Sailor

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MOUNTING INSTRUCTIONS FOR SAILOR TANDEM STATION & INSTRUCTION BOOK FOR CENTER PANEL H1222

A/S S. P. RADIO · AALBORG · DENMARK

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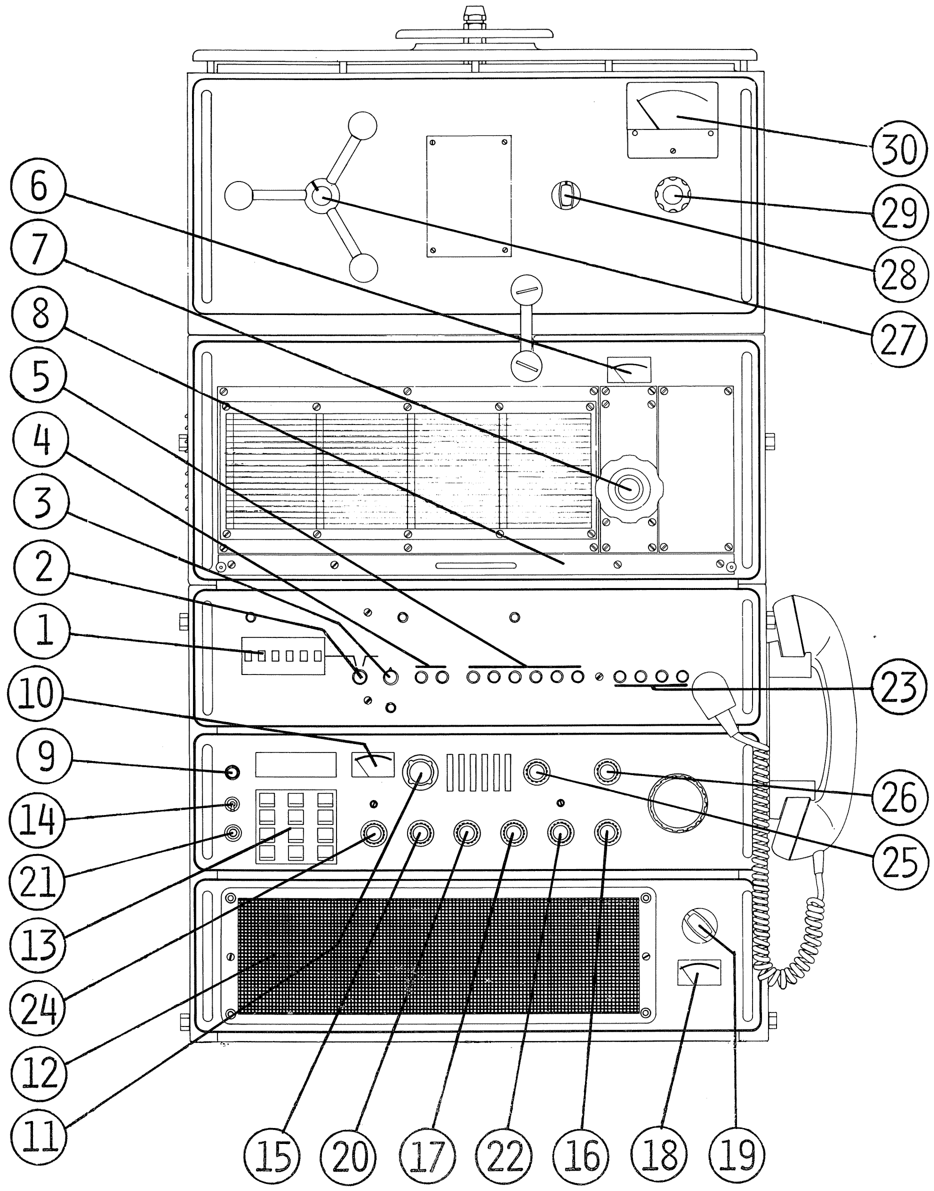
CONTROLS



H1201

CONTROLS

(1) FREQUENCY SELECTOR
For selection of the transmitting frequency in the maritime bands.

(2) DISTRESS (2182 kHz)
For selection of the distress frequency 2182 kHz.

(3) POWER
Normally to be in position FULL. Under certain circumstances it can be advantageous to reduce the output power of the transmitter. The output power can be reduced in four 5 dB steps to about -20 dB.

(4) SIMPLEX - DUPLEX
Switching between simplex and duplex operations.

(5) A3A, A3J (SSB) and A3H (AM)
Selection of transmission mode.

TUNE
For tuning of T1127, a two-tone signal is generated.

TEST ALARM
Activate TEST ALARM and the two-tone-alarm will be heard in the micro-telephone handset.

ALARM
Activate TEST ALARM and ALARM for transmitting two-tone-alarm signal on the DISTRESS frequency 2182 kHz.

(6) AERIAL METER
Shows the aerial current in Amp.

(7) AERIAL TUNE
For tuning of aerial.
Keep the button TUNE (5) pressed and tune for max. aerial current.

(8) AIR FILTER - TRANSMITTER
See special paragraph in this manual.

(9) NOISE GENERATOR
Disconnects the aerial and activates the built-in noise generator.

(10) METER
The meter shows the field strength of the received signal.

(11) RF TUNE
Tunes the RF filters to the selected frequency, when the noise generator (9) has been activated. Note: Frequencies below 150 kHz are not tuneable.

(12) AIR FILTER - POWER SUPPLY
See special paragraph in this manual.
The fuses are placed behind the filter. Also spare fuses are stored there.

(13) FREQUENCY SELECTOR
For selection of receiving frequency. Key in the frequency. Press the NOISE GENERATOR button (9) , and tune the RF TUNE (11) for maximum deflection on the METER (10) .

NOTE: For use of the continuous tuning facility. Read the chapter: DIRECTIONS FOR USE in the receiver manual.

(14) LOUDSPEAKER ON/OFF
Switches ON, all the loudspeakers.

(15) CLARIFIER
Corrects for small frequency errors in SSB signals.
To be set for clearest reception of SSB signals.

(16) MODE SWITCH
Switches between reception of SSB (A3A and A3J) signals, AM (A3, A3H, A2 and A2H) signals and distress frequency signals (2182 kHz).

(17) RF-GAIN
Controls the amplification in the IF-amplifier.

(18) SUPPLY VOLTAGE
Shows the input voltage to the station.
Must be in the green area, also when the transmitter is keyed.

(19) MAIN SWITCH
Main switch for the station.
Switches between the positions:

OFF............The station is switched off

RECEIVER ONLY...Only the receiver is switched ON

STAND BY.......The receiver is switched ON and the transmitter is ready for immediate use.

ON.............Both receiver and transmitter are switched on. The transmitter is ready for use if the delay time (30 secs) has passed, either in position STAND BY or ON.

The positions STAND BY and ON should not be used more than necessary, as this will result in unnecessary power consumption, wear and tear on the output tube of the transmitter and dirty air filters.

(20) AGC SWITCH

ON........... For normal SSB purpose (long decay time).

OFF.......... Automatic gain control off.

TELEX........ To be used in telex operation and for very noisy telephony reception (short decay time).

(21) HEADPHONES
When the headphone is connected, the loudspeakers are switched off.

(22) AF-GAIN
Controls the audio output.

(23) TELEPHONY - TELEGRAPHY - TELEX

TELEPHONY: To be activated for normal telephony use.

TELEGRAPHY: Activate the buttons A1 or A2H together with the button A3H (5). The telegraph key is now connected to transmitter.

TELEX: Activate the button TELEX together with the button A3J (5). The teleprinter is now connected via the simplex TOR equipment to the receiver and transmitter.

(24) DIMMER
Controls the light intensity from the frequency display and from the METER (10).

(25) BFO (only with R1120)

Adjust the beat note in A1 mode.

(26) FILTER (only with R1120)

Chooses the wanted bandwidth in A1 - and A2 mode, and disables the BFO in the AUX position.
As option a special telex filter or an LSB filter can be inserted in AUX position.

(27) BAND SWITCH
Pos. BAND I, BAND II and BAND III.
To be used when transmitting in the range 405 - 535 kHz.
Select band corresponding to the table on front plate of T1127L.

Pos. TEST: 405 - 535 kHz.
Output from H1201 is connected to a built-in dummy load.

Pos. TEST 2 MHz BAND
Output from T1127L is connected to a dummy load in H1201.

Pos. 1.6 - 26 MHz
To be used when transmitting in this frequency band.

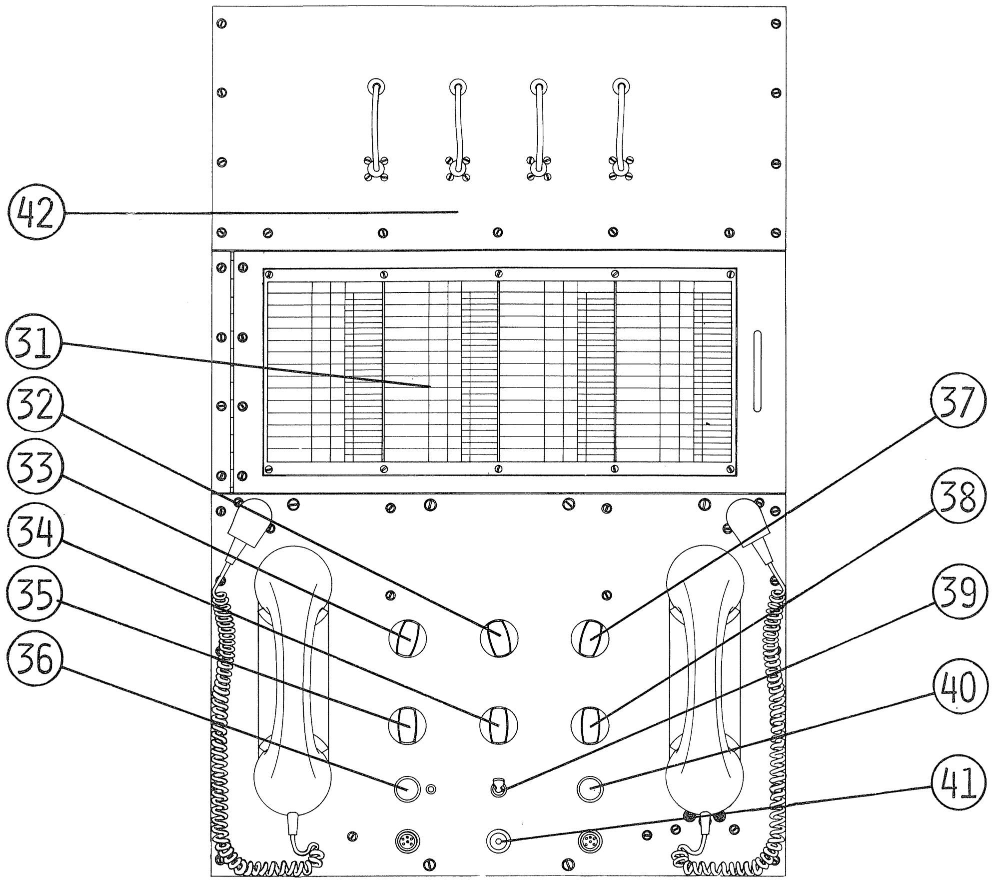
(28) LOAD SWITCH
To be used only in the range 405 - 535 kHz.
To be set corresponding to the table on the front plate of T1127L.

(29) AERIAL TUNE 405 - 535 kHz
For tuning of aerial, only to be used in the frequency range 405 - 535 kHz.

Select frequency (1) .
Set BAND SWITCH (24) and LOAD SWITCH (25) corresponding to table on T1127L.
Select transmitting mode A1 or A2H on (23) .
Press telegraphy key and tune for max. meter reading on AERIAL METER 405 - 535 kHz.

(3o) AERIAL METER 405 - 535 kHz

CONTROLS FOR CENTER SECTION



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(31) FREQUENCY TABLE
Hatch for inspection of fuses and supply cables.

(32) MUTE
ON: Both the Main and the Reserve Receivers are muted from the transmitter in operation (with full break-in).
OFF: The Main Receiver only is muted of the Main Transmitter and the Reserve Receiver only is muted from the Reserve Transmitter.

(33) TELEX
The Simplex TOR equipment can be switched from the Main Transmitter and Receiver to the Reserve Transmitter and Receiver.

(34) TIME SIGNAL
An extra loudspeaker in the chart room can be connected to the Main or Reserve Receiver.

(35) PHONE PATCH
MAIN: The ship's interphone network is connected to the Main Transmitter and Receiver for duplex telephone connections ashore. The transmitter is automatically keyed.
RESERVE: The ship's interphone network is connected to the Reserve Transmitter and Receiver for duplex telephone connections ashore. The transmitter is automatically keyed.
OFF: The ship's interphone network is disconnected.

36 PHONE PATCH LEVEL
The level from the interphone network has to be adjusted so that the lamp is just flashing.

37 TAPE RECORDER
For tape recording of information from the Main or Reserve Receiver.

38 LINE OUTPUT
Output from the Main or the Reserve Receiver for auxiliary amplifier equipment.

39 EMERGENCY LIGHT
The emergency light in the radioroom can be switched on here or at the door.

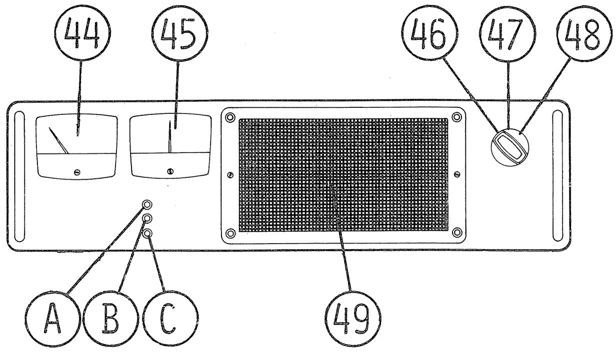
40 SIDE TONE LEVEL
Level of side tone when key down or TUNE on.

41 LEAD LIGHT
For connection of lead light or a small solder iron (25 Watt).

42 RECEIVER AERIAL SELECTOR PANEL
Possibility for selecting of four aerials to the receivers.

H1222

CONTROLS FOR BATTERY CHARGER N1404



(44) VOLTMETER
Indicates the battery voltage.

(45) AMMETER
Indicates the charge - or discharge current.

(46) MAIN SWITCH - OFF
The battery charger is switched off with the voltmeter (44) and ammeter (45) in function.

(47) MAIN SWITCH - AUTOMATIC
The battery charger is switched on and automatically controlling the charge current.

The control lamp (A) SUPPLY is ON and indicates that AC Mains is present.

The control lamp (B) CHARGE is ON until the battery is fully charged.

The control lamp (C) BATTERY is ON when the battery is fully charged (trickle-charging).

(48) MAIN SWITCH - MANUAL
This position is used should the automatic charge system fail.

By manual control, the voltmeter reading (44) shall be kept between 26 and 29 volts. If the voltmeter reading is more than 29 volts, switch off the charger unit. If the voltmeter reading is less than 26 volts, switch on the charger unit pos. MANUAL. When the transmitter is ON the charger unit should be ON too in pos. MANUAL.

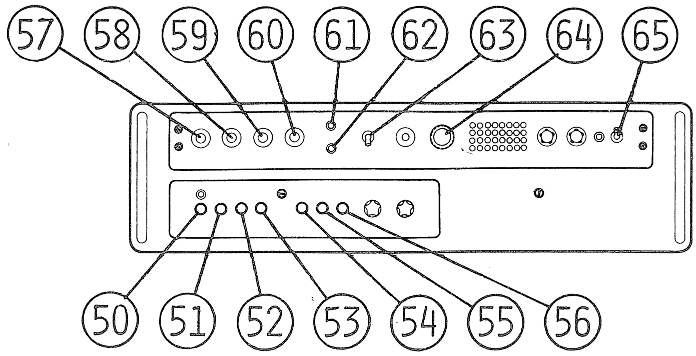
If it is impossible to increase the battery voltage to 29 volts with the ammeter (45) indicating charge current, the reason may be a defective battery or a leakage.

In position MANUAL the control lamps (A) (B) (C) are of no consequence.

(49) AIR FILTER
The AIR FILTER has to be cleaned at regular intervals (look up the section CLEANING OF AIR FILTER in the OPERATING INSTRUCTIONS FOR SAILOR MF/HF TELEPHONY STATION).

N1404 A

CONTROLS FOR AKD AND AUTO ALARM RECEIVER



(50) POWER
Press POWER button to connect power supply with AKD/H1218.

(51) MONITOR
The built-in sound transducer will be activated by the automatic key after pressing the MONITOR button.

(52) TEST
For testing the Automatic Keying Device and the connected Auto Alarm Receiver press the TEST button. AKD/H1218 will then key the selected sequence (54) only to the Auto Alarm Receiver.

(53) RESET
When pressing the RESET button AKD/H1218 will momentarily stop in neutral position. When releasing the RESET button AKD/H1218 will start keying from the initial stage of the selected sequence (54) .

(54) DISTRESS ONLY
While the DISTRESS ONLY button is pressed AKD/H1218 will only key the distress message. In released position AKD/H1218 will key the alarm signal followed by the distress message.

(55) MAIN TX
The main telegraph transmitter is keyed by AKD/H1218 in the selected mode (54) while the MAIN TX button is pressed.

(56) RESERVE TX
Operation as for the MAIN TX button.

(57) KEY
For manually testing the Auto Alarm Receiver select Auto Alarm Service (63) and make the marks of the alarm signal by pressing the KEY button. The signal lamp (62) should light when a mark is keyed, and the alarm circuit should operate when four marks have been keyed.

(58) NORMAL TEST
The external alarm bells are silenced while the NORMAL TEST button is pressed.

(59) HIGH TEST
Operation as for the NORMAL TEST button but the input level is increased.

(60) RESET
Press the RESET button to reset the alarm circuit and to stop the alarm bells.

(61) ALARM LAMP
When Auto Alarm Service is selected (63) the ALARM LAMP lights when four marks of the alarm signal have been detected.

(62) SIGNAL LAMP
The SIGNAL LAMP will light when a 500 kHz signal, large enough to operate the alarm circuit, is being received.

(63) AUTO ALARM/WATCHKEEP SWITCH
While the switch is in AUTO ALARM position the Auto Alarm Receiver will give alarm when four marks of the alarm signal have been detected.

While the switch is in WATCHKEEP position the Auto Alarm Receiver acts like a normal 500 kHz receiver.

(64) AF GAIN
Control for the audio level.

(65) SUPPLY
ON/OFF power switch for the Auto Alarm Receiver.

OPERATING INSTRUCTIONS FOR TELEPHONY - TELEGRAPHY - TELEX AND PHONE PATCH

SAILOR R1119 and R1120 are capable of receiving on all frequencies in the frequency range 10 kHz - 30 MHz.

SAILOR S1301 can be set for any frequency in the maritime bands between 1.6 and 26 MHz.

SAILOR T1127 is capable of transmitting the signal generated in the exciter S1301.

TELEPHONY

1. Switch on the station by turning the MAIN SWITCH (19) in the power supply N1400 or N1401 to pos. ON.
2. Set the loudspeaker switch LOUDSPEAKER ON/OFF (14) to pos. ON and the AGC SWITCH (20) to pos. ON.
3. Turn the radio frequency amplification control RF-GAIN (17) clockwise to its extreme position.
4. Select the mode of reception wanted A3H/AM or A3J/SSB by means of the MODE SWITCH (16) .
5. Set FREQUENCY SELECTOR (13) to the wanted frequency and the CLARIFIER (15) to center position.
6. Activate NOISE GENERATOR (9) and tune RF TUNE (11) for max. METER (10) deflection.
7. Turn the volume control AF-GAIN (22) clockwise for suitable volume.
8. If the received signal is an SSB signal, the CLARIFIER (15) is to be set for max. clearness.
9. If necessary the RF TUNE (11) can be finely adjusted on the received signal.
10. If the reception of SSB signals is disturbed by noise from rigging etc., turn the AGC SWITCH (20) to TELEX position and turn the RF-Gain (17) counter clokwise, until the volume is just reduced.
11. Set FREQUENCY SELECTOR (1) to the wanted transmitting frequency.
12. Set POWER (3) to full.
13. Activate the buttons TUNE (5) and tune the AERIAL TUNE (7) for max. deflection on AERIAL METER (6) .
14. Select transmitting mode by activating one of the buttons A3A, A3J (SSB) or A3H (AM) (5) .

15. Select simplex or duplex operation by activating SIMPLEX - DUPLEX (4) .

16. Remove the handset from its holder and when the handset key is activated the transmitter is started.

TELEGRAPHY

1. Switch on the station as described in TELEPHONY points 1 - 11 incl.

2. Select transmitting mode A1 or a2H:

   For A1 activate both the buttons A1 (23) and A3H (5) .
   For A2H activate both the buttons A2H (23) and A3H (5) .

3. Set BAND SWITCH (27) to pos. 1.6 - 26 MHz if the selected frequency is in that range.
   If the frequency is in the range 405 - 535 kHz set the BAND SWITCH (27) and the LOAD SWITCH (28) to the positions shown on the table on the front plate of T1127L.

4. Press the key and tune for max. AERIAL METER reading.
   In the frequency range 1.6 - 26 MHz use AERIAL METER 1.6 - 26 MHz (6) and AERIAL TUNE 1.6 - 26 MHz (7) .
   In the frequency range 405 - 535 kHz use AERIAL METER 405 - 535 kHz (30) and AERIAL TUNE 405 - 535 kHz (29) .

TELEX

1. Switch on the station as described in TELEPHONY 1 - 14

   IMPORTANT: The working frequency for Simplex TOR communication is given as assigned frequency (centerfrequency for the modulation).
   Set the FREQUENCY SELECTOR on the Receiver and Exciter to the assigned frequency minus the modulation centre frequency. Depending on your Simplex TOR equipment the modulation centre frequency is 1,5 kHz - 1,7 kHz or 1,9 kHz.

2. Activate the buttons A3J (5) and the TELEX 23

3. For use in conjunction with Simplex TOR equipment activate the button Simplex (4) .

4. The transmitter and receiver is now controlled from the teleprinter via the Simplex TOR equipment.

PHONE PATCH

1. Switch on the station as described in TELEPHONY 1 - 14.

2. When there is radio contact with the coast station and the intertelephone connection is established, set the switch PHONE PATCH (35) in pos. MAIN or RESERVE for SAILOR tandem station and for phone patch H1224 set the switch in position PHONE PATCH

3. Hang up the local microtelephone and adjust the PHONE PATCH LEVEL (36) so that the lamp is just flashing.

4. Monitoring of the duplex communication is possible with the loudspeaker.

5. If there are problems with cross-talk, read the deflection on the METER (10) . Set the AGC switch (20) to pos. OFF. Turn the RF-GAIN (17) to same deflection on the METER (10) .

OPERATING INSTRUCTIONS FOR DISTRESS CALLS 2182 KHz

<u>Transmitter</u>

1. Turn MAIN SWITCH (19) in the power supply N1400 or N1401 to position ON.
2. Set AERIAL SWITCH to desired position (if installed).
3. Turn BAND SWITCH (27) to 1,6 - 26 MHz.
4. Turn the DISTRESS SELECTOR (2) to position DISTRESS 2182 kHz.
5. Activate the button SIMPLEX (4) .

<u>RECEIVER</u>

1. Turn RF-GAIN (17) fully clockwise.
2. Turn MODE SWITCH (16) to position 2182 Distress.
3. Set AGC SWITCH (20) to ON position.
4. Turn AF-GAIN (22) to suitable volume.

<u>TRANSMITTER</u> (30 seconds after switching ON the transmitter (19)).

6. Activate TUNE (5) and tune the AERIAL TUNE (7) for max. deflection on AERIAL METER (6) .
7. Press the two buttons marked TEST ALARM (5) and ALARM (5) simultaneously and keep them pressed for about 30 seconds (after 45 seconds the distress signal will automatically be interrupted).
8. Release buttons TEST ALARM (5) and ALARM (5) .
9. Take the handset, press the key and make your distress call (MAY-DAY - name of ship - position etc.).
   Release the handset key and listen for an answer.

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OPERATING INSTRUCTIONS FOR DISTRESS CALLS 2182 KHz

TRANSMITTER

1. Turn MAIN SWITCH (19) in the power supply N1400 or N1401 to position ON.
2. Set AERIAL SWITCH to desired position (if installed).
3. Turn BAND SWITCH (27) to 1.6 - 26 MHz.
4. Turn the DISTRESS SELECTOR (2) to position DISTRESS 2182 kHz.
5. Activate the button SIMPLEX (4) .

RECEIVER

1. Turn RF-gain (17) fully clockwise.
2. Turn MODE SWITCH (16) to position 2182 Distress.
3. Turn AGC SWITCH (20) to ON position.
4. Turn AF-GAIN (22) to suitable volume.

TRANSMITTER (30 seconds after switching ON the transmitter (19)).

6. Activate TUNE (5) and tune the AERIAL TUNE (7) for max. deflection on AERIAL METER (6) .
7. Press the two buttons marked TEST ALARM (5) and ALARM (5) simultaneously (after 45 seconds the distress signal will automatically be interrupted).
8. Press the button A3H (5) .
9. Take the handset, press the key and make your distress call (MAY-DAY - name of ship - position etc.). Relase the handset key and listen for an answer.

S1301-H1201/02
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OPERATING INSTRUCTIONS FOR DISTRESS CALLS 500 KHz

TRANSMITTER

1. Set MAIN SWITCH (19) to ON on power supply N1400 or N1401.
2. Set AERIAL SWITCH to desired position (if installed).
3. Set BAND SWITCH (27) to the setting for 500 kHz shown in table on T1127L.
4. Set LOAD (28) to the setting for 500 kHz shown in table on T1127L.
5. Set the FREQUENCY SELECTOR (1) to 500 kHz.
6. Press the buttons A3H (5) and A2H (23) .
7. Press the Key for the one used.
8. Turn AERIAL TUNE 405 - 535 kHz (29) for max. deflection on the AERIAL CURRENT METER (30) .
9. Press the button POWER (51) on the A.K.D.-Unit.
10. Release the button DISTRESS ONLY (54) .
11. Press the button MAIN TX (55) or RESERVE TX (56) the one used.
12. The ALARM SIGNAL followed by the S.O.S., the SHIP'S CALL SIGN and TWO LONG DASHES are being sent.

H12o1-H1218

CLEANING OF AIR FILTERS

The station has three air filters, one at the front of each of the two power supplies and one at the front of the transmitter. (See drawing under the section CONTROLS).

These filters must be cleaned, maybe replaced, at regular intervals.

How often this must be done naturally depends on the conditions under which the station is working (quantity of dust in the air), and therefore it is impossible to give general rules for how often the filters must be cleaned.

Therefore, we recommend that you at the beginning keep an eye on how fast the filters become dirty (at least once a month) and then you can determine the cleaning intervals.

Normally it will be sufficient to clean once every second month.

The filter on the power supply must be cleaned as follows:

1. Remove the 4 milled nuts and take off the cover with the mounted filter.

2. The filter mat is fixed on the back of the cover by means of two round rods.
   By passing the filter mat perpendicular over these rods along the back of the cover, the filter mat can be taken out and put back.
   If the filter mat goes too high this can be remedied by slackening off one of the two screws on the front of the cover.

3. Clean the filter mat in lukewarm water or by vacuum cleaning followed by wash in lukewarm water.

4. Put the filter mat back as described under 2. (However not until the mat is quite dry).

5. Mount the cover again on the front of the power supply.

If the filter mat is very damaged, it must be replaced. With every station we deliver an extra filter mat. If necessary you can ask for more.

The filter in the transmitter must be cleaned as follows:

1. Remove the two milled nuts.

2. Pull out the filter drawer.

3. Clean the filter in lukewarm water (without removing the filter mat from the drawer) or by vacuum cleaning followed by cleaning in lukewarm water.

4. Let the filter drawer dry completely and put it then back in the station.

If the filter material is damaged, the filter mat must be replaced by removing the frame, which keeps the mat in place (4 screws), then the new filter can be mounted.
We deliver an extra filter mat with every set, and if necessary you can ask for more.

MONTHLY RUN-IN OF THE STATION

In order to obtain a greater reliability of operation for the transmitter it must, out of consideration for the PA-tubes, be used for at least 10 minutes once a month, or it should be tested regularly once a month in accordance with the procedure below:

1. Set FREQUENCY SELECTOR (1) (2) to a frequency lower than 4 MHz (not 2182 kHz).

2. Set POWER (3) to low and activate A3J (5).

3. Set MAIN SWITCH (19) to ON, and key the transmitter for 10 minutes by means of the microphone plug marked KEY, supplied with the station, (to be inserted in the exciter instead of the handset plug).

RUN-IN OF THE STATION AFTER A LONGER LAY UP PERIOD

1. Set FREQUENCY SELECTOR (1) (2) to a frequency lower than 4 MHz (not 2182 kHz).

2. Set POWER (3) to low and activate A3J (5).

3. Turn MAIN SWITCH (19) to STAND BY for 30 minutes.

4. Turn MAIN SWITCH (19) to ON and key the transmitter for 60 minutes by means of the microphone plug marked KEY, supplied with the station, (to be inserted in the exciter instead of the handset plug).

5. The station will now be ready for use.

FUNCTION TEST FOR SHORT-WAVE STATION

INITIAL SETTINGS:

1. If the station has not been used for a month or a longer period look up the section MONTHLY RUN-IN OF THE STATION etc. and do the necessary run-in, else:

2. Remove the two covers (the extreme left and the extreme right) on the T1127 and the AIR-FILTER on power supply (12) .

3. Check that the three switches located at the extreme left PCB on the T1127 are in the following positions:

   TEST SWITCH: I_{k1}
   POWER: ON
   MOTOR: AUTOM.

4. Set FREQUENCY SELECTORS (1) (2) to the first frequency indicated in the table below.

5. Set POWER (3) to FULL.

6. Press DUPLEX (4) push button.

7. Press A3J push button (5) .

8. Set LOUDSPEAKER ON/OFF (14) to pos. ON.

9. Set MODE SWITCH (16) to A3J.

10. Turn RF-GAIN (17) fully clockwise.

11. Turn AF-GAIN (22) fully counter clockwise.

12. Set the AGC SWITCH (20) to ON position.

13. Make sure that the aerials are connected to the T1127 and the R1119 or R1120

1	1600.0	2	1911.1	3	2022.2	4	2233.3	5	2444.4
6	2655.5	7	2866.6	8	3177.7	9	3488.8	10	3799.9
11	4100.0	12	6200.0	13	8200.0	14	12300.0	15	16500.0
16	22000.0	17	25000.0						

S1301 C

FUNCTION TEST FOR SHORT-WAVE STATION cont.:

CHECKS:

1. Set MAIN SWITCH (19) to pos. RECEIVER ONLY.

2. Check that the SUPPLY VOLTAGE (18) meter pointer is in green area.

3. Turn test meter switch located behind the AIR FILTER on power supply (12) through all positions.

4. Check that the readings are:

   In green area: +22V and input

   Zero: All other settings

5. Choose 1611.1 kHz on the FREQUENCY SELECTOR (13) . Press the NOISE GENERATOR (9) and adjust RF TUNE (11) for max. reading on the METER (10) .

6. Turn AF-GAIN (22) to suitable volume.

7. Check that noise is heard in the loudspeakers.

8. Check that LOUDSPEAKER ON/OFF (14) is functional.

9. Turn RF-GAIN (17) fully counter clockwise.

10. Check that the noise disappears and the METER (10) pointer is turned extremely right.

11. Turn RF-GAIN (17) fully clockwise.

12. Set FREQUENCY SELECTOR (13) to 152.2 - 528.8 - 543.3 - 1577.7 - 1611.1 - 3999.9 - 4464.4 - 6888.8 - 7777.7 - 13666.6 - 15325.5 - 29200.0 - 1111.1 - 2222.2 - 8888.8 kHz in turn and repeat point 13.

13. Press NOISE GENERATOR (9) and adjust RF TUNE (11) for max. METER (10) reading. Check meter reading to be approx. 2.

14. Technical staff only: Set MODE SWITCH (16) to pos. 2182 kHz and adjust AERIAL TUNE 2182 for max. noise or signal in the loudspeaker on max. METER (10) deflection (the location of the AERIAL TUNE 2182 is shown in the instruction book for R1119/R1120).

15. Turn MAIN SWITCH (19) to pos. STAND BY.

16. Turn test meter switch located behind the AIR FILTER on power supply (12) through all positions and check that the readings are:

   In green area: +22V, V_g1 and input

   Zero: All other settings

17. Check that the blower in the N140X and the blower in the T1127 are running.

18. Turn MAIN SWITCH (19) to pos. ON.

19. Repeat point 17 and check:

   N1400: Green area: +22V, V_g1 and input

   Zero: All other settings

   N1401: Green area: +22V, V_g1, Va and input

   All other settings

20. Check that the drum switch located behind the frequency table of the T1127 has stopped and the band block lamp on the S1301 is off.

21. Insert the plug labelled KEY to the handset socket (plug supplied with the trimming kit from the factory).

22. Check that the extreme right test meter on T1127 is in the range 2.5 - 4 scale division.

23. Set the TEST SWITCH in the T1127 to pos. I_k2.

24. Repeat point 22 and return TEST SWITCH to pos. I_k1.

25. Press TUNE push button (5) and adjust AERIAL TUNE (7) for max. deflection on AERIAL METER (6) .

26. Check that the aerial current corresponds to the value indicated on the TUNING CHART T1127. The obtained value is dependent on environment, aerial condition and the supply voltage.

27. Technical staff only: Execute point 25 and adjust DRIVE LEVEL as described in the instruction book for the T1127 section SERVICE paragraph 5.4., and execute point 26.

28. Press A3J push button (5) .

29. Set test meter switch located behind the AIR FILTER (12) on power supply to pos. V_a.

30. Check that the SUPPLY VOLTAGE (18) meter pointer is below the green area (approx. half scale deflection).

31. Remove the KEY and insert the handset.

32. Set FREQUENCY SELECTOR (13) to the transmitter frequency, mode switch (16) to A3J and press NOISE GENERATOR (9) and adjust RF TUNE (11) for max. METER (10) deflection.

33. Press TUNE push button (5) and adjust AERIAL TUNE (7) for max. deflection on AERIAL METER (6) .

34. Set POWER (3) to LOW and press A3J push button (5) .

35. Key the transmitter.

36. Execute a modulation test by listening to your own speech.

37. Press A3A push button (5) and repeat points 35 and 36.

38. Press A3H push button (5) and set MODE SWITCH (16) to pos. A3H and repeat points 35 and 36.

39. Set POWER (3) to FULL.

40. Set FREQUENCY SELECTORS (1) (2) to next frequency indicated in the table.

41. Repeat the points 25, 26, 27 and 28.

42. Repeat the points 32, 35 and 36.

43. Repeat the points 41, 42 and 43 on the remaining frequencies in the table.

44. Key the transmitter and check that the SUPPLY VOLTAGE (18) meter pointer is in the green area, depending upon the input voltage.

45. Set test meter switch located behind the AIR FILTER on power supply (12) to pos. INPUT.

46. Set FREQUENCY SELECTORS (1) (2) to the first frequency indicated in the table.

47. Press TUNE push button (5) and adjust AERIAL TUNE (7) for max. deflection on AERIAL METER (6) .

48. Press A3A push button (5) .

49. Set FREQUENCY SELECTOR (13) to the frequency 1 kHz below the transmitter frequency.

50. Press NOISE GENERATOR (9) and adjust RF TUNE (11) for max. METER (10) reading.

51. Key the transmitter and check that a 1 kHz beat note is heard in the earphone.

52. Turn the CLARIFIER (15) and check that the beat note frequency varies.

53. Press the TUNE push button (5) and check that the aerial current decreases corresponding to POWER (3) settings.

54. Press the TEST ALARM push button (5) and check that the alarm signal appears in the earphone.

55. Press the SIMPLEX (4) push button.

56. Press the TUNE push button (5) and check that the noise in the loudspeaker disappears.

57. Set FREQUENCY SELECTORS (2) to 2182 kHz.

58. Press TUNE push button (5) BEWARE OF SILENT PERIOD ON DISTRESS FREQUENCY.

59. Repeat point 26.

60. Technical staff only: Execute point 58 and tune for max. deflection on AERIAL METER (6) by means of 2182 AERIAL TUNE, refer instruction book for T1127. Repeat point 27 and repeat INITIAL SETTINGS point 3.

61. Mount the two covers on the T1127.

62. Check the two AIR FILTERS. Refer section CLEANING OF AIR FILTERS.

SAILOR

MOUNTING INSTRUCTIONS FOR SAILOR TANDEM STATION & INSTRUKTION BOOK FOR CENTER PANEL H1222

500 kHz TUNER H1201

On installation: See tuning-up procedure.

TRANSMITTER T1127L

On installation: See tuning-up procedure.

EXCITER S1301L

RECEIVER R1120

On installation: See tuning-up procedure.

BATTERY CHARGER N1404

POWER SUPPLY 220V AC N1401

POWER SUPPLY 24V DC N1400

AUTOMATIC KEYING DEVICE H1218 AND AUTO ALARM RECEIVER

VARIOUS

Sailor

Sailor

MOUNTING INSTRUCTIONS FOR SAILOR TANDEM STATION
&
INSTRUCTION BOOK FOR CENTER PANEL H1222

A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS:

TECHNICAL DATA H1222

PHONE PATCH

AF output to telephone line .... 100 mV +-2 dB/600 ohm.
AF output from telephone line .... 150 mV +-15 dB/600 ohm.

TELEX

AF output from Receiver .... 700 mV +-2 dB/600 ohm
AF input to Transmitter .... 350 mV +-10 dB/600 ohm
TT from TELEX .... 24 V 50 mA
Teleprinter start (High tension ON) .... 24 V 13 mA

LINE OUTPUT

AF output from Receiver .... 400 mV +-3 dB/4,7 kohm

TAPE RECORDER

AF output from Receiver .... 20 mV +-3 dB/4,7 kohm

TIME SIGNAL

AF output from Receiver .... 4 Watt/8 ohm

MUTE (Supply Terminal Block)

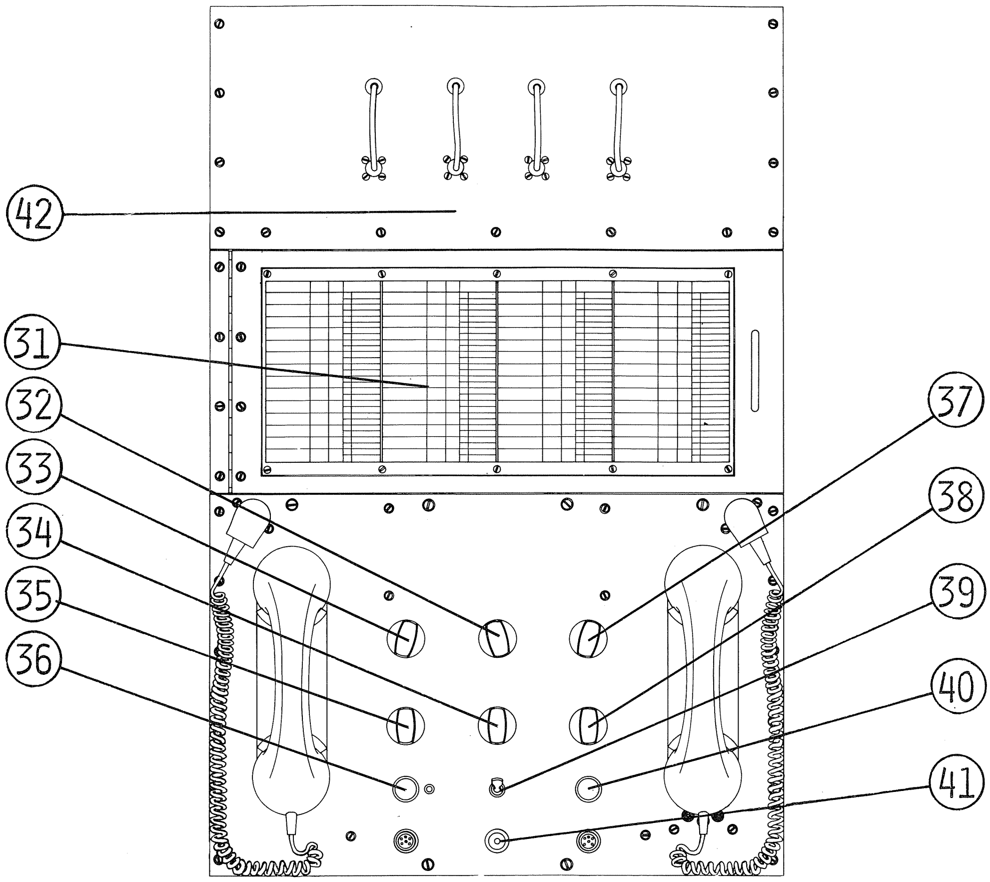
For muting of auxiliary receivers and central aerial systems.
When main or reserve station is transmitting, the contact between ST 5 and ST 6 will close.
The contact between ST 3 and ST 4 can be strapped for opened or closed contact when transmitting.

D.F. RECEIVER SWITCH

Contact .... Max. 1 Amp - 24 Volt

The contact between ST 7 and ST 8 can be strapped for opened or closed contact when Transmitter Aerial Switch is in pos. D.F.

CONTROLS FOR CENTER SECTION



H1222

(31) FREQUENCY TABLE
Hatch for inspection of fuses and supply cables.

(32) MUTE
ON: Both the Main and the Reserve Receivers are muted from the transmitter in operation (with full break-in).
OFF: The Main Receiver only is muted of the Main Transmitter and the Reserve Receiver only is muted from the Reserve Transmitter.

(33) TELEX
The Simplex TOR equipment can be switched from the Main Transmitter and Receiver to the Reserve Transmitter and Receiver.

(34) TIME SIGNAL
An extra loudspeaker in the chart room can be connected to the Main or Reserve Receiver.

(35) PHONE PATCH
MAIN: The ship's interphone network is connected to the Main Transmitter and Receiver for duplex telephone connections ashore. The transmitter is automatically keyed.
RESERVE: The ship's interphone network is connected to the Reserve Transmitter and Receiver for duplex telephone connections ashore. The transmitter is automatically keyed.
OFF: The ship's interphone network is disconnected.

(36) PHONE PATCH LEVEL
The level from the interphone network has to be adjusted so that the lamp is just flashing.

(37) TAPE RECORDER
For tape recording of information from the Main or Reserve Receiver.

(38) LINE OUTPUT
Output from the Main or the Reserve Receiver for auxiliary amplifier equipment.

(39) EMERGENCY LIGHT
The emergency light in the radioroom can be switched on here or at the door.

(40) SIDE TONE LEVEL
Level of side tone when key down or TUNE on.

(41) LEAD LIGHT
For connection of lead light or a small solder iron (25 Watt).

(42) RECEIVER AERIAL SELECTOR PANEL
Possibility for selecting of four aerials to the receivers.

H1222

GENERAL

It is the object of the present manual to give the information necessary to prepare and carry out a correct installation of a SAILOR short wave station.

Therefore in this manual further to the information about the mechanical dimensions, the dimensions of bolts etc., information will also be given about the choice and installation of cables, aerials and earthbands.

When the station has been installed as described in this manual, it must be run-in and tuned up. The procedures to follow will appear in the technical manuals for transmitter, receiver and operation instructions.

TRANSMITTER AERIAL

The transmitter T1127L with the TUNER H1201 is constructed for the type of aerial which will give the best radiation diagram, namely a vertical aerial with an electrical length of 15 to 22 metres.

Out of consideration for the range covered on the high short wave bands a short aerial should be selected. However, it must also be considered that as large a part of the aerial as possible be able to radiate the around for better results. To obtain this it may be necessary to use a rather long aerial. For the 405 - 535 kHz MF-band the long aerial will give the best result, but it is the tuning in the frequency range from 1.6 - 4 MHz which determines the max. length of the aerial. In other words, if the transmitter can be tuned to the highest frequency in the range 1.6 - 4 MHz, the aerial is not too long.

When choosing type of aerial and insulators all these considerations have to be taken into account, including that the antenna voltage at the foot point is very high (25 k Volt) in the band from 405 - 535 kHz.

The aerial can be a self supporting whip aerial or a wire aerial with a suitable top capacity.

Recommended aerials:
Self supporting whip aerial from DUK Antennen STA 150 C - MF/HF.
Self supporting whip aerial from TJØSTHEIM Antennas AS 9 STX.
Wire aerial with suitable top capacity: Electrical length 15 - 22 m.

From the deckhead insulator to the insulator on top of H1201 or H1202 the signal is led through a feeder, which can be made either of 8 - 12 mm copper tube or of aerial wire. The feeder is placed on stand-off insulators is such manner that there is a distance of at least 100 mm between the feeder and the deckhouse roof, the deck or the bulkhead. The feeder must be as short as possible, and it should be no longer than 10% of the total length of the aerial.

RECEIVER AERIAL

For receiver aerial use either a whip aerial 6 - 9 metres or a wire aerial of at least 6 metres. The whip aerial will normally give the best result owing to its radiation characteristics.

For the lead-in from aerial to receiver use 50 ohm coaxial cable.

If 50 ohm coaxial cable RG213U is used, cable has to run in steel tube (conduit).

If 50 ohm triaxial cable H1213 (S.P.RADIO) is used outer screen has to be earthed to console end only.

At the footpoint of aerial mount a junction box e.g. SAILOR H1209 for the connection of aerial and coaxial cable. The box must be designed for outside mounting in maritime environments.

IMPORTANT! The aerial must be connected directly to the cable. No transformer or protection diode must be used. Only SAILOR Receiver Protecting Unit H1223 must be used in the console end.

The screen of the coaxial cable (innerscreen) and the connection box must be effectively earthed (RF earth) to mast or the like, on which the aerial is mounted.

The aerial must be placed as high and as clear as possible, and for duplex reasons as far from the transmitter aerial as possible.

If a wire aerial is used it will for duplex reasons be preferable that the angle, which the down lead of the receiver aerial forms with the transmitter aerial, be as large as possible.

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EARTHING

The earthbands of the station (100 mm x min. 0.5 mm copper) are connected to the mounting plates as shown on PHOTO 1. The four earth bands are led to the deck and the deckhouse roof in the shortest possible way. Earth stubs as shown on drawing DRILLING PLAN FOR SAILOR TANDEM STATION can be used.

For ships where the mounting plates are directly bolted to the steel bulkhead or outer metal wall, the earthbands can under certain circumstances be omitted if the following points are observed:

a. The steel bulkhead must be fully welded to the ship's superstructure so that there are good electrical connections to both roof and deck.

b. The bolts securing the mounting plate must be welded to bulkhead or outer wall.

Generally speaking an effective earth connection is just as important as a good aerial.

PACKING LIST

CENTER PANEL FOR SAILOR TANDEM STATION

- ☐ 1 Transmitter aerial switch H1202
- ☐ 1 Cabinet for H1202
- ☐ 4 Aerial stand off for H1202
- ☐ 1 Receiver aerial selector panel
- ☐ 1 Hatch with frequency table and cover plate
- ☐ 1 Center panel H1222
- ☐ 1 Center mounting plate with dual-rear, contact board and supply terminal block
- ☐ 2 Iron-bars for mounting plates
- ☐ 2 Copper tubes for interconnection H1201/H1202
- ☐ 2 Meter flexible air tube
- ☐ 2 Clamps for air tube
- ☐ 2 Wall flanges for air outlet
- ☐ 4 Receiver protecting units H1223 with mounting plate
- ☐ 1 Spacer rail marked G
- ☐ 2 Wood spacers marked Z
- ☐ 1 Set of screws for assembling of Tandem station marked A-F-H-I-K
- ☐ 1 Bag M Spare screws etc.
- ☐ 1 Bag N Stickers for Main and Reserve station
- ☐ 1 Bag O Stickers for Main and Reserve Key
- ☐ 1 Bag P Sticker for H1202 special version
- ☐ 6 Spadebolts H1220
- ☐ 2 Headphones
- ☐ 2 Keys AMPLIDAN
- ☐ 1 Loudspeaker L167 special
- ☐ 2 Bells for auto alarm 500 kHz
- ☐ 1 Aerial transformer for auto alarm 500 kHz (Only with Redifon AA1 Auto alarm)
- ☐ 1 Operation instructions for SAILOR Tandem station
- ☐ 1 Set mounting instruction and manuals for SAILOR Tandem station

  If the Main and Reserve station are pre-mounted for Tandem station the following parts are mounted by S.P.Radio

- ☐ 3 Coaxial aerial cables PL259/BNC
- ☐ 1 Multicable for H1218 P104/J301
- ☐ 1 AC mains cable N1401 long type for Tandem station
- ☐ 2 Microtelephone cables with plug MEZ60BZ
- ☐ 2 Grommets for mic. cables

  Cable clips and screws from bag B
  Labels from bag C

- ☐ 1 H1218 automatic keying device and REDIFON AA1 Auto alarm/ITT AA734 Auto alarm
- ☐ 1 Cabinet for H1218
- ☐ 2 Coupling flanges for air outlet H1221
- ☐ 2 Mounting hardware for center panel
  Screws from bag D/screws from bag E/Cable clips from bag L

MOUNTING INSTRUCTIONS

Main station consisting of H1201-T1127L-S1301L-R1120-H1218-N1401.

Reserve station consisting of H1201-T1127L-S1301L-R1120-N1400-N1404.

Center Section consisting of H1202-H1220-H1221-H1222-H1223.

PHOTO 1

1.1 Drill the holes in the bulkhead and the table-top as shown under the DRILLING PLAN for SAILOR TANDEM STATION.

1.2 Remove the units from the main and reserve cabinets.

1.3 Remove the mounting plates from the main and reserve cabinets.

1.4 Assemble, on a table, the two mounting plate and the center mounting plate together on the two flat iron-bars. Use the screws from Bag.A.

1.5 Fix the combined mounting plate to the bulkhead by means of 8 pcs. 3/8" or 8 mm bolts (not delivered by manufacturer). If needed the bulkhead and table must be strengthened. The weight of the complete tandem station is 400 kg.

1.6 Earthing of the tandem station as described in the paragraph EARTHING.

PHOTO 2

2.1 Supply and signal cable from the ship's installation to Supply Terminal Block (S.T.). See drawing for WIRING to SAILOR TANDEM STATION.

PHOTO 3

3.1 Check the cabling on the stations and make it ready for a tandem installation. Use cable clips from Bag.B.

Arrow A Receiver aerial cable for R1120.

3.2 Mount coaxial aerial cable for Auto Alarm Receiver through the hole "G" (left cabinet).

3.3 Mount multicable for H1218, through the hole "G" (left cabinet).

3.4 Mount the new long AC Mains cable through the hole "I" (left cabinet).

Arrow B Microtelephone cable through hole on front of the cabinet (photo 3 and 5).

Arrow C Fix the labels from Bag.C. on the rear contact cables J101.

PHOTO 4

Arrow D Assembling of Coupling Flange for Air Outlet H1221.

Arrow E Assembling of mounting hardware for Center Panel. Use screws from Bag.D.

Arrow F With the screws from Bag.E. make mechanical adjustment of the rack so it fits tightly against the mounting hardware.

PHOTO 5

5.1 Mounting of the Transmitter Aerial Switch H1202 between the main and reserve transmitter cabinets. Use the screws from Bag.F.

Arrow G IMPORTANT: The grounding straps from H1202 have to be mounted together with the grounding straps from H1201. See photo 3.

5.2 Before pushing the tandem cabinet against the mounting plates the spacer rail marked "G" has to be mounted.

5.3 Push the tandem cabinet into place on the mounting plates.

PHOTO 6

Arrow H Chassis for Dual Rear Contact Board has to be removed as shown.

Arrow J Insert the 12 bolts without tightening them.

Arrow K Place the 6 spade bolts as shown and tighten the nuts slightly under the table.

6.1 Drill 6 pcs. Ø9 holes in the cabinets through the hole of the spade bolts and mount 6 pcs. MG 8 x 16. (H1220).

6.2 Tighten the bolts (Arrow J) and the 6 nuts under the table.

6.3 Remove the spacer rail marked "G" and assemble the chassis for Dual Contact Board (Arrow H). Tighten the screws carefully.

PHOTO 7

Arrow L Connect the cables marked Main J101 and Reserve J101 to Main P101 and Reserve P101.

Arrow M Mount the 10 pole Hirschmann plug through the hole to H1202 as shown. Use cable clips and screws from Bag.H.

Arrow N Mount the 4 Receiver Protection Units H1223 as shown. Use the screws from Bag.I.

7.1 Mount the aerial coaxial cable to the Receiver Protection Unit H1223. The outer shielding braid from the triaxial cable H1213 have to be grounded at the strain relief clamps.

Arrow O Mount the corresponding coaxial cables from the Receiver Aerial Selector Panel.

Arrow P Mount the air tube to the air outlet with the clamps delivered.

PHOTO 8

Arrow R Mount the Receiver Aerial Selector Panel. Use the screws from Bag.K. Connect the corresponding receiver coaxial cables to the Receiver Aerial Selector Panel.

Arrow S Mount the corresponding microtelephone cables from main and reserve transmitter to the Phone Patch Unit.

Arrow T Mount the plugs P102-P103-P104 to J102-J103-J104.

8.1 Mount the cables from the power supply N1401, the battery charger N1404 and the emergency light to the Supply Terminal Block. (S.T.) See drawing Interconnection Diagram for Dual Rear Contactboard and Supply Terminal Block.

Arrow U Fasten the multicable from H1218 and the two cables from the Center Panel H1222 as shown. Use the cable clips from Bag.L.

PHOTO 9

Arrow V Mount the cover plate.

Arrow X Adjustment hole for Phone Patch ballance.

Arrow Y Mount the hatch with the frequency table. Use the screws from Bag.K.

9.1 Mount the Center Panel H1222. Use the screws from Bag.K.

9.2 Mount all the units in the cabinets.

PHOTO 0

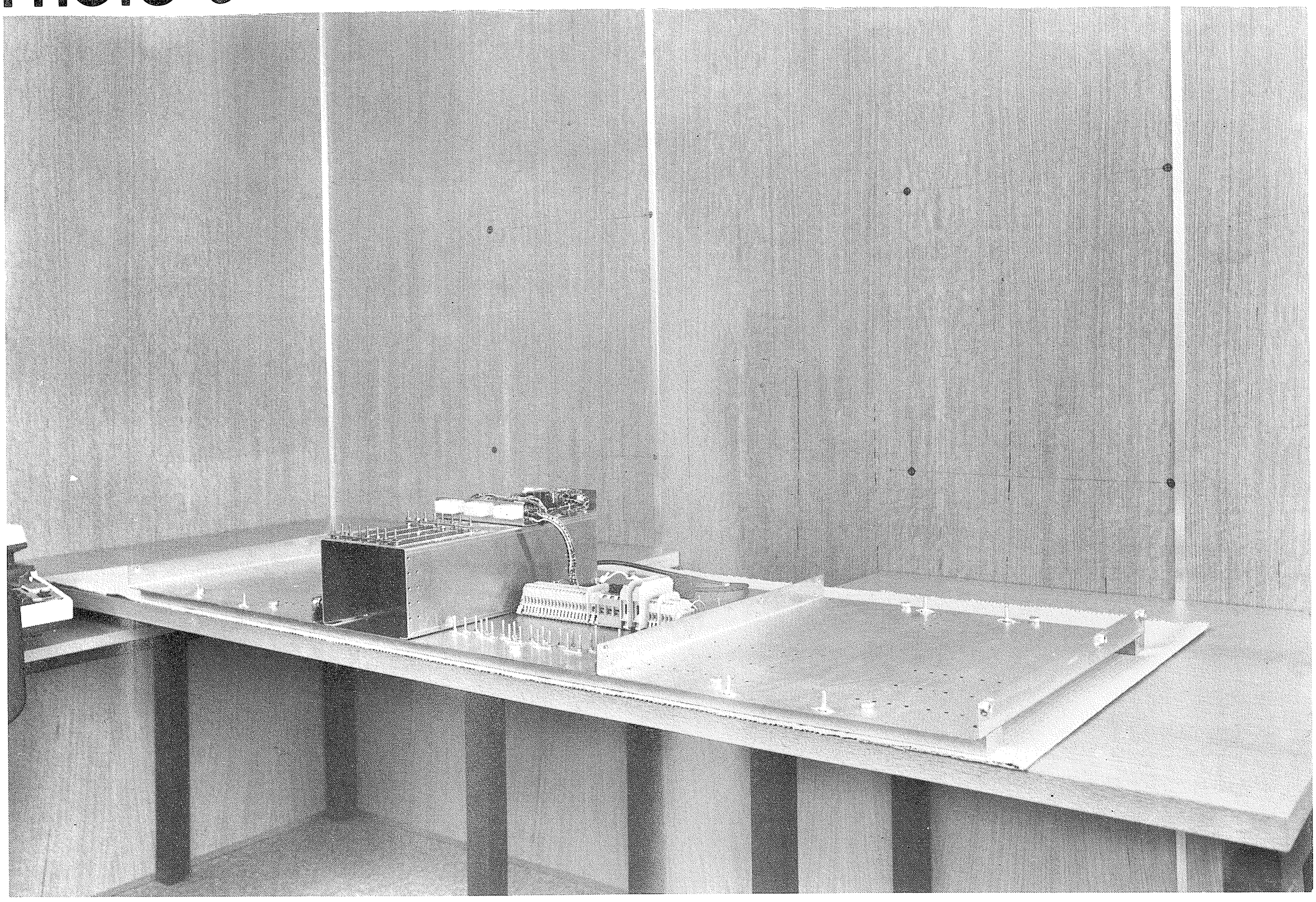


PHOTO 1

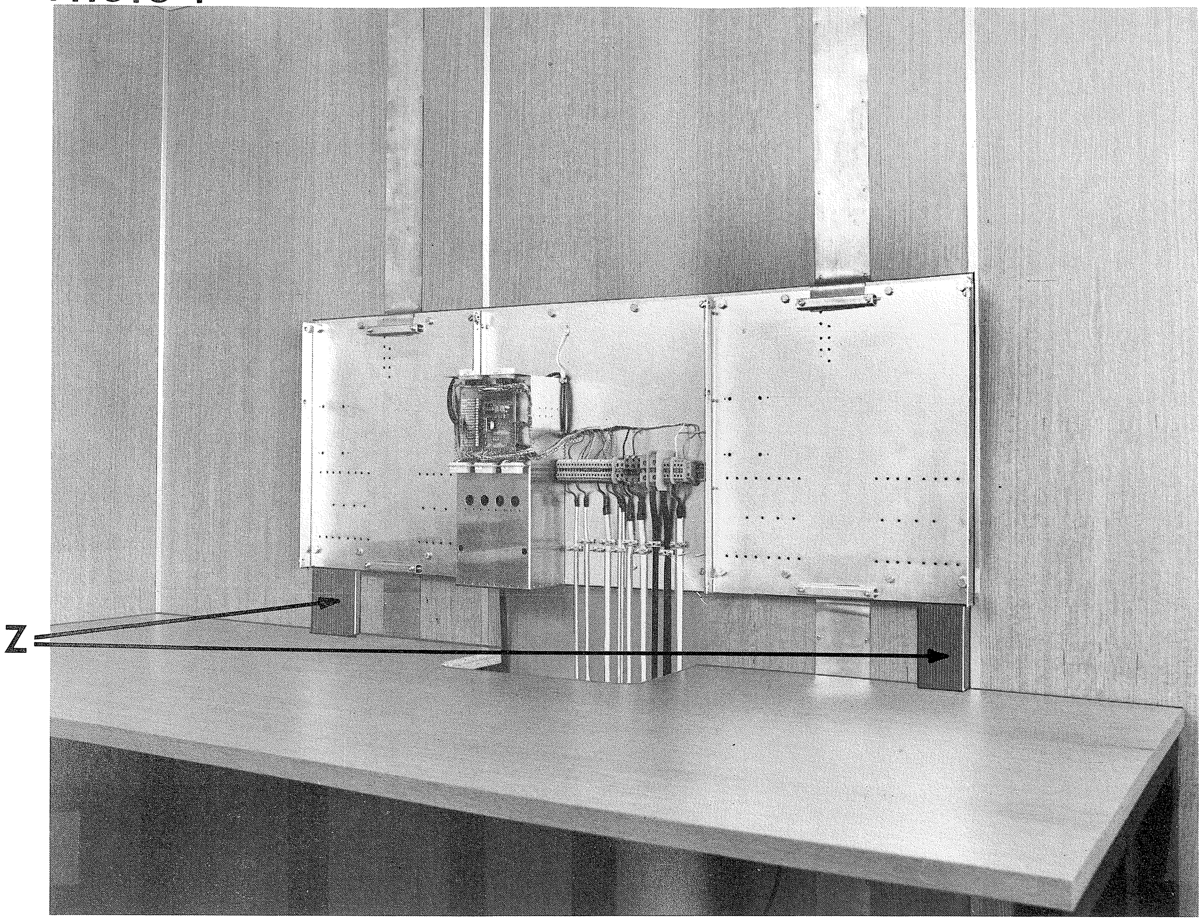


PHOTO 2

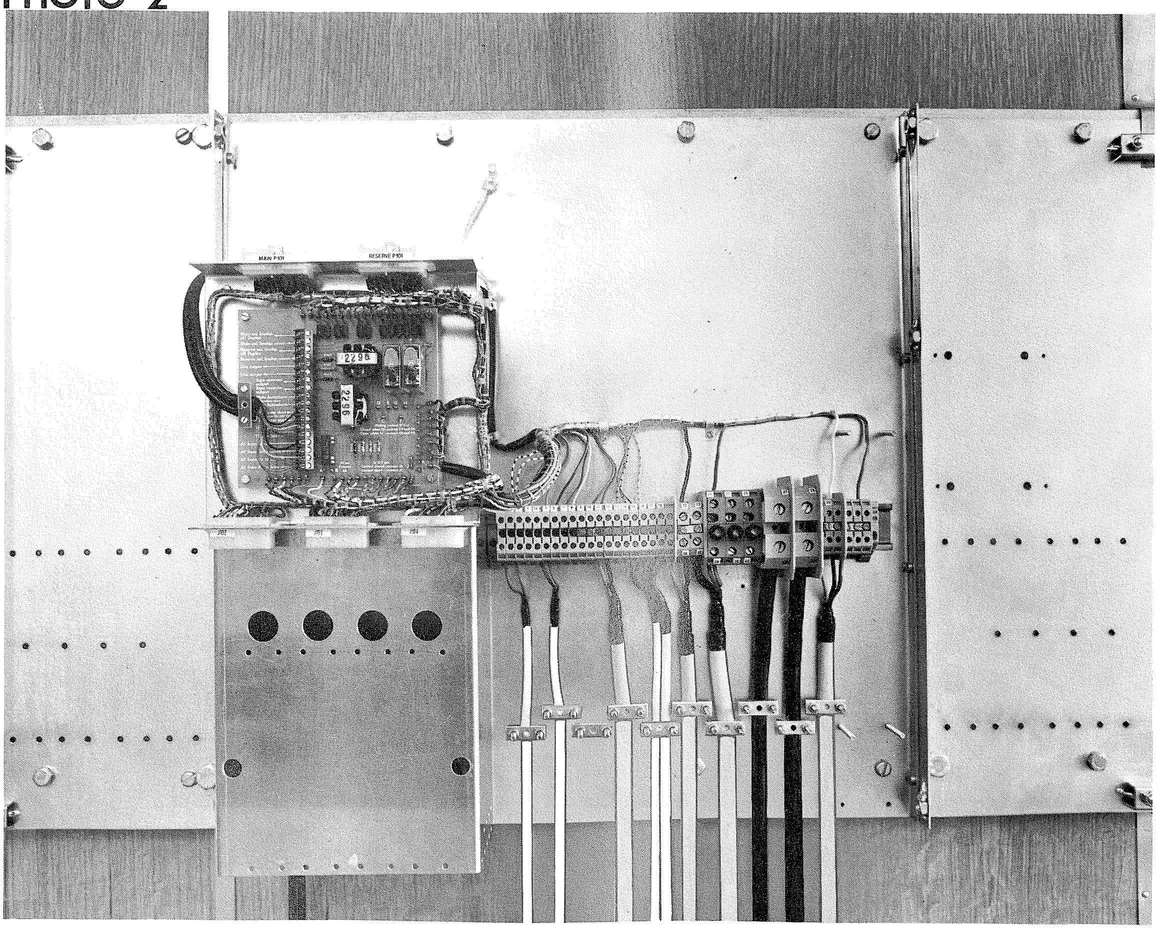


PHOTO 3

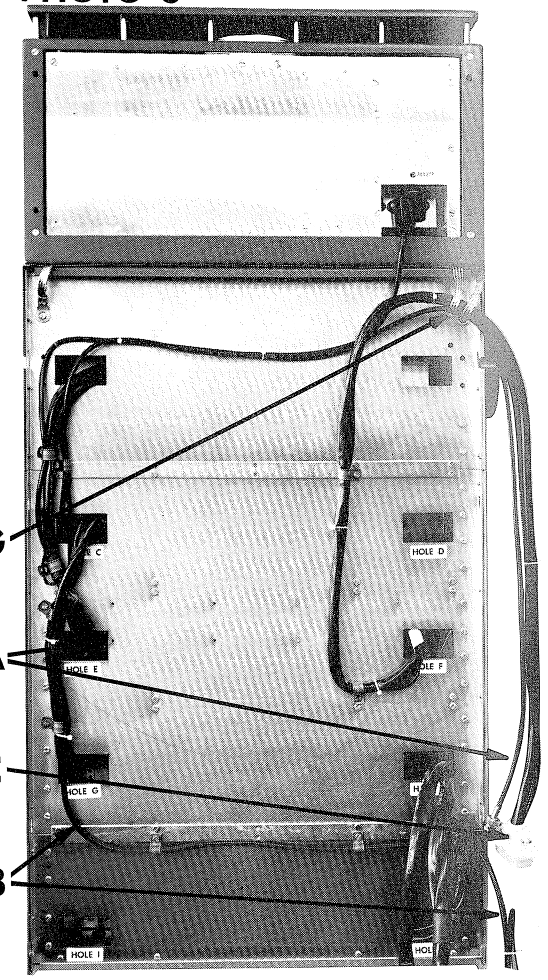


PHOTO 4

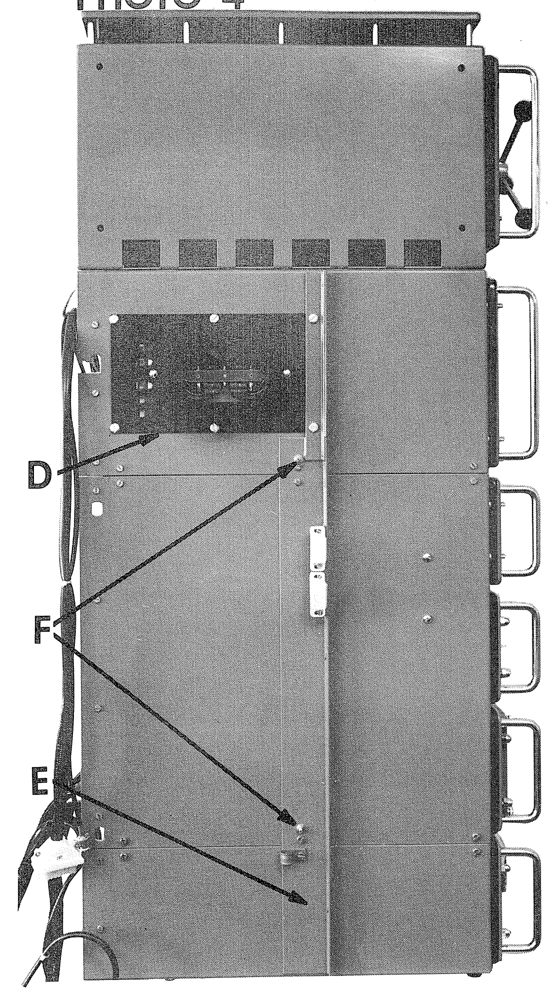
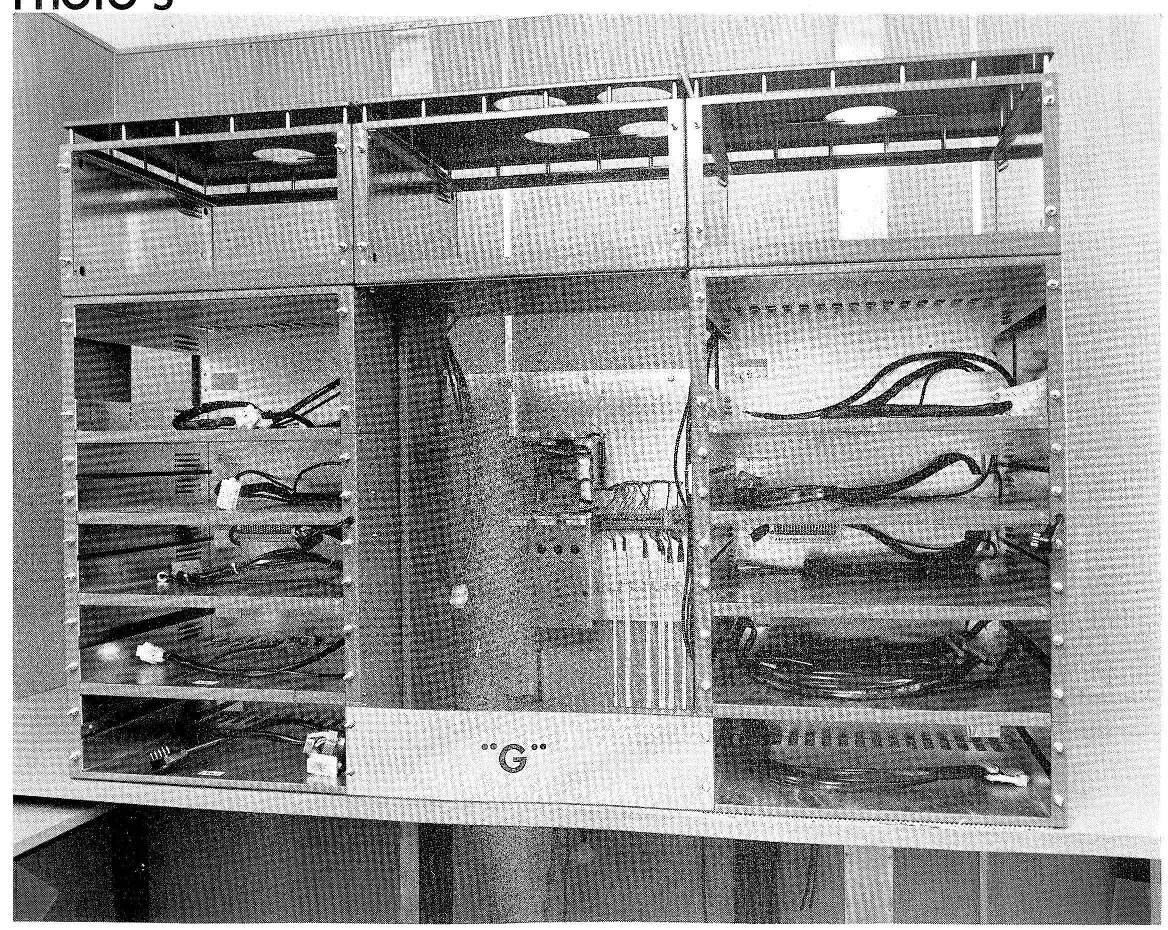


PHOTO 5



Mounting instructions for
Sailor Tandem station

PHOTO 6

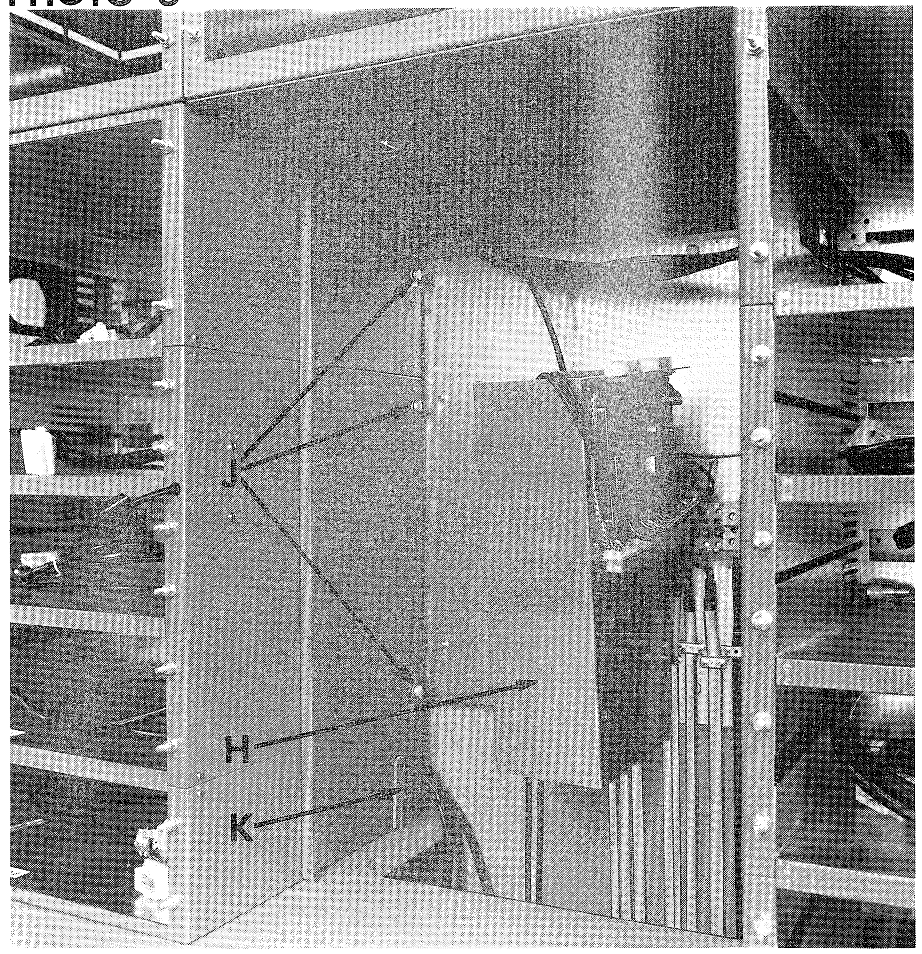


PHOTO 7

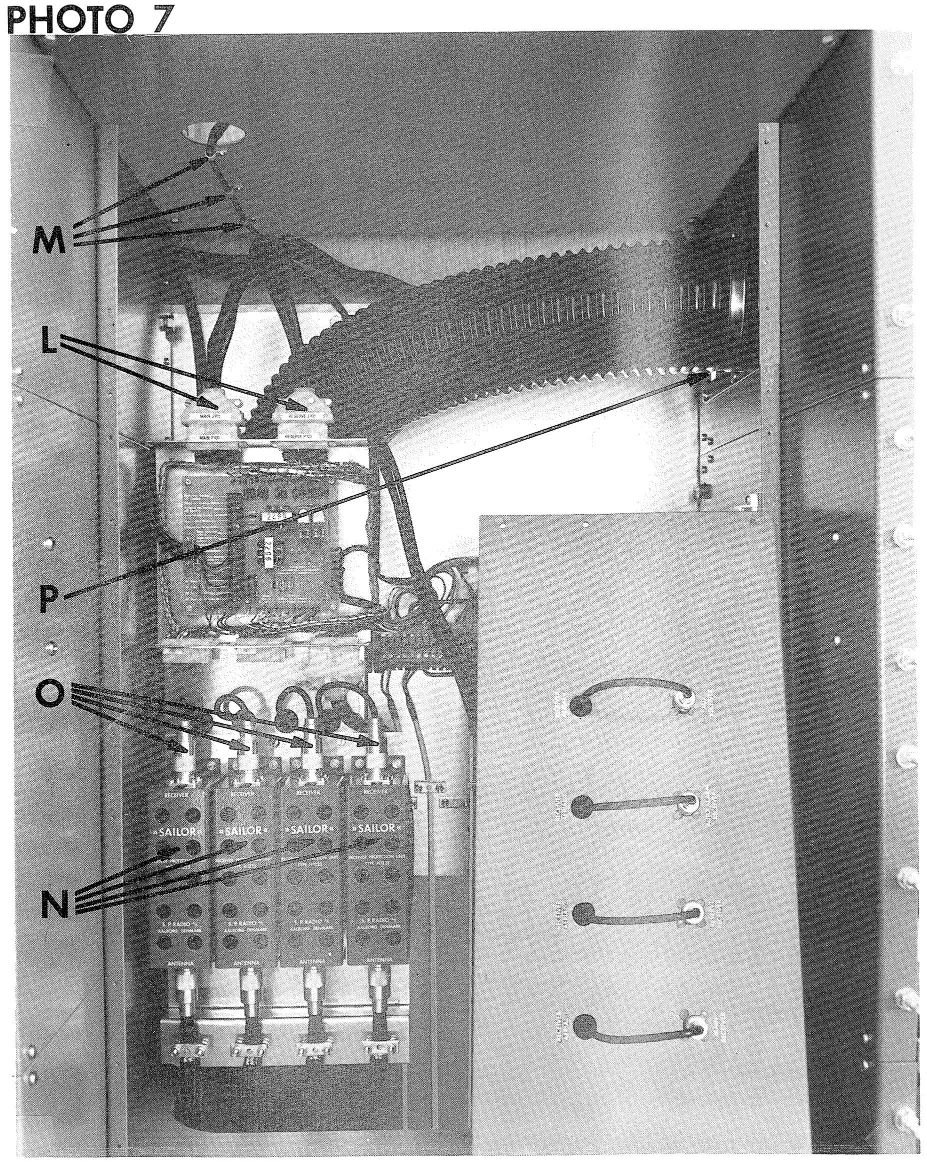
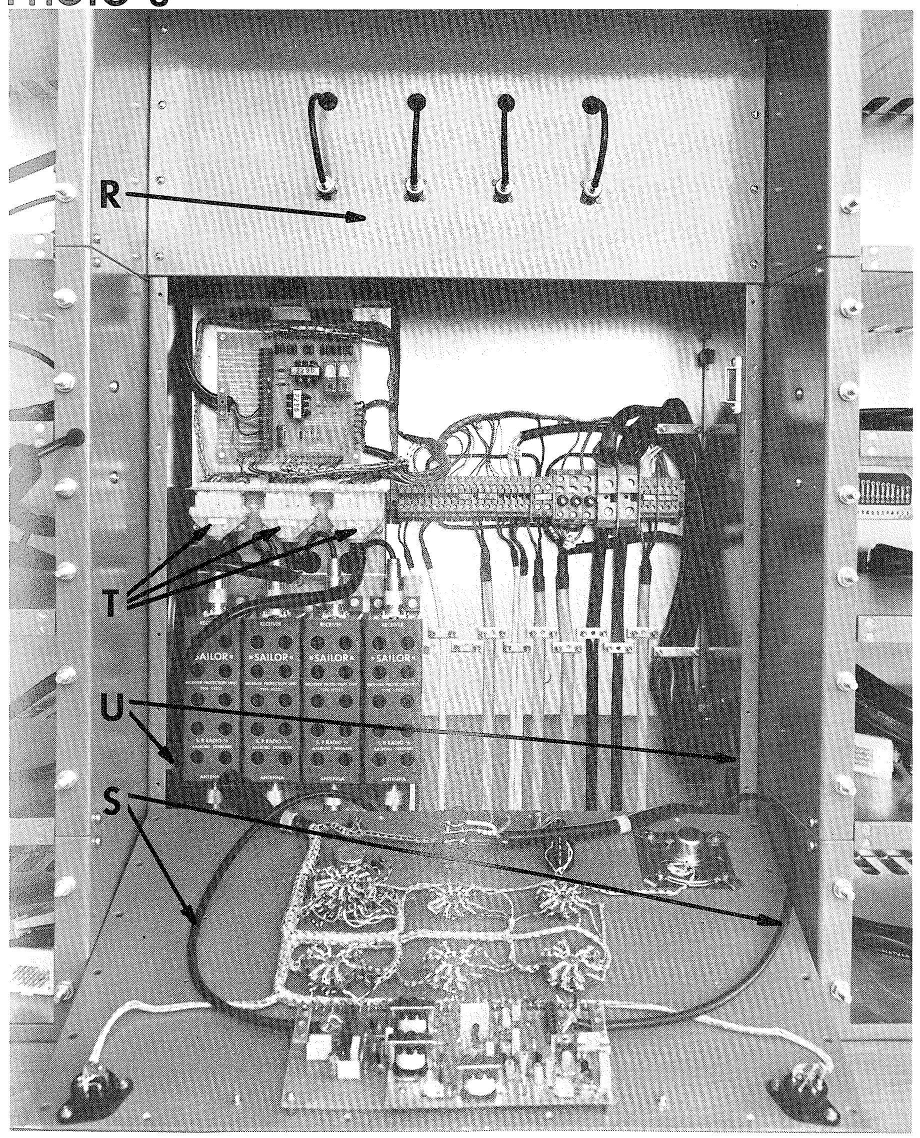
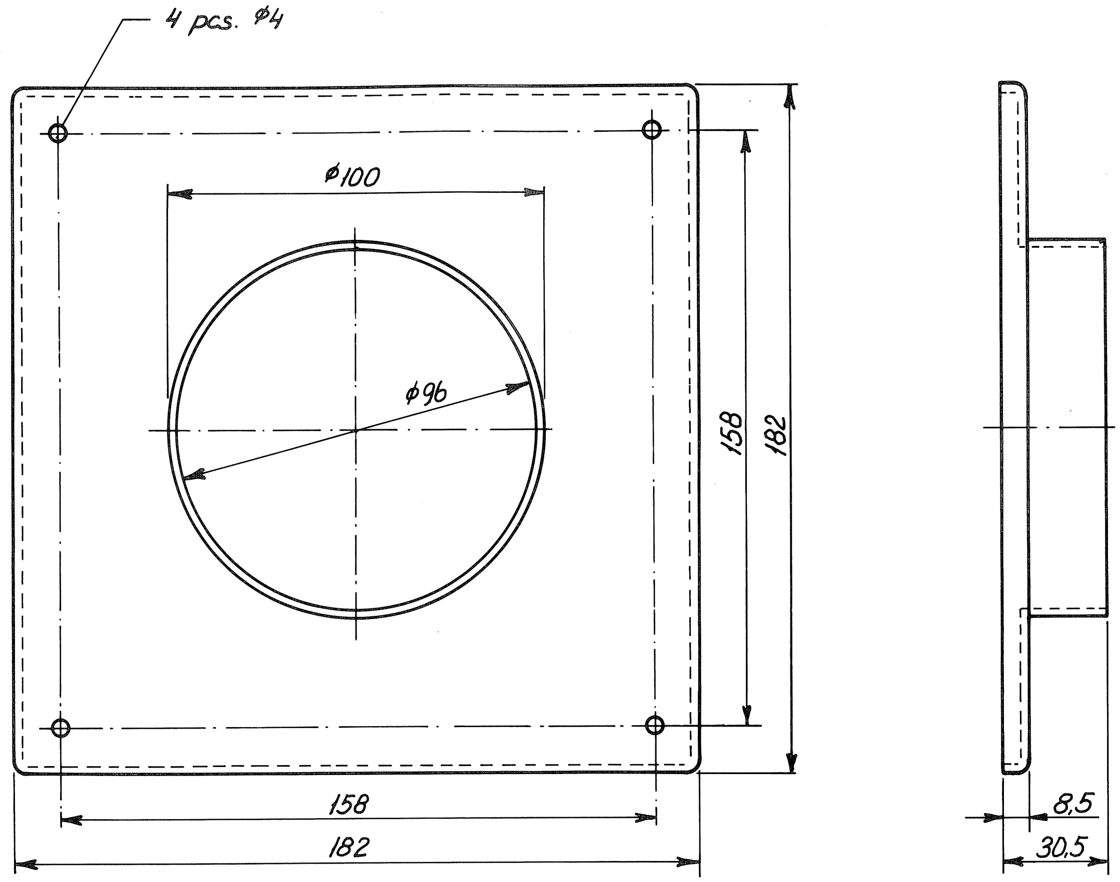


PHOTO 9

PHOTO 8





Wall flange. Tandem Station

Note 1.

All shipyard supply cables have to be Butyl P.C.P. Screened and earthed at each end.

Note 2.

Minimum bending radius of cable 100 mm.

Note 3.

Requires 2x16 Amp. Supplies.

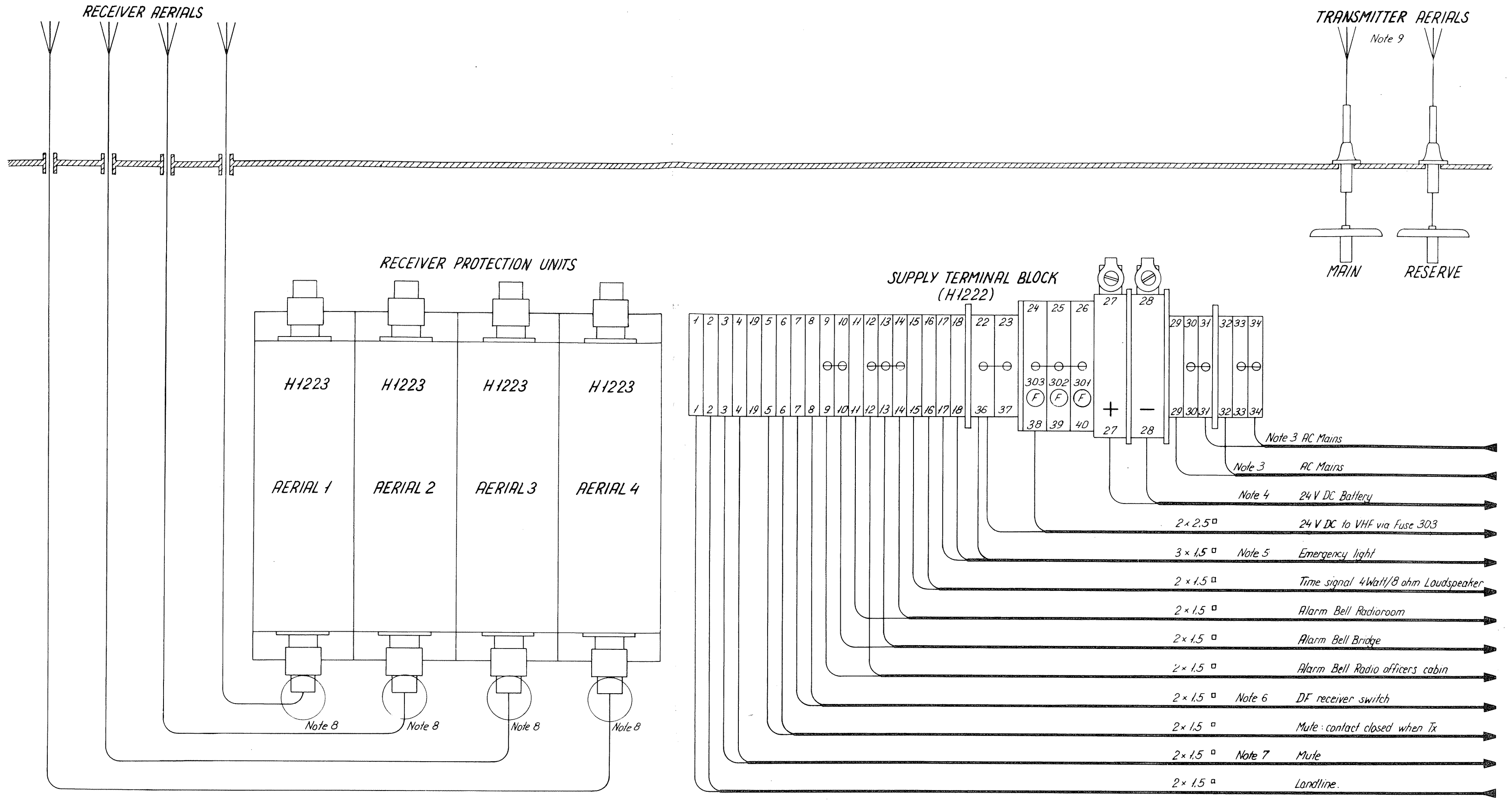
Recommended supply cables:

110-117V AC conductor - diameter = 2.5 mm^2
220-240V AC conductor - diameter = 1.5 mm^2

Note 4.

24V DC SUPPLY CABLES
Max. voltage drop allowed between the batteries and short wave set is 0,66V at max. 70 Amp. power consumption, on basis of which the adjoining table for 24V DC supply cables has been set up.

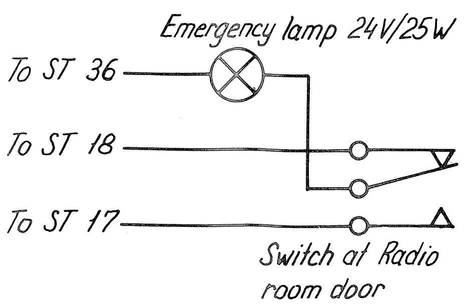
Distance between battery and short wave set	Min. cable diameter in mm^2: □
1,5 m	6 mm^2
2,4 m	10 mm^2
3,8 m	16 mm^2
6 m	25 mm^2
8,3 m	35 mm^2
12 m	50 mm^2
16,5 m	70 mm^2



H 1222

Note 5.

Emergency light installation in radio room.



Note 6.

DF receiver switch: Max. 1 Amp. 24V DC

Contact closed in DF pos.: Connect J to K on Dual Rear Contact Board.

Contact open in DF pos.: Connect J to L on Dual Rear Contact Board.

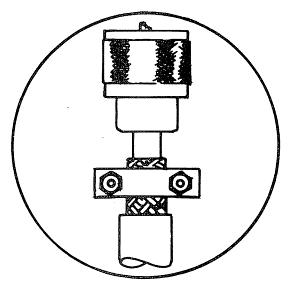
Note 7.

Mute: Supply Terminal Block S.T. 3-4
Contact closed when transmitting:
Connect C to E and F to H on Dual Rear Contact Board.

Contact open when transmitting:
Connect C to D and F to G on Dual Rear Contact Board.

Note 8.

Receiver coaxial cable.
If 50 ohm coaxial cable RG213U is used, the cable has to run in steel tube (conduit). If 50 ohm triaxial cable H1213 (S.P. Radio) is used, outer screen has to be earthed at console end only.



Note 9.

Recommended main and reserve transmitter aerials.

Whip aerial from DUK Antennen STA 150 C - HF/MF

Whip aerial from TJØSTHEIM Antennas AS 9 STX

Wire aerial: Length between 15 and 22 m.

»SAILOR« S. P. RADIO A/S AALBORG DENMARK

WIRING TO
SAILOR TANDEM STATION

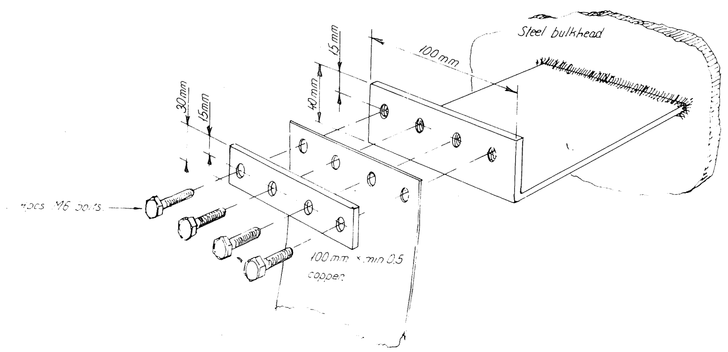
H 1222

Note 1.

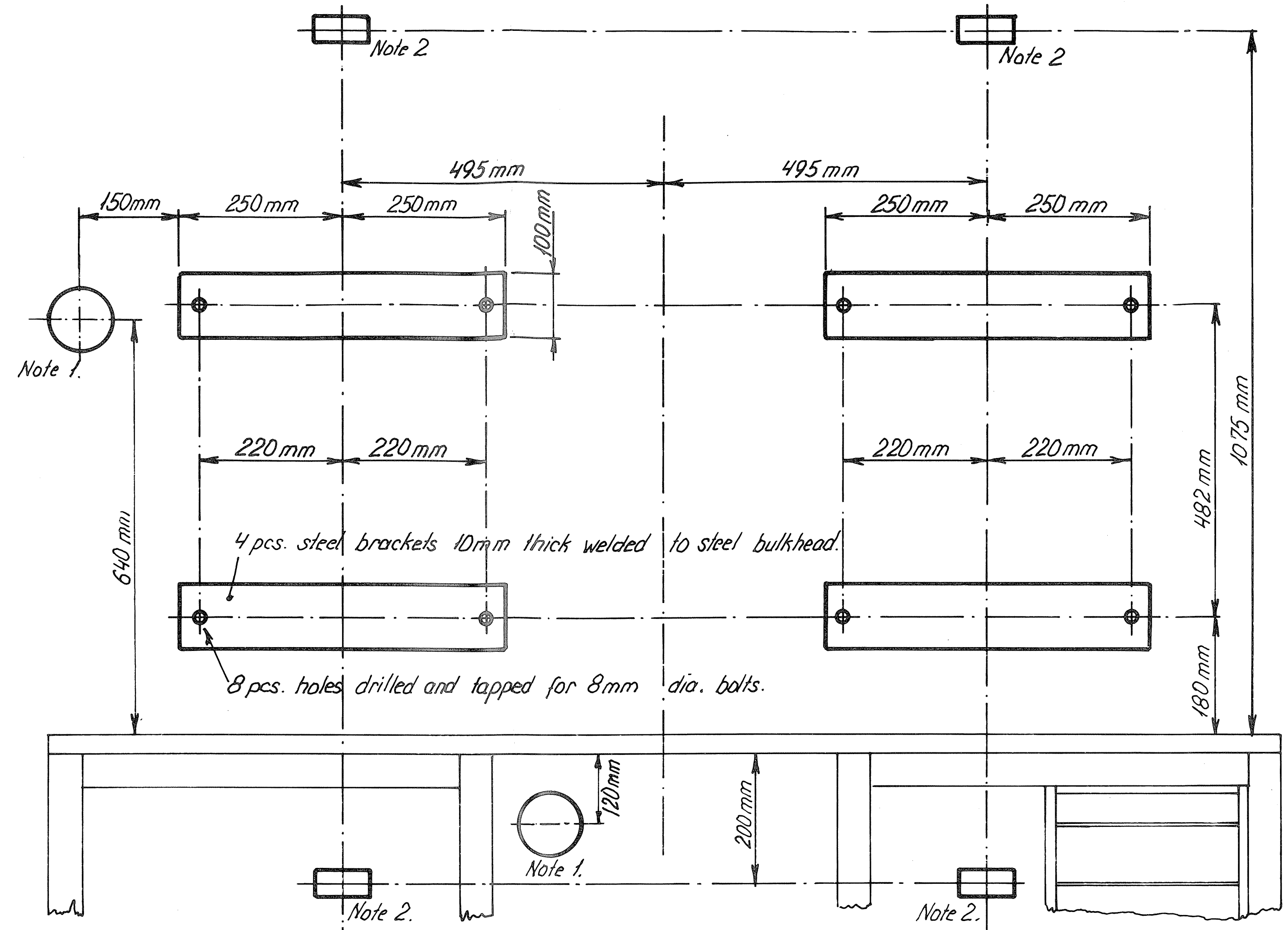
The position for the exhaust vents (non return) to outside of superstructure, is shown as close as possible to the radio station. They can be placed in the radio room, where it is convenient.
Max. Temperature for air outlet is 50° C.
Diameter of AIR OUTLET COUPLING FLANGE H1221 is 100 mm.
Vent Pipe Data: Max. 130° C., min. diameter 100 mm.

Note 2.

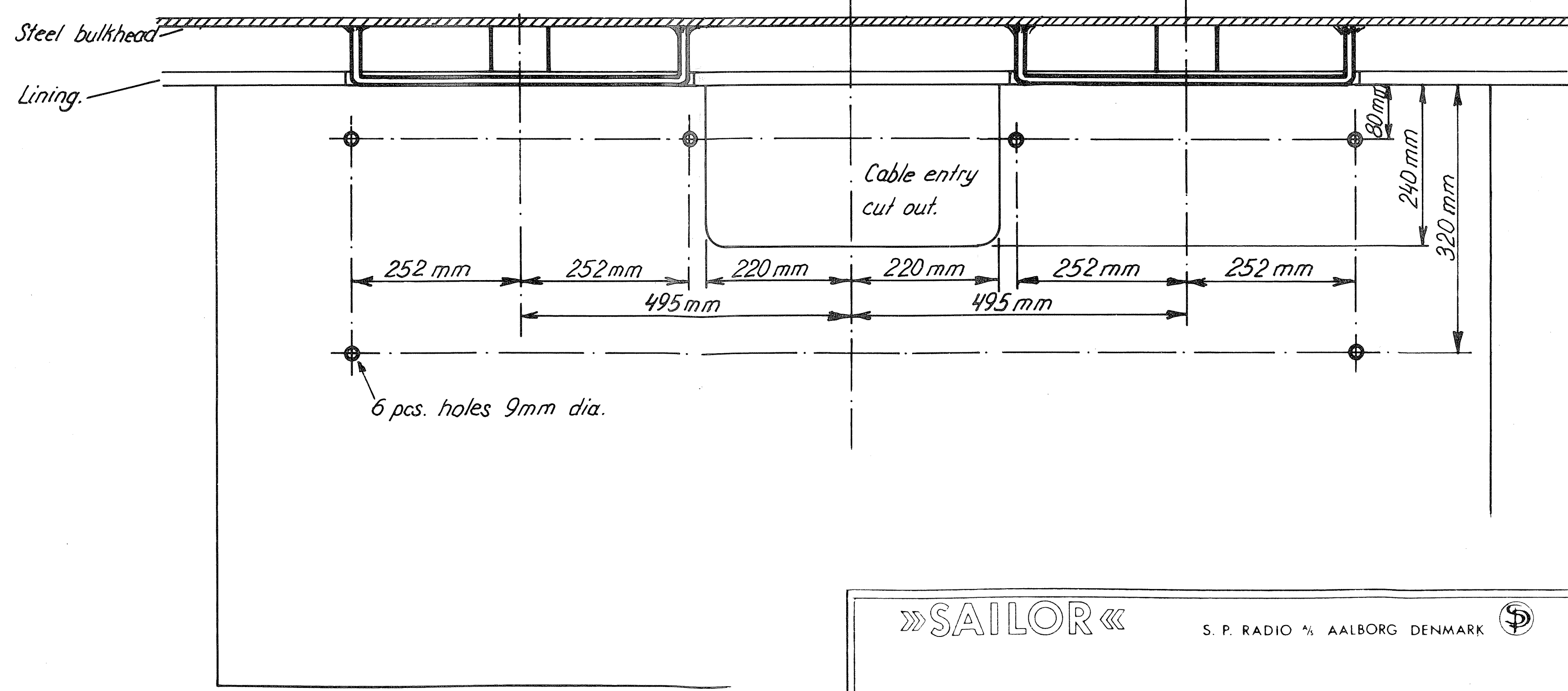
The Earth Stubs to be made of Stainless Steel (18-8-3).
The Earth Stubs must be welded to the steel bulkhead with ESAB welding rod OK6775.



BULKHEAD DRILLING PLAN



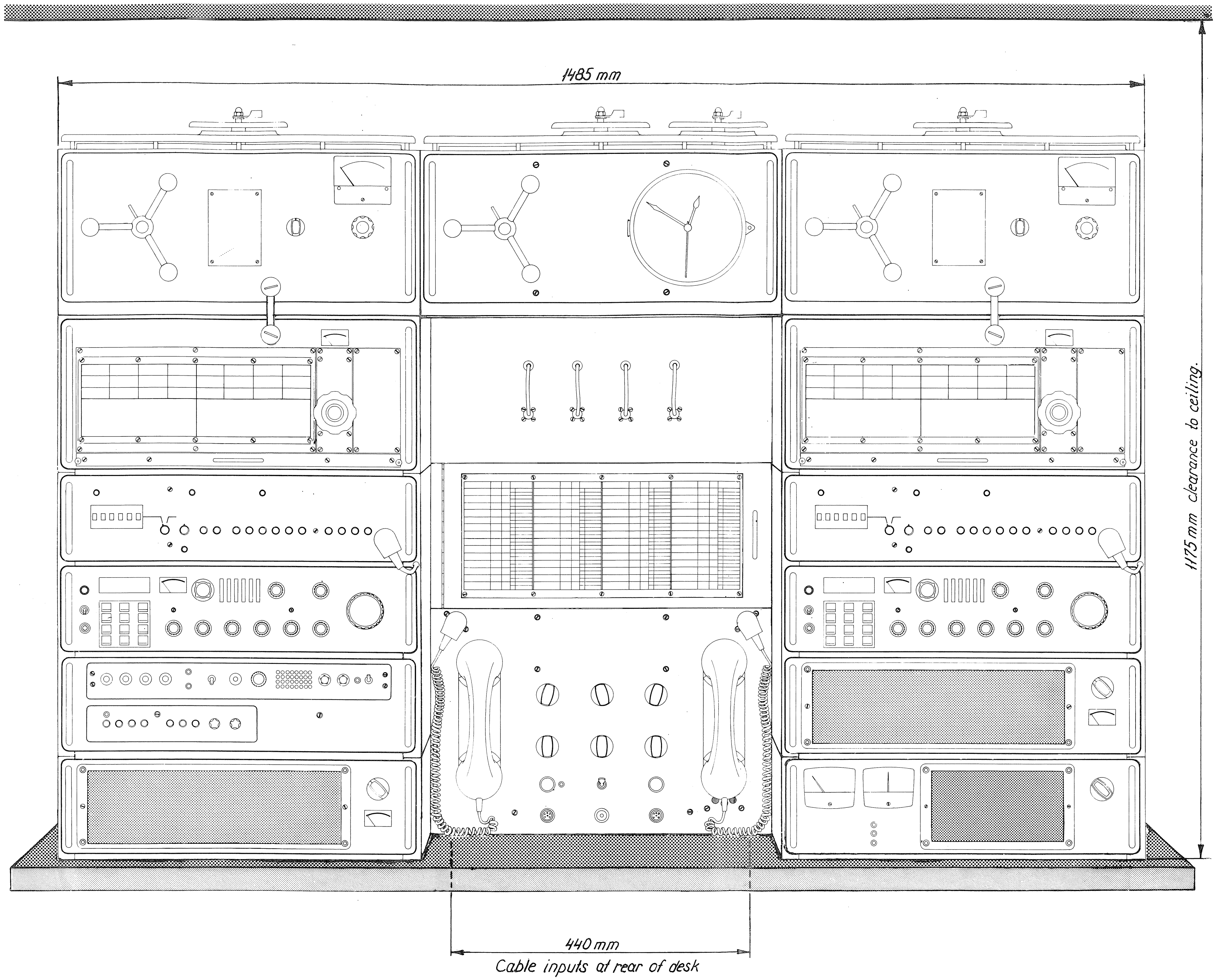
DESK TOP DRILLING PLAN

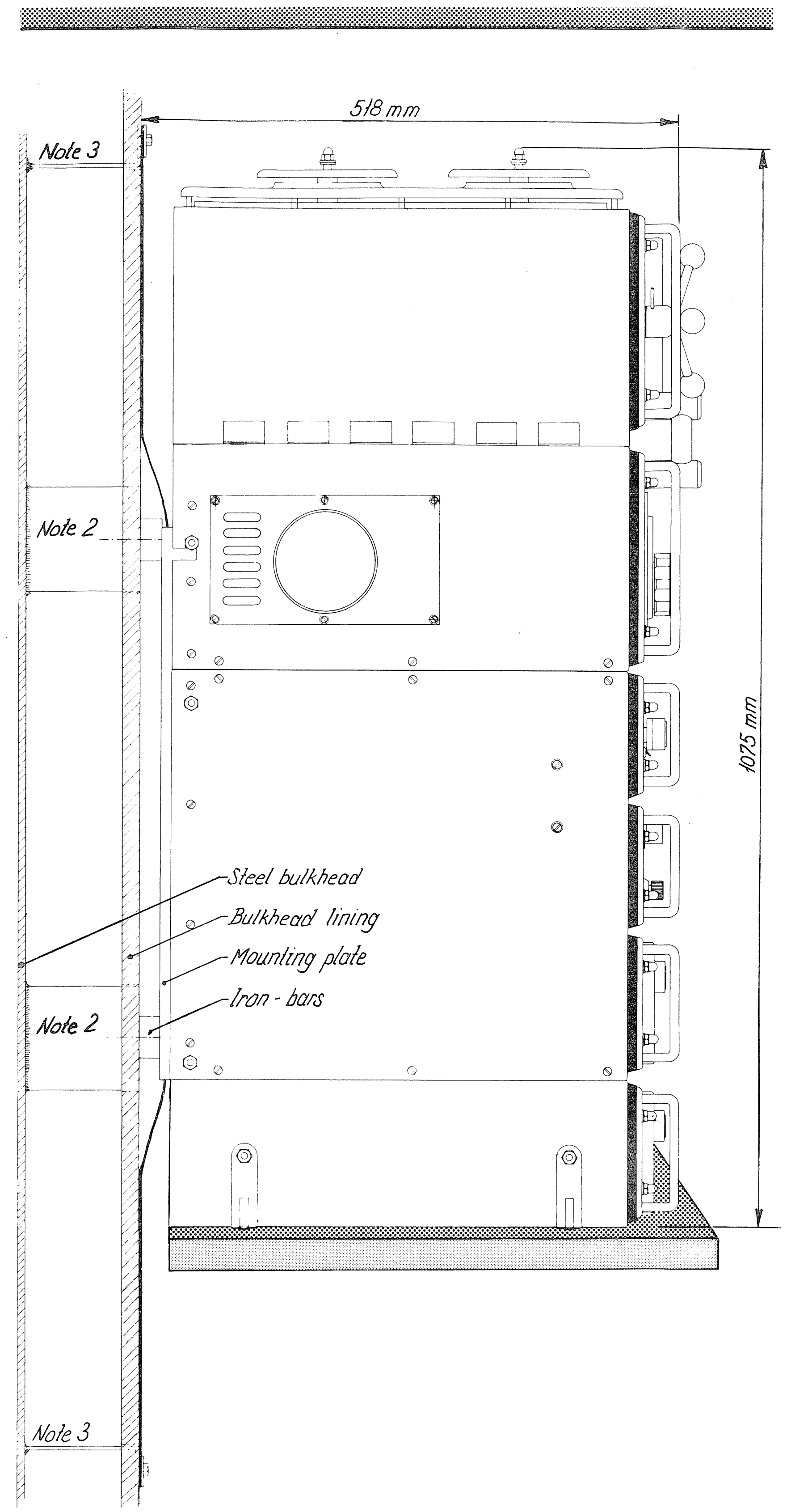


»SAILOR« S. P. RADIO A/S AALBORG DENMARK

DRILLING PLAN FOR
SAILOR TANDEM STATION

H 1222





Note 1.

Weight of Console 400 kg.
Desk construction to suit.

Note 2.

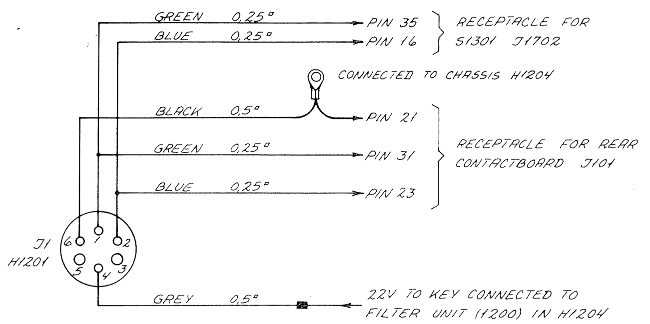
Steel mounting brackets
100 mm x 500 mm and 10 mm
thick welded to bulkhead.

Note 3.

Earth stubs. See Drilling Plan.

»SAILOR« S. P. RADIO A/S AALBORG DENMARK

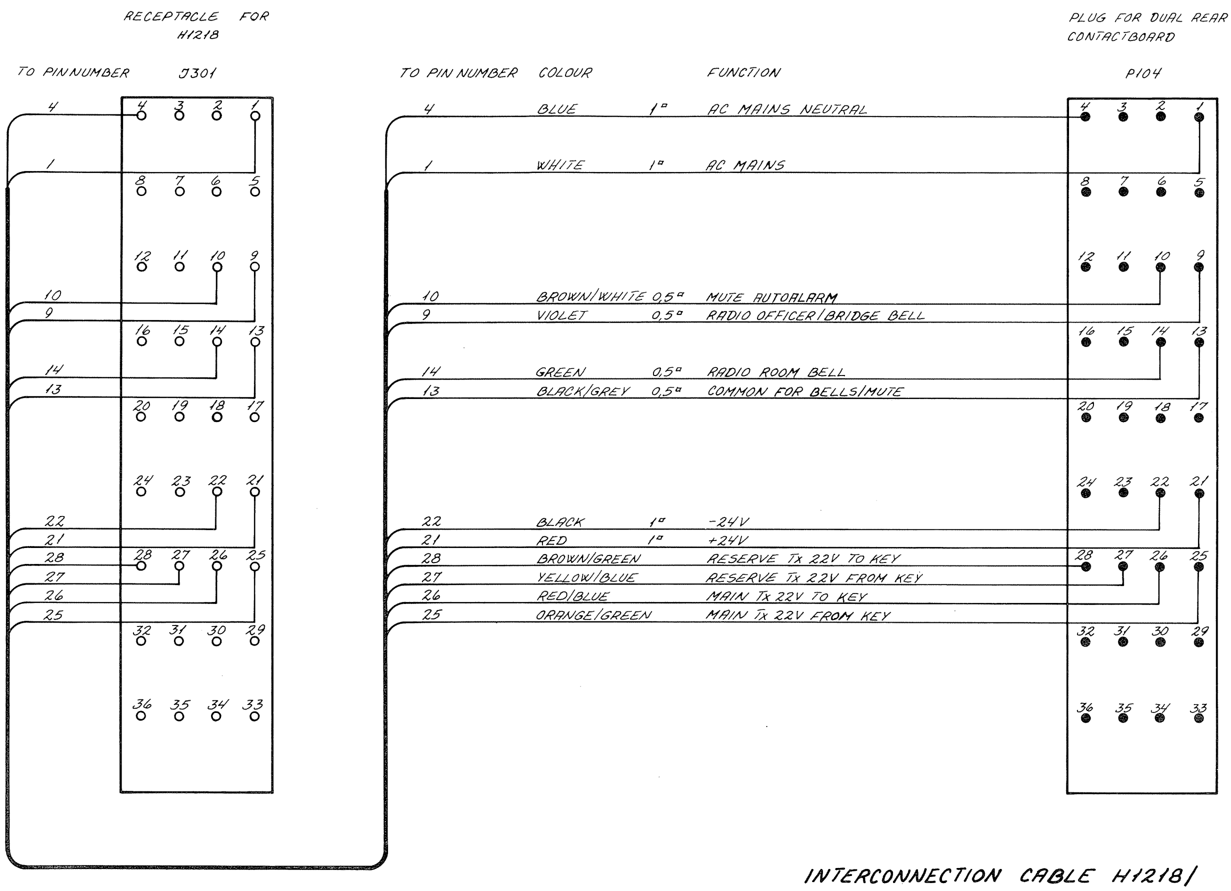
DIMENSIONAL DRAWING FOR
SAILOR TANDEM STATION



INTERCONNECTION CABLE H1201/H1202 AND S1301

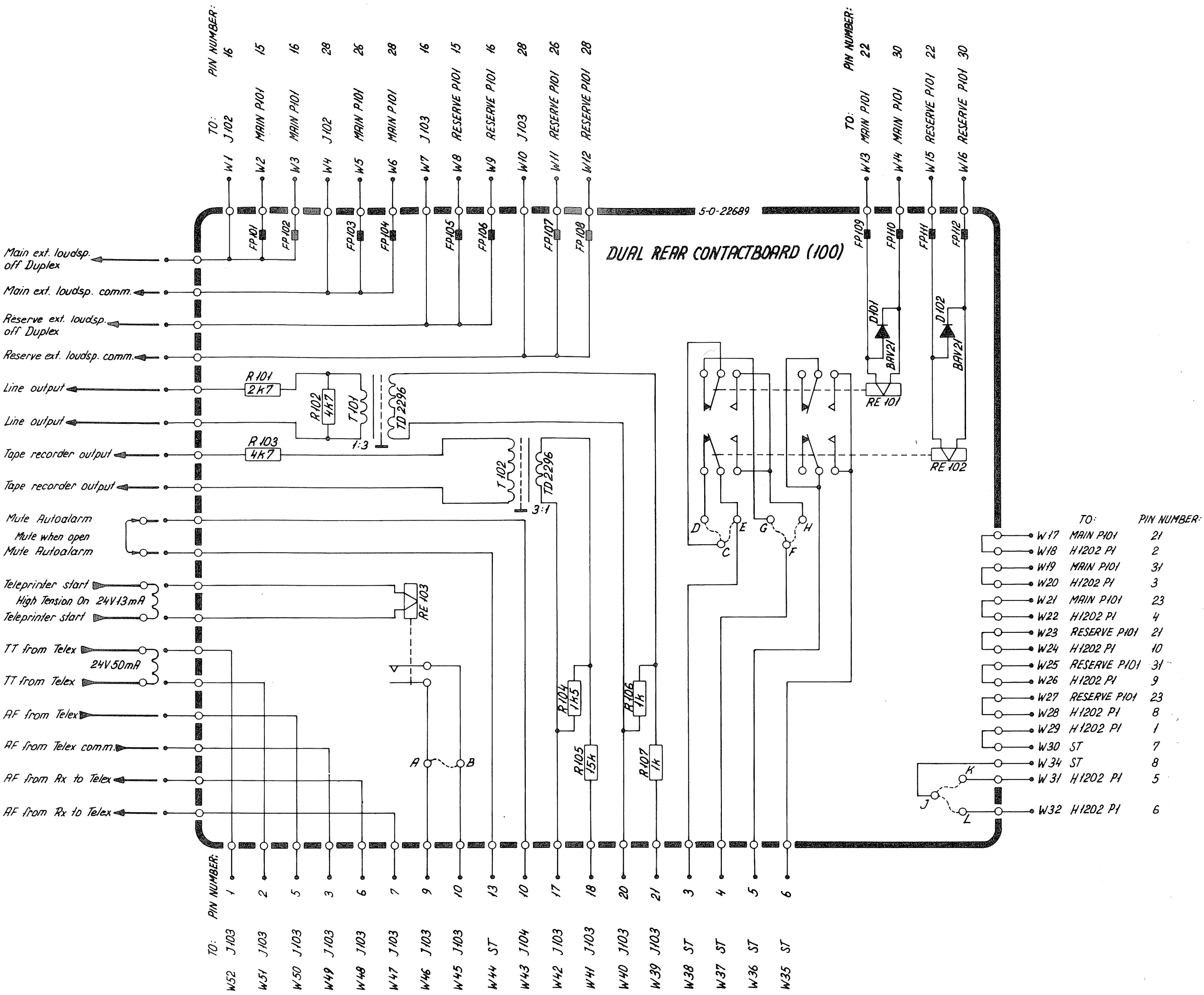
H 1222

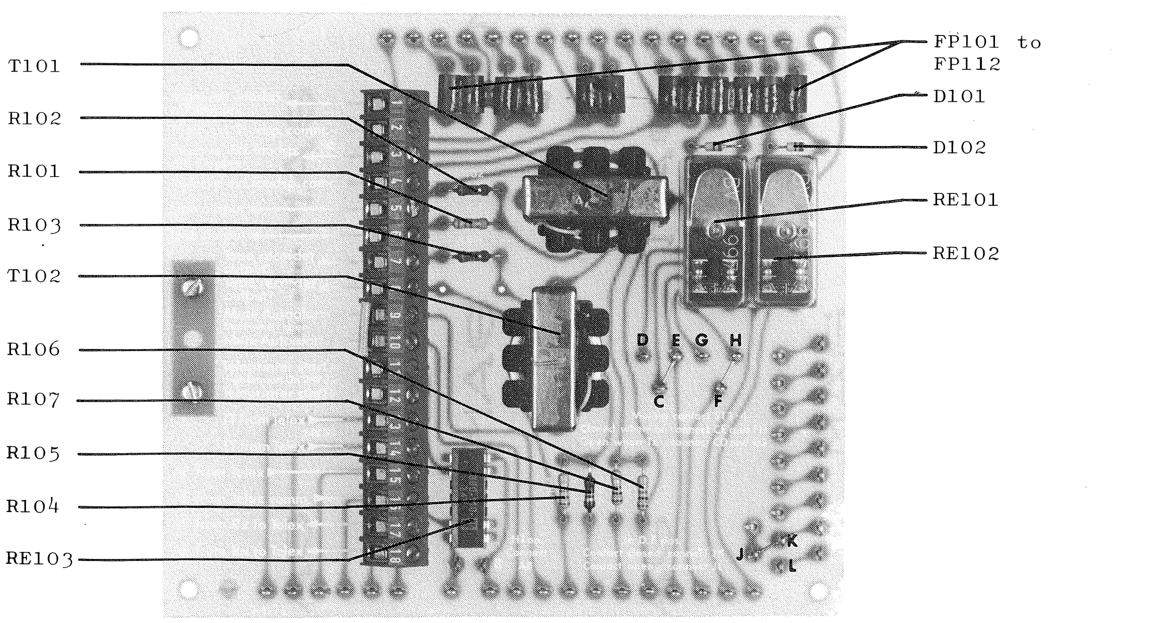
H1218-H 1222



INTERCONNECTION CABLE H1218/
Ⓐ DUAL REAR CONTACTBOARD H1222

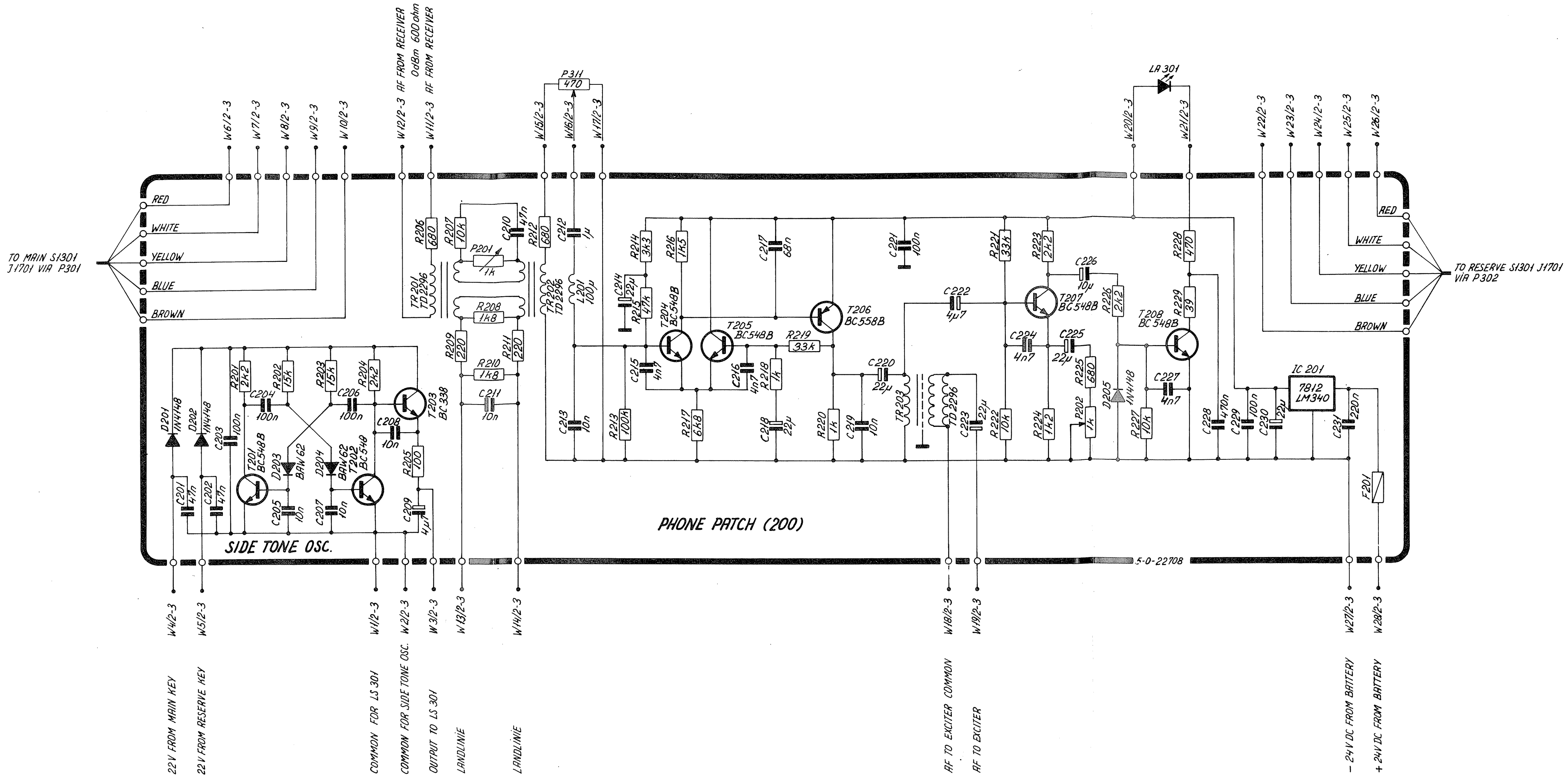
H 1222

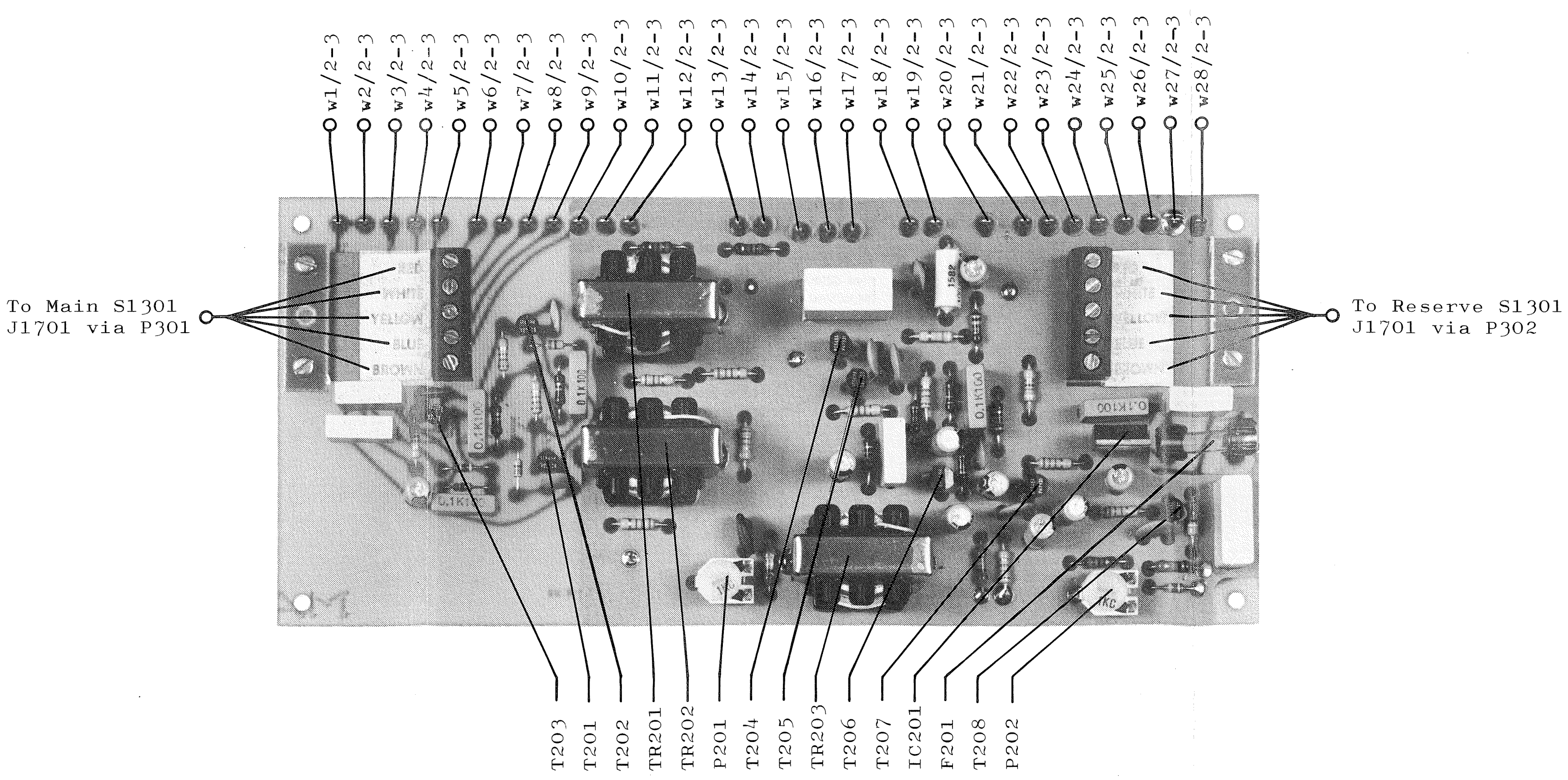




DUAL REAR CONTACT BOARD

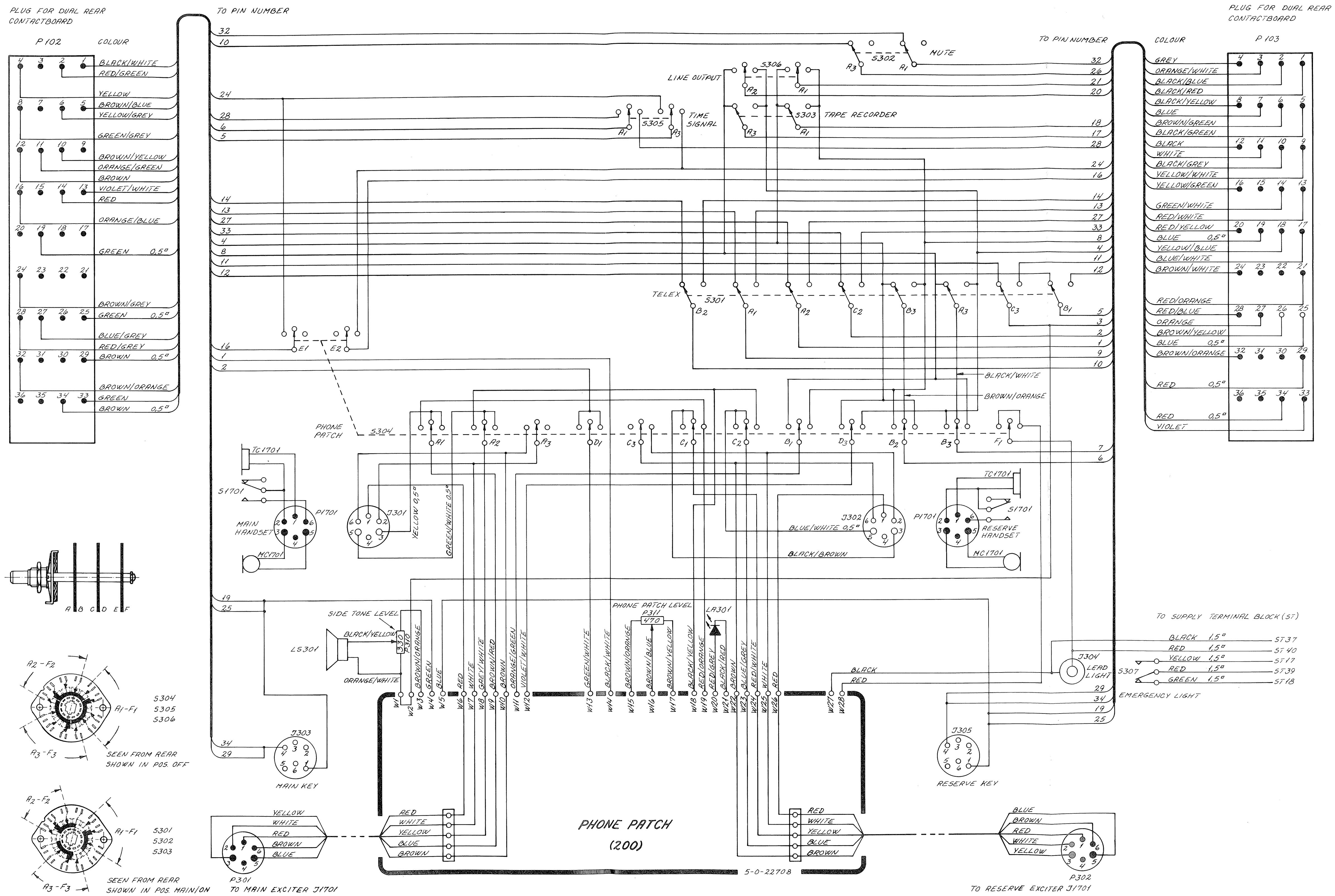
H 1222





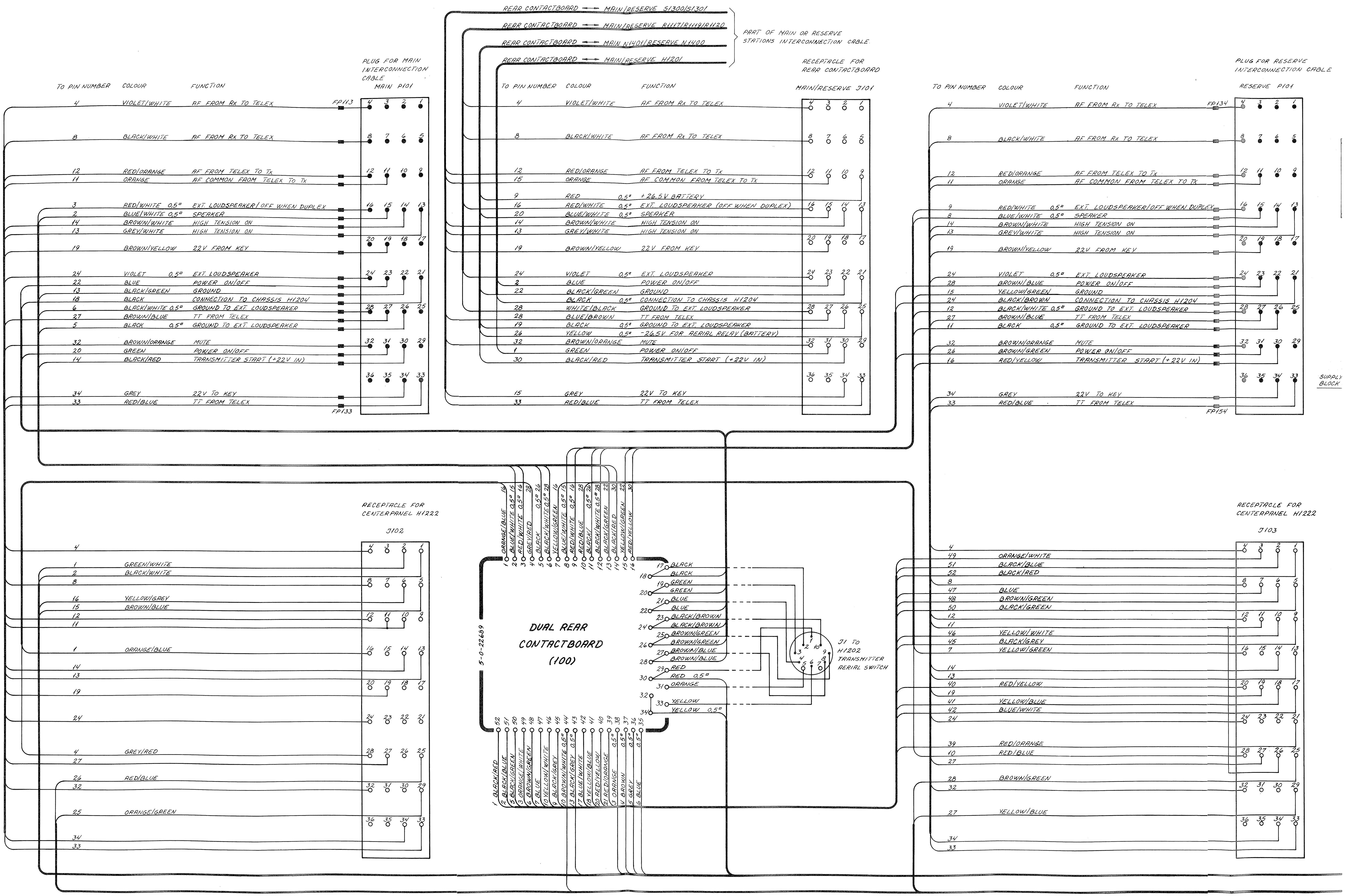
PHONE PATCH

H 1222

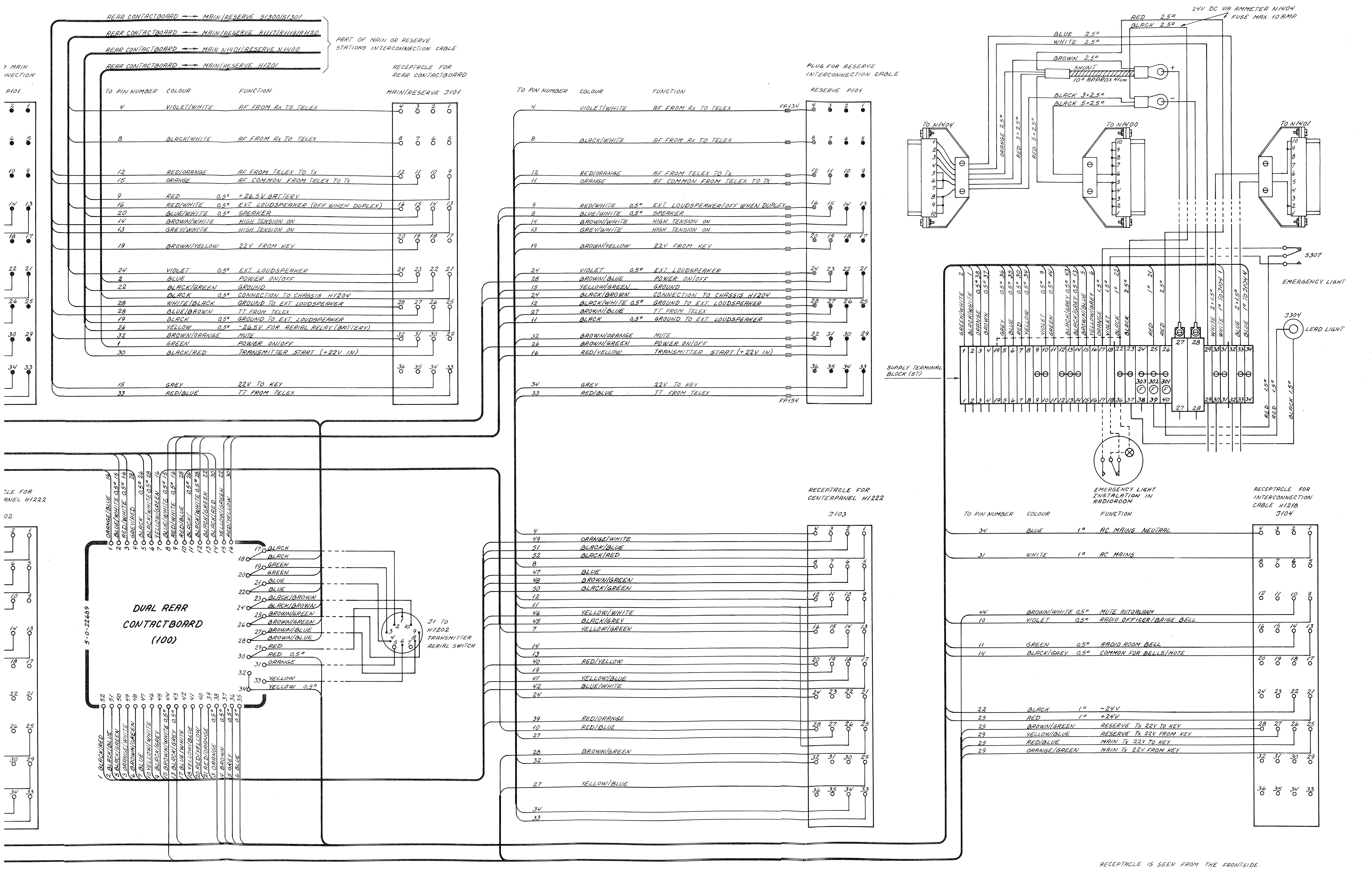


PLUG IS SEEN FROM BEHIND.
WHEN NO WIRE SIZE IS GIVEN, THE SIZE IS 0,25□

Ⓐ DIAGRAM FOR CENTERPANEL H1222


REAR CONTACTBOARD ←→ MAIN/RESERVE S1300/S1301
REAR CONTACTBOARD ←→ MAIN/RESERVE R1117/R1119/R1120
REAR CONTACTBOARD ←→ MAIN N1401/RESERVE N1400
REAR CONTACTBOARD ←→ MAIN/RESERVE H1201
PART OF MAIN OR RESERVE STATIONS INTERCONNECTION CABLE
PLUG FOR MAIN INTERCONNECTION CABLE
MAIN P101
RECEPTACLE FOR REAR CONTACTBOARD
MAIN/RESERVE J101
PLUG FOR RESERVE INTERCONNECTION CABLE
RESERVE P101
TO PIN NUMBER
COLOUR
FUNCTION
4 VIOLET/WHITE AF FROM Rx TO TELEX
8 BLACK/WHITE AF FROM Rx TO TELEX
12 RED/ORANGE AF FROM TELEX TO Tx
11 ORANGE AF COMMON FROM TELEX TO Tx
3 RED/WHITE 0,5° EXT. LOUDSPEAKER/OFF WHEN DUPLEX
2 BLUE/WHITE 0,5° SPEAKER
14 BROWN/WHITE HIGH TENSION ON
13 GREY/WHITE HIGH TENSION ON
19 BROWN/YELLOW 22V FROM KEY
24 VIOLET 0,5° EXT. LOUDSPEAKER
22 BLUE POWER ON/OFF
13 BLACK/GREEN GROUND
18 BLACK CONNECTION TO CHASSIS H1204
6 BLACK/WHITE 0,5° GROUND TO EXT. LOUDSPEAKER
27 BROWN/BLUE TT FROM TELEX
5 BLACK 0,5° GROUND TO EXT. LOUDSPEAKER
32 BROWN/ORANGE MUTE
20 GREEN POWER ON/OFF
14 BLACK/RED TRANSMITTER START (+22V IN)
34 GREY 22V TO KEY
33 RED/BLUE TT FROM TELEX
FP113
FP133
4 VIOLET/WHITE AF FROM Rx TO TELEX
8 BLACK/WHITE AF FROM Rx TO TELEX
12 RED/ORANGE AF FROM TELEX TO Tx
15 ORANGE AF COMMON FROM TELEX TO Tx
9 RED 0,5° +26,5V BATTERY
16 RED/WHITE 0,5° EXT. LOUDSPEAKER (OFF WHEN DUPLEX)
20 BLUE/WHITE 0,5° SPEAKER
14 BROWN/WHITE HIGH TENSION ON
13 GREY/WHITE HIGH TENSION ON
19 BROWN/YELLOW 22V FROM KEY
24 VIOLET 0,5° EXT. LOUDSPEAKER
2 BLUE POWER ON/OFF
22 BLACK/GREEN GROUND
BLACK 0,5° CONNECTION TO CHASSIS H1204
28 WHITE/BLACK GROUND TO EXT. LOUDSPEAKER
28 BLUE/BROWN TT FROM TELEX
19 BLACK 0,5° GROUND TO EXT. LOUDSPEAKER
26 YELLOW 0,5° -26,5V FOR AERIAL RELAY (BATTERY)
32 BROWN/ORANGE MUTE
1 GREEN POWER ON/OFF
30 BLACK/RED TRANSMITTER START (+22V IN)
15 GREY 22V TO KEY
33 RED/BLUE TT FROM TELEX
4 VIOLET/WHITE AF FROM Rx TO TELEX
8 BLACK/WHITE AF FROM Rx TO TELEX
12 RED/ORANGE AF FROM TELEX TO Tx
11 ORANGE AF COMMON FROM TELEX TO Tx
9 RED/WHITE 0,5° EXT. LOUDSPEAKER/OFF WHEN DUPLEX
8 BLUE/WHITE 0,5° SPEAKER
14 BROWN/WHITE HIGH TENSION ON
13 GREY/WHITE HIGH TENSION ON
19 BROWN/YELLOW 22V FROM KEY
24 VIOLET 0,5° EXT. LOUDSPEAKER
28 BROWN/BLUE POWER ON/OFF
15 YELLOW/GREEN GROUND
24 BLACK/BROWN CONNECTION TO CHASSIS H1204
12 BLACK/WHITE 0,5° GROUND TO EXT. LOUDSPEAKER
27 BROWN/BLUE TT FROM TELEX
11 BLACK 0,5° GROUND TO EXT. LOUDSPEAKER
32 BROWN/ORANGE MUTE
26 BROWN/GREEN POWER ON/OFF
16 RED/YELLOW TRANSMITTER START (+22V IN)
34 GREY 22V TO KEY
33 RED/BLUE TT FROM TELEX
FP134
FP154
SUPPLY BLOCK
RECEPTACLE FOR CENTERPANEL H1222
J102
4
1 GREEN/WHITE
2 BLACK/WHITE
8
16 YELLOW/GREY
15 BROWN/BLUE
12
11
1 ORANGE/BLUE
14
13
19
24
4 GREY/RED
27
26 RED/BLUE
32
25 ORANGE/GREEN
34
33
DUAL REAR CONTACTBOARD (100)
5-0-22689
1 ORANGE/BLUE
2 BLUE/WHITE 0,5°
3 RED/WHITE 0,5°
4 GREY/RED
5 BLACK
6 BLACK/WHITE 0,5°
7 YELLOW/GREEN
8 BLUE/WHITE 0,5°
9 RED/WHITE 0,5°
10 BLACK/BLUE
11 BLACK
12 BLACK/WHITE 0,5°
13 BLACK/GREEN
14 BLACK/RED
15 YELLOW/BLUE
16 RED/YELLOW
17 BLACK
18 BLACK
19 GREEN
20 GREEN
21 BLUE
22 BLUE
23 BLACK/BROWN
24 BLACK/BROWN
25 BROWN/GREEN
26 BROWN/GREEN
27 BROWN/BLUE
28 BROWN/BLUE
29 RED
30 RED 0,5°
31 ORANGE
33 YELLOW
34 YELLOW 0,5°
1 BLACK/RED
2 BLACK/BLUE
3 BLACK/GREEN
3 ORANGE/WHITE
6 BROWN/GREEN
6 BLUE
7 YELLOW/WHITE
9 BLACK/GREY
10 BROWN/WHITE 0,5°
13 BLACK/GREY
17 BLUE/WHITE
18 YELLOW/BLUE
20 RED/YELLOW
21 RED/ORANGE
3 ORANGE
4 BROWN
5 GREY
6 BLUE
J1 TO H1202 TRANSMITTER AERIAL SWITCH
RECEPTACLE FOR CENTERPANEL H1222
J103
4
49 ORANGE/WHITE
51 BLACK/BLUE
52 BLACK/RED
8
47 BLUE
48 BROWN/GREEN
50 BLACK/GREEN
12
11
46 YELLOW/WHITE
45 BLACK/GREY
7 YELLOW/GREEN
14
13
40 RED/YELLOW
19
41 YELLOW/BLUE
42 BLUE/WHITE
24
39 RED/ORANGE
10 RED/BLUE
27
28 BROWN/GREEN
32
27 YELLOW/BLUE
34
33

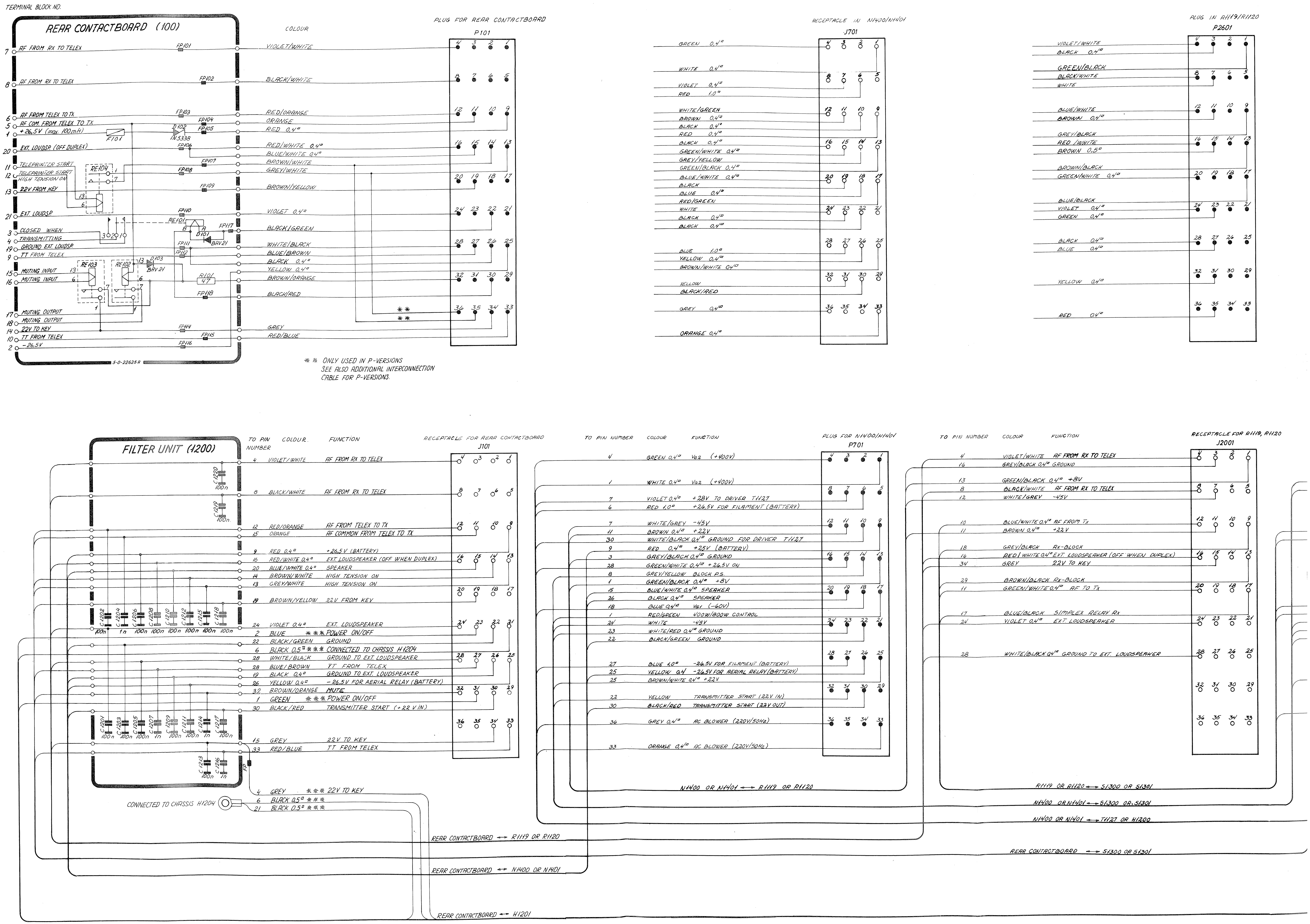
H 1222 A



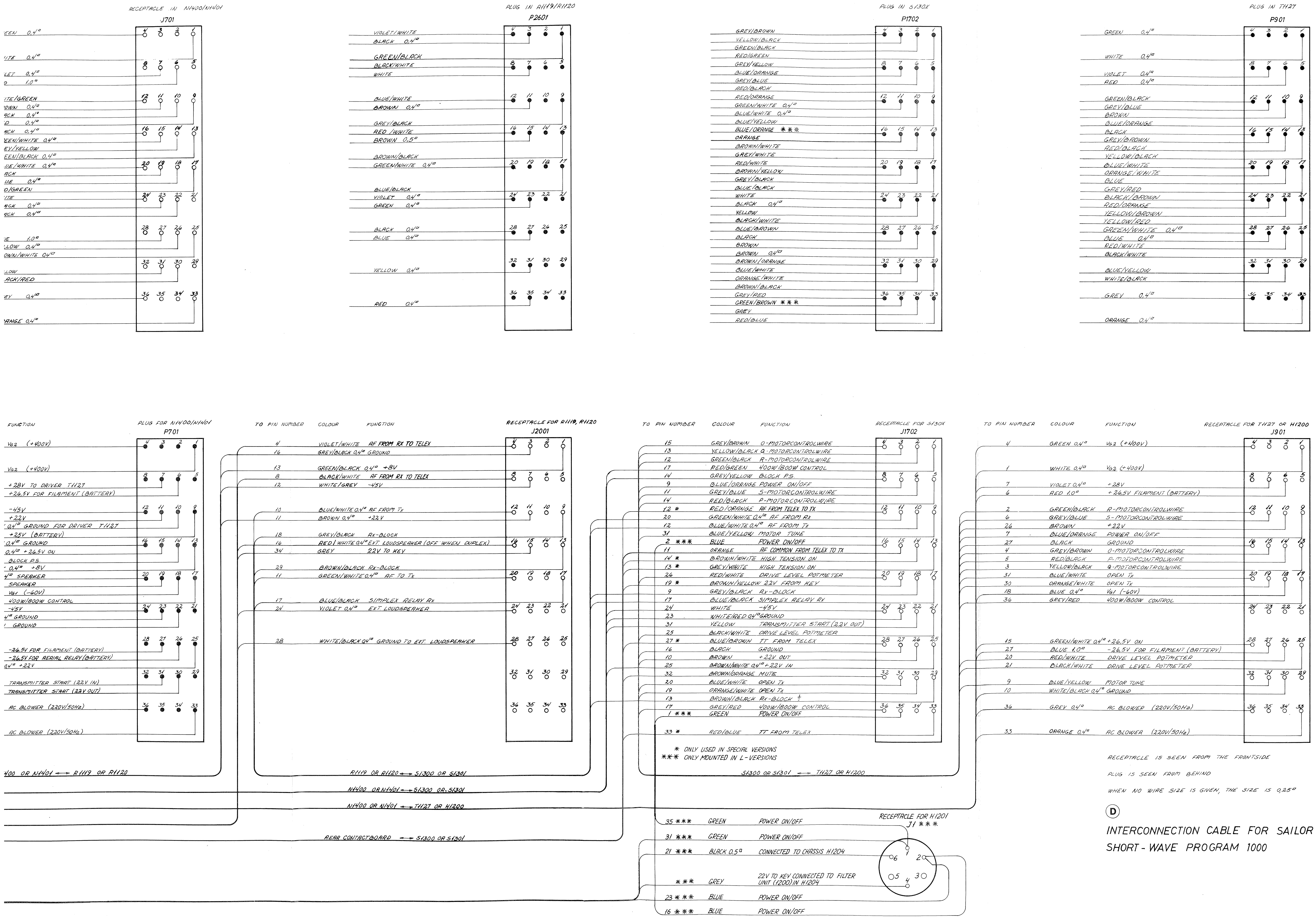
RECEPTACLE IS SEEN FROM THE FRONTSIDE.
PLUG IS SEEN FROM BEHIND.
WHEN NO WIRE SIZE IS GIVEN, THE SIZE IS 0,25°

INTERCONNECTION DIAGRAM FOR DUAL REAR CONTACTBOARD AND SUPPLY TERMINAL BLOCK H1222

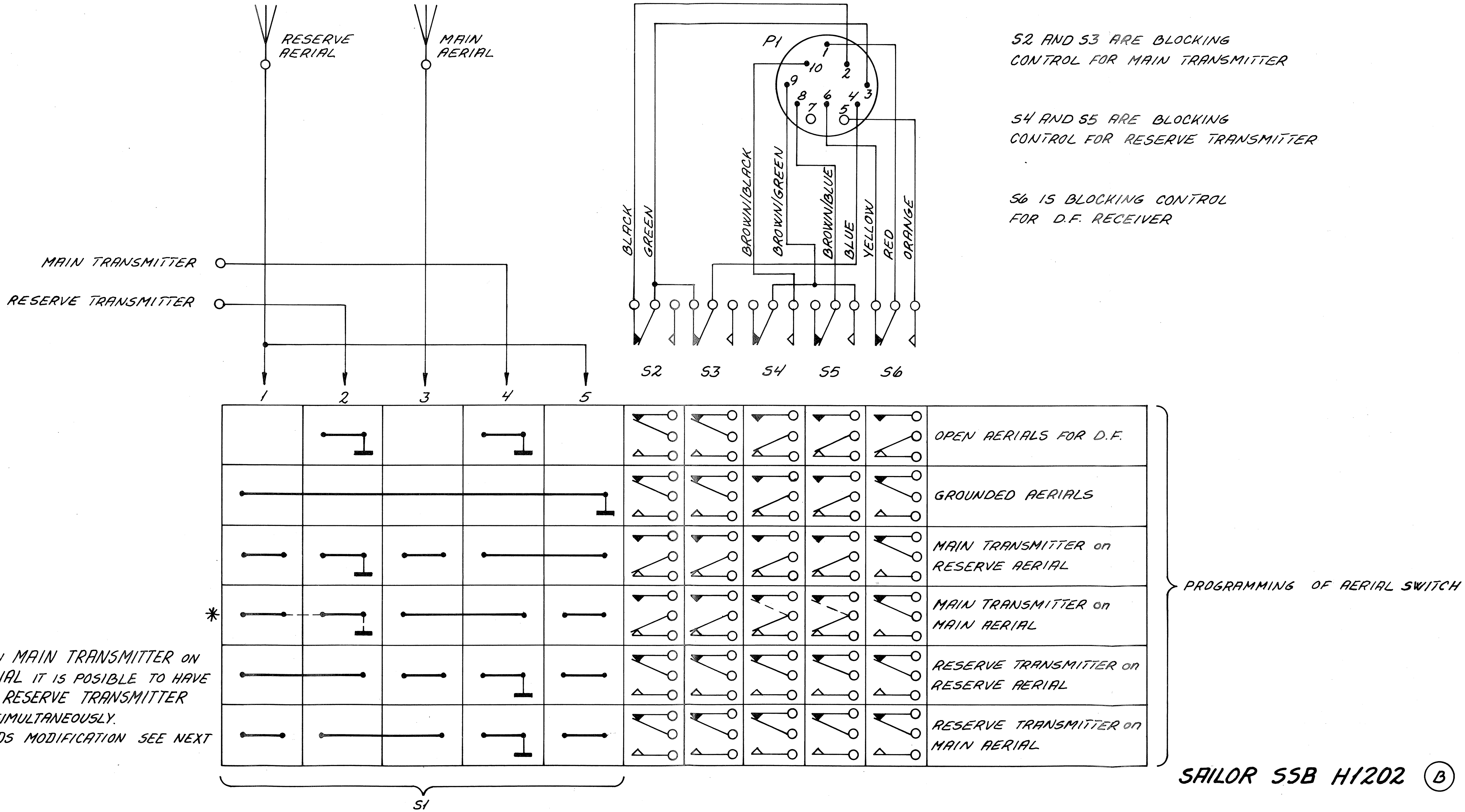
(A)



TERMINAL BLOCK NO.
REAR CONTACTBOARD (100)
COLOUR
PLUG FOR REAR CONTACTBOARD
P101
AF FROM RX TO TELEX
AF FROM RX TO TELEX
AF FROM TELEX TO TX
AF COM. FROM TELEX TO TX
+26,5V (max. 100mH)
EXT. LOUDSP. (OFF DUPLEX)
TELEPRINTER START
TELEPRINTER START
HIGH TENSION ON
22V FROM KEY
EXT. LOUDSP.
CLOSED WHEN TRANSMITTING
GROUND EXT. LOUDSP.
TT FROM TELEX
MUTING INPUT
MUTING INPUT
MUTING OUTPUT
MUTING OUTPUT
22V TO KEY
TT FROM TELEX
-26,5V
FP101
FP102
FP103
FP104
FP105
FP106
FP107
FP108
FP109
FP110
FP111
FP112
FP114
FP115
FP116
FP117
FP118
F101
D102
IN 5338
RE104
RE101
D101
BAV21
RE103
RE102
D103
BAV 21
R101
47
5-0-22625 R
VIOLET/WHITE
BLACK/WHITE
RED/ORANGE
ORANGE
RED 0,4□
RED/WHITE 0,4□
BLUE/WHITE 0,4□
BROWN/WHITE
GREY/WHITE
BROWN/YELLOW
VIOLET 0,4□
BLACK/GREEN
WHITE/BLACK
BLUE/BROWN
BLACK 0,4□
YELLOW 0,4□
BROWN/ORANGE
BLACK/RED
GREY
RED/BLUE
** ONLY USED IN P-VERSIONS
SEE ALSO ADDITIONAL INTERCONNECTION
CABLE FOR P-VERSIONS.
RECEPTACLE IN N1400/N1401
J701
GREEN 0,4□
WHITE 0,4□
VIOLET 0,4□
RED 1,0□
WHITE/GREEN
BROWN 0,4□
BLACK 0,4□
RED 0,4□
BLACK 0,4□
GREEN/WHITE 0,4□
GREY/YELLOW
GREEN/BLACK 0,4□
BLUE/WHITE 0,4□
BLACK
BLUE 0,4□
RED/GREEN
WHITE
BLACK 0,4□
BLACK 0,4□
BLUE 1,0□
YELLOW 0,4□
BROWN/WHITE 0,4□
YELLOW
BLACK/RED
GREY 0,4□
ORANGE 0,4□
PLUG IN R1119/R1120
P2601
VIOLET/WHITE
BLACK 0,4□
GREEN/BLACK
BLACK/WHITE
WHITE
BLUE/WHITE
BROWN 0,4□
GREY/BLACK
RED /WHITE
BROWN 0,5□
BROWN/BLACK
GREEN/WHITE 0,4□
BLUE/BLACK
VIOLET 0,4□
GREEN 0,4□
BLACK 0,4□
BLUE 0,4□
YELLOW 0,4□
RED 0,4□
FILTER UNIT (1200)
TO PIN NUMBER
COLOUR
FUNCTION
RECEPTACLE FOR REAR CONTACTBOARD
J101
4 VIOLET/WHITE AF FROM RX TO TELEX
8 BLACK/WHITE AF FROM RX TO TELEX
12 RED/ORANGE AF FROM TELEX TO TX
15 ORANGE AF COMMON FROM TELEX TO TX
9 RED 0,4□ +26,5V (BATTERY)
16 RED/WHITE 0,4□ EXT. LOUDSPEAKER (OFF WHEN DUPLEX)
20 BLUE/WHITE 0,4□ SPEAKER
14 BROWN/WHITE HIGH TENSION ON
13 GREY/WHITE HIGH TENSION ON
19 BROWN/YELLOW 22V FROM KEY
24 VIOLET 0,4□ EXT. LOUDSPEAKER
2 BLUE *** POWER ON/OFF
22 BLACK/GREEN GROUND
6 BLACK 0,5□ *** CONNECTED TO CHASSIS H1204
28 WHITE/BLACK GROUND TO EXT. LOUDSPEAKER
28 BLUE/BROWN TT FROM TELEX
19 BLACK 0,4□ GROUND TO EXT. LOUDSPEAKER
26 YELLOW 0,4□ -26,5V FOR AERIAL RELAY (BATTERY)
32 BROWN/ORANGE MUTE
1 GREEN *** POWER ON/OFF
30 BLACK/RED TRANSMITTER START (+22 V IN)
15 GREY 22V TO KEY
33 RED/BLUE TT FROM TELEX
C1220 100n
C1219 100n
C1202 100n
C1204 1n
C1206 100n
C1208 100n
C1210 100n
C1212 100n
C1215 100n
C1218 100n
C1201 100n
C1203 100n
C1205 100n
C1207 1n
C1209 100n
C1211 100n
C1214 1n
C1217 100n
C1213 100n
C1216 1n
4 GREY *** 22V TO KEY
6 BLACK 0,5□ ***
21 BLACK 0,5□ ***
CONNECTED TO CHASSIS H1204
REAR CONTACTBOARD ↔ R1119 OR R1120
REAR CONTACTBOARD ↔ N1400 OR N1401
REAR CONTACTBOARD ↔ H1201
TO PIN NUMBER
COLOUR
FUNCTION
PLUG FOR N1400/N1401
P701
4 GREEN 0,4□ Va2 (+400V)
1 WHITE 0,4□ Va2 (+400V)
7 VIOLET 0,4□ +28V TO DRIVER T1127
6 RED 1,0□ +26,5V FOR FILAMENT (BATTERY)
7 WHITE/GREY -45V
11 BROWN 0,4□ +22V
30 WHITE/BLACK 0,4□ GROUND FOR DRIVER T1127
9 RED 0,4□ +25V (BATTERY)
3 GREY/BLACK 0,4□ GROUND
28 GREEN/WHITE 0,4□ +26,5V ON
8 GREY/YELLOW BLOCK P.S.
1 GREEN/BLACK 0,4□ +8V
15 BLUE/WHITE 0,4□ SPEAKER
26 BLACK 0,4□ SPEAKER
18 BLUE 0,4□ Vg1 (-60V)
1 RED/GREEN 400W/800W CONTROL
24 WHITE -45V
23 WHITE/RED 0,4□ GROUND
22 BLACK/GREEN GROUND
27 BLUE 1,0□ -26,5V FOR FILAMENT (BATTERY)
25 YELLOW 0,4 -26,5V FOR AERIAL RELAY (BATTERY)
25 BROWN/WHITE 0,4□ +22V
22 YELLOW TRANSMITTER START (22V IN)
30 BLACK/RED TRANSMITTER START (22V OUT)
36 GREY 0,4□ AC BLOWER (220V/50Hz)
33 ORANGE 0,4□ AC BLOWER (220V/50Hz)
N1400 OR N1401 ↔ R1119 OR R1120
TO PIN NUMBER
COLOUR
FUNCTION
RECEPTACLE FOR R1119, R1120
J2001
4 VIOLET/WHITE AF FROM RX TO TELEX
16 GREY/BLACK 0,4□ GROUND
13 GREEN/BLACK 0,4□ +8V
8 BLACK/WHITE AF FROM RX TO TELEX
12 WHITE/GREY -45V
10 BLUE/WHITE 0,4□ AF FROM Tx
11 BROWN 0,4□ +22V
18 GREY/BLACK Rx-BLOCK
16 RED/WHITE 0,4□ EXT. LOUDSPEAKER (OFF WHEN DUPLEX)
34 GREY 22V TO KEY
29 BROWN/BLACK Rx-BLOCK
11 GREEN/WHITE 0,4□ AF TO Tx
17 BLUE/BLACK SIMPLEX RELAY Rx
24 VIOLET 0,4□ EXT. LOUDSPEAKER
28 WHITE/BLACK 0,4□ GROUND TO EXT. LOUDSPEAKER
R1119 OR R1120 ↔ S1300 OR S1301
N1400 OR N1401 ↔ S1300 OR S1301
N1400 OR N1401 ↔ T1127 OR H1200
REAR CONTACTBOARD ↔ S1300 OR S1301



INTERCONNECTION CABLE FOR SAILOR SHORT-WAVE PROGRAM 1000



S2 AND S3 ARE BLOCKING CONTROL FOR MAIN TRANSMITTER

S4 AND S5 ARE BLOCKING CONTROL FOR RESERVE TRANSMITTER

S6 IS BLOCKING CONTROL FOR D.F. RECEIVER

* OPTION

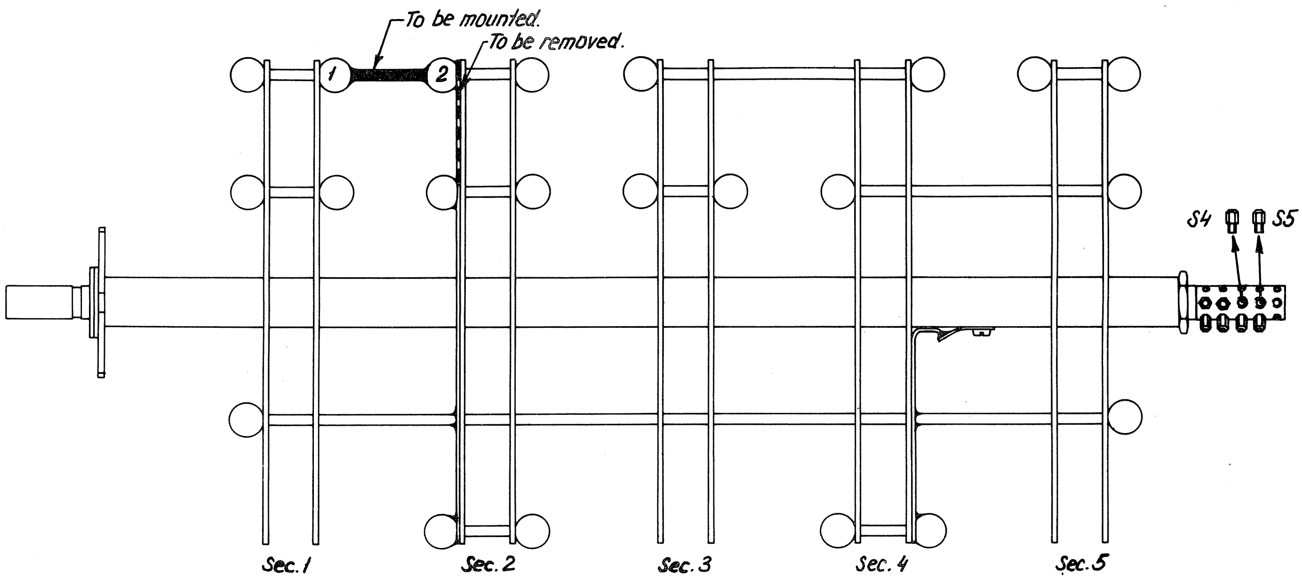
IN POSITION MAIN TRANSMITTER ON MAIN AERIAL IT IS POSIBLE TO HAVE MAIN AND RESERVE TRANSMITTER WORKING SIMULTANEOUSLY.
AS REGARDS MODIFICATION SEE NEXT PAGE.

