC-Information to pass on to the vari-cap diodes of the Voltage Controlled Oscillators. By use of the Phase Error Adjustment potentiometer the phase error pulse width can be minimized. Once adjusted this width will remain unchanged throughout the whole frequency range of the VCO, due to the use of an integrator in the Loop Filter. Both of the VCO's are amplitude regulated.

The selection of one of the three bands, in which VCO_2 is operating, is carried out by means of a decoding circuit on 212.


5.6.4.



VCO_3

This circuit board contains the Loop 3-filter and the Voltage Controlled Oscillator VCO_3 .

The Loop 3-filter consists of a 1st order low pass filter and an integrator. The filter serves to remove the pulses of the Phase/Freq. Detector output signal and allow only the DC-information to pass on to the vari-cap diodes of VCO₃. By use of the Phase Error Adjustment the phase error pulse width can be minimized, and once adjusted it will remain unchanged throughout the whole frequency range of VCO₃ due to the use of an integrator in the Loop Filter.



VCO₃ consists of three Voltage Controlled Oscillators VCO_{3x}, VCO_{3y} and VCO_{3z}, each covering a band of approximately 10 MHz. The band selection is carried out by means of a decoding circuit on .

The VCO₃ output signal is amplitude regulated and serves as an injection signal to the 1st mixer in the receiver signal path.

5.6.5. Loop 3 Divider.

The Loop3-Divider divides the frequency of VCO₃ by 10; this signal is then fed to the Loop Translator.

5.7. Circuit Summary, Frequency Selection

The frequency selection is performed by the two printed circuit boards  and .

The purpose of this unit is to control the selection of the receiving frequency, display it and control the Synthesizer output frequency in accordance with this setting.

The frequency setting can be done in the following ways.

From the Keyboard any number (the receiving frequency) less than 30,000.0 can be keyed into the displays. This number can be changed in steps of 1 kHz in the A3/A3H-mode or 100 Hz in any other mode by means of the Tuning Wheel provided that the LOCK-key is not activated. If the LOCK-key is activated, the Tuning Wheel will be inoperative while the Keyboard will remain operative. When the Band switch is moved to the 500 kHz or 2182 kHz positions these frequency settings will override the present setting, which is saved and will appear again when the Band switch is moved to any other position.

It is not possible to choose a number greater than 29,999.9; if such an attempt is done, the displays are automatically cleared and ready to accept a new frequency setting.

For any frequency setting less than 10.0 kHz the receiver is muted.


To display the receiving frequency a multiplexing system is used. All the digit datas used to control the Synthesizer are present on a parallel form and in the code of BCD 9's complement right after the 500 kHz and 2182 kHz Preselection Circuits. In order to display the receiving frequency the Scan Counter selects via the Multiplexer unit one of these digit data blocks at a time, converts it to BCD code and decodes it further to 7 segment information. This information controls a 7 segment Driver, which starts driving the appropriate digit-display selected by the Scan Decoder. So, in fact, only one display is derived at a time but the repetition rate is so high that no flickering appears.

The Dimmer Control potentiometer is used to regulate the period of time in which the respective display is activated, thus controlling the light intensity of the displays. The light intensity of the meter is regulated simultaneously in the same manner.

The most significant digit is decoded to select the correct band of the VCO's of the Frequency Synthesizer.

5.8. Circuit Description, Frequency Selection.

5.8.1. Display and Keyboard


When a key (except for the LOCK-key) is depressed the associated key-number is partly encoded in IC1 and passed on to an additional encoder located on  to complete the BCD 9's Complement encoding. Furthermore IC1 serves as an N-key lock-out unit, i.e. if one or more keys have already been depressed, it is not possible to activate the Keyboard before all depressed keys are released. If two or more keys are depressed simultaneously the lowest key-number is chosen.


The Tuning Control consists of a Tuning Wheel, two optically coupled modules, and an UP/DOWN-Control. The Tuning Wheel is a thin metal disk in which holes are etched. The two optically coupled modules sense these holes, and produce a pulse for each hole encountered. Each pulse counts up or down the displayed number, provided that the LOCK-key is not activated. The direction of this counting is controlled by IC?

By means of the two potentiometers R26 and R27 it is possible to adjust the duty cycles of the output from the two Smith-triggers (IC9) to 50%. When the wheel is rotated the outputs will exhibit a phase difference of 90° if the optically coupled modules are correctly mounted. This is necessary to ensure proper functioning of the UP/DOWN-Control.

The heart of the multiplex system is the combined Clock Generator and Dimmer Control consisting of IC4 together with external components, of which the potentiometer regulates the duty cycle of the clock.

This Clock Generator drives the Scan Counter which again produces the Scan Address. This address decides which digit the multiplex system is to operate on. The Scan Decoder selects via a driver transistor, the appropriate digit i.e.d. display.

The multiplexed BCD-input from  after being decoded into the 7-segment code in IC15 decides which figure is to be shown in this display.

Two other signals from  control IC15. One signal derived from the multiplex clock, is fed to the RBo terminal. Due to the variable duty cycle of the multiplex clock, it is possible to control within a clock cycle the ratio between how long the outputs of IC15 are enabled and disabled, thus controlling the light intensity of the display. The other signal is a blanking control signal, which is led to the RBi terminal, completely blanking the displays that would otherwise show irrelevant zeros.

Because of the high peak currents driving the displays, the segment driving is performed by a special high current array, IC 14

The displays show the frequency in kHz and the decimal points is the only light source, which is not dimmable.

The AGC-voltage from board 205 is shown on the meter; the light intensity of the associated bulb is controlled by the Dimmer Control in the same way as the displays.

5.8.2



Synthesizer Control

When a key is depressed or released there will always be some sort of bouncing effect before the key has settled. This bouncing is removed by means of the Key Bounce Eliminator consisting of IC4 and additional external gates. A load-command for the Digit Register Stack consisting of six programmable up/down-counters is generated as long as a key (except for the LOCK-key) is depressed. A clock pulse is produced when the key has settled after being activated, and then the data corresponding to the key number is loaded into IC10 and simultaneously all the data present in the Digit Register Stack is shifted to the next counter.

The encoding of the key-number is completed on this board before entering the Digit Register Stack.

To Clear this stack the last half of IC4 is triggered by means of the multiplex clock and, simultaneously data corresponding to key-number »O« is produced. So for each clock cycle these data are read into the Data Register Stack.

When the Tuning Wheel is rotated a pulse is generated in the Pulse Shaper each time a hole passes the optically coupled modules on 211. This pulse activates the last half of the Key Bounce Eliminator which produces a counting pulse for the Digit Register Stack, thus incrementing or decrementing . on 211. If the LOCK-key is activated, the counters IC10 and IC11 will become disabled thus making it impossible to tune the receiver in the way mentioned above, but the Keyboard will remain operative.

By means of the A3/A3H-mode information, it is decided which of the first two counters of the Digit Register Stack is to be activated by the counting pulse, thus deciding whether to tune in steps of 100 Hz or 1kHz.

The outputs of the Data Register Stack are led through the 500 kHz and 2182 kHz Preselection circuits, IC16-IC21. If neither of these two Band-settings is chosen the data passes through these gates. Otherwise one of the two preselected frequency numbers is chosen independent of the content of the Digit Register Stack.

By means of IC29 it is tested every 8th cycle of the multiplex clock, whether the most significant digit is greater than 2 or not, if it is, then a Clear command identical to that produced by means of the Clear-Key is generated through the subsequent 8 clock cycles.

The data now containing the information of the receiving frequency in BCD 9's complement. is then used for two purposes. First to control the Frequency Synthesizer and second to feed the displays.

The four multiplexers select one digit data block, controlled by the Scan Address, and pass it on through a BCD 9's Complement Converter before it enters 211 in order to become displayed there.

In order to establish a so-called leading edge zero suppression of the displayed frequency, the latch consisting of two gates from IC7 controls the blanking input RB₁ of the BDC to 7 segment decoder on 211. This latch is reset by clock pulse number six and seven whereby the blanking input is activated. Through the four inverters of IC31 the latch senses the first zero to come, beginning with the most significant digit. The first digit different from zero sets the latch, thus cancelling the blanking command. If all the digits are equal to zero, a pulse from 211 sets the latch on clock pulse number five, so that the least significant digit is always displayed.

In order to mute the receiver, if the receiving frequency setting is less than 10 kHz, the output from the latch mentioned above is sampled on the third clock pulse, thus deciding whether the four most significant digits are all different from zero or not. If they all are equal to zero a mute command is produced.

The most significant digit is decoded in order to control the band selection of the VCO's of the Frequency Synthesizer.

5.9. Circuit Summary, P5010, 24VDC Power Pack

- 5.9.1.** The complete circuit diagram is shown on page 8-91. The block diagram on page 8-55 illustrates the operation of the power pack.
- 5.9.2.** The necessary supply voltages for the receiver are generated in a converter. The converter transformer gives full isolation between the battery voltage and chassis permitting these to be earthed without causing the supply leads to be earthed.
- 5.9.3.** The output voltages from the converter transformer are rectified in two sets of rectifiers, each followed by a voltage stabilizer.

The converter frequency is determined by an RC-coupled oscillator, followed by a bistable multivibrator.

5.10. Circuit Description, P5010, 24VDC Power Pack

5.10.1. 280 Converter

The total input current is passed through fuse FS1 to POWER switch S1. An RFI-filter on board 281 is followed by zener diode D1.

Diode D1 protects the power pack against transients on the supply leads and against the consequences of polarity reversal.

The converter is composed of transistors TR1 and TR2 and the square wave output signal is coupled through transformer T1 to two sets of rectifiers.

5.10.2.  Converter Driver, Rectifiers and Stabilizers

A bistable multivibrator composed of transistors TR2 and TR3 is driven from oscillator TR1 with the nominal frequency 400 Hz. The output signals from the multivibrator are therefore square waves with a repetition frequency of 200 Hz, and these signals having a phase difference of 180° are used as driving signals for the converter.

One output signal from transformer 280T1 is fed to a double rectifier followed by a voltage stabilizer having a nominal output voltage of 15.7V, while a second output signal after rectification, also in a double rectifier, is fed to a voltage stabilizer having a nominal output voltage of 7.5 V.

5.11. Circuit Summary, P 5011, AC Power Pack

- 5.11.1. The complete circuit diagram is shown on page 8-93. The block diagram on page 8-56 illustrates the operation of the power pack.
- 5.11.2. The necessary supply voltages for the receiver are obtained from two secondary windings on the mains transformer.
- 5.11.3. The output voltages from the transformer are rectified in two sets of rectifiers, each followed by a voltage stabilizer.

5.12. Circuit Description, P5011, AC Power Pack

5.12.1.  Transformer

A double pole mechanically operated safety switch is inserted in the mains input leads. The primary current of transformer T1 is controlled by the front panel mounted POWER-switch.

5.12.2.  Rectifiers and Stabilizers

One output voltage from transformer 283T1 is fed to a double rectifier followed by a voltage stabilizer having a nominal output voltage of 15.7V while a second output voltage after rectification, also in a double rectifier, is fed to a voltage stabilizer having a nominal output voltage of 7.5V.

5.13. Circuit Summary, P5012, 24VDC/AC Power Pack

The complete circuit diagram is shown on page 8-95. The block diagram on page 8-57 illustrates the operation of the power pack.

- 5.13.2. The necessary supply voltages are obtained through either a mains transformer or a converter. The transformers give full isolation between mains voltage/ battery voltage and chassis, permitting the chassis to be earthed without causing the supply leads to be earthed.

5.13.3. A mains voltage sensor ensures that the receiver is supplied from the mains as long as a mains voltage is available. Should the mains voltage be interrupted the Power Pack will automatically switch over to 24V battery operation. When mains voltage is again available the Power Pack will automatically switch back to mains supply.


5.13.4. The output voltages from the mains and converter transformers are rectified in two sets of rectifiers, each followed by a voltage stabilizer.

5.14. Circuit Description, P5012, 24VDC/AC Power Pack

5.14.1. Transformers and Converter

A double pole mechanically operated safety switch is inserted in the AC mains input leads. The primary current of the mains transformer T1 is controlled by the front panel mounted POWER-switch.

The secondary windings of T are connected to two sets of rectifiers.

Input current from the battery input terminal is also controlled by the POWER-switch. An RFI-filter on board  is followed by Zener diode D1.

Diode D1 protects the converter against transients on the supply leads and against the consequences of polarity reversal of the battery supply leads. The converter is composed of transistors TR1 and TR2 and the square wave output signal is coupled through transformer T2 to two sets of rectifiers.

5.14.2. Converter Driver, Rectifiers and Stabilizers.

A bistable multivibrator composed of transistors TR2 and TR3 is driven from oscillator TR1 with the nominal frequency 400 Hz. The output signals from the multivibrator are therefore square waves with a repetition frequency of 200 Hz, and these signals having a phase difference of 180° are used as driving signals for the converter. One output signal from transformer 286T2 is fed to a double rectifier followed by a voltage stabilizer having a nominal voltage of 15.7V, while a second output signal after rectification also in a double rectifier is fed to a voltage stabilizer having a nominal output voltage of 7.5V.

A mains voltage sensor composed of transistors TR2, TR3 and TR6 controls, via RL2, the 24V converter.

6. Simple Service

6.1 Incorrect Operation

If the equipment is not functioning correctly, a check should be made that it is being operated properly. Go through adjustment procedures 2.2 and 2.3 if necessary.

6.2 Battery

The condition of the battery should be checked at frequent intervals. The battery must always be fully charged and should be topped up frequently with distilled water (liquid should rise 5 to 10 mm above the plates).

6.3 Replacement of Fuses

All fuses, are accessible on the front panel of the Power Pack.

7. REPAIR AND ALIGNMENT

7.1. Introduction

Repairs and adjustments on the equipment should be performed only by qualified technicians, to whom this chapter is addressed. Before attempting any repairs or adjustments, a study of Chapter 5, Technical Description, is recommended.

7.2. Cross-Slot Screws

The cross-slot screws used to secure the printed circuit boards are Pozidriv screws. A Pozidriv screwdriver No. 1 should be used in order to avoid damaging such screws.

7.3. Locating Subunits and Components

Locations of circuit boards in the equipment appear from the photographs on pages 8-48 to 8-49. Locations of components on each circuit board appear on the component location drawings against the respective circuit diagrams.

7.4. Locating Faults

Fault finding, as described in section 7.5. below, is aided by test points provided for the purpose of permitting rapid localization of faulty circuit boards on the basis of DC measurements. Since not all types of faults can be traced by means of DC measurements, supplementary AC measurements with an oscilloscope may be required; see section 7.6. To facilitate fault finding on each individual circuit board, typical voltages are listed on the circuit diagrams.

7.5. Test Points

Several circuit boards contain one or more test points. They are small pin-type terminals, colour coded following the standard colour code in addition to being numbered. In the circuit diagrams, test points are marked TP 1 , TP 2 etc., and typical voltages at the test points are listed there.

The terminals of the circuit boards may to a great extent also be regarded as test points. Typical voltages are therefore also listed against relevant terminals on the circuit diagrams.

If a voltage measured at a test point differs markedly from the listed value it is a fairly certain indication that the circuit board in question is faulty, assuming that the voltages applied to the circuit board are the correct ones. This should likewise be checked.

7.6. AC Voltages

AC voltages listed on the circuit diagrams are typical voltages. Voltages specified are based on measurement with an oscilloscope having an input impedance of 10 Mohms in parallel with 7 pF, a sensitivity of the order of 50mV/div. and a frequency range of not less than DC-50 MHz.

7.7. DC Voltages

DC voltages listed on the circuit diagrams are based on measurement with a 25 kohm/volt multimeter. If a stated voltage is dependent on the setting of a control, this is also stated on the circuit diagrams.

Typical logic levels (LOW/HIGH) are indicated in brackets.

7.8. Typical Sensitivity Levels

Input voltages to be applied at the input to (203) 2nd mixer and the input to (205) IF amplifier, detector and AGC to obtain an AGC voltage of 2.3 V DC measured at terminal 205-17:

Receiver control settings:

MODE switch on A3J. A3A-AGC ON

SENSITIVITY turned fully clockwise

Frequency higher than 10 KHz.

| Input to | Generator output impedance | Generator Frequency | Generator Modulation | Typical input level |
|----------|----------------------------|------------------------------|----------------------|---------------------|
| 203-8 | 50 ohm | 37999 kHz | 0 | 10 dB/1uV |
| 205-5 | 1 k ohm | 1.399 kHz or 1.401 kHz | 0 | 30 dB/1uV |

7.9. Adjustments

The following sections describe alignment procedures for printed circuit boards that contain adjustable components. Bear in mind that no adjustment should be carried out unless there is a clear indication that it is really necessary. Moreover, adjustments should be carried out only by a qualified technician with the necessary equipment at his disposal.

When a unit or printed circuit board is replaced, adjustments are in some cases necessary. These cases are listed in the table below:

| Replacement of unit board: | Adjustment required of: | Procedure given in section: |
|----------------------------|-------------------------|-----------------------------|
| 209 | 209-R13 209-R14 | 7.15.3. 7.15.4. |
| 210 | 210-R5 | 7.17.2. |

7.10. Realignment of Input Filters or

Measuring Equipment:

Standard signal generator covering the range 0.1-30 MHz and having an output impedance of 50 ohm. Accuracy better than 10 kHz.

RF millivoltmeter having a sensitivity of 10 mV f.s.d. Input impedance better than 10 K ohm in parallel with 6 pF.

Connect signal generator to antenna input socket and set it to alignment frequency indicated in table below. Output voltage 100 mV.

7.10.1. Duplex Band

Receiver settings:

Band switch to the desired band.

- 1) Connect RF millivoltmeter probe to the input terminals 202-3 and 202-4 (216-3 and 216-4).
- 2) Detune second and third tuned circuits of filter to be aligned by turning core anti-clockwise.
- 3) Adjust first tuned circuit for maximum voltage as indicated by RF millivoltmeter. Adjust second circuit for minimum reading and third tuned circuit for maximum.

7.10.2. Preselector Bands. MF

Bandswitch to the desired band:

0.060-0.180 . 0.180-0.530 . 0.530-1,6 MHz

- 1) Connect RF millivoltmeter probe to test point 1.
- 2) Turn the preselector fully clockwise.
- 3) Adjust the signal generator.
- 4) Tune the coil to maximum.

7.10.3. Fixed Tuned Bands

Bandswitch to 500 KHz.

- 1) Connect RF millivoltmeter probe to test point 1.
- 2) Adjust the signal generator.
- 3) Adjust C3 to maximum.

7.10.4. Realignment of the Bands 1.6-4 MHz and 2182 KHz

Bandswitch to 2182 kHz

- 1) Adjust signal generator.
- 2) Connect RF millivoltmeter probe to the input terminals 202-3 and 202-4 (216-3 and 216-4).
- 3) Detune the second tuned circuit in the band 1.6-4 MHz by turning core anti-clockwise (T14).
- 4) Adjust first tuned circuit (T8) for maximum.
- 5) Adjust second circuit for minimum.
- 6) Bandswitch to 1.6-4 MHz.
- 7) Turn preselector fully clockwise.
- 8) Adjust signal generator (5000 kHz).
- 9) Adjust C 49 for maximum.
- 10) Adjust C 76 for minimum.
- 11) Bandswitch on 2182 kHz.
- 12) Adjust signal generator (2182 kHz).
- 13) Adjust C2 for maximum.
- 14) Adjust C1 for minimum.



7.10.5. Preselector Bands HF

Bandswitch to the desired band

4-12. 12-30 MHz.

- 1) Turn preselector fully anti-clockwise.
- 2) Connect RF millivoltmeter probe to the input terminals 202-3 and 202-4 (216-3 and 216-4).
- 3) Detune second tuned circuit of filter to be aligned by turning core anti-clockwise.

- 4) Adjust signal generator.
- 5) Adjust first tuned circuit for maximum (T9 or T10).
- 6) Adjust second tuned circuit for minimum (T15 or T16).
- 7) Turn preselector fully clockwise.
- 8) Adjust signal generator.
- 9) Adjust C50 or C51 for max.
- 10) Adjust C 77 or C 78 for min.

- 7.10.6. Realignment of 1st mixer on circuit board  or 
- 1) Connect signal generator to antenna input socket and adjust it to the frequency 37.999 kHz. Output voltage 10mV.
 - 2) Set bandswitch to the band 12-30 MHz.
 - 3) Select the mode A3J. A3A.
 - 4) Switch off the AGC.
 - 5) Key-in the frequency 28.000.0 kHz.
 - 6) Adjust 202-R25 (216-R25) for minimum whistling in the LF output.
 - 7) Adjust the signal generator to 28.001.0 kHz. Output voltage 1 mV.
 - 8) Adjust 202-T25 (216-T25) for maximum LF output.

| Band | Alignment Frequencies | |
|-----------|------------------------|----------------|
| 4 | 4400 kHz | |
| 6 | 6550 kHz | |
| 8 | 8778 kHz | |
| 12 | 13226 kHz | |
| 16 | 17533 kHz | |
| 22 | 23000 kHz | |
| 25 | 26000 kHz | |
| 0.06-0.18 | 175 kHz | |
| 0.18-0.53 | 530 kHz | |
| 0.53-1.6 | 1750 kHz | |
| 500 | 500 kHz | |
| 2182 | 2182 kHz | |
| 4-12 | (Capacity) 11.9 MHz | (coil) 4MHz |
| 12-30 | 29 MHz | 12 MHz |

7.11. **203** Realignment of 2nd Mixer and Clarifier Oscillator

Measuring equipment:

Standard signal generator covering 1400 kHz. Output impedance 50 ohm.

Frequency counter having an accuracy better than 10^{-6} .

AF output meter.

- 1) Connect signal generator to antenna input and tune it to the frequency for which the receiver is set. Output level approx. 0.1 mV.
- 2) Switch AGC off and adjust SENSITIVITY to a convenient output level.

7.11.1. Realignment of 1.4 MHz Mixer, 38 MHz Filter and 36.6 MHz Filter

- 1) Adjust 203-T5, T3, T1 and T2 one by one for maximum AF output.

7.11.2. Realignment of the Clarifier Oscillator

- 1) Disconnect the wire to terminal 203-3.
- 2) Connect the counter to the test point TP 2.
- 3) Adjust the potentiometer R8 to the frequency 3000.000 Hz.
- 4) Replace the wire to terminal 203-3.

7.11.3. Realignment of Balancing Potentiometer R 36

- 1) Disconnect the coaxial cable to the terminal 203-8.
- 2) Connect the signal generator to the terminal 203-8.
- 3) Adjust the signal generator to the frequency 1399 kHz. Output level approx. 1 mV.
- 4) Select the mode *A3J.A3A – AGC-OFF* on the receiver.
- 5) Adjust the potentiometer R 36 for min. AF output.

7.12. **205** Realignment of IF Amplifier Detector and AGC

Measuring equipment:

Standard Signal generator covering 2182 kHz.

7.12.1. Realignment of 1.4 MHz IF Filter and 2.8 MHz AGC Filter

- 1) Connect signal generator to antenna input and tune it to 2182 kHz. Signal level approx. 20 dB/luV.
- 2) Set the BANDSWITCH to 2182.
- 3) Adjust cores in 205 L1 and 205 T1 for maximum AF output.
- 4) Increase signal generator level to approx. 40 dB/luV and adjust 205 L2 for minimum AF output.

7.13.  **Realignment of AF Amplifier**

Measuring Equipment:

Frequency counter, accuracy better than 10^{-7} .

RF millivoltmeter having a sensitivity of 10 mV f.s.d.

Input impedance better than 10 kohm in parallel with 6 pF.

Extension board 259 .

7.13.1. *Realignment of 1.4 MHz Coils*

- 1) *Connect the RF voltmeter between 206-10a and common.*
- 2) *Adjust the coil 206 T1 for maximum output (typically 90 mV).*
- 3) *Connect the RF voltmeter between 206-12C and 206-12a.*
- 4) *Adjust the coil 206 T4 for maximum output (typically 350 mV unloaded).*

7.13.2. *Realignment of 33.6 MHz Filter*

- 1) *Connect the RF-voltmeter between 206-28c and 206-30c.*
- 2) *Adjust the coils 206 T2 and 206 T3 for maximum output (typically 53 mV).*

7.14.  **Frequency Adjustment of the TCXO**

- 1) Connect the counter between 206-28c and 206-30 (11.2 MHz multiplied by 3).
- 2) At approx. 25°C the frequency must be within ± 2 Hz of the nominal frequency 11,2 MHz \pm the offset frequency (marked on the top of the metal case).

If the frequency is not within these limits, the value of the resistor R2 must be changed, generally with a lower value. A resistor can therefore be placed in parallel with R2.

7.15.  **Realignment of VCO₁ and VCO₂**

Measuring equipment:

Frequency Counter having an accuracy better than 10^{-3} and a sensitivity of at least 0.5 V.

Extension Board 

7.15.1. *Realignment of VCO1*

- 1) Connect a shorting lead between terminal 209-32c and common.
- 2) Connect the frequency counter between 209-22c and common.
- 3) Adjust transformer 209T1 until the counter reads 23.0 MHz.
- 4) Remove the shorting lead referred to in (1).

7.15.2. Realignment of VCO₂

- 1) Connect shorting lead between terminal 209-2c and common.
- 2) Connect the frequency counter between 209-16c and common.
- 3) Select the (3.7-4.69)MHz VCO₂-band.
- 4) Adjust transformer 209T2 until the counter reads 5.0 MHz.
- 5) Select the (4.70-5.69) MHz VCO₂-band.
- 6) Adjust coil 209L6 until the counter reads 6.1 MHz.
- 7) Select the 5.70-6.69)MHz VCO₂-band.
- 8) Adjust coil 209L5 until the counter reads 7.1 MHz.
- 9) Remove the short circuit referred to in (1).

7.15.3. Realignment of Phase/Frequency Detector 1 error signal

- 1) Unsolder the yellow lead from terminal 205-1.
- 2) Select by means of the keyboard 1.0 kHz as the receiving frequency.
- 3) Select the SSB-mode.
- 4) Set the clarifier to »O«.
- 5) Adjust 209R13 for minimum tone level from the loudspeaker.
- 6) Re-solder the yellow lead to terminal 205-1.

7.15.4. Realignment of Phase/Frequency Detector 2 error signal


- 1) Unsolder the yellow lead from terminal 205-1.
- 2) Select by means of the keyboard 9.0 kHz as the receiving frequency.
- 3) Select the SSB-mode.
- 4) Set the CLARIFIER to »O«.
- 5) Adjust 209R14 for minimum tone level from the loudspeaker.
- 6) Resolder the yellow lead to terminal 205-1.

7.16. 208 Realignment of LOOP TRANSLATOR



Measuring Equipment:

Signal Generator covering the range 100 kHz to 10 MHz.


Oscilloscope or *RF Voltmeter* having an input impedance greater than 10 kohm and a sensitivity of at least 10 mV/Div.

Extension board  259 .

7.16.1. Realignment of 1.5 MHz LP-Filter

- 1) Remove p.c.b.  and  from their sockets.
- 2) Connect the signal generator to pin 12 of 208IC4 through a 0.1 pF capacitor and common.
- 3) Connect the oscilloscope probe tip to the collector of 208TR5 and the oscilloscope ground clip to common.
- 4) Adjust the signal generator to 20mV rms.
- 5) Sweep the signal generator from 60 kHz to 1.45 MHz; the voltage reading level on the oscilloscope must not change more than 1 dB. (Take care that the output level of the signal generator does not change during the sweep).
- 6) Readjust the signal generator until the signal level measured is decreased by 3dB related to the maximum signal level found under 5). The frequency should then be between 1.5 MHz and 1.9 MHz.
- 7) Readjust the signal generator until the signal level measured is decreased by 20 dB related to the maximum signal found under 5). The frequency should then be between 1.8 MHz and 1.9 MHz.

7.16.2. Realignment of Transformer 208 T1

- 1) Insert the p.c.b.  into its socket.
- 2) Select by means of the Keyboard 29.900.0 MHz as the receiving frequency.
- 3) Connect the oscilloscope probe tip to pin 1 of 208IC4.
- 4) Adjust the transformer 208T1 until the signal measured is approximately 2Vpp.

7.17. Realignment of VCO₃

Measuring equipment:

Frequency Counter having an accuracy better than 10^{-3} , a sensitivity of at least 1 V and an upper frequency limit of at least 75 MHz.

Extension Board .

7.17.1. Realignment of VCO₃

- 1) Connect a shorting lead between terminal 210-6c and common.
- 2) Connect the frequency counter between 210-16c and common.
- 3) Select VCO_{3Z}

- 4) Adjust 210C24 until the counter reads 51.0 MHz.
- 5) Select VCO_{3Y}
- 6) Adjust 210C26 until the counter reads 61.3 MHz.
- 7) Select VCO_{3X}
- 8) Adjust 210C28 until the counter reads 71.3 MHz.
- 9) Remove the shorting lead referred to in (1).

7.17.2. Realignment of Phase/Frequency Detector 3 Error Signal

- 1) Select by means of the Keyboard 100.0 kHz as the receiving frequency.
- 2) Select the SSB-mode.
- 3) Adjust the CLARIFIER until an audible tone is heard from the loudspeaker.
Adjust 210 R5 for minimum tone level from the loudspeaker.

8. PARTS LIST AND CIRCUIT DIAGRAMS

8.1 Numbering

An identification number between $\triangle 200$ and $\triangle 214$ is assigned to each module. The designation of a component or terminal includes this number as a prefix – example: 203R3 (resistor R3 on module $\triangle 203$), or 203- 4 (terminal No. 4 on module $\triangle 203$).

8.2 Switches

Switches with stops are shown in the extreme anticlockwise position. The BAND -switch is shown in the 500 kHz position.

Switch wafer No. 1 is the wafer nearest to the front panel, and the front side of a wafer is the side facing the front panel.

8.3 Terminals

Locations of terminals appear from the component location drawings. On the circuit diagrams, each terminal is identified by a number and in most cases by an explanatory text. In addition to this, the number of the module and terminal to which the lead is connected is indicated (example: $\triangle 203$ - 4). Where interconnections consist of coaxial cables, only the number of the terminal is given to which the inner conductor of the cable is connected.

8.4 Voltages

Typical DC voltages are indicated on the circuit diagrams next to the points to which they refer and are marked with a »V«.

Typical logic levels are indicated in a bracket (LOW/HIGH) on the circuit diagrams next to the point to which they refer.

Typical AC voltages are likewise indicated on the circuit diagrams. They are marked with »Vpp« or »mVpp«.

For measuring conditions see Chapter 7.

8.5 Test Points

Location of test points are shown on the component location drawings. Typical voltage at each test point is indicated on the circuit diagram.

8.6 Symbol Explanation

8.6.1 Logic circuits:

A small circle at an external input means that the specific input is active LOW, i.e. it produces the desired function, in conjunction with other inputs if its voltage is the lower of the two logic levels in the system, otherwise the specific input is HIGH.

A small circle at a clock input means that the outputs change on the HIGH to LOW clock transition.

A small circle at an output indicates that when the function designated is true, the output is LOW.

Inputs and outputs are labelled with mnemonic letters as described in table 8.6.1.

8.6.2 Logic Functions:

Logic functions are labelled with mnemonic letters in a bracket. An active LOW function is given a bar over the label.

More logic functions may be connected by means of the principles of Boolean Algebra.

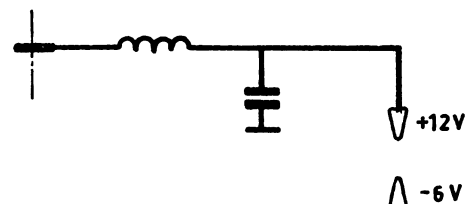
8.6.3 Arrows:

A black arrow on a line indicates in which direction an AC-signal flows.

A white arrow on a line indicates in which direction the information of a DC signal flows. An exception from this rule is the supply lines and their connections, which are always indicated by a supply voltage level or its associated label.