SAILOR SSB H1202 (B)

H 1222

For SAILOR TANDEM STATION it is possible to work with both the main- and reserve transmitter at the same time.

SAILOR AERIAL SWITCH H1202 has to be modified in the position MAIN TRANSMITTER on MAIN AERIAL. The RESERVE TRANSMITTER will then be connected to RESERVE AERIAL and the safety circuit will have to be modified so both transmitters can transmit at the same time.



MODIFICATION

The dot- and dash wire is to be cut out and resoldered between the two balls 1 and 2 as shown on the drawing.

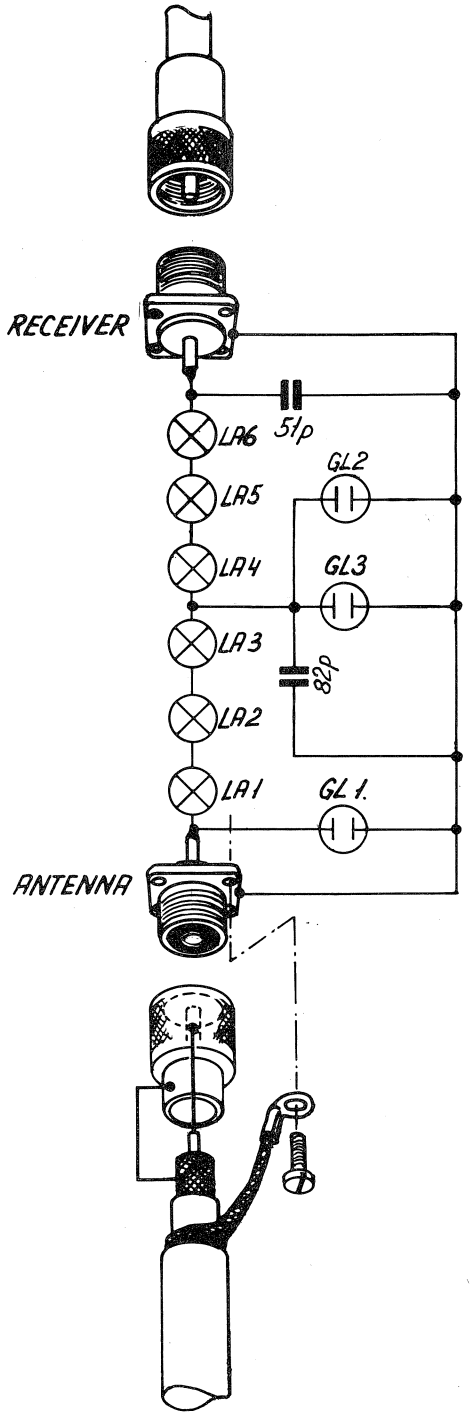
The Hexagon screw is to be removed in S4 and S5. The enclosed sticker "RESERVE TRANSMITTER on RESERVE AERIAL and" from bag P is to be placed on the front plate of H1202.

IMPORTANT

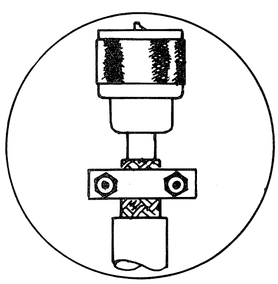
When both transmitters have to transmit at the same time it is not allowed in the same maritime band. From 1.6 MHz to 4 MHz it is allowed to transmit with both transmitters if you have a reasonable separation between the frequencies. We think at least 10 % is necessary but depending on the aerial installation.

»SAILOR« RECEIVER PROTECTOR TYPE H1223

S. P. RADIO A/S AALBORG DENMARK



Receiver coaxial cable.
If 50 ohm coaxial cable RG213U is used, the cable has to run in steel tube (conduit). If 50 ohm triaxial cable H1213 (S.P. Radio) is used, outer screen has to be earthed at console end only.



LA1-3: 12V 5W Philips 12821
LA4-6: 24V 10W Philips 13814
GL1: Glow lamp. 150V Siemens A70-A150-Q69-X245
GL2: Glow lamp. 90V Siemens A70-C90-Q69-X247
GL3: Glow lamp. 90V Siemens A70-C90-Q69-X247
Glow capacitor 51 pF 10% 500V Jahre 49.54/5
Glow capacitor 82 pF 10% 500V Jahre 49.54/5

H1223B

Symbol	Description			Manufact.	
R101	Resistor	2,7 Kohm ±5%	0,33W	Philips	2322 211 13272
R102	Resistor	4,7 Kohm ±5%	0,33W	Philips	2322 211 13472
R103	Resistor	4,7 Kohm ±5%	0,33W	Philips	2322 211 13472
R104	Resistor	1,5 Kohm ±5%	0,33W	Philips	2322 211 13152
R105	Resistor	15 Kohm ±5%	0,33W	Philips	2322 211 13153
R106	Resistor	1 Kohm ±5%	0,33W	Philips	2322 211 13102
R107	Resistor	1 Kohm ±5%	0,33W	Philips	2322 211 13102
D101	Diode			Philips	BAV21
D102	Diode			Philips	BAV21
RE101	Relay		24V	PASI	BV997
RE102	Relay		24V	PASI	BV997
RE103	Relay		24V	CP.Clare	PRME 15003A
T101	Transformer			TRADANIA	TD2296
T102	Transformer			TRADANIA	TD2296
J101	Plug	MEK100		Hirschman	973 033-100
J102	Plug			MOLEX	03-06-1363
J103	Plug			MOLEX	03-06-1363
J104	Plug			MOLEX	03-06-1363
P101	Main plug			MOLEX	03-06-2364
P101	Reserve plug			MOLEX	03-06-2364
FP101-FP154	Ferrite bead			Kaschke	K3/1200/0,1 Hz/ 4/2/7A

H 1222

Symbol	Description				Manufact.	
R201	Resistor	2,2 Kohm	±5%	0,33W	Philips	2322 211 13222
R202	Resistor	15 Kohm	±5%	0,33W	Philips	2322 211 13153
R203	Resistor	15 Kohm	±5%	0,33W	Philips	2322 211 13153
R204	Resistor	2,2 Kohm	±5%	0,33W	Philips	2322 211 13222
R205	Resistor	100 Ohm	±5%	0,33W	Philips	2322 211 13101
R206	Resistor	680 Ohm	±5%	0,33W	Philips	2322 211 13681
R207	Resistor	10 Kohm	±5%	0,33W	Philips	2322 211 13103
R208	Resistor	1,8 Kohm	±5%	0,33W	Philips	2322 211 13182
R209	Resistor	220 Ohm	±5%	0,33W	Philips	2322 211 13221
R210	Resistor	1,8 Kohm	±5%	0,33W	Philips	2322 211 13182
R211	Resistor	220 Ohm	±5%	0,33W	Philips	2322 211 13221
R212	Resistor	680 Ohm	±5%	0,33W	Philips	2322 211 13681
R213	Resistor	100 Kohm	±5%	0,33W	Philips	2322 211 13101
R214	Resistor	3,3 Kohm	±5%	0,33W	Philips	2322 211 13332
R215	Resistor	47 Kohm	±5%	0,33W	Philips	2322 211 13473
R216	Resistor	1,5 Kohm	±5%	0,33W	Philips	2322 211 13152
R217	Resistor	6,8 Kohm	±5%	0,33W	Philips	2322 211 13682
R218	Resistor	1 Kohm	±5%	0,33W	Philips	2322 211 13102
R219	Resistor	33 Kohm	±5%	0,33W	Philips	2322 211 13333
R220	Resistor	1 Kohm	±5%	0,33W	Philips	2322 211 13102
R221	Resistor	33 Kohm	±5%	0,33W	Philips	2322 211 13333
R222	Resistor	10 Kohm	±5%	0,33W	Philips	2322 211 13103
R223	Resistor	2,2 Kohm	±5%	0,33W	Philips	2322 211 13222
R224	Resistor	1,2 Kohm	±5%	0,33W	Philips	2322 211 13122
R225	Resistor	680 Ohm	±5%	0,33W	Philips	2322 211 13681
R226	Resistor	2,2 Kohm	±5%	0,33W	Philips	2322 211 13222
R227	Resistor	10 Kohm	±5%	0,33W	Philips	2322 211 13103
R228	Resistor	470 Ohm	±5%	0,33W	Philips	2322 211 13471
R229	Resistor	39 Ohm	±5%	0,33W	Philips	2322 211 13390
P201	Potentiometer	1 Kohm	±20%		Noble	TM8KV2-1S
P202	Potentiometer	1 Kohm	±20%		Noble	TM8-KV2-1S
C201	Capacitor polyester	47 n/100V	±20%		Philips	2222 344 24473
C202	Capacitor polyester	47 n/100V	±20%		Philips	2222 344 24473
C203	Capacitor polyester	100 n/100V	±20%		Philips	2222 344 24104
C204	Capacitor polyester	100 n/100V	±20%		Philips	2222 344 24104
C205	Capacitor ceramic	10 n/50V	-20 +80%		KCK	HE-70SJ-YF-103Z

H 1222

Symbol	Description			Manufact.	
C206	Capacitor polyester	100 n/100V	+20%	Philips	2222 344 24104
C207	Capacitor ceramic	10 n/50V	-20 +80%	KCK	HE-70SJ-YF-103Z
C208	Capacitor ceramic	10 n/50V	-20 +80%	KCK	HE-70SJ-YF-103Z
C209	Capacitor electrolytic	4,7 u/50V	+20%	ROE	EKI 00AA 147H
C210	Capacitor ceramic	47 n/	16V	KCK	
C211	Capacitor ceramic	10 n/50V	-20 +80%	KCK	HE-70SJ-YF-103Z
C212	Capacitor polyester	1 u/100V	+20%	Philips	2222 344 24105
C213	Capacitor ceramic	10 n/50V	-20 +80%	KCK	HE-70SJ-YF-103Z
C214	Capacitor electrolytic	22 u/25V	+20%	ROE	EKI 00AA 222E
C215	Capacitor ceramic	4,7 n/50V	-20 +80%	KCK	HE-80SJ-YD-472M
C216	Capacitor ceramic	4,7 n/50V	-20 +80%	KCK	HE-80SJ-YD-472M
C217	Capacitor polyester	68 n/250V	+10%	Philips	2222 344 41683
C218	Capacitor electrolytic	22 u/25V	+20%	ROE	EKI 00AA 222E
C219	Capacitor ceramic	10 n/50V	-20 +80%	KCK	HE-70SJ-YF-103Z
C220	Capacitor electrolytic	22 u/25V	+20%	ROE	EKI 00AA 222E
C221	Capacitor polyester	100 n/100V	+10%	Philips	2222 344 24104
C222	Capacitor electrolytic	4,7 u/50V	+20%	ROE	EKI 00AA 147H
C223	Capacitor electrolytic	22 u/25V	+20%	ROE	EKI 00AA 222E
C224	Capacitor ceramic	4,7 n/50V	-20 +80%	KCK	HE-80SJ-YD-472M
C225	Capacitor electrolytic	22 u/25V	+20%	ROE	EKI 00AA 222E
C226	Capacitor electrolytic	10 u/35V	+20%	ROE	EKI 00AA 210F
C227	Capacitor ceramic	4,7 n/50V	-20 +80%	KCK	HE-80SJ-YD-472M
C228	Capacitor polyester	470 n/100V	+10%	Philips	2222 344 24474
C229	Capacitor polyester	100 n/100V	+10%	Philips	2222 344 24104
C230	Capacitor electrolytic	22 u/25V	+20%	ROE	EKI 00AA 222E
C231	Capacitor polyester	220 n/100V		Philips	2222 344 24224
D201	Diode			Philips	1N4148
D202	Diode			Philips	1N4148
D203	Diode			Philips	BAW62
D204	Diode			Philips	BAW62
D205	Diode			Philips	1N4148
T201	Transistor			Philips	BC548B
T202	Transistor			Philips	BC548B
T203	Transistor			Philips	BC338-25
T204	Transistor			Philips	BC548B
T205	Transistor			Philips	BC548B

H 1222

Symbol	Description			Manufact.	
T206	Transistor			Philips	BC558B
T207	Transistor			Philips	BC548B
T208	Transistor			Philips	BC548B
IC201	Voltage regulator			National	LM 340 T12
L201	Choke	100 uH	0,2A	Ferroperm	1582
F201	Fuse	ø5x20 mm	160 mA	Wickmann	Middeltræg
TR201	Transformer			Tradania	TD2296
TR202	Transformer			Tradania	TD2296
TR203	Transformer			Tradania	TD2296

H 1222

Center panel

Module No.: 300

Symbol	Description	Manufact.	
R310	Potentiometer wire wound 330 Ohm Lin	Danotherm	
P311	Potentiometer 470 Ohm Lin CP23	Philips	2322 350 70703
S301	Switch 6x2 pos. 2 sekt. non shorting	MEC	120
S302	Switch 6x2 pos. 2 sekt. non shorting	MEC	120
S303	Switch 6x2 pos. 2 sekt. non shorting	MEC	120
S304	Switch 6x3 pos. 3 sekt. non shorting	MEC	120
S305	Switch 6x3 pos. 1 sekt. non shorting	MEC	120
S306	Switch 6x3 pos. 2 sekt. non shorting	MEC	120
S307	Switch	ADR	20 646 N/2
J301	Microtelephone jack (female) MEB60H	Hirschmann	973 031-100
J302	Microtelephone jack (female) MEB60H	Hirschmann	973 031-100
J303	Key jack (female)	Tuchel	T3403/1
J304	Lead light jack (female)	Bosch	0-352-222-006
J305	Key jack (female)	Tuchel	T3403/1
P102	Plug	Molex	03-06-2364
P103	Plug	Molex	03-06-2364
LA301	Diode light emitting	Xciton	XC5053R
LS301	Great HT 50 Ohm	Ekløw	P24R015

H 1222

Sailor

Sailor

INSTRUKTIONSBOG FOR SAILOR H 1201

INSTRUCTION BOOK FOR SAILOR H 1201

A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS:

GENERAL DESCRIPTION

TUNER H1201 is an antenna matching circuit for use in the 405 - 535 kHz band.

TUNER H1201 is to be used in connection with transmitter T1127L, and exciter S1301L.

TUNER H1201 contains two dummy loads for testing of the transmitter on 500 kHz and 2182 kHz.

TUNER H1201 is simple to operate: Select Band, load and tune aerial.

TUNER H1201 fits into SAILOR 19" rack system.

TUNER H1201 is constructed so that in an emergency situation it can be adjusted to any antenna merely by using the 3 buttons: BANDSWITCH, LOAD, and AERIAL TUNE on the front.

EMERGENCY TUNING PROCEDURE:

1. Select frequency on S1301L.

2. Select the band (BAND I, BAND II or BAND III) in mentioned order which makes it possible to adjust to max. antenna current.

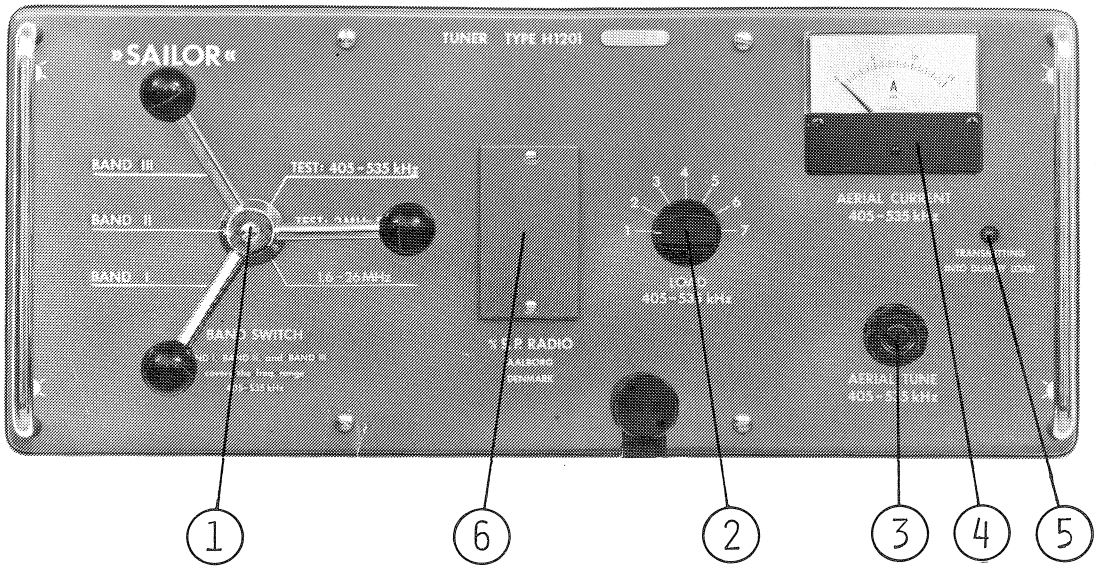
3. Select the loadstep giving max. antenna current when the antenna current is tuned to max. (Avoid to operate switches when transmitter is keyed).

TECHNICAL DATA

Technical data for H1201/T1127L/S1301L.

1.6 - 26 MHz:	See instruction book for S1301L and T1127L.
405 - 535 kHz:	
Output power:	400 W PEP to antenna.
Antenna types:	190 - 800 pF in series with 1-20 ohm.
Frequency tolerance:	See instruction book for S1301L.
Types of emission:	A1 and A2H.
Modulation frequency for A2H:	465 Hz.
Power reduction:	See instruction book for S1301L.
Spurious attenuation:	Better than 40 dB rel. carrier.
Hum and noice:	Better than 40 dB rel. carrier.
Unwanted frequency modulation:	See instruction book for S1301L.
Keying speed:	30 baud.

CONTROLS



(1) BAND SWITCH

For selection of 405 - 535 kHz bands, TEST 405 - 535 kHz, TEST 2 MHz and 1.6 - 26 MHz.

(2) LOAD 405 - 535 kHz

For selection of correct load in 405 - 535 kHz band.

(3) AERIAL TUNE 405 - 535 kHz

After change of frequency in 405 - 535 kHz band tune the aerial by means of knob (3) for max. AERIAL CURRENT (4) .

(4) AERIAL CURRENT 405 - 535 kHz

Shows the aerial current in Amps when transmitting in the 405 - 535 kHz band.

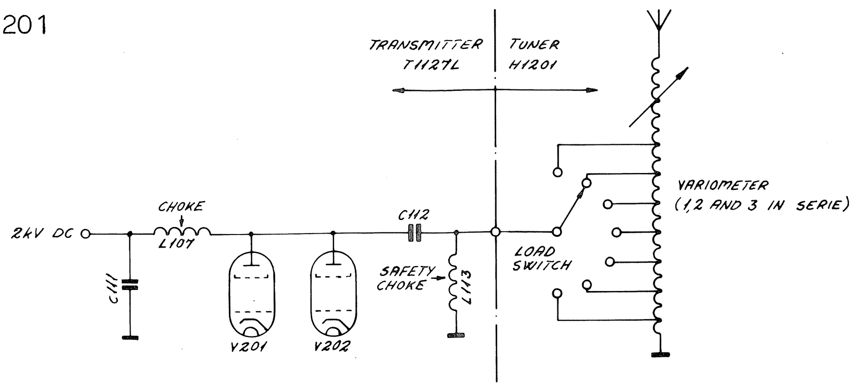
(5) TRANSMITTING INTO DUMMY LOAD

When TEST 405 - 535 kHz or TEST 2 MHz is selected the lamp will light up.

(6) Behind this cover is adjustment for dummy load 2 MHz.

PRINCIPLE OF OPERATION

TUNER H1201



H1201 is made for use in conjunction with transmitter T1127L, exciter S1301L and the power supplies N1400 and N1401.

S1301L and T1127L are originally planned and constructed so that they are both equipped with totally 19 bands of which the 18 bands covers the frequency range 1.6 - 26 MHz. The 19. band is for use in the frequency range 405 - 535 kHz.

Transmitter T1127L is constructed so that the antenna matching circuits for bands between 1.6 and 26 MHz are built into the transmitter, and the antenna can therefore be connected directly to the output terminal of the transmitter.

However for the band 405 - 535 kHz the transmitter has no antenna matching circuit. In this band the transmitter works as a power amplifier of approx. 1000 W PEP and with an output impedance of approx. 1500 ohms.

This means that S1301L/T1127L must be equipped with an external antenna matching circuit when the frequency range 405 - 535 kHz is to be used.

H1201 contains besides the above mentioned antenna matching unit also two artificial antennas for test of the station in the 405 - 535 kHz band and the 2 MHz band.

Furthermore H1201 contains a bandswitch with the following positions.

1.6 - 26 MHz.

The output terminal on transmitter T1127L is connected directly to the antenna connection on top of H1201. Therefore H1201 has no influence on the way T1127L/ S1301L works in the frequency range 1.6 - 26 MHz.

BAND I, BAND II, BAND III.

The output terminal on T1127L is connected to the antenna connection of H1201 via the antenna matching circuit.

On the frontplate of T1127L is a table showing which band and loadstep is to be used when using the different antennas and frequencies. This table is filled-in by the technician when the set is installed.

H1201 is constructed so that in an emergency situation it can be adjusted to any antenna mereby by using the 3 buttons: BANDSWITCH, LOAD, and AERIAL TUNE on the front.

TEST 405 - 535 kHz

Dummy load for test of frequencies in the band 405 - 535 kHz.
The antenna is grounded.

TEST 2 MHz BAND

Dummy load for test of emergency tone generator on frequency close to 2182 kHz.
The antenna is grounded.
(SOLAS conference 1974, Regulation 16).

During installation the impedance for this dummy load is adjusted so that it corresponds to the antenna at the test frequency in question. This adjustment takes place behind the cover on the front of H1201 (Fig. 1).

H1201/T1127L/S1301L is equipped with a blocking system to avoid harmful effects from incorrect operation.

S1 on the H1201 diagram is a part of that blocking system.

TUNING-UP PROCEDURE

1.6 - 26 MHz

Tune the transmitter as described in the instruction manual for the transmitter, the bands 1.6 - 26 MHz (bandswitch in pos. 1.6 - 26 MHz).

TEST 2 MHz BANDS

Set bandswitch to pos. TEST 2 MHz bands.

Select a TEST FREQUENCY close to 2182 kHz.

Start the transmitter on this frequency. Tune the transmitter in the dummy load on the selected frequency. (The meter on T1127L tunes to max.).

If it is not possible to obtain a peak reading on the meter (meter on T1127L) the jumper wire behind the cover on the front plate of H1201 must be cut (fig. 1) (cut the wire in both ends close to the solderings).

Note TEST FREQUENCY on the table on the front of T1127L.

405 - 535 kHz BAND

Tune the transmitter in the 405 - 535 kHz band in the following way:

a. Set the frequency 512 kHz on S1301L.

b. Set LOAD to 4 and bandswitch to BAND I.

c. Key the transmitter, type of emission A1.
   Tune the antenna. If this is not possible try BAND II and then BAND III until it is possible. (Avoid to operate switches on H1201 when transmitter is keyed).

d. Select the loadstep which gives max. antenna current when the antenna current is carefully tuned to peak reading.

e. Drive level is now adjusted in the same way as for 1.6 - 26 MHz bands, except for the meter reading which is set to 8 instead of 3, or if the spark gap is activated to a lower value which will keep the spark gap inactive.

f. Repeat d.

h. Note the BAND (I, II or III) and loadstep for this frequency and antenna in question on the table on the front of T1127L.

i. Repeat the points a - d incl. and point h for all frequencies in the 405 - 535 kHz band with main- and reserve antenna.

TEST 405 - 535 MHz

Set bandswitch to TEST 405 - 535 kHz.

Select for 500 kHz the loadstep giving highest antenna current and note this on the table on the front of T1127L.

SAFETY SPARK GAP

To avoid excessive voltage in H1201 and aerial installation, H1201 is equipped with a spark gap.

The spark gap consists of 2 Ø6 bars, mounted under the top cover of H1201, and the aerial stand-off.

The spark gap limits the voltage to approx. 22 kV peak.

If the spark gap is activated under normal conditions the aerial must be changed or the drive level (point e. in the tuning-up procedure for H1201) must be reduced to a lower test meter reading.

AERIAL

The transmitter T1127L with the TUNER H1201 is constructed for the type of aerial which will give the best radiation diagram, namely a vertical aerial with an electrical length of 15 to 22 metres.

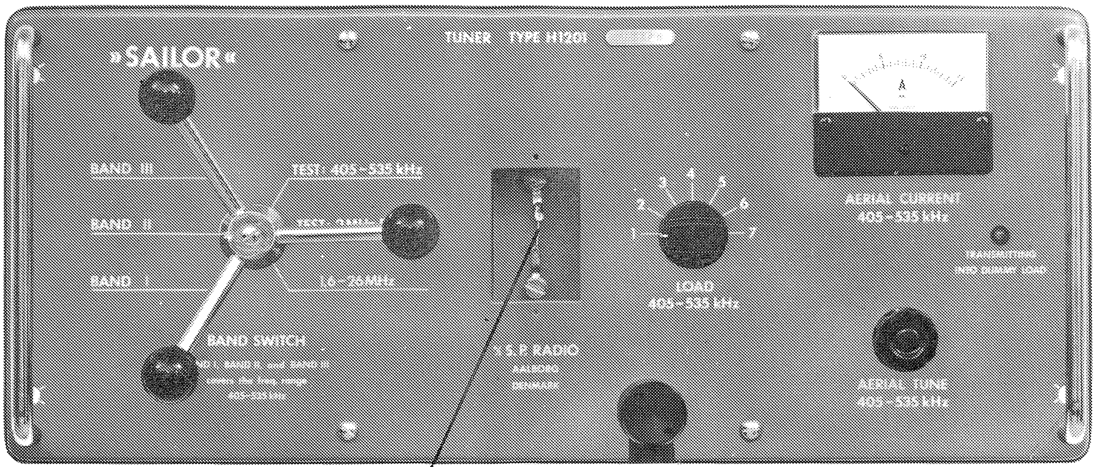
Out of consideration for the range covered on the high short wave bands a short aerial should be selected. However, it must also be considered that as large a part of the aerial as possible be able to radiate the around for better results. To obtain this it may be necessary to use a rather long aerial. For the 405 - 535 kHz MF-band the long aerial will give the best result, but it is the tuning in the frequency range from 1.6 - 4 MHz which determines the max. length of the aerial. In other words, if the transmitter can be tuned to the highest frequency in the range 1.6 - 4 MHz, the aerial is not too long.

When choosing type of aerial and insulators all these considerations have to be taken into account, including that the antenna voltage at the foot point is very high (25 k Volt) in the band from 405 - 535 kHz.

The aerial can be a self supporting whip aerial or a wire aerial with a suitable top capacity.

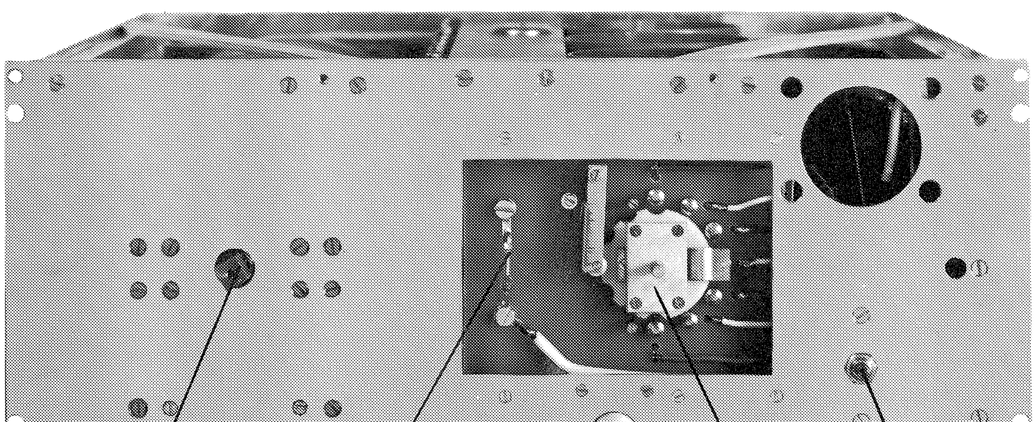
Recommended aerials:
Self supporting whip aerial from DUK Antennen STA 150 C - MF/HF.
Self supporting whip aerial from TJØSTHEIM Antennas AS 9 STX.
Wire aerial with suitable top capacity: Electrical length 15 - 22 m.

From the deckhead insulator to the insulator on top of H1201 or H1202 the signal is led through a feeder, which can be made either of 8 - 12 mm copper tube or of aerial wire. The feeder is placed on stand-off insulators is such manner that there is a distance of at least 100 mm between the feeder and the deckhouse roof, the deck or the bulkhead. The feeder must be as short as possible, and it should be no longer than 10% of the total length of the aerial.



JUMPER WIRE FOR
ADJUSTMENT OF
DUMMY LOAD 2 MHz

FIG. 1



BAND SWITCH S3

JUMPER WIRE FOR ADJUSTMENT OF DUMMY LOAD 2 MHz

INPUT STAND OFF

LOADING S2

ANTENNA TUNE KNOB

FIG. 2

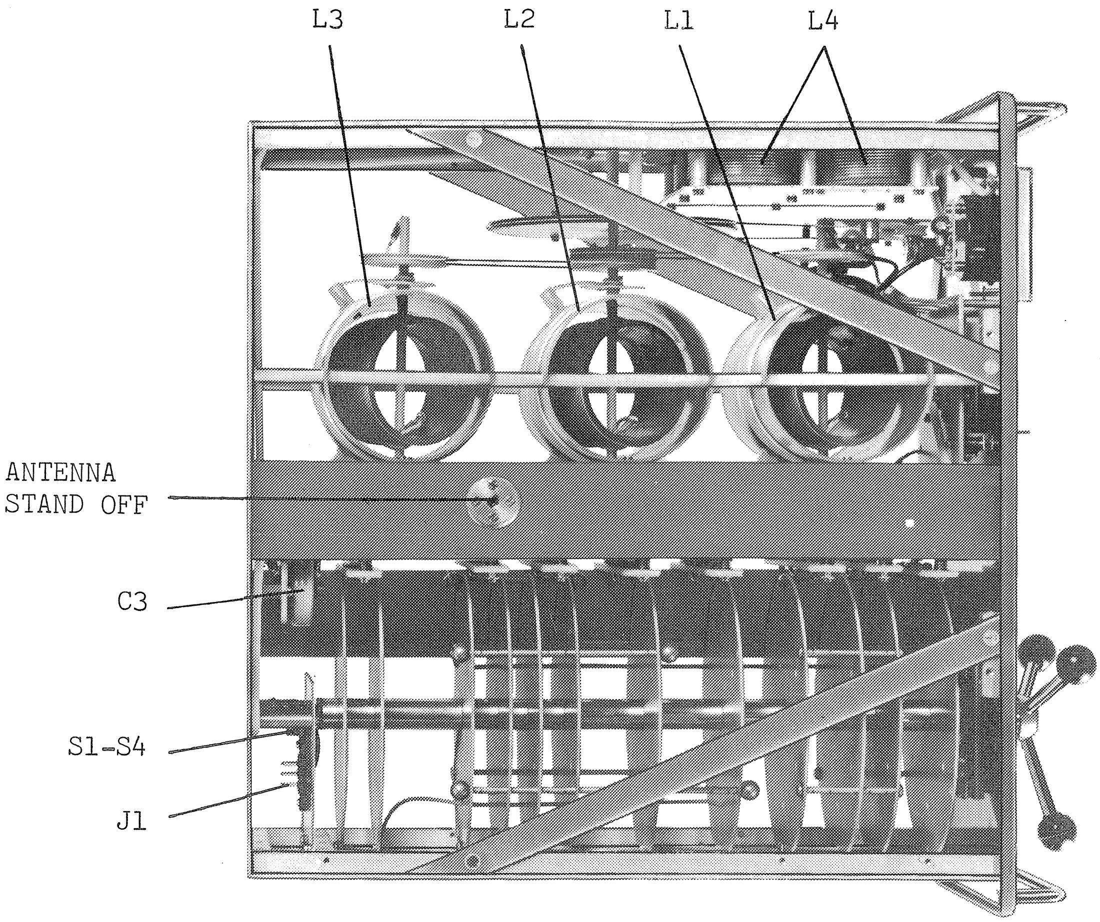

L3
L2
L1
L4
ANTENNA STAND OFF
C3
S1-S4
J1

FIG. 3

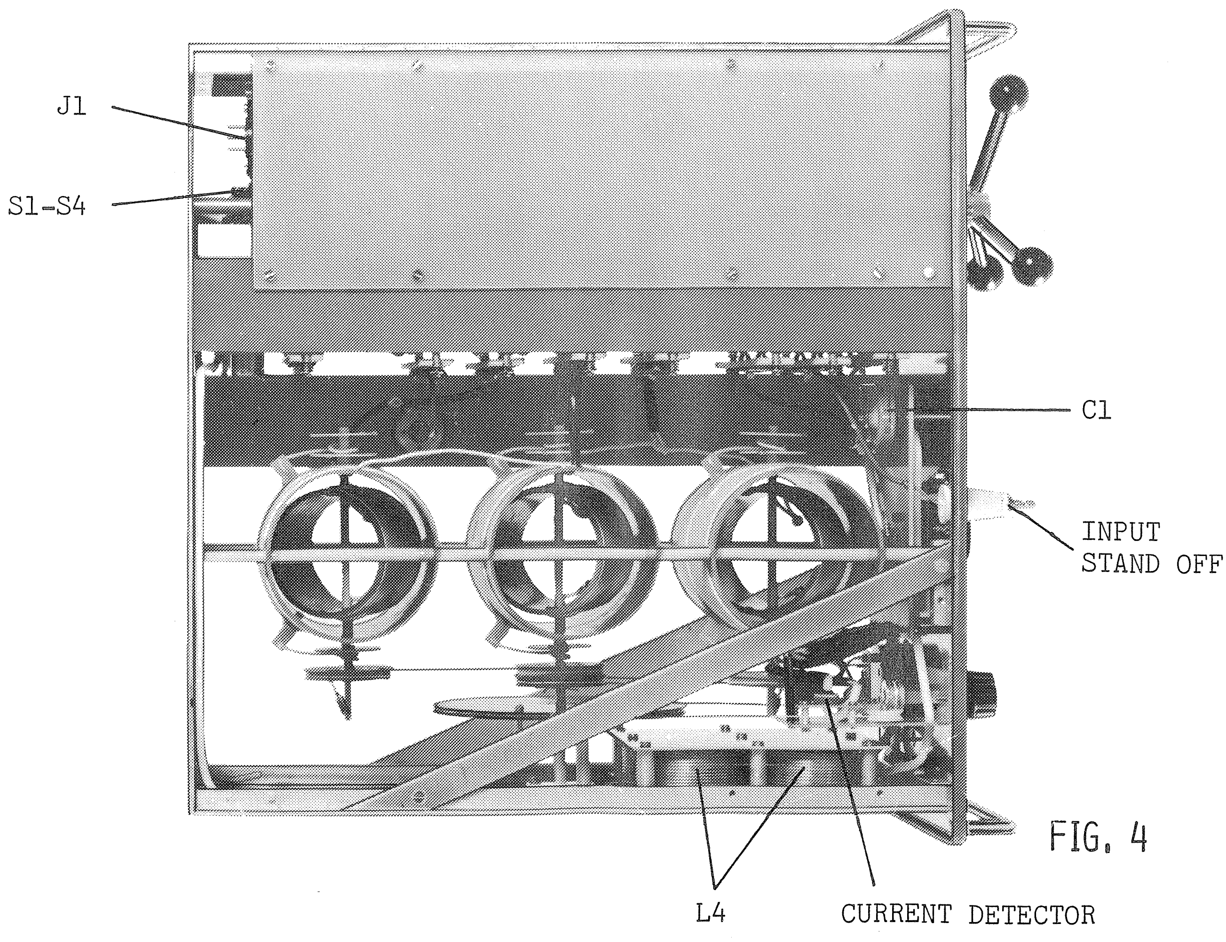

J1
S1-S4
C1
INPUT STAND OFF
L4
CURRENT DETECTOR

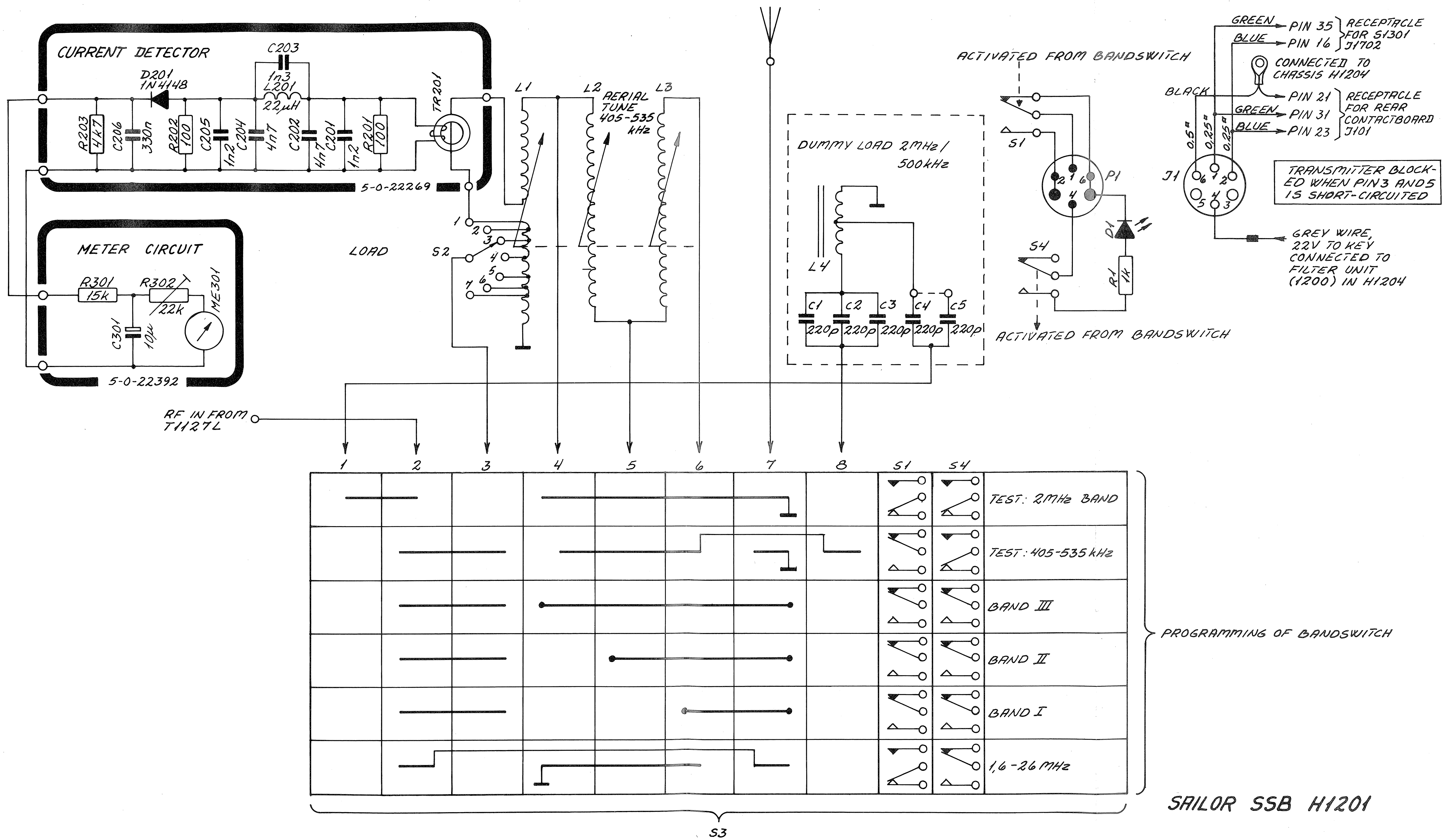
FIG. 4

Main chassis H1201

Symbol	Description	Manufact.	
C1	Capacitor 220pF ±20% 5KV	R.C.L.	441/1/83822/113
C2	Capacitor 220pF ±20% 5KV	R.C.L.	441/1/83822/113
C3	Capacitor 220pF ±20% 5KV	R.C.L.	441/1/83822/113
C4	Capacitor 220pF ±20% 5KV	R.C.L.	441/1/83822/113
C5	Capacitor 220pF ±20% 5KV	R.C.L.	441/1/83822/113
D1	Diode, light emitting	Xciton	XC 5053Y
L1	Variometer H1201	S.P.	
L2	Variometer H1201	S.P.	
L3	Variometer H1201	S.P.	
L4	R.F. Resistor coil H1201	S.P.	
R1	Resistor 1Kohm ± 5% 0.33W	Philips	2322 211 13102
S1	Micro switch	Cherry	E62 10HD PDT
S2	Switch	S.P.	
S3	Switch	S.P.	
S4	Micro switch	Cherry	E62 10HD PDT
J1	Socket	Hirschmann	Mesei 60F
P1	Plug	Hirschmann	Mek 60Bz

Current detector H1201

Symbol	Description		Manufact.	
R201	Resistor	100 ohm ±5% 1,15W	Philips	2322 191 31001
R202	Resistor	100 ohm ±5% 1,15W	Philips	2322 191 31001
R203	Resistor	4,7Kohm ±5% 0,33W	Philips	2322 211 13472
C201	Capacitor polystyrene 1,2nF		Philips	2222 425 41202
C202	Capacitor polystyrene 4,7nF		Philips	2222 425 41702
C203	Capacitor polystyrene 1,3nF		Philips	2222 426 41302
C204	Capacitor polystyrene 4,7nF		Philips	2222 425 41702
C205	Capacitor polystyrene 1,2nF		Philips	2222 425 41202
C206	Capacitor polyester	0,33uF ± 10% 100V	Philips	2222 344 25333
D201	Diode		Philips	1N4148
L201	Choke	22uH ± 5%	Kaschke	Bauform 200
TR201	Toroid		S.P.	TL274
	Meter circuit			
R301	Resistor	22Kohm ± 5% 0,33W	Philips	2322 211 13223
R302	Resistor potentiometer 22Kohm ± 20%		Philips	2322 410 01158
C301	Capacitor electrolytic 10uF-10/+100% 40V		Siemens	B41313-A7106-V
ME301	Meter	300uA	Sinohara	SW-80


CURRENT DETECTOR
D201 1N4148
C203 1n3
L201 22µH
TR201
R203 4K7
C206 330n
R202 100
C205 1n2
C204 4n7
C202 4n7
C201 1n2
R201 100
5-0-22269
METER CIRCUIT
R301 15k
R302 22k
ME301
C301 10µ
5-0-22392
L1
L2
L3
AERIAL TUNE 405-535 kHz
LOAD
S2
DUMMY LOAD 2MHz / 500kHz
L4
C1 C2 C3 C4 C5
220p 220p 220p 220p 220p
RF IN FROM T1127L
ACTIVATED FROM BANDSWITCH
S1
P1
S4
D1
R1 1k
ACTIVATED FROM BANDSWITCH
GREEN → PIN 35
BLUE → PIN 16
RECEPTACLE FOR S1301 J1702
CONNECTED TO CHASSIS H1204
BLACK
GREEN → PIN 21
GREEN → PIN 31
BLUE → PIN 23
RECEPTACLE FOR REAR CONTACTBOARD J101
J1
0,5"
0,25"
0,25"
TRANSMITTER BLOCKED WHEN PIN 3 AND 5 IS SHORT-CIRCUITED
GREY WIRE, 22V TO KEY CONNECTED TO FILTER UNIT (1200) IN H1204
1 2 3 4 5 6 7 8 S1 S4
TEST: 2MHz BAND
TEST: 405-535 kHz
BAND III
BAND II
BAND I
1,6-26 MHz
PROGRAMMING OF BANDSWITCH
S3
SAILOR SSB H1201

Sailor

Sailor

NOTE:

This book is only valid for serial No. above 201206.
Tuning-up for 1.6 MHz to 4 MHz has been modified.

INSTRUKTIONSBOG FOR SAILOR T1127/T1127L

INSTRUCTION BOOK FOR SAILOR T1127/T1127L

A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS:

GENERAL DESCRIPTION

INTRODUCTION

SAILOR T1127 is an*800 Watt PEP SSB transmitter.

SAILOR T1127 transmitter can be remote controlled by the SAILOR H1200 up to a distance of 200 meters. This means that the location of the radio station and the aerials can be chosen independently to ensure maximum performance.

SAILOR T1127 is simple to operate: Set frequency, tune aerial, select transmission mode. That's all. B

SAILOR T1127 can be used in conjunction with the exciters S1300 and S1301.

SAILOR T1127 is supplied from N1400 (24V DC) or N1401 (AC mains).

SAILOR T1127 fits into SAILOR 19" rack system.

* Canadian version: 750 Watt due to higher intermodulation requirements in Canada.

NOTE: When T1127 is used together with H1201 it is modified, and type number is changed to T1127L.

TECHNICAL DATA

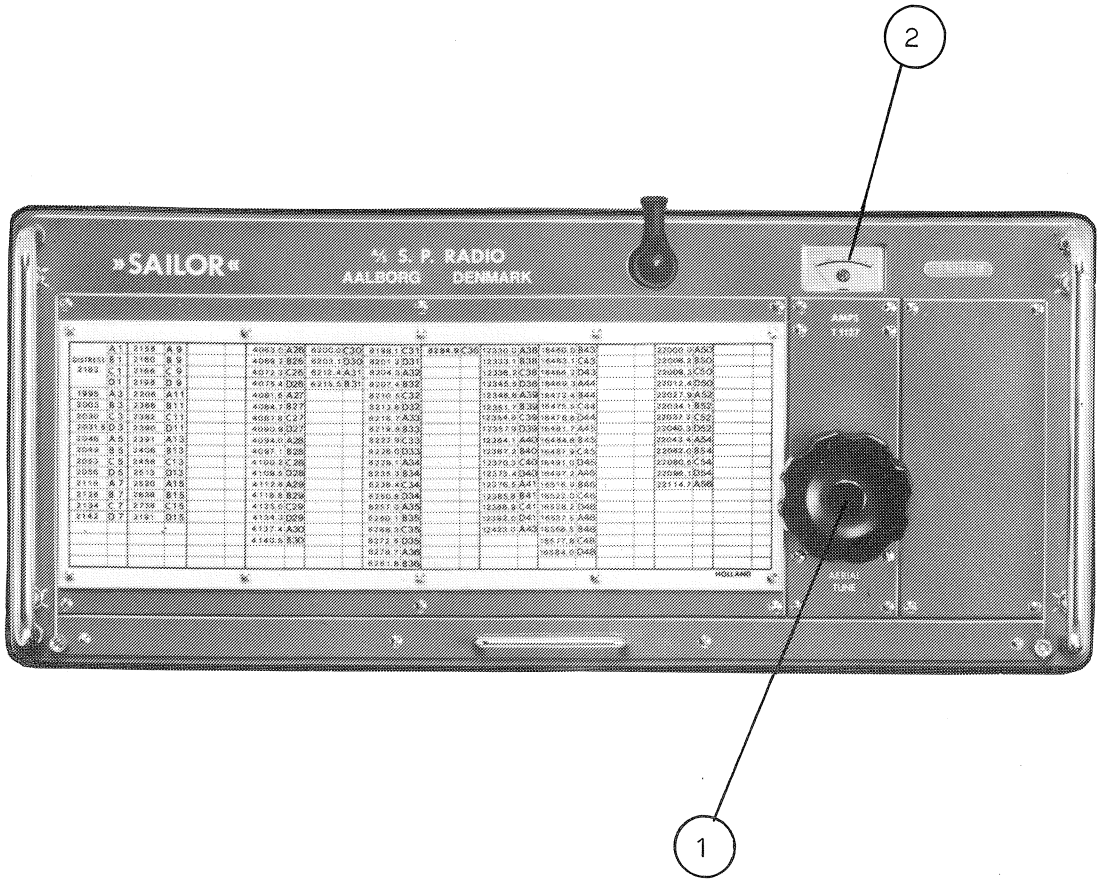
Output power:	1.6 - 4 MHz *400 Watt PEP in the aerial in all transmitting modes.
Output power:	4, 6, 8, 12, 16, 22 and 25 MHz bands **800 Watt PEP in the aerial in all transmitting modes.
Number of channels:	)
Frequency stability:	)
Mode of operation:	) Dependent on the exciter in question.
Distress call:	)
Modulation:	)
Temperature range:	$-15^{\circ}C$ to $+55^{\circ}C$
Power consumption:	See instruction manual for power supply N1400 or N1401.

B

* Canadian version: 350 Watt due to higher intermodulation requirements in Canada.

** Canadian version: 750 Watt due to higher intermodulation requirements in Canada.

CONTROLS



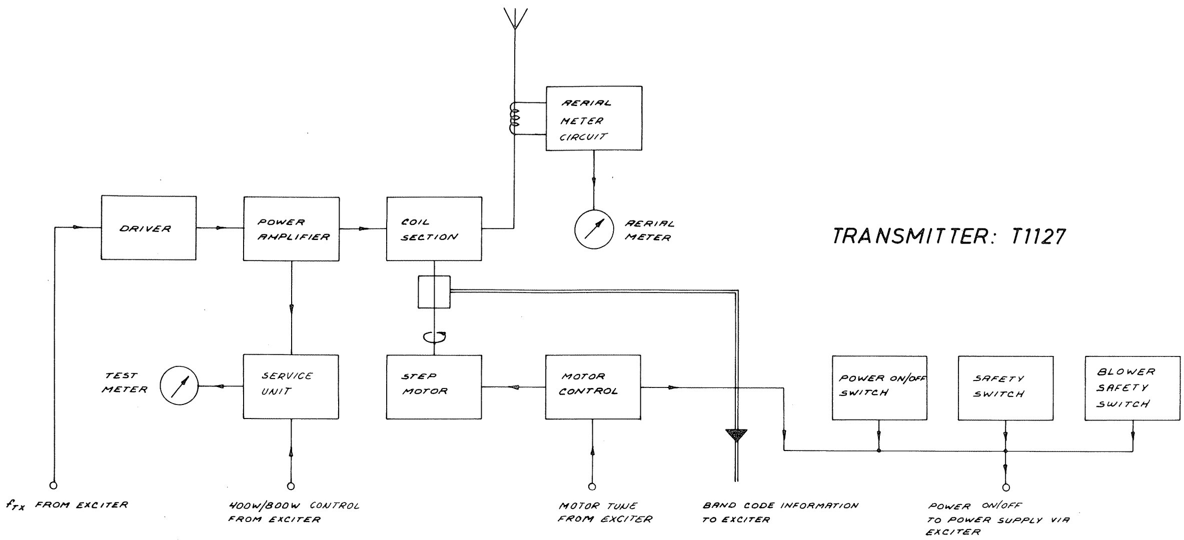
① AERIAL TUNE

After change of frequency tune the aerial by means of knob ① for max. AERIAL METER ② deflection. (Press TUNE button on the exciter).

② AERIAL METER

Shows the aerial current in Amps.

PRINCIPLE OF OPERATION



TRANSMITTER T1127

A

The signal from the exciter is first amplified in a transistorized wide-band DRIVER which operates in class A. The output of the driver is fed through a matching circuit to the power amplifier, which is composed of two beam power tetrodes connected in parallel and operates as an amplifier in class AB. The anodes are connected to the coil section, which consists of tuned circuits and aerial matching circuits. All switchings in the coil section are made by means of a motor driven drum switch.

The transmitter is tuned in 19 bands, namely 11 bands in the frequency range 1.6 - 4 MHz, the 7 short-wave bands and 1 band for special frequencies.

The motor driven drum switch has the following functions:

1. Selecting the proper anode circuit.

2. Selecting the proper aerial matching circuit.

3. Give a digital information to the exciter, which indicates the position of the drum switch.

The transmitter has a built-in TEST METER, AERIAL METER, safety and protection circuits.

TUNING-UP PROCEDURE

NECESSARY TOOLS:

1 pc. screwdriver
1 pc. alignment kit (supplied with the transmitter) comprising:
1 pc. nylon fork for locking the TUNE knob.
4 pcs. alignment tool for contact drums.
1 pc. combined alignment tool and box spanner for hexagon contact studs.
30 pcs. hexagon contact studs.

When the set has been installed as described in the manual "Mounting Instructions for SAILOR short-wave programme" both the receiver and the transmitter must be tuned for the actual aerials. As far as the receiver is concerned please see the instruction book for the receiver in question.

As far as the transmitter is concerned a step-by-step procedure is given here below, but first some general remarks.

For programming of the drum switch two types of contact studs are used:

1. Hexagon studs for programming after installation. (Load and aerial tuning).

2. Round studs for factory programming. MUST NEVER BE REMOVED.

When tuning-up procedure takes place the transmitter aerial must have the same conditions as is open sea. This means:

a. Crane derricks, booms etc. must be in the same position as when the ship is in open sea.

b. If the ship is moored it must be away from cranes on land, high buildings, bridges, other ships and any other sources of interference.

STEP-BY-STEP PROCEDURE:

Take off the two front panel covers. (see fig. 1).

Adjust zero signal current as described in SERVICE section 5.3.

C.T. band 1.6 - 4 MHz:

The transmitter must be tuned in all bands where frequencies are programmed. The bands and the corresponding letters, which are printed on the drum switch are tabulated on the next page.

NOTE: THIS TUNING-UP PROCEDURE IS ONLY VALID FROM SERIAL NO. 201206 AND UP.

Band MHz	Letter on the drum switch	Band MHz	Letter on the drum switch
2.182	A	2.6 - 2.7999	M
1.6 - 1.7999	B	2.8 - 3.0999	O
1.8 - 1.9999	D	3.1 - 3.3999	Q
2.0 - 2.1999	F	3.4 - 3.6999	R
2.2 - 2.3999	H	3.7 - 4.0	S
2.4 - 2.5999	K	0.4 - 0.5999	T

Always tune band A (2182 kHz distress) first.

If the transmitter has preset tuning on 2182 kHz, use paragraph 8a for band A and paragraph 8b for all other bands.

If the transmitter has manual tuning on 2182 kHz (Dutch version) use 8b for all bands inclusive band A.

1. Set the MAIN SWITCH to position ON.

2. Set POWER switch to pos. OFF (fig. 1). Pull forward the exciter so that it is possible to fix the TUNE button in its depressed position by wedging the nylon fork supplied, between the collar of the button and the back of the front panel. Set the POWER switch on the exciter to position FULL.

3. Find in the above table the letter which corresponds to the band in question.

4. Switch MOTOR switch (see fig. 1) between position STOP and MANUAL, until the letter concerned (row of threaded holes) faces forwards. Then remove all hexagon studs in the rows concerned.

5. Select the lowest frequency in the band.

6. Set MOTOR switch to position AUTOM. Then the drum switch turns to the correct position.

7. Establish contact between contact 47 and the drum by pressing the U-shaped metal part of the alignment tool between contact and drum (the open part of the U to be facing the drum).

   NOTE! When the alignment tool are removed or inserted, the POWER switch <u>must always</u> be in position OFF (anode voltage OFF).

8a. Preset tuning of 2182 kHz.
Tuning of aerial coil 2182 kHz.
Set POWER switch to pos. ON and tune AERIAL TUNE 2182 kHz (see fig. 1) for AERIAL METER peak reading. If a peak cannot be obtained then stop the transmitter and establish contact between contact 54 and the drum by means of the alignment tool. Start the transmitter and tune the AERIAL TUNE 2182 kHz for AERIAL METER peak reading.

NOTE: THIS TUNING-UP PROCEDURE IS ONLY VALID FROM SERIAL NO. 201206 AND UP.

8b. Tuning of aerial coil.
Establish contact between contact 54 and the drum by means of the alignment tool.
Set POWER switch to pos. ON (transmitter starts) and tune the AERIAL TUNE knob for AERIAL METER peak reading. If a peak cannot be obtained, set POWER switch to pos. OFF (transmitter stops) and remove the alignment tool from contact 54. Start transmitter and tune the AERIAL TUNE knob for AERIAL METER peak reading. If a peak cannot be obtained, stop transmitter and activate contacts 54 and 11. Start transmitter and tune the AERIAL TUNE knob for AERIAL METER peak reading. If a peak cannot be obtained stop transmitter and activate contacts 54, 11 and 13. Start transmitter and tune the AERIAL TUNE knob for AERIAL METER peak reading. If a peak cannot be obtained the aerial is either too long or too short.

NOTE! It is important to follow the above procedure to avoid the risk of tuning to the second harmonic frequency.

9. Drive level.
Set TEST SWITCH to pos. DRIVE, start transmitter and adjust the drive level potentiometer facing forwards (see fig. 1) for a TEST METER reading of 3 divisions on the right hand section of the scale.

10. Loading.
Set TEST SWITCH to pos. LOAD and check whether the TEST METER deflection is on the left hand or the right hand section of the scale. C 3/5

If left hand deflection, then activate contacts from 47 to 43 both incl. to get TEST METER deflection within the scale, when AERIAL TUNE is tuned for max. AERIAL METER deflection. Then transfer the alignment tool to that contact, which gives max. AERIAL METER deflection while the TEST METER deflection is within the scale.

If right hand deflection, then activate contacts from 47 to 50 both incl. to get the TEST METER deflection within the scale, when AERIAL TUNE is tuned for max. AERIAL METER deflection. Then transfer the alignment tool to that contact, which gives max. AERIAL METER deflection while the TEST METER deflection is within the scale.

Due to interacting between load circuit and aerial coil it may be necessary to repeat point 8a or 8b.

11. Bandwidth check.
Select the highest frequency in the band and check if it is possible to tune AERIAL TUNE for AERIAL METER peak reading.

If a peak cannot be obtained then repeat point 8a or 8b on this frequency and recheck on the lowest frequency in the band.

12. Set POWER SWITCH to pos. OFF.
Note the positions of the alignment tools in the TUNING SHART T1127 enclosed in the "OPERATING INSTRUCTIONS FOR SAILOR MF/HF STATIONS".
Put hexagon studs into the threaded holes corresponding to the noted positions when the drum switch is in proper position, as described under point 4.

13. Repeat the points 3 to 12 in the remaining bands.

TUNING-UP PROCEDURE cont.:

HF bands 4, 6, 8, 12, 16, 22 and 25 MHz

When tuning-up these bands select frequencies as below (international calling frequencies) or frequencies as close as possible.

Band (MHz)	Letter on the drum switch	Frequency (MHz)
4	C	4.1250
6	E	6.2155
8	G	8.2570
12	I	12.3920
16	L	16.5220
22	N	22.0620
25	P	25.0200 x

x no calling frequency

A 4/5

1. Set POWER switch to pos. OFF (fig. 1) and lock the TUNE knob as described under C.T. band 1.6 - 4 MHz point 2.
   Set POWER switch on the exciter to pos. FULL.

2. Find in the above table the letter which corresponds to the band in question.

3. Switch MOTOR switch (fig. 1) between position STOP and MANUAL until the letter concerned (row of threaded holes) faces forwards.
   Then remove all the hexagon studs in the rows concerned.

4. Select frequency in the lowest HF band.

5. Set MOTOR switch to pos. AUTOM., then the drum switch turns to the correct position.

6. Establish contact between contact 47 and the drum by pressing the U-shaped metal part of the alignment tool between contact and drum (the open part of the U to be facing the drum).

   NOTE! When the alignment tool are removed or inserted, the POWER switch must always be in pos. OFF (anode voltage OFF).

7. Adjustment of aerial coil and selection of aerial capacitor.
   The aerial coil is adjusted by activating none or one of the contacts 14 to 25 incl. in such a way that increasing contact number gives increasing self-inductance. (Contacts activated by round studs excluded).

   The selection of aerial capacitor is done by means of the contact 29 (50 pF), 28 (100 pF) and 27 (200 pF) and thus gives a variation range from 50 pF to 350 pF in intervals of 50 pF. Eg. contact 27 and 29 activated results in an aerial capacitor of 250 pF.

8. Tuning of aerial coil and aerial capacitor.
   Set POWER switch to pos. ON.
   Activate contact 14 and tune AERIAL TUNE knob for AERIAL METER peak reading.
   If a peak cannot be obtained then transfer the alignment tool to the next higher contact number to obtain a peak, until a contact with a round stud is reached.
   If a peak still cannot be obtained then increase aerial capacitor in steps of 50 pF until it is possible.
   Every time the aerial capacitor is increased repeat point 8 from the beginning.
   Leave the alignment tool(s) in the contact(s).

9. Drive level.
   Set TEST SWITCH to pos. DRIVE, start transmitter and adjust the drive level potentiometer facing forwards (see fig. 1) for a TEST METER reading of 3 divisions on the right hand section of the scale.

10. Loading.
    Set TEST SWITCH to pos. LOAD, and check whether the TEST METER deflection is on the left hand or the right hand section of the scale.

    If right hand deflection then activate contacts from 47 to 43 both incl. to get TEST METER deflection within the scale when AERIAL TUNE is tuned for max. AERIAL METER deflection. Then transfer the alignment tool to that contact which gives maximum AERIAL METER deflection while the TEST METER deflection is within the scale.

    If left hand deflection then activate contacts from 47 to 50 both incl. to get the TEST METER deflection within the scale when the AERIAL TUNE is tuned for max. AERIAL METER deflection. Then transfer the alignment tool to that contact which gives maximum AERIAL METER deflection while the TEST METER deflection is within the scale.

    If you end up in contact 50 then increase aerial capacitor in steps of 50 pF until max. aerial current is reached. Every time the aerial capacitor is increased repeat points 6-8-9 and 10.

    If it is possible to reach the same aerial current for two different values of aerial capacitor select the lowest value.

11. Turn AERIAL TUNE for absolute maximum and repeat point 9.

12. Bandwidth check.
    Select the lowest frequency in the band and check that it is possible to tune AERIAL TUNE for AERIAL METER peak reading. If a peak cannot be obtained then transfer the alignment tool located between contacts 14 - 25 one step aside to obtain a peak.

    Select the highest frequency in the band and check that it is possible to tune AERIAL TUNE for AERIAL METER peak reading. If a peak cannot be obtained then transfer the alignment tool located between contacts 14 - 25 one step aside to obtain a peak.

13. Set POWER switch to pos. OFF.
    Note the positions of the alignment tools in the TUNING CHART T1127 enclosed in the "OPERATING INSTRUCTIONS FOR SAILOR MF/HF STATIONS".
    Put hexagon studs into the threaded holes corresponding to the noted positions when the drum switch is in proper position as described under point 3.

14. Repeat the points 2 to 13 incl. in the remaining HF bands.

15. Set TEST SWITCH to pos. Ik_1, POWER switch to pos. ON and MOTOR switch to pos. AUTOM.
    Mount the two front panel covers.

TUNING-UP PROCEDURE T1127/H1200

PROCEDURE:

The tuning-up procedure for the remote-controlled transmitter is exactly the same as for the rack-mounted transmitter.

NOTE! NEVER CHANGE FREQUENCY UNLESS THE POWER SWITCH (fig. 1) IS IN POS. OFF.

When the tuning-up procedure is finished remove the AERIAL TUNE knob and the front panel cover behind and mount the remote control motor unit as described below.

Serial numbers up to 173910.

1. Set MAIN SWITCH to pos. OFF.

2. Remove the AERIAL TUNE knob.

3. Remove the front panel cover behind the AERIAL TUNE knob.

4. Remove the shaft for AERIAL TUNE knob by removing the three screws which penetrate the round iron plate riveted to the shaft.

5. Remove the flat bronze spring by means of a pair of nippers <u>without</u> loosening the fastening screws.

6. Mount the remote control motor unit and take care that the crankshaft fits into the slot in the disc. The two short screws have to be mounted beneath the AERIAL METER.

   NOTE! NEVER TURN THE CRANKSHAFT AS IT WILL DAMAGE THE GEARBOX.

7. Solder the red/orange wire and the brown/black wire for the motor to the terminals marked ^{xx} and the black wire to the terminal marked ^{xxx} at fig. 1. Take care that the wires are not trapped by the mechanics when the crankshaft is turning.

8. Remove the jumper wire between the two terminals marked ^{x} at fig. 1.

9. Set TEST SWITCH to pos. Ik_1, POWER switch to pos. ON and MOTOR switch to pos. AUTOM.
   Mount the remaining front panel covers.

From serial number 173910.

1. Set MAIN SWITCH to pos. OFF.

2. Remove the front panel cover carrying the AERIAL TUNE knob.

3. Mount the remote control motor unit and take care that the crankshaft fits into the slot in the meter disc. The two short screws have to be mounted beneath the AERIAL METER.

   NOTE! NEVER TURN THE CRANKSHAFT AS IT WILL DAMAGE THE GEARBOX.

4. Solder the red/orange wire and the brown/black wire for the motor to the terminals marked ^{xx} and the black wire to the terminal marked ^{xxx} at fig. 1. Take care that the wires are not trapped by the mechanics when the crankshaft is turning.

B 1/2

5. Remove the jumper wire between the two terminals marked ^{x} at fig. 1.

6. Set TEST SWITCH to pos. Ik_1, POWER switch to pos. ON and MOTOR switch to pos. AUTOM.
Mount the remaining front panel covers.

Final check:

Check that the remote control motor unit is functional by tuning the transmitter from the REMOTE CONTROL UNIT H1200 in some bands.

A 2/2

SERVICE

1. MAINTENANCE
2. NECESSARY TEST EQUIPMENT
3. TROUBLE-SHOOTING
4. PERFORMANCE CHECK
5. ADJUSTMENT PROCEDURE
6. NECESSARY ADJUSTMENTS AFTER REPAIR
7. FUNCTION CHECK
8. MECHANICAL DISASSEMBLING T1127 ONLY

1. MAINTENANCE

1.1.
When the SAILOR SHORT-WAVE SET type 1000 has been correctly installed, the maintenance can, dependent on the environment and working hours, be reduced to a performance check at the service workshop at intervals not exceeding 5 years. A complete performance check list is enclosed in the PERFORMANCE CHECK section.

Also inspect the antennas, cables and plugs for mechanical defects, salt deposits, corrosion and any foreign bodies.

Along with each set a TEST SHEET is delivered, in which some of the measurings made at the factory are listed. If the performance check does not show the same values as those on the TEST SHEET, the set must be adjusted as described under ADJUSTMENT PROCEDURE.

Any repair of the set should be followed by a FUNCTION CHECK of the unit in question.

2. NECESSARY TEST EQUIPMENT

T1127	N140X	S1300	R1117	Equipment	
X	X	X	X	OSCILLOSCOPE:	
				Bandwidth	0-25 MHz
				Sensitivity	2mV/cm
				Input impedance	1 Mohm/30 pF
				Triggering	EXT-INT-ENVELOPE
				E.g. PHILIPS	PM3212
X		X	X	PASSIVE PROBE:	
				Attenuation	10x
				Input resistance DC	10 Mohm
				Input capacitance	15 pF
				Compensation range	10 pF - 30 pF
				E.g. PHILIPS	PM 9396
		X	X	MULTIMETER:	
				Sensitivity (f.s.d.)	1V
				Input impedance	10 Mohm
				Accuracy (f.s.d.)	±2%
				E.g. PHILIPS	PM2503
X	X			MULTIMETER:	
				Sensitivity	0.3V and 3A
				Input impedance	30 Kohm/V
				Accuracy (f.s.d.)	±1%
				Current range	100A
				Voltage range	500V and 2.5 kV
				E.g. Unigor A43, with probe and shunt	

NECESSARY TEST EQUIPMENT cont.:

T1127	N140X	S1300	R1117		
		X		TONEGENERATOR:	
				Frequency range	200 - 3000 Hz
				Output	1V RMS
				Output impedance	≦600 ohm
				E.g. PHILIPS	PM5107
			X	AF VOLTMETER:	
				Sensitivity (f.s.d.)	300 mV
				Input impedance	≧4 ohm
				Accuracy (f.s.d.)	±5%
				Frequency range	100 Hz - 5 kHz
				E.g. PHILIPS	PM2503
		X	X	FREQUENCY COUNTER:	
				Frequency range	100 Hz - 40 MHz
				Resolution	0.1 Hz at f ≧ 10 MHz
				Accuracy	$1 \cdot 10^{-7}$
				Sensitivity	100 mV RMS
				Input impedance	1 Mohm
				Single period measurement range resolution	 1 sec. 1 mS
				E.g. PHILIPS	PM6611 + PM9679
			X	SIGNAL GENERATOR:	
				Frequency range	550 kHz - 30 MHz R1118: 100 kHz - 30 MHz
				Output inpedance	50/75 ohm
				Output voltage	1 uV - 100 mV EMF
				Modulation	AM, 30%, 1000 Hz
				E.g. PHILIPS	PM5326

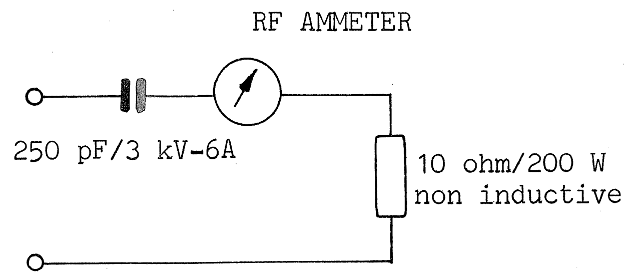
NECESSARY TEST EQUIPMENT cont.:

T1127	N140X	S1300	R1117		
				POWER SUPPLIES:	
X				T1127:	
				V_{out}	26.5V DC
				I_{out}	60A DC
				E.g. 2 pcs. LAMBDA type	LMG24
		X	X	R1117/S1300:	
				V_{out} 1	22V
				I_{out} 1	1.5A
				V_{out} 2	-45V
				I_{out} 2	0.2A
				E.g. SAILOR POWER SUPPLY type	N1402
		X		TEST BOX S1300:	
				SP type S1300/01 TEST BOX	
X				POWER METER:	
				Power range	500W
				E.g. Bird Thruline Wattmeter Model	43
				plug-in element	500W 2-30 MHz
				impedance	50 ohm
X				RF-AMMETER (Thermocross):	
				Current range	5A
				E.g. HELWEG MIKKELSEN & CO. Copenhagen, Denmark type TR-68x71	5A
X		X		DUMMY LOAD for HF bands, 4 MHz to 25 MHz	
				Impedance	50 ohm
				Frequency range	0-25 MHz
				Power range	500W
				E.g. BIRD Termaline Coaxial resistor Model 8401	

NECESSARY TEST EQUIPMENT cont.:

T1127	N140X	S1300	R1117	
X				DUMMY LOAD for C.T. band 1.6 MHz to 4 MHz
			X	DUMMY LOAD for the C.T. band 1.6 to 4 MHz
			X	DUMMY LOAD for the HF bands 4 MHz to 25 MHz

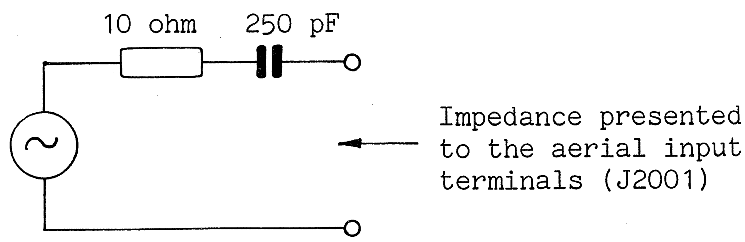
DUMMY LOAD for C.T. band 1.6 MHz to 4 MHz



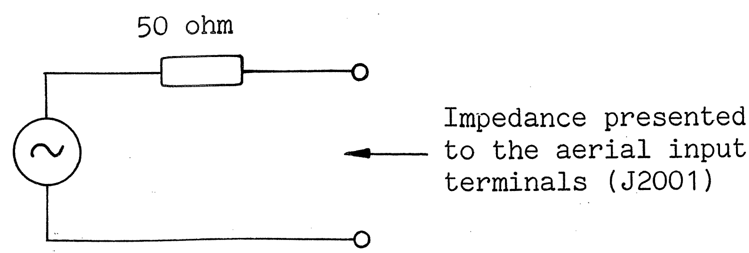
E.g. DRALORIC 06 1291 TD 20x50 L
8 KV_s 250 pF ±20% R85

E.g. 10 pcs. DALE PH-25A-17, 100 ohm 5% 25W

DUMMY LOAD for the C.T. band 1.6 to 4 MHz



DUMMY LOAD for the HF bands 4 MHz to 25 MHz



E.g. SAILOR Rx DUMMY LOAD type H219.

3. TROUBLE-SHOOTING

Trouble-shooting should only be performed by persons with sufficient technical knowledge, who have the necessary test equipment at their disposal, and who have carefully studied the operation principles and structure of the unit in question.

Start to find out whether the fault is somewhere in the antenna circuit, the power source, or in the short-wave set.

For help with trouble-shooting in the short-wave set there is a built-in test meter and test meter switch, located behind the air filter on the power supply.

When the fault has been located to a certain unit look up the PERFORMANCE CHECK list in the instruction book and make relevant performance check to incircle the fault. Then look up the CIRCUIT DESCRIPTION. This section contains schematic diagrams, description of the modules and pictures showing the location of the components. (ADJUSTMENT LOCATIONS).
Typical AC and DC voltages are indicated on the schematic diagrams.

No adjustment must take place unless the service workshop has the necessary test equipment to perform the ADJUSTMENT PROCEDURE in question.

After repair or replacement of the module look up the section NECESSARY ADJUSTMENTS AFTER REPAIR to see, whether the unit has to be adjusted or not.

Anyway the unit has to have a complete FUNCTION CHECK after repair. B

4. PERFORMANCE CHECK FOR T1127

4.1.
PREPARATION AND LOCATIONS.

4.1.1.
If S1300 or S1300TT: Mount the TEST STRIPS Nos 1 to 5 incl. in the first five positions of the frequency selector in the exciter.
If S1301: Use the frequencies in brackets.

4.1.2.
Refer to fig. 2 and fig. 4.

4.2.
CHECK OF FILAMENT VOLTAGE.

4.2.1.
Set MAIN SWITCH to position STAND BY.

4.2.2.
Connect the voltmeter to TP4 and TP5.

4.2.3.
Check that the voltage is 13.5 ±1V.

4.3.
CHECK OF ZERO SIGNAL CURRENT.

4.3.1.
Select a frequency in the 4 MHz band.

4.3.2.
Set MAIN SWITCH to position ON and key the transmitter in A3J mode by means of the KEY plug.

4.3.3.
Set TEST SWITCH to position I_k1.

4.3.4.
Check that the testmeter reading is
* 3.3 ±0.3 scale div. after 5 minutes in operation.

4.3.5.
Set TEST SWITCH to position I_k2.

4.3.6.
Check that the testmeter reading is
* 3.3 ±0.3 scale div.

4.4.
CHECK OF DRIVER.

4.4.1.
Remove the high voltage plug located at the rear of the power supply, set MAIN SWITCH to position ON, TEST SWITCH to position I_k1 and key the transmitter by means of the KEY plug.

4.4.2.
Connect the voltmeter to TP3.

4.4.3.
Check that the voltage is 4 ±0.6V.

4.4.4.
Connect the voltmeter to TP1.

4.4.5.
Check that the voltage is 1.60 ±0.15V.

4.4.6.
Connect the voltmeter to TP1 and TP2.

4.4.7.
Check that the voltage is less than 60 mV.

4.4.8.
Connect the ammeter in series with the 28V supply wire.

4.4.9.
Check that the current is 2.7 ±0.2A.

4.4.10.
Set the POWER switch on the exciter to position FULL, set FREQUENCY SELECTORS to 2C (1600 kHz) and turn the drive level potentiometer fully counter clockwise.

4.4.11.
Connect 10:1 probe and oscilloscope to TP6, press TUNE button and note the peak to peak voltage.

4.4.12.
Connect 10:1 probe and oscilloscope to TP7, press TUNE button and note the peak to peak voltage.

4.4.13.
Calculate the voltage gain and check that it is within 6.3 to 7.6 (16.8 ± 0.8 dB).

* Canadian version: 4 ± 0.3 scale div. due to higher intermodulation requirements in Canada.

4.4.14.
Set TEST SWITCH to position DRIVE.

4.4.15.
Press TUNE button and adjust drive level potentiometer for a TEST METER reading of zero.

4.4.16.
Check that the envelope of the two tone signal at TP7 is undistorted.

4.4.17.
Set FREQUENCY SELECTORS to 3C (4.125 MHz), 3D (6.2155 MHz), 4A (8.257 MHz), 4B (12.892 MHz), 4C (16.522 MHz) 4D (22.062 MHz), and 5A (25.02 MHz) in turn and repeat 4.4.15 and 4.4.16.

4.4.18.
Insert the high voltage plug.

4.5.
CHECK OF MOTOR DRIVEN DRUM SWITCH.

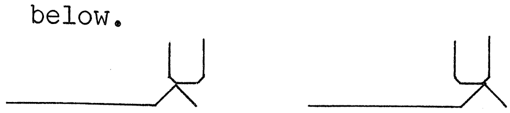
4.5.1.
Set MAIN SWITCH to position ON and POWER switch to position OFF.

4.5.2.
Pull slowly forward the arm on the microswitch until the motor is running and check that the distance x is within 18 mm to 20 mm (see fig. 2).

4.5.3.
Rotate the drum switch 360^{o} in steps by means of the MOTOR switch. For each step check:

a) the contact position of the high voltage switch.

b) that the contact positions of the studs is within the limits shown below.



4.5.4.
Set MOTOR switch to AUTOM.

4.5.5.
Set FREQUENCY SELECTORS and check the drum positions according to the table below.

FREQUENCY SELECTOR SETTINGS		LETTER FACING THE CONTACTS
S1300 or S1300TT	S1301 MHz	
1A	3.8	S
1B	3.6	R
1C	2.9	O
1D	2.1	F
2A	2.3	H
2B	2.7	M
2C	1.7	B
2D	3.2	Q
3A	1.9	D
3B	2.5	K
3C	4.1	C
3D	6.2	E
4A	8.2	G
4B	12.3	I
4C	16.5	L
4D	22.0	N
5A	25.0	P
5D	2.182	A

4.6.
CHECK OF ANODE RESONANCE

4.6.1.
Set MAIN SWITCH to position ON and TEST SWITCH to position I_k1.

4.6.2.
Rotate the drums by means of the MOTOR switch until the letter C faces forwards.

4.6.3.
Remove the hexagon stud in one of the contacts 43 to 50 incl. and note the position.

4.6.4.
Set the MOTOR switch to AUTOM. and insert the alignment tool in contact 14.

4.6.5.
Press TUNE button and check that the TEST METER deflection is less than 5 scale div.

4.6.6.
Mount the hexagon stud in the noted position.

4.6.7.
Repeat 4.6.2. to 4.6.6. incl. according to the table below.

FREQUENCY SELECTOR SETTINGS		LETTER FACING THE CONTACTS
S1300 or S1300TT	S1301 MHz	
3C	4.125	C
3D	6.2155	E
4A	8.257	G
4B	12.392	I
4C	16.522	L
4D	22.062	N
5A	25.02	P

4.7.
CHECK OF OUTPUT POWER.

4.7.1.
Set MAIN SWITCH to position ON.

4.7.2.
Connect the dummy load to transmitter.

C.T. band: 10 ohm + 250 pF + RF ammeter.

HF bands: 50 ohm + power meter

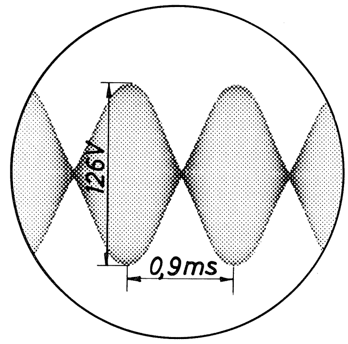
4.7.3.
Connect 10:1 probe and oscilloscope across the resistant part of the dummy load.

4.7.4.
Set FREQUENCY SELECTORS to 2A (2.3 MHz)

4.7.5.
Tune up the transmitter as described in the TUNING-UP PROCEDURE.

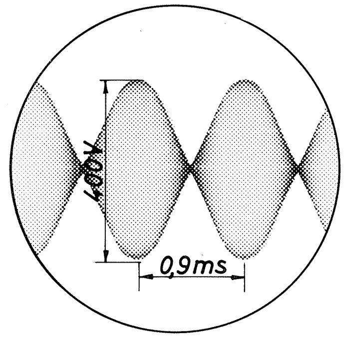
4.7.6.
Press TUNE button and check that the envelope is undistorted as shown next column.

approx.
120V



C.T. band measured across 10 ohm

approx.
400V



HF band measured across 50 ohm

4.7.7.
C.T. band:
Press TUNE button and check that RF ammeter reading is within 3A - 4.5A dependent on the supply voltage.

4.7.8.
HF bands:
Press TUNE button and check that the power meter reading is greater than 200W dependent on the supply voltage.

4.7.9.
Repeat 4.7.2. to 4.7.8. incl. according to the table below:

FREQUENCY SELECTOR SETTINGS	
S1300 or S1300TT	S1301 MHz
2A	2.3
3C	4.125
3D	6.2155
4A	8.257
4B	12.392
4C	16.522
4D	22.062
5A	25.02

4.7.10.
Set FREQUENCY SELECTORS to 5D (2182 kHz) and connect the dummy load 10 ohm + 250 pF + RF ammeter to transmitter.

4.7.11.
Tune up the transmitter as described in the TUNING-UP PROCEDURE point 14.

4.7.12.
Key the transmitter by means of the KEY plug and check that the RF ammeter reading is greater than 2.2A dependent on the supply voltage.

4.8.
CHECK OF SAFETY SYSTEM.

4.8.1.
Set MAIN SWITCH to position ON, select a frequency, activate A3J push button and key the transmitter by means of the KEY plug.

4.8.2.
Set the test switch located behind the AIR FILTER on the power supply to position V_{driver} and check that the test meter reading is in the green area.

4.8.3.
Set POWER switch to position OFF and check that the test meter reading falls to zero. Set the POWER switch to position ON.

4.8.4.
Check that the test meter reading is in the green area. Set the MOTOR switch to position STOP and MANUAL in turn and check that the test meter reading falls to zero. Set the MOTOR switch to position AUTOM.

4.8.5.
Check that the test meter reading is in the green area. Pull forward the transmitter until SAFETY SWITCH is released, (see fig. 4) and check that the test meter reading falls to zero.

4.8.6.
Set MAIN SWITCH to position OFF and pull forward the transmitter until the BLOWER SAFETY switch is visible.

4.8.7.
Short-circuit the anodes of the PA valves to chassis, to discharge the anode voltage capacitor.

4.8.8.
Check that the BLOWER SAFETY switch is released, tin box is opened.

4.8.9.
Fasten the tin box in open position and push the transmitter back to operation position.

4.8.10.
Set MAIN SWITCH to position ON and wait approx. one minute and check that the test meter reading is zero.

4.8.11.
Repeat 4.8.6. and 4.8.7. and release the fastenings.

5. ADJUSTMENT PROCEDURE FOR T1127

5.1.
ADJUSTMENT OF FILAMENT STABILIZER.

5.1.1.
Set MAIN SWITCH to position STAND BY, and connect the voltmeter to TP4 (+) and TP5 (-).

5.1.2.
Adjust R1105 to 13.5V.

5.2.
ADJUSTMENT OF LOAD METER CIRCUIT.

5.2.1.
Set MAIN SWITCH to position ON.

5.2.2.
Connect dummy load (10 ohm + 250 pF) to the transmitter.

5.2.3.
Select the lowest frequency in C.T. band.

5.2.4.
Note the position of all hexagon studs in the row of threaded holes concerned, (see TUNING-UP PROCEDURE C.T. band, point 4), and remove all of them.

5.2.5.
Activate contact 43 by means of the alignment tool.

5.2.6.
Set test meter switch behind the AIR FILTER in power supply to position V_{g2}.

5.2.7.
Tune aerial coil as described in TUNING-UP PROCEDURE C.T. band point 8.

5.2.8.
Adjust drive level: refer 5.4.

5.2.9.
Tune AERIAL TUNE for max. AERIAL METER deflection and note the V_{g2} reading.

5.2.10.
Transfer the alignment tool to the next number up and repeat 5.2.8. to 5.2.10. until V_{g2} decreases.

5.2.11.
Transfer the alignment tool to the previous number.

5.2.12.
Check drive level and tune AERIAL TUNE for max. AERIAL METER deflection.

5.2.13.
Set TEST SWITCH in position LOAD and adjust R601 (fig. 2) for a test meter reading of zero.

5.2.14.
Remount the hexagon studs (5.2.4.).

5.2.15.
Select 4125 kHz and connect 50 ohm's dummy load to the transmitter.

5.2.16.
Note the position of all hexagon studs in the row of threaded holes concerned, (see TUNING-UP PROCEDURE HF bands, point 3), and remove all of them.

5.2.17.
Activate contact 50 by means of the alignment tool.

5.2.18.
Tune aerial coil as described in TUNING-UP PROCEDURE HF bands point 8 .

5.2.19.
Adjust drive level: refer 5.4.

5.2.20.
Tune AERIAL TUNE for max. AERIAL METER deflection and note the V_{g2} reading.

5.2.21.
Transfer the alignment tool to the next number down, and repeat 5.2.19. to 5.2.21. until V_{g2} decreases.

5.2.22.
Transfer the alignment tool to the previous number.

5.2.23.
Check drive level and tune AERIAL TUNE for max. AERIAL METER deflection.

5.2.24.
Set TEST SWITCH in position LOAD, and adjust R602 (fig. 2) for a test meter reading of zero.

5.2.25.
Remount the hexagon studs (5.2.16).

5.3.
ADJUSTMENT OF ZERO SIGNAL CURRENT.

5.3.1.
Set TEST SWITCH to position I_{K1}.

5.3.2.
Turn R606 and R607 fully counter clockwise (fig. 2).

5.3.3.
Key transmitter in A3J mode by means of the KEY plug.

5.3.4.
Adjust R606 for a TEST METER reading of*3.3 div.

5.3.5.
Set TEST SWITCH to position I_{K2} and adjust R607 for a TEST METER reading of*3.3 div.

5.4.
ADJUSTMENT OF DRIVE LEVEL.

5.4.1.
Set TEST SWITCH to position DRIVE and POWER switch on the exciter to position FULL.

5.4.2.
Press TUNE button.

5.4.3.
Adjust drive level potentiometer for a TEST METER reading of 3 div.

5.5.
ADJUSTMENT OF AERIAL METER.

5.5.1.
Connect dummy load in series with an RF-ammeter to the transmitter (10 ohm + 250 pF).

5.5.2.
Select a frequency close to 2 MHz.

5.5.3.
Key transmitter in A3H mode by means of the KEY plug.

5.5.4.
Adjust R705 (fig. 2) for an AERIAL METER reading equal to the RF-ammeter reading.

5.6.
ADJUSTMENT OF COIL SECTION.

NOTE: ANODE VOLTAGE 2kV IS PRESENT AT THE COILS WHEN BOTH THE MAIN SWITCH AND POWER SWITCH ARE IN POSITION ON. The location of the coils is shown on fig. 5 and fig. 6.

5.6.1.
Set MAIN SWITCH to position ON, POWER switch to position OFF and TEST SWITCH to position I_{K1}.

5.6.2.
Select a frequency in the lowest band in question.

5.6.3.
Remove the hexagon stud in one of the contacts 43 - 50 incl. and note the contact number.

5.6.4.
Activate contact 14 by means of the alignment tool.

5.6.5.
Set POWER switch to position ON.
Press TUNE button and note the TEST METER reading.

5.6.6.
Set POWER switch to position OFF, and short-circuit RF GROUND to chassis by means of a screwdriver (see fig. 5).

* Canadian version: 4 div. due to higher intermodulation requirements in Canada.

5.6.7.: 4-6-8 MHz bands.
Transfer the adj. wire in question (see fig. 6) to neighbour tap on the coil. Remove the screwdriver.

5.6.8.
Repeat 5.6.5., 5.6.6. and 5.6.7. searching for that tap which gives minimum TEST METER deflection.
The TEST METER deflection must be less than 5 scale div.

5.6.9.
Put the hexagon stud into the noted contact (5.6.3.).

5.6.10.
Repeat 5.6.1. to 5.6.9. incl. for the remaining higher frequency bands, e.g. the 4 MHz band has been adjusted, then repeat the procedure on 6 MHz and 8 MHz band.

5.6.11.
Carry out 5.6.12. to 5.6.17.

5.6.12.: 12-16-22-25 MHz bands.
Repeat 5.6.1. to 5.6.6. incl.

5.6.13.
Release the screw in the adjustment core and move it slightly in or out the coil. Remove the screwdriver.

5.6.14.
Repeat 5.6.5., 5.6.6. and 5.6.13. searching for that core position which gives minimum TEST METER deflection.

5.6.15.
Repeat 5.6.6.
Tighten the screw in the adjustment core and put the hexagon stud into the noted contact (5.6.3.).

5.6.16.
Repeat 5.6.12. to 5.6.15. incl. For the remaining higher frequency bands, e.g. the 16 MHz band has been adjusted, then repeat the procedure on 22 MHz and 25 MHz.

5.6.17.
Due to interaction in the 22 MHz and 25 MHz band. Check that the TEST METER deflection is less than 5 scale div. in the 22 MHz band. If not then repeat 5.6.12. to 5.6.15. in both the 22 MHz and 25 MHz band until the TEST METER reading is less than 5 scale div.

5.7.
ADJUSTMENT OF MOTOR DRIVEN DRUM SWITCH.

5.7.1.
Set MAIN SWITCH to position ON.

5.7.2.
Set POWER switch to position OFF.

5.7.3.
Set MOTOR switch to position STOP.

5.7.4.
Pull slowly forward the arm on the microswitch until the motor starts running and measure the distance x (see fig. 2). The distance x must be within 18 mm to 20 mm. To adjust x bend the arm of the microswitch.

5.7.5.
Adjustment of the upper drum.
Remove all the four screws in the sector disc (see fig. 5).

5.7.6.
Fix the drum and rotate the sector disc two steps forward by means of the MOTOR switch.

5.7.7.
Adjust the drum so that the brass-bar on the high voltage switch (see fig. 5) stands on the top of the contact springs.

5.7.8.
Mount one allen screw and drill a cone in the shaft with a 3.5 mm drill through the other threaded hole and mount an allen screw.

5.7.9.
Rotate the drum and drill cones and mount the two remaining allen screws.

5.7.10.
Adjustment of lower drum is only necessary when the drum has been replaced.

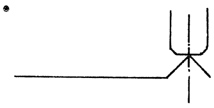
5.7.11.
Check that the adjustment of the upper drum is correct (see 5.7.7.).

5.7.12.
Rotate the lower drum until the letter E faces the contact springs. Never rotate the drums by means of the contact studs.

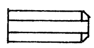
ADJUSTMENT PROCEDURE FOR T1127 cont.:

5.7.13.
Fix the lower drum and rotate the upper drum by means of the MOTOR switch until the letter E faces the contact springs.

5.7.14.
Adjust the lower drum for correct contact position.



5.7.15.
Drill a 2 mm hole in the insulator located in the right hand end of the drum and insert the spring clip supplied.



5.7.16.
Rotate the drum 180° and repeat 5.7.15.

5.8.
ADJUSTMENT OF DRIVER.

5.8.1.
Remove the high voltage plug located on the rear side of the power supply.

5.8.2.
Set MAIN SWITCH to position ON and key the transmitter in the A3J mode by means of the KEY plug.

5.8.3.
Connect the voltmeter to 28V supply wire and note the meter reading.

5.8.4.
Connect the voltmeter to TP1 and adjust R411 according to the table below.

28V supply	TP1
26 V	1.5 V
27 V	1.55 V
28 V	1.6 V
29 V	1.65 V
29.4 V	1.68 V

5.8.5.
Connect the voltmeter to TP1 and TP2 and check that the voltage is less than 60 mV.

5.8.6.
Select a frequency in the 25 MHz band (how to programme see instruction book for the exciter).

5.8.7.
Set TEST SWITCH to position DRIVE, press the TUNE button and adjust drive level potentiometer for a TEST METER reading of 5 div. on the left hand section of the scale.

5.8.8.
Adjust L401 (see fig. 3) to max. TEST METER deflection and keep the TEST METER deflection on the left hand section of the scale by means of the drive level potentiometer.

5.8.9.
Seal the core and insert the high voltage plug.

6. NECESSARY ADJUSTMENT AFTER REPAIR FOR T1127

In the following paragraphs reference is made to the ADJUSTMENT PROCEDURE T1127 and PERFORMANCE CHECK T1127.

Locations: refer to fig. 2 to fig. 6. incl.

6.1.
COIL SECTION 100.
Execute 5.7., 5.6. and 4.7.

6.2.
PA-UNIT 200.
Perform the RUN-IN OF THE STATION AFTER A LONGER LAY-UP PERIOD, described in the OPERATING INSTRUCTIONS FOR SAILOR MF/HF TELEPHONY STATION.
Execute 4.2., 5.3. and 4.7.

6.3.
PA-PRINT 300.
Execute 4.7. in the 25 MHz band.

6.4.
DRIVER UNIT 400.
Execute 5.8. and 4.4.

6.5.
SERVICE UNIT 600.
Execute 5.3., 5.2., 4.8.1. to 4.8.3. incl. and check the MOTOR switch.

6.6.
AERIAL METER CIRCUIT 700.
Execute 5.5.

6.7.
DRIVE LEVEL UNIT 1000.
Execute 5.4. in all bands.

6.8.
FILAMENT STABILIZER 1100.
Execute 5.1.

A 1/1

7. FUNCTION CHECK FOR T1127

NECESSARY TEST EQUIPMENT:

SAILOR TEST STRIPS No. 2, 4 and 5.
DUMMY LOAD: 10 ohm + 250 pF.
DUMMY LOAD: 50 ohm.

PREPARATIONS:

1.
If S1300 or S1300TT:
Place test strip No. 2 in position 2 of the frequency selector in the exciter and so on with strip No. 4 and No. 5.
If S1301:
Use the frequency in brackets.

2.
Take off the two front panel covers.

3.
Connect dummy load 10 ohm + 250 pF.

FUNCTION CHECK:

7.1.
Set MAIN SWITCH to position ON.

7.2.
Set FREQUENCY SELECTORS to position 4C (4.125 MHz).

7.3.
Set TEST SWITCH to position I_{K1}.

7.4.
Select A3J mode and key the transmitter by means of the KEY plug.

7.5.
Check that the TEST METER reading is* 3.3 ± 0.3 scale div.

7.6.
Set TEST SWITCH to I_{K2} and check that the TEST METER reading is* 3.3 ± 0.3 scale div.

7.7.
Set FREQUENCY SELECTORS to position 2C (1.7 MHz).

7.8.
Tune up the transmitter as described in TUNING-UP PROCEDURE C.T. band and check that the AERIAL METER reading is greater than 2.5A.

7.9.
Connect dummy load 50 ohm.

7.10.
Set FREQUENCY SELECTOR to 4C (16.522 MHz).

7.11.
Tune up the transmitter as described in TUNING-UP PROCEDURE HF bands and check that the AERIAL METER reading is greater than 2.5A.

7.12.
Set TEST SWITCH to position I_{K1}, POWER switch to position ON and MOTOR switch to position AUTOM.

7.13.
Mount the two front panel covers.

* Canadian version: 4 ± 0.3 scale div. due to higher intermodulation requirements in Canada.

8. MECHANICAL DISASSEMBLING FOR T1127

8.1.
REPLACEMENT OF PA-PRINT.

8.1.1.
Unscrew the screws marked * on fig. 4.

8.1.2.
Press the anode feed-through up. (fig. 4).

8.1.3.
It is now possible to tilt the PA-chassis out.

8.2.
REPLACEMENT OF DRUM SWITCHES.

8.2.1.
Set MOTOR switch to position MANUAL.

8.2.2.
Set POWER switch to position OFF.

8.2.3.
Remove the top cover of T1127.

8.2.4.
Unsolder the blue wire on the motor.

8.2.5.
Set MAIN SWITCH to position ON.

8.2.6.
Short-circuit RF ground to chassis by means of a screwdriver to discharge the anode capacitor.

8.2.7.
By means of the blue wire, make the motor stop between two positions. Note the letter which faces downwards.

8.2.8.
Unscrew the screws ** on fig. 4.

8.2.9.
Remove the left side cover.

8.2.10.
It is now possible to pull out the drums, the shafts will remain in the transmitter.

8.2.11.
When reassembling, put the drums on to the shafts. Make sure that the correct letter faces downwards.

NOTE: The upper drum has two possible positions, but only one correct. The lower drum has thirty possible positions, but only one correct.

If new drum switches are mounted see 5.7.

8.3.
REPLACEMENT OF BLOWER.

8.3.1.
Unscrew the screws marked * on fig. 3.

8.3.2.
Remove the right side cover.

8.3.3.
Unsolder the blower wires on the filter-print.

8.3.4.
Unscrew the screw marked*** on fig. 3.

8.3.5.
Unscrew the four screws which retain the blower.

8.3.6.
It is now possible to take out the blower.

8.4.
REPLACEMENT OF DRIVE LEVEL UNIT.

8.4.1.
Remove the top cover of T1127.

8.4.2.
Unscrew the screws marked * on fig. 3.

8.4.3.
Remove the right side cover.

8.4.4.
Unscrew the screws marked * on fig. 2.

A 1/2

8.4.5.
Remove the front plate.

8.4.6.
Unscrew the screws marked ** on fig. 3. and fig. 2.

8.4.7.
Unscrew the two allen screws which retain the drive level unit.

8.4.8.
It is now possible to pull out the unit.

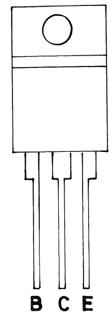
8.5.
REPLACEMENT OF MOTOR.

8.5.1.
Disconnect the wires to the motor.

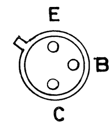
8.5.2.
Unscrew the four screws which retain the motor (see fig. 5).

8.5.3.
It is now possible to take out the motor.

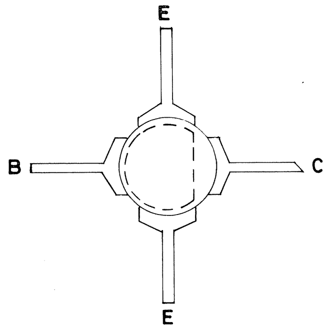
TOP VIEW | **BOTTOM VIEW**



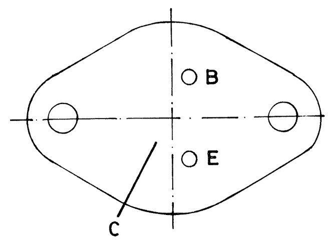
BD 241 A



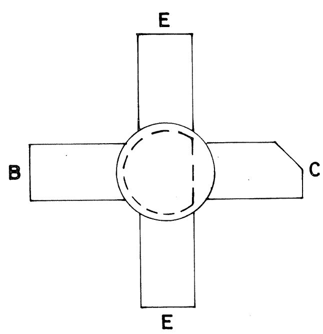
BC 141-10



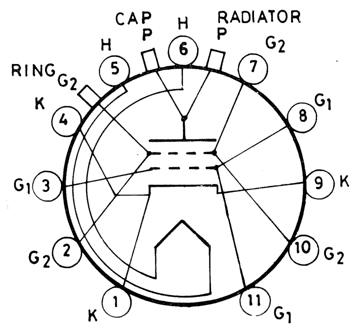
ZRF 0132



MJ 802



MRF 401 mp



8122

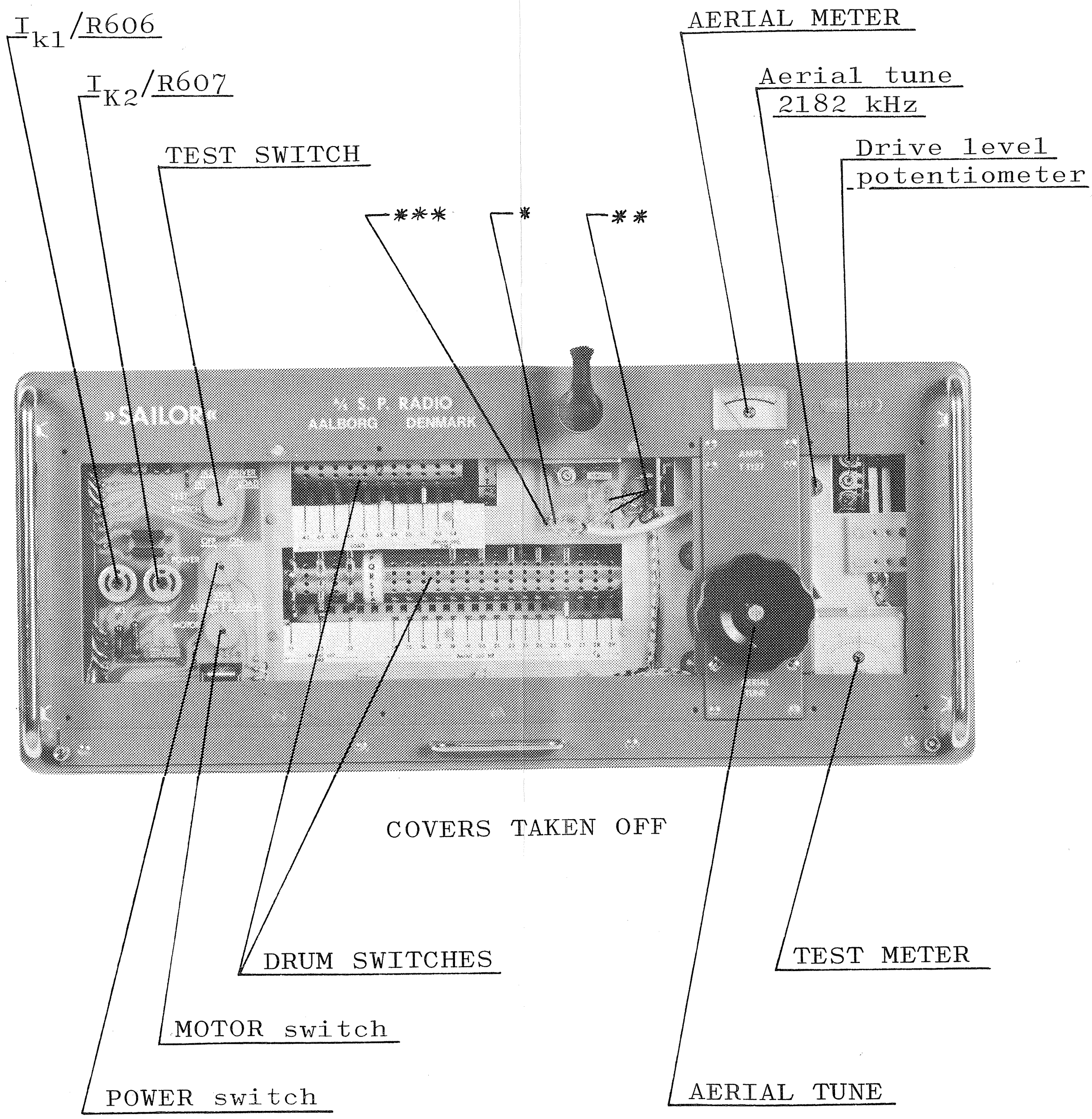


FIG. 1. TUNING FACILITIES T1127

A

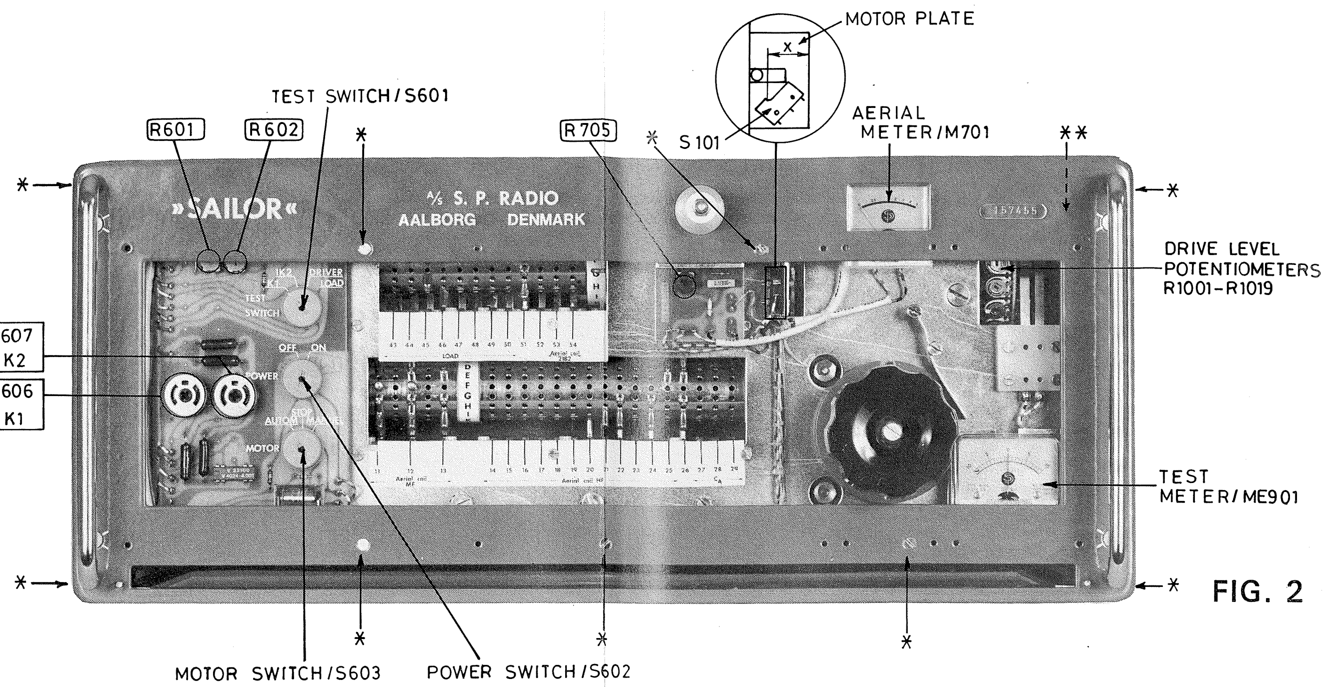


FIG. 2

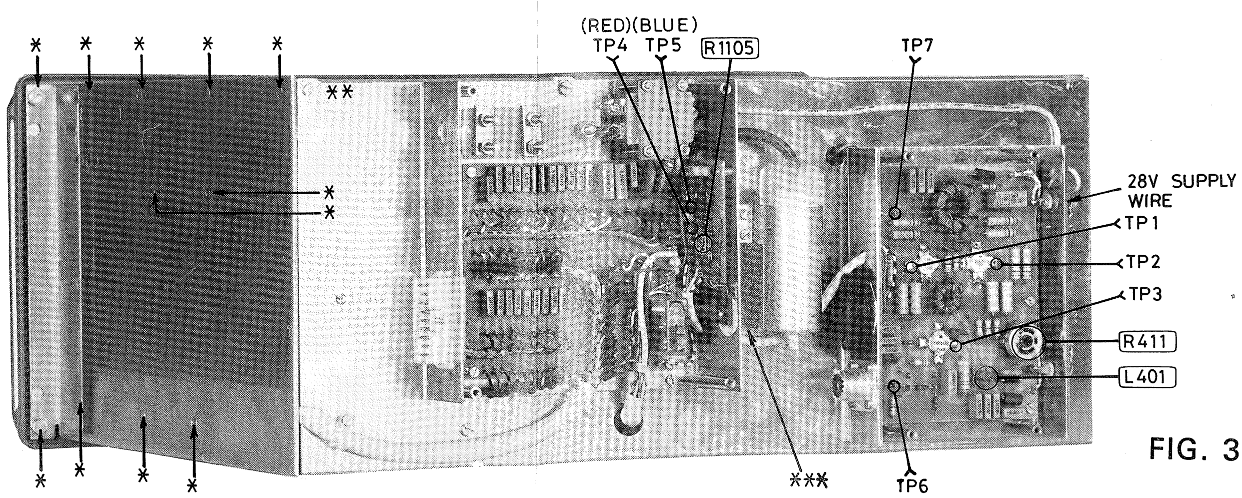


FIG. 3

ADJUSTMENT- and MECHANICAL LOCATIONS FOR T 1127

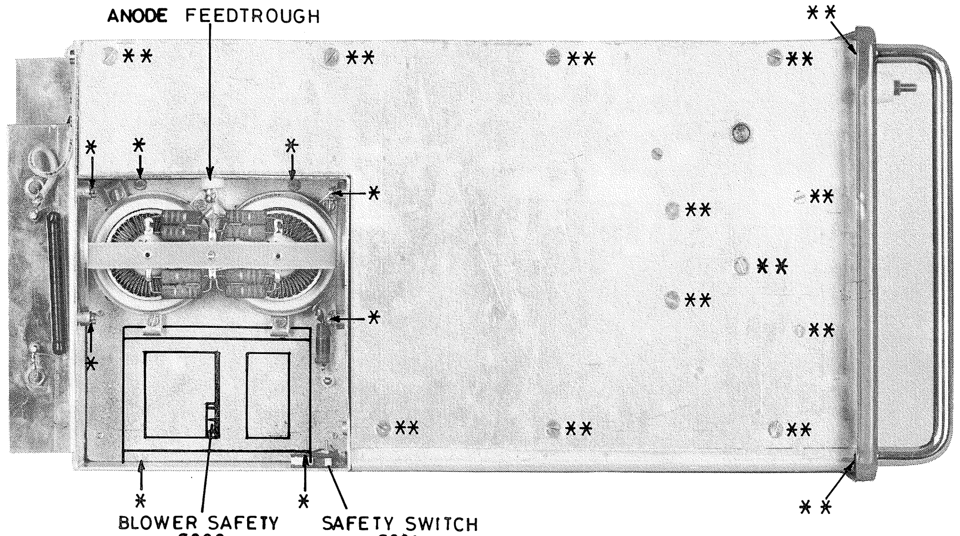


FIG. 4

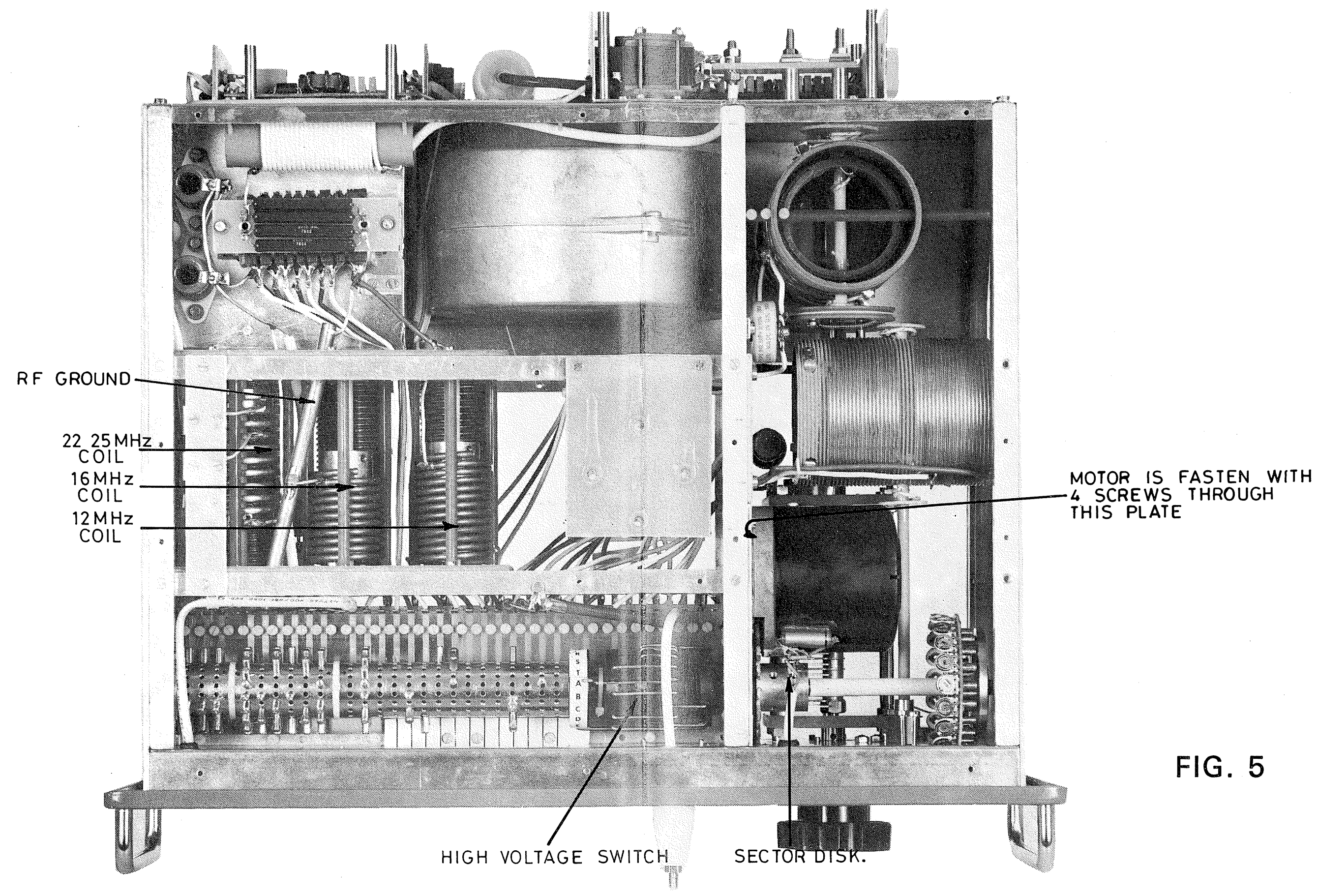


FIG. 5

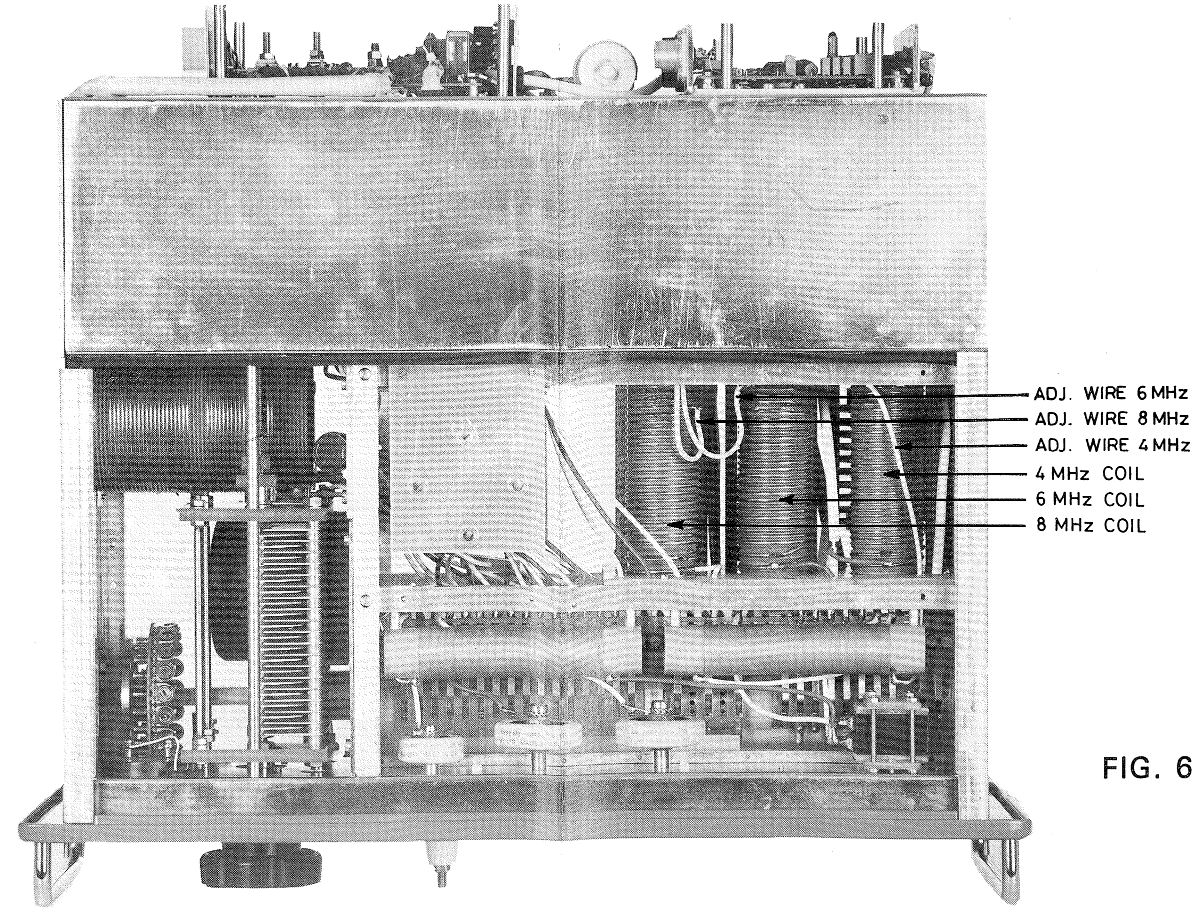


FIG. 6

ADJUSTMENT- and MECHANICAL LOCATIONS FOR T1127

CIRCUIT DESCRIPTION COIL SECTION T1127

COIL SECTION

To obtain max. performance over the entire frequency range, the anode load configuration is built-up as follows:

1.6 - 4 MHz

In this frequency range the anode circuit consists of an L-type network. The L-type network consists of the loading capacitors C101 - C110 and the variometers L110 and L111. On the frequency 2182 kHz (distress) the variometer L109 (Pre-set) is used.

The entire frequency range (1.6 - 4 MHz) is split up in 11 bands (2182 incl). For each of these bands it is possible to perform aerial tuning. Resonance is obtained by means of the contacts 11 and 13 (2182: 53 and 54), whereas the loading is made by selecting one of the contacts 43 - 50 incl.

4 - 6 - 8 - 12 and 16 MHz bands

The anode load in these bands consists of a parallel circuit. In the 4 MHz band L106 and C101 to C110 are used to form a parallel circuit. In the 6 MHz band the coil consists of L106 in parallel with L105. In the 8 MHz band the coil consists of L106 in parallel with L105 and L104, and so on up to 16 MHz incl. The correct anode load is obtained by activating one of the contacts 43 - 50 both incl.

The aerial is brought into resonance by means of the variable capacitor C114 and by selecting a suitable part of the aerial coil L112 (the contacts 14 - 26 incl.). If the ohmic part of the aerial cannot be tuned by means of the load contacts 43 - 50 incl., impedance match is then obtained with the aerial capacitors C118, C119 and C120.

22 and 25 MHz bands

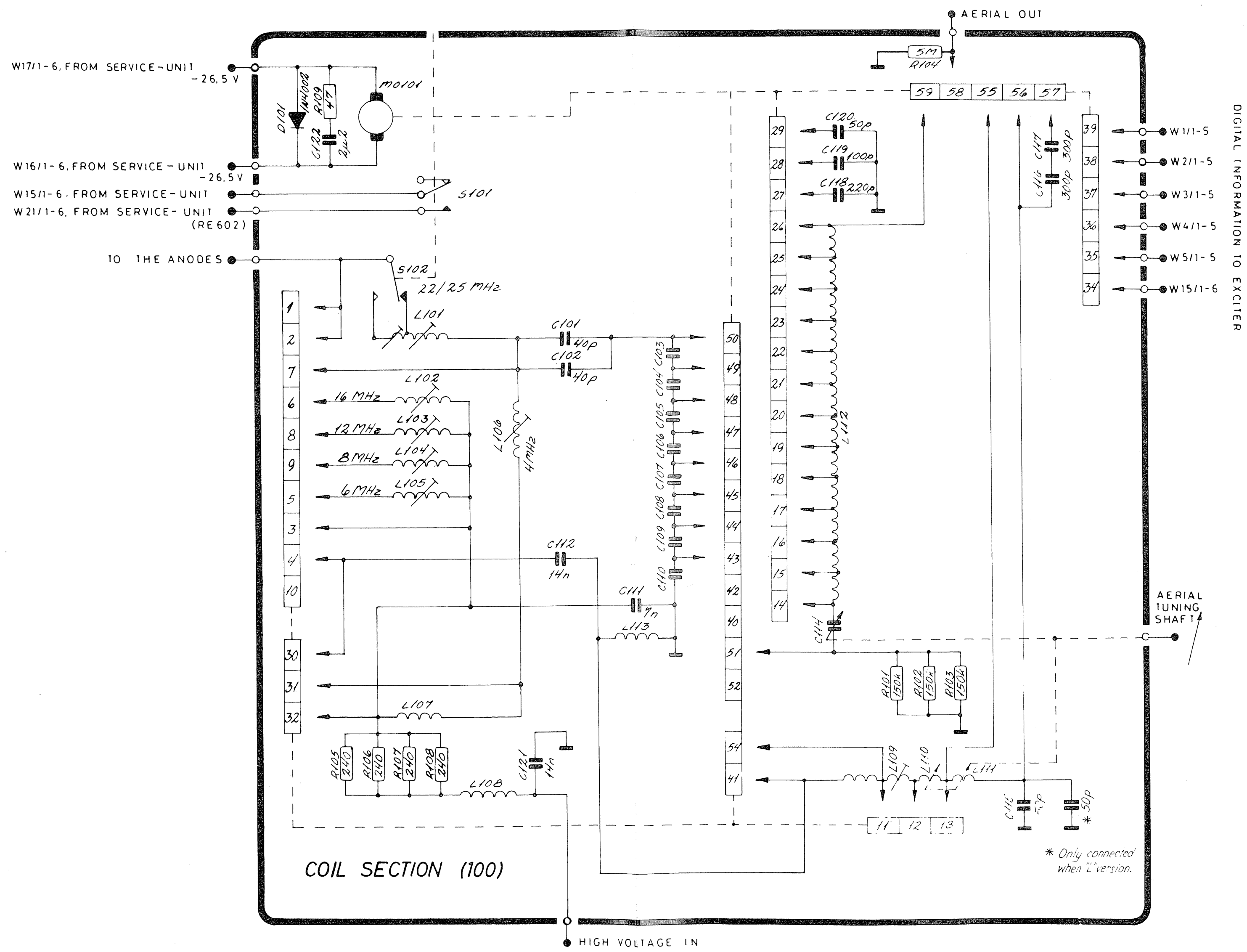
The anode load in these bands consists of a complete pi-network. The input capacitor of the pi-network consists of the inner anode capacity and the stray capacities. The output capacitor and coil are C101 - C110 incl. and L101. As the anode choke the 4 MHz tuning coil L106 is used.

The aerial circuit is the same as described for the 4-6-8-12 and 16 MHz bands.

T1127L

400 - 599.9 kHz

In this frequency range the anode voltage swing is sent directly to the aerial horn at the front of T1127.



CIRCUIT DESCRIPTION POWER AMPLIFIER T1127

POWER AMPLIFIER

The power amplifier consists of two beam power tetrode tubes RCA 8122 in parallel. The anodes are coupled directly in parallel, whereas all other electrodes are supplied from independent circuits. This means that if one tube is defective the other tube will still be operative, and the transmitter will still operate.

There is made difference protecting circuits to protect the tubes and the driver. In the anode supply there is 60 ohm (R105 to R108) in order to limit the plate peak current during a flash in the tubes. In the screen grid supply there is a current limiting circuit placed in the power supply. To prevent high voltage in case of a flash in the tubes, from getting into the driver, there is made a protecting circuit on the grids consisting of D304, D305, C313 and R314.

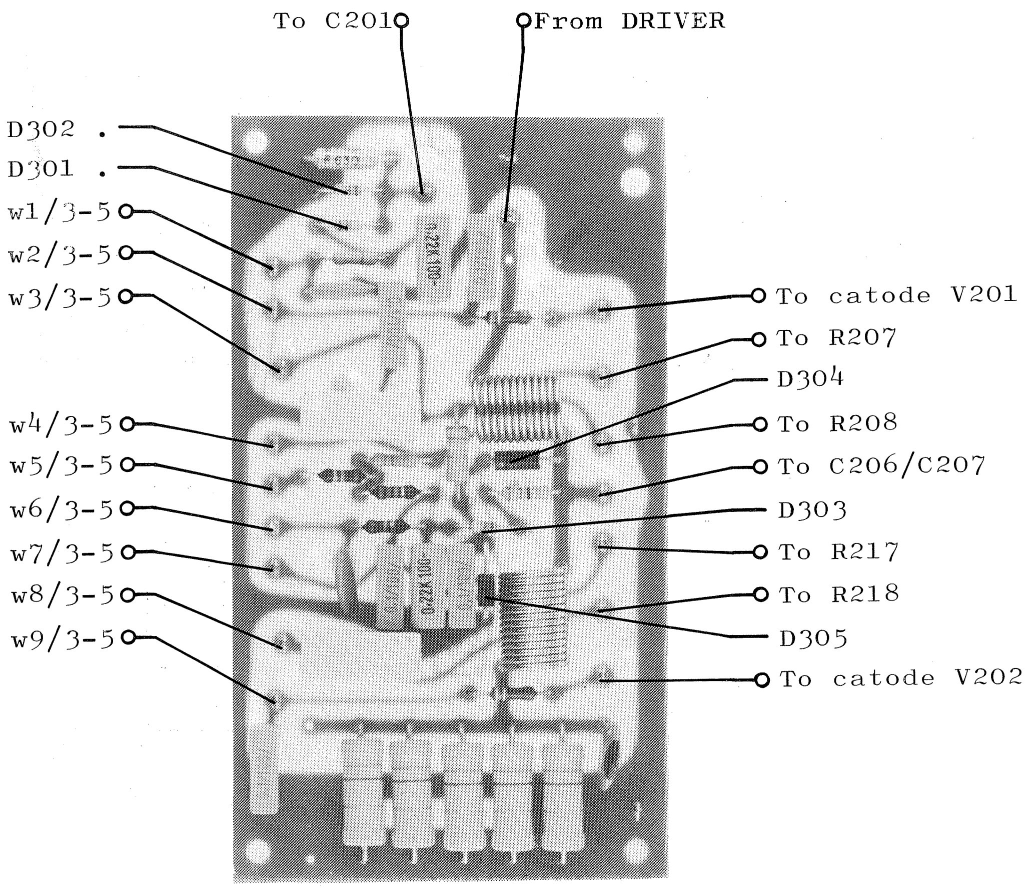
A filter is made to obtain match between the driver and the grids. The filter consists of L302, L301, C301, the coax cable from the driver to the PA-print and the input capacitance of the PA tubes. The filter is terminated with R301 to R305.

The filaments is coupled in parallel and supplied with 13.5V from the filament stabilizer.

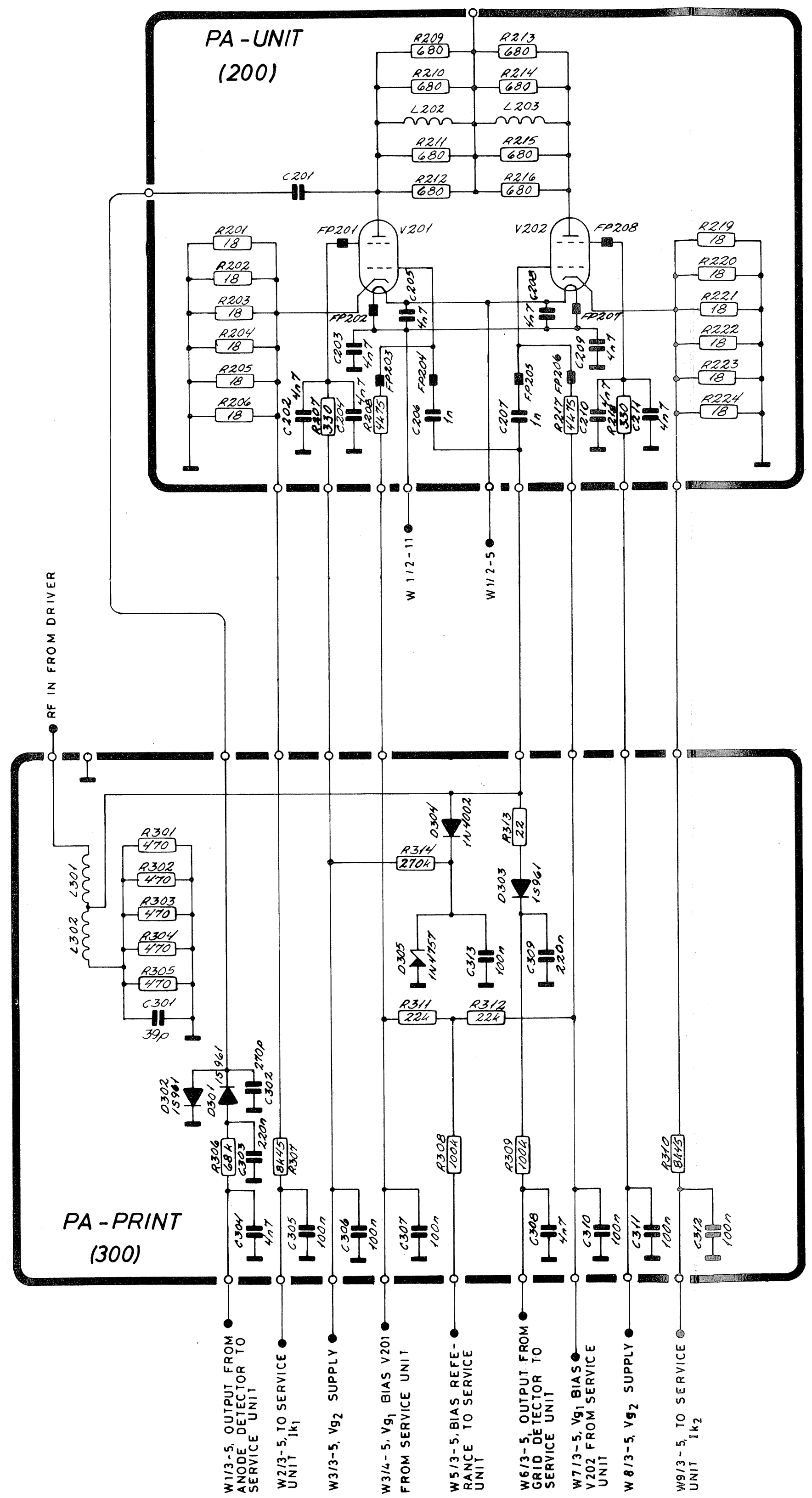
COOLING SYSTEM

Within the transmitter there is a blower which provides the necessary cooling for the transmitter. This means that the transmitter can be mounted away from the rest of the station. Before the air flows into the transmitter it passes through an air filter located in the bottom of the transmitter. If the blower stops, a safety system will stop the transmitter, so that no components are damaged.

A2/2 T1127



To C201
From DRIVER
D302
D301
w1/3-5
w2/3-5
w3/3-5
w4/3-5
w5/3-5
w6/3-5
w7/3-5
w8/3-5
w9/3-5
To catode V201
To R207
D304
To R208
To C206/C207
D303
To R217
To R218
D305
To catode V202



PA-UNIT
(200)
PA-PRINT
(300)
RF IN FROM DRIVER
W 11/2-11
W 11/2-5
W1/3-5. OUTPUT FROM ANODE DETECTOR TO SERVICE UNIT
W2/3-5. TO SERVICE UNIT Ik1
W3/3-5. Vg2 SUPPLY
W3/4-5. Vg1 BIAS V201 FROM SERVICE UNIT
W5/3-5. BIAS REFERANCE TO SERVICE UNIT
W6/3-5. OUTPUT FROM GRID DETECTOR TO SERVICE UNIT
W7/3-5. Vg1 BIAS V202 FROM SERVICE UNIT
W8/3-5. Vg2 SUPPLY
W9/3-5. TO SERVICE UNIT Ik2

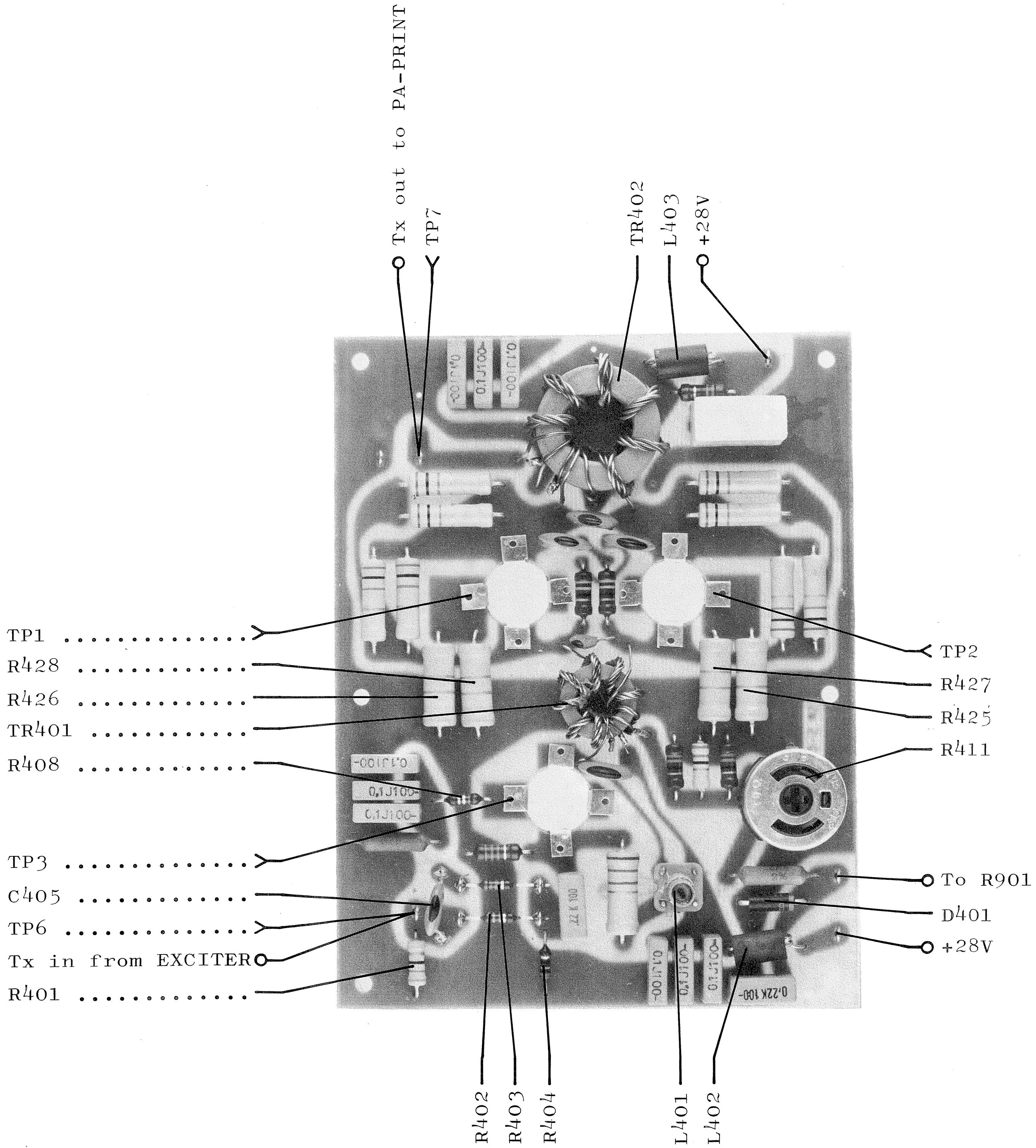
CIRCUIT DESCRIPTION DRIVER UNIT T1127

DRIVER UNIT

The driver is transistorized and covers the frequency range 0.5 - 25 MHz. It has a gain of 16.8 dB ± 0.8 dB.

At the input of the driver there is a frequency dependent attenuator consisting of R401, R402, R403, R404 and C405. The frequency dependent attenuator is used to compensate for the coax cable between the exciter and T1127, when it is a remote controlled installation. (For specific values see the table below). T401 is a class A amplifier with a feed-back consisting of L401 and R406, which stabilizes the gain over the frequency range. The first stage is coupled through a wide band transformer TR401 to the output stage. This transformer also provides the necessary phase split to the push-pull output stage. The output stage is also a class A amplifier. The D.C. bias is stabilized with D401, and adjustment of zero signal current is made by means of R411. The cross stabilization is made by R423, C416, R424 and C415. The output stage is coupled through a wide band transformer TR402 to the PA-PRINT.

Cable length	R402	R403	C405
(m)	(ohm)	(ohm)	(pF)
0 - 100	180	560	27
100 - 200	150	120	47

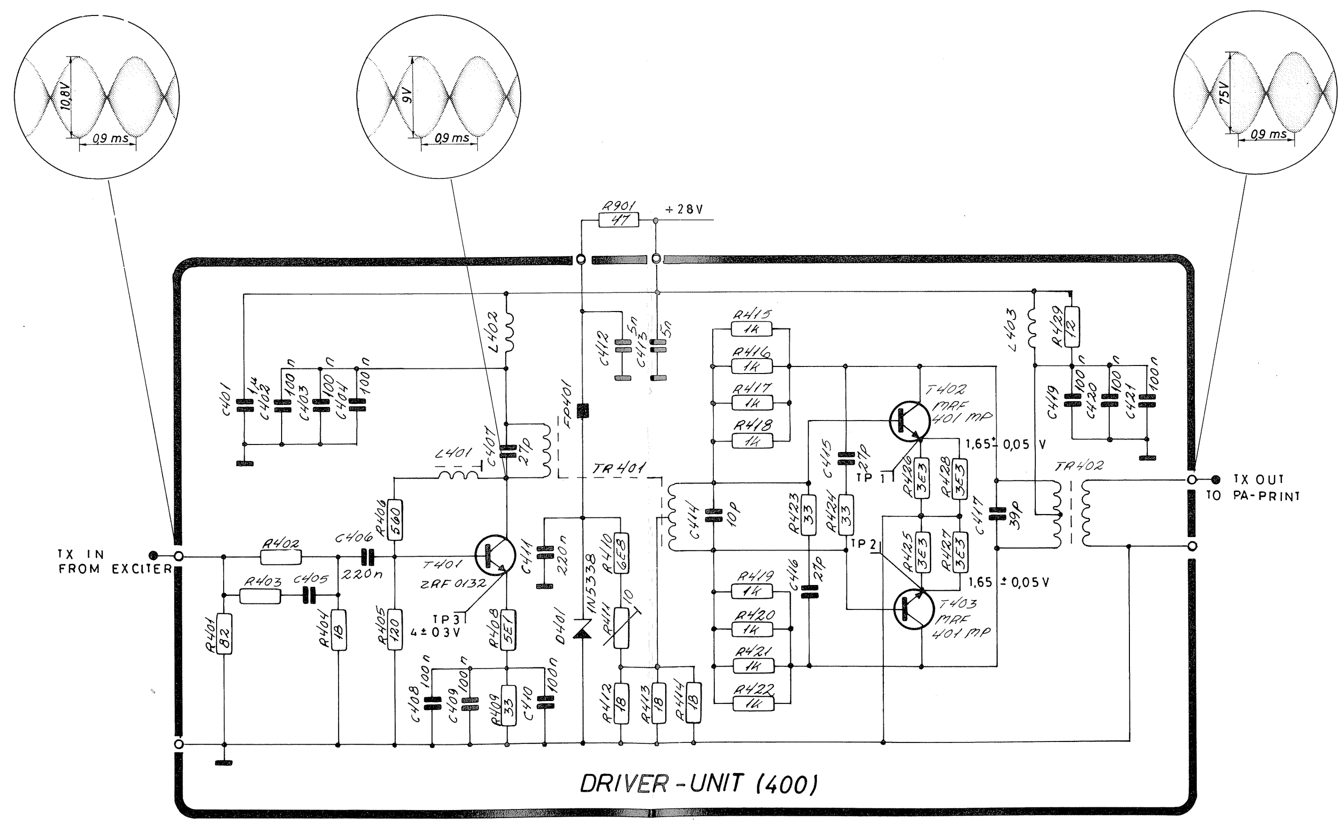


TEST CONDITIONS

Frequency	:	2 MHz or as close as possible.
Drive	:	Adjusted to zero on the testmeter.
Oscilloscope input	:	Passive probe 10 Mohm//15 pF.