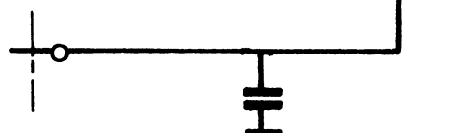
Positive supply line:

Example

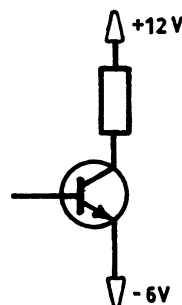


Negative supply line:

Example



Connections to supply line: Example



| Label | Short for | Meaning |
|----------------|-----------------|--|
| I _x | Input | Inputs to combinatorial circuits |
| J,K | | Inputs to JK flip flops |
| D _x | Data | Inputs to D flip flops and latches |
| S,R | Set, Reset | Inputs to JK and D flip flops, latches, registers, and counters; R resets output to LOW; S sets output to HIGH |
| P _x | Address | Inputs registers and counters |
| A _x | | Inputs used for selection of an input, output, data route, or memory location |
| E | Enable | Control input used to synchronously load information in parallel into a circuit |
| PE | Parallel Enable | |
| MR | Master Reset | Input which resets asynchronously all outputs to LOW, overriding all other inputs |
| CL | Clear | Input which resets outputs to LOW, but does not override all other inputs |
| CP | Clock Pulse | Control inputs to counters |
| CE, CEP, CET | Count Enable | |
| O _x | Output | Outputs of combinatorial circuits |
| Q _x | | Outputs of sequential circuits |
| TC | Terminal Count | (Output of a counter indicating 1111 for up binary counters, 1001 for up decimal counters, or 0000 for down counters). |

Table 8.6.1

8.7. Abbreviations

| | |
|---------|---|
| A | = ampere, amperes |
| C | = capacitor |
| Car. | = carbon |
| Cer. | = ceramic |
| D | = diode |
| F | = farad |
| FS | = fuse |
| H | = henry |
| IC | = integrated circuit |
| k | = kilo or 10^3 |
| L | = inductor |
| LS | = loudspeaker |
| lin. | = linear |
| log. | = logarithmic |
| m | = milli or 10^{-3} |
| M | = mega or 10^6 |
| ME | = instrument |
| MF | = metal film |
| Mi | = mica |
| MP | = metallized paper |
| μ | = micro or 10^{-6} |
| n | = nano or 10^{-9} |
| NPO | = temp. coefficient 0 |
| N150 | = temp. coefficient -150 |
| NTC | = neg. temp. coefficient |
| P | = pico or 10^{-12} |
| PL | = connector (plug) |
| Polyes. | = polyester |
| Polyst. | = polystyrene |
| PTC | = pos. temp. coefficient |
| R | = resistor |
| RL | = relay |
| S | = switch |
| SK | = connector (socket) |
| SL | = lamp |
| T | = transformer |
| Tan | = tantalum electrolytic capacitor |
| TR | = transistor |
| V | = working voltage DC or volts |
| V1... | = valve |
| Vac. | = working voltage AC |
| Var. | = variable |
| Vpp | = peak to peak voltage |
| Varicap | = variable capacitance diode |
| ww | = wire wound |
| W | = watt, watts |
| W.alum. | = wet aluminium electrolytic |
| X | = crystal, crystal osc. or crystal filter |

PARTS LIST

FOR



| | | | | | |
|--------|------------------|----------|-----|------|------------|
| 200C1 | 47n | -20/+80% | 16V | Cer. | 601 447 00 |
| C2-3 | UHF π Filter | | | Cer. | 779 000 02 |
| 200PL1 | | One Way | | | 751 000 01 |
| 200R 1 | 4.7 kohms | Lin | | | 355 222 31 |
| R 2 | 10 kohms | Lin | | | 355 222 21 |
| R 3 | 10 kohms | Log | | | 355 222 41 |
| 200S 1 | Band | | | | 375 200 86 |
| S 2 | | | | | 762 000 10 |
| S 3 | Mode | | | | 375 202 34 |
| 200SK1 | | | | | 750 000 11 |

PARTS LIST

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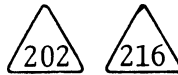


| | | | | | |
|-----------|--------|--------|------|---------|------------|
| 201C 1-5 | 0.1 uF | 10% | 250V | Polyes. | 624 510 01 |
| 201SK1- 4 | | 32 Way | | | 751 000 21 |
| SK5- 6 | | 64 Way | | | 751 000 23 |

995 212 63
995 212 82
995 213 01

PARTS LIST

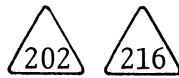
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| | | | | | | |
|--------------|-----------|----------|------|---------|--|------------|
| 202/216C 1-3 | 4.5-26 pF | Var. | | | | 683 126 00 |
| C 4 | 220 pF | 1% | 500V | Polyst. | | 615 222 00 |
| C 5 | 2x518 pF | Var. | | | | 686 251 81 |
| C 6 | 220 pF | 1% | 500V | Polyst. | | 615 222 00 |
| C 7 | 10 nF | -20+80% | 32V | Cer. | | 602 410 00 |
| C 8 | 0.68 uF | 10% | 100V | Polyes. | | 623 568 00 |
| C 9 | 0.1 uF | 10% | 250V | Polyes. | | 624 510 00 |
| C10 | 1 uF | 10% | 250V | Polyes. | | 624 610 00 |
| C11 | 0.1 uF | 10% | 250V | Polyes. | | 624 510 00 |
| C12 | 0.1 uF | 10% | 100V | Polyes. | | 623 510 00 |
| C13-19 | 0.1 uF | 10% | 250V | Polyes. | | 624 510 00 |
| C20 | 910 pF | 1% | 500V | Polyst. | | 615 291 00 |
| C21 | 422 pF | 1% | 125V | Polyst. | | 613 242 20 |
| C22 | 130 pF | 5% | 400V | Cer. | | 605 213 00 |
| C23 | 100 pF | 5% | 400V | Cer. | | 605 210 00 |
| C24 | 91 pF | 5% | 400V | Cer. | | 605 191 00 |
| C25 | 0.1 uF | 10% | 100V | Polyes. | | 623 510 00 |
| C26 | 4.7 pF | +0.25 pF | 400V | Cer. | | 605 047 01 |
| C27 | 3.9 pF | +0.25 pF | 400V | Cer. | | 605 039 00 |
| C28 | 5.6 pF | +0.25 pF | 400V | Cer. | | 605 056 00 |
| C29 | 0.1 uF | 10% | 100V | Polyes. | | 623 510 00 |
| C30 | 910 pF | 1% | 500V | Polyst. | | 615 291 00 |
| C31 | 0.1 uF | 10% | 100V | Polyes. | | 623 510 00 |
| C32 | 422 pF | 1% | 125V | Polyst. | | 613 242 00 |
| C33 | 180 pF | 5% | 400V | Cer. | | 605 218 01 |
| C34 | 180 pF | 5% | 400V | Cer. | | 605 218 00 |
| C35 | 3.9 pF | +0.25 pF | 400V | Cer. | | 605 039 00 |
| C36 | 3.3 pF | +0.25 pF | 400V | Cer. | | 605 033 00 |
| C37 | 6.8 pF | +0.25 pF | 400V | Cer. | | 605 068 00 |
| C38 | 68 pF | 5% | 400V | Cer. | | 605 168 00 |
| C39 | 51 pF | 5% | 400V | Cer. | | 605 151 00 |
| C40 | 39 pF | 5% | 400V | Cer. | | 605 139 00 |
| C41 | 3.3 pF | +0.25 pF | 400V | Cer. | | 605 033 00 |
| C42 | 1.5 pF | +0.25 pF | 400V | Cer. | | 605 015 00 |
| C43-44 | 1.8 pF | +0.25 pF | 400V | Cer. | | 605 018 00 |
| C45 | 15 pF | 5% | 400V | Cer. | | 605 115 00 |
| C46 | 100 pF | 5% | 400V | Cer. | | 605 210 00 |
| C47 | 3.3 nF | 1% | 125V | Polyst. | | 613 333 00 |
| C48 | 0.1 uF | 10% | 250V | Polyes. | | 624 510 00 |
| C49-51 | 4.5-26 pF | Var. | | | | 683 126 00 |
| C52 | 130 pF | 5% | 400V | Cer | | 605 213 00 |
| C53 | 100 pF | 5% | 400V | Cer. | | 605 210 00 |

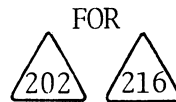
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| | | | | | |
|------------|-----------|----------|------|---------|------------|
| 202/216C54 | 91 pF | 5% | 400V | Cer. | 605 191 00 |
| C55 | 1.8 pF | +0.25 pF | 400V | Cer. | 605 018 00 |
| C56 | 47 nF | 10% | 250V | Polyes. | 624 447 00 |
| C57 | 1.8 pF | +0.25 pF | 400V | Cer. | 605 018 00 |
| C58 | 22 nF | 10% | 250V | Polyes. | 624 422 00 |
| C59 | 4.7 pF | +0.25 pF | 400V | Cer. | 605 047 01 |
| C60 | 180 pF | 5% | 400V | Cer. | 605 218 00 |
| C61 | 4.7 pF | +0.25 pF | 400V | Cer. | 605 047 01 |
| C62 | 3.9 pF | +0.25 pF | 400V | Cer. | 605 039 00 |
| C63 | 5.6 pF | +0.25 | 400V | Cer. | 605 056 00 |
| C64 | 68 pF | 5% | 400V | Cer. | 605 168 00 |
| C65 | 51 pF | 5% | 400V | Cer. | 605 151 00 |
| C66 | 39 pF | 5% | 400V | Cer. | 605 139 00 |
| C67 | 3.3 pF | +0.25 pF | 400V | Cer. | 605 033 00 |
| C68 | 3.9 pF | +0.25 pF | 400V | Cer. | 605 039 00 |
| C69 | 3.3 pF | +0.25 pF | 400V | Cer. | 605 033 00 |
| C70 | 6.8 pF | +0.25 pF | 400V | Cer. | 605 068 00 |
| C71 | 2.7 pF | +0.25 pF | 400V | Cer. | 605 027 00 |
| C72-73 | 1.8 pF | +0.25 pF | 400V | Cer. | 605 018 00 |
| C74 | 27 pF | 5% | 400V | Cer. | 605 127 00 |
| C75 | 15 pF | 5% | 400V | Cer. | 605 115 00 |
| C76-78 | 4.5-26 pF | Var. | | | 683 126 00 |
| C79 | 180 pF | 5% | 400V | Cer. | 605 218 00 |
| C80 | 130 pF | 5% | 400V | cer. | 605 213 00 |
| C81 | 100 pF | 5% | 400V | Cer. | 605 210 00 |
| C82 | 91 pF | 5% | 400V | Cer. | 605 191 00 |
| C83 | 68 pF | 5% | 400V | Cer. | 605 168 00 |
| C84 | 47 pF | 5% | 400V | Cer. | 605 147 00 |
| C85 | 33 pF | 5% | 400V | Cer. | 605 133 00 |
| C86 | 3.3 nF | 1% | 125V | Polyst. | 613 333 00 |
| C87 | 1 uF | 10% | 100V | Polyes. | 623 610 00 |
| C88 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C89-98 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C99 | 10 nF | -20+80% | 32V | Cer. | 602 410 00 |
| C100 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C101-102 | 15 pF | 5% | 400V | Cer. | 605 115 00 |
| C103 | 1 uF | 10% | 100V | Polyes. | 623 610 00 |
| C104-105 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C106-108 | 10 nF | -20+80% | 32V | Cer. | 602 410 00 |
| C109 | 22 pF | +0.25 pF | 400V | Cer. | 605 122 02 |
| C110 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C111-112 | 10 nF | -20+80% | 32V | Cer. | 602 410 00 |

PARTS LIST



| | | | | | |
|---------------|-----------|----------|----------|---------|------------|
| 202/216C113 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C114 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C115 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C116-118 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C119 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C120 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| | | | | | |
| 202/216D 1- 4 | 388A | | | | 830 038 80 |
| D 5-42 | 1S920 | | | | 830 192 00 |
| | | | | | |
| 202/216L 1- 2 | 1 mH | 10% | RF Choke | | 740 310 01 |
| L 3- 4 | 100 uH | 10% | RF Choke | | 740 210 00 |
| | | | | | |
| L 6 | | | Coil | | 105 018 32 |
| L 7 | | | Coil | | 105 018 42 |
| | | | | | |
| L 8 | | | Coil | | 105 018 52 |
| L 9 | 680 uH | 10% | RF-Choke | | 740 268 00 |
| L10 | | | Coil | | 105 018 62 |
| L11-12 | | | Coil | | 105 018 72 |
| L13 | | | Coil | | 105 018 22 |
| | | | | | |
| L14-15 | 22 uH | 10% | RF Choke | | 740 122 00 |
| L16-17 | 0.68 uH | 10% | RF Choke | | 740 006 80 |
| L18 | 22 uH | 10% | RF Choke | | 740 122 00 |
| L19 | 1 mH | 10% | RF Choke | | 740 310 01 |
| | | | | | |
| 202/216R1 | 100 kohm | 5% | 1/3W | Car. | 501 510 00 |
| R2 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R 3- 9 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R10 | 220 kohms | 5% | 1/3W | Car. | 501 522 00 |
| R11 | 6.8 kohms | 5% | 1/3W | Car. | 501 368 00 |
| R12-14 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| | | | | | |
| R15-16 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R17-18 | 18 kohms | 5% | 1/3W | Car. | 501 418 00 |
| R19-20 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R21-22 | 33 kohms | 5% | 1/3W | Car. | 501 433 00 |
| R23 | 8.2 kohms | 5% | 1/3W | Car. | 501 382 00 |
| | | | | | |
| R24 | 39 ohms | 5% | 1/3W | Car. | 501 139 00 |
| R25 | 100 ohms | Var. | | | 582 210 00 |
| R26 | 39 ohms | 5% | 1/3W | Car. | 501 139 00 |
| R27-28 | 56 ohms | 5% | 1/3W | Car. | 501 156 00 |
| | | | | | |
| 202/216S 1 | | | | | 375 200 45 |
| S 2- 3 | | | | | 375 200 56 |
| S 4 | | | | | 375 200 76 |
| S 5 | | | | | 375 200 65 |

PARTS LIST

FOR



| | | | | |
|-------------|--------|----------------|----------------------|------------|
| 202/216SL1- | 8 | A9A-C | | 821 000 05 |
| 202/216T | 1 | Transformer | | 105 017 71 |
| | T 2 | Transformer | | 105 017 81 |
| | T 3 | Transformer | | 105 017 91 |
| | T 4 | Transformer | | 105 017 62 |
| | T 5 | Transformer | | 105 018 01 |
| | T 6- 7 | Transformer | | 105 018 11 |
| | T 8 | Transformer | | 105 216 61 |
| | T 9 | Transformer | | 105 216 41 |
| | T10 | Transformer | | 105 216 53 |
| | T11 | Transformer | | 105 218 02 |
| | T12 | Transformer | | 105 218 12 |
| | T13 | Transformer | | 105 218 22 |
| | T14 | Transformer | | 105 216 91 |
| | T15 | Transformer | | 105 217 01 |
| | T16 | Transformer | | 105 217 11 |
| | T17 | Transformer | | 105 217 21 |
| | T18 | Transformer | | 105 217 31 |
| | T19 | Transformer | | 105 217 41 |
| | T20 | Transformer | | 105 217 51 |
| | T21 | Transformer | | 105 217 61 |
| | T22-23 | Transformer | | 105 217 72 |
| | T24 | Transformer | | 105 217 91 |
| | T25 | Transformer | | 105 215 12 |
| | T26 | Transformer | | 105 217 91 |
| 202/216TR1- | 4 | J310 | | 840 031 01 |
| 202X | 1 | Crystal filter | 38 MHz -2.7/+2.7 MHz | 285 201 41 |
| 216X | 1 | Crystal filter | 38 MHz -4/+4 MHz | 385 201 31 |

PARTS LIST

FOR



| | | | | | |
|-----------|---------|----------|----------|---------|------------|
| 203C 1 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 2 | 47 nF | 10% | 250V | Polyes. | 624 447 00 |
| C 3 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 4 | 560 pF | 1% | 500V | Polyst. | 615 256 00 |
| C 5 | 510 pF | 1% | 500V | Polyst. | 615 251 00 |
| C 6- 7 | 2.2 nF | 1% | 250V | Polyst. | 614 322 00 |
| C 8 | 22 uF | | 16V | Polyst. | 615 722 00 |
| C 9-10 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C11 | 56 pF | 5% | 400V | Cer. | 605 156 02 |
| C12 | 22 pF | ±0.25 pF | 400V | Cer. | 605 122 02 |
| C13 | 1 pF | | | | |
| C14 | 56 pF | 5% | 400V | Cer. | 605 156 02 |
| C15-16 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C17 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C18 | 47 nF | -20/+80% | 16V | Cer. | 601 547 00 |
| C19 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C20 | 4.7 pF | ±0.25 pF | 400V | Cer. | 605 047 01 |
| C21 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C22 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C23 | 110 pF | 1% | 500V | Polyst. | 615 211 00 |
| C24 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C25-26 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C27-29 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C30 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C31 | 390 pF | 1% | 500V | Polyst. | 615 239 00 |
| C32 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C33 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C34 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| 203D 1- 4 | BB109 G | | | | 833 010 90 |
| D 5 | BA379 | | | | 833 037 90 |
| 203IC1 | 1496CN | | | | 850 149 60 |
| 203L 1- 3 | 100 uH | 10% | RF Choke | | 740 210 00 |

PARTS LIST

FOR



| | | | | | |
|--------|-----------|------|------|------|------------|
| 203R 1 | 18 kohms | 5% | 1/3W | Car. | 501 418 00 |
| R 2 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R 3 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R 4 | 1.8 kohms | 5% | 1/3W | Car. | 501 318 00 |
| R 5 | 22 kohms | 5% | 1/3W | Car. | 501 422 00 |
| R 6 | 12 kohms | 5% | 1/3W | Car. | 501 412 00 |
| R 7 | 150 kohms | 5% | 1/3W | Car. | 501 515 00 |
| R 8 | 47 kohms | Var. | | | 582 447 00 |
| R 9 | 56 ohms | 5% | 1/3W | Car. | 501 156 00 |
| R10 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R11 | 470 kohms | 5% | 1/3W | Car. | 501 515 00 |
| R12 | 470 kohms | 5% | 1/3W | Car. | 501 547 00 |
| R13 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R14 | 470 kohms | 5% | 1/3W | Car. | 501 547 00 |
| R15 | 560 ohms | 5% | 1/3W | Car. | 501 256 00 |
| R16 | 27 kohms | 5% | 1/3W | Car. | 501 427 00 |
| R17 | 22 kohms | 5% | 1/3W | Car. | 501 422 00 |
| R18 | 12 kohms | 5% | 1/3W | Car. | 501 412 00 |
| R19 | 82 kohms | 5% | 1/3W | Car. | 501 482 00 |
| R20 | 1.5 kohms | 5% | 1/3W | Car. | 501 315 00 |
| R21 | 2.7 kohms | 5% | 1/3W | Car. | 501 327 00 |
| R22 | Not used | | | | |
| R23 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R24 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R25 | 1.5 kohms | 5% | 1/3W | Car. | 501 315 00 |
| R26 | 2.2 kohms | 5% | 1/3W | Car. | 501 322 00 |
| R27 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R28 | 27 kohms | 5% | 1/3W | Car. | 501 427 00 |
| R29 | 33 ohms | 5% | 1/3W | Car. | 501 133 00 |
| R30 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R31 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R32 | 47 ohms | 5% | 1/3W | Car. | 501 147 00 |
| R33 | 1 kohms | 5% | 1/3W | Car. | 501 310 00 |
| R34 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R35 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R36 | 1 kohm | Var. | | | 582 310 00 |
| R37 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R38 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R39 | 56 ohms | 5% | 1/3W | Car. | 501 156 00 |
| R40 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |

PARTS LIST

FOR



| | | |
|-----------|---------------|------------|
| 203T 1 | Transformer | 105 215 21 |
| T 2 | Transformer | 105 215 31 |
| T 3 | Transformer | 105 215 41 |
| T 4 | Transformer | 105 216 71 |
| T 5 | Transformer | 105 106 62 |
| 203TR1- 3 | BC547B | 840 054 70 |
| TR4 | BSX20 | 840 002 00 |
| TR5 | TIS88A | 843 008 80 |
| TR6 | BC547B | 840 054 70 |
| TR7 | TIS88A | 843 008 80 |
| 203X 1 | 2.999 750 MHz | 385 202 23 |

PARTS LIST

FOR



| | | | | | |
|---------|------------|---------|------|---------|------------|
| 204C1 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C2 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C3 | 1 nF | 1% | 500V | Polyst. | 615 310 01 |
| C4-6 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C7 | 6.8 nF | 1% | 125V | Polyst. | 613 368 00 |
| C8 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C9 | 1 nF | 1% | 500V | Polyst. | 615 310 01 |
| C10 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| 204D1-6 | 1S920 | | | | 830 192 00 |
| 204L1-2 | | Coil | | | 105 215 81 |
| 204R1 | 6.8 kohms | 5% | 1/3W | Car. | 501 368 00 |
| R2-4 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R5-7 | 6.8 kohms | 5% | 1/3W | Car. | 501 368 00 |
| R8-10 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R11-13 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R14 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R15 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| 204X1 | Filter LSB | 1.4 MHz | | | 385 112 02 |
| X2 | Option | | | | |

PARTS LIST

FOR



| | | | | | |
|-----------|----------|----------|----------|---------|------------|
| 205C 1 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C 2 | 22 uF | | 16V | Tan | 651 722 00 |
| C 3 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 4 | 2.2 pF | ±0.25 pF | 400V | Cer. | 605 022 00 |
| C 5 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 6 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C 7 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 8 | 100 uF | | 25V | W.alum. | 652 810 00 |
| C 9-12 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C13 | 1 nF | 1% | 500V | Polyst. | 615 310 00 |
| C14 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C15 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C16 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C17 | 10 pF | 5% | 400V | Cer. | 605 110 00 |
| C18 | 1.2 nF | 1% | 500V | Polyst. | 615 312 00 |
| C19-20 | 22 nF | 10% | 250V | Polyes. | 624 510 00 |
| C21 | 120 pF | 5% | 400V | Cer. | 605 212 00 |
| C22 | 470 pF | 1% | 500V | Polyst. | 615 247 00 |
| C23 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C24-28 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C29 | 3.9 nF | 1% | 250V | Polyst. | 614 339 00 |
| C30 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C31-32 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C33 | 0.47 uF | 10% | 250V | Polyes. | 624 547 00 |
| C34-35 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C36 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| 205D 1- 9 | 1S920 | | | | 830 192 00 |
| D10 | AAZ17 | | | | 830 001 70 |
| D11-12 | 1S920 | | | | 830 192 00 |
| 205IC1 | TBA120 | | | | 850 012 00 |
| 205L 1 | | | Coil | | 105 106 92 |
| L 2 | | | Coil | | 105 107 22 |
| L 3- 4 | 100 uH | 10% | RF-Choke | | 740 210 00 |
| 205R 1 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R 2 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R 3 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R 4 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R 5 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R 6 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |

PARTS LIST

FOR



| | | | | | |
|--------|-----------|----|------|------|------------|
| 205R 7 | 27 ohms | 5% | 1/3W | Car. | 501 127 00 |
| R 8 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R 9 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R10 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R11-12 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R13 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R14 | 150 kohms | 5% | 1/3W | Car. | 501 515 00 |
| R15 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R16 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R17-18 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R19 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R20 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R21-22 | 100 kohms | 5% | 1/3W | Car. | 501 510 00 |
| R23 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R24 | 33 ohms | 5% | 1/3W | Car. | 501 133 00 |
| R25 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R26 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R27 | 68 kohms | 5% | 1/3W | Car. | 501 468 00 |
| R28 | 27 kohms | 5% | 1/3W | Car. | 501 427 00 |
| R29 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R30 | 6.8 kohms | 5% | 1/3W | Car. | 501 368 00 |
| R31 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R32 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R33 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R34 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R35 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R36 | 1.2 kohms | 5% | 1/2W | Car. | 502 312 00 |

| | | |
|--------|-------------|------------|
| 205T 1 | Transformer | 105 107 02 |
|--------|-------------|------------|

| | | |
|-----------|--------|------------|
| 205TR1- 2 | BF240 | 840 024 00 |
| TR3 | BC547B | 840 054 70 |
| TR4 | BF240 | 840 024 00 |
| TR5 | BC547B | 840 054 70 |

PARTS LIST

FOR



| | | | | | |
|-----------|---------|----------|----------|---------|------------|
| 206C 1 | 0.47 uF | 10% | 100V | Polyes. | 623 547 00 |
| C 3 | 22 uF | | 16V | Tan. | 651 722 00 |
| C 4 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 5 | 0.47 uF | 10% | 100V | Polyes. | 623 547 00 |
| C 6 | 470 uF | | 16V | W.alum. | 651 847 00 |
| C 7 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C 8 | 22 uF | | 16V | Tan | 651 722 00 |
| C 9 | 100 uF | | 25V | W-alum. | 652 810 00 |
| C10 | 1 uF | 10% | 100V | Polyes. | 623 610 00 |
| C11 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C12 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C13 | 47 pF | 5% | 400V | Cer. | 605 147 00 |
| C14 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C15 | 100 uF | | 25V | W.alum. | 652 810 00 |
| C16 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C17 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C18 | 5.6 nF | 1% | 63V | Polyst. | 612 356 00 |
| C19 | 47 nF | -20/+80% | 12V | Cer. | 601 447 00 |
| C20 | 330 pF | 1% | 500V | Polyst. | 615 233 00 |
| C21 | 1.2 nF | 1% | 500V | Polyst. | 615 312 00 |
| C22 | 2.2 nF | 1% | 250V | Polyst. | 614 322 00 |
| C23 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C24 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C25 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C26 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C27 | 100 uF | | 25V | W.alum | 652 810 00 |
| C28 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C29 | 470 uF | | 16V | W.alum. | 651 847 00 |
| C30 | 47 pF | 5% | 400V | Cer. | 605 147 00 |
| C31-32 | 3.3 pF | ±0.25 pF | 400V | Cer. | 605 033 00 |
| C33 | 47 pF | 5% | 400V | Cer. | 605 147 00 |
| C34 | 0.22 uF | 10% | 250V | Polyes. | 624 522 00 |
| C35 | 3.3 nF | 1% | 125V | Polyst. | 613 333 00 |
| C36 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| 206D 1 | 1S920 | | | | 830 192 00 |
| 206IC1 | TBA810S | | | | 850 081 00 |
| IC2 | 7493 | | | | 850 749 31 |
| 206L 1- 3 | 100 uH | 10% | RF Choke | | 740 210 00 |
| L 4 | 47 uH | 10% | RF Choke | | 740 147 00 |
| L 5 | 100 uH | 10% | RF Choke | | 740 210 00 |
| PL 1 | 32 Way | | | | 701 000 20 |

PARTS LIST

FOR



| | | | | | |
|--------|-----------|----|------|------|------------|
| 206R 1 | 820 ohms | 5% | 1/3W | Car. | 501 282 00 |
| R 2 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R 3 | 47 kohms | | Var. | | 582 447 01 |
| R 4 | 100 kohms | 5% | 1/3W | Car. | 501 510 00 |
| R 5 | 33 kohms | 5% | 1/3W | Car. | 501 433 01 |
| R 6 | 2.7 kohms | 5% | 1/3W | Car. | 501 327 00 |
| R 7 | 1.8 kohms | 5% | 1/3W | Car. | 501 318 00 |
| R 8 | 150 ohms | 5% | 1/3W | Car. | 501 215 00 |
| R 9 | 15 kohms | 5% | 1/3W | Car. | 501 415 00 |
| R10 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R11 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R12-13 | 270 ohms | 5% | 1/3W | Car. | 501 227 00 |
| R14 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R15 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R16 | 27 kohms | 5% | 1/3W | Car. | 501 427 00 |
| R17 | 8.2 kohms | 5% | 1/3W | Car. | 501 382 00 |
| R18 | 56 ohms | 5% | 1/3W | Car. | 501 156 00 |
| R19 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R20 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R21 | 2.2 kohms | 5% | 1/3W | Car. | 501 322 00 |
| R22 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R23 | 820 ohms | 5% | 1/3W | Car. | 501 282 00 |
| R24 | 270 ohms | 5% | 1/3W | Car. | 501 227 00 |
| R25 | 33 ohms | 5% | 1/2W | Car. | 502 133 00 |
| R26 | 820 ohms | 5% | 1/3W | Car. | 501 282 00 |
| R27 | 220 ohms | 5% | 1/3W | Car. | 501 222 00 |
| R28 | 100 kohms | 5% | 1/3W | Car. | 501 510 00 |
| R29 | 15 kohms | 5% | 1/3W | Car. | 501 415 00 |
| R30 | 8.2 kohms | 5% | 1/3W | Car. | 501 382 00 |
| R31 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R32 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R33 | 120 ohms | 5% | 1/3W | Car. | 501 212 00 |
| R34 | 47 ohms | 5% | 1/3W | Car. | 501 147 00 |
| R35 | 220 ohms | 5% | 1/3W | Car. | 501 222 00 |
| R36 | 390 ohms | 5% | 1/3W | Car. | 501 239 00 |
| R37 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R38 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R39 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R40 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R41 | 2.7 kohms | 5% | 1/3W | Car. | 501 327 00 |

PARTS LIST

FOR



| | | | | | |
|--------|-------------|----|------|------|------------|
| 206R42 | 6.8 kohms | 5% | 1/3W | Car. | 501 368 00 |
| R43 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R44 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R45 | 56 ohms | 5% | 1/3W | Car. | 501 156 00 |
| R46 | 1 ohm | 5% | 2W | WW | 523 010 00 |
| R47 | 820 ohms | 5% | 1/3W | Car. | 501 282 00 |
| R48 | 560 ohms | 5% | 1/3W | Car. | 501 256 00 |
| R49 | 27 ohms | 5% | 1/3W | Car. | 501 127 00 |
| 206T 1 | Transformer | | | | 105 218 31 |
| T 2 | Transformer | | | | 105 215 51 |
| T 3 | Transformer | | | | 105 215 61 |
| T 4 | Transformer | | | | 105 215 71 |
| 206TR1 | BC547B | | | | 840 054 70 |
| TR2 | BF240 | | | | 840 024 00 |
| TR3 | BC557B | | | | 840 055 70 |
| TR4- 5 | BF240 | | | | 840 024 00 |
| TR6- 8 | BSX20 | | | | 840 002 00 |
| 206X 1 | 11.2 MHz | | | | 811 000 01 |

PARTS LIST

FOR



| | | | | | |
|-----------|-----------|----------|----------|---------|------------|
| 207C 1- 3 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 4 | 4.7 nF | | 32V | Cer. | 602 347 00 |
| C 5 | 47 nF | -20/+80% | 12V | Cer. | 601 447 00 |
| C 6- 9 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C10 | 4.7 nF | | 32V | Cer. | 602 347 00 |
| C11-12 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C13 | 47 nF | -20/+80% | 12V | Cer. | 601 447 00 |
| C14-15 | 270 pF | 1% | 500V | Polyst. | 615 227 00 |
| C16-17 | 220 pF | 1% | 500V | Polyst. | 615 222 00 |
| C18-19 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C20 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| 207IC1 | 74S74 | | | | 850 747 41 |
| IC2 | 74LS74 | | | | 850 747 40 |
| IC3 | 74H30 | | | | 850 743 02 |
| IC4 | 74LS20 | | | | 850 742 01 |
| IC5 | 93S10 | | | | 850 931 00 |
| IC6 | 74S32 | | | | 850 743 21 |
| IC7 | 74LS160 | | | | 857 416 00 |
| IC8 | 74LS93 | | | | 850 749 32 |
| IC9 | 74LS00 | | | | 850 740 02 |
| IC10 | 74LS02 | | | | 850 740 21 |
| IC11 | 93S10 | | | | 850 931 00 |
| IC12 | 74LS90 | | | | 850 749 01 |
| IC13 | 74LS160 | | | | 857 416 00 |
| IC14 | 93S10 | | | | 850 931 00 |
| IC15 | 74LS160 | | | | 850 931 00 |
| IC16 | 74LS 90 | | | | 850 749 01 |
| IC17 | 74163 | | | | 857 416 30 |
| IC18 | 74LS30 | | | | 850 743 01 |
| IC19-20 | 74LS00 | | | | 850 740 02 |
| IC21-22 | 7426 | | | | 850 742 60 |
| IC23 | 74LS02 | | | | |
| 207L 1- 2 | 100 uH | 10% | RF-Choke | | 740 210 00 |
| 207PL 1 | 64 Way | | | | 751 000 22 |
| 207R 1 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| R 2 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R 3 | 1.5 kohms | 5% | 1/3W | Car. | 501 315 00 |
| R 4 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R 5 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |

PARTS LIST

FOR



| | | | | | |
|--------|-----------|----|------|------|------------|
| 207R 6 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R 7 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R 8 | 220 ohms | 5% | 1/3W | Car. | 501 222 00 |
| R 9 | 82 ohms | 5% | 1/3W | Car. | 501 182 00 |
| R10 | 220 ohms | 5% | 1/3W | Car. | 501 222 00 |
| R11 | 82 ohms | 5% | 1/3W | Car. | 501 182 00 |
| R12 | 180 ohms | 5% | 1/3W | Car. | 501 218 00 |
| R13 | 47 ohms | 5% | 1/3W | Car. | 501 147 00 |
| R14 | 390 ohms | 5% | 1/3W | Car. | 501 239 00 |
| R15 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R16 | 820 ohms | 5% | 1/3W | Car. | 501 282 00 |
| R17 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R18 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R19 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R20 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R21 | 390 ohms | 5% | 1/3W | Car. | 501 239 00 |
| R22-24 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R25-26 | 1.5 kohms | 5% | 1/3W | Car. | 501 315 00 |
| R27 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R28 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R29 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R30 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R31-32 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R33-37 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R38 | 1.8 kohm | 5% | 1/3W | Car. | 501 318 00 |
| R39 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R40 | 1.8 kohm | 5% | 1/3W | Car. | 501 318 00 |
| 207TR1 | BSX20 | | | | 840 002 00 |
| TR2- 3 | BC547B | | | | 840 054 70 |
| TR4 | BSX20 | | | | 840 002 00 |
| TR5- 6 | BC547B | | | | 840 054 70 |

PARTS LIST

FOR



| | | | | | |
|--------|---------|----------|------|---------|------------|
| 208C 1 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C 2 | 0.22 uF | 10% | 100V | Polyes. | 623 522 00 |
| C 3- 5 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C 6 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C 7 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 8 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C 9 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C10-11 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C12 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C13 | 180 pF | 1% | 500V | Polyst. | 615 218 00 |
| C14-15 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C16 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C17 | 0.47 uF | 10% | 100V | Polyes. | 623 547 00 |
| C18 | 130 pF | 1% | 500V | Polyst. | 615 213 00 |
| C19 | 5.6 pF | ±0.25 pF | 400V | Cer. | 605 056 00 |
| C20 | 220 pF | 1% | 500V | Polyst. | 615 222 00 |
| C21 | 33 pF | 5% | 400V | Cer. | 605 133 00 |
| C22 | 180 pF | 1% | 500V | Polyst. | 615 218 00 |
| C23 | 39 pF | 5% | 400V | Cer. | 605 139 00 |
| C24 | 180 pF | 1% | 500V | Polyst. | 615 218 00 |
| C25 | 22 pF | 5% | 400V | Cer. | 605 122 00 |
| C26 | 120 pF | 1% | 500V | Polyst. | 615 212 00 |
| C27-28 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C29 | 68 pF | 5% | 400V | Cer. | 605 168 00 |
| C30 | 220 pF | 1% | 500V | Polyst. | 615 222 00 |
| C31 | 0.68 uF | 10% | 100V | Polyes. | 623 568 00 |
| C32 | 68 pF | 5% | 400V | Cer. | 605 168 00 |
| C33 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C34 | 3.3 nF | 1% | 125V | Polyes. | 613 333 00 |
| C35 | 1.8 nF | 1% | 250V | Polyst. | 614 318 00 |
| 208IC1 | 7805 | | | | 850 780 50 |
| IC2 | 74LS13 | | | | 850 741 30 |
| IC3 | 74LS73 | | | | 850 747 30 |
| IC4 | 1496 | | | | 850 149 60 |
| IC5 | 74LS13 | | | | 850 741 30 |
| IC6 | 74490 | | | | 857 449 00 |
| IC7-10 | 74LS93 | | | | 850 749 32 |
| IC11 | 74LS20 | | | | 850 742 01 |
| IC12 | 74LS00 | | | | 850 740 02 |

PARTS LIST

FOR



| | | | | | |
|---------|-----------|-----|----------|------|------------|
| 208IC13 | 74121 | | | | 857 412 10 |
| IC14 | 74LS13 | | | | 850 741 30 |
| IC15 | 74LS00 | | | | 850 740 02 |
| IC16 | 74LS03 | | | | 850 740 31 |
| IC17 | 7416 | | | | 850 741 60 |
| 208L 1 | 100 uH | 10% | RF-Choke | | 740 210 00 |
| L 2 | | | Coil | | 105 218 92 |
| L 3 | | | Coil | | 105 219 11 |
| L 4 | | | Coil | | 105 219 01 |
| L 5 | | | Coil | | 105 218 81 |
| L 6 | 100 uH | 10% | RF-Choke | | 740 210 00 |
| 208PL1 | 32 Way | | | | 751 000 20 |
| 208R 1 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R 2 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R 3 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R 4 | 15 kohms | 5% | 1/3W | Car. | 501 415 00 |
| R 5- 6 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R 7 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R 8 | 1.8 kohms | 5% | 1/3W | Car. | 501 318 00 |
| R 9 | 18 kohms | 5% | 1/3W | Car. | 501 418 00 |
| R10 | 12 kohms | 5% | 1/3W | Car. | 501 412 00 |
| R11-14 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R15 | 680 ohms | 5% | 1/3W | Car. | 501 268 00 |
| R16 | 180 ohms | 5% | 1/3W | Car. | 501 218 00 |
| R17 | 560 ohms | 5% | 1/3W | Car. | 501 256 00 |
| R18 | 270 ohms | 5% | 1/3W | Car. | 501 227 00 |
| R19-20 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R21-24 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R25 | 15 kohms | 5% | 1/3W | Car. | 501 415 00 |
| R26 | 12 kohms | 5% | 1/3W | Car. | 501 412 00 |
| R27 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R28 | 560 ohms | 5% | 1/3W | Car. | 501 256 00 |
| R29 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R30 | 27 kohms | 5% | 1/3W | Car. | 501 427 00 |
| R31 | 100 kohms | 5% | 1/3W | Car. | 501 510 00 |
| R32 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R33 | 390 ohms | 5% | 1/3W | Car. | 501 239 00 |
| R34 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |

PARTS LIST

FOR



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|--------|---------------|----|------|------|------------|
| 208R35 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R36 | 47 kohms | 5% | 1/3W | Car. | 501 447 00 |
| R37 | 560 ohms | 5% | 1/3W | Car. | 501 256 00 |
| R38 | 150 ohms | 5% | 1/3W | Car. | 501 215 00 |
| R39 | 15 kohms | 5% | 1/3W | Car. | 501 415 00 |
| R40 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R41-44 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R45 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R46-47 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R48 | 1.8 kohms | 5% | 1/3W | Car. | 501 318 00 |
| R49 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R50 | 5.6 kohm | 5% | 1/3W | Car. | 501 356 00 |
| 208T 1 | Transformator | | | | 105 219 21 |
| 208TR1 | BSX20 | | | | 840 002 00 |
| TR2- 5 | BC547B | | | | 840 054 70 |

PARTS LIST

FOR



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|--------|---------|----------|------|---------|-----------|
| 209C 1 | 0.1 uF | 10% | 250V | Polyes. | 624 510 0 |
| C 2 | 68 nF | 10% | 100V | Polyes. | 623 468 0 |
| C 3 | 0.1 uF | 10% | 250V | Polyes. | 624 510 0 |
| C 4 | 22 nF | 10% | 250V | Polyes. | 624 422 0 |
| C 5 | 0.1 uF | 10% | 250V | Polyes. | 624 510 0 |
| C 6 | 22 nF | 10% | 250V | Polyes. | 624 422 0 |
| C 7 | 2.2 nF | 1% | 250V | Polyst. | 614 322 0 |
| C 8 | 3.3 nF | 1% | 125V | Polyst. | 613 333 0 |
| C 9 | 33 pF | 5% | 400V | Cer. | 605 133 0 |
| C10 | 47 nF | 10% | 250V | Polyes. | 624 447 0 |
| C11 | 33 pF | 5% | 400V | Cer. | 605 133 0 |
| C12 | 470 uF | | 16V | W.alum. | 651 847 0 |
| C13 | 1000 uF | | 16V | W.alum. | 651 910 0 |
| C14-16 | 100 uF | | 16V | W.alum. | 651 810 0 |
| C17-19 | 0.1 uF | 10% | 250V | Polyes. | 624 510 0 |
| C20-21 | 33 pF | 5% | 400V | Cer. | 605 133 0 |
| C22 | 0.22 uF | 10% | 250V | Polyes. | 624 522 0 |
| C23 | 0.47 uF | 10% | 100V | Polyes. | 623 547 0 |
| C24 | 22 nF | 10% | 250V | Polyes. | 624 422 0 |
| C25 | 10 nF | 10% | 250V | Polyes. | 624 410 0 |
| C26 | 47 nF | 10% | 250V | Polyes. | 624 447 0 |
| C27-29 | 10 nF | 10% | 250V | Polyes. | 624 410 0 |
| C30 | 47 nF | 10% | 250V | Polyes. | 624 447 0 |
| C31 | 100 pF | 1% | 500V | Polyst. | 615 210 0 |
| C32 | 12 pF | 5% | 400V | Cer. | 605 112 0 |
| C33 | 0.1 uF | 10% | 250V | Polyes. | 624 510 0 |
| C34 | 10 nF | 10% | 250V | Polyes. | 624 410 0 |
| C35 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 0 |
| C36 | 470 pF | 1% | 500V | Polyst. | 615 247 0 |
| C37-38 | 0.1 uF | 10% | 250V | Polyes. | 624 510 0 |
| C39 | 470 uF | | 16V | W.alum. | 651 847 0 |
| C40-41 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 0 |
| C42 | 0.1 uF | 10% | 250V | Polyes. | 624 510 0 |
| C43 | 1 uF | 10% | 100V | Polyes. | 623 610 0 |
| C44 | 47 nF | 10% | 250V | Polyes. | 624 447 0 |
| C45 | 47 nF | -20/+80% | 16V | Cer. | 601 447 0 |
| C46 | 47 nF | 10% | 250V | Polyes. | 624 447 0 |
| C47 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 0 |
| C48 | 47 nF | -20/+80% | 16V | Cer. | 601 447 0 |
| C49-50 | 0.1 uF | 10% | 250V | Polyes. | 624 510 0 |
| C51 | 1 uF | 10% | 100V | Polyes. | 623 610 0 |
| C52 | 47 nF | -20/+80% | 16V | Car. | 601 447 0 |
| C53 | 47 nF | -20/+80% | 16V | Car. | 601 447 0 |

PARTS LIST

FOR



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|-----------|-----------|-------|----------|-----------------|
| 209D 1- 2 | BZX79C6V8 | Zener | | 832 796 80 |
| D 3 | BB113 | | | 833 011 30 |
| D 4 | BB104 | | | 833 010 40 |
| D 5-6 | IS 920 | | | 830 192 00 |
| 209IC1- 4 | 301A | | | 850 030 10 |
| 209L 1- 2 | 220 uH | 10% | RF-Choke | 740 222 00 |
| L 3- 4 | 1 mH | 10% | RF-Choke | 740 310 01 |
| L 5 | | | Coil | 105 218 61 |
| L 6 | | | Coil | 105 218 72 |
| L 7 | 220 uH | 10% | RF-Choke | 740 222 00 |
| 209PL 1 | 32 Way | | | 751 000 20 |
| 209R 1 | 22 kohms | 5% | 1/3W | Car. 501 422 00 |
| R 2 | 18 kohms | 5% | 1/3W | Car. 501 418 00 |
| R 3- 4 | 270 ohms | 5% | 1/3W | Car. 501 227 00 |
| R 5 | 22 kohms | 5% | 1/3W | Car. 501 422 00 |
| R 6 | 18 kohms | 5% | 1/3W | Car. 501 418 00 |
| R 7 | 33 ohms | 5% | 1/3W | Car. 501 133 00 |
| R 8 | 22 ohms | 5% | 1/3W | Car. 501 122 00 |
| R 9 | 39 ohms | 5% | 1/3W | Car. 501 139 00 |
| R10-11 | 4.7 kohms | 5% | 1/3W | Car. 501 347 00 |
| R12 | 18 kohms | 5% | 1/3W | Car. 501 418 00 |
| R13-14 | 1 kohm | | Var. | 582 310 00 |
| R15 | 47 kohms | 5% | 1/3W | Car. 501 447 00 |
| R16 | 12 kohms | 5% | 1/3W | Car. 501 412 00 |
| R17-18 | 4.7 kohms | 5% | 1/3W | Car. 501 347 00 |
| R19 | 15 kohms | 5% | 1/3W | Car. 501 415 00 |
| R20 | 56 kohms | 5% | 1/3W | Car. 501 456 00 |
| R21 | 18 kohms | 5% | 1/3W | Car. 501 418 00 |
| R22 | 12 kohms | 5% | 1/3W | Car. 501 412 00 |
| R23 | 18 kohms | 5% | 1/3W | Car. 501 418 00 |
| R24 | 8.2 kohms | 5% | 1/3W | Car. 501 382 00 |
| R26 | 4.7 kohms | 5% | 1/3W | Car. 501 347 00 |
| R27 | 100 kohms | 5% | 1/3W | Car. 501 510 00 |
| R28 | 4.7 kohms | 5% | 1/3W | Car. 501 347 00 |
| R29 | 560 kohms | 5% | 1/3W | Car. 501 556 00 |
| R30 | 100 kohms | 5% | 1/3W | Car. 501 510 00 |
| R31 | 2.2 kohms | 5% | 1/3W | Car. 501 322 00 |
| R32 | 3.9 kohms | 5% | 1/3W | Car. 501 339 00 |
| R33 | 1.5 kohms | 5% | 1/3W | Car. 501 315 00 |
| R34 | 4.7 kohms | 5% | 1/3W | Car. 501 347 00 |
| R35 | 220 ohms | 5% | 1/3W | Car. 501 222 00 |
| R36 | 15 kohms | 5% | 1/3W | Car. 501 415 00 |
| R37 | 560 ohms | 5% | 1/3W | Car. 501 256 00 |
| R38 | 2.7 kohms | 5% | 1/3W | Car. 501 327 00 |
| R39 | 100 ohms | 5% | 1/3W | Car. 501 210 00 |

PARTS LIST

FOR



| | | | | | |
|-----------|-----------|----|---------------|------|------------|
| 209R40 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R41 | 180 ohms | 5% | 1/3W | Car. | 501 218 00 |
| R42 | 22 kohms | 5% | 1/3W | Car. | 501 422 00 |
| R43 | 15 kohms | 5% | 1/3W | Car. | 501 415 00 |
| R44 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R45 | 2.7 kohms | 5% | 1/3W | Car. | 501 327 00 |
| R46 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R47 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R48 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R49 | 180 ohms | 5% | 1/3W | Car. | 501 218 00 |
| R50 | 39 ohms | 5% | 1/3W | Car. | 501 139 00 |
| R51 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R52 | 120 ohms | 5% | 1/3W | Car. | 501 212 00 |
| R53 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R54 | 100 kohms | 5% | 1/3W | Car. | 501 510 00 |
| R55 | 120 ohms | 5% | 1/3W | Car. | 501 212 00 |
| R56 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R57 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R58 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R59 | 82 ohms | 5% | 1/3W | Car. | 501 182 00 |
| R60 | 56 ohms | 5% | 1/3W | Car. | 501 156 00 |
| R61 | 220 ohms | 5% | 1/3W | Car. | 501 222 00 |
| R62 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R63 | 100 kohms | 5% | 1/3W | Car. | 501 510 00 |
| R64 | 120 ohms | 5% | 1/3W | Car. | 501 212 00 |
| R65 | 22 ohms | 5% | 1/3W | Car. | 501 122 00 |
| R66 | 22 kohms | 5% | 1/3W | Car. | 501 422 00 |
| 209T 1 | | | Transformator | | 105 218 51 |
| T 2 | | | Transformator | | 105 218 41 |
| 209TR1- 4 | BF240 | | | | 840 024 00 |
| TR5 | BSX20 | | | | 840 002 00 |
| TR6 | BC547B | | | | 840 054 70 |
| TR7 | BSX20 | | | | 840 002 00 |
| TR8 | BC547B | | | | 840 054 70 |

PARTS LIST

FOR



| | | | | | |
|----------|------------|---------------|------|----------|------------|
| 210C 1 | 330 pF | 1% | 500V | Polyst. | 615 233 00 |
| C 2 | 110 pF | 1% | 500V | Polyst. | 615 211 00 |
| C 3 | 22 pF | 5% | 400V | Cer. | 605 122 00 |
| C 4-6 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C 7 | 100 uF | | 25V | W. alum. | 652 810 00 |
| C 8 | 1000 uF | | 16V | W. alum. | 651 910 00 |
| C 9 | 33 pF | 5% | 400V | Cer. | 605 133 00 |
| C10-11 | 0.47 uF | 10% | 100V | Polyes. | 623 547 00 |
| C12 | 3.9 nF | 1% | 125V | Polyst. | 613 339 00 |
| C13-15 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C16-18 | 3.3 pF | ± 0.25 pF | 400V | Cer. | 605 033 00 |
| C19 | 47 pF | 5% | 400V | Cer. | 605 147 00 |
| C20-22 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C23 | 100 uF | | 25V | W.alum. | 651 910 00 |
| C24 | (4.5-26)pF | Var. | | | 683 126 00 |
| C25 | 100 uF | | 25V | W.alum | 651 910 00 |
| C26 | (4.5-26)pF | Var. | | | 683 126 00 |
| C27 | 100 uF | | 25V | W.alum. | 651 910 00 |
| C28 | (4.5-26)pF | Var. | | | 683 126 00 |
| C29-31 | 100 pF | 1% | 500V | Polyst. | 615 210 00 |
| C32-35 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C36-38 | 3.3 pF | ± 0.25 pF | 400V | Cer. | 605 033 00 |
| C39 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C40 | 1 uF | 10% | 100V | Polyes. | 623 610 00 |
| C41 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C42 | 82 pF | 5% | 400V | Cer. | 605 182 00 |
| C43 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C44-45 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C46 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C47 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C48 | 51 pF | 5% | 400V | Cer. | 605 151 00 |
| C49 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C50 | 22 nF | 10% | 250V | Polyes. | 624 422 00 |
| C51 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| 210D 1-4 | BB109G | | | | 833 010 90 |
| D 5 | 1S920 | | | | 830 192 00 |
| D 6-7 | BB109G | | | | 833 010 90 |
| D 8 | 1S920 | | | | 830 192 00 |

PARTS LIST

FOR



| | | | | | |
|-----------|-----------|------|----------|------|------------|
| 210D 9-10 | BB109G | | | | 833 010 90 |
| D11 | 1S920 | | | | 830 192 00 |
| D12-21 | BB109G | | | | 833 010 90 |
| D22-24 | BA182 | | | | 830 018 20 |
| 210IC1- 2 | 301A | | | | 850 030 10 |
| IC3 | 74S132 | | | | 857 413 20 |
| 210L 1- 2 | 220 uH | 10% | RF-choke | | 740 222 00 |
| L 3 | 22 uH | 10% | RF-choke | | 740 122 00 |
| L 4 | 10 uH | 10% | RF-choke | | 740 110 00 |
| L 5 | 2.2 uH | 10% | RF-choke | | 740 022 00 |
| L 6 | | | Coil | | 105 219 42 |
| L 7-8 | | | Coil | | 105 219 51 |
| L 9-11 | 100 uH | 10% | RF-choke | | 740 210 00 |
| L 12-13 | 10 uH | 10% | RF-choke | | 740 110 00 |
| 210PL1 | | | | | 751 000 20 |
| 210R 1- 2 | 33 kohms | 5% | 1/3W | Car. | 501 433 00 |
| R 3 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R 4 | 56 kohms | 5% | 1/3W | Car. | 501 456 00 |
| R 5 | 1 kohm | Var. | | | 582 310 00 |
| R 6 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R 7 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R 8 | 12 kohms | 5% | 1/3W | Car. | 501 412 00 |
| R 9-10 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R11 | 6.8 kohms | 5% | 1/3W | Car. | 501 368 00 |
| R12-14 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R15-16 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R17-18 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R19-20 | 2.2 kohms | 5% | 1/3W | Car. | 501 322 00 |
| R21-23 | 180 kohms | 5% | 1/3W | Car. | 501 518 00 |
| R24-26 | 820 kohms | 5% | 1/3W | Car. | 501 582 00 |
| R27 | 180 ohms | 5% | 1/3W | Car. | 501 218 00 |
| R28 | 270 ohms | 5% | 1/3W | Car. | 501 227 00 |
| R29-30 | 180 ohms | 5% | 1/3W | Car. | 501 218 00 |
| R31 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R32 | 180 ohms | 5% | 1/3W | Car. | 501 218 00 |

PARTS LIST

FOR



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|-----------|-----------|----|------|------|------------|
| 210R33 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R34 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R35 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R36 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R37 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R38 | 12 ohms | 5% | 1/3W | Car. | 501 112 00 |
| R39 | 150 ohms | 5% | 1/3W | Car. | 501 215 00 |
| R40 | 56 kohms | 5% | 1/3W | Car. | 501 456 00 |
| R41 | 120 ohms | 5% | 1/3W | Car. | 501 212 00 |
| R42 | 120 ohms | 5% | 1/3W | Car. | 501 212 00 |
| R43 | 220 ohms | 5% | 1/3W | Car. | 501 222 00 |
| R44 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R45 | 1.5 kohms | 5% | 1/3W | Car. | 501 315 00 |
| R46 | 6.8 kohms | 5% | 1/3W | Car. | 501 368 00 |
| R47 | 2.2 kohms | 5% | 1/3W | Car. | 501 322 00 |
| R48 | 10 ohms | 5% | 1/3W | Car. | 501 110 00 |
| R49 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| R50 | 330 ohms | 5% | 1/3W | Car. | 501 233 00 |
| R51 | 56 ohms | 5% | 1/3W | Car. | 501 156 00 |
| R52 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R53 | 1.5 kohms | 5% | 1/3W | Car. | 501 315 00 |
| 210TR1- 3 | BFX 89 | | | | 840 008 90 |
| TR4 | BC547B | | | | 840 054 70 |
| TR5- 6 | BC577 | | | | 840 055 70 |
| TR7- 9 | E310 | | | | 840 031 00 |
| TR10 | BC547B | | | | 840 054 70 |
| TR11 | BSX20 | | | | 840 002 00 |
| TR12 | BF240 | | | | 840 024 00 |
| TR13 | BFW17A | | | | 840 001 70 |
| TR14 | BSX20 | | | | 840 002 00 |

PARTS LIST

FOR



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|-----------|-----------|----------|----------|----------|------------|
| 211C 1 | 0.47 uF | 10% | 100V | Polyes. | 623 547 00 |
| C 2 | 1000 uF | | 10V | W.alum. | 651 910 00 |
| C 3 | 22 uF | | 16V | Tan | 651 722 00 |
| C 4- 7 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C 8 | 0.1 uF | 10% | 100V | Polyes. | 623 510 00 |
| C 9 | 10 nF | 10% | 250V | Polyes. | 624 410 00 |
| C10 | 2.2 nF | 1% | 250V | Polyst. | 614 322 00 |
| C11 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C12 | 100 uF | | 16V | W. alum. | 651 810 00 |
| 211D 1- 2 | 1S920 | | | | 830 192 00 |
| 211IC1 | SN74148 | | | | 857 414 81 |
| IC2 | uA7805 | | | | 850 780 50 |
| IC3 | SN74LS93 | | | | 850 749 32 |
| IC4 | NE555 | | | | 850 055 50 |
| IC5 | SN74145 | | | | 857 414 51 |
| IC6- 7 | SDA20 | | | | 879 000 00 |
| IC8 | MAN82 | | | | 824 008 20 |
| IC9 | 74LS13 | | | | 850 741 30 |
| IC10 | 74LS74 | | | | 850 747 40 |
| IC11-13 | MAN82 | | | | 824 008 20 |
| IC14 | 2003A | | | | 850 200 30 |
| IC15 | 7448 | | | | 850 744 80 |
| IC16-17 | MAN82 | | | | 824 008 20 |
| 211L1 | 4.7 uH | 10% | RF Choke | | 740 047 00 |
| 211ME1 | | 1 mA | 300 ohms | | 873 000 10 |
| 211R 1 | 2.7 kohms | 5% | 1/3W | Car. | 501 327 00 |
| R 2 | 1.8 kohms | 5% | 1/3W | Car. | 501 318 00 |
| R 3 | 2.2 ohms | 5% | 2W | WW | 523 022 00 |
| R 4 | 2.7 kohms | 5% | 1/3W | Car. | 501 327 00 |
| R 5- 6 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R 7-10 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R11 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R12-14 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R15 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R16-19 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R20 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R21 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R22 | 47 kohms | Var. | | Log. | 355 222 13 |
| R23 | 2.2 kohms | 5% | 1/3W | Car. | 501 322 00 |
| R24-25 | 82 ohms | 5% | 1/3W | Car. | 501 182 00 |

PARTS LIST

FOR



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|-----------|--------------|-------|------|------|------------|
| 211R26-27 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R28-33 | 82 ohms | 5% | 1/3W | Car. | 501 182 00 |
| R34 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R35-40 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R41-43 | 27 ohms | 5% | 1/3W | Car. | 501 127 00 |
| R44 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R45-47 | 27 ohms | 5% | 1/3W | Car. | 501 127 00 |
| R48 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R49 | 27 ohms | 5% | 1/3W | Car. | 501 127 00 |
| R50 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| 211S 1- 3 | M61-0110 | | | | 763 000 07 |
| S 4 | M51-0136 | | | | 763 000 08 |
| S 5- | M61-0110 | | | | 763 000 07 |
| 211SK1- 6 | Socket | | | | 751 000 25 |
| 211SL1 | 7V | 30 mA | | | |
| 211TR1 | BC558B | | | | 840 055 80 |
| TR2- 5 | BC547B | | | | 840 054 70 |
| TR6-11 | BC327 | | | | 840 032 70 |
| 211TW1 | Tuning Wheel | | | | 345 221 74 |

PARTS LIST

FOR



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|-----------|---------|----------|------|---------|------------|
| 212C 1 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C 2 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C 3 | 4.7 nF | 1% | 125V | Polyst. | 613 347 00 |
| C 4 | 22 uF | | 16V | Tan. | 651 722 00 |
| C 5 | 1.8 nF | 1% | 250V | Polyst. | 614 318 00 |
| C 6-14 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| C15 | 100 pF | 1% | 500V | Polyst. | 615 210 00 |
| C16-35 | 1 nF | -20/+80% | 25V | Cer. | 602 310 00 |
| C36 | 4.7 nF | -20/+80% | 32V | Cer. | 602 347 00 |
| C37 | 470 uF | | 6.3V | W.alum. | 650 847 00 |
| C38 | 15 nF | 1% | 63V | Polyst. | 612 415 00 |
| C39 | 390 PF | 1% | 500V | Polyst. | 615 239 00 |
| 212D 1- 3 | AAZ17 | | | | 830 001 70 |
| 212IC1 | 74LS08 | | | | 850 740 80 |
| IC2 | 7404 | | | | 850 740 40 |
| IC3 | 74LS05 | | | | 850 740 51 |
| IC4 | 74LS123 | | | | 857 412 30 |
| IC5 | 74LS09 | | | | 850 740 90 |
| IC6 - 7 | 74LS00 | | | | 850 740 02 |
| IC8 - 9 | 74LS32 | | | | 850 743 20 |
| IC10-15 | 74LS168 | | | | 857 416 80 |
| IC16 | 74LS32 | | | | 850 743 20 |
| IC17 | 74LS08 | | | | 850 740 80 |
| IC18 | 74LS32 | | | | 850 743 20 |
| IC19-20 | 74LS08 | | | | 850 740 80 |
| IC21 | 74LS32 | | | | 850 743 20 |
| IC22 | 74LS08 | | | | 850 740 80 |
| IC23 | 74LS32 | | | | 850 743 20 |
| IC24 | 74LS08 | | | | 850 740 80 |
| IC25-28 | 74LS151 | | | | 857 415 10 |
| IC29 | 74LS74 | | | | 850 747 40 |
| IC30 | 7409A | | | | 850 740 91 |
| IC31 | 74LS05 | | | | 850 740 51 |
| 212PL1 | 64 Way | | | | 751 000 22 |

PARTS LIST

FOR



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|--------|-----------|----|------|------|------------|
| 212R 1 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R 2 | 470 ohms | 5% | 1/3W | Car. | 501 247 00 |
| R 3- 7 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R 8 | 1.8 kohms | 5% | 1/3W | Car. | 501 318 00 |
| R 9 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R10 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R11 | 27 kohms | 5% | 1/3W | Car. | 501 427 00 |
| R12-13 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R14 | 2.7 kohms | 5% | 1/3W | Car. | 501 327 00 |
| R15 | 3.3 kohms | 5% | 1/3W | Car. | 501 333 00 |
| R16 | 1.5 kohms | 5% | 1/3W | Car. | 501 315 00 |
| R17 | 18 kohms | 5% | 1/3W | Car. | 501 418 00 |
| R18 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |

PARTS LIST

FOR



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|----------|-----------|-----|----------|---------|------------|
| 213C 1 | 0.68 uF | 10% | 100V | Polyes. | 623 568 00 |
| C 2 | 0.47 uF | 10% | 250V | Polyes. | 624 547 00 |
| C 3 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 4 | 1000 uF | | 25V | W.alum. | 652 910 00 |
| C 5 | 2200 uF | | 40V | W.alum. | 652 922 00 |
| C 6 | 39 pF | 5% | 400V | Cer. | 605 139 00 |
| C 7 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 8 | 0.68 uF | 10% | 100V | Polyes. | 623 568 00 |
| C 9-10 | 0.01 uF | 10% | 250V | Polyes. | 624 410 00 |
| C11-12 | 39 pF | 5% | 400V | Cer. | 605 139 00 |
| C13 | 18 pF | 5% | 400V | Cer. | 605 118 02 |
| C14 | 27 pF | 5% | 400V | Cer. | 605 127 02 |
| 213IC1-2 | 7812 | | | | 850 781 20 |
| IC3 | 7805 | | | | 850 780 50 |
| 213L1-4 | 25 uH | | RF Choke | | 740 125 00 |
| L5 | 100 uH | 10% | RF Choke | | 740 210 00 |
| L6-8 | 25 uH | | RF Choke | | 740 125 00 |
| L9-10 | 22 uH | 10% | RF Choke | | 740 122 00 |
| L11 | | | Coil | | 105 216 21 |
| L12 | | | Coil | | 105 216 11 |
| L13 | | | Coil | | 105 216 21 |
| 213PL1 | 12 Way | | | | 751 000 27 |
| 213R1 | 2.2 kohms | 5% | 1/3W | Car. | 501 322 00 |
| R2 | 33 kohms | 5% | 1/3W | Car. | 501 433 00 |
| 213SK1-3 | | | | | 750 000 10 |

PARTS LIST

FOR



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|-----------|-----------|----------|----------|------|------------|
| 214C 1- 2 | 47 nF | -20/+80% | 16V | Cer. | 601 447 00 |
| 214IC1 | 74S196 | | | | 857 419 60 |
| 214L 1 | 220 uH | 10% | RF Choke | | 740 222 00 |
| 214R 1 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R 2 | 1.5 kohms | 5% | 1/3W | Car. | 501 315 00 |

PARTS LIST

FOR



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|----------|-----------|-----------|-------------|---------|------------|
| 280C1 | 47 nF | 10% | 250V | Polyes. | 624 447 00 |
| C2 | 1 uF | 10% | 250V | Polyes. | 624 610 00 |
| C3 | 47 nF | 10% | 250V | Polyes. | 624 447 00 |
| 280D1 | BZY93C33R | Zener | | | 832 933 00 |
| 280FS1 | 2.5A | Fast | 6.3 x 32 mm | | 720 231 50 |
| FS2 | 1A | Fast | 6.3 x 32 mm | | 720 310 00 |
| 280PL1 | | BNC | | | 374 208 52 |
| 280S1 | | Power | | | 762 000 00 |
| 280SK1 | | Amp | | | 772 000 12 |
| SK2 | | UHF SO239 | | | 750 000 01 |
| SK3 | | 12 Way | | | 751 000 29 |
| 280T1 | | Converter | | | 384 209 03 |
| 280TR1-2 | 2N6254 | | | | 842 625 40 |
| TR3 | BD234-10 | | | | 842 023 40 |
| TR4-5 | 2N3055 | | | | 842 305 50 |
| 280TS1 | | 18 Way | | | 770 000 04 |