TP: Testpoints

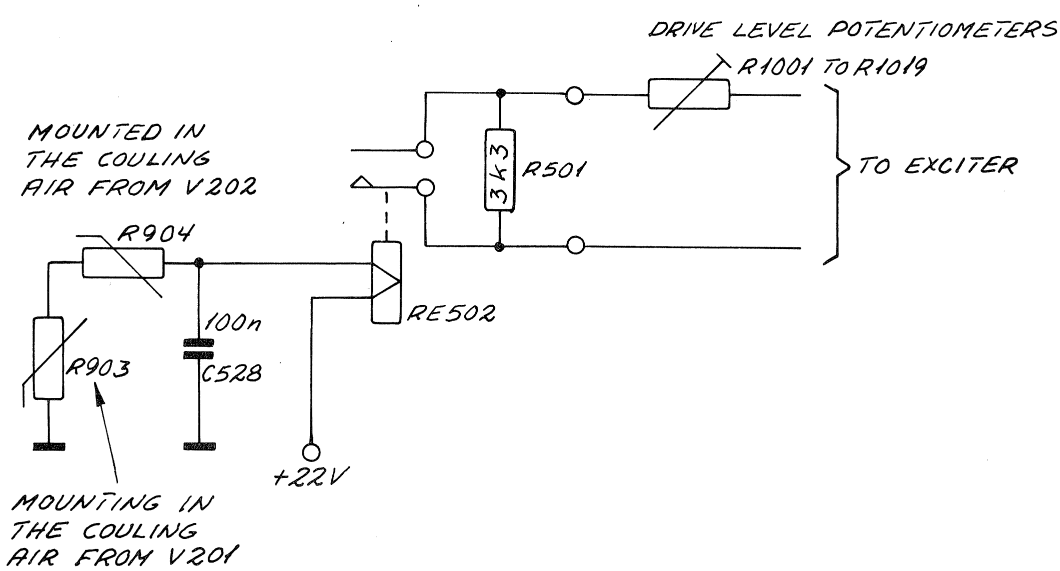
Values on oscillograms is approx. values.



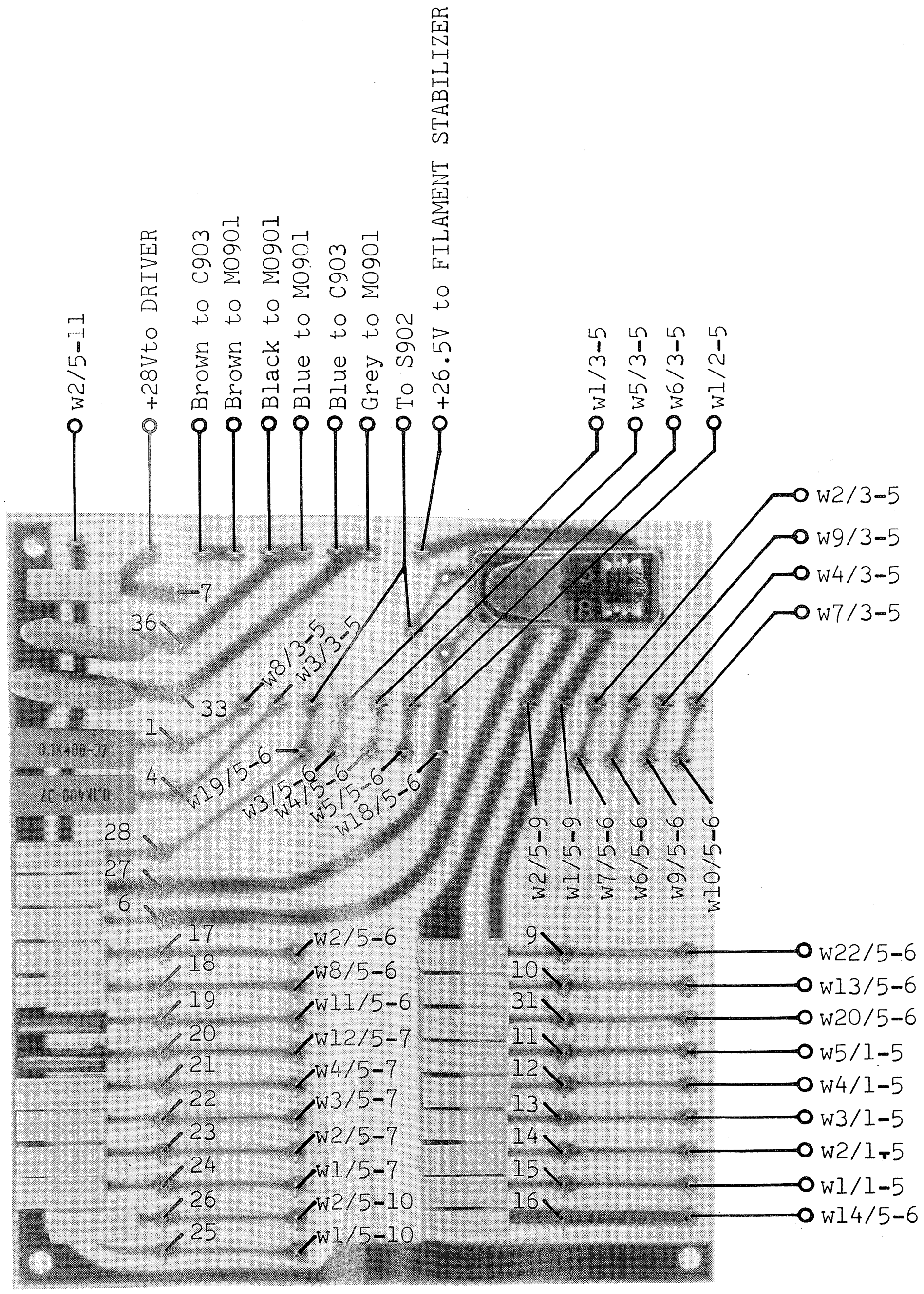
CIRCUIT DESCRIPTION THERMAL PROTECTION CIRCUIT ONLY T1127L

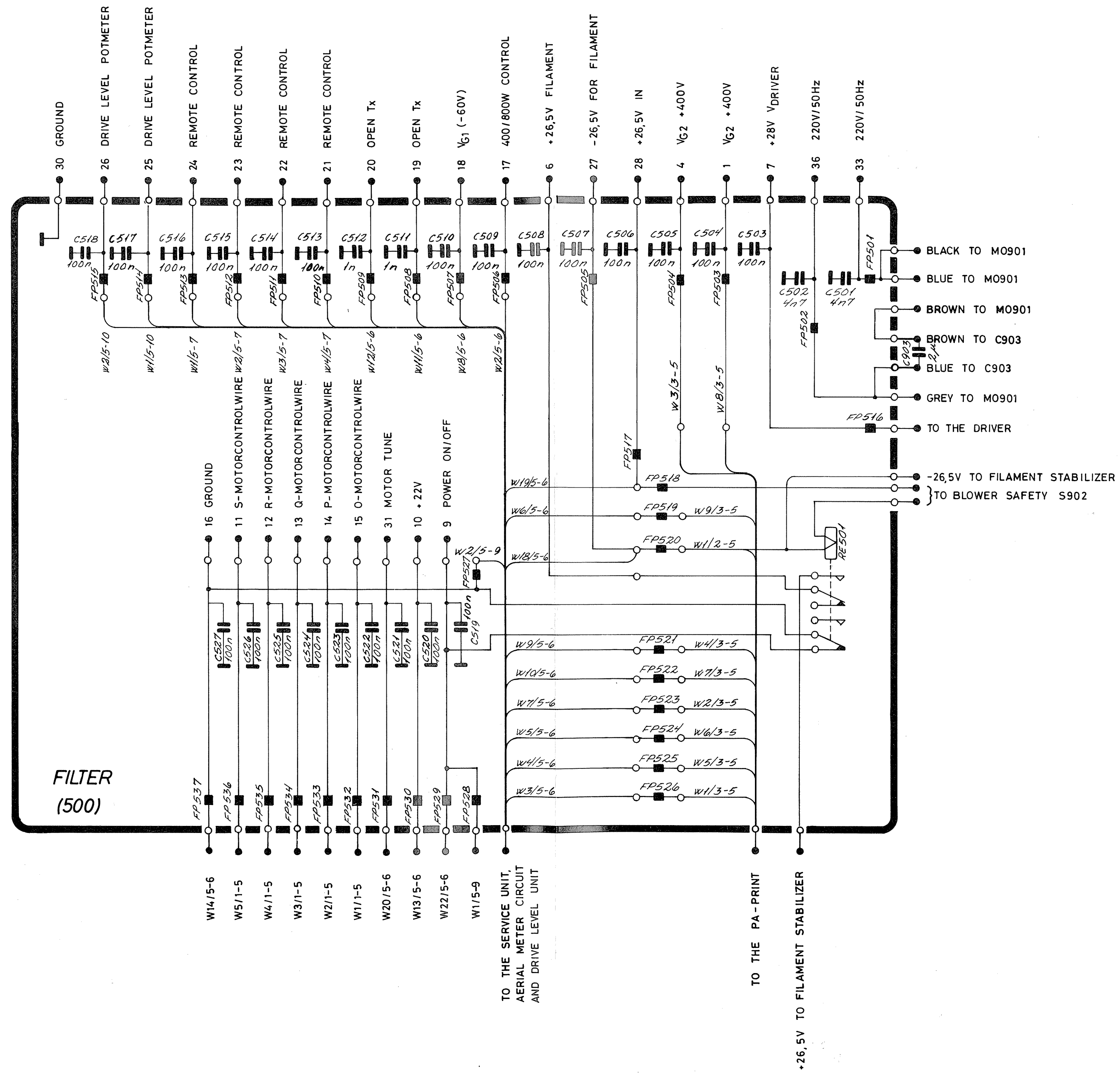
THERMAL PROTECTION CIRCUIT

The circuit protects the PA-tubes against excessive temperatures. When the plate temperature is above 250°C the value of the PTC-resistor R902 will be so high that the relay RE502 will release and R501 will be connected in series with the drive level potentiometer to reduce the drive level approx. 6 dB.
When the temperature is below approx. 200°C again the value of the PTC-resistor R902 will be so small that the relay RE502 will be activated and R501 will be short-circuited and drive level will be on normal.



A1/1 T1127


w2/5-11
+28Vto DRIVER
Brown to C903
Brown to MO901
Black to MO901
Blue to MO901
Blue to C903
Grey to MO901
To S902
+26.5V to FILAMENT STABILIZER
w1/3-5
w5/3-5
w6/3-5
w1/2-5
w2/3-5
w9/3-5
w4/3-5
w7/3-5
w8/3-5
w3/3-5
w19/5-6
w3/5-6
w4/5-6
w5/5-6
w18/5-6
w2/5-9
w1/5-9
w7/5-6
w6/5-6
w9/5-6
w10/5-6
w2/5-6
w8/5-6
w11/5-6
w12/5-7
w4/5-7
w3/5-7
w2/5-7
w1/5-7
w2/5-10
w1/5-10
w22/5-6
w13/5-6
w20/5-6
w5/1-5
w4/1-5
w3/1-5
w2/1-5
w1/1-5
w14/5-6
0,1K400-J7


30 GROUND
26 DRIVE LEVEL POTMETER
25 DRIVE LEVEL POTMETER
24 REMOTE CONTROL
23 REMOTE CONTROL
22 REMOTE CONTROL
21 REMOTE CONTROL
20 OPEN Tx
19 OPEN Tx
18 VG1 (-60V)
17 400/800W CONTROL
6 +26,5V FILAMENT
27 -26,5V FOR FILAMENT
28 +26,5V IN
4 VG2 +400V
1 VG2 +400V
7 +28V VDRIVER
36 220V/50Hz
33 220V/50Hz
BLACK TO MO901
BLUE TO MO901
BROWN TO MO901
BROWN TO C903
BLUE TO C903
GREY TO MO901
TO THE DRIVER
-26,5V TO FILAMENT STABILIZER
TO BLOWER SAFETY S902
16 GROUND
11 S-MOTORCONTROLWIRE
12 R-MOTORCONTROLWIRE
13 Q-MOTORCONTROLWIRE
14 P-MOTORCONTROLWIRE
15 O-MOTORCONTROLWIRE
31 MOTOR TUNE
10 +22V
9 POWER ON/OFF
FILTER
(500)
W14/5-6
W5/1-5
W4/1-5
W3/1-5
W2/1-5
W1/1-5
W20/5-6
W13/5-6
W22/5-6
W1/5-9
TO THE SERVICE UNIT, AERIAL METER CIRCUIT AND DRIVE LEVEL UNIT
TO THE PA-PRINT
+26,5V TO FILAMENT STABILIZER

CIRCUIT DESCRIPTION SERVICE UNIT T1127

SERVICE UNIT

The service unit consists of a test meter, which is located behind the right front panel cover and a printed circuit board located behind the left front panel cover.

On the printed circuit board following controls are placed:

TEST SWITCH (S601) with following functions:

Ik1: The cathode current in tube V201 is measured.

Ik2: The cathode current in tube V202 is measured.

The voltage drop across the cathode resistor is used to give an information of the cathode current. R307 or R310 is in serial with the test meter to give full scale deflection of 300 mA cathode current.

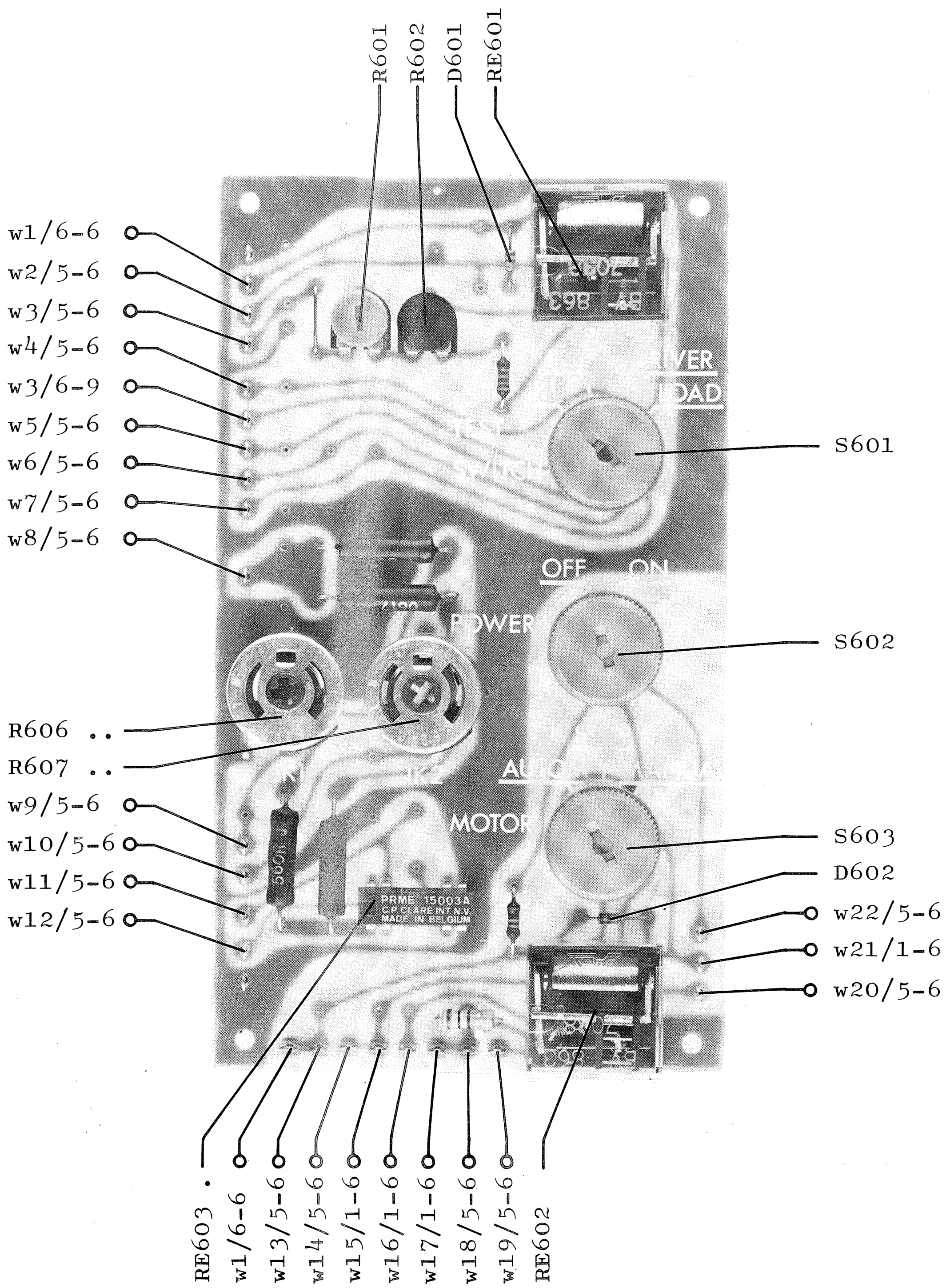
DRIVE: The positive peak of the RF signal on the grids is measured (the detector is located on the PA-print and consists of D303 and C309) and compared to the neg. bias in such a way that when the pointer of the test meter shows 3 div. the drive level is correct.

LOAD: The positive peak of the RF signal on the grids is measured (same detector as in drive) and compared with the peak to peak voltage swing on the anodes (peak to peak detector is located on the PA-print and consists of D301, D302 and C303) in such a way that when the pointer of the test meter is at zero, the tubes are properly loaded. When changing from C.T. bands to HF bands the anode impedance changes, and the sensitivity of the load meter is changed. This is done by means of RE601, R602 and R603.

POWER switch (S602): When it is in position ON the transmitter is controlled with the handset, in position OFF the anode and screen grid supply is switched off.

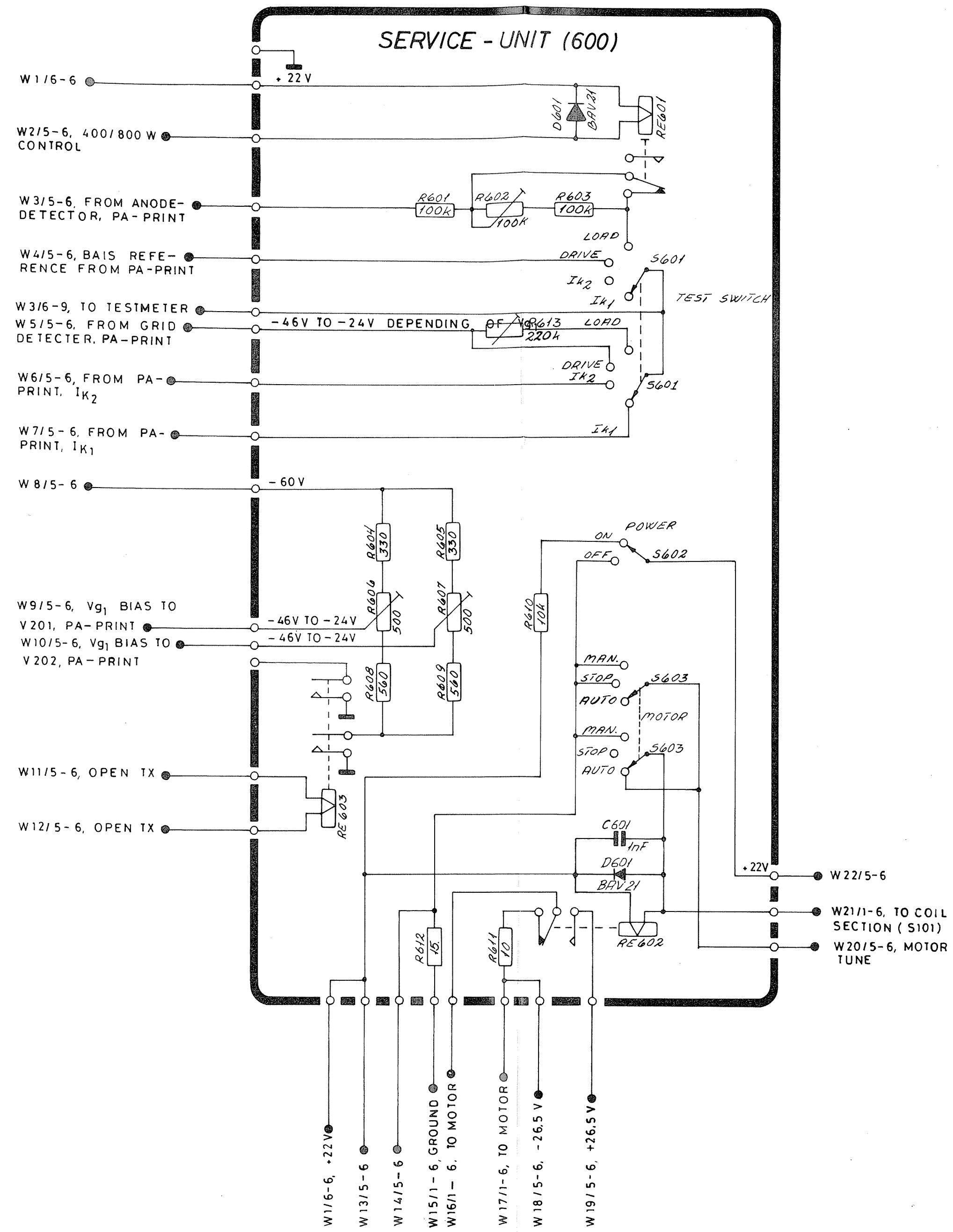
MOTOR switch (S603): When MOTOR switch is in position AUTOM, the motor (MO101) is controlled from the exciter. When pin 31 in P901 is grounded RE602 is activated and +26.5V is supplied to the motor and it will rotate. When the drum switch has reached the correct band, pin 31 is disconnected but the motor rotates until S101 is released.Then RE602 disconnects +26.5V to the motor and short-circuits the motor through R611 in order to stop the motor quickly. S101 is released when the drum switch is locked in the correct position. When MOTOR switch is in position MAN., the motor will rotate until the switch is switched back into position STOP.

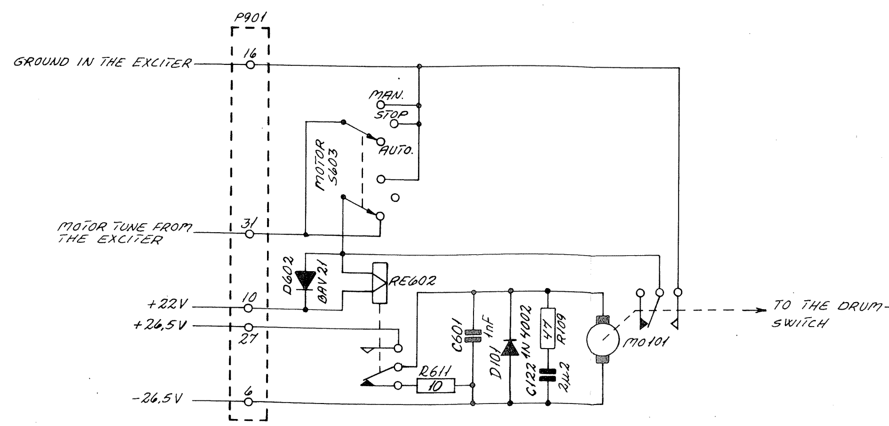
The zero signal currents in the PA tubes are adjusted by means of R606 and R607. The relay RE603 is opened when the transmitter is not keyed and the negative grid bias is then -60V to ensure that the tubes are cut off.



TEST CONDITIONS

Transmitter keyed.



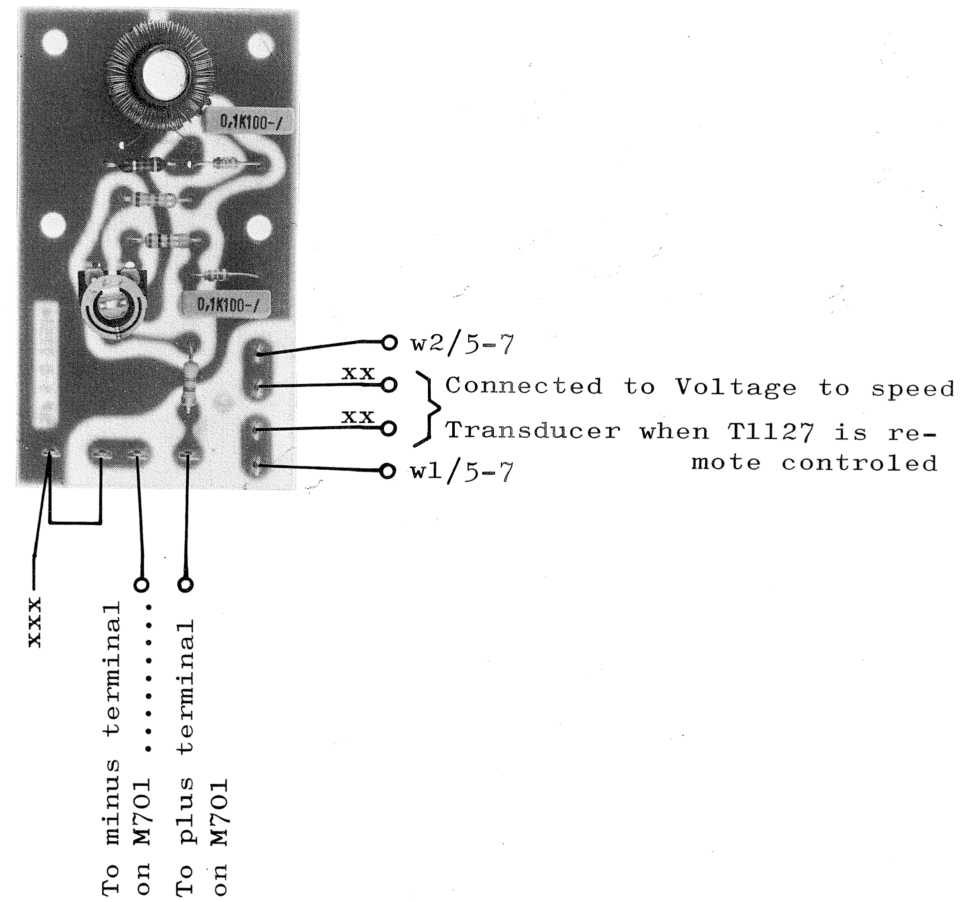


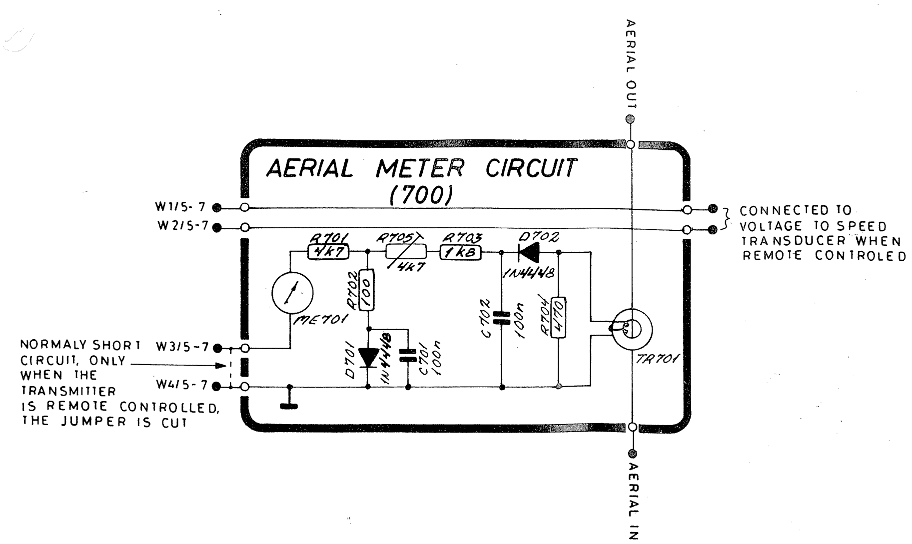
A2/2 T1127

CIRCUIT DESCRIPTION AERIAL METER CIRCUIT T1127

AERIAL METER CIRCUIT

The voltage from the current transformer TR701 is rectified in a peak rectifier (D702 and C702) and fed into a voltage divider. When the aerial current is below 1 Amp., the meter sensitivity is determined by R701, R703, and R705. If the aerial current is above 1 Amp., D701 is on and the meter sensitivity is reduced because R702 is connected in parallel to the meter.

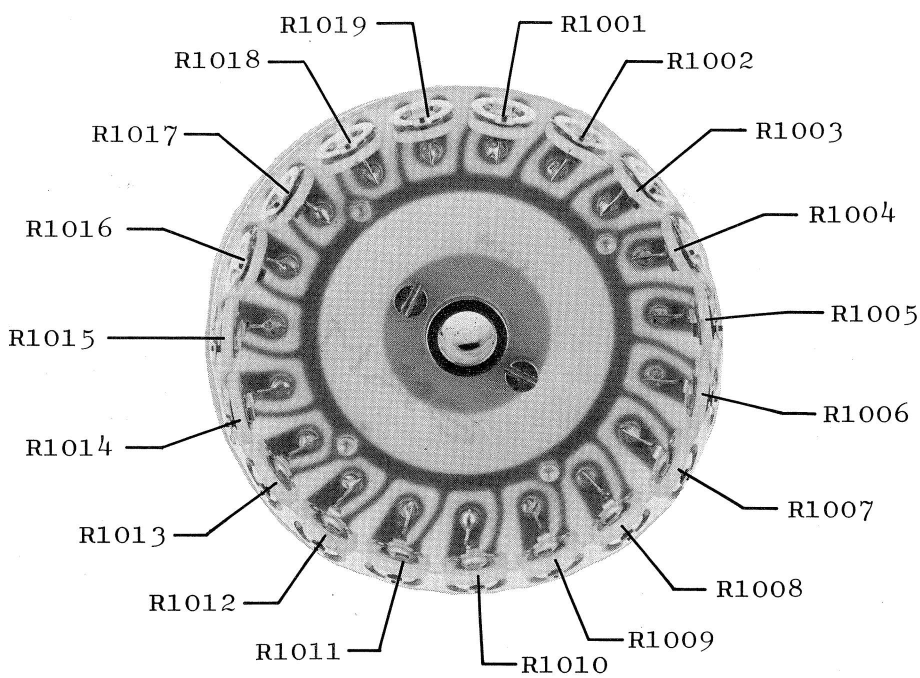


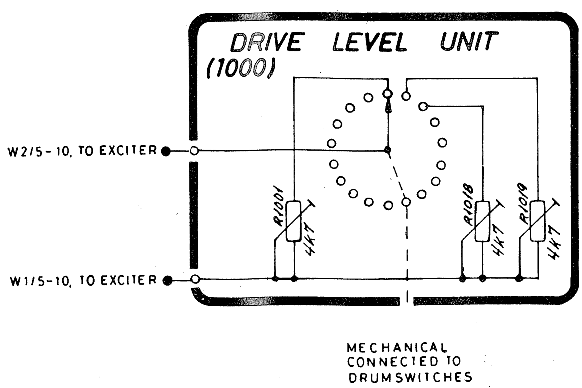


CIRCUIT DESCRIPTION DRIVE LEVEL UNIT T1127

DRIVE LEVEL UNIT

The potentiometers R1001 to R1019 give a DC voltage feed-back to a voltage dependent attenuator in the exciter.



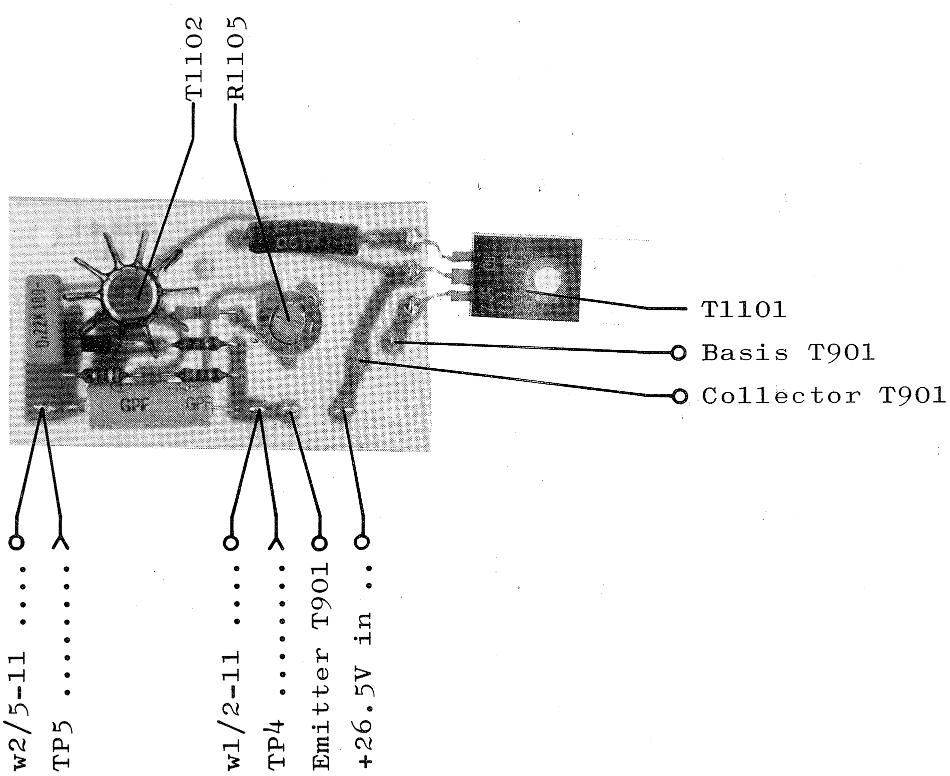


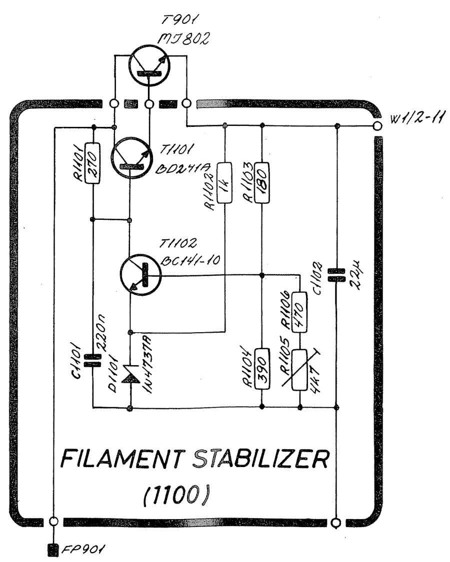
A1/1 T1127

CIRCUIT DESCRIPTION FILAMENT STABILIZER T1127

FILAMENT STABILIZER

The stabilizer is supplied with 26.5V DC either direct from ship mains when N1400 is used, or via a rectifier when N1401 is used. The stabilizer is a serial regulator. It is mounted on the side of the filter box. T901 is mounted on the side of the driver unit.





A1/1 T1127

CIRCUIT DESCRIPTION QUICK HEATING UNIT ONLY T1127LE

QUICK HEATING UNIT

This unit controls the filament supply in the following way.

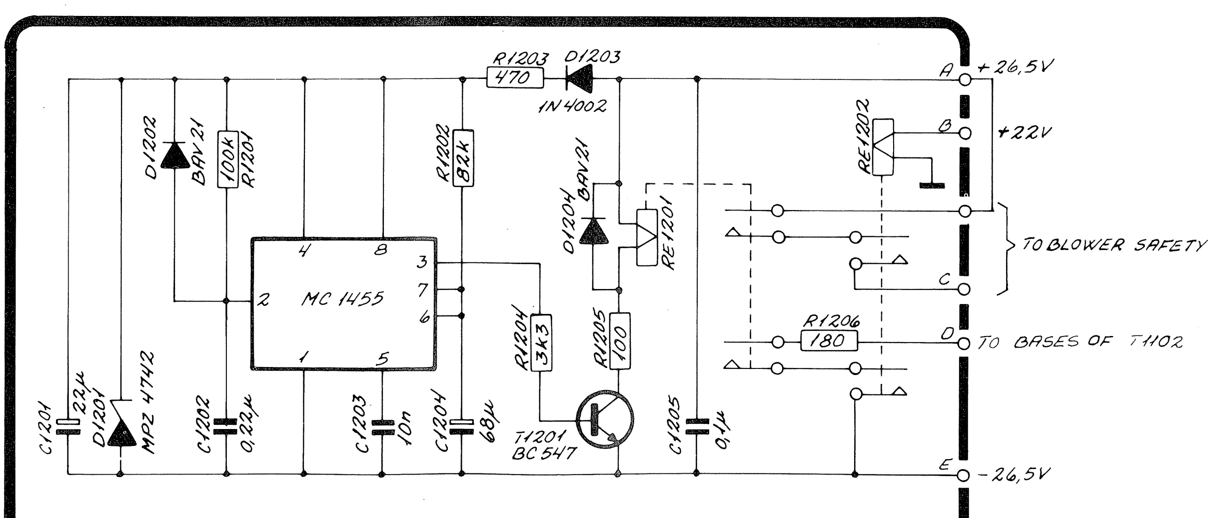
1. If the MAIN SWITCH is switched directly to ON the filament supply will be raised to 22V for a period controlled by the timer MC1455.

2. If the MAIN SWITCH is switched to STAND BY and left there until the delay time of the timer MC1455 has passed the filament supply will be 13.5V $\pm$10%.

When the power supply is switched in position STAND BY (MAIN SWITCH) the +26.5V is switched on and the timer MC1455 starts. This means that pin 3 goes high and brings T1201 in saturation and activates the relay RE1201. When the MAIN SWITCH is in position STAND BY the +22V is not present and RE1202 will be open. First when the MAIN SWITCH is switched to position ON the +22V is switched on and RE1202 will be on. This means that the blower safety is overrided and the base of T1102 is connected to ground through R1206, and it will stay so until the delay time of the timer is finished. Now pin 3 on MC1455 will go low and T1201 will be off and RE1201 will open.

When the base of T1102 is connected to ground through R1206 the filament supply will raise to 22V.

T1127 LE



QUICK HEATING UNIT (1200)

CIRCUIT DESCRIPTION SAFETY CIRCUIT T1127

SAFETY CIRCUIT

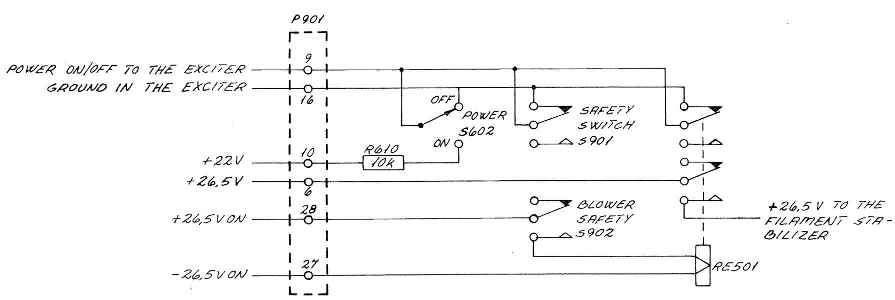
In the transmitter there is three safety switches.

1. Safety switch S901 is released when transmitter is drawn out of the rack.

2. Blower safety switch S902 is activated by the air pressure in such a way that when the blower stops S902 is released.

3. When the drum switch is rotating the power supply is blocked from the exciter.

When pin 9 in P901 is grounded the power supply is blocked from the exciter and the transmitter can not be keyed (anode- and screen grid supply is switched off). When S902 is open RE501 connects pin 9 in P901 to ground and the power supply is blocked. RE501 also disconnects the supply to the filaments.



Positions of factory programmed studs (round studs).

Upper drum

Pos.	Range			Motor pos.						Load												Aerial coil 2182	
	30	31	32	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	53	54
A				X					X		X												
B				X	X		X				X												
C	X	X	X	X		X			X												X		
D				X	X			X	X		X												
E	X	X	X	X		X															X		
F				X	X	X	X	X	X		X												
G	X	X	X	X			X	X	X												X		
H				X	X	X	X	X			X												
I	X	X	X	X			X	X													X		
K				X	X	X	X		X		X												
L	X	X	X	X			X		X												X		
M				X	X	X	X				X												
N	X	X	X	X			X														X		
O				X		X	X		X		X												
P	X	X	X	X				X	X												X		
Q				X		X	X				X												
R				X		X		X	X		X												
S				X		X		X			X												
T				X							X												

C 1/2

Lower drum

Pos.	Range										Aerial coil MF			Aerial coil HF													C_A		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
A	X	X		X			X				X	X	X																
B	X	X		X			X					X																	
C	X	X					X					X														X			
D	X	X		X			X					X																	
E	X	X			X		X					X	X												X	X			
F	X	X		X			X					X																	
G	X	X			X		X		X			X	X									X		X		X			
H	X	X		X			X					X																	
I	X	X			X		X	X	X		X	X	X								X	X		X		X			
K	X	X		X			X					X																	
L	X	X			X	X	X	X	X		X	X	X							X		X		X		X			
M	X	X		X			X					X																	
N			X		X	X		X	X		X	X	X						X	X		X		X		X			
O	X	X		X			X					X																	
P			X		X	X		X	X		X	X	X					X		X		X		X		X			
Q	X	X		X			X					X																	
R	X	X		X			X					X																	
S	X	X		X			X					X																	
T	X	X		X			X				X	X	X																

LOCATIONS OF PRE-PROGRAMMED STUDS T1127

Positions of factory programmed studs (round studs).

NOTE: ONLY VALID FOR SERIAL NO. ABOVE 201206

Upper drum

Pos.	Range			Motor pos.								Load											
	30	31	32	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	53	54
A				X					X													X	
B				X	X		X															X	
C	X	X	X	X		X			X												X		
D				X	X			X	X													X	
E	X	X	X	X		X															X		
F				X	X	X	X	X	X													X	
G	X	X	X	X			X	X	X												X		
H				X	X	X	X	X														X	X
I	X	X	X	X			X	X													X		
K				X	X	X	X		X													X	X
L	X	X	X	X			X		X												X		
M				X	X	X	X															X	X
N	X	X	X	X			X														X		
O				X		X	X		X													X	X
P	X	X	X	X				X	X												X		
Q				X		X	X															X	X
R				X		X		X	X													X	X
S				X		X		X														X	X
T				X				X														X	X

Lower drum

Pos.	Range										Aerial coil MF			Aerial coil HF													C_A		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
A	X	X		X			X					X	X																
B	X	X		X			X					X																	
C	X	X					X				X	X	X													X			
D	X	X		X			X					X																	
E	X	X			X		X				X	X	X												X	X			
F	X	X		X			X					X																	
G	X	X			X		X		X		X	X	X									X		X		X			
H	X	X		X			X					X																	
I	X	X			X		X	X	X		X	X	X								X	X		X		X			
K	X	X		X			X					X																	
L	X	X			X	X	X	X	X		X	X	X							X		X		X		X			
M	X	X		X			X					X																	
N			X		X	X		X	X		X	X	X						X	X		X		X		X			
O	X	X		X			X					X																	
P			X		X	X		X	X		X	X	X					X		X		X		X		X			
Q	X	X		X			X					X																	
R	X	X		X			X					X																	
S	X	X		X			X					X																	
T	X	X		X			X				X	X	X																

LOCATIONS OF PRE-PROGRAMMED STUDS T1127/T1127L

b Coil section T1127

Symbol	Description			Manufact.	
R101	Resistor	150 Kohm	1W	Vitrohm	BT 107-0
R102	Resistor	150 Kohm	1W	Vitrohm	BT 107-0
R103	Resistor	150 Kohm	1W	Vitrohm	BT 107-0
R104	Resistor	5 Mohm 2W 20%	8KV	Rosenthal	LHK 2
R105-					
R108	Resistor	240 ohm 12W 5%		Danoterm	GAN 12
R109	Resistor	47 ohm 0,5W 10%		Philips	2322 212 13479
C101	Capacitor ceramic	40pF±20%	3KV	R.C.L.	060239 RC 16x40L R7
C102	Capacitor ceramic	40pF±20%	3KV	R.C.L.	060239 RC 16x40L R7
C103-					
C111	Capacitor stack	T1127		S.P.	
C112	Capacitor	T1127	14nF	S.P.	83720/123
C113	Not used				
C114	Capacitor variable	T1127		S.P.	
C115	Capacitor ceramic	50pF±20%	5KV	U.T.C.	441/1/84250/013
C116	Capacitor ceramic	300pF±20%	3KV	R.C.L.	060237 RA 16x40L R42
C117	Capacitor ceramic	300pF±20%	3KV	R.C.L.	060237 RA 16x40L R42
C118	Capacitor ceramic	220pF±20%	5KV	U.T.C.	441/1/83822/113
C119	Capacitor ceramic	100pF±20%	5KV	U.T.C.	441/1/84310/113
C120	Capacitor ceramic	50pF±20%	5KV	U.T.C.	441/1/84250/013
C121	Capacitor	T1127	14nF	S.P.	
C122	Capacitor polycarbonate	2,2uF±10%	100V	ERO	MKC 1860-522/0
C123	Capacitor ceramic	300pF ± 20%	3KV	R.C.L.	060237 RA 16x40L R42
D101	Diode			Motorola	1N4002
L101	Coil	22MHz/25MHz		S.P.	
L102	Coil	16MHz		S.P.	
L103	Coil	12MHz		S.P.	
L104	Coil	8MHz		S.P.	
L105	Coil	6MHz		S.P.	
L106	Coil	4MHz		S.P.	
L107	MF Choke			S.P.	TL 071
L108	RF Choke			S.P.	TL 275
L109	Variometer 2182			S.P.	
L110	Variometer MF			S.P.	
L111	Variometer MF			S.P.	
L112	Coil Aerial			S.P.	
L113	MF Choke			S.P.	TL 071
S101	Microswitch			Cherry	E62 - 10H
S102	Switch	22MHz/25MHz		S.P.	
MO101	Step motor			S.P.	

b PA-unit T1127

Symbol	Description				Manufact.	
R201-						
R206	Resistor	18 ohm	5% MF	2W	Electrosil	N8
R207	Resistor	330 ohm	2%	1W	Vitrohm	253-0
R208	Resistor	4,75Kohm	1%	½W	Philips	2322 152 54752
R209-						
R216	Resistor	680 ohm		1W	Vitrohm	BT107-0
R217	Resistor	4,75Kohm	1%	½W	Philips	2322 152 54752
R218	Resistor	330 ohm	2%	1W	Vitrohm	253-0
R219-						
R224	Resistor	18 ohm	5% MF	2W	Electrosil	N8
C201	Capacitor				S.P.	
C202	Capacitor ceramic	4,7nF	-20/+80%	400V	Ferroperm	9/0138,9
C203	Capacitor ceramic	4,7nF	-20/+80%	400V	Ferroperm	9/0138,9
C204	Capacitor ceramic	4,7nF	-20/+80%	400V	Ferroperm	9/0138,9
C205	Capacitor ceramic	4,7nF	-20/+80%	400V	Ferroperm	9/0138,9
C206	Capacitor ceramic	1nF	-20/+80%	5KV	Ferroperm	9/0138,9 isol.
C207	Capacitor ceramic	1nF	-20/+80%	5KV	Ferroperm	9/0138,9 isol.
C208	Capacitor ceramic	4,7nF	-20/+80%	400V	Ferroperm	9/0138,9
C209	Capacitor ceramic	4,7nF	-20/+80%	400V	Ferroperm	9/0138,9
C210	Capacitor ceramic	4,7nF	-20/+80%	400V	Ferroperm	9/0138,9
C211	Capacitor ceramis	4,7nF	-20/+80%	400V	Ferroperm	9/0138,9
L202	Parasit coil				S.P.	TL259
L203	Parasit coil				S.P.	TL259
V201	PA tube				RCA	8122
V202	PA tube				RCA	8122
FP201-						
FP208	Ferroxcube beads				Philips	4322 020 34420

PA-print T1127

Symbol	Description	Manufact.	
R301	Resistor 470 ohm 1,15W	Philips	2322 214 13471
R302	Resistor 470 ohm 1,15W	Philips	2322 214 13471
R303	Resistor 470 ohm 1,15W	Philips	2322 214 13471
R304	Resistor 470 ohm 1,15W	Philips	2322 214 13471
R305	Resistor 470 ohm 1,15W	Philips	2322 214 13471
R306	Resistor 68 Kohm 0,33W	Philips	2322 211 13683
R307	Resistor 8,45 Kohm 1% MF 0,4 W	Philips	2322 151 58452
R308	Resistor 100 Kohm 0,33W	Philips	2322 211 13104
R309	Resistor 100 Kohm 0,33W	Philips	2322 211 13104
R310	Resistor 8,45 Kohm 1% MF 0,4 W	Philips	2322 151 58452
R311	Resistor 22 Kohm 0,33W	Philips	2322 211 13223
R312	Resistor 22 Kohm 0,33W	Philips	2322 211 13223
R313	Resistor 22 ohm 0,33W	Philips	2322 211 13229
R314	Resistor 270 Kohm 0, 5W	Philips	2322 212 13274
C301	Capacitor ceramic 39pF ±5% 400V	Ferroperm	9/0112.9
C302	Capacitor polyester 270pF 500V	Philips	2222 427 42701
C303	Capacitor polyester 0,22uF 100V	ERO	MKT 1822 422/0
C304	Capacitor ceramic 4,7nF -20/+80% 400V	Ferroperm	9/0138.9
C305	Capacitor polyester 0,1uF 100V	ERO	MKT 1822 410/0
C306	Capacitor polyester 0,1uF 400V	ERO	MKT 1822 410/4
C307	Capacitor polyester 0,1uF 100V	ERO	MKT 1822 410/0
C308	Capacitor ceramic 4,7nF -20/+80% 400V	Ferroperm	9/0138.9
C309	Capacitor polyester 0,22uF 100V	ERO	MKT 1822 422/0
C310	Capacitor polyester 0,1uF 100V	ERO	MKT 1822 410/0
C311	Capacitor polyester 0,1uF 400V	ERO	MKT 1822 410/4
C312	Capacitor polyester 0,1uF 100V	ERO	MKT 1822 410/0
C313	Capacitor polyester 0,1uF 100V	ERO	MKT 1822 410/0
D301	Diode	Texas	1S961
D302	Diode	Texas	1S961
D303	Diode	Texas	1S961
D304	Diode	Motorola	1N4002
D305	Zener diode	Motorola	1N4757
L301	Coil	S.P.	TL221
L302	Coil	S.P.	TL221

b	Driver unit T1127		
Symbol	*Description*	*Manufact.*	
R401	Resistor 82 ohm 0,5W	Philips	2322 212 13829
R402	See chapter for driver		
R403	See chapter for driver		
R404	Resistor 18 ohm 0,33W	Philips	2322 211 13189
R405	Resistor 120 ohm 0,5W	Philips	2322 212 13121
R406	Resistor 560 ohm 1,15W	Philips	2322 214 13561
R407	Not used		
R408	Resistor 5,1 ohm 0,33W	Philips	2322 211 13518
R409	Resistor 33 ohm 2% 1W	Vitrohm	253-0
R410	Resistor 6,8 ohm 2% 1W	Vitrohm	253-0
R411	Resistor,potentiometer 10ohm 10%	AB Metal	Typ. 115 Q7
R412	Resistor 18 ohm 0,5W	Philips	2322 212 13189
R413	Resistor 18 ohm 0,5W	Philips	2322 212 13189
R414	Resistor 18 ohm 0,5W	Philips	2322 212 13189
R415-			
R422	Resistor 1Kohm 0,67W	Philips	2322 213 13102
R423	Resistor 33 ohm 0,5W	Philips	2322 212 13339
R424	Resistor 33 ohm 0,5W	Philips	2322 212 13339
R425-			
R428	Resistor 3,3 ohm 1,15W	Philips	2322 214 13338
R429	Resistor 12 ohm 0,5W	Philips	2322 212 13129
C401	Capacitor,polyester 1uF 100V	ERO	MKT 1822-510/0
C402-			
C404	Capacitor,polyester 0,1uF 100V	ERO	MKT 1822-410/0
C405	See chapter for driver		
C406	Capacitor,polyester 0,22uF 100V	ERO	MKT 1822-422/0
C407	Capacitor,ceramic 27pF 5% 400V	Ferroperm	9/0112,9
C408-			
C410	Capacitor,polyester 0,1uF 100V	ERO	MKT 1822-410/0
C411	Capacitor,polyester 0,22uF 100V	ERO	MKT 1822-410/0
C412	Capacitor,ceramic 5nF 500V	CRL	DGDS/4x16
C413	Capacitor,ceramic 5nF 500V	CRL	DGDS/4x16

Driver unit T1127

Symbol	Description				Manufact.	
C414	Capacitor,ceramic	10pF	5%	400V	Ferroperm	9/0112,9
C415	Capacitor,ceramic	27pF	5%	400V	Ferroperm	9/0112,9
C416	Capacitor,ceramic	27pF	5%	400V	Ferroperm	9/0112,9
C417	Capacitor,ceramic	39pF	5%	400V	Ferroperm	9/0112,9
C418	Not used					
C419- C420	Capacitor,polyester	0,1uF		100V	ERO	MKT 1822-410/0
T401	Transistor				Motorola	ZRF 0132
T402	Transistor				Motorola	MRF 401MP
T403	Transistor				Motorola	MRF 401MP
D401	Diode,zener					1N5338
L401	Coil				S.P.	TL 114
L402	Choke				S.P.	TL 067
L403	Choke				S.P.	TL 067
TR401	Transformer				S.P.	TL 228
TR402	Transformer, output				S.P.	TL 229
FP401	Ferroxcube beads				Philips	4322 020 34420

b	Filter T1127		
Symbol	*Description*	*Manufact.*	
C501	Capacitor ceramic 4n7 -20/+80 % 5KV	Ferroperm	9/138,9 isol.
C502	Capacitor ceramic 4n7 -20/+80% 5KV	Ferroperm	9/128,9 isol.
C503	Capacitor polyester 0,1uF 20% 100V	ERO	MKT 1822 410/0
C504	Capacitor polyester 0,1uF 20% 400V	ERO	MKT 1822 410/4
C505	Capacitor polyester 0,1uF 20% 400V	ERO	MKT 1822 410/4
C506- C510	Capacitor polyester 0,1uF 20% 100V	ERO	MKT 1822 410/0
C511	Capacitor polycarbonate 1nF 20% 630V	ERO	KC 1849/210/6
C512	Capacitor polycarbonate 1nF 20% 630V	ERO	KC 1849/210/6
C513- C527	Capacitor polyester 0,1uF 20% 100V	ERO	MKT 1822 410/0
RE501	Relay 24V	Pasi	KS 3
FP501- FP537	Ferroxcube beads	Kaschke	K3/1200/01 Hz 4/2/7A
	T1127L		
C528	Capacitor polyester 0,1uF 20% 100V	ERO	MKT 1822 410/0
RE502	Relay 12 V	Clare	PRME 15002
R501	Resistor 3.3Kohm 0.33W	Philips	2322 211 13332

b Service unit T1127

Symbol	Description	Manufact.	
R601	Resistor 100Kohm 5% 0,33W	Philips	2322 211 13104
R602	Resistor potentiometer 100Kohm 5% 0,33W	Philips	2322 410 43361
R603	Resistor 100Kohm 5% 0,33W	Philips	2322 211 13104
R604	Resistor 330 ohm 5% 4W	Philips	2322 330 22331
R605	Resistor 330 ohm 5% 4W	Philips	2322 330 22331
R606	Resistor potentiometer 500 ohm 10% 3W	A.B.Metal	115Q7
R607	Resistor potentiometer 500 ohm 10% 3W	A.B.Metal	115Q7
R608	Resistor 560 ohm 5% 4W	Philips	2322 330 22561
R609	Resistor 560 ohm 5% 4W	Philips	2322 330 22561
R610	Resistor 10Kohm 5% 0,33W	Philips	2322 211 13103
R611	Resistor 10 ohm 10% 0,5W	Philips	2322 211 13109
R612	Resistor 15 ohm 5% 0,33W	Philips	2322 211 13159
R613	Resistor potentiometer 220Kohm	Philips	2322 410 43362
RE601	Relay 22V-15% +10% - 10°C + 10°C	Pasi	MS/K BV863
RE602	Relay 22V-15% +10% - 10°C + 10°C	Pasi	MS/K BV863
RE603	Relay DLR	Siemens	V23100-V4324-B000
D601	Diode	Philips	BAV 21
D602	Diode	Philips	BAV 21
S601	Switch	Jeanrenaud	RBP12F 2x4 NCC
S602	Switch	Jeanrenaud	RBP12F 4x2 NCC
S603	Switch	Jeanrenaud	RBP12F 2x3 NCC

a Aerialmeter circuit T1127

Symbol	Description	Manufact.	
R701	Resistor 4,7 Kohm 0,33W	Philips	2322 211 13392
R702	Resistor 100 ohm 0,33W	Philips	2322 211 13152
R703	Resistor 1,8 Kohm 0,33W	Philips	2322 211 13333
R704	Resistor 470 ohm 0,33W	Philips	2322 211 13471
R705	Resistor potentiomete 4,7 Kohm	Philips	2322 410 43358
C701	Capacitor polyester 0,1uF 100V	ERO	MKT 1822 410/0
C702	Capacitor polyester 0,1uF 100V	ERO	MKT 1822 410/0
D701	Diode	Texas/ Philips	1N4448
D702	Diode	Texas/ Philips	1N4448
ME701	Meter nonometer	Elmatok	MG20
TR701	Toroide	S.P.	TL072

b Chassis T1127

Symbol	Description				Manufact.	
R901	Resistor	47 ohm	5%	15W	Vitrohm	220-0
C903	Capacitor	2uF		400V	NETO	Type LC200
T901	Transistor				Motorola	MJ 802
S901	Microswitch				Cherry	E62-10H
ME901	Servicemeter	± 100uA DC			Shinohara	MR 45P
MO901	Blower	1x220V 50 Hz			EBM	Type RG E 120-2 220V 2100 omdr.
P901	Plug	1772			Molex	03-06-2364
J901	Coaxsocket				K.V.Hansen	S0239
FP901	Ferroxcube beads				Kaschke	K3/1200/01Hz 4/2/719
		T1127L				
R902	Resistor PTC	110°			Microtherm	PTC 110 KYC 511
R903	Resistor PTC	110°			Microtherm	PTC 110 KYC 511

Drive level unit T1127

Symbol	Description			Manufact.	
R1001	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1002	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1003	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1004	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1005	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1006	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1007	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1008	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1009	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1010	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1011	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1012	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1013	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1014	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1015	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1016	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1017	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1018	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472
R1019	Resistor potentiometer	4,7 Kohm	½W	Philips	2322 482 30472

a Filament Stabilizer T1127

Symbol	Description			Manufact.	
R1101	Resistor	270 ohm	4,2W	Philips	2322 330 22271
R1102	Resistor	1Kohm	0,33W	Philips	2322 211 13102
R1103	Resistor	180 ohm	0,33W	Philips	2322 211 13181
R1104	Resistor	390 ohm	0,33W	Philips	2322 211 13391
R1105	Resistor potentiometer	4,7Kohm		A.B. Metal	Typ. HC10
R1106	Resistor	470Kohm	0,33W	Philips	2322 211 13471
C1101	Capacitor polyester	0,22uF	100V	Ero	MKT 1822-422/0
C1102	Capacitor electrolytic	22uF	40V	Siemens	B41283-B7226-T
D1101	Diode, zener		7,5V	Motorola	1N4737A
T1101	Transistor			Motorola	BD 241A
T1102	Transistor			Siemens	BC 141-10

FILTER UNIT H1204

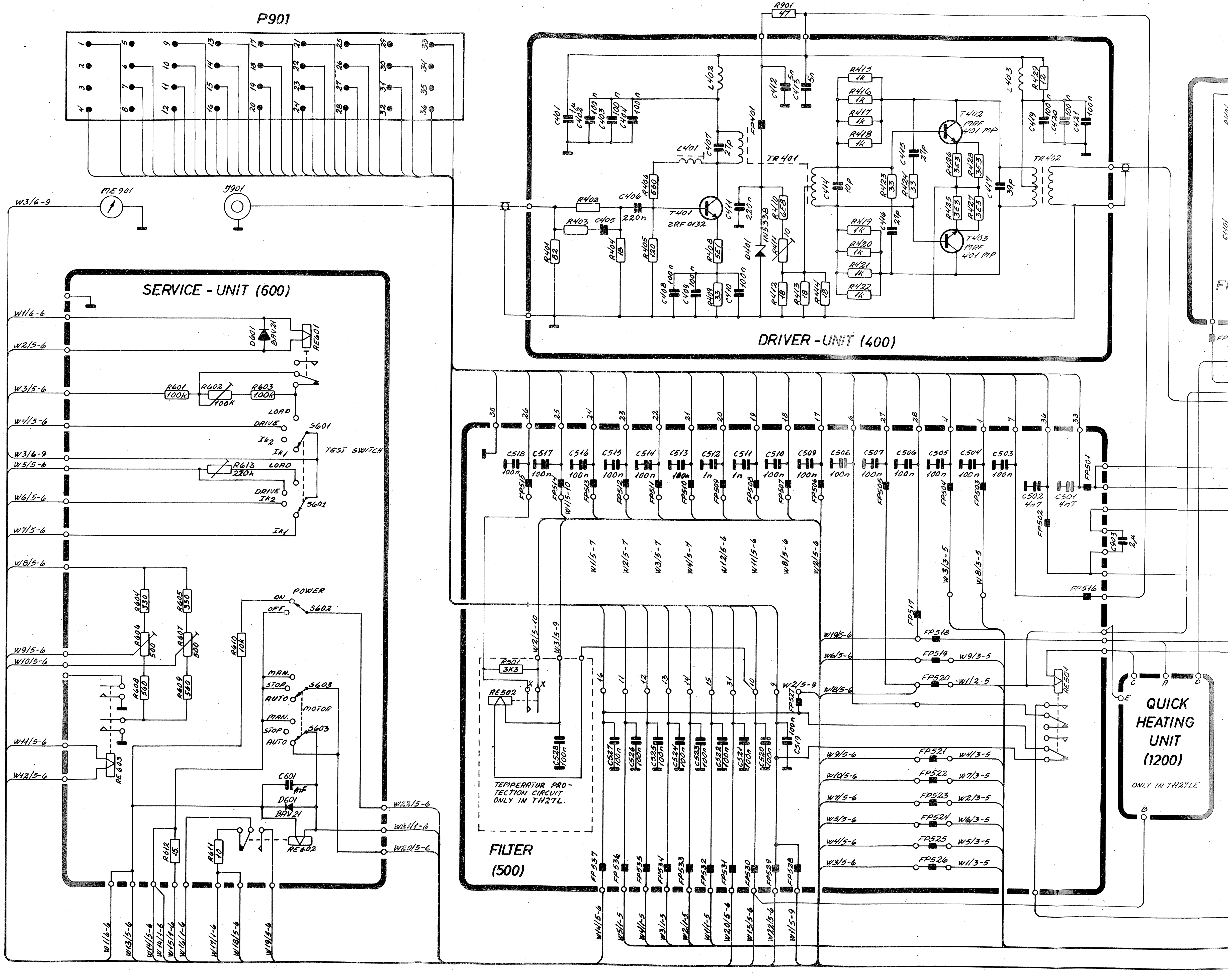
Symbol	Description				Manufact.	
C1201	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1202	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1203	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1204	Capacitor polycarbonate	1nF	20%	630V	Ero	KC 1849/210/6
C1205	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1206	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1207	Capacitor polycarbonate	1nF	20%	630V	Ero	KC 1849/210/6
C1208	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1209	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1210	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1211	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1212	Capacitor polyester	0.1uF	20%	100V	Philips	2222 244 24104
C1213	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1214	Capacitor polycarbonate	1nF	20%	630V	Ero	KC 1849/210/6
C1215	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1216	Capacitor polycarbonate	1nF	20%	630V	Ero	KC 1849/210/6
C1217	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1218	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1219	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104
C1220	Capacitor polyester	0.1uF	20%	100V	Philips	2222 344 24104

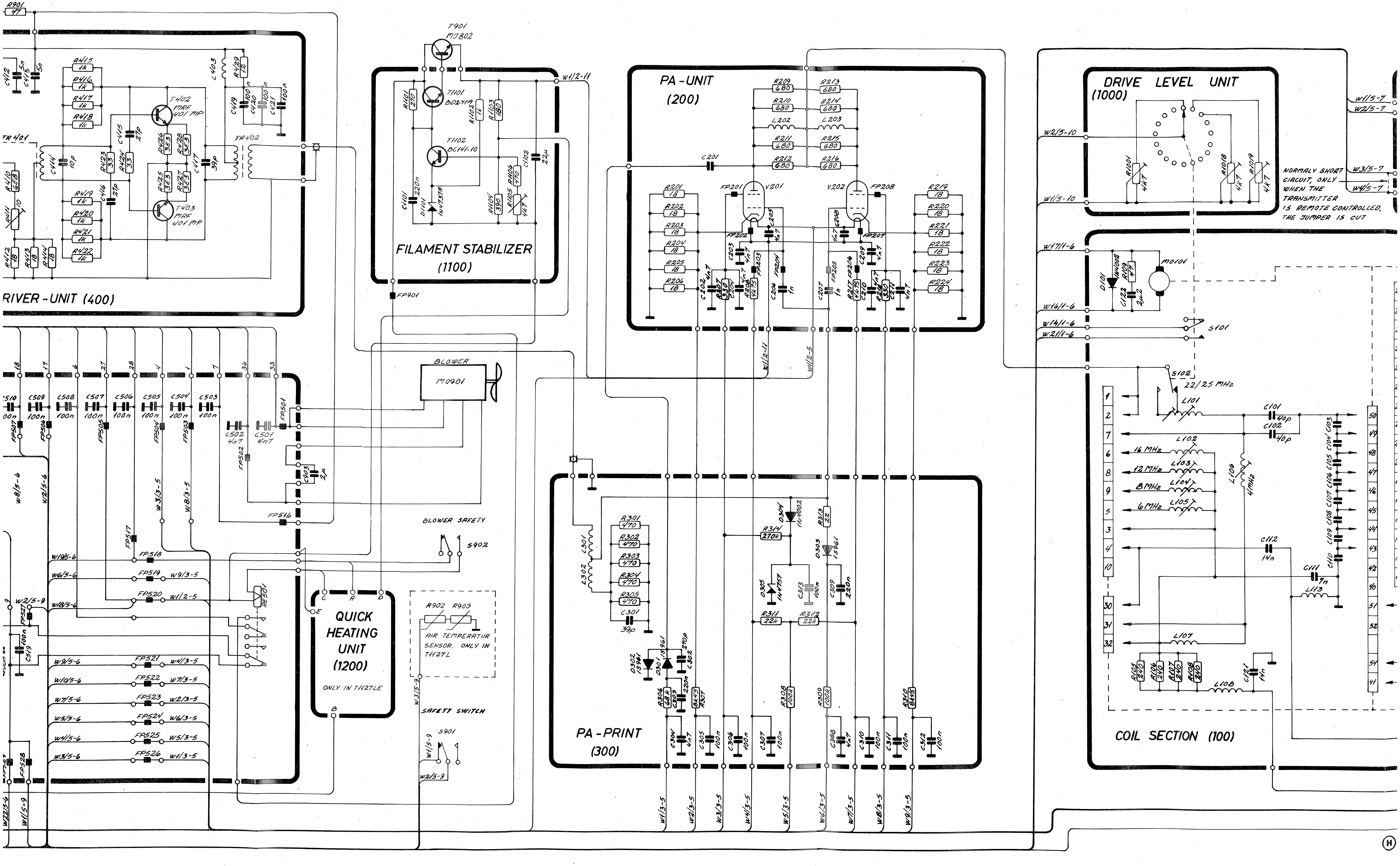
REAR CONTACT BOARD H1204 b

Symbol	Description		Manufact.	
D101	Diode, silicon		Philips	BAV 21
D102	Diode, zener 5,1V ±5%	5W	Motorola	1N5338
D103	Diode, silicon		Philips	BAV 21
R101	Resistor 47 ohm	0.33W	Philips	2322 211 13479
RE101	Relay		Pasi	MS/K BV863
RE102	Relay, reed	24V	Clare	Preme 15003A
RE103	Relay, reed	24V	Clare	Preme 15003A
RE104	Relay, reed	24V	Clare	Preme 15003A
FP101	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP102	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP103	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP104	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP105	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP106	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP107	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP108	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP109	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP110	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP111	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP112	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP113	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP114	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP115	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP116	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP117	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
FP118	Ferroxcube beads		Kaschke	K3/1200/0.1Hz 4/2/7A
F101	Fuse 315mA time-lag Ø5x20mm		Elu	

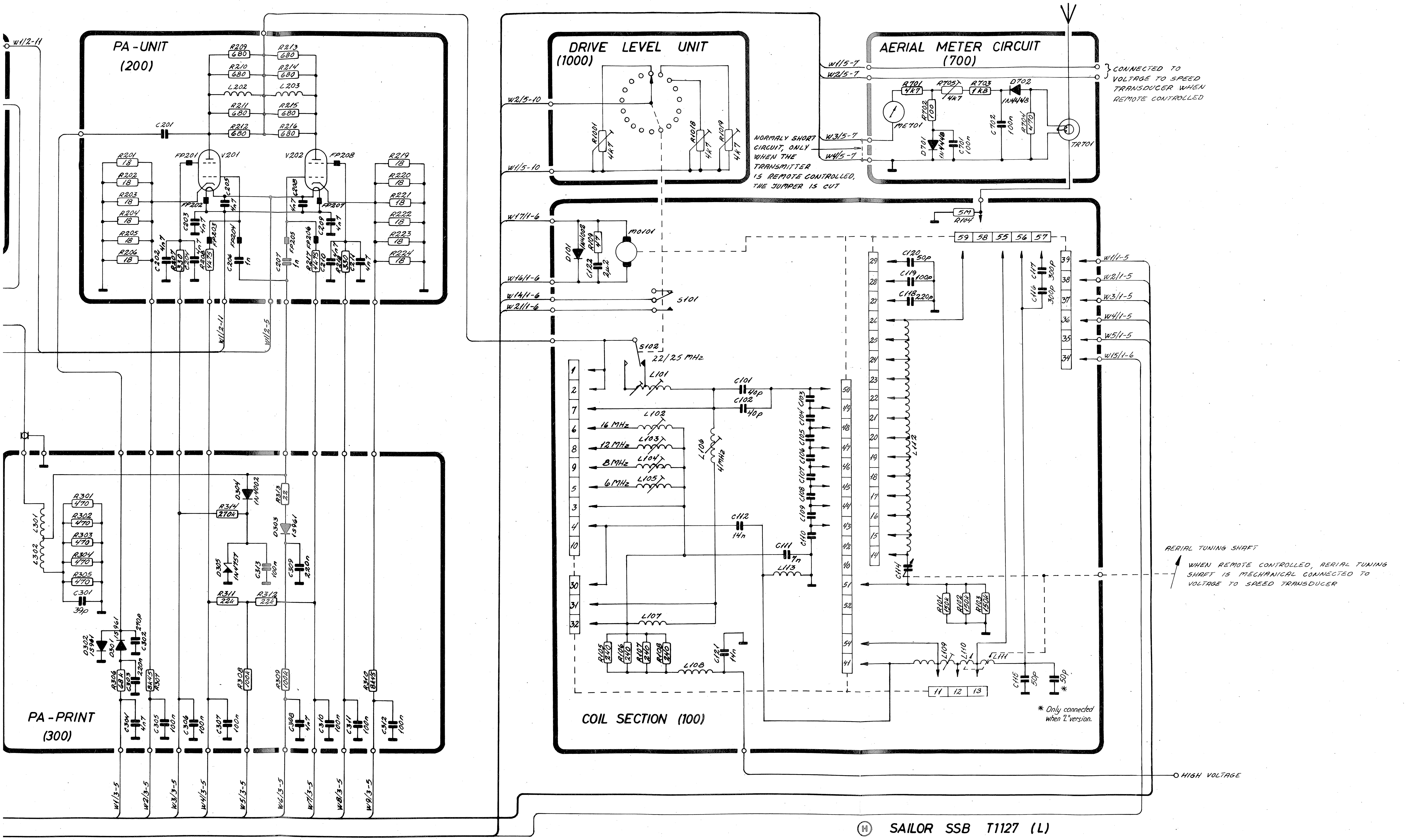
Symbol	Description			Manufact.	
R1201	Resistor	100Kohm	0.33W	Philips	2322 211 13104
R1202	Resistor	82Kohm	0.33W	Philips	2322 211 13823
R1203	Resistor	470 ohm	1.15W	Philips	2322 214 13471
R1204	Resistor	3.3Kohm	0.33W	Philips	2322 211 13332
R1205	Resistor	100 ohm	0.33W	Philips	2322 211 13101
R1206	Resistor	180 ohm	0.33W	Philips	2322 211 13181
C1201	Capacitor tantalum	22uF	40V	Siemens	B41283-B7226-T
C1202	Capacitor polyester	0.22uF	100V	ERO	MKT 1822-422/0
C1203	Capacitor ceramic	10nF+80/-20%	50V	KCK	HE70SJYF103Z
C1204	Capacitor tantalum	68uF±10%	16V	ERO	ETQ 68/16 10%
C1205	Capacitor polyester	0.1uF	100V	ERO	MKT 1822-410/0
D1201	Diode, zener	12V 5%	1W	Motorola	MPZ 4742A
D1202	Diode			Philips	BAV21
D1203	Diode			Motorola	1N4002
D1204	Diode			Philips	BAV21
T1201	Transistor			Motorola	BC547A
IC1201	Integrated circuit			Motorola	MC1455PL
RE1201	Relay		24V	National	HB2-DC 24V
RE1202	Relay		24V	National	HB2-DC 24V

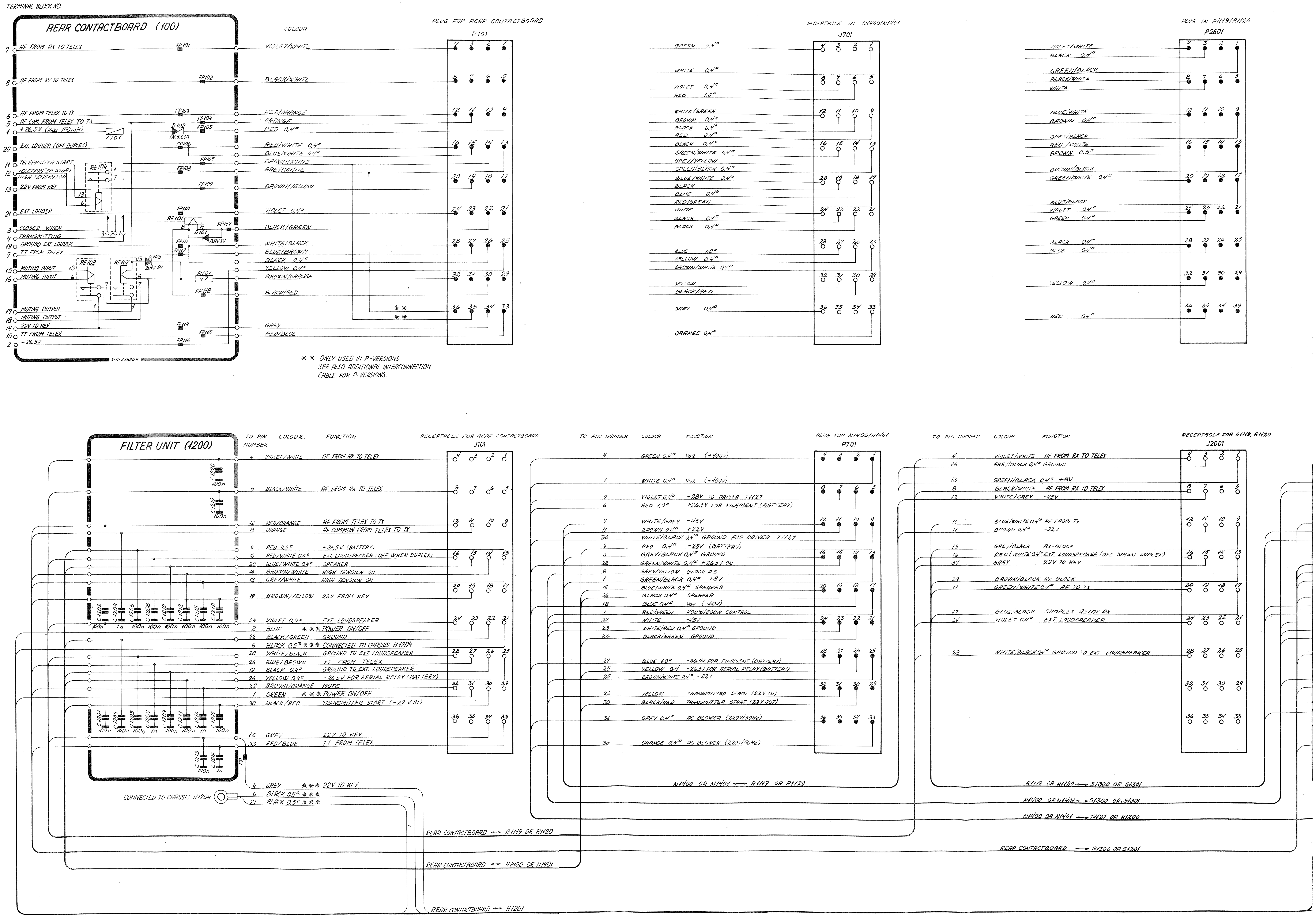
1	V_{G2} (+400V)
2	
3	
4	V_{G2} (+400V)
5	
6	+26,5V FILAMENT
7	+28V
8	
9	POWER ON/OFF
10	+22V
11	S-MOTORCONTROLWIRE
12	R-MOTORCONTROLWIRE
13	Q-MOTORCONTROLWIRE
14	P-MOTORCONTROLWIRE
15	O-MOTORCONTROLWIRE
16	GROUND
17	400/800W CONTROL
18	V_{G1} (-60V)
19	OPEN TX
20	OPEN TX
21	REMOTE CONTROL
22	REMOTE CONTROL
23	REMOTE CONTROL
24	REMOTE CONTROL
25	DRIVE LEVEL POTMETER
26	DRIVE LEVEL POTMETER
27	-26,5V FOR FILAMENT
28	+26,5V ON
29	
30	GROUND
31	MOTOR TUNE
32	
33	AC BLOWER (220V/50Hz)
34	
35	
36	AC BLOWER (220V/50Hz)

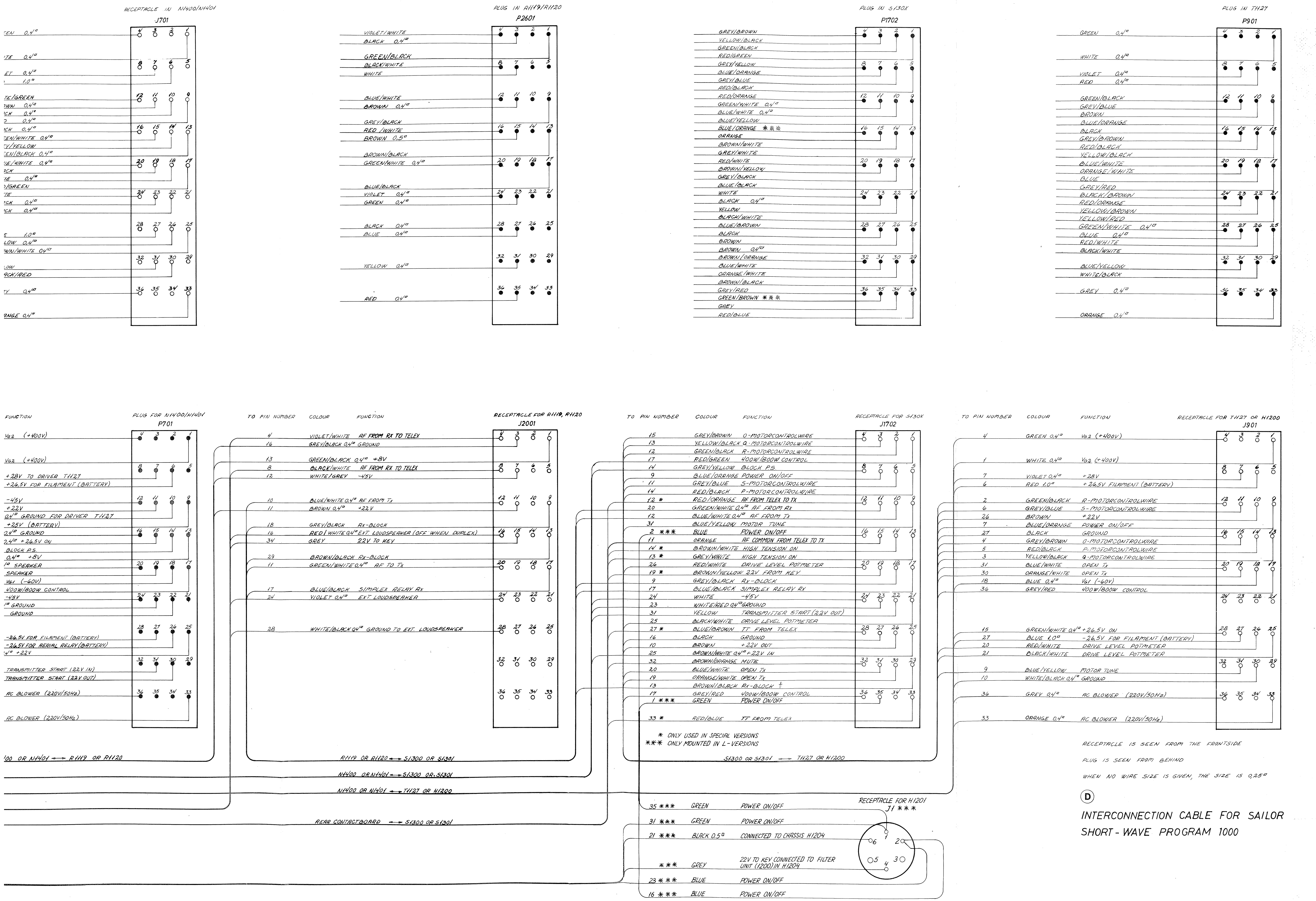




RIVER-UNIT (400)
FILAMENT STABILIZER
(1100)
PA-UNIT
(200)
DRIVE LEVEL UNIT
(1000)
NORMALY SHORT CIRCUIT, ONLY WHEN THE TRANSMITTER IS REMOTE CONTROLLED, THE JUMPER IS CUT
BLOWER
M0901
BLOWER SAFETY
S902
QUICK
HEATING
UNIT
(1200)
ONLY IN TH27LE
R902 R903
AIR TEMPERATUR SENSOR. ONLY IN TH27L
SAFETY SWITCH
S901
PA-PRINT
(300)
COIL SECTION (100)
S101
S102
22/25 MHz
16 MHz
12 MHz
8 MHz
6 MHz
T901
MJ802
T1101
BD241A
T1102
BC141-10
T402
MRF 401 MP
T403
MRF 401 MP
V201
V202
M0101
RE501
H


PA-UNIT (200)
DRIVE LEVEL UNIT (1000)
AERIAL METER CIRCUIT (700)
CONNECTED TO VOLTAGE TO SPEED TRANSDUCER WHEN REMOTE CONTROLLED
NORMALY SHORT CIRCUIT, ONLY WHEN THE TRANSMITTER IS REMOTE CONTROLLED, THE JUMPER IS CUT
AERIAL TUNING SHAFT
WHEN REMOTE CONTROLLED, AERIAL TUNING SHAFT IS MECHANICAL CONNECTED TO VOLTAGE TO SPEED TRANSDUCER
PA-PRINT (300)
COIL SECTION (100)
* Only connected when "L" version.
HIGH VOLTAGE
SAILOR SSB T1127 (L)


TERMINAL BLOCK NO.
REAR CONTACTBOARD (100)
COLOUR
PLUG FOR REAR CONTACTBOARD
P101
AF FROM RX TO TELEX
AF FROM TELEX TO TX
AF COM. FROM TELEX TO TX
+26,5V (max 100mA)
EXT. LOUDSP. (OFF DUPLEX)
TELEPRINTER START
TELEPRINTER START HIGH TENSION ON
22V FROM KEY
EXT. LOUDSP.
CLOSED WHEN TRANSMITTING
GROUND EXT. LOUDSP.
TT FROM TELEX
MUTING INPUT
MUTING OUTPUT
22V TO KEY
TT FROM TELEX
-26,5V
VIOLET/WHITE
BLACK/WHITE
RED/ORANGE
ORANGE
RED 0,4□
RED/WHITE 0,4□
BLUE/WHITE 0,4□
BROWN/WHITE
GREY/WHITE
BROWN/YELLOW
VIOLET 0,4□
BLACK/GREEN
WHITE/BLACK
BLUE/BROWN
BLACK 0,4□
YELLOW 0,4□
BROWN/ORANGE
BLACK/RED
GREY
RED/BLUE
5-0-22625 R
** ONLY USED IN P-VERSIONS
SEE ALSO ADDITIONAL INTERCONNECTION
CABLE FOR P-VERSIONS.
RECEPTACLE IN N1400/N1401
J701
PLUG IN R1119/R1120
P2601
FILTER UNIT (1200)
TO PIN NUMBER
COLOUR
FUNCTION
RECEPTACLE FOR REAR CONTACTBOARD
J101
AF FROM RX TO TELEX
AF FROM TELEX TO TX
AF COMMON FROM TELEX TO TX
+26,5V (BATTERY)
EXT LOUDSPEAKER (OFF WHEN DUPLEX)
SPEAKER
HIGH TENSION ON
22V FROM KEY
EXT. LOUDSPEAKER
*** POWER ON/OFF
GROUND
*** CONNECTED TO CHASSIS H1204
GROUND TO EXT. LOUDSPEAKER
TT FROM TELEX
GROUND TO EXT. LOUDSPEAKER
-26,5V FOR AERIAL RELAY (BATTERY)
MUTE
*** POWER ON/OFF
TRANSMITTER START (+22 V IN)
22V TO KEY
TT FROM TELEX
*** 22V TO KEY
CONNECTED TO CHASSIS H1204
TO PIN NUMBER
PLUG FOR N1400/N1401
P701
GREEN 0,4□ Vg2 (+400V)
WHITE 0,4□ Vg2 (+400V)
VIOLET 0,4□ +28V TO DRIVER T1127
RED 1,0□ +26,5V FOR FILAMENT (BATTERY)
WHITE/GREY -45V
BROWN 0,4□ +22V
WHITE/BLACK 0,4□ GROUND FOR DRIVER T1127
RED 0,4□ +25V (BATTERY)
GREY/BLACK 0,4□ GROUND
GREEN/WHITE 0,4□ +26,5V ON
GREY/YELLOW BLOCK P.S.
GREEN/BLACK 0,4□ +8V
BLUE/WHITE 0,4□ SPEAKER
BLACK 0,4□ SPEAKER
BLUE 0,4□ Vg1 (-60V)
RED/GREEN 400W/800W CONTROL
WHITE -45V
WHITE/RED 0,4□ GROUND
BLACK/GREEN GROUND
BLUE 1,0□ -26,5V FOR FILAMENT (BATTERY)
YELLOW 0,4 -26,5V FOR AERIAL RELAY (BATTERY)
BROWN/WHITE 0,4□ +22V
YELLOW TRANSMITTER START (22V IN)
BLACK/RED TRANSMITTER START (22V OUT)
GREY 0,4□ AC BLOWER (220V/50Hz)
ORANGE 0,4□ AC BLOWER (220V/50Hz)
RECEPTACLE FOR R1119, R1120
J2001
VIOLET/WHITE AF FROM RX TO TELEX
GREY/BLACK 0,4□ GROUND
GREEN/BLACK 0,4□ +8V
BLACK/WHITE AF FROM RX TO TELEX
WHITE/GREY -45V
BLUE/WHITE 0,4□ AF FROM Tx
BROWN 0,4□ +22V
GREY/BLACK Rx-BLOCK
RED/WHITE 0,4□ EXT. LOUDSPEAKER (OFF WHEN DUPLEX)
GREY 22V TO KEY
BROWN/BLACK Rx-BLOCK
GREEN/WHITE 0,4□ AF TO Tx
BLUE/BLACK SIMPLEX RELAY Rx
VIOLET 0,4□ EXT. LOUDSPEAKER
WHITE/BLACK 0,4□ GROUND TO EXT. LOUDSPEAKER
N1400 OR N1401 ↔ R1119 OR R1120
R1119 OR R1120 ↔ S1300 OR S1301
N1400 OR N1401 ↔ S1300 OR S1301
N1400 OR N1401 ↔ T1127 OR H1200
REAR CONTACTBOARD ↔ S1300 OR S1301
REAR CONTACTBOARD ↔ R1119 OR R1120
REAR CONTACTBOARD ↔ N1400 OR N1401
REAR CONTACTBOARD ↔ H1201



INTERCONNECTION CABLE FOR SAILOR SHORT-WAVE PROGRAM 1000

Sailor

Sailor

INSTRUKTIONSBOG FOR
SAILOR S1301/S1301L

INSTRUCTION BOOK FOR
SAILOR S1301/S1301L

A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS

GENERAL DESCRIPTION

SAILOR S1301 is a telephony exciter for use in conjunction with the transmitter T1127.

SAILOR S1301 Transmitting frequency can be free selected in the frequency range 1.6 - 4.0 MHz and the 4, 6, 8, 12, 16, 22 and 25 MHz maritime HF bands.

SAILOR S1301 uses a digital synthesizer for frequency generation. The frequency stability is controlled from one 10 MHz TCXO.

SAILOR S1301 produces completely finished signals on the transmission frequency.

SAILOR S1301 can be used for telephony in the following modes: A3J, A3A and A3H.

SAILOR S1301 can be used for telegraphy in the two modes A1 and A2H.

SAILOR S1301 can be used in conjunction with a teleprinter via e.g. a Simplex TOR equipment.

SAILOR S1301 is provided with a built-in alarm signal generator for distress calls.

SAILOR S1301 fits into SAILOR 19" rack system.

SAILOR S1301 is supplied from N1400 (24V DC) or N1401 (AC mains).

TECHNICAL DATA

The exciter S1301 delivers USB signals.

Frequency range:	MF: 1.6 - 4.0 MHz HF: 4, 6, 8, 12, 22 and 25 MHz maritime bands.
FREQUENCY RESOLUTION:	100 Hz
Frequency stability:	
Temperature range 0°C to +40°C:	Less than ± 1 ppm (±25 Hz)
Long term stability :	Less than ± 1 ppm (±25 Hz/year)
Short term stability :	Less than ± 2 Hz
Mode of operation:	A3J, A3A and A3H
Distress call:	Automatic A3H on 2182 kHz Two-Tone-Alarm: 1300 and 2200 Hz. with a duration of 45 secs.
Output power:	1 Watt PEP/50 ohm
Output power reduction:	In four 5dB steps (-20dB)
Modulation:	350 - 2700 Hz with compressor
Operation temperature range:	-15°C to + 55°C
500 kHz Version S1301L	The S1301L is identical to S1301 but is furthermore operational in the frequency range 405.0 kHz to 535.0 kHz for A1 and A2H purpose.

TECHNICAL DATA for connections on REAR-CONTACT-BOARD.

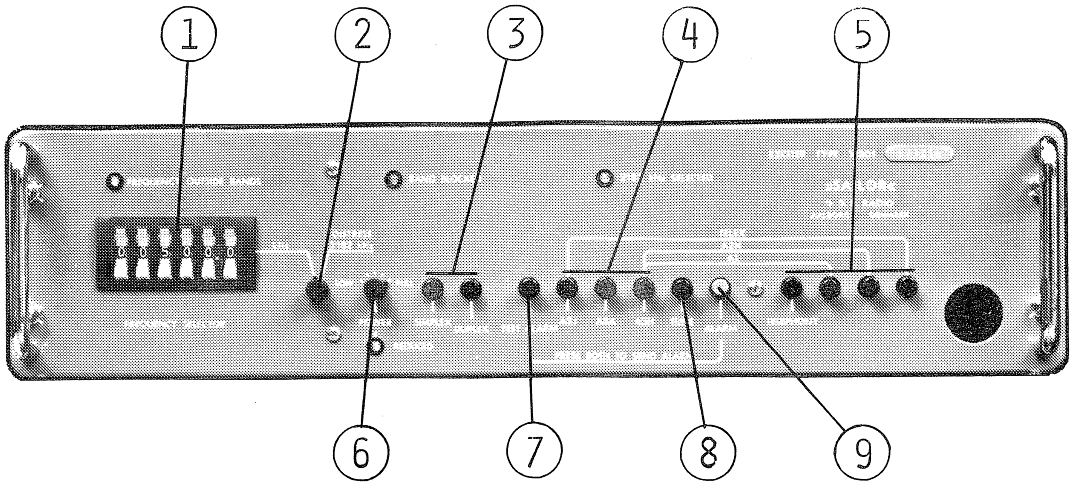
AF FROM TELEX TO TX:	R_{IN} = 600 Ohm
	-17 dBm P_{IN} 3 dBm
	110 mV_{RMS} V_{IN} 1.1V_{RMS}
AF FROM RECEIVER TO TELEX:	R_{OUT} = 600 Ohm
	P_{OUT} = 0 dBm
	V_{OUT} = 750 mV_{RMS}
TT FROM TELEX:	V_{IN} = 24V
	I_{IN} = 50 mA
TELEPRINTER START:	V_{IN} = 24V
(HIGH TENSION ON)	I_{IN} = 13 mA
MUTING INPUT:	V_{IN} = 24V
	I_{IN} = 13 mA
MUTING OUTPUT:	I_{max} = 0.5A
The contacts: CLOSED WHEN TRANSMITTING	I_{max} = 6A

TECHNICAL DATA FOR TELEGRAPHY AND TELEX

Data for SAILOR short-wave station.

Output power A1:	200 W PEP (1.6 - 4 MHz)
	400 W PEP (4 - 25 MHz)
Output power A2H:	400 W PEP (1.6 - 4 MHz)
	800 W PEP (4 - 25 MHz)
Output power TELEX:	
Simplex TOR mode	400 W PEP (1.6 - 4 MHz)
	800 W PEP (4 - 25 MHz)
Broadcast mode	200 W PEP (1.6 - 4 MHz)
	400 W PEP (4 - 25 MHz)

CONTROLS



(1) FREQUENCY SELECTOR

For selection of the transmitting frequency in the maritime bands.

(2) DISTRESS (2182 kHz)

For selection of the distress frequency 2182 kHz.

(3) SIMPLEX, DUPLEX

Press button SIMPLEX for Single-Frequency Operation.
Press button DUPLEX for Two-Frequency Operation.

(4) A3J, A3A and A3H

Select transmission mode A3J, A3A or A3H.

(5) TELEPHONY-TELEGRAPHY-TELEX

TELEPHONY: To be activated for normal telephony use.

TELEGRAPHY: Activate the buttons A1 or A2H together with the button A3H (5) .
The telegraph key is now connected to transmitter.

TELEX: Activate the button TELEX together with the button A3J (5) .
The teleprinter is now connected via the Simplex TOR equipment to the receiver and transmitter.

(6) POWER

For reducing the RF-output-Power in four 5 dB steps to about -20 dB.

(7) TEST ALARM

Press button TEST ALARM and the two-tone-alarm signal will be heard in the microtelephone handset.

(8) TUNE

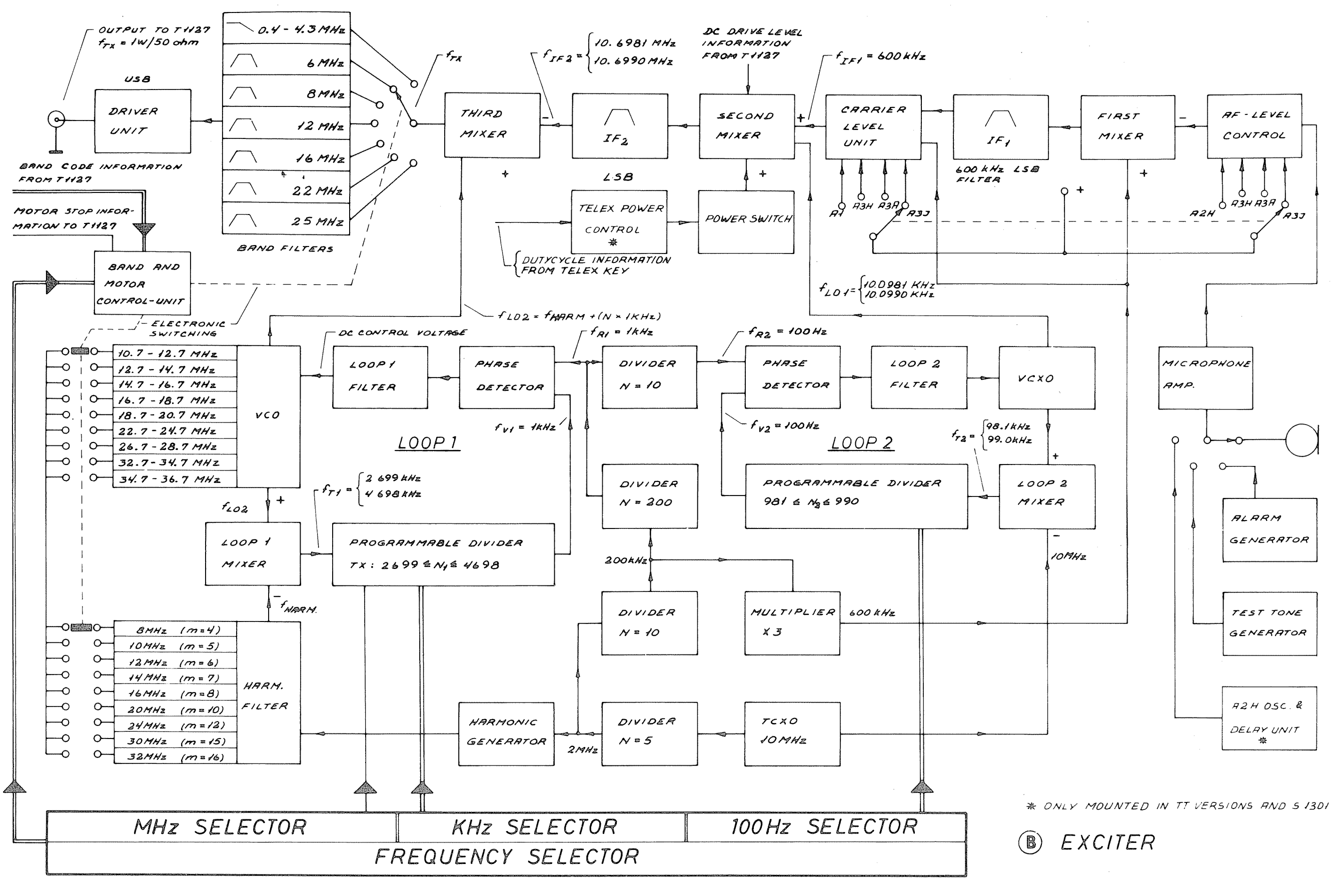
For tuning of Transmitter T1127, a two-tone signal is generated.

(9) ALARM

Press both TEST ALARM (6) and ALARM (7) for transmitting two-tone alarm signal on the DISTRESS frequency 2182 kHz.

S1301 B

PRINCIPLE OF OPERATION



(B) EXCITER

EXCITER S1300TT & S1301

The SAILOR Exciter S1300TT and S1301 are fully synthesized and deliver USB signals on the carrier frequency.

The signal from the Microphone, the Alarm Generator or the Test-Tone-Generator is fed to the Microphone Amplifier, where the necessary amplification, amplitude limitation and filtering take place. The amplitude limitation is performed by a compressor stage, which regulates the amplification, so that the amplitude will always be kept below a certain max. level. The AF-signal is fed via AF Level-Control to the first Mixer. The AF-Level-Control is determining the right AF level in the modes A3J, A3A, A3H and A2H. The First Mixer is a balanced modulator where a 600 kHz double-side-band signal is generated. The DSB-signal is then fed through the 600 kHz LSB crystal-filter and out we have a lower-side-band signal to the Carrier-Level-Unit.

In the Carrier-Level-Unit reinsertion of 600 kHz carrier for A3A, A3H, A2H and A1 takes place. The 600 kHz signal is then passed on to the Second-Mixer which also receives the local-oscillator-signal f_{LO1} from Loop 2. The Second-Mixer also receives a DC Drive Level Information from T1127 which can attenuate the output from the mixer to the wanted drive level. The output from the Second-Mixer is an LSB-signal f_{IF2} and it passes through a crystal filter to the Third Mixer.

Third Mixer is a double balanced mixer where both the local oscillator signal f_{LO2} and 2nd IF-signal f_{IF2} is suppressed. The output from the mixer is the carrier frequency f_{TX}, with the upper side-band. The band filter section serves the purpose of removing all undesired mixing products and the signal passes from the Band-Filters to the Driver-Unit where the final amplification to max. 1 Watt PEP/50 ohm takes place.

FREQUENCY GENERATION

The necessary frequencies are generated by two frequency synthesizers according to the Phase Locked Loop principle.

Local oscillator signal f_{LO2} to Third Mixer is generated in the Phase Locked Loop 1 and has a resolution of 1 kHz.

Local oscillator signal f_{LO1} to Second Mixer is generated in the Phase-Locked Loop 2 and has a resolution of 100 Hz.

LOOP 1

The voltage controlled oscillator (VCO) generates the necessary local oscillator frequencies in nine 2 MHz bands electronically selected by the MHz Selector via the Band and the Motor Control Unit. Inside each 2 MHz band the VCO-frequency f_{LO2} can be varied by means of a DC control voltage from the Phase-Detector. The DC control voltage is filtered in the Loop 1 Filter.

A 2/4

The Phase Detector receives two signals, one variable frequency f_{V1} and one reference frequency f_{R1}. The reference frequency f_{R1} is a result of the 10 MHz TCXO frequency being divided down to 1 kHz.

The variable frequency f_{V1} is generated from the VCO frequency f_{LO2} in the following way:

In the Loop 1 Mixer the counter frequency f_{T1} is produced from the VCO frequency f_{LO2} and the frequency f_{HARM} which is a multiple of 2 MHz. The 2 MHz signal is generated from the 10 MHz TCXO

$$f_{T1} = f_{LO2} - f_{HARM} = f_{LO2} - (m \times 2\ \text{MHz}) = N_1 \times 1\ \text{kHz}$$

For every 2 MHz band a new f_{HARM} is selected of the MHz Selector and it always results in a variation of 2 MHz of the frequency f_{T1} to the Programmable Divider.

The frequency f_{T1} is divided down by the dividing figure N_1 in the Programmable-Divider to the variable frequency f_{V1}

$$f_{V1} = f_{T1}/N_1 = 1\ \text{kHz}$$

The working principle in a Phase-Locked-Loop is as follows:

If there is a phase error between the variable frequency f_{V1} and the reference frequency f_{R1}, the regulation system has the characteristic that the DC-Control Voltage will correct the VCO frequency and consequently the variable frequency f_{V1}, so that f_{V1} will always follow the reference frequency f_{R1} in phase

$$f_{R1} = f_{V1} = 1\ \text{kHz}$$

The VCO frequency f_{LO2} is now phase locked on a fixed frequency to the reference frequency f_{R1} and has therefore the same accuracy as this.

Changing of the VCO frequency f_{LO2} by e.g. 1 kHz can be performed by changing the dividing figure N_1 in the Programmable Divider by one.

$$f_{LO2} = f_{HARM} + (N_1 \times 1\text{ kHz})$$

Principle of programming is as follows:

The Programmable Divider contains a counter circuit, which is counting down from a start figure 2000 + P_1 and stops at the stop figure S_1. Each time the counter reaches the stop figure S_1, a pulse (f_{V1}) is given to the Phase Detector, and the counter will start counting down again from the start figure 2000 + P_1. Division of f_{T1} by N_1 has now been achieved

$$f_{V1} = f_{T1}/N_1; \quad N_1 = 2000 + P_1 - S_1$$

A special code from the MHz Selector to the Band and Motor-control-unit selects the right 2 MHz band for the VCO and Harmonic Filter.

Inside each 2 MHz band the programmable figure P_1, is encoded from the Frequency Selector (MHz and kHz positions) in BCD-code representing the direct frequency reading of the 2 MHz band.

$$\text{Start-figure: } 2000 + P_1; \quad 0 \leq P_1 \leq 1999$$

$$\text{Stop-figure : } S1 = -699$$

$$N_1 = 2000 + P_1 - S_1 = P_1 + 2699$$

B 3/4

Output frequency from Loop 1:

$$f_{LO2} = m \times 2\text{ MHz} + (P_1 + 2699) \times 1\text{ kHz} \quad 4 \leq m \leq 16$$

LOOP 2

Phase Locked Loop 2 has a frequency variation of 1 kHz with a resolution of 100 Hz and the working principle is the same as for Phase Locked Loop 1. Principle of programming is as follows:

The frequency shift in Loop 2 is controlled from the 100 Hz Selector.

The Programmable Divider is counting up from the start figure P_2 to the stop figure S_2.

The 100 Hz Selector is encoding the start-figure P_2 in BCD-code to the Programmable Divider.

Start figure : $0 \leq P_2 \leq 9$

Stop figure : $S_2 = 990$

Dividing figure : $N_2 = S_2 - P_2 = 990 - P_2$

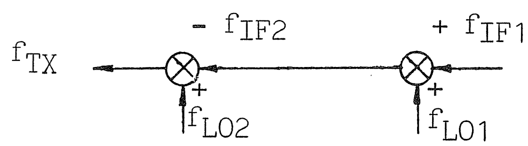
PRINCIPLE OF OPERATION cont.:

Output frequency from Loop 2:

f_{LO1} = 10 MHz + (N_2 x 0,1 kHz) = 10 MHz + ((990 - P_2) x 0,1 kHz);

f_{LO1} = 10,099 MHz - (P_2 x 0,1 kHz);

CARRIER FREQUENCY f_{TX} FROM EXCITER S1300



f_{IF1} = 0,600 MHz;

f_{LO1} = 10.099 MHz - (P_2 x 0,1 kHz);

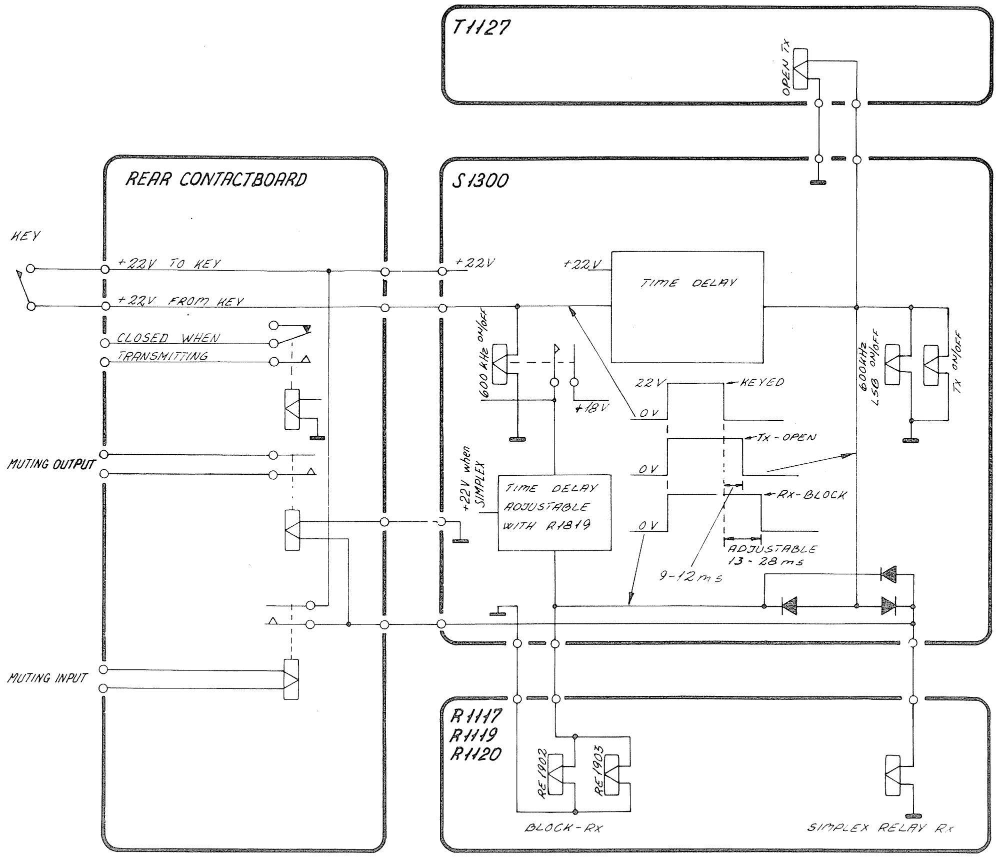
f_{IF2} = f_{IF1} + f_{LO2} = 10,699 MHz - (P_2 x 0,1 kHz)

f_{LO2} = m x 2 MHz + (P_1 + 2699) x 1 kHz $4 \leq m \leq 16$

f_{TX} = f_{LO2} - f_{IF2} = (m - 4) x 2 MHz + (P_1 + (0,1 x P_2)) x 1 kHz

A 4/4

PRINCIPAL DESCRIPTION OF TELEGRAPHY MODE



S1301 1/1 B

TELEGRAPHY:

See principal diagram above.

PULSE SHAPING

When the KEY is pressed and released the transmission starts and stops. An RC-network on MODE-SWITCH-UNIT shapes the transmitter output signal. The switch off time of the transmitter is delayed 10 msecs in order to produce the correct output signal shape.

FULL BREAK-IN

The receiver is blocked for a time period of about 23 msecs after the KEY is released. This secures full break-in on the receiver.

MUTING INPUT

The receiver is blocked when +24V is connected.

MUTING OUTPUT

The contacts are closed when the transmitter is keyed.

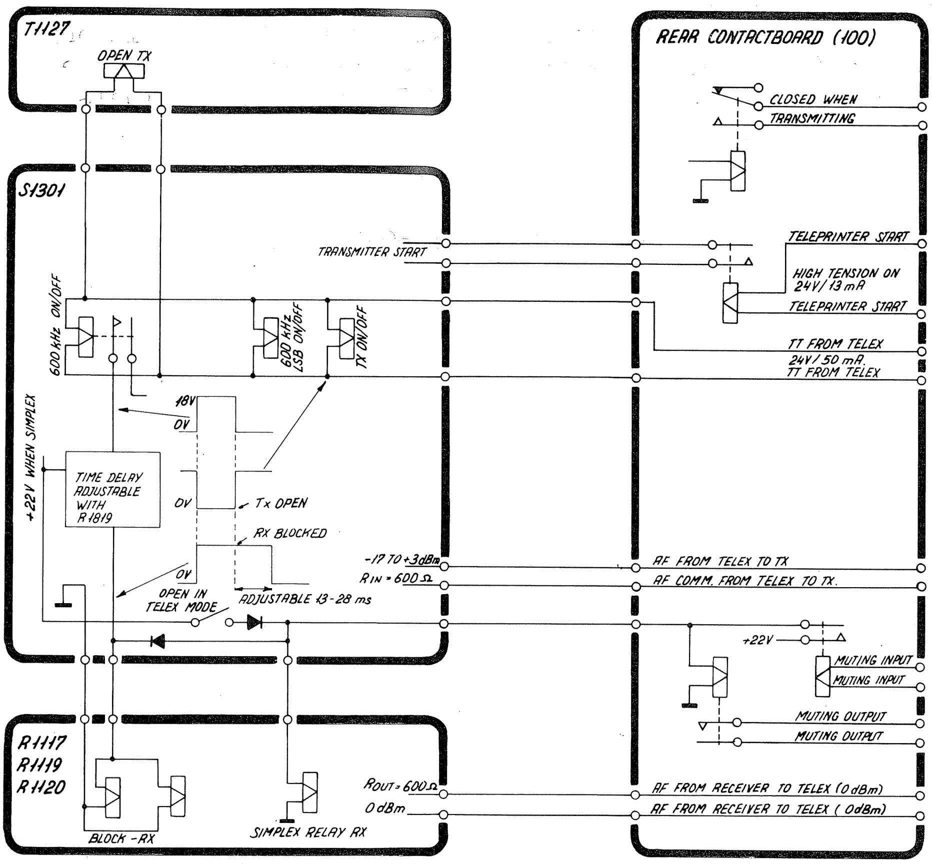
INSTALLATION

All connections are done on the REAR CONTACT BOARD placed on the mounting plate.

PRINCIPAL DESCRIPTION OF TELEX MODE

TELEX

The SAILOR short-wave station is designed to be connected to a TELEPRINTER via a SIMPLEX TOR equipment. The control signals to the exciter match with Philips Simplex TOR equipment STB75/STB750.
See the principal diagram below.



<u>TELEPRINTER START</u> (HIGH TENSION ON)

By means of these terminals it is possible to start the transmitter from Simplex TOR equipment.

The station is switched on as described in the OPERATING INSTRUCTIONS. After that the station is controlled from the Simplex TOR equipment. When a CALL-CODE is received, the TOR connects 24V to the TELEPRINTER START TERMINALS (HIGH TENSION ON) and the station is immediately ready to send an answer.

<u>TT FROM TELEX</u>

This information is used to switch the station between transmit and receive mode. When TT FROM TELEX is connected to 24V the transmitter is open and the receiver is blocked. When TT FROM TELEX is disconnected the transmission stops immediately and the receiver is blocked for another 13 - 28 msecs controlled from the DELAY-UNIT (adjustable with R1819). This delay must last until the transmitter output is less than the sensitivity of the receiver. The delay is pre-adjusted from the factory to 18 msecs, which secures a good reception with only 20 dB attenuation between the transmitter and the receiver aerials.

PRINCIPAL DESCRIPTION OF TELEX MODE cont.:

MUTING INPUT

The receiver is blocked when +24V is connected.

MUTING OUTPUT

The contacts are closed when the transmitter is keyed.

CLOSED WHEN TRANSMITTING

The contacts are closed when the telephony-key on the handset is pressed. In telegraphy-mode (A1 or A2H) the contacts are closed all the time. In telex-mode they are closed when the TELEPRINTER START terminals are connected to 24V.

INSTALLATION

All connections are done on the REAR CONTACT BOARD placed on the mounting plate.

SERVICE

1. MAINTENANCE
2. NECESSARY TEST EQUIPMENT
3. TROUBLE-SHOOTING
4. PERFORMANCE CHECK
5. ADJUSTMENT PROCEDURE
6. NECESSARY ADJUSTMENTS AFTER REPAIR
7. FUNCTION CHECK
8. MECHANICAL DISASSEMBLING T1127 ONLY

1. MAINTENANCE

1.1.
When the SAILOR SHORT WAVE SET type 1000 has been correctly installed, the maintenance can, depending on the environment and working hours, be reduced to a performance check at the service workshop at intervals not exceeding 5 years. A complete performance check list is enclosed in the PERFORMANCE CHECK section.

Also inspect the antennas, cables and plugs for mechanical defects, salt deposits, corrosion and any foreign bodies.

Along with each set a TEST SHEET is delivered, in which some of the measurings made at the factory are listed. If the performance check does not show the same values as those on the TEST SHEET, the set must be adjusted as described under ADJUSTMENT PROCEDURE.

Any repair of the set should be followed by a FUNCTION CHECK of the unit in question.

2. NECESSARY TEST EQUIPMENT

T1127	N140X	S1300	R1117	Equipment	
X	X	X	X	**OSCILLOSCOPE:**	
				Bandwidth	0-25 MHz
				Sensitivity	2mV/cm
				Input impedance	1 Mohm//30 pF
				Triggering	EXT-INT-ENVELOPE
				E.g. PHILIPS	PM3212
X		X	X	**PASSIVE PROBE:**	
				Attenuation	10x
				Input resistance DC	10 Mohm
				Input capacitance	15 pF
				Compensation range	10 pF - 30 pF
				E.g. PHILIPS	PM 9396
		X	X	**MULTIMETER:**	
				Sensitivity (f.s.d.)	1V
				Input impedance	10 Mohm
				Accuracy (f.s.d.)	±2%
				E.g. PHILIPS	PM2503
X	X			**MULTIMETER:**	
				Sensitivity	0.3V and 3A
				Input impedance	30 Kohm/V
				Accuracy (F.S.d.)	±1%
				Current range	100A
				Voltage range	500V, and 2.5 kV
				E.g. Unigor A43, with probe and shunt	

NECESSARY TEST EQUIPMENT cont.:

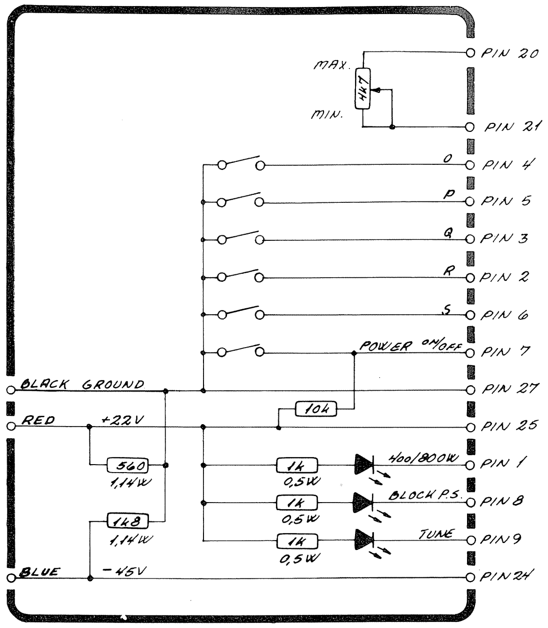
T1127	N140X	S1300	R1117		
		X		**TONEGENERATOR:**	
				Frequency range	200 - 3000 Hz
				Output	1V RMS
				Output impedance	≦ 600 ohm
				E.g. PHILIPS	PM5107
			X	**AF VOLTMETER:**	
				Sensitivity (f.s.d.)	300 mV
				Input impedance	≧ 4 ohm
				Accuracy (f.s.d.)	±5 %
				Frequency range	100 Hz - 5 kHz
				E.g. PHILIPS	PM2503
		X	X	**FREQUENCY COUNTER:**	
				Frequency range	100 Hz - 40 MHz
				Resolution	0,1 Hz at f ≧ 10 MHz
				Accuracy	$1 \cdot 10^{-7}$
				Sensitivity	100 mV RMS
				Input impedance	1 Mohm
				Single period measurement	
				range	1 sec.
				resolution	1 mS
				E.g. PHILIPS	PM6611 + PM9679
			X	**SIGNAL GENERATOR**	
				Frequency range	550 kHz - 30 MHz R1118: 100 kHz - 30 MHz
				Output impedance	50/75 ohm
				Output voltage	1 uV - 100 mV EMF
				Modulation	AM, 30%, 1000 Hz
				E.g. PHILIPS	PM5326

NECESSARY TEST EQUIPMENT cont.:

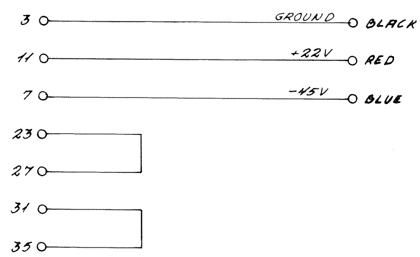
T1127	N140X	S1300	R1117	
				POWER SUPPLIES
X				T1127: V_{out} — 26,5V DC I_{out} — 60A DC E.g. 2 pcs. LAMBDA type — LMG24
		X	X	R1117/S1300: V_{out} 1 — 22V I_{out} 1 — 1,5A V_{out} 2 — -45V I_{out} 2 — 0,2A E.g. SAILOR POWER SUPPLY type — N1402
		X		TEST BOX S1300: SP type S1300/01 TEST BOX For S1300TT and S1301 only: SP: ARTIFICIAL KEY for S1300TT and S1301
X				POWER METER: Power range — 500W E.g. Bird Thruline Wattmeter — Model 43 plug-in element — 500W 2-30 MHz impedance — 50 ohm
X				RF-AMMETER (Thermocross) Current range — 5A E.g. HELWEG MIKKELSEN & CO. Copenhagen, Denmark type TR-68x71 — 5A
X		X		DUMMY LOAD for HF bands, 4 MHz to 25 MHz Impedance — 50 ohm Frequency range — 0-25 MHz Power range — 500W E.g. BIRD Termaline Coaxial resistor Model 8401

NECESSARY TEST EQUIPMENT cont.:

SCEMATIC DIAGRAM FOR TESTBOX S1300/1301.

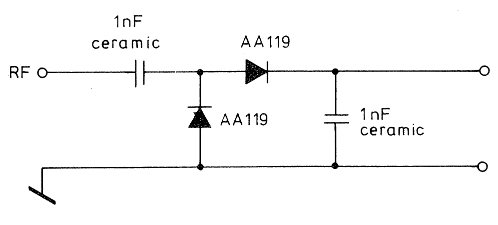


Connections to N1402

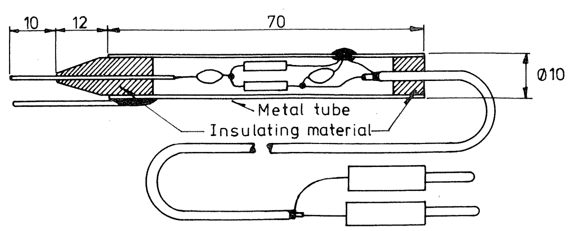


A 4/5

DIODE PROBE



LAYOUT OF THE PROBE



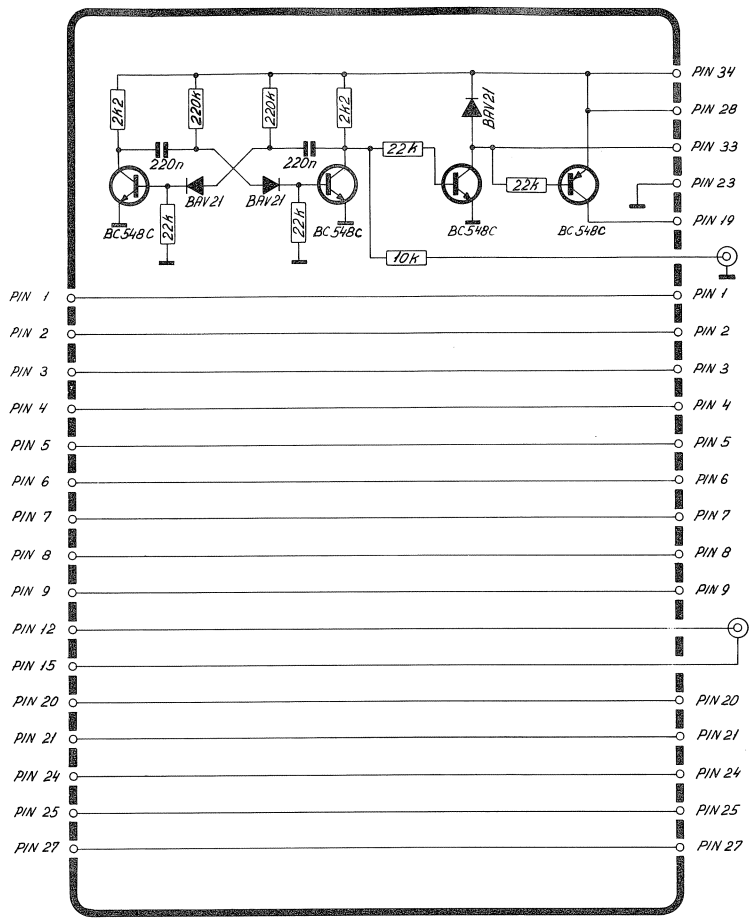
Necessary test equipment cont.:

FREQUENCY TABLE FOR TEST STRIPS

		Programming Code								Programming Code					
Progr. freq.	Pos.	zyxv	M A	100 DCBA	10 DCBA	1 DCBA	0,1 DCBA	Progr. freq.	Pos.	zyxv	M A	100 DCBA	10 DCBA	1 DCBA	0,1 DCBA
2000,5	1A	0101	0	0000	0000	0000	0101	25999,0	10A	1100	1	1001	1001	1001	0000
2000,0	1B	0100	0	0000	0000	0000	0000	24000,0	10B	1100	0	0000	0000	0000	0000
2000,9	1C	0010	0	0000	0000	0000	1001	NONE	10C	1111	0	0000	0000	0000	0000
2000,0	1D	0001	0	0000	0000	0000	0000	NONE	10D	0000	0	0000	0000	0000	0000
2200,0	2A	0001	0	0010	0000	0000	0000	2000,0	11A	0101	0	0000	0000	0000	0000
2600,0	2B	0001	0	0110	0000	0000	0000	4400,0	11B	0110	0	0100	0000	0000	0000
1600,0	2C	0001	1	0110	0000	0000	0000	3000,0	11C	0101	1	0000	0000	0000	0000
2400,9	2D	0011	0	0100	0000	0000	1001	5000,0	11D	0110	1	0000	0000	0000	0000
1888,8	3A	0001	1	1000	1000	1000	1000	6200,0	12A	0111	0	0010	0000	0000	0000
2444,4	3B	0001	0	0100	0100	0100	0100	6263,0	12B	0111	0	0010	0110	0011	0000
4222,2	3C	0110	0	0010	0010	0010	0010	6325,0	12C	0111	0	0011	0010	0101	0000
6300,0	3D	0111	0	0011	0000	0000	0000	NONE	12D	0000	0	0000	0000	0000	0000
8300,0	4A	1000	0	0011	0000	0000	0000	8195,0	13A	1000	0	0001	1001	0101	0000
12300,0	4B	1001	0	0011	0000	0000	0000	8315,0	13B	1000	0	0011	0001	0101	0000
16300,0	4C	1010	0	0011	0000	0000	0000	8435,0	13C	1000	0	0100	0011	0101	0000
22111,1	4D	1011	0	0001	0001	0001	0001	NONE	13D	0000	0	0000	0000	0000	0000
25300,0	5A	1100	1	0011	0000	0000	0000	12330,0	14A	1001	0	0011	0011	0000	0000
NONE	5B	0000	0	0000	0000	0000	0000	12491,0	14B	1001	0	0100	1001	0001	0000
400,0	5C	1101	0	0100	0000	0000	0000	12652,0	14C	1001	0	0110	0101	0010	0000
2182,0	5D	1110	0	0001	1000	0010	0000	NONE	14D	0000	0	0000	0000	0000	0000
1999,0	6A	1101	1	1001	1001	1001	0000	16460,0	15A	1010	0	0100	0110	0000	0000
0000,0	6B	1101	0	0000	0000	0000	0000	16660,0	15B	1010	0	0110	0110	0000	0000
3999,0	6C	0010	1	1001	1001	1001	0000	16859,0	15C	1010	0	1000	0101	1001	0000
2000,0	6D	0010	0	0000	0000	0000	0000	NONE	15D	0000	0	0000	0000	0000	0000
5999,0	7A	0110	1	1001	1001	1001	0000	22000,0	16A	1011	0	0000	0000	0000	0000
4000,0	7B	0110	0	0000	0000	0000	0000	22156,0	16B	1011	0	0001	0101	0110	0000
7999,0	7C	0111	1	1001	1001	1001	0000	22311,0	16C	1011	0	0011	0001	0001	0000
6000,0	7D	0111	0	0000	0000	0000	0000	NONE	16D	0000	0	0000	0000	0000	0000
9999,0	8A	1000	1	1001	1001	1001	0000	25070,0	17A	1100	1	0000	0111	0000	0000
8000,0	8B	1000	0	0000	0000	0000	0000	25090,0	17B	1100	1	0000	1001	0000	0000
13999,0	8C	1001	1	1001	1001	1001	0000	25110,0	17C	1100	1	0001	0001	0000	0000
12000,0	8D	1001	0	0000	0000	0000	0000	NONE	17D	0000	0	0000	0000	0000	0000
17999,0	9A	1010	1	1001	1001	1001	0000	595,0	18A	1101	0	0101	1001	0101	0000
16000,0	9B	1010	0	0000	0000	0000	0000	598,0	18B	1101	0	0101	1001	1000	0000
23999,0	9C	1011	1	1001	1001	1001	0000	601,0	18C	1101	0	0110	0000	0001	0000
22000,0	9D	1011	0	0000	0000	0000	0000	NONE	18D	0000	0	0000	0000	0000	0000

NECESSARY TEST EQUIPMENT cont.:

ARTIFICIAL KEY for S1300TT and S1301.



The ARTIFICIAL KEY is designed to connect between the exciter and the TEST BOX S1300/01. The necessary wires is fed through to the TEST BOX, and a multivibrator keyes via two transistors the exciter in the telex and telegraphy mode. The key frequency is approx. 15 Hz. Additionally there is taken out pulses to trig an oscilloscope, an AF signal can be fed into the exciter to modulate it in the telex mode.

3. TROUBLE-SHOOTING

Trouble-shooting should only be performed by persons with sufficient technical knowledge, who have the necessary test equipment at their disposal, and who have carefully studied the operation principles and structure of the unit in question.

Start to find our whether the fault is somewhere in the antenna circuit, the power source, or in the short wave set.

For help with trouble-shooting in the short wave set there is a built-in test meter and test meter switch, located behind the air filter on the power supply.

When the fault has been located to a certain unit look up the PERFORMANCE CHECK list in the instruction book and make relevant performance check to incircle the fault. Then look up the CIRCUIT DESCRIPTION. This section contains scematic diagrams, description of the modules and pictures showing the location of the components. (ADJUSTMENT LOCATIONS).
Typical AC and DC voltages are indicated on the scematic diagrams.

No adjustment must take place unless the service workshop has the necessary test equipment to perform the ADJUSTMENT PROCEDURE in question.

After repair or replacement of the module look up the section NECESSARY ADJUSTMENTS AFTER REPAIR to see, whether the unit has to be adjusted or not.

Anyway the unit has to have a complete FUNCTION CHECK after repair.

A

TROUBLE-SHOOTING IN THE FREQUENCY GENERATING CIRCUIT

LOOP 1

If the fault has been located to LOOP 1 the following hints can be used for trouble-shooting.

If there is no output signal from the VCO the fault has to be found in the VCO-UNIT.

If the output frequency from the VCO is lower than the low frequency limits or higher than the high frequency limits of the 2 MHz band in question, the phase locked loop 1 is out of lock. For VCO frequencies look-up the section PRINCIPLE OF OPERATION.

1. Check the LOOP 1 MIXER output signal on the terminal "Loop 1 out".
   a. If there is no output signal, the failure is on LOOP 1 MIXER, HARMONIC FILTER UNIT or VCO-UNIT.
   b. If the output frequency is approx. 2 MHz or approx. 5 MHz, the VCO-UNIT LOOP 1 MIXER and the HARMONIC FILTER UNIT are apparently ok.
2. Check that the frequency on the phase/frequency detector IC106, pin 1 is 1 kHz.
3. Check the Loop 1 Programmable Divider.
   a. If the frequency on the input terminal "Loop 1 In" is approx. 2 MHz and the frequency on the phase/frequency detector IC106, pin 3 is lower than 1 kHz, the programmable divider is apparently ok.
   b. If the frequency on the input terminal "Loop 1 In" is approx. 5 MHz and the frequency on the phase/frequency detector IC106, pin 3 is higher than 1 kHz, the programmable divider is apparently ok.
4. Check the phase/frequency detector IC106.
   a. Measure 1.5V DC on the terminal "PD1 (1.5V) out" on DIVIDER-UNIT.
   b. If the input frequency on IC106, pin 3 is higher than 1 kHz and the DC-voltage on the terminal "PD1 out" on DIVIDER-UNIT is approx. 0.7V, the phase/frequency detector is apparently ok.
   c. If the input frequency on IC106, pin 3 is lower than 1 kHz and the DC-voltage on the terminal "PD1 out" on DIVIDER-UNIT is approx. 2.3V, the phase/frequency detector is apparently ok.
5. Check the integrator IC202 on LOOP 1 FILTER & ±18V SUPPLY-UNIT.
   a. If the DC voltage on the terminal "PD1 In" is approx. 0.7V and the DC voltage on output terminal of IC202, pin 6 is approx. -4V, the integrator IC202 is apparently ok.
   b. If the DC voltage on the terminal "PD1" is approx. 2.3V and the DC voltage on the output terminal of IC202, pin 6 is approx. -17V, the integrator IC202 is apparently ok.
6. If the failure has not been found yet the 1 kHz loop filter IC201 and the wirings to the VCO must be checked.

TROUBLE-SHOOTING cont.:

LOOP 2

If the fault has been located to LOOP 2 the following hints can be used for trouble-shooting.

If there is no output signal from the VCXO and LOOP 2 FILTER on the terminal "VCXO out" , the failure has to be found in the VCXO.

If the output frequency from the VCXO and LOOP 2 FILTER on the terminal "VCXO out" is lower than 10.098 MHz or higher than 10.099 MHz, the phase locked loop 2 is out of lock.

1. Check the output signal on VCXO and LOOP 2 FILTER terminal "Loop 2 out".
   a. If there is no output signal, the failure is in the loop 2 mixer or the 10 MHz injection signal is missing.
   b. If the output frequency is slightly lower than 98 kHz or slightly higher than 99 kHz, the VCXO, LOOP 2 mixer and the 10 MHz injection signal are apparently ok.

2. Check that the frequency on the phase/frequency detector IC113, pin 1 is 100 Hz.

3. Check the LOOP 2 Programmable Divider.
   a. If the frequency on the input terminal "Loop 2 In" is approx. 97 kHz and the frequency on the phase/frequency detector IC113, pin 3 is slightly lower than 100 Hz, the programmable divider is apparently ok.
   b. If the frequency on the input terminal "Loop 2 In" is approx. 100 kHz and the frequency on the phase/frequency detector IC113, pin 3 is slightly higher than 100 Hz, the programmable divider is apparently ok.

4. Check the phase/frequency detector IC113.
   a. Measure 1.5V DC on the terminal "PD2 (1.5V)" on the DIVIDER-UNIT.
   b. If the input frequency on IC113, pin 3 is lower than 100 Hz and the DC voltage on the terminal "PD2 Out" on DIVIDER-UNIT is approx. 0.7V, the phase/frequency detector is apparently ok.
   c. If the input voltage on IC113, pin 3 is higher than 100 Hz and the DC voltage on the terminal "PD2 Out" on DIVIDER-UNIT is approx. 2.3V the phase/frequency is apparently ok.

5. Check the integrator IC601 on VCXO and LOOP 2 FILTER.
   a. If the DC voltage on the terminal "PD2 In" is approx. 0.7V and the DC voltage on output terminal of IC601, pin 6 is approx. 17V, the integrator IC601 is apparently ok.
   b. If the DC voltage on the terminal "PD2 In" is approx. 2.3V and the DC voltage on the output terminal of IC601, pin 6 is approx. 1V, the integrator IC601 is apparently ok.

6. If the failure has not yet been found the 100 Hz loop filter must be checked.

4. PERFORMANCE CHECK FOR S1301

Before executing performance check the exciter must be connected to power supplies +22V and -45V via the testbox S1300/01 and the artificial key for S1300TT and S1301. The output connector shall be loaded with 50 ohm, and the exciter shall be activated by a microphone key plug with a capacitor in it for connection to tone generator.

4.1.1.
Connect voltmeter to TP1.

4.1.2.
Check the voltage to be within 18V ±0.2V.

4.1.3.
Connect voltmeter to TP2.

4.1.4.
Check the voltage to be within -18V ±0.2V.

4.1.5.
Connect voltmeter between TP1 and TP3.

4.1.6.
Check the voltage to be within 100 mV.

4.1.7.
Connect voltmeter to TP31.

4.1.8.
Check the voltage to be within 5V ±0.2V.

4.1.9.
Connect frequency counter to TP4.

4.1.10.
Check the frequency to be within 10 000 000 Hz ±1 Hz.

4.2.
MOTOR CONTROL AND FREQUENCY SELECTOR.

4.2.1.
Set POWER "ON/OFF" to "1".

4.2.2.
Connect frequency counter to TP21. Mode, A3A and full power on both front panel and power level potentiometer.

4.2.3.
Set the frequency selector to the first frequency indicated in fig. 1.

4.2.3.
Code the corresponding motor code on the testbox S1300/01.

4.2.4.
Check that the LEDs on the testbox is lighting as indicated in fig. 1. Note that for incorrect code TUNE lamp is lighting instead of BLOCK P.S.

4.2.5.
Check that the output frequency read on the frequency counter is as indicated in fig. 1.

4.2.6.
Go to next frequency indicated in fig. 1 and go through 4.2.3., 4.2.4., 4.2.5. and 4.2.6. until all the table is done.

4.2.7.
Switch off the frequency selector and go to fixed 2182 kHz.

4.2.8.
Code the corresponding motor code s,r,q,p,o = 1,1,1,1,0.

4.2.9.
Check that only BLOCK P.S. on the testbox and the "2182 SELECTED" on front panel is lighting.

4.2.10.
Set "POWER ON/OFF" to "0", and check that BLOCK P.S. turns off. Set "POWER ON/OFF" back to "1".

4.2.11.
Change one bit in the motor code and check that the tune lamp on front panel is lighting.

4.2.12.
Select 26100.0 kHz and check that "FREQUENCY OUTSIDE BANDS" lamp on front panel is lighting and tune lamp not.

FREQUENCY SELECTED	MOTOR CONTROL CODE	BAND CODE			BLOCK P.S.	TUNE	400W/800W
	s r q p o	Z Y X V	A	O C B			
1600.0	0 1 0 1 1	0 0 0 1	1	0 1 1	X		
1700.0	0 1 0 1 1	0 0 0 1	1	0 1 1	X		
1800.0	0 1 1 0 0	0 0 0 1	1	1 0 0	X		
1900.0	0 1 1 0 0	0 0 0 1	1	1 0 0	X		
2000.0	0 0 0 0 0	0 0 0 1	0	0 0 0	X		
2100.0	0 0 0 0 0	0 0 0 1	0	0 0 0	X		
2200.0	0 0 0 0 1	0 0 0 1	0	0 0 1	X		
2300.0	0 0 0 0 1	0 0 0 1	0	0 0 1	X		
2400.0	0 0 0 1 0	0 0 0 1	0	0 1 0	X		
2500.0	0 0 0 1 0	0 0 0 1	0	0 1 0	X		
2600.0	0 0 0 1 1	0 0 0 1	0	0 1 1	X		
2700.0	0 0 0 1 1	0 0 0 1	0	0 1 1	X		
2800.0	1 0 0 1 0	0 0 1 0			X		
2900.0	1 0 0 1 0	0 0 1 0			X		
3000.0	1 0 0 1 0	0 0 1 0			X		
3100.0	1 0 0 1 1	0 0 1 1			X		
3200.0	1 0 0 1 1	0 0 1 1			X		
3300.0	1 0 0 1 1	0 0 1 1			X		
3400.0	1 0 1 0 0	0 1 0 0			X		
3500.0	1 0 1 0 0	0 1 0 0			X		
3600.0	1 0 1 0 0	0 1 0 0			X		
3700.0	1 0 1 0 1	0 1 0 1			X		
3800.0	1 0 1 0 1	0 1 0 1			X		
3900.0	1 0 1 0 1	0 1 0 1			X		
4000.0	1 0 1 1 0	0 1 1 0			X		X
4100.0	1 0 1 1 0	0 1 1 0			X		X
4200.0	1 0 1 1 0	0 1 1 0			X		X
6200.0	1 0 1 1 1	0 1 1 1			X		X
6300.0	1 0 1 1 1	0 1 1 1			X		X
8100.0	1 1 0 0 0	1 0 0 0			X		X
8200.0	1 1 0 0 0	1 0 0 0			X		X
8300.0	1 1 0 0 0	1 0 0 0			X		X
8400.0	1 1 0 0 0	1 0 0 0			X		X
12300.0	1 1 0 0 1	1 0 0 1			X		X
12400.0	1 1 0 0 1	1 0 0 1			X		X
12500.0	1 1 0 0 1	1 0 0 1			X		X
16400.0	1 1 0 1 0	1 0 1 0			X		X
16500.0	1 1 0 1 0	1 0 1 0			X		X
16600.0	1 1 0 1 0	1 0 1 0			X		X
16700.0	1 1 0 1 0	1 0 1 0			X		X
16800.0	1 1 0 1 0	1 0 1 0			X		X
22000.0	1 1 0 1 1	1 0 1 1			X		X
22100.0	1 1 0 1 1	1 0 1 1			X		X
22200.0	1 1 0 1 1	1 0 1 1			X		X
22300.0	1 1 0 1 1	1 0 1 1			X		X
25000.0	1 1 1 0 0	1 1 0 0			X		X
25100.0	1 1 1 0 0	1 1 0 0			X		X
405.0	1 1 1 0 1	1 1 0 1			X		X
535.0	1 1 1 0 1	1 1 0 1			X		X

FIG. 1.

S1301 B 2/7

4.3.
FREQUENCY SELECTION.

4.3.1.
Connect frequency counter to TP21.
Mode A3A.

4.3.2.
Choose the following frequencies on the frequency selector: 1888.8 kHz, 2444.4 kHz, 2222.2 kHz and 2111.1 kHz, and check correct output frequency.

4.4.
HARMONIC FILTER
Load TP26 with 68 ohm.

4.4.1.
Connect frequency counter to TP30.

4.4.2.
Connect voltmeter to TP6.

4.4.3.
Connect voltmeter to TP7.

4.4.4.
Disconnect the grey/black (100 kHz D), yellow/brown (1 MHz A), red/black (100 kHz B) and the yellow/black (100 kHz C) wire on the frequency selector board. Connect the yellow/black and the red/black wire to chassis. Connect the brown/yellow and the grey/black together and leave them open in all A positions and short-circuit them to chassis in all B positions.

4.4.5.
Go through the frequencies indicated in fig. 5 and check the above mentioned test points.

Ad. 4.4.1.
In the A positions read 4698 kHz.
In the B positions read 2699 kHz.

Ad. 4.4.2.
In all positions check the voltage to be below 3.5V.

Ad. 4.4.3.
In the A positions read 15V ±1V.
In the B positions read 7.5V ±2.5V.

4.4.6.
Disconnect the 68 ohm load from TP26.
Reconnect the four wires disconnected in 4.4.4.

VCO under test	Pos.	Frequency selected
VCO1	A	1999.0
	B	1800.0
VCO2	A	2999.0
	B	2800.0
VCO3	A	4199.0
	B	4000.0
VCO4	A	6399.0
	B	6200.0
VCO5	A	8199.0
	B	8200.0
VCO7	A	12399.0
	B	12400.0
VCO9	A	16599.0
	B	16600.0
VCO12	A	22199.0
	B	22200.0
VCO13	A	25199.0
	B	25000.0

FIG. 5.

4.5.
STEP RESPONSE.

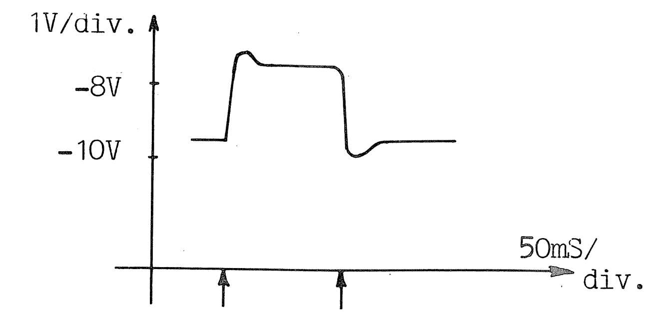
4.5.1.
Connect oscilloscope to TP7.

4.5.2.
Set the frequency selector to 2499.9 kHz.

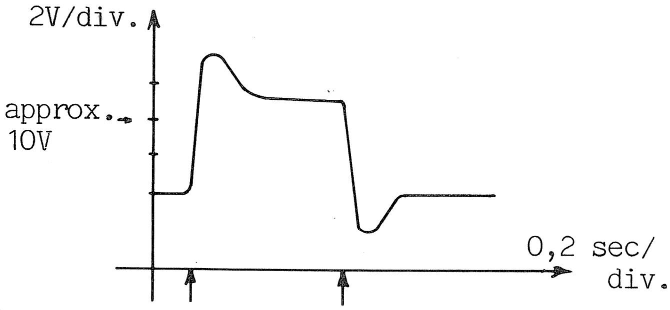
4.5.3.
Short-circuit the black/yellow control wire on divider board to ground. Step response is seen on oscilloscope, compare to fig. 2. next page.

4.5.4.
Connect oscilloscope to TP8.

4.5.5.
Short-circuit the grey control wire on divider board to ground. Step response is seen on oscilloscope, compare to fig. 3.



Connect Disconnect Fig. 2.



Connect Disconnect Fig. 3.

4.6.
LEVEL CHECK.

4.6.1.
Set the frequency selector to 2000.5 kHz.

4.6.2.
Connect oscilloscope to TP29 via 1:10 probe.

4.6.3.
Check the voltage to be above 1.7V pp.

4.6.4.
Connect oscilloscope to TP27 via 1:10 probe.

4.6.5.
Check the voltage to be above 1.6V pp.

4.6.6.
Connect oscilloscope to TP28 via 1:10 probe.

4.6.7.
Check the voltage to be above 2.5V pp.

4.6.8.
Connect voltmeter to TP8.

4.6.9.
Check the voltage to be within 6V to 11V.

4.6.10.
Switch the frequency selector to 2000.0 kHz, and check the voltage to be below 14.5V.

4.6.11.
Switch the frequency selector to 2000.9 kHz, and check the voltage to be above 4V.

4.7.
MICROPHONE AMPLIFIER.

4.7.1.
Connect oscilloscope to TP12.

4.7.2.
Set exciter to A3J and connect tone generator, 1000 Hz, to microphone plug.

4.7.3.
Turn tone generator output control fully counter clockwise and then clockwise until the level on TP12 is just constant. This limitation shall happen at approx. 300 mV pp. measured on TP25.

4.7.4.
Add 10 dB to tone generator output (1V pp.), and check that the measured signal is approx. symmetrical clipped.

4.7.5.
Connect oscilloscope to TP24.

4.7.6.
By connection and disconnection of the tone generator signal the measured voltage shall be as shown on fig. 4.

4.8.
A2H OSCILLATOR AND DELAY UNIT.

4.8.1.
Connect frequency counter to TP32, and check the frequency to be within 455 Hz to 475 Hz in A2H position.

4.8.2.
Connect oscilloscope to TP21, and tone-generator to the artificial key. Tone-generator output: 1500Hz and 1Vpp.

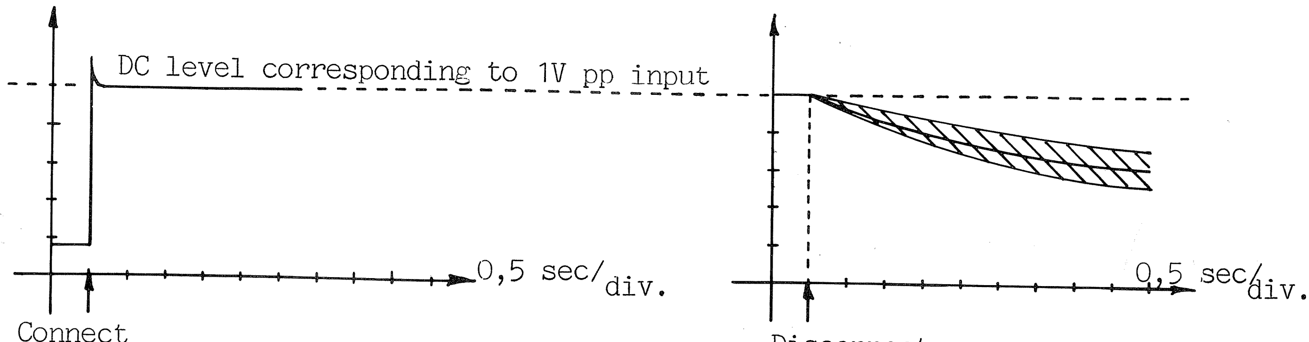
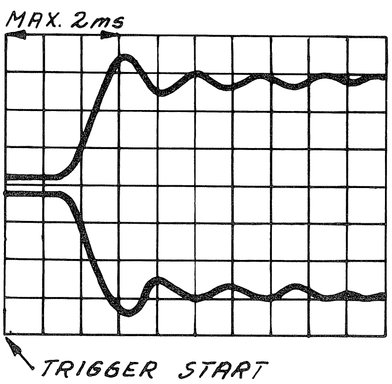


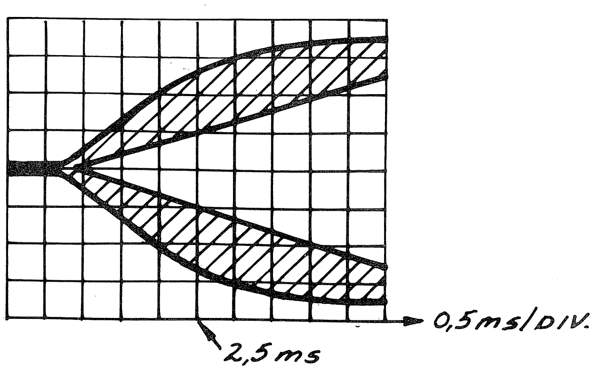
Fig. 4.

4.8.3.
Select 2000.5 kHz and telex, trig the oscilloscope from the artificial key, and check the output envelope on the oscilloscope with the figure below.
Disconnect the tonegenerator.

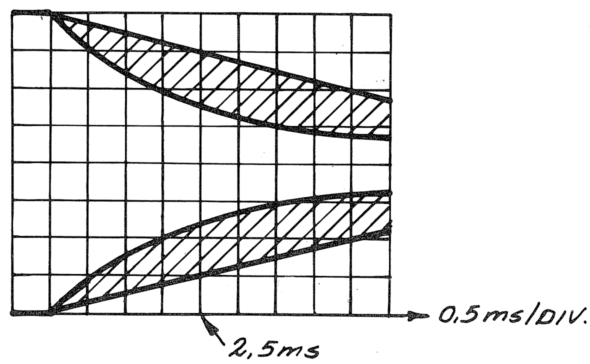


4.8.4.
Select 2000.5 kHz, A1 and oscilloscope sensitivity to 0.1V/div., adjust power level potentiometer until the steady state level is 8 cm pp. on the screen.

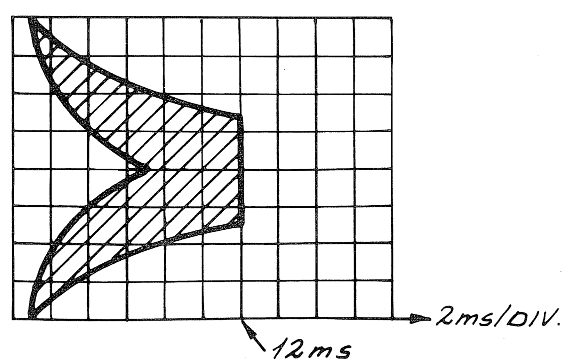
4.8.5.
Trig the oscilloscope from the artificial key and check the output envelope on the oscilloscope with the figure below.



4.8.6.
Trig the oscilloscope on the opposite edge and check the output envelope with the figure below.



4.8.7.
Change sweep rate to 2 mS/div. and check the +22V from delay as indicated on the figure below.



4.8.8.
Connect the oscilloscope to TP35 on the A2H oscillator board and check that the voltage is +22V for a time period between 10 mS and 30 mS.

4.9.
OUTPUT LEVEL.

4.9.1.
Connect oscilloscope to TP21 via 1:10 probe.

4.9.2.
Select 2000.5 kHz, tune, full power and power level potentiometer fully clockwise.
Measure the voltage to be within 18V pp. and 21V pp.

4.10.
POWER REDUCTION

4.10.1.
Connect diode probe to TP21.

4.10.2.
Select 2000.5 kHz, tune and full power. Check that the power level potentiometer can change output level between 10 dB and 13 dB.

4.10.3.
With power level potentiometer fully clockwise, check the first power reduction step to be between 4 dB and 6 dB below full power, the second step 8 dB to 12 dB, the third step 12 dB to 18 dB and the fourth step 17 dB to 23 dB below full power.