PARTS LIST

FOR



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|-----------|-----------|----------|------|---------|------------|
| 281C 1- 2 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 3 | 470 uF | | 40V | W.alum. | 652 847 00 |
| C 4- 6 | 1 uF | 10% | 250V | Polyes. | 624 610 01 |
| C 7 | 47 nF | 10% | 250V | Polyes. | 624 447 00 |
| C 8 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C 9 | 47 nF | 10% | 250V | Polyes. | 624 447 00 |
| C10 | 2200 uF | | 40V | W.alum. | 652 922 00 |
| C11 | 47 nF | 10% | 250V | Polyes. | 624 447 00 |
| C12-14 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C15 | 100 uF | | 25V | W.alum. | 652 810 00 |
| C16 | 4700 uF | | 25V | W.alum. | 652 947 01 |
| C17 | 100 uF | | 16V | W.alum. | 651 810 00 |
| 281D 1 | 1S920 | | | | 830 192 00 |
| D 2 | 1N5401 | | | | 831 540 10 |
| D 3 | 1S920 | | | | 830 192 00 |
| D 4 | 1N5401 | | | | 831 540 10 |
| D 5- 6 | 1S920 | | | | 830 192 00 |
| D 7- 8 | 1N5401 | | | | 831 540 10 |
| D 9-10 | BZX79B7V5 | Zener | | | 832 797 50 |
| D11 | BZX79B6V8 | Zener | | | 832 796 81 |
| 281L 1- 2 | 25 uH | RF-Choke | | | 740 125 00 |
| 281R 1 | 220 kohms | 5% | 1W | Car. | 504 522 00 |
| R 2 | 12 ohms | 5% | 3/4W | Car. | 503 112 00 |
| R 3 | 1.5 kohms | 5% | 1W | Car. | 504 315 00 |
| R 4 | 220 kohms | 5% | 1/3W | Car. | 501 522 00 |
| R 5 | 27 ohms | 5% | 1/3W | Car. | 501 127 00 |
| R 6 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| R 7 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R 8 | 1.2 kohms | 5% | 1/3W | Car. | 501 312 00 |
| R 9 | 220 ohms | 5% | 5W | WW | 527 222 00 |
| R10 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R11 | 100 ohms | 5% | 1/2W | Car. | 501 210 00 |
| R12-13 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R14 | 100 ohms | 5% | 1/2W | Car. | 501 210 00 |
| R15 | 15 ohms | 5% | 1/2W | Car. | 502 115 00 |
| R16 | 220 ohms | 5% | 5W | WW | 527 222 00 |

PARTS LIST

FOR



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|--------|---------------------|----|------|------|------------|
| 281R17 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R18 | 1 ohm | 5% | 5W | WW | 527 010 01 |
| R19 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R20 | 150 ohms | 5% | 1/2W | Car. | 502 215 00 |
| R21 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| R22 | 82 ohms | 5% | 3W | WW | 526 182 00 |
| R23 | 68 ohms | 5% | 1/2W | Car. | 502 168 00 |
| R24 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| 281RL1 | 1 breake, 24 V Coil | | | | 780 000 20 |
| 281TR1 | 2N6027 | | | | 844 602 70 |
| TR2- 3 | BC337-25 | | | | 840 033 70 |
| TR4 | BD135-10 | | | | 842 013 50 |
| TR5 | BC337-25 | | | | 840 033 70 |

PARTS LIST

FOR



| | | | | |
|---------|-------------|-----------|-------------|------------|
| 283FS1 | 1A | Slow | 6.3 x 32 mm | 720 310 00 |
| FS2 | 110V 0.63A | Fast | 6.3 x 32 mm | 720 263 00 |
| | 220V 0.315A | | | 720 231 51 |
| 283PL1 | | BNC | | 374 208 52 |
| 283S1 | | | | 764 000 02 |
| S2 | | | | 262 000 00 |
| 283SK1 | | Amp | | 772 000 12 |
| SK2 | | UHF S0239 | | 751 000 01 |
| SK3 | | 12 Way | | 751 000 29 |
| 283T1 | | Main | | 384 209 11 |
| 283TR1 | BD234-10 | | | 842 023 40 |
| TR2 | 2N3055 | | | 842 305 50 |
| 283 TS1 | | 18 Way | | 770 000 04 |

PARTS LIST

FOR



| | | | | | |
|---------|------------|------------------|------|---------|------------|
| 284C1-2 | 47 nF | 10% | 630V | Polyes. | 626 447 00 |
| C3-4 | 0.47 uF | 10% | 630V | Polyes. | 626 547 00 |
| C5 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C6 | 2200 uF | | 40V | W.alum. | 652 922 00 |
| C7-9 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C10 | 100 uF | | 25V | W.alum. | 652 810 00 |
| C11 | 4700 uF | | 25V | W.alum. | 652 947 01 |
| C12 | 100 uF | | 25V | W-alum. | 652 810 00 |
| 284D1-2 | 1N5401 | | | | 831 540 10 |
| D3-4 | 1S920 | | | | 830 192 00 |
| D5-6 | BZX79 B7V5 | Zener | | | 832 797 50 |
| D7-8 | 1N5401 | | | | 831 540 10 |
| D9 | BZX79 B6V8 | Zener | | | 832 796 81 |
| 284L1-2 | 25 uH | RF Choke | | | 740 125 00 |
| 284R1 | 1.5 kohms | 5% | 1W | Car. | 504 315 00 |
| R2 | 15 ohms | 5% | 1/3W | Car. | 501 115 00 |
| R3 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R4 | 150 ohms | 5% | 1/2W | Car. | 502 215 00 |
| R5 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| R6 | 82 ohms | | 3W | WW | 526 182 00 |
| R7 | 68 ohms | 5% | 1/2W | Car. | 502 168 00 |
| R8 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| 284RL1 | | 1 Break 24V Coil | | | 780 125 21 |
| 284TR1 | BD135-10 | | | | 842 013 50 |
| TR2 | BC337-25 | | | | 840 033 70 |

PARTS LIST

FOR



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|----------|-------------|-----------|-------------|---------|------------|
| 286C1 | 1u | 10% | 250V | Polyes | 624 610 00 |
| C2-3 | 47nF | 10% | 250V | Polyes. | 624 447 00 |
| 286D1 | BZY93C33R | Zener | | | 832 933 00 |
| D2 | MV 5353 | | | | 823 000 01 |
| 286FS1 | 1A | Fast | 6.3 x 32 mm | | 720 310 00 |
| FS2 | 2.5A | Fast | 6.3 x 32 mm | | 720 325 00 |
| FS3 | 0.63A/110V | Slow | 6.3 x 32 mm | | 720 263 00 |
| FS3 | 0.315A/220V | Slow | 6.3 x 32 mm | | 720 231 51 |
| 286PL1 | | BNC | | | 374 208 52 |
| 286R1 | 56 ohms | | 3W | WW | 526 156 00 |
| R2 | 3.3 kohms | 5% | 1/3W | Car. | 502 333 00 |
| 286S1 | | Safety | | | 764 000 02 |
| S2 | | Mains | | | 762 000 00 |
| 286SK1 | | Amp | | | 772 000 12 |
| SK2 | | UHF SO239 | | | 750 000 01 |
| SK3 | | 12 Way | | | 751 000 29 |
| 286T1 | | Mains | | | 384 209 11 |
| T2 | | Converter | | | 384 209 03 |
| 286TR1-2 | 2N6254 | | | | 842 625 40 |
| TR3 | 2N3055 | | | | 842 305 50 |
| TR4 | BD23410 | | | | 842 023 40 |
| TR5 | 2N3055 | | | | 842 305 50 |
| 286TS1 | | 18 Way | | | 770 000 04 |

PARTS LIST

FOR



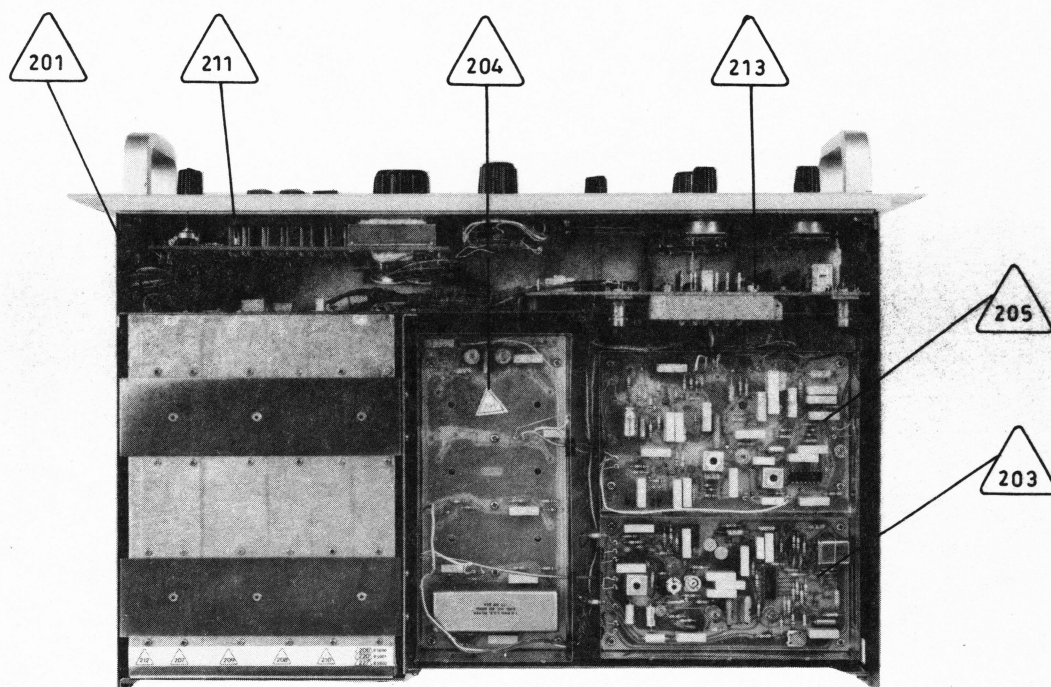
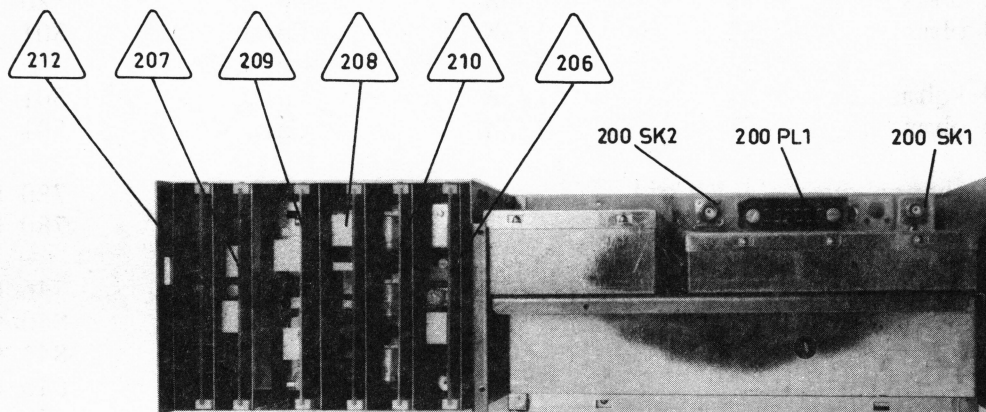
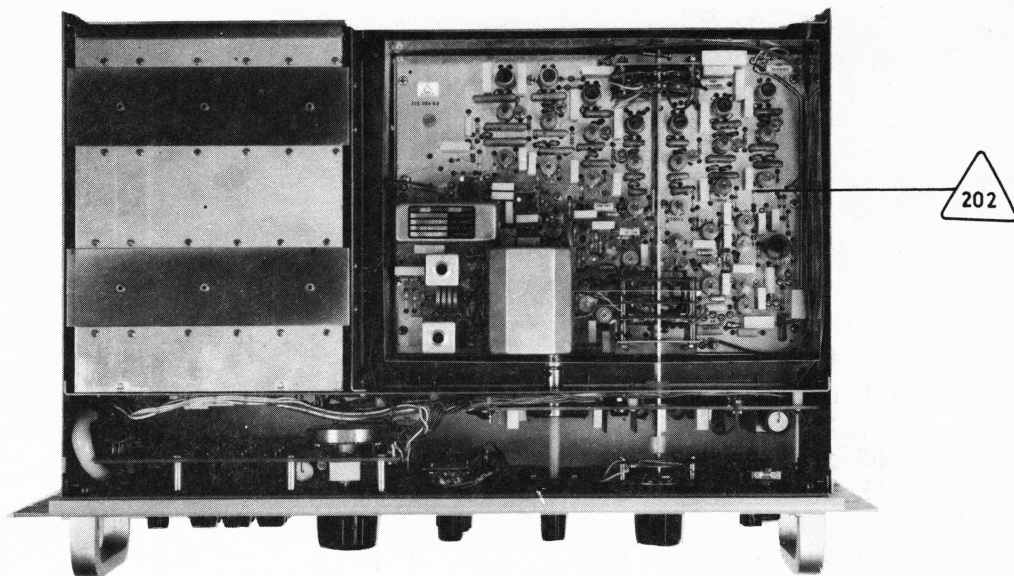
| | | | | | |
|---------|------------|----------|------|---------|------------|
| 287C1-2 | 47 nF | 10% | 630V | Polyes. | 626 447 00 |
| C3-4 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C5 | 0.47 uF | 10% | 630V | Polyes. | 626 547 00 |
| C6 | 1 uF | 10% | 100V | Polyes. | 623 610 01 |
| C7-14 | 0.1 uF | 10% | 250V | Polyes. | 624 510 00 |
| C15 | 0.47 uF | 10% | 630V | Polyes. | 626 547 00 |
| C16 | 1 uF | 10% | 100V | Polyes. | 623 610 00 |
| C17 | 4700 uF | | 25V | W.alum. | 652 947 01 |
| C18 | 2200 uF | | 40V | W.alum. | 652 922 00 |
| C19 | 470 uF | | 40V | W.alum. | 652 847 00 |
| C20-21 | 1 uF | 10% | 100V | Polyes. | 623 610 00 |
| C22-24 | 47 nF | 10% | 250V | Polyes. | 624 447 00 |
| C25 | 1 uF | 10% | 100V | Polyes. | 623 610 00 |
| C26 | 100 uF | | 25V | W.alum. | 652 810 00 |
| C27 | 100 uF | | 25V | W.alum. | 652 810 00 |
| 287D1-8 | 1N5401 | | | | 831 540 10 |
| D9-15 | 1S920 | | | | 830 192 00 |
| D16 | BZX79 B6V8 | Zener | | | 832 796 81 |
| D17-18 | BZX79 B7V5 | Zener | | | 832 797 50 |
| 287L1-4 | 25uH | RF Choke | | | 740 125 00 |
| 287R1 | 220 kohms | 5% | 1W | Car. | 504 522 00 |
| R2 | 1.5 kohms | 5% | 1W | Car. | 504 315 00 |
| R3 | 220 ohms | 5% | 5W | WW | 527 222 00 |
| R4 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R5 | 12 ohms | 5% | 3/4W | Car. | 503 112 00 |
| R6 | 12 kohms | 5% | 1/3W | Car. | 501 412 00 |
| R7 | 100 ohms | 5% | 1/2W | Car. | 502 210 00 |
| R8 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R9-10 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R11 | 220 kohms | 5% | 1/3W | Car. | 501 522 00 |
| R12 | 27 ohms | 5% | 1/3W | Car. | 501 127 00 |
| R13 | 1 kohm | 5% | 1/3W | Car. | 501 310 00 |
| R14 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R15 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R16 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R17 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R18 | 1.2 kohm | 5% | 1/3W | Car. | 501 312 00 |
| R19 | 100 ohms | 5% | 1/2W | Car. | 502 210 00 |
| R20 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R21 | 220 ohms | 5% | 5W | WW | 527 220 00 |

PARTS LIST

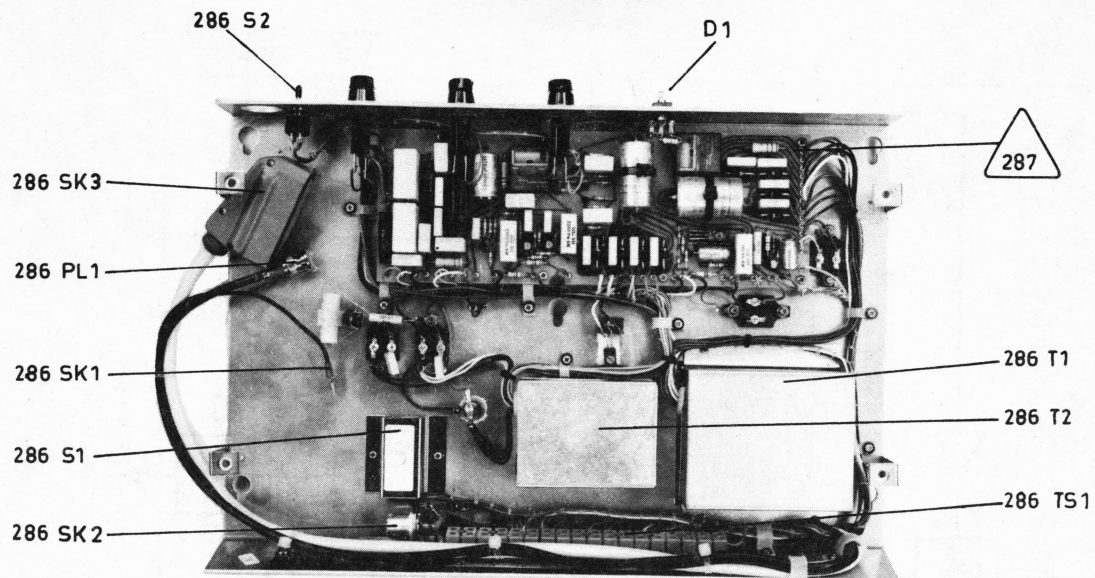
FOR



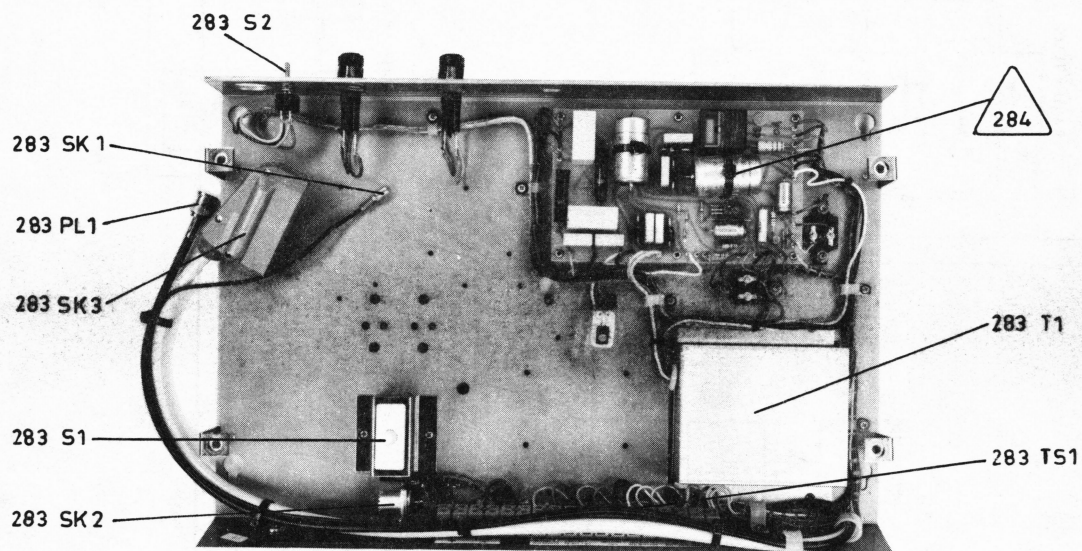
| | | | | | |
|--------|--------------------------|-----|------|------|------------|
| 287R22 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R23 | 120 ohms | 5% | 1/2W | Car. | 502 212 00 |
| R24 | 4.7 kohms | 5% | 1/3W | Car. | 501 347 00 |
| R25 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| R26 | 15 ohms | 5% | 1/2W | Car. | 502 115 00 |
| R27 | 68 ohms | 5% | 1/2W | Car. | 502 168 00 |
| R28 | 1 ohm | 5% | 5W | WW | 527 010 01 |
| R29 | 150 ohms | 5% | 1/2W | Car. | 502 215 00 |
| R30 | 82 ohms | 5% | 3W | WW | 526 182 00 |
| R31 | 68 ohms | 5% | 1/3W | Car. | 501 168 00 |
| R32 | 10 kohms | 5% | 1/3W | Car. | 501 410 00 |
| R33 | 100 ohms | 5% | 1/3W | Car. | 501 210 00 |
| 287RL1 | 1 change over, 24 V Coil | | | | 780 000 21 |
| RL2 | 1 change over, 24 V Coil | | | | 780 000 19 |
| 287TR1 | BC337-25 | | | | 846 033 70 |
| TR2-3 | BC557B | | | | 840 055 70 |
| TR4 | 2N6027 | PUT | | | 844 602 70 |
| TR5 | BC337-25 | | | | 846 033 70 |
| TR6 | BC547B | | | | 840 054 70 |
| TR7 | BC337-25 | | | | 846 033 70 |
| TR8 | BC135-10 | | | | 842 013 50 |



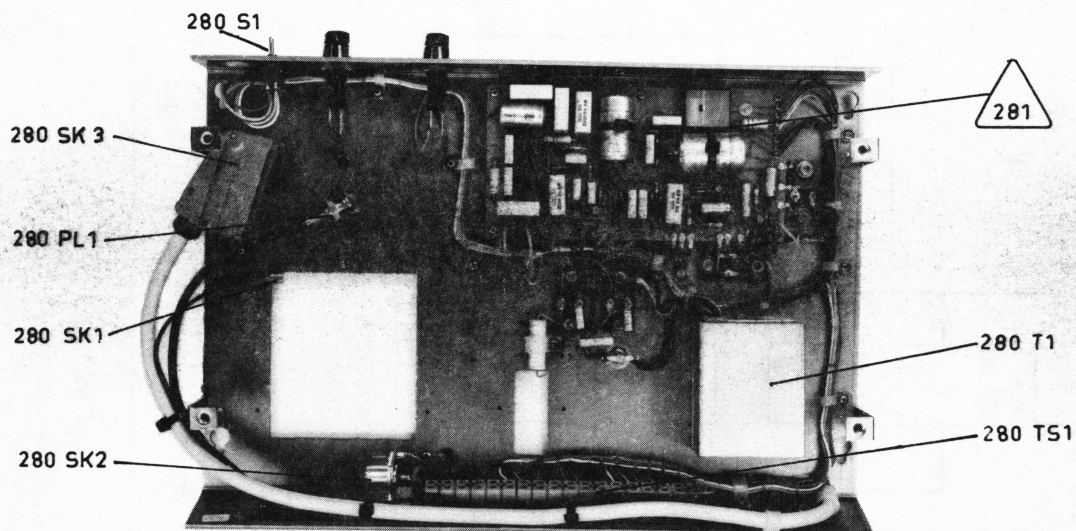
LOCATION OF CIRCUIT BOARDS
RECEIVER R5000