4.11.
A3H, A3A, A2H, A1 and TELEX.

4.11.1.
Connect oscilloscope to TP21 via 1:10 probe.

4.11.2.
Select 2000.5 kHz, tune and full power, adjust power level potentiometer until there is full deflection (8 cm) on oscilloscope screen.

4.11.3.
Change to A3H, without modulation. Check A3H carrier, now seen to be within 4 cm and 5 cm.

4.11.4.
Connect tonegenerator, 1000 Hz and 1V pp. to microphone plug.

4.11.5.
Check the output in A3H, A3A, A2H and A3J to be within 7 cm pp. and 8 cm pp. on oscilloscope.

4.11.6.
Check the output in A1 to be within 5 cm pp. and 6.4 cm pp. on the oscilloscope.

4.11.7.
Select 2000.5 kHz and A3J. Connect tonegenerator, 1500 Hz and 1V pp. to the microphone plug and adjust the output level to full deflection (8 cm) on the oscilloscope screen. Connect tonegenerator to the artificial key.

4.11.8.
Select 2000.5 kHz and telex. Connect the grey/white wire W2/9-10 to the yellow wire W1/9-10 on the mode switch board. Connect TP33 to ground and check the steady state output to be within 7 cm pp. and 8 cm pp. on the oscilloscope.

4.11.9.
Connect TP33 to TP34 on the mode switch unit and check the steady state output to be within 4.5 cm pp. and 6 cm pp. Disconnect the established connections.

4.12.
BANDPASS FILTER UNIT.

Lowpass filter and bandpass filters are checked as described in adjustment procedure 5.9.1. - 5.9.4.

4.13.
ALARM GENERATOR

The alarm generator is checked as described in adjustment procedure 5.6.1. - 5.6.4.

4.14.
FREQUENCY RESPONSE

Frequency responses from microphone plug to output socket is measured as described in adjustment procedure 5.7.3.

4.15.
DISTRESS

Connect a handset to the exciter. Switch to fixed 2182 kHz and do a talk test. Check the output on TP21 with oscilloscope. Press alarm and test alarm at the same time.
The distress signal can now be seen on the oscilloscope. The time from start of alarm signal until it automatically disappears is checked by a watch to be within 35 secs. and 55 secs.

5. ADJUSTMENT PROCEDURE FOR S1301

Before adjustment of the exciter, it must be connected to +22V and -45V power supplies via the testbox S1300/01 and the artificial key, furthermore the output connector shall be loaded with 50 ohm and the exciter shall be activated by a microphone key plug with a capacitor in it for connection to a tone generator.

The following adjustment steps are all starting with information about frequency selected and operation mode, e.g. 2000.5, tune.

The trimming cores are factory sealed. In order to break the seal, use normal cellulose thinner.

5.1.
DC ADJUSTMENTS.

5.1.1.
Connect voltmeter to TP1.

5.1.2.
Adjust R902 to +18V.

5.1.3.
Connect voltmeter to TP2.

5.1.4.
Adjust R209 to -18V.

5.1.5.
Connect voltmeter between TP1 and TP3.

5.1.6.
Adjust R214 to less than 100 mV.

5.1.7.
Disconnect brown wire to TP22, and insert amperemeter.

5.1.8.
Adjust R1536 to 285 mA.

5.1.9.
Reconnect brown wire to TP22.

5.2.
MICROPHONE AMPLIFIER.

5.2.1.
2000.5, A3J. Connect tone generator, 1000 Hz and 300 mV pp. measured on TP25.

5.2.2.
Connect oscilloscope to TP12.

5.2.3.
Turn R1201 fully counter clockwise, and then clockwise until the measured level is just constant.

5.2.4.
Add 10 dB to tone generator output 1V pp.

5.2.5.
Adjust R1224 for symmetrical clipping.

5.2.6.
Connect oscilloscope to TP13.

5.2.7.
Change to tune position.

5.2.8.
Adjust R1232 to 80 mV pp.

5.3.
TCXO.

5.3.1.
Connect frequency counter to TP4.

5.3.2.
Adjust R112 to 10 000 000 Hz.

5.4.
SIGNAL PATH.

5.4.1.
2000.5, A3J, with no input from tone generator. Connect oscilloscope to TP9 via 1:10 probe.

5.4.2.
Adjust L101, L1101 and L1103 for max.

5.4.3.
Adjust R1125 and C1123 for min. This adjustment shall be repeated until the measured signal is almost a 1.2 MHz sine.

5.4.4.
Turn power level potentiometer fully clockwise.

5.4.5.
Connect oscilloscope to TP23 via 1:10 probe.

5.4.6.
Adjust R1625 to min.

5.4.7.
2000.5, tune, full power. Connect oscilloscope to TP21 via 1:10 probe. If the signal is clipped, reduce output until it is undistorted.

5.4.8.
Adjust L1108, L1601, L1603 and L1604 for max.

5.4.9.
Connect oscilloscope to TP17 via 1:10 probe and set output to max.

5.4.10.
Adjust R1151 to 350 mV pp.

5.4.11.
Connect oscilloscope to TP20 via 1:10 probe.

5.4.12.
Adjust R1631 to 2.8V pp.

5.4.13.
Connect oscilloscope to TP21 via 1:10 probe.

5.4.14.
Adjust R1534 to 21V pp.

5.5.
A3H AND A2H LEVEL.

5.5.1.
Connect frequency counter to TP32.

5.5.2.
2000.5, A2H. Adjust L1801 to 465 Hz ±5 Hz.

5.5.3.
2000.5, tune and full power. Connect oscilloscope to TP21 via 1:10 probe.

5.5.4.
Adjust power level potentiometer to full screen (8 cm).

5.5.5.
Change to A3H without modulation. Adjust the A3H carrier now seen to 4.4 cm with R1109.

5.5.6.
Change to A2H, and adjust R1806 until the A2H signal now seen is 8 cm pp.

5.5.7.
Connect oscilloscope to TP35, and trig the oscilloscope from the artificial key and load TP35 with 1 kOhm.

5.5.8.
2000.5, A1. Adjust the voltage now seen to be +22V for a time period of 18 mS ±1 mS on the potentiometer R1819.

5.6.
ALARM GENERATOR.

5.6.1.
2000.5, test alarm. Short-circuit C1301. One of the two alarm tones can now be measured on TP11. By removing and establishing the short-circuit, the alarm generator can be changed to the other tone. If necessary the tones may be adjusted on L1301: 22 00 Hz ±15 Hz and L1302 1300 Hz ±10 Hz.

5.6.2.
Disconnect the established short-circuit.

5.6.3.
Connect frequency counter, in time period position, to TP10.

5.6.4.
Adjust R1301 to 250 mS ±10 mS. Under adjustment the alarm generator will stop after about 45 secs. For restart, release test alarm push button and activate it again.

The following filter adjustments shall only be carried out when some repair is done around a filter.

5.7.
600 kHz SSB FILTER.

5.7.1.
2000.5, tune. Connect oscilloscope to TP21 via 1:10 probe.

5.7.2.
Adjust L1106 and L1107 for max.

5.7.3.
Control of filter response is carried out in mode A3J, with tone generator connected to microphone plug, output 1V pp. measured on TP25.

Frequency response is measured with diode probe on TP21. Max. permissible ripple is 2 dB in the frequency range 500 Hz - 2500 Hz, -6dB frequencies is approx. 350 Hz and 2700 Hz.

5.7.4.
Go through 5.4.9. - 5.4.14.

5.8.
10.7 MHz FILTER.

5.8.1.
598.0, A3H without modulation. Disconnect innercore of coaxial cable W1/6-16 and short-circuit the green wire (X band select) on the FREQUENCY SELECTOR UNIT to chassis.

5.8.2.
Connect point 1 to point 5 on mixerboard with an external wire.

5.8.3.
Connect oscilloscope to TP19 via 1:10 probe.

5.8.4.
Adjust L1601 and L1602 to max.

5.8.5.
Adjust slightly L1601 and/or L1602 until the amplitude is the same within ±0.25 dB, with the frequencies 595.0 kHz, 598.0 kHz and 601.0 kHz selected.

5.8.6.
Remove wire between 1 and 5, reconnect W1/6-16, and the green wire on the FREQUENCY SELECTOR UNIT.

5.8.7.
Go through 5.4.9. - 5.4.14.

5.9.
BAND FILTER UNIT AND LOWPASS FILTER.

5.9.1.
2000.0, tune. Connect diode probe to TP21.

5.9.2.
Adjust power level potentiometer until 7.75V, corresponding to +20 dB on the decibel scale, is attained.
Repeat adjustment of L1513 and L1514 until output difference is below 0.5 dB with the frequencies 1600.0 kHz, 2000.0 kHz, 3000 kHz and 4299.0 kHz selected.

5.9.3.
2000.0, tune. Connect diode probe to TP21.

5.9.4.
Adjust power level potentiometer to +20 dB (7.75V).

The frequencies for bandpass filter adjustments is chosen so that center frequency is in position B, and band limits in position A and C. See the table below.

Every single bandpass filter shall be adjusted to max. output. The output must be within +0.25 dB in A and C relative to B. And the deflection on the center frequency, position B, shall be between 19.0 dB and 20.5 dB.

A	B	C
6200.0	6263.0	6325.0
8195.0	8315.0	8435.0
12330.0	12491.0	12652.0
16460.0	16660.0	16859.0
22000.0	22156.0	22311.0
25070.0	25090.0	25110.0

5.9.5.
Go through 5.4.9. - 5.4.14.

6. NECESSARY ADJUSTMENTS AFTER REPAIR FOR S1301

In the following paragraphs is referred to the necessary adjustment- and performance check paragraphs in chapter 4 and 5.

6.1.
DIVIDER UNIT
Execute 4.1.8., 5.3. and adjust L101 as described in 5.4.1. and 5.4.2.
Check 4.3.1., 4.3.2., 4.5. and 4.9.

6.2.
LOOP 1 FILTER & ±18V POWER SUPPLY

Execute 5.1.1. - 5.1.6. (both incl.)
Check 4.4., 4.5.1., 4.5.2. and 4.5.3.

6.3.
VCO UNIT, HARMONIC FILTER OR LOOP 1 MIXER

Check 4.3., 4.4., 4.5.1., 4.5.2. and 4.5.3.

6.4.
VCXO AND LOOP 2 FILTER

Execute 5.4.7. - 5.4.14. (both incl.) without adjusting L1108, L1603 and L1604.
Check 4.6.6. - 4.6.11. (both incl.).
Check 4.5.4. and 4.5.5.

6.5.
MOTOR CONTROL UNIT

Check 4.2.

6.6. FILTER UNIT

Execute 5.1.1., 5.1.2., 5.1.5. and 5.1.6.

6.7.
MODE SWITCH UNIT

Carry out a FINCTION CHECK 7.

6.8.
SSB GENERATOR
Execute 5.4., 5.5., 5.10.3. and 5.10.4., without adjusting L101, L601, L1603 and L1604.

6.9.
MICROPHONE AMPLIFIER

Execute 5.2. and 5.4.9. - 5.4.14. (both incl.).
Check 4.7.

6.10.
ALARM SIGNAL GENERATOR

Execute 5.6.
Check 4.15.

6.11.
DRIVER UNIT OR BANDPASS FILTER

Execute 5.1.8., 5.1.9. and 5.9., no coil adjustment will generally be necessary.

6.12.
MIXER UNIT

Execute 5.4.4. - 5.4.14. (both Incl.) without adjusting L1108 and L1601.

6.13.
A2H OSCILLATOR & DELAY UNIT

Execute 5.5. without adjusting R1109

6.14.
FREQUENCY SELECTOR UNIT

Execute 4.2.2., 4.2.3., and 4.2.5. for every frequency in fig. 1.

Execute 4.2.12 and 4.3.

7. FUNCTION CHECK FOR S1301

7.1.1.
Connect artificial key, S1300/01 testbox, power supplies, 50 ohm load and tonegenerator via key plug to the exciter.

7.1.2.
Connect frequency counter to output connector via 1:10 probe.

7.1.3.
Set exciter to A3A, full power, power level potentiometer fully clockwise and no modulation.

7.1.4.
Select the following frequencies: 1888.8 kHz, 2444.4 kHz, 4111.1 kHz, 6222.2 kHz, 8300.0 kHz, 12400.0 kHz, 16600.0 kHz, 22100.0 kHz and 25100.0 kHz, and check the output frequency to be within 0.5 ppm.

7.2.1.
Change to tune position.

7.2.2.
Connect diode probe to output connector.

7.2.3.
Go through the above mentioned frequencies and check the voltage to be within 16V to 20V.

7.2.4.
Check that the power level potentiometer control range is approx. 12 dB.

7.2.5.
With power level potentiometer fully clockwise, check the first power reduction step to be between 4 dB and 6 dB below full power, the second step 8 dB to 12 dB, the third step 12 dB to 18 dB and the fourth step 17 dB to 23 dB below full power.

7.3.1.
Change to A3J. Select 2000.0 kHz.

7.3.2.
Supply 1500 Hz and 1V RMS to microphone plug.

7.3.3.
Adjust power level potentiometer until meter deflection is 7.75V corresponding to +20 dB.

FUNCTION CHECK FOR S1301 cont.:

7.3.4.
Change tone generator frequency between 500 Hz and 2500 Hz, and check that the output amplitude ripple is below 2 dB. Check that -6 dB frequencies are approx. 300 Hz and 2700 Hz.

7.3.5.
Turn tone generator to 1000 Hz.

7.3.6.
Disconnect diode probe and connect oscilloscope to output connector.

7.3.7.
Change to tune position.

7.3.8.
Adjust power level potentiometer to full deflection on oscilloscope - screen (8 cm pp.).

7.3.9.
Check that the amplitude is within 7 cm pp. and 8 cm pp. in the positions A3J, A3H and A3A.

7.3.10.
Check that the steady state amplitude is within 7 cm pp. and 8 cm pp. in A2H position.

7.3.11.
Check that the steady state amplitude is within 5 cm pp. and 6.4 cm pp. in A1 position.

7.3.12.
Supply 1500 Hz and 1V RMS to the artificial key.

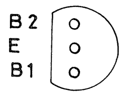
7.3.13.
Check that the steady state amplitude is within 6 cm pp. and 8 cm pp. in telex position.

7.4.1.
Change to fixed 2182 kHz.

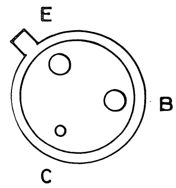
7.4.2.
Press alarm and test alarm at the same time. The distress signal can now be seen on the oscilloscope. The time from start of alarm signal until it automatically disappears shall be between 35 secs. and 55 secs.

Check that power switch is disabled under alarm transmission.

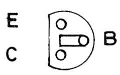
BOTTOM VIEW



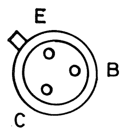
2N4871



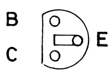
BFW 17A



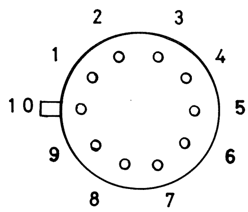
BC 328-25
BC 338
BC 547
BC 548 A,B,C
BC 556 A
BC 558 A,B,C



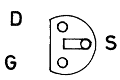
2N2368



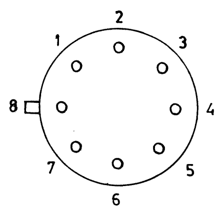
BF 199
BF 494



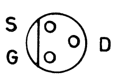
CA 3019



BF256 A,B,C



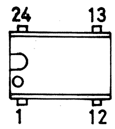
LM3053



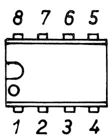
E310

A 1/2

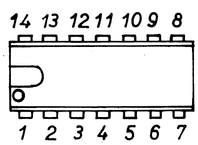
TOP VIEW



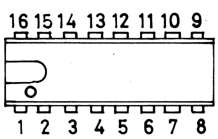
MC 14515 BCB



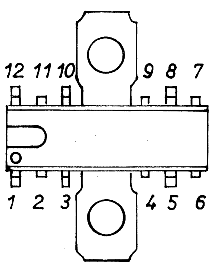
LM 308 N
MC 1455 P1
MC 1458



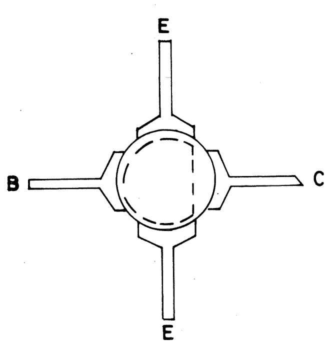
LM 324
LM 3086
MC 4044
MC 14077 B CP
MC 14081 B CP
SN 7407N
SN 7410N
SN 7472N
SN 74LS 20N
SN 74LS27 N
SN 74 LS 290N



MC 14519 B CP
MC14530B CP
SN 74LS109N
SN 74LS192N
SN 74LS390N

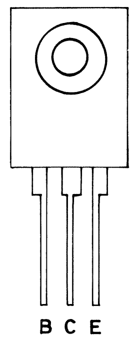


TCA 940

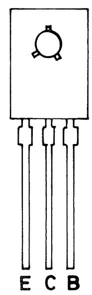


2N5641

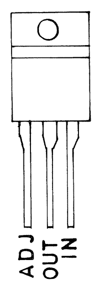
FRONT VIEW



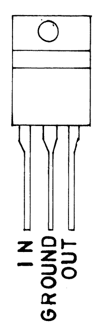
BD 577



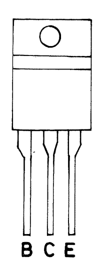
BD138
BD139



LM317 T



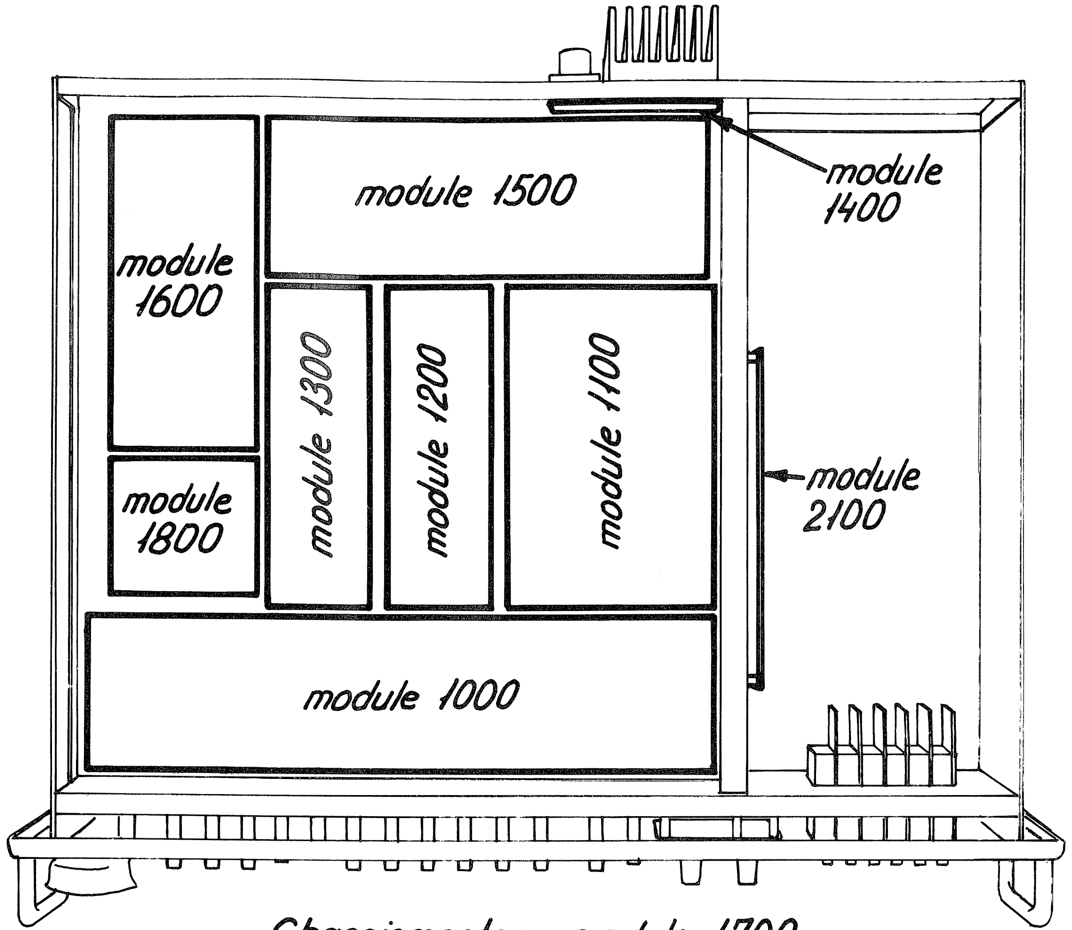
MC7805 CT
MC 7818 CT



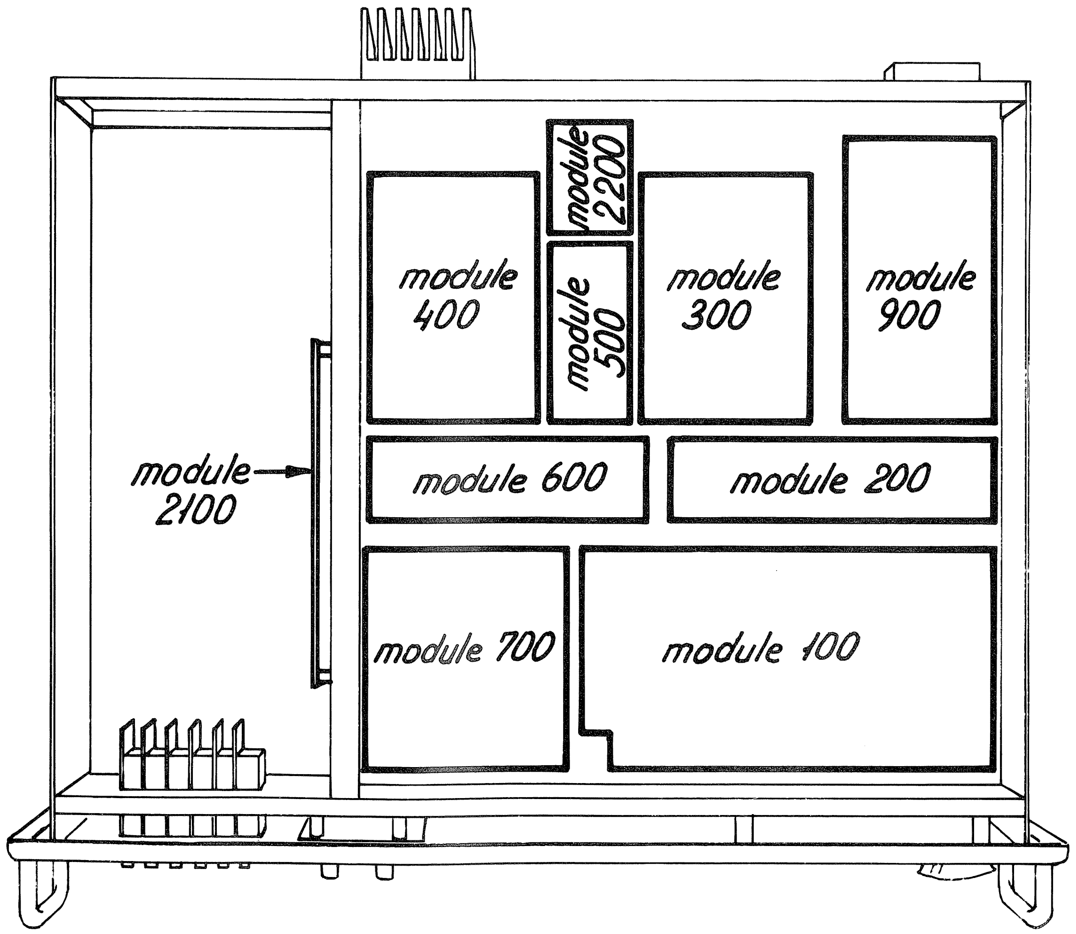
BD 241

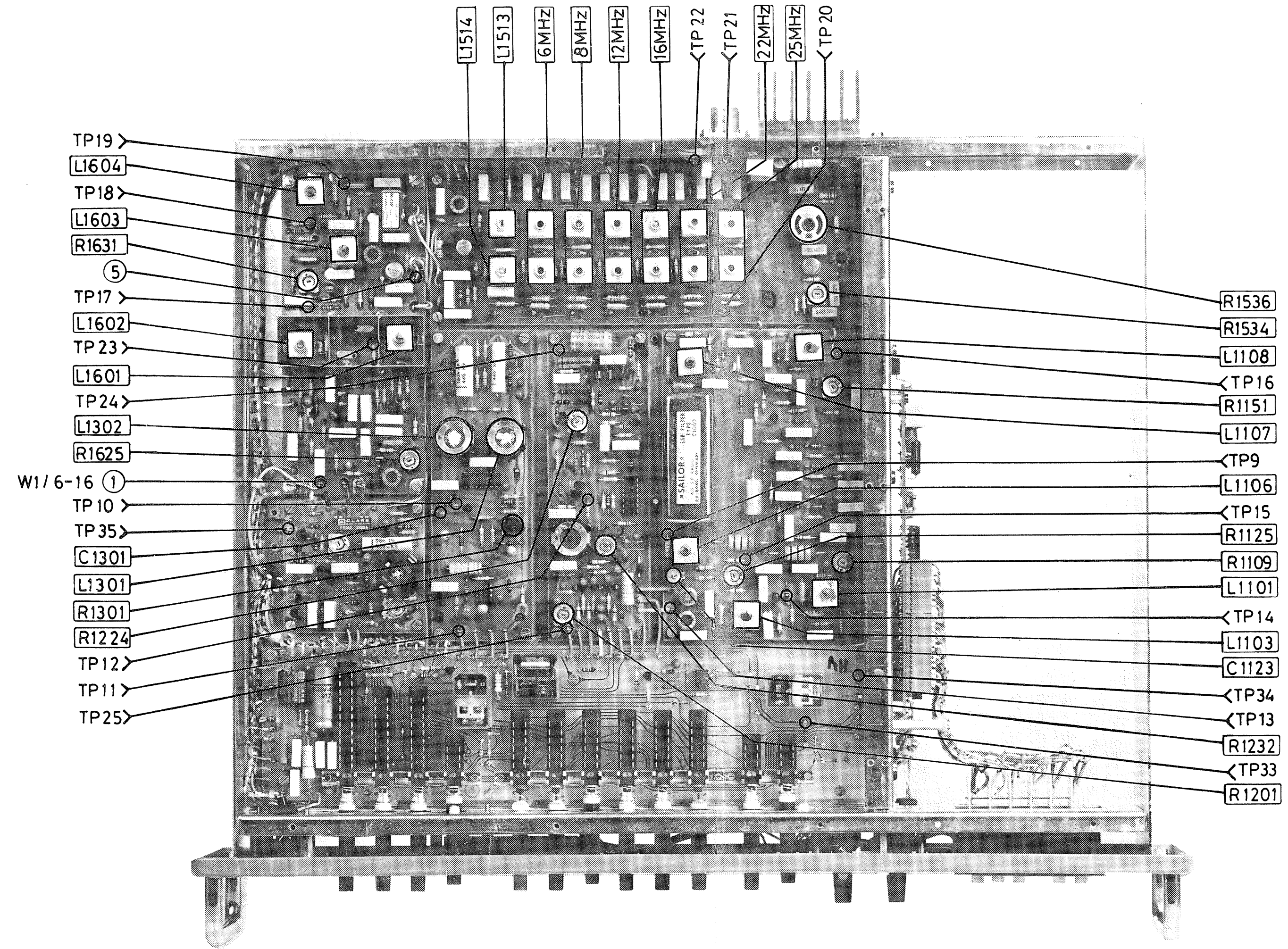
A 2/2

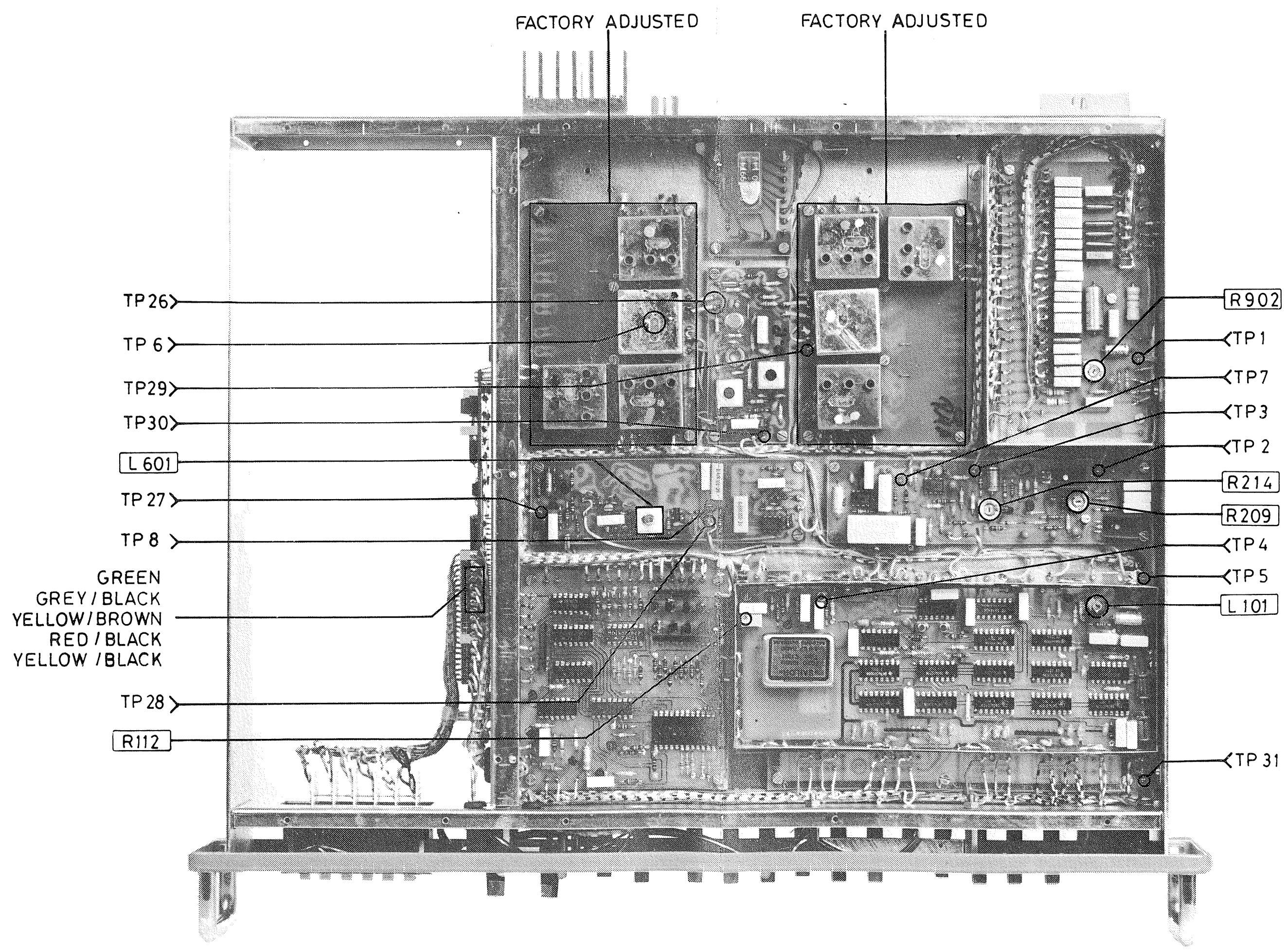
PIN CONFIGURATIONS



Chassismontage module 1700



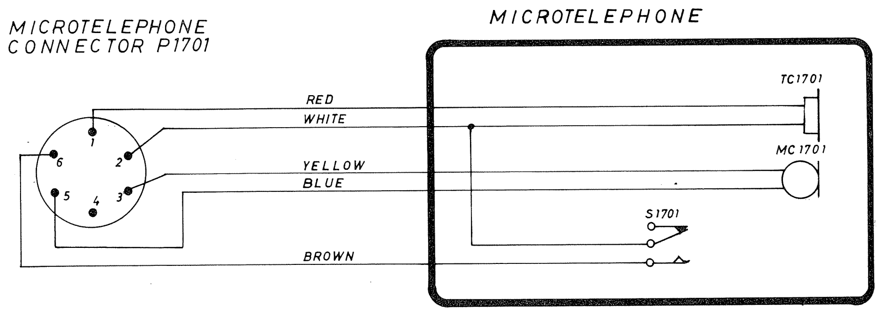




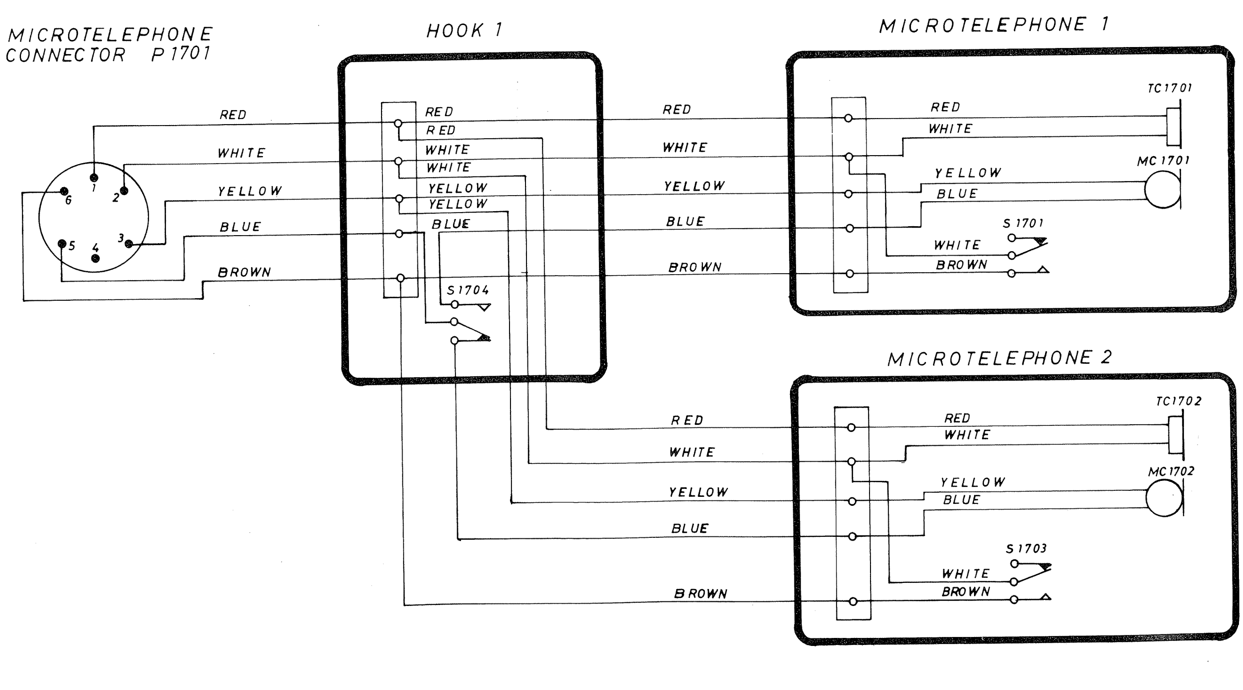
MICROTELEPHONE INSTALLATION S1300

It is possible on request to get a special two microphone installation as described on the scematic diagram below.

NORMAL INSTALLATION WITH ONE MICROTELEPHONE



SPECIAL INSTALLATION WITH TWO MICROTELEPHONES
Microtelephone one with preference.



Symbol	Description				Manufact.	
R101	Resistor	15Kohm	±5%	0,33W	Philips	2322 211 13153
R102	Resistor	15Kohm	±5%	0,33W	Philips	2322 211 13153
R103	Resistor	560 ohm	±5%	0,33W	Philips	2322 211 13561
R104	Resistor	15Kohm	±5%	0,33W	Philips	2322 211 13153
R105	Resistor	560 ohm	±5%	0,33W	Philips	2322 211 13561
R106	Resistor	5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R107	Resistor	1,8Kohm	±5%	0,33W	Philips	2322 211 13182
R108	Resistor	10Kohm	±5%	0,33W	Philips	2322 211 13103
R109	Resistor	1,8Kohm	±5%	0,33W	Philips	2322 211 13182
R110	Resistor	820 ohm	±5%	0,33W	Philips	2322 211 13821
R111	Resistor	220 ohm	±5%	0,33W	Philips	2322 211 13221
R112	Preset potentiometer	2Kohm	±10%	0,5 W	Bourns	3299 W-1-202
R113	Resistor	820 ohm	±5%	0,33W	Philips	2322 211 13821
R114	Resistor	470 ohm	±5%	0,33W	Philips	2322 211 13471
R115	Resistor	10Kohm	±5%	0,33W	Philips	2322 211 13103
R116	Resistor	1,2Kohm	±5%	0,33W	Philips	2322 211 13122
R117	Resistor	2,2Kohm	±5%	0,33W	Philips	2322 211 13222
R118	Resistor	560 ohm	±5%	0,33W	Philips	2322 211 13561
R119	Resistor	22Kohm	±5%	0,33W	Philips	2322 211 13223
R120	Resistor	270 ohm	±5%	0,33W	Philips	2322 106 33271
R121	Resistor	1,8Kohm	±5%	0,33W	Philips	2322 211 13182
R122	Resistor	10Kohm	±5%	0,33W	Philips	2322 211 13103
R123	Resistor	220 ohm	±5%	0,33W	Philips	2322 106 33221
R124	Resistor	2,2Kohm	±5%	0,33W	Philips	2322 211 13222
R125	Resistor	1Kohm	±5%	0,33W	Philips	2322 211 13102
R126	Resistor	220 ohm	±5%	0,33W	Philips	2322 211 13221
R127	Resistor	680 ohm	±5%	0,33W	Philips	2322 211 13681
R128	Resistor	12Kohm	±5%	0,33W	Philips	2322 211 13123
R129	Resistor	6,8Kohm	±5%	0,33W	Philips	2322 211 13682
R130	Resistor	1Kohm	±5%	0,33W	Philips	2322 211 13102
R131	Resistor	220 ohm	±5%	0,33W	Philips	2322 211 13221
RA101	Resistor array	8x10Kohm	±5%	0,125W	ITT	VR8,10Kohm ±5%
RA102	Resistor array	8x10Kohm	±5%	0,125W	ITT	VR8,10Kohm ±5%

b	DIVIDER UNIT S1300/R1117		2/3
Symbol	Description	Manufact.	
C101	Capacitor, polyester 10nF±20% 400V	Philips	2222 344 54103
C102	Capacitor, tantalum 10uF-20/+50% 16V	ERO	ETP 2E
C103	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C104	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C105	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C106	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C107	Capacitor, ceramic 12pF NPO±5% 400V	Ferroperm	9/0112.9
C108	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C109	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C110	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C111	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C112	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C113	Capacitor, ceramis 10nF-20/+80% 32V	Ferroperm	9/0145.9
C114	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C115	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C116	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C117	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C118	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C119	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C120	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C121	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C122	Capacitor, ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C123	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C124	Capacitor, polyester 15nF±20% 400V	Philips	2222 344 54153
C125	Capacitor, polyester 47nF±20% 250V	Philips	2222 344 40473
C126	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C127	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C128	Capacitor, electrolytic10uF-10/+100% 40V	Siemens	B41313-A7106-V
C129	Capacitor, electrolytic10uF-10/+100% 40V	Siemens	B41313-A7106-V
C130	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C131	Capacitor, polyester 47nF±20% 250V	Philips	2222 344 40473
C132	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C133	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C134	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C135	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C136	Capacitor, polystyrene 1,2nF±5% 63V	Philips	2222 424 21202
C137	Capacitor, polystyrene 6,8nF±5% 63V	Philips	2222 424 26802
L101	Coil	S.P.	TL 235

a DIVIDER UNIT S1300/R1117

Symbol	Description	Manufact.	
D101	Diode, zener 12V ±5% 0,4W	Philips	BZX 79 C12
D102	Diode, silicon	Philips	BAW 62
T101	Transistor	Philips	2N2368
T102	Transistor	Philips	2N2368
T103	Transistor	Philips	BF199
T104	Transistor	Philips	2N2368
T105	Transistor	Philips	BF199
IC101	Integrated circuit	Texas	SN74LS192N
IC102	Integrated circuit	Texas	SN74LS192N
IC103	Integrated circuit	Texas	SN74LS192N
IC104	Integrated circuit	Texas	SN74LS192N
IC105	Integrated circuit	Texas	SN74LS192N
IC106	Integrated circuit	Motorola	MC4044P
IC107	Integrated circuit	Texas	SN74LS390N
IC108	Integrated circuit	Texas	SN74LS20N
IC109	Integrated circuit	Texas	SN74LS27N
IC110	Integrated circuit	Texas	SN74LS109N
IC111	Integrated circuit	Texas	SN74LS390N
IC112	Integrated circuit	Texas	SN74LS390N
IC113	Integrated circuit	Motorola	MC4044P
IC114	Integrated circuit	Texas	SN7410N
IC115	Integrated circuit	Texas	SN74LS290N
X0101	TCXO 10,0 MHz	S.P.	C1001
S101	Switch for 2182 (R1117 only)	Petrick	7-3-21412

MODULE NO: 200

a	LOOP 1 FILTER & ±18V SUPPLY UNIT S1300/R1117		1/2
Symbol	*Description*	*Manufact.*	
R201	Resistor 1Kohm ±5% 0,33W	Philips	2322 211 13102
R202	Resistor 82 ohm ±5% 0,33W	Philips	2322 211 13829
R204	Resistor 820 ohm ±5% 0,33W	Philips	2322 211 13821
R205	Resistor 2,2Kohm ±5% 0,33W	Philips	2322 211 13222
R206	Resistor 12Kohm ±5% 0,33W	Philips	2322 211 13123
R207	Resistor 1,2Kohm ±5% 0,33W	Philips	2322 211 13122
R208	Resistor 3,3Kohm ±5% 0,33W	Philips	2322 211 13332
R209	Preset potmeter cermet 2,2Kohm ±20% 0,5W	Philips	2322 482 20222
R210	Resistor 10Kohm ±5% 0,33W	Philips	2322 211 13103
R212	Resistor 10Kohm ±5% 0,33W	Philips	2322 211 13103
R213	Resistor 10Kohm ±5% 0,33W	Philips	2322 211 13103
R214	Preset potmeter cermet 2,2Kohm ±20% 0,5W	Philips	2322 482 20222
R215	Resistor 3,3Kohm ±5% 0,33W	Philips	2322 211 13332
R216	Resistor 1,5Kohm +5% 0,33W	Philips	2322 211 13152
R217	Resistor 10Kohm ±5% 0,33W	Philips	2322 211 13103
R218	Resistor 3,3Kohm ±5% 0,33W	Philips	2322 211 13332
R219	Resistor 2,7Kohm ±5% 0,33W	Philips	2322 106 33272
R220	Resistor 560 ohm ±5% 0,33W	Philips	2322 211 13561
R221	Resistor 3,92Kohm ±1% 0,25W	Vitrohm	471-0
R222	Resistor 22Kohm ±5% 0,33W	Philips	2322 211 13223
R223	Resistor 150 ohm ±5% 0,33W	Philips	2322 211 13151
R224	Resistor 2,7Mohm ±5% 0,33W	Philips	2322 211 12275
R225	Resistor 4,7Kohm ±5% 0,33W	Philips	2322 211 13472
R226	Resistor 2,2Kohm ±5% 0,33W	Philips	2322 211 13222
R227	Resistor 3,92Kohm ±1% 0,25W	Vitrohm	471-0
R228	Resistor 3,92Kohm ±1% 0,25W	Vitrohm	471-0
R229	Resistor 36,5Kohm ±1% 0,25W	Vitrohm	471-0
	S1300 only		
R203	Resistor 270Kohm ±5% 0,33W	Philips	2322 211 13274
R211	Resistor 15 ohm ±5% 0,33W	Philips	2322 211 13159
	R1117 only		
R203	Resistor 150Kohm ±5% 0,33W	Philips	2322 211 13154
R211	Resistor 12 ohm ±5% 0,33W	Philips	2322 211 13129

c	LOOP 1 FILTER & ±18V SUPPLY UNIT S1300/R1117		2/2
Symbol	*Description*	*Manufact.*	
C201	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145,9
C202	Capacitor tantalum 10uF-20/+50% 25V	Ero	ETP-3F
C203	Capacitor tantalum 10uF-20/+50% 25V	Ero	ETP-3F
C204	Capacitor tantalum 10uF-20/+50% 25V	Ero	ETP-3F
C205	Capacitor electrolytic10uF- 10/+100% 40V	Siemens	B41313-A7106V
C206	Capacitor tantalum 10uF-20/+50% 25V	Ero	ETP-3F
C207	Capacitor polycarbonate 470nF ±10% 100V	Philips	2222 344 21474
C208	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145,9
C209	Capacitor polystyrene 39nF ±1,25% 63V	Arco	KS1.39A39000±1,25%
C210	Capacitor tantalum 10uF-20/+50% 25 V	Ero	ETP-3F
C211	Capacitor polyester 6,8uF ±10% 100V	Philips	2222 344 25685
C212	Capacitor ceramic 220pF ±20% 400V	Ferroperm	9/0129,9
C213	Capacitor ceramic 220pF ±20% 400V	Ferroperm	9/0129,9
C214	Capacitor polyester 220nF ±10% 100V	Philips	2222 344 25224
C215	Capacitor polyester 150nF ±10% 100V	Philips	2222 344 25154
C216	Capacitor polyester 220nF ±20% 100V	Philips	2222 344 24224
C217	Capacitor polyester 220nF ±20% 100V	Philips	2222 344 24224
C218	Capacitor polyester 220nF ±20% 100V	Philips	2222 344 24224
T201	Transistor	Philips	BD139
T202	Transistor	Philips	BC548A
T203	Transistor	Philips	BD138
T204	Transistor	Philips	BC558
T205	Transistor	Philips	BC556A
T206	Transistor	Philips	BC548
D201	Diode, zener 4,7V ± 5% 0,4W	Philips	BZX79C4V7
D202	Diode, silicon	Philips	BAW62
D203	Diode, silicon	Philips	BAW62
D204	Diode, silicon	Philips	BAW62
D205	Diode, zener 4,7V ± 5% 0,4W	Philips	BZX79C4V7
D206	Diode, silicon	Philips	BAV21
IC201	Intergrated circuit	National	LM308N
IC202	Intergrated circuit	National	LM308N

a	VCO-UNIT AND HARMONIC FILTER-UNIT S1300/R1117		1/1
Symbol	*Description*	*Manufact.*	
	The units are factory adjusted and sealed and can only be repaired at the factory		
	Module No: 300	S.P.	VCO-UNIT S1300/R1117
	Module No: 400	S.P.	HARMONIC FILTER-UNIT S1300/R1117

a	LOOP 1 MIXER S1300/R1117		1/1
Symbol	*Description*	*Manufact.*	
R501	Resistor 3.3 ohm ± 5% 0.33W	Philips	2322 211 13338
R502	Resistor 3.3kohm ± 5% 0.33W	Philips	2322 211 13332
R503	Resistor 15kohm ± 5% 0.33W	Philips	2322 211 13153
R504	Resistor 2.2kohm ± 5% 0.33W	Philips	2322 211 13222
R505	Resistor 270 ohm ± 5% 0.33W	Philips	2322 211 13271
R506	Resistor 100 ohm ± 5% 0.33W	Philips	2322 211 13101
R507	Resistor 10 ohm ± 5% 0.33W	Philips	2322 211 13109
R508	Resistor 330 ohm ± 5% 0.33W	Philips	2322 211 13331
R509	Resistor 2.7kohm ± 5% 0.33W	Philips	2322 211 13272
R510	Resistor 680 ohm ± 5% 0.33W	Philips	2322 211 13681
R511	Resistor 390 ohm ± 5% 0.33W	Philips	2322 211 13391
R512	Resistor 470 ohm ± 5% 0.33W	Philips	2322 211 13471
R513	Resistor 27kohm ± 5% 0.33W	Philips	2322 211 13273
R514	Resistor 2.7kohm ± 5% 0.33W	Philips	2322 211 13272
R515	Resistor 560 ohm ± 5% 0.33W	Philips	2322 211 13479
R516	Resistor 47 ohm ± 5% 0.33W	Philips	2322 211 13479
C501	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C502	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C503	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C504	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C505	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C506	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C507	Capacitor ceramic 47pF±2% 100V	Philips	2222 638 34479
C508	Capacitor polyester 100nF±20% 100V	Philips	2222 344 24104
C509	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C510	Capacitor ceramic 100pF±2% 100V	Philips	2222 638 34101
C511	Capacitor polystyrene 180pF±1% 500V	Philips	2222 427 41801
C512	Capacitor ceramic 33pF±2% 100V	Philips	2222 638 34339
C513	Capacitor ceramic 56pF±2% 100V	Philips	2222 638 34569
C514	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C515	Capacitor ceramic 10nF-20/+80% 32V	Ferroperm	9/0145.9
C516	Capacitor polyester 100nF±20% 100V	Philips	2222 344 24104
L501	Coil	S.P.	TL 059
L502	Coil 12uH±5%	Kaschke	220/5
L503	Coil 12uH±5%	Kaschke	220/5
TR501	Transformer	S.P.	TL198
T501	Transistor	Philips	BF199
T502	Transistor	Philips	BF199
IC501	Integrated circuit	N.S.	LM 3053

MODULE NO: 600

a	VCXO AND LOOP 2 FILTER FOR S1300					1/2
Symbol	*Description*				*Manufact.*	
R601	Resistor	2,7 Kohm	±5%	0,33W	Philips	2322 211 13272
R602	Resistor	22 Kohm	±5%	0,33W	Philips	2322 211 13223
R603	Resistor	220 ohm	±5%	0,33W	Philips	2322 211 13221
R604	Resistor	2,7 Mohm	±5%	0,33W	Philips	2322 211 13275
R605	Resistor	4,7 Kohm	±5%	0,33W	Philips	2322 211 13472
R606	Resistor	220 Kohm	±5%	0,33W	Philips	2322 211 13224
R607	Resistor	18 Kohm	±5%	0,33W	Philips	2322 211 13183
R608	Resistor NTC	4,7Kohm	±5%	0,5 W	Philips	2322 635 02472
R609	Resistor	180 Kohm	±5%	0,33W	Philips	2322 211 13184
R610	Resistor	15 Kohm	±5%	0,33W	Philips	2322 211 13153
R611	Resistor	680 ohm	±5%	0,33W	Philips	2322 211 13681
R612	Resistor	180 ohm	±5%	0,33W	Philips	2322 211 13181
R613	Resistor	33 Kohm	±5%	0,33W	Philips	2322 211 13333
R614	Resistor	1,5 Kohm	±5%	0,33W	Philips	2322 211 13152
R615	Resistor	100 Kohm	±5%	0,33W	Philips	2322 211 13104
R616	Resistor	5,6 Kohm	±5%	0,33W	Philips	2322 211 13562
R617	Resistor	18 Kohm	±5%	0,33W	Philips	2322 211 13183
R618	Resistor	10 Kohm	±5%	0,33W	Philips	2322 211 13103
R619	Resistor	390 ohm	±5%	0,33W	Philips	2322 211 13391
R620	Resistor	39 Kohm	±5%	0,33W	Philips	2322 211 13393
R621	Resistor	5,6 Kohm	±5%	0,33W	Philips	2322 211 13562
R622	Resistor	560 ohm	±5%	0,33W	Philips	2322 211 13561
R623	Resistor	150 ohm	±5%	0,33W	Philips	2322 211 13151
R624	Resistor	560 ohm	±5%	0,33W	Philips	2322 211 13561
C601	Capacitor ceramic		10nF-20/+80%	32V	Ferroperm	9/0145,9
C602	Capacitor tantalum		10uF-20/+50%	25V	ERO	ETP-3F
C603	Capacitor polyester		47nF±10%	100V	Philips	2222 344 25473
C604	Capacitor ceramic		33pF ±2%	100V	Philips	2222 642 34339
C605	Capacitor polyester		680 nF ±10%	100V	Philips	2222 344 25684
C606	Capacitor polyester		47nF ±10%	100V	Philips	2222 344 25473
C607	Capacitor polyester		470nF ±10%	100V	Philips	2222 344 25474
C608	Capacitor polyester		47nF ±20%	100V	Philips	2222 344 24473
C609	Capacitor ceramic		56pF ± 2%	100V	Philips	2222 642 34569
C610	Capacitor polyester		51pF ± 1%	500V	Philips	2222 427 45109
C611	Capacitor ceramic		5,6pF ± 0,25pF	63V	Draloric	3x4 N150/1B
C612	Capacitor ceramic		10nF-20/+80%	32V	Ferroperm	9/0145,9
C613	Capacitor tantalum		10uF-20/+50%	25V	Ero	ETP-3F

a VCXO AND LOOP 2 FILTER S1300 2/2

Symbol	Description	Manufact.	
C614	Capacitor polyester 47nF ±20% 100V	Philips	2222 344 24473
C615	Capacitor tantalum 10uF -20/+50% 25V	Ero	ETP-3F
C616	Capacitor polystyrene 220pF ±5% 500V	Philips	2222 427 22201
L601	Coil	S.P.	TL 257
T601	Transistor	Philips	BF256B
T602	Transistor	Philips	BF199
T603	Transistor	Philips	BC558
D601	Diode varicap.	Motorola	MV109
D602	Diode varicap.	Motorola	MV109
IC601	Integrated circuit	N.S.	LM 308N
X601	Crystal f=10097.600 kHz	S.P.	C 1010

MODULE NO: 700

b	MOTOR CONTROL UNIT S1300				1/3
Symbol	*Description*			*Manufact.*	
R701	Resistor 390 ohm	±5%	0,33W	Philips	2322 211 13391
R702	Resistor 10Kohm	±5%	0,33W	Philips	2322 211 13103
R703	Resistor 3,9Kohm	±5%	0,33W	Philips	2322 211 13392
R704	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R705	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R706	Resistor 820 ohm	±5%	0,33W	Philips	2322 211 13821
R707	Resistor 8,2Kohm	±5%	0,33W	Philips	2322 211 13822
R708	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R709	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R710	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R711	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R712	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R713	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R714	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R715	Resistor 10Kohm	±5%	0,33W	Philips	2322 211 13103
R716	Resistor 10Kohm	±5%	0,33W	Philips	2322 211 13103
R717	Resistor 5,6Kohm	±5%	0,33W	Philips	2322 211 13562
R718	Resistor 1Kohm	±5%	0,33W	Philips	2322 211 13102
R719	Resistor 1Kohm	±5%	0,33W	Philips	2322 211 13102
R720	Resistor 1Kohm	±5%	0,33W	Philips	2322 211 13102
R721	Resistor 1Kohm	±5%	0,33W	Philips	2322 211 13102
R722	Resistor 1Kohm	±5%	0,33W	Philips	2322 211 13102
R723	Resistor 3,9Kohm	±5%	0,33W	Philips	2322 211 13392
R724	Resistor 100Kohm	±5%	0,33W	Philips	2322 211 13104
R725	Resistor 3,9Kohm	±5%	0,33W	Philips	2322 211 13392
R726	Resistor 1Kohm	±5%	0,33W	Philips	2322 211 13102
R727	Resistor 100Kohm	±5%	0,33W	Philips	2322 211 13104
R728	Resistor 100Kohm	±5%	0,33W	Philips	2322 211 13104
R729	Resistor 100Kohm	±5%	0,33W	Philips	2322 211 13104
R730	Resistor 100Kohm	±5%	0,33W	Philips	2322 211 13104
R731	Resistor 100Kohm	±5%	0,33W	Philips	2322 211 13104
R732	Resistor 10Kohm	±5%	0,33W	Philips	2322 211 13103
R733	Resistor 100Kohm	±5%	0,33W	Philips	2322 211 13104
R734	Resistor 10Kohm	±5%	0,33W	Philips	2322 211 13103
R735	Resistor 10Kohm	±5%	0,33W	Philips	2322 211 13103
RA701	Resistor, array 8x10Kohm	±5%	0,125W	ITT	VR8,10Kohm ±5%
RA702	Resistor, array 8x820ohm	±5%	0,125W	ITT	VR10,820 ohm±5%
RA703	Resistor, array 8x10Kohm	±5%	0,125W	ITT	VR8,10Kohm ±5%

c	MOTOR CONTROL UNIT S1300		2/3
Symbol	*Description*	*Manufact.*	
C701	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C702	Capacitor,electrolytic 10uF-10/+100% 25V	Siemens	B41313-A5106-V
C703	Capacitor, polyester 10nF±20% 250V	Philips	2222 344 40103
C704	Capacitor, tantalum 0,1uF-20/+50% 35V	Ero	ETP 1A
C705	Capacitor, tantalum 0,1uF-20/+50% 35V	Ero	ETP 1A
C706	Capacitor, tantalum 0,1uF-20/+50% 35V	Ero	ETP 1A
C707	Capacitor, tantalum 0,1uF-20/+50% 35V	Ero	ETP 1A
C708	Capacitor, tantalum 0,1uF-20/+50% 35V	Ero	ETP 1A
D701	Diode, silicon	Philips	BAV 21
D702	Diode, silicon	Philips	BAV 21
D703	Diode, silicon	Philips	BAV 21
D704	Diode, silicon	Philips	BAV 21
D705	Diode, silicon	Philips	BAV 21
D706	Diode, silicon	Philips	BAV 21
D707	Diode, silicon	Philips	BAV 21
D708	Diode, silicon	Philips	BAV 21
D709	Diode, silicon	Philips	BAV 21
D710	Diode, silicon	Philips	BAV 21
D711	Diode, silicon	Philips	BAV 21
D712	Diode, silicon	Philips	BAV 21
D713	Diode, silicon	Philips	BAV 21
D714	Diode, silicon	Philips	BAV 21
T701	Transistor	Philips	BC639
T702	Transistor	Philips	BC328-25
T703	Transistor	Philips	BC328-25
T704	Transistor	Philips	BC328-25
T705	Transistor	Philips	BC328-25
T706	Transistor	Philips	BC328-25
T707	Transistor	Philips	BC328-25
T708	Transistor	Philips	BC328-25
T709	Transistor	Philips	BC328-25
T710	Transistor	Philips	BC328-25
T711	Transistor	Philips	BC328-25
T712	Transistor	Philips	BC548
T713	Transistor	Philips	BC548
T714	Transistor	Philips	BC639
T715	Transistor	Philips	BC639
T716	Transistor	Philips	BC548

a	MOTOR CONTROL UNIT S1300		3/3
Symbol	Description	Manufact.	
IC701	Integrated circuit	Texas	SN7407N
IC702	Integrated circuit	Motorola	MC14519B CP
IC703	Integrated circuit	Motorola	MC14077B CP
IC704	Integrated circuit	Motorola	MC14077B CP
IC705	Integrated circuit	Motorola	MC14081B CP
IC706	Integrated circuit	Motorola	MC14530B CP
IC707	Integrated circuit	Motorola	MC14515B CP

a	FILTER-UNIT FOR S1300		1/2
Symbol	*Description*	*Manufact.*	
R901	Resistor 470 ohm +5% 1.14W	Philips	2322 214 13471
R902	Preset potmeter, cermet 1Kohm+20% 0.5W	Philips	2322 482 20102
R903	Resistor 2.7kohm +5% 0.33W	Philips	2322 211 13272
R904	Resistor 220 ohm +5% 0.33W	Philips	2322 211 13221
R905	Not used		
R906	Resistor 1kohm +5% 0.5 W	Philips	2322 212 13102
R907	Resistor 1kohm +5% 0.5 W	Philips	2322 212 13102
C901	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C902	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C903	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C904	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C905	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C906	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C907	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C908	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C909	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C910	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C911	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C912	Not used		
C913	Not used		
C914	Not used		
C915	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C916	Capacitor polycarbonate 1nF +20% 630V	Ero	KC 1849 210/6
C917	Not used		
C918	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C919	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C920	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C921	Capacitor polycarbonate 1nF +20% 630V	Ero	KC 1849 210/6
C922	Capacitor polycarbonate 1nF +20% 630V	Ero	KC 1849 210/6
C923	Caoacitor electrolytic 47uF-10/+50% 63V	Siemens	B41283-C8476-T
C924	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C925	Capacitor tantalum 10uF-20/+50% 25V	Ero	ETP 3F
C926	Capacitor electrolytic 10uF-10/+100%40V	Siemens	B41313-A7106-V
C927	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C928	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C929	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C930	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C931	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104
C932	Capacitor polyester 100nF +20% 100V	Philips	2222 344 24104

b	FILTER UNIT FOR S1300		2/2
Symbol	Description	Manufact.	
C933	Capacitor polycarbonate 1nF±20% 630V	Ero	KC 1849 210/6
C934	Capacitor polycarbonate 1nF±20% 630V	Ero	KC 1849 210/6
C935	Capacitor polycarbonate 1nF±20% 630V	Ero	KC 1849 210/6
D901	Diode, silicon	Philips	BAV 21

d MODE SWITCH UNIT S1300 1/2

Symbol	Description	Manufact.	
R1001	Resistor 10kohm ± 5% 0.33W	Philips	2322 211 13103
R1002	Resistor 18kohm ± 5% 0.33W	Philips	2322 211 13183
R1003	Resistor 47kohm ± 5% 0.33W	Philips	2322 211 13473
R1004	Resistor 330 ohm ± 5% 1.14W	Philips	2322 214 13331
R1005	Resistor 68 ohm ± 5% 0.33W	Philips	2322 211 13689
R1007	Resistor 820 ohm ± 5% 0.33W	Philips	2322 211 13821
R1009	Resistor 1.5kohm ± 5% 0.33W	Philips	2322 211 13152
R1010	Resistor 2.2kohm ± 5% 0.33W	Philips	2322 211 13222
R1011	Resistor 1.5kohm ± 5% 4W	Philips	2322 330 22152
R1012	Resistor 820 ohm ± 5% 4W	Philips	2322 330 22821
R1013	Resistor 820 ohm ± 5% 0.33W	Philips	2322 211 13821
R1014	Resistor 10kohm ± 5% 0.33W	Philips	2322 211 13103
R1015	Resistor 100kohm ± 5% 0.33W	Philips	2322 211 13104
R1016	Resistor 47kohm ± 5% 0.33W	Philips	2322 211 13473
R1017	Resistor 10kohm ± 5% 0.33W	Philips	2322 211 13103
R1018	Resistor 680kohm ± 5% 0.33W	Philips	2322 106 33684
R1019	Resistor 82.5kohm ± 1% 0.4 W	Philips	2322 151 58253
R1020	Resistor 39.2kohm ± 1% 0.4 W	Philips	2322 151 53923
R1021	Resistor 39.2kohm ± 1% 0.4 W	Philips	2322 151 53923
R1022	Resistor 47kohm ± 5% 0.33W	Philips	2322 211 13473
R1023	Resistor 10kohm ± 5% 0.33W	Philips	2322 211 13103
R1024	Resistor 1.5kohm ± 5% 0.33W	Philips	2322 211 13152
R1025	Resistor 820 ohm ± 5% 0.5 W	Philips	2322 212 13821
C1001	Capacitor, tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1002	Capacitor, electrolytic 470uF-20/+50% 25V	Philips	2222 017 16471
C1003	Capacitor, polyester 100nF ±10% 100V	Philips	2222 344 25104
C1004	Capacitor, polyester 10nF ±20% 250V	Philips	2222 344 40103
C1005	Capacitor, polyester 10nF ±20% 250V	Philips	2222 344 40103
C1006	Capacitor, polyester 10nF ±20% 250V	Philips	2222 344 40103
C1007	Capacitor, tantalum 4.7uF-20/±50% 35V	Ero	ETP 2E
C1008	Capacitor, tantalum 10uF ±20% 35V	ITT	TAP 10M 35HE
D1001	Diode, silicon	Philips	BAV 21
D1002	Diode, silicon	Philips	BAV 21

d	MODE SWITCH UNIT S1300		2/2
Symbol	Description	Manufact.	
D1003	Diode, silicon	Philips	BAV 21
D1004	Diode, silicon	Philips	BAV 21
D1005	Diode, silicon	Philips	BAV 21
D1006	Diode, silicon	Philips	BAV 21
D1007	Diode, silicon	Philips	BAV 21
D1008	Diode, silicon	Philips	BAV 21
D1009	Diode, silicon	Philips	BAV 21
D1010	Diode, silicon	Philips	BAV 21
D1011	Diode, silicon	Philips	BAV 21
D1012	Diode, silicon	Philips	BAV 21
D1013	Diode, silicon	Philips	BAV 21
D1014	Diode, silicon	Philips	BAV 21
D1015	Diode, silicon	Philips	BAV 21
D1016	Diode, silicon	Philips	BAV 21
D1017	Not used		
D1018	Diode, silicon	Philips	BAV 21
D1019	Diode, silicon	Philips	BAV 21
D1020	Diode, silicon	Philips	BAV 21
D1021	Diode, silicon	Philips	BAW 62
D1022	Diode, silicon	Philips	BAV 21
D1023	Diode, silicon	Philips	BAV 21
RE1001	Relay	Siemens	V23154-N0721-B110
RE1002	Relay	Pasi	MS/K BV863
RE1003	Relay	Siemens	V23154-N0721-B110
RE1004	Relay	Siemens	V23100-V4024-A001
T1001	Transistor	Philips	BC 558
T1002	Transistor	Philips	BC 548
IC1001	Integrated circuit	National	LM 358
S1001	Switch	S.P.	Draw. 7-3-21346
S1002	Switch	S.P.	Draw. 7-3-20060
S1003	Switch	S.P.	Draw. 7-3-21487

b	SSB-Generator S1300		1/3
Symbol	Description	Manufact.	
R1101	Resistor 6,8 Kohm ±5% 0,33W	Philips	2322 211 13682
R1102	Resistor 1 Kohm ±5% 0,33W	Philips	2322 211 13102
R1103	Resistor 220 ohm ±5% 0,33W	Philips	2322 211 13221
R1104	Resistor 1 Kohm ±5% 0,33W	Philips	2322 211 13102
R1105	Resistor 1 Kohm ±5% 0,33W	Philips	2322 211 13102
R1106	Resistor 1 Kohm ±5% 0,33W	Philips	2322 211 13102
R1107	Resistor 1 Kohm ±5% 0,33W	Philips	2322 211 13102
R1108	Resistor 6,8 Kohm ±5% 0,33W	Philips	2322 211 13682
R1109	Preset potmeter cermet 22 Kohm ±20% 0,5W	Philips	2322 482 20223
R1110	Resistor 4,7 Kohm ±5% 0,33W	Philips	2322 211 13472
R1111	Resistor 12 Kohm ±5% 0,33W	Philips	2322 211 13123
R1112	Resistor 2,2 Kohm ±5% 0,33W	Philips	2322 211 13222
R1113	Resistor 2,2 Kohm ±5% 0,33W	Philips	2322 211 13222
R1114	Resistor 2,2 Kohm ±5% 0,33W	Philips	2322 211 13222
R1115	Resistor 2,2 Kohm ±5% 0,33W	Philips	2322 211 13222
R1116	Resistor 68 ohm ±5% 0,33W	Philips	2322 211 13689
R1117	Resistor 150 ohm ±5% 0,33W	Philips	2322 211 13151
R1118	Resistor 15 Kohm ±5% 0,33W	Philips	2322 211 13153
R1119	Resistor 47 Kohm ±5% 0,33W	Philips	2322 211 13473
R1120	Resistor 47 Kohm ±5% 0,33W	Philips	2322 211 13473
R1121	Resistor 47 ohm ±5% 0,33W	Philips	2322 211 13479
R1122	Resistor 47 ohm ±5% 0,33W	Philips	2322 211 13479
R1123	Resistor 390 ohm ±5% 0,33W	Philips	2322 211 13391
R1124	Resistor 47 Kohm ±5% 0,33W	Philips	2322 211 13473
R1125	Preset potmeter cermet 100 ohm ±20% 0,5W	Philips	2322 482 20101
R1126	Resistor 330 ohm ±5% 0,33W	Philips	2322 211 13331
R1127	Resistor 330 ohm ±5% 0,33W	Philips	2322 211 13331
R1128	Resistor 470 Kohm ±5% 0,33W	Philips	2322 211 13471
R1129	Resistor 47 Kohm ±5% 0,33W	Philips	2322 211 13473
R1130	Resistor 150 ohm ±5% 0,33W	Philips	2322 211 13151
R1131	Resistor 2,2 Kohm ±5% 0,33W	Philips	2322 211 13222
R1132	Resistor 18 Kohm ±5% 0,33W	Philips	2322 211 13183
R1133	Resistor 56 Kohm ±5% 0,33W	Philips	2322 211 13563
R1134	Resistor 100 ohm ±5% 0,33W	Philips	2322 211 13101
R1135	Resistor 1 Kohm ±5% 0,33W	Philips	2322 211 13102
R1136	Resistor 1 Kohm ±5% 0,33W	Philips	2322 211 13102
R1137	Resistor 22 Kohm ±5% 0,33W	Philips	2322 211 13223
R1138	Resistor 68 Kohm ±5% 0,33W	Philips	2322 211 13683
R1139	Resistor 1,5 Kohm ±5% 0,33W	Philips	2322 211 13152

a	SSB-GENERATOR S1300		2/3
Symbol	*Description*	*Manufact.*	
R1140	Resistor NTC 1kohm +10% 0.5W	Philips	2322 642 12102
R1141	Resistor 1kohm ± 5% 0.33W	Philips	2322 211 13102
R1142	Resistor 150 ohm ± 5% 0.33W	Philips	2322 211 13151
R1143	Resistor 330 ohm ± 5% 0.33W	Philips	2322 211 13331
R1144	Resistor 2.7Kohm ± 5% 0.33W	Philips	2322 211 13272
R1145	Resistor 1.8Kohm ± 5% 0.33W	Philips	2322 211 13782
R1146	Resistor 2.2Kohm ± 5% 0.33W	Philips	2322 211 13222
R1147	Resistor 1.5Kohm ± 5% 0.33W	Philips	2322 211 13152
R1148	Resistor 68 ohm ± 5% 0.33W	Philips	2322 211 13689
R1149	Resistor 15Kohm ± 5% 0.33W	Philips	2322 211 13153
R1150	Resistor 350 ohm ± 5% 0.33W	Philips	2322 211 13331
R1151	Preset pot.meter cermet 220 ohm±20% 0.5W	Philips	2322 482 20221
R1152	Resistor 220 ohm ± 5% 0.33W	Philips	2322 211 13221
C1101	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1102	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1103	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1104	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1105	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1106	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1107	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1108	Capacitor polystyrene 1,2nF ±5% 125V	Philips	2222 425 21202
C1109	Capacitor polystyrene 4,7nF ±5% 125V	Philips	2222 425 24702
C1110	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1111	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1112	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1113	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1114	Capacitor polystyrene 1nF ± 5% 125V	Philips	2222 425 21002
C1115	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1116	Capacitor electrolytic 100uF-20/+50% 25V	Siemens	B41283-B5107-T
C1117	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1118	Capacitor polyester 10nF ±20% 250V	Philips	2222 344 40103
C1119	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1120	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 20103
C1121	Capacitor polyester 10nF ±20% 250V	Philips	2222 344 40103
C1122	If fitted:		
	Capacitor ceramic 27pF ± 5% 400V	Ferroperm	9/0112.9
C1123	Capacitor trimmmer teflon 2.5-45pF NPO	DAU	107-5901 045
C1124	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1125	Capacitor polystyrene 1nF ± 5% 125V	Philips	2222 425 21002

SSB-GENERATOR S1300 3/3

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Symbol	Description	Manufact.	
C1126	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1127	Capacitor polystyrene1,5nF ± 5% 125V	Philips	2222 425 21502
C1128	Capacitor polystyrene3,3nF ± 5% 125V	Philips	2222 425 23302
C1129	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1130	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1131	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1132	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1133	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1134	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1135	Capacitor polystyrene 1nF ± 5% 125V	Philips	2222 425 21002
C1136	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
L1101	Coil	S.P.	TL013
L1102	Coil	Prahn	1580/9K
L1103	Coil	S.P.	TL 020
L1104	Coil 1mH	Prahn	1580/9K
L1105	Coil 1mH	S.P.	TL 076
L1106	Coil	S.P.	TL 026
L1107	Coil	S.P.	TL 013
L1108	Coil	S.P.	TL 220
T1101	Transistor silicon	Philips	BC 547
T1102	Transistor silicon	Philips	BC 547
T1103	Transistor silicon	Philips	BC 547
T1104	Transistor silicon	Philips	BC 547
T1105	Transistor silicon	Philips	BF 199
D1101	Diode, switch	Philips	BA 182
D1102	Diode, switch	Philips	BA 182
D1103	Diode, switch	Philips	BA 182
D1104	Diode, switch	Philips	BA 182
IC1101	Integrated circuit	RCA	CA3019
TL1101	LSB crystal filter 600 kHz	S.P.	C1002

MODULE NO: 1200

b	MICROPHONE AMPLIFIER S1300		1/3
Symbol	Description	Manufact.	
R1201	Preset pot.meter, cermet 1Kohm +20%0,5W	Philips	2322 482 20102
R1202	Resistor 330 ohm +5% 1,15W	Philips	2322 214 13331
R1203	Resistor 1Kohm +5% 0,33W	Philips	2322 211 13102
R1204	Resistor 2,7Kohm +5% 0,33W	Philips	2322 211 13272
R1205	Resistor 2,7Kohm +5% 0,33W	Philips	2322 211 13272
R1206	Resistor 180 ohm +5% 0,33W	Philips	2322 211 13181
R1207	Resistor 100 ohm +5% 0,33W	Philips	2322 211 13101
R1208	Resistor 4,7Kohm +5% 0,33W	Philips	2322 211 13472
R1209	Resistor 100Kohm +5% 0,33W	Philips	2322 211 13104
R1210	Resistor 2,7Kohm +5% 0,33W	Philips	2322 211 13272
R1211	Resistor 820 ohm +5% 0,33W	Philips	2322 211 13821
R1212	Resistor 100Kohm +5% 0,33W	Philips	2322 211 13104
R1213	Resistor 220Kohm +5% 0,33W	Philips	2322 211 13224
R1214	Resistor 4,7Kohm +5% 0,33W	Philips	2322 211 13472
R1215	Resistor 4,7Kohm +5% 0,33W	Philips	2322 211 13472
R1216	Resistor 390 ohm +5% 0,33W	Philips	2322 211 13391
R1217	Resistor 10Kohm +5% 0,33W	Philips	2322 211 13103
R1218	Resistor 4,7Kohm +5% 0,33W	Philips	2322 211 13472
R1219	Resistor 10Kohm +5% 0,33W	Philips	2322 211 13103
R1220	Resistor 1Kohm +5% 0,33W	Philips	2322 211 13102
R1221	Resistor 470 ohm +5% 0,33W	Philips	2322 211 13471
R1222	Resistor 2,2Kohm +5% 0,33W	Philips	2322 211 13222
R1223	Resistor 220Kohm +5% 0,33W	Philips	2322 211 13224
R1224	Preset potmeter, cermet 100Kohm+20%0,5W	Philips	2322 482 20104
R1225	Resistor 1Kohm +5% 0,33W	Philips	2322 211 13102
R1226	Resistor 10Kohm +5% 0,33W	Philips	2322 211 13103
R1227	Resistor 4,53Kohm +1% 0,33W	Philips	2322 151 54533
R1228	Resistor 4,53Kohm +1% 0,33W	Philips	2322 151 54533
R1229	Resistor 100Kohm +5% 0,33W	Philips	2322 211 13104
R1230	Resistor 1Kohm +5% 0,33W	Philips	2322 211 13102
R1231	Resistor 2,2Kohm +5% 0,33W	Philips	2322 211 13222
R1232	Preset potmeter cermet 470 ohm+20% 0,5W	Philips	2322 482 20471
R1233	Resistor 47Kohm +5% 0,33W	Philips	2322 211 13473
R1234	Resistor 47Kohm +5% 0,33W	Philips	2322 211 13473
R1235	Resistor 2,2Kohm +5% 0,33W	Philips	2322 211 13222
R1236	Resistor 1Kohm +5% 0,33W	Philips	2322 211 13102
R1237	Resistor 1Kohm +5% 0,33W	Philips	2322 211 13102
R1238	Resistor 3,9Kohm +5% 0,33W	Philips	2322 211 13392
R1239	Resistor 2,2Kohm +5% 0,33W	Philips	2322 211 13222
R1240	Resistor 2,2Kohm +5% 0,33W	Philips	2322 211 13222

Symbol	Description	Manufact.	
R1241	Resistor 2.2Kohm ±5% 0,33W	Philips	2322 211 13222
R1242	Resistor 390 ohm ±5% 0,33W	Philips	2322 211 13391
R1243	Resistor 270 ohm ±5% 0,33W	Philips	2322 211 13271
R1244	Resistor 120 Ohm ±5% 0,33W	Philips	2322 211 13121
R1245	Resistor 1Kohm ±5% 0,33W	Philips	2322 211 13102
R1246	Resistor 1Kohm ±5% 0,33W	Philips	2322 211 13102
R1247	Resistor 1Kohm ±5% 0,33W	Philips	2322 211 13102
R1248	Resistor 15Kohm ±5% 0,33W	Philips	2422 211 13153
R1249	Resistor 10Kohm ±5% 0,33W	Philips	2322 211 13102
R1250	Resistor 1Kohm ±5% 0,33W	Philips	2422 211 13102
C1201	Capacitor tantalum 33uF-20/+50% 10V	Ero	ETP 3G
C1202	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1203	Capacitor tantalum 220nF-20/+50% 35V	Ero	ETP 1A
C1204	Capacitor ceramic 1nF-20/+80% 40V	Ferroperm	9/0129,8
C1205	Capacitor ceramic 1nF-20/+80% 40V	Ferroperm	9/0129,8
C1206	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1207	Capacitor tantalum 100nF-20/+50% 35V	Ero	ETP 1A
C1208	Capacitor electrolytic 470uF-10/+50% 10V	Siemens	B41283-A3477-T
C1209	Capacitor polyester 100nF ±20% 100V	Philips	2222 344 24104
C1210	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1211	Capacitor ceramic 150pF ±10% 25V	Ferroperm	9/0121.8
C1212	Capacitor polyester 68nF ± 5% 100V	Philips	2222 344 23684
C1213	Capacitor poly carb. 68nF ± 5% 250V	Philips	2222 344 43683
C1214	Capacitor electrolytic 10uF-10/+50% 63V	Siemens	B41283-A8106-T
C1215	Capacitor poly carb. 68nF± 5% 250V	Philips	2222 344 43683
C1216	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1217	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1218	Capacitor tantalum 10uF-20/+50% 25V	Ero	ETP 3F
C1219	Capacitor polyester 47nF ±10% 250V	Philips	2222 344 41473
C1220	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1221	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1222	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1223	Capacitor polyester 68nF ±10% 250V	Philips	2222 344 41683
C1224	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1225	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1226	Capacitor tantalum 4.7uF-20/+50% 35V	Ero	ETP 2E
C1227	Capacitor polyester 220nF ±20% 100V	Philips	2322 344 24224
L1201	Coil	S.P.	TL 219

MODULE NO: 1200

a	MICROPHONE AMPLIFIER S1300			3/3
Symbol	**Description**		**Manufact.**	
T1201	Transistor		Philips	BC 338
T1202	Transistor		Philips	BF 256 B
T1203	Transistor		Philips	BC 548B
T1204	Transistor		Philips	BC 548B
T1205	Transistor		Philips	BC 548B
T1206	Transistor		Philips	BC 548B
T1207	Transistor		Philips	BC 558B
T1208	Transistor		Philips	BC 558B
T1209	Transistor		Philips	BC 548B
T1210	Transistor		Philips	BC 548B
T1211	Transistor		Philips	BC 548B
T1212	Transistor		Philips	BC 548B
T1213	Transistor		Philips	BC 548B
D1201	Diode, zener 5.1V $\pm$5%	1W	Motorola	1N4733A
D1202	Diode, zener 5.1V $\pm$5%	0.4W	Philips	BZX79 C5V1
D1203	Diode, silicon		Philips	BAV 21
D1204	Diode, zener 7.5V $\pm$5%	0.4W	Philips	BZX79 C7V5
D1205	Diode, silicon		Philips	BAV 21
D1206	Diode, switch		Philips	BA 182
D1207	Diode, switch		Philips	BA 182
D1208	Diode, switch		Philips	BA 182
D1209	Diode, switch		Philips	BA 182
IC1201	Integrated circuit		Texas	SN7472N

b ALARM SIGNAL GENERATOR S1300 1/2

Symbol	Description				Manufact.	
R1301	Preset pot.meter 22Kohm				Noble	TM8KV2-15
R1302	Resistor	2,7Kohm	±5%	0,33W	Philips	2322 211 13272
R1303	Resistor	150 ohm	±5%	0,33W	Philips	2322 211 13151
R1304	Resistor	33 ohm	±5%	0,33W	Philips	2322 211 13339
R1305	Resistor	1Kohm	±5%	0,33W	Philips	2322 211 13102
R1306	Resistor	2,7Kohm	±5%	0,33W	Philips	2322 211 13272
R1307	Resistor	150 ohm	±5%	0,33W	Philips	2322 211 13151
R1308	Resistor	82Kohm	±5%	0,33W	Philips	2322 211 13823
R1309	Resistor	22Kohm	±5%	0,33W	Philips	2322 211 13223
R1310	Resistor	270 ohm	±5%	0,33W	Philips	2322 211 13271
R1311	Resistor	22Kohm	±5%	0,33W	Philips	2322 211 13223
R1312	Resistor	100 ohm	±5%	0,33W	Philips	2322 211 13101
R1313	Resistor	82Kohm	±5%	0,33W	Philips	2322 211 13823
R1314	Resistor	2,7Kohm	±5%	0,33W	Philips	2322 211 13272
R1315	Resistor	1Kohm	±5%	0,33W	Philips	2322 211 13102
R1316	Resistor	3,3Kohm	±5%	0,33W	Philips	2322 211 13332
R1317	Resistor	15Kohm	±5%	0,33W	Philips	2322 211 13153
R1318	Resistor	27Kohm	±5%	0,33W	Philips	2322 211 13273
R1319	Resistor	150 ohm	±5%	0,33W	Philips	2322 211 13151
R1320	Resistor	1Kohm	±5%	0,33W	Philips	2322 211 13102
R1321	Resistor	270 ohm	±5%	1,14W	Philips	2322 214 13271
R1322	Resistor	10Kohm	±5%	0,33W	Philips	2322 211 13103
R1323	Resistor	270Kohm	±5%	0,33W	Philips	2322 211 13274
R1324	Resistor	27 ohm	±5%	0,33W	Philips	2322 211 13279
R1325	Resistor	220Kohm	±5%	0,33W	Philips	2322 211 13224
C1301	Capacitor tantalum	4,7uF-20/+50%		35V	Ero	ETP 2E
C1302	Capacitor tantalum	10uF-20/+50%		25V	Ero	ETP 3F
C1303	Capacitor tantalum	1,5uF-20/+50%		35V	Ero	ETP 1E
C1304	Capacitor polystyren	22nF	±1%	125V	Philips	2222 425 42203
C1305	Capacitor polyester	22nF	±10%	250V	Philips	2222 344 41223
C1306	Capacitor polyester	22nF	±10%	250V	Philips	2222 344 41223
C1307	Capacitor tantalum	10uF-20/+50%		25V	Ero	ETP 3F
C1308	Capacitor polystyren	47nF	±1%	125V	Philips	2222 425 44703
C1309	Capacitor tantalum	3,3uF-20/+50%		35V	Ero	ETP 2D
C1310	Capacitor tantalum	22uF-20/+50%		16V	Ero	ETP 3G

b	ALARM SIGNAL GENERATOR S1300			2/2
Symbol	*Description*		*Manufact.*	
C1311	Capacitor tantalum 10uF-20/+50%	25V	Ero	ETP 3F
C1312	Capacitor tantalum 22uF-20/+50%	16V	Ero	ETP 3G
C1313	Capacitor tantalum 22uF-20/+50%	16V	Ero	ETP 3G
C1314	Capacitor tantalum 4,7uF-20/+50%	35V	Ero	ETP 2E
C1315	Capacitor polyester 10nF ±10%	250V	Philips	2222 344 41103
C1316	Capacitor tantalum 68uF ±10%	16V	Ero	ETQ 5
L1301	Coil		SP	TL022
L1302	Coil		SP	TL021
D1301	Diode, silicon		Philips	BAX 16
D1302	Diode, switch		Philips	BA182
D1303	Diode, switch		Philips	BA182
D1304	Diode, zener, 7,5V ±5%	1W	Motorola	1N4737A
T1301	Transistor		Motorola	2N4871
T1302	Transistor		Philips	BC548
T1303	Transistor		Philips	BC548
T1304	Transistor		Philips	BC338
T1305	Transistor		Philips	BC548
IC1301	Integrated circuit		Texas	SN 7472 N
IC1302	Integrated circuit		Motorola	MC 1455 P1.

b	DRIVER-UNIT FOR S1300		1/1
Symbol	*Description*	*Manufact.*	
R1401	Resistor 560 ohm ±5% 1,14W	Philips	2322 214 13561
R1402	Resistor 15 ohm ±5% 0,5 W	Philips	2322 212 23159
R1403	Resistor 15 ohm ±5% 0,5 W	Philips	2322 212 23159
C1401	Capacitor polyester 220nF ±20% 100V	Philips	2222 344 24224
C1402	Capacitor ceramic 10nF -20/+80% 32V	Ferroperm	9/0145,9
C1403	Capacitor polyester 22nF ±20% 250V	Philips	2222 344 40223
C1404	Capacitor polyester 220nF ±20% 100V	Philips	2222 344 24224
L1401	Coil 330nH ±10%	Ferroperm	1582/7
L1402	Coil 33uH ±10%	Ferroperm	1583
L1403	Coil 33uH ±10%	Ferroperm	1583
T1401	Transistor, h_{FE} > 10 for(V_{CE}, I_C=(5V,0,25A)	Motorola	ZRF0132
RE1401	If fitted Relay	Siemens	V23100-V4024-A001

MODULE NO: 1500

a	BANDFILTER S1300				1/4
Symbol	Description			Manufact.	
R1501	Resistor	220 ohm ±5%	0,33W	Philips	2322 211 13221
R1502	Resistor	470 ohm ±5%	0,33W	Philips	2322 106 33471
R1503	Resistor	39 ohm ±5%	0,33W	Philips	2322 211 13399
R1504	Resistor	120 ohm ±5%	0,33W	Philips	2322 211 13121
R1505	Resistor	10 ohm ±5%	0,33W	Philips	2322 211 13109
R1506	Resistor	27 ohm ±5%	0,33W	Philips	2322 211 13279
R1507	Resistor	120 ohm ±5%	0,5 W	Philips	2322 212 13121
R1508	Resistor	390 ohm ±5%	0,33W	Philips	2322 106 33391
R1509	Resistor	1,5Kohm ±5%	0,33W	Philips	2322 211 13152
R1510	Not mounted				
R1511	Resistor	390 ohm ±5%	0,33W	Philips	2322 106 33391
R1512	Resistor	1,5Kohm ±5%	0,33W	Philips	2322 211 13152
R1513	Not mounted				
R1514	Resistor	390 ohm ±5%	0,33W	Philips	2322 106 33391
R1515	Resistor	1,5Kohm ±5%	0,33W	Philips	2322 211 13152
R1516	Not mounted				
R1517	Resistor	390 ohm ±5%	0,33W	Philips	2322 106 33391
R1518	Resistor	1,5Kohm ±5%	0,33W	Philips	2322 211 13152
R1519	Resistor	15Kohm ±5%	0,33W	Philips	2322 211 13153
R1520	Resistor	390 ohm ±5%	0,33W	Philips	2322 106 33391
R1521	Resistor	1,5Kohm ±5%	0,33W	Philips	2322 211 13152
R1522	Resistor	15Kohm ±5%	0,33W	Philips	2322 211 13153
R1523	Resistor	390 ohm ±5%	0,33W	Philips	2322 106 33391
R1524	Resistor	1,5Kohm ±5%	0,33W	Philips	2322 211 13152
R1525	Resistor	22Kohm ±5%	0,33W	Philips	2322 211 13223
R1526	Resistor	180Kohm ±5%	0,33W	Philips	2322 211 13184
R1527	Resistor	390 ohm ±5%	0,33W	Philips	2322 106 33391
R1528	Resistor	1,5Kohm ±5%	0,33W	Philips	2322 211 13152
R1529	Resistor	680 ohm ±5%	0,33W	Philips	2322 211 13681
R1530	Resistor	150 ohm ±5%	0,33W	Philips	2322 211 13151
R1531	Resistor	180 ohm ±5%	0,33W	Philips	2322 211 13181
R1532	Resistor	68 ohm ±5%	0,33W	Philips	2322 211 13689
R1533	Resistor	18 ohm ±5%	0,33W	Philips	2322 211 13189

a BANDFILTER S1300

Symbol	Description	Manufact.	
R1534	Preset pot.meter,cermet 100 ohm±20% 0,5W	Philips	2322 482 20101
R1535	Resistor 680 ohm± 5% 0,5W	Philips	2322 212 13681
R1536	Preset pot.meter 47 ohm±10% 3W	A.B.Metal	115 Q 7
R1537	Resistor 27 ohm± 5%0,33W	Philips	2322 211 13279
C1501	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C1502	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C1503	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C1504	Capacitor ceramic 10 nF -20/+80% 32V	Ferroperm	9/0145,9
C1505	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C1506	Capacitor ceramic 10 nF -20/+80% 32V	Ferroperm	9/0145,9
C1507	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1508	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1509	Capacitor polystyrene 62 pF ±2% 500V	Philips	2222 427 36209
C1510	Capacitor ceramic 3,3 pF ±0,25pF NPO 400V	Ferroperm	9/0112,9
C1511	Capacitor polystyrene 180 pF ±2% 500V	Philips	2222 427 31801
C1512	Capacitor polystyrene 91 pF ±2% 500V	Philips	2222 427 39109
C1513	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1514	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1515	Capacitor polystyrene 75 pF ±2% 500V	Philips	2222 427 37509
C1516	Capacitor ceramic 4,3pF ±0,25pF NPO 400V	Ferroperm	9/0112,9
C1517	Capacitor polystyrene 220 pF ±2% 500V	Philips	2222 427 32201
C1518	Capacitor polystyrene 110 pF ±2% 500V	Philips	2222 427 31101
C1519	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1520	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1521	Capacitor polystyrene 91 pF ±2% 500V	Philips	2222 427 39109
C1522	Capacitor ceramic 5,1pF ±0,25pF NPO 400V	Ferroperm	9/0112,9
C1523	Capacitor polystyrene 270 pF ±2% 500V	Philips	2222 427 32701
C1524	Capacitor polystyrene 130 pF ±2% 500V	Philips	2222 427 31301
C1525	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1526	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223

a	BANDFILTER S1300		3/4
Symbol	*Description*	*Manufact.*	
C1527	Capacitor polystyrene 120 pF ±2% 500V	Philips	2222 427 31201
C1528	Capacitor ceramic 7,5 pF ±0,25pF NPO 400V	Ferroperm	9/0112,9
C1529	Capacitor polystyrene 330 pF ±2% 500V	Philips	2222 427 33301
C1530	Capacitor polystyrene 180 pF ±2% 500V	Philips	2222 427 31801
C1531	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1532	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1533	Capacitor polystyrene 180 pF ±2% 500V	Philips	2222 427 31801
C1534	Capacitor ceramic 11 pF ±5% NPO 400V	Ferroperm	9/o112,9
C1535	Capacitor polystyrene 510 pF ±2% 250V	Philips	2222 426 35101
C1536	Capacitor polystyrene 270 pF ±2% 500V	Philips	2222 427 32701
C1537	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40223
C1538	Capacitor polyester 22 nF ±20% 250V	Philips	2222 344 40233
C1539	Capacitor polystyrene 220 pF ±2% 500V	Philips	2222 427 32201
C1540	Capacitor ceramic 13 pF ±5% NPO 400V	Ferroperm	9/0112,9
C1541	Capacitor polystyrene 680 pF ±2% 250V	Philips	2222 426 36801
C1542	Capacitor polystyrene 330 pF ±2% 500V	Philips	2222 427 33301
C1543	Capacitor polystyrene 150 pF ±2% 500V	Philips	2222 427 31501
C1544	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C1545	Capacitor polystyrene 390 pF ±2% 250V	Philips	2222 426 33901
C1546	Capacitor polystyrene 150 pF ±2% 500V	Philips	2222 427 31501
C1547	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C1548	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1549	Capacitor polystyrene 3,9 nF ±5% 63V	Philips	2222 424 23902
C1550	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1551	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1552	Capacitor ceramic 10 nF -20/+80% 32V	Ferroperm	9/0145,9
C1553	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
L1501	Coil	S.P.	TL 247
L1502	Coil	S.P.	TL 248
L1503	Coil	S.P.	TL 245
L1504	Coil	S.P.	TL 246
L1505	Coil	S.P.	TL 243
L1506	Coil	S.P.	TL 244
L1507	Coil	S.P.	TL 241
L1508	Coil	S.P.	TL 242
L1509	Coil	S.P.	TL 239

a

BANDFILTER S1300

Symbol	Description	Manufact.	
L1510	Coil	S.P.	TL 240
L1511	Coil	S.P.	TL 237
L1512	Coil	S.P.	TL 238
L1513	Coil	S.P.	TL 236
L1514	Coil	S.P.	TL 236
T1501	Transistor	Philips	BFW17A
T1502	Transistor	Philips	BFW17A
D1501	Diode, switch	Philips	BA182
D1501	Diode, switch	Philips	BA182
D1502	Diode, switch	Philips	BA182
D1503	Diode, switch	Philips	BA182
D1504	Diode, switch	Philips	BA182
D1505	Diode, switch	Philips	BA182
D1506	Diode, switch	Philips	BA182
D1507	Diode, switch	Philips	BA182
D1508	Diode, switch	Philips	BA182
D1509	Diode, switch	Philips	BA182
D1510	Diode, switch	Philips	BA182
D1511	Diode, switch	Philips	BA182
D1512	Diode, switch	Philips	BA182
D1513	Diode, switch	Philips	BA182
D1514	Diode, switch	Philips	BA182
D1515	Diode, switch	Philips	BA182
D1516	Diode, switch	Philips	BA182
D1517	Diode, switch	Philips	BA182
D1518	Diode, silicon	Philips	BAV21
TR1501	Transformer	S.P.	TL 249
TR1502	Transformer	S.P.	TL 250

MODULE NO: 1600

a	MIXER UNIT S1300		1/3
Symbol	*Description*	*Manufact.*	
R1601	Resistor 820 ohm ± 5% 0.33W	Philips	2322 211 13821
R1602	Resistor 1.5kohm ± 5% 0.33W	Philips	2322 211 13152
R1603	Resistor 6.8kohm ± 5% 0.33W	Philips	2322 211 13682
R1604	Resistor 820 ohm ± 5% 0.33W	Philips	2322 211 13821
R1605	Resistor 3.3kohm ± 5% 0.33W	Philips	2322 211 13332
R1606	Resistor 33 ohm ± 5% 0.33W	Philips	2322 211 13339
R1607	Resistor NTC 1kohm±10% 0.5W	Philips	2322 642 12102
R1608	Resistor 330 ohm ± 5% 0.33W	Philips	2322 211 13331
R1609	Resistor 220 ohm ± 5% 0.33W	Philips	2322 211 13221
R1610	Resistor 150 ohm ± 5% 0.33W	Philips	2322 211 13151
R1611	Resistor 15 ohm ± 5% 0.33W	Philips	2322 211 13159
R1612	Resistor 4.7kohm ± 5% 0.33W	Philips	2322 211 13472
R1613	Resistor 3.3kohm ± 5% 0.33W	Philips	2322 211 13332
R1614	Resistor 15 ohm ± 5% 0.33W	Philips	2322 211 13159
R1615	Resistor 68 ohm ± 5% 0.33W	Philips	2322 211 13689
R1616	Resistor 68 ohm ± 5% 0.33W	Philips	2322 211 13689
R1617	Resistor 180 ohm ± 5% 0.33W	Philips	2322 211 13181
R1618	Resistor 1kohm ± 5% 0.33W	Philips	2322 211 13102
R1619	Resistor 12kohm ± 5% 0.33W	Philips	2322 211 13123
R1620	Resistor 1.8kohm ± 5% 0.33W	Philips	2322 211 13182
R1621	Resistor 470 ohm ± 5% 0.33W	Philips	2322 211 13471
R1622	Resistor 4.7kohm ± 5% 0.33W	Philips	2322 211 13472
R1623	Resistor 3.9kohm 0.33W	Philips	2322 211 13392
R1624	Resistor 470 ohm ± 5% 0.33W	Philips	2322 211 13471
R1625	Preset pot.meter cermet 2.2kohm±20% 0.5W	Philips	2322 482 20222
R1626	Resistor 2.2kohm ± 5% 0.33W	Philips	2322 211 13222
R1627	Resistor 2.2kohm ± 5% 0.33W	Philips	2322 211 13222
R1628	Resistor 10kohm ± 5% 0.33W	Philips	2322 211 13103
R1629	Resistor 27kohm ± 5% 0.33W	Philips	2322 211 13273
R1630	Resistor 47 ohm ± 5% 0.33W	Philips	2322 211 13479
R1631	Preset pot.meter cermet 100 ohm±20% 0.5W	Philips	2322 482 20101
R1632	Resistor 220 ohm ± 5% 0.33W	Philips	2322 211 13221
R1633	Resistor 1kohm ± 5% 0.33W	Philips	2322 211 13102
R1634	Resistor 8.2kohm ± 5% 0.33W	Philips	2322 211 13822
R1635	Resistor 680 ohm ± 5% 0.33W	Philips	2322 211 13681
R1636	Resistor 100 ohm ± 5% 0.33W	Philips	2322 211 13101
R1637	Resistor 5.6kohm ± 5% 0.33W	Philips	2322 211 13562
R1638	Resistor 22kohm ± 5% 0.33W	Philips	2322 211 13223
R1639	Resistor 330 ohm ± 5% 0.33W	Philips	2322 211 13331
R1640	Resistor 100 ohm ± 5% 0.33W	Philips	2322 211 13101
R1641	Resistor 47 ohm ± 5% 0.33W	Philips	2322 211 13279

c MIXER UNIT S1300

Symbol	Description			Manufact.	
R1642	Resistor 220 ohm ± 5%		0.33W	Philips	2322 211 13221
R1643	Resistor 33 ohm ± 5%		0.33W	Philips	2322 211 13339
R1644	Resistor 180 ohm ± 5%		0.5W	Philips	2322 212 13181
R1645	Resistor 22 ohm ± 5%		0.33W	Philips	2322 211 13229
R1646	Resistor 180 ohm ± 5%		0.33W	Philips	2322 106 33181
R1647	Resistor 560 ohm ± 5%		0.33W	Philips	2322 106 33181
	In exciters with 3 pos. power switch only:				
R1619	Resistor 12kohm ± 5%			Philips	2322 211 13123
C1601	Capacitor, tantalum	10uF-20/+50%	25V	Ero	ETP 3F
C1602	Capacitor, polyester	47nF ±20%	250V	Philips	2222 344 40473
C1603	Capacitor, tantalum	10uF-20/+50%	25V	Ero	ETP 3F
C1604	Capacitor, polyester	47nF ±20%	250V	Philips	2222 344 40473
C1605	Capacitor, polyester	22nF ±20%	400V	Philips	2222 344 54223
C1606	Capacitor, polyester	47nF ±20%	250V	Philips	2222 344 40473
C1607	Capacitor, polyester	22nF ±20%	400V	Philips	2222 344 54223
C1608	Capacitor polystyrene	2.2nF ± 5%	160V	Philips	2222 425 22202
C1609	Capacitor, polyester	22nF ±20%	400V	Philips	2222 344 54223
C1610	Capacitor, polyester	47nF ±20%	250V	Philips	2222 344 40473
C1611	Capacitor, polyester	47nF ±20%	250V	Philips	2222 344 40473
C1612	Capacitor, polyester	22nF ±20%	400V	Philips	2222 344 54223
C1613	Capacitor, ceramic	12pF ± 5%	400V	Ferroperm	9/0112.9
C1614	Capacitor, ceramic	15pF ± 5%	400V	Ferroperm	9/0112.9
C1615	Capacitor, polystyrene	270pF± 2%	630V	Philips	2222 427 32701
C1616	Capacitor, polystyrene	680pF± 2%	250V	Philips	2222 426 36801
C1617	Capacitor, polyester	22nF ±20%	400V	Philips	2222 344 54223
C1618	Capacitor, ceramic	22pF ±10%	400V	Ferroperm	9/0112.9
C1619	Capacitor, polyester	22nF ±20%	400V	Philips	2222 344 54223
C1620	Capacitor, polystyrene	330pF± 2%	630V	Philips	2222 426 36801
C1621	Capacitor, polystyrene	820pF± 2%	630V	Philips	2222 426 38201
C1622	Capacitor, polystyrene	180pF± 2%	630V	Philips	2222 427 31801
C1623	Capacitor, polystyrene	1.5nF± 2%	160V	Philips	2222 425 31502
C1624	Capacitor, polyester	100nF±20%	100V	Philips	2222 344 24104
C1625	Capacitor, polyester	100nF±20%	100V	Philips	2222 344 24104
C1626	Capacitor, polyester	100nF±20%	100V	Philips	2222 344 24104
C1627	Capacitor, polyester	100nF±20%	100V	Philips	2222 344 24104
C1628	Capacitor, polyester	100nF±20%	100V	Philips	2222 344 24104

a	MIXER UNIT S1300		3/3
Symbol	Description	Manufact.	
C1629	Capacitor, polyester 100nF±20% 100V	Philips	2222 344 24104
L1601	Coil	S.P.	TL 264
L1602	Coil	S.P.	TL 265
L1603	Coil	S.P.	TL 254
L1604	Coil	S.P.	TL 255
TR1601	W.B. Trafo	S.P.	TL 266
TR1602	W.B. Trafo	S.P.	TL 256
T1601	Transistor	Philips	BF 199
T1602	Transistor	Philips	BF 494
T1603	Transistor	Philips	BF 494
T1604	Transistor	Philips	BF 494
T1605	Transistor	Philips	BF 199
T1606	Transistor	Philips	BFW 17A
D1601	Diode, silicon	Philips	BAV 21
D1602	Diode, silicon	Philips	BAV 21
FL1601	Crystal filter 10.697 MHz	S.P.	C1012
M1601	Mixer, double balanced	S.P.	C1007

c	MAIN CHASSIS S1300			1/1
Symbol	Description		Manufact.	
LA1701	Diode, light emitting		Xciton	XC 5053Y
LA1702	Diode, light emitting		Xciton	XC 5053Y
LA1703	Diode, light emitting		Xciton	XC 5053Y
IC1701	Voltage regulator		National	LM317T
IC1702	Voltage regulator		Motorola	MC7805CT
S1701	Switch		Cherry	E62 10HS PDT
S1702	Switch		C&K	7103 SYZQ
J1701	Socket		Hirschmann	Meb 60 H-DK
J1702	Coax-socket		K.V.Hansen	SO 239
P1701	Plug		Hirschmann	Mes 60 BZ
P1702	Plug		Molex	03-06-2364
MC1701	Microphone cartridge	50 ohm	GNT	AN1-52001
TC1701	Telephone cartridge	200 ohm	Holmco	6890 350A3
R1701	Resistor 33 ohm ± 5%	10W	Danotherm	HS 10
IC1703	Voltage regulator		Motorola	MC 7805CT
S1703	Switch		GEFE	C4.5KST1
S1704	Switch		GEFE	C4.5KST1 (Spec.)
S1705	Switch		GEFE	C4.5KST1
S1706	Switch		GEFE	C4.5KST1
S1707	Switch		GEFE	C4.5KST1
S1708	Switch		GEFE	C4.5KST1
FP1701	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A
FP1702	Ferrit bead		Kaschke	K3/1200/0.1HZ4/2/7A
FP1703	Ferrit bead		Kaschke	K3/1200/0.1HZ4/2/7A
FP1704	Ferrit bead		Kaschke	K3/1200/0.1HZ4/2/7A
FP1705	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A

b A2H - OSCILLATOR & DELAY UNIT S1300 1/2

Symbol	Description		Manufact.	
R1801	Resistor 1kohm ± 5%	0.33W	Philips	2322 211 13102
R1802	Resistor 100kohm ± 5%	0.33W	Philips	2322 211 13104
R1803	Resistor 39kohm ± 5%	0.33W	Philips	2322 211 13393
R1804	Resistor 4.7kohm ± 5%	0.33W	Philips	2322 211 13472
R1805	Resistor 33kohm ± 5%	0.33W	Philips	2322 211 13333
R1806	Preset pot.meter 1kohm ± 20%	0.5W	Philips	2322 482 20102
R1807	Resistor 1kohm ± 5%	0.33W	Philips	2322 211 13102
R1808	Resistor 2.2kohm ± 5%	0.33W	Philips	2322 211 13222
R1809	Resistor 56kohm ± 5%	0.33W	Philips	2322 211 13563
R1810	Resistor 120kohm ± 5%	0.33W	Philips	2322 211 13124
R1811	Resistor 10kohm ± 5%	0.33W	Philips	2322 211 13103
R1812	Resistor 3.9kohm ± 5%	0.33W	Philips	2322 211 13392
R1813	Resistor 10kohm ± 5%	0.33W	Philips	2322 211 13103
R1814	Resistor 56kohm ± 5%	0.33W	Philips	2322 211 13563
R1815	Resistor 10kohm ± 5%	0.33W	Philips	2322 211 13103
R1816	Resistor 10kohm ± 5%	0.33W	Philips	2322 211 13103
R1817	Resistor 3.9kohm ± 5%	0.33W	Philips	2322 211 13392
R1818	Resistor 56kohm ± 5%	0.33W	Philips	2322 211 13563
R1819	Preset pot.meter 100kohm ±20%	0.5W	Philips	2322 482 20104
R1820	Resistor 56kohm ± 5%	0.33W	Philips	2322 211 13563
R1821	Resistor 3.9kohm ± 5%	0.33W	Philips	2322 211 13392
R1822	Resistor 10kohm ± 5%	0.33W	Philips	2322 211 13103
R1823	Resistor 10kohm ± 5%	0.33W	Philips	2322 211 13103
R1824	Resistor 56kohm ± 5%	0.33W	Philips	2322 211 13563
R1825	Resistor 10kohm ± 5%	0.33W	Philips	2322 211 13103
R1826	Resistor 10kohm ± 5%	0.33W	Philips	2322 211 13103
R1827	Resistor 3.9kohm ± 5%	0.33W	Philips	2322 211 13392
C1801	Capacitor tantalum 10uF-20/+50%	25V	Ero	ETP 3F
C1802	Capacitor tantalum 10uF-20/+50%	25V	Ero	ETP 3F
C1803	Capacitor tantalum 4.7uF-20/+50%	35V	Ero	ETP 2E
C1804	Capacitor polystyrene 56nF ± 1%	63V	Philips	2222 444 45603
C1805	Capacitor tantalum 4.7uF-20/+50%	35V	Ero	ETP 2E
C1806	Capacitor tantalum 4.7uF-20/+50%	35V	Ero	ETP 2E
C1807	Capacitor polyester 100nF ±10%	100V	Philips	2222 344 25104
C1808	Capacitor polyester 220nF ±10%	400V	Philips	2222 344 25224
C1809	Capacitor polyester 220nF ±10%	100V	Philips	2222 344 25224
C1810	Capacitor polyester 10nF ±20%	400V	Philips	2222 344 54103

MODULE NO: 1800

a	A2H - OSCILLATOR & DELAY UNIT S1300		2/2
Symbol	*Description*	*Manufact.*	
L1801	Coil	S.P.	TL 267
D1801	Diode, silicon	Philips	BAV 21
D1802	Diode, silicon	Philips	BAV 21
D1803	Diode, silicon	Philips	BAV 21
D1804	Diode, silicon	Philips	BAV 21
D1805	Diode, silicon	Philips	BAV 21
D1806	Diode, silicon	Philips	BAV 21
T1801	Transistor	Philips	BC 548
T1802	Transistor	Philips	BC 548
T1803	Transistor	Philips	BC 548
T1804	Transistor	Philips	BC 548
T1805	Transistor	Philips	BC 558
T1806	Transistor	Philips	BC 548
T1807	Transistor	Philips	BC 548
T1808	Transistor	Philips	BA 548
T1809	Transistor	Philips	BC 558
RE1801	Relay	Siemens	V23100-V4024-A001

a	POWER SWITCH S1301			1/1
Symbol	*Description*		*Manufact.*	
R2001	Resistor	33kohm ± 5% 0.33W	Philips	2322 211 13333
R2002	Resistor	10kohm ± 5% 0.33W	Philips	2322 211 13103
R2003	Resistor	3.6kohm ± 5% 0.33W	Philips	2322 211 13362
S2001	Switch		Jeanrenaud	RBP 12 FA.2.5.NCC
S2002	Switch		Jeanrenaud	RBP 12 FA.4.2.NCC

MODULE NO: 2100

a	FREQUENCY SELECTOR S1301		1/1
Symbol	Description	Manufact.	
R2101	Resistor 47 ohm ± 5% 4W	Philips	2322 330 22479
R2102	Resistor 10kohm ± 5% 0.33W	Philips	2322 211 13103
R2103	Resistor 10kohm ± 5% 0.33W	Philips	2322 211 13103
R2104	Resistor 4.7kohm ± 5% 0.33W	Philips	2322 211 13472
R2105	Resistor 1kohm ± 5% 0.5W	Philips	2322 212 13102
R2106	Resistor 2.2kohm ± 5% 0.33W	Philips	2322 211 13222
RA2101	Resistor array 8x10 kohm ± 5% 0.125W	ITT	VR8, 10kohm 5%
RA2102	Resistor array 8x10 kohm ± 5% 0.125W	ITT	VR8, 10kohm 5%
RA2103	Resistor array 8x10 kohm ± 5% 0.125W	ITT	VR8, 10kohm 5%
C2101	Capacitor, electrolytic 10uF-10/+100%40V	Siemens	B41313-A7106-V
C2102	Capacitor, polyester 220nF ± 20% 100V	Philips	2222 344 24224
C2103	Capacitor, polyester 100nF ± 20% 100V	Philips	2222 344 24104
C2104	Capacitor, polyester 100nF ± 20% 100V	Philips	2222 344 24104
C2105	Capacitor, polyester 100nF ± 20% 100V	Philips	2222 344 24104
T2101	Transistor	Philips	BC 548
IC2101	Integrated circuit	Motorola	GMM 7643
IC2102	Integrated circuit	Texas	74LS27
IC2103	Integrated circuit	Texas	7407
IC2104	Integrated circuit	Texas	74LS09
IC2105	Integrated circuit	Texas	74LS09
IC2106	Integrated circuit	Texas	74LS09
IC2107	Integrated circuit	Texas	74LS09

MF - SPECIAL - UNIT S1300 AND S1301

Symbol	Description	Manufact.	
R2201	Resistor 5.6 kohm ±5% 0,33W	Philips	2322 211 13562
R2202	Resistor 10 kohm ±5% 0,33W	Philips	2322 211 13103
T2201	Transistor	Philips	BC 548
T2202	Transistor	Philips	BC 548
D2201	Diode, silicon	Philips	BAV 62
RE2201	Relay	Pasi	KS/U-3-H BV997

CIRCUIT DESCRIPTIONS AND SCHEMATIC DIAGRAMS

CIRCUIT DESCRIPTION FOR DIVIDER UNIT S1300 & R1117

This unit contains the logic part of phase locked LOOP 1 and phase locked LOOP 2.

The 10 MHz reference oscillator (TCXO), reference divider, 2 MHz spectrum generator, 600 kHz carrier generator, programmable dividers for LOOP 1 and LOOP 2 and the phase/frequency detectors for LOOP 1 and LOOP 2.

10 MHz REFERENCE

The frequency stability of the exciter is related to the 10 MHz TCXO XO101. The 10 MHz reference signal is amplified in the transistors T103 and T104.

REFERENCE DIVIDER

The counters IC115, IC111 and IC107 divides the 10 MHz reference signal down to respectively f_{R1} = 1 kHz and f_{R2} = 100 Hz.

2 MHz HARMONIC SPECTRUM GENERATOR

With a repetition frequency of 2 MHz the output Q_D of IC115 goes low and the nand-gates in IC114 will generate a narrow pulse due to the delay-time in the gates.

600 kHz GENERATOR

The output on IC111 pin 5, Q_B has a high contents of 600 kHz, which is amplified in the transistor T105 and filter in the tuned circuit L101, C136 and C137.

PROGRAMMABLE DIVIDER FOR LOOP 1

The variable frequency f_{T1} from LOOP 1 MIXER is amplified and shaped in T101 and IC109a. Independent of which 2 MHz band used the frequency f_{T1} will vary from 2699 kHz to 4698 kHz as the VCO varies 2 MHz. The programmable divider divides f_{T1} down to 1 kHz (dividing figure N_1). This means that there is 2000 frequencies in each 2 MHz band. The frequency is controlled by the FREQUENCY SELECTOR, which encodes the start figure P_1 into the BCD counters IC101, IC102, IC103 and IC104.

The stop figure S_1 is controlled from the gates IC108b and IC109c. When the counter outputs Q_A, Q_B ... etc. equals the stop figure S_1 + 2 the J-K flip-flop IC110b uses 2 clock pulses to load the start figure P_1 into the counters IC101, IC102, IC103 and IC104. The counter counts down from the start figure P_1 to stop figure S_1 and thus the dividing figure $N_1 = P_1 - S_1$.

LOOP 1 PHASE/FREQUENCY DETECTOR

The reference frequency f_{R1} = 1 kHz and the variable frequency f_{V1} = 1 kHz are fed into the phase/frequency detector IC106. The phase/frequency detector IC106 generates an error voltage, which is proportional to frequency or

A1/2 S1301, S1300/TT,T; R1117

phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the LOOP 1 FILTER & ± 18V SUPPLY UNIT.

PROGRAMMABLE DIVIDER FOR LOOP 2

The variable frequency f_{T2} from the loop 2 mixer is amplified and shaped in T102 and IC109b. The frequency f_{T2} will vary between 98.1 kHz and 99.0 kHz depending on the 100 Hz programming. The programmable divider divides f_{T1} down to 100 Hz (dividing figure N_2).

From the FREQUENCY SELECTOR the start figure P_2 encodes into the BCD counter IC105.

The stop figure S_2 is controlled from the gate IC108a. When the counter outputs Q_A, Q_B, Q_C ... etc. equals the stop figure S_2 - 2 the J-K flip-flop IC110a uses 2 clock pulses to load the start figure P_2 into the counters IC105 and IC112. The counter will count up from the start figure P_2 to the stop figure S_2 and thus the dividing figure is $N_2 = S_2 - P_2$.

LOOP 2 PHASE/FREQUENCY DETECTOR

The reference frequency f_{R2} = 100 Hz and the variable frequency f_{V1} = 100 Hz, are fed into the phase/frequency detector IC113. The phase/frequency detector IC113 generates an error voltage proportional to the frequency or the phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the VCXO & LOOP 2 FILTER UNIT.

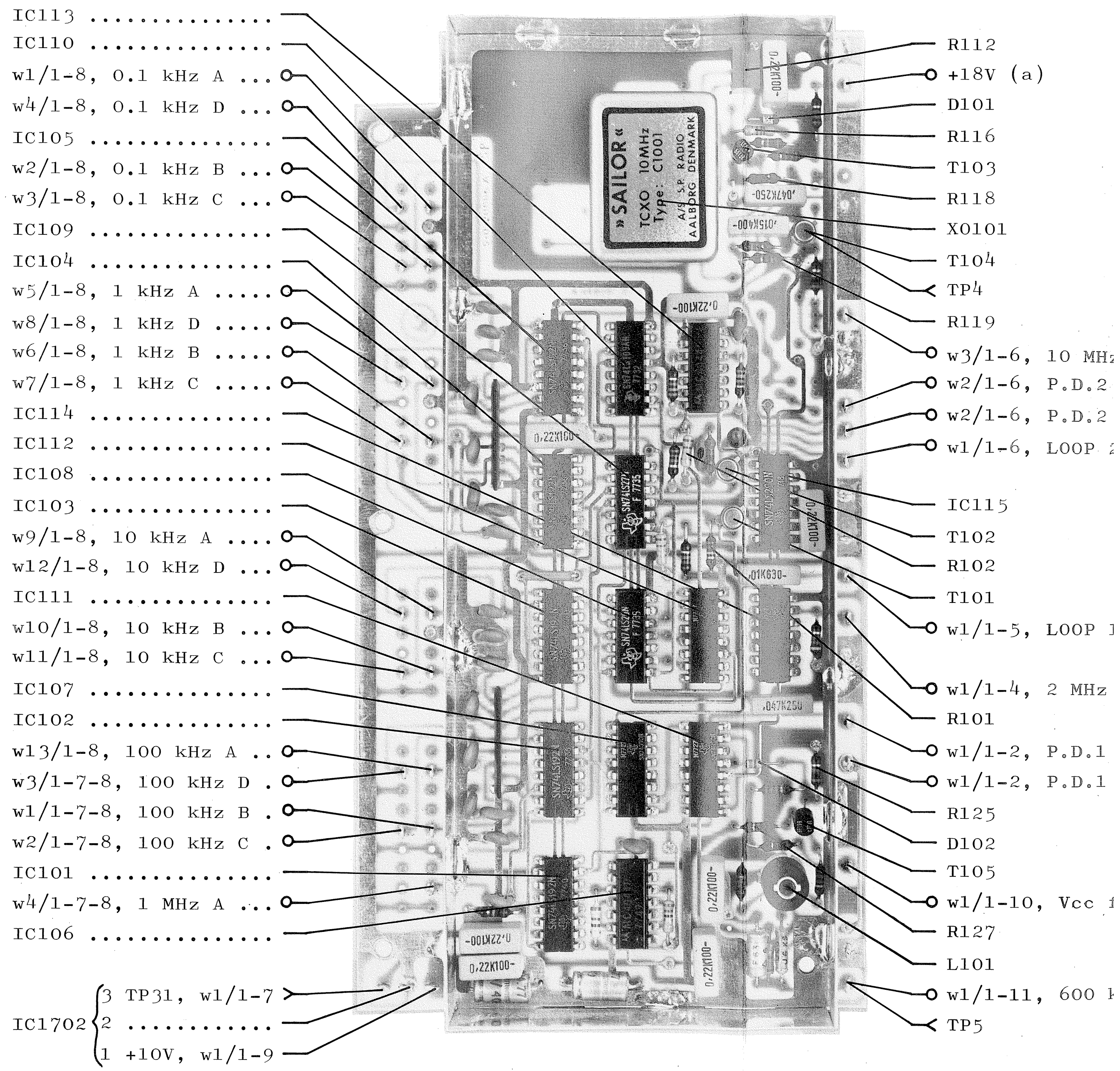
TEST CONDITIONS

Frequency selector	: 1A (f = 2.0005 MHz)
Mode	: A3J
KEY	: ON
Oscilloscope input	: Passive probe 10 Mohm/11pF
DC voltmeter input	: 10 Mohm

⦿ : Diode probe measurements

TP : Testpoints

All voltage statements are typical



CIRCUIT DESCRIPTION LOOP 1 FILTER & ±18V SUPPLY UNIT S1300 & R1117

This unit contains two regulated power supplies ±18V with fold-back current limiter, the complete integrator and filter for LOOP 1.

-18V SUPPLY

The series transistor T201 supplies a -18V output controlled by the current flow into its base from T202, where a portion of the output voltage, via a voltage divider containing R209, is compared to a reference voltage created by R204, D202 and D201. The fold-back is within the circuit. When the output current from the regulator increases the base current must increase too, but this current is limited by R204. When the regulator reaches this limit T205 stops conducting and so it folds back. To ensure that T201 starts conducting R203 is added.

+18V SUPPLY

The principle of operation for this regulator is exactly as described above, with an additional current limiter containing T204 and T206 to ensure the fold-back characteristic is maintained within design limits. To ensure start-up R212 is added.

INTEGRATOR & LOOP 1 FILTER

The integrator is built-up around IC202, the integration capacitor is C211. R220 feeds current into the diode coupled Darlington pair in the phase comparator MC4044 on the divider board to perform the 1.5V reference. Output from the integrator pin 6 on IC202 feeds into the active low-pass filter IC201 to filter out the 1 kHz ripple from the phase comparator. The voltage divider R217 and R218 connected to IC202 via D206 ensure that the output voltage swing is within approx. -4V to -17V.

TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)

Oscilloscope input : Passive probe 10 Mohm/11 pF

DC voltmeter input : 10 Mohm

⦿ : Diode probe measurements

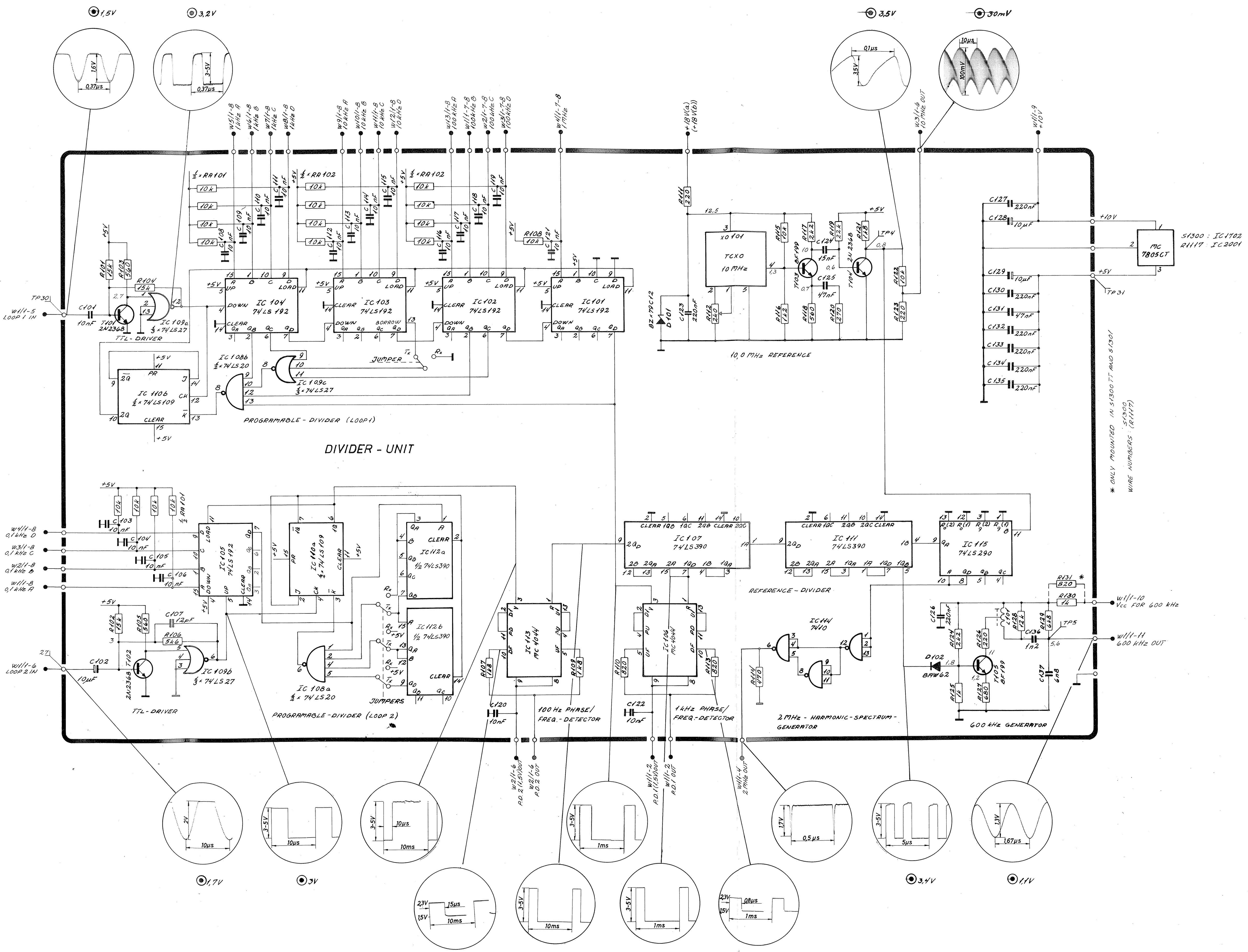
TP : Testpoints

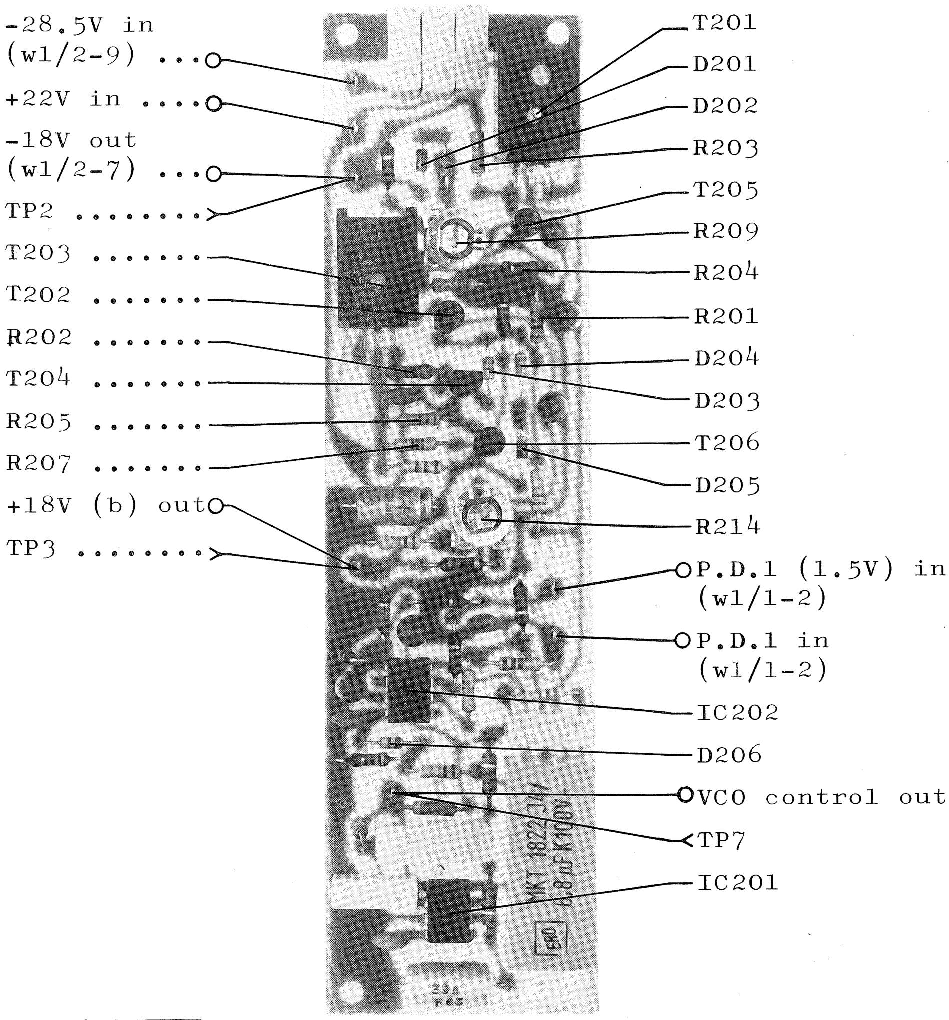
All voltage statements are typical

- R112
- +18V (a)
- D101
- R116
- T103
- R118
- X0101
- T104
- TP4
- R119
- w3/1-6, 10 MHz out
- w2/1-6, P.D.2 (1.5V) out
- w2/1-6, P.D.2 out
- w1/1-6, LOOP 2 in

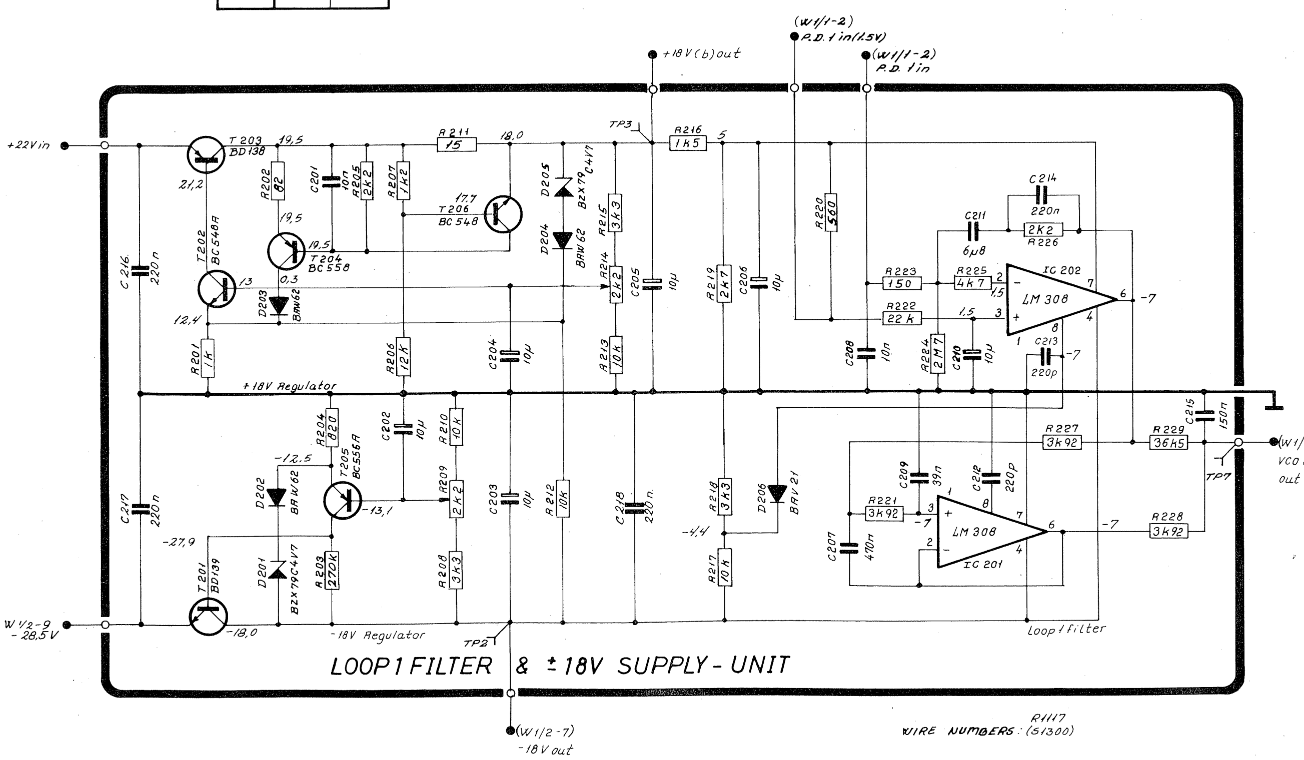
- IC115
- T102
- R102
- T101
- w1/1-5, LOOP 1 in

- w1/1-4, 2 MHz out
- R101
- w1/1-2, P.D.1 out
- w1/1-2, P.D.1 (1.5V) out
- R125
- D102
- T105
- w1/1-10, Vcc for 600kHz
- R127
- L101
- w1/1-11, 600 kHz out
- TP5





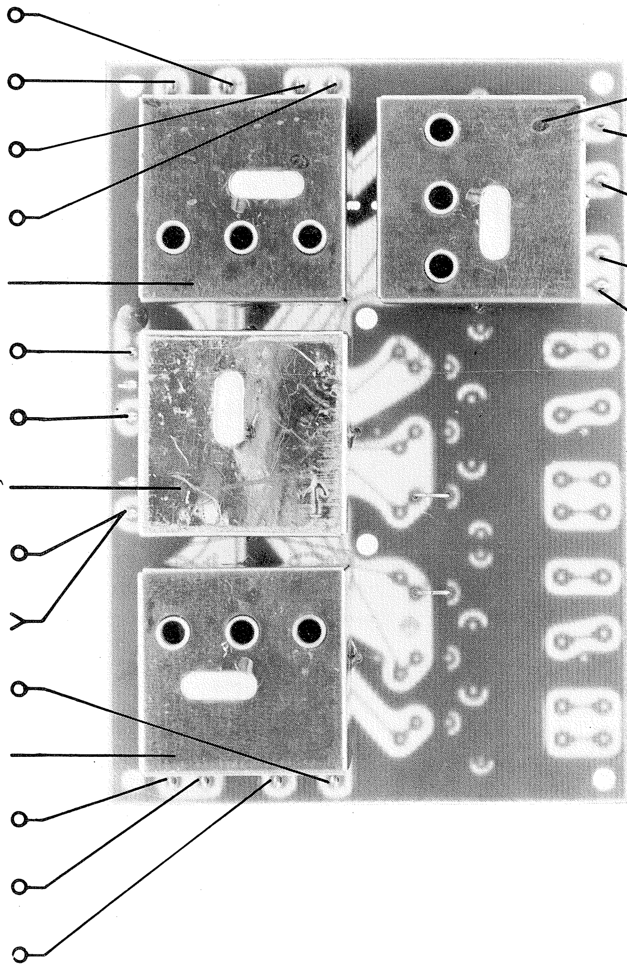
	S1300	R1117
R203	270kΩ	150kΩ
R211	15Ω	12Ω



CIRCUIT DESCRIPTION VCO-UNIT S1300 & R1117

This unit contains in principle nine VCO's constructed in such a way that it contains one single oscillator unit and nine coil units switched in and out by the diodes D301 to D320. The oscillator circuit is made up of T301 and T302, the output signal is fed through the buffer amplifier T303. The signal current in T303 is measured by the level detector C312, R307 and D321, and via T304 it regulates the oscillator amplitude to maintain a constant output voltage.

The oscillator unit is factory adjusted and sealed and cannot be repaired in the field, it must be replaced and can be repaired at the factory.



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TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)

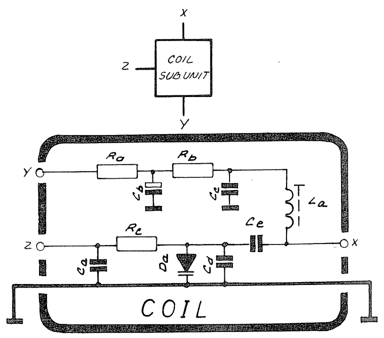
Oscilloscope input : Passive probe 10 Mohm//11 pF

DC voltmeter input : 10 Mohm

⦿ : Diode probe measurements

TP : Testpoints

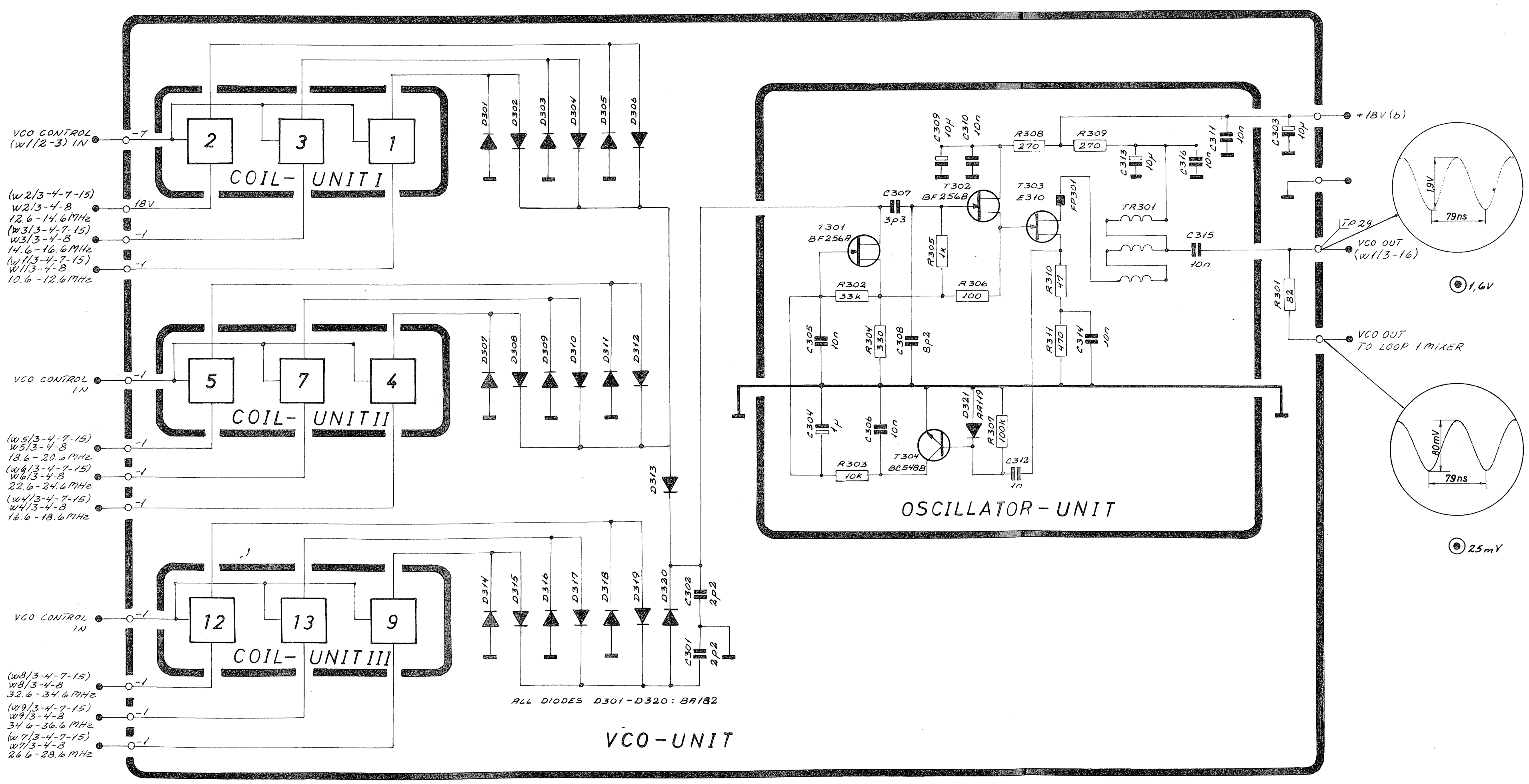
All voltage statements are typical



COIL UNIT	COIL	R_a (Ω)	R_b (Ω)	R_c (Ω)	C_a (nF)	C_b (μF)	C_c (nF)	C_d (pF)	C_e (pF)	L_a	D_a
I	1	R312 470	R321 47	R330 5k6	C317 10n	C320 10μ	C329 10n	C338	C347 120	L301 TL208	D322 BB113
	2	R313 470	R322 47	R331 5k6		C321 10μ	C330 10n	C339 4p7	C348 100	L302 TL209	D323 BB113
	3	R314 470	R323 47	R332 4k7		C322 10μ	C331 10n	C340 8p2	C349 82	L303 TL210	D324 BB113
II	4	R315 470	R324 47	R333 3k9	C318 10n	C323 10μ	C332 10n	C341 10p	C350 68	L304 TL211	D325 BB113
	5	R316 470	R325 47	R334 3k3		C324 10μ	C333 10n	C342 8p2	C351 56	L305 TL212	D326 BB113
	7	R317 470	R326 47	R335 3k3		C325 10μ	C334 10n	C343 10p	C352 47	L306 TL213	D327 BB113
III	9	R318 470	R327 47	R336 3k3	C319 10n	C326 10μ	C335 10n	C344 5p6	C353 39	L307 TL214	D328 BB113
	12	R319 470	R328 47	R337 4k7		C327 10μ	C336 10n	C345 8p2	C354 33	L308 TL216	D329 BB113
	13	R320 470	R329 47	R338 6k8		C328 10μ	C337 10n	C346 5p6	C355 31	L309 TL215	D330 BB113

TABLE FOR COMPONENTVALUES OF COILS

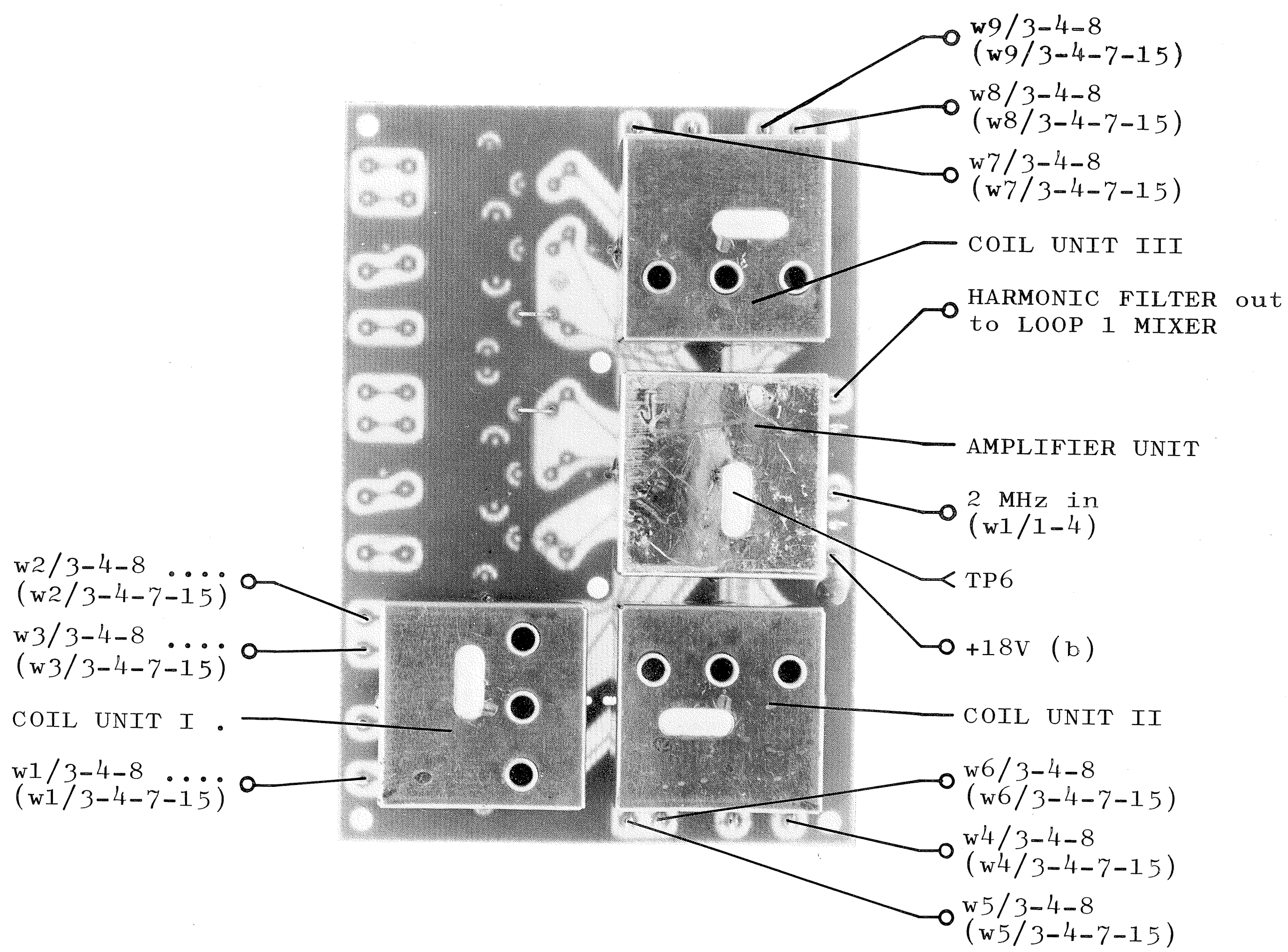
WIRE NUMBERS: R1117 (S1300)



CIRCUIT DESCRIPTION HARMONIC FILTER UNIT S1300 & R1117

This unit is a tuned amplifier, it receives 2 MHz impulses from the divider board and filters out the wanted harmonic with a tuned circuit. On the board there is one single amplifier and nine coil units switched in and out by the diodes D401 to D420. The tuned amplifier is T401 feeding into the source follower T402. The output voltage is measured by the level detector C411, R409 and D422 and via T403 it regulates the transconductance in T401 to maintain a constant output voltage.

The harmonic filter unit is factory adjusted and sealed and cannot be repaired in the field. It must be replaced and can be repaired at the factory.



TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)

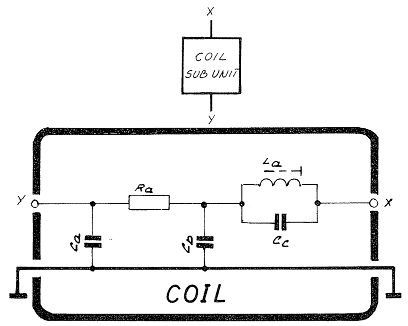
Oscilloscope input : Passive probe 10 Mohm//11 pF

DC voltmeter input : 10 Mohm

⦿ : Diode probe measurements

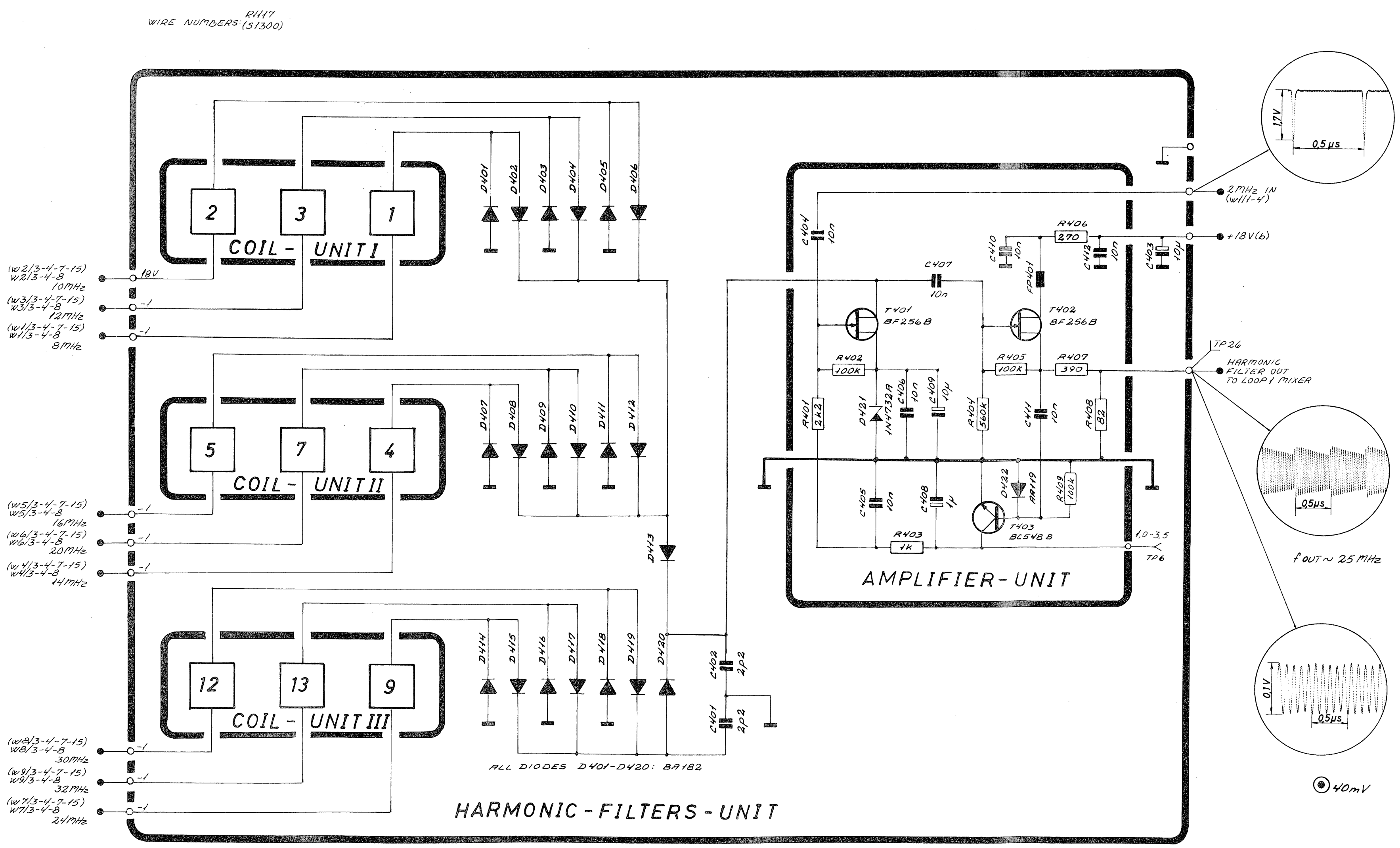
TP : Testpoints

All voltage statements are typical



COIL UNIT	COIL	R_a (Ω)	C_a (nF)	C_b (nF)	C_c (pF)	L_a
I	1	R409 470	C413 10	C422 10	C431 300	L401 TL199
	2	R410 470	C414 10	C423 10	C432 240	L402 TL200
	3	R411 470	C415 10	C424 10	C433 220	L403 TL201
II	4	R412 470	C416 10	C425 10	C434 180	L404 TL202
	5	R413 470	C417 10	C426 10	C435 180	L405 TL203
	7	R414 470	C418 10	C427 10	C436 110	L406 TL203
III	9	R415 470	C419 10	C428 10	C437 100	L407 TL204
	12	R416 470	C420 10	C429 10	C438 82	L408 TL205
	13	R417 470	C421 10	C430 10	C439 91	L409 TL206

TABLE FOR COMPONENT VALUES OF COILS



CIRCUIT DESCRIPTION LOOP 1 MIXER S1300 & R1117

This unit mixes together the VCO signal and the signal from the harmonic filter and filters out the difference frequency to supply the variable divider.

The VCO signal is fed to the top of R501 which is part of a voltage divider. From here it is fed into a buffer amplifier T501 and after that to the integrated balanced mixer IC501. To this the harmonic filter signal is applied via C505. Output from the mixer is fed into the combiner transformer TR501 feeding into the low-pass filter containing L502 and L503. This low-pass filter filters out the wanted mixing product and prevents the two local-oscillator signals from reaching the variable divider. The filtered signal is amplified in the output amplifier T502.

TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)

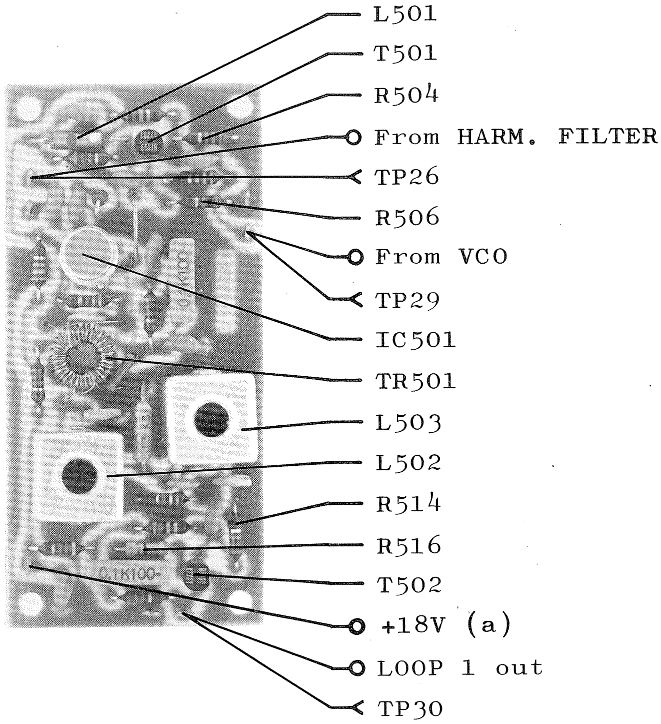
Oscilloscope input : Passive probe 10 Mohm//11 pF

DC voltmeter input : 10 Mohm

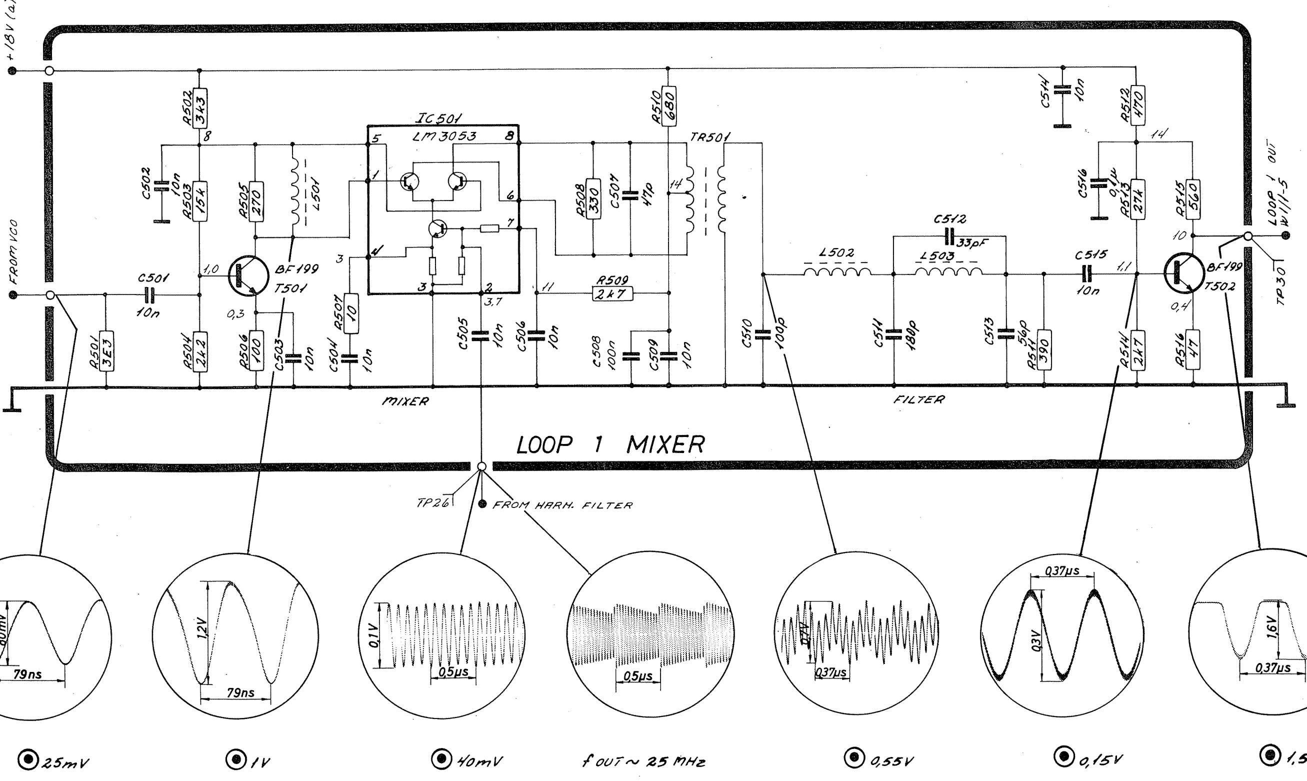
⦿ : Diode probe measurements

TP : Testpoints

All voltage statements are typical



L501
T501
R504
From HARM. FILTER
TP26
R506
From VCO
TP29
IC501
TR501
L503
L502
R514
R516
T502
+18V (a)
LOOP 1 out
TP30



+18V (a)
FROM VCO
IC501
LM3053
TR501
BF199
T501
T502
L501
L502
L503
C512
33pF
MIXER
FILTER
LOOP 1 MIXER
LOOP 1 OUT
TP30
TP26
FROM HARM. FILTER
80mV
79ns
1,2V
79ns
0,1V
0,5µs
0,5µs
0,37µs
0,37µs
0,3V
1,6V
0,37µs
25mV
1V
40mV
f OUT ~ 25 MHz
0,55V
0,15V
1,5V

CIRCUIT DESCRIPTION VCXO & LOOP 2 FILTER S1300

This unit contains the integrator and loop filter for loop 2, the voltage controlled crystal oscillator (VCXO) and the loop 2 mixer.

LOOP 2 FILTER

The integrator is built up around IC601 the integration capacitor is C605. R601 feeds current into the diode coupled Darlington pair in the phase comparator MC4044 on the divider board to make the 1.5V reference. Output from the integrator pin 6 on IC601 is fed into the low-pass filters R607, C607, R609 and C606 to filter out the 100 Hz ripple from the phase comparator. From the low-pass filter the control voltage is fed via R615 into the VCXO.

VCXO

The VCXO is built up around the FET T601. The oscillator is an ordinary Hartley oscillator with a crystal in the feed-back path. The crystal is tuned with the varicaps D601 and D602 to carry out the voltage control of the frequency. The output from the VCXO to first mixer is taken from the tap on the coil L601. From the source a portion of the oscillator signal is taken to the loop 2 mixer.

LOOP 2 MIXER

As mentioned above the VCXO signal is fed into the base of mixer transistor T602 via R610. 10 MHz from the TCXO are applied to the same base via R619. Because of the big difference between the two oscillator frequencies and the wanted output frequency the only filtering needed to filter out the wanted frequency product is R621 and C616. The mixer transistor feeds into the output amplifier T603.

TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)

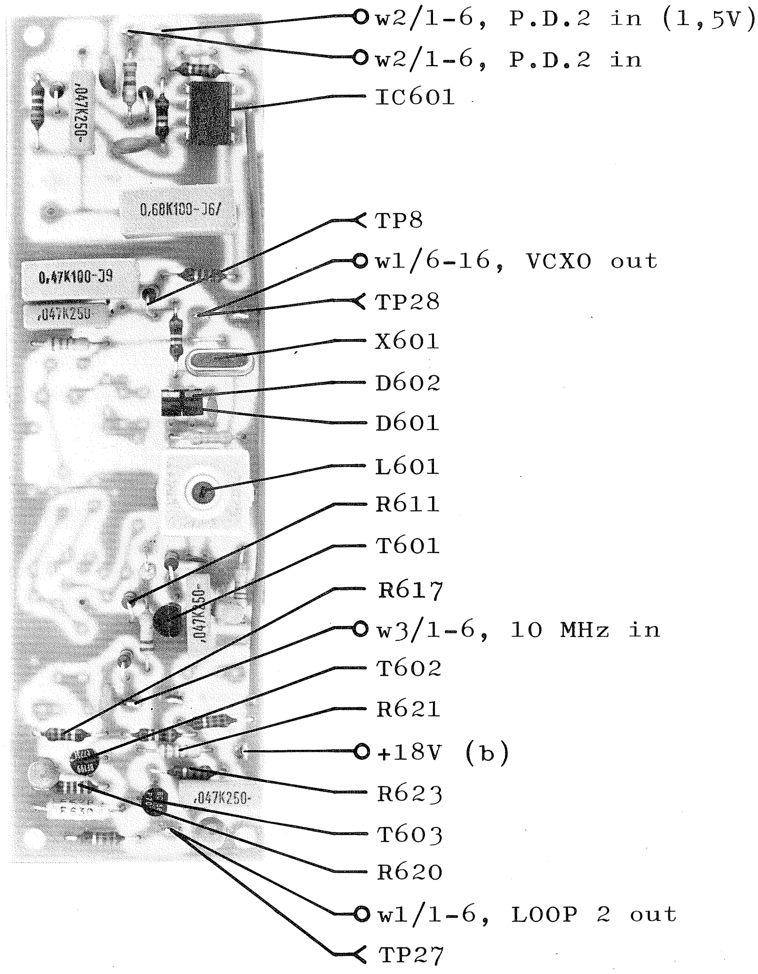
Oscilloscope input : Passive probe 10 Mohm/11 pF

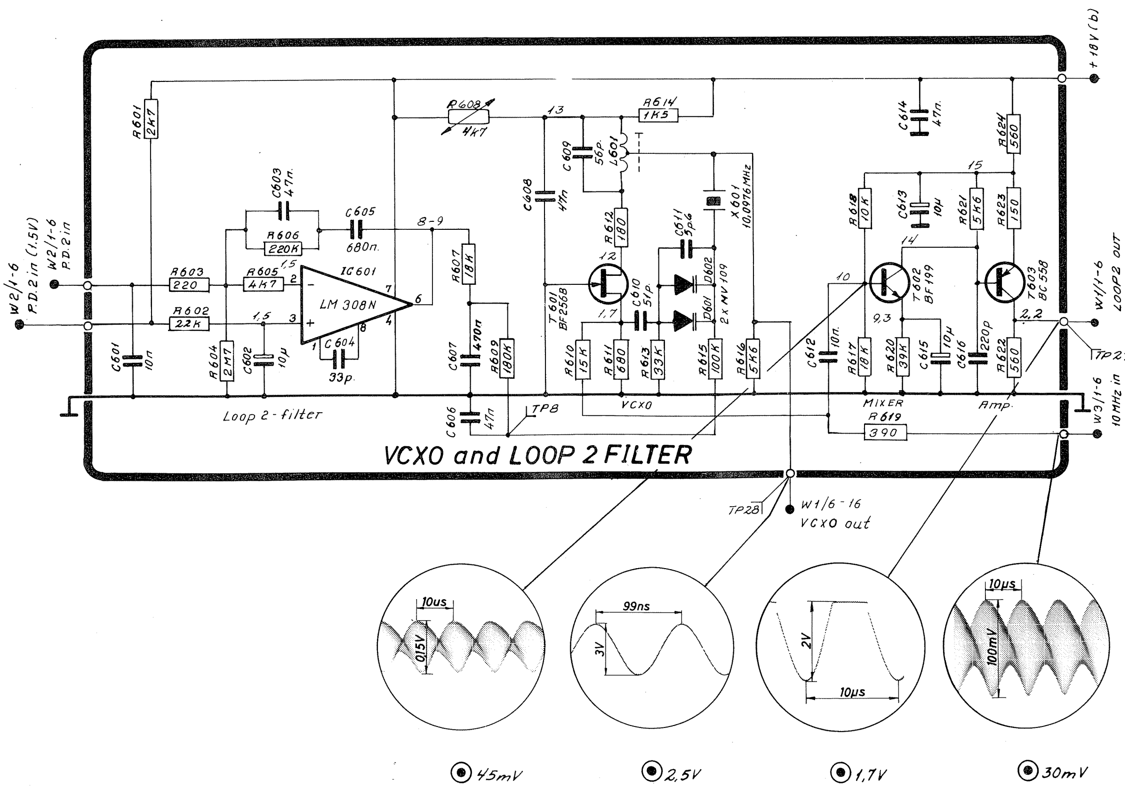
DC voltmeter input : 10 Mohm

⦿ : Diode probe measurements

TP : Testpoints

All voltage statements are typical


w2/1-6, P.D.2 in (1,5V)
w2/1-6, P.D.2 in
IC601
TP8
w1/6-16, VCXO out
TP28
X601
D602
D601
L601
R611
T601
R617
w3/1-6, 10 MHz in
T602
R621
+18V (b)
R623
T603
R620
w1/1-6, LOOP 2 out
TP27


VCXO and LOOP 2 FILTER
+18V (b)
W2/1-6 P.D.2 in (1,5V)
W2/1-6 P.D.2 in
R601 2K7
R603 220
R602 22K
C501 10n
R605 4K7
R606 220K
C603 47n
C605 680n
R604 2M7
C602 10µ
IC601 LM 308N
C604 33p
Loop 2 - filter
R607 18K
C607 470n
R609 180K
C606 47n
TP8
R608 4K7
C608 47n
C609 56p
L601
R614 1K5
R612 180
T601 BF256B
C610 51p
C611 5p6
D602
D601
2 x MV 109
X601 10,0976 MHz
R610 15K
R611 680
R613 33K
R615 100K
R616 5K6
VCXO
C612 10n
R618 10K
C613 10µ
T602 BF199
R617 18K
R620 39K
C615 10µ
C616 220p
C614 47n
R624 560
R621 5K6
R623 150
T603 BC 558
R622 560
R619 390
MIXER
Amp.
W1/1-6 LOOP2 out
TP27
W3/1-6 10 MHz in
TP28
W1/6-16 VCXO out
10µs
0,15V
99ns
3V
2V
10µs
10µs
100mV
45mV
2,5V
1,7V
30mV

CIRCUIT DESCRIPTION MOTOR CONTROL UNIT S1300

SELECTION OF THE FREQUENCY BANDS IN TRANSMITTER T1127.

This unit contains the control circuits for the band selection in T1127 and S1300, output power and power supply ON/OFF.

The transmitter T1127 has a 19 position drum switch driven by a step-motor. For each position a five bit code (S,R,Q,P,O) is generated.

The FREQUENCY SELECTOR in the exciter is programmed with a code for the 19 bands corresponding to the code from the transmitter. The two codes are compared and if the codes are unequal the step-motor runs and for equal codes the step-motor stops.

From the FREQUENCY-SELECTOR the transmit band code (ZYXV), the MHz code (A) and the 100 kHz code (DCB) are delivered to MOTOR CONTROL UNIT. In the first six MF bands the DATA SELECTOR IC702 transfers the MHz code (A) and 100 kHz code (DCB) to the comparator IC703a,b,c,d and IC704c. In all other bands the DATA SELECTOR IC702 transfers the transmit band code (ZYXV) to the comparator IC703a,b,c,d and IC704c.

The information from the comparator is inverted in IC704b and via IC705c to T714 which controls the step-motor. IC705b stops the information if the decimal code of (ZYXV) is 15 or 0 indicating that no programming strip or an unprogrammed one is mounted. This information is also fed to IC705a and T715 in order to block the power supply. The information that the step-motor is running and the POWER ON/OFF information are fed to IC705a and T715 in order to block the power supply.

SELECTION OF VCO AND HARMONIC FILTER

For each 2 MHz band a VCO and a HARMONIC FILTER are used. To cover the MF and HF maritime band 9 VCO's and HARMONIC FILTERS are used.

From the FREQUENCY SELECTOR the transmit band code (ZYXV) is fed to the 4 to 16 Line Decoder IC707 and the MHz code (A) are fed to the Majority Logic IC706a.

For the two frequency bands from 1.6 - 2.0 MHz the MHz code (A) controls the Majority Logic IC706a to switch on the transistor T702, and thus selects the 0 - 2 MHz VCO.

For the four frequency bands from 2.0 - 2.9 MHz the MHz code (A) controls the Majority Logic IC706b to switch on the transistor T703, and thus selects the 2 - 4 MHz VCO.

For the four frequency bands from 2.8 - 4.0 MHz the transmit band code (ZYXV) activates the outputs from 2 - 5 on the 4 to 16 Line Decoder IC707. These outputs controls the Majority Logic IC706b to switch on the transistor T703 and thus selects the 2 - 4 MHz VCO.

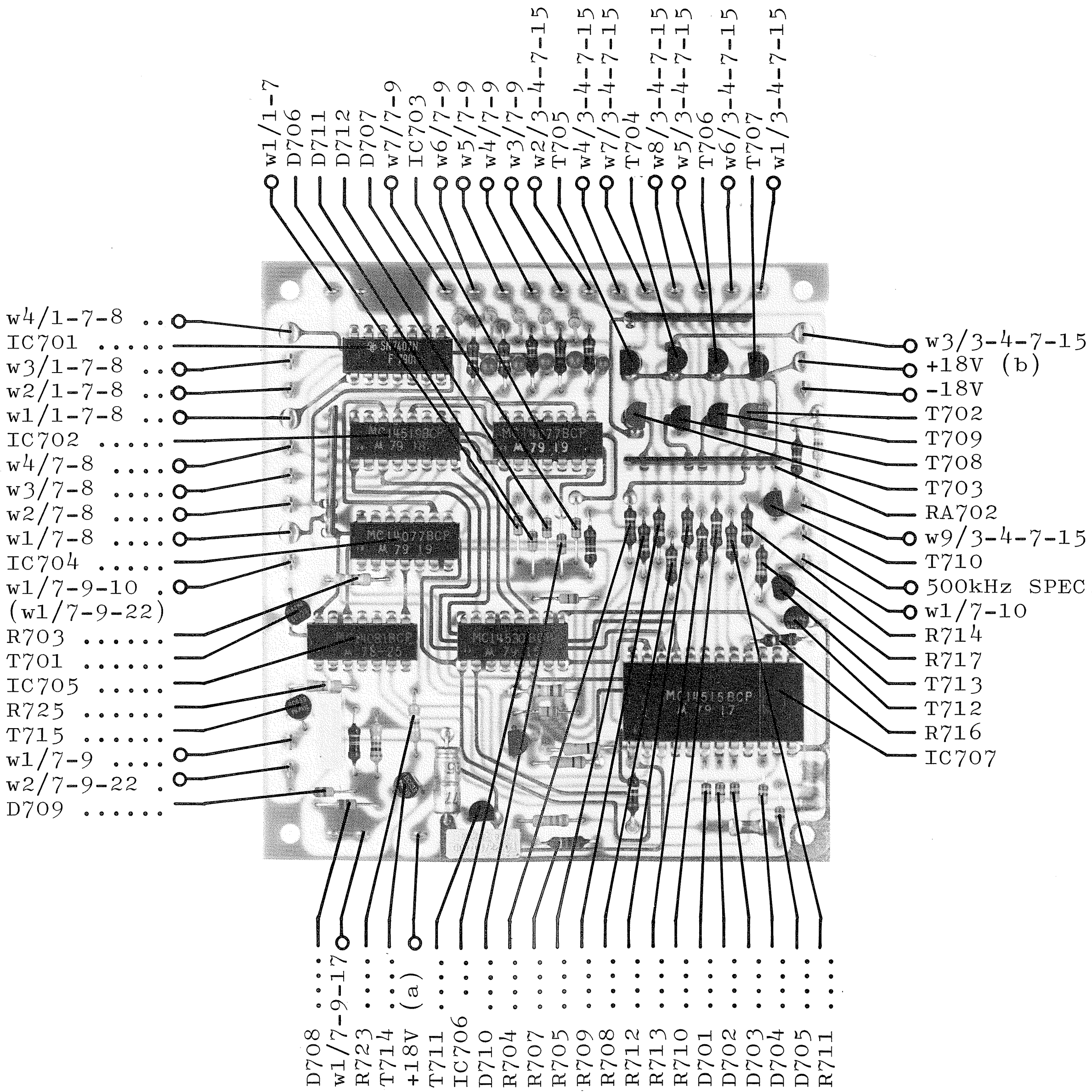
For the 7 HF bands the transmit band code (ZYXV) activates the outputs from 6 to 12 on the 4 to 16 Line Decoder IC707. These outputs switch on the transistors T704 to T710 in order to select the corresponding VCO's 4 - 6 MHz, 6 - 8 MHz, 8 - 10 MHz, 12 - 14 MHz, 16 - 18 MHz, 22 - 24 MHz and 24 - 26 MHz.

For the 2182 MHz band the transmit band code (ZYXV) activates output 14 on the 4 to 16 Line Decoder IC707. This output switches on the transistor T703 via the Majority Logic IC706b and thus selects the 2 - 4 MHz VCO. The output 14 on IC707 is fed through T712 and T713 to indicate that 2182 kHz is selected.

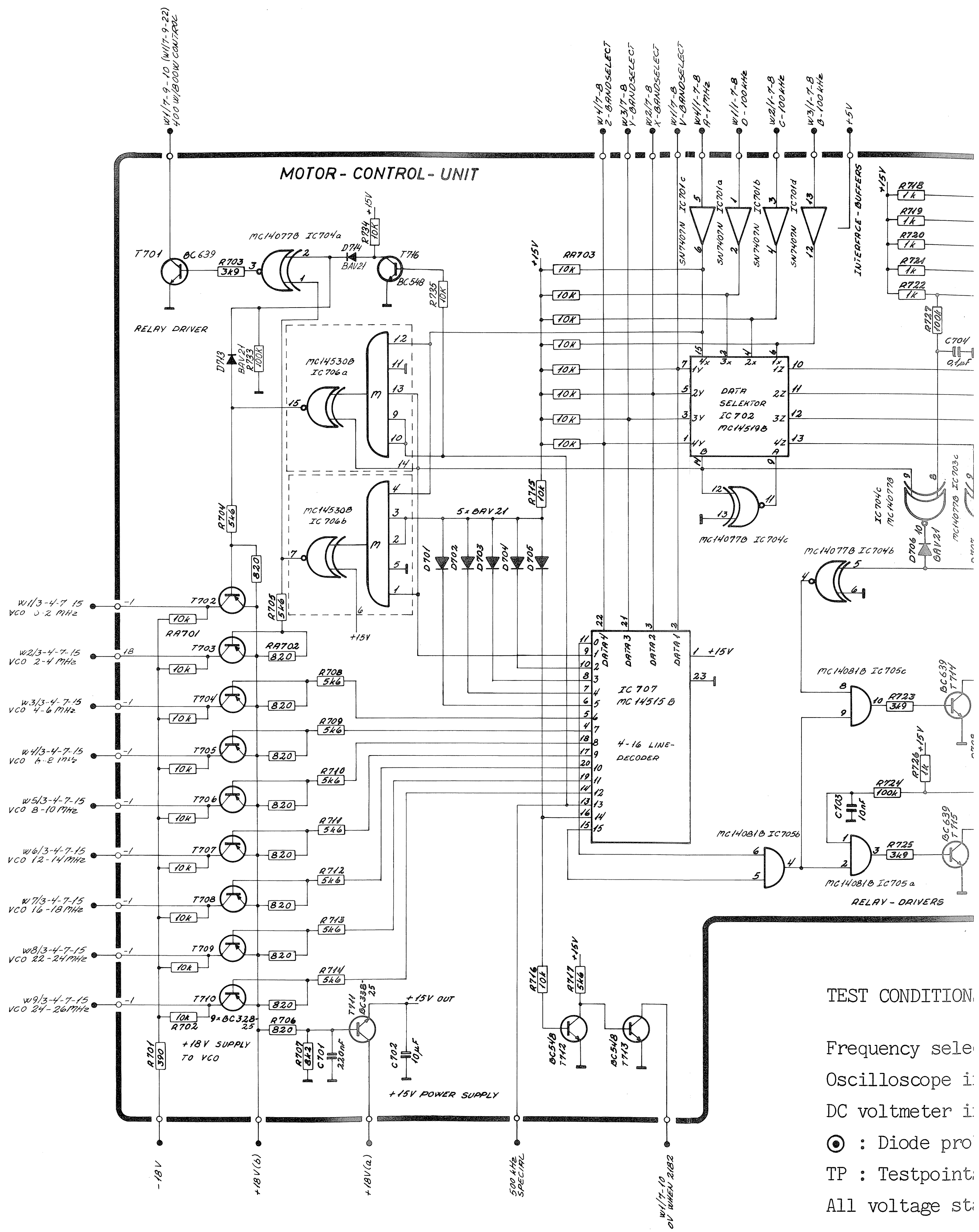
For the 500 kHz band the transmit band code (ZYXV) activates output 13 on the 4 to 16 Line Decoder IC707. This output switches on the transistor T702 via the Majority Logic IC706b and thus selects the 0 - 2 MHz VCO.

400W/800W CONTROL

In the MF band from 1.6 - 4 MHz the output power must not exceed 400W PEP. The information that a frequency below 4 MHz is selected is fed from the outputs on the Majority Logics IC706a and IC706b to the IC704a and T701.



Nolation in brackets: Only in S1301



TEST CONDITION

Frequency sele

Oscilloscope i

DC voltmeter i

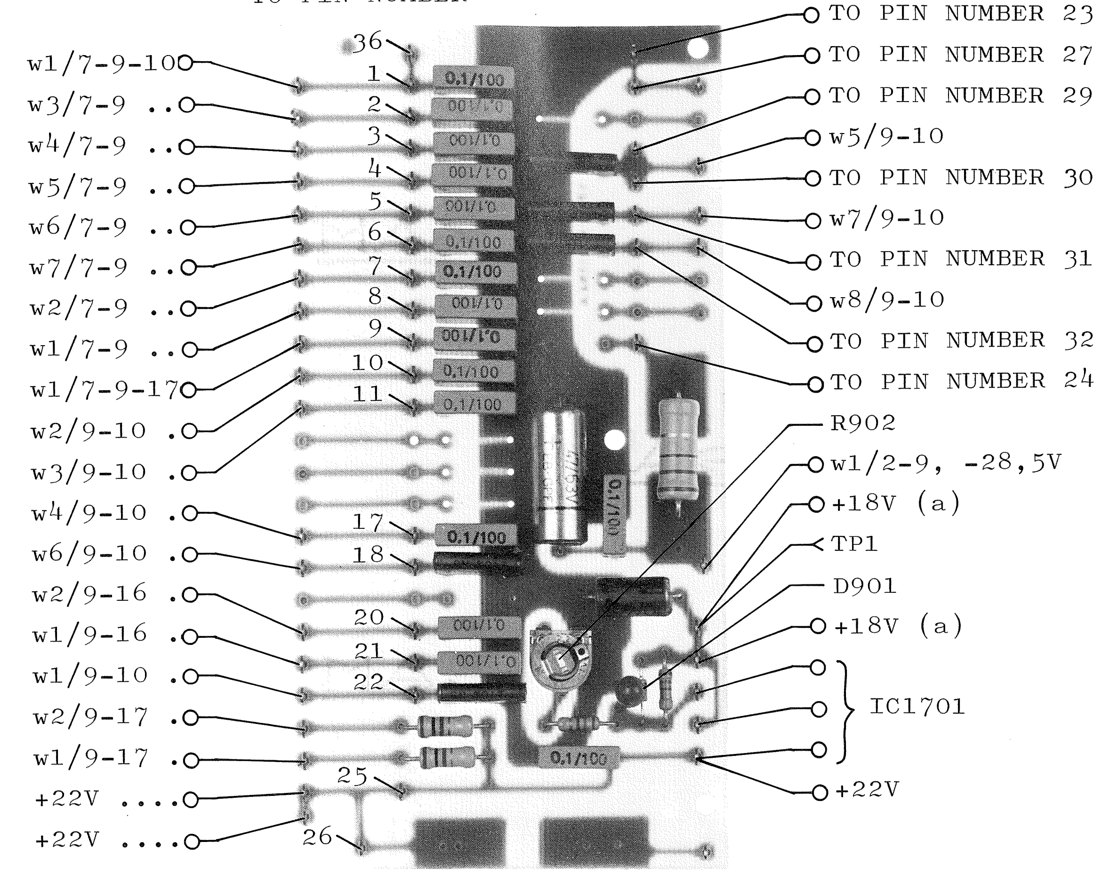
⊙ : Diode pro

TP : Testpoint

All voltage st

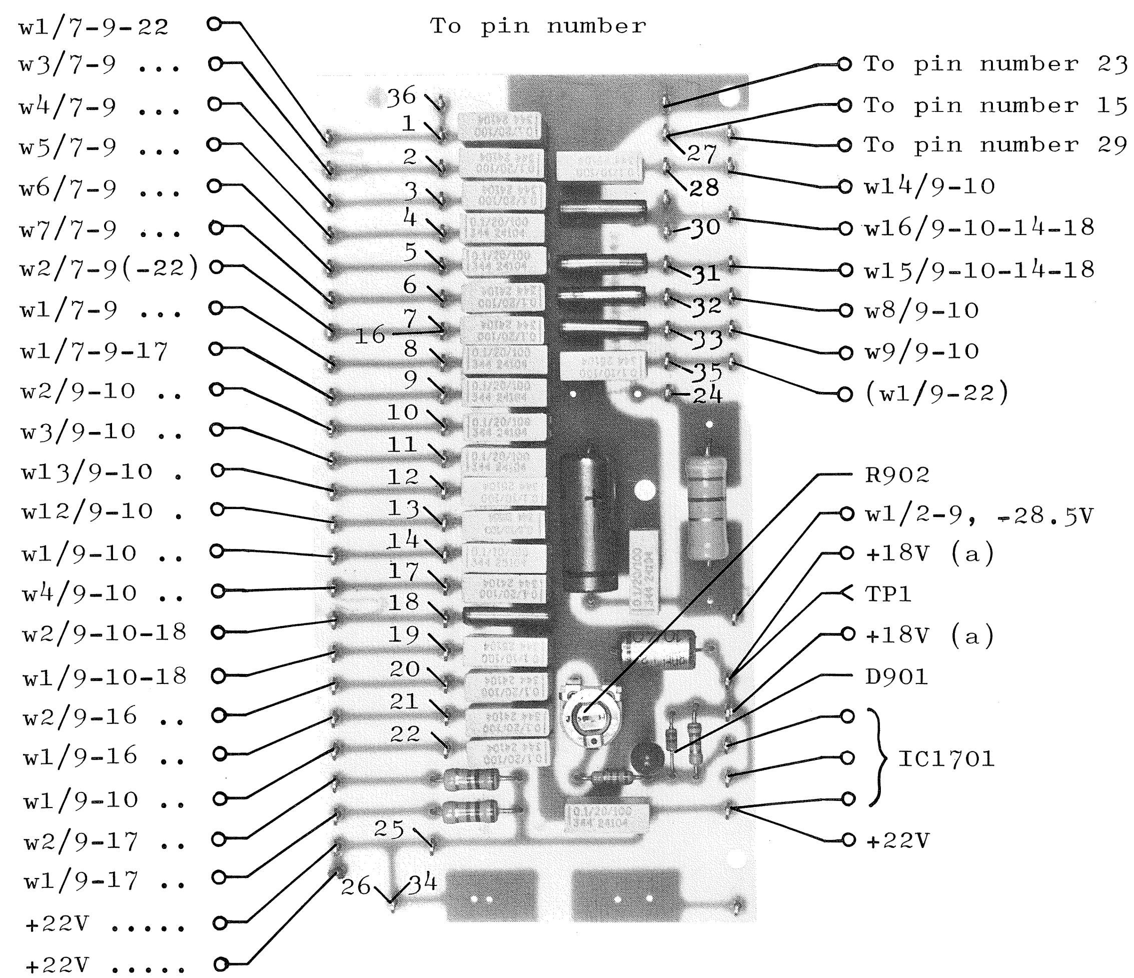
S1300

TO PIN NUMBER



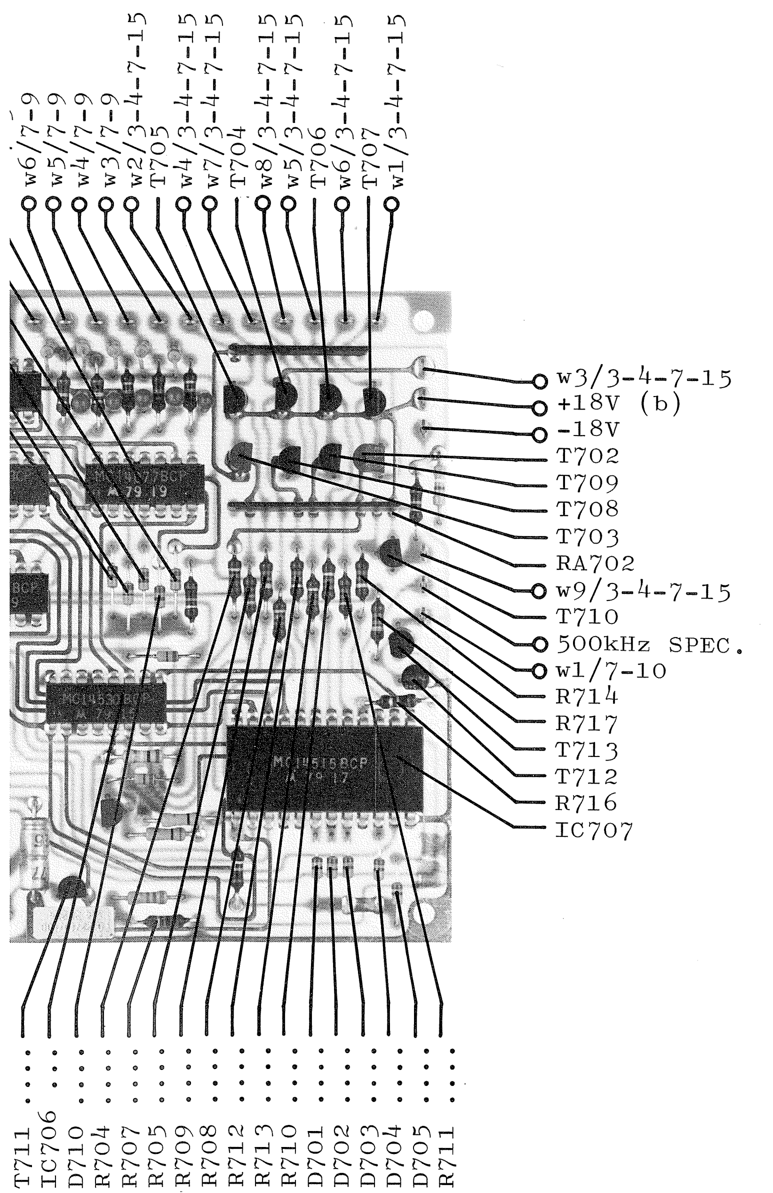
S1301

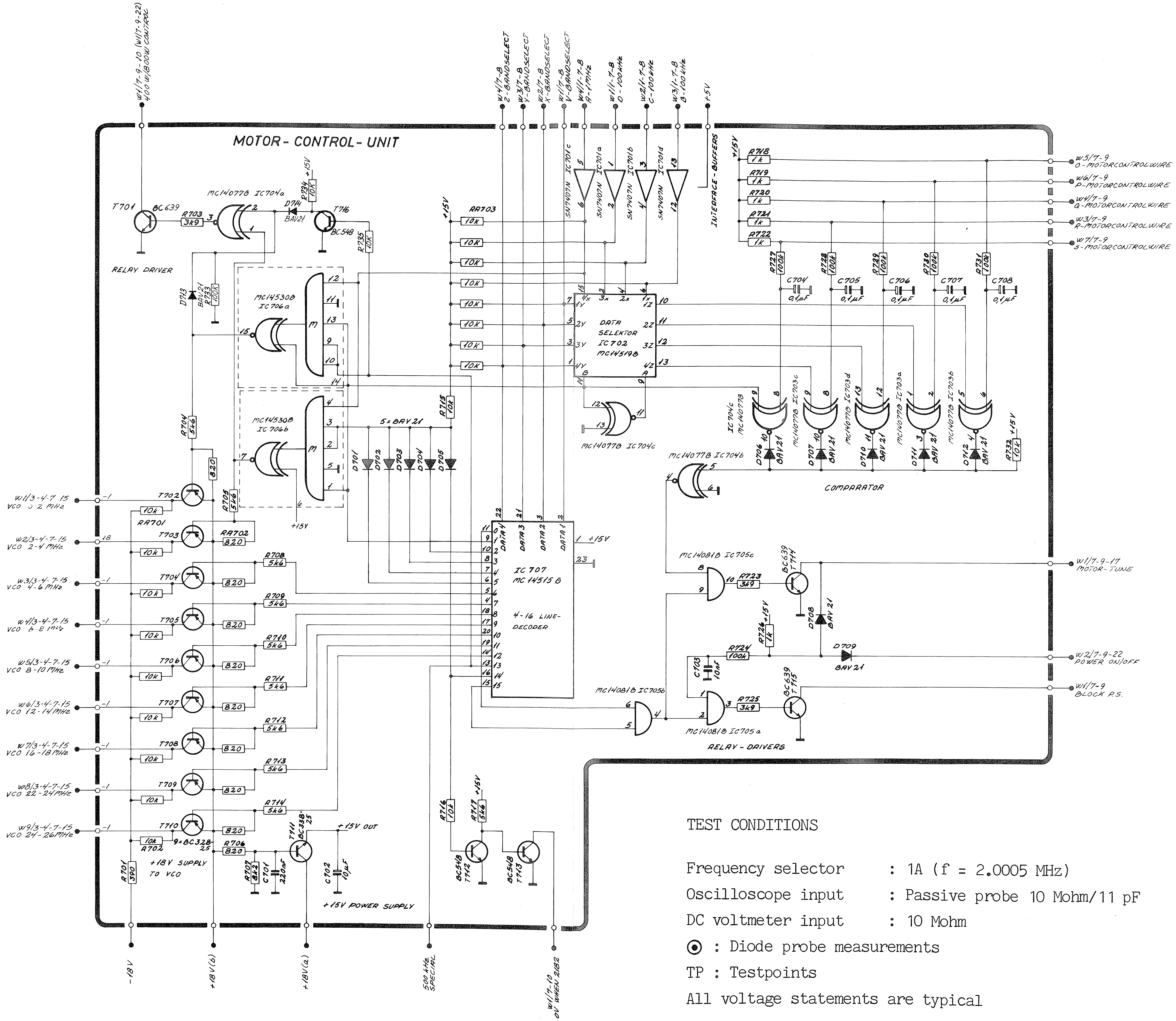
To pin number



ınsmit band code (ZYXV) activates output 13 on the
This output switches on the transistor T702 via
ıd thus selects the 0 - 2 MHz VCO.

MHz the output power must not exceed 400W PEP.
ıency below 4 MHz is selected is fed from the out-
IC706a and IC706b to the IC704a and T701.





TEST CONDITIONS

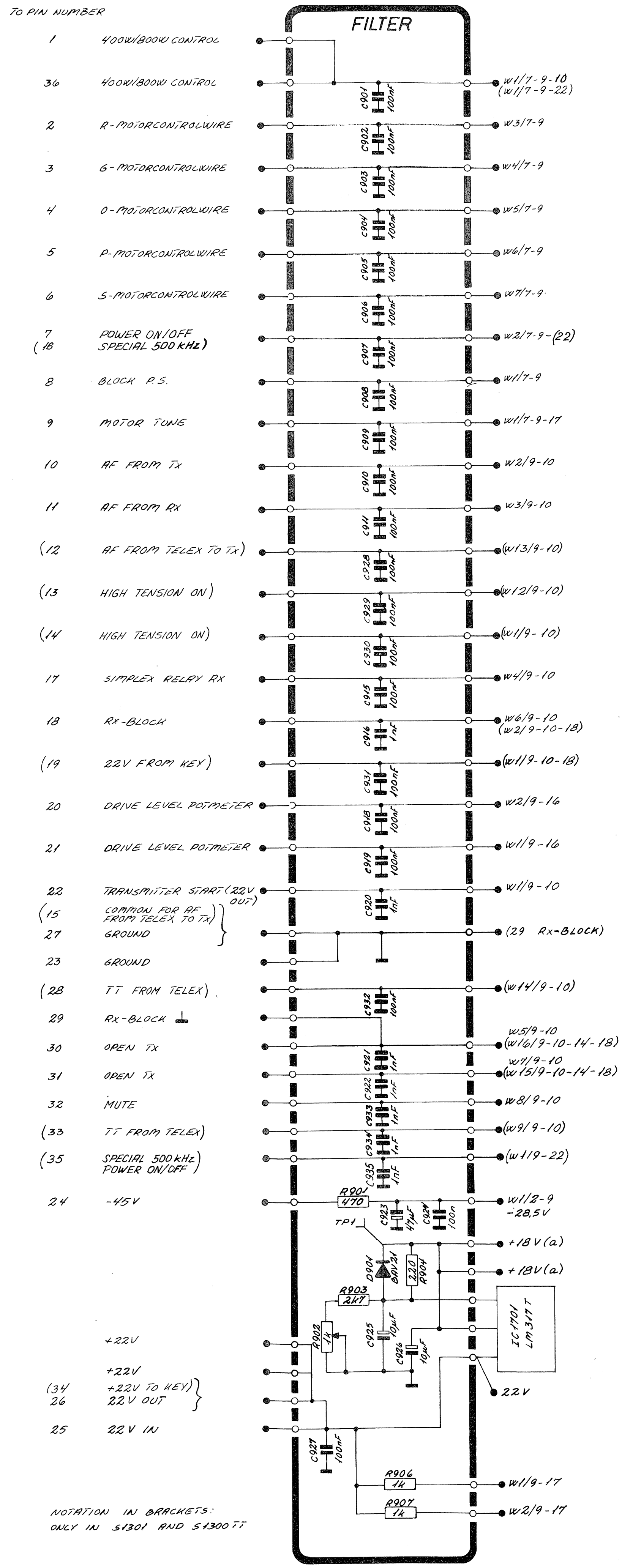
Frequency selector	: 1A (f = 2.0005 MHz)
Oscilloscope input	: Passive probe 10 Mohm/11 pF
DC voltmeter input	: 10 Mohm

⊙ : Diode probe measurements

TP : Testpoints

All voltage statements are typical

in brackets: Only in S1301


TO PIN NUMBER
FILTER
1 400W/800W CONTROL
36 400W/800W CONTROL
2 R-MOTORCONTROLWIRE
3 G-MOTORCONTROLWIRE
4 O-MOTORCONTROLWIRE
5 P-MOTORCONTROLWIRE
6 S-MOTORCONTROLWIRE
7 POWER ON/OFF
(16 SPECIAL 500 kHz)
8 BLOCK P.S.
9 MOTOR TUNE
10 AF FROM TX
11 AF FROM RX
(12 AF FROM TELEX TO TX)
(13 HIGH TENSION ON)
(14 HIGH TENSION ON)
17 SIMPLEX RELAY RX
18 RX-BLOCK
(19 22V FROM KEY)
20 DRIVE LEVEL POTMETER
21 DRIVE LEVEL POTMETER
22 TRANSMITTER START (22V OUT)
(15 COMMON FOR AF FROM TELEX TO TX)
27 GROUND
23 GROUND
(28 TT FROM TELEX)
29 RX-BLOCK
30 OPEN TX
31 OPEN TX
32 MUTE
(33 TT FROM TELEX)
(35 SPECIAL 500 kHz POWER ON/OFF)
24 -45V
+22V
+22V
(34 +22V TO KEY)
26 22V OUT
25 22V IN
C901 100nF
C902 100nF
C903 100nF
C904 100nF
C905 100nF
C906 100nF
C907 100nF
C908 100nF
C909 100nF
C910 100nF
C911 100nF
C928 100nF
C929 100nF
C930 100nF
C915 100nF
C916 1nF
C931 100nF
C918 100nF
C919 100nF
C920 1nF
C932 100nF
C921 1nF
C922 1nF
C933 1nF
C934 1nF
C935 1nF
R901 470
C923 47µF
C924 100n
TP1
D901 BAV21
R904 220
R903 2k7
R902 1k
C925 10µF
C926 10µF
IC 1701 LM317T
C927 100nF
R906 1k
R907 1k
w1/7-9-10
(w1/7-9-22)
w3/7-9
w4/7-9
w5/7-9
w6/7-9
w7/7-9
w2/7-9-(22)
w1/7-9
w1/7-9-17
w2/9-10
w3/9-10
(w13/9-10)
(w12/9-10)
(w1/9-10)
w4/9-10
w6/9-10
(w2/9-10-18)
(w1/9-10-18)
w2/9-16
w1/9-16
w1/9-10
(29 RX-BLOCK)
(w14/9-10)
w5/9-10
(w16/9-10-14-18)
w7/9-10
(w15/9-10-14-18)
w8/9-10
(w9/9-10)
(w1/9-22)
w1/2-9
-28,5V
+18V(a)
+18V(a)
22V
w1/9-17
w2/9-17
NOTATION IN BRACKETS:
ONLY IN S1301 AND S1300TT

CIRCUIT DESCRIPTION SSB GENERATOR S1300

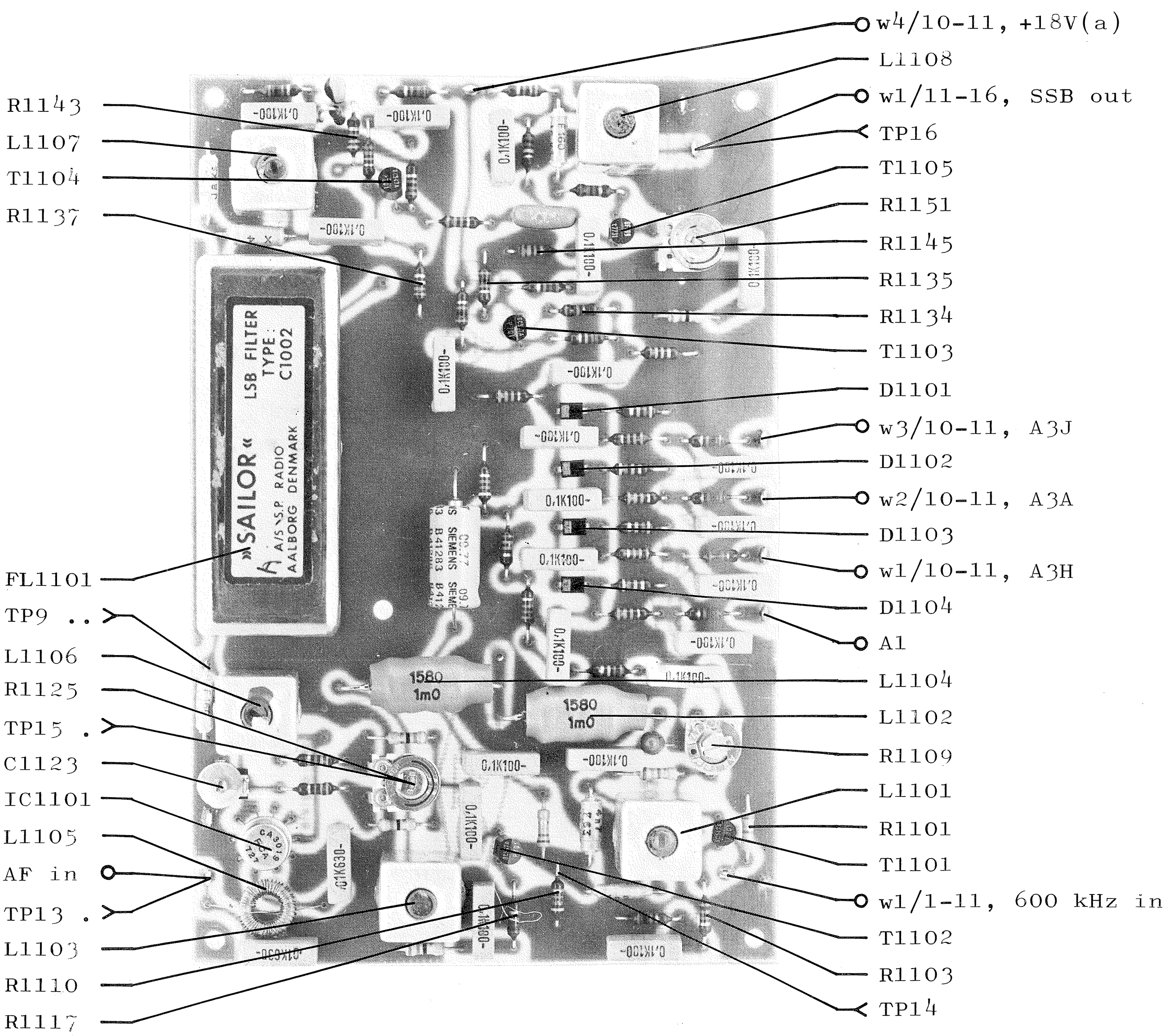
In this unit the required types of signals are generated (A3A, A3H and A3J).

SSB GENERATOR

The 600 kHz carrier signal from the divider unit is fed to T1101 and T1102 two tuned amplifiers. From the collector of T1101 600 kHz signal is taken to the carrier reinsertion circuit. From the collector of T1102 the carrier signal is fed into the double balanced modulator IC1101, which in addition receives AF signals via the low-pass filter L1105, C1118 and C1121, to remove RF pick-up from the microphone amplifier. A double sideband signal is now created on TP9 and fed into the crystal filter FL1101. The tuned circuits containing L1106 and L1107 around the filter carries out proper impedance matching to the filter. T1104 is an untuned buffer stage feeding into the tuned output amplifier T1105. On the base of T1105 the SSB signal from T1104 and the chosen portion of reinserted carrier from T1103 are added.

CARRIER INSERTION

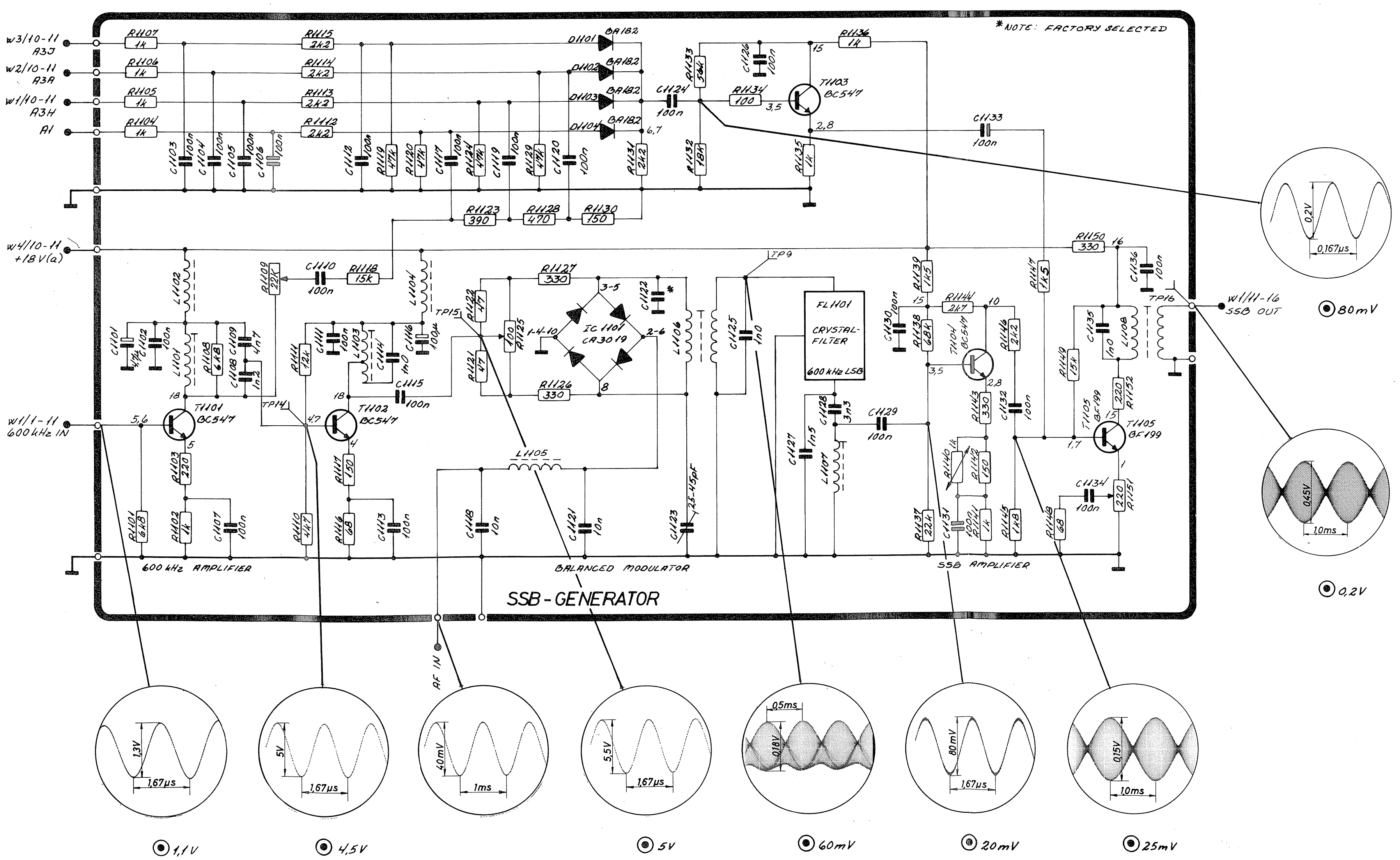
600 kHz carrier from the collector of T1101 is fed into a voltage divider R1109, R1118, R1123, R1128 and R1130. The necessary portion of carrier is chosen with diode D1101, D1102, D1103 or D1104, buffered by the emitter follower T1103 and fed via R1147 to the output amplifier.



MODULE NO. 1100

TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)
Mode : A3H
AF input 1 kHz : 1 Vpp (serial condensator) } via microphone plug
KEY : ON } via microphone plug
Oscilloscope input : Passive probe 10 Mohm/11pF
DC voltmeter input : 10 Mohm
⦿ : Diode probe measurements
TP : Testpoints
All voltage statements are typical



CIRCUIT DESCRIPTION MICROPHONE AMPLIFIER S1300

This unit generates and processes all the AF signals used in normal operation.

COMPRESSOR

The AF signal is after level regulation in R1201 fed into a voltage divider R1204, R1205 and then the FET T1202 acts as an electronically variable attenuator. The amount of attenuation is controlled by the voltage applied to the gate of the FET T1202.

The FET T1202 is biased in the off condition by 5.1V from zenerdiode D1202, with no control voltage applied to the gate. Under these conditions no attenuation takes place. With a control voltage of 5.1V applied to the gate, max. attenuation is obtained.

The electronically controlled attenuator is used to keep the output across the FET T1202 constant independent of speech volume, so performing a compressor action.

The control voltage already mentioned is derived from the very same signal, across the FET T1202 after amplification by T1203 and T1205. The output is taken across R1219 and fed to the level detector system consisting of T1210 and D1205.

As soon as the applied voltage to the base of T1210 becomes sufficiently low (about 4.7V) the collector current in transistor T1210 cuts off. This means that transistor T1208 normally saturated by the collector current of T1210 cuts off, leading to saturation of T1207 with the result that capacitor C1214 is charged very quickly.
The voltage across C1214 is slowly discharged via R1218 and the filter circuit R1218 and C1208 and is applied to the gate of the previously mentioned FET T1202 via R1212.

Presence of the control voltage causes the attenuation to increase until the collector current in transistor T1210 is not cut off any more, and a balanced condition is established. The amplified and compressed microphone signal then passes through to an AF filter driven by T1212 and T1213 removing signals insignificant for clarity. The AF signal from the filter is carried to the fixed voltage divider R1238, R1244, R1243 and R1242. The AF voltages from this voltage divider is chosen with the diode D1206, D1207, D1208 or D1209 feeding into the output amplifier.

TEST TONE GENERATOR

The test tone generator is a two-tone generator operating at the frequencies 2400 Hz and 1200 Hz. The multivibrator, composed of T1206, T1209 is oscillating at 2400 Hz, and in the integrated circuit IC1201 this frequency is divided to 1200 Hz, which can be measured on pin 8.

T1204 functions as emitter follower, and the 2400 Hz signal is fed from here via R1214 to the output transistor T1201. The 1200 Hz signal is also fed to T1201 via R1208 and is mixed with the 2400 Hz signal. The mixed signal is supplied to the compressor input during tuning of the transmitter and owing to the presence of the AF filter. Sinewave shaped tones are produced, as the two-tone generator itself delivers square wave voltages.

TEST CONDITIONS

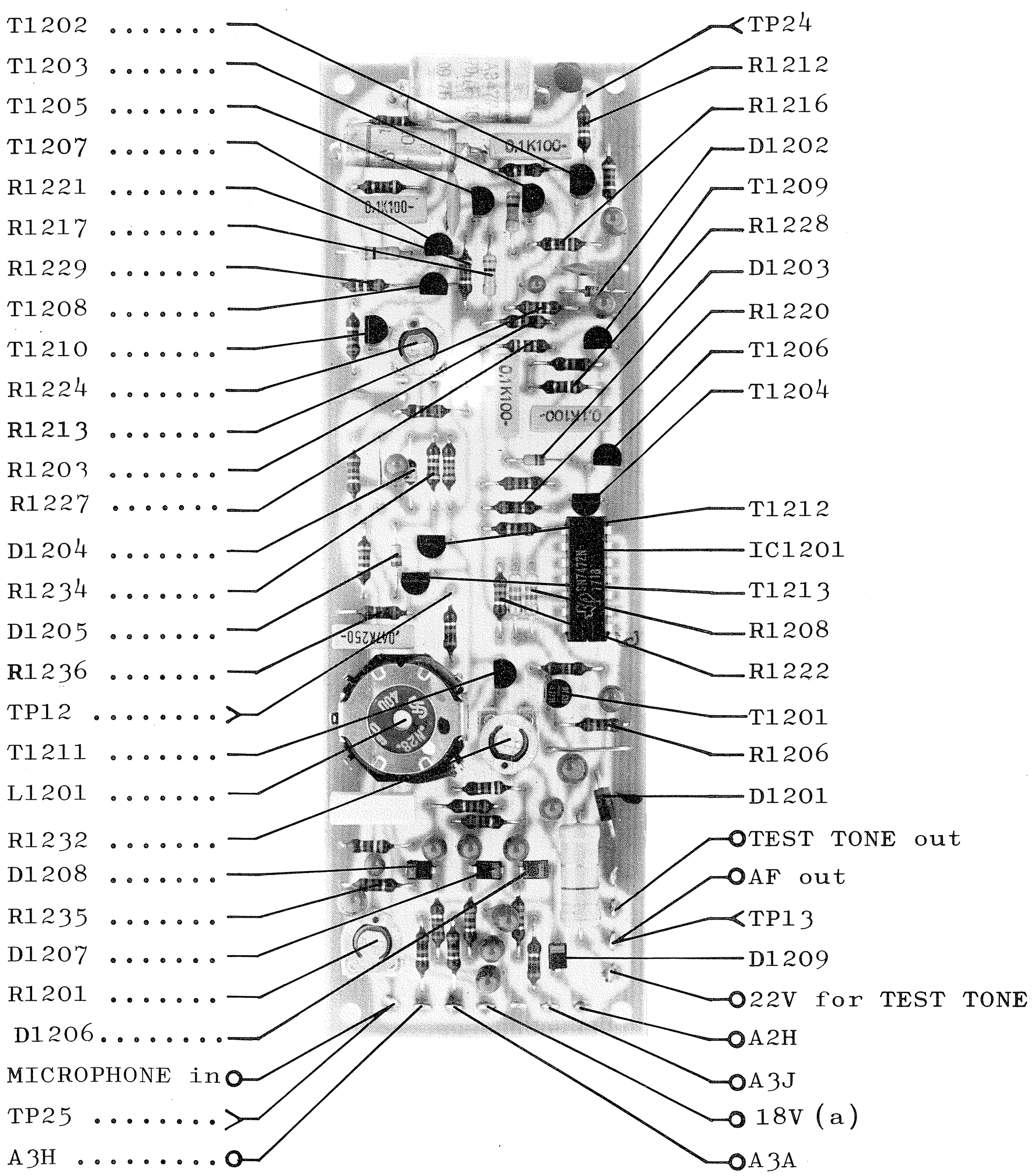
Mode : TUNE

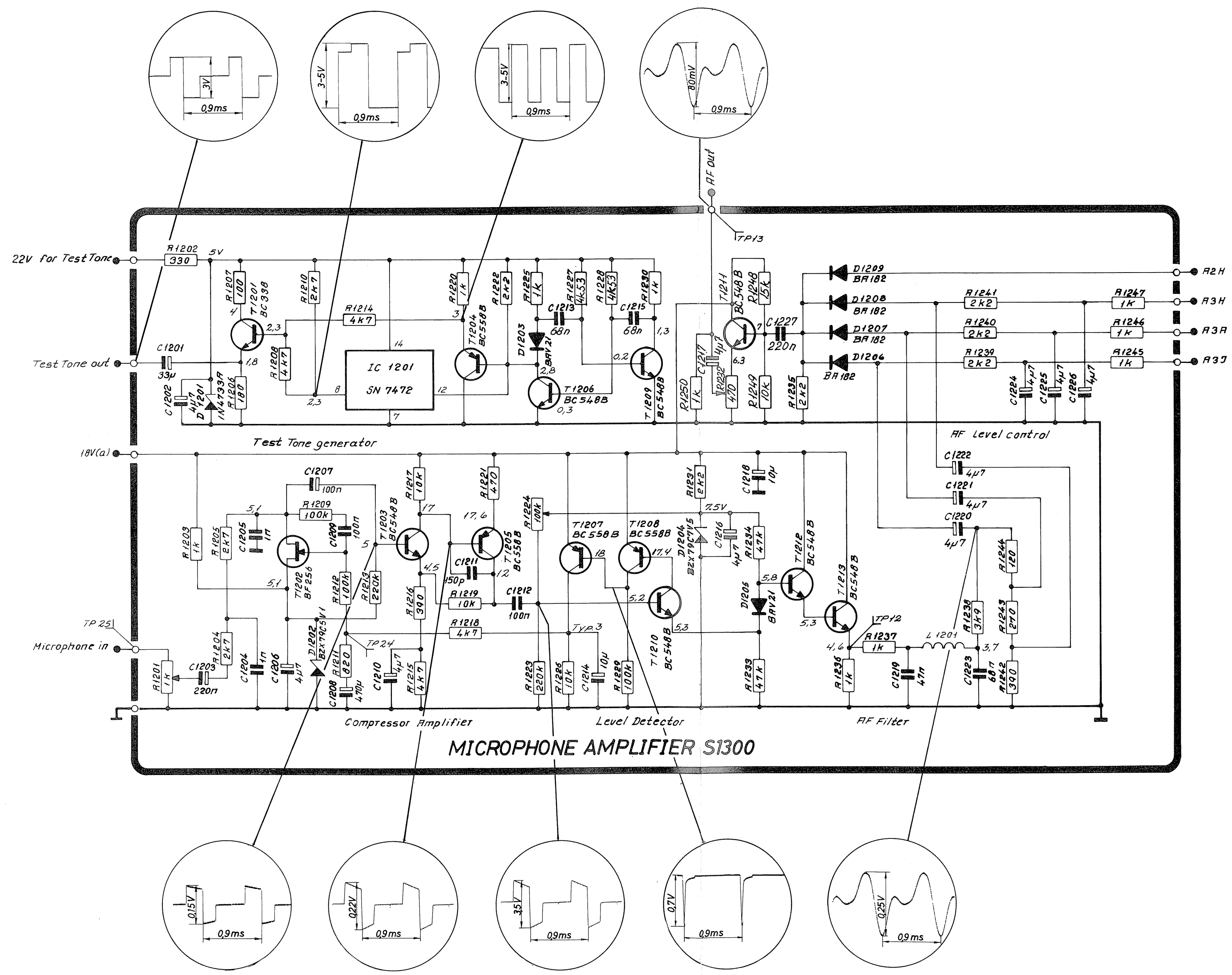
Oscilloscope input : Passive probe 10 Mohm//11 pF

DC voltmeter input : 10 Mohm

TP: Testpoints

All voltage statements are typical





CIRCUIT DESCRIPTION ALARM SIGNAL GENERATOR S1300

This module has the task of modulating the exciter with the standardized "Distress" signal. This signal is composed of two tones, 1300 Hz and 2200 Hz. The switching between these two tones takes place at intervals of 0.25 secs. The generation of this signal is automatically stopped after 45 secs.

The transistor T1303 operates as a 1300 Hz osciloator and T1302 as 2200 Hz oscillator. The switching period between the two tones is determined by T1301, which is a unijunction transistor giving a shift pulse to the integrated circuit IC1301, which operates as a flip-flop in such a way that the output signals on pin 6 and pin 8 fall from +6V to 0V and back each time T1301 gives a shift pulse.

In addition the voltage on pin 6 is +6V, when the voltage on pin 8 is 0V and vice-versa. In this way the gate diode D1302 is brought into conduction, when pin 6 reaches the value 0V, which has the effect that D1301 is cut off and only the 2200 Hz signal is fed out to T1304. At the next shift pulse the 1300 Hz signal is supplied to T1304. T1304 is operating as power amplifier and delivers the signal to both microtelephone and compressor.

Start and stop of the alarm signal generator takes place by means of the integrated timer IC1302. With supply voltage appearing, it feeds through to pin 3 and starts charging C1316. After a time period determinated by R1323, R1325 and C1316 this feeding through is blocked and the alarm signal generator stops. The transistor T1305 is only saturated when the alarm signal generator is activated, and it activates a relay on the mode switch circuit board.

TEST CONDITIONS

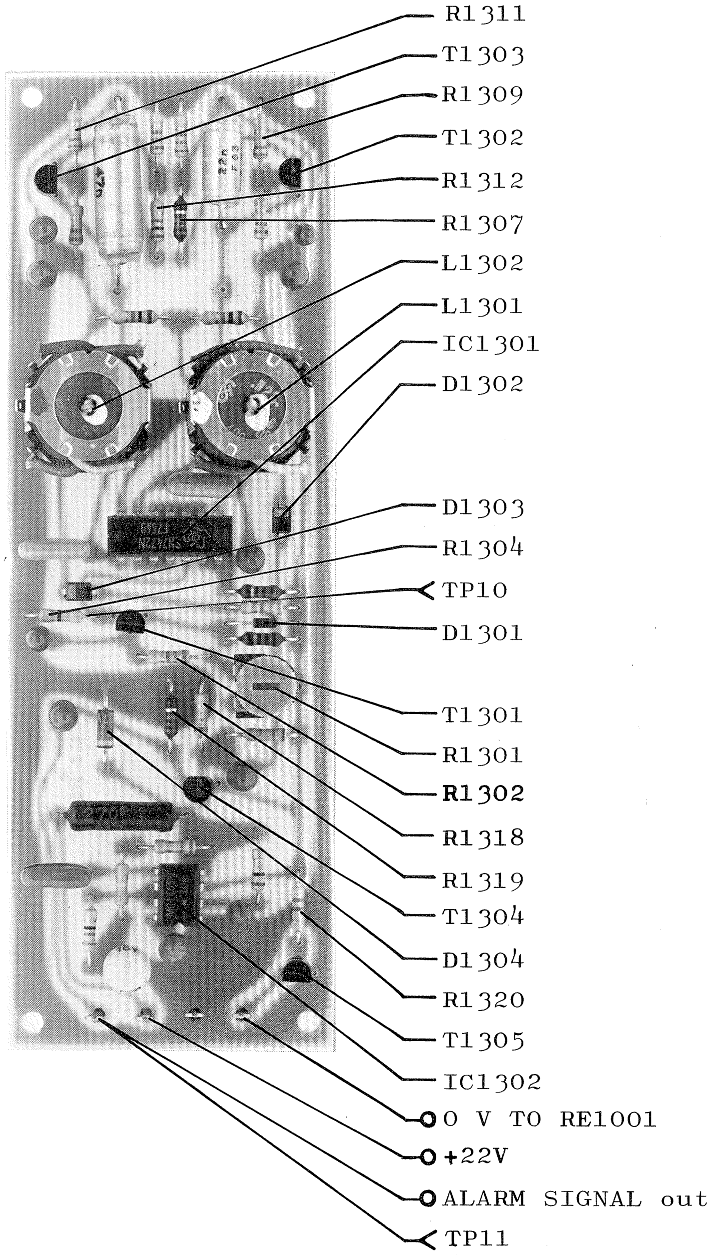
Mode : TEST ALARM

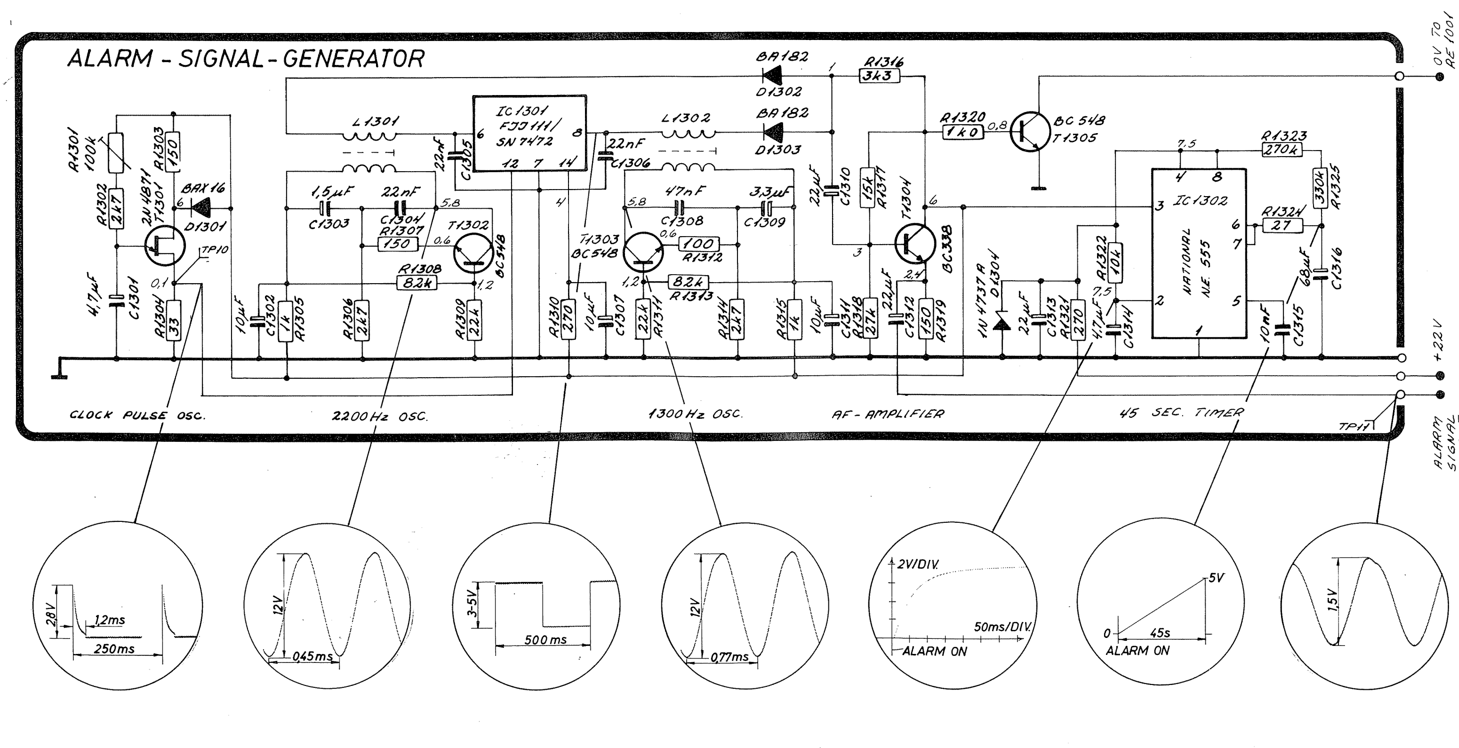
Oscilloscope input : Passive probe 10 Mohm//11 pF

DC voltmeter input : 10 Mohm

TP: Testpoints

All voltage statements are typical


R1311
T1303
R1309
T1302
R1312
R1307
L1302
L1301
IC1301
D1302
D1303
R1304
TP10
D1301
T1301
R1301
R1302
R1318
R1319
T1304
D1304
R1320
T1305
IC1302
0 V TO RE1001
+22V
ALARM SIGNAL out
TP11


ALARM - SIGNAL - GENERATOR
0V TO RE1001
+22V
ALARM SIGNAL OUT
TP11
TP10
R1301 100k
R1302 2k7
R1303 150
2N 4871 T1301
BAX 16 D1301
4,7µF C1301
R1304 33
L1301
L1302
IC1301 FJJ 111/ SN 7472
22nF C1305
22nF C1306
1,5µF C1303
22nF C1304
R1307 150
T1302 BC 548
R1308 8.2k
10µF C1302
R1305 1k
R1306 2k7
R1309 2.2k
BA182 D1302
BA182 D1303
R1316 3k3
T1303 BC 548
47nF C1308
3,3µF C1309
100 R1312
8.2k R1313
R1310 270
10µF C1307
R1311 22k
R1314 2k7
R1315 1k
10µF C1311
22µF C1310
15k R1317
T1304 BC 338
R1318 27k
22µF C1312
150 R1319
R1320 1k0
BC 548 T1305
1N 4737 A D1304
22µF C1313
R1321 270
R1322 10k
4,7µF C1314
IC1302 NATIONAL NE 555
R1323 270k
330k R1325
R1324 27
68µF C1316
10nF C1315
CLOCK PULSE OSC.
2200 Hz OSC.
1300 Hz OSC.
AF - AMPLIFIER
45 SEC. TIMER
28V
1,2ms
250ms
12V
0,45ms
3-5V
500 ms
12V
0,77ms
2V/DIV.
50ms/DIV.
ALARM ON
5V
0
45s
ALARM ON
1,5V

CIRCUIT DESCRIPTION DRIVER UNIT S1300TT & S1301

The driver unit produces the wanted one watt PEP into a 50 ohm load. The drive signal is applied to the base of T1401 via L1401. Combined with the drive signal the DC current is needed to bring T1401 to proper working point (IC = 285 mA). R1401, R1402 and R1403 perform feed-back and L1401 is together with input capacitance of the transistor a frequency compensation. The relay RE1401 interrupts the output signal in receive mode to prevent noise interference.

TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)

Power level : FULL

Mode : TUNE

Maximum drive, 50 ohm connected to TX out, J1702

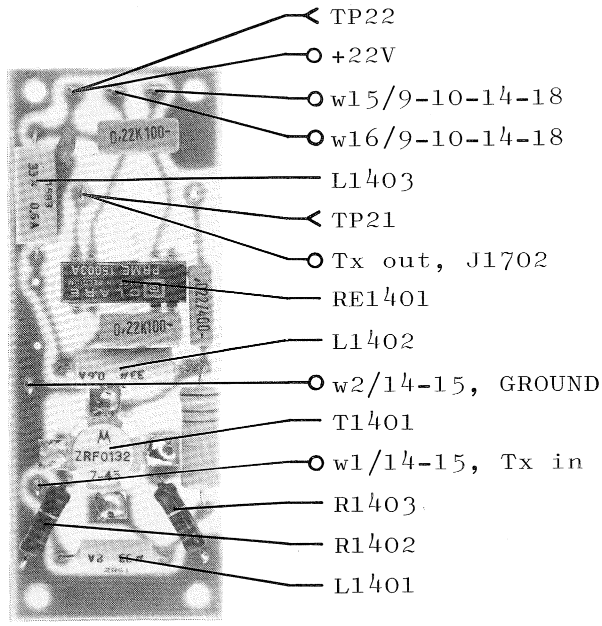
Oscilloscope input : Passive probe 10 Mohm//11 pF

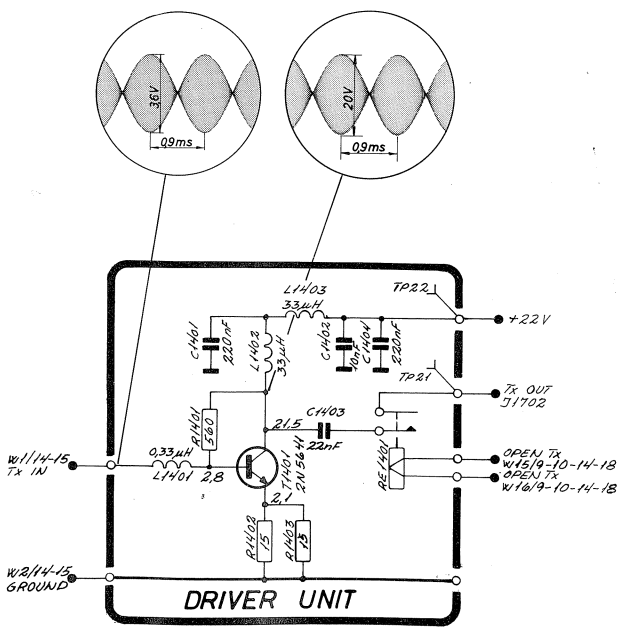
DC voltmeter input : 10 Mohm

⦿ : Diode probe measurements

TP : Testpoints

All voltage statements are typical

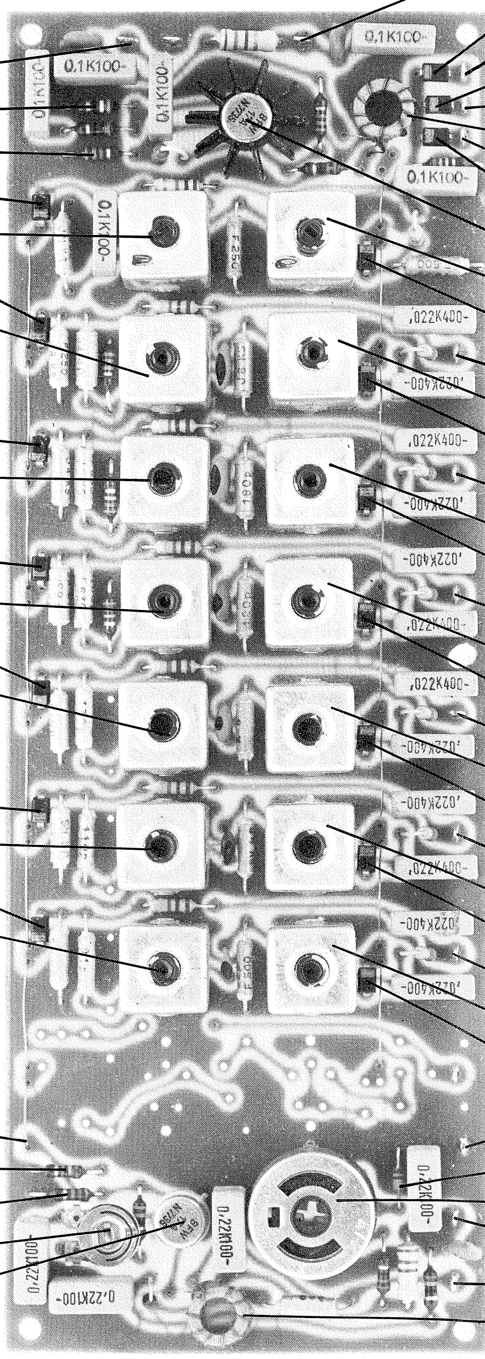

TP22
+22V
w15/9-10-14-18
w16/9-10-14-18
L1403
TP21
Tx out, J1702
RE1401
L1402
w2/14-15, GROUND
T1401
w1/14-15, Tx in
R1403
R1402
L1401


36V
0,9ms
20V
0,9ms
L1403
33μH
TP22
+22V
C1401
220nF
L1402
33μH
C1402
10nF
C1404
220nF
TP21
Tx OUT
J1702
R1401
560
C1403
21,5
22nF
0,33μH
W1/14-15
Tx IN
L1401
2,8
T1401
2N5641
RE1401
OPEN Tx
W15/9-10-14-18
OPEN Tx
W16/9-10-14-18
2,1
R1402
15
R1403
15
W2/14-15
GROUND
DRIVER UNIT

CIRCUIT DESCRIPTION BAND FILTER S1300

This unit contains two amplifiers, six band-pass filters and a low-pass filter.

The signal from second mixer appears at the base of first amplifier T1501 via C1501. This amplifier is supplied with feed-back via R1502 and R1505 to act as the correct load for the mixer. Output from this amplifier is via an 1:2 transformer TR1501, fed into the selected band-pass filter or low-pass filter. The band-pass filter contains two tuned circuits, each with a coilcap on the input side and a capacitorcap on the output. Output from the chosen filter is fed into the buffer amplifier T1502 in conjunction with the output transformer TR1502 there is frequency compensation. C1549, R1535, R1537, R1536 and D1518 produce bias for the driver transistor.



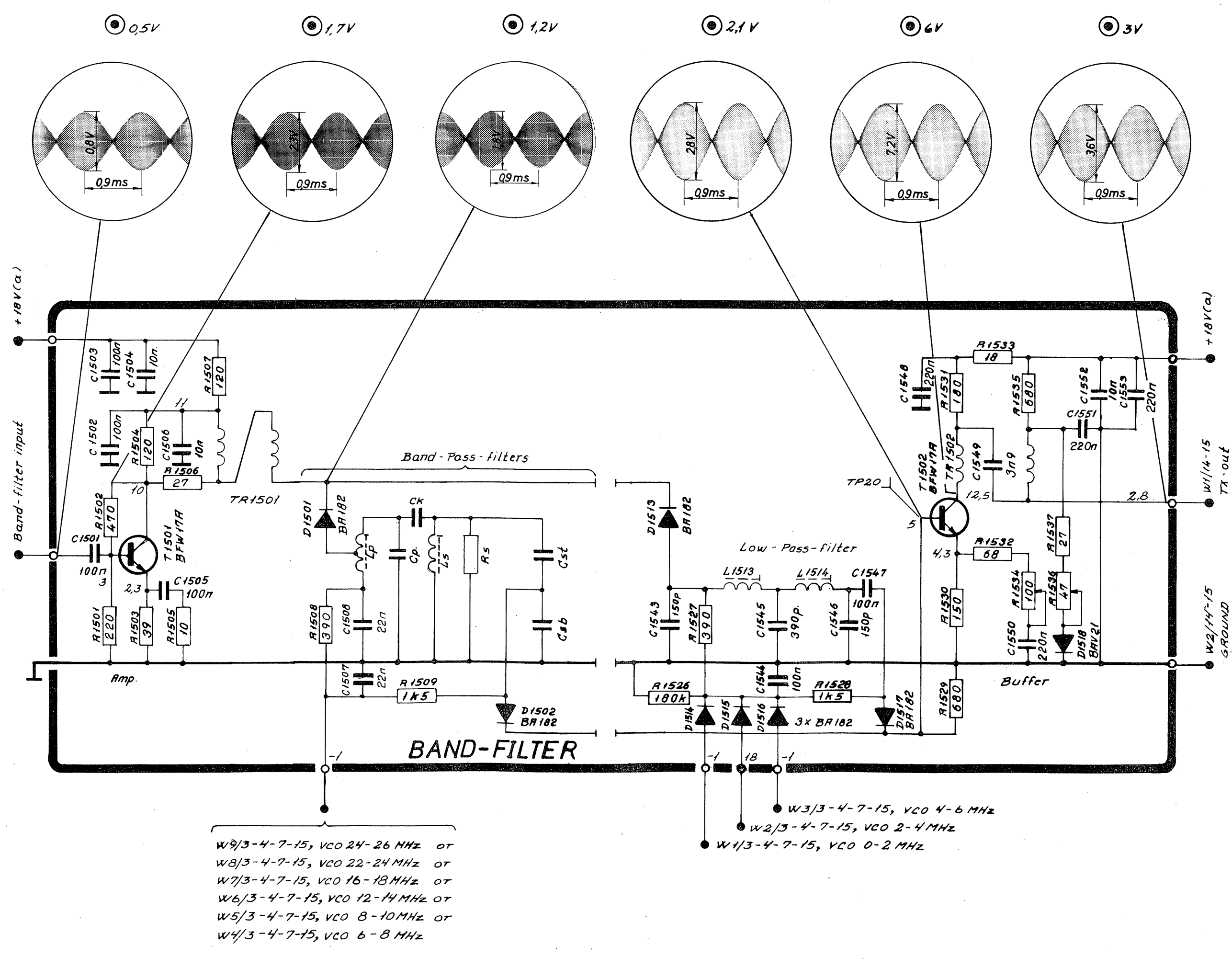
A1/2 S1301, S1300/TT,T

TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)
Power level : FULL
Mode : TUNE
Maximum drive, 50 ohm connected to TX out, J1702
Oscilloscope input : Passive probe 10 Mohm/11 pF
DC voltmeter input : 10 Mohm
⊙ : Diode probe measurements
TP : Testpoints
ALL voltage statements are typical

Component tabel for Band-Pass-Filters

BAND	Lp	Cp	Ck	Ls	Rs	Csb	Cst
25 MHz	L 1501	C 1509 62pF	C 1510 3,3 pF	L 1502	R 1510 non	C 1511 180pF	C 1512 91pF
22 MHz	L 1503	C 1515 75pF	C 1516 4,3pF	L 1504	R 1513 non	C 1517 220pF	C 1518 110pF
16 MHz	L 1505	C 1521 91pF	C 1522 5,1pF	L 1506	R 1516 non	C 1523 270pF	C 1524 130pF
12 MHz	L 1507	C 1527 120pF	C 1528 7,5pF	L 1508	R 1519 15 k ohm	C 1529 330pF	C 1530 180pF
8 MHz	L 1509	C 1533 180pF	C 1534 11pF	L 1510	R 1522 15 k ohm	C 1535 510pF	C 1536 270pF
6 MHz	L1511	C1539 220pF	C 1540 13pF	L1512	R 1525 22 k ohm	C 1541 680pF	C 1542 330pF



CIRCUIT DESCRIPTION MIXER UNIT S1300

In this unit the 600 kHz signal from the SSB generator is mixed together with the VCXO and VCO signals in two steps to produce the wanted output frequency. In addition the necessary power level regulation is controlled in this unit.

FIRST MIXER

The transistors T1602 and T1603 form a balanced mixer. The 600 kHz signal is fed into the mixer via the phase splitting transformer TR1601. The VCXO signal is fed into the emitters via the buffer amplifier T1601. In this transistor it is possible to regulate the DC working point in two ways. One: changing the emitter resistor at the point "fixed power regulation". Two: changing the base current via a potentiometer between the two points "drive level potmeter". This DC working point regulation will control the amplitude of the VCXO signal to the mixer and in that way the output power is regulated.

FILTER AND AMPLIFIER

The first mixer feeds into the crystal filter FL1601. The tuned circuits containing L1601 and L1602 around the filter carry out proper impedance-matching to the filter. T1604 and T1605 are two buffer amplifiers, the circuit C1622, L1604, C1623 and R1643 carries out correct generator impedance for the mixer M1601.

SECOND MIXER

The secons mixer M1601 is a double balanced hotcarrier diode mixer which mixes the 10.7 MHz signal together with the chosen VCO signal. The transistor T1606 is a wideband power amplifier supplying the mixer with the necessary power for proper operation. Output from the mixer is fed into the band filter unit.

A1/2 S1301, S1300/TT,T

TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)

Power level : FULL

Mode : TUNE

Maximum drive, 50 ohm connected to TX out, J1702

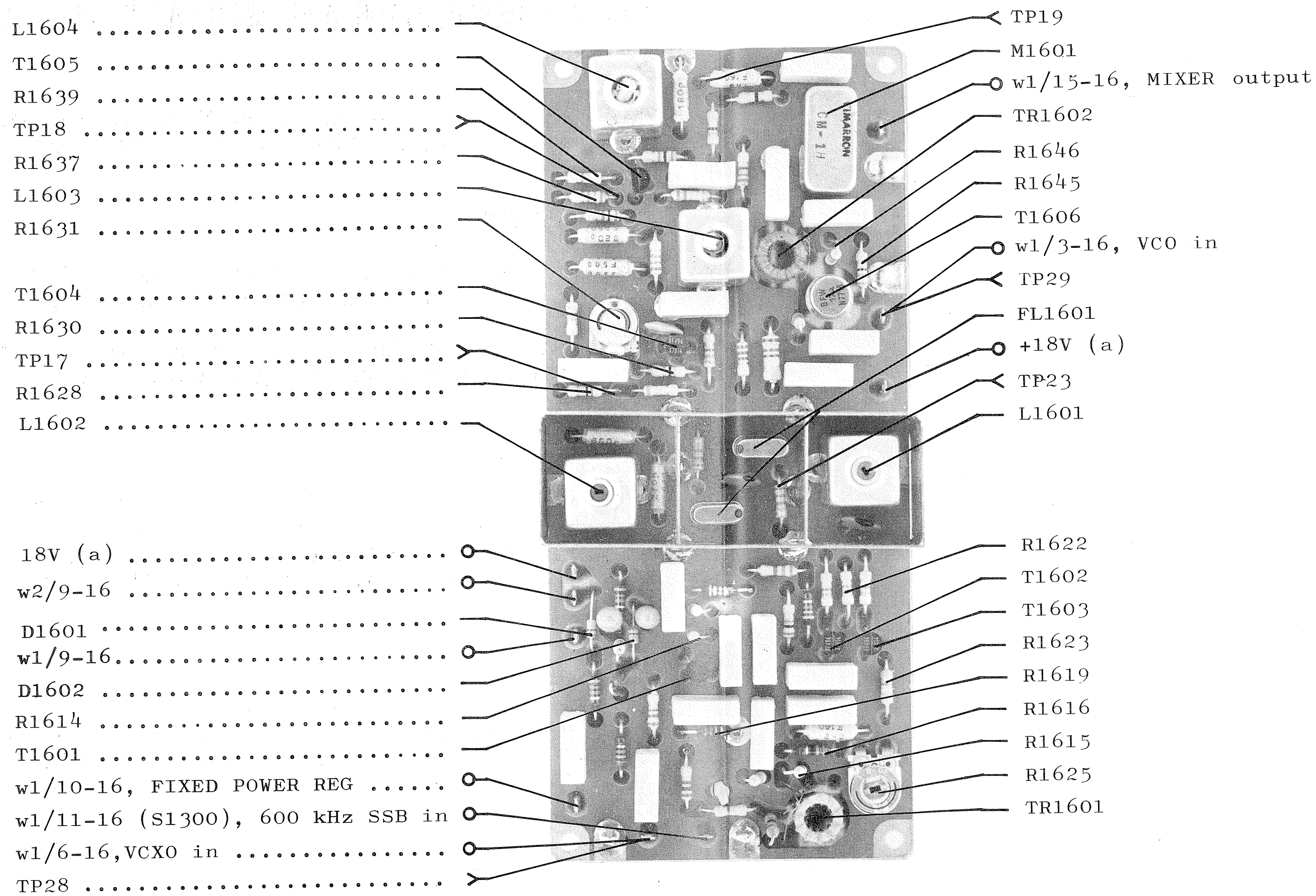
Oscilloscope input : Passive probe 10 Mohm/11 pF

DC voltmeter input : 10 Mohm

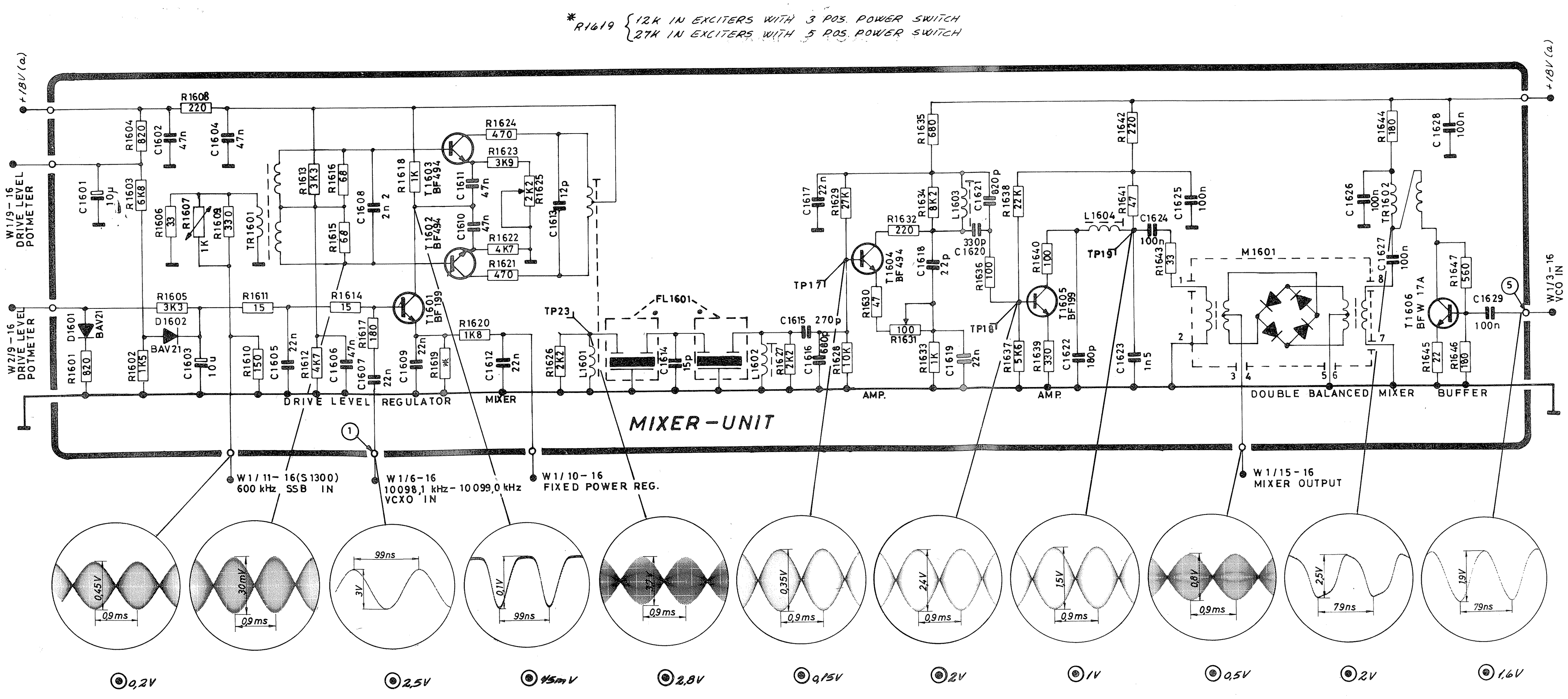
⦿ : Diode probe measurements

TP : Testpoints

ALL voltage statements are typical



L1604
T1605
R1639
TP18
R1637
L1603
R1631
T1604
R1630
TP17
R1628
L1602
18V (a)
w2/9-16
D1601
w1/9-16
D1602
R1614
T1601
w1/10-16, FIXED POWER REG
w1/11-16 (S1300), 600 kHz SSB in
w1/6-16,VCXO in
TP28
TP19
M1601
w1/15-16, MIXER output
TR1602
R1646
R1645
T1606
w1/3-16, VCO in
TP29
FL1601
+18V (a)
TP23
L1601
R1622
T1602
T1603
R1623
R1619
R1616
R1615
R1625
TR1601



*R1619 { 12K IN EXCITERS WITH 3 POS. POWER SWITCH
27K IN EXCITERS WITH 5 POS. POWER SWITCH
+18V (a)
W1/9-16 DRIVE LEVEL POTMETER
W2/9-16 DRIVE LEVEL POTMETER
DRIVE LEVEL REGULATOR
MIXER
MIXER-UNIT
AMP.
AMP.
DOUBLE BALANCED MIXER
BUFFER
W1/3-16 VCO IN
W1/11-16 (S1300) 600 kHz SSB IN
W1/6-16 10098,1 kHz-10099,0 kHz VCXO IN
W1/10-16 FIXED POWER REG.
W1/15-16 MIXER OUTPUT
0,2V
2,5V
2,8V
0,15V
2V
1V
0,5V
2V
1,6V

CIRCUIT DESCRIPTION A2H OSCILLATOR AND DELAY UNIT S1300

This unit generates the necessary AF signal to modulate the exciter in the A2H mode and the necessary time delays for the telegraphy and telex operation.

A2H OSCILLATOR

The A2H AF oscillator is built-up around T1801 with the tuned circuit C1803, C1804 and L1801 adjustable to the wanted frequency 465 hz.

The output is a combination of a DC voltage to switch on the diode in the microphone amplifier, and the AF signal which is controlled via potentiometer R1806.

TX-DELAY

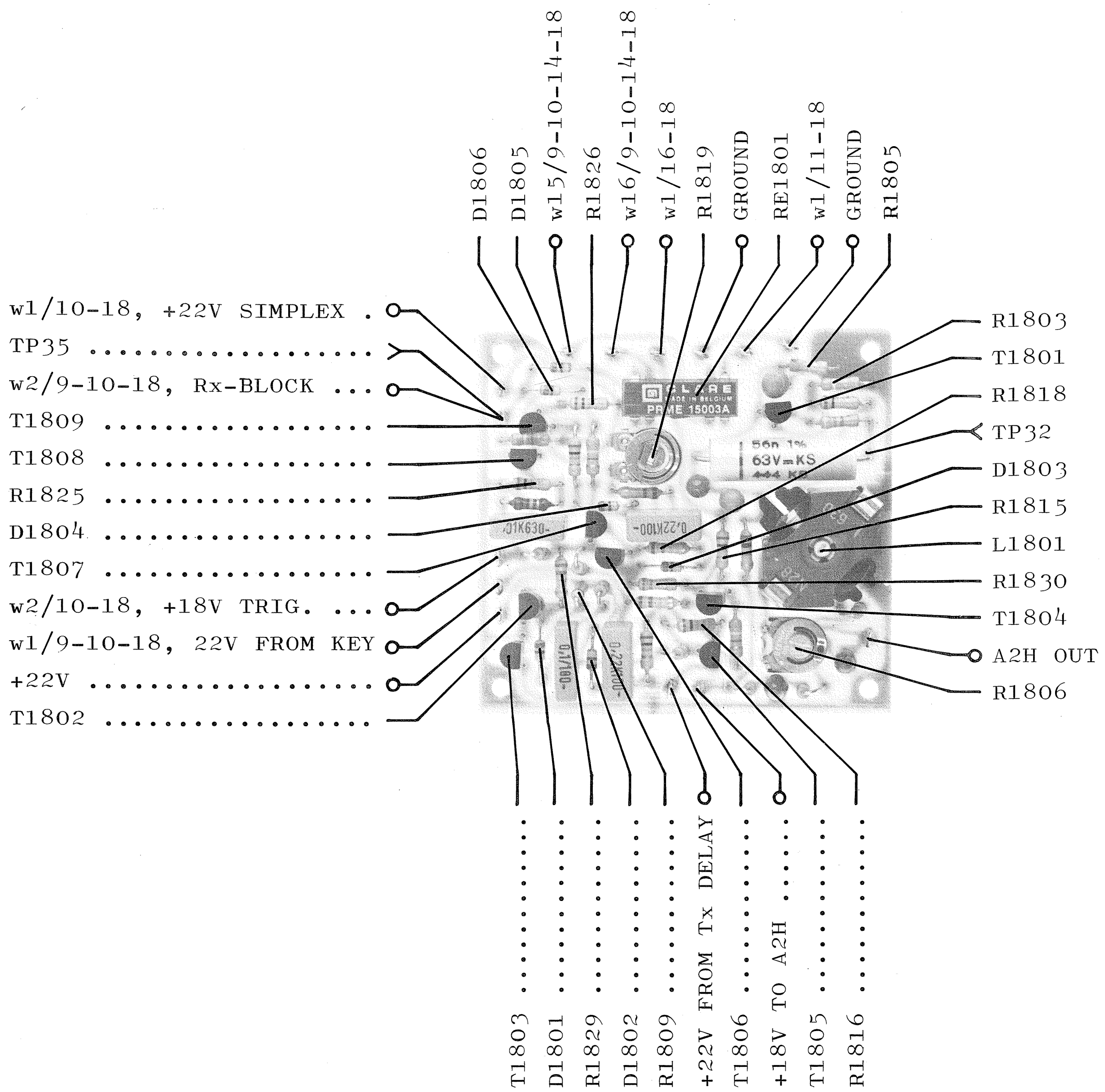
+22V FROM KEY controls T1805 to conduct, and T1805 will then supply +22V FROM TX-DELAY to the relays 600 kHz LSB ON/OFF and TX ON/OFF in telegraphy mode. When the key is released T1804 is off, but T1803 goes on for a time period of approx. 10 mS determinated by the monostable multivibrator T1802 and T1803.

RX-DELAY

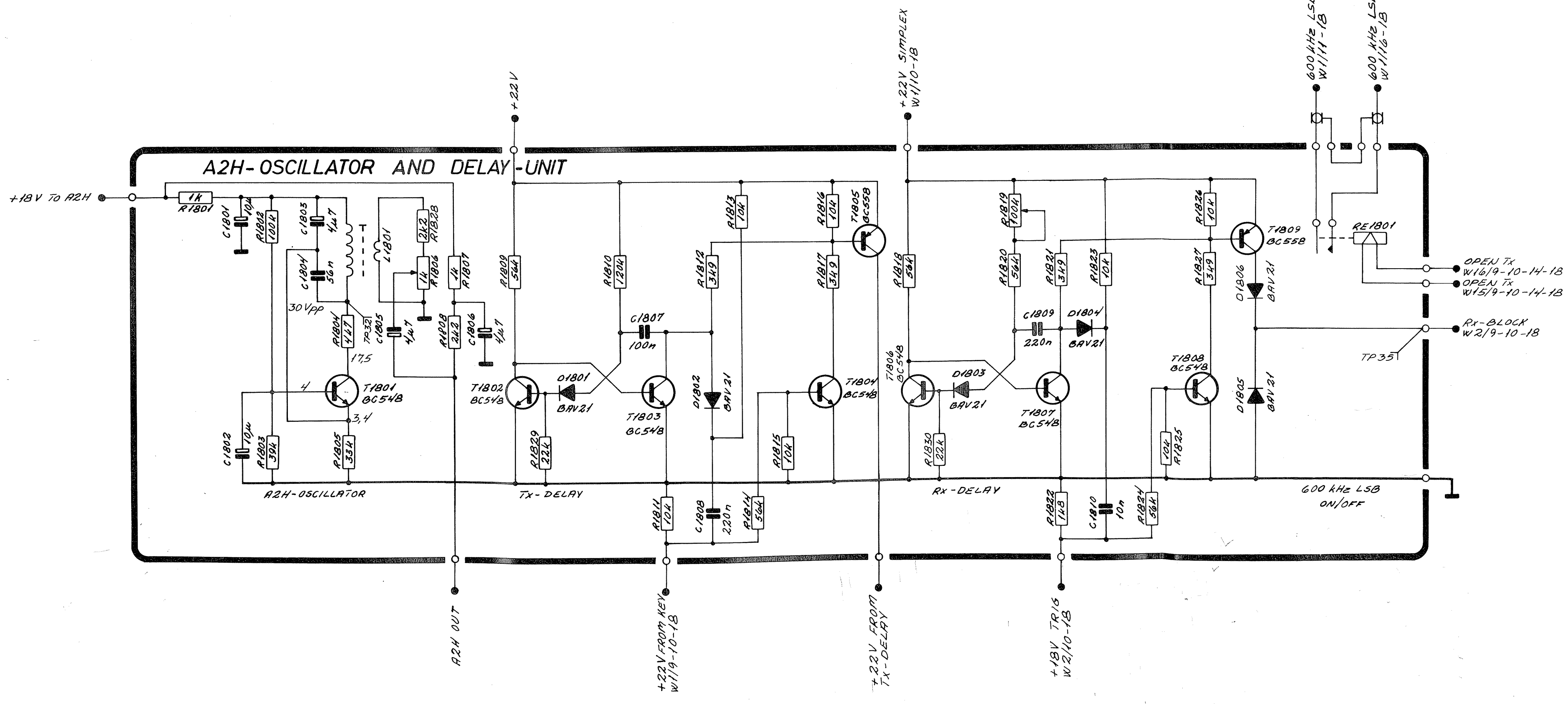
With the transmitter keyed there is +18V on +18V TRIG. keeping T1809 conducting, and in this way the receiver is blocked. When the key is released T1808 is off, but T1807 goes on and stays on for a time period between 13 mS and 30 mS determinated by the monostable multivibrator T1806 and T1807 and adjustable with R1819.

600 kHz LSB ON/OFF

The relay RE1801 switches the signal from the SSB generator to the mixer unit off in receive mode.



D1806
D1805
w15/9-10-14-18
R1826
w16/9-10-14-18
w1/16-18
R1819
GROUND
RE1801
w1/11-18
GROUND
R1805
w1/10-18, +22V SIMPLEX
TP35
w2/9-10-18, Rx-BLOCK
T1809
T1808
R1825
D1804
T1807
w2/10-18, +18V TRIG.
w1/9-10-18, 22V FROM KEY
+22V
T1802
R1803
T1801
R1818
TP32
D1803
R1815
L1801
R1830
T1804
A2H OUT
R1806
T1803
D1801
R1829
D1802
R1809
+22V FROM Tx DELAY
T1806
+18V TO A2H
T1805
R1816



A2H-OSCILLATOR AND DELAY-UNIT
+18V TO A2H
+22V
+22V SIMPLEX W1/10-18
600 kHz LSB IN W1/11-18
600 kHz LSB OUT W1/16-18
OPEN Tx W16/9-10-14-18
OPEN Tx W15/9-10-14-18
Rx-BLOCK W2/9-10-18
TP35
600 kHz LSB ON/OFF
A2H-OSCILLATOR
Tx-DELAY
Rx-DELAY
A2H OUT
+22V FROM KEY W1/9-10-18
+22V FROM Tx-DELAY
+18V TRIG W2/10-18

CIRCUIT DESCRIPTION FOR FREQUENCY SELECTOR S1301

This unit converts the coded frequency to the necessary frequency code and band select code for the divider unit and motor control unit.

Furthermore frequencies selected outside the maritime bands will be inhibited, and fixed 2182 kHz can be selected.

NORMAL FREQUENCY SELECT

The frequency code from the frequency selectors S1703 - S1706 and the "A" from S1707 are fed through the gates IC2104 - IC2107 to the divider unit.

The frequency codes from S1706, S1707 and the "A" and "B" from S1708 are fed to the factory programmed read only memory (PROM) and are here used as address. For each possible address the corresponding band select code is programmed in the PROM, and on the addresses corresponding to frequencies outside the maritime bands, the band select code are "1" in both 01, 02, 03 and 04 to ensure that no frequency is selected.

In order to get "1" on the PROM outputs when 3, 4, 5, 6, 7, 8 or 9 is selected on S1708 these figures are detected by IC2103a, IC2103b and IC2102, and the detector output is fed into the PROM IC2101 and disables the outputs.

On the front panel there is a LED to indicate that a frequency outside the maritime bands is selected. This LED is controlled from T2101, and IC2104c and IC2104d detect if there is "1" on all the outputs.

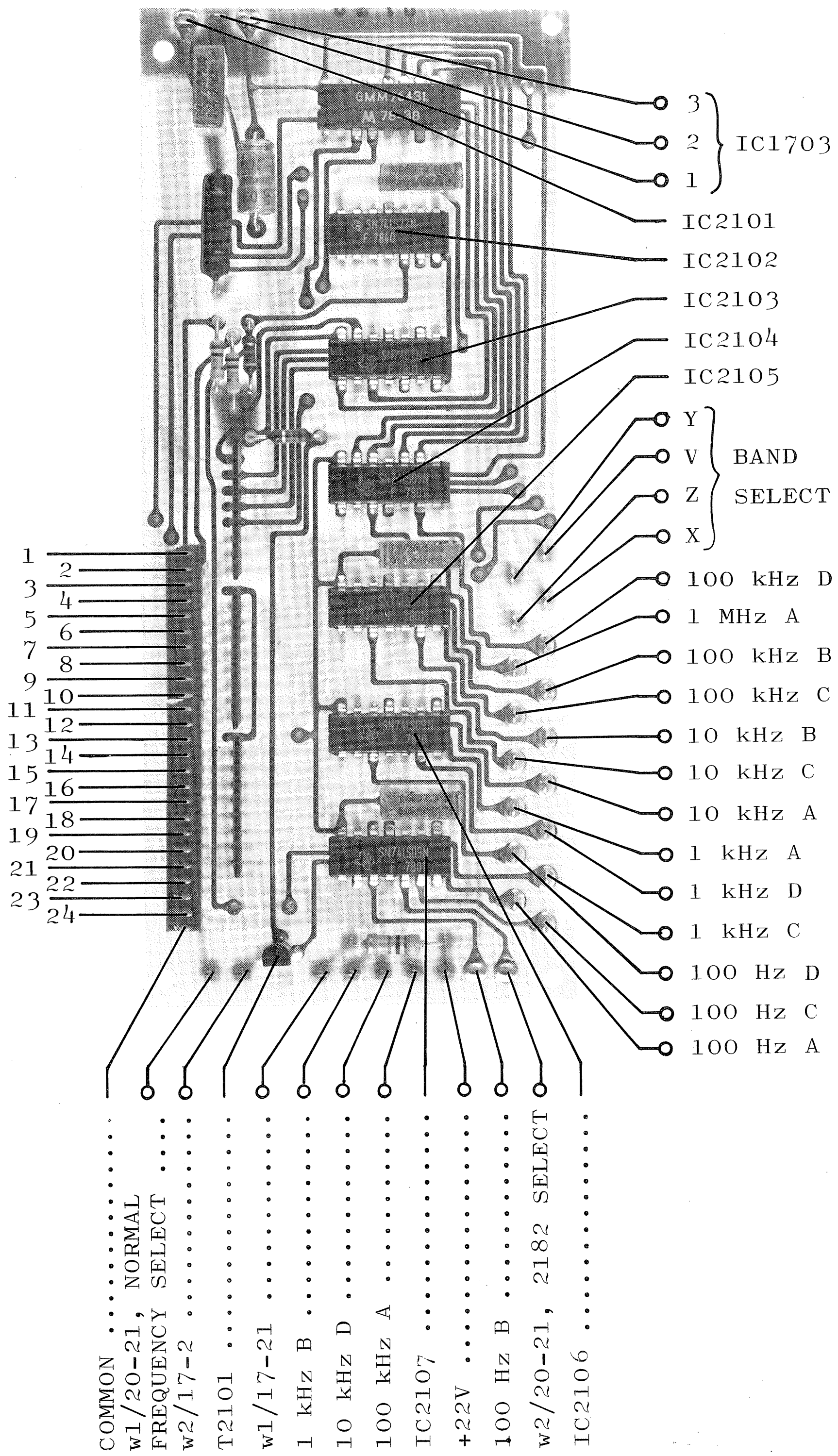
2182 kHz SELECT

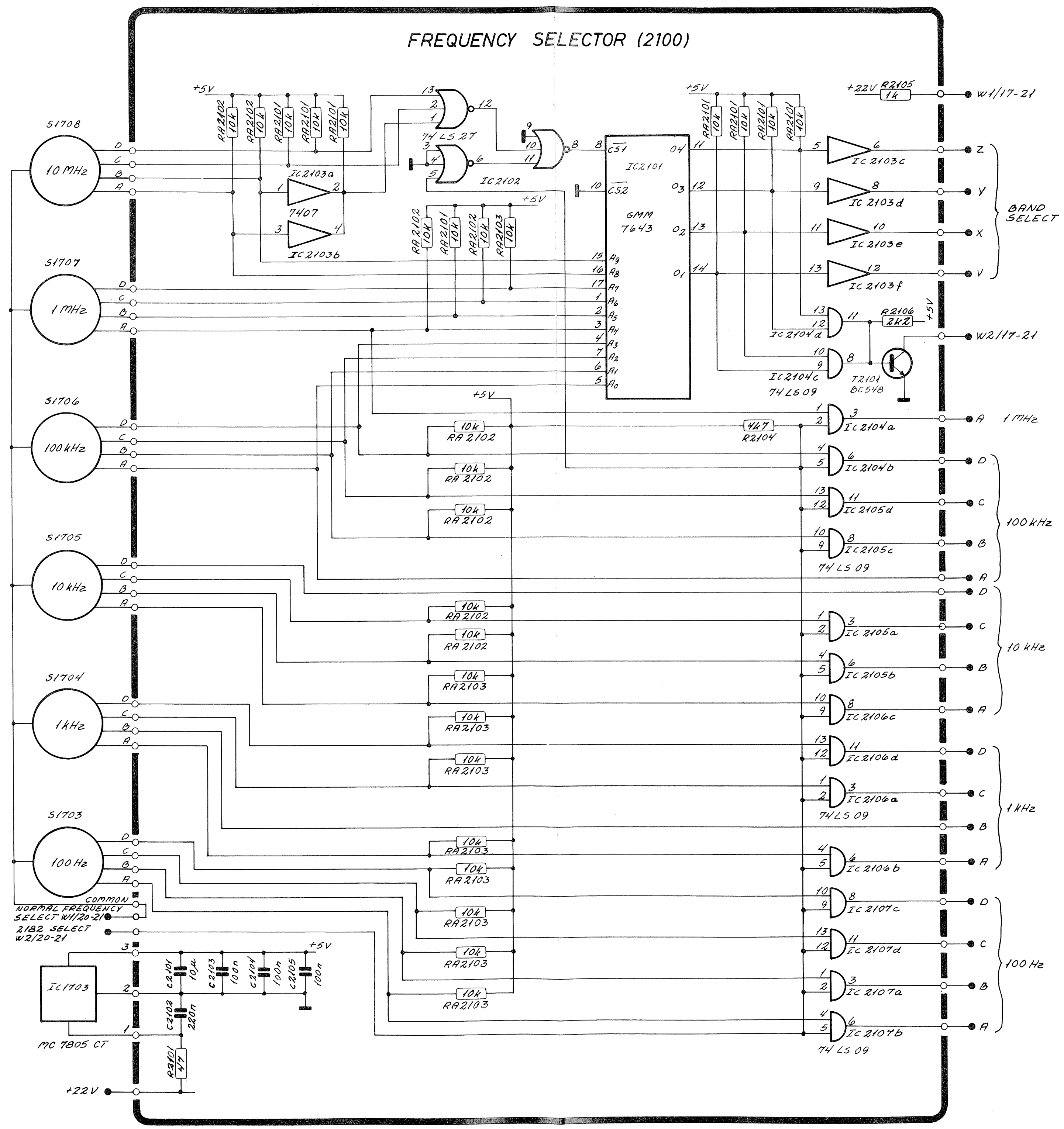
In order to select 2182 kHz the necessary code for the divider unit is fixed programmed on the gates IC2104 to IC2107. To choose this programming the common input is grounded via the 2182 kHz switch on the front panel. From the same switch the common wire for the frequency selectors is left open. This means that all the address inputs to IC2102 are high, and on this address the 2182 kHz band select code is stored.

A2/2 S1301

TO S1703-S1708

10 MHz	A-7	
	B-6	
	C-5	
	D-4	
1 MHz	A-8	
	B-3	
	C-2	
	D-1	
100 kHz	A-22	
	B-10	
	C-11	
	D-9	
10 kHz	A-14	
	B-13	
	C-12	
	D-23	
1 kHz	A-17	
	B-24	
	C-16	
	D-15	
100 Hz	A-21	
	B-20	
	C-19	
	D-18	





CIRCUIT DESCRIPTION FOR MODE SWITCH S1300

This unit contains the necessary switches to switch between the needed operation modes, relaies to activate the exciter, one for normal operation and one for 2182 kHz operation. Furthermore there is a relay to secure no A3H transmission above 4 MHz, only activated in some countries.

In the special telegraphy and telex versions there are four further push buttons, and on the printed circuit board there is a special circuit activated in telex mode. When output duty cycle is too high, the output is reduced to protect the power supplies against overload.

SIMPLEX/DUPLEX SELECTOR

The switch is controling: The RX loudspeaker, the receiver blocking and the simplex relay in the receiver.

MODE SELECTOR

The wanted transmission mode is in the exciter choosen via a + 18V DC voltage fed to necessary diode switches on the SSB generator and the microphone amplifier.

The transmit relay RE1001 is activated via the microtelephone key or, if the TEST ALARM button is pressed, via the alarm signal generator.

The 2182 relay RE1003 is activated from the motor control unit, where it is detected if the distress frequency 2182 is selected

The A3H relay RE1002 interrupts the 18V to the SSB generator, and so ensures no output of the exciter, under two conditions. First A3H is chosen, and second a frequency above 4 MHz is selected. The second condition is detected from the motor control unit and fed via the 400W/800W control wire to the transistor T1001. If the dotted connection on S1002-D3 is removed the A3H relay is disabled and so the exciter is able to transmit A3H in the full frequency range.

Most of the diodes on the mode switch printed circuit board are transient protection diodes, these are: D1001, D1002, D1003, D1009, D1010, D1014, D1015, D1016, D1019 and D1020.

D1004 prevents the alarm signal generator to start when the exciter is keyed and the alarm button is pressed.

D1005, D1006 and D1013 prevents the reduced power to get an unwanted voltage if distress is selected.

D1007 makes it possible to choose A2H or A3H on the microphone amplifier, even if A3H is chosen on the SSB generator.

D1008 makes it impossible for an external voltage on the wire SIMPLEX RELAY RX to disturb the key circuit.

D1101 prevents the wires 22V FROM DELAY and 22V FROM KEY to be connected together and in that way make the delay circuit selflocking.

CIRCUIT DESCRIPTION FOR MODE SWITCH S1300 cont.:

D1012 prevents the SIMPLEX RELAY RX and the RX BLOCK to follow the key in telephony duplex mode.

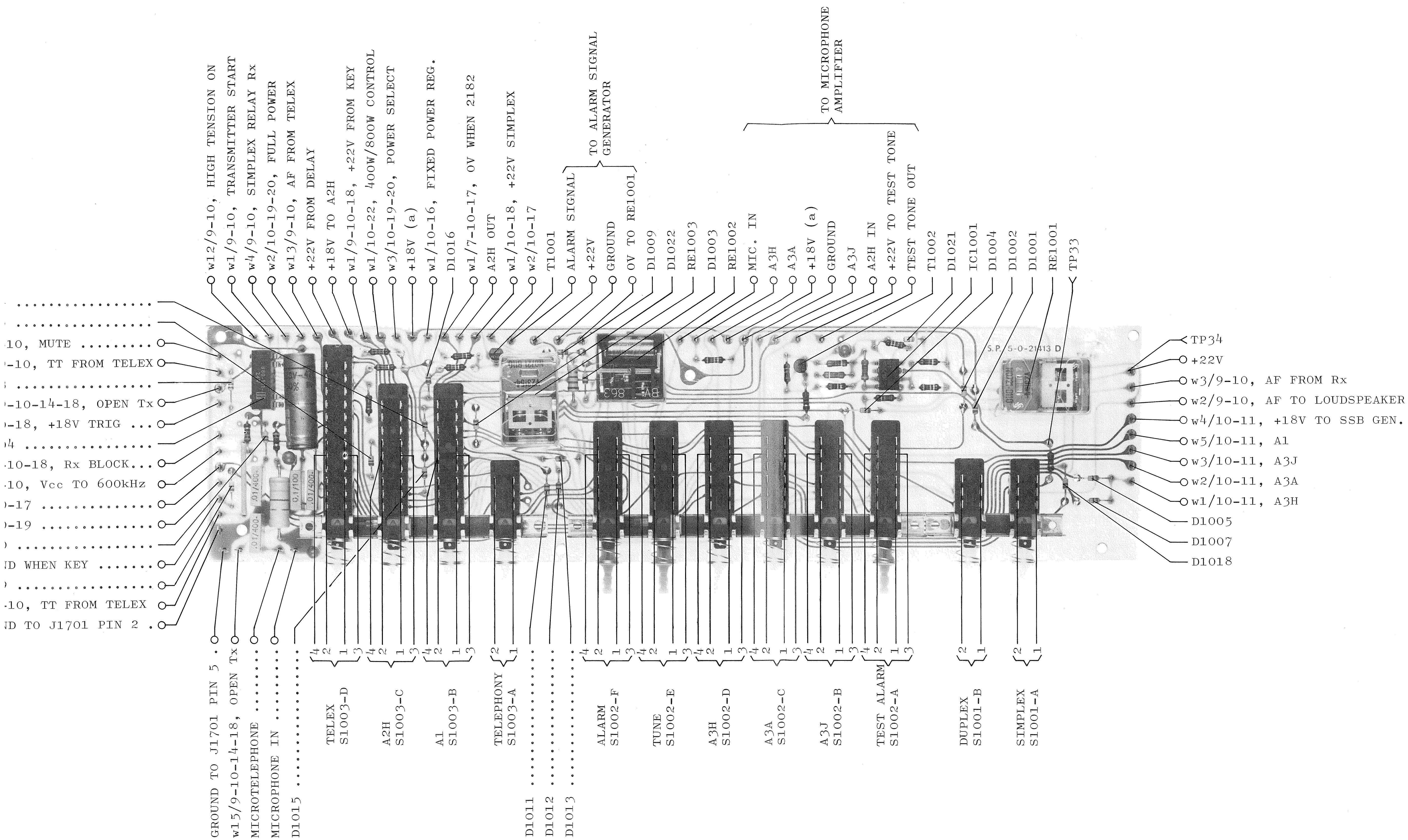
D1018 prevents an external voltage on the RX BLOCK wire to disturb the key circuit. The network: R1005, C1002, C1003, R1004 and C1005 is feeding DC into the microphone.

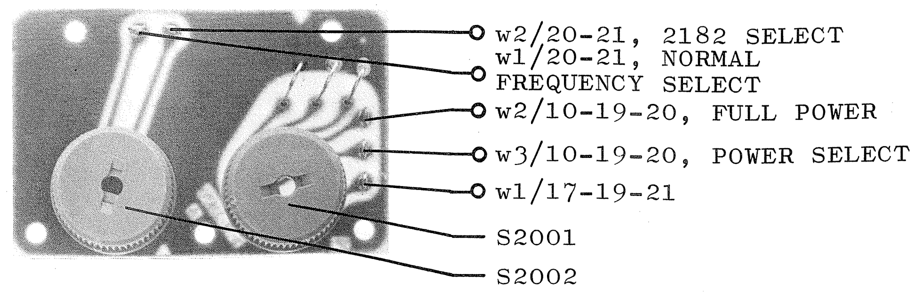
D1022 prevents the key circuit to be disturbed of an external voltage on the MUTING wire when 2182 kHz is selected.

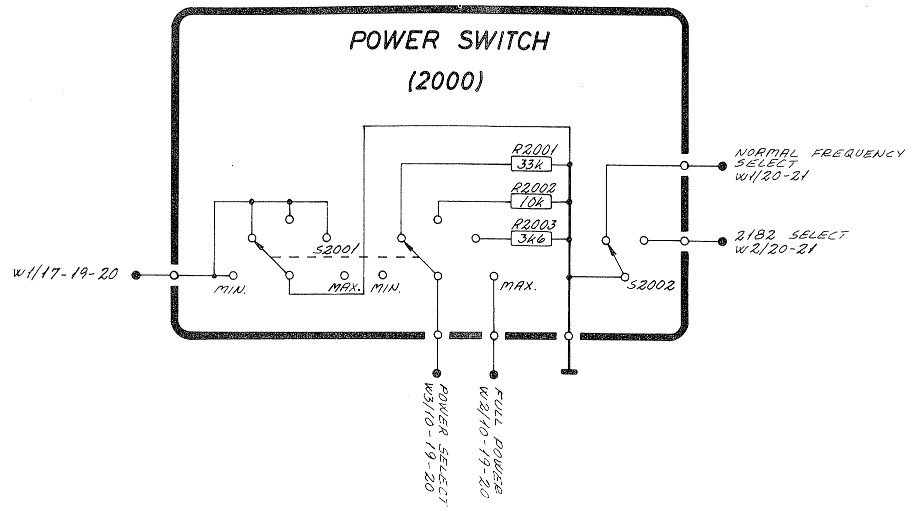
D1023 prevents the SIMPLEX RELAY RX to be energized from an external voltage on the RX BLOCK wire.

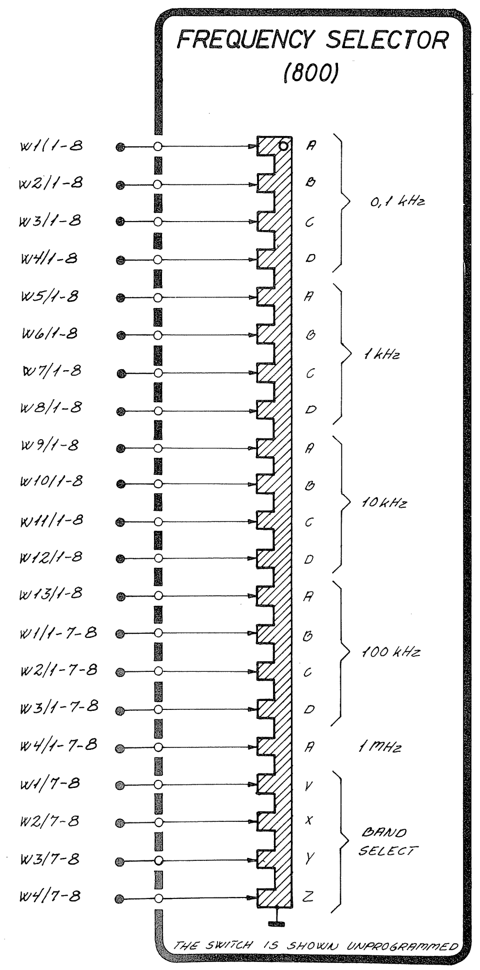
TELEX POWER CONTROL

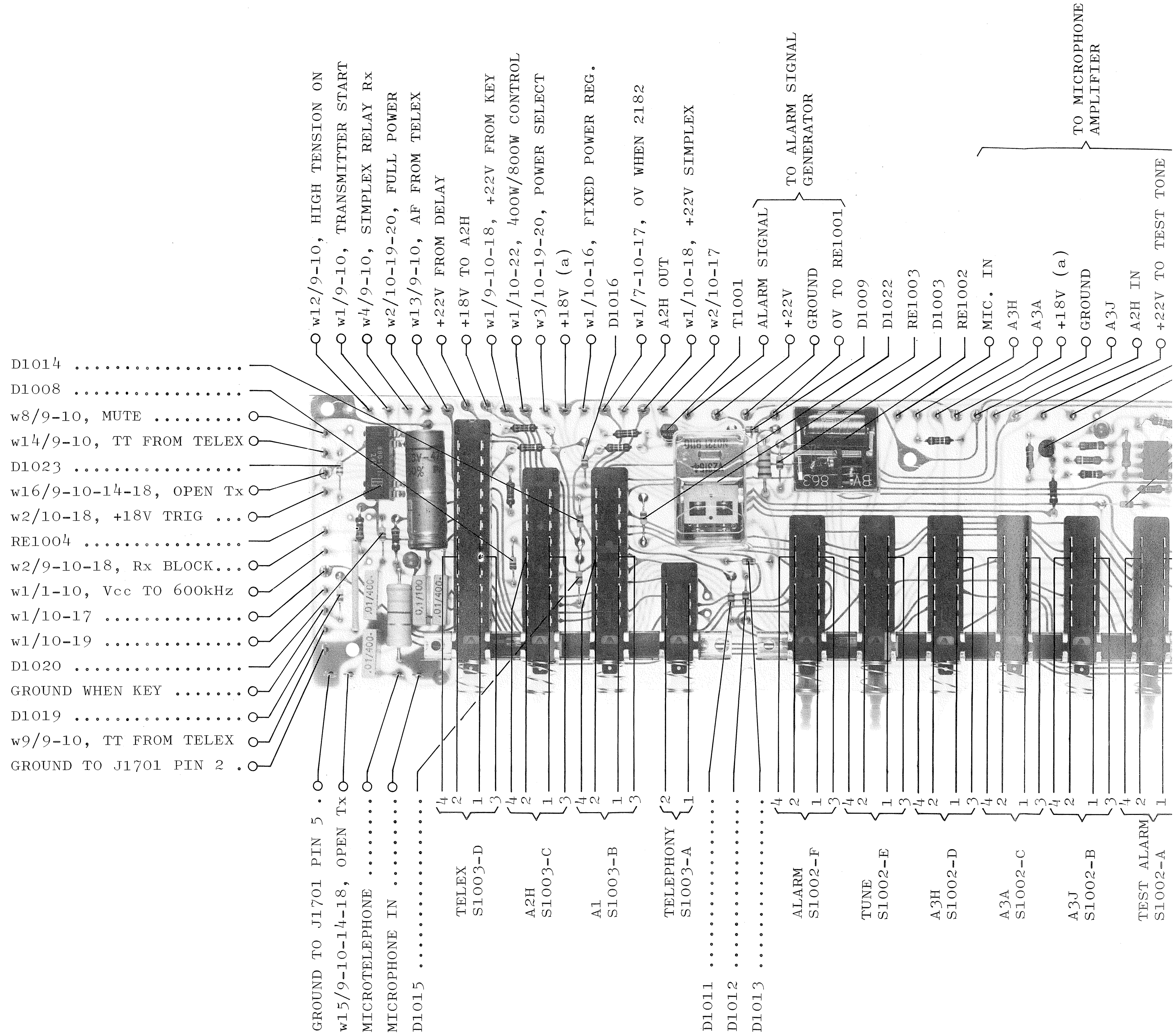
The key information is taken from the relay RE1004, and is fed into the buffer IC1001a. The switch information from there is fed into the integrator R1018 and C1008. The diode D1021 compensates the temperature dependent leak current in the capacitor C1008. When the integration voltage (pin 6. IC1001b) reaches 12.6V (approx. 55% duty cycle) the output of the comparator IC1001b goes low, and turns T1002 off, and so the output power is reduced.


w12/9-10, HIGH TENSION ON
w1/9-10, TRANSMITTER START
w4/9-10, SIMPLEX RELAY Rx
w2/10-19-20, FULL POWER
w13/9-10, AF FROM TELEX
+22V FROM DELAY
+18V TO A2H
w1/9-10-18, +22V FROM KEY
w1/10-22, 400W/800W CONTROL
w3/10-19-20, POWER SELECT
+18V (a)
w1/10-16, FIXED POWER REG.
D1016
w1/7-10-17, OV WHEN 2182
A2H OUT
w1/10-18, +22V SIMPLEX
w2/10-17
T1001
TO ALARM SIGNAL GENERATOR
ALARM SIGNAL
+22V
GROUND
OV TO RE1001
D1009
D1022
RE1003
D1003
RE1002
TO MICROPHONE AMPLIFIER
MIC. IN
A3H
A3A
+18V (a)
GROUND
A3J
A2H IN
+22V TO TEST TONE
TEST TONE OUT
T1002
D1021
IC1001
D1004
D1002
D1001
RE1001
TP33
S.P. 5-0-21413 D
TP34
+22V
w3/9-10, AF FROM Rx
w2/9-10, AF TO LOUDSPEAKER
w4/10-11, +18V TO SSB GEN.
w5/10-11, A1
w3/10-11, A3J
w2/10-11, A3A
w1/10-11, A3H
D1005
D1007
D1018
-10, MUTE
-10, TT FROM TELEX
-10-14-18, OPEN Tx
-18, +18V TRIG
4
-10-18, Rx BLOCK
-10, Vcc TO 600kHz
-17
-19
D WHEN KEY
-10, TT FROM TELEX
D TO J1701 PIN 2
GROUND TO J1701 PIN 5
w15/9-10-14-18, OPEN Tx
MICROTELEPHONE
MICROPHONE IN
D1015
TELEX S1003-D
A2H S1003-C
A1 S1003-B
TELEPHONY S1003-A
D1011
D1012
D1013
ALARM S1002-F
TUNE S1002-E
A3H S1002-D
A3A S1002-C
A3J S1002-B
TEST ALARM S1002-A
DUPLEX S1001-B
SIMPLEX S1001-A

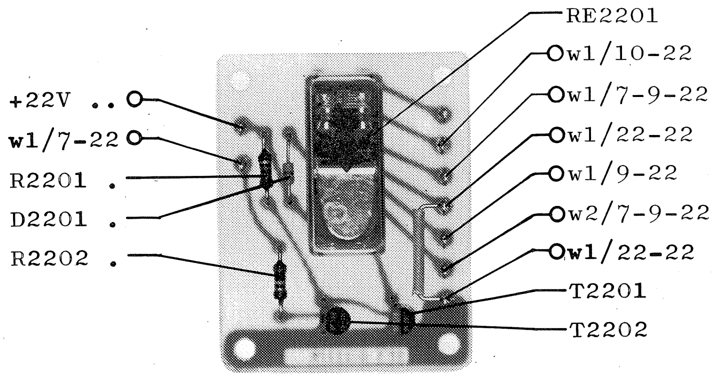


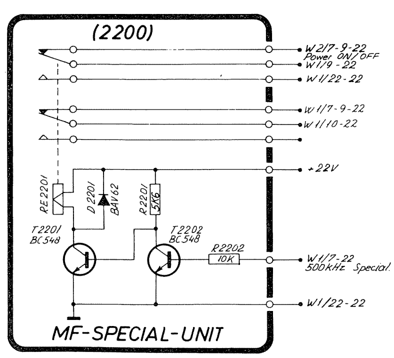




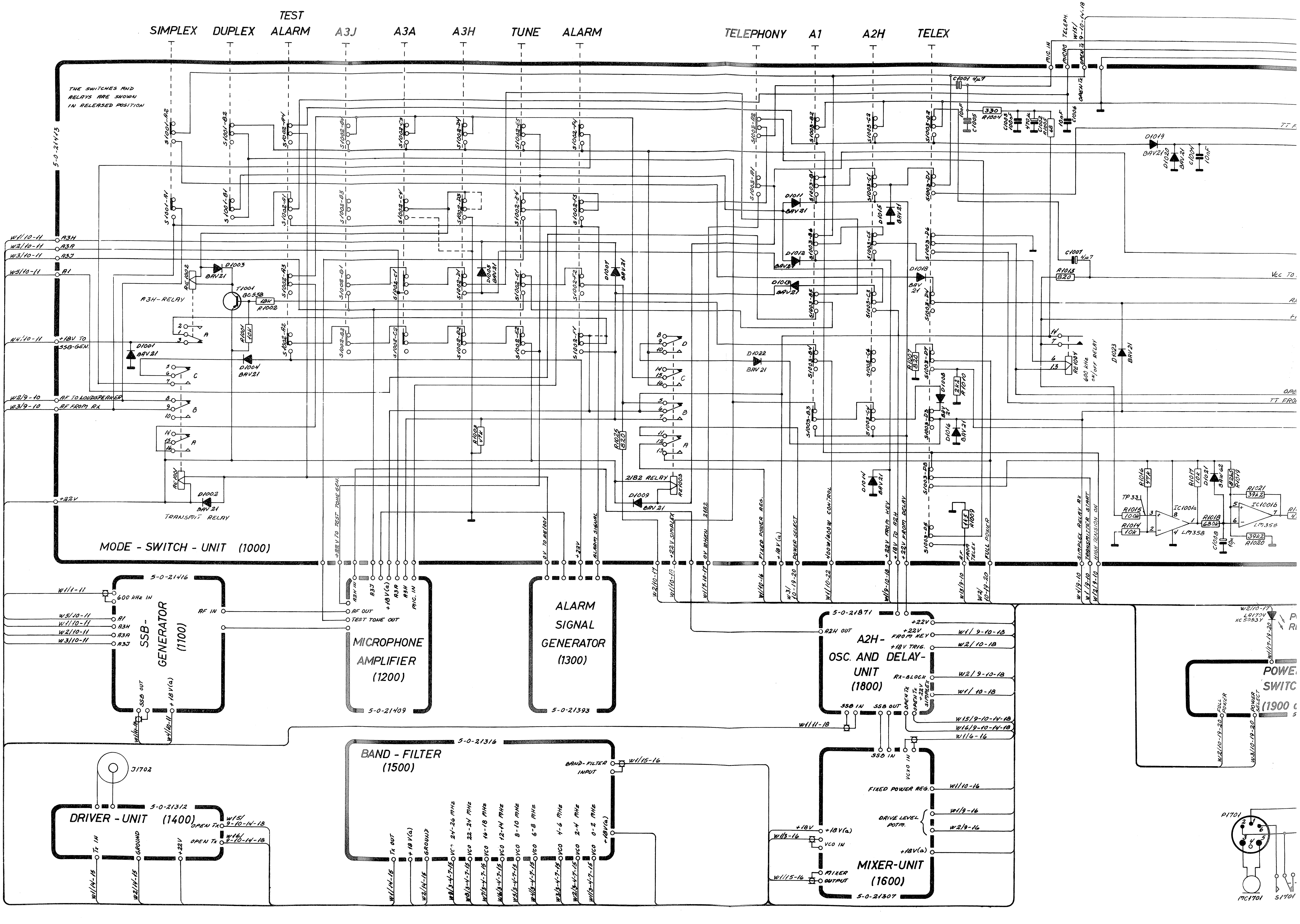


MODULE NO. 1000

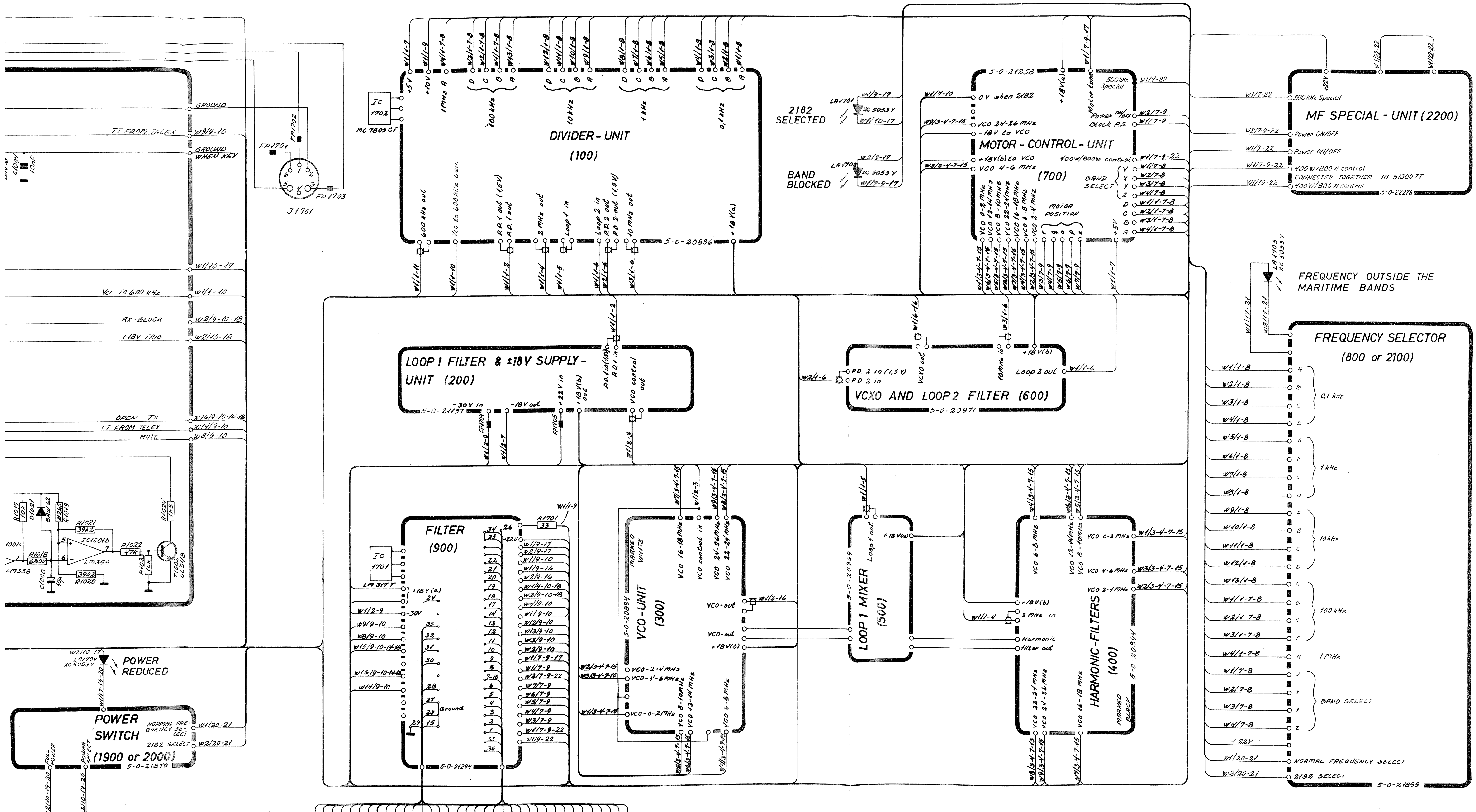

RE2201
w1/10-22
w1/7-9-22
w1/22-22
w1/9-22
w2/7-9-22
w1/22-22
T2201
T2202
+22V
w1/7-22
R2201
D2201
R2202

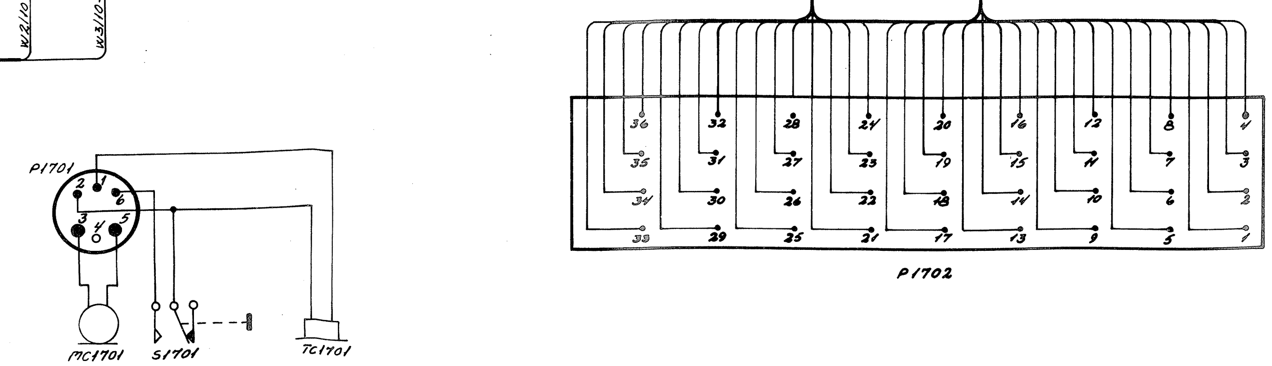

(2200)
W2/7-9-22
Power ON/OFF
W1/9-22
W1/22-22
W1/7-9-22
W1/10-22
+22V
RE2201
D2201
BAV62
R2201
5K6
T2201
BC548
T2202
BC548
R2202
10K
W1/7-22
500kHz Special
W1/22-22
MF-SPECIAL-UNIT

B1/1 S1301



SIMPLEX
DUPLEX
TEST ALARM
A3J
A3A
A3H
TUNE
ALARM
TELEPHONY
A1
A2H
TELEX
THE SWITCHES AND RELAYS ARE SHOWN IN RELEASED POSITION
5-0-21413
A3H-RELAY
TRANSMIT RELAY
2182 RELAY
MODE - SWITCH - UNIT (1000)
SSB-GENERATOR (1100)
5-0-21416
MICROPHONE AMPLIFIER (1200)
5-0-21409
ALARM SIGNAL GENERATOR (1300)
5-0-21393
A2H-OSC. AND DELAY-UNIT (1800)
5-0-21871
BAND - FILTER (1500)
5-0-21316
DRIVER - UNIT (1400)
5-0-21312
MIXER-UNIT (1600)
5-0-21307
LM358





1	400w/800w CONTROL
2	R-MOTORCONTROLWIRE
3	Q-MOTORCONTROLWIRE
4	O-MOTORCONTROLWIRE
5	P-MOTORCONTROLWIRE
6	S-MOTORCONTROLWIRE
7	POWER ON/OFF
8	BLOCK P.S.
9	MOTOR TUNE
10	AF FROM Tx
11	AF FROM Rx
12	AF FROM TELEX TO Tx
13	HIGH TENSION ON
14	HIGH TENSION ON
15	COMMON FOR AF FROM TELEX TO Tx
16	POWER ON/OFF
17	SIMPLEX RELAY Rx
18	Rx BLOCK
19	22V FROM KEY
20	DRIVE LEVEL POTMETER
21	DRIVE LEVEL POTMETER
22	TRANSMITTER START (22V OUT)
23	GROUND
24	-45V
25	+22V IN
26	+22V OUT
27	GROUND
28	TT FROM TELEX
29	Rx-BLOCK ⏚
30	OPEN Tx
31	OPEN Tx
32	MUTE
33	TT FROM TELEX
34	22V TO KEY
35	POWER ON/OFF
36	400w/800w CONTROL

MF SPECIAL-UNIT		(2200)
POWER SWITCH	(1900)	(2000)
FREQUENCY SELECTOR	(800)	(2100)
	S1300TT	S1301

(D) MAIN SCHEMATIC DIAGRAM
SAILOR SSB S1300TT / S1301
No. 200560

Sailor

Sailor

INSTRUKTIONSBOG FOR SAILOR R1120

INSTRUCTION BOOK FOR SAILOR R1120

A/S S. P. RADIO · AALBORG · DENMARK

INSTRUCTION BOOK FOR
RECEIVER R1119/R1120

VALID FROM S.N. 255239

CONTENTS:

GENERAL DESCRIPTION

INTRODUCTION

SAILOR R1120 is a main receiver intended for reception of A3, A3H, A3A, A3J, A2, A2H, A1 & F1 signals in the frequency range 10 kHz to 30 MHz.

SAILOR R1120 uses a digital synthesizer for frequency generation, and thus can be set to any frequency in the above mentioned frequency range. The digital synthesizer is controlled from a key board or the built-in continuous tuning wheel, the frequency selected is displayed on a six segment liquid crystal display (LCD). The frequency stability is controlled from one 10 MHz TCXO.

SAILOR R1120 is prepared for use in conjunction with telex and faximile equipment.

SAILOR R1120 is provided with higher order tunable RF filters to ensure good duplex performance.

SAILOR R1120 has automatical RF filter selection.

SAILOR R1120 fits into SAILOR 19" rack system.

SAILOR R1120 can be supplied with a selfcontaining cabinet H1225, and an AC/DC power supply N1405 with automatic change-over from AC to DC.

TECHNICAL DATA

The receiver is fully synthesized and has a frequency resolution of 100 Hz.

The receiver has a speech clarifier with a frequency control range of ±150 Hz.

The receiver is intended for reception of the following wave types A3 (A3E), A3H (H3E), A3A (R3E), A3J (J3E), A2 (A2A), A2H (H2A), A1 (A1A), F1 (F1B) and 2.4F1 (F1C).

Frequency ranges: 10 kHz - 30 MHz

Tuning error: less than 30 Hz

Frequency drift, short time: less than 5 Hz

Frequency drift, long time: less than 25 Hz per year

Frequency drift: 0 - 40°C: less than 25 Hz
Also possibility for better figures for frequency drift when using another TCXO.

IF band width:

Mode or band width	Min. pass band at -6 dB	Max. pass band at -60 dB	Classification of reception old	new
SSB/A3J	+ 350 Hz + 2700 Hz	- 300 Hz + 3400 Hz	A3A A3J F1 2.4F4	R3E J3E F1B F1C
AM/A3H	± 2900 Hz	± 9.5 kHz	A3 A3H	A3E H3E
MCW/A2 CW/A1 Interme-diate	± 1200 Hz	± 2800 Hz	A1 A2 A2H	A1A A2A H2A
CW/A1 Narrow	± 700 Hz	± 1700 Hz	A1	A1A
CW/A1 V.Narrow	max. ±190 Hz	± 600 Hz	A1	A1A

Options:

			SP TYPE
AUX Telex	+ 1300 Hz + 1700 Hz	+ 1075 Hz + 1925 Hz	C1022
AUX Telex	+ 1500 Hz + 1900 Hz	+ 1275 Hz + 2125 Hz	C1023
AUX Telex	+ 1700 Hz + 2100 Hz	+ 1475 Hz + 2375 Hz	C1024
AUX LSB	- 350 Hz - 2700 Hz	+ 300 Hz - 3400 Hz	C1013

R1120 A 1/2

TECHNICAL DATA cont.:

Sensitivity, 20 dB SN/N:

MF, A3J :	< 16 dB/1 uV
MF, A3H :	< 30 dB/1 uV
HF, A3J :	< 10 dB/1 uV
HF, A3H :	< 24 dB/1 uV
HF, A1/Narrow:	< 5 dB/1 uV

Adjacent Channel Selectivity:

A3J:	>50 dB at -1 and +4 kHz
	>55 dB at -2 and +5 kHz
	>75 dB at -5 and +8 kHz
A3:	>55 dB at -10 and +10 kHz
	>75 dB at -20 and +20 kHz

Blocking:	wanted signal	60 dB/1 uV
	blocking level	>110 dB/1 uV
Cross Modulation:	wanted signal	60 dB/1 uV
	cross modulation level	>100 dB/1 uV
Intermodulation:	3rd order intermodulation	Δf = 30 kHz
	intermodulation level	>90 dB/1 uV
Operation Temperature Range:	-15°C to +55°C	
Spurious rejection:	image rejection	> 60 dB
	IF rejection	> 60 dB
	all others	> 70 dB
Spurious emission:	P_{out} < 0.1 nW into 50 ohm	

Audio outputs:

Loudspeaker	4W into 8 ohms
Headphones	60 mW into 8 ohms
Line	0 dBm into 600 ohms

Automatic gain control:

ΔV_{in} = 40 dB

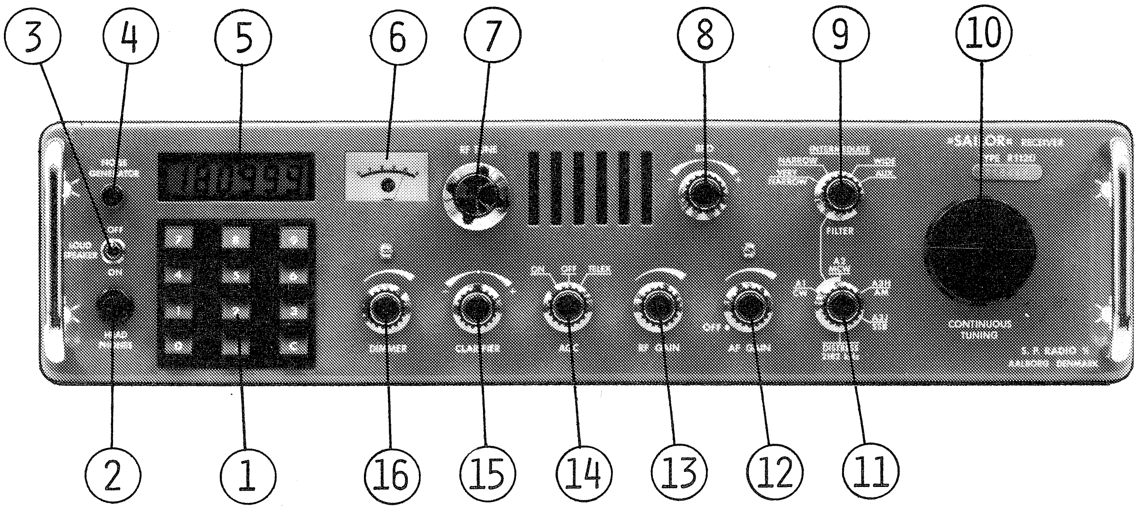
AM AGC:	attack time approx.	35 mSec
	decay time approx.	80 mSec
SSB AGC:	attack time approx.	2 mSec
	hang time approx.	3 Sec
TELEX AGC:	attack time approx.	2 mS
	decay time approx.	80 mS

IF frequencies:

1st IF:	10.6085 MHz & 16.6085 MHz
2nd IF:	600 kHz

R1120 A 2/2

CONTROLS R1120



① KEYBOARD

Enters the frequency into the frequency synthesizer. The frequency shall be entered in kHz, and only if a fractional kHz is wanted it is necessary to activate the decimal point key. Before a new frequency is entered, and if a wrong figure is keyed in all the display is cleared by means of the clear key C. After clearing and keying in a new frequency, the receiver is blocked. Furthermore the zero key and the decimal point key controls the CONTINUOUS TUNING ⑩ .

R1120 A 1/2

② HEADPHONES

Receptable for headphones.

③ LOUDSPEAKER ON/OFF

Switches ON or OFF the loudspeakers.

④ NOISE GENERATOR

Removes the keyboard controlled receiver blocking and the aerial, and activates the built-in noise generator.

⑤ DISPLAY

Displays the keyed figures and finally the actual receiving frequency.

⑥ METER

Shows the field strength of the incoming signal.

CONTROLS cont.:

(7) RF TUNE

Tunes the band filter to the chosen frequency.

(8) BFO

Adjusts the beat note in A1 mode.

(9) FILTER

Chooses the wanted bandwidth in A1- and A2 mode, and disables the BFO in the AUX. position.

(10) CONTINUOUS TUNING

Is activated by pressing the decimal point key on the KEYBOARD (1), and tunes over the full frequency range. The tuning wheel can be disabled by pressing the zero key on the KEYBOARD (1).

R1120 A 2/2

(11) MODE SWITCH

Switches between reception of fixed 2182 kHz (Distress), A3J - (A3J and A3A), A3H - (A3H and A3), A2 (A2 and A2H) and A1 signals.

(12) AF GAIN

Controls the AF output and turns the mains on/off.

(13) RF GAIN

Controls the overall RF amplification in the receiver.

(14) AGC

Changes between slow (ON) and fast (TELEX) release time for the SSB AGC system or switches OFF the AGC.

(15) CLARIFIER

Provides incremental tuning over a ±150 Hz frequency range.

(16) DIMMER

Controls the light intensity from the DISPLAY and the METER.

DIRECTIONS FOR USE

INITIAL SETTINGS

Turn on the receiver on the AF GAIN (12) or on the power supply N1400 or N1401 and turn the AF GAIN (12) to approx. middle position.
Turn the CLARIFIER (15) to the center position, the RF GAIN (13) fully clockwise and the AGC SWITCH (14) to position ON. Choose the wanted mode of reception on the MODE SWITCH (11). (For further description of mode filter - and AGC selection, please examine the paragraphs below).

FREQUENCY CONTROL

The frequency is controlled from the KEYBOARD (1) and the CONTINUOUS TUNING (10) wheel. The wanted frequency must be entered into the KEYBOARD (1) in kHz and is then displayed on the liquid crystal DISPLAY (5). The decimal point is only to be used when a fractional kHz is wanted. After entering a frequency the receiver is blocked and the CONTINUOUS TUNING (10) wheel is disabled.
After keying in a frequency you must press the NOISE GENERATOR (4) and adjust RF TUNE (7) for maximum reading on the METER (6). For frequencies below 150 kHz chosen there is no tuning to be done on the RF TUNE (7), just press NOISE GENERATOR (4) to unblock the receiver.
Now the wanted frequency is selected and the receiver front end is tuned. The CLARIFIER (15) controls the frequency between the 100 Hz steps selectable.
For searching over a frequency range the CONTINUOUS TUNING (10) wheel is activated by pressing the decimal point key on the KEYBOARD (1). When the desired frequency is found the CONTINUOUS TUNING (10) wheel can be disabled by pressing the zero key on the KEYBOARD (1).
The CONTINUOUS TUNING (10) wheel is able to tune the receiver over the full frequency range 10 kHz to 30 MHz. It is necessary to follow the frequency tuning wheel with the front end tuning on the RF TUNE (7). Each time you pass a band limit by means of the CONTINUOUS TUNING (10) the receiver blocks. (Bandlimits: 150 kHz, 530 kHz, 1.6 MHz, 4 MHz, 7 MHz, 14 MHz and 30 MHz). To unblock the receiver again you must press the NOISE GENERATOR (4) and adjust the RF-TUNE (7) for maximum METER (6) reading.