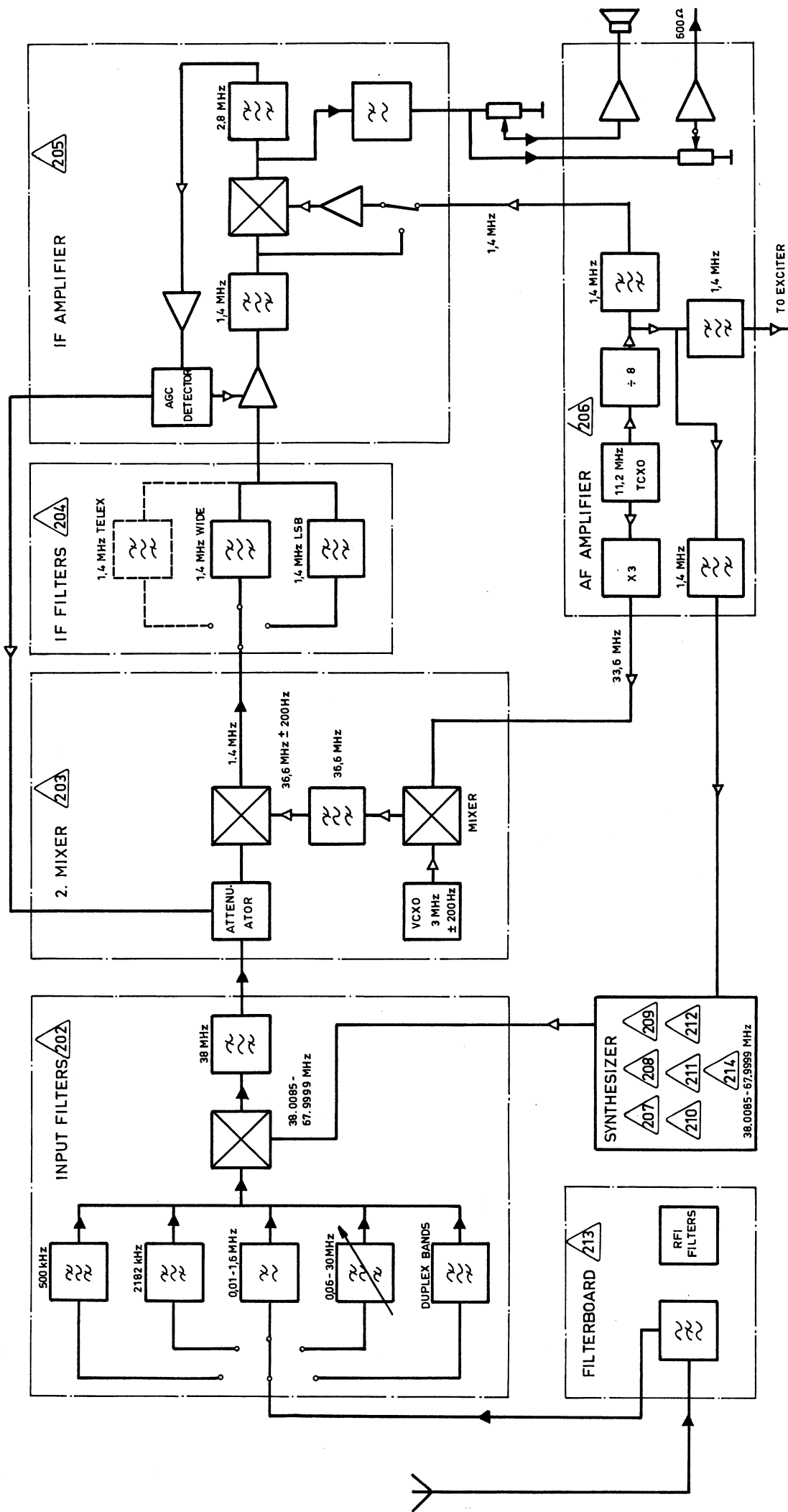
DC /AC POWER PACK P5012



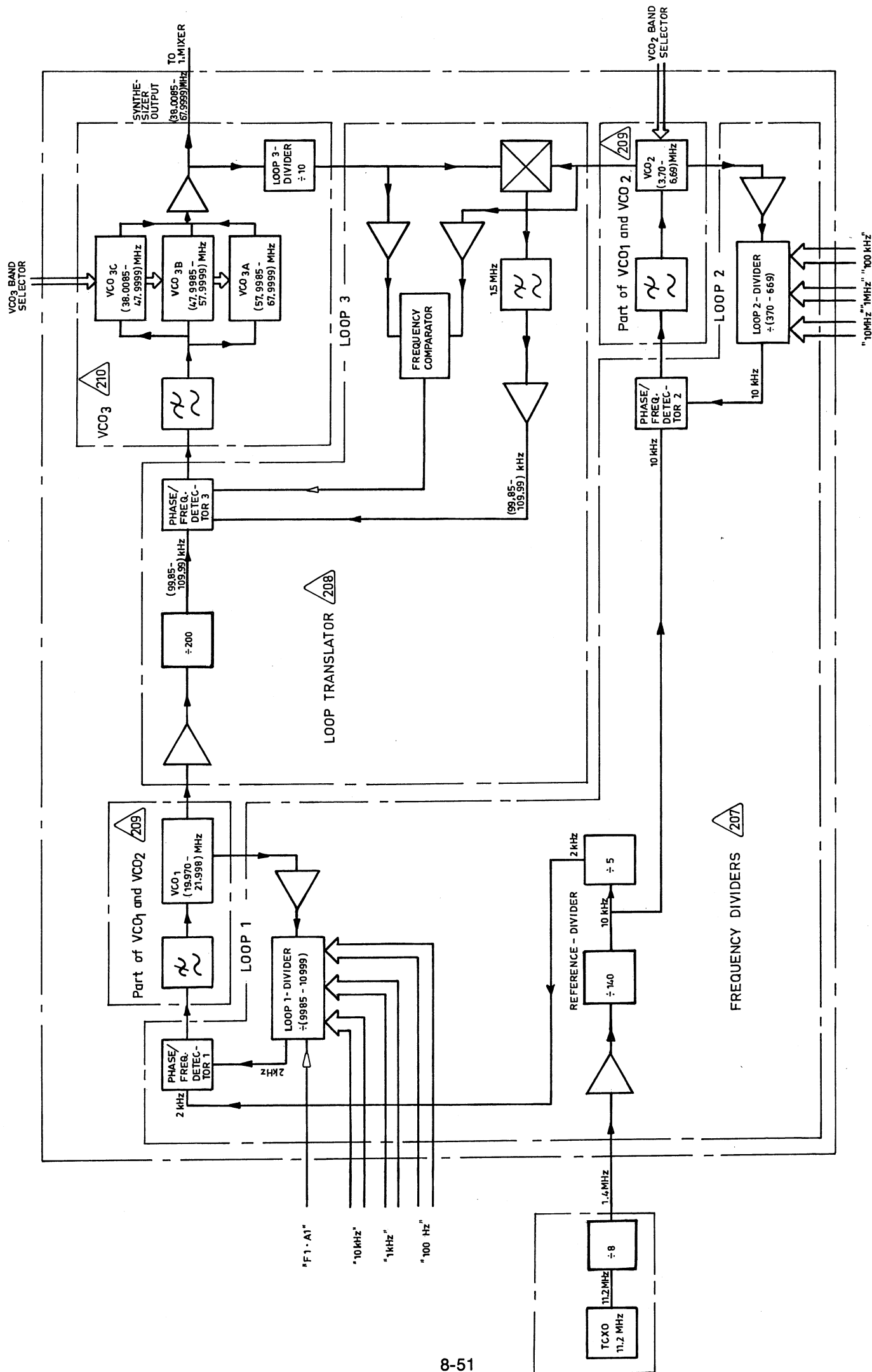
AC POWER PACK P5011

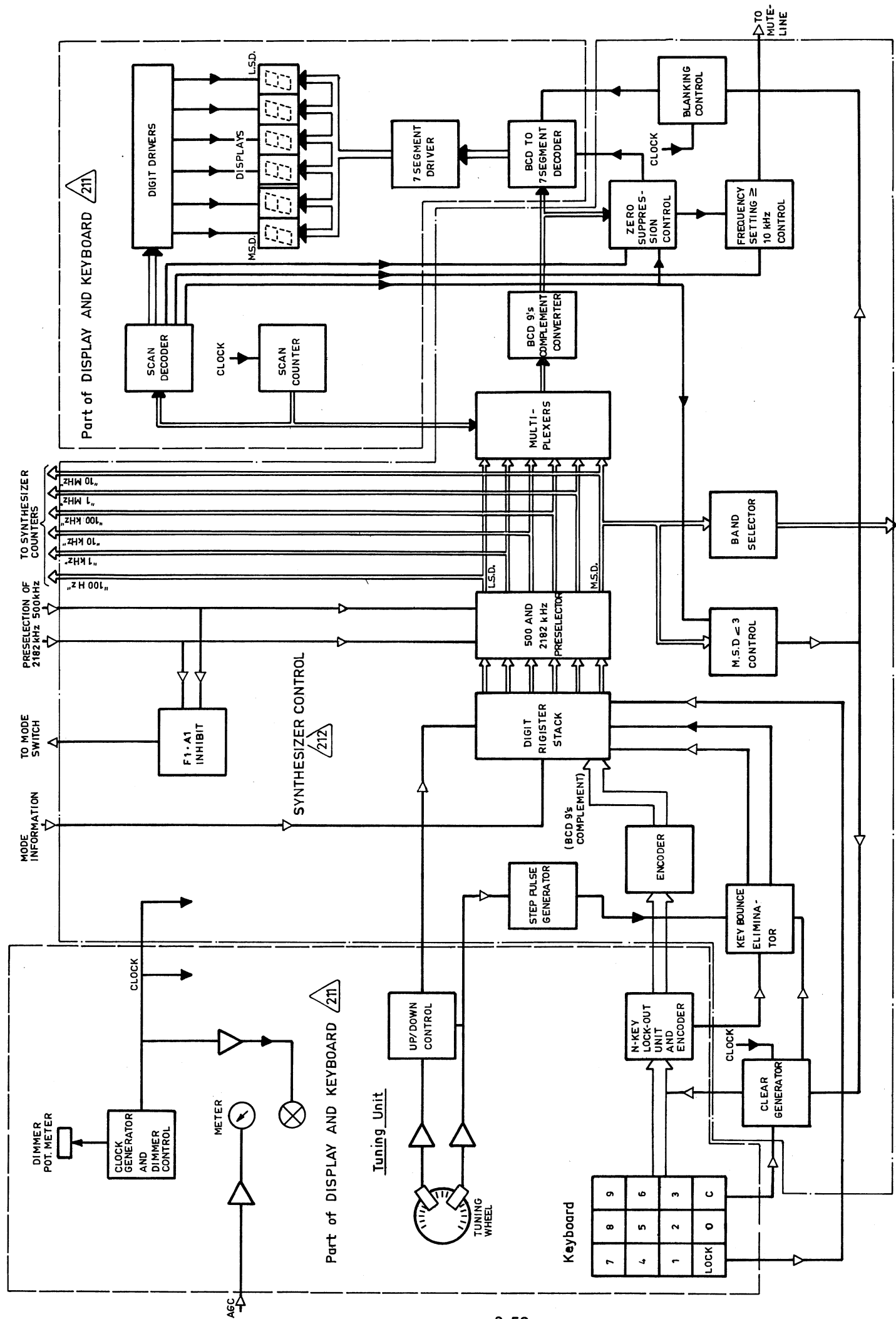


DC POWER PACK P5010
LOCATION OF CIRCUIT BOARDS
POWER PACK P5010, P5011 AND P5012

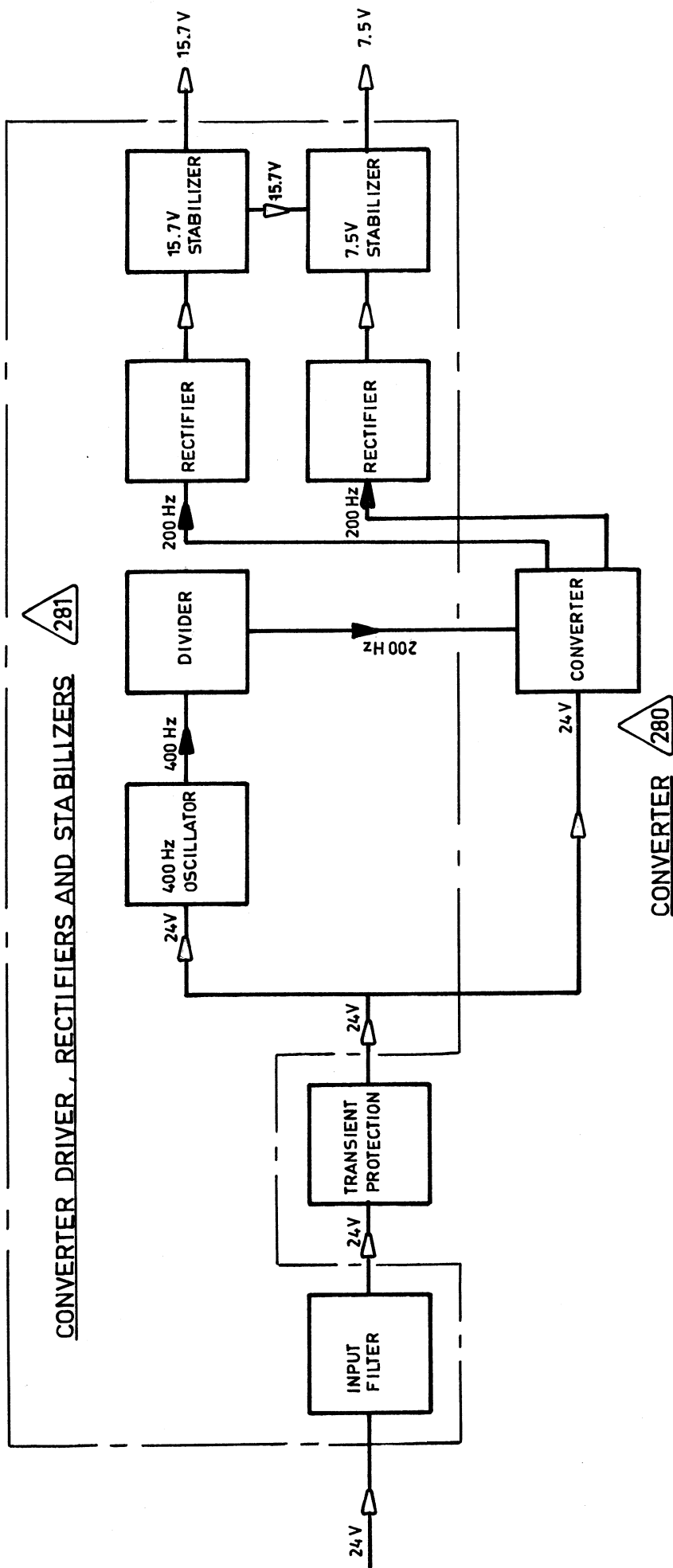


BLOCK DIAGRAM , SIGNAL PATH

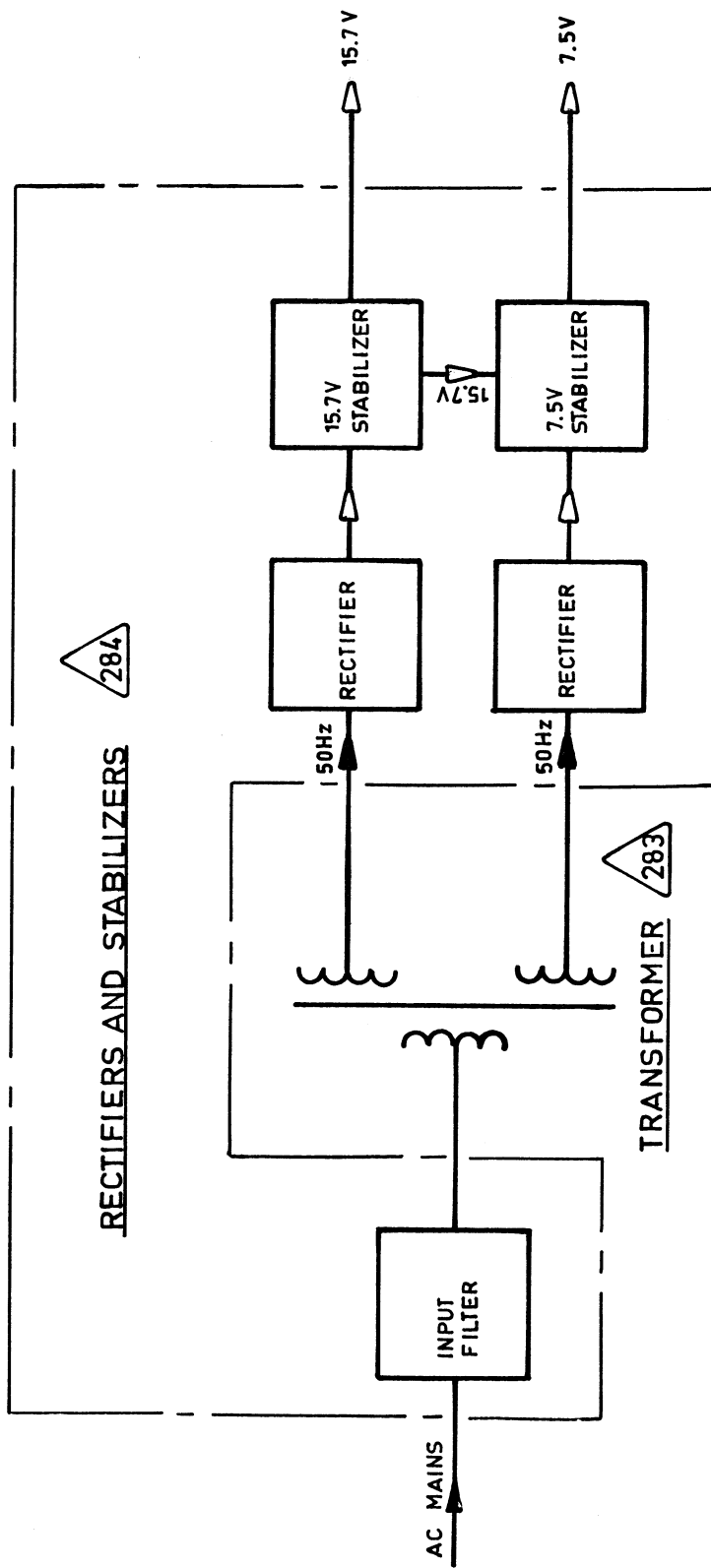




BLOCK DIAGRAM, FREQUENCY SELECTION

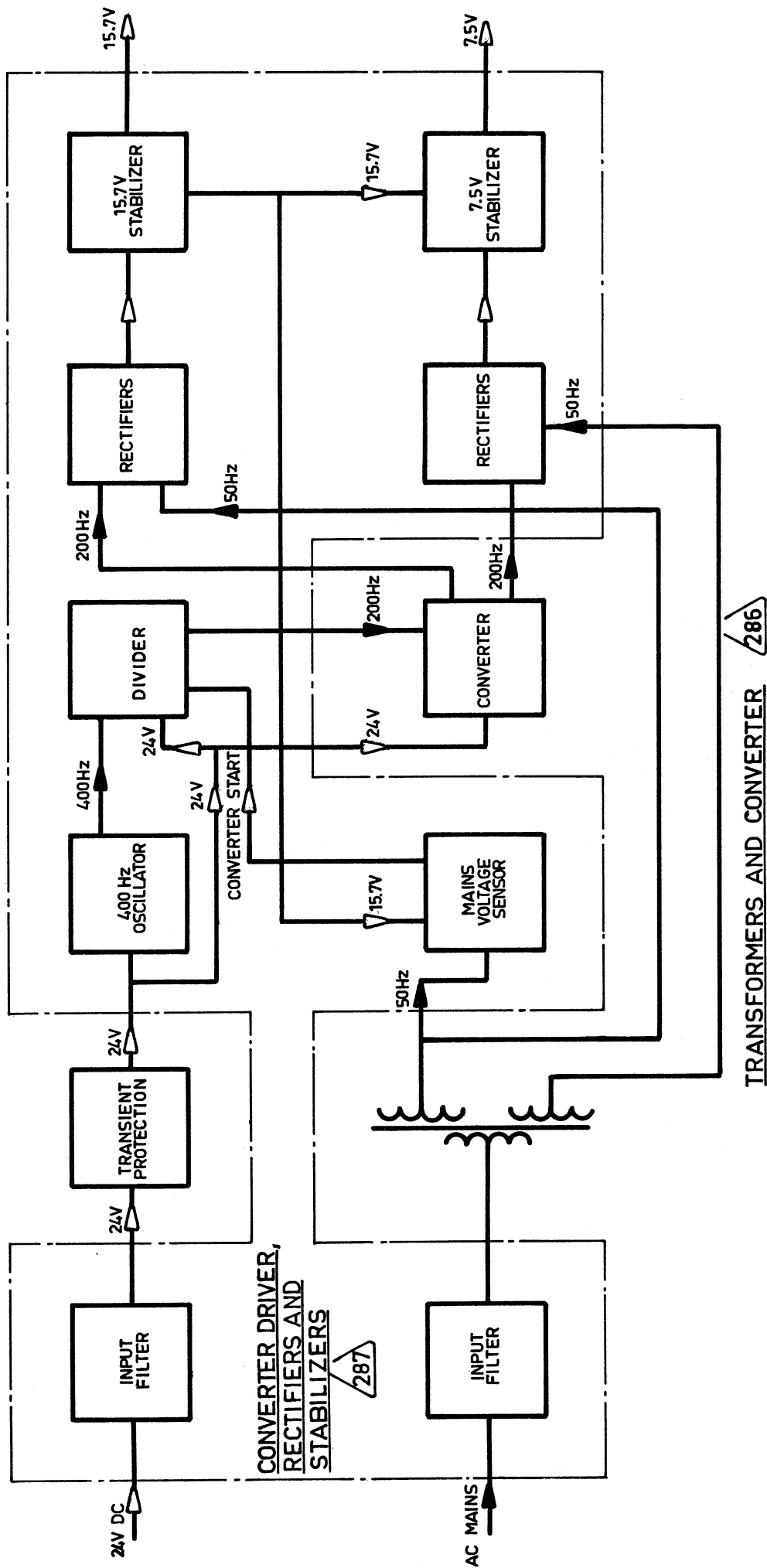


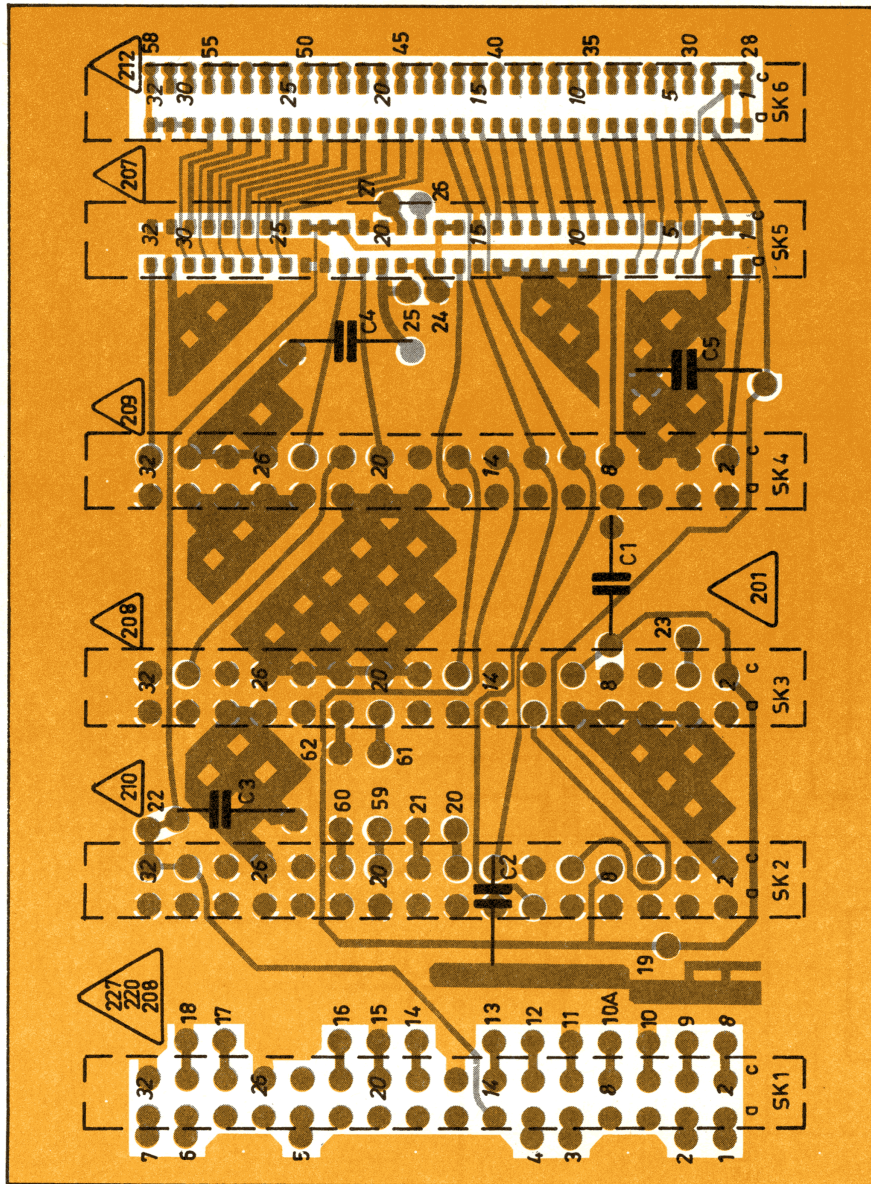
BLOCK DIAGRAM , P5010 24V DC POWER PACK



BLOCK DIAGRAM , P5011 AC POWER PACK

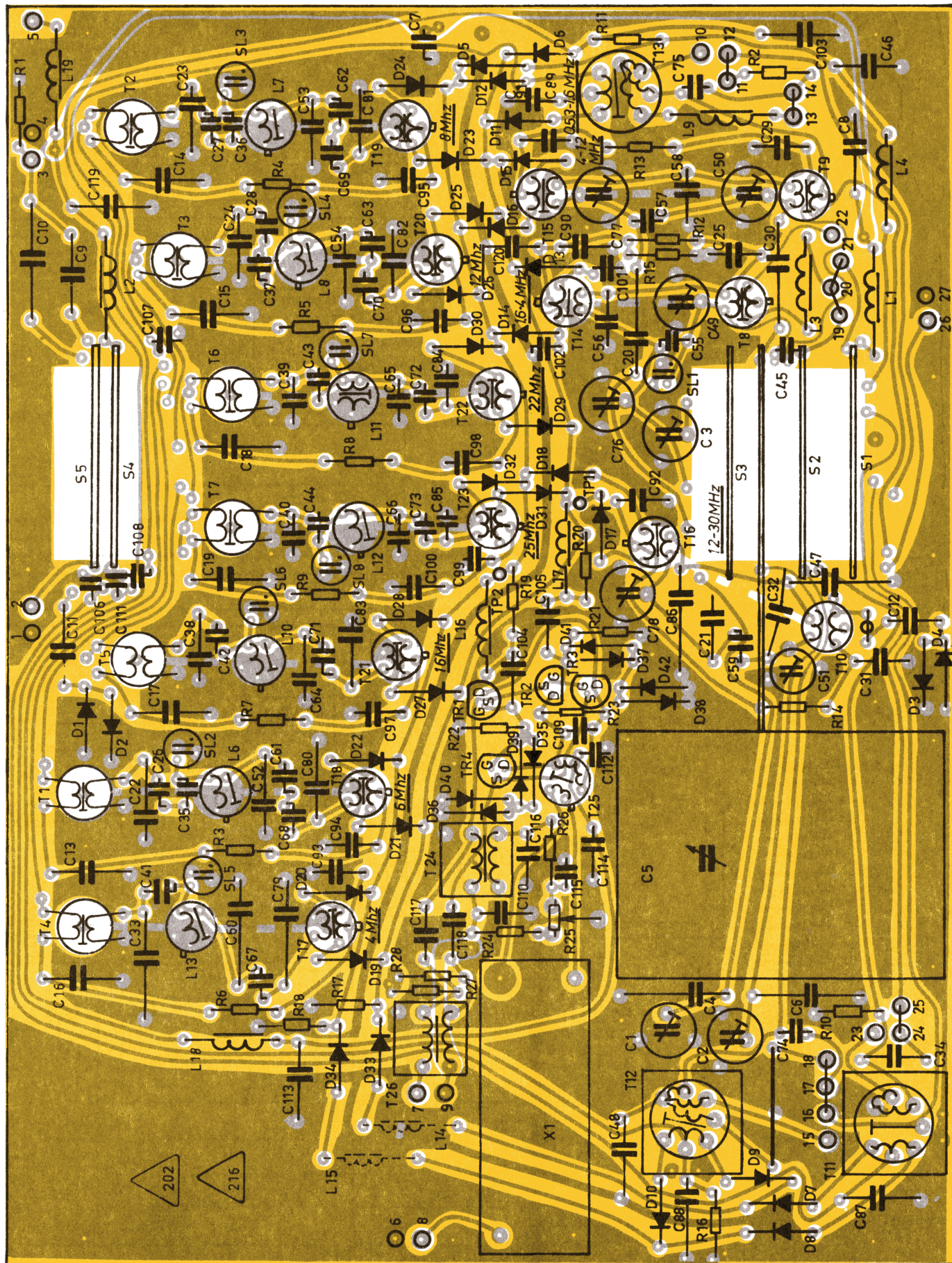
994 211 12



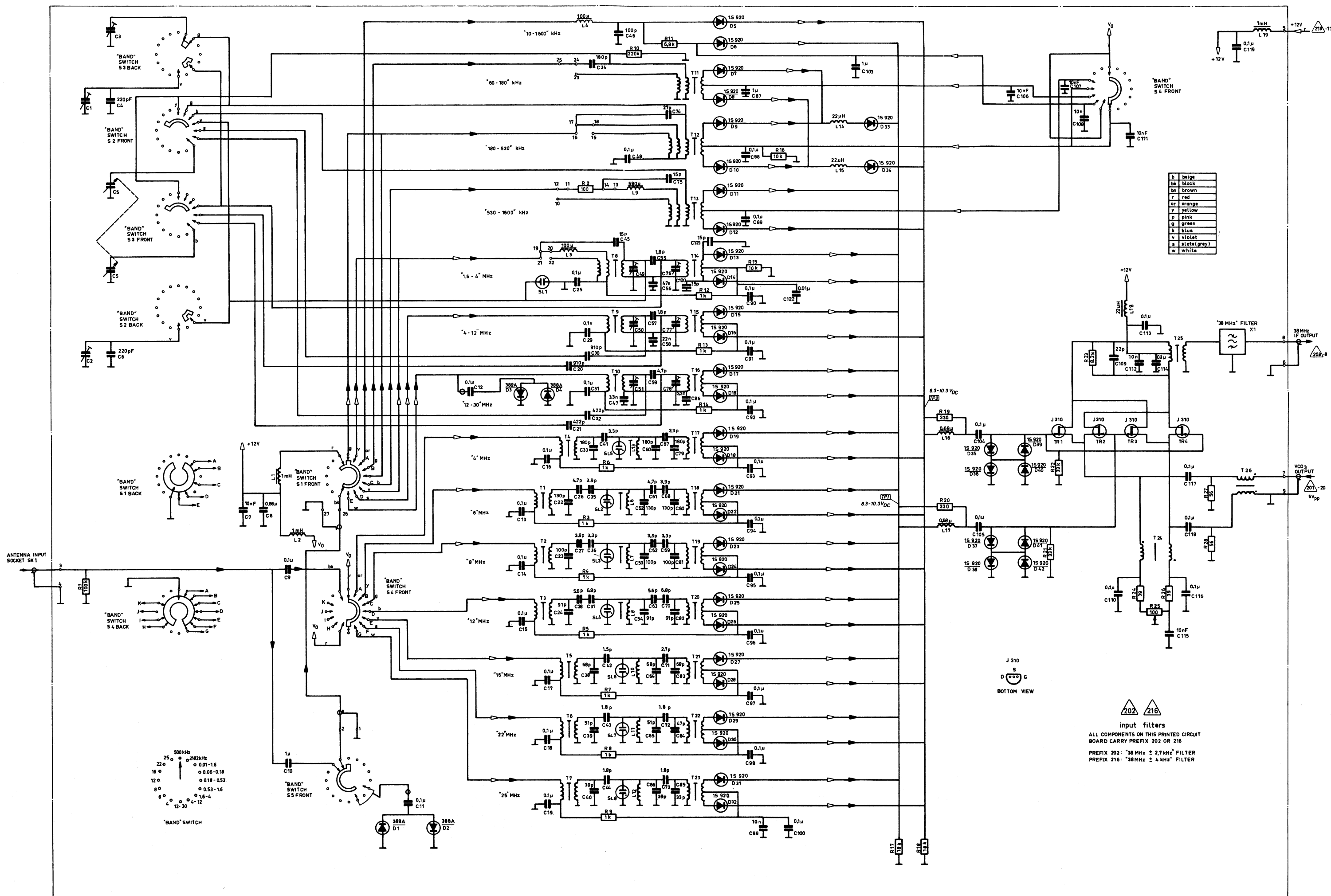


PRINTED CIRCUIT BOARD 201
VIEWED FROM SOLDER SIDE

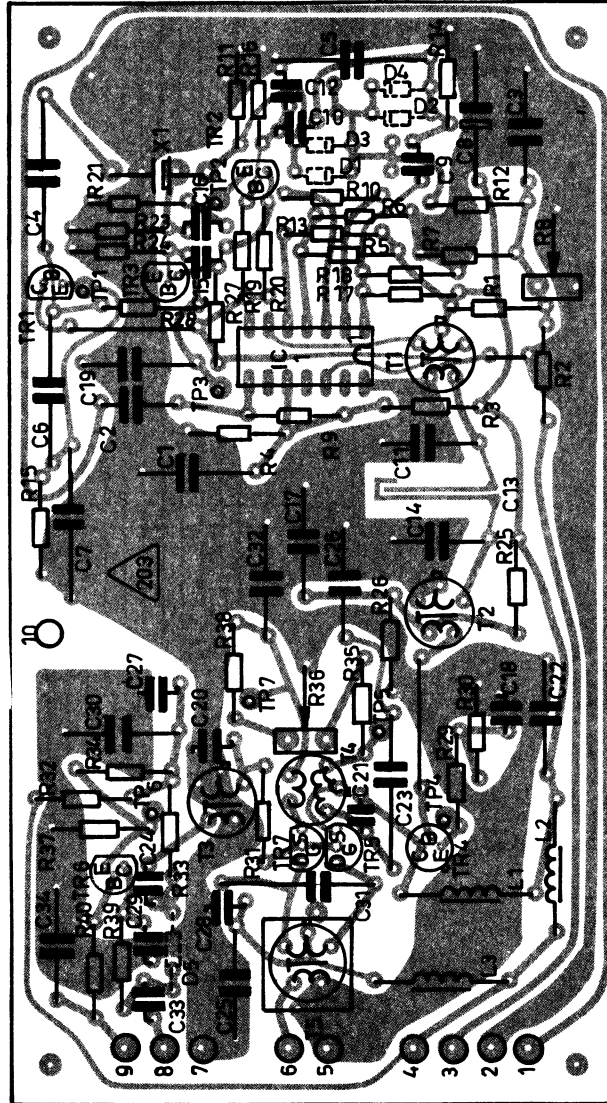





PRINTED CIRCUIT BOARD 202 or 216
VIEWED FROM COMPONENT SIDE

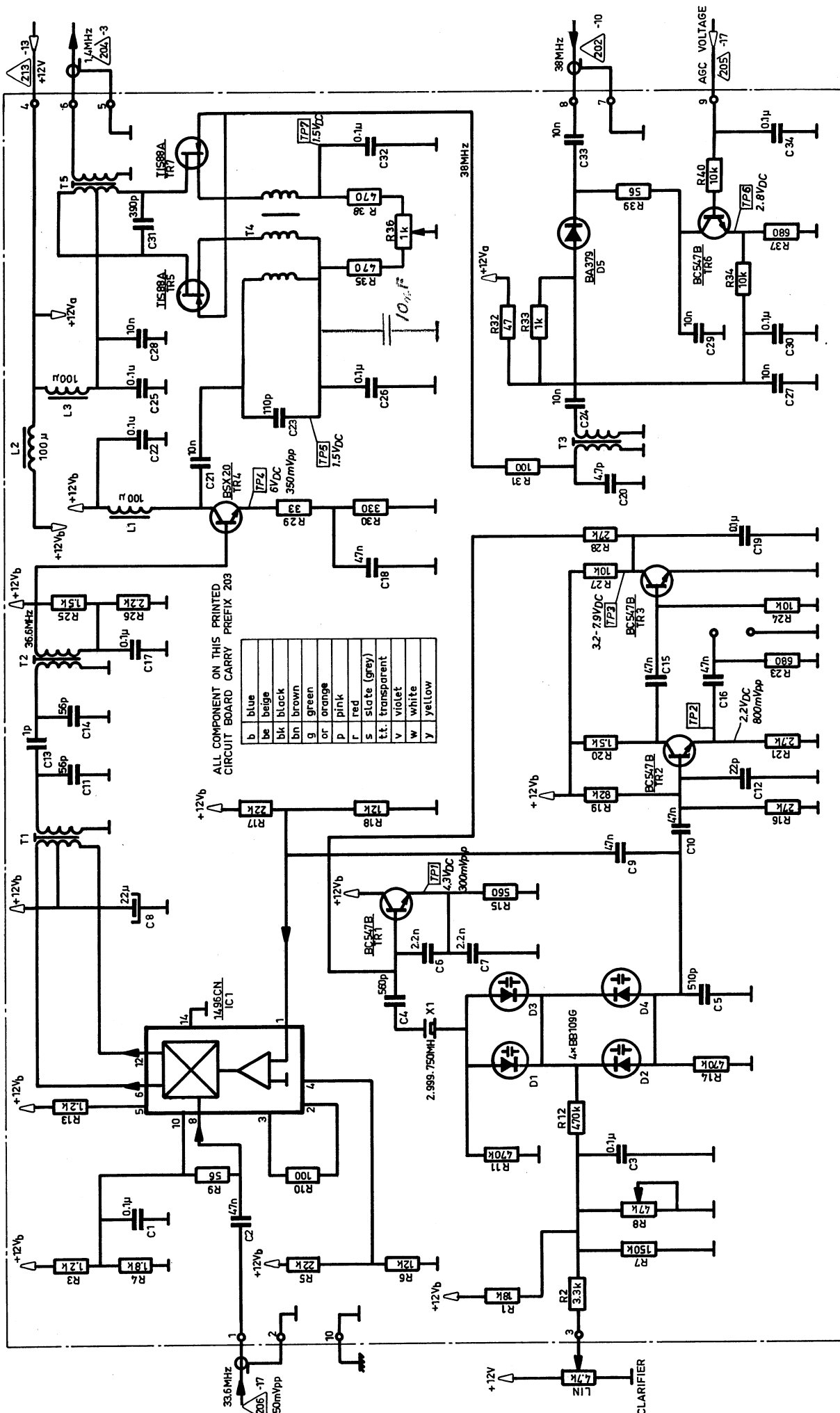


input filters
 ALL COMPONENTS ON THIS PRINTED CIRCUIT BOARD CARRY PREFIX 202 OR 216
 PREFIX 202: 30 MHz \pm 2.7 kHz FILTER
 PREFIX 216: 30 MHz \pm 4 kHz FILTER

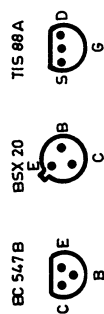


PRINTED CIRCUIT BOARD  203
VIEWED FROM COMPONENT SIDE

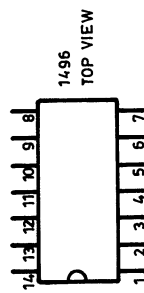
995 205 91



ALL TYPICAL VOLTAGE MEASUREMENTS
WITH "AGC-OFF" "CLARIFIER" AT "0" AND
"SENSITIVITY" FULLY COUNTERCLOCKWISE.