DISTRESS

With the controls set as described under INITIAL SETTINGS above just turn the MODE SWITCH (11) to DISTRESS (2182 kHz) position. Now the receiver is ready for reception on the distress frequency, mode selection (AM) and front end tuning is automatically done in the receiver.

SSB TELEPHONY

For normal telephony purpose turn the MODE SWITCH (11) to A3J (SSB) position.
Now SSB reception of normal upper sideband is established.
For SSB telephony purpose the preferable AGC (14) position is ON.

It is possible by means of the RF GAIN (13) to control the attack level for the AGC system in such a way that signals below a certain level not attacks the AGC system.
In noisy environments it can be advantageous to switch OFF the AGC (14) and control the gain by the RF GAIN (13) to avoid that noise impulses activates the AGC circuit.
Another possibility for gain regulation under strong repetitive noise impulses is to switch the AGC (14) to the TELEX position and turn the RF GAIN (13) fully clockwise.
The AGC system now regulates the amplification down immediately and thus prevents the noise impulse to be heard in the loudspeaker. When the noise impulse disappears again the amplification increases rapidly. This fast AGC system suppresses effectively noise impulses, but for SSB purpose it furthermore introduces some distortion because of the missing hang time in this position. For that reason it is only advantageous to use the TELEX AGC system when your environments is so noisy that the ON pos. is unusable.

GENERAL BROADCASTING

With the controls set as described under INITIAL SETTINGS above, turn the MODE SWITCH (11) to A3H (AM) position. Now you are ready to key in a wanted frequency or search by means of the CONTINUOUS TUNING (10) as described under FREQUENCY CONTROL.

TELEX IN SSB MODE

For telex reception the receiver is operating as described under SSB TELEPHONY. Because of the nature of the telex signal (it contains no envelope modulation) is the most advantageous AGC (14) choice the TELEX one. The extremely good noise performance of this AGC is fully utilized because no distortion can be introduced.
Special attention must be paid to the frequency selected. The telex service frequencies listed by the authorities are assigned frequency. For that reason you must set the frequency either 1700 Hz or 1500 Hz below the assigned frequency, depending upon the telex equipment used.

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TELEX IN AUX. MODE IF TELEX FILTER IS FITTED

As in the TELEX IN SSB MODE except that the MODE SWITCH (11) is set to position A1 (CW) and the FILTER SWITCH (9) to position AUX.

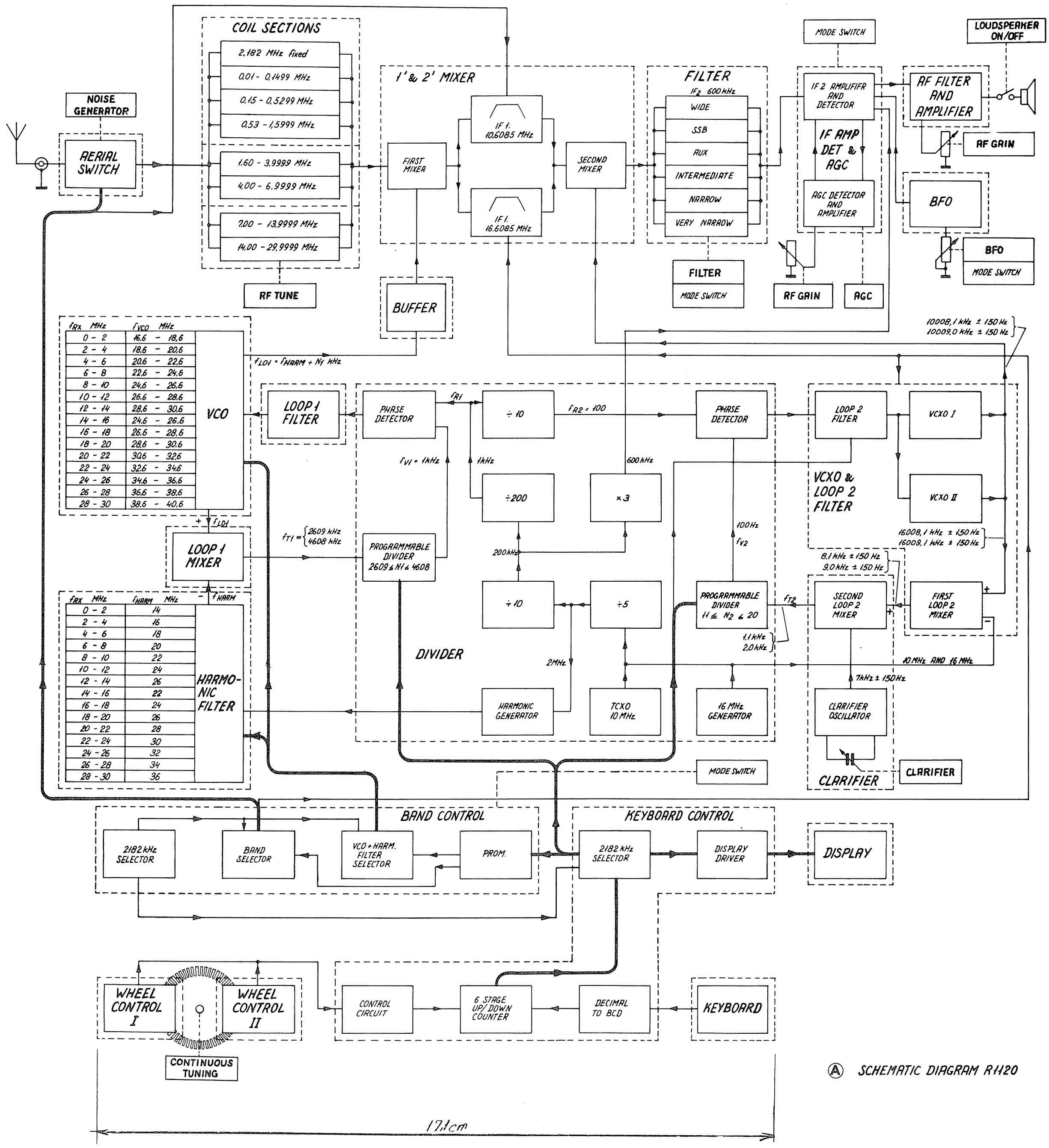
MODULATED TELEGRAPHY

With the controls set as described under INITIAL SETTINGS above, turn the MODE SWITCH (11) to position A2 (MCW) and the FILTER SWITCH (9) to INTERMEDIATE.
The AGC system now chosen is the SSB one, and you must set the AGC (14) to the most suitable position (ON or TELEX) after the present noise conditions.

TELEGRAPHY

With the controls set as described under INITIAL SETTINGS above, turn the MODE SWITCH (11) to A1 (CW) position and turn the FILTER SWITCH (9) to suitable bandwidth. Now the receiver is ready for telegraphy reception and the BFO (8) is operational and can be tuned to a desirable beat note. For the same reasons as described in the telex paragraph the most advantageous AGC (14) choice is the ON one.

PRINCIPLE OF OPERATION



Ⓐ SCHEMATIC DIAGRAM R1120

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RECEIVER R 1120

The SAILOR R1120 is a fully synthesized double superhetereodyne receiver with 10.6085 or 16.6085 MHz 1st IF and 600 kHz 2nd IF.

The signal from the aerial is led through the BAND FILTER UNIT to the FIRST MIXER, where the aerial signal is mixed with the f_{LO1} signal having frequency resolution of 1 kHz, and thus giving a 1st IF frequency range from 10.6081 MHz to 10.6090 MHz or 16.6081 MHz to 16.6090 MHz.

The signal is then led through a double monolitic crystal filter to the SECOND MIXER, where the signal is mixed with the f_{LO2} signal having continuous tuning in the frequency range from 10.00795 MHz to 10.00915 MHz or 16.00795 MHz to 16.00915 MHz, and thus giving a 2nd IF frequency of 600 kHz.

The 16.6085 MHz 1st IF is selected in the frequency range 0.0100 MHz to 13.9999 MHz and 10.6085 MHz in the range 14.0000 MHz to 29.9999 MHz.

The produced 2nd IF signal is led through one of the five filters available on the IF FILTER UNIT. The switching takes place electronically by means of the MODE and/or the FILTER SWITCH.

The signal is then passed on to the IF2 AMPLIFIER and DETECTOR. The IF amplifier consists of 3 AGC controlled amplifier stages. The detector for both AM and SSB reception is an envelope detector, and in the SSB and CW mode the carrier is reinjected in such a way that the incoming signal is converted to an A3H signal.

The reinjected carrier in SSB mode is 600 kHz derived from the 10 MHz reference oscillator, and in CW mode the carrier signal from the beat frequency oscillator BFO is used. This frequency can be varied between 599.5 kHz and 601.8 kHz.

The AGC DETECTOR AND AMPLIFIER consists of the AM AGC system and the hang AGC system.

The audio frequency signal is fed from the detector to the AF FILTER AND AMPLIFIER, consisting of an audio filter, a preamplifier and an output power amplifier, which delivers signal to the fixed AF output (0 dBm), the headphones and the speakers.

FREQUENCY GENERATION

The necessary frequencies are generated by two frequency synthesizers according to the phase locked principle.

Local oscillator signal f_{LO1} to FIRST MIXER is generated in the phase locked loop 1 and has a resolution of 1 kHz.

Local oscillator signal f_{LO2} to SECOND MIXER is generated in the phase locked loop 2 and has a resolution of 100 Hz, and continuous tuning over the 100 Hz steps by means of the CLARIFIER.

LOOP 1

The voltage controlled oscillator (VCO) generates the necessary local oscillator signal to FIRST MIXER in twelve 2 MHz bands selected by the BAND CONTROL UNIT. Inside each 2 MHz band the VCO frequency f_{LO1} is controlled by a DC controlled voltage derived from the PHASE DETECTOR and filtered out in the LOOP 1 FILTER.

PRINCIPLE OF OPERATION cont.:

The PHASE DETECTOR compares two signals, a variable frequency f_{V1} and a reference frequency f_{R1}. The reference frequency f_{R1} is the 10 MHz TCXO frequency divided down to 1 kHz.

The variable frequency f_{V1} is generated from the VCO frequency f_{LO1} in the following way:

In the LOOP 1 MIXER the counter frequency f_{T1} is produced as the difference between the VCO frequency f_{LO1} and the frequency f_{HARM} which is a multiple of 2 MHz derived from the 10 MHz TCXO.

$$f_{T1} = f_{LO1} - f_{HARM} = f_{LO1} - (m \times 2 \text{ MHz}) = N_1 \times 1 \text{ kHz}$$

For each 2 MHz band a new f_{LO1} and f_{HARM} is selected by the BAND CONTROL UNIT, and it always results in a 2 MHz variation of the frequency f_{T1} to PROGRAMMABLE DIVIDER.

The frequency f_{T1} is divided down by a dividing figure N_1 in the PROGRAMMABLE DIVIDER to the variable frequency f_{V1}.

$$f_{V1} = f_{T1}/N_1 = 1 \text{ kHz}$$

The working principle in a phase locked loop is as follows:

A frequency error between the variable frequency f_{V1} and the reference frequency f_{R1} will via the PHASE DETECTOR and the LOOP 1 FILTER cause a DC control voltage controlling the VCO frequency and consequently the variable frequency f_{V1} so that f_{V1} follows the reference frequency f_{R1} in frequency.

$$f_{R1} = f_{V1} = 1 \text{ kHz}$$

The VCO frequency f_{LO1} is now phase locked on a fixed frequency to the reference frequency f_{R1} and has therefore the same accuracy as this.

Changing of the VCO frequency f_{LO1} by 1 kHz is carried out by changing the dividing figure N_1 in the PROGRAMMABLE DIVIDER by one.

$$f_{LO1} = f_{HARM} + (N_1 \times 1 \text{ kHz})$$

Principle of programming:

The PROGRAMMABLE DIVIDER contains a counter circuit counting down from a start figure 2000 + P_1 and stops at the stop figure S_1. Each time the counter reaches the stop figure S_1, a pulse (f_{V1}) is fed to the PHASE DETECTOR, and the counter starts counting down again from the start figure 2000 + P_1. Division of f_{T1} by N_1 is now achieved.

$$f_{V1} = f_{T1}/N_1; \; N_1 = 2000 + P_1 - S_1$$

The BAND CONTROL unit selects the correct VCO- and HARMONIC FILTER range.

Inside each 2 MHz band the programmable figure P_1, is encoded from the KEY BOARD CONTROL unit in BCD code representing the frequency within the 2 MHz band.

Start figure: $2000 + P_1$; $0 \leq P_1 \leq 1999$

Stop figure: $S_1 = -609$

$N_1 = 2000 + P_1 - S_1 = P_1 + 2609$

Output frequency from Loop 1:

$$f_{LO1} = m \times 2\text{ MHz} + (P_1 + 2069) \times 1\text{ kHz};\ 7 \leq m \leq 18$$

LOOP 2

The voltage controlled crystal oscillator (VCXO) generates the necessary local oscillator signal to SECOND MIXER. The VCXO is in the Loop 2 system phase locked to the internal 10 MHz reference frequency.

The phase locked loop principle is the same as for the Loop 1 system. The only difference is that there are two mixers in the feed-back path, where the one injection signal is a fixed 10 MHz or 16 MHz signal and the other one f_{CL} is the CLARIFIER signal.

The CLARIFIER has a frequency variation of $\pm$150 Hz which results in a $\pm$150 Hz variation of the VCXO frequency f_{LO2}.

Principle of programming:

The frequency shift in Loop 2 is controlled from the 0.1 kHz code from the KEY BOARD CONTROL UNIT.

The PROGRAMMABLE DIVIDER counts up from the start figure P_2 to the stop figure S_2.

The 0.1 kHz code controls the start figure P_2 to the PROGRAMMABLE DIVIDER.

Start figure: $0 \leq P_2 \leq 9$

Stop figure: $S_2 = 20$

Dividing figure: $N_2 = S_2 - P_2 = 20 - P_2$

PRINCIPLE OF OPERATION cont.:

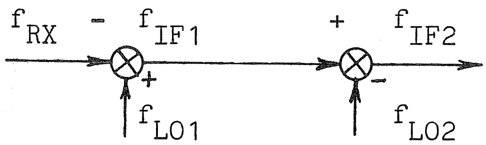
Output frequency from Loop 2:

$$f_{LO2} = 10 \text{ MHz} + f_{CL} \pm 150 \text{ Hz} + (N_2 \times 0.1 \text{ kHz})$$
$$f_{LO2} = 10.007 \text{ MHz} \pm 150 \text{ Hz} + (20 - P_2) \times 0.1 \text{ kHz}$$
$$f_{LO2} = 10.009 \text{ MHz} \pm 150 \text{ Hz} - (P_2 \times 0.1 \text{ kHz})$$

or:

$$f_{LO2} = 16 \text{ MHz} + f_{CL} \pm 150 \text{ Hz} + (N_2 \times 0.1 \text{ kHz})$$
$$f_{LO2} = 16.007 \text{ MHz} \pm 150 \text{ Hz} + (20 - P_2) \times 0.1 \text{ kHz}$$
$$f_{LO2} = 16.009 \text{ MHz} \pm 150 \text{ Hz} - P_2 \times 0.1 \text{ kHz}$$

RECEIVING FREQUENCY F_{RX} FOR RECEIVER R1119 & R1120



$$f_{IF2} = 0.600 \text{ MHz}$$

$$f_{LO2} = \begin{cases} 10.009 \text{ MHz} + 150 \text{ Hz} - (P_2 \times 0{,}1 \text{ kHz}) \\ 16.009 \text{ MHz} \pm 150 \text{ Hz} - (P_2 \times 0{,}1 \text{ kHz}) \end{cases}$$

$$f_{IF1} = f_{IF2} + f_{102} = \begin{cases} 10.009 \text{ MHz} - (P_2 \times 0{,}1 \text{ kHz}) \\ 16.009 \text{ MHz} - (P_2 \times 0{,}1 \text{ kHz}) \end{cases}$$

$$f_{LO1} = m \times 2 \text{ MHz} + (P_1 + 2609) \times 1 \text{ kHz}, \quad 7 \leq m \leq 18$$

<u>For $0.0100 \text{ MHz} \leq f_{RX} \leq 13.9999 \text{ MHz}$</u>

$$f_{RX} = f_{LO1} - f_{IF1} = (m-4) \times 2 \text{ MHz} + (P_1 + 0{,}1\, P_2) \times 1 \text{ kHz}$$

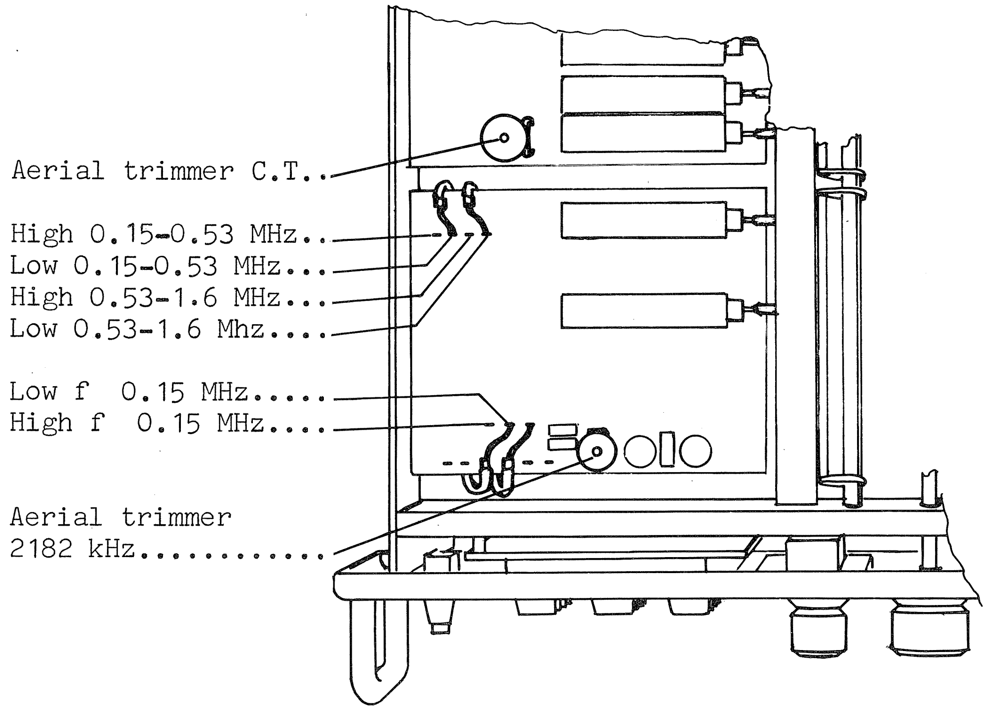
<u>For $14.0000 \text{ MHz} \leq f_{RX} \leq 29.9999 \text{ MHz}$</u>

$$f_{RX} = f_{LO2} - f_{IF1} = (m-7) \times 2 \text{ MHz} + (P_1 + 0{,}1\, P_2) \times 1 \text{ kHz}$$

AERIAL TUNE PROCEDURE

When the receiver has been installed the aerial trimmer for the 2182 kHz input filter must be adjusted, and for installation with short coax cables 1   12 m. it may be advantageous to adjust the aerial trimmer for the C.T. band 1.6 - 4 MHz.

NOTE: The length of the coax cable is from the aerial input socket of the receiver to the connection box for the aerial.



ADJUSTING PROCEDURE 2182 kHz:

1. Set mode switch to pos. 2182 kHz.
2. Set AGC switch to pos. ON.
3. Turn RF GAIN fully clockwise.
4. Turn AF GAIN to suitable volume.
5. Adjust by means of an insulated trimming stick the aerial trimmer 2182 kHz for max. METER reading or max. noise in the loudspeaker.

ADJUSTING PROCEDURE C.T. BAND (cable length 12 m.):

1. Set mode switch to pos. AM.
2. Set AGC switch to pos. ON.
3. Turn RF GAIN fully clockwise.
4. Turn AF GAIN to suitable volume.

AERIAL TUNE PROCEDURE cont.:

5. Key in a low frequency in the C.T. band e.g. 1610 kHz by means of the KEYBOARD.
6. Activate the NOISE GENERATOR and adjust RF TUNE for max. meter reading.
7. Press the decimal point key on the KEYBOARD and search by means of the CONTINUOUS TUNING wheel for a weak station in the low end of the C.T. band.
8. Adjust RF TUNE for max. METER reading.
9. Adjust by means of an insulated trimming stick the aerial trimmer C.T. for max. METER reading.
10. Repeat 8) and 9) until no essential improvement is achieved.

CHANGE OF INPUT IMPEDANCE FOR FREQUENCIES BELOW 1.6 MHz:

For installations with short coax cables and short aerials it may be advantageous to shift from 50 ohms input impedance, pos. LOW to high input impedance pos. HIGH.

To determine which pos. is the most advantageous, search for a weak station near the band limits, note the METER readings. Change for the other input impedance and check if the METER readings have increased. Remember to adjust RF TUNE.

Band limits: 150 kHz, 530 kHz and 1.6 MHz.

SERVICE

1. MAINTENANCE

1.1.
When the SAILOR SHORT WAVE SET type 1000 has been correctly installed, the maintenance can, dependent on the environment and working hours, be reduced to a performance check at the service workshop at intervals not exceeding 5 years. A complete performance check list is enclosed in the PERFORMANCE CHECK section.

Also inspect the antennas, cables and plugs for mechanical defects, salt deposits, corrosion and any foreign bodies.

Along with each set a TEST SHEET is delivered, in which some of the measurings made at the factory are listed. If the performance check does not show the same values as those on the TEST SHEET, the set must be adjusted as described under ADJUSTMENT PROCEDURE.

Any repair of the set should be followed by a FUNCTION CHECK of the unit in question.

2. NECESSARY TEST EQUIPMENT

TX: T1127, T1127L
EXC: S1300, S1301
RX: R1119, R1120
PS: N1400, N1401

TX	EXC	RX	PS		
X	X	X	X	<u>OSCILLOSCOPE</u>:	
				Bandwidth	DC - 35 MHz
				Sensitivity	2 mV/cm
				Input impedance	1 Mohm//30 pF
				Triggering	EXT-INT-ENVELOPE
				E.g. PHILIPS type	PM3216
X	X	X		<u>PASSIVE PROBE</u>:	
				Attenuation	20 dB (10X)
				Input resistance	10 Mohm
				Input capacitance	15 pF
				Compensation range	10 - 30 pF
				E.g. PHILIPS type	PM8925
	X	X		<u>MULTIMETER</u>:	
				Sensitivity DC (f.s.d.)	1V
				Input impedance	10 Mohm
				Accuracy (f.s.d.)	±2%
				E.g. PHILIPS type	PM2505
X			X	<u>MULTIMETER</u>:	
				Sensitivity DC (f.s.d.)	0.3V & 3A
				Input impedance	30 kohm/V
				Accuracy (f.s.d.)	±1%
				Current range	100 A
				Voltage range	500V & 2.5 kV
				E.g. Unigor type	A43
				Shunt type	GE4277
				H.T.probe type	GE4196

NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS		
	X	X		<u>TONE GENERATOR</u>:	
				Frequency range	200 - 3000 Hz
				Output voltage	1V RMS
				Output impedance	≦600 ohm
				E.g. PHILIPS type	PM5107
		X		<u>AF VOLTMETER</u>:	
				Sensitivity (f.s.d.)	300 mV
				Input impedance	≧4 ohm
				Accuracy (f.s.d.)	±5%
				Frequency range	100 - 3000 Hz
				E.g. PHILIPS type	PM2505
	X	X		<u>FREQUENCY COUNTER</u>:	
				Frequency range	100 Hz - 30 MHz
				Resolution	0.1 Hz at f≧10 MHz
				Accuracy	1×10^{-7}
				Sensitivity	100 mV RMS
				Input impedance	1 Mohm//25 pF
				Single period range	1 sec.
				Resolution	1 mSec.
				E.g. PHILIPS type	PM6611 + PM9679
		X		<u>SIGNAL GENERATOR</u>:	
				Frequency range	0.1 - 30 MHz
				Output impedance	50/75 ohm
				Output voltage	1 uV - 100 mV EMF
				Modulation	AM, 30%, 1000 Hz
				Ext. mod.	300 - 2700 Hz
				Ext. mod. sensitivity	1V for M=0.3
				E.g. PHILIPS	PM5326
				<u>POWER SUPPLIES</u>:	
X		X		N1400/T1127:	
				Vout	26.5V DC
				Iout	70A DC
				E.g. 2 pcs. LAMBDA type	LXS-G-24-OV-R

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NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS		
				<u>POWER SUPPLIES:</u>	
	X			S1300, S1301	
				Vout 1	22V
				Iout 1	1.5A
				Vout 2	-45V
				Iout 2	-0.1A
				E.g. SAILOR types	N1402 N1402 spec. N1405
	X	X		R1119, R1120:	
				Vout 1	22V
				Iout 1	1A
				Vout 2	8V
				Iout 2	1A
				Vout 3	-45V
				Iout 3	-0.1A
				E.g. SAILOR types	N1402 spec. N1405
	X			<u>TEST BOX S1300/S1301:</u>	
				S.P. type	S1300/01 Test box
	X			<u>ARTIFICIAL KEY S1300TT/S1301:</u>	
				S.P. type	Artificial key
X				<u>POWER METER:</u>	
				Power range	500W
				Impedance	50 ohm
				E.g. Bird Thruline Wattmeter Plug-in element	Model 43 500W 2-30 MHz
X				<u>RF AMMETER (Thermocross):</u>	
				Current range	5A
				E.g. Helweg Mikkelsen & Co. Copenhagen, Denmark type	TR-68x71, 5A

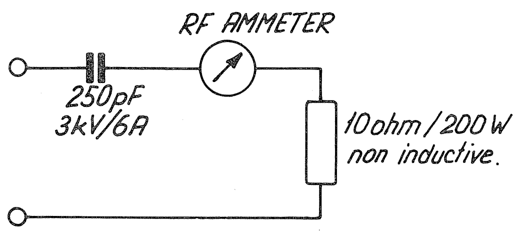
NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS	
X	X			DUMMY LOAD for HF bands, 4 - 25 MHz
X				DUMMY LOAD for C.T. band 1.6 - 4 MHz

DUMMY LOAD for HF bands, 4 - 25 MHz:

Impedance	50 ohm
Frequency range	4 - 25 MHz
Power range	400W
SWR	1:1.2
E.g. Bird Termaline Coaxial Resistor	Model 8401

DUMMY LOAD for C.T. band 1.6 - 4 MHz:



E.g. Draloric type 06-1291TD 20x50L 8KVs 250 pF ±20% R85

E.g. 10 pcs. Dale type PH-25A-17, 100 ohm, 5%, 25W

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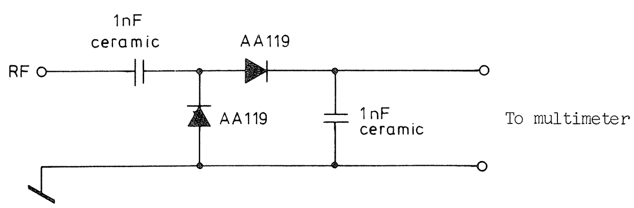
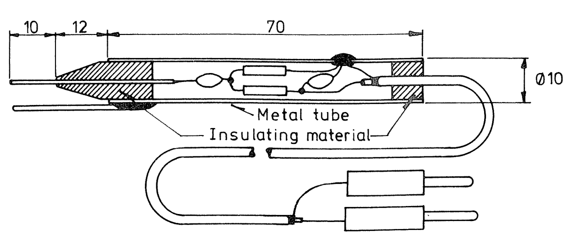
DIODE PROBE



LAYOUT OF THE PROBE



3. TROUBLE-SHOOTING

Trouble-shooting should only be performed by persons with sufficient technical knowledge, who have the necessary test equipment at their disposal, and who have carefully studied the operation principles and structure of the unit in question.

Start to find out whether the fault is somewhere in the antenna circuit, the power source, or in the short wave set.

For help with trouble-shooting in the short wave set there is a built-in test meter and test meter switch, located behind the air filter on the power supply.

When the fault has been located to a certain unit look up the PERFORMANCE CHECK list in the instruction book and make relevant performance check to incircle the fault. Then look up the CIRCUIT DESCRIPTION. This section contains schematic diagrams, description of the modules and pictures showing the location of the components. (ADJUSTMENT LOCATIONS).
Typical AC and DC voltages are indicated on the schematic diagrams.

No adjustment must take place unless the service workshop has the necessary test equipment to perform the ADJUSTMENT PROCEDURE in question.

After repair or replacement of the module look up the section NECESSARY ADJUSTMENTS AFTER REPAIR to see, whether the unit has to be adjusted or not.

Anyway the unit has to have a complete FUNCTION CHECK after repair.

TROUBLE-SHOOTING IN THE FREQUENCY GENERATING CIRCUIT.

LOOP 1

If the fault has been located to LOOP 1 the following hints can be used for trouble-shooting.

If there is no output signal from the VCO the fault has to be found in the VCO-UNIT.

If the output frequency from the VCO is lower than the low frequency limits or higher than the high frequency limits of the 2 MHz band in question, the phase locked loop 1 is out of lock. For VCO frequencies look-up the section PRINCIPLE OF OPERATION.

1. Check the LOOP 1 MIXER output signal on the terminal LOOP 1 OUT, module 1400.
   a. If there is no output signal, the failure is on LOOP 1 MIXER, HARMONIC FILTER UNIT or VCO-UNIT.
   b. If the output frequency is approx. 2 MHz or approx. 5 MHz, the VCO-UNIT, LOOP 1 MIXER and the HARMONIC FILTER UNIT are apparently ok.
2. Check that the frequency on the phase/frequency detector IC1006, pin 1 is 1 kHz.
3. Check the Loop 1 Programmable Divider, module 1000.
   a. If the frequency on the input terminal LOOP 1 IN is approx. 2 MHz and the frequency on the phase/frequency detector IC1006, pin 3 is lower than 1 kHz, the programmable divider is apparently ok.
   b. If the frequency on terminal LOOP 1 IN is approx. 5 MHz and the frequency on the phase/frequency detector IC1006, pin 3 is higher than 1 kHz, the programmable divider is apparently ok.
4. Check the phase/frequency detector IC1006.
   a. Measure 1.5V DC on PD 1 OUT on the DIVIDER-UNIT.
   b. If the input frequency on IC1006, pin 3 is higher than 1 kHz and the DC-voltage on PD 1 OUT is approx. 0.7V, the phase/frequency detector is apparently ok.
   c. If the input frequency on IC1006, pin 3 is lower than 1 kHz and the DC-voltage on PD 1 OUT is approx. 2.3V, the phase/frequency detector is apparently ok.
5. Check the integrator IC1102 on LOOP 1 FILTER & ±18V SUPPLY-UNIT, module 1100.
   a. If the DC voltage on PD 1 IN is approx. 0.7V and the DC voltage on output terminal of IC1102, pin 6 is approx. -4V, the integrator IC1102 is apparently ok.
   b. If the DC voltage on PD 1 IN is approx. 2.3V and the DC voltage on the output terminal of IC1102, pin 6 is approx. -17V, the integrator IC1102 is apparently ok.
6. If the failure has not been found yet the 1 kHz loop filter IC1101 and the selection circuit for choosing VCO- and HARMONIC FILTER must be checked.

TROUBLE-SHOOTING cont.:

LOOP 2

If the fault has been located to LOOP 2 the following hints can be used for trouble-shooting.

If there is no output signal from the VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER on terminal LO 2 OUT, the failure has to be found in the VCXO.

If the output frequency from the VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER on terminal LO 2 OUT is lower than 10.008 MHz or higher than 10.009 MHz, respectively 16.008 MHz and 16.009 MHz, the phase-locked loop 2 is out of lock.

1. Set the CLARIFIER to center position and check the output signal from VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER on terminal FIRST LOOP 2 OUT.
   a. If there is no output signal, the failure is in the 1st loop 2 mixer or that the 10 MHz and/or 16 MHz injection signal is missing.
   b. If the output frequency is slightly lower than 8 kHz or slightly higher than 9 kHz the VCXO, the 1st loop 2 mixer and the 10 MHz and/or 16 MHz injection signal are apparently ok.

2. Set the CLARIFIER to center position and check the output signal on TP10 on the CLARIFIER AND 2nd LOOP 2 MIXER, module 1700.
   a. If there is no output signal, the failure is on the CLARIFIER AND 2nd LOOP 2 MIXER circuit board.
   b. If the output frequency is lower than 1 kHz or higher than 2 kHz, then the CLARIFIER AND 2nd LOOP 2 MIXER is apparently ok.

3. Check that the frequency on the phase/frequency detector IC1013, pin 1 is 100 Hz.

4. Check the LOOP 2 Programmable Divider.
   a. If the frequency on terminal LOOP 2 IN, module 1000 is lower than 1 kHz and the frequency on the phase/frequency detector IC1013, pin 3 is lower than 100 Hz, the programmable divider is apparently ok.
   b. If the frequency on terminal LOOP 2 IN, module 1000 is higher than 2 kHz and the frequency on the phase/frequency detector IC1013, pin 3 is higher than 100 Hz, the programmable divider is apparently ok.

5. Check the phase/frequency detector IC1013.
   a. Measure 1.5V DC on terminal PD 2 OUT on the DIVIDER-UNIT.
   b. If the input frequency on IC1013, pin 3 is lower than 100 Hz and the DC voltage on terminal PD 2 OUT is approx. 0.7V, the phase/frequency detector is apparently ok.
   c. If the input frequency on IC1013, pin 3 is higher than 100 Hz and the DC voltage on terminal PD 2 OUT is approx. 2.3V, the phase/frequency detector is apparently ok.

6. Check the integrator IC1601b on VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER.
   a. If the DC voltage on TP9 is approx. 0.7V and the DC voltage on output terminal IC1601b, pin 1 is approx. 17V, the integrator is apparently ok.
   b. If the DC voltage on TP9 is approx. 2.3V and the DC voltage on the output terminal of IC1601b, pin 1 is approx. 1V, the integrator is apparently ok.

7. If the failure has not yet been found the summing amplifier IC1601a and the loop filter C1614 and R1616 must be checked.

4. PERFORMANCE CHECK FOR R1119 AND R1120

4.1.
DEFINITIONS USED - LOCATIONS.

4.1.1.
Definitions used refer to 5.1.

4.1.2.
Locations refer to ADJUSTMENT LOCATIONS.

4.2.
CHECK OF ±18V SUPPLY UNIT.

4.2.1.
Connect the voltmeter to TP2.

4.2.2.
Check that the voltage is +18V ±0.2V.

4.2.3.
Connect the voltmeter to TP1.

4.2.4.
Check that the voltage is -18V ±0.2V.

4.3.
CHECK OF +5V REGULATOR.

4.3.1.
Connect the voltmeter to pin 3 of IC2602.

4.3.2.
Check that the voltage is 5V ±0.2V.

4.3.3.
Connect the voltmeter to TP23.

4.3.4.
Check that the voltage is 5V ±0.2V.

4.4.
CHECK OF TCXO.
The receiver must be ON for at least 5 minutes.

4.4.1.
Connect the counter to TP3.

4.4.2.
Check that the frequency is 10,000,000 ±1 Hz.

4.5.
CHECK OF KEYBOARD.

4.5.1.
Press the KEYBOARD C and 1 simultaneously. The DISPLAY shows 111111.

4.5.2.
Repeat 4.5.1. for C and 2, 3 .... 9.

4.5.3.
Press the KEYBOARD C and 9 simultaneously, release C before 9. The DISPLAY shows 999999. Check that no noise is heard from the loudspeaker.

4.5.4.
Press the KEYBOARD 0. The DISPLAY shows 999990.

4.5.5.
Press the KEYBOARD decimal point. The DISPLAY shows 99990.0.

4.5.6.
Press the KEYBOARD 1. The DISPLAY shows 99990.1.

4.5.7.
Press the KEYBOARD C. The DISPLAY shows 000000.

4.5.8.
Press the KEYBOARD 99. The DISPLAY shows 000099.

4.5.9.
Press the NOISE GENERATOR button. The DISPLAY shows 00099.0. Check that noise is heard from the loudspeaker.

4.5.10.
Press the KEYBOARD decimal point. Check that noise is heard from the loudspeaker.

4.5.11.
Turn the CONTINUOUS TUNING until the DISPLAY shows 00150.0. Check that no noise is heard from the loudspeaker.

4.5.12.
Turn the CONTINUOUS TUNING until the DISPLAY shows 00149.0. Press the NOISE GENERATOR, check that noise is heard from the loudspeaker.

4.5.13.
Turn the CONTINUOUS TUNING until the DISPLAY shows 99999.9. Check that no noise is heard from the loudspeaker.

4.5.14.
Press the KEYBOARD 0 and turn the CONTINUOUS TUNING. The displayed figure must not change.

4.5.15.
Connect the passive probe to IC2020, pin 8 and to a scope.

4.5.16.
Turn the CONTINUOUS TUNING and check that the voltage on pin 8 is approx. 4V DC.

4.5.17.
Connect the passive probe to IC2020, pin 11 and to a scope.

4.5.18.
Turn the CONTINUOUS TUNING and check that the voltage on pin 11 is approx. OV DC.

4.5.19.
Set the MODE SWITCH to DISTRESS 2182 kHz.

4.5.20.
Check that the DISPLAY shows 2182 kHz.

4.6.
CHECK OF HARMONIC FILTERS.

4.6.1.
Set the MODE SWITCH to A3J.

4.6.2.
Connect the voltmeter to TP 24.

4.6.3.
Enter the following f_{RX} to the KEYBOARD and press the NOISE GENERATOR. f_{RX} = 1 - 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20 - 22 - 24 - 26 - 28 MHz.

4.6.4.
Check that the voltage is ≤3.5V DC for serial number below (21XXXX) and check that the voltage is ≤X.XV DC for serial numbers above (21XXXX).

4.7.
CHECK OF VCO.

4.7.1.
Set MODE SWITCH to A3J.

4.7.2.
Connect the voltmeter to TP11.

4.7.3.
Enter the following f_{RX} to the KEYBOARD and press the NOISE GENERATOR. f_{RX} = 1.999 - 3.999 - 5.999 - 7.999 - 9.999 - 11.999 - 13.999 - 15.999 - 17.999 - 19.999 - 21.999 - 23.999 - 25.999 - 27.999 - 29.999 kHz.

4.7.4.
Check that the voltage is 15V ±1V.

4.7.5.
Enter the following f_{RX} to the KEYBOARD and press the NOISE GENERATOR. f_{RX} = 0 - 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20 - 22 - 24 - 26 - 28 MHz.

4.7.6.
Check that the voltage is 7.0V ±1.5V.

4.8.
CHECK OF CLARIFIER.

4.8.1.
Set the MODE SWITCH to A3J.

4.8.2.
Set the CLARIFIER to center position.

4.8.3.
Press the CLEAR and the NOISE GENERATOR button.

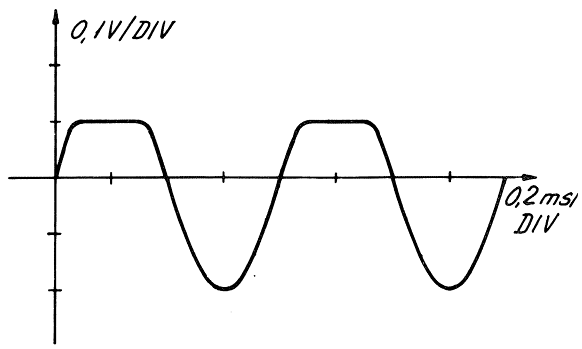
4.8.4.
Connect the counter to TP4.

4.8.5.
Check that the frequency is 9000 Hz ±10 Hz.

4.8.6.
Check that the CLARIFIER deviation range is more than ±150 Hz.

4.8.7.
Connect the passive probe to TP10 and to a scope.

4.8.8.
Check that the wave form is as shown below.



4.8.9.
Enter f_{RX} = 16 MHz to the KEYBOARD and press the NOISE GENERATOR.

4.8.10.
Check that the wave form is as shown in point 4.8.8.

4.9.
CHECK OF VCXO.

4.9.1.
Set the MODE SWITCH to A3J.

4.9.2.
Connect +5V to TP25.

4.9.3.
Press the CLEAR, the NOISE GENERATOR button and the DECIMAL POINT key.

4.9.4.
Connect the voltmeter to TP12.

4.9.5.
Check that the voltage is 14V ±1V.

4.9.6.
Turn the CONTINUOUS TUNING and check that a one decimal change in the 100 Hz display causes a 0.6V change in the meter reading.

4.9.7.
Check that the voltage is 8.5 ±1V when the 100 Hz display shows 9.

4.9.8.
Remove the +5V from TP25.

4.9.9.
Enter the following f_{RX} = 10000.0 kHz to the KEYBOARD, press the NOISE GENERATOR button.

4.9.10.
Turn the CLARIFIER extreme counter clockwise.

4.9.11.
Check that the voltage is 11V ±1V.

4.9.12.
Enter the following f_{RX} = 10000.9 kHz to the KEYBOARD, press the NOISE GENERATOR button.

4.9.13.
Turn the CLARIFIER extreme clockwise.

4.9.14.
Check that the voltage is 7V ±1V.

4.9.15.
Enter the following f_{RX} = 16000.0 kHz to the KEYBOARD, press the NOISE GENERATOR button.

4.9.16.
Turn the CLARIFIER extreme counter clockwise.

4.9.17.
Check that the voltage is 11V ±1V.

4.9.18.
Enter the following f_{RX} = 16000.9 kHz to the KEYBOARD and press the NOISE GENERATOR button.

4.9.19.
Turn the CLARIFIER extreme clockwise.

4.9.20.
Check that the voltage is 6V ±1V.

4.10.
CHECK OF 600 kHz GENERATOR.

4.10.1.
Set the MODE SWITCH to pos. A3J.

4.10.2.
Connect the diode probe to TP27.

4.10.3.
Check that the voltage is 1V ±0.2V.

4.10.4.
Check that the voltage disappears in the A3H MODE.

4.11.
CHECK OF BFO OSCILLATOR (R1120 only).

4.11.1.
Set the MODE SWITCH to pos. A1.

4.11.2.
Set the FILTER SWITCH to pos. NARROW.

4.11.3.
Set the BFO to center position.

4.11.4.
Connect the counter to TP26.

4.11.5.
Check that the frequency is 600,000 Hz ±10 Hz.

4.11.6.
Check that the BFO deviation range is at least 598.2 kHz to 600.5 kHz.

4.11.7.
Connect the diode probe to TP26.

4.11.8.
Check that the voltage os 1.3V ±0.2V.

4.12.
CHECK OF LOOP 1 STEP RESPONSE.

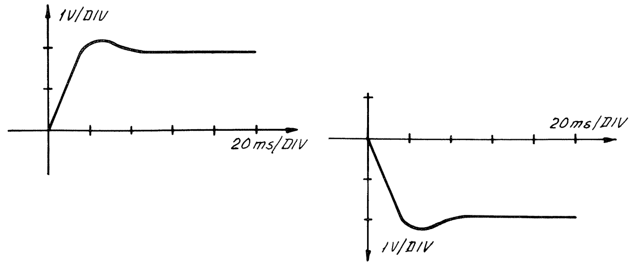
4.12.1.
Connect a 68 ohm resistor across HARMONIC FILTERS output.

4.12.2.
Set the MODE SWITCH to pos. A3J.

4.12.3.
Connect the passive probe and the scope to TP11.

4.12.4.
Enter f_{RX} = 22499.9 kHz to the KEYBOARD and press the NOISE GENERATOR button.

4.12.5.
Short-circuit the yellow wire on the 100 Hz data input at the divider board to chassis and check the step response on the scope. Typical wave form is shown next column.



4.12.6.
Remove the 68 ohm resistor from HARMONIC FILTER output.

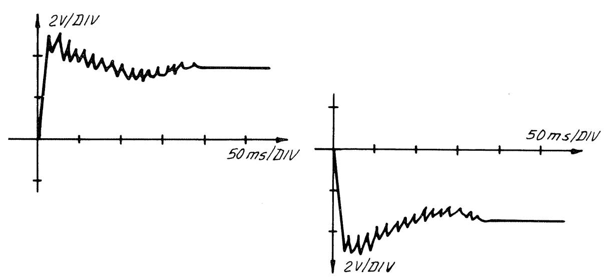
4.13.
CHECK OF LOOP 2 STEP RESPONSE.

4.13.1.
Set the MODE SWITCH to pos. A3J.

4.13.2.
Connect the passive probe and the scope to TP12.

4.13.3.
Enter f_{RX} = 22499.9 kHz to the KEYBOARD and press the NOISE GENERATOR button.

4.13.4.
Short-circuit the grey wire on the 100 Hz data input at the divider board to chassis and check the step response on the scope. Typical wave form is shown below.



4.14.
CHECK OF +18V SUPPLY VOLTAGE.

4.14.1.
Connect the voltmeter to TP13.

4.14.2.
Measure 18V ±1.5V DC.

4.15.
CHECK OF +17V SUPPLY VOLTAGE.

4.15.1.
Connect the voltmeter to TP14.

4.15.2.
Turn AF GAIN fully clockwise.

4.15.3.
Measure 17.3V ±1.5V DC.

4.16.
CHECK OF -45V PROTECTION CIRCUIT.

4.16.1.
Connect the voltmeter to TP15.

4.16.2.
Measure approx. -45V DC.

4.16.3.
Connect output from TX-exciter S1300 to antenna input terminals of the receiver.

4.16.4.
Use the following procedure at one frequency in each of the frequency bands 2182 kHz FIXED, 0.15 - 0.53 MHz, 0.53 - 1.6 MHz, 1.6 - 4.0 MHz, 4.0 - 7.0 MHz, 7.0 - 14.0 MHz, 14.0 - 30.0 MHz.

4.16.5.
Set S1300 to FULL POWER, DUPLEX, A3H and turn POWER LEVEL potentiometer fully clockwise,

4.16.6.
Set S1300 and the receiver on the same frequency.

4.16.7.
Connect the voltmeter to TP15.

4.16.8.
Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

4.16.9.
Key S1300 by means of the KEY plug and check that the voltage on TP15 increases.

4.17.
CHECK OF LOCAL OSCILLATOR INPUTS.

4.17.1.
Enter f_{RX} = 1.0 MHz to the KEYBOARD and press the NOISE GENERATOR button.

4.17.2.
Connect the diode probe to TP16.

4.17.3.
Measure 0.6V ±0.15V.

4.17.4.
Connect the diode probe to TP17.

4.17.5.
Measure 3.7V ±0.7V.

4.17.6.
Enter f_{RX} = 25.0 MHz to the KEYBOARD and press the NOISE GENERATOR button.

4.17.7.
Connect the diode probe to TP16.

4.17.8.
Measure 0.6V ±0.15V.

4.17.9.
Connect the diode probe to TP17.

4.17.10.
Measure 3.7V ±0.7V

4.17.11.
Set the MODE SWITCH to A3J.

4.17.12.
Turn RF GAIN fully counter clockwise.

4.17.13.
Connect diode probe to TP18.

4.17.14.
Measure 1.7V ±0.3V.

4.17.15.(R1120 only)
Set the MODE SWITCH to A1 and the FILTER SWITCH to NARROW.

4.17.16. (R1120 only)
Connect diode probe to TP18.

4.17.17. (R1120 only)
Measure 2.2V ±0.4V.

4.17.18. (R1119 fitted with AUX FILTER)
Set MODE SWITCH to AUX and repeat 4.17.13. and 4.17.14.

4.18.
CHECK OF LOOP 1 MIXER.

4.18.1.
Enter f_{RX} = 28.0 MHz to the KEYBOARD and press the NOISE GENERATOR button.

4.18.2.
Connect the diode probe to TP28.

4.18.3.
Measure 1.3V $\pm$0.5V.

4.18.4.
Enter f_{RX} = 29.999 MHz to the KEYBOARD and press the NOISE GENERATOR button.

4.18.5.
Connect the diode probe to TP28.

4.18.6.
Measure 1.3V $\pm$0.5V.

4.19.
CHECK OF DETECTOR LEVEL.

4.19.1.
Set MODE SWITCH to A3J.

4.19.2.
Enter f_{RX} = 25,000 kHz to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

4.19.3.
Set the signal generator to f_G = 25,001 kHz and V_G = 1 mV.

4.19.4.
Set AGC ON/OFF to TELEX.

4.19.5.
Turn RF GAIN fully clockwise.

4.19.6.
Connect voltmeter to HEADPHONES via a screened cable and adjust AF GAIN to the meter reads 0 dB in the 1V AC range.

4.19.7.
Set AGC ON/OFF to OFF.

4.19.8.
Adjust RF GAIN until meter reading is 0 dB in the 1V range.

4.19.9.
Short-circuit carrier reinjection to ground e.g. on the anode of D812.

4.19.10.
Connect the diode probe to TP18.

4.19.11.
Measure 550 mV $\pm$100 mV.

4.20.
CHECK OF AGC ATTACK - AND DECAY TIME.

4.20.1.
Enter f_{RX} = 3,900 kHz to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

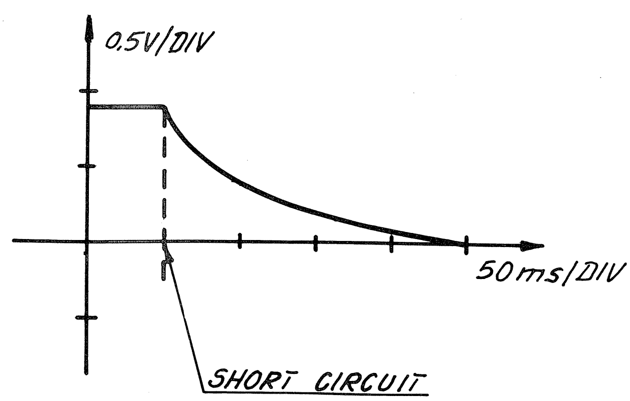
4.20.2.
Set the signal generator to f_G = 3,901 kHz and V_G = 1 mV.

4.20.3.
Set AGC ON/OFF to TELEX and turn RF GAIN fully clockwise.

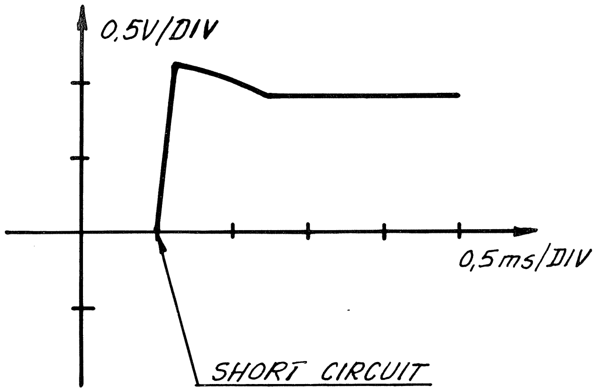
4.20.4.
Connect the passive probe to the scope and to TP19.

4.20.5.
By means of e.g. a trimming tool short-circuit inner and outer conductor on the coax cable leading from IF-FILTERS to IF-AMPLIFIER, DETECTOR and AGC.

4.20.6.
When short-circuiting as mentioned above, no signal will come to the AGC-circuit, which causes the AGC voltage to decay as shown below.

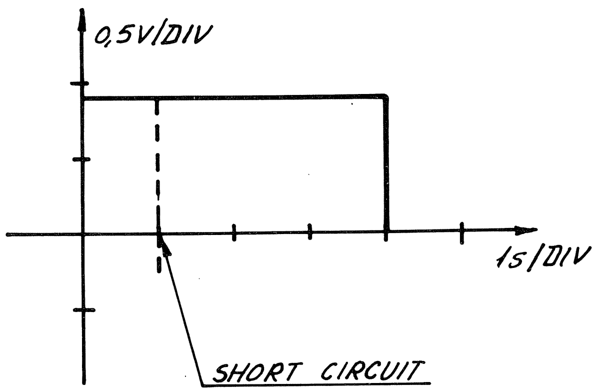


4.20.7.
Removing the short-circuit causes the AGC-voltage to "attack" as shown below.



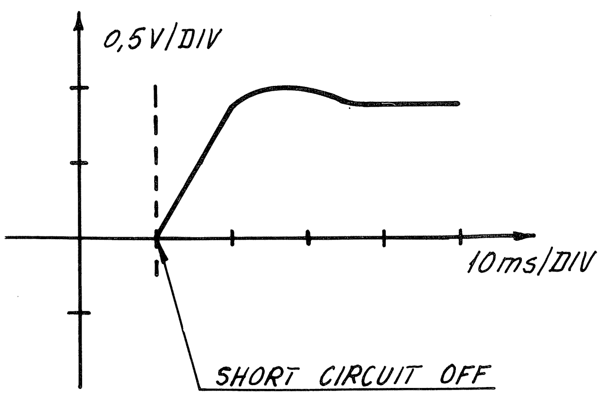
4.20.8.
Set AGC SWITCH to ON.

4.20.9.
Similar to 4.20.6. a decay will be seen.



4.20.10.
Set MODE SWITCH to A3H (AM).

4.20.11.
Similar to 4.20.7. an "attack" will be seen.



4.21.
CHECK OF 0 dBm AF OUTPUT.

4.21.1.
Enter f_{RX} = 6700 kHz to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

4.21.2.
Set the signal generator to 6701 kHz and V_G = 1 mV.

4.21.3.
Set the MODE SWITCH to A3J and the AGC SWITCH to ON.

4.21.4.
Connect voltmeter and 560 ohm resistor parallel to TP20 and TP21.

4.21.5.
Measure 0.9V ±0.2V AC.

4.21.6.
Set MODE SWITCH to A3H (AM).

4.21.7.
Modulate f_G to 30% with an 1 kHz tone.

4.21.8.
Measure 0.8V ±0.2V AC.

4.22.
CHECK OF AF AMPLIFIER.

4.22.1.
Perform 4.20.1. - 4.20.3.

4.22.2.
Solder a 4 ohm (min. 10 W) resistor to TP22 and connect the oscilloscope probe parallel to the resistor.

4.22.3.
Set the LOUDSPEAKER ON/OFF to OFF.

4.22.4.
Turn the AF GAIN fully clockwise and check that the AF voltage is at least 15Vpp.

4.22.5.
Reduce AF GAIN until AF voltage is 13 Vpp. Now a sinusoidal signal should be seen (distortion is typical around 3%)

4.23.
CHECK OF SIMPLEX RELAY.

4.23.1.
Connect an ohm-meter to the antenna input terminal and to ground.

4.23.2.
Connect TP30 to TP29 with a piece of wire and check that RE101 is activated.

4.23.3.
Check that the ohm-meter is showing a short-circuit.

4.24.
SENSITIVITY MEASUREMENT.

4.24.1.
Choose f_{RX} and f_G according to table 4.24.11.

4.24.2.
Choose V_G according to table 4.24.12. (and refer to the definitions given in section 5.1.).
NOTE: The sensitivity measured in A3J mode must be 14 dB better than the measured sensitivity in A3H mode.

4.24.3.
Enter f_{RX} to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

4.24.4.
Set the signal generator to the stated f_G and V_G.

4.24.5.
Set the MODE SWITCH to A3H.

4.24.6.
Connect the voltmeter to HEADPHONES via a screened cable and adjust AF GAIN to the meter reads 0 dB in the 1V range.

4.24.7.
Set AGC ON/OFF to OFF.

4.24.8.
Reduce RF GAIN until the meter reading again is 0 dB.

4.24.9.
Fine tune RF TUNE to max. meter reading and reduce the meter reading to 0 dB with RF GAIN.

4.24.10.
Remove the modulation from V_G and notice the drop on the meter reading.

In any case this must be at least 20 dB.

4.24.11.
Table 4.24.11.(next page).

MODE	f_{RX}	V_G (EMF) R_G = 50 ohm
A3H (AM)	100 kHz - 149 kHz	50 dB above 1 uV or 320 uV
	150 kHz - 529 kHz	30 dB above 1 uV or 32 uV
	530 kHz - 1.6 MHz	30 dB above 1 uV or 32 uV
	1.6 MHz - 4.0 MHz incl. 2182 kHz	30 dB above 1 uV or 32 uV
	4.0 MHz - 30.0 MHz	25 dB above 1 uV or 18 uV

4.24.12.
Table 4.24.12.

MODE	BAND	f_{RX} MHz	f_G MHz
A3H (AM)	100 kHz - 149 kHz	100 kHz 149 kHz	f_{RX} modulated 30% with 1 kHz
	150 kHz - 529 kHz	150 kHz 280 kHz 529 kHz	
	530 kHz - 1.599 kHz	530 kHz 920 kHz 1.599 kHz	
	1.6 MHz - 3.999 MHz	1.6 MHz 2.182 MHz 2.530 MHz 3.999 MHz	
	DISTRESS 2182 kHz	2.182 kHz Fixed	
	4.0 MHz -29.999 MHz	4.000 MHz 5.290 MHz 6.999 MHz 7.000 MHz 9.900 MHz 13.999 MHz 14.000 MHz 20.880 MHz 28.000 MHz	

5. ADJUSTMENT PROCEDURE FOR R1119 & R1120

NOTE: The trimming cores are factory sealed. Use normal cellulose thinner to break the seal.

5.1.
DEFINITIONS USED.

5.1.1.
f_{RX} = frequency to which the receiver is adjusted (clarifier in the middle of its operating range).

f_G = signal generator frequency, i.e. the input frequency to the receiver.

V_G = EMF of signal generator with proper generator impedance.

f_{AF} = Audio frequency to HEADPHONES and loudspeaker.

5.2.
THE FOLLOWING SEQUENCE WILL OFTEN BE USED:

5.2.1.
Connect the signal generator to the antenna input terminal on the receiver.

5.2.2.
Switch ON the receiver.

5.2.3.
Set LOUDSPEAKER ON/OFF to ON.

5.2.4.
Set AGC SWITCH to TELEX.

5.2.5.
Turn RF GAIN fully clockwise.

5.2.6.
Set AF GAIN to approx. middle position.

5.2.7.
Set the signal generator to the stated f_G and V_G.

5.2.8.
Enter the stated f_{RX} to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

5.3.
ADJUSTMENT OF ±18V SUPPLY UNIT.

5.3.1.
Connect the voltmeter to TP1.

5.3.2.
Adjust R1110 to -18V ±0.2V.

5.3.3.
Connect the voltmeter to TP2.

5.3.4.
Adjust R1114 to +18V ±0.2V.

5.4.
ADJUSTMENT OF TCXO.

5.4.1.
The receiver must be ON for at least 5 minutes.

5.4.2.
Connect the counter to TP3.

5.4.3.
Adjust R1013 to 10,000,000 Hz.

5.5.
ADJUSTMENT OF CLARIFIER.

5.5.1.
Set the CLARIFIER to its center position.

5.5.2.
Set the MODE SWITCH to position 2182 kHz.

5.5.3.
Connect the counter to TP4.

5.5.4.
Adjust L1701 to 9000 Hz.

5.6.
ADJUSTMENT OF 600 kHz GENERATOR.

5.6.1.
Set the MODE SWITCH to pos. A3J.

5.6.2.
Connect the diode probe to TP5.

5.6.3.
Adjust L1002 for max. deflection on the TP-meter (approx. 1V).

5.7.
ADJUSTMENT OF BFO (R1120 only).

5.7.1.
Set the CLARIFIER to its center position.

5.7.2.
Set the MODE SWITCH to A1.

5.7.3.
Set the FILTER SWITCH to WIDE.

5.7.4.
Connect the frequency counter to TP6.

5.7.5.
Remove the BFO button.

5.7.6.
Adjust the potentiometer to 600,000 Hz.

5.7.7.
Mount the button with dot to dot, to indicate the center position.

5.8.
ADJUSTMENT OF 16 MHz GENERATOR.

5.8.1.
Enter f_{RX} = 11111 kHz to the KEYBOARD, (press 1 and C simultaneously) and execute 5.2.

5.8.2.
Connect the diode probe to TP4.

5.8.3.
Adjust L1001 to max. voltage (approx. 2V).

5.9.
ADJUSTMENT OF IF AMPLIFIER DETECTOR.

5.9.1.
Connect the signal generator to TP7 through a 10 nF capacitor, execute 5.2.2., 5.2.3., 5.2.4., 5.2.5., 5.2.6., set the signal generator to f_G = 599 kHz and V_G = 10 mV.

5.9.2.
Set MODE SWITCH to A3J.

5.9.3.
Slowly reduce V_G until noise starts to dim the AF tone; then increase V_G 20 dB.

5.9.4.
Connect voltmeter to HEADPHONES via a screened cable, and adjust AF GAIN so that the meter reads 0 dB in the 1V AC range.

5.9.5.
Adjust L805 for max. meter reading and at the same time keep this on 0 dB by reducing AF GAIN.

5.9.6.
Set AGC SWITCH to OFF.

5.9.7.
Reduce RF GAIN until meter reading again is 0 dB in the 1V range.

5.9.8.
Adjust L801 for max. meter reading and at the same time keep this on 0 dB by reducing RF GAIN.

5.10.
ADJUSTMENT OF IF FILTER.

5.10.1.
Execute 5.2. with f_G = 600,0 kHz, $V_G = V_G$ max. & f_{RX} = 11111 kHz.

5.10.2.
Connect the signal generator to TP7 through a 10 nF capacitor.

5.10.3.
Set the MODE SWITCH to A3H.

5.10.4.
Turn the trimming cores in L602, L603, L604 and L605 fully counter clockwise.

5.10.5.
Connect the diode probe to TP8.

5.10.6.
Adjust L601 to max. meter deflection.

5.10.7.
Adjust L602 to min. meter deflection.

5.10.8.
Adjust L603 to max. meter deflection.

5.10.9.
Adjust L604 to min. meter deflection.

5.10.10.
Adjust L605 to max. meter deflection.

5.10.11.
Remove the diode probe.

5.10.12.
Set V_G to 10 mV and modulate the signal generator 30 per cent with 1 kHz.

5.10.13.
Execute 5.9.3., 5.9.4., 5.9.6. and 5.9.7.

5.10.14.
Modulate the signal generator with a tone generator (modulation depth 30 per cent). Vary the modulation frequency between 300 Hz and 2700 Hz and find the frequency giving max. meter deflection.

5.10.15.
Set meter reading to 0 dB by means of the RF GAIN.

5.10.16.
Adjust the modulation frequency between 300 Hz and 2700 Hz and check that the meter reading is not less than -6 dB in this range.

5.10.17.
Set the MODE SWITCH to A3J.

5.10.18.
Set the AGC SWITCH to TELEX.

5.10.19.
Set the f_G = 599,0 kHz and V_G = 10 mV unmodulated.

5.10.20.
Execute 5.9.3., 5.9.4., 5.9.6. and 5.9.7.

5.10.21.
Adjust L606 for max. meter reading and keep this on 0 dB by reducing RF GAIN.

5.10.22.
Connect the frequency counter parallel to the voltmeter, and thus measure the frequency of the detected AF signal, f_{AF}.

5.10.23.
Adjust f_G so that f_{AF} varies between 300 Hz and 2700 Hz and find the frequency that gives max. meter deflection.

5.10.24.
Set meter reading to 0 dB by means of the RF GAIN.

5.10.25.
Adjust f_G so that f_{AF} varies between 300 Hz and 2700 Hz and check the meter reading is not less than -6 dB in this frequency range.

THE FOLLOWING POINTS 5.10.26. to 5.10.44. IS ONLY TO BE EXECUTED FOR R1120.

AUX FILTER ADJUSTMENT EXECUTE 5.10.45. AND 5.10.52.

5.10.26.
Set f_G = 601 kHz and V_G = 10 mV unmodulated. Execute 5.10.2.

5.10.27.
Set MODE SWITCH to A1 and FILTER SWITCH to INTERMEDIATE.

5.10.28.
Set the AGC SWITCH to TELEX.

5.10.29.
Turn RF GAIN fully clockwise.

5.10.30.
Set the BFO to f_{AF} = 1000 Hz.

5.10.31.
Execute 5.9.3., 5.9.4., 5.9.6. and 5.9.7.

5.10.32.
Adjust L608 for max. meter reading and at the same time keep this on 0 dB by reducing RF GAIN.

5.10.33.
Adjust f_G between 599.0 kHz and 601.0 kHz, and simultaneously adjust the BFO so that f_{AF} is approx. 1000 Hz. Find the frequency f_G that gives max. meter reading and adjust this reading to 0 dB by means of RF GAIN.

5.10.34.
Adjust f_G between 599.0 kHz and 601.0 kHz and simultaneously adjust the BFO so that f_{AF} is approx. 1000 Hz. Check that the meter reading is above -6 dB in this frequency range.

5.10.35.
Set the FILTER SWITCH to NARROW and f_G = 600 kHz.

5.10.36.
Execute 5.2.4., 5.2.5., 5.2.6., 5.9.6., 5.9.7. and adjust the BFO for f_{AF} approx. 1000 Hz.

5.10.37.
Adjust L609 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.10.38.
Execute 5.10.33. and 5.10.34. by varying f_G in the frequency range 599.5 kHz to 600.5 kHz.

5.10.39.
Set the FILTER SWITCH to VERY NARROW and f_G = 600 kHz.

5.10.40.
Execute 5.2.4., 5.2.5., 5.9.6., 5.9.7. and adjust the BFO for f_{AF} approx. 1000 Hz.

5.10.41.
Adjust L610 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.10.42.
Execute 5.10.33. by varying f_G in the frequency range 599.8 kHz to 600.2 kHz.

5.10.43.
Set f_G to 599.8 kHz and 600.2 kHz respectively. Check that the meter reading is below -6 dB at both frequencies.

5.10.44.
Remove the signal generator from TP7, and remove the plug from HEADPHONES.

R1119 TELEX AND R1120
AUX FILTER ADJUSTMENT EXECUTE 5.10.45. and 5.10.52.

5.10.45.
Set MODE SWITCH to A1, FILTER SWITCH to AUX and the AGC SWITCH to TELEX.

5.10.46.
Set f_G = 1200 kHz - filter center frequency, V_G = 10 mV unmodulated and execute 5.10.2.
Filter center frequency appears from section TECHNICAL DATA.

5.10.47.
Turn RF GAIN fully clockwise and set the BFO to f_{AF} = 1000 Hz (except for LSB filter adjustment).

5.10.48.
Execute 5.9.3., 5.9.4., 5.9.6. and 5.9.7.

5.10.49.
Adjust L606 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.10.50.
Adjust f_G inside the min. pass band as illustrated in TECHNICAL DATA, find the frequency f_G that gives max. meter reading and adjust this reading to 0 dB by means of RF GAIN.

5.10.51.
Adjust f_G inside the min. pass band as illustrated in TECHNICAL DATA. Check that the meter reading is above -6 dB in this frequency range.

5.10.52.
Remove the signal generator from TP7 and remove the plug from HEADPHONES.

5.11.
ADJUSTMENT OF FIRST AND SECOND MIXER.

5.11.1.
Execute 5.2. f_{RX} = 3 kHz and V_G = 0.

5.11.2.
Set the MODE SWITCH to A3H.

5.11.3.
Adjust R506 for min. deflection on the TUNE meter.

5.11.4.
Connect the signal generator to TP9.

5.11.5.
For f_{RX} = 10000 kHz, f_G = 16608.5 kHz modulated 30 per cent, 1 kHz and V_G = 10 mV. Execute 5.2.4., 5.2.5., 5.2.7., 5.2.8., 5.9.3., 5.9.4., 5.9.6. and 5.9.7.

5.11.6.
Remove the innercores of the six coaxial cables to the input of first mixer.

5.11.7.
Adjust C512 and L503 for max. meter reading and keep this on 0 dB by reducing RF GAIN.

5.11.8.
Change f_{RX} to 20000 kHz and f_G to 10608.5 kHz and press the NOISE GENERATOR to unblock the receiver.

5.11.9.
Adjust C511 and L501 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.11.10.
Reconnect the six coaxial cables.

5.12.
MECHANICAL ADJUSTMENT OF THE FRONT-END TUNING MECHANISM.

5.12.1.
Loosen the mechanical adjusting ring mounted behind the front plate on the TUNE shaft.

5.12.2.
Mount a 3x8 mm screw DIN84 and a 6 mm spacing pipe in the square bar carrying the ferrite cores. Use the hole nearest the front plate.

5.12.3.
Turn the square bars extreme left.

5.12.4.
Turn the adjusting ring clockwise against the stop screw.

5.12.5.
Turn the TUNE shaft counter clockwise so much that you can tighten the adjusting ring through the hole in the division plate behind the front plate.

5.12.6.
Turn the TUNE shaft fully counter clockwise.

5.12.7.
Adjust the ferrite cores for L201 and L202 so that the ends of the cores are flushing with the division plate.

5.12.8.
Adjust the ferrite cores for L301, L302, L303, L304, L305, L306, L401, L402, L403, L404, L405 and L406 so that the ends of the cores are flushing in a distance of 2 mm from the division plate.

5.12.9.
Remove the screw and spacing pipe mounted in paragraph 5.12.2.

5.13.
ADJUSTMENT OF 14 - 30 MHz and 7 - 14 MHz BAND FILTERS.

5.13.1.
Set the MODE SWITCH to A3H and set C408 and C414 to middle position.

5.13.2.
Execute 5.2. with $f_G = f_{RX}$ = 28000 kHz V_G = 10 mV.

5.13.3.
Execute 5.9.4., 5.9.6. and 5.9.7.

5.13.4.
Adjust L401, L404 and L406 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.13.5.
Execute 5.2.8. for $f_{RX} = f_G$ = 14000 kHz.

5.13.6.
Adjust C408 and C414 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.13.7.
Execute 5.2.8. for $f_{RX} = f_G$ = 28000 kHz.

5.13.8.
Repeat 5.13.4., 5.13.5., 5.13.6. and 5.13.7. successively until there is no need for further adjustments.
NOTE: You must be very careful and adjust to exactly maximum.

5.13.9.
Remove the cable from HEADPHONE.

5.13.10.
Enter f_{RX} 14000 kHz to the KEYBOARD. Press the NOISE GENERATOR and turn RF TUNE over its full range. Check that there is only one maximum on the METER. If a maximum is obtained for the RF TUNE turned fully counter clockwise it is necessary to screw the ferrite cores to L401, L404 and L406 a bit farther out of the coil formers and then repeat 5.13.3. to 5.13.10.
If a maximum is obtained for the RF TUNE turned fully clockwise it is necessary to screw the ferrite cores L401, L404 and L406 a bit farther into the coil formers and then repeat 5.13.3. to 5.13.10.

5.13.11.
Lock the cores with the counter nut.

5.13.12.
Set C413 and C418 to middle position.

5.13.13.
Execute 5.2.4., 5.2.5., 5.2.7., 5.2.8., 5.9.4., 5.9.6. and 5.9.7. with $f_{RX} = f_G$ = 10000 kHz and V_G = 10 mV modulated 30 per cent with 1 kHz.

5.13.14.
Adjust L402, L403 and L405 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.13.15.
Execute 5.2.8. for $f_{RX} = f_G$ = 7000 kHz.

5.13.16.
Adjust C413 and C418 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.13.17.
Execute 5.2.8. for $f_{RX} = f_G$ = 10000 kHz.

5.13.18.
Repeat 5.13.14., 5.13.15., 5.13.16. and 5.13.17. successively until there is no need for further adjustments.
NOTE: You must be very careful and adjust to exactly maximum.

5.13.19.
Execute 5.2.8. for $f_{RX} = f_G$ = 13999 kHz.

5.13.20.
Adjust C413 and C418 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.
NOTE: You must be very careful and adjust to exactly maximum.

5.13.21.
Lock the cores with the counter nuts.

5.13.22.
Perform a SENSITIVITY MEASUREMENT (4.24.) in the frequency band of current interest and remove the cable from HEADPHONES.

5.14.
ADJUSTMENT OF 4 - 7 MHz and 1.6 - 4 MHz.

5.14.1.
Set the MODE SWITCH to A3H.

5.14.2.
Set C312 and C318 to middle position.

5.14.3.
Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_{RX} = f_G$ = 6999 kHz, V_G = 10 mV modulated 30 per cent with 1 kHz.

5.14.4.
Adjust L302, L304 and L305 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.14.5.
Execute 5.2.8. for $f_{RX} = f_G$ = 4000 kHz.

5.14.6.
Adjust C312 and C318 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.14.7.
Execute 5.2.8. for $f_{RX} = f_G$ = 6999 kHz.

5.14.8.
Repeat 5.14.4., 5.14.5., 5.14.6. and 5.14.7. successively until there is no need for further adjustment.
NOTE: You must be very careful and adjust to exactly maximum.

5.14.9.
Set C301, C313 and C319 to middle position.

5.14.10.
Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_{RX} = f_G$ = 3900 kHz, V_G = 10 mV modulated 30 per cent with 1 kHz.

5.14.11.
Adjust L301, L303 and L306 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.14.12.
Execute 5.2.8. for $f_{RX} = f_G$ = 1600 kHz.

5.14.13.
Adjust C301, C313 and C319 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.14.14.
Execute 5.2.8. for $f_G = f_{RX}$ = 3900 kHz.

5.14.15.
Repeat 5.14.11., 5.14.12., 5.14.13. and 5.14.14. successively until there is no need for further adjustment.
NOTE: You must be very careful and adjust to exactly maximum.

5.14.16.
Lock the cores with the counter nut.

5.14.17.
Execute 5.13.22.

5.15.
ADJUSTMENT OF 530 - 1600 kHz, 150 - 530 kHz AND 2182 kHz.

5.15.1.
Set the MODE SWITCH to A3H.

5.15.2.
Set C210 to minimum capacity.

5.15.3.
Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_G = f_{RX}$ = 560 kHz and V_G = 10 mV modulated 30 per cent with 1 kHz.

5.14.4.
$f_G = f_{RX}$ = 530 kHz push the NOISE GENERATOR button, but do not touch the RF TUNE.

5.15.5.
Adjust C210 to max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.15.6.
Execute 5.2.8. with $f_G = f_{RX}$ = 1599 kHz. If no METER maximum is obtainable it is necessary to screw the ferrite core to L202 a bit farther out of the coil formers and then repeat 5.15.2. to 5.15.6.

5.15.7.
Set C209 to minimum capacity.

5.15.8.
Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_G = f_{RX}$ = 160 kHz and V_G = 10 mV modulated 30 per cent with 1 kHz.

5.15.9.
$f_G = f_{RX}$ = 150 kHz push the NOISE GENERATOR button, but do not touch the RF TUNE.

5.15.10.
Adjust C209 to max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.15.11.
Execute 5.2.8. with $f_G = f_{RX}$ = 529 kHz. If no METER maximum is obtainable it is necessary to screw the ferrite core to L201 a bit farther out of the coil formers and then repeat 5.15.7. to 5.15.11.

5.15.12.
Lock the cores with the counter nut.

5.15.13.
Set MODE SWITCH to DISTRESS 2182 kHz.

5.15.14.
Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_G = f_{RX}$ = 2182 kHz and V_G = 10 mV modulated 30 per cent with 1 kHz.

5.15.15.
Adjust the screw core of L209 to be in level with the top of the coil former.

5.15.16.
Adjust C219 and L205 to max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.15.17.
Execute 5.13.22.

5.16.
ADJUSTMENT OF WHEEL I AND II.

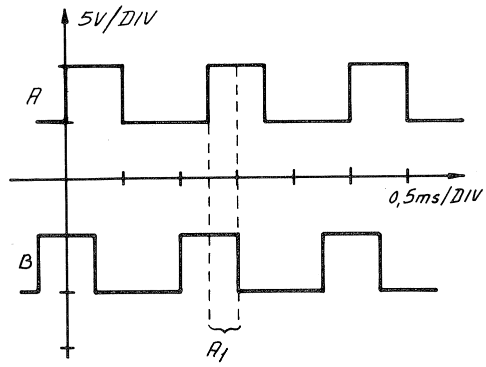
5.16.1.
Switch the receiver ON.

5.16.2.
Push the NOISE GENERATOR button and the decimal point key.

5.16.3.
Connect a passive probe to IC2020 pin 8 and to channel A on an oscilloscope.
Connect a passive probe to IC2020 pin 11 and to channel B on an oscilloscope.
Let the oscilloscope be positive triggered by channel A.

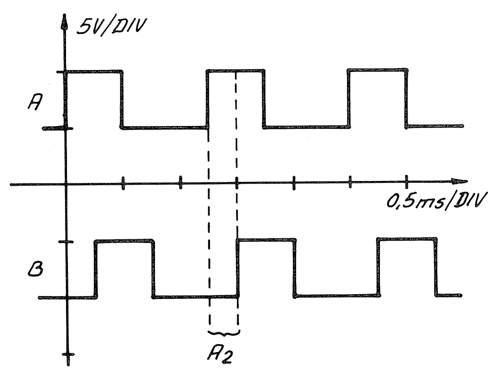
5.16.4.
Turn the CONTINUOUS TUNING clockwise.

5.16.5.
Check that the waveforms are as shown below.



5.16.6.
Turn the CONTINUOUS TUNING counter clockwise.

5.16.7.
Check that the waveforms are as shown below.



5.16.8.
By adjusting the P.C.boards WHEEL I AND WHEEL II the sections marked A1 and A2 should be made equal.
NOTE: The adjustment should be done before remounting the front panel.

6. NECESSARY ADJUSTMENTS AFTER REPAIR FOR R1119 AND R1120

In the following paragraphs reference is made to the ADJUSTMENT PROCEDURE FOR R1119 AND R1120 and PERFORMANCE CHECK FOR R1119 AND R1120.
Definition used: refer to 5.1.
Locations: refer to ADJUSTMENT LOCATIONS.

6.1.
Module No. 100: AERIAL SWITCH.

6.1.1.
Execute 4.23.

6.1.2.
Enter the following f_{RX} to the KEYBOARD and press the NOISE GENERATOR button.
f_{RX} = 240 kHz - 800 kHz - 2182 kHz - 6.0 MHz - 10.0 MHz - 20.0 MHz.

6.1.3.
When pressing the NOISE GENERATOR, adjust the RF TUNE to max. deflection on the METER.

6.1.4.
Check that max. METER deflection is at least 1.5.

6.1.5.
Set the MODE SWITCH to DISTRESS 2182 kHz.

6.1.6.
Press the NOISE GENERATOR and check that the deflection on the METER is at least 1.5.

6.2.
Module No. 200: BANDFILTER 0.01-1.6 MHz.

6.2.1.
Execute 4.15., 5.15. and 4.24. for the coil section in question.

6.3.
Module No. 300: BANDFILTER 1.6-4.0 MHz and 4.0 - 7.0 MHz.

6.3.1.
Execute 4.15., 5.14. and 4.24. for the coil section in question.

6.4.
Module No. 400: BANDFILTER 7.0-14.0 MHz and 14.0-30.0 MHz.

6.4.1.
Execute 4.15., 5.13. and 4.24. for the coil section in question.

6.5.
Module No. 500: 1st and 2nd MIXER.

6.5.1.
Execute 5.11. and 4.17.

6.5.2.
Enter f_{RX} = 2.182 MHz to the KEYBOARD and press the NOISE GENERATOR button.

6.5.3.
Check that the deflection on the METER is at least 1.5.

6.6.
Module No. 600 or 700: IF FILTER.

6.6.1.
Execute 5.10., 6.5.2. and 6.5.3.

6.7.
Module No. 800: IF AMPLIFIER, AGC AND DETECTOR.

6.7.1.
Execute 5.9., 4.19., 4.20., 6.5.2. and 6.5.3.

6.8.
Module No. 900: AUDIO AMPLIFIER.

6.8.1.
Execute 4.21. and 4.22.

6.9.
Module No. 1000: DIVIDER-UNIT.

6.9.1.
Execute 4.3., 5.4., 5.6., 5.8., 4.12., 4.13. and 4.24.

6.10.
Module No. 1100: LOOP 1 FILTER AND ±18V SUPPLY-UNIT.

6.10.1.
Execute 5.3., 4.6. with f_{RX} = 10.0 MHz, 4.12. and 4.18.

6.11.
Module No. 1200: VCO-UNIT.

6.11.1.
Execute 4.7., 4.12. and 4.17.

6.12.
Module No. 1300: HARMONIC FILTER-UNIT.

6.12.1.
Execute 4.6., 4.12.

6.13.
Module No. 1400: LOOP 1. MIXER-UNIT.

6.13.1.
Execute 4.7. and 4.12.

6.14.
Module No. 1500: VCO BUFFER-UNIT.

6.14.1.
Execute 4.17. with the exception of point 2, 3, 7 and 8.

6.15.
Module No. 1600: VCXO, 1st LOOP 2 MIXER AND LOOP 2 FILTER.

6.15.1.
Execute 4.8.1. to 4.8.5.(both incl.), 4.9., 4.13. and 6.17. with the exception of point 4, 5, 9 and 10.

6.16.
Module No. 1700: CLARIFIER AND 2nd LOOP 2 MIXER.

6.16.1.
Execute 5.5. and 4.8.

6.17.
Module No. 1800: BFO-UNIT.

6.17.1.
Execute 5.7. and 4.11.

6.18.
Module No. 1900: BAND CONTROL.

6.18.1.
Press the KEYBOARD CLEAR, the NOISE GENERATOR button and the KEYBOARD DECIMAL POINT.

6.18.2.
Turn the CONTINUOUS TUNING clockwise.

6.18.3.
Check that noise is heard from the loudspeaker until the DISPLAY shows 150.0 kHz then the receiver is blocked.

6.18.4.
Press the NOISE GENERATOR button. Check that noise is heard from the loudspeaker.

6.18.5.
Turn the CONTINUOUS TUNING clockwise.

6.18.6.
Check that noise is heard from the loudspeaker until the DISPLAY shows 530.0 kHz then the receiver is blocked.

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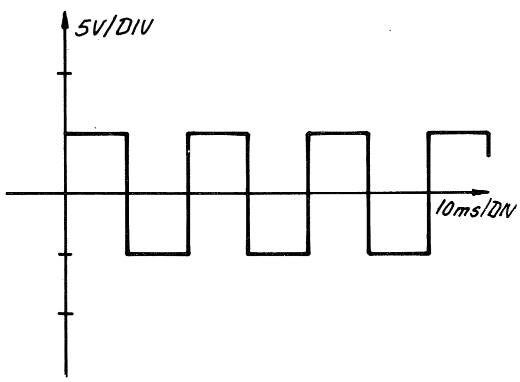
6.18.7.
Repeat 4.18.4. to 4.18.6. and check that the receiver has the following blocking frequencies 1.6 MHz, 4.0 MHz, 7.0 MHz, 14.0 MHz and 30.0 MHz.

6.18.8.
Execute 4.24.

6.19.
Module No. 2000: KEYBOARD CONTROL.

6.19.1.
Connect the passive probe to TP29 and to the scope.

6.19.2.
Check that the wave form seen on the scope is as shown below.



6.19.3.
Execute 4.3.3., 4.3.4. and 4.5.

6.19.4.
Execute 6.18.1. - 6.18.7. (both incl.).

6.19.5.
Enter f_{RX} = 1111.1 kHz to the KEYBOARD.

6.19.6.
Connect the voltmeter to the wires of 100 Hz, 1 kHz, 10 kHz, 100 kHz and 1 MHz data input terminals at the divider-unit.

6.19.7.
Check that the voltmeter shows 5V DC on the brown wires and the brown/black wire and that the voltmeter shows OV DC on the other wires.

6.19.8.
Enter f_{RX} = 222.2 kHz to the KEYBOARD.

6.19.9.
Repeat 6.19.6.

6.19.10.
Check that the voltmeter shows 5V DC on the red wires and that the voltmeter shows OV DC on the other wires.

6.19.11.
Enter f_{RX} = 444.4 kHz to the KEYBOARD.

6.19.12.
Repeat 6.19.6.

6.19.13.
Check that the voltmeter shows 5V DC on the yellow wires and that the voltmeter shows OV DC on the other wires.

6.19.14.
Enter f_{RX} = 888.8 kHz to the KEYBOARD.

6.19.15.
Repeat 6.19.6.

6.19.16.
Check that the voltmeter shows 5V DC on the grey wires and that the voltmeter shows OV DC on the other wires.

6.20.
Module No. 2100: KEYBOARD.

6.20.1.
Execute 4.5.1. - 4.5.5. (both incl.).

6.21.
Module No. 2200: DISPLAY.

6.21.1.
Execute 6.19.1. and 6.19.2.

6.21.2.
Execute 4.5.1. - 4.5.5. (both incl.).

6.22.
Module No. 2300 and 2400: WHEEL I AND II.

6.22.1.
Execute 5.16., 4.5.14. - 4.5.18. (both incl.).

6.23.
Module No. 2500: INPUT FILTER.

6.23.1.
Execute 4.14., 4.15., 4.16.1., 4.16.2., 4.21.1. - 4.21.5. (both incl.) and 4.23.

6.24.
Module No. 2600: CLARIFIER CAPACITOR.

6.24.1.
Adjust knob for symmetrical variation range.

6.24.2.
Execute 5.5. and 4.8.4. - 4.8.6. (both incl.).

7. FUNCTION CHECK R1119 AND R1120

NECESSARY TEST EQUIPMENT:

POWER SUPPLY E.g. SAILOR N1405

MULTIMETER E.g. PHILIPS PM2503

If a signal generator is by hand this can be used.

SIGNAL GENERATOR E.g. PHILIPS PM5326

INITIAL SETTINGS:

1.
Set the CLARIFIER to center position.

2.
Set the AGC SWITCH to TELEX MODE.

3.
Turn the RF GAIN fully clockwise.

4.
Turn the AF GAIN fully counter clockwise.

5.
Set the MODE SWITCH to DISTRESS 2182 kHz.

6.
Set the LOUDSPEAKER ON/OFF to ON.

7.
Set the BFO to center position (R1120 only).

8.
Set the FILTER SWITCH to WIDE (R1120 only).

9.
Connect the receiver to the power supply (N1405).

10.
Connect the antenna input terminals to the antenna or to the signal generator.

FUNCTION CHECK:

7.1.
Turn AF GAIN to suitable volume.

7.2.
Check that the LOUDSPEAKER ON/OFF is functional.

7.3.
Connect headphones to HEADPHONES socket.

7.4.
Check that the loudspeaker now is off and the noise is heard in the headphones.
Remove the headphones.

7.5.
Turn RF GAIN fully counter clockwise.

7.6.
Check that the noise in the loudspeaker disappears and the RF METER reading is now approx. 5. Turn RF GAIN fully clockwise.

7.7.
Press the NOISE GENERATOR button.

7.8.
Check that the RF METER reading is at least 1.5.

7.9.
Check that the DISPLAY shows 2182 kHz.

7.10.
Set the MODE SWITCH to A3J.

7.11.
Press the KEYBOARD C. The DISPLAY shows 000000.

7.12.
Check that no noise is heard from the loudspeaker.

7.13.
Press the KEYBOARD C and 1 simultaneously. The DISPLAY shows 111111.

7.14.
Repeat 7.13. for C and 2, 3 ---- 9,0.

7.15.
Press the KEYBOARD C and the NOISE GENERATOR button. The DISPLAY shows 00000.0.
Check that noise is heard from the loudspeaker.

7.16.
Press the KEYBOARD decimal point. The DISPLAY shows 00000.0.

7.17.
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00150.0 kHz.
Check that no noise is heard from the loudspeaker.

7.18.
Press the KEYBOARD 0 and turn the CONTINUOUS TUNING. The displayed figure must not change.

7.19.
Press the KEYBOARD C and the NOISE GENERATOR button.

7.20.
Turn the CLARIFIER extreme clockwise and check that the beat note heard from the loudspeaker change.

7.21.
Repeat 7.20. within the CLARIFIER extreme counter clockwise.

7.22. (R1120 only)
Set the MODE SWITCH to A1.

7.23. (R1120 only)
Adjust the BFO until no beat note is heard from the loudspeaker.
Check that the BFO now is in its counter position.

7.24. (R1120 only)
Turn the BFO extreme clockwise.
Check that a beat note is heard from the loudspeaker.

7.25. (R1120 only)
Repeat 7.24. with the BFO extreme counter clockwise.

7.26. (R1120 only)
Set the FILTER SWITCH to VERY NARROW.

7.27. (R1120 only)
Set the CLARIFIER to center position.

7.28. (R1120 only)
Turn the BFO to center position and then clockwise until a proper beat note is heard from the loudspeaker.

7.30. (R1120 only)
Connect the voltmeter to HEADPHONES via a screened cable and adjust AF GAIN to the meter reads 0 dB in the 0.3V range.

7.31. (R1120 only)
Set the AGC ON/OFF to OFF.

7.32. (R1120 only)
Reduce RF GAIN until the meter reading is 0 dB again.

7.33. (R1120 only)
Press the KEYBOARD decimal point.

7.34. (R1120 only)
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00000.4 kHz.

7.35. (R1120 only)
Check that the meter reading is $\leq$-10 dB.

7.36. (R1120 only)
Set the FILTER SWITCH to NARROW.

7.37. (R1120 only)
Adjust the RF GAIN until the meter reading is 0 dB again.

7.38. (R1120 only)
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00001.0 kHz.

7.39. (R1120 only)
Check that the meter reading is $\leq$-10 dB.

7.40. (R1120 only)
Set the FILTER SWITCH to INTERMEDIATE.

7.41. (R1120 only)
Repeat 7.37.

7.42. (R1120 only)
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00001.5 kHz.

7.43. (R1120 only)
Check that the meter reading is ≦ -10 dB.

7.44. (R1120 only)
Set the FILTER SWITCH to WIDE.

7.45. (R1120 only)
Repeat 7.37.

7.46. (R1120 only)
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00003.0 kHz.

7.47. (R1120 only)
Check that the meter reading is ≦ -10 dB.

7.48. (R1120 only)
Set the FILTER SWITCH to AUX.

7.49. (R1120 only)
If an AUX FILTER is fitted find a radio station and check that the filter bandwidth is correct.

7.50. (R1120 only)
Set the FILTER SWITCH to WIDE.

7.51. (R1120 only)
Set the MODE SWITCH to A2.
Set the AGC SWITCH to TELEX.
Turn the RF GAIN fully clockwise.

7.52. (R1120 only)
Press the KEYBOARD C and the NOISE GENERATOR button.

7.53. (R1120 only)
Press the KEYBOARD decimal point.
Turn the CONTINUOUS TUNING clockwise.

7.54. (R1120 only)
Check that the RF METER deviation begins to drop when the DISPLAY shows 00003.0 kHz and that the RF METER is approx. 0 when the DISPLAY shows 00010.0 kHz.

7.55. (R1120 only)
Set the MODE SWITCH to A3J.

7.56. (R1120 only)
Disconnect the meter from HEADPHONES.

7.57. (R1120 only)
Press the KEYBOARD C and the NOISE GENERATOR button.

7.58. (R1120 only)
Turn the CLARIFIER extreme counter clockwise.

7.59.
Press the KEYBOARD decimal point.

7.60.
Check that the RF METER shows approx. 3.

7.61.
Turn the CONTINUOUS TUNING until the DISPLAY shows 00000.5 kHz.

7.62.
Check that the RF METER shows approx. 0.

7.63.
Set the MODE SWITCH to A3H (AM).

7.64.
Check that the RF METER shows approx. 3.

7.65.
Turn the CONTINUOUS TUNING clockwise.

7.66.
Check that the RF METER deviation begins to drop when the DISPLAY shows 00003.0 kHz and that the RF METER is approx. 0 when the DISPLAY shows 00010.0 kHz.

7.67. (R1119 only)
Set the MODE SWITCH to TELEX.

7.68. (R1119 only)
If an AUX filter is fitted. Check the filter bandwidth by means of a suitable broadcast station or the signal generator.

7.69. (R1119 only)
Set the MODE SWITCH to A3H (AM).

7.70.
Set the MODE SWITCH to A3J (SSB).

7.71.
Set the AGC SWITCH to ON.

7.72.
Press the KEYBOARD C and the NOISE GENERATOR button.

7.73.
Press the KEYBOARD decimal point.

7.74.
Turn the CLARIFIER extreme counter clockwise.

7.75.
Notice the position of the RF METER pointer.

7.76.
Turn the CONTINUOUS TUNING counter clockwise.

7.77.
Check that it takes approx. 3 secs. after turning the CONTINUOUS TUNING until the pointer of the RF METER is approx. 0.

7.78.
If a signal generator is by hand, set $f_G = f_{RX}$, V_G = 1 mV modulated 30 per cent with 1 kHz.

7.79.
If no signal generator is by hand, connect a DC voltmeter to TP11.

7.80.
Set the MODE SWITCH to A3H (AM).

7.81.
Enter f_{RX} = 1.999 MHz to the KEY-BOARD.

7.82.
Press the NOISE GENERATOR and adjust the RF TUNE to max. deflection on the RF METER and check that the RF METER deflection is at least 1.5.

7.83.
Check that a 1000 Hz tone is heard from the loudspeaker if a signal generator is used.

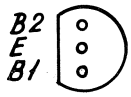
7.84.
If no signal generator is used check that the voltmeter measures 15V ± 1.5V DC.

7.85.
Repeat 7.82. - 7.84. for $f_{RX} = f_G$ = 3.999 - 5.999 - 7.999 - 9.999 - 11.999 - 13.999 - 15.999 - 17.999 - 19.999 - 21.999 - 23.999 - 25.999 - 27.999 - 29.999 MHz.

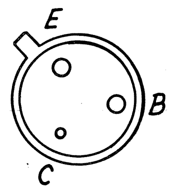
7.86.
Turn the DIMMER extreme clockwise.

7.87.
Check that the DISPLAY and the RF METER is illuminated.

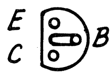
BOTTOM VIEW



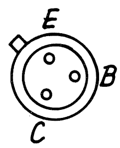
2N 4871



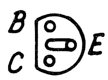
BFW 17A



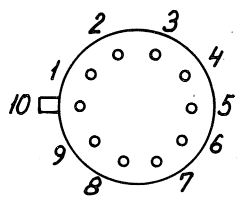
BC 328 - 25
BC 338
BC 547
BC 548 A, B, C
BC 556 A
BC 558 A, B, C



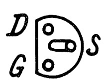
2N 2368



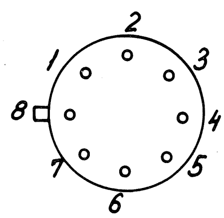
BF 199
BF 494



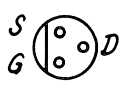
CA 3019



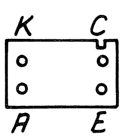
BF 256 A, B, C



LM 3053

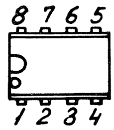


E 310

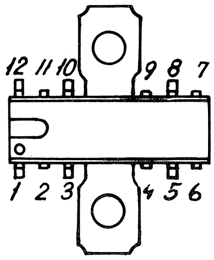


OPB 825

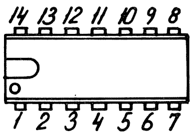
TOP WIEW



LM 308 N
MC 1455 P1
MC 1458 C

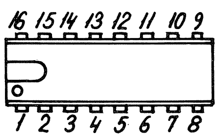


TCA 940

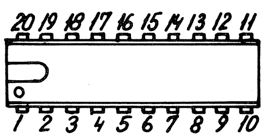


LM 324 N
LM 3086
MC 4044 P
MC 14011 B CP
MC 14077 B CP
MC 14081 B CP
SN 7406 N
SN 7407 N
SN 74010N
SN 74072N

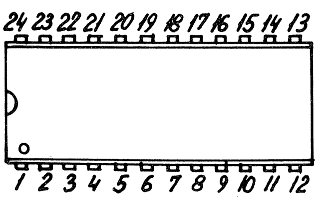
SN 74 LS 00 N
SN 74 LS 04 N
SN 74 LS 08 N
SN 74 LS 11 N
SN 74 LS 20 N
SN 74 LS 27N
SN 74 LS 32N
SN 74 LS 74N
SN 74 LS 86 N
SN 74 LS 132 N
SN 74 LS 290N



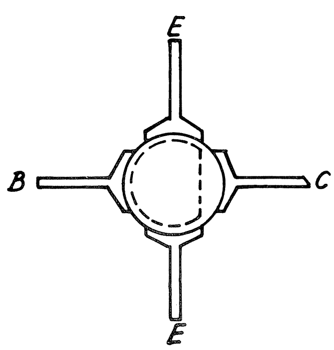
CD 4056 B
MC 14519 B CP
MC 14530 B CP
SN 74 LS 42N
SN 74 LS 109N
SN 74 LS 123N
SN 74 LS 138N
SN 74 LS 148N
SN 74 LS 192N
SN 74LS 390N
SN 74 LS 668N



6308-1

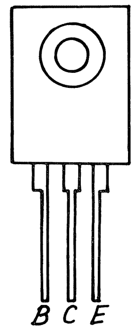


MC 14515 BCP

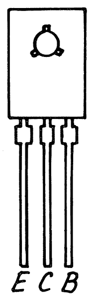


2N 5641

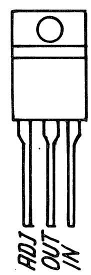
FRONT WIEW



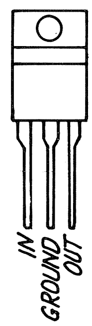
BD 577



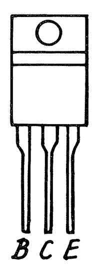
BD 138
BD 139



LM 317 T

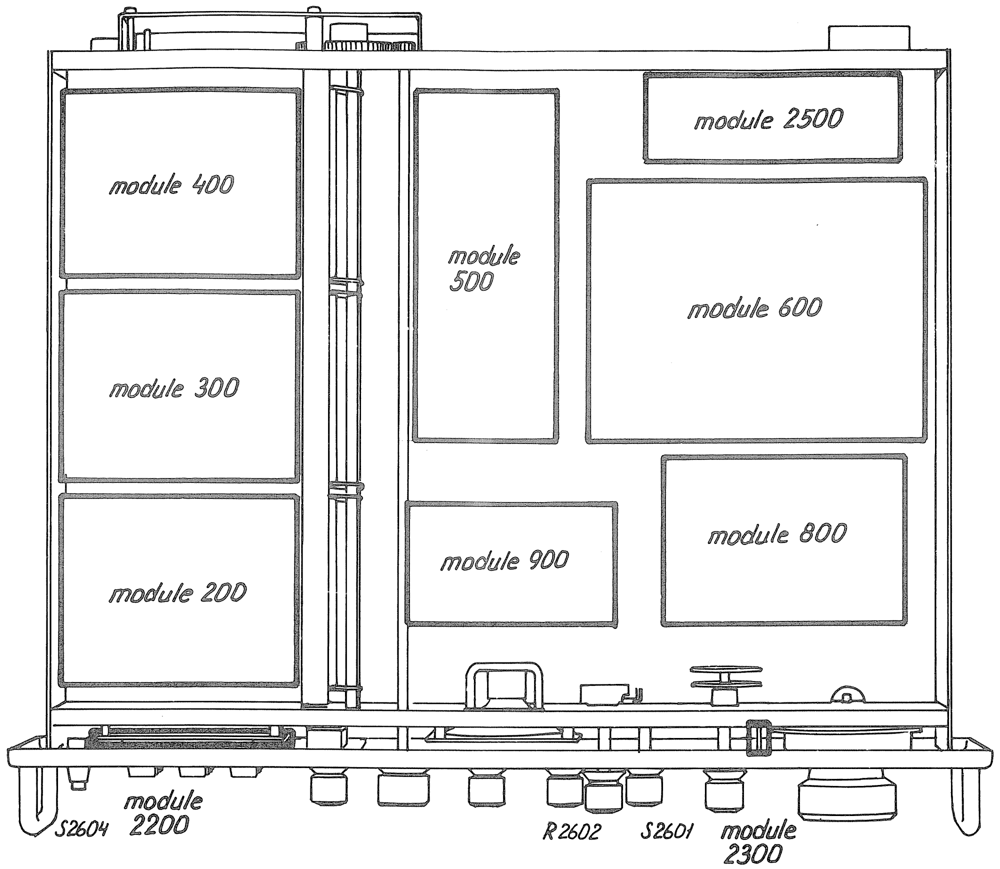


MC 7805 CT
MC 7818 CT

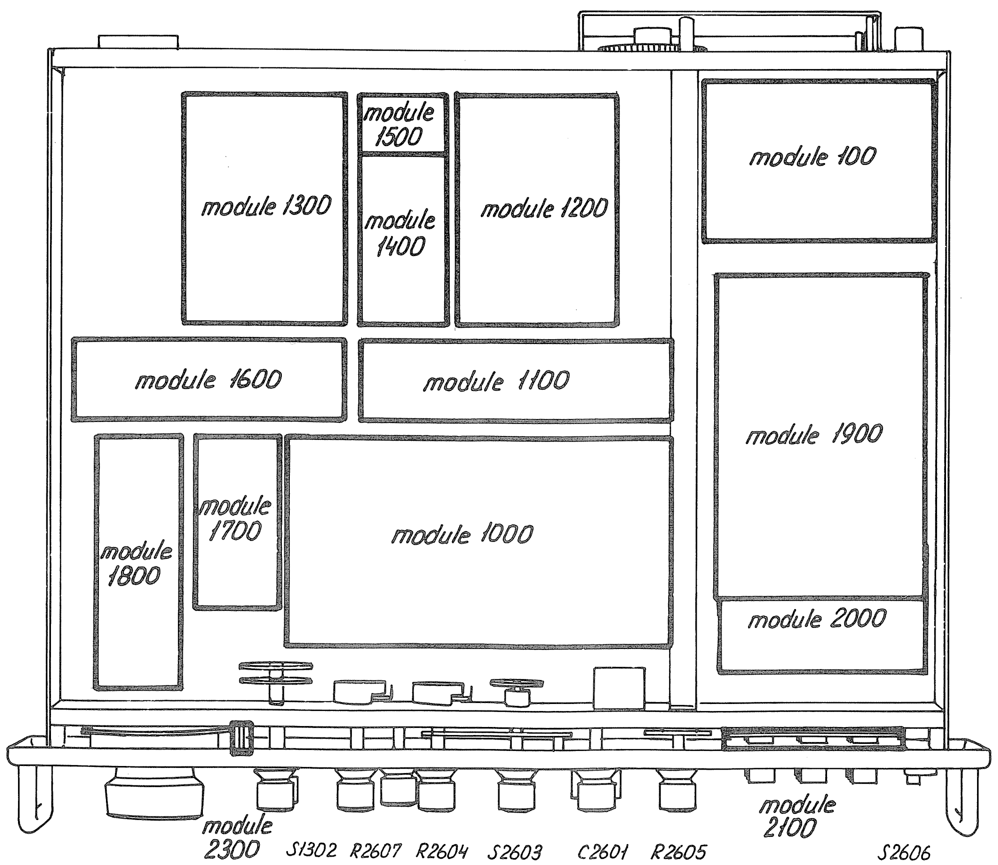


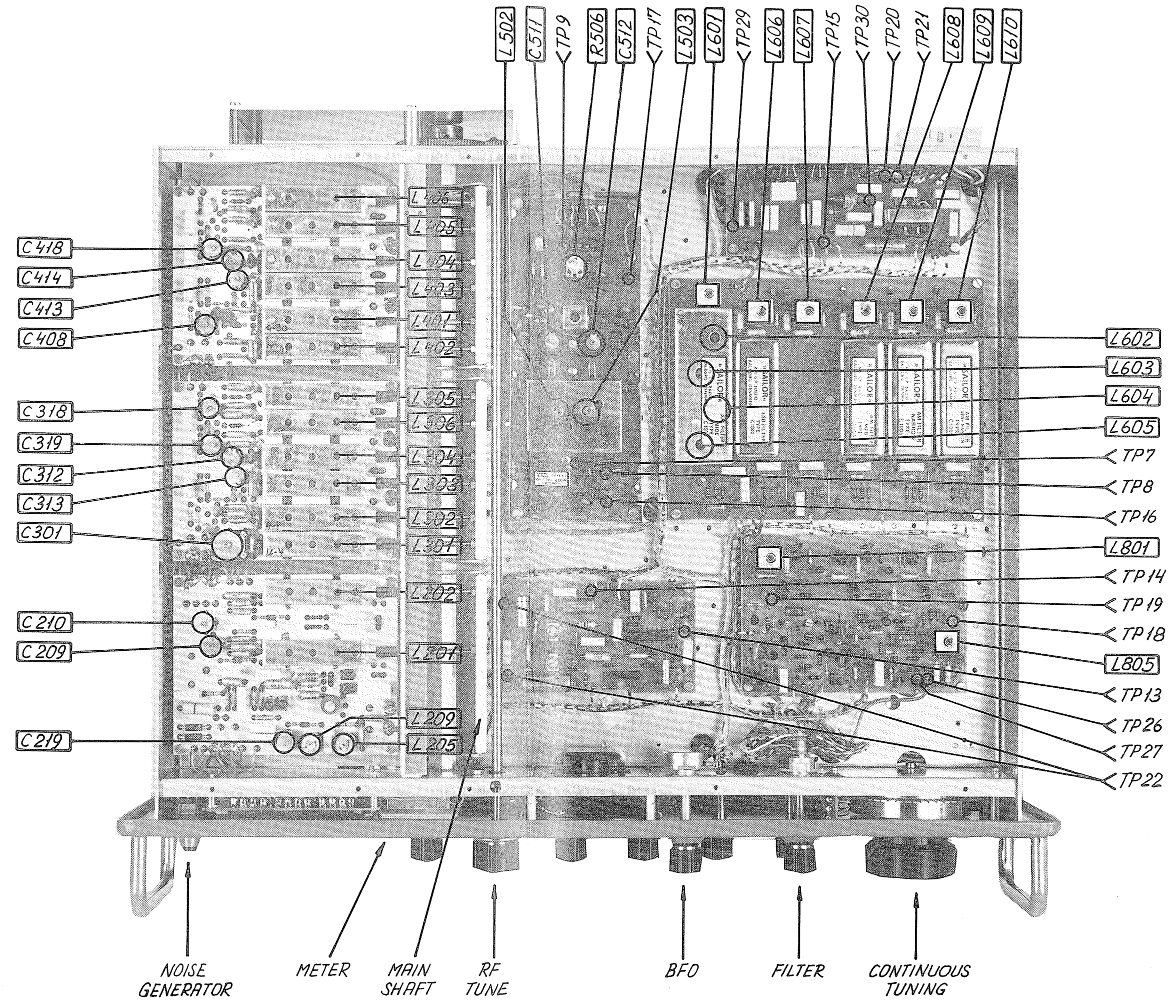
BD 241

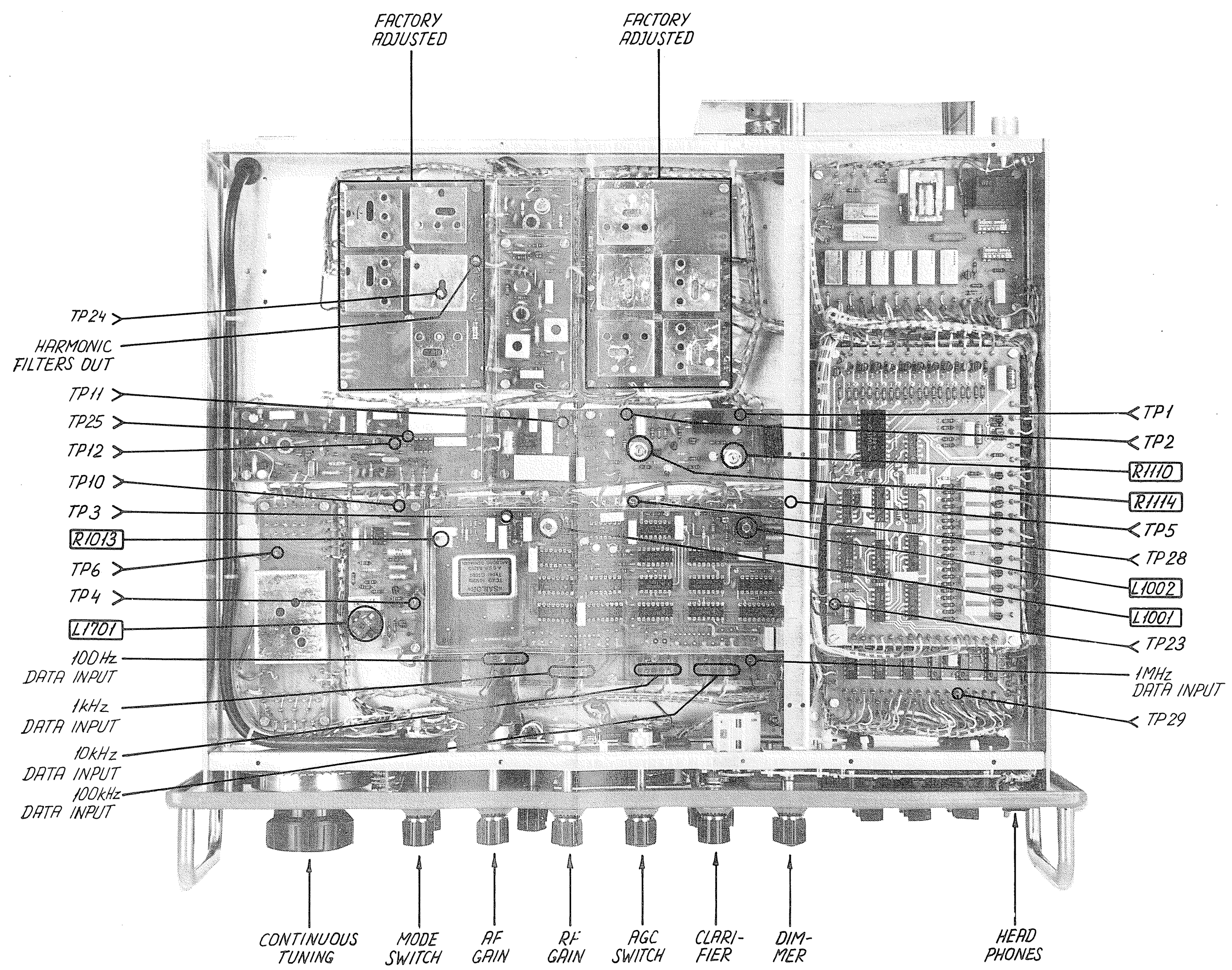
R1120 A 1/1



Chassis montage 2600







ADJUSTMENT LOCATIONS R1120

CIRCUIT DESCRIPTIONS AND SCHEMATIC DIAGRAMS

CIRCUIT DESCRIPTION AERIAL SWITCH R1119 & R1120

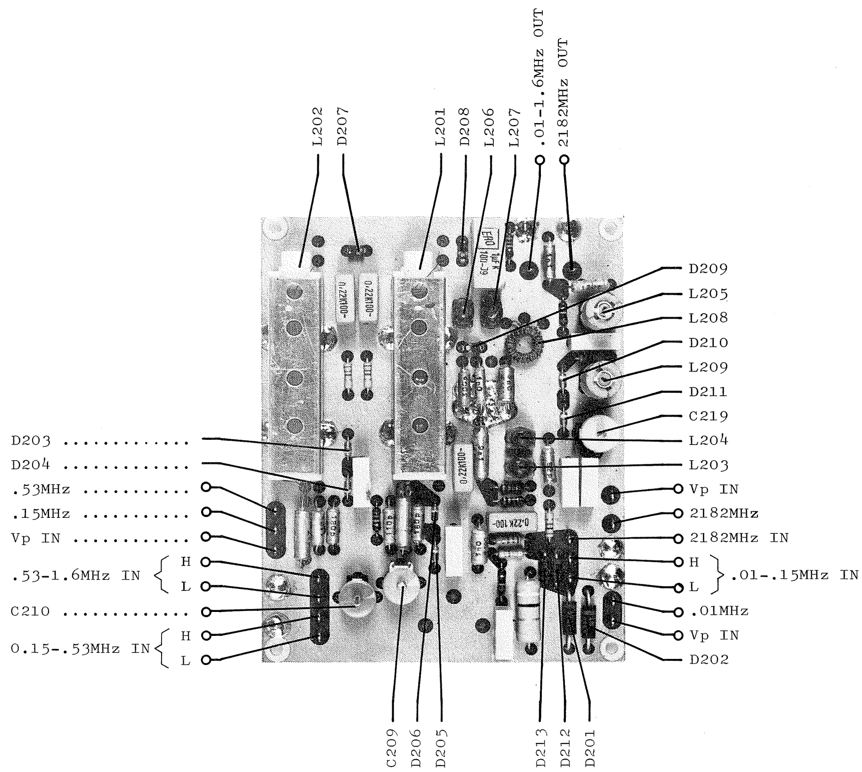
This unit contains the simplex relay, the blocking relay, the noise generator and the aerial switch relays.

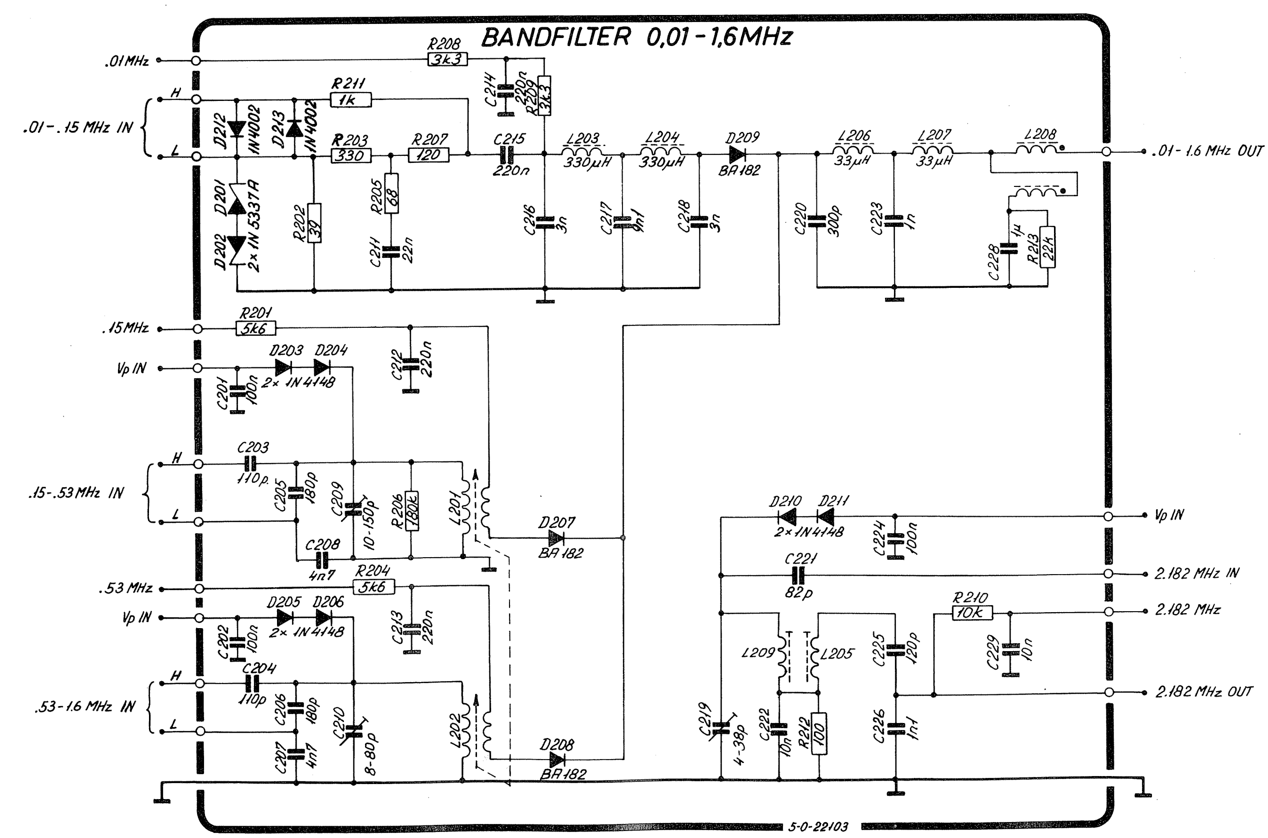
The aerial signal enters the BAND FILTER via RE102, R104 and one of the relays RE105 - RE112.

The relay RE101 is the simplex relay, RE103 is the blocking relay and RE104 is the aerial short-circuit relay in the telex mode.

The zenerdiode D102 generates white noise, which is led to the BAND FILTER in question via RE102.

Transistor T101 is a part of the internal blocking system.


L202
D207
L201
D208
L206
L207
.01-1.6MHz OUT
2182MHz OUT
D209
L205
L208
D210
L209
D211
C219
L204
L203
Vp IN
2182MHz
2182MHz IN
H
L
.01-.15MHz IN
.01MHz
Vp IN
D202
D203
D204
.53MHz
.15MHz
Vp IN
.53-1.6MHz IN
H
L
C210
0.15-.53MHz IN
H
L
C209
D206
D205
D213
D212
D201


BANDFILTER 0,01 - 1,6MHz
.01MHz
.01-.15 MHz IN
H
L
.15MHz
Vp IN
.15-.53 MHz IN
.53 MHz
Vp IN
.53-1.6 MHz IN
.01- 1.6 MHz OUT
Vp IN
2.182 MHz IN
2.182 MHz
2.182 MHz OUT
R208 3k3
R211 1k
R203 330
R207 120
C215 220n
L203 330μH
L204 330μH
D209 BA182
L206 33μH
L207 33μH
L208
C214 220n
R209 3k3
D212 1N4002
D213 1N4002
D201 D202 2× 1N 5337A
R202 39
R205 68
C211 22n
C216 3n
C217 4n1
C218 3n
C220 300p
C223 1n
C228 1μ
R213 22k
R201 5k6
D203 D204 2× 1N4148
C201 100n
C212 220n
C203 110p
C205 180p
C209 10-150p
R206 180k
L201
C208 4n7
D207 BA182
R204 5k6
D205 D206 2× 1N4148
C202 100n
C213 220n
C204 110p
C206 180p
C210 8-80p
C207 4n7
L202
D208 BA182
D210 D211 2× 1N4148
C224 100n
C221 82p
R210 10k
C229 10n
L209
L205
C225 120p
C219 4-38p
C222 10n
R212 100
C226 1n1
5-0-22103

CIRCUIT DESCRIPTION BAND FILTER 1.6 - 7 MHz R1119 & R1120

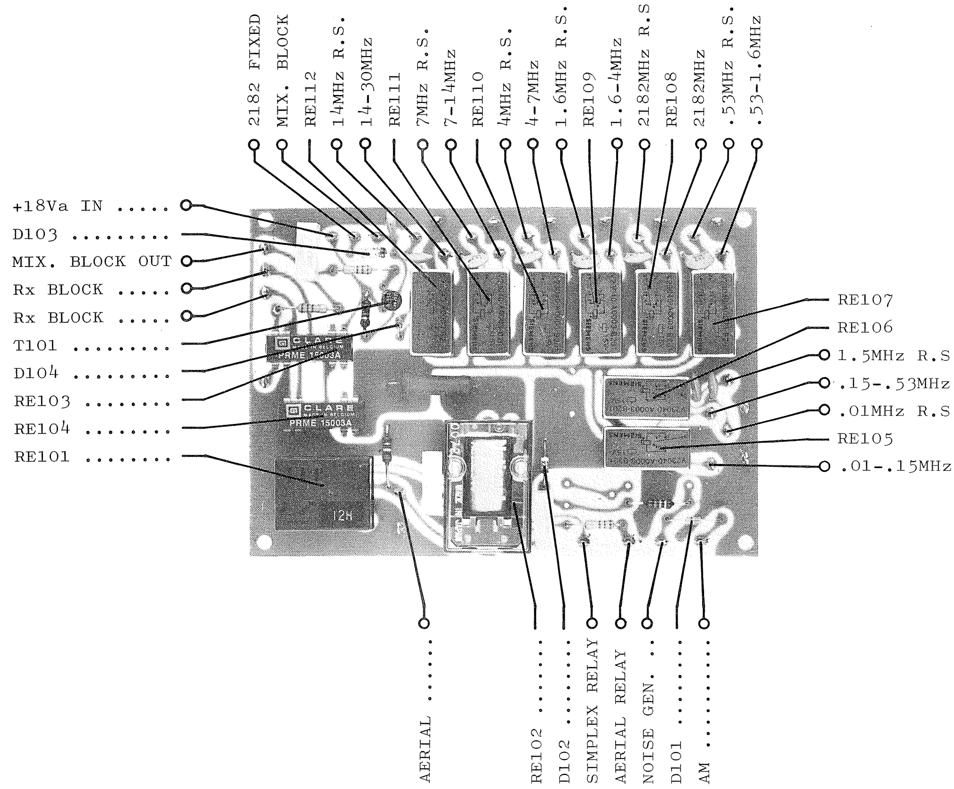
This section consists of two tuneable band pass filters covering the frequency ranges of 1.6 - 4 MHz and 4 - 7 MHz.

1.6 - 4 MHz BP FILTER:

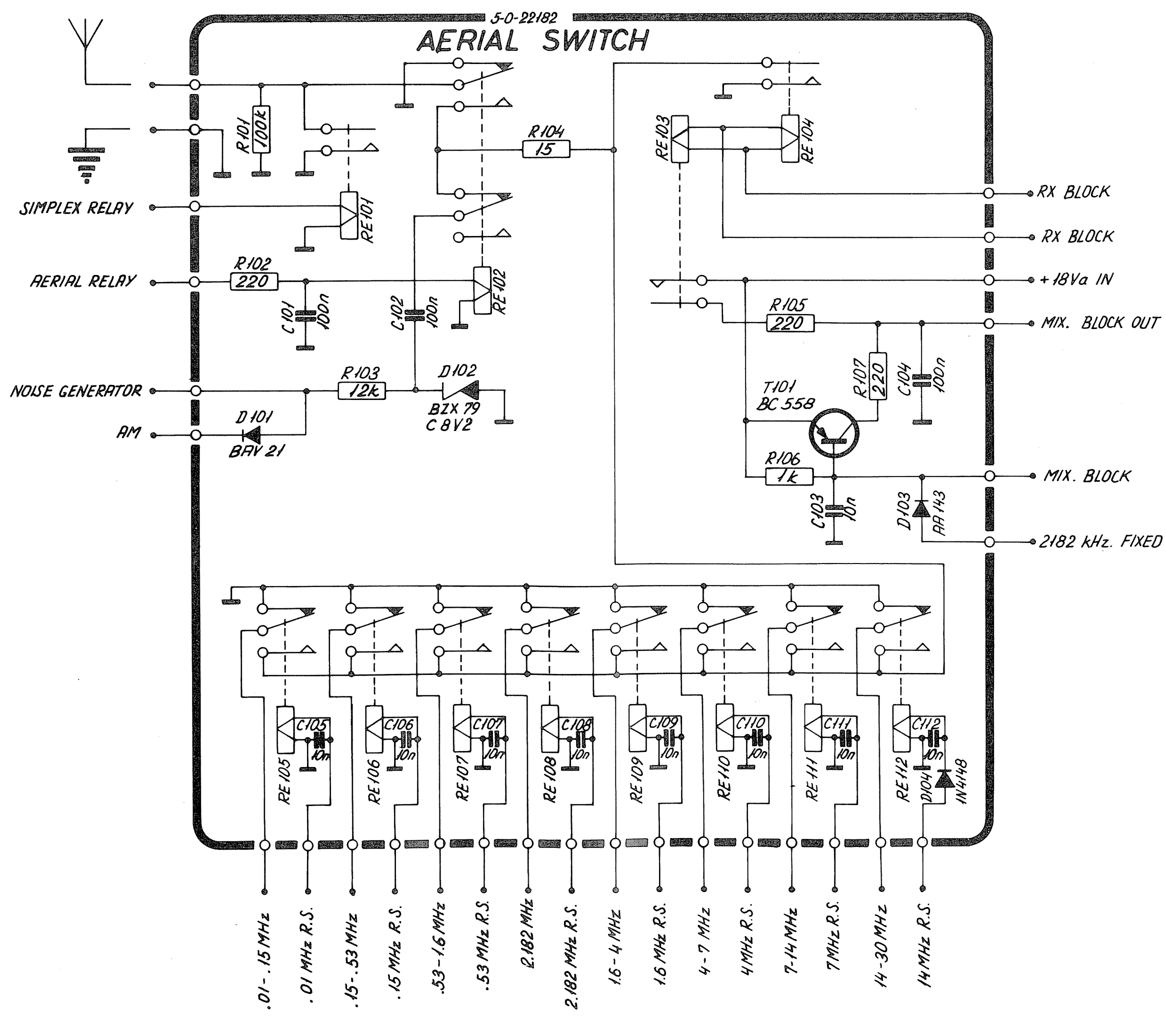
The aerial signal enters the filter through the aerial trimming capacitor C301, which is a part of the tuning capacitor for L301 and leaves the capacitive coupled filter at the impedance transformer C321 and C323. The two reverse biased diodes D301 and D302 are part of the aerial coil protection circuit.

4 - 7 MHz BP FILTER:

The aerial signal enters the filter through the capacitive impedance transformer C304 and C305 and leaves the filter at the impedance transformer C320 and C322. The two reverse biased diodes D303 and D304 are part of the aerial coil protection circuit.



2182 FIXED
MIX. BLOCK
RE112
14MHz R.S.
14-30MHz
RE111
7MHz R.S.
7-14MHz
RE110
4MHz R.S.
4-7MHz
1.6MHz R.S.
RE109
1.6-4MHz
2182MHz R.S.
RE108
2182MHz
.53MHz R.S.
.53-1.6MHz
+18Va IN .....
D103 ....
MIX. BLOCK OUT
Rx BLOCK .....
Rx BLOCK .....
T101 ....
D104 ....
RE103 ....
RE104 ....
RE101 ....
RE107
RE106
1.5MHz R.S.
.15-.53MHz
.01MHz R.S.
RE105
.01-.15MHz
AERIAL ......
RE102 ....
D102 ....
SIMPLEX RELAY
AERIAL RELAY
NOISE GEN. ..
D101 ....
AM ....



5-0-22182
AERIAL SWITCH
R101 100k
R104 15
RE103
RE104
RX BLOCK
RX BLOCK
SIMPLEX RELAY
RE101
AERIAL RELAY
R102 220
C101 100n
C102 100n
RE102
+18Va IN
R105 220
MIX. BLOCK OUT
R107 220
C104 100n
T101 BC 558
NOISE GENERATOR
R103 12k
D102 BZX 79 C 8V2
AM
D101 BAV 21
R106 1k
C103 10n
MIX. BLOCK
D103 AA 143
2182 kHz. FIXED
RE105 C105 10n
RE106 C106 10n
RE107 C107 10n
RE108 C108 10n
RE109 C109 10n
RE110 C110 10n
RE111 C111 10n
RE112 C112 10n
D104 1N4148
.01-.15MHz
.01 MHz R.S.
.15-.53MHz
.15 MHz R.S.
.53-1.6MHz
.53 MHz R.S.
2.182 MHz
2.182 MHz R.S.
1.6-4 MHz
1.6 MHz R.S.
4-7 MHz
4 MHz R.S.
7-14 MHz
7 MHz R.S.
14-30 MHz
14 MHz R.S.

CIRCUIT DESCRIPTION BAND FILTERS 0.01 - 1.6 MHz R1119 & R1120

This section is divided into 4 sub groups, namely a low pass filter for frequencies below 150 kHz, a coil section for the frequency range 150 - 530 kHz, another covering the 530 - 1600 kHz band and the fixed tuned 2182 kHz filter.

All filters except the 2182 kHz one have a high impedance input terminal for short aerials and short coax cables and a low impedance input terminal, approx. 50 ohm, for long coax cables.

150 kHz LP FILTER:

The aerial signal enters the filter either through the input attenuator consisting of R202, R203, R205, C211 and R207 or via R211 and led to the 150 kHz LP filter C216, L203, C217, L204 and C218 and via D209 to the 1.6 MHz LP filter consisting of C220, L206, C223, L207 and C532 located at the mixer PCB. L208 is an impedance step-up transformer. The two zenerdiodes D201 and D202 are part of the aerial coil protection circuit.

150 - 530 kHz COIL SECTION:

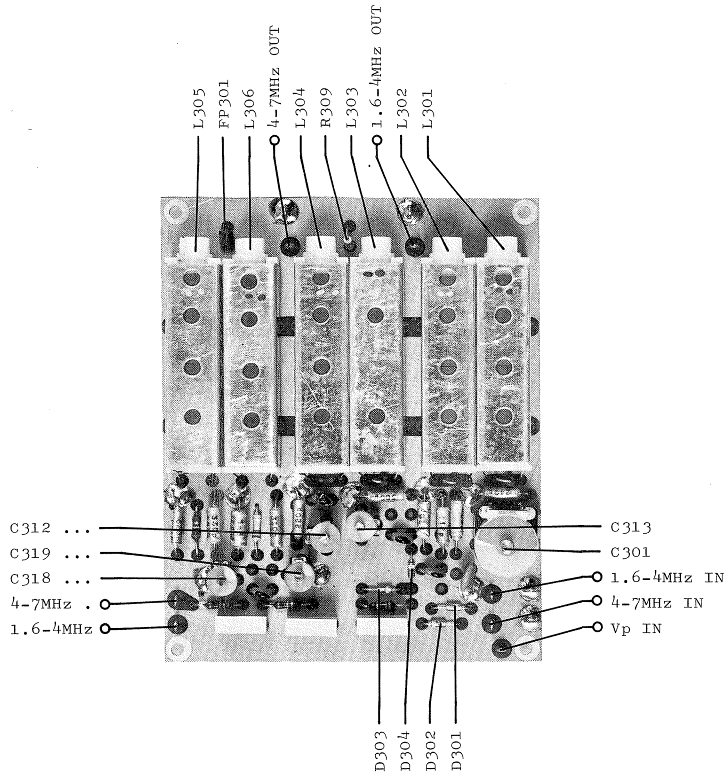
The aerial signal enters the filter either through the "high" input terminal C203 or via the impedance transformer C205 and C208 and leaves the filter via the link of L201 and led through the 1.6 MHz LP filter. The two reverse biased diodes D203 and D204 are part of the aerial protection circuit.

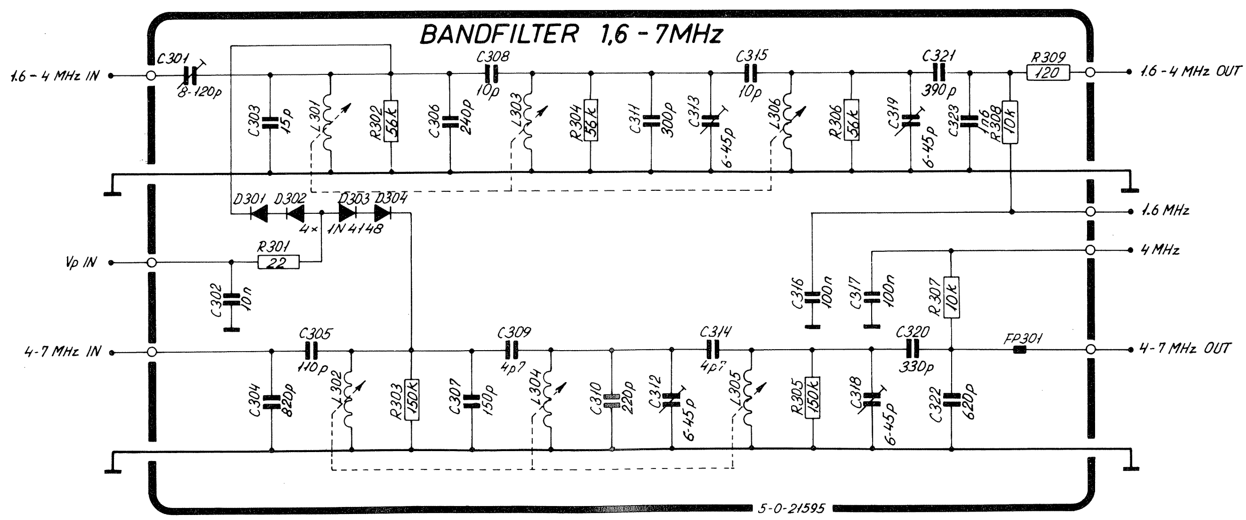
530 - 1600 kHz COIL SECTION:

The aerial signal enters the filter either through the "high" input terminal C204 or via the impedance transformer C206 and C207 and leaves the filter via the link of L202 and led through the 1.6 MHz LP filter. The two reverse biased diodes D205 and D206 are part of the aerial protection circuit.

2182 kHz COIL SECTION:

The aerial signal enters the filter through C221 and leaves the filter at the impedance transformer C225 and C226. The coupling between L209 and L205 takes place by means of C222. Capacitor C219 is the aerial trimming capacitor. The two reverse biased diodes D210 and D211 are part of the aerial protection circuit.


L305
FP301
L306
4-7MHz OUT
L304
R309
L303
1.6-4MHz OUT
L302
L301
C312 ...
C319 ...
C318 ...
4-7MHz .
1.6-4MHz
C313
C301
1.6-4MHz IN
4-7MHz IN
Vp IN
D303
D304
D302
D301


BANDFILTER 1,6 - 7MHz
1,6 - 4 MHz IN
C301
8-120p
C303
15p
L301
R302
56k
C306
240p
C308
10p
L303
R304
56k
C311
300p
C313
6-45p
C315
10p
L306
R306
56k
C319
6-45p
C321
390p
C323
1n6
R308
10k
R309
120
1,6 - 4 MHz OUT
1,6 MHz
4 MHz
D301
D302
D303
D304
4× 1N4148
Vp IN
R301
22
C302
10n
C316
100n
C317
100n
R307
10k
4-7 MHz IN
C305
110p
C304
820p
L302
R303
150k
C307
150p
C309
4p7
L304
C310
220p
C312
6-45p
C314
4p7
L305
R305
150k
C318
6-45p
C320
330p
C322
620p
FP301
4-7 MHz OUT
5-0-21595

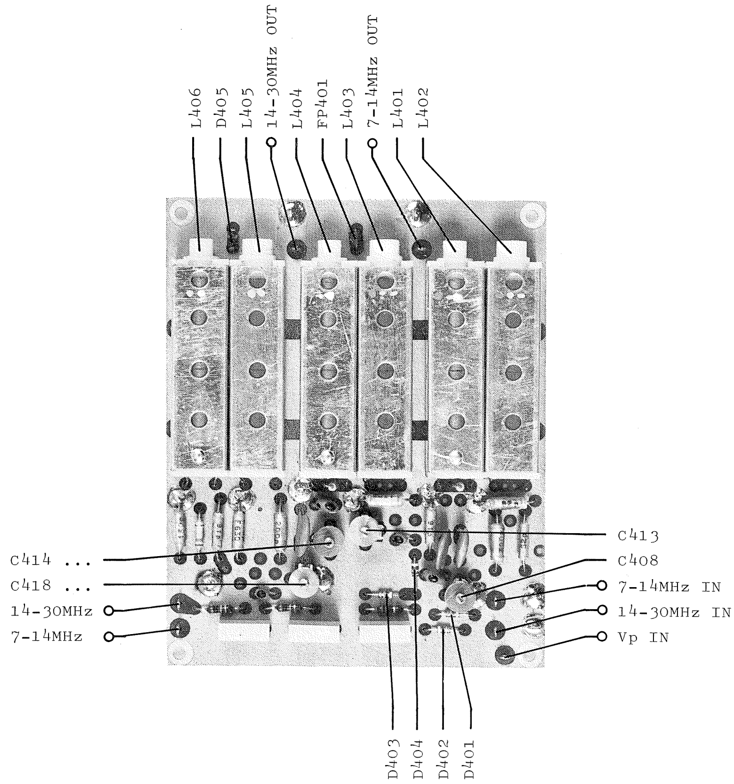
CIRCUIT DESCRIPTION BAND FILTER 7 - 30 MHz R1119 & R1120

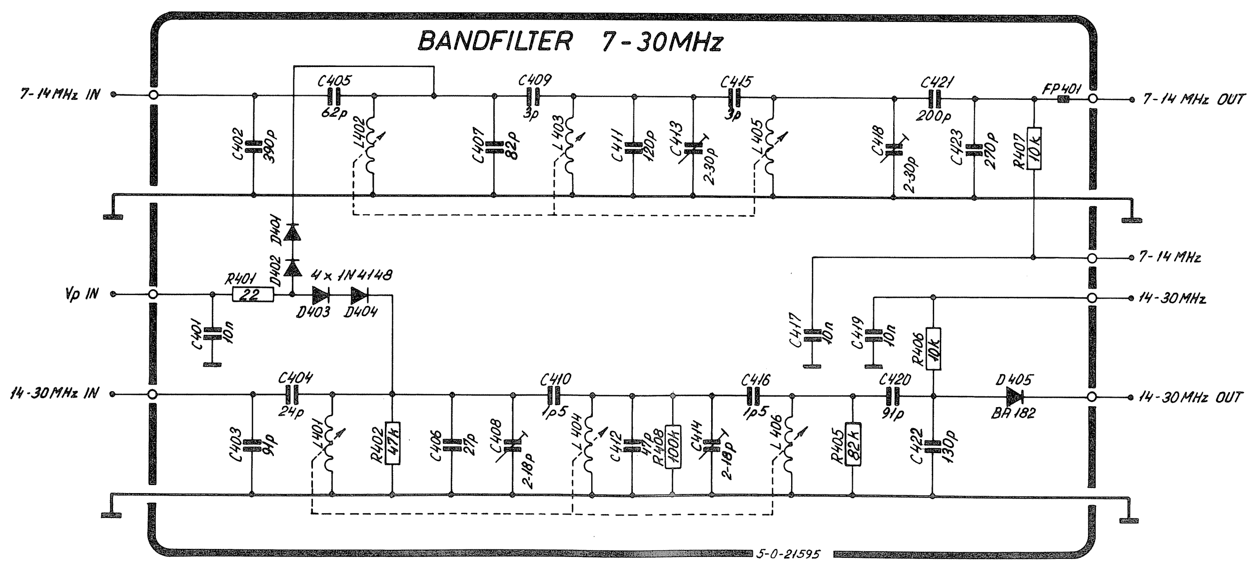
This section consists of two tuneable band pass filters covering the frequency ranges of 7 - 14 MHz and 14 - 30 MHz.

7 - 14 MHz AND (14 - 30)MHz BP FILTERS

The aerial signal enters the filter through the capacitive impedance transformer C402 and C405 (C403 and C404) and leaves the filter at the impedance transformer C421 and C423 (C420 and C422).

The two reverse biased diodes D401 and D402 (D403 and D404) are part of the aerial coil protection circuit.


L406
D405
L405
14-30MHz OUT
L404
FP401
L403
7-14MHz OUT
L401
L402
C414 ...
C418 ...
14-30MHz
7-14MHz
C413
C408
7-14MHz IN
14-30MHz IN
Vp IN
D403
D404
D402
D401


BANDFILTER 7-30MHz
7-14MHz IN
7-14 MHz OUT
Vp IN
7-14 MHz
14-30MHz
14-30MHz IN
14-30MHz OUT
C405 62p
C409 3p
C415 3p
C421 200p
FP401
C402 390p
L402
C407 82p
L403
C411 120p
C413 2-30p
L405
C418 2-30p
C423 270p
R407 10k
D401
D402
R401 22
4 x 1N4148
D403
D404
C401 10n
C417 10n
C419 10n
R406 10k
C404 24p
C410 1p5
C416 1p5
C420 91p
D405 BA182
C403 91p
L401
R402 47k
C406 27p
C408 2-18p
L404
C412 470
R408 100k
C414 2-18p
L406
R405 82k
C422 130p
5-0-21595

CIRCUIT DESCRIPTION 1ST & 2ND MIXER R1119 & R1120

This unit contains the aerial input switching diodes, the first mixer, the first IF selectivity and the second mixer.

1st MIXER

From the band filters the signal is fed to the balanced transformer TR501 and led to the balanced FET mixer T501 and T502. The first local oscillator signal from the VCO BUFFER is fed into the sources of the FET's. The difference frequency at the drains of the FET's is filtered out in the tuned circuits either TR502 and C512, for receiver frequency settings below 14 MHz or TR502, C508 and C511 for frequency settings above 14 MHz.

1st IF SELECTIVITY

For receiver frequency settings below 14 MHz, the tuned transformer TR501 ensures a proper generator impedance for the monolitic crystal filter FL502. The center frequency of the filter is 16.6085 MHz. The tuned circuit L503 and C519 ensures proper load impedance for the filter FL502 and proper generator impedance for the second micer M501.

For receiver frequency settings above 14 MHz the tuned transformer ensures a proper generator impedance for the monolitic crystal filter FL501 the center frequency of which is 10.6085 MHz. The tuned circuit L502 and C518 ensures proper load impedance for the filter FL501 and proper generator impedance for the second mixer M501.

The switching between the two IF's takes place by means of either R515, D513, R520, R514, R511 and D510 or R517, D514, R520, R513, R512 and D511.

2nd MIXER

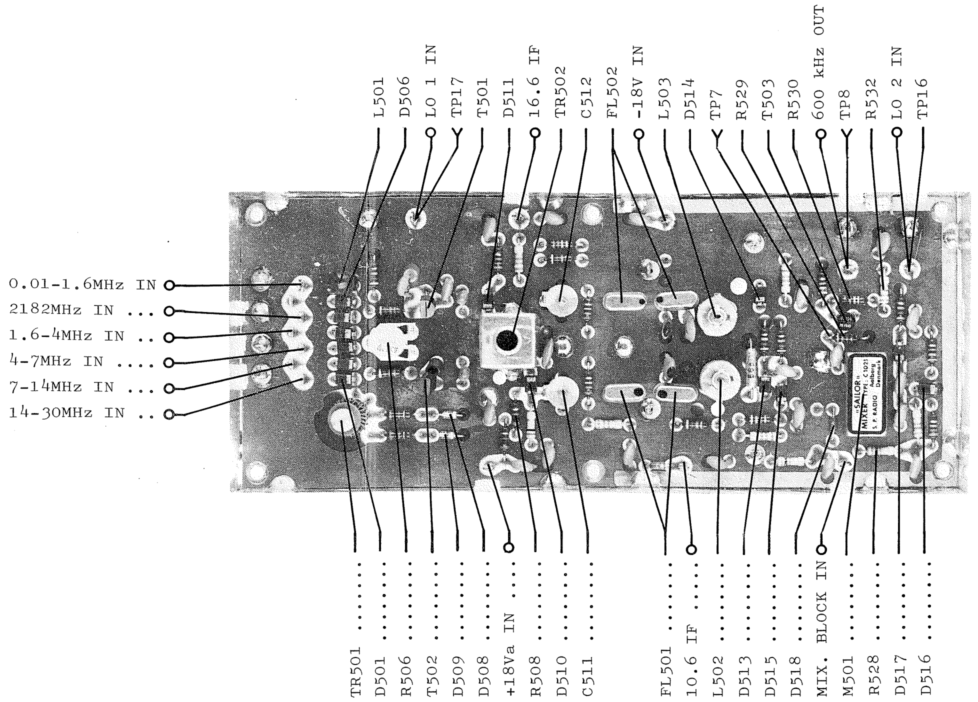
From the coil L502/L503 the signal is fed to the input port of the balanced diode mixer M501. The second local oscillator signal from the VCXO 1st LOOP 2 MIXER & LOOP 2 FILTER is fed to the LO port of the mixer.

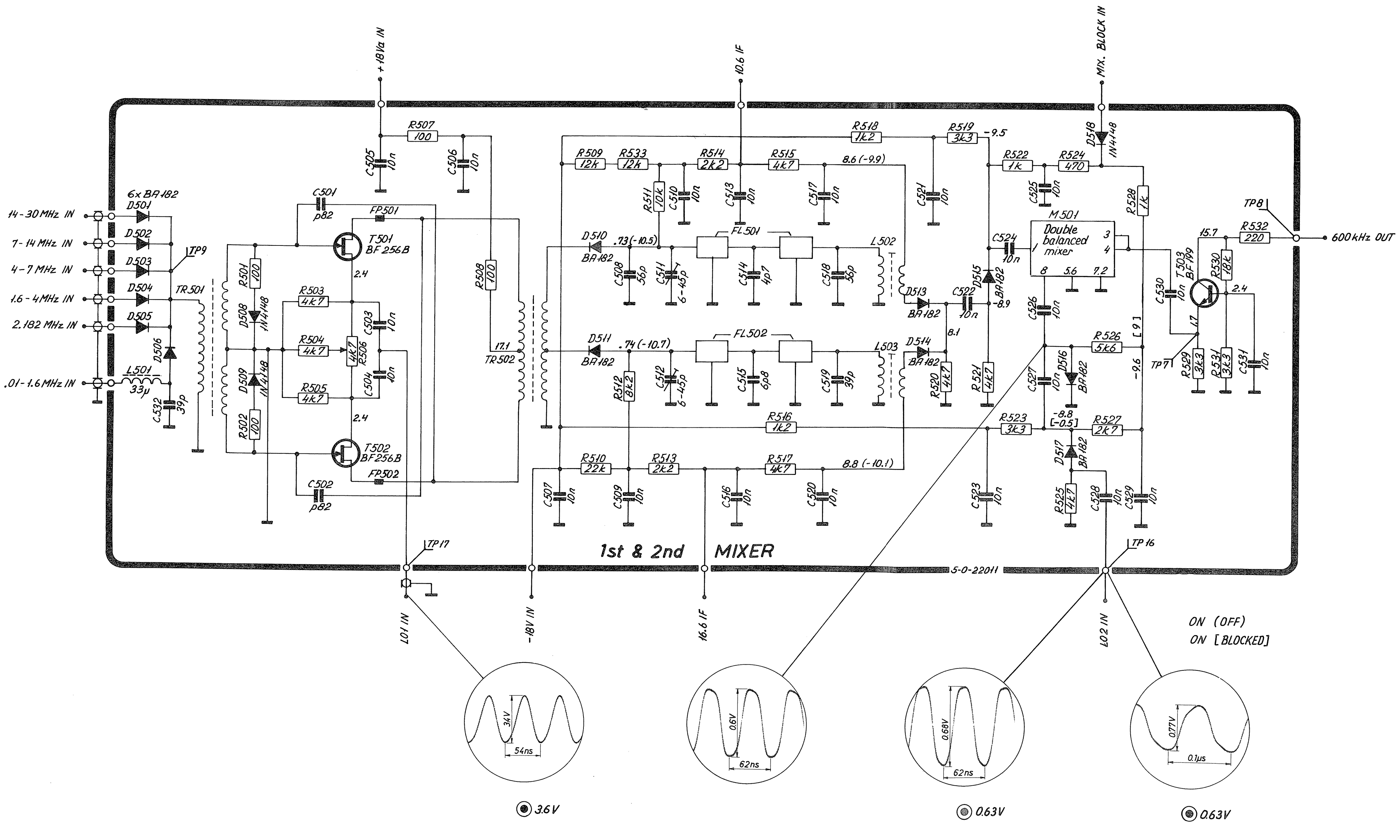
From the output port of the mixer the signal is led to the common base buffer amplifier T503. The difference frequency at the collector of T503 is filtered out in the IF-FILTERS.

The remaining components D518, R524, R522, D515, R521, R528, R526, D516, R525, D517 and R525 is the mixer blocking circuit, which secures that no energy is stored in the IF-FILTER's when the receiver is blocked.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical





CIRCUIT DESCRIPTION IF FILTER R1120

This unit contains the AM filter, the SSB filter, the telegraphy filters, the external circuit for an auxiliary filter and a tuned 600 kHz amplifier.

The fifth order AM filter C1016 ensures the necessary adjacent channel selectivity and far away attenuation in the AM mode.

The high order SSB filter FL601 together with the tuned circuit L606, C615 and C616 ensures the necessary carrier rejection, adjacent channel selectivity and far away attenuation in the SSB mode.

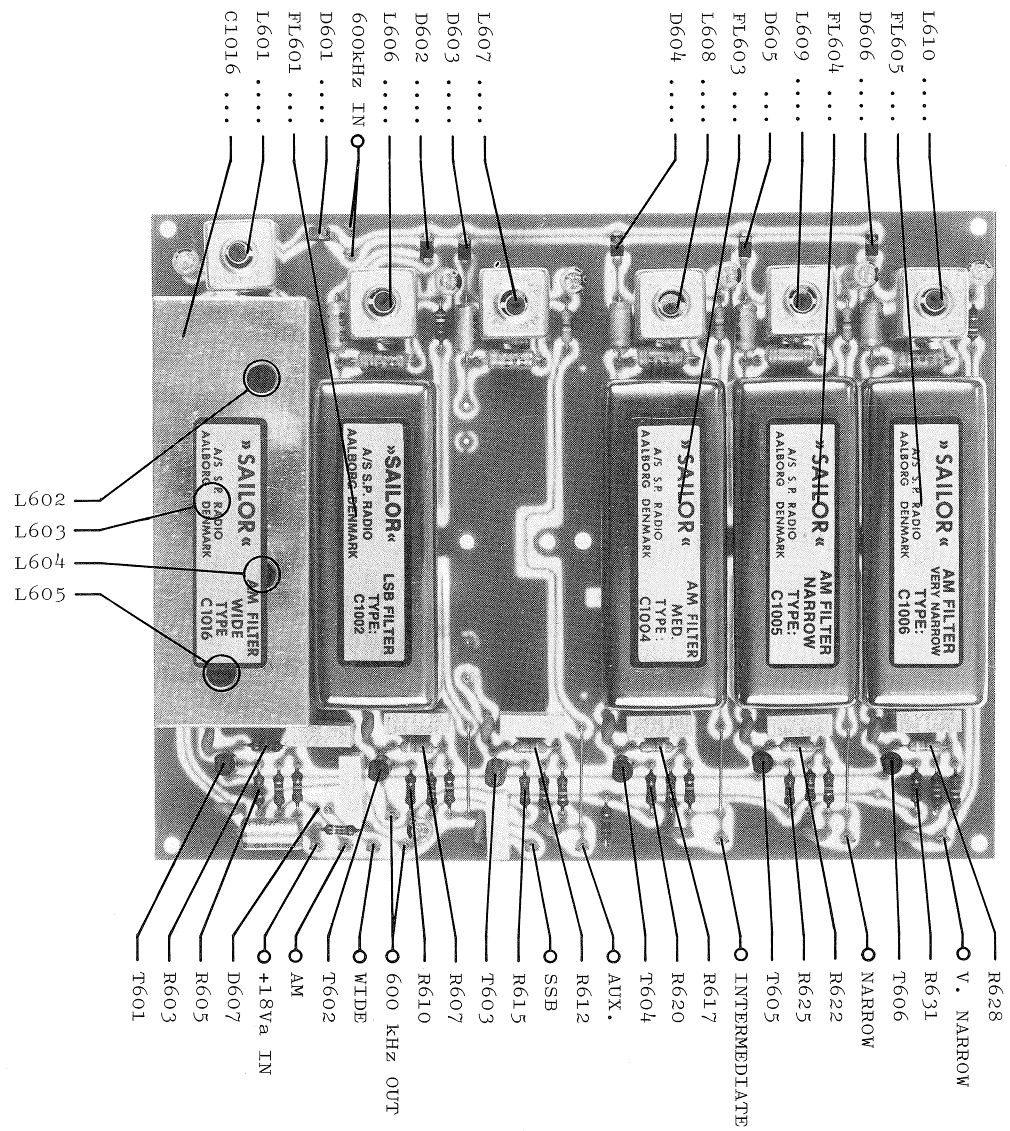
The high order telegraphy filters FL603, FL604 and FL605 together with their tuned circuits ensures the necessary adjacent channel selectivity and far away attenuation in the A1 and A2 modes.

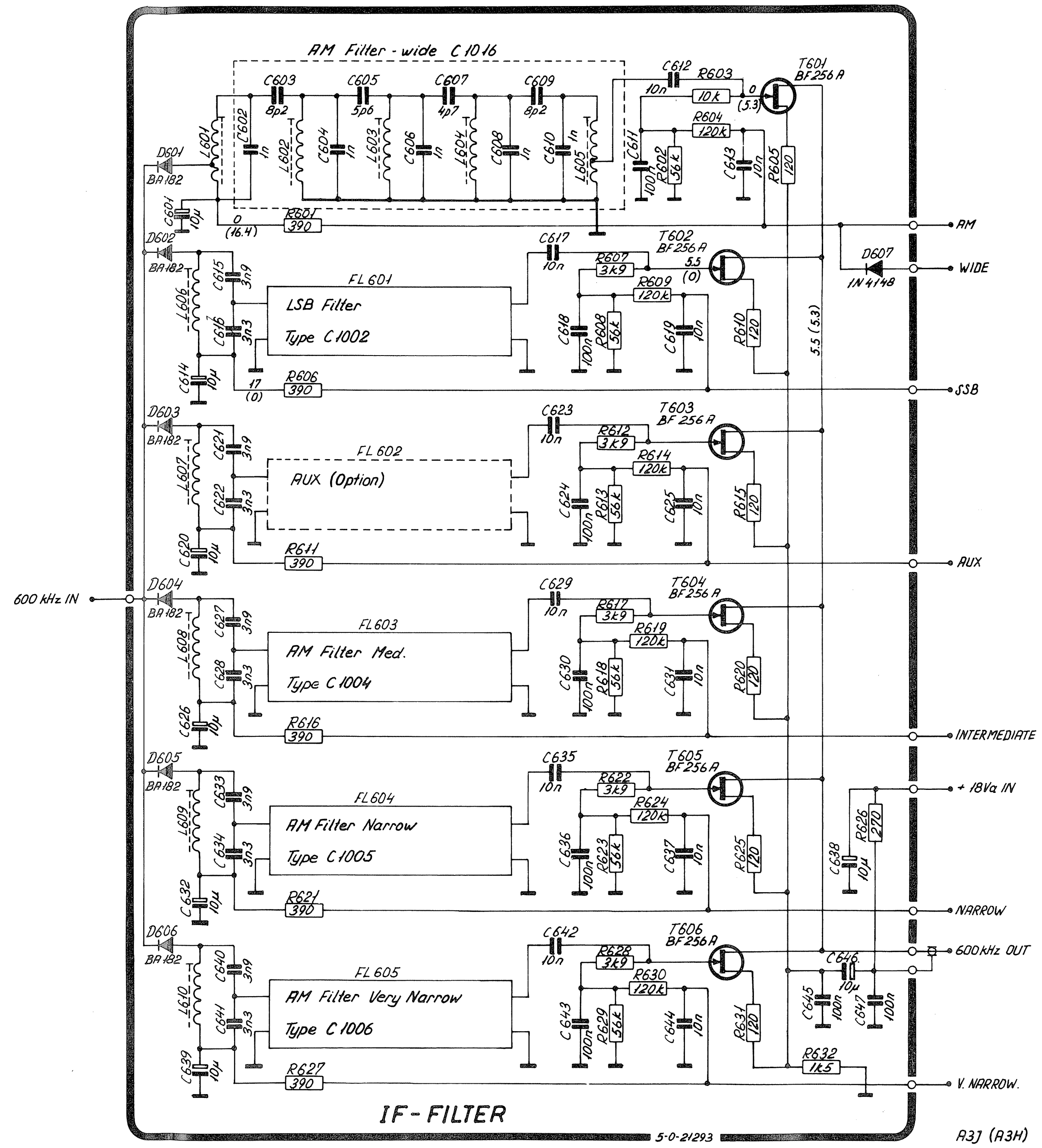
Depending on the filter chosen one of the FET's T601, T602, T603, T604, T605 and T606 is a 600 kHz tuned amplifier stage. The tuned circuit is located on the IF AMPLIFIER, DETECTOR AND AGC PCB.

The switching in and out takes place by means of the switching diodes D601, D602, D603, D604, D605, D606 and the above mentioned FET's.

The center frequency of the second IF is 600 kHz.

R1120 A 2/2


C1016
L601
FL601
D601
600kHz IN
L606
D602
D603
L607
D604
L608
FL603
D605
L609
FL604
D606
FL605
L610
L602
L603
L604
L605
»SAILOR« A/S S.P. RADIO AALBORG DENMARK AM FILTER WIDE TYPE C1016
»SAILOR« A/S S.P. RADIO AALBORG DENMARK LSB FILTER TYPE: C1002
»SAILOR« A/S S.P. RADIO AALBORG DENMARK AM FILTER MED. TYPE: C1004
»SAILOR« A/S S.P. RADIO AALBORG DENMARK AM FILTER NARROW TYPE: C1005
»SAILOR« A/S S.P. RADIO AALBORG DENMARK AM FILTER VERY NARROW TYPE: C1006
T601
R603
R605
D607
+18Va IN
AM
T602
WIDE
600 kHz OUT
R610
R607
T603
R615
SSB
R612
AUX.
T604
R620
R617
INTERMEDIATE
T605
R625
R622
NARROW
T606
R631
V. NARROW
R628


AM Filter - wide C1016
T601 BF256A
LSB Filter Type C1002
FL601
T602 BF256A
FL602
AUX (Option)
T603 BF256A
FL603
AM Filter Med. Type C1004
T604 BF256A
FL604
AM Filter Narrow Type C1005
T605 BF256A
FL605
AM Filter Very Narrow Type C1006
T606 BF256A
D607 1N4148
600 kHz IN
AM
WIDE
SSB
AUX
INTERMEDIATE
+ 18Va IN
NARROW
600 kHz OUT
V. NARROW.
IF-FILTER
5-0-21293
A3J (A3H)

CIRCUIT DESCRIPTION IF AMPLIFIER, DETECTOR AND AGC R1119 & R1120

This unit contains the 600 kHz IF amplifier, the AM and SSB detector and the AM and SSB AGC system.

IF AMPLIFIER

The IF signal from the IF FILTERS enters the 600 kHz tuned circuit L801, C802 and C803. From a tap on L801 the signal is fed to the gate of T804 where it is amplified. The load of T804 consists of a 600 kHz fixed tuned circuit L802, C810 and C811.

From the drain of T804 the signal is fed to the gate of T808. The load of T808 consists of a 600 kHz fixed tuned circuit L803, C818 and C819. The diodes D805 and D806 are amplitude limiters to protect T814.

From the drain of T808 the signal is fed to the base of the untuned amplifier T814. From the collector of T814 the signal is fed to the base of the tuned amplifier T817D. The tuned circuit consists of L805, C834 and C837.

The stabistors D814 and D815 are amplitude limiters to limit the output in the AGC OFF mode.

DETECTOR

From L805 the signal is fed to the bases of T817A and T817B, which are an envelope transistor detector suitable for AM signals.

In the SSB mode a carrier reinjection signal is added to the IF signal via T817C and L805 in such a way that the modulation percent is kept low, approx. 11% in the resulting A3H signal to ensure low detector distortion.

R1120 only:

In the A1 mode the BFO signal is added to the IF signal instead of the fixed 600 kHz carrier reinjection signal.

AGC SYSTEM

The control of the IF amplification is carried out by negative feed-back and decreasing of the load impedance of the three tuned amplifier stages by means of the transistors T801, T806 and T809. That will say increasing current means decreasing gain. The AGC voltage is fed to T801, T806 and T809 from C813 via the amplifier consisting of T803 and T805.

A3H (AM) MODE

The information to the AGC system is taken at the emitter of T817D and fed to the emitter follower T813 via C825 to a peak detector consisting of D808 and T812.

CIRCUIT DESCRIPTION IF AMPLIFIER, DETECTOR AND AGC R1119 & R1120 cont.:

T812 acts as a DC amplifier with a ripple filter R835 and C820. The signal is then fed to another emitter follower T810. The signal from T811 is grounded through R826. From T810 the signal is fed to the capacitor C813, thus feeding the AGC voltage to transistor T805. C813 is discharged through R820 and R827 which in A3H mode is grounded.

The discharge path through R841 is off because T815 is off.

A3J (SSB) MODE

Charge of C813 and C816.

As in the A3H mode the signal is taken at the emitter of T817D and passed through T813, T812 and R835 to the transistors T811 and T810, transistor T811 is charging C816 through R826 and T810 is charging C813 through R820. C816 is charged very fast to the AGC voltage, but because of the voltage divider R826 and R824 the voltage on C813 is taking over after a while, meaning that in the steady state condition the AGC voltage is the voltage on C813.

At the same time C832 is charged to 4.2V via T807 and R828, giving a reference voltage for the hang AGC system. When the voltage on C828 is over 1.2V transistor T816 is on and T815 is off meaning that the discharge path of C813 through R841 is off.

When the IF signal disappears the only discharge path of C813 is via the base of T805 as T815 is off. C832 is now discharged through R865, T816 and D810. When the voltage across C832 is so low that T816 goes off, T815 goes on and C813 is discharged through R841.

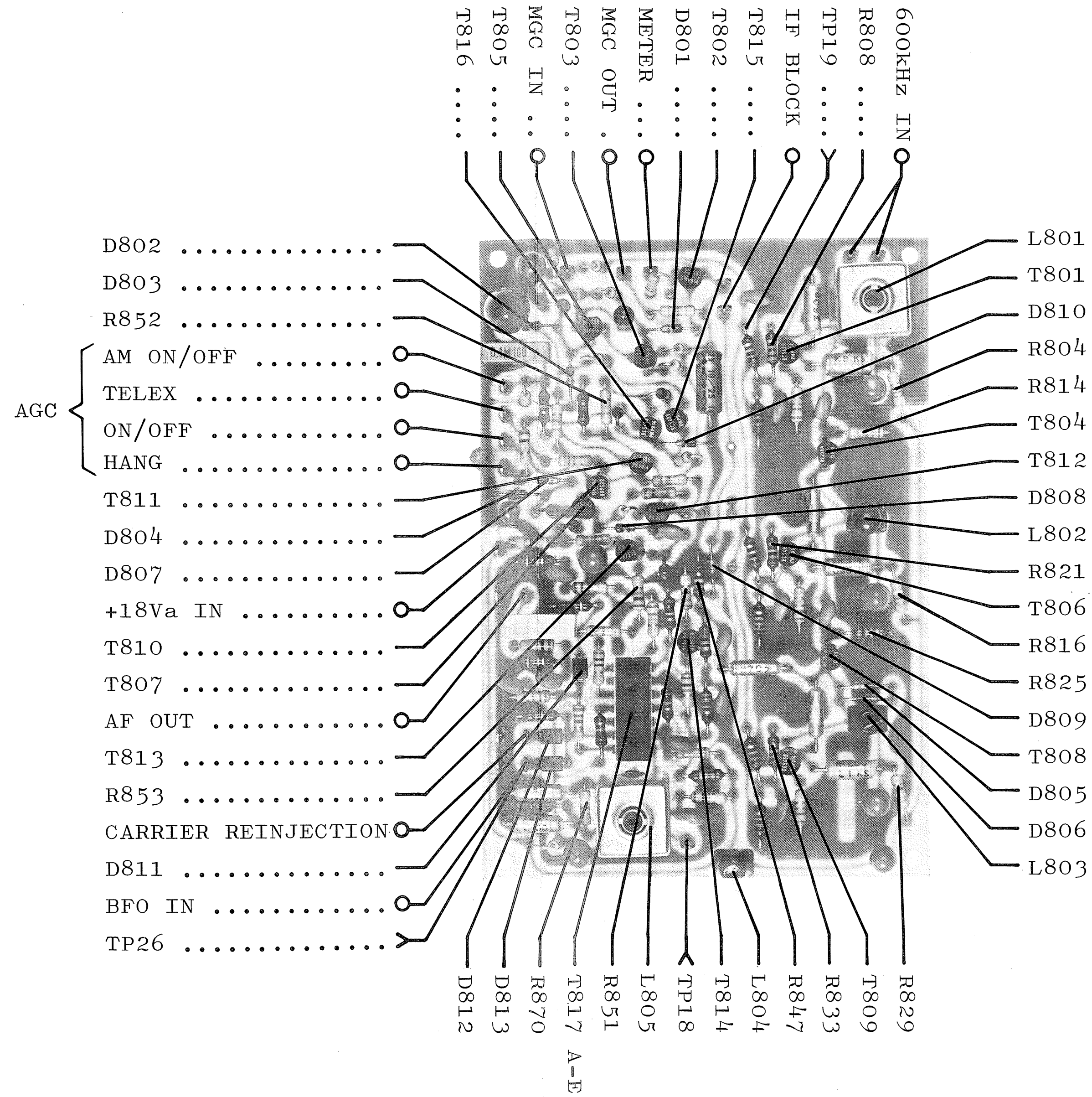
When the AGC switch is in TELEX MODE, R827 is grounded and C813 is discharged through R820 and R827 when the IF signal disappears.

Remaining functions of the unit:

The transistor T802 is the emitter follower for the AGC meter.

The AGC ON/OFF function is performed by grounding the base of T810 and T811.

The MGC function is performed by means of the voltage divider R801, R802, R2604 (RF-GAIN) R2603 and R803.



TEST CONDITIONS

Frequency setting	: f = 2.0005 MHz
Mode	: A3J (A3H)
Clarifier	: Center position
RF input	: 1 mW EMF/50 ohm
AGC	: ON
RF gain	: Maximum
Front end tuned to max. meter reading	
Oscilloscope input	: Passive probe 10:1
DC voltmeter input	: 10 Mohm

◉: Diode probe measurements
TP: Testpoints
All voltage statements are typical

CIRCUIT DESCRIPTION AUDIO AMPLIFIER R1119 & R1120

This unit contains the AF preamplifier, the active low pass filter, the 0 dBm fixed AF output amplifier and the AF power amplifier.

AF PREAMPLIFIER AND LOW PASS FILTER

The AF signal from the detector is amplified in the operational amplifier IC901d and fed to the fifth order active LP filter with a cut-off frequency of 2.9 kHz. The active filter is built-up around the operational amplifiers IC901c and IC901b. The signal is then fed to the 0 dBm fixed AF output amplifier IC901a, the output from which enters the output transformer L2502 located on the INPUT FILTER circuit board.

AF POWER AMPLIFIER

From the output of the active filter, R921, the signal is fed to the AF GAIN, R2607, and from there to the input of the power amplifier C914.

The integrated power amplifier IC902 has two built-in protection facilities, namely output current limiter and thermal shut-down, which means that the power amplifier cannot be destroyed by overload.

From the output terminal, pin 12, the signal is fed to the loudspeaker and the voltage divider for headphones output, J2602.

TEST CONDITIONS

Frequency setting : f = 2.0005 MHz
Mode : A3J (A3H)
Clarifier : Center position
RF input : 1 mW EMF/50 ohm
AGC : ON
RF gain : Maximum
Front end tuned to max. meter reading
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⦿: Diode probe measurements
TP: Testpoints
All voltage statements are typical

:

gnal is
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feeding
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or T811
C816 is
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tran-
313

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D810.
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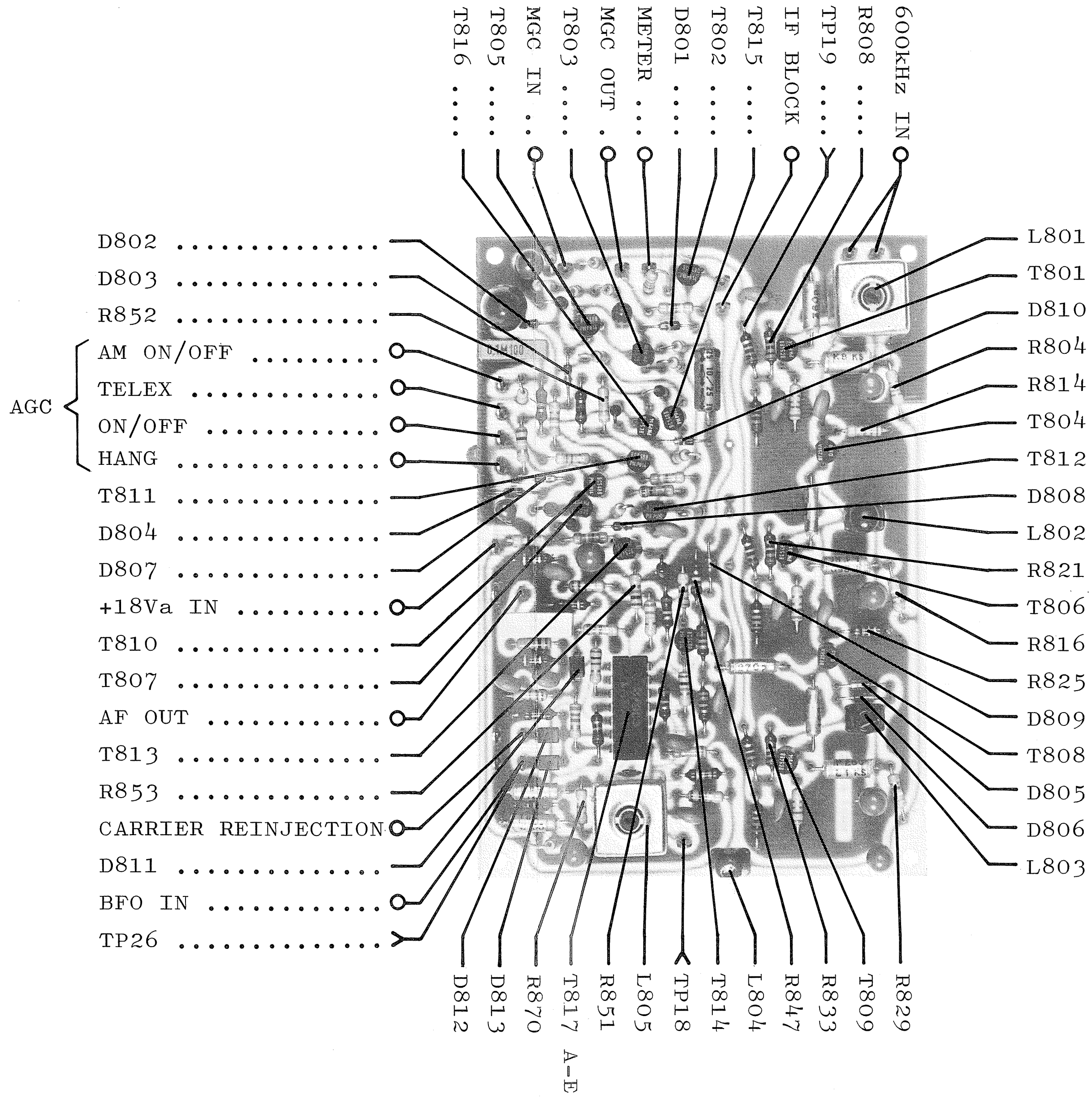
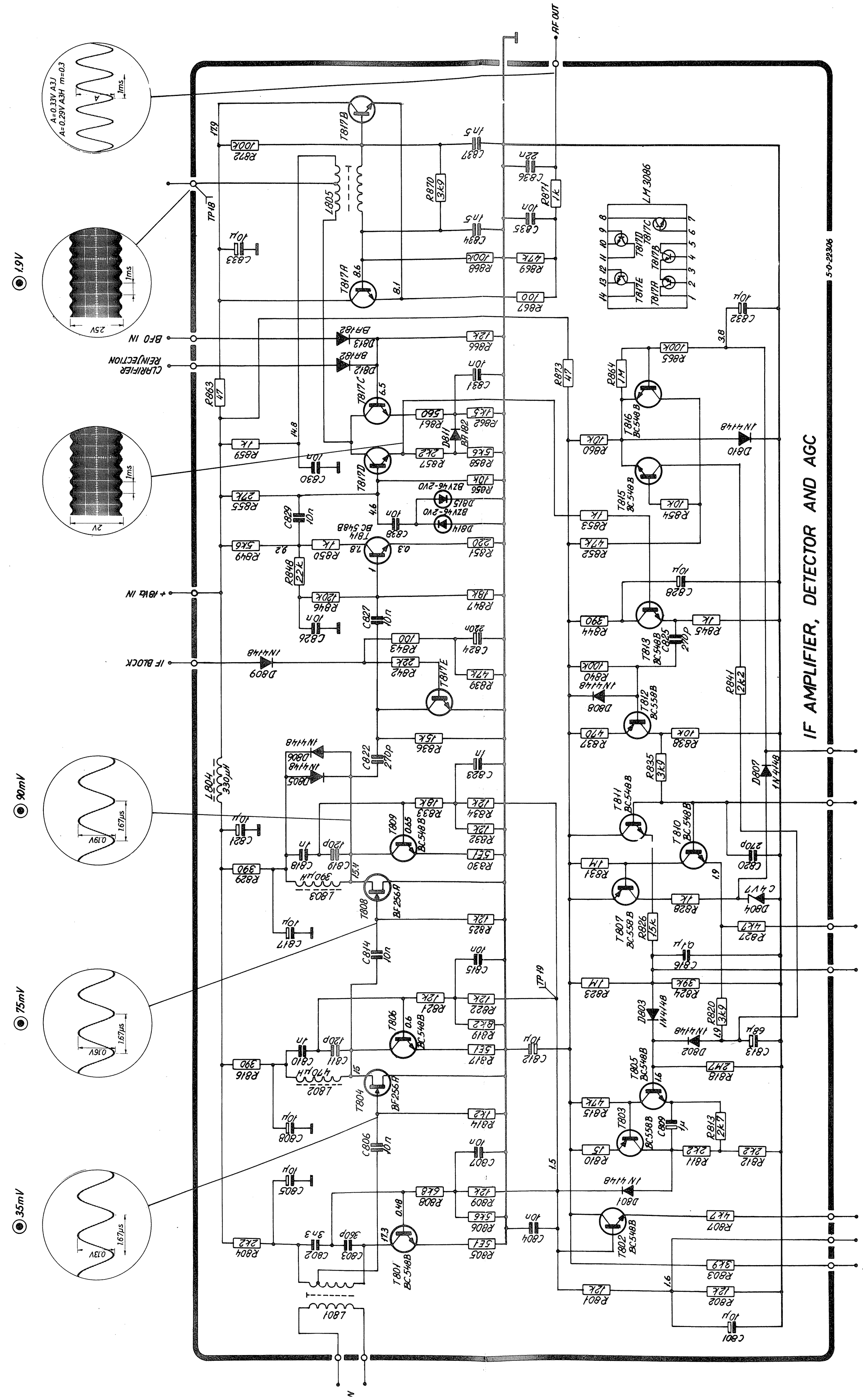
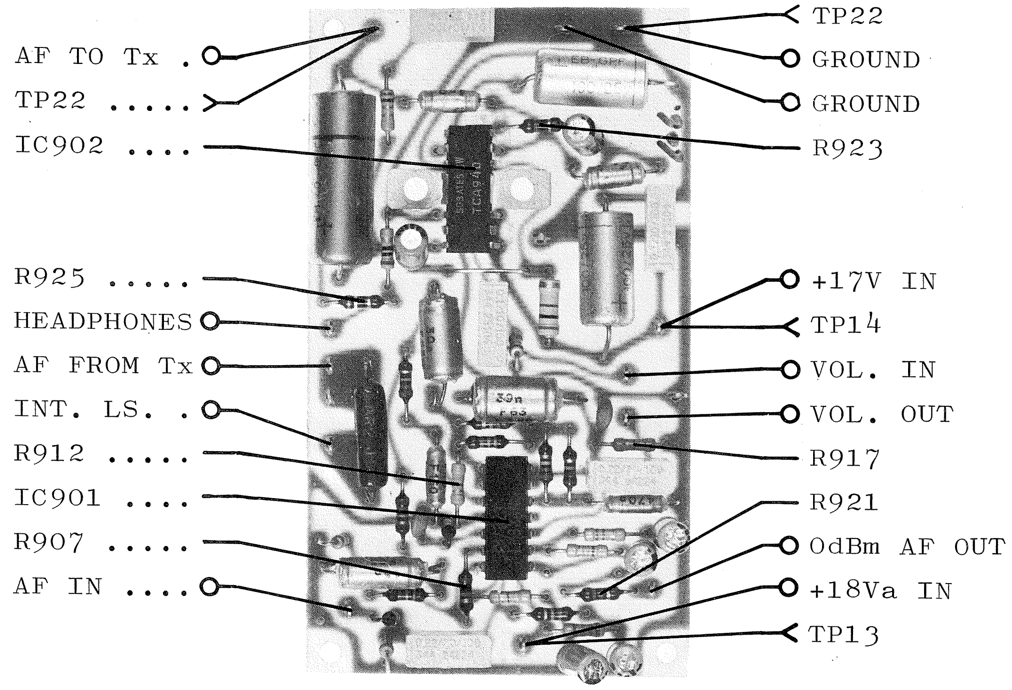
charged

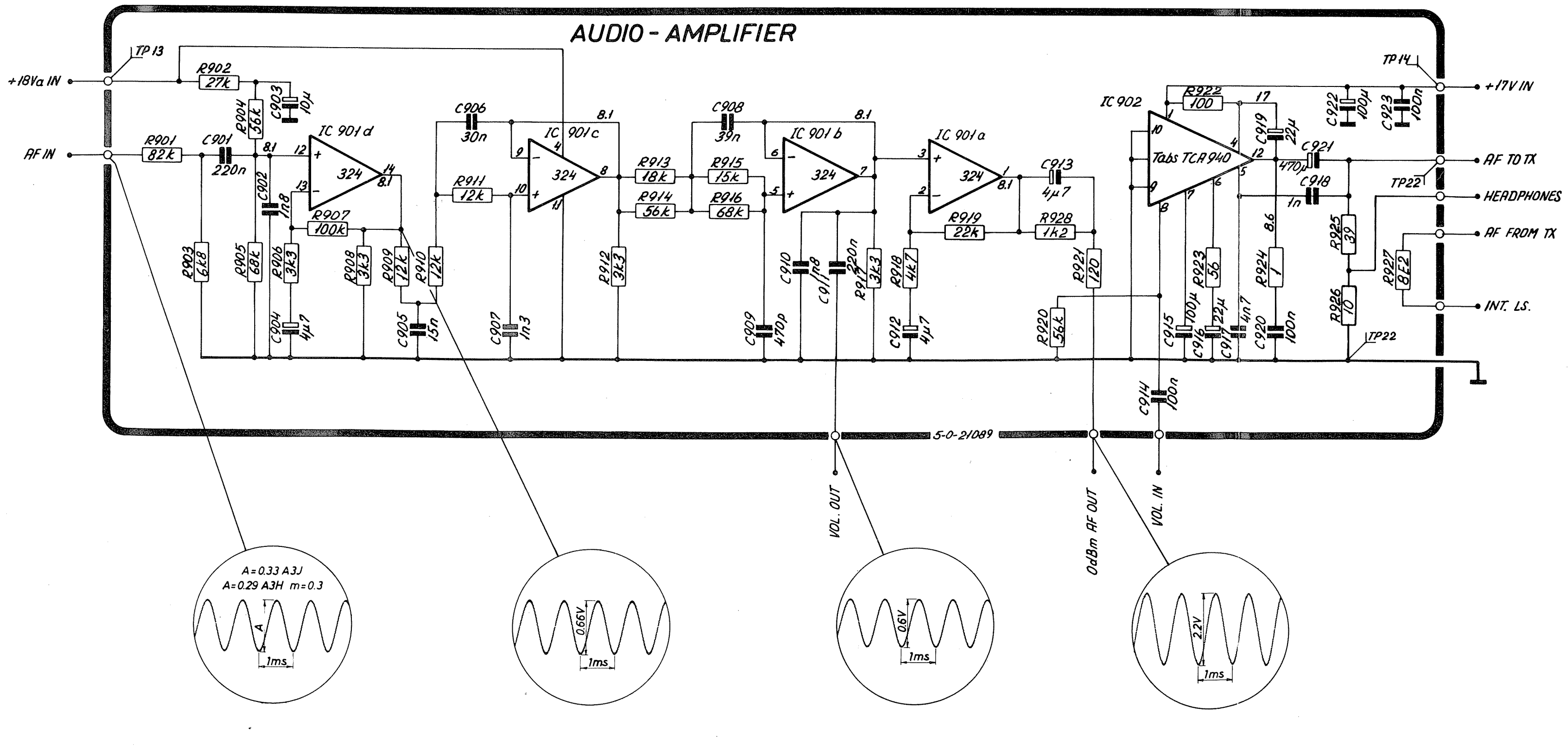
T811.

D2,






AF TO Tx .
TP22 .....
IC902 ....
R925 .....
HEADPHONES
AF FROM Tx
INT. LS. .
R912 .....
IC901 ....
R907 .....
AF IN ....
TP22
GROUND
GROUND
R923
+17V IN
TP14
VOL. IN
VOL. OUT
R917
R921
OdBm AF OUT
+18Va IN
TP13


AUDIO - AMPLIFIER
+18Va IN
AF IN
TP13
R902 27k
R901 82k
C901 220n
C903 10µ
R904 56k
IC 901 d
324
R907 100k
C906 30n
IC 901 c
R911 12k
R913 18k
R914 56k
C908 39n
R915 15k
R916 68k
IC 901 b
IC 901 a
C913 4µ7
R919 22k
R928 1k2
IC 902
R922 100
Tabs TCA 940
C921 470µ
C918 1n
C922 100µ
C923 100n
TP 14
+17V IN
AF TO TX
TP22
HEADPHONES
AF FROM TX
INT. LS.
R925 39
R926 10
R927 8E2
5-0-21089
VOL. OUT
OdBm AF OUT
VOL. IN
C914 100n
A = 0.33 A3J
A = 0.29 A3H m = 0.3
1ms
0.66V
0.6V
2.2V

CIRCUIT DESCRIPTION FOR DIVIDER UNIT R1119 & R1120

This unit contains the logic part of phase locked LOOP 1 and phase locked LOOP 2.

The 10 MHz reference oscillator (TCXO), reference divider, 2 MHz spectrum generator, 600 kHz carrier generator, programmable dividers for LOOP 1 and LOOP 2, the phase/frequency detectors for LOOP 1 and LOOP 2 and the 10/16 MHz output for the VCXO 1st LOOP 2 MIXER & LOOP 2 FILTER.

10 MHz REFERENCE

The frequency stability of the receiver is related to the 10 MHz TCXO XO1001. The 10 MHz reference signal is amplified in the transistors T1004 and T1005.

REFERENCE DIVIDER

The counters IC1015, IC1011 and IC1007 divides the 10 MHz reference signal down to respectively f_{R1} = 1 kHz and f_{R2} = 100 Hz.

2 MHz HARMONIC SPECTRUM GENERATOR

With a repetition frequency of 2 MHz the output Q_D of IC1015 goes low and the nand-gates in IC1014 will generate a narrow pulse due to the delay-time in the gates.

600 kHz GENERATOR

The output on IC1011 pin 5, Q_B has a high contents of 600 kHz, which is amplified in the transistor T1006 and filter in the tuned circuit L1002, C1021 and C1022.

PROGRAMMABLE DIVIDER FOR LOOP 1

The variable frequency f_{T1} from LOOP 1 MIXER is amplified and shaped in T1001 and IC1009a. Independent of which 2 MHz band used the frequency f_{T1} will vary from 2699 kHz to 4698 kHz as the VCO varies 2 MHz. The programmable divider divides f_{T1} down to 1 kHz (dividing figure N_1), This means that there is 2000 frequencies in each 2 MHz band. The frequency is controlled by the KEYBOARD CONTROL, which encodes the start figure P_1 into the BCD counters IC1001, IC1002, IC1003 and IC1004.

The stop figure S_1 is controlled from the gates IC1008b and IC1009c. When the counter outputs Q_A, Q_B ... etc. equals the stop figure $S_1 + 2$ the J-K flip-flop IC1010b uses 2 clock pulses to load the start figure P_1 into the counters IC1001, IC1002, IC1003 and IC1004. The counter counts down from the start figure P_1 to stop figure S_1 and thus the dividing figure $N_1 = P_1 - S_1$.

LOOP 1 PHASE/FREQUENCY DETECTOR

The reference frequency f_{R1} = 1 kHz and the variable frequency f_{V1} = 1 kHz are fed into the phase/frequency detector IC1006. The phase/frequency detector IC1006 generates an error voltage, which is proportional to frequency or phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the LOOP 1 FILTER & ± 18V SUPPLY UNIT.

PROGRAMMABLE DIVIDER FOR LOOP 2

The variable frequency f_{T2} from the loop 2 mixer is amplified and shaped in T1002 and IC1009b. The frequency f_{T2} will vary between 7.85 kHz and 9.25 kHz depending on the 100 Hz programming. The programmable divider divides f_{T1} down to 100 Hz (dividing figure N_2).

From the KEYBOARD CONTROL the start figure P_2 encodes into the BCD counter IC1005.

The stop figure S_2 is controlled from the gate IC1008a. When the counter outputs Q_A, Q_B, Q_C ... etc. equals the stop figure S_2 - 2 the J-K flip-flop IC1010a uses 2 clock pulses to load the start figure P_2 into the counters IC1005 and IC1012. The counter will count up from the start figure P_2 to the stop figure S_2 and thus the dividing figure is $N_2 = S_2 - P_2$.

LOOP 2 PHASE/FREQUENCY DETECTOR

The reference frequency f_{R2} = 100 Hz and the variable frequency f_{V1} = 100 Hz, are fed into the phase/frequency detector IC1013. The phase/frequency detector IC1013 generates an error voltage proportional to the frequency or the phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the VCXO 1st LOOP 2 MIXER & LOOP 2 FILTER.

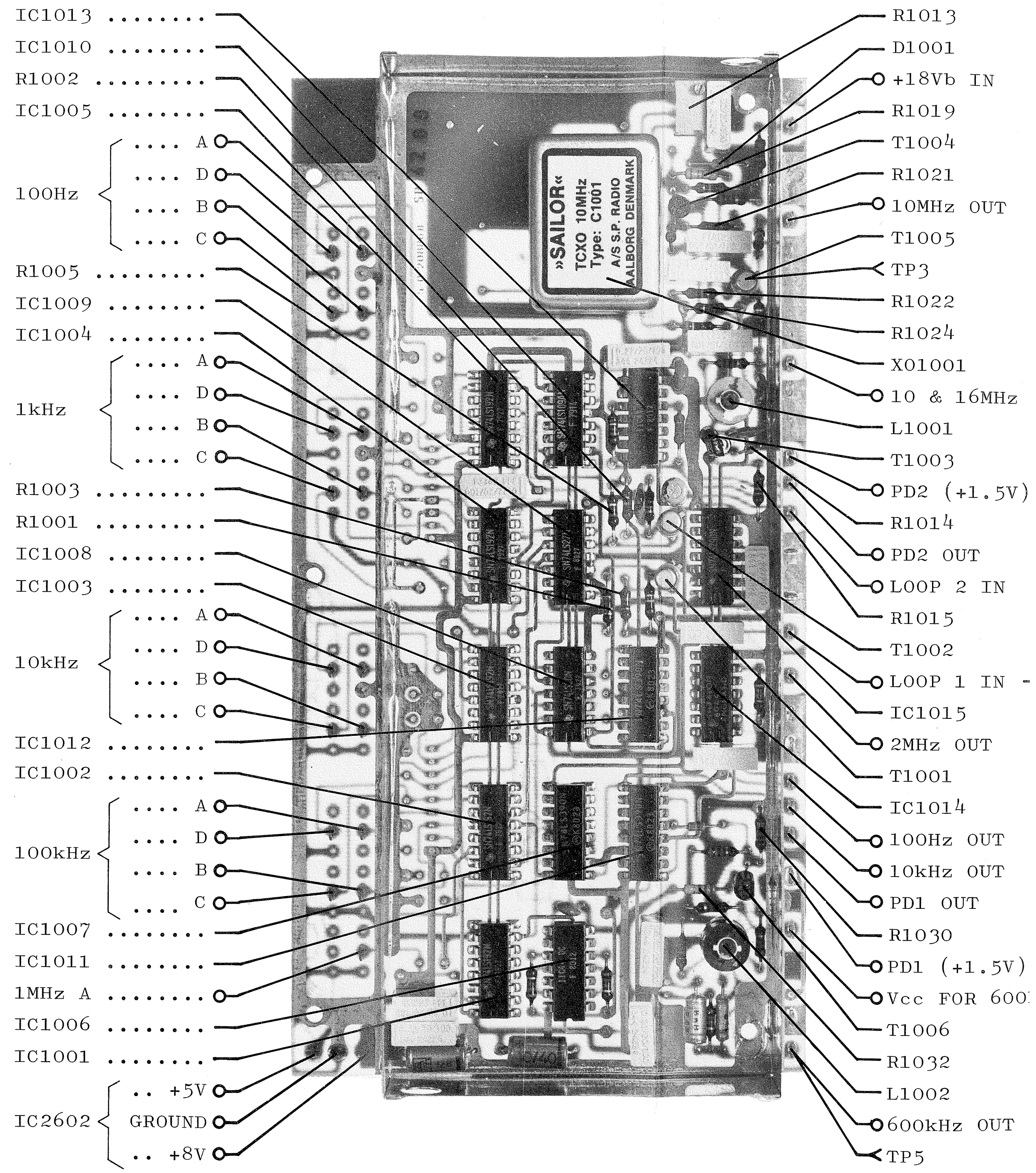
10/16 MHz OUTPUT

The 10 MHz and the 16 MHz outputs are respectively taken from the 10 MHz amplifier T1005 and the 16 MHz tuned amplifier T1003 which is fed from pin 11 of the reference divider IC1015. This output has a high content of 16 MHz. The signals are added in the resistors R1027, R1025 and R1026 and fed to the VCXO 1st LOOP 1 MIXER & LOOP 2 FILTER.

TEST CONDITIONS

Frequency setting	: 2.0005 MHz
Mode	: A3J
Clarifier	: Center position
Oscilloscope input	: Passive probe 10:1
DC voltmeter input	: 10 Mohm

⦿: Diode probe measurements
TP: Testpoints
All voltage statements are typical



CIRCUIT DESCRIPTION LOOP 1 FILTER & ± 18V SUPPLY UNIT R1119 & R1120

This unit contains two regulated power supplies ±18V with fold-back current limiter, the complete integrator and filter for LOOP 1.

-18V SUPPLY

The series transistor T1103 supplies a -18V output controlled by the current flow into its base from T1105, where a portion of the output voltage, via a voltage divider containing R1110, is compared to a reference voltage created by R1103, D1102 and D1103. The fold-back is within the circuit. When the output current from the regulator increases the base current must increase too, but this current is limited by R1103. When the regulator reaches this limit, T1105 stops conducting and so it folds back. To ensure that T1103 starts conducting R1104 is added.

+18V SUPPLY

The principle of operation for this regulator is exactly as described above, with an additional current limiter containing T1104 and T1106 to ensure the fold-back characteristic is maintained within design limits. To ensure start-up R1112 is added.

INTEGRATOR & LOOP 1 FILTER

The integrator is built-up around IC1102, the integration capacitor is C1113. R1120 feeds current into the diode coupled Darlington pair in the phase comparator MC4044 on the divider board to perform the 1.5V reference. Output from the integrator pin 6 on IC1102 feeds into the active low pass filter IC1101 to filter out the 1 kHz ripple from the phase comparator. The voltage divider R1118 and R1119 connected to IC1102 via D1106 ensure that the output voltage swing is within approx. -4V to -17V.

TEST CONDITIONS

Frequency setting	:	2.0005 MHz
Oscilloscope input	:	Passive probe 10:1
DC voltmeter input	:	10 Mohm

⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical

LOOP 1 PHASE/FREQUENCY DETECTOR

The reference frequency f_{R1} = 1 kHz and the variable frequency f_{V1} = 1 kHz are fed into the phase/frequency detector IC1006. The phase/frequency detector IC1006 generates an error voltage, which is proportional to frequency or phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the LOOP 1 FILTER & ± 18V SUPPLY UNIT.

PROGRAMMABLE DIVIDER FOR LOOP 2

The variable frequency f_{T2} from the loop 2 mixer is amplified and shaped in T1002 and IC1009b. The frequency f_{T2} will vary between 7.85 kHz and 9.25 kHz depending on the 100 Hz programming. The programmable divider divides f_{T1} down to 100 Hz (dividing figure N_2).

From the KEYBOARD CONTROL the start figure P_2 encodes into the BCD counter IC1005.

The stop figure S_2 is controlled from the gate IC1008a. When the counter outputs Q_A, Q_B, Q_C ... etc. equals the stop figure S_2 - 2 the J-K flip-flop IC1010a uses 2 clock pulses to load the start figure P_2 into the counters IC1005 and IC1012. The counter will count up from the start figure P_2 to the stop figure S_2 and thus the dividing figure is $N_2 = S_2 - P_2$.

LOOP 2 PHASE/FREQUENCY DETECTOR

The reference frequency f_{R2} = 100 Hz and the variable frequency f_{V1} = 100 Hz, are fed into the phase/frequency detector IC1013. The phase/frequency detector IC1013 generates an error voltage proportional to the frequency or the phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the VCXO 1st LOOP 2 MIXER & LOOP 2 FILTER.

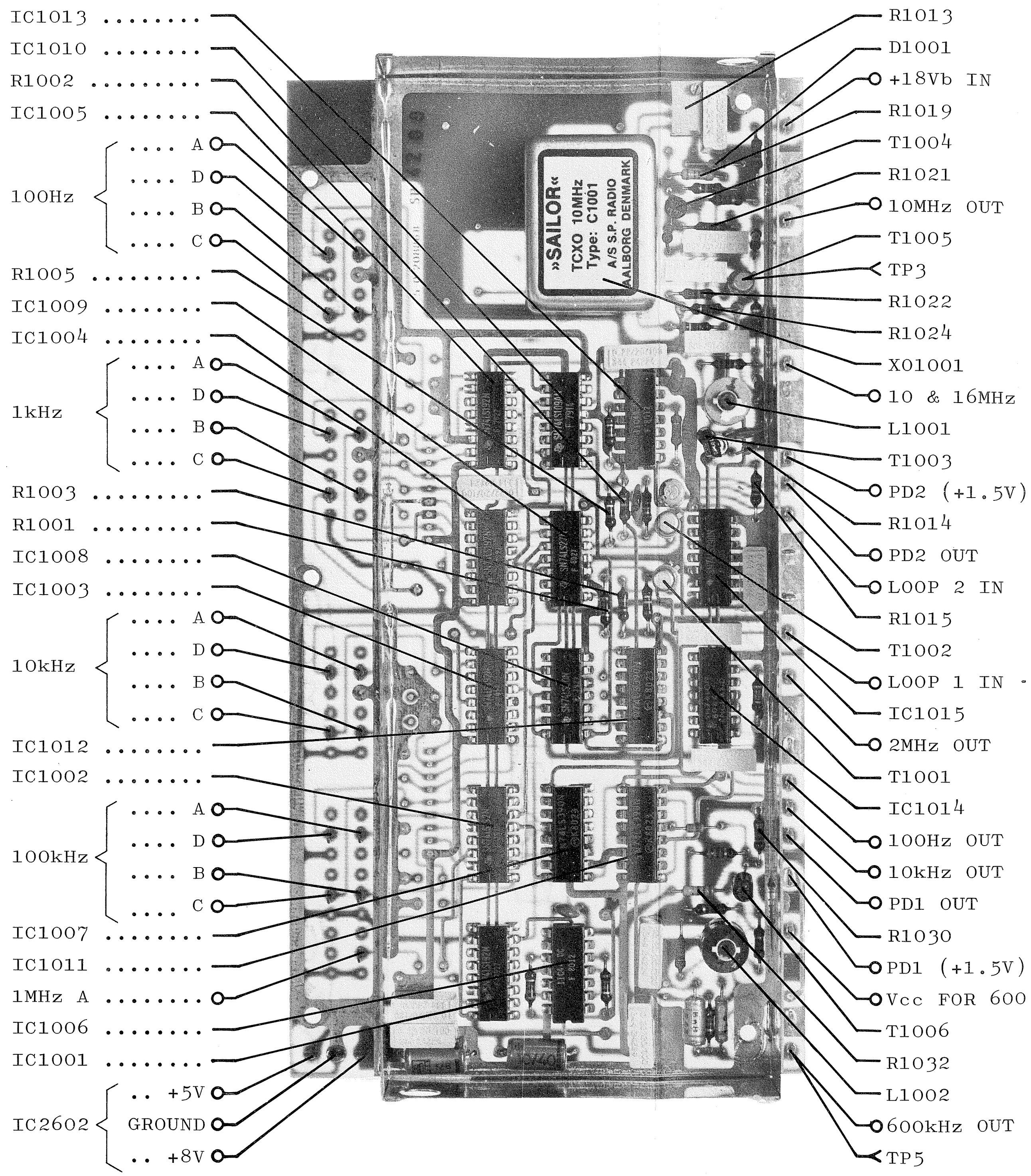
10/16 MHz OUTPUT

The 10 MHz and the 16 MHz outputs are respectively taken from the 10 MHz amplifier T1005 and the 16 MHz tuned amplifier T1003 which is fed from pin 11 of the reference divider IC1015. This output has a high content of 16 MHz. The signals are added in the resistors R1027, R1025 and R1026 and fed to the VCXO 1st LOOP 1 MIXER & LOOP 2 FILTER.

TEST CONDITIONS

Frequency setting	: 2.0005 MHz
Mode	: A3J
Clarifier	: Center position
Oscilloscope input	: Passive probe 10:1
DC voltmeter input	: 10 Mohm

⦿: Diode probe measurements
TP: Testpoints
All voltage statements are typical



CIRCUIT DESCRIPTION LOOP 1 FILTER & ± 18V SUPPLY UNIT R1119 & R1120

This unit contains two regulated power supplies ±18V with fold-back current limiter, the complete integrator and filter for LOOP 1.

-18V SUPPLY

The series transistor T1103 supplies a -18V output controlled by the current flow into its base from T1105, where a portion of the output voltage, via a voltage divider containing R1110, is compared to a reference voltage created by R1103, D1102 and D1103. The fold-back is within the circuit. When the output current from the regulator increases the base current must increase too, but this current is limited by R1103. When the regulator reaches this limit, T1105 stops conducting and so it folds back. To ensure that T1103 starts conducting R1104 is added.

+18V SUPPLY

The principle of operation for this regulator is exactly as described above, with an additional current limiter containing T1104 and T1106 to ensure the fold-back characteristic is maintained within design limits. To ensure start-up R1112 is added.

INTEGRATOR & LOOP 1 FILTER

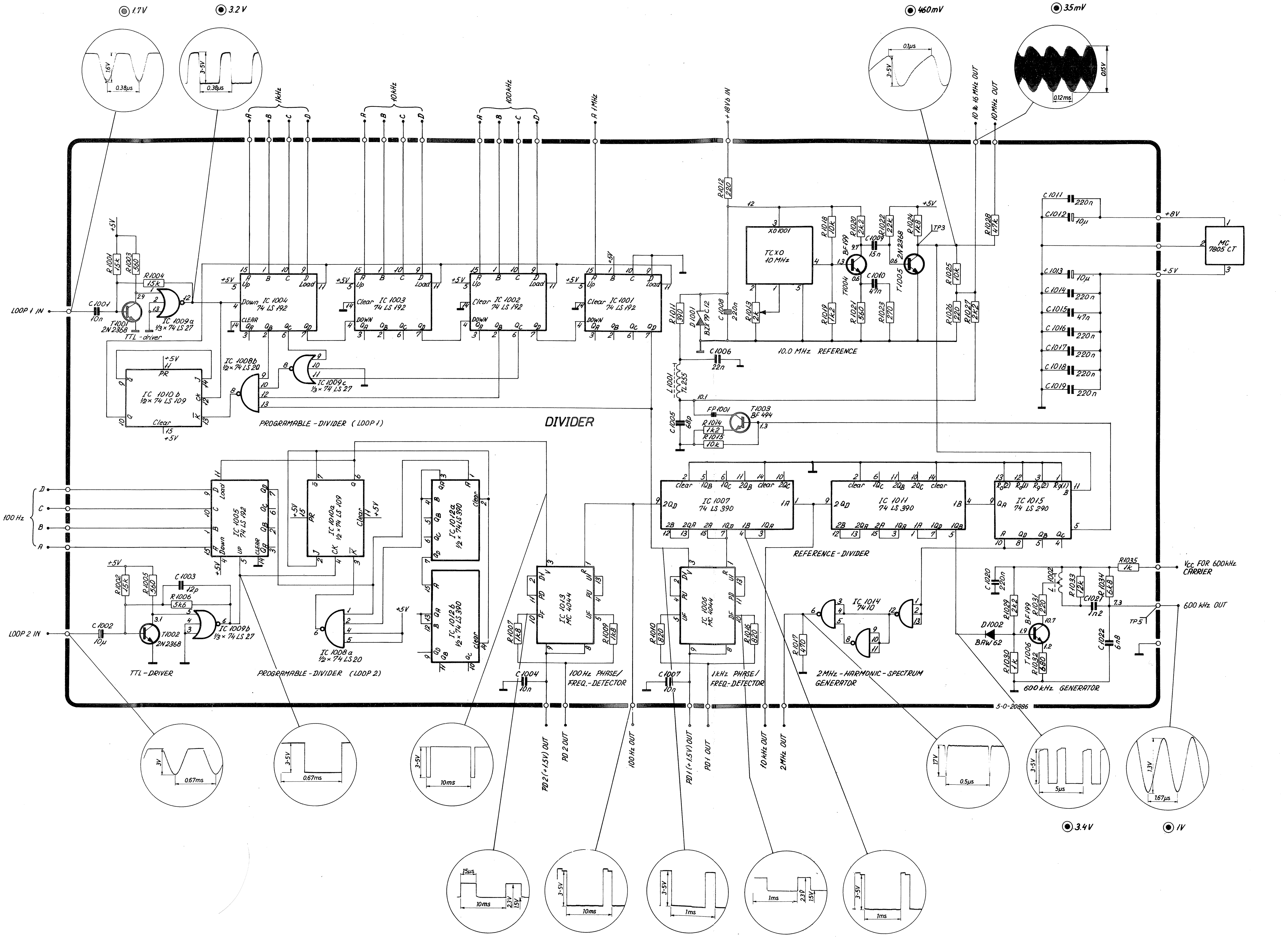
The integrator is built-up around IC1102, the integration capacitor is C1113. R1120 feeds current into the diode coupled Darlington pair in the phase comparator MC4044 on the divider board to perform the 1.5V reference. Output from the integrator pin 6 on IC1102 feeds into the active low pass filter IC1101 to filter out the 1 kHz ripple from the phase comparator. The voltage divider R1118 and R1119 connected to IC1102 via D1106 ensure that the output voltage swing is within approx. -4V to -17V.

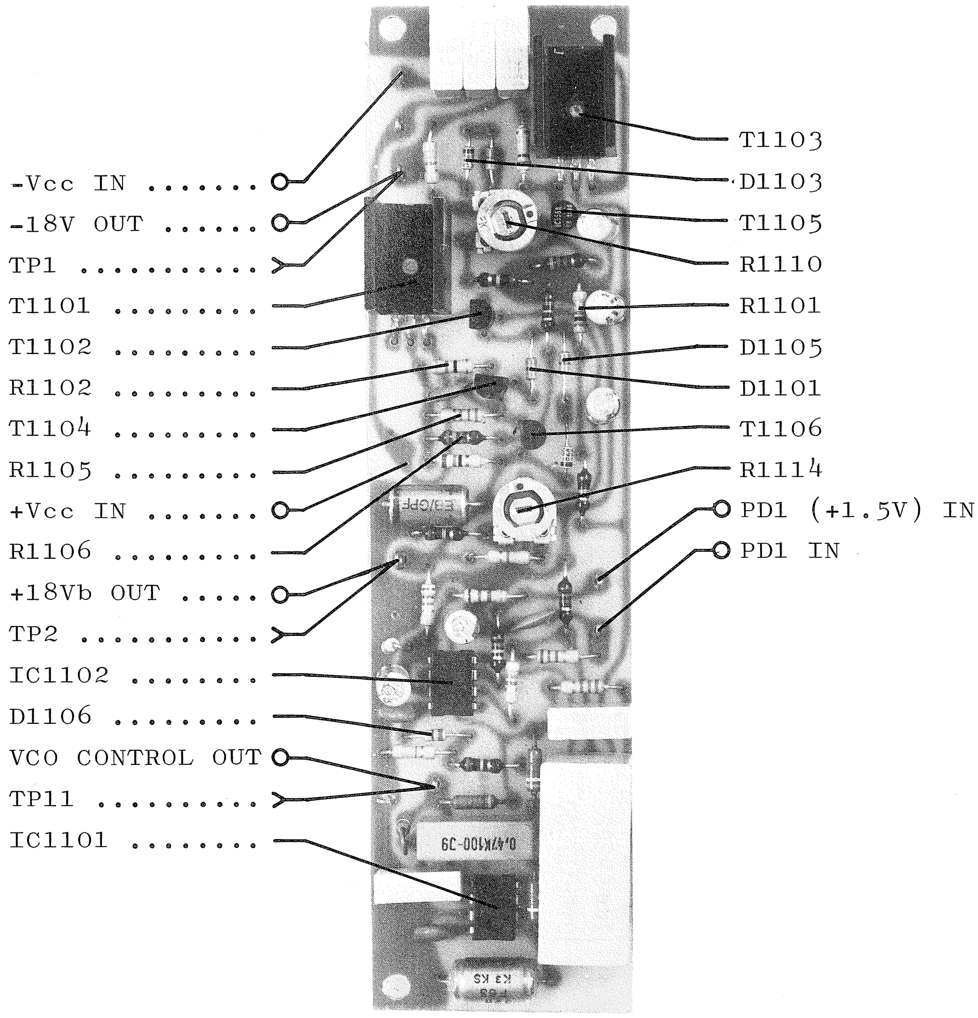
TEST CONDITIONS

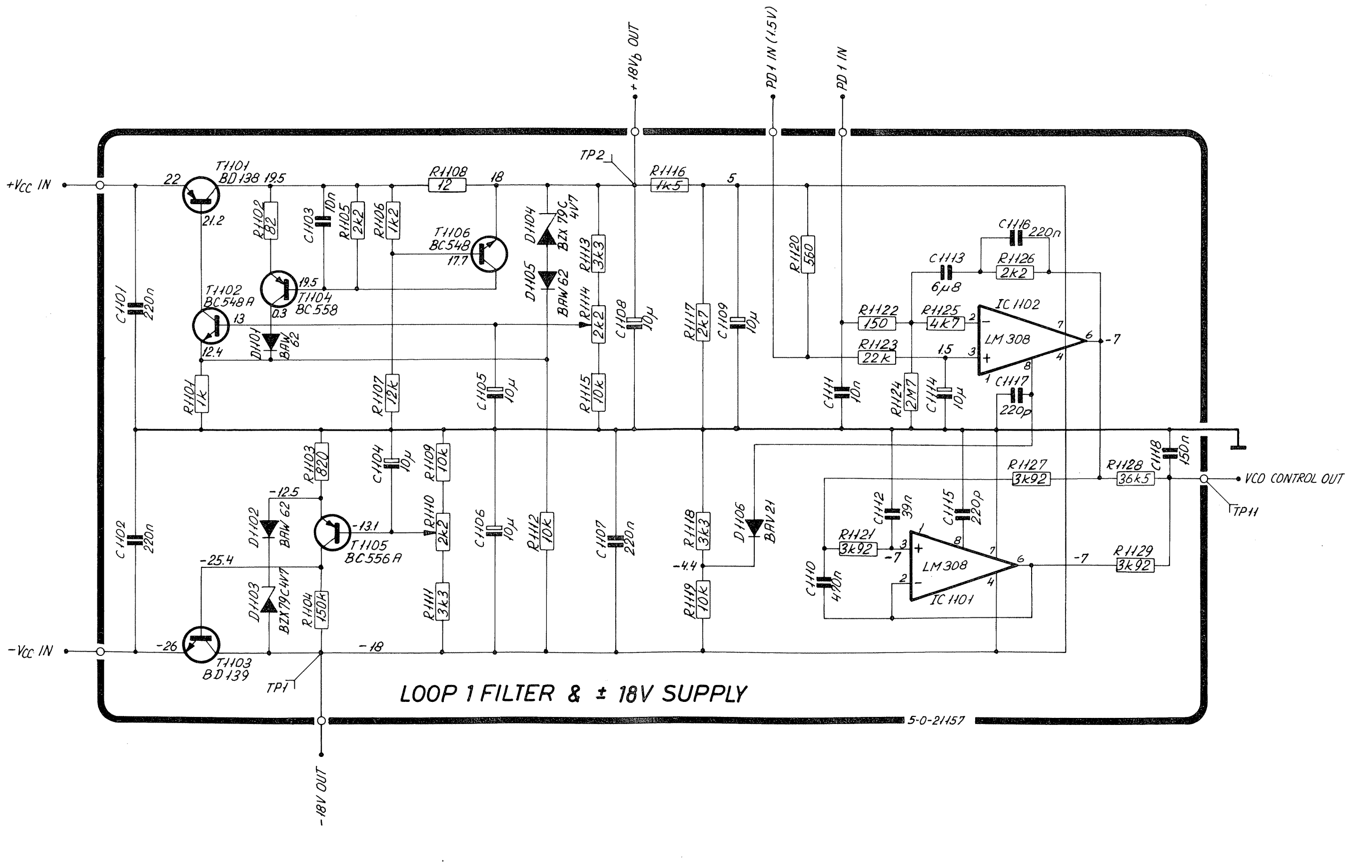
Frequency setting	: 2.0005 MHz
Oscilloscope input	: Passive probe 10:1
DC voltmeter input	: 10 Mohm

⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical

R1013
D1001
+18Vb IN
R1019
T1004
R1021
10MHz OUT
T1005
TP3
R1022
R1024
X01001
10 & 16MHz OUT
L1001
T1003
PD2 (+1.5V) OUT
R1014
PD2 OUT
LOOP 2 IN
R1015
T1002
LOOP 1 IN TP28
IC1015
2MHz OUT
T1001
IC1014
100Hz OUT
10kHz OUT
PD1 OUT
R1030
PD1 (+1.5V) OUT
Vcc FOR 600kHz CARRIER
T1006
R1032
L1002
600kHz OUT
TP5





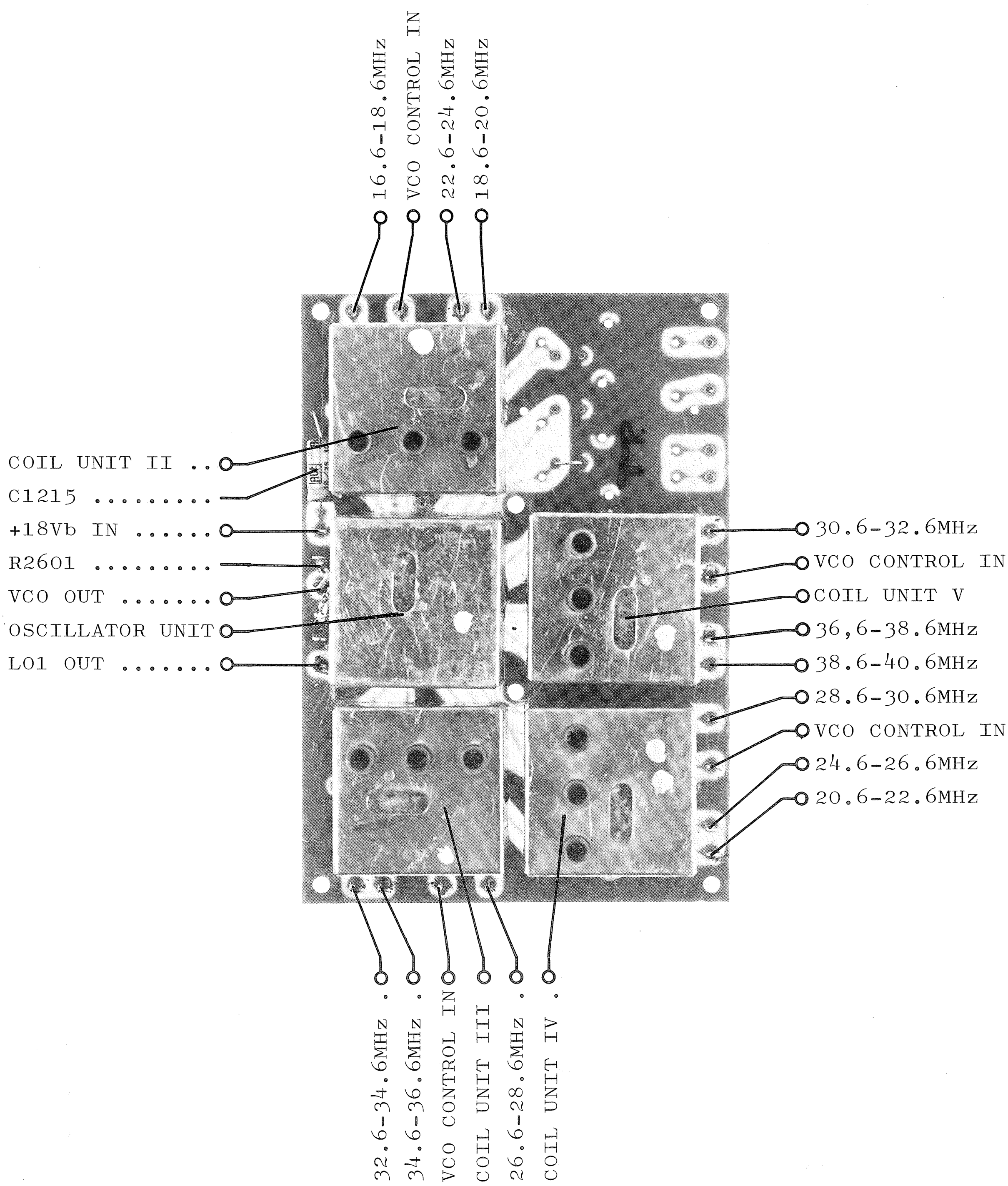


LOOP 1 FILTER & ± 18V SUPPLY

CIRCUIT DESCRIPTION VCO-UNIT R1119 & R1120

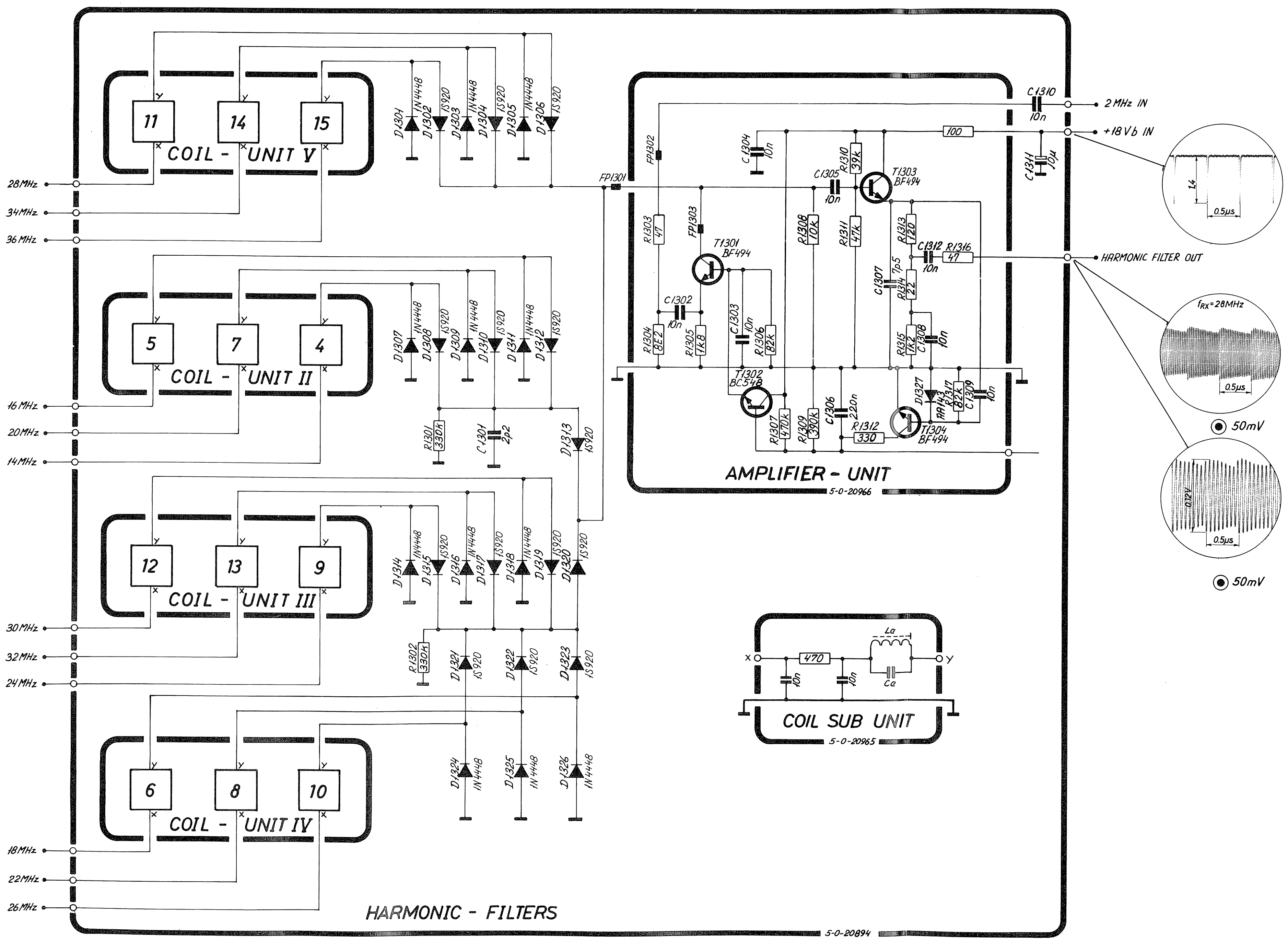
This unit contains in principle twelve VCO's constructed in such a way that it contains one single oscillator unit and twelve coil units switched in and out by the diodes D1201 to D1226. The oscillator circuit is made up of T1201 and T1203, the output signal is fed through the buffer amplifier T1204. The signal current in T1204 is measured by the level detector C1209, R1208 and D1227 and T1202 it regulates the oscillator amplitude to maintain a constant output voltage.

The oscillator unit is factory adjusted and sealed and cannot be repaired in the field, it must be replaced and can be repaired at the factory.



TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical



CIRCUIT DESCRIPTION LOOP 1 MIXER R1119 & R1120

This unit mixes together the VCO signal and the signal from the harmonic filter and filters out the difference frequency to supply the variable divider.

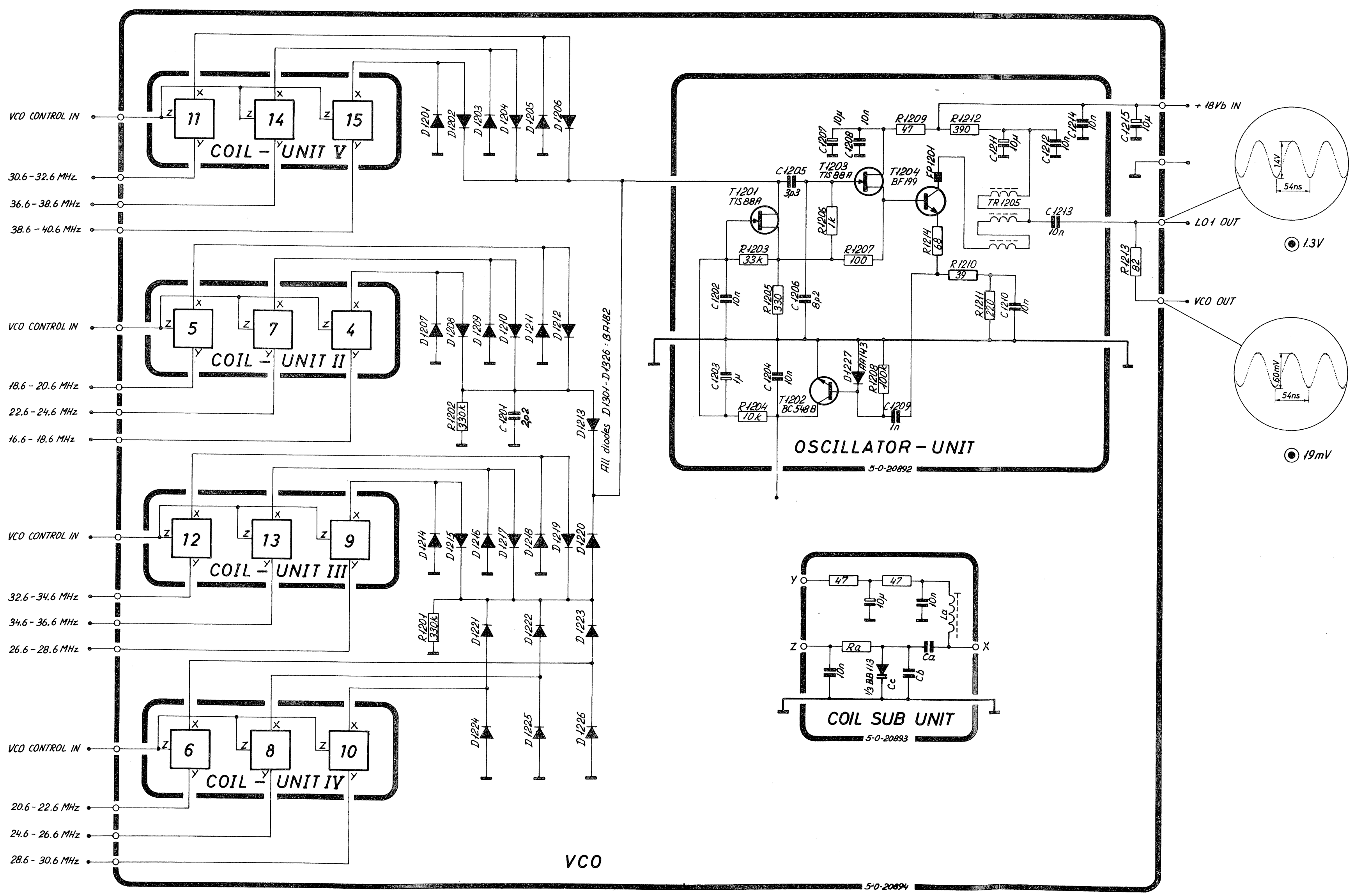
The VCO signal is fed via C1401 to the buffer amplifier T1401 and after that to the integrated balanced mixer IC1401. To this the harmonic filter signal is applied via C1405. Output from the mixer is fed into the combiner transformer TR1401 feeding into the low pass filter containing L1402, L1403, C1410, C1411, C1412 and C1413. This low pass filter filters out the wanted mixing product and prevents the two local-oscillator signals from reaching the variable divider. The filtered signal is amplified in the output amplifier.T1402.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical

TEST CONDITIONS

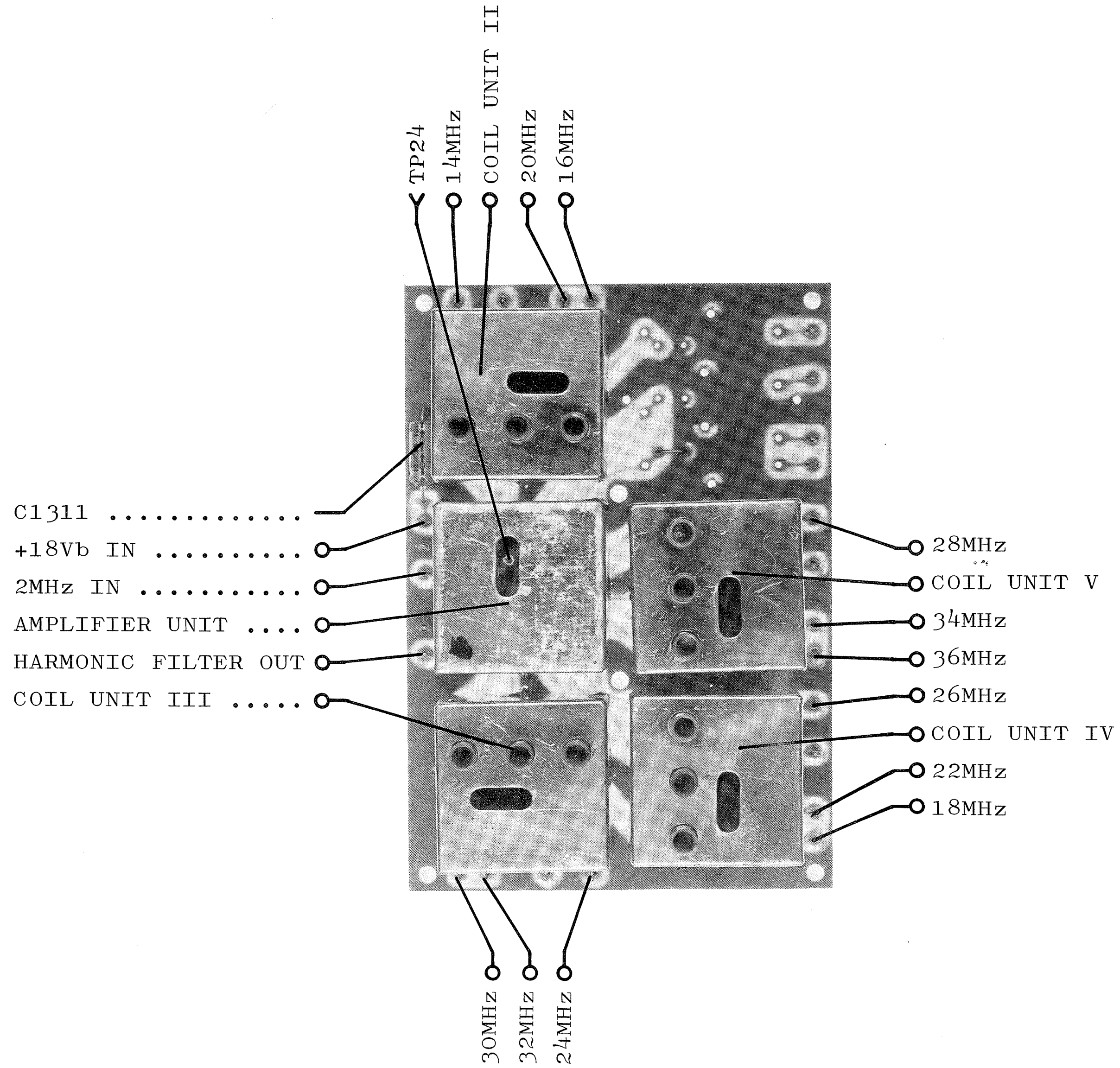
Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⊙: Diode probe measurement
TP: Testpoint
All voltage statements are typical

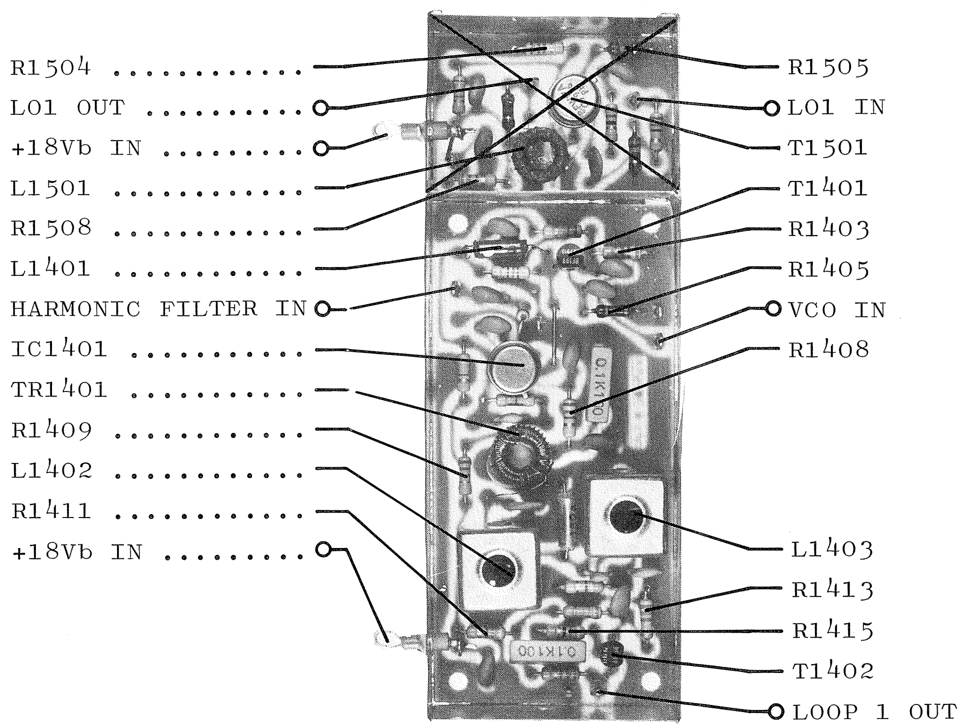


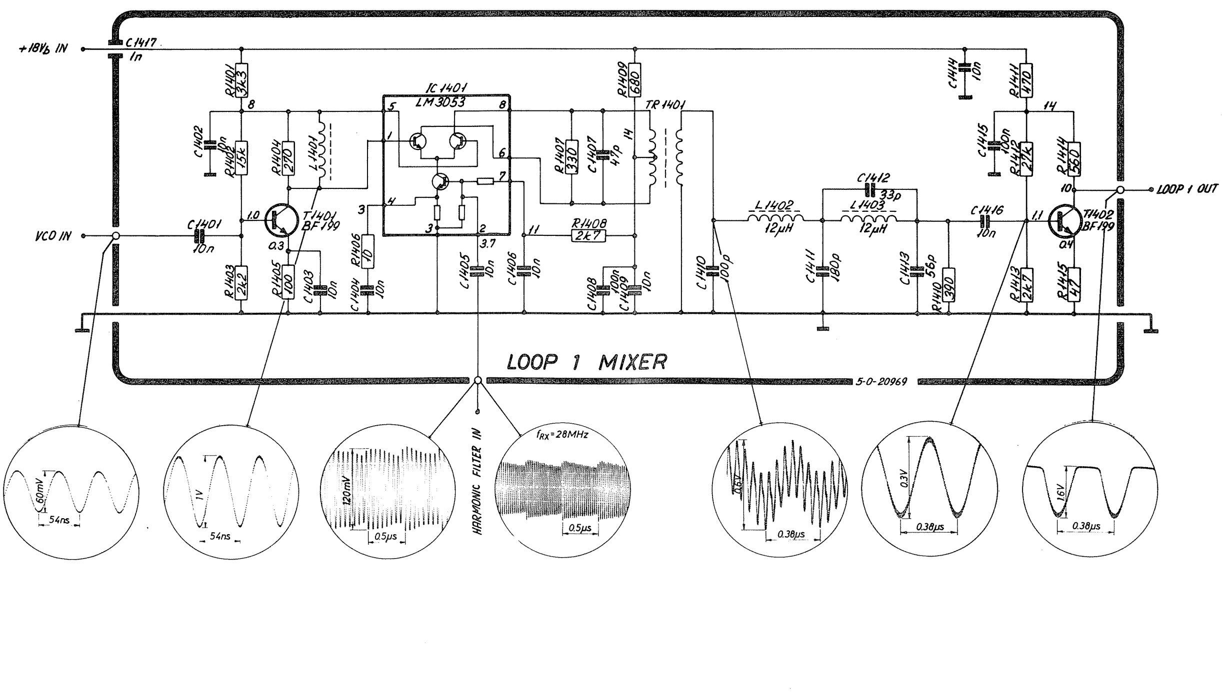
CIRCUIT DESCRIPTION HARMONIC FILTER UNIT R1119 & R1120

This unit is a tuned amplifier, it receives 2 MHz impulses from the divider board and filters out the wanted harmonic with a tuned circuit. On the board there is one single amplifier and twelve coil units switched in and out by the diodes D1301 to D1326. The tuned amplifier is T1301 feeding into the source follower T1302. The output voltage is measured by the level detector C1309, R1308 and D1328 and via T1303 it regulates the transconductance in T1301 to maintain a constant output voltage.

The harmonic filter unit is factory adjusted and sealed and cannot be repaired in the field. It must be replaced and can be repaired at the factory.




R1504
LO1 OUT
+18Vb IN
L1501
R1508
L1401
HARMONIC FILTER IN
IC1401
TR1401
R1409
L1402
R1411
+18Vb IN
R1505
LO1 IN
T1501
T1401
R1403
R1405
VCO IN
R1408
L1403
R1413
R1415
T1402
LOOP 1 OUT


+18Vb IN
VCO IN
LOOP 1 OUT
IC1401
LM3053
TR1401
T1401
BF199
T1402
BF199
HARMONIC FILTER IN
LOOP 1 MIXER
5-0-20969

CIRCUIT DESCRIPTION VCO-BUFFER R1119 & R1120

This unit contains the VCO buffer amplifier.

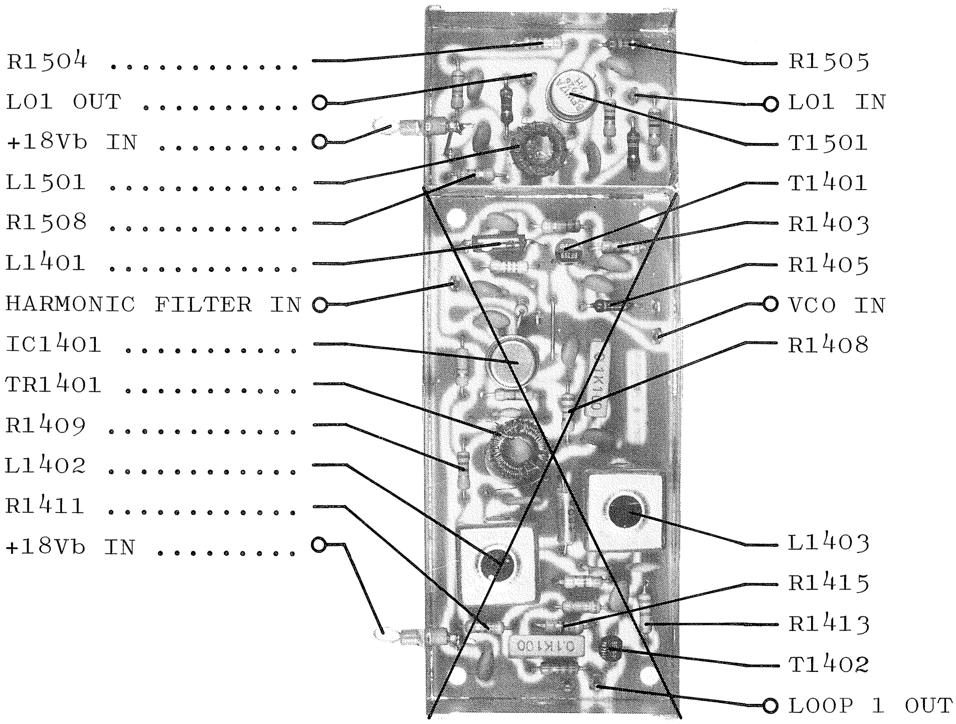
The signal from the VCO-UNIT enters the base of T1501 via the frequency compensating capacitor C1502. Capacitor C1503 and resistor R1506 are part of the frequency compensating circuit.

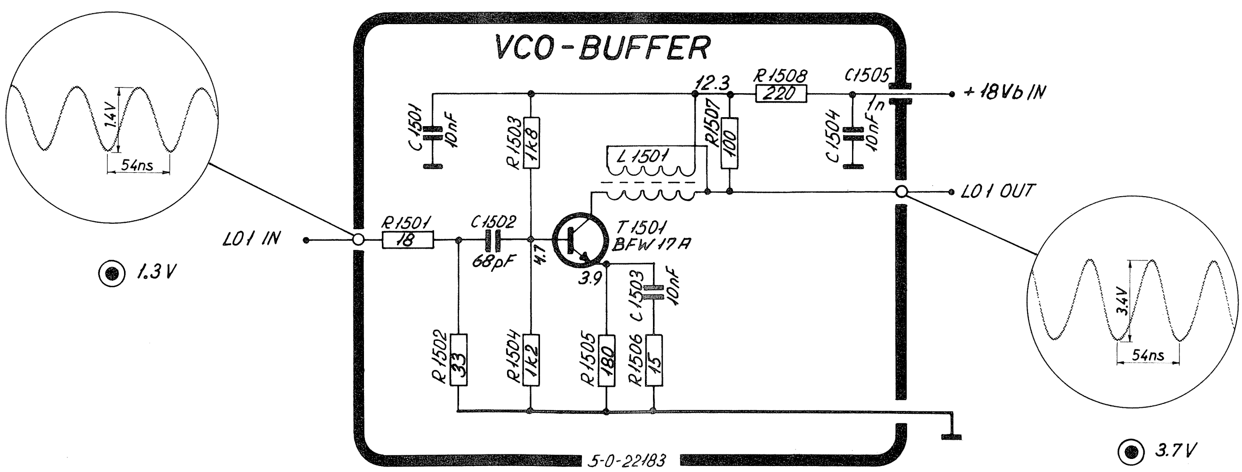
From the collector of T1501 the signal is fed to the 1st & 2nd MIXER circuit board via the impedance step down transformer L1501.

TEST CONDITIONS

Frequency setting	:	2.0005 MHz
Oscilloscope input	:	Passive probe 10:1
DC voltmeter input	:	10 Mohm

⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical


R1504
LO1 OUT
+18Vb IN
L1501
R1508
L1401
HARMONIC FILTER IN
IC1401
TR1401
R1409
L1402
R1411
+18Vb IN
R1505
LO1 IN
T1501
T1401
R1403
R1405
VCO IN
R1408
L1403
R1415
R1413
T1402
LOOP 1 OUT


VCO-BUFFER
1.4V
54ns
1.3V
LO1 IN
R1501
18
C1502
68pF
4.7
C1501
10nF
R1503
1k8
12.3
R1508
220
C1505
1n
+18Vb IN
R1507
100
C1504
10nF
L1501
LO1 OUT
T1501
BFW17A
3.9
C1503
10nF
R1502
33
R1504
1k2
R1505
180
R1506
15
5-0-22183
3.4V
54ns
3.7V

CIRCUIT DESCRIPTION VCXO 1ST LOOP 2 MIXER & LOOP 2 FILTER R1119 & R1120

This unit contains the LOOP 2 integrator, the summing amplifier, the voltage controlled crystal oscillators (VCXO's) and the first LOOP 2 MIXER.

LOOP 2 INTEGRATOR

The integrator is built-up around IC1601a, the integration capacitor is C1609. R1628 feeds current into the diode coupled Darlington pair in the phase comperator IC1013 on the divider board in order to perform the 1.5V reference voltage. The output from the integrator pin 1 feeds into pin 5 of the summing amplifier.

SUMMING AMPLIFIER

The IC1601b sums up two signals namely the output from the integrator and the informations from the 100 Hz setting. This information is weighed by means of the resistors R1617, R1618, R1619, R1620 and R1621. This summing is done to speed up the LOOP 2 system in the continuous tuning mode.

The output, pin 7 of IC1601b, is fed to the VCXO's via a ripple filter consisting of R1616 and C1614.

VCXO's

The VCXO's are crystal controlled Pierce Collpits oscillators, the frequency of which are tuned of varicap's, D1601, D1605 and D1606.

For receiver frequencies below 14 MHz the 16 MHz oscillator is working and for frequencies above 14 MHz the 10 MHz one is working.

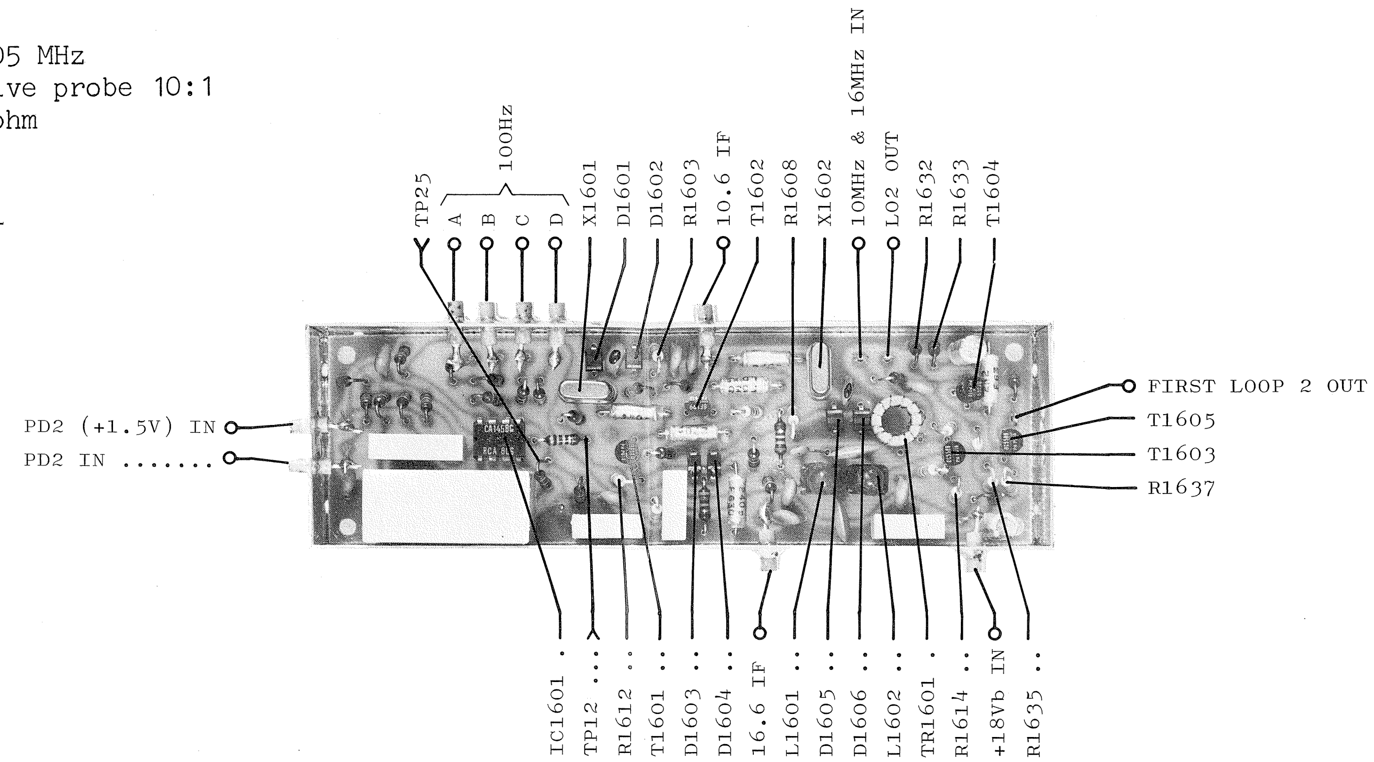
The outputs from the VCXO's are fed to the low pass filter consisting of L1609, L1610, C1612, C1613 and C1616, and then to the buffer amplifier T1603 and out via the impedance step down transformer TR1601 to the 2nd mixer located at the 1st AND 2nd MIXER circuit board. A portion of the oscillator signal is fed to the first loop 2 mixer via R1624.

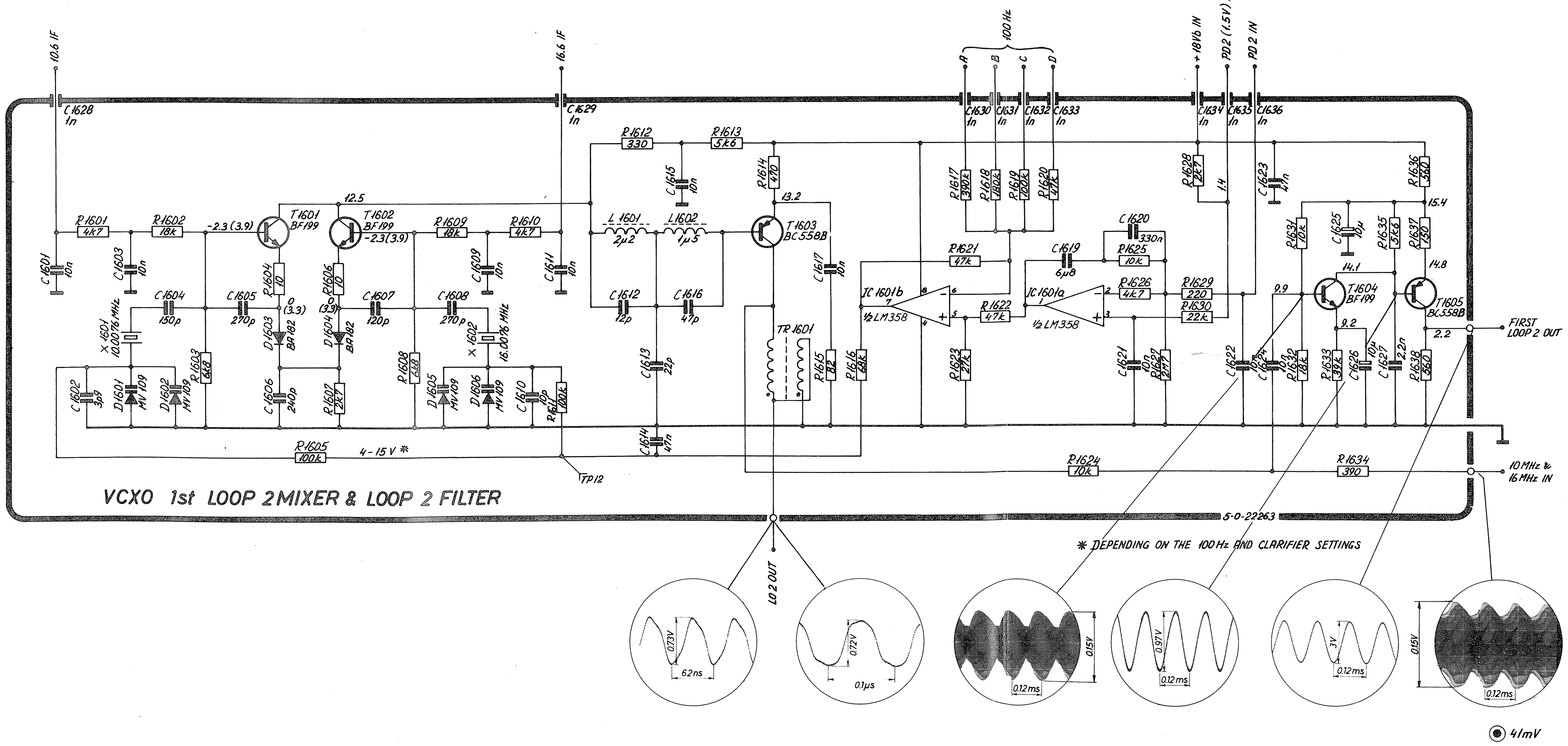
FIRST LOOP 2 MIXER

As mentioned above the VCXO signal is fed into the base of mixer transistor T1604, together with the 10 MHz and 16 MHz signals from the DIVIDER UNIT. Because of the big difference between the mixer frequencies and the output frequency the only filtering needed to filter out the wanted mixing product is R1635 and C1627. The mixer transistor is feeding into the output amplifier T1605.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical





CIRCUIT DESCRIPTION CLARIFIER AND 2ND LOOP 2 MIXER R1119 & R1120

This unit contains the clarifier AF oscillator, 2nd LOOP 2 MIXER and a low pass filter.

AF OSCILLATOR

The AF oscillator consists of the transistor T1701 and the tuned circuit L1701, C1702, C1703 and the clarifier control capacitors C2601, C2602 and C2603. The nominal frequency is 7 kHz (clarifier to center pos.).

2nd LOOP 2 MIXER

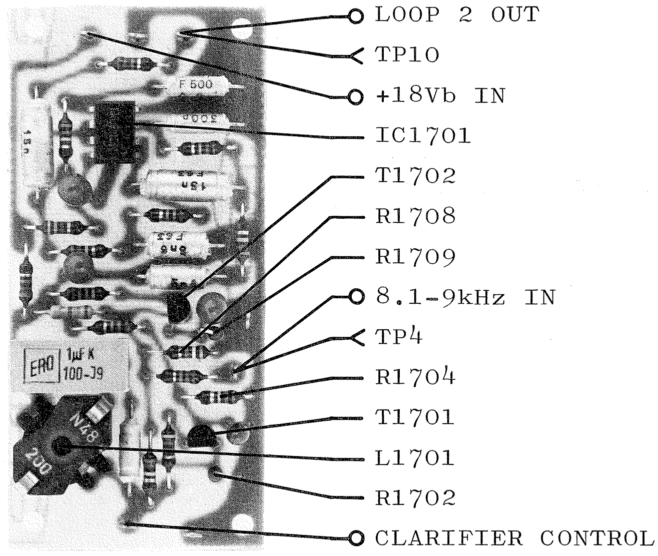
From the collector of T1701 the signal is fed to the base of the 2nd LOOP 2 MIXER T1702, where it is subtracted from the other injection signal, having a nominal frequency range from 8.1 kHz to 9.0 kHz (clarifier to center pos.).

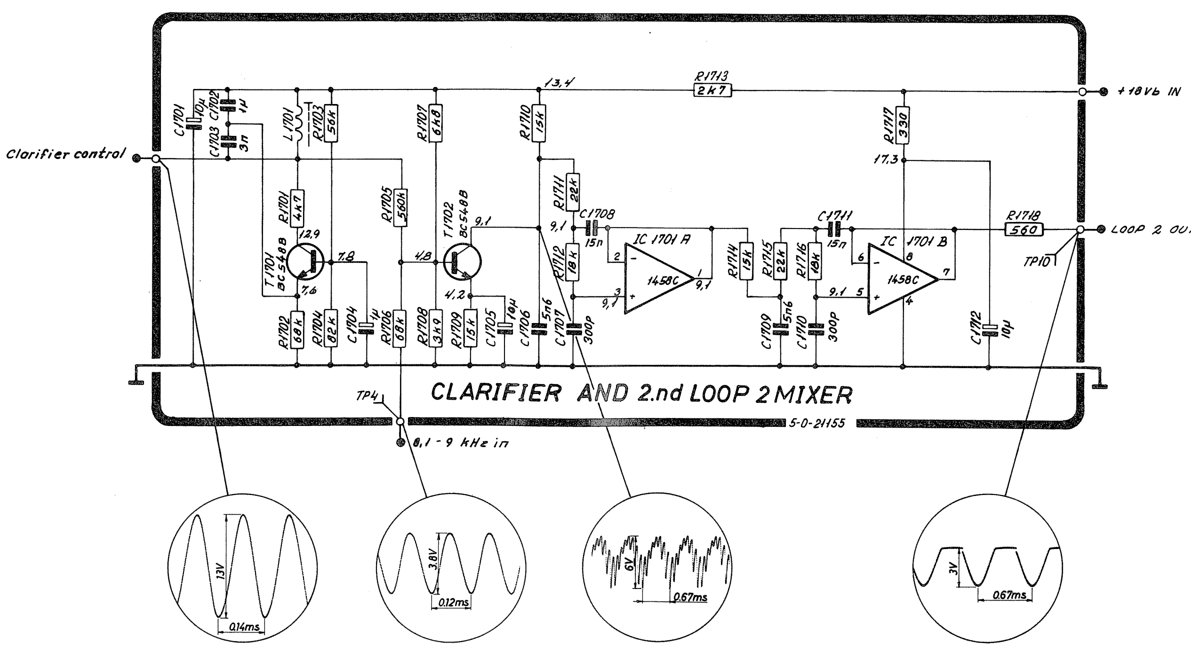
LOW PASS FILTER

The mixed signal on the collector of T1702 is fed to a sixth order active low pass filter with a cut-off frequency of 3.5 kHz, and thus allows the difference frequency to pass through. The nominal output frequency range is 1.1 kHz - 2.0 kHz. The filter is built-up around IC1701A and IC1701B. The output frequency is fed to the programmable divider on the DIVIDER-UNIT.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical


LOOP 2 OUT
TP10
+18Vb IN
IC1701
T1702
R1708
R1709
8.1-9kHz IN
TP4
R1704
T1701
L1701
R1702
CLARIFIER CONTROL


Clarifier control
+18Vb IN
LOOP 2 OUT
TP10
TP4
8,1 - 9 kHz in
CLARIFIER AND 2.nd LOOP 2 MIXER
5-0-21155
R1713 2k7
IC 1701 A
IC 1701 B
1458C
T1701 BC548B
T1702 BC548B
R1718 560
R1717 330
13V
0.14ms
3.8V
0.12ms
6V
0.67ms
3V
0.67ms

CIRCUIT DESCRIPTION BFO R1120

This unit contains the BFO oscillator, BFO mixer and the strapping terminals for the A1 and A2 modes.

BFO

The 9.4 MHz oscillator is a crystal controlled variocap. tuned Pierce Collpits oscillator.

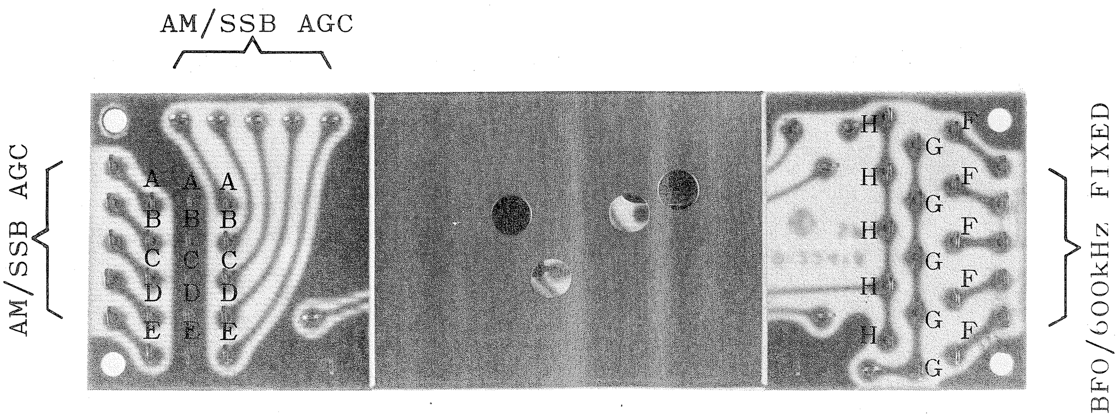
The control voltage for the variocap. is taken from the BFO control R2602.

From the collector of the oscillator transistor T1801 the signal is fed to the mixer T1802.

BFO MIXER

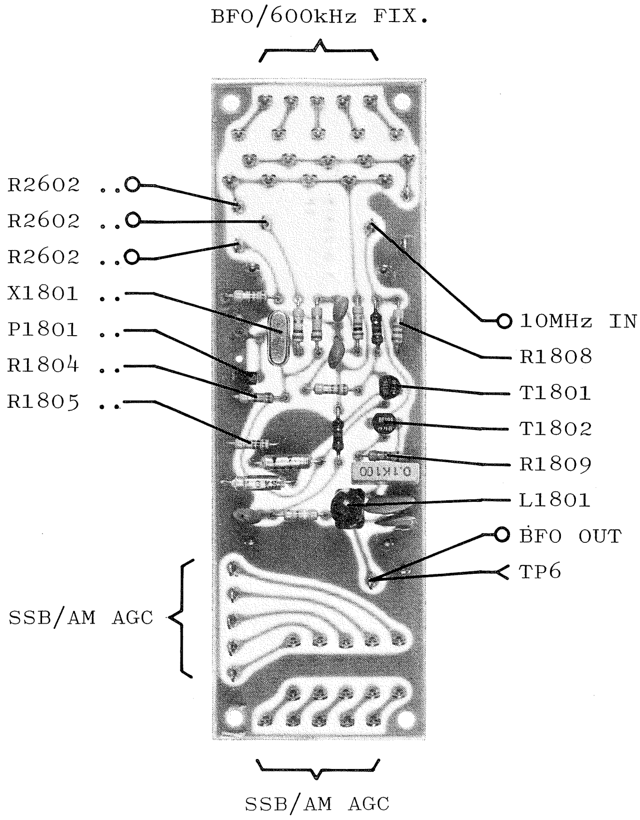
The 9.4 MHz signal from the oscillator T1801 and the 10 MHz signal from the DIVIDER UNIT are mixed in T1802, and the difference is filtered out in the low pass filter consisting of L1801, C1807 and C1809 and fed to the IF AMPLIFIER DETECTOR AND AGC CIRCUIT BOARD.

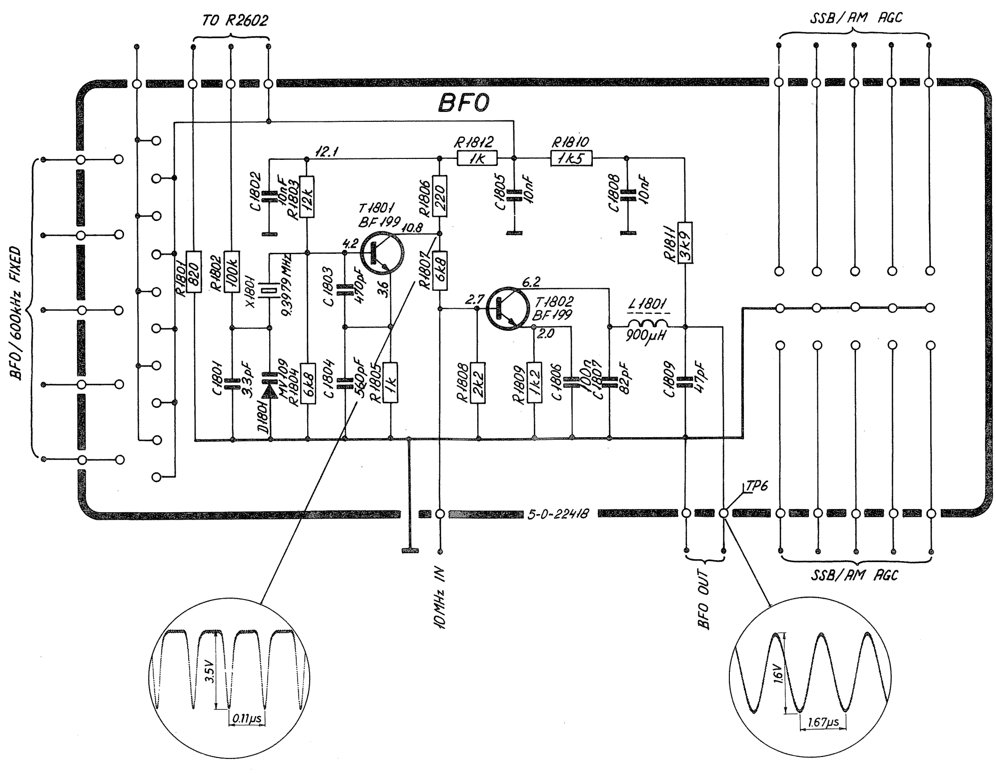
STRAPPING TERMINALS

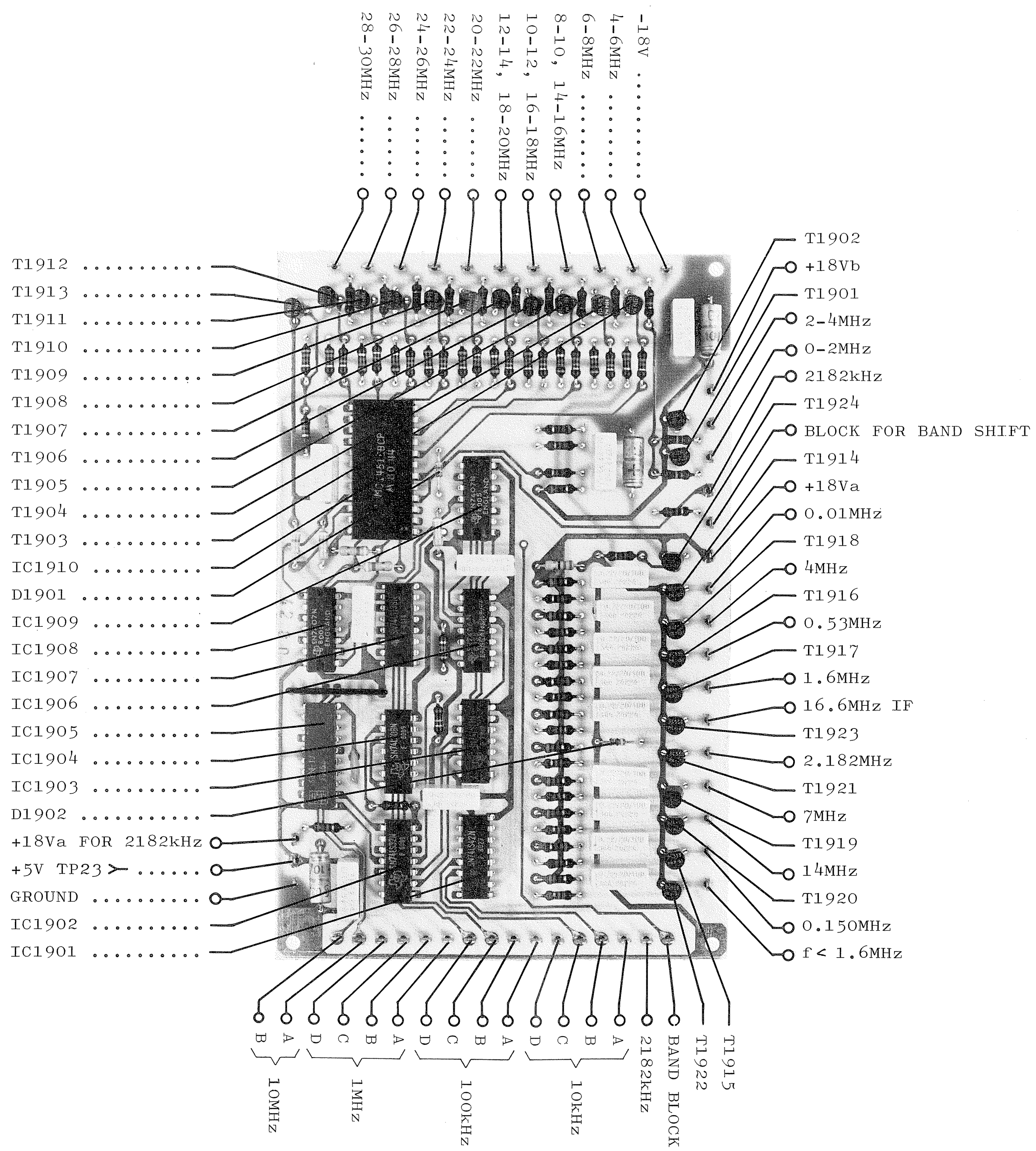


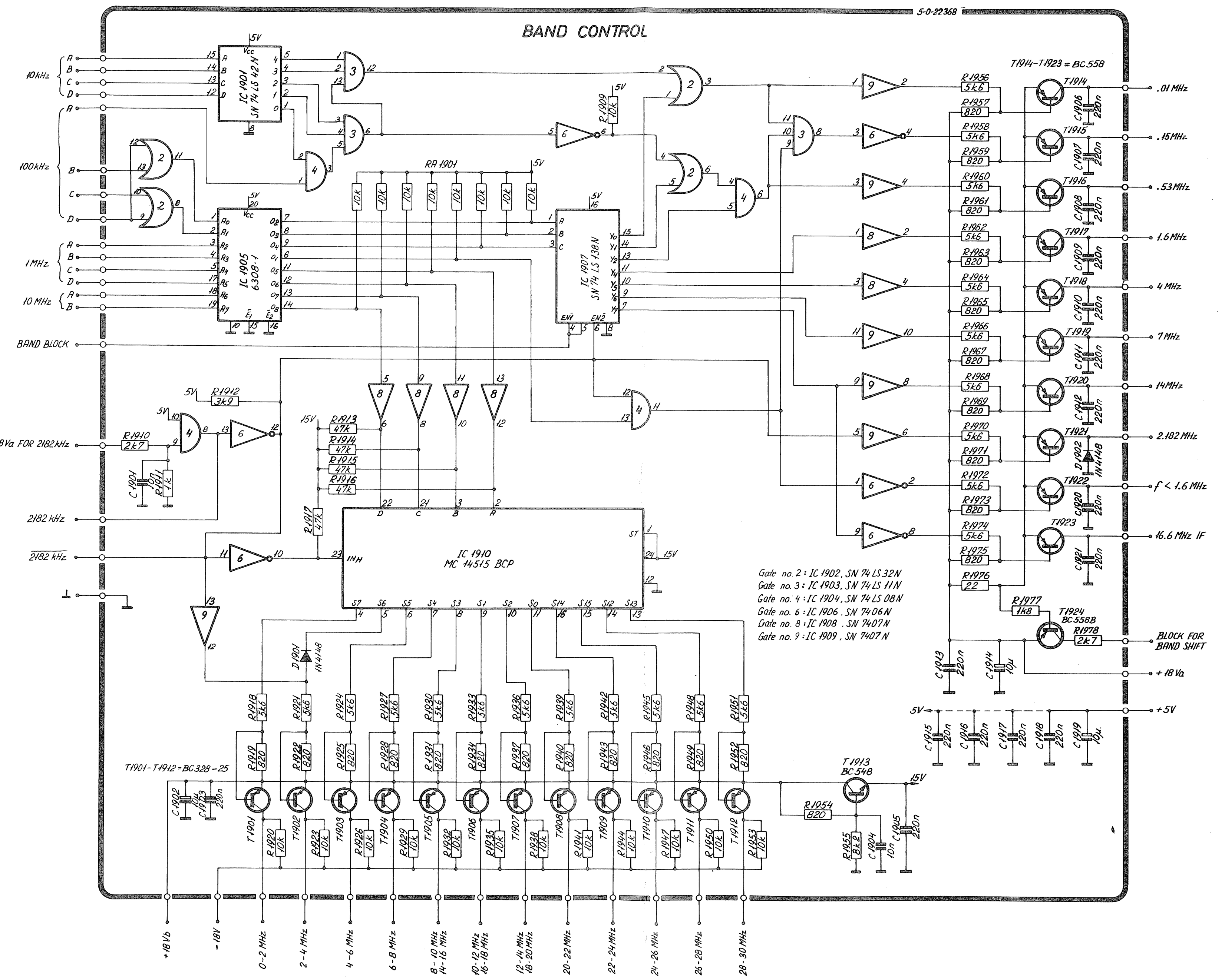
AM/SSB AGC: Are the three identical letters connected, AM AGC is chosen, if no connection, SSB AGC is chosen.

BFO/600 kHz fix: Is F connected to G, 600 kHz fix is chosen, is F connected to H, BFO is chosen.

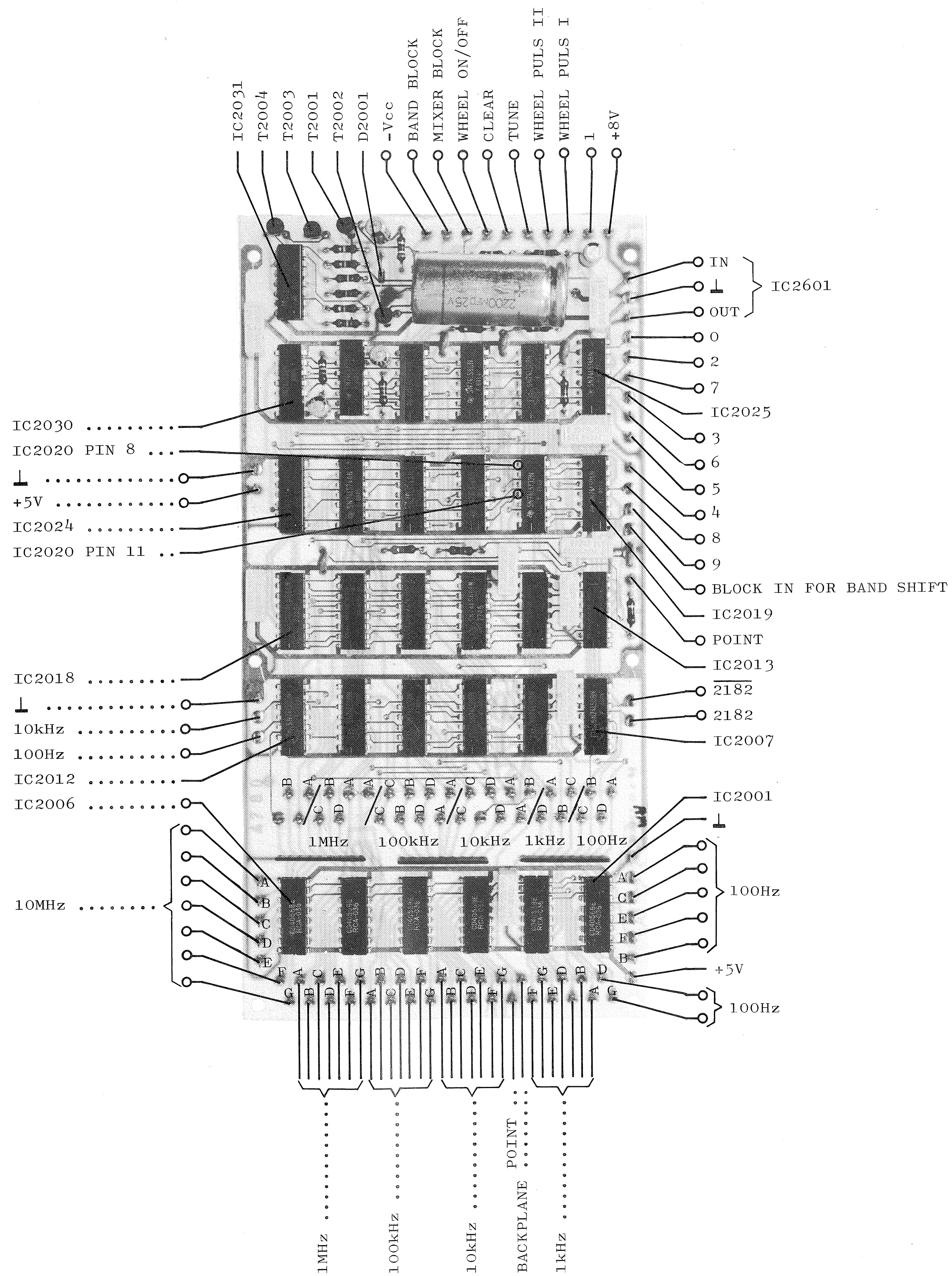

BFO/600kHz FIX.
R2602
R2602
R2602
X1801
P1801
R1804
R1805
10MHz IN
R1808
T1801
T1802
R1809
L1801
BFO OUT
TP6
SSB/AM AGC
SSB/AM AGC

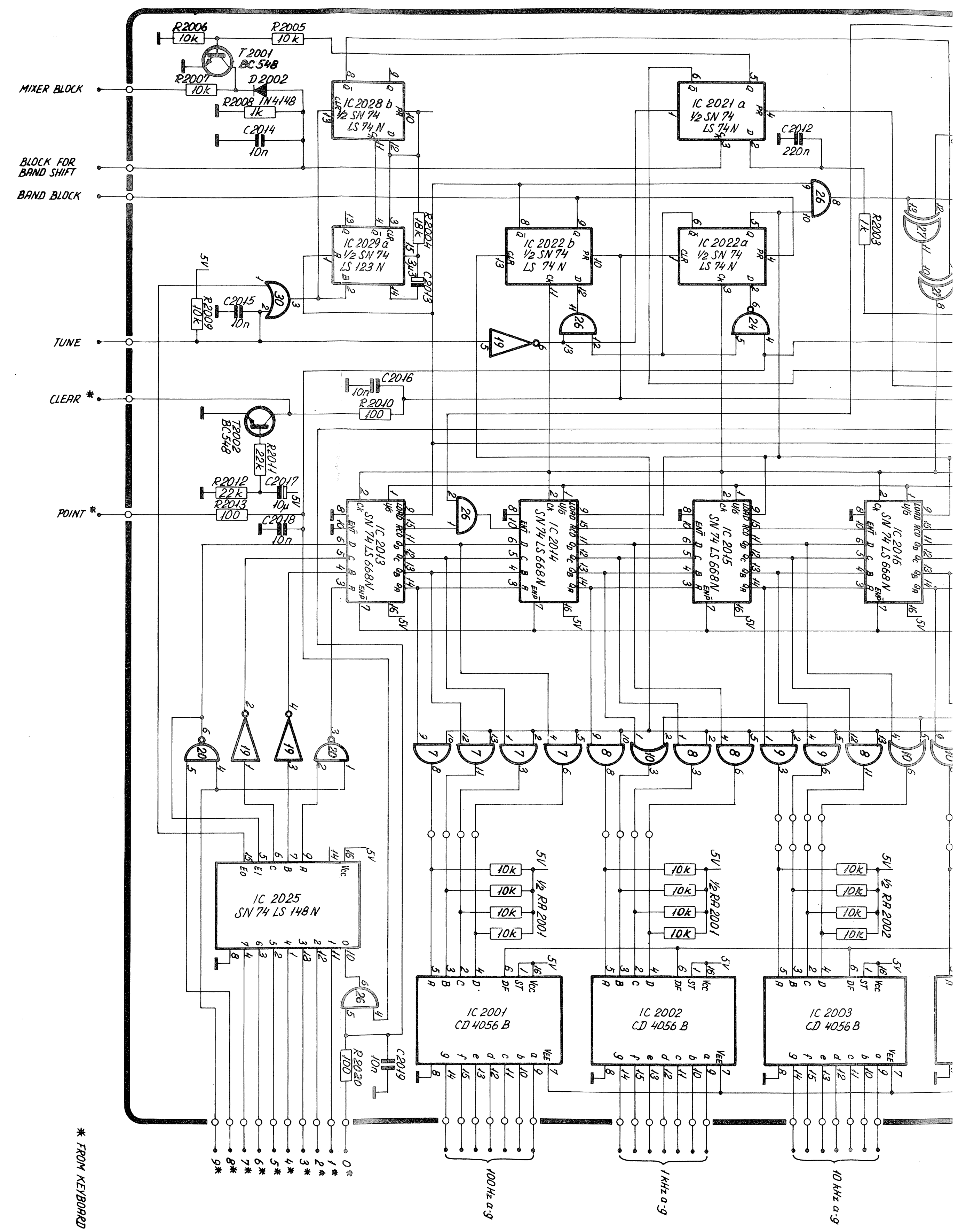

TO R2602
SSB/AM AGC
BFO
BFO/600kHz FIXED
R1812 1k
R1810 1k5
12.1
C1802 10nF
R1803 12k
R1806 220
C1805 10nF
C1808 10nF
R1811 3k9
T1801 BF199
T1802 BF199
R1801 820
R1802 100k
X1801 9.3979 MHz
C1803 470pF
R1807 6k8
L1801 900μH
C1801 3.3pF
D1801 MV109
R1804 6k8
C1804 560pF
R1805 1k
R1808 2k2
R1809 1k2
C1806 100n
C1807 82pF
C1809 47pF
5-0-22418
TP6
10MHz IN
BFO OUT
SSB/AM AGC
3.5V
0.11μs
1.6V
1.67μs


-18V
4-6MHz
6-8MHz
8-10, 14-16MHz
10-12, 16-18MHz
12-14, 18-20MHz
20-22MHz
22-24MHz
24-26MHz
26-28MHz
28-30MHz
T1912
T1913
T1911
T1910
T1909
T1908
T1907
T1906
T1905
T1904
T1903
IC1910
D1901
IC1909
IC1908
IC1907
IC1906
IC1905
IC1904
IC1903
D1902
+18Va FOR 2182kHz
+5V TP23
GROUND
IC1902
IC1901
T1902
+18Vb
T1901
2-4MHz
0-2MHz
2182kHz
T1924
BLOCK FOR BAND SHIFT
T1914
+18Va
0.01MHz
T1918
4MHz
T1916
0.53MHz
T1917
1.6MHz
16.6MHz IF
T1923
2.182MHz
T1921
7MHz
T1919
14MHz
T1920
0.150MHz
f < 1.6MHz
B A 10MHz
D C B A 1MHz
D C B A 100kHz
D C B A 10kHz
2182kHz
BAND BLOCK
T1922
T1915


BAND CONTROL
5-0-22368
T1914-T1923 = BC 558
T1901-T1912 = BC 328-25
IC 1910
MC 14515 BCP
Gate no. 2 : IC 1902, SN 74 LS 32 N
Gate no. 3 : IC 1903, SN 74 LS 11 N
Gate no. 4 : IC 1904, SN 74 LS 08 N
Gate no. 6 : IC 1906, SN 7406 N
Gate no. 8 : IC 1908, SN 7407 N
Gate no. 9 : IC 1909, SN 7407 N
BAND BLOCK
+18Va FOR 2182kHz
2182 kHz
BLOCK FOR BAND SHIFT
+18Va
+5V
+18Vb
-18V
0-2 MHz
2-4 MHz
4-6 MHz
6-8 MHz
8-10 MHz 14-16 MHz
10-12 MHz 16-18 MHz
12-14 MHz 18-20 MHz
20-22 MHz
22-24 MHz
24-26 MHz
26-28 MHz
28-30 MHz
.01 MHz
.15 MHz
.53 MHz
1.6 MHz
4 MHz
7 MHz
14 MHz
2.182 MHz
f < 1.6 MHz
16.6 MHz IF

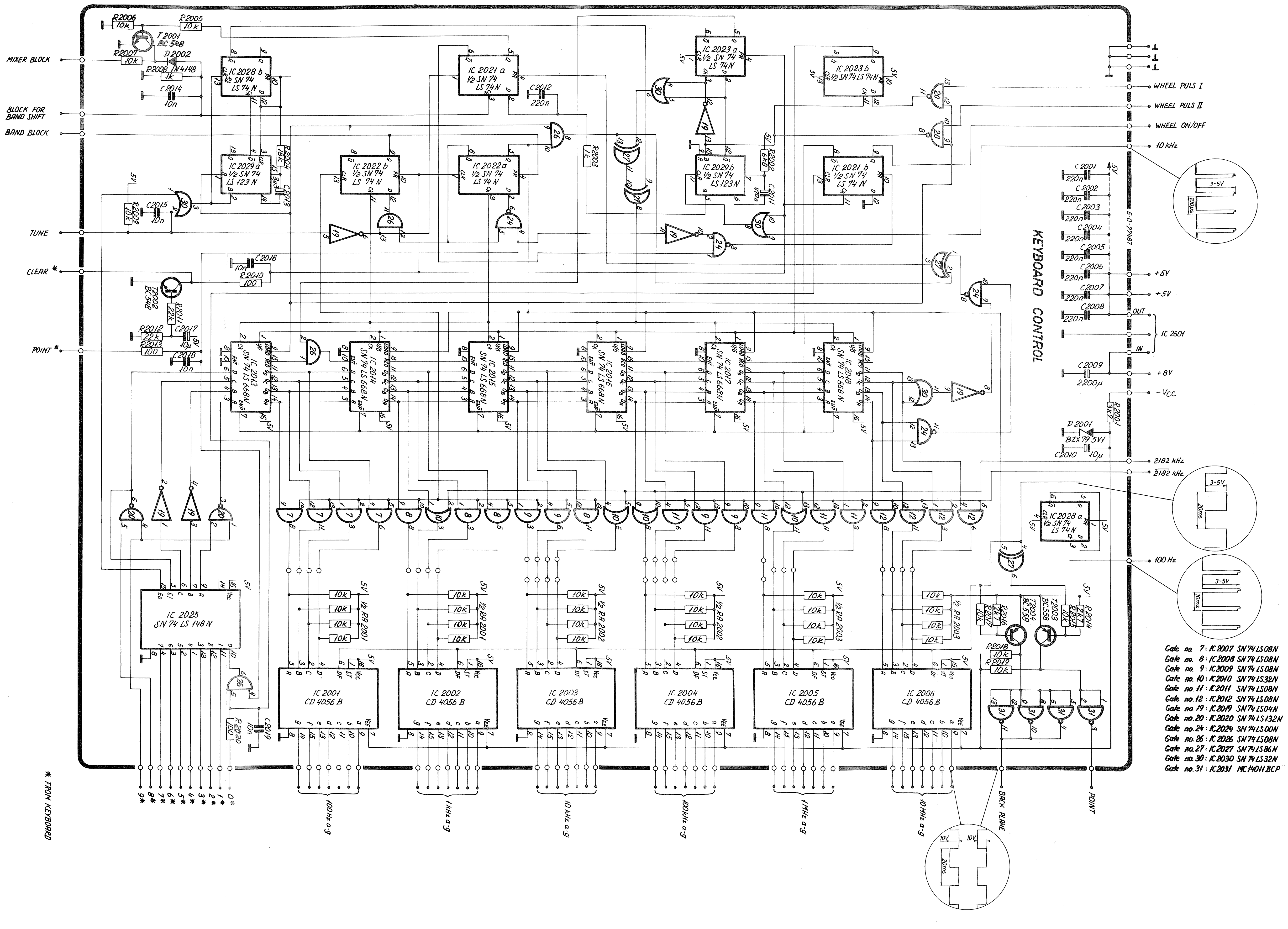
B

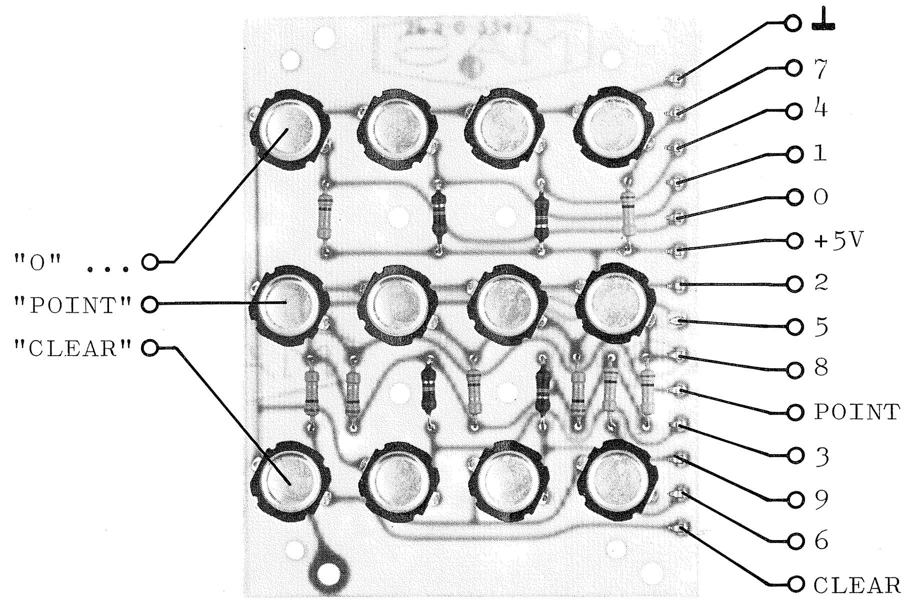

IC2031
T2004
T2003
T2001
T2002
D2001
-Vcc
BAND BLOCK
MIXER BLOCK
WHEEL ON/OFF
CLEAR
TUNE
WHEEL PULS II
WHEEL PULS I
1
+8V
IN
OUT
IC2601
0
2
7
IC2025
3
6
5
4
8
9
BLOCK IN FOR BAND SHIFT
IC2019
POINT
IC2013
2182
2182
IC2007
IC2030
IC2020 PIN 8
+5V
IC2024
IC2020 PIN 11
IC2018
10kHz
100Hz
IC2012
IC2006
IC2001
1MHz
100kHz
10kHz
1kHz
100Hz
10MHz
100Hz
+5V
100Hz
1MHz
100kHz
10kHz
BACKPLANE
POINT
1kHz

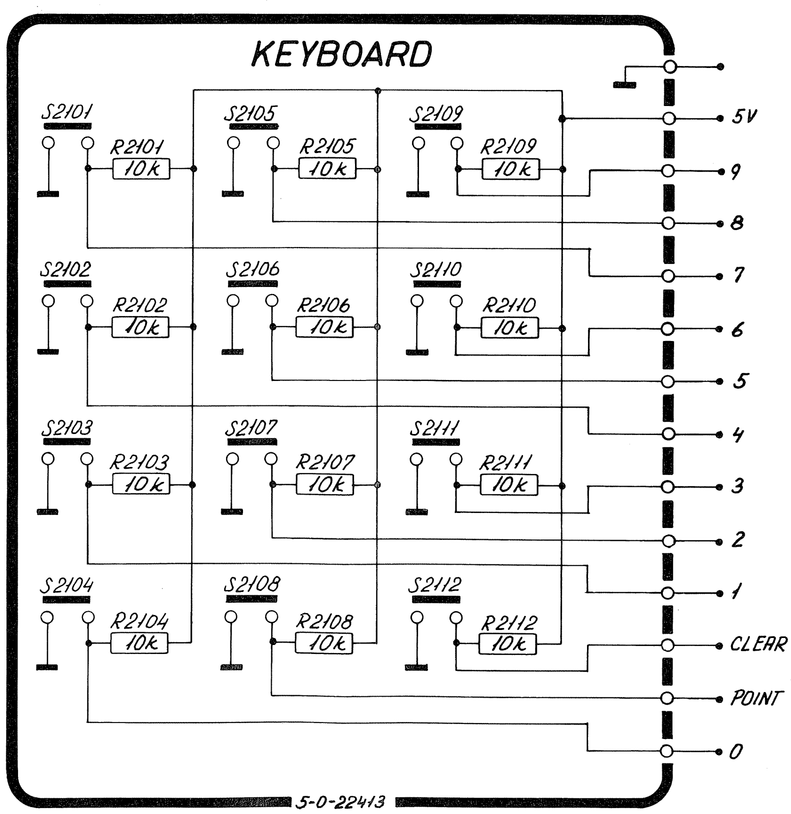

MIXER BLOCK
BLOCK FOR BAND SHIFT
BAND BLOCK
TUNE
CLEAR *
POINT *
R2006 10k
R2005 10k
T2001 BC548
R2007 10k
D2002 1N4148
R2008 1k
C2014 10n
IC 2028 b 1/2 SN 74 LS 74 N
IC 2021 a 1/2 SN 74 LS 74 N
C2012 220n
IC 2029 a 1/2 SN 74 LS 123 N
IC 2022 b 1/2 SN 74 LS 74 N
IC 2022 a 1/2 SN 74 LS 74 N
R2003 1k
R2009 10k
C2015 10n
C2016 10n
R2010 100
T2002 BC548
R2011 22k
R2012 22k
R2013 100
C2017 10µ
C2018 10n
IC 2013 SN 74 LS 668 N
IC 2014 SN 74 LS 668 N
IC 2015 SN 74 LS 668 N
IC 2016 SN 74 LS 668 N
IC 2025 SN 74 LS 148 N
R2020 100
C2019 10n
1/2 RA 2001
1/2 RA 2001
1/2 RA 2002
IC 2001 CD 4056 B
IC 2002 CD 4056 B
IC 2003 CD 4056 B
100Hz a-g
1kHz a-g
10kHz a-g
* FROM KEYBOARD

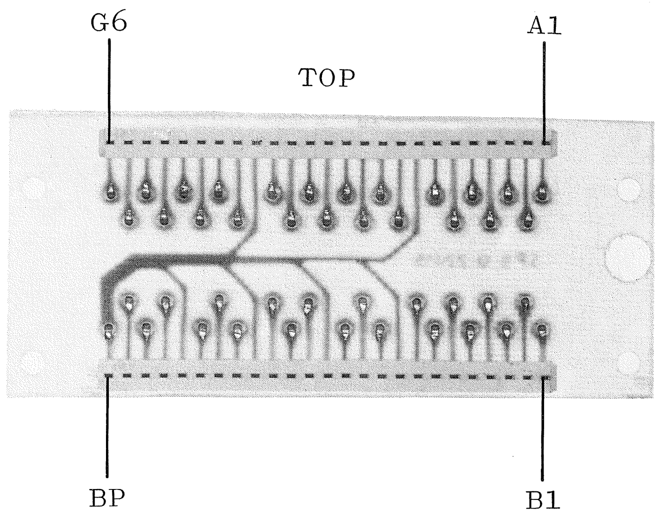
601

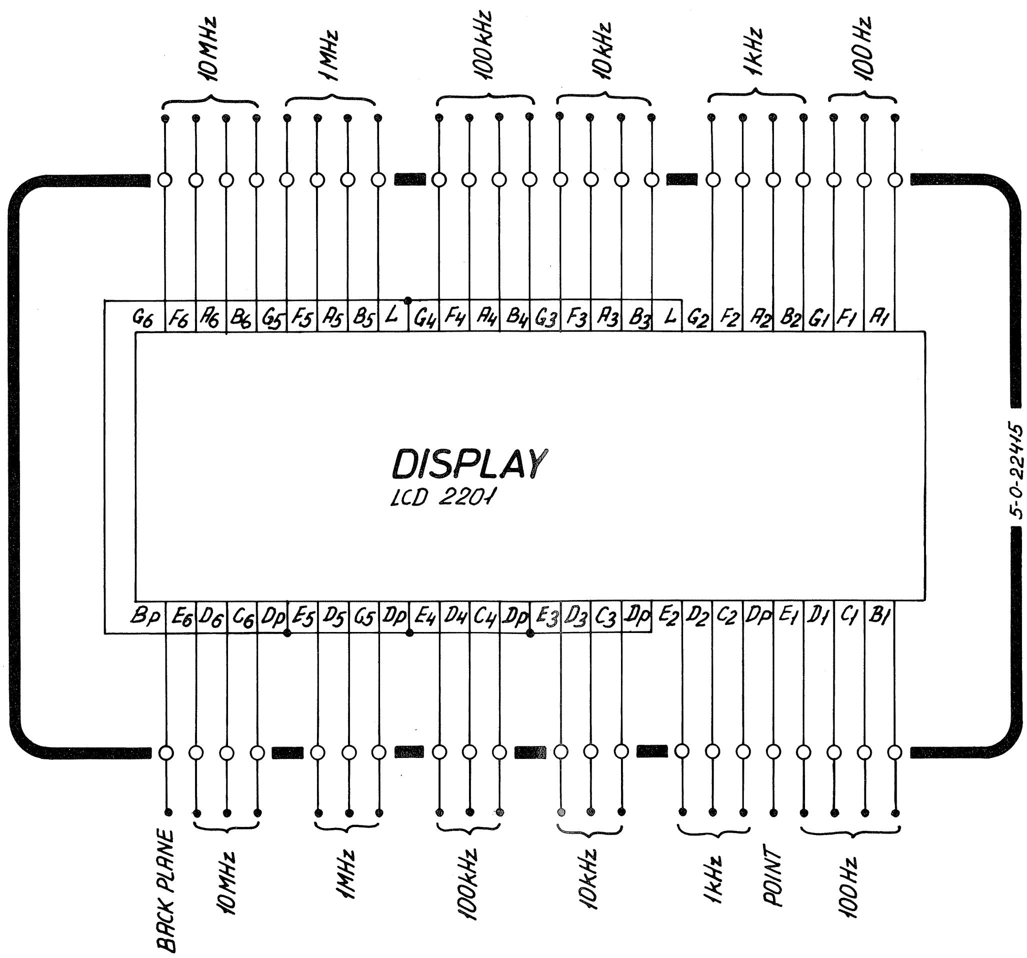
FOR BAND SHIFT

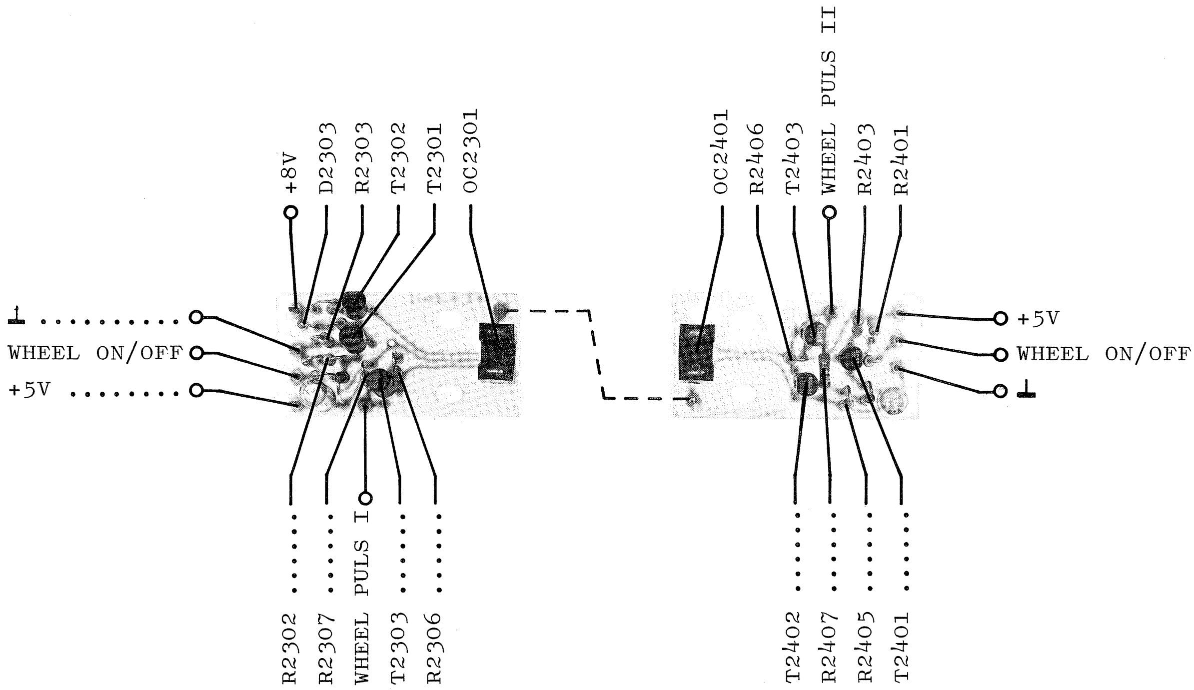



"0" ...
"POINT"
"CLEAR"
7
4
1
0
+5V
2
5
8
POINT
3
9
6
CLEAR

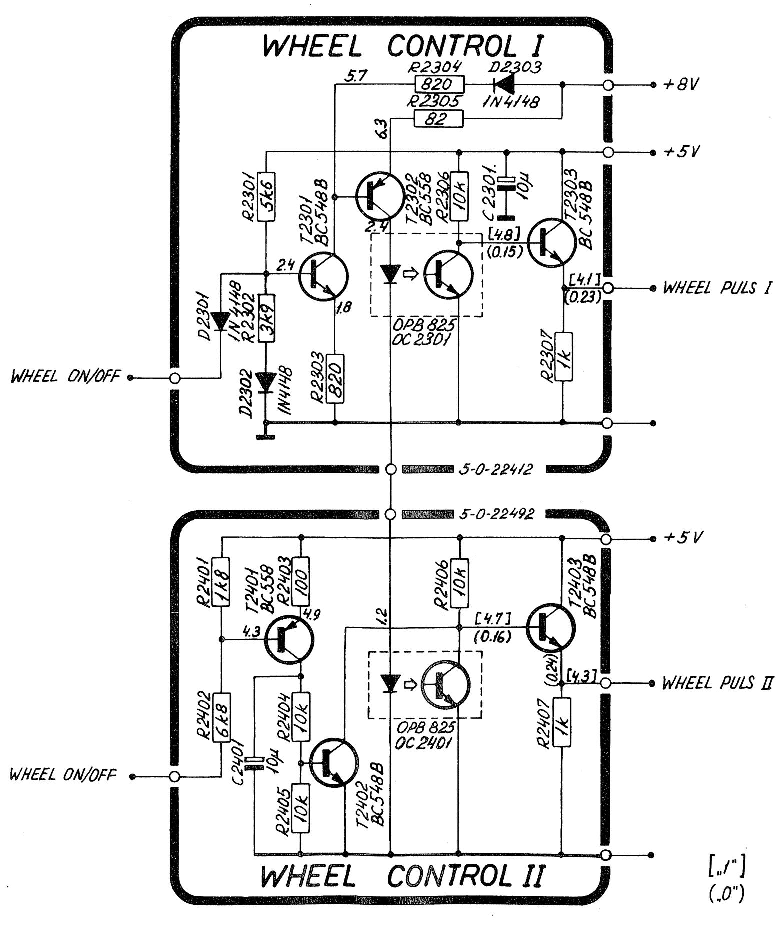

KEYBOARD
S2101
R2101
10k
S2102
R2102
10k
S2103
R2103
10k
S2104
R2104
10k
S2105
R2105
10k
S2106
R2106
10k
S2107
R2107
10k
S2108
R2108
10k
S2109
R2109
10k
S2110
R2110
10k
S2111
R2111
10k
S2112
R2112
10k
5V
9
8
7
6
5
4
3
2
1
CLEAR
POINT
0
5-0-22413


G6
A1
TOP
BP
B1

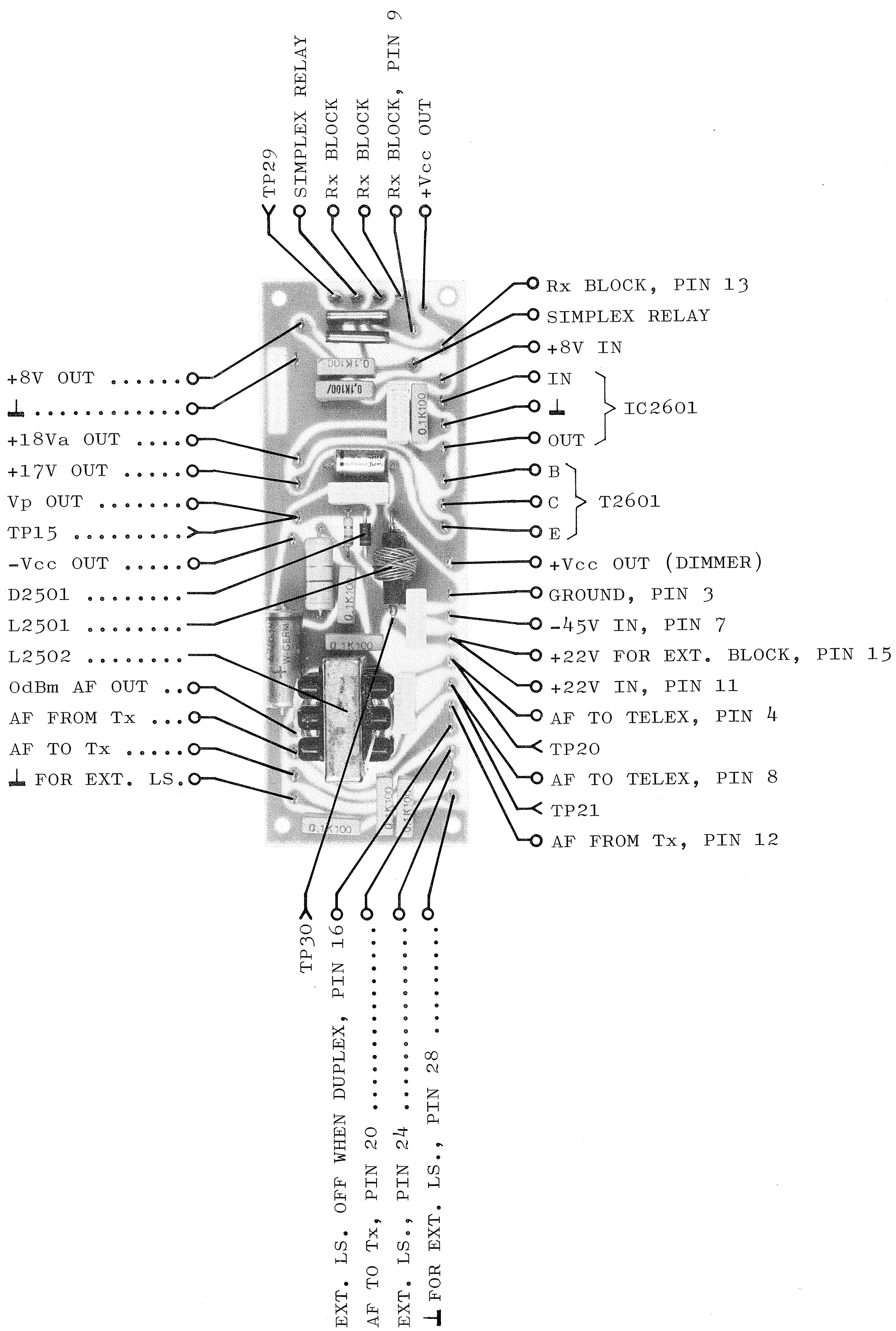

10 MHz
1 MHz
100 kHz
10 kHz
1 kHz
100 Hz
G6 F6 A6 B6 G5 F5 A5 B5 L G4 F4 A4 B4 G3 F3 A3 B3 L G2 F2 A2 B2 G1 F1 A1
DISPLAY
LCD 2201
5-0-2245
Bp E6 D6 C6 Dp E5 D5 C5 Dp E4 D4 C4 Dp E3 D3 C3 Dp E2 D2 C2 Dp E1 D1 C1 B1
BACK PLANE
10 MHz
1 MHz
100 kHz
10 kHz
1 kHz
POINT
100 Hz

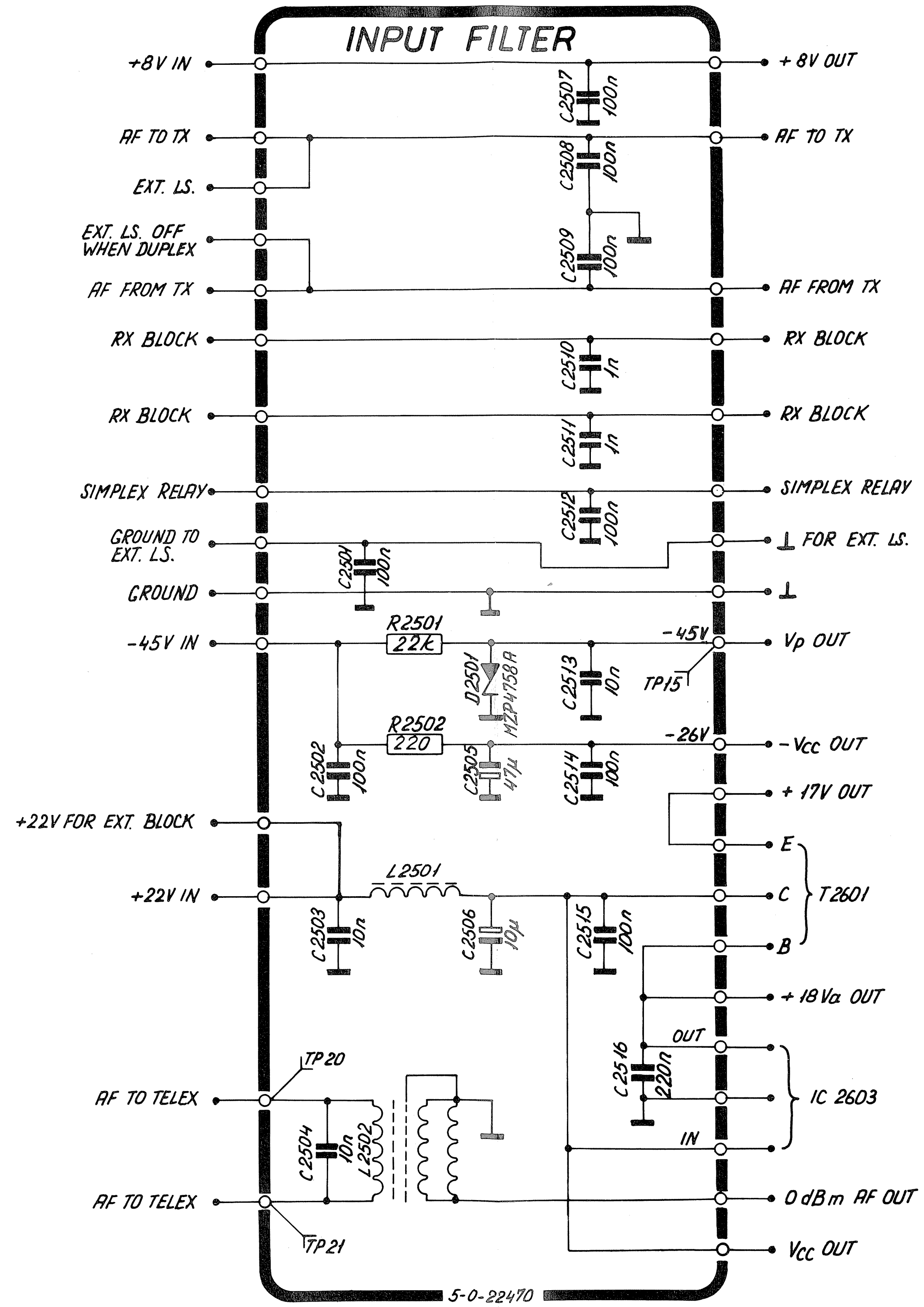


+8V
D2303
R2303
T2302
T2301
OC2301
OC2401
R2406
T2403
WHEEL PULS II
R2403
R2401
WHEEL ON/OFF
+5V
+5V
WHEEL ON/OFF
R2302
R2307
WHEEL PULS I
T2303
R2306
T2402
R2407
R2405
T2401