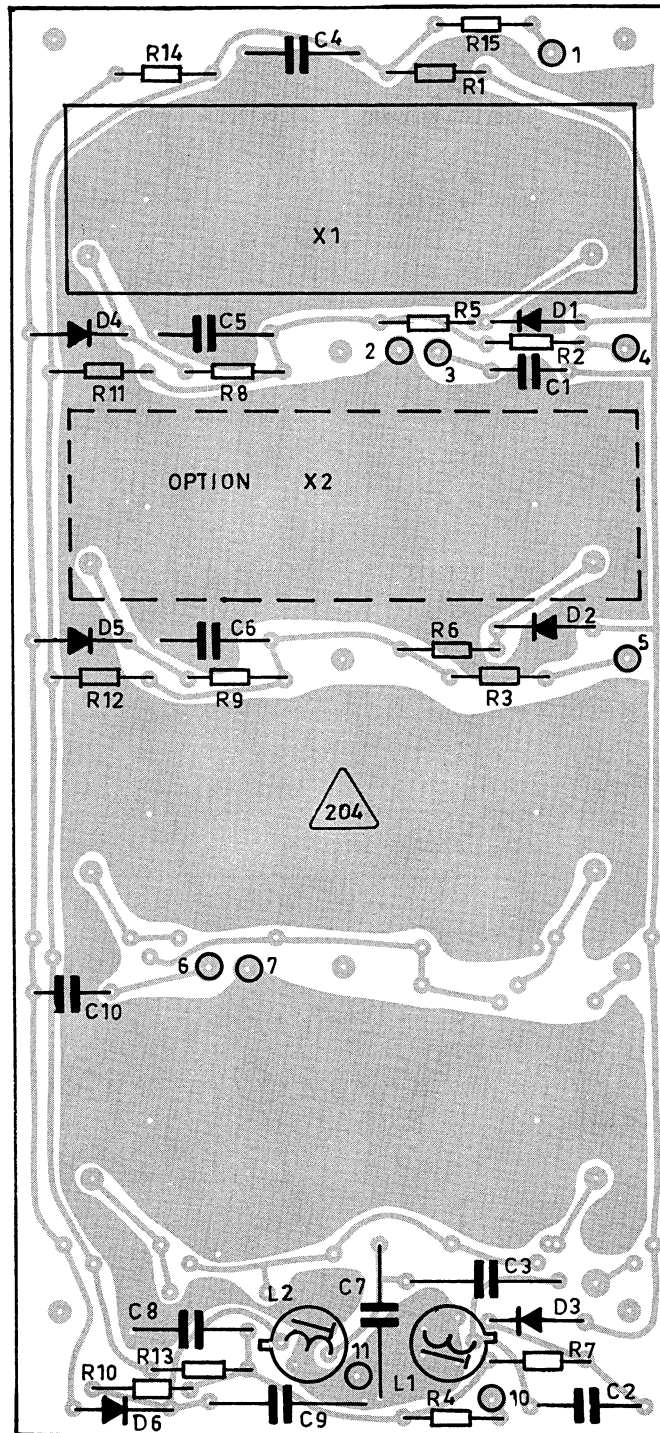


BOTTOM VIEWS



99 5 206 03

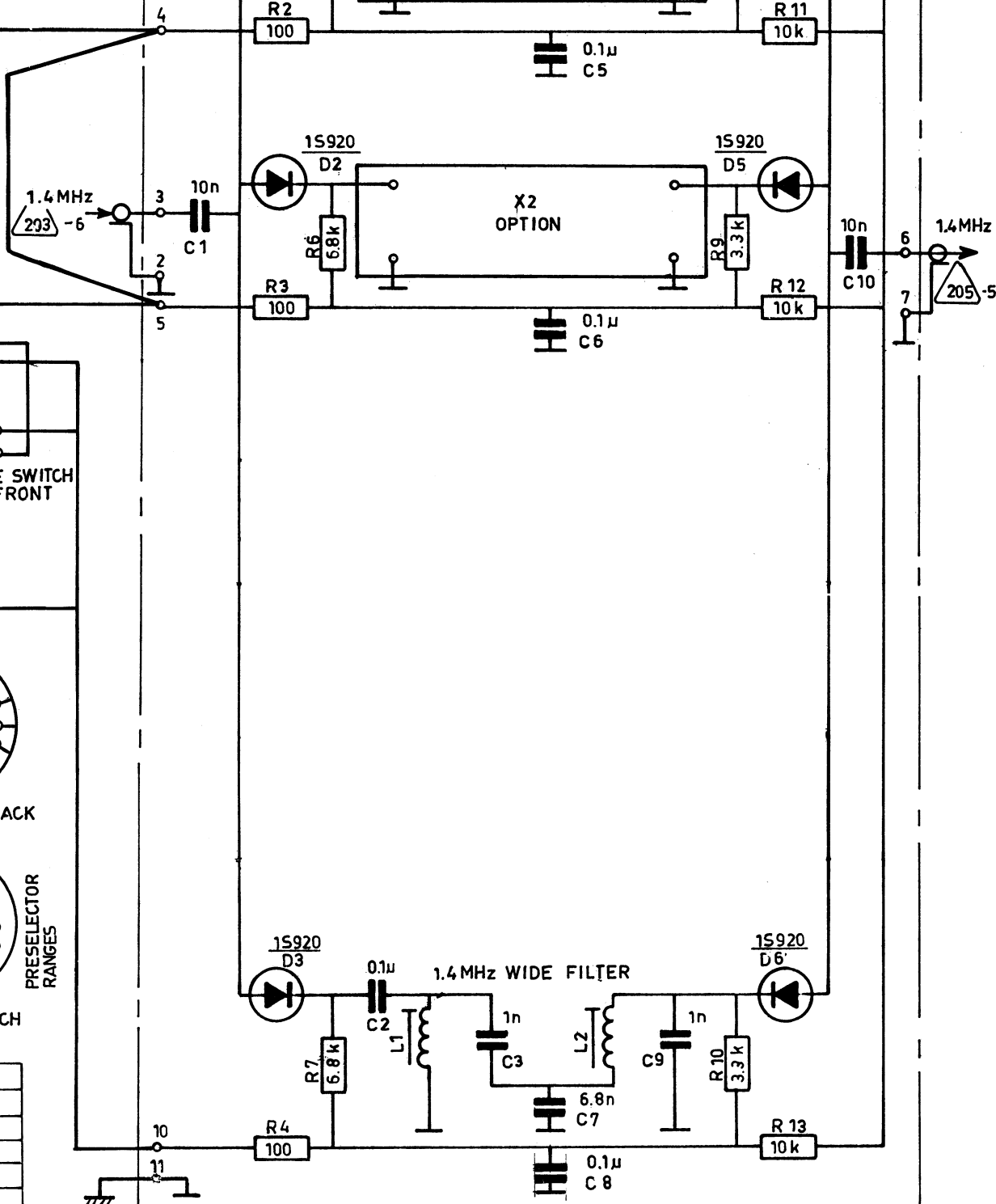
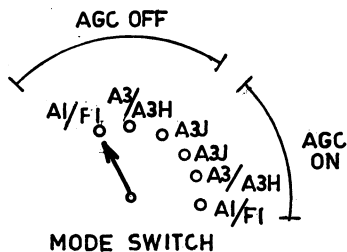
2. MIXER



204

IF-filters

ALL COMPONENTS ON THIS PRINTED
CIRCUIT BOARD CARRY PREFIX 204



IF AN OPTIONAL TELEX FILTER IS TO BE INSTALLED,
PLACE IT IN POSITION X2, AND REMOVE THE CONNECTION
BETWEEN TERMINAL 4 AND TERMINAL 5.

| | |
|----|--------------|
| be | beige |
| bk | black |
| bn | brown |
| r | red |
| or | orange |
| y | yellow |
| p | pink |
| g | green |
| b | blue |
| v | violet |
| s | slate (grey) |
| w | white |

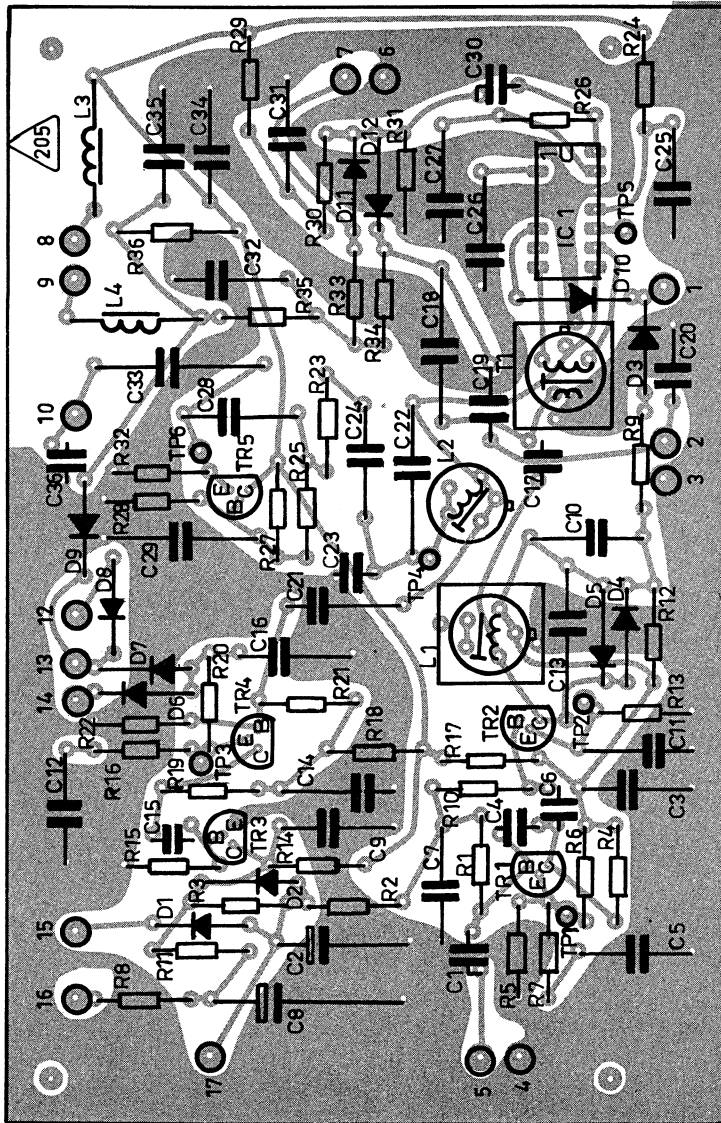
R 5000

RECEIVER MODULE

204

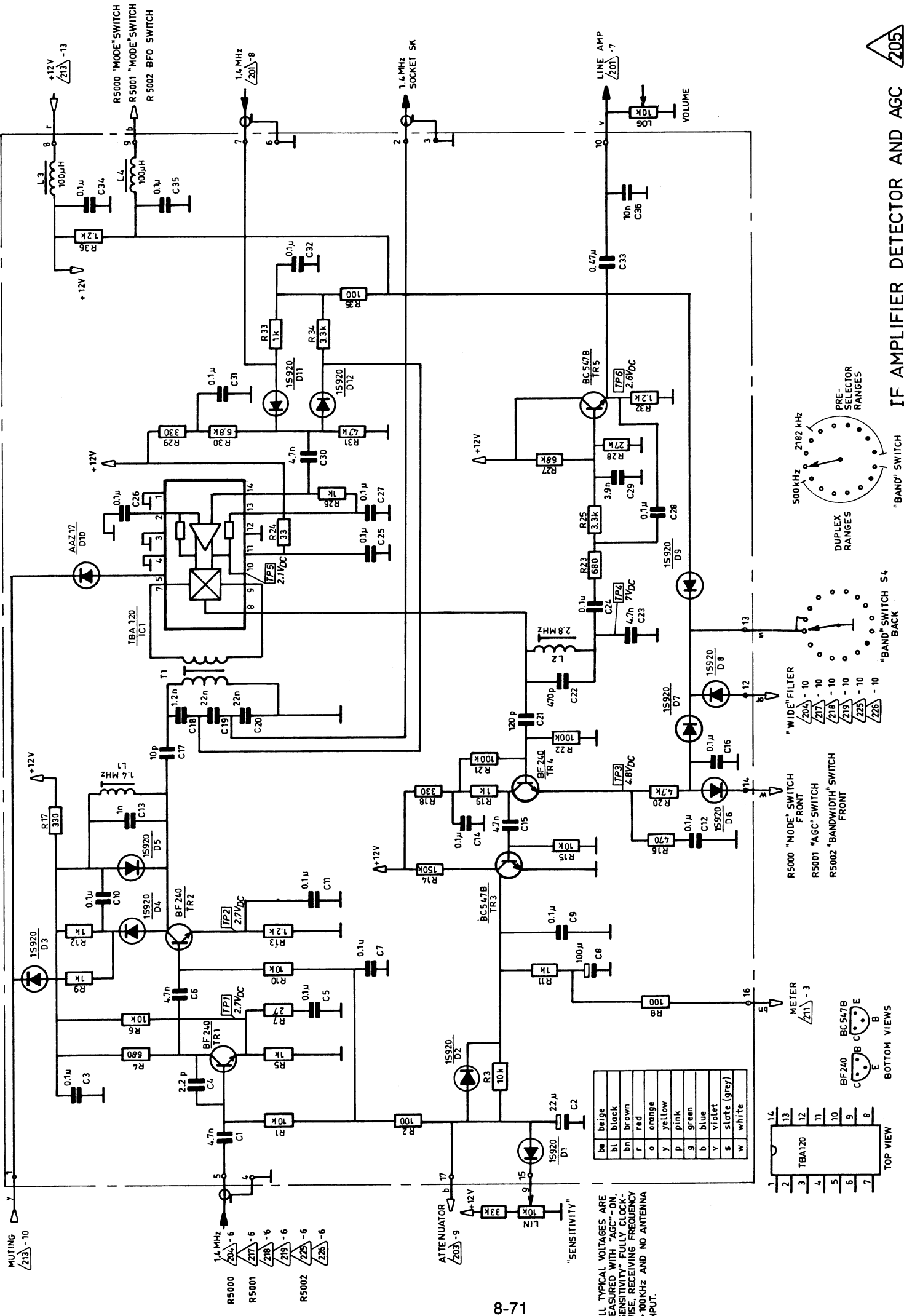
995 206 9 (3)

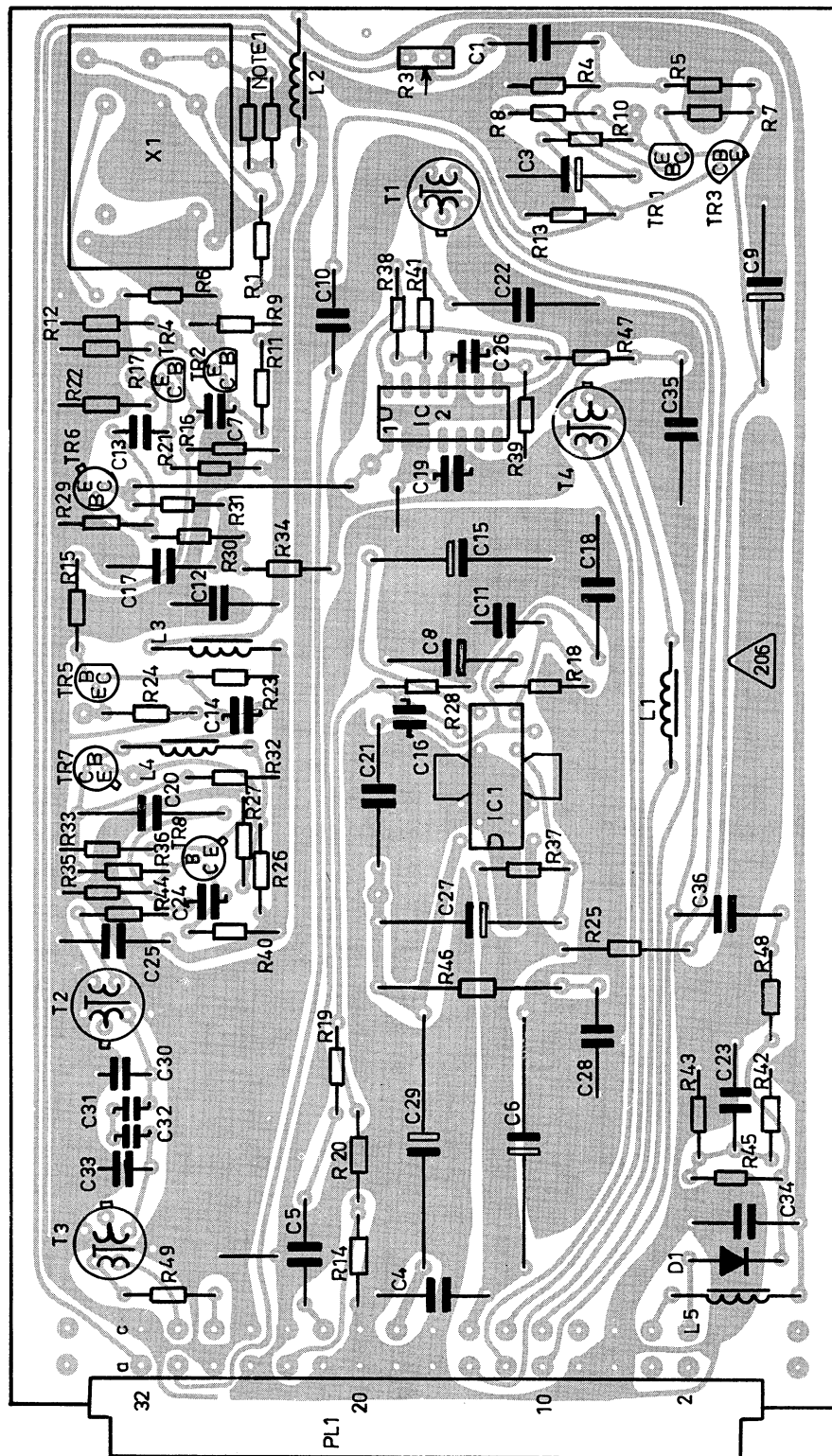
R-65



PRINTED CIRCUIT BOARD 205
VIEWED FROM COMPONENT SIDE

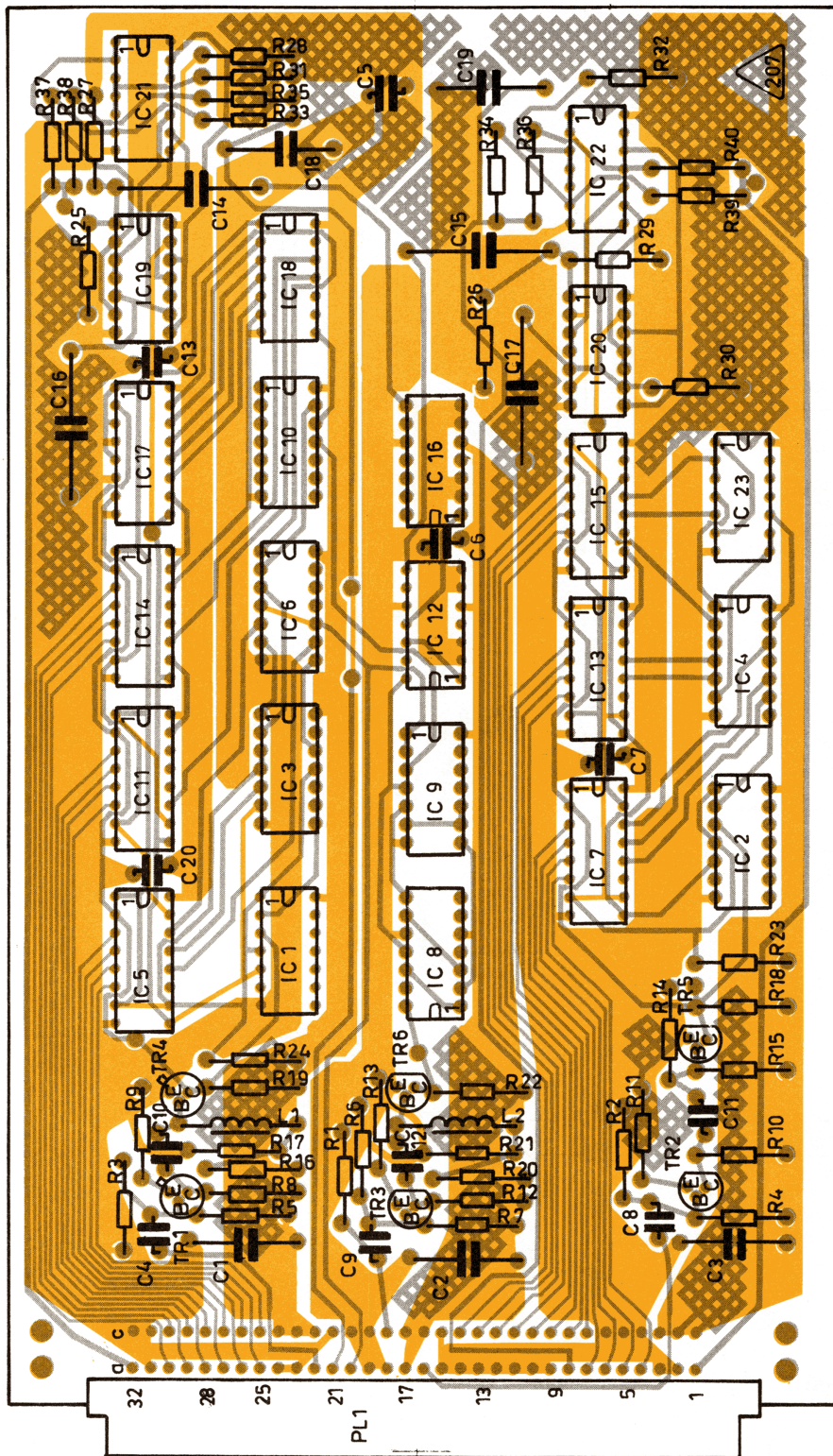
995 207 81





PRINTED CIRCUIT BOARD 206
VIEWED FROM COMPONENT SIDE

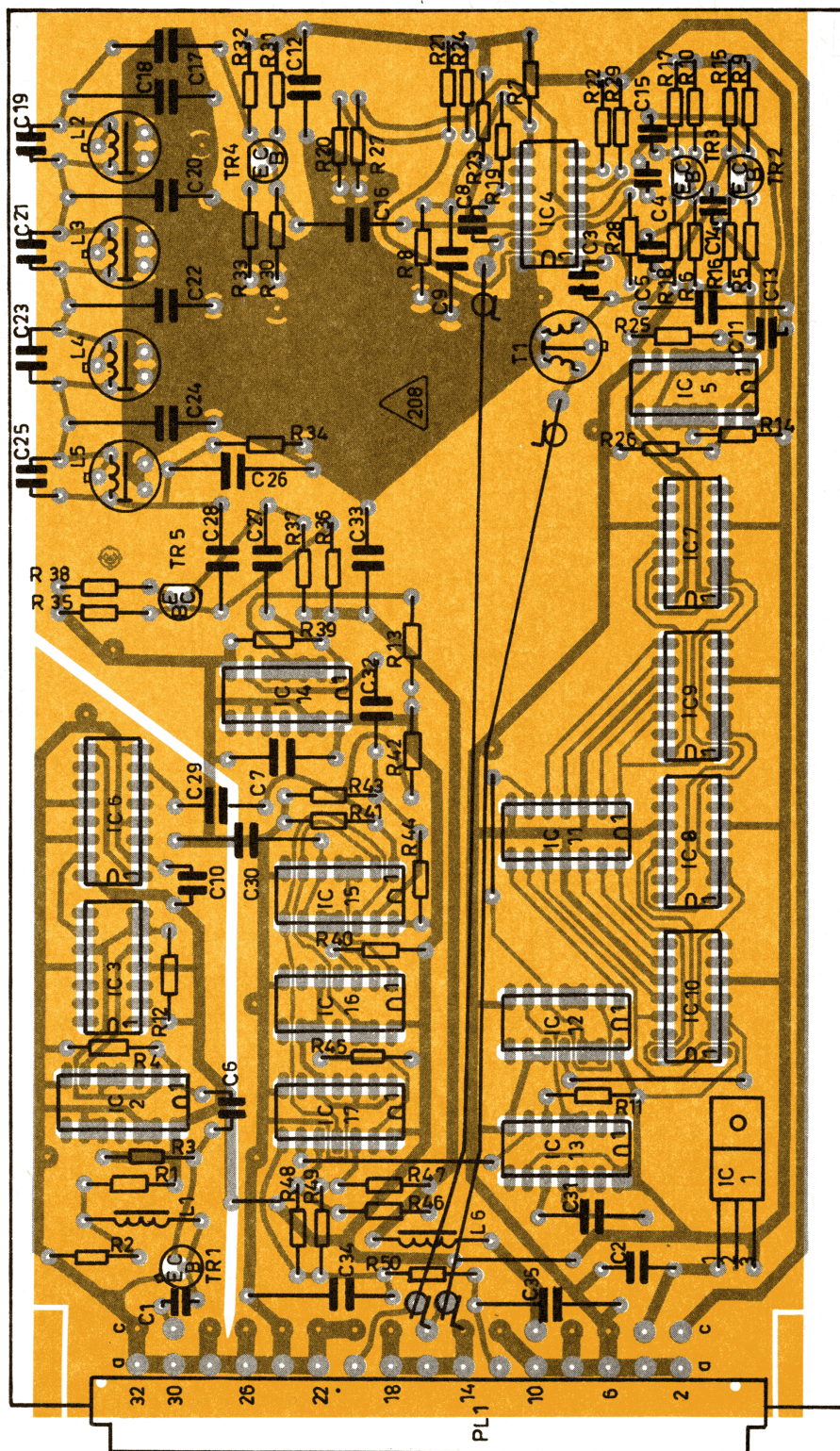
995 208 31



PRINTED CIRCUIT BOARD 207
VIEWED FROM COMPONENT SIDE

375 208 81

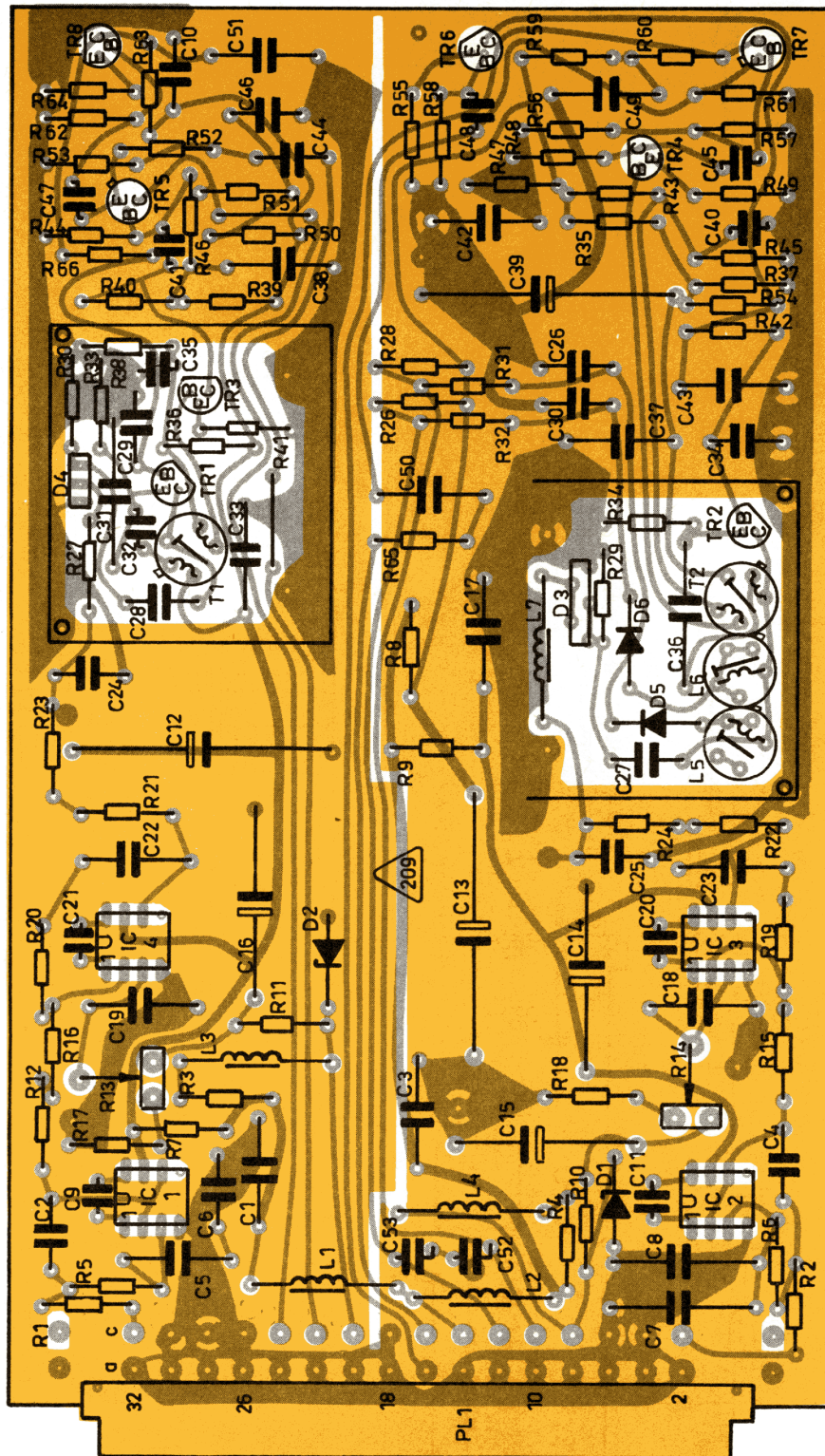




PRINTED CIRCUIT BOARD 208
VIEWED FROM COMPONENT SIDE

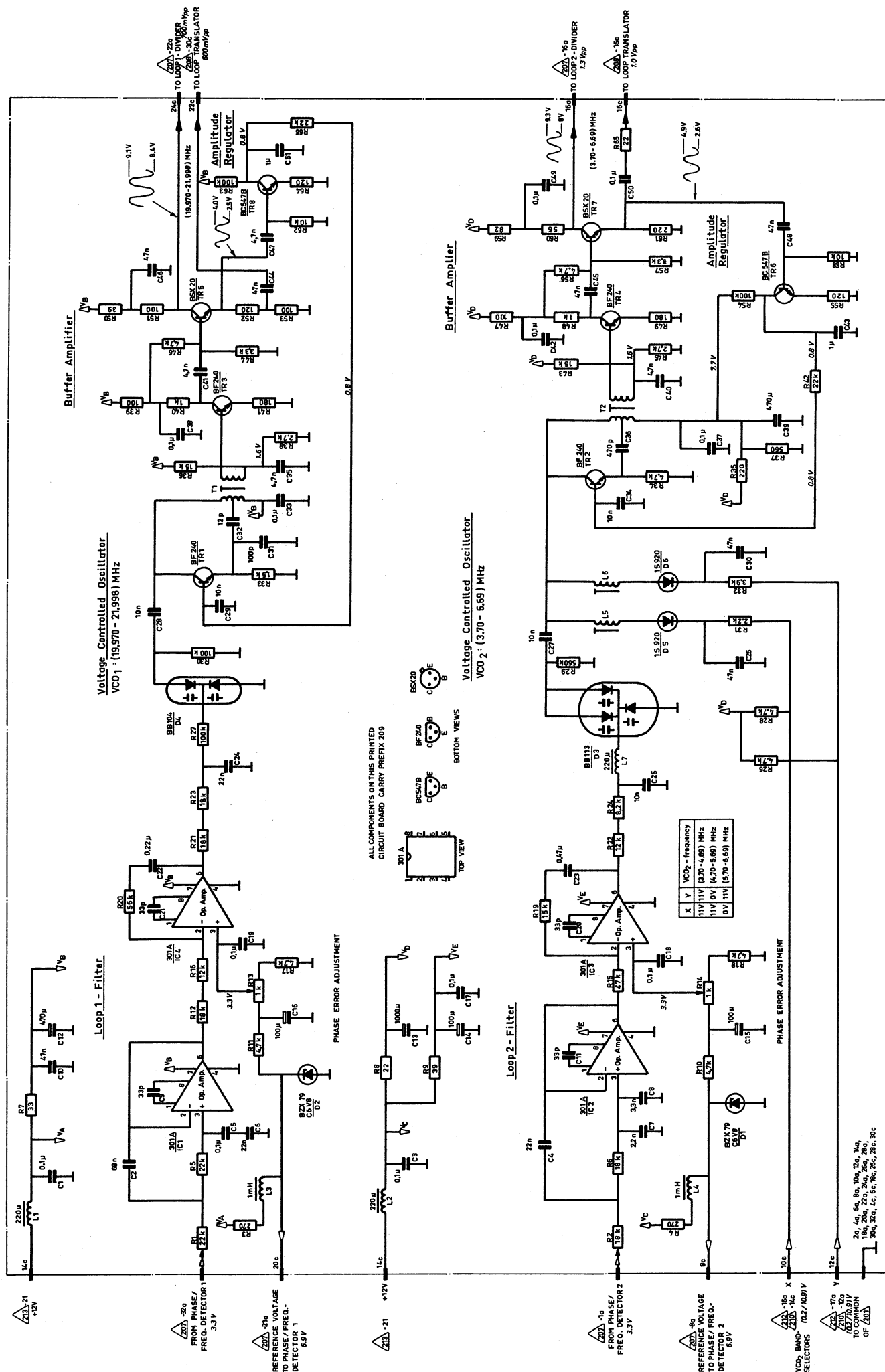
375 209 14

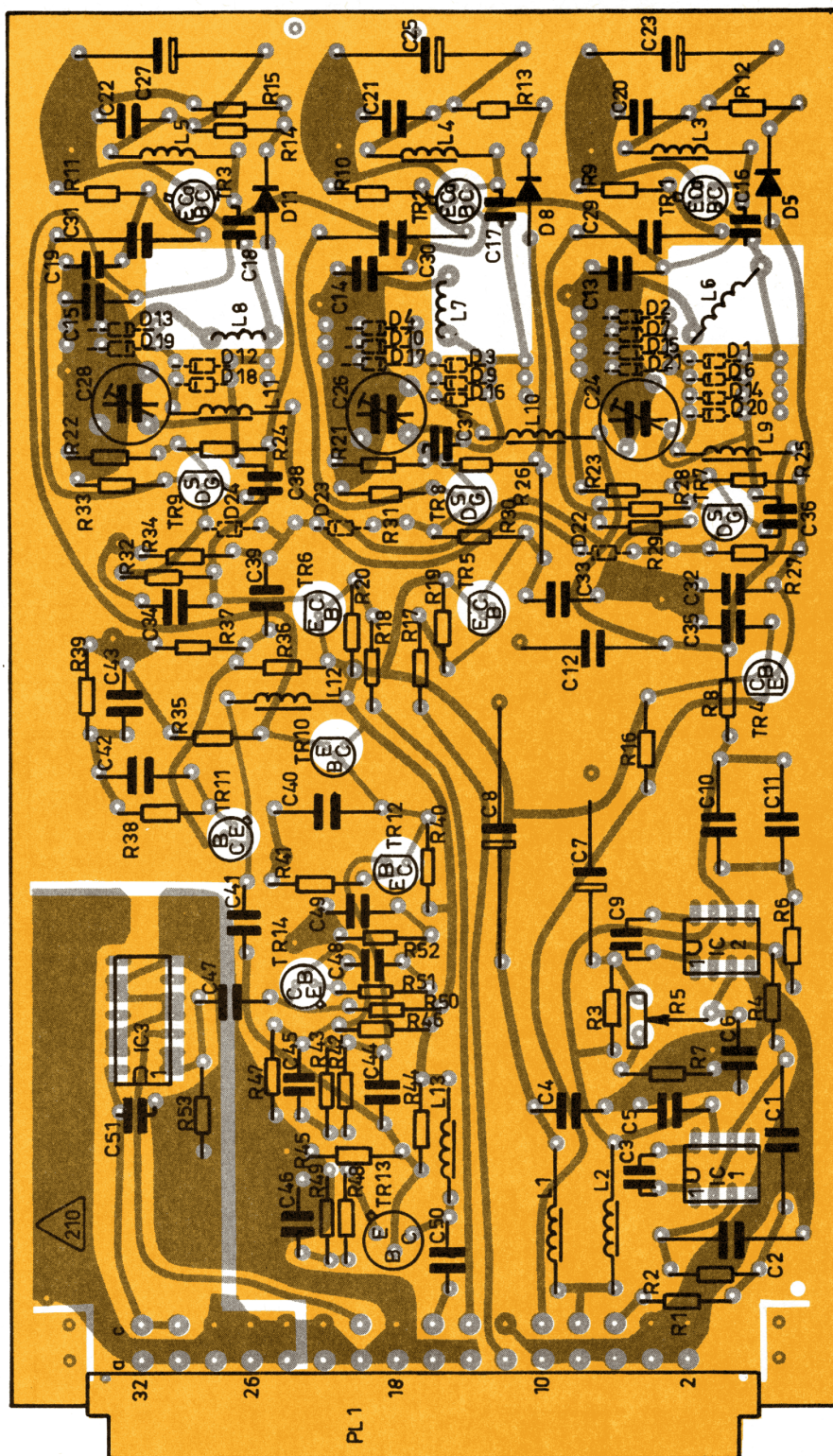




PRINTED CIRCUIT BOARD 209
VIEWED FROM COMPONENT SIDE

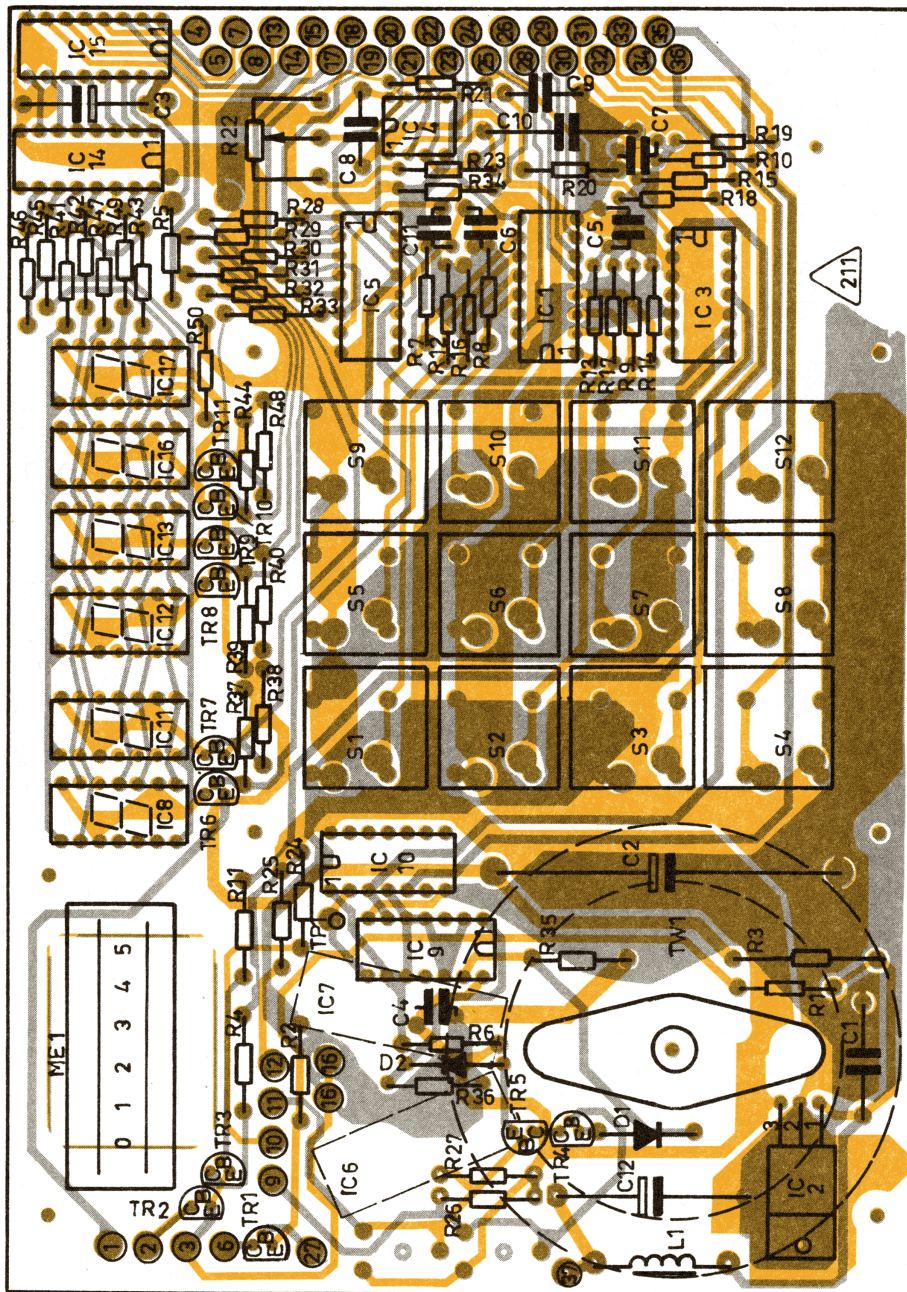
375 209 81

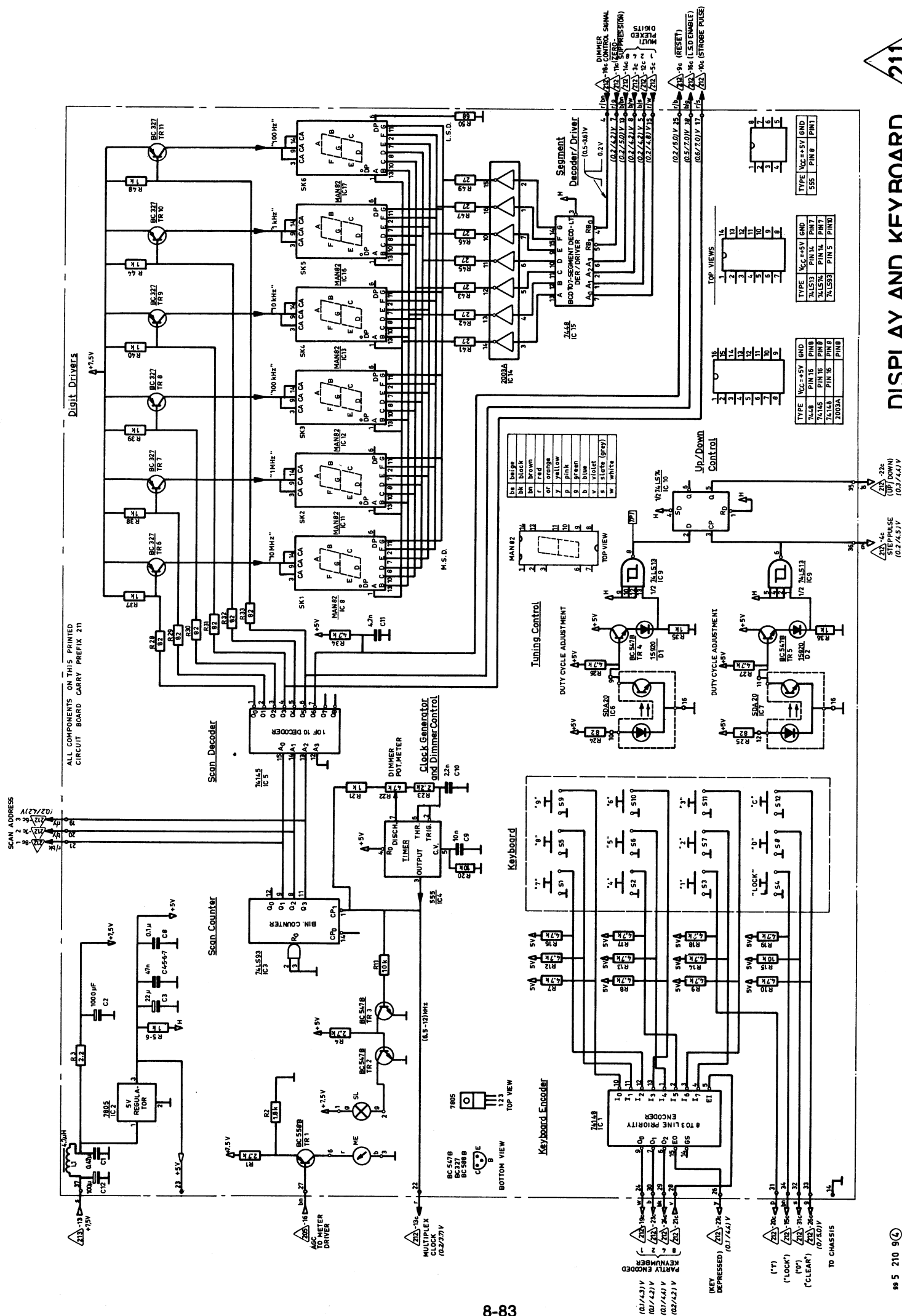


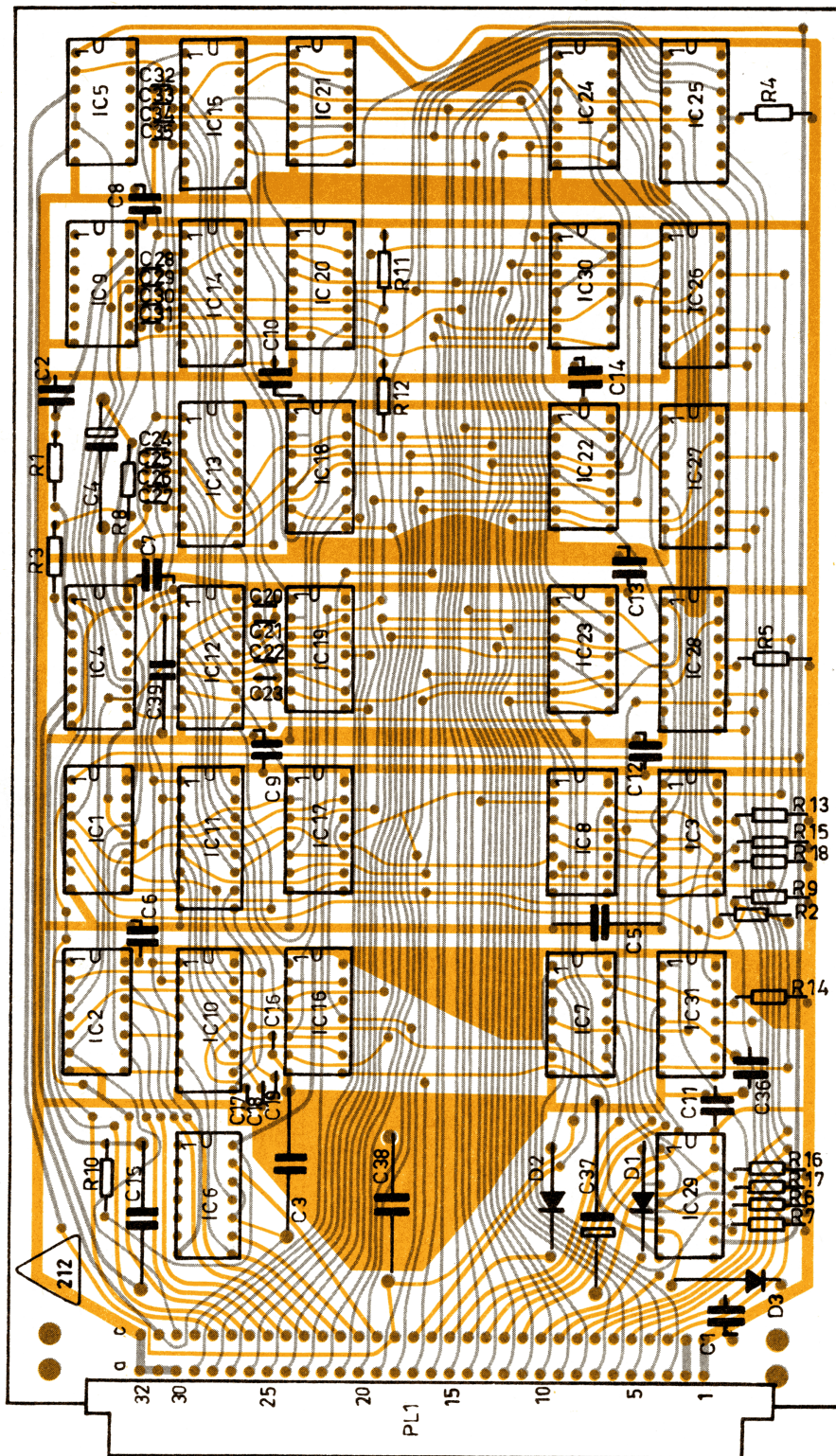


PRINTED CIRCUIT BOARD 210
VIEWED FROM COMPONENT SIDE

995 210 31

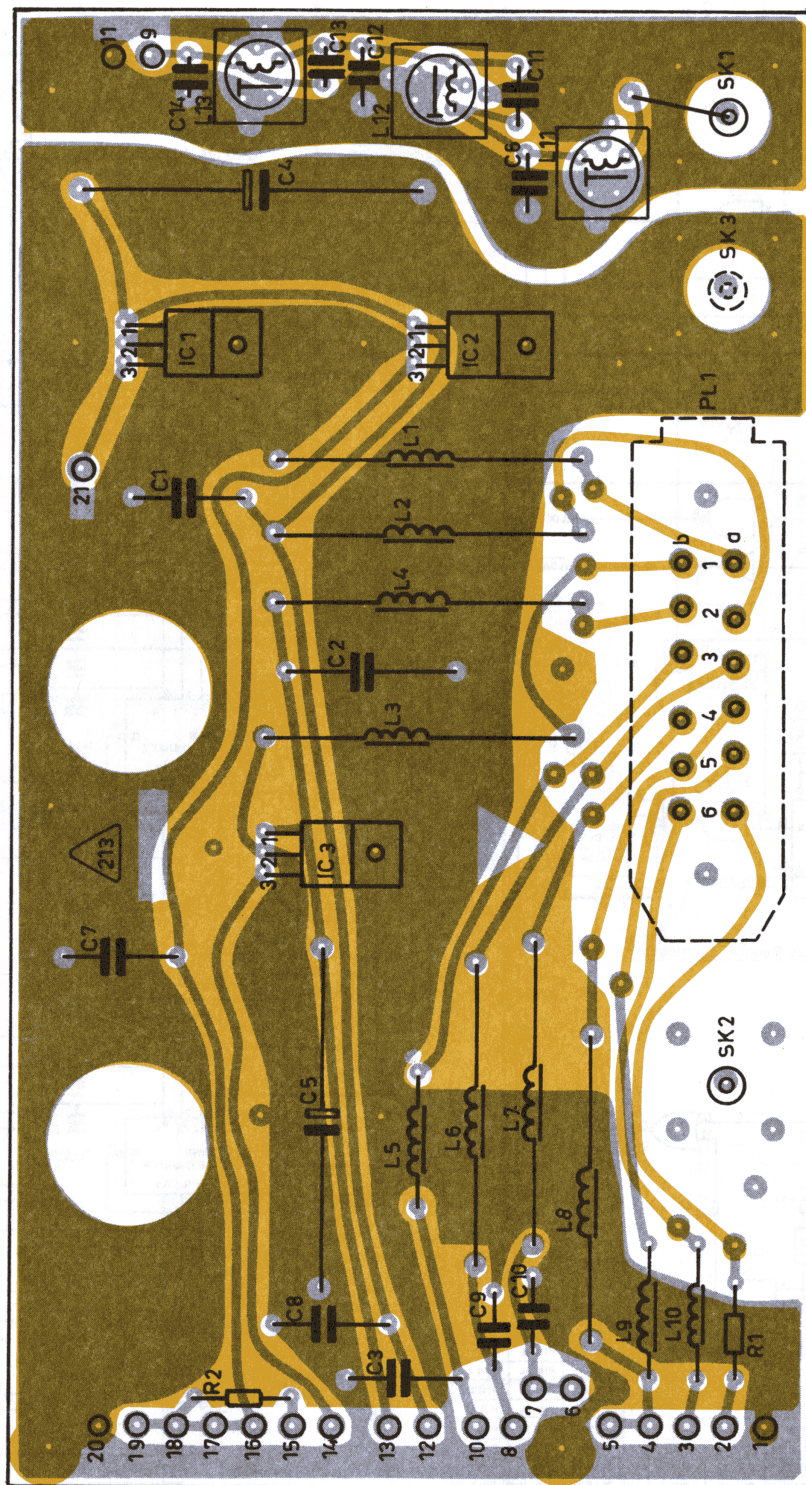






PRINTED CIRCUIT BOARD 212
VIEWED FROM COMPONENT SIDE





PRINTED CIRCUIT BOARD 213
VIEWED FROM COMPONENT SIDE

995 214 71

FROM POWER PACK
P5000 260 PL3
P5001 265 PL3
P5010 280 SK2
P5011 283 SK2
P5012 286 SK2

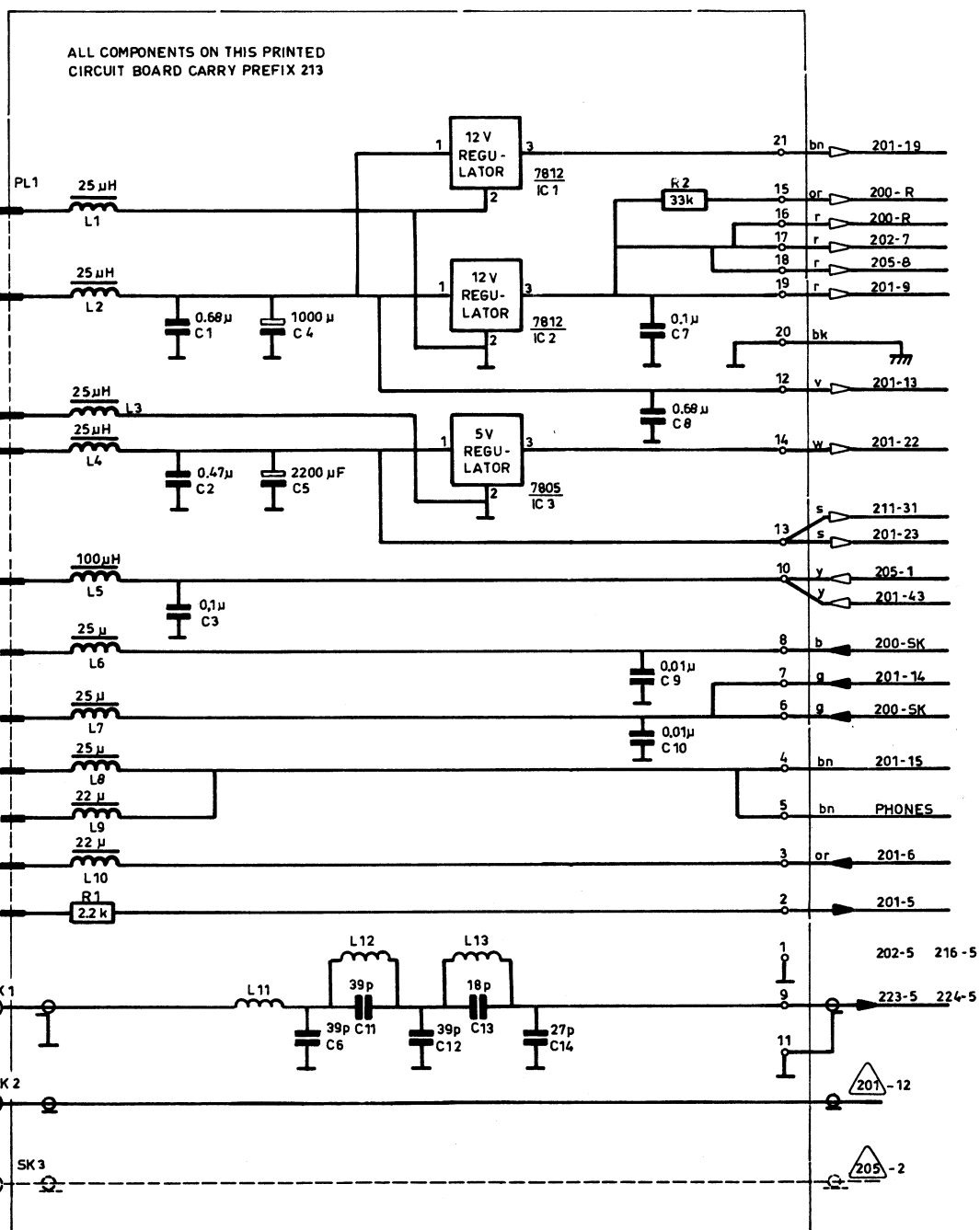
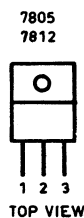
ALL COMPONENTS ON THIS PRINTED
CIRCUIT BOARD CARRY PREFIX 213

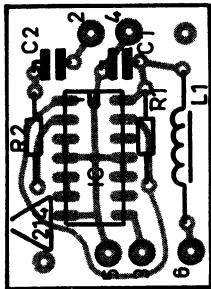
FROM RECEIVER ANTENNA
TERMINAL STRIP IN CABINET OR*

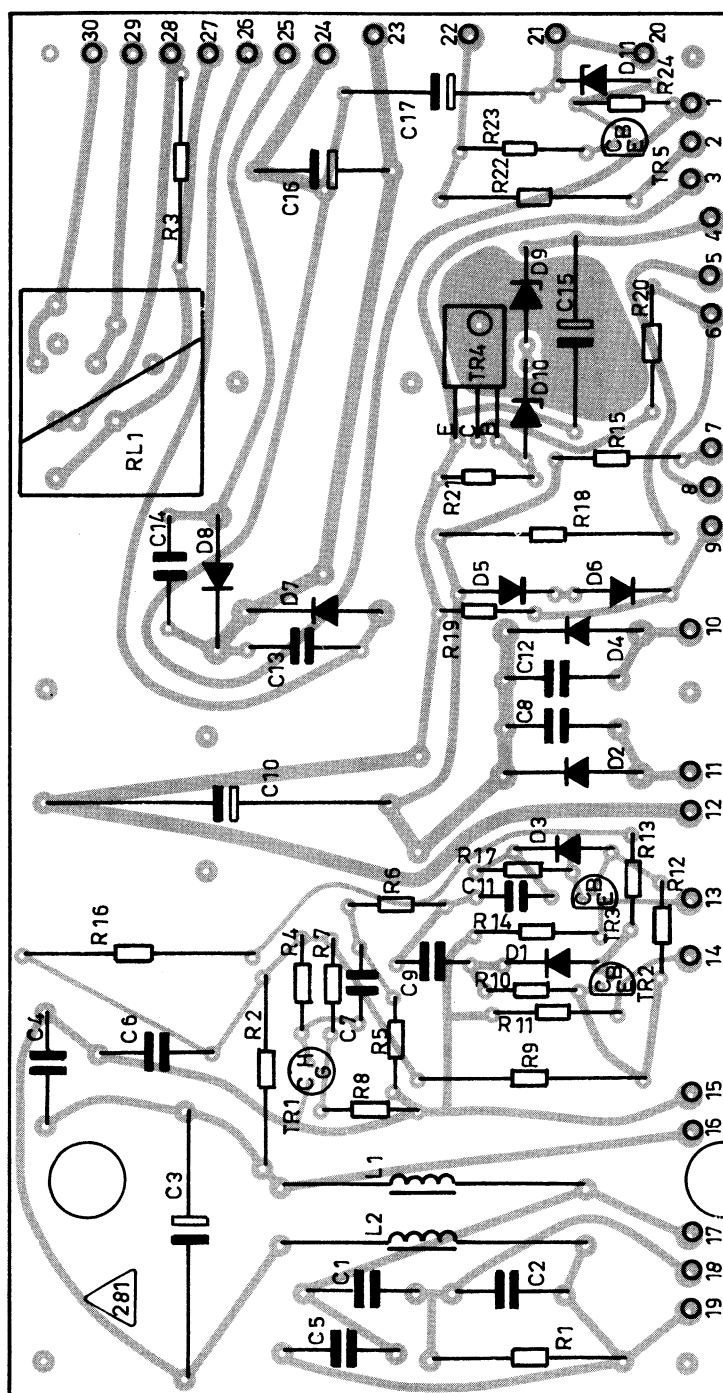
ANTENNA SK 1
TO E5000 230 SK 2
1.4 MHz
OUTPUT SK 2
IF OUTPUT SK 3

* P5010 280 PL1
P5011 283 PL1
P5012 286 PL1

| | |
|----|--------------|
| b | blue |
| be | beige |
| bk | black |
| bn | brown |
| g | green |
| or | orange |
| p | pink |
| r | red |
| s | slate (grey) |
| v | violet |
| y | yellow |
| w | white |







PRINTED CIRCUIT BOARD 281
VIEWED FROM COMPONENT SIDE

| | |
|----|-------------|
| be | beige |
| bk | black |
| b | blue |
| bn | brown |
| g | green |
| or | orange |
| p | pink |
| r | red |
| s | slate |
| tt | transparent |
| v | violet |
| w | white |
| y | yellow |

BOTTOM VIEW
C AND
CASE



2N3055
2N6254

TOP VIEW



BD135-10
BD234-10

BOTTOM VIEW



BC337-25

BOTTOM VIEW



2N6027

RECEIVER
GROUND

24V BATTERY
INPUT

DISABLING OF
LOCAL SPEAKER
(SEE NOTE 1)

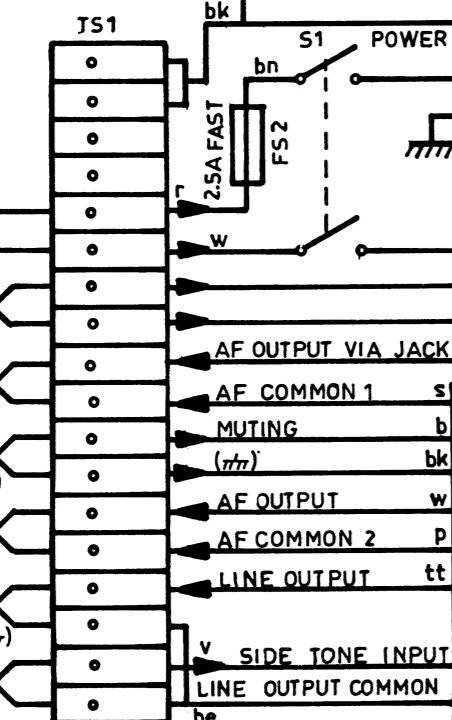
LOCAL SPEAKER
(SEE NOTE 2)

MUTING
(SEE NOTE 3)

LOW IMPEDANCE
AF-OUTPUT
(SEE NOTE 2)

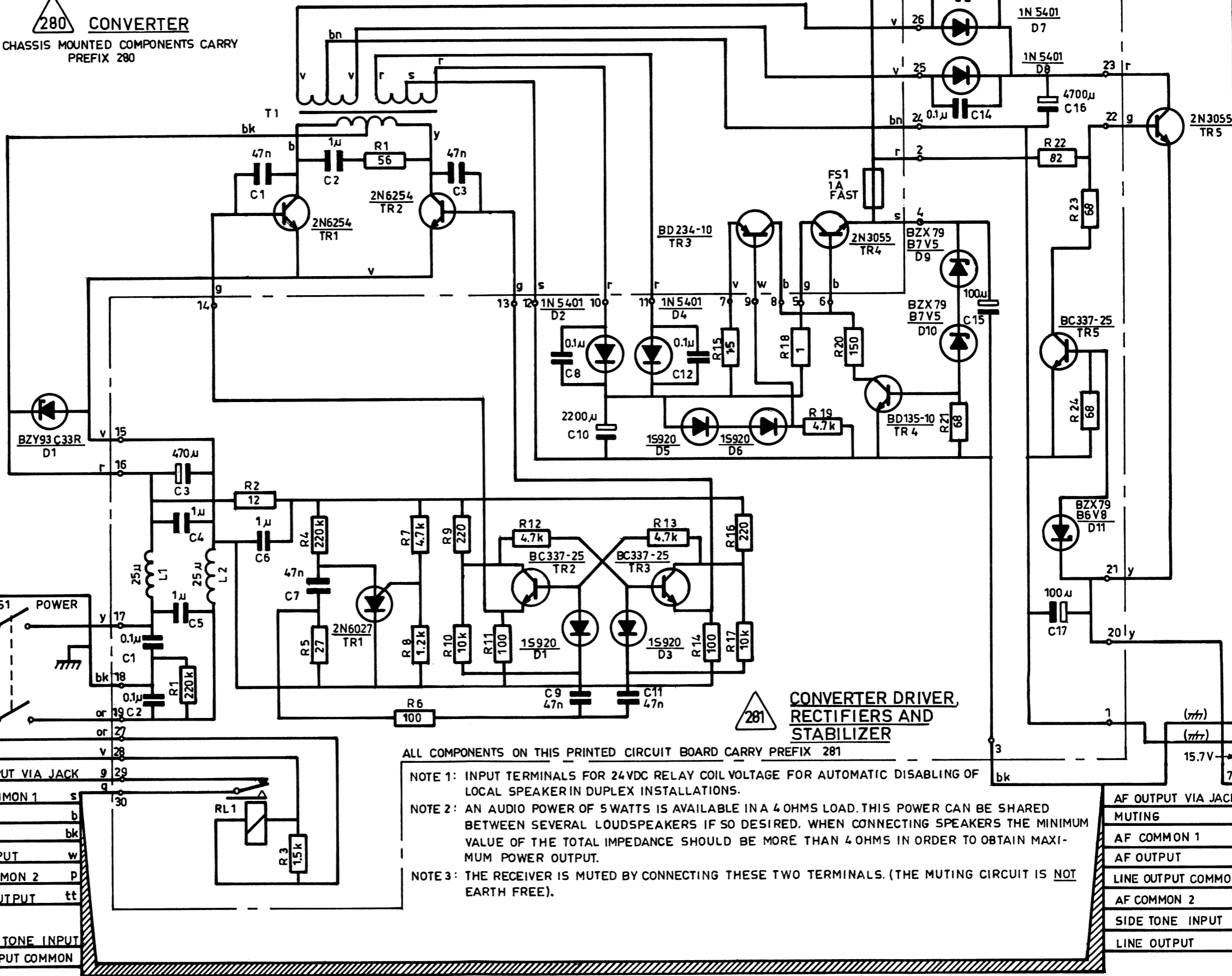
LINE OUTPUT
(MAX 10dBm IN
600 OHMS)

SIDE TONE
INPUT



280 CONVERTER

ALL CHASSIS MOUNTED COMPONENTS CARRY
PREFIX 280



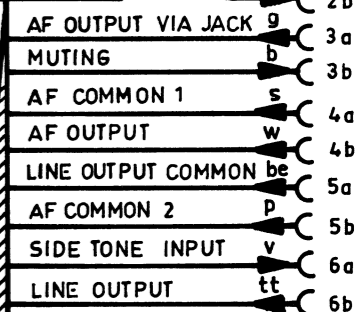
281 CONVERTER DRIVER, RECTIFIERS AND STABILIZER

ALL COMPONENTS ON THIS PRINTED CIRCUIT BOARD CARRY PREFIX 281

NOTE 1: INPUT TERMINALS FOR 24VDC RELAY COIL VOLTAGE FOR AUTOMATIC DISABLING OF
LOCAL SPEAKER IN DUPLEX INSTALLATIONS.

NOTE 2: AN AUDIO POWER OF 5 WATTS IS AVAILABLE IN A 4 OHMS LOAD. THIS POWER CAN BE SHARED
BETWEEN SEVERAL LOUDSPEAKERS IF SO DESIRED. WHEN CONNECTING SPEAKERS THE MINIMUM
VALUE OF THE TOTAL IMPEDANCE SHOULD BE MORE THAN 4 OHMS IN ORDER TO OBTAIN MAXI-
MUM POWER OUTPUT.

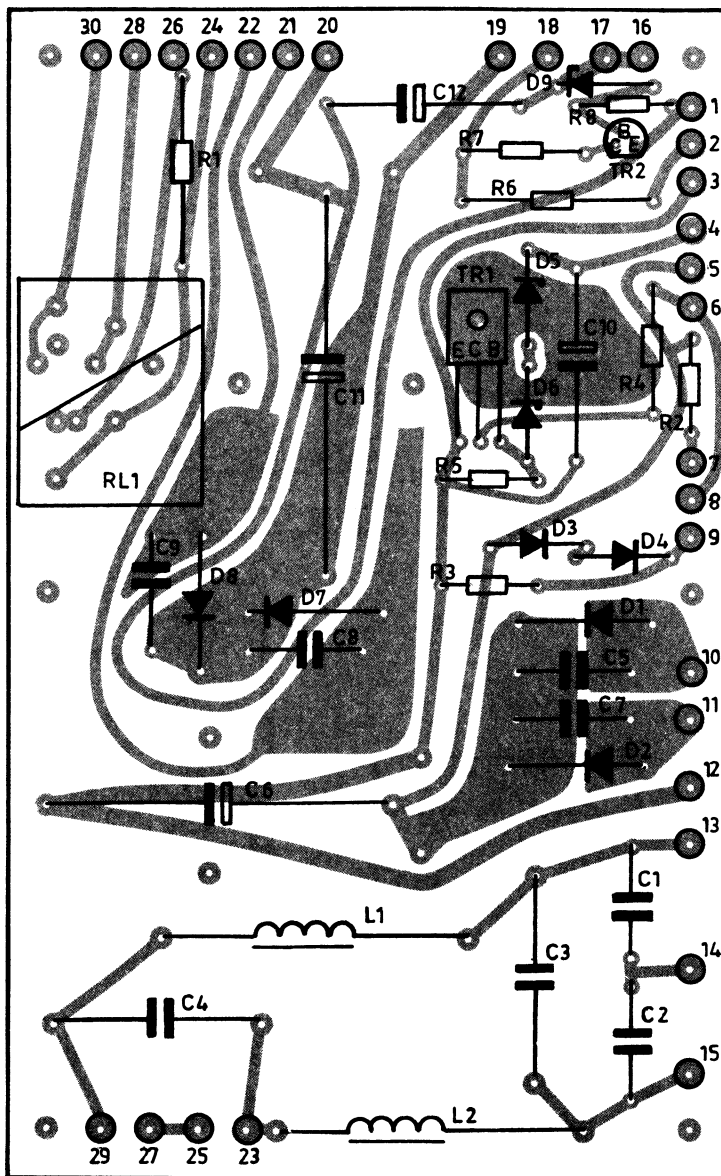
NOTE 3: THE RECEIVER IS MUTED BY CONNECTING THESE TWO TERMINALS. (THE MUTING CIRCUIT IS NOT
EARTH FREE).



TO RECEIVER 213 PL1

PL1 TO RECEIVER
213 SK1

SK1 TO RECEIVER
200/215 PL1

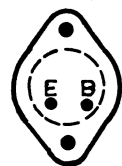


994 206 81

PRINTED CIRCUIT BOARD  284
VIEWED FROM COMPONENT SIDE

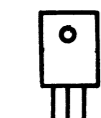
| | |
|----|-------------|
| b | blue |
| be | beige |
| bk | black |
| bn | brown |
| g | green |
| or | orange |
| p | pink |
| r | red |
| s | slate |
| tt | transparent |
| v | violet |
| w | white |
| y | yellow |

BOTTOM VIEW
C AND
CASE



2N 3055
2N 6254

TOP VIEW



BD 135-10
BD 234-10

BOTTOM VIEW
C

B
BC 337-25

RECEIVER
GROUND

AC MAINS
INPUT

DISABLING OF
LOCAL SPEAKER
(SEE NOTE 1)

LOCAL SPEAKER
(SEE NOTE 2)

MUTING
(SEE NOTE 3)

LOW IMPEDANCE
AF OUTPUT
(SEE NOTE 2)

LINE OUTPUT
(MAX. 10 dB MIN
600 OHMS)

SIDE TONE
INPUT

TS1

S1
SAFETY

S2
POWER

AF OUTPUT VIA JACK

AF COMMON 1

MUTING

AF OUTPUT

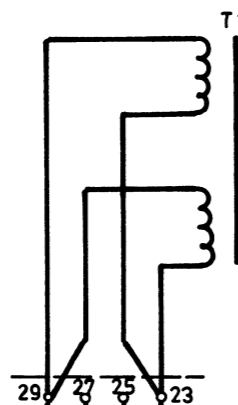
AF COMMON 2

LINE OUTPUT

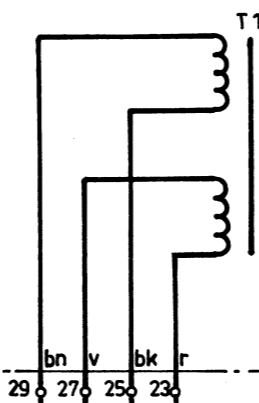
SIDE TONE INPUT

LINE OUTPUT COMMON

PRIMARY CONNECTIONS
FOR 110/115/120 V
OPERATION

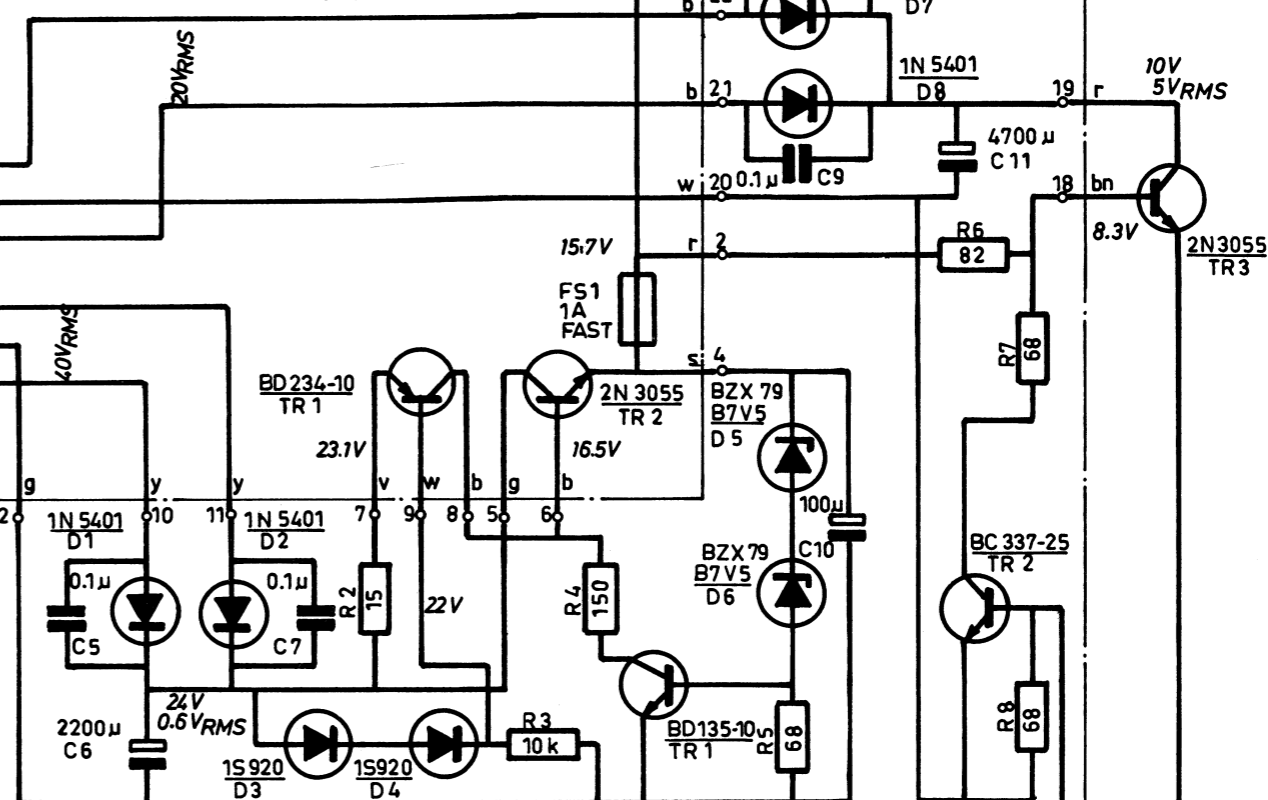


PRIMARY SHOWN
CONNECTED FOR
220/230/240 V
OPERATION



TRANSFORMER 283

ALL CHASSIS MOUNTED COMPONENTS CARRY
PREFIX 283



RECTIFIERS AND STABILIZERS 284

ALL COMPONENTS ON THIS PRINTED CIRCUIT BOARD
CARRY PREFIX 284

NOTE 1: INPUT TERMINALS FOR 24VDC RELAY COIL VOLTAGE FOR AUTOMATIC DISABLING OF
LOCAL SPEAKER IN DUPLEX INSTALLATIONS.

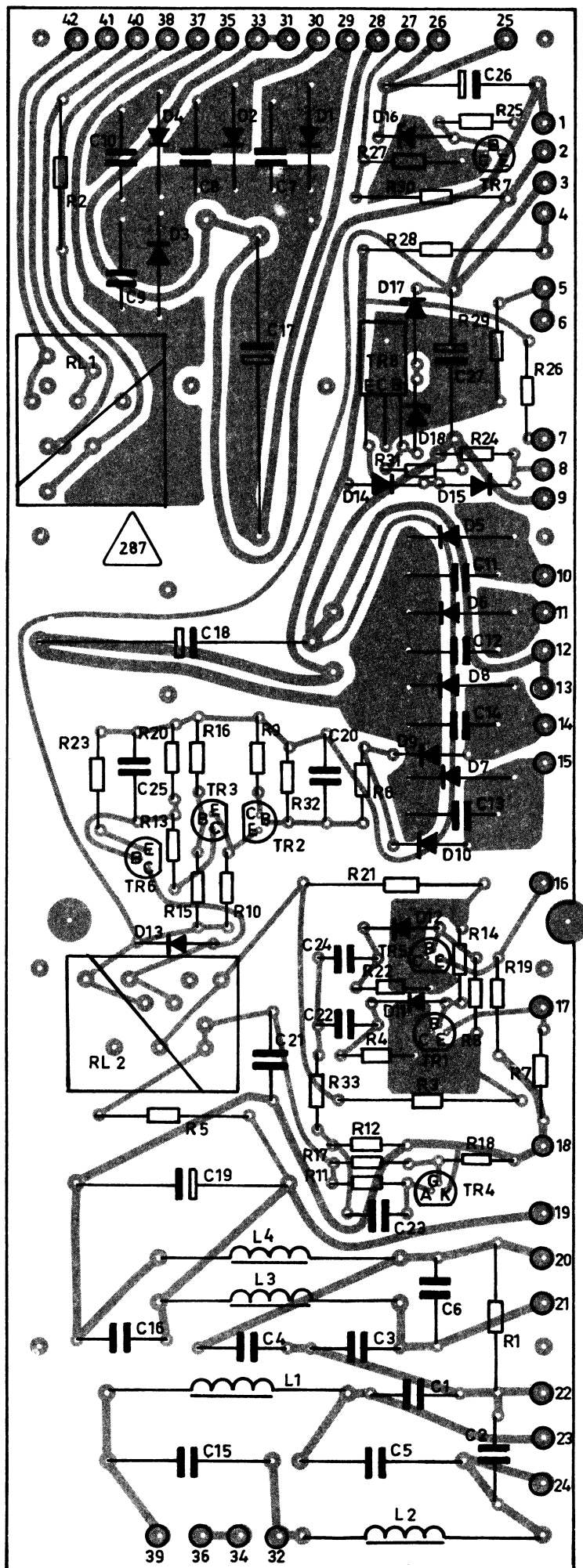
NOTE 2: AN AUDIO POWER OF 5 WATTS IS AVAILABLE IN A 4 OHMS LOAD. THIS POWER CAN BE SHARED
BETWEEN SEVERAL LOUDSPEAKERS IF SO DESIRED. WHEN CONNECTING SPEAKERS THE MINIMUM
VALUE OF THE TOTAL IMPEDANCE SHOULD BE MORE THAN 4 OHMS IN ORDER TO OBTAIN MAXIMUM
POWER OUTPUT.


NOTE 3: THE RECEIVER IS MUTED BY CONNECTING THESE TWO TERMINALS. (THE MUTING CIRCUIT IS NOT
EARTH FREE).

ALL TYPICAL VOLTAGES ARE MEASURED WITH RECEIVER CONNECTED.
MAINS VOLTAGE = 110V OR 220V V MEASURED RELATIVE TO CHASSIS.
AC-VOLTAGES: V_{RMS} ARE MEASURED ACROSS TRANSFORMER WINDINGS

AF OUTPUT VIA JACK
MUTING
AF COMMON 1
AF OUTPUT
LINE OUTPUT COMMON
AF COMMON 2
SIDE TONE INPUT
LINE OUTPUT

TO RECEIVER 213 PL1



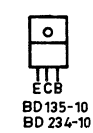
PRINTED CIRCUIT BOARD 
VIEWED FROM COMPONENT SIDE

| | |
|----|-------------|
| be | beige |
| bk | black |
| b | blue |
| bn | brown |
| g | green |
| or | orange |
| p | pink |
| r | red |
| s | slate |
| tt | transparent |
| v | violet |
| w | white |
| y | yellow |

BOTTOM VIEW
C AND CASE



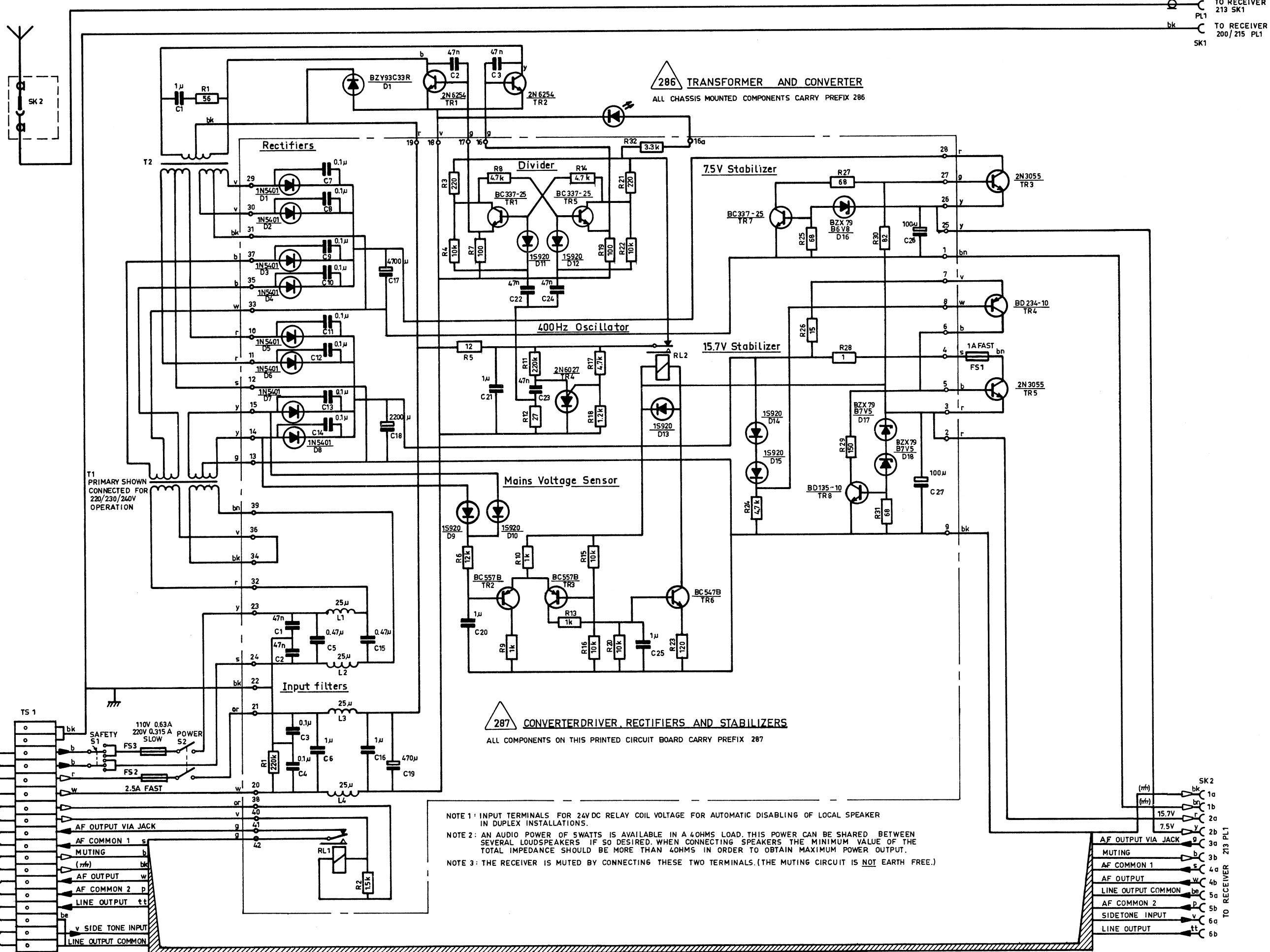
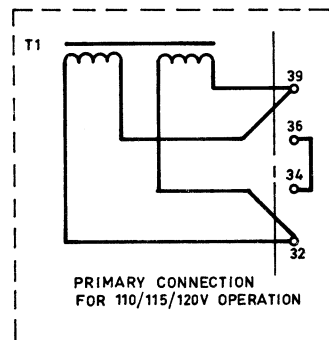
TOP VIEW



BOTTOM VIEW



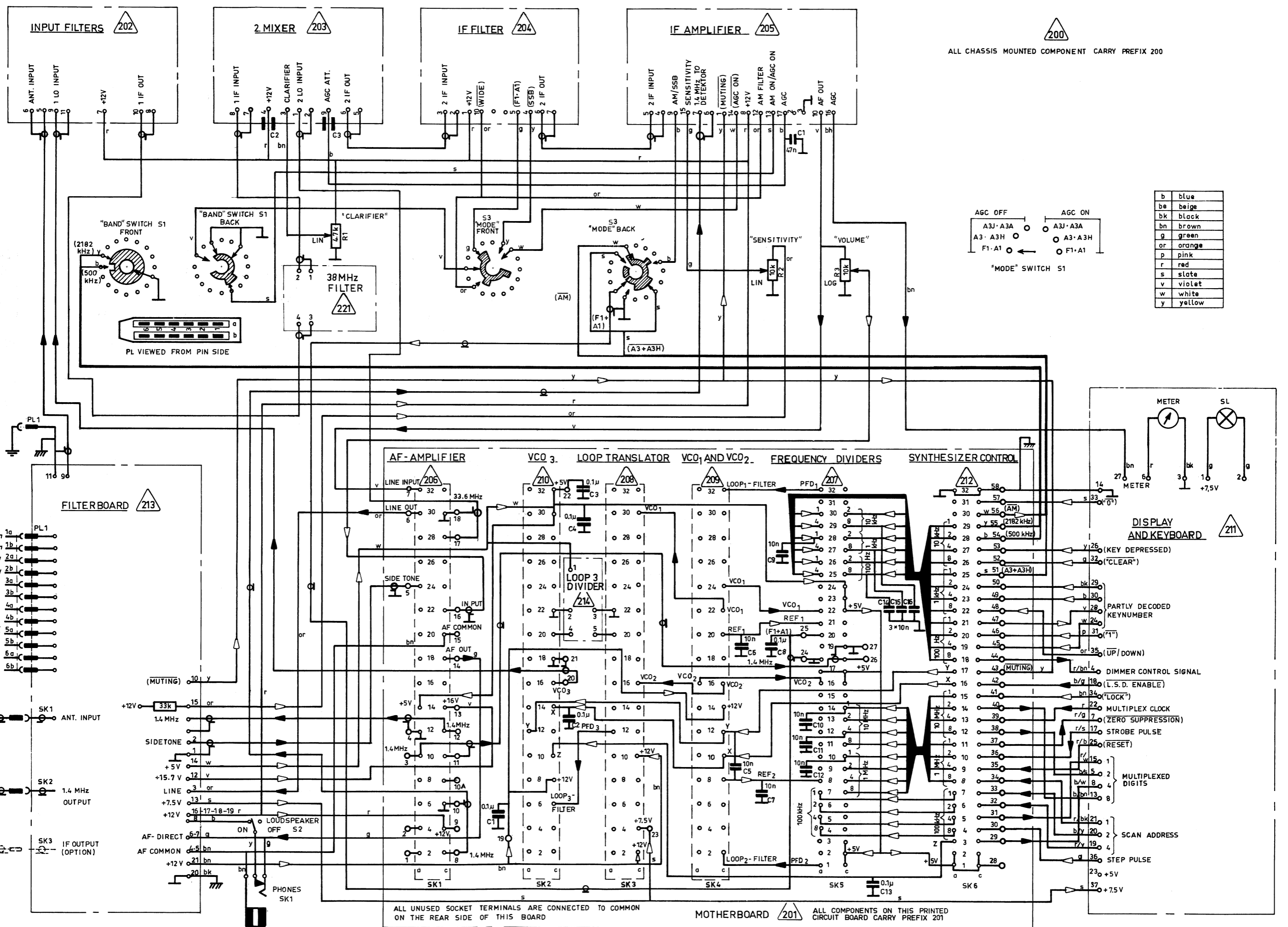
BOTTOM VIEW



NOTE 1: INPUT TERMINALS FOR 24V DC RELAY COIL VOLTAGE FOR AUTOMATIC DISABLING OF LOCAL SPEAKER IN DUPLEX INSTALLATIONS.

NOTE 2: AN AUDIO POWER OF 5WATTS IS AVAILABLE IN A 4OHMS LOAD. THIS POWER CAN BE SHARED BETWEEN SEVERAL LOUDSPEAKERS IF SO DESIRED. WHEN CONNECTING SPEAKERS THE MINIMUM VALUE OF THE TOTAL IMPEDANCE SHOULD BE MORE THAN 4OHMS IN ORDER TO OBTAIN MAXIMUM POWER OUTPUT.

NOTE 3: THE RECEIVER IS MUTED BY CONNECTING THESE TWO TERMINALS. (THE MUTING CIRCUIT IS NOT EARTH FREE.)



PARTS LIST

FOR



| | | | | | |
|--------|------------------|----------|-----|------|------------|
| 200C1 | 47n | -20/+80% | 16V | Cer. | 601 447 00 |
| C2-3 | UHF π Filter | | | Cer. | 779 000 02 |
| 200PL1 | | One Way | | | 751 000 01 |
| 200R 1 | 4.7 kohms | Lin | | | 355 222 31 |
| R 2 | 10 kohms | Lin | | | 355 222 21 |
| R 3 | 10 kohms | Log | | | 355 222 41 |
| 200S 1 | Band | | | | 375 200 86 |
| S 2 | | | | | 762 000 10 |
| S 3 | Mode | | | | 375 202 34 |
| 200SK1 | | | | | 750 000 11 |

PARTS LIST

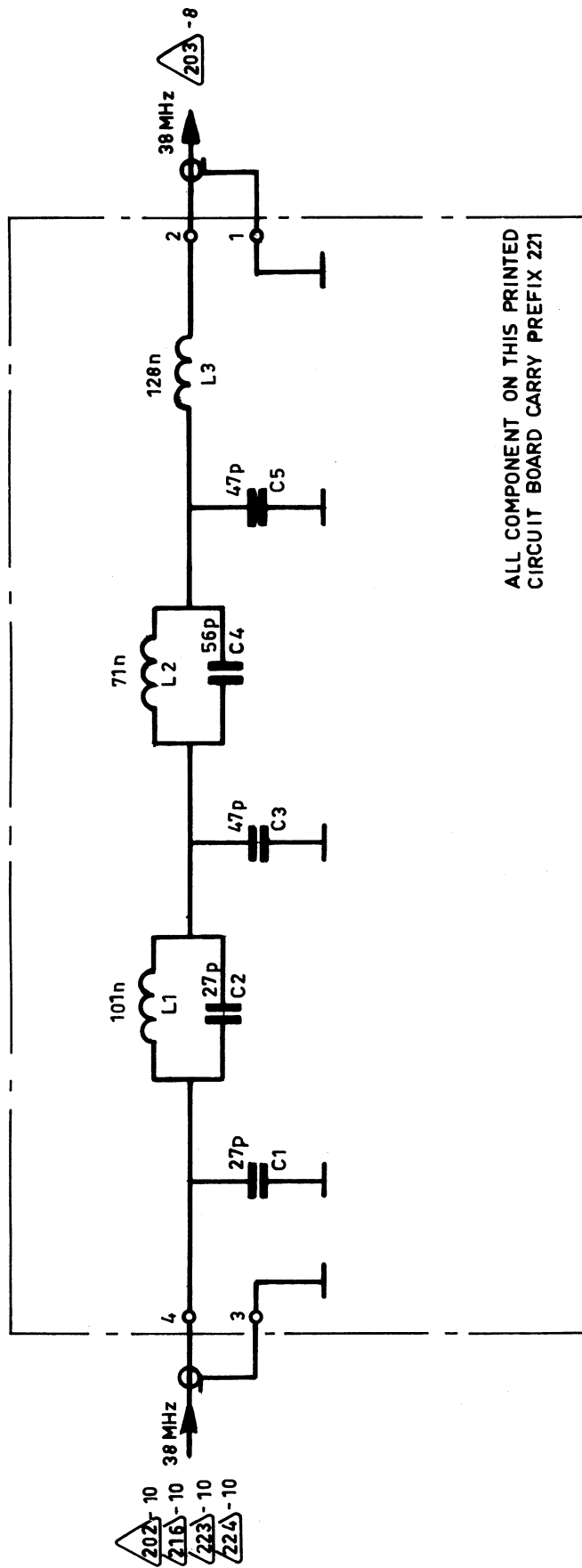
FOR



| | | | | | |
|-----------|--------|----------|------|---------|------------|
| 201C 1-4 | 0.1 uF | 10% | 250V | Polyes. | 624 510 01 |
| C 5-7 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C 8 | 0.1 uF | 10% | 250V | Polyes. | 624 510 01 |
| C 9-12 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| C13 | 0.1 uF | 10% | 250V | Polyes. | 624 510 01 |
| C14-16 | 10 nF | -20/+80% | 32V | Cer. | 602 410 00 |
| 201SK 1-4 | | 32 Way | | | 751 000 21 |
| SK 5-6 | | 64 Way | | | 751 000 23 |

995 212 64

995 212 83



PARTS LIST

FOR



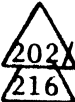









| | | | | | |
|----------|-------|-----|-----|------|------------|
| 221C 1-2 | 27 pF | 10% | 25V | Cer. | 605 127 03 |
| C 3 | 47 pF | 10% | 25V | Cer. | 605 147 01 |
| C 4 | 56 pF | 10% | 25V | Cer. | 605 156 03 |
| C 5 | 47 pF | 10% | 25V | Cer. | 605 147 01 |
| 221L 1 | | | | | |
| L 2 | | | | | |
| L 3 | | | | | |
| | | | | | 375 239 61 |

ERRATA FOR R 5000 INSTRUCTION MANUAL, edition 4.

- Page 8-73 At terminal 14c change as folloes:
+15,7V, $\triangle 213$ -9 to read +15,7V $\triangle 213$ -12.
- Page 5-2: Section 5.4.2. Change as follows:
"By using part of IC1 as a crystal-oscillator" to read
"By using TR1 as a crystal-oscillator"
- Page 5-2 Section 5.4.2. Change as follows:
"Diode D1" to read "Diodes D1-4".
- Page 5-4 Section 5.4.5. Change as follows:
"TR5, TR8" to read "TR4, TR6".
- Page 8-5 Add to the parts list:
D2 - 1S920 - 830 192 00.
- Page 8-13 Change as follows:
"203X-1 - 2.999.750 MHz - 385 202 23" to read
"203X-1 - 2.999.750 MHz - 385 203 01".

AMENDMENTS TO R 5000 INSTRUCTION MANUAL, edition 4

| MODULE No. | issue No. | Modification relative to prior issue | SKANTI code No. of new parts | Date introduced |
|---|---|---|------------------------------------|--------------------|
|  |  | Capacitor 10nF -20/+80 %, 30V, CER. added between TP5 and ground. Capacitor 10nF -20/+80 %, 30V, CER. added between terminal 203-3 and ground. The ground of the circuit board 203 connected to chassis at the resistor 203R30. | 602 410 00 | 1 - 78 |
|  |  | Capacitor 18pF, 5%, 400V, CER. added between terminal 202/216-7 and ground | 605 118 00 | 1 - 78 |
|  |  | Capacitor 820pF, 1 %, 500V, POLYST. placed between basis of TR6 and ground | 615 282 00 | 1 - 78 |
|  |  | Scan Decoder IC5 - 74145 changed to TEXAS Type only | 857 414 51 | 1 - 78 |
|  |  | Diode 1S920 placed between IC30-7409A pin 3 and terminal 17C (cathode at IC30-pin 3) Diode 1S920 added between IC30-7409A pin 11 and IC30-7409A pin 3. (Cathode at IC30-pin 3). | 830 192 00 | 5 - 78 |