WHEEL CONTROL I
R2304 820
D2303 1N4148
+8V
R2305 82
+5V
R2301 5k6
T2301 BC548B
T2302 BC558
R2306 10k
C2301 10µ
T2303 BC548B
D2301 1N4148
R2302 3k9
D2302 1N4148
R2303 820
OPB 825 OC2301
R2307 1k
WHEEL PULS I
WHEEL ON/OFF
5-0-22412
5-0-22492
+5V
R2401 1k8
T2401 BC558
R2403 100
R2406 10k
T2403 BC548B
R2402 6k8
R2404 10k
C2401 10µ
R2405 10k
T2402 BC548B
OPB 825 OC2401
R2407 1k
WHEEL PULS II
WHEEL ON/OFF
WHEEL CONTROL II
[„1"]
(„0")


TP29
SIMPLEX RELAY
Rx BLOCK
Rx BLOCK
Rx BLOCK, PIN 9
+Vcc OUT
Rx BLOCK, PIN 13
SIMPLEX RELAY
+8V IN
IN
⊥
OUT
IC2601
B
C
E
T2601
+Vcc OUT (DIMMER)
GROUND, PIN 3
-45V IN, PIN 7
+22V FOR EXT. BLOCK, PIN 15
+22V IN, PIN 11
AF TO TELEX, PIN 4
TP20
AF TO TELEX, PIN 8
TP21
AF FROM Tx, PIN 12
+8V OUT
⊥
+18Va OUT
+17V OUT
Vp OUT
TP15
-Vcc OUT
D2501
L2501
L2502
OdBm AF OUT
AF FROM Tx
AF TO Tx
⊥ FOR EXT. LS.
TP30
EXT. LS. OFF WHEN DUPLEX, PIN 16
AF TO Tx, PIN 20
EXT. LS., PIN 24
⊥ FOR EXT. LS., PIN 28


INPUT FILTER
+8V IN
AF TO TX
EXT. LS.
EXT. LS. OFF WHEN DUPLEX
AF FROM TX
RX BLOCK
RX BLOCK
SIMPLEX RELAY
GROUND TO EXT. LS.
GROUND
-45V IN
+22V FOR EXT. BLOCK
+22V IN
AF TO TELEX
AF TO TELEX
TP20
TP21
C2507 100n
C2508 100n
C2509 100n
C2510 1n
C2511 1n
C2512 100n
C2501 100n
R2501 22k
D2501 MZP4758A
C2513 10n
R2502 220
C2502 100n
C2505 47µ
C2514 100n
L2501
C2503 10n
C2506 10µ
C2515 100n
C2516 220n
C2504 10n
L2502
-45V
-26V
TP15
OUT
IN
+8V OUT
AF TO TX
AF FROM TX
RX BLOCK
RX BLOCK
SIMPLEX RELAY
⊥ FOR EXT. LS.
⊥
Vp OUT
-Vcc OUT
+17V OUT
E
C
B
T2601
+18Va OUT
IC 2603
0dBm AF OUT
Vcc OUT
5-0-22470

Symbol	Description			Manufact.	
C101	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C102	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C103	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C104	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C105	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C106	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C107	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C108	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C109	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C110	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C111	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C112	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
C113	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF 103Z
D101	Diode, silicon			Philips	BAV21
D102	Diode, zener	8.2V ±5%	0.4W	Philips	BZX79 C8V2
D103	Diode, germanium			Philips	AA143
D104	Diode, silicon			Philips	1N4148
R101	Resistor	100Kohm ±5%	0.33W	Philips	2322 211 13104
R102	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
R103	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R104	Resistor	15 ohm ±5%	2.5W	Philips	2322 192 31509
R105	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
R106	Resistor	1Kohm ±5%	0.33W	Philips	2322 211 13102
R107	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
RE101	Relay			ITT	LZ24H
RE102	Relay			NATIONAL	NF2E-12V
RE103	Relay			CLAIRE	PRME 1500 3A
RE104	Relay			CLAIRE	PRME 1500 3A
RE105	Relay			SIEMENS	V23040-A0003-B101
RE106	Relay			SIEMENS	V23040-A0003-B101
RE107	Relay			SIEMENS	V23040-A0003-B101
RE108	Relay			SIEMENS	V23040-A0003-B101
RE109	Relay			SIEMENS	V23040-A0003-B101
RE110	Relay			SIEMENS	V23040-A0003-B101
RE111	Relay			SIEMENS	V23040-A0003-B101
RE112	Relay			SIEMENS	V23040-A0003-B101
T101	Transistor			Philips	BC558

Symbol	Description				Manufact.	
C201	Capacitor polyester	100 nF	±20%	100V	Philips	2222 344 24104
C202	Capacitor polyester	100 nF	±20%	100V	Philips	2222 344 24104
C203	Capacitor polystyrene	110 pF	± 5%	630V	Philips	2222 427 21101
C204	Capacitor polystyrene	110 pF	± 5%	630V	Philips	2222 427 21101
C205	Capacitor polystyrene	180 pF	± 5%	630V	Philips	2222 427 21801
C206	Capacitor polystyrene	180 pF	± 5%	630V	Philips	2222 427 21801
C207	Capacitor polystyrene	4n7	± 5%	160V	Philips	2222 425 24702
C208	Capacitor polystyrene	4n7	± 5%	160V	Philips	2222 425 24702
C209	Capacitor trimmer	10-150 pF	polycarbonat	100V	DAU	109.6601.150
C210	Capacitor trimmer	8- 80 pF	polycarbonat	100V	DAU	109.4601.080
C211	Capacitor polyester	22 nF	±20%	400V	Philips	2222 344 54223
C212	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C213	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C214	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C215	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C216	Capacitor polystyrene	3 nF	± 5%	160V	Philips	2222 425 23002
C217	Capacitor polystyrene	9 n1	± 5%	160V	Philips	2222 425 29102
C218	Capacitor polystyrene	3 nF	± 5%	160V	Philips	2222 425 23002
C219	Capacitor trimmer	4-38 pF	TEFLON	100V	DAU	109.3901.038
C220	Capacitor polystyrene	300 pF	± 5%	630V	Philips	2222 427 23001
C221	Capacitor polystyrene	82 pF	± 5%	630V	Philips	2222 427 28209
C222	Capacitor polyester	10 nF	±10%	100V	Philips	2222 344 55103
C223	Capacitor polystyrene	1 nF	± 5%	160V	Philips	2222 425 21002
C224	Capacitor polyester	100 nF	±20%	100V	Philips	2222 344 24104
C225	Capacitor polystyrene	120 pF	± 5%	630V	Philips	2222 427 21201
C226	Capacitor polystyrene	1n1	± 5%	160V	Philips	2222 425 21102
C227	Not used					
C228	Capacitor polyester	1 uF	±20%	100V	Philips	2222 344 24105
C229	Capacitor polyester	10 nF	±20%	400V	Philips	2222 344 54103
D201	Diode zener	4.7V	±10%	5W	MOTOROLA	1N5337A
D202	Diode zener	4.7V	±10%	5W	MOTOROLA	1N5337A
D203	Diode silicon				Philips	1N4148
D204	Diode silicon				Philips	1N4148
D205	Diode silicon				Philips	1N4148
D206	Diode silicon				Philips	1N4148
D207	Diode switch				Philips	BA182
D208	Diode switch				Philips	BA182
D209	Diode switch				Philips	BA182
D210	Diode silicon				Philips	1N4148
D211	Diode silicon				Philips	1N4148

Symbol	Description			Manufact.	
D212	Diode silicon			Motorola	IN4002
D213	Diode silicon			Motorola	IN4002
L201	Coil			S.P.	TL286
L202	Coil			S.P.	TL287
L203	Coil	330 uH ±5 %		Kaschke	Type 200
L204	Coil	330 uH ±5 %		Kaschke	Type 200
L205	Coil			S.P.	TL192
L206	Coil	33 uH ±5 %		Kaschke	Type 200
L207	Coil	33 uH ±5 %		Kaschke	Type 200
L208	Coil			S.P.	TL069
L209	Coil			S.P.	TL192
R201	Resistor	5.6 kohm ±5 %	0.33W	Philips	2322 211 13562
R202	Resistor	39 ohm ±5 %	1.15W	Philips	2322 214 13399
R203	Resistor	330 ohm ±5 %	0.33W	Philips	2322 211 13331
R204	Resistor	5.6 kohm ±5 %	0.33W	Philips	2322 211 13562
R205	Resistor	68 ohm ±5 %	0.33W	Philips	2322 211 13689
R206	Resistor	180 kohm ±5 %	0.33W	Philips	2322 211 13184
R207	Resistor	120 ohm ±5 %	0.33W	Philips	2322 211 13121
R208	Resistor	3.3 kohm ±5 %	0.33W	Philips	2322 211 13332
R209	Resistor	3.3 kohm ±5 %	0.33W	Philips	2322 211 13332
R210	Resistor	10 kohm ±5 %	0.33W	Philips	2322 211 13103
R211	Resistor	1 kohm ±5 %	0.33W	Philips	2322 211 13102
R212	Resistor	100 ohm ±5 %	0.33W	Philips	2322 211 13101
R213	Resistor	22 kohm ±5 %	0.33W	Philips	2322 211 13223

a	BAND FILTER 1.6 - 7 MHz R1119 & R1120			1/2
Symbol	*Description*		*Manufact.*	
C301	Capacitor trimmer 8/125 pF TEFLON	100V	DAU	116.4901.120
C302	Capacitor polyester 10 uF ±20%	400V	Philips	2222 344 54103
C303	Capacitor ceramic 15 pF ±0.25 pF N150	400V	Ferroperm	9/0116.9
C304	Capacitor polystyrene 820pF ± 2%	250V	Philips	2222 426 38201
C305	Capacitor polystyrene 110pF ± 2%	630V	Philips	2222 427 31101
C306	Capacitor polystyrene 240pF ± 2%	630V	Philips	2222 427 32401
C307	Capacitor polystyrene 150pF + 2%	630V	Philips	2222 427 31501
C308	Capacitor ceramic 5p6 ±0.25 pF NPO	400V	Ferroperm	9/0112.9
C309	Capacitor ceramic 4p7 ±0.25 pF NPO	400V	Ferroperm	9/0112.9
C310	Capacitor polystyrene 220pF ± 2%	630V	Philips	2222 427 32201
C311	Capacitor polystyrene 300pF ± 2%	630V	Philips	2222 427 33001
C312	Capacitor trimmer 6/45pF TEFLON	100V	DAU	107.5901.045
C313	Capacitor trimmer 6/45pF TEFLON	100V	DAU	107.5901.045
C314	Capacitor ceramic 4p7 ±0.25pF NPO	400V	Ferroperm	9/0112.9
C315	Capacitor ceramic 5p6 ±0.25pF NPO	400V	Ferroperm	9/0112.9
C316	Capacitor polyester 100nF ±20%	100V	Philips	2222 344 24104
C317	Capacitor polyester 100nF ±20%	100V	Philips	2222 344 24104
C318	Capacitor trimmer 6/45pF TEFLON	100V	DAU	107.5901.045
C319	Capacitor trimmer 6/45pF TEFLON	100V	DAU	107.5901.045
C320	Capacitor polystyrene 330pF ± 2%	630V	Philips	2222 427 33301
C321	Capacitor polystyrene 390pF ± 2%	630V	Philips	2222 427 33901
C322	Capacitor polystyrene 620pF ± 2%	250V	Philips	2222 426 35201
C323	Capacitor polystyrene 1n6 ± 2%	250V	Philips	2222 426 31602
D301	Diode silicon		Philips	1N4148
D302	Diode silicon		Philips	1N4148
D303	Diode silicon		Philips	1N4148
D304	Diode silicon		Philips	1N4148
FP301	Ferrite bead 4B1		Philips	4322 020 34420
L301	Coil		S.P.	TL261
L302	Coil		S.P.	TL288
L303	Coil		S.P.	TL261
L304	Coil		S.P.	TL288
L305	Coil		S.P.	TL288
L303	Coil		S.P.	TL261
R301	Resistor 22 ohm ± 5%	0.33W	Philips	2322 211 13229
R302	Resistor 56Kohm ± 5%	0.33W	Philips	2322 106 33563
R303	Resistor 150Kohm ± 5%	0.33W	Philips	2322 106 33154
R304	Resistor 56Kohm + 5%	0.33W	Philips	2322 106 33563

Symbol	Description			Manufact.	
R305	Resistor	150Kohm ± 5%	0.33W	Philips	2322 211 13154
R306	Resistor	56Kohm ± 5%	0.33W	Philips	2322 211 13563
R307	Resistor	10Kohm ± 5%	0.33W	Philips	2322 211 13103
R308	Resistor	10Kohm ± 5%	0.33W	Philips	2322 211 13103
R309	Resistor	120 ohm ± 5%	0.33W	Philips	2322 106 33121

a BAND FILTER 7 - 30 MHz R1119 & R1120

Symbol	*Description*	*Manufact.*	
C401	Capacitor polyester 10uF ± 20% 400V	Philips	2222 344 54103
C402	Capacitor polystyrene 390pF ± 2% 250V	Philips	2322 426 33901
C403	Capacitor polystyrene 91pF ± 2% 630V	Philips	2322 427 39109
C404	Capacitor ceramic 24pF ± 5% N150 400V	Ferroperm	9/0116.9
C405	Capacitor polystyrene 62pF ± 2% 630V	Philips	2222 427 36209
C406	Capacitor ceramic 27pF ± 5% N150 400V	Ferroperm	9/0116.9
C407	Capacitor polystyrene 82pF ± 2% 630V	Philips	2222 427 38209
C408	Capacitor trimmer 2/18pF Teflon 100V	DAU	107.2901.018
C409	Capacitor ceramic 3pF ± 0.25pF NPO 400V	Ferroperm	9/0112.9
C410	Capacitor ceramic 1p5 ± 0.25pF NPO 250V	Ferroperm	9/0112.9
C411	Capacitor polystyrene 120pF ± 2% 630V	Philips	2222 427 31201
C412	Capacitor ceramic 47pF ± 5% N150 400V	Ferroperm	9/0116.9
C413	Capacitor trimmer 2/30pF Teflon 100V	DAU	107.3901.027
C414	Capacitor trimmer 2/18pF Teflon 100V	DAU	107.2901.018
C415	Capacitor ceramic 3pF ± 0.25pF NPO 400V	Ferroperm	9/0112.9
C416	Capacitor ceramic 1p5 ± 0.25pF NPO 250V	Ferroperm	9/0112.9
C417	Capacitor polyester 10nF ± 20% 400V	Philips	2222 344 54103
C418	Capacitor trimmer 2/30pF Teflon 100V	DAU	107.3901.027
C419	Capacitor polyester 10nF ± 20% 400V	Philips	2222 344 54103
C420	Capacitor polystyrene 91pF ± 2% 630V	Philips	2222 427 39109
C421	Capacitor polystyrene 200pF ± 2% 630V	Philips	2222 427 32001
C422	Capacitor polystyrene 130pF ± 2% 630V	Philips	2222 427 31301
C423	Capacitor polystyrene 270pF ± 2% 630V	Philips	2222 427 32701
D401	Diode silicon	Philips	1N4148
D402	Diode silicon	Philips	1N4148
D403	Diode silicon	Philips	1N4148
D404	Diode silicon	Philips	1N4148
D405	Diode switch	Philips	BA182
FP401	Ferrite bead 4B1	Philips	4322 020 34420
L401	Coil	S.P.	TL289
L402	Coil	S.P.	TL288
L403	Coil	S.P.	TL288
L404	Coil	S.P.	TL289
L405	Coil	S.P.	TL288
L406	Coil	S.P.	TL289

Symbol	Description			Manufact.	
R401	Resistor	22 ohm ± 5%	0.33W	Philips	2322 211 13229
R402	Resistor	47Kohm ± 5%	0.33W	Philips	2322 106 33473
R403	Not used				
R404	Not used				
R405	Resistor	82Kohm ± 5%	0.33W	Philips	2322 211 13823
R406	Resistor	10Kohm ± 5%	0.33W	Philips	2322 211 13103
R407	Resistor	10Kohm ± 5%	0.33W	Philips	2322 211 13103
R408	Resistor	100Kohm ± 5%	0.33W	Philips	2322 106 33104

Symbol	Description			Manufact.	
C501	Capacitor ceramic	0.82pF ± 0.25pF	250V	Ferroperm	9/0110.9
C502	Capacitor ceramic	0.82pF ± 0.25pF	250V	Ferroperm	9/0110.9
C503	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C504	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C505	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C506	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C507	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C508	Capacitor polystyrene	56pF ± 2%	630V	Philips	2222 427 35609
C509	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C510	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C511	Capacitor trimmer	6/45 Teflon	100V	DAU	107.5901.045
C512	Capacitor trimmer	6/45 Teflon	100V	DAU	107.5901.045
C513	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C514	Capacitor ceramic	4p7 ± 0.25pF	400V	Ferroperm	9/0112.9
C515	Capacitor ceramic	6p8 ± 0.25pF	400V	Ferroperm	9/0112.9
C516	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C517	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C518	Capacitor ceramic	56pF ± 5%N150	1000V	Ferroperm	9/0116.9
C519	Capacitor ceramic	39pF ± 5%	400V	Ferroperm	9/0116.9
C520	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C521	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C522	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C523	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C524	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C525	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C526	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C527	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C528	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C529	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C530	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C531	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C532	Capacitor ceramic	39pF ± 5%	400V	Ferroperm	9/0116.9
D501	Diode switch			Philips	BA182
D502	Diode switch			Philips	BA182
D503	Diode switch			Philips	BA182
D504	Diode switch			Philips	BA182
D505	Diode switch			Philips	BA182
D506	Diode switch			Philips	BA182
D507	Diode switch			Philips	BA182

Symbol	Description			Manufact.	
D508	Diode silicon			Philips	1N4148
D509	Diode silicon			Philips	1N4148
D510	Diode switch			Philips	BA182
D511	Diode switch			Philips	BA182
D512	Diode switch			Philips	BA182
D513	Diode switch			Philips	BA182
D514	Diode switch			Philips	BA182
D515	Diode switch			Philips	BA182
D516	Diode switch			Philips	BA182
D517	Diode switch			Philips	BA182
D518	Diode silicon			Philips	1N4148
FL501	Crystal filter 10.6085 MHz			S.P.	C1008
FL502	Crystal filter 16.6085 MHz			S.P.	C1014
FP501	Ferrite bead 4B1			Philips	4322 020 34420
FP502	Ferrite bead 4B1			Philips	4322 020 34420
L501	Coil 33uH ±5%			Kaschke	type 200
L502	Coil			S.P.	TL290
L503	Coil			S.P.	TL273
M501	Mixer			S.P.	C1021
R501	Resistor	100 ohm ± 5%	0.33W	Philips	2322 211 13101
R502	Resistor	100 ohm ± 5%	0.33W	Philips	2322 211 13101
R503	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R504	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R505	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R506	Preset potmeter	4K7 ohm ±20%	0.3 W	Noble	IM8KV2-1S
R507	Resistor	100 ohm ± 5%	0.33W	Philips	2322 211 13101
R508	Resistor	100 ohm ± 5%	0.33W	Philips	2322 211 13101
R509	Resistor	12kohm ± 5%	0.33W	Philips	2322 211 13123
R510	Resistor	22kohm ± 5%	0.33W	Philisp	2322 211 13223
R511	Resistor	10kohm ± 5%	0.33W	Philips	2322 211 13103
R512	Resistor	8K2 ohm ± 5%	0.33W	Philips	2322 211 13822
R513	Resistor	2K2 ohm ± 5%	0.33W	Philips	2322 211 13222
R514	Resistor	2K2 ohm ± 5%	0.33W	Philips	2322 211 13222
R515	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R516	Resistor	1K2 ohm ± 5%	0.33W	Philips	2322 211 13122
R516	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472

Symbol	Description			Manufact.	
R518	Resistor	1K2 ohm ± 5%	0.33W	Philips	2322 211 13122
R519	Resistor	3K3 ohm ± 5%	0.33W	Philips	2322 211 13332
R520	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R521	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R522	Resistor	1Kohm ± 5%	0.33W	Philips	2322 211 13102
R523	Resistor	3K3 ohm ± 5%	0.33W	Philips	2322 211 13332
R524	Resistor	470 ohm ± 5%	0.33W	Philips	2322 211 13471
R525	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R526	Resistor	5K6 ohm ± 5%	0.33W	Philips	2322 211 13562
R527	Resistor	2K7 ohm ± 5%	0.33W	Philips	2322 211 13272
R528	Resistor	1Kohm ± 5%	0.33W	Philips	2322 211 13102
R529	Resistor	3K3 ohm ± 5%	0.33W	Philips	2322 211 13332
R530	Resistor	18Kohm ± 5%	0.33W	Philips	2322 211 13183
R531	Resistor	3K3 ohm ± 5%	0.33W	Philips	2322 211 13332
R532	Resistor	220 ohm ± 5%	0.33W	Philips	2322 211 13221
R533	Resistor	12Kohm ± 5%	0.33W	Philips	2322 211 13123
T501	Transistor			Philips	BF256B
T502	Transistor			Philips	BF256B
T503	Transistor			Philips	BF199
TR501	Transformer			S.P.	TL272
TR502	Transformer			S.P.	TL269

Symbol	Description			Manufact.	
C601	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C602	Capacitor polystyrene	1nF ± 2%	160V	Philips	2222 425 31002
C603	Capacitor ceramic	8p2 ± 0.25pF	400V	Ferroperm	9/0112.9
C604	Capacitor polystyrene	1nF ± 2%	500V	Rifa	PFE216
C605	Capacitor ceramic	5p6 ± 0.25pF	400V	Ferroperm	9/0112.9
C606	Capacitor polystyrene	1nF ± 2%	500V	Rifa	PFE216
C607	Capacitor ceramic	4p7 ± 0.25pF	400V	Ferroperm	9/0112.9
C608	Capacitor polystyrene	1nF ± 2%	500V	Rifa	PFE216
C609	Capacitor ceramic	8p2 ± 0.25pF	400V	Ferroperm	9/0112.9
C610	Capacitor polystyrene	1nF ± 2%	500V	Rifa	PFE216
C611	Capacitor polystyrene	100nF ±20%	100V	Philips	2222 344 24104
C612	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C613	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C614	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C615	Capacitor polystyrene	3n9 ± 2%	160V	Philips	2222 425 33902
C616	Capacitor polystyrene	3n3 ± 2%	160V	Philips	2222 425 33302
C617	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C618	Capacitor polyester	100nF ±20%	100V	Philips	2222 344 24104
C619	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C620	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C621	Capacitor polystyrene	3n9 ± 2%	160V	Philips	2222 425 33902
C622	Capacitor polystyrene	3n3 ± 2%	160V	Philips	2222 425 33302
C623	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C624	Capacitor polyester	100nF ±20%	100V	Philips	2222 344 24104
C625	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C626	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C627	Capacitor polystyrene	3n9 ± 2%	160V	Philips	2222 425 33902
C628	Capacitor polystyrene	3n3 ± 2%	160V	Philips	2222 425 33302
C629	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C630	Capacitor polyester	100nF ± 20%	100V	Philips	2222 344 24104
C631	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C632	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C633	Capacitor polystyrene	3n9 ± 2%	160V	Philips	2222 425 33902
C634	Capacitor polystyrene	3n3 ± 2%	160V	Philips	2222 425 33302
C635	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C636	Capacitor polyester	100nF ±20%	100V	Philips	2222 344 24104
C637	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C638	Capacitor electrolytic	10uF-10/+100%	40V	Siemens	B41313-A7106V
C639	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C640	Capacitor polystyrene	3n9 ± 2%	160V	Philips	2222 425 33902

Symbol	Description			Manufact.	
C641	Capacitor polystyrene	3n3 ± 2%	160V	Philips	2222 425 33302
C642	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C643	Capacitor polyester	100nF ±20%	100V	Philips	2222 344 24104
C644	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C645	Capacitor polyester	100nF ±20%	100V	Philips	2222 344 24104
C646	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C647	Capacitor polyester	100nF ±20%	100V	Philips	2222 344 24104
D601	Diode switch			Philips	BA182
D602	Diode switch			Philips	BA182
D603	Diode switch			Philips	BA182
D604	Diode switch			Philips	BA182
D605	Diode switch			Philips	BA182
D606	Diode switch			Philips	BA182
D607	Diode silicon			Philips	1N4148
FL601	Crystal filter			S.P.	C1002
FL602	Option				
FL603	Crystal filter			S.P.	C1004
FL604	Crystal filter			S.P.	C1005
FL605	Crystal filter			S.P.	C1006
L601	Coil			S.P.	TL276
L602	Coil			S.P.	TL003
L603	Coil			S.P.	TL003
L604	Coil			S.P.	TL003
L605	Coil			S.P.	TL277
L606	Coil			S.P.	TL194
L607	Coil			S.P.	TL194
L608	Coil			S.P.	TL194
L609	Coil			S.P.	TL194
L610	Coil			S.P.	TL194
R601	Resistor	390 ohm ± 5%	0.33W	Philips	2322 211 13391
R602	Resistor	56kohm ± 5%	0.33W	Philips	2322 211 13563
R603	Resistor	10kohm ± 5%	0.33W	Philips	2322 211 13103
R604	Resistor	120kohm ± 5%	0.33W	Philips	2322 211 13124
R605	Resistor	120 ohm ± 5%	0.33W	Philips	2322 211 13121
R606	Resistor	390 ohm ± 5%	0.33W	Philips	2322 211 13391

Symbol	Description			Manufact.	
R607	Resistor	3k9 ohm ± 5%	0.33W	Philips	2322 211 13392
R608	Resistor	56Kohm ± 5%	0.33W	Philips	2322 211 13563
R609	Resistor	120Kohm ± 5%	0.33W	Philips	2322 211 13124
R610	Resistor	120 ohm ± 5%	0.33W	Philips	2322 211 13121
R611	Resistor	390 ohm ± 5%	0.33W	Philips	2322 211 13391
R612	Resistor	3k9 ohm ± 5%	0.33W	Philips	2322 211 23392
R613	Resistor	56Kohm ± 5%	0.33W	Philips	2322 211 13563
R614	Resistor	120Kohm ± 5%	0.33W	Philips	2322 211 13121
R615	Resistor	120 ohm ± 5%	0.33W	Philips	2322 211 13121
R616	Resistor	390 ohm ± 5%	0.33W	Philips	2322 211 13391
R617	Resistor	3k9 ohm ± 5%	0.33W	Philips	2322 211 13392
R618	Resistor	56Kohm ± 5%	0.33W	Philips	2322 211 13563
R619	Resistor	120Kohm ± 5%	0.33W	Philips	2322 211 13121
R620	Resistor	120 ohm ± 5%	0.33W	Philips	2322 211 13121
R621	Resistor	390 ohm ± 5%	0.33W	Philips	2322 211 13391
R622	Resistor	3K9 ohm ± 5%	0.33W	Philips	2322 211 13392
R623	Resistor	56Kohm ± 5%	0.33W	Philips	2322 211 13563
R624	Resistor	120Kohm ± 5%	0.33W	Philips	2322 211 13124
R625	Resistor	120 ohm ± 5%	0.33W	Philips	2322 211 13121
R626	Resistor	270 ohm ± 5%	0.33W	Philips	2322 211 13271
R627	Resistor	390 ohm ± 5%	0.33W	Philips	2322 211 13391
R628	Resistor	3k9 ohm ± 5%	0.33W	Philips	2322 211 13392
R629	Resistor	56Kohm ± 5%	0.33W	Philips	2322 211 13563
R630	Resistor	120Kohm ± 5%	0.33W	Philips	2322 211 13124
R631	Resistor	120 ohm ± 5%	0.33W	Philips	2322 211 13121
R632	Resistor	1K5 ohm ± 5%	0.33W	Philips	2322 211 13152
T601	Transistor			Philips	BF256A
T602	Transistor			Philips	BF256A
T603	Transistor			Philips	BF256A
T604	Transistor			Philips	BF256A
T605	Transistor			Philips	BF256A
T606	Transistor			Philips	BF256A

Symbol	Description				Manufact.	
C701	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C702	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C703	Capacitor polystyrene	3n9	±2%	160V	Philips	2222 425 33902
C704	Capacitor polystyrene	3n3	±2%	160V	Philips	2222 425 33302
C705	Capacitor polystyrene	1nF	±2%	160V	Philips	2222 425 31002
C706	Capacitor ceramic	8p2	±0.25pF	400V	Ferroperm	9/0112.9
C707	Capacitor polystyrene	1nF	±2%	500V	Rifa	PFE216
C708	Capacitor ceramic	5p6	±0.25pF	400V	Ferroperm	9/0112.9
C709	Capacitor polystyrene	1nF	±2%	500V	Rifa	PFE216
C710	Capacitor ceramic	4p7	±0.25pF	400V	Ferroperm	9/0112.9
C711	Capacitor polystyrene	1nF	±2%	500V	Rifa	PFE216
C712	Capacitor ceramic	8p2	±0.25pF	400V	Ferroperm	9/0112.9
C713	Capacitor polystyrene	1nF	±2%	500V	Rifa	PFE216
C714	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF 103Z
C715	Capacitor polyester	100nF	±20%	100V	Philips	2222 344 24104
C716	Capacitor polyester	100nF	±20%	100V	Philips	2222 344 24104
C717	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF 103Z
C718	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF 103Z
C719	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF 103Z
C720	Capacitor polyester	100nF	±20%	100V	Philips	2222 344 24104
C721	Capacitor electrolytic	10uF	-10/+100%	40V	Siemens	B41313-A7106-V
C722	Capacitor electrolytic	10uF	±20%	35V	ERO	EKI00AA210F
C723	Capacitor polyester	100nF	±20%	100V	Philips	2222 344 24104
C724	Capacitor electrolytic	10uF	±20%	35V	ERO	EKI00AA210F
C725	Capacitor polystyrene	3n9	±2%	160V	Philips	2222 425 33902
C726	Capacitor polystyrene	3n3	±2%	160V	Philips	2222 425 33302
C727	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF 103Z
C728	Capacitor polyester	100nF	±20%	100V	Philips	2222 344 24104
C729	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF 103Z
D701	Diode switch				Philips	BA182
D702	Diode switch				Philips	BA182
D703	Diode silicon				Philips	1N4148
D704	Diode switch				Philips	BA182
FL701	Crystal filter LSB 600 kHz				S.P.	C1002
L701	Coil				S.P.	TL276
L702	Coil				S.P.	TL194
L703	Coil				S.P.	TL003

Symbol	Description			Manufact.	
L704	Coil			S.P.	TL003
L705	Coil			S.P.	TL003
L706	Coil			S.P.	TL277
L707	Coil			S.P.	TL194
R701	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R702	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R703	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R704	Resistor	56kohm ±5%	0.33W	Philips	2322 211 13563
R705	Resistor	120kohm ±5%	0.33W	Philips	2322 211 13124
R706	Resistor	10kohm ±5%	0.33W	Philips	2322 211 13103
R707	Resistor	56kohm ±5%	0.33W	Philips	2322 211 13563
R708	Resistor	120kohm ±5%	0.33W	Philips	2322 211 13124
R709	Resistor	120 ohm ±5%	0.33W	Philips	2322 211 13121
R710	Resistor	120 ohm ±5%	0.33W	Philips	2322 211 13121
R711	Resistor	1k5 ohm ±5%	0.33W	Philips	2322 211 13152
R712	Resistor	270 ohm ±5%	0.33W	Philips	2322 211 13271
R713	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R714	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R715	Resistor	56kohm ±5%	0.33W	Philips	2322 211 13563
R716	Resistor	120kohm ±5%	0.33W	Philips	2322 211 13124
R717	Resistor	120 ohm ±5%	0.33W	Philips	2322 211 13121
T701	Transistor			Philips	BF256A
R702	Transistor			Philips	BF256A
T703	Transistor			Philips	BF256A

Symbol	Description				Manufact.	
C801	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C802	Capacitor polystyrene	3n3	+ 5%	160V	Philips	2222 425 23302
C803	Capacitor polystyrene	360pF	+ 2%	630V	Philips	2222 427 33601
C804	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C805	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C806	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C807	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C808	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C809	Capacitor electrolytic	1uF	+20%	50V	ERO	EKI00AA110H
C810	Capacitor polystyrene	1nF	+ 5%	250V	Philips	2222 426 21002
C811	Capacitor polystyrene	120pF	+ 2%	630V	Philips	2222 427 31201
C812	Capacitor electrolytic	10uF	-10/+100%	25V	Siemens	B41313 A5106-V
C813	Capacitor tantalum	68uF	+20%	16V	Siemens	ETQ - 5
C814	Capacitor ceramic	10uF	-20/+80%	50V	KCK	HE70SJYF103Z
C815	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C816	Capacitor polyester	100nF	+20%	100V	Philips	2222 344 24104
C817	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C818	Capacitor polystyrene	1nF	+ 5%	250V	Philips	2222 426 21002
C819	Capacitor polystyrene	120pF	+ 2%	630V	Philips	2222 427 31201
C820	Capacitor polystyrene	270pF	+10%	400V	Ferroperm	9/0129.9
C821	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C822	Capacitor ceramic	270pF	+ 5%	630V	Philips	2222 427 22701
C823	Capacitor ceramic	1nF	-20/+80%	400V	Ferroperm	9/0138.9
C824	Capacitor tantalum	220nF	+20%	35V	ERO	ETP1A
C825	Capacitor ceramic	270pF	+10%	400V	Ferroperm	9/0129.9
C826	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C827	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C828	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C829	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103J
C830	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103J
C831	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103J
C832	Capacitor electrolytic	10uF	+20%	35V	ERO	EKI00AA210F
C833	Capacitor electrolytic	10uF	-20/+80%	35V	ERO	EKI00AA210F
C834	Capacitor polystyrene	1nF	+ 5%	250V	Philips	2222 426 21502
C835	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C836	Capacitor polyester	22nF	+20%	250V	Philips	2222 344 40223
C837	Capacitor polystyrene	1n5	+5%	250V	Philips	2222 426 21502
C838	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
D801	Diode silicon				Philips	1N4148
D802	Diode silicon				Philips	1N4148

Symbol	Description			Manufact.	
D803	Diode silicon			Philips	1N4148
D804	Diode zener	4.7V ± 5%	0.4W	Philips	BZX79C4V7
D805	Diode silicon			Philips	1N4148
D806	Diode silicon			Philips	1N4148
D807	Diode silicon			Philips	1N4148
D808	Diode silicon			Philips	1N4148
D809	Diode silicon			Philips	1N4148
D810	Diode silicon			Philips	1N4148
D811	Diode switch			Philips	BA182
D812	Diode switch			Philips	BA182
D813	Diode switch			Philips	BA182
D814	Diode stabistor			Philips	BZV 46 2V0
D815	Diode stabistor			Philips	BZV 46 2V0
L801	Coil			S.P.	TL195
L802	Coil	470uH ± 5%		Kaschke	Type 200/5
L803	Coil	390uH ± 5%		Kaschke	Type 200/5
L804	Coil	330uH ± 5%		Kaschke	Type 200/5
L805	Coil			S.P.	TL196
R801	Resistor	12Kohm ±5%	0.33W	Philips	2322 106 33123
R802	Resistor	12Kohm ±5%	0.33W	Philips	2322 106 33123
R803	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R804	Resistor	2k2 ohm ±5%	0.33W	Philips	2322 211 13222
R805	Resistor	5E1 Ohm ±5%	0.33W	Philips	2322 211 13518
R806	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R807	Resistor	4K7 ohm ±5%	0.33W	Philips	2322 106 33472
R808	Resistor	6k8 ohm ±5%	0.33W	Philips	2322 211 13682
R809	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R810	Resistor	15 ohm ±5%	0.33W	Philips	2322 106 33159
R811	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 106 33222
R812	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 106 33222
R813	Resistor	2k7 ohm ±5%	0.33W	Philips	2322 106 33272
R814	Resistor	1k2 ohm ±5%	0.33W	Philips	2322 211 13122
R815	Resistor	47Kohm ±5%	0.33W	Philips	2322 106 33473
R816	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R817	Resistor	5E1 ohm ±5%	0.33W	Philips	2322 211 13518
R818	Resistor	2M7 ohm ±5%	0.33W	Philips	2322 106 33275
R819	Resistor	8k2 ohm ±5%	0.33W	Philips	2322 211 13822
R820	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R821	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123

Symbol	Description			Manufact.	
R822	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R823	Resistor	1Mohm ±5%	0.33W	Philips	2322 211 13105
R824	Resistor	39Kohm ±5%	0.33W	Philips	2322 106 33393
R825	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R826	Resistor	15Kohm ±5%	0.33W	Philips	2322 211 13153
R827	Resistor	4k7 ohm ±5%	0.33W	Philips	2322 211 13472
R828	Resistor	1Kohm ±5%	0.33W	Philips	2322 106 33102
R829	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R830	Resistor	5E1 ohm ±5%	0.33W	Philips	2322 211 13518
R831	Resistor	1Mohm ±5%	0.33W	Philips	2322 106 33105
R832	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R833	Resistor	18k ohm ±5%	0.33W	Philips	2322 211 13183
R834	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R835	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R836	Resistor	15Kohm ±5%	0.33W	Philips	2322 211 13153
R837	Resistor	470 ohm ±5%	0.33W	Philips	2322 106 33471
R838	Resistor	10Kohm ±5%	0.33W	Philips	2322 106 33103
R839	Resistor	47Kohm ±5%	0.33W	Philips	2322 211 13473
R840	Resistor	100Kohm ±5%	0.33W	Philips	2322 211 13104
R841	Resistor	2k2 ohm ±5%	0.33W	Philips	2322 106 33222
R842	Resistor	22Kohm ±5%	0.33W	Philips	2322 211 13223
R843	Resistor	100 ohm ±5%	0.33W	Philips	2322 211 13101
R844	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R845	Resistor	1Kohm ±5%	0.33W	Philips	2322 106 33102
R846	Resistor	120Kohm ±5%	0.33W	Philips	2322 211 13124
R847	Resistor	18Kohm ±5%	0.33W	Philips	2322 211 13183
R848	Resistor	22Kohm ±5%	0.33W	Philips	2322 211 13223
R849	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R850	Resistor	1Kohm ±5%	0.33W	Philips	2322 211 13102
R851	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
R852	Resistor	47Kohm ±5%	0.33W	Philips	2322 211 13473
R853	Resistor	1Kohm ±5%	0.33W	Philips	2322 211 13102
R854	Resistor	10Kohm ±5%	0.33W	Philips	2322 106 33103
R855	Resistor	27Kohm ±5%	0.33W	Philips	2322 211 13273
R856	Resistor	10Kohm ±5%	0.33W	Philips	2322 211 13103
R857	Resistor	2k2 ohm ±5%	0.33W	Philips	2322 211 13222
R858	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R859	Resistor	1Kohm ±5%	0.33W	Philips	2322 211 13102
R860	Resistor	10Kohm ±5%	0.33W	Philips	2322 106 33103
R861	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561

Symbol	Description			Manufact.	
R862	Resistor	1k5 ohm ±5%	0.33W	Philips	2322 211 13152
R863	Resistor	47 ohm ±5%	0.33W	Philips	2322 106 33479
R864	Resistor	1Mohm ±5%	0.33W	Philips	2322 106 33105
R865	Resistor	100Kohm ±5%	0.33W	Philips	2322 211 13104
R866	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R867	Resistor	100 ohm ±5%	0.33W	Philips	2322 211 13101
R868	Resistor	100Kohm ±5%	0.33W	Philips	2322 211 13104
R869	Resistor	47Kohm ±5%	0.33W	Philips	2322 211 13473
R870	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R871	Resistor	1Kohm ±5%	0.33W	Philips	2322 211 13102
R872	Resistor	100Kohm ±5%	0.33W	Philips	2322 211 13104
R873	Resistor	47 ohm ±5%	0.33W	Philips	2322 106 33479
T801	Transistor			Philips	BC548B
T802	Transistor			Philips	BC548B
T803	Transistor			Philips	BC558B
T804	Transistor			Philips	BF256A
T805	Transistor			Philips	BC548B
T806	Transistor			Philips	BC548B
T807	Transistor			Philips	BC558B
T808	Transistor			Philips	BF256A
T809	Transistor			Philips	BC548B
T810	Transistor			Philips	BC548B
T811	Transistor			Philips	BC548B
T812	Transistor			Philips	BC558B
T813	Transistor			Philips	BC548B
T814	Transistor			Philips	BC548B
T815	Transistor			Philips	BC548B
T816	Transistor			Philips	BC548B
T817	A - E Transistor array			National	LM3086N

Symbol	Description			Manufact.	
C901	Capacitor polyester	220nF ±20%	100V	ERO	MKT1822-422/0
C902	Capacitor ceramic	1n8-20/+80%	400V	Ferroperm	9/0141.9
C903	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C904	Capacitor electrolytic	4u7 ±20%	50V	ERO	EKI00AA147H
C905	Capacitor polystyrene	15nF ± 2%	63V	Philips	2222 424 31503
C906	Capacitor polystyrene	30nF ± 2%	63V	Philips	2222 424 33003
C907	Capacitor polystyrene	1n3 ± 2%	160V	Philips	2222 425 31302
C908	Capacitor polystyrene	39nF ± 2%	63V	Philips	2222 424 33903
C909	Capacitor polystyrene	470pF ± 2%	250V	Philips	2222 426 44701
C910	Capacitor ceramic	1n8-20/+80%	400V	Ferroperm	9/0141.9
C911	Capacitor polyester	220nF ±20%	100V	ERO	MKT1822-422/0
C912	Capacitor electrolytic	4u7 ±20%	50V	ERO	EKI00AA147H
C913	Capacitor electrolytic	4u7 ±20%	50V	ERO	EKI00AA147H
C914	Capacitor polyester	100nF ±20%	100V	ERO	MKT1822-410/0
C915	Capacitor electrolytic	100uF-10/+50	25V	Siemens	B41283-B5107-T
C916	Capacitor electrolytic	22uF ±20%	35V	ERO	EKI00BB222F
C917	Capacitor polystyrene	4n7 ± 2%	63V	Philips	2222 424 34702
C918	Capacitor polystyrene	1nF ± 2%	250V	Philips	2222 426 31002
C919	Capacitor electrolytic	22uF ±20%	35V	ERO	EKI00BB222F
C920	Capacitor polyester	100nF ±20%	100V	ERO	MKT1822-410/0
C921	Capacitor electrolytic	470uF-10/+50%	16V	Siemens	B41283-A4477-T
C922	Capacitor electrolytic	100uF-10/+50%	25V	Siemens	B41283-B5107-T
C923	Capacitor polyester	100nF ±20%	100V	ERO	MKT1822-410/0
IC901	Integrated circuit			National	LM324
IC902	Integrated circuit			SGS/ATES	TCA940
R901	Resistor	82Kohm ±5%	0.33W	Philips	2322 211 13823
R902	Resistor	27Kohm ±5%	0.33W	Philips	2322 211 13273
R903	Resistor	6k8 ohm ±5%	0.33W	Philips	2322 106 33682
R904	Resistor	56Kohm ±5%	0.33W	Philips	2222 211 13563
R905	Resistor	68Kohm ±5%	0.33W	Philips	2222 106 33683
R906	Resistor	3k3 ohm ±5%	0.33W	Philips	2222 211 13332
R907	Resistor	100Kohm ±5%	0.33W	Philips	2222 211 13104
R908	Resistor	3k3 ohm ±5%	0.33W	Philips	2222 106 33332
R909	Resistor	12Kohm ±5%	0.33W	Philips	2222 211 13123
R910	Resistor	12Kohm ±5%	0.33W	Philips	2222 211 13123
R911	Resistor	12Kohm ±5%	0.33W	Philips	2222 211 13123
R912	Resistor	3k3 ohm ±5%	0.33W	Philips	2222 211 13332
R913	Resistor	18Kohm ±5%	0.33W	Philips	2222 211 13183

Symbol	Description				Manufact.	
R914	Resistor	56Kohm	+5%	0.33W	Philips	2222 211 13563
R915	Resistor	15Kohm	+5%	0.33W	Philips	2222 211 13153
R916	Resistor	68Kohm	+5%	0.33W	Philips	2222 211 13683
R917	Resistor	3k3 ohm	+5%	0.33W	Philips	2322 211 13332
R918	Resistor	4k7 ohm	+5%	0.33W	Philips	2222 211 13472
R919	Resistor	22Kohm	+5%	0.33W	Philips	2222 211 13223
R920	Resistor	56Kohm	+5%	0.33W	Philips	2222 106 33563
R921	Resistor	120 ohm	+5%	0.33W	Philips	2222 211 13121
R922	Resistor	100 ohm	+5%	0.5W	Philips	2222 212 13101
R923	Resistor	56 ohm	+5%	0.33W	Philips	2222 211 13569
R924	Resistor	1 ohm	+5%	0.33W	Philips	2222 211 13108
R925	Resistor	39 ohm	+5%	0.33W	Philips	2222 211 13399
R926	Resistor	10 ohm	+5%	0.33W	Philips	2222 211 13109
R927	Resistor	8E2 ohm	+5%	4.2W	Philips	2222 330 22828
R928	Resistor	1K2 ohm	+5%	0.33W	Philips	2222 211 13122

Symbol	Description				Manufact.	
C1001	Capacitor	10 nF	±20%	400V	Philips	2222 344 54103
C1002	Capacitor electrolytic	10 uF	±20%	35V	ERO	EKI 00AA 210F
C1003	Capacitor ceramic	12 pF	±5% NPO	400V	Ferroperm	9/0112.9
C1004	Capacitor ceramic	10 nF	-20/+80%	50V	KCK	HE70SJYF103Z
C1005	Capacitor ceramic	68 pF	±2% N150	100V	KCK	SDPU-6E/N150/68/G/100V
C1006	Capacitor polyester	22 nF	±20%	400V	Philips	2222 344 54223
C1007	Capacitor polyester	10 nF	-20/+80%	50V	KCK	HE70SJYF103Z
C1008	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1009	Capacitor polyester	15 nF	±20%	400V	Philips	2222 344 54153
C1010	Capacitor polyester	47 nF	±20%	250V	Philips	2222 344 40473
C1011	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1012	Capacitor electrolytic	10 uF	-10/+100%	40V	Siemens	B41313-A7106-V
C1013	Capacitor electrolytic	10 uF	-10/+100%	40V	Siemens	B41313-A7106-V
C1014	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1015	Capacitor polyester	47 nF	±20%	250V	Philips	2222 344 40473
C1016	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1017	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1018	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1019	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1020	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1021	Capacitor polystyrene	1n2F	±5%	63V	Philips	2222 424 21202
C1022	Capacitor polystyrene	6n8F	±5%	63V	Philips	2222 424 26802
D1001	Diode zener	12V	±5%	0.4W	Philips	BZX79C12
D1002	Diode silicon				Philips	BAW62
FP1001	Ferrite bead	4B1			Philips	4322 020 34420
IC1001	Integrated circuit				Texas	SN74LS192N
IC1002	Integrated circuit				Texas	SN74LS192N
IC1003	Integrated circuit				Texas	SN74LS192N
IC1004	Integrated circuit				Texas	SN74LS192N
IC1005	Integrated circuit				Texas	SN74LS192N
IC1006	Integrated circuit				Motorola	MC4044P
IC1007	Integrated circuit				Texas	SN74LS390N
IC1008	Integrated circuit				Texas	SN74LS20N
IC1009	Integrated circuit				Texas	SN74LS27N
IC1010	Integrated circuit				Texas	SN74LS109N
IC1011	Integrated circuit				Texas	SN74LS390N
IC1012	Integrated circuit				Texas	SN74LS390N

Symbol	Description			Manufact.	
IC1013	Integrated circuit			Motorola	MC4044P
IC1014	Integrated circuit			Texas	SN7410N
IC1015	Integrated circuit			Texas	SN74LS290N
L1001	Coil			S.P.	TL255
L1002	Coil			S.P.	TL235
R1001	Resistor	15 Kohm ±5%	0.33W	Philips	2322 211 13153
R1002	Resistor	15 Kohm ±5%	0.33W	Philips	2322 211 13153
R1003	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561
R1004	Resistor	15 Kohm ±5%	0.33W	Philips	2322 211 13153
R1005	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561
R1006	Resistor	5K6 ohm ±5%	0.33W	Philips	2322 211 13562
R1007	Resistor	1K8 ohm ±5%	0.33W	Philips	2322 211 13182
R1008	not used				
R1009	Resistor	1K8 ohm ±5%	0.33W	Philips	2322 211 13182
R1010	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1011	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R1012	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
R1013	Preset potmeter	2K ohm ±10%	0.5W	Bourns	3299W-1-202
R1014	Resistor	1K2 ohm ±5%	0.33W	Philips	2322 106 33122
R1015	Resistor	10K ohm ±5%	0.33W	Philips	2322 211 13103
R1016	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1017	Resistor	470 ohm ±5%	0.33W	Philips	2322 211 13471
R1018	Resistor	10 Kohm ±5%	0.33W	Philips	2322 211 13103
R1019	Resistor	1K2 ohm ±5%	0.33W	Philips	2322 211 13122
R1020	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 211 13222
R1021	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561
R1022	Resistor	22 Kohm ±5%	0.33W	Philips	2322 211 13223
R1023	Resistor	270 ohm ±5%	0.33W	Philips	2322 106 33271
R1024	Resistor	1K8 ohm ±5%	0.33W	Philips	2322 211 13182
R1025	Resistor	10 Kohm ±5%	0.33W	Philips	2322 211 13103
R1026	Resistor	220 ohm ±5%	0.33W	Philips	2322 106 33221
R1027	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 211 13222
R1028	Resistor	47 Kohm ±5%	0.33W	Philips	2322 106 33473
R1029	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 211 13222
R1030	Resistor	1 Kohm ±5%	0.33W	Philips	2322 211 13102
R1031	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
R1032	Resistor	680 ohm ±5%	0.33W	Philips	2322 211 13681
R1033	Resistor	12 Kohm ±5%	0.33W	Philips	2322 211 13123

Symbol	Description			Manufact.	
R1034	Resistor	6K8 ohm ±5%	0.33W	Philips	2322 211 13682
R1035	Resistor	1 Kohm ±5%	0.33W	Philips	2322 211 13102
T1001	Transistor			Philips	2N2368
T1002	Transistor			Philips	2N2368
T1003	Transistor			Philips	BF494
T1004	Transistor			Philips	BF199
T1005	Transistor			Philips	2N2368
T1006	Transistor			Philips	BF199

Symbol	Description				Manufact.	
C1101	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1102	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1103	Capacitor ceramic	10 nF	-20/+80%	50V	KCK	HE70SJYF 103Z
C1104	Capacitor electrolytic	10 uF	±20%	35V	ERO	EKI 00AA 210F
C1105	Capacitor electrolytic	10 nF	±20%	35V	ERO	EKI 00AA 210F
C1106	Capacitor electrolytic	10 uF	±20%	35V	ERO	EKI 00AA 210F
C1107	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C1108	Capacitor electrolytic	10 uF	-10/+100%	40V	Siemens	B41313-A7106-V
C1109	Capacitor electrolytic	10 uF	±20%	35V	ERO	EKI 00AA 210F
C1110	Capacitor polycarbonate	470 nF	±10%	100V	Philips	2222 344 21474
C1111	Capacitor ceramic	10 nF	-20/+80%	50V	KCK	HE70SJYF 103Z
C1112	Capacitor polystyrene	39 nF	±1%	63V	Philips	2222 424 43903
C1113	Capacitor polyester	6u8F	±10%	100V	Philips	2222 344 25685
C1114	Capacitor electrolytic	10 uF	±20%	35V	ERO	EKI 00AA 210F
C1115	Capacitor ceramic	220 pF	±20%	400V	Ferroperm	9/0129.9
C1116	Capacitor polyester	220 uF	±10%	100V	Philips	2222 344 25224
C1117	Capacitor ceramic	220 pF	±20%	400V	Ferroperm	9/0129.9
C1118	Capacitor polyester	150 nF	±10%	100V	Philips	2222 344 25154
D1101	Diode silicon				Philips	BAW62
D1102	Diode silicon				Philips	BAW62
D1103	Diode zener	4.7V	±5%	0.4W	Philips	BZX79C4V7
D1104	Diode zener	4.7V	±5%	0.4W	Philips	BZX79C4V7
D1105	Diode silicon				Philips	BAW62
D1106	Diode silicon				Philips	BAV21
IC1101	Integrated circuit				National	LM308
R1101	Resistor	1 Kohm	±5%	0.33W	Philips	2322 211 13102
R1102	Resistor	82 ohm	±5%	0.33W	Philips	2322 211 13829
R1103	Resistor	820 ohm	±5%	0.33W	Philips	2322 211 13821
R1104	Resistor	150 Kohm	±5%	0.33W	Philips	2322 211 13154
R1105	Resistor	2K2 ohm	±5%	0.33W	Philips	2322 211 13222
R1106	Resistor	1K2 ohm	±5%	0.33W	Philips	2322 211 13122
R1107	Resistor	12 Kohm	±5%	0.33W	Philips	2322 211 13123
R1108	Resistor	12 ohm	±5%	0.33W	Philips	2322 211 13129
R1109	Resistor	10 Kohm	±5%	0.33W	Philips	2322 211 13103
R1110	Preset potmeter	2K2 ohm	±20%	0.5W	Philips	2322 482 20222
R1111	Resistor	3K3 ohm	±5%	0.33W	Philips	2322 211 13332
R1112	Resistor	10 Kohm	±5%	0.33W	Philips	2322 211 13103

Symbol	Description				Manufact.	
R1113	Resistor	3K3 ohm	±5%	0.33W	Philips	2322 211 13332
R1114	Preset potmeter	2K2 ohm	±20%	0.5W	Philips	2322 482 20222
R1115	Resistor	10 Kohm	±5%	0.33W	Philips	2322 211 13103
R1116	Resistor	1K5 ohm	±5%	0.33W	Philips	2322 211 13152
R1117	Resistor	2K7 ohm	±5%	0.33W	Philips	2322 106 33272
R1118	Resistor	3K3 ohm	±5%	0.33W	Philips	2322 211 13332
R1119	Resistor	10 Kohm	±5%	0.33W	Philips	2322 211 13103
R1120	Resistor	560 ohm	±5%	0.33W	Philips	2322 211 13561
R1121	Resistor	3K92 ohm	±1%	0.25W	VITROHM	471-0
R1122	Resistor	150 ohm	±5%	0.33W	Philips	2322 211 13151
R1123	Resistor	22 Kohm	±5%	0.33W	Philips	2322 211 13223
R1124	Resistor	2M7 ohm	±5%	0.33W	Philips	2322 211 12275
R1125	Resistor	4K7 ohm	±5%	0.33W	Philips	2322 211 13472
R1126	Resistor	2K2 ohm	±5%	0.33W	Philips	2322 211 13222
R1127	Resistor	3K92 ohm	±1%	0.25W	VITROHM	471-0
R1128	Resistor	36K5 ohm	±1%	0.25W	VITROHM	471-0
R1129	Resistor	3K92 ohm	±1%	0.25W	VITROHM	471-0
T1101	Transistor				Philips	BD138
T1102	Transistor				Philips	BC548A
T1103	Transistor				Philips	BD139
T1104	Transistor				Philips	BC558
T1105	Transistor				Philips	BC556A
T1106	Transistor				Philips	BC548

Symbol	Description	Manufact.	
	The units are factory adjusted and sealed and can only be repaired at the factory.		
	Module No. 1200	S.P.	VCO UNIT
	Module No. 1300	S.P.	HARMONIC FILTER UNIT

Symbol	Description		Manufact.	
C1401	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1402	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1403	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1404	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1405	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1406	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1407	Capacitor ceramic	47 pF ±2% N150 100V	Philips	2222 638 34479
C1408	Capacitor polyester	100 nF ±20% 100V	Philips	2222 344 24104
C1409	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1410	Capacitor ceramic	100 pF ±2% N150 100V	Philips	2222 628 34101
C1411	Capacitor polystyrene	180 pF ±1% 630V	Philips	2222 427 41801
C1412	Capacitor ceramic	33 pF ±2% 100V	Philips	2222 628 34339
C1413	Capacitor ceramic	56 pF ±2% 100V	Philips	2222 628 34569
C1414	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1415	Capacitor polyester	100 nF ±20% 100V	Philips	2222 344 24104
C1416	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1417	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
IC1401	Integrated circuit		National	LM3053
L1401	Coil		S.P.	TL059
L1402	Coil	12 uH ±5%	Kaschke	220/5
L1403	Coil	12 uH ±5%	Kaschke	220/5
R1401	Resistor	3K3 ohm ±5% 0.33W	Philips	2322 211 13332
R1402	Resistor	15 Kohm ±5% 0.33W	Philips	2322 211 13153
R1403	Resistor	2K2 ohm ±5% 0.33W	Philips	2322 211 13222
R1404	Resistor	270 ohm ±5% 0.33W	Philips	2322 211 13271
R1405	Resistor	100 ohm ±5% 0.33W	Philips	2322 211 13101
R1406	Resistor	10 ohm ±5% 0.33W	Philips	2322 106 33109
R1407	Resistor	330 ohm ±5% 0.33W	Philips	2322 211 13331
R1408	Resistor	2K7 ohm ±5% 0.33W	Philips	2322 211 13272
R1409	Resistor	680 ohm ±5% 0.33W	Philips	2322 211 13681
R1410	Resistor	390 ohm ±5% 0.33W	Philips	2322 211 13391
R1411	Resistor	470 ohm ±5% 0.33W	Philips	2322 211 13471
R1412	Resistor	27 Kohm ±5% 0.33W	Philips	2322 211 13273
R1413	Resistor	2K7 ohm ±5% 0.33W	Philips	2322 211 13272
R1414	Resistor	560 ohm ±5% 0.33W	Philips	2322 211 13561
R1415	Resistor	47 ohm ±5% 0.33W	Philips	2322 211 13479

Symbol	Description	Manufact.	
T1401	Transistor	Philips	BF199
T1402	Transistor	Philips	BF199
TR1401	Coil	S.P.	TL198

Symbol	Description	Manufact.	
C1501	Capacitor ceramic 10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1502	Capacitor ceramic 68 pF ±5% N220 50V	KCK	HE60SJRH680
C1503	Capacitor ceramic 10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1504	Capacitor ceramic 10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1505	Capacitor feed through 1 nF -20/+80% 250V	Ferroperm	9/0138.58
L1501	Coil	S.P.	TL234
R1501	Resistor 18 ohm ±5% 0.33W	Philips	2322 211 13189
R1502	Resistor 33 ohm ±5% 0.33W	Philips	2322 211 13339
R1503	Resistor 1k8 ohm ±5% 0.33W	Philips	2322 211 13182
R1504	Resistor 1k2 ohm ±5% 0.33W	Philips	2322 211 13122
R1505	Resistor 180 ohm ±5% 0.33W	Philips	2322 211 13181
R1506	Resistor 15 ohm ±5% 0.33W	Philips	2322 211 13159
R1507	Resistor 100 ohm ±5% 0.33W	Philips	2322 211 13101
R1508	Resistor 220 ohm ±5% 0.33W	Philips	2322 211 13221
T1501	Transistor	Philips	BFW17A

Symbol	Description			Manufact.	
C1601	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1602	Capacitor ceramic	3p9F ±0.25 pF NPO	400V	Ferroperm	9/0112.9
C1603	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1604	Capacitor polystyrene	150 pF ±5%	630V	Philips	2222 427 21501
C1605	Capacitor polystyrene	270 pF ±5%	630V	Philips	2222 427 22701
C1606	Capacitor polystyrene	240 pF ±5%	630V	Philips	2222 427 22401
C1607	Capacitor polystyrene	120 pF ±5%	630V	Philips	2222 427 21201
C1608	Capacitor polystyrene	270 pF ±5%	630V	Philips	2222 427 22701
C1609	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1610	Capacitor ceramic	10 pF ±10% NPO	400V	Ferroperm	9/0112.9
C1611	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1612	Capacitor ceramic	12 pF ±5% N150	100V	KCK	SDRU-6B
C1613	Capacitor ceramic	22 pF ±5% N150	100V	KCK	SDRU-6B
C1614	Capacitor polyester	47 nF ±10%	250V	Philips	2222 344 25473
C1615	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1616	Capacitor ceramic	47 pF ±5% N150	100V	KCK	SDRU-6B
C1617	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1618	Not used				
C1619	Capacitor polyester	6u8F ±10%	100V	Philips	2222 344 25685
C1620	Capacitor polyester	330 nF ±10%	100V	Philips	2222 344 25334
C1621	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1622	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1623	Capacitor polyester	47 nF ±20%	100V	Philips	2222 344 24473
C1624	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1625	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA210F
C1626	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA210F
C1627	Capacitor polystyrene	2n2F ±5%	100V	Philips	2222 424 22202
C1628	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
C1629	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
C1630	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
C1631	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
C1632	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
C1633	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
C1634	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
C1635	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
C1636	Capacitor feed through	1 nF -20/+80%	250V	Ferroperm	9/0138.58
D1601	Diode varicap.			Motorola	MV109
D1602	Diode varicap.			Motorola	MV109

Symbol	Description				Manufact.	
D1603	Diode switch				Telefunken	BA243
D1604	Diode switch				Telefunken	BA243
D1605	Diode varicap.				Motorola	MV109
D1606	Diode varicap.				Motorola	MV109
IC1601	Integrated circuit				National	LM358N
L1601	Coil	2u2H	+10%		Kaschke	220
L1602	Coil	1u5H	+10%		Kaschke	220
R1601	Resistor	4k7 ohm	+5%	0.33W	Philips	2322 106 33472
R1602	Resistor	18 kohm	+5%	0.33W	Philips	2322 211 13183
R1603	Resistor	6k8 ohm	+5%	0.33W	Philips	2322 106 33682
R1604	Resistor	10 ohm	+5%	0.33W	Philips	2322 106 33109
R1605	Resistor	100 kohm	+5%	0.33W	Philips	2322 106 33104
R1606	Resistor	10 ohm	+5%	0.33W	Philips	2322 106 33109
R1607	Resistor	2k7 ohm	+5%	0.33W	Philips	2322 211 13272
R1608	Resistor	6k8 ohm	+5%	0.33W	Philips	2322 106 33682
R1609	Resistor	18 kohm	+5%	0.33W	Philips	2322 106 33183
R1610	Resistor	4k7 ohm	+5%	0.33W	Philips	2322 106 33472
R1611	Resistor	100 kohm	+5%	0.33W	Philips	2322 106 33104
R1612	Resistor	330 ohm	+5%	0.33W	Philips	2322 106 33331
R1613	Resistor	5k6 ohm	+5%	0.33W	Philips	2322 106 33562
R1614	Resistor	470 ohm	+5%	0.33W	Philips	2322 106 33471
R1615	Resistor	82 ohm	+5%	0.33W	Philips	2322 106 33829
R1616	Resistor	68 kohm	+5%	0.33W	Philips	2322 211 13683
R1617	Resistor	390 kohm	+5%	0.33W	Philips	2322 106 33394
R1618	Resistor	180 kohm	+5%	0.33W	Philips	2322 106 33184
R1619	Resistor	100 kohm	+5%	0.33W	Philips	2322 106 33104
R1620	Resistor	47 kohm	+5%	0.33W	Philips	2322 106 33473
R1621	Resistor	47 kohm	+5%	0.33W	Philips	2322 106 33473
R1622	Resistor	47 kohm	+5%	0.33W	Philips	2322 106 33473
R1623	Resistor	27 kohm	+5%	0.33W	Philips	2322 106 33273
R1624	Resistor	10 kohm	+5%	0.33W	Philips	2322 106 33103
R1625	Resistor	10 kohm	+5%	0.33W	Philips	2322 106 33103
R1626	Resistor	4k7 ohm	+5%	0.33W	Philips	2322 106 33472
R1627	Resistor	2M7 ohm	+5%	0.33W	Philips	2322 106 32275
R1628	Resistor	2k7 ohm	+5%	0.33W	Philips	2322 106 33272
R1629	Resistor	220 ohm	+5%	0.33W	Philips	2322 106 33221
R1630	Resistor	22 kohm	+5%	0.33W	Philips	2322 106 33223
R1631	Resistor	10 kohm	+5%	0.33W	Philips	2322 106 33103

Symbol	Description			Manufact.	
R1632	Resistor	18 kohm ±5%	0.33W	Philips	2322 106 33183
R1633	Resistor	39 kohm ±5%	0.33W	Philips	2322 106 33393
R1634	Resistor	390 ohm ±5%	0.33W	Philips	2322 106 33391
R1635	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 106 33562
R1636	Resistor	560 ohm ±5%	0.33W	Philips	2322 106 33561
R1637	Resistor	150 ohm ±5%	0.33W	Philips	2322 106 33151
R1638	Resistor	560 ohm ±5%	0.33W	Philips	2322 106 33561
T1601	Transistor			Philips	BF199
T1602	Transistor			Philips	BF199
T1603	Transistor			Philips	BC558B
T1604	Transistor			Philips	BF199
T1605	Transistor			Philips	BC558B
TR1601	Coil			S.P.	TL234
X1601	Crystal	10.0076 MHz		S.P.	C1018
X1602	Crystal	16.0076 MHz		S.P.	C1019

Symbol	Description				Manufact.	
C1701	Capacitor electrolytic	10 uF	+20%	35V	ERO	EKI 00AA210F
C1702	Capacitor polyester	1 uF	+20%	100V	ERO	MKT 1822 - 510/0
C1703	Capacitor polystyrene	3 nF	+2%	100V	Philips	2222 424 33002
C1704	Capacitor electrolytic	1 uF	+20%	50V	ERO	EKI 00AA110H
C1705	Capacitor electrolytic	10 uF	+20%	35V	ERO	EKI 00AA210F
C1706	Capacitor polystyrene	5n6F	+2%	100V	Philips	2222 424 35602
C1707	Capacitor polystyrene	300 pF	+2%	630V	Philips	2222 427 33001
C1708	Capacitor polystyrene	15 nF	+5%	100V	Philips	2222 424 21503
C1709	Capacitor polystyrene	5n6F	+2%	100V	Philips	2222 424 35602
C1710	Capacitor polystyrene	300 pF	+2%	630V	Philips	2222 427 33001
C1711	Capacitor polystyrene	15 nF	+5%	100V	Philips	2322 424 21503
C1712	Capacitor electrolytic	10 uF	+20%	35V	ERO	EKI 00AA210F
IC1701	Integrated circuit				Motorola	MC1458CP
L1701	Coil				S.P.	TL223
R1701	Resistor	4k7 ohm	+5%	0.33W	Philips	2322 211 13472
R1702	Resistor	68 kohm	+5%	0.33W	Philips	2322 106 33683
R1703	Resistor	56 kohm	+5%	0.33W	Philips	2322 211 13563
R1704	Resistor	82 kohm	+5%	0.33W	Philips	2322 211 13823
R1705	Resistor	560 kohm	+5%	0.33W	Philips	2322 211 13564
R1706	Resistor	68 kohm	+5%	0.33W	Philips	2322 211 13683
R1707	Resistor	6k8 ohm	+5%	0.33W	Philips	2322 211 13682
R1708	Resistor	3k9 ohm	+5%	0.33W	Philips	2322 211 13392
R1709	Resistor	15 kohm	+5%	0.33W	Philips	2322 106 33153
R1710	Resistor	15 kohm	+5%	0.33W	Philips	2322 211 13153
R1711	Resistor	22 kohm	+5%	0.33W	Philips	2322 211 13223
R1712	Resistor	18 kohm	+5%	0.33W	Philips	2322 211 13183
R1713	Resistor	2k7 ohm	+5%	0.33W	Philips	2322 211 13272
R1714	Resistor	15 kohm	+5%	0.33W	Philips	2322 211 13153
R1715	Resistor	22 kohm	+5%	0.33W	Philips	2322 211 13223
R1716	Resistor	18 kohm	+5%	0.33W	Philips	2322 211 13183
R1717	Resistor	330 ohm	+5%	0.33W	Philips	2322 211 13331
R1718	Resistor	560 ohm	+5%	0.33W	Philips	2322 211 13561
T1701	Transistor				Philips	BC548B
T1702	Transistor				Philips	BC548B

Symbol	Description				Manufact.	
C1801	Capacitor ceramic	3p3F ±0.25 pF N470		250V	Ferroperm	9/0119.9
C1802	Capacitor ceramic	10 nF -20/+80%		50V	KCK	HE70SJYF103Z
C1803	Capacitor polystyrene	470 pF ±2%		250V	Philips	2222 426 34701
C1804	Capacitor polystyrene	560 pF ±2%		250V	Philips	2222 426 35601
C1805	Capacitor ceramic	10 nF -20/+80%		50V	KCK	HE70SJYF103Z
C1806	Capacitor polyester	100 nF ±20%		100V	ERO	MKT 1822 - 410/0
C1807	Capacitor ceramic	82 pF ±5% N150		500V	KCK	HM95SJPH820J
C1808	Capacitor ceramic	10 nF -20/+80%		50V	KCK	HE70SJYF103Z
C1809	Capacitor ceramic	47 pF ±3% N150		500V	KCK	HM74SJPH470 3%
D1801	Diode varicap.				Motorola	MV106
L1801	Coil	900 uH ±10%			Kaschke	200/5
R1801	Resistor	820 ohm	±5%	0.33W	Philips	2322 211 13821
R1802	Resistor	100 kohm	±5%	0.33W	Philips	2322 211 13104
R1803	Resistor	12 kohm	±5%	0.33W	Philips	2322 211 13123
R1804	Resistor	6k8 ohm	±5%	0.33W	Philips	2322 211 13682
R1805	Resistor	1 kohm	±5%	0.33W	Philips	2322 211 13102
R1806	Resistor	220 ohm	±5%	0.33W	Philips	2322 211 13221
R1807	Resistor	6k8 ohm	±5%	0.33W	Philips	2322 211 13682
R1808	Resistor	2k2 ohm	±5%	0.33W	Philips	2322 211 13222
R1809	Resistor	1k2 ohm	±5%	0.33W	Philips	2322 211 13122
R1810	Resistor	1k5 ohm	±5%	0.33W	Philips	2322 211 13152
R1811	Resistor	3k9 ohm	±5%	0.33W	Philips	2322 211 13392
R1812	Resistor	1 kohm	±5%	0.33W	Philips	2322 211 13102
T1801	Transistor				Philips	BF199
X1801	Crystal	9.3979 MHz			S.P.	C1020

Symbol	Description	Manufact.	
C1901	Capacitor ceramic 10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1902	Capacitor electrolytic 10 uF -10/+100% 25V	Siemens	B41313-A5106-V
C1903	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1904	Capacitor ceramic 10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1905	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1906	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1907	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1908	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1909	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1910	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1911	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1912	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1913	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1914	Capacitor electrolytic 10 uF -10/+100% 25V	Siemens	B41313-A5106-V
C1915	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1916	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1917	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1918	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1919	Capacitor electrolytic 10 uF -10/+100% 25V	Siemens	B41313-A5106-V
C1920	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
C1921	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
D1901	Diode silicon	Philips	1N4148
D1902	Diode silicon	Philips	1N4148
IC1901	Integrated circuit	Texas	SN74LS42N
IC1902	Integrated circuit	Texas	SN74LS32N
IC1903	Integrated circuit	Texas	SN74LS11N
IC1904	Integrated circuit	Texas	SN74LS08N
IC1905	Integrated circuit	MMI	6308-1
IC1906	Integrated circuit	Texas	SN7406N
IC1907	Integrated circuit	Texas	SN74LS138N
IC1908	Integrated circuit	Texas	SN7407N
IC1909	Integrated circuit	Texas	SN7407N
IC1910	Integrated circuit	Motorola	MC14515 BCP
R1901	Not used		
R1902	Not used		
R1903	Not used		
R1904	Not used		

Symbol	Description			Manufact.	
R1905	Not used				
R1906	Not used				
R1907	Not used				
R1908	Not used				
R1909	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1910	Resistor	2k7 ohm ±5%	0.33W	Philips	2322 211 13272
R1911	Resistor	1 kohm ±5%	0.33W	Philips	2322 211 13102
R1912	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R1913	Resistor	47 kohm ±5%	0.33W	Philips	2322 211 13473
R1914	Resistor	47 kohm ±5%	0.33W	Philips	2322 211 13473
R1915	Resistor	47 kohm ±5%	0.33W	Philips	2322 211 13473
R1916	Resistor	47 kohm ±5%	0.33W	Philips	2322 211 13473
R1917	Resistor	47 kohm ±5%	0.33W	Philips	2322 211 13473
R1918	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1919	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1920	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1921	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1922	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1923	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1924	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1925	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1926	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1927	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1928	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1929	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1930	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1931	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1932	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1933	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1934	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1935	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1936	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1937	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1938	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1939	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1940	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1941	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R1942	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R1943	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1944	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103

Symbol	Description				Manufact.	
R1945	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1946	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1947	Resistor	10	kohm ±5%	0.33W	Philips	2322 211 13103
R1948	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1949	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1950	Resistor	10	kohm ±5%	0.33W	Philips	2322 211 13103
R1951	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1952	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1953	Resistor	10	kohm ±5%	0.33W	Philips	2322 211 13103
R1954	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1955	Resistor	8k2	ohm ±5%	0.33W	Philips	2322 211 13822
R1956	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1957	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1958	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1959	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1960	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1961	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1962	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1963	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1964	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1965	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1966	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1967	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1968	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1969	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1970	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1971	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1972	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1973	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1974	Resistor	5k6	ohm ±5%	0.33W	Philips	2322 211 13562
R1975	Resistor	820	ohm ±5%	0.33W	Philips	2322 211 13821
R1976	Resistor	22	ohm ±5%	0.33W	Philips	2322 211 13229
R1977	Resistor	1k8	ohm ±5%	0.33W	Philips	2322 211 13182
R1978	Resistor	2k7	ohm ±5%	0.33W	Philips	2322 211 13272
RA1901	Resistor array. 8x10 kohm ±5%			0.125W	ITT	UR8 10 kohm ±5%
T1901	Transistor				Philips	BC328-25
T1902	Transistor				Philips	BC328-25
T1903	Transistor				Philips	BC328-25

Symbol	Description	Manufact.	
T1904	Transistor	Philips	BC328-25
T1905	Transistor	Philips	BC328-25
T1906	Transistor	Philips	BC328-25
T1907	Transistor	Philips	BC328-25
T1908	Transistor	Philips	BC328-25
T1909	Transistor	Philips	BC328-25
T1910	Transistor	Philips	BC328-25
T1911	Transistor	Philips	BC328-25
T1912	Transistor	Philips	BC328-25
T1913	Transistor	Philips	BC548
T1914	Transistor	Philips	BC558
T1915	Transistor	Philips	BC558
T1916	Transistor	Philips	BC558
T1917	Transistor	Philips	BC558
T1918	Transistor	Philips	BC558
T1919	Transistor	Philips	BC558
T1920	Transistor	Philips	BC558
T1921	Transistor	Philips	BC558
T1922	Transistor	Philips	BC558
T1923	Transistor	Philips	BC558
T1924	Transistor	Philips	BC558B

Symbol	Description				Manufact.	
C2001	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C2002	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C2003	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C2004	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C2005	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C2006	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C2007	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C2008	Capacitor polyester	220 nF	+20%	100V	Philips	2222 344 24224
C2009	Capacitor electrolytic	2200uF	-20/+50%	25V	ERO	EG.00KG 422E
C2010	Capacitor electrolytic	10 uF	±20%	35V	ERO	EKI 00AA210F
C2011	Capacitor electrolytic	470 nF	±20%	50V	ERO	EKI 00AA047H
C2012	Capacitor polyester	220 nF	±20%	100V	Philips	2222 344 24224
C2013	Capacitor electrolytic	3u3F	±20%	50V	ERO	EKI 00AA133H
C2014	Capacitor ceramic	10 nF	-20/+80%	50V	KCK	HE70SJYF103Z
C2015	Capacitor ceramic	10 nF	-20/+80%	50V	KCK	HE70SJYF103Z
C2016	Capacitor ceramic	10 nF	-20/+80%	50V	KCK	HE70SJYF103Z
C2017	Capacitor electrolytic	10 uF	±20%	35V	ERO	EKI 00AA210F
C2018	Capacitor ceramic	10 nF	-20/+80%	50V	KCK	HE70SJYF103Z
C2019	Capacitor ceramic	10 nF	-20/+80%	50V	KCK	HE70SJYF103Z
D2001	Diode zener	5.1V	±5%	0.4W	Philips	BZY79 C5V1
D2002	Diode silicon				Philips	1N4148
IC2001	Integrated circuit				RCA	CD4056B
IC2002	Integrated circuit				RCA	CD4056B
IC2003	Integrated circuit				RCA	CD4056B
IC2004	Integrated circuit				RCA	CD4056B
IC2005	Integrated circuit				RCA	CD4056B
IC2006	Integrated circuit				RCA	CD4056B
IC2007	Integrated circuit				Texas	SN74LS08N
IC2008	Integrated circuit				Texas	SN74LS08N
IC2009	Integrated circuit				Texas	SN74LS08N
IC2010	Integrated circuit				Texas	SN74LS32N
IC2011	Integrated circuit				Texas	SN74LS08N
IC2012	Integrated circuit				Texas	SN74LS08N
IC2013	Integrated circuit				Texas	SN74LS668N
IC2014	Integrated circuit				Texas	SN74LS668N
IC2015	Integrated circuit				Texas	SN74LS668N
IC2016	Integrated circuit				Texas	SN74LS668N
IC2017	Integrated circuit				Texas	SN74LS668N

Symbol	Description			Manufact.	
IC2018	Integrated circuit			Texas	SN74LS668N
IC2019	Integrated circuit			Texas	SN74LS04N
IC2020	Integrated circuit			Texas	SN74LS132N
IC2021	Integrated circuit			Texas	SN74LS74AN
IC2022	Integrated circuit			Texas	SN74LS74AN
IC2023	Integrated circuit			Texas	SN74LS74AN
IC2024	Integrated circuit			Texas	SN74LS00N
IC2025	Integrated circuit			Texas	SN74LS148N
IC2026	Integrated circuit			Texas	SN74LS08N
IC2027	Integrated circuit			Texas	SN74LS86N
IC2028	Integrated circuit			Texas	SN74LS74AN
IC2029	Integrated circuit			Texas	SN74LS123N
IC2030	Integrated circuit			Texas	SN74LS32N
IC2031	Integrated circuit			Motorola	MC14011 BCP
R2001	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R2002	Resistor	6k8 ohm ±5%	0.33W	Philips	2322 211 13682
R2003	Resistor	1 kohm ±5%	0.33W	Philips	2322 211 13102
R2004	Resistor	18 kohm ±5%	0.33W	Philips	2322 211 13183
R2005	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2006	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2007	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2008	Resistor	1 kohm ±5%	0.33W	Philips	2322 211 13102
R2009	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2010	Resistor	100 ohm ±5%	0.33W	Philips	2322 211 13101
R2011	Resistor	22 kohm ±5%	0.33W	Philips	2322 211 13223
R2012	Resistor	22 kohm ±5%	0.33W	Philips	2322 211 13223
R2013	Resistor	100 ohm ±5%	0.33W	Philips	2322 211 13101
R2014	Resistor	2.7 kohm ±5%	0.33W	Philips	2322 211 13272
R2015	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2016	Resistor	2.7 kohm ±5%	0.33W	Philips	2322 211 13272
R2017	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2018	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2019	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2020	Resistor	100 ohm ±5%	0.33W	Philips	2322 211 13101
RA2001	Resistor array. 8x10 kohm ±5%		0.125W	ITT	UR8 10 kohm ±5%
RA2002	Resistor array. 8x10 kohm ±5%		0.125W	ITT	UR8 10 kohm ±5%
RA2003	Resistor array. 8x10 kohm ±5%		0.125W	ITT	UR8 10 kohm ±5%

Symbol	Description	Manufact.	
T2001	Transistor	Philips	BC548
T2002	Transistor	Philips	BC548
T2003	Transistor	Philips	BC558
T2004	Transistor	Philips	BC558

Symbol	Description			Manufact.	
R2101	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2102	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2103	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2104	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2105	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2106	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2107	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2108	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2109	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2110	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2111	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
R2112	Resistor	10 kohm ±5%	0.33W	Philips	2322 211 13103
S2101	Switch			ITT	ED/SP
S2102	Switch			ITT	ED/SP
S2103	Switch			ITT	ED/SP
S2104	Switch			ITT	ED/SP
S2105	Switch			ITT	ED/SP
S2106	Switch			ITT	ED/SP
S2107	Switch			ITT	ED/SP
S2108	Switch			ITT	ED/SP
S2109	Switch			ITT	ED/SP
S2110	Switch			ITT	ED/SP
S2111	Switch			ITT	ED/SP
S2112	Switch			ITT	ED/SP

Symbol	Description	Manufact.	
LCD2201	Display six segments	Data modul	60D7F05KG
J2201	Connector	AMP	2-583773-1
J2202	Connector	AMP	2-583773-1

Symbol	Description					Manufact.	
C2301	Capacitor electrolytic	10	uF	±20%	35V	ERO	EKI 00AA210F
D2301	Diode silicon					Philips	1N4148
D2302	Diode silicon					Philips	1N4148
D2303	Diode silicon					Philips	1N4148
OC2301	Opto coupler					TRW	OPB825
R2301	Resistor	5k6	ohm	±5%	0.33W	Philips	2322 106 33562
R2302	Resistor	3k9	ohm	±5%	0.33W	Philips	2322 106 33392
R2303	Resistor	820	ohm	±5%	0.33W	Philips	2322 106 33821
R2304	Resistor	820	ohm	±5%	0.33W	Philips	2322 106 33821
R2305	Resistor	82	ohm	±5%	0.33W	Philips	2322 106 33829
R2306	Resistor	10	kohm	±5%	0.33W	Philips	2322 106 33103
R2307	Resistor	1	kohm	±5%	0.33W	Philips	2322 106 33102
T2301	Transistor					Philips	BC548
T2302	Transistor					Philips	BC558
T2303	Transistor					Philips	BC548

a WHEEL CONTROL II R1119 & R1120

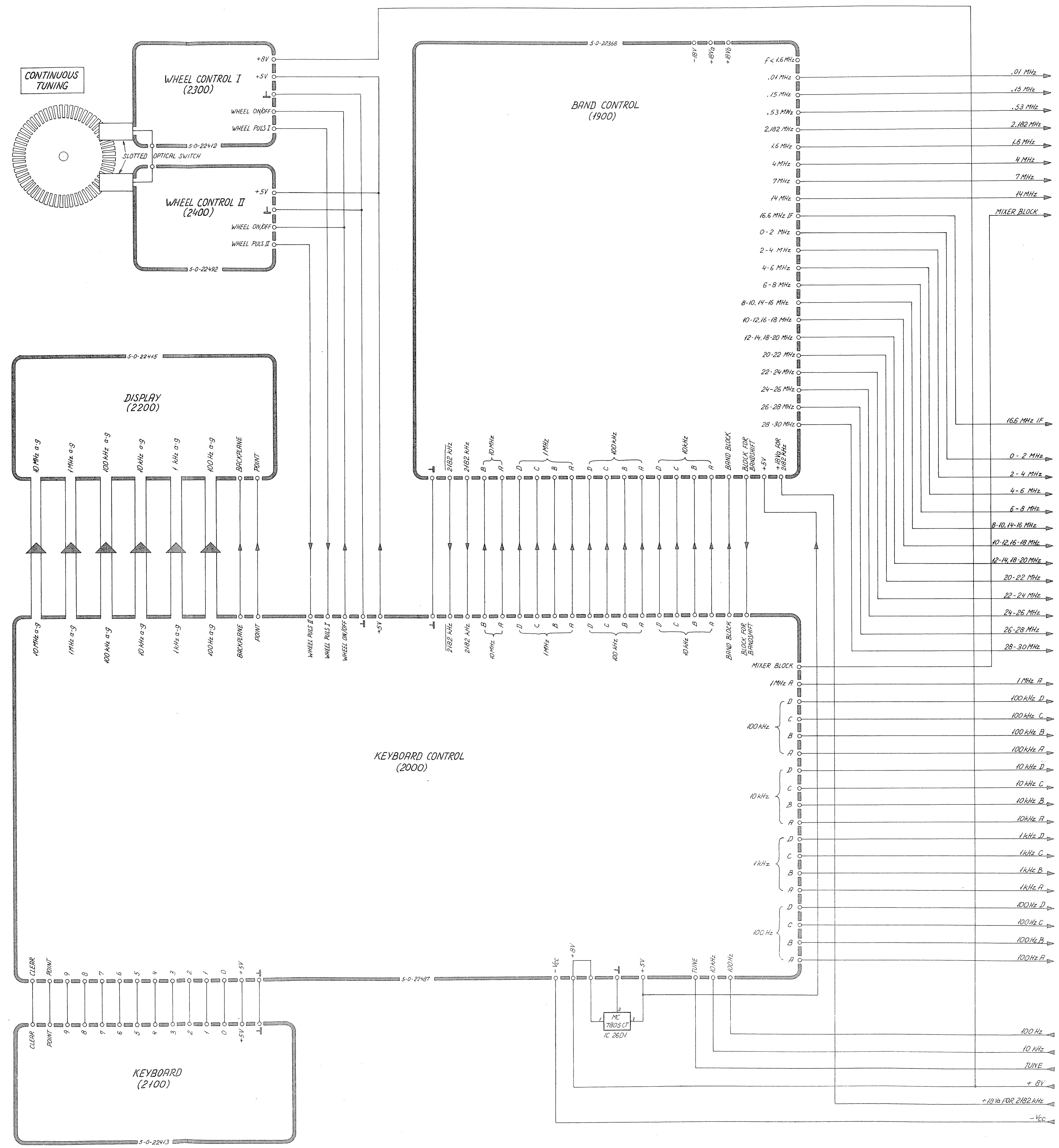
Symbol	Description			Manufact.	
C2401	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA210F
OC2401	Opto coupler			TRW	OPB825
R2401	Resistor	1k8 ohm ±5%	0.33W	Philips	2322 106 33182
R2402	Resistor	6k8 ohm ±5%	0.33W	Philips	2322 106 33682
R2403	Resistor	100 ohm ±5%	0.33W	Philips	2322 106 33101
R2404	Resistor	10 kohm ±5%	0.33W	Philips	2322 106 33103
R2405	Resistor	10 kohm ±5%	0.33W	Philips	2322 106 33103
R2406	Resistor	10 kohm ±5%	0.33W	Philips	2322 106 33103
R2407	Resistor	1 kohm ±5%	0.33W	Philips	2322 211 13102
T2401	Transistor			Philips	BC558
T2402	Transistor			Philips	BC548B
T2403	Transistor			Philips	BC548B

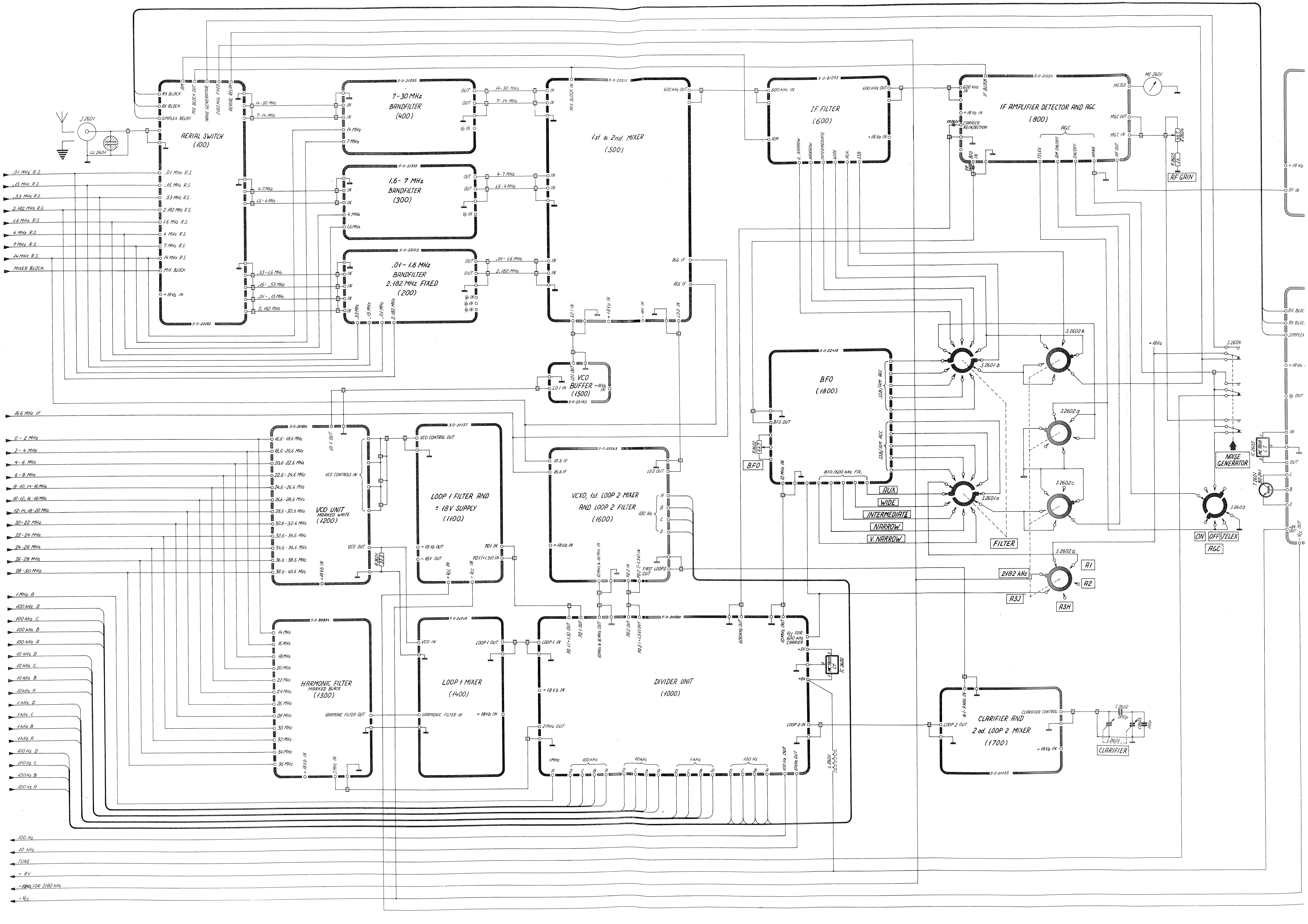
Symbol	Description	Manufact.	
C2501	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C2502	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C2503	Capacitor polyester 10 nF ±20% 400V	Philips	2222 344 54103
C2504	Capacitor polyester 10 nF ±20% 400V	Philips	2222 344 54103
C2505	Capacitor electrolytic 47 uF -10/+50% 63V	ERO	EB 00FC 247J
C2506	Capacitor electrolytic 10 uF -10/+100% 40V	ERO	EB 00CA 210G
C2507	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C2508	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C2509	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C2510	Capacitor polycarbonate 1 uF ±20% 630V	ERO	KC1849 210/6
C2511	Capacitor polycarbonate 1 uF ±20% 630V	ERO	KC1849 210/6
C2512	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C2513	Capacitor polyester 10 nF ±20% 400V	Philips	2222 344 54103
C2514	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C2515	Capacitor polyester 100 nF ±20% 100V	Philips	2222 344 24104
C2516	Capacitor polyester 220 nF ±20% 100V	Philips	2222 344 24224
D2501	Diode zener 56V ±5% 1W	Motorola	MZP 4758A
L2501	Coil	S.P.	TL079
L2502	AF transformer	Tradania	2296
R2501	Resistor 22 kohm ±5% 0.33W	Philips	2322 211 13223
R2502	Resistor 220 ohm ±5% 1.15W	Philips	2322 214 13221

Symbol	Description				Manufact.	
C2601	Capacitor variable	2x335 pF			HELAG	250-30
C2602	Capacitor ceramic	200 pF +5% N150		100V	KCK	SPDU-4E
C2603	Capacitor ceramic	110 pF +5% N150		100V	KCK	SPDU-4B
FP2601	Ferrite bead Grade 4B1				Philips	4322 020 34420
FP2602	Ferrite bead Grade 4B1				Philips	4322 020 34420
FP2603	Ferrite bead Grade				Kaschke	K3/1200/0.1 Hz 4/2/7A
FP2604	Ferrite bead Grade				Kaschke	K3/1200/0.1 Hz 4/2/7A
FP2605	Ferrite bead Grade				Kaschke	K3/1200/0.1 Hz 4/2/7A
FP2606	Ferrite bead Grade				Kaschke	K3/1200/0.1 Hz 4/2/7A
FP2607	Ferrite bead Grade				Kaschke	K3/1200/0.1 Hz 4/2/7A
FP2608	Ferrite bead Grade				Kaschke	K3/1200/0.1 Hz 4/2/7A
GL2601	Neon lamp				Siemens	B1C90-Q69 X151
IC2601	Integrated circuit	5V 1A			Motorola	MC7805CT
IC2602	Integrated circuit	5V 1A			Motorola	MC7805CT
IC2603	Integrated circuit	18V 1A			Motorola	MC7818CT
J2601	Aerial socket				K.V.Hansen	S0239
J2602	Headphone socket				CLIFF	type S1/BB
L2601	Coil				S.P.	TL294
LA2601	Dial lamp	15V/37mA			OSHINE	OL-6003-MB
LA2602	Dial lamp	15V/37mA			OSHINE	OL-6003-MB
LS2601	Loudspeaker	8 ohm			Peerless	E230 MT/8 ohm
ME2601	Meter	MG20			MONI-METER	KL-218J-140
P2601	Power plug				MOLEX	03-06-2364
R2601	Resistor	3E3	ohm ±5%	0.33W	Philips	2322 106 33338
R2602	Resistor variable	4k7	ohm LIN.		NOBLE	V24L5 (10x6.5)N 37S-B4.7K
R2603	Resistor variable	1 kohm	±5%	0.33W	Philips	2222 211 13102
R2604	Resistor variable	4k7	ohm LIN.		NOBLE	V24L5 (10x6.5)N 37S-B4.7K
R2605	Resistor variable	4k7	ohm LIN.		NOBLE	V16L4N B4.7K
R2606	Resistor	1k2	ohm ±5%	0.5W	Philips	2322 212 13122

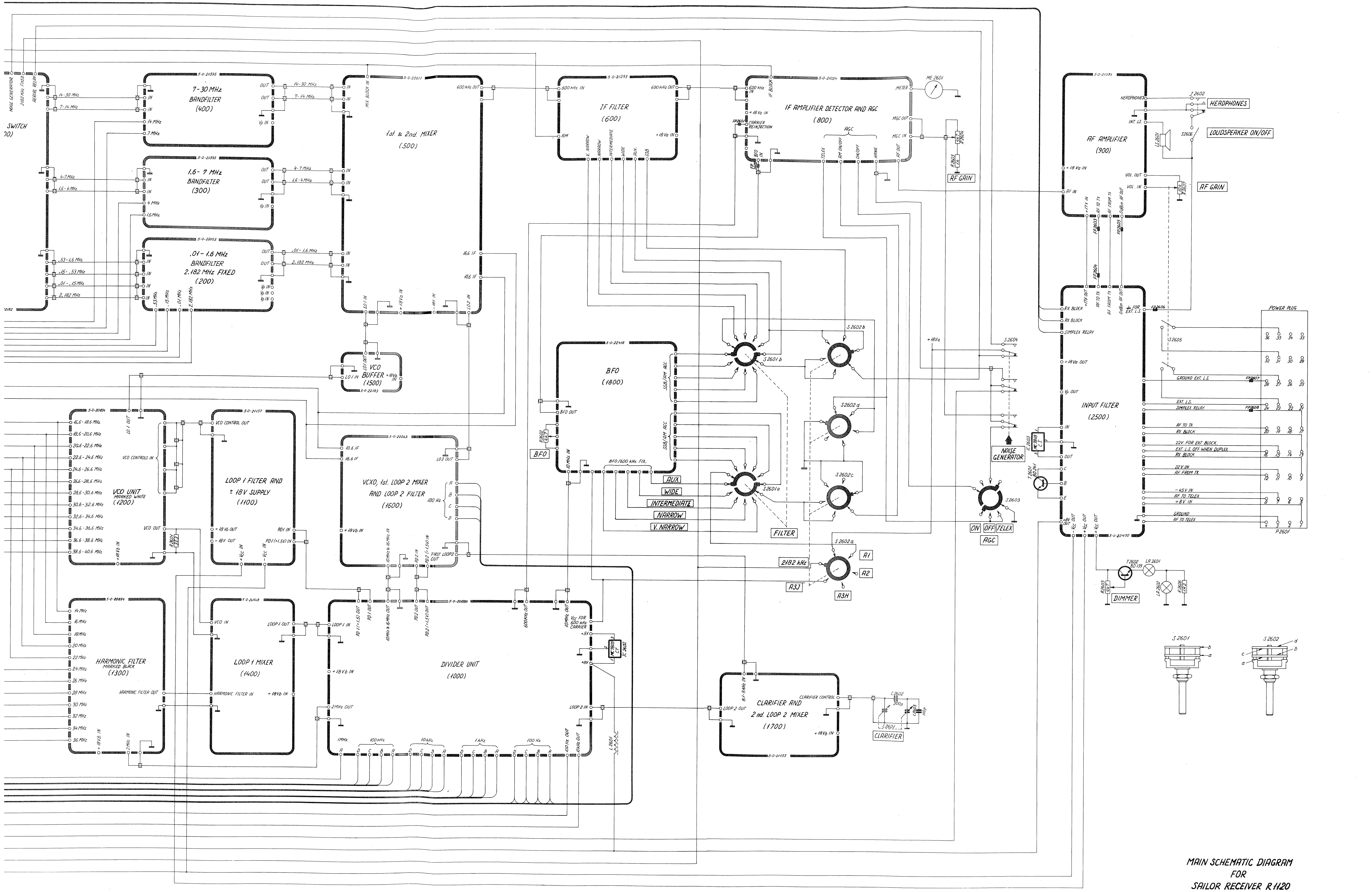
Symbol	Description	Manufact.	
R2607	Resistor variable 10 kohm LOG	NOBLE	V24L5 (10x6.5)S (V12DV-S) 10K
S2601	Switch, 5 pos. SM25 30^{o}	ITT	48432-62565
S2602	Switch, 5 pos. SM25 60^{o}	ITT	48432-62573
S2603	Switch, 3 pos. SM25 30^{o}	ITT	48432-62574
S2604	Switch, push button	C & K	8321
S2605	Switch, mains, part of R2607		
S2606	Switch, toggle	C & K	7101 SYZB
S2607	Switch, 3 pos. SM25 60^{o}	ITT	48432-62587
T2601	Transistor	Motorola	BD241
T2602	Transistor	Motorola	BD139

MAIN SCHEMATIC DIAGRAM
FOR
SAILOR RECEIVER R1120


CONTINUOUS TUNING
SLOTTED OPTICAL SWITCH
WHEEL CONTROL I (2300)
WHEEL CONTROL II (2400)
WHEEL ON/OFF
WHEEL PULS I
WHEEL PULS II
5-0-22412
5-0-22492
5-0-22368
BAND CONTROL (1900)
F < 1,6 MHz
.01 MHz
.15 MHz
.53 MHz
2,182 MHz
1,6 MHz
4 MHz
7 MHz
14 MHz
16,6 MHz IF
0-2 MHz
2-4 MHz
4-6 MHz
6-8 MHz
8-10, 14-16 MHz
10-12, 16-18 MHz
12-14, 18-20 MHz
20-22 MHz
22-24 MHz
24-26 MHz
26-28 MHz
28-30 MHz
MIXER BLOCK
BAND BLOCK
BLOCK FOR BANDSHIFT
5-0-22415
DISPLAY (2200)
10 MHz a-g
1 MHz a-g
100 kHz a-g
10 kHz a-g
1 kHz a-g
100 Hz a-g
BACKPLANE
POINT
KEYBOARD CONTROL (2000)
1 MHz A
100 kHz D
100 kHz C
100 kHz B
100 kHz A
10 kHz D
10 kHz C
10 kHz B
10 kHz A
1 kHz D
1 kHz C
1 kHz B
1 kHz A
100 Hz D
100 Hz C
100 Hz B
100 Hz A
5-0-22487
MC 7805CT
IC 2601
TUNE
100 Hz
10 kHz
+ 8V
+10 V FOR 2182 kHz
-Vcc
CLEAR
KEYBOARD (2100)
5-0-22413



AERIAL SWITCH (100)
RX BLOCK
RX BLOCK
SIMPLEX RELAY
J 2601
.01 MHz R.S.
.15 MHz R.S.
.53 MHz R.S.
2.182 MHz R.S.
1.6 MHz R.S.
4 MHz R.S.
7 MHz R.S.
14 MHz R.S.
MIXER BLOCK
+18Vb IN
7-30 MHz BANDFILTER (400)
14-30 MHz
7-14 MHz
1.6-7 MHz BANDFILTER (300)
4-7 MHz
1.6-4 MHz
.01-1.6 MHz BANDFILTER 2.182 MHz FIXED (200)
.53-1.6 MHz
.15-.53 MHz
.01-.15 MHz
2.182 MHz
1st. & 2nd. MIXER (500)
MIX. BLOCK IN
600 kHz OUT
16.6 IF
10.6 IF
VCO BUFFER (1500)
LO1 OUT
LO1 IN
IF FILTER (600)
600 kHz IN
600 kHz OUT
AM
V. NARROW
NARROW
INTERMEDIATE
WIDE
AUX.
SSB
+18Va IN
IF AMPLIFIER DETECTOR AND AGC (800)
600 kHz IN
CARRIER REINJECTION
AGC
METER
MGC OUT
MGC IN
AF OUT
ME 2601
RF GAIN
+18 Va
AF IN
16.6 MHz IF
0-2 MHz
2-4 MHz
4-6 MHz
6-8 MHz
8-10, 14-16 MHz
10-12, 16-18 MHz
12-14, 18-20 MHz
20-22 MHz
22-24 MHz
24-26 MHz
26-28 MHz
28-30 MHz
VCO UNIT MARKED WHITE (1200)
16.6-18.6 MHz
18.6-20.6 MHz
20.6-22.6 MHz
22.6-24.6 MHz
24.6-26.6 MHz
26.6-28.6 MHz
28.6-30.6 MHz
30.6-32.6 MHz
32.6-34.6 MHz
34.6-36.6 MHz
36.6-38.6 MHz
38.6-40.6 MHz
VCO CONTROLS IN
VCO OUT
LO1 OUT
LOOP 1 FILTER AND ± 18V SUPPLY (1100)
VCO CONTROL OUT
+18Vb OUT
-18V OUT
PD1 IN
VCXO, 1st. LOOP 2 MIXER AND LOOP 2 FILTER (1600)
10.6 IF
16.6 IF
LO2 OUT
100 Hz
FIRST LOOP2 OUT
+18Vb IN
BFO (1800)
BFO OUT
BFO/600 kHz FIX.
SSB/AM AGC
10 MHz IN
BFO
S2601b
S2601a
S2602b
S2602d
S2602c
S2602a
S2603
S2604
AUX
WIDE
INTERMEDIATE
NARROW
V. NARROW
FILTER
2182 kHz
A1
A2
A3J
A3H
NOISE GENERATOR
ON
OFF
TELEX
AGC
IN
OUT
RX BLOCK
RX BLOCK
SIMPLEX
+18Vb
Vp OUT
1 MHz A
100 kHz D
100 kHz C
100 kHz B
100 kHz A
10 kHz D
10 kHz C
10 kHz B
10 kHz A
1 kHz D
1 kHz C
1 kHz B
1 kHz A
100 Hz D
100 Hz C
100 Hz B
100 Hz A
HARMONIC FILTER MARKED BLACK (1300)
14 MHz
16 MHz
18 MHz
20 MHz
22 MHz
24 MHz
26 MHz
28 MHz
30 MHz
32 MHz
34 MHz
36 MHz
HARMONIC FILTER OUT
+18Vb IN
2 MHz IN
LOOP 1 MIXER (1400)
VCO IN
LOOP 1 OUT
HARMONIC FILTER IN
+18Vb IN
DIVIDER UNIT (1000)
LOOP 1 IN
+18Vb IN
2 MHz OUT
1 MHz
100 kHz
10 kHz
1 kHz
100 Hz
100 Hz OUT
10 kHz OUT
LOOP 2 IN
600 kHz OUT
10 MHz OUT
Vcc FOR 600 kHz CARRIER
+5V
+8V
IC 2602
L 2601
CLARIFIER AND 2nd. LOOP 2 MIXER (1700)
LOOP 2 OUT
CLARIFIER CONTROL
+18Vb IN
C2601
C2602
CLARIFIER
100 Hz
10 kHz
TUNE
+8V
+18Vb FOR 2182 kHz
-Vcc



MAIN SCHEMATIC DIAGRAM FOR SAILOR RECEIVER R 1120

Sailor

Sailor

INSTRUKTIONSBOG FOR
SAILOR BATTERILADER N1404

INSTRUCTION BOOK FOR
SAILOR BATTERY CHARGER N1404

A/S S. P. RADIO · AALBORG · DENMARK

N1404

S A I L O R

INSTRUCTION BOOK

FOR

BATTERY CHARGER

TYPE

N1404

S. P. RADIO A/S, AALBORG, DENMARK

F

CONTENTS:

N1404

GENERAL

The SAILOR battery charger N1404 is intended for use in conjunction with the SAILOR short-wave programme.

The charger unit is used when the station is supplied from 24V DC (power supply N1400).

The charger unit is constructed in such a way that when installed with the station it becomes an integral part of the station (the lower drawer in the rack-system). This means that the installation of a station equipped with the N1404 is very simple.

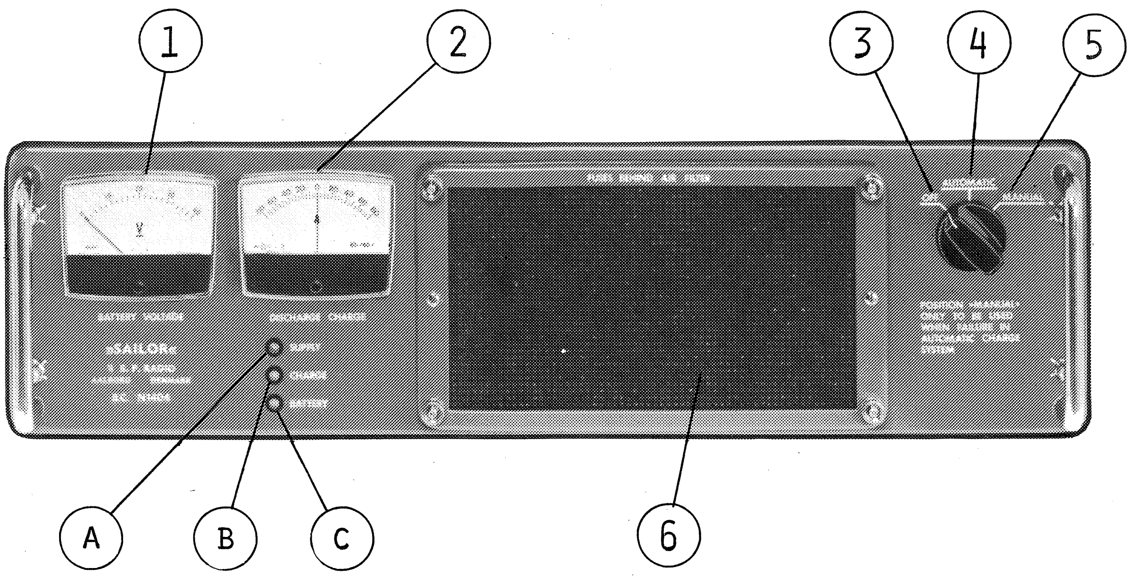
The front panel of the SAILOR battery charger is equipped with the necessary meters and control lamps which fulfil the authorities' requirements. This means that there is no need for a separate meter panel.

The battery charger is automatic and can, if the automatic section fails, be used as an ordinary manual charger simply by turning the main switch from pos. AUTOMATIC to pos. MANUAL.

The automatic section of the battery charger is fitted within a compact plug-in unit, which can easily be changed.

The charger unit and its connections to the station are constructed in such a way that you will have max. charging rate when the station is on. This means that the charge condition of the battery remains almost unaltered even after hours of continuous use of the station.

CONTROLS



N1404

(1) Voltmeter: indicates the battery voltage.

(2) Ammeter: indicates the charge - or discharge current.

(3) Main switch pos. OFF:
The battery charger is switched OFF with the voltmeter (1) and ammeter (2) in function.

(4) Mainswitch pos. AUTOMATIC.
The battery charger is switched on and automatically controlling the charge current.

The control lamp (A) SUPPLY is on and indicates that AC mains is present.

The control lamp (B) CHARGE is on as long as the battery is not fully charged.

The control lamp (C) BATTERY is on when the battery is fully charged (trickle-charging)

(5) Main switch pos. MANUAL.
This position is used should the automatic charge system fail.

By manual control, the voltmeter reading (1) shall be kept between 26 and 29 volts. If the voltmeter reading is more than 29 volts, switch OFF the charger-unit. If the voltmeter reading is less than 26 volts, switch on the charger-unit pos. MANUAL. When the transmitter is on the charger-unit should be on too pos. MANUAL.

If it is impossible to increase the battery voltage to 29 volts with the ammeter (2) indicating charge current, the reason may be a defective battery or a leakage.

In position MANUAL the control lamps (A) (B) (C) are of no consequence.

(6) AIRFILTER: the AIRFILTER has to be cleaned at regular intervals (look up the section CLEANING OF AIR FILTER in the OPERATING INSTRUCTIONS FOR SAILOR MF/HF TELEPHONY STATION.

PRINCIPLE OF OPERATION AND TECHNICAL DATA

AUTOMATIC

The automatic section of the charger-unit switches between two charge modes, MAIN CHARGING and TRICKLE CHARGING.

By increasing battery voltage (charge) the automatic section switches from main charging to trickle charging when the gasvoltage is reached (the gasvoltage is the voltage where the battery starts gassing). By decreasing battery voltage (discharge) the automatic section switches from trickle charging to main charging at a voltage approx. 12% below the gasvoltage.

When the mainswitch is in pos. MANUAL, the automatic section is out of function and main charging is always on.

MAIN CHARGING

40 Amps. at 25 volts terminal voltage and nominal input voltage (AC). The variation of the main charging as a function of the terminal voltage and the input voltage (AC) is in accordance with the DIN 41774 (Halbleiter-Gleichrichtergeräte mit W-Kennlinie für das Laden von Bleibatterien).

TRICKLE CHARGING

Low charging rate which compensates for the external and internal discharge of the battery.

N1404

COOLING SYSTEM

Convection and forced air cooling.

The blower is not running continuously but is controlled by thermostats located at the heat sink for rectifier and at the main transformer.

PROTECTION AGAINST OVERLOAD

Thermostats located inside the transformer-windings and on the rectifier heat sink disconnect the charger if the temperature goes too high. When the temperature returns to normal level the charger is activated again.

SUPPLY VOLTAGE

The charger can be delivered in two versions. One version where the supply voltage can be adjusted in the range 205 - 265V AC in 10 steps, and another one which can be adjusted in the range 105 - 140V AC in 10 steps.

To ensure full performance the charger must be adjusted for the actual supply voltage. The actual supply voltage at the location must be measured when the ships generator is running under normal conditions.

The method of adjusting the charger-unit in accordance with the actual voltage is shown at fig. 1.

INTERFERENCE SUPPRESSION (R.F.I.).

The charger unit fulfils the requirements stated in the V.D.E. regulation as "KLEINSTORGRAD" equipment.

CIRCUIT DESCRIPTION

AUTOMATIC

The automatic unit changes between the two modes, main charging (CHARGE) and trickle charging (BATTERY) dependent on the battery voltage. When the battery under charge reaches a voltage of 28.8V it is changed to trickle charging. It stays in this mode until the battery voltage falls below 25.5V. At this point the charger returns to main charging mode.

The changing is carried out by means of a relay changing between two winding ratios of the main transformer. This relay is controlled by a reference, sense- and changing unit on the output side (DC) and a logical circuit including a time delay.
On the input side R224 and R225 create a reference voltage, which is fed into IC202B. IC202A senses the battery voltage via a voltage divider and the preset potentiometer R230 adjusts for max. permissible battery voltage (normal 28.8V). IC202A performs as a voltage follower and filter. For increasing voltage at the battery there will be 0V on the output of IC202B and the attenuated and filtered battery voltage is further attenuated in R226 and R223 before it is compared to the reference at IC202B. At maximum battery voltage (the gasvoltage) the output of IC202B goes positive, the shift information is transferred to the AC side. Furthermore R226 and R223 no longer perform as a voltage attenuator and thus the battery voltage can decrease approx. 12 %, before IC202B switches again.

Via IC201A, IC201B and IC201C, T205 will be switched off, whereby T203 is turned on and RE201 and D103 will respectively be activated and turned off. To get stable switching a time delay is introduced by means of C207 and R221, so that RE201 after releasing remains in that state for some seconds, no matter what the information from IC202B may be. In the same way there is a time delay, due to C206 and R220, when the relay is activated again.

N1404

For indicating the charge mode in pos. AUTOMATIC there are three LED's. D101 (SUPPLY) lights when the charger is turned on. D102 (BATTERY) lights in the trickle charge mode. D103 (CHARGE) lights in the main charge mode and simultaneously D102 is turned off, as both diodes are controlled by the information from IC202B. If the charger is in position MANUAL, the automatic section is out of function and the charge mode is main charging, even if the automatic plug-in unit is removed.

MAIN TRANSFORMER/RECTIFIER

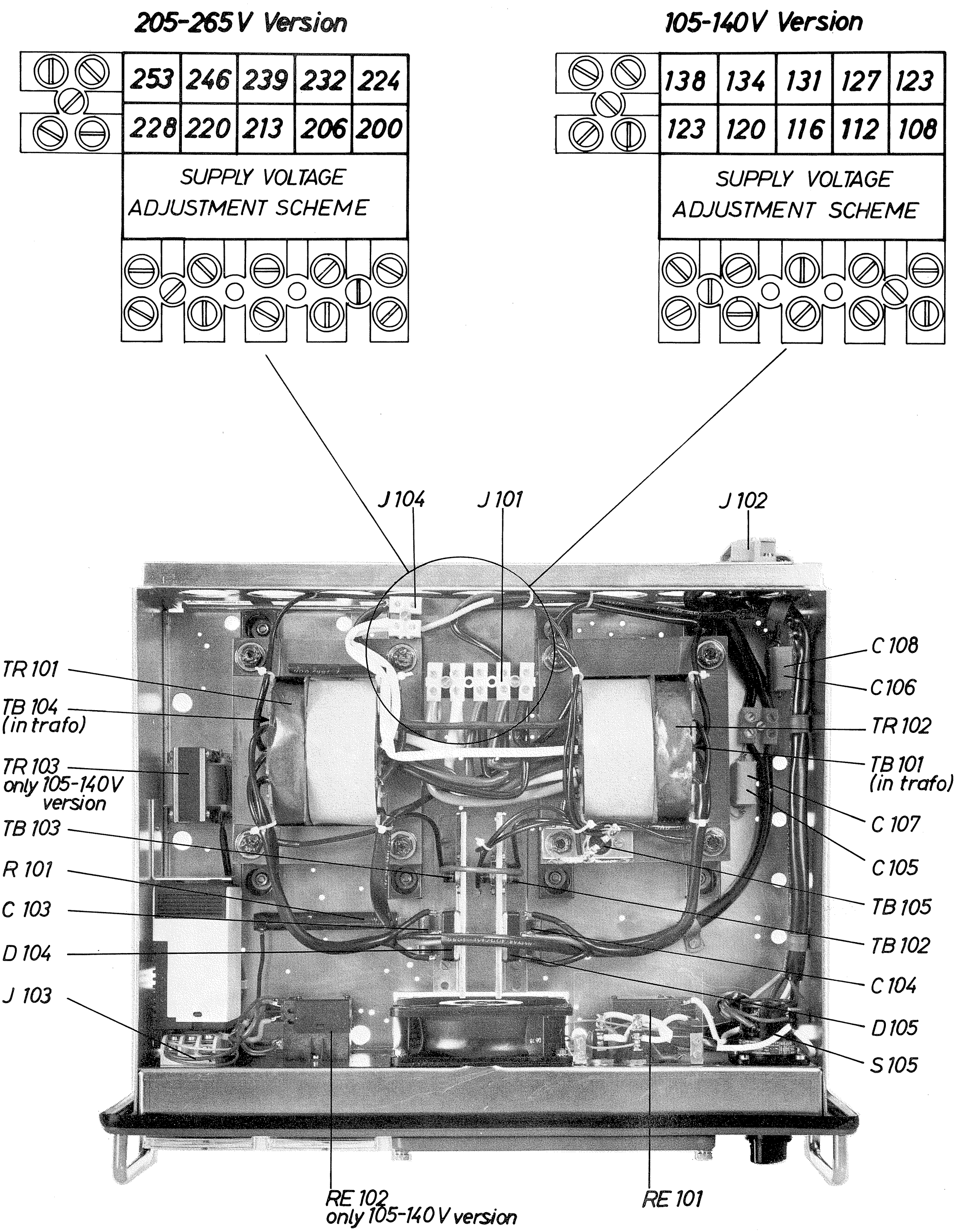
The charger unit has two main transformers, which have their primary windings in parallel connection and their secondary windings each connected to a rectifier bridge.

The primary voltage adjustment and the shift between main charging and trickle charging is carried out by means of connectors on the main transformers.

The R101 resistor in series connection with the connectors for trickle charging protects the contacts in RE201 by limiting the peak current.

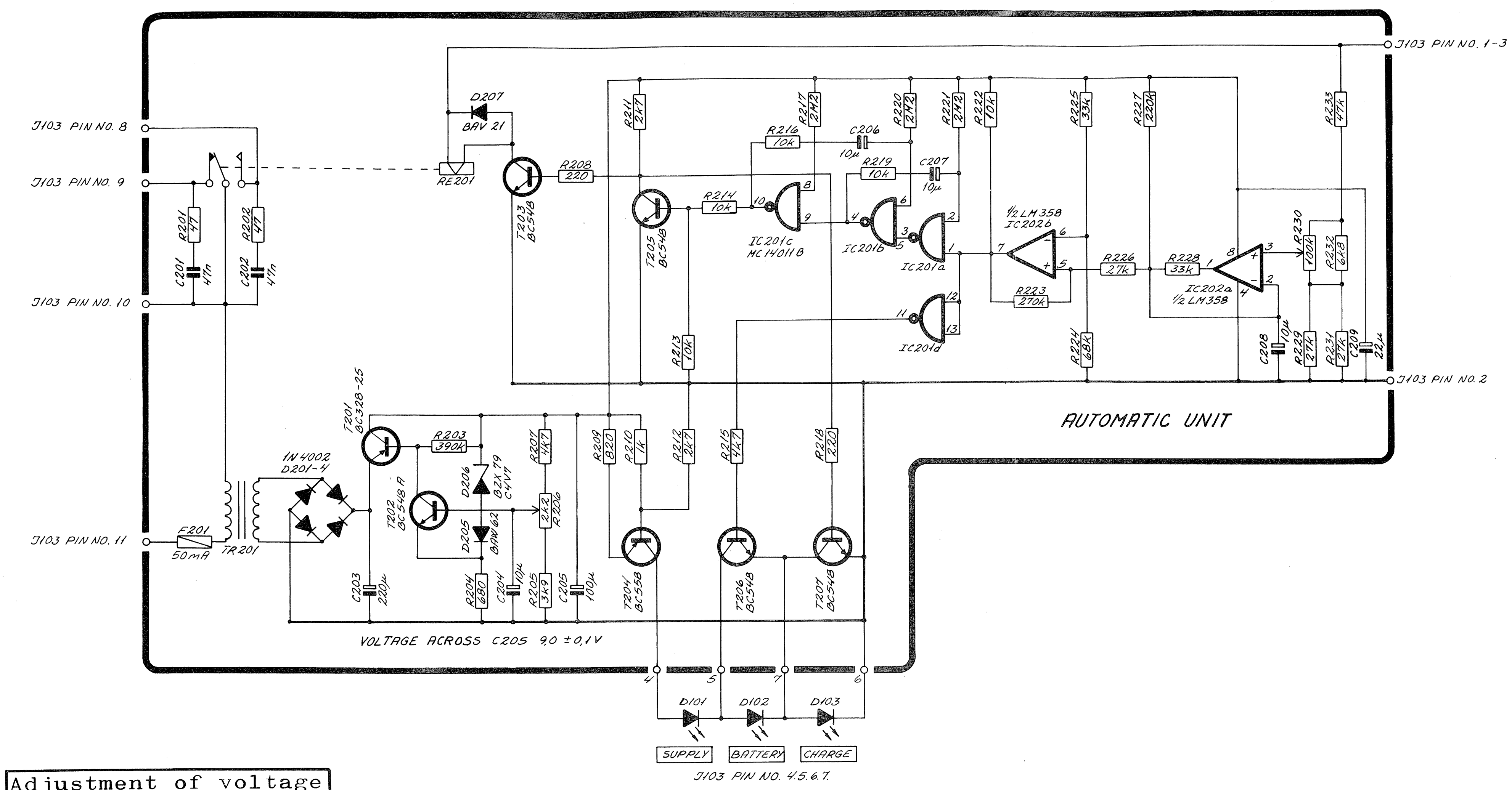
SUPPLY VOLTAGE ADJUSTMENT:

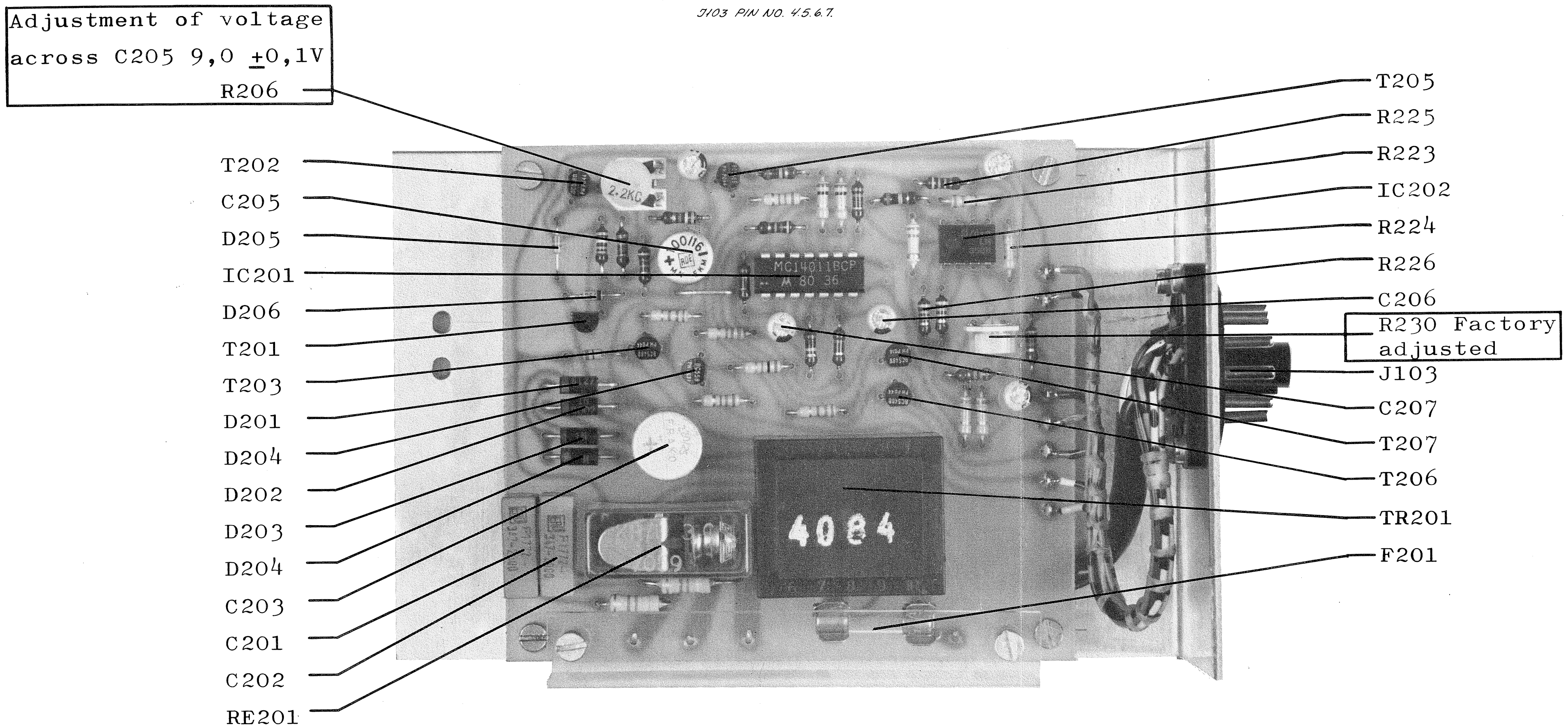
Measure the ship's AC voltage when the ship's generator is running under normal conditions.
Find in the supply voltage scheme the voltage which is nearest to the measured voltage. Connect yellow wire in 2-pole terminal and brown wire in 5-pole terminal corresponding to the selected voltage.

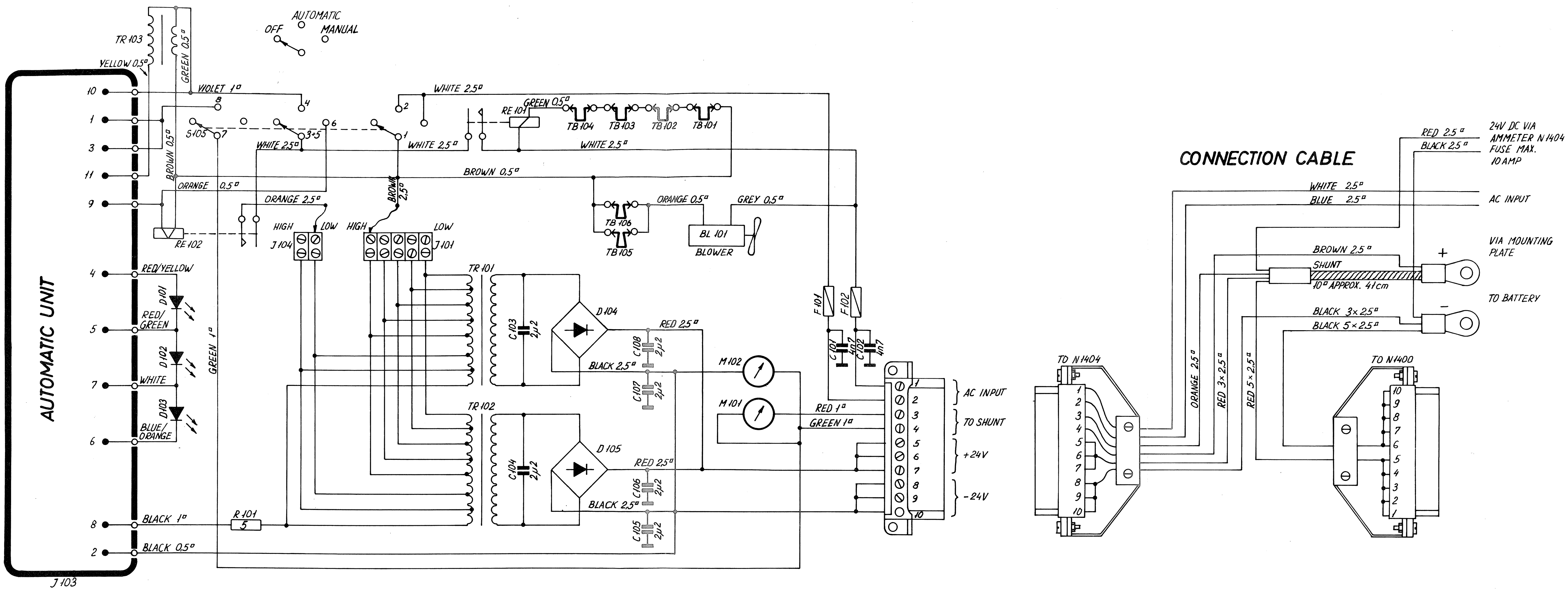


N1404

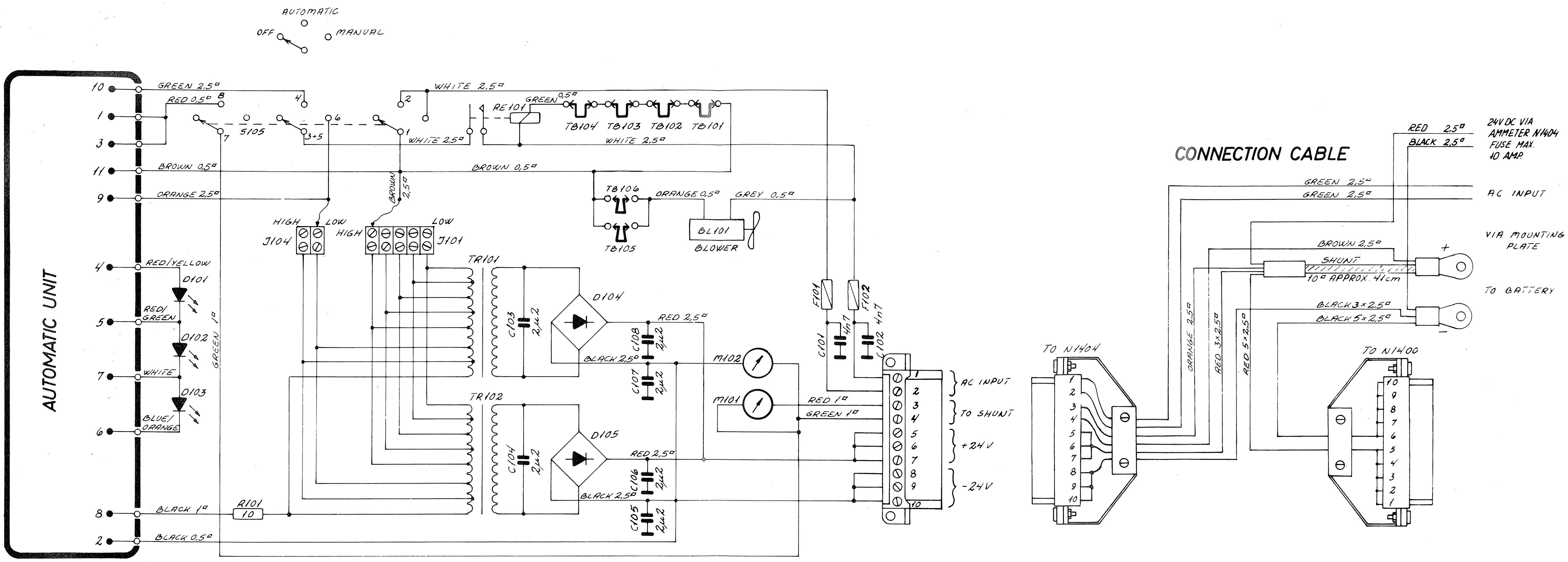
N1404


J103 PIN NO. 1-3
J103 PIN NO. 8
J103 PIN NO. 9
J103 PIN NO. 10
J103 PIN NO. 11
J103 PIN NO. 2
AUTOMATIC UNIT
VOLTAGE ACROSS C205 9,0 ±0,1V
SUPPLY
BATTERY
CHARGE
J103 PIN NO. 4,5,6,7.


Adjustment of voltage across C205 9,0 ±0,1V
R206
T202
C205
D205
IC201
D206
T201
T203
D201
D204
D202
D203
D204
C203
C201
C202
RE201
T205
R225
R223
IC202
R224
R226
C206
R230 Factory adjusted
J103
C207
T207
T206
TR201
F201



Ⓑ N1404 105-140V VERSION



Ⓐ N1404 205-265V VERSION

BATTERY CHARGER N1404

Symbol	Description			Manufact.	
C101	Capacitor, ceramic	4,7nF	5KV	Ferroperm	9/0138,9 insul
C102	Capacitor, ceramic	4,7nF	5KV	Ferroperm	9/0138,9 insul
C103	Capacitor, polycarbonate	2,2uF	250V	Philips	2222 341 49225
C104	Capacitor, polycarbonate	2,2uF	250V	Philips	2222 341 49225
C105	Capacitor, polycarbonate	2,2uF	100V	Philips	2222 341 29225
C106	Capacitor, polycarbonate	2,2uF	100V	Philips	2222 341 29225
C107	Capacitor, polycarbonate	2,2uF	100V	Philips	2222 341 29225
C108	Capacitor, polycarbonate	2,2uF	100V	Philips	2222 341 29225
D101	Diode, LED			Mer-el	XC5053Y
D102	Diode, LED			Mer-el	XC5053Y
D103	Diode, LED			Mer-el	XC5053Y
D104	Diode, bridge			Motorola	BYW 62
D105	Diode, bridge			Motorola	BYW 62
J101	Terminal strip	5 pole		J.Nielsen	1553
J102	Plug	STV 2/10		Weidmüller	3338,6
J103	Socket for automatic unit			FN.Elektro	
J104	Terminal strip	2 pole		J.Nielsen	1553
M101	Meter	80-0-80A		FN.Elektro	KR45
M102	Meter	0-40V		FN.Elektro	KR45
S105	Switch Kraus & Naimer			C.Thiim	AYK 881
TB101	Thermal Breaker	OFF 120°C	ON 77°C	FN.Elektro	
TB102	Thermal Breaker	OFF 100°C	ON 71°C	FN.Elektro	
TB103	Thermal Breaker	OFF 100°C	ON 71°C	FN.Elektro	
TB104	Thermal Breaker	OFF 120°C	ON 77°C	FN.Elektro	
TB105	Thermostat	ON 70°C	OFF 55°C	Elmwood	2455R-88-915
TB106	Thermostat	ON 70°C	OFF 55°C	Elmwood	2455R-88-915

Symbol	Description			Manufact.	
	105-140V VERSION ONLY				
BL101	Blower		115V AC	PAPST	TYP 4500N
F101	Fuse		20A	Wickmann	314.020
F102	Fuse		20A	Wickmann	314.020
R101	Resistor	5 ohm	50W	Danotherm	GRF 50L
RE101	Relay			PASI	CR/A-7-C
RE102	Relay			PASI	CR/A-7-C
TR101	Transformer		24V/20A-110V	FN.Elektro	
TR102	Transformer		24V/20A-110V	FN.Elektro	
TR103	Transformer			FN.Elektro	110V/220V
	205-265V VERSION ONLY				
BL101	Blower		220V AC	PAPST	TYP 4550N
F101	Fuse		10A	Wickmann	314.010
F102	Fuse		10A	Wickmann	314.010
R101	Resistor	10 ohm	50W	Danotherm	GRF 50L
RE101	Relay			PASI	CR/A-8-C
TR101	Transformer		24V/20A-220V	FN.Elektro	
TR102	Transformer		24V/20A-220V	FN.Elektro	

AUTOMATIC UNIT N1404 S.P. Module: 200

Symbol	Description				Manufact.	1/2
R201	Resistor	47 ohm	+5%	0.5W	Philips	2322 212 13479
R202	Resistor	47 ohm	+5%	0.5W	Philips	2322 212 13479
R203	Resistor	390Kohm	+5%	0.33W	Philips	2322 211 13394
R204	Resistor	680 ohm	+5%	0.33W	Philips	2322 211 13681
R205	Resistor	3,9Kohm	+5%	0.33W	Philips	2322 211 13392
R206	Potentiometer	2,2Kohm	+20%		Noble	TM8KV2-1S/2K2
R207	Resistor	4,7Kohm	+5%	0.33W	Philips	2322 211 13472
R208	Resistor	220 ohm	+5%	0.33W	Philips	2322 211 13221
R209	Resistor	820 ohm	+5%	0.33W	Philips	2322 211 13821
R210	Resistor	1Kohm	+5%	0.33W	Philips	2322 211 13102
R211	Resistor	2,7Kohm	+5%	0.33W	Philips	2322 211 13272
R212	Resistor	2,7Kohm	+5%	0.33W	Philips	2322 211 13272
R213	Resistor	10Kohm	+5%	0.33W	Philips	2322 211 13103
R214	Resistor	10Kohm	+5%	0.33W	Philips	2322 211 13103
R215	Resistor	4,7Kohm	+5%	0.33W	Philips	2322 211 13472
R216	Resistor	10Kohm	+5%	0.33W	Philips	2322 211 13103
R217	Resistor	2,2Mohm	+5%	0.33W	Philips	2322 241 23225
R218	Resistor	220 ohm	+5%	0.33W	Philips	2322 211 13221
R219	Resistor	10Kohm	+5%	0.33W	Philips	2322 211 13103
R220	Resistor	2,2Mohm	+5%	0.33W	Philips	2322 241 23225
R221	Resistor	2,2Mohm	+5%	0.33W	Philips	2322 241 23225
R222	Resistor	10Kohm	+5%	0.33W	Philips	2322 211 13103
R223	Resistor	270Kohm	+5%	0.33W	Philips	2322 211 13274
R224	Resistor	68Kohm	+5%	0.33W	Philips	2322 211 13683
R225	Resistor	33Kohm	+5%	0.33W	Philips	2322 211 13333
R226	Resistor	27Kohm	+5%	0.33W	Philips	2322 211 13273
R227	Resistor	220Kohm	+5%	0.33W	Philips	2322 211 13224
R228	Resistor	33Kohm	+5%	0.33W	Philips	2322 211 13333
R229	Resistor	27Kohm	+5%	0.33W	Philips	2322 211 13273
R230	Resistor	100Kohm	+20%		Noble	TM8KH1-1S/100K
R231	Resistor	27Kohm	+5%	0.33W	Philips	2322 211 13273
R232	Resistor	6,8Kohm	+5%	0.33W	Philips	2322 211 13682
R233	Resistor	47Kohm	+5%	0.33W	Philips	2322 211 13473

AUTOMATIC UNIT N1404 S.P. Module: 200

Symbol	Description	Manufact.	2/2
C201	Capacitor polyester 47nF/250V AC	ERO	F 1772 347 2000
C202	Capacitor polyester 47nF/250V AC	ERO	F 1772 347 2000
C203	Capacitor electrolytic 220uF/25V	ROE	EKM 00 FD 322E
C204	Capacitor electrolytic 10uF/35V	ROE	EKI 00 AA 210F
C205	Capacitor electrolytic 100uF/16V	ROE	EKI 00 CC 310D
C206	Capacitor electrolytic 10uF/35V	ROE	EKI 00 AA 210F
C207	Capacitor electrolytic 10uF/35V	ROE	EKI 00 AA 210F
C208	Capacitor electrolytic 10uF/35V	ROE	EKI 00 AA 210F
C209	Capacitor electrolytic 22uF/25V	ROE	EKI 00 AA 222E
D201	Diode	Motorola	1N4002
D202	Diode	Motorola	1N4002
D203	Diode	Motorola	1N4002
D204	Diode	Motorola	1N4002
D205	Diode	Philips	BAW62
D206	Diode zener	Philips	BZX79C4V7
D207	Diode	Philips	BAV21
T201	Transistor	Philips	BC328-25
T202	Transistor	Philips	BC548A
T203	Transistor	Philips	BC548
T204	Transistor	Philips	BC558
T205	Transistor	Philips	BC548
T206	Transistor	Philips	BC548
T207	Transistor	Philips	BC548
IC201	Integrated circuit	Motorola	MC14011 BCP
IC202	Integrated circuit	National	LM358N
RE201	Relay	PASI	KH/U-3-C
TR201	Transformer	TRADANIA	TD 4084
F201	Fuse 50mA time-lag	ELU	50mAT/5x20mm

Sailor

Sailor

INSTRUKTIONSBOG FOR SAILOR N1401

INSTRUCTION BOOK FOR SAILOR N1401

A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS:

GENERAL DESCRIPTION

SAILOR N1401 is an AC power supply intended to supply a SAILOR SSB short-wave set, when the set has to be supplied from AC mains.

SAILOR N1401 has a MAIN SWITCH which controls all power supply to the short-wave set. All fuses for the short-wave set are located behind the AIR FILTER.

SAILOR N1401 has a built-in delay unit which ensures the proper sequence for applying voltages to the transmitter, regardless of how the MAIN SWITCH is operated.

SAILOR N1401 with MAIN SWITCH in position RECEIVER ONLY. Only the receiver is supplied and low power consumption is achieved.

SAILOR N1401 with MAIN SWITCH in position STAND BY, filament and negative bias are supplied to the transmitter.

SAILOR N1401 has a meter which controls the input voltage. A switch behind the AIR FILTER makes it possible, with the same meter, to check the voltages inside the set.

SAILOR N1401 is provided with thermal breakers, which switch off the set if the temperature inside the power supply gets too high.

SAILOR N1401 has a built-in loudspeaker for the connected receiver.

SAILOR N1401 fits into SAILOR 19" rack system.

TECHNICAL DATA

The power supply N1401 delivers all necessary voltages to a SAILOR SSB short wave set with an output power of 800 W PEP in the frequency range 4 - 27.5 MHz. In the frequency range 1.6 - 4 MHz the plate voltage is reduced in order to limit the output power to 400 W PEP. When N1401 is used for 405 - 535 kHz transmitters the plate voltage is the same as when the frequency is 4 - 27.5 MHz.

Input voltage: 110/127/220/237V AC ±10%, frequency 50 - 60 Hz.

Input current:

Input current (220V AC)	1.6 - 4 MHz	4 - 27.5 MHz
Receiver only	0.25A	0.25A
Stand by	1.2A	1.2A
On	1.4A	1.4A
Tune (full PEP 2-tone)	5.0A	6.5A
SSB Normal Speech	4.2A	5.2A
A3H Normal Speech	4.5A	5.8A
A2H telegraphy key up/down	2.5/5.0	2.5/6.5
A1 telegraphy key up/down	2.5/5.8	2.5/7.3

Output voltages:

DC unstabilized

Va	1.4/2 KV
Vfilament	27 V
-45	-45 V

DC stabilized

V_{driver}	28V ±5%
V_{g1}	-60V ±5%
22V	22V ±2%
8V	8V ±5%
2xVg2	400V ±2%

The currents from Vg2's are limited to protect the screen in the P.A. tubes.

AC unstabilized

Blower supply 220V (input via auto-transformer).

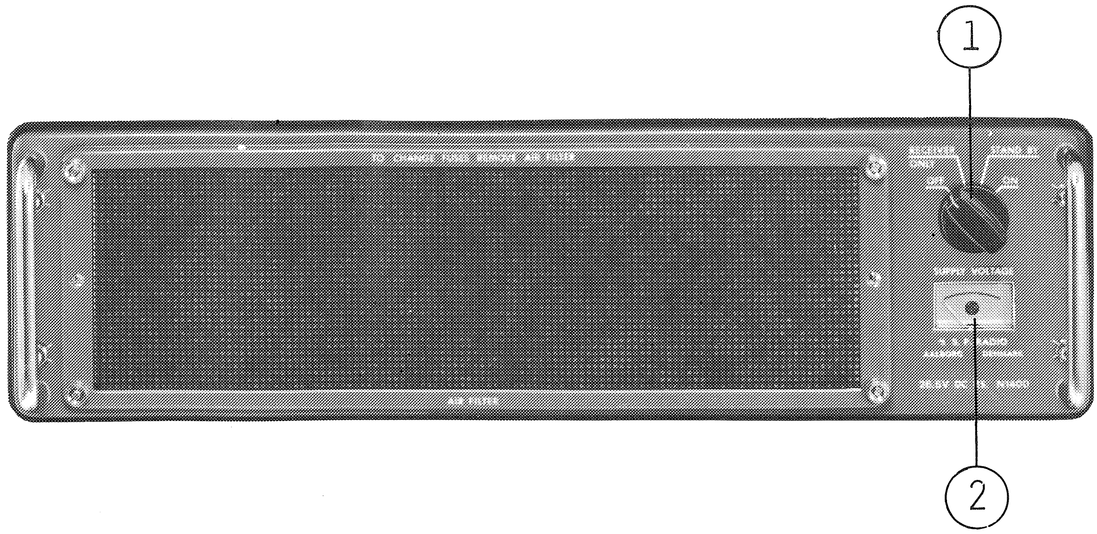
Operation temperature range: -15°C to +55°C

Cooling: With MAIN SWITCH in positions STAND BY and ON the internal blower is running. If the inside temperature gets too high thermal breakers disconnect the 22V and stop the set until it has cooled down.

When MAIN SWITCH is in position RECEIVER ONLY and the temperature on the cooling fin for T102 exceeds +70°C the internal blower starts automatically, when the temperature falls below +55°C the blower stops. (Valid for power supplies N1401 with serial number higher than 192672).

Power supplies N1401 with a serial number below 217450 do not have the 8V supply, except those modified at the factory.

CONTROLS



(1) MAIN SWITCH

Switching between the functions.

OFF

The set is switched off.

RECEIVER ONLY

The receiver is supplied with power and ready for use.

STAND BY

Internal blower starts and voltages are supplied to the transmitter in order to make it ready for use.

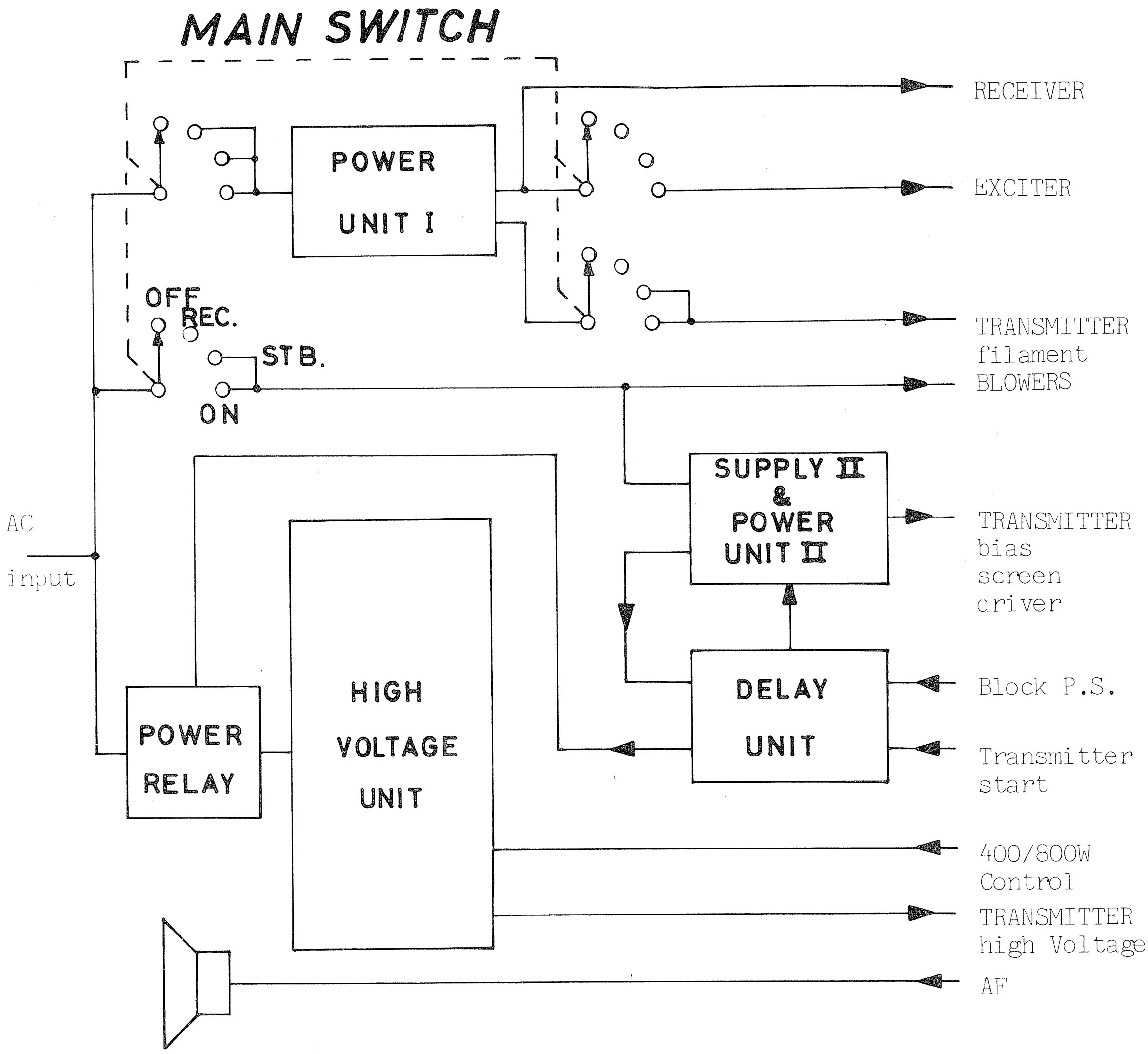
ON

The transmitter is ready for use if it has been in position STAND BY or ON for a period equal to or longer than the delay time.

(2) SUPPLY VOLTAGE METER

Meter checking the input voltage to the set. Internal voltage check, by using the switch located behind the AIR FILTER it is possible to check different voltages in the set.

PRINCIPLE OF OPERATION N1401



POWER SUPPLY N1401

The function of the power supply is controlled from MAIN SWITCH, DELAY UNIT and the control inputs Transmitter start and Block P.S.

POWER UNIT I is connected in positions RECEIVER ONLY, STAND BY and ON. It supplies the RECEIVER and the EXCITER. The EXCITER in position ON only. POWER UNIT I delivers filament to the TRANSMITTER in positions STAND BY and ON.

POWER UNIT II & SUPPLY II is connected in positions STAND BY and ON. The output bias is present, whereas the outputs screen and driver follows the Transmitter start control input if the power supply N1401 is not blocked via the control input Block P.S.

HIGH VOLTAGE UNIT is functional in position ON controlled by the control input Block P.S. via the POWER RELAY. The size of the HIGH VOLTAGE is controlled via the control input 400/800W Control.

DELAY UNIT is started in position STAND BY and runs in STAND BY and ON while filament is supplied to the transmitter tubes. After the delay time the control inputs Transmitter start and Block P.S. are allowed to pass through the DELAY UNIT.

SERVICE

1. MAINTENANCE

1.1.
When the SAILOR SHORT-WAVE SET type 1000 has been correctly installed, the maintenance can, dependent on the environment and working hours, be reduced to a performance check at the service workshop at intervals not exceeding 5 years. A complete performance check list is enclosed in the PERFORMANCE CHECK section.

Also inspect the antennas, cables and plugs for mechanical defects, salt deposits, corrosion and any foreign bodies.

Along with each set a TEST SHEET is delivered, in which some of the measurings made at the factory are listed. If the performance check does not show the same values as those on the TEST SHEET, the set must be adjusted as described under ADJUSTMENT PROCEDURE.

Any repair of the set should be followed by a FUNCTION CHECK of the unit in question.

2. NECESSARY TEST EQUIPMENT

T1127	N140X	S1300	R1117	Equipment	Specification
X	X	X	X	**OSCILLOSCOPE:**	
				Bandwidth	0-25 MHz
				Sensitivity	2mV/cm
				Input impedance	1 Mohm//30 pF
				Triggering	EXT-INT-ENVELOPE
				E.g. PHILIPS	PM3212
X		X	X	**PASSIVE PROBE:**	
				Attenuation	10x
				Input resistance DC	10 Mohm
				Input capacitance	15 pF
				Compensation range	10 pF - 30 pF
				E.g. PHILIPS	PM 9396
		X	X	**MULTIMETER:**	
				Sensitivity (f.s.d.)	1V
				Input impedance	10 Mohm
				Accuracy (f.s.d.)	±2%
				E.g. PHILIPS	PM2503
X	X			**MULTIMETER:**	
				Sensitivity	0.3V and 3A
				Input impedance	30 Kohm/V
				Accuracy (F.S.d.)	±1%
				Current range	100A
				Voltage range	500V, and 2.5 kV
				E.g. Unigor A43, with probe and shunt	

NECESSARY TEST EQUIPMENT cont.:

T1127	N140X	S1300	R1117	Equipment	Value
		X		<u>TONEGENERATOR:</u>	
				Frequency range	200 - 3000 Hz
				Output	1V RMS
				Output impedance	≦ 600 ohm
				E.g. PHILIPS	PM5107
			X	<u>AF VOLTMETER:</u>	
				Sensitivity (f.s.d.)	300 mV
				Input impedance	≧ 4 ohm
				Accuracy (f.s.d.)	±5 %
				Frequency range	100 Hz - 5 kHz
				E.g. PHILIPS	PM2503
		X	X	<u>FREQUENCY COUNTER:</u>	
				Frequency range	100 Hz - 40 MHz
				Resolution	0,1 Hz at f ≧ 10 MHz
				Accuracy	$1 \cdot 10^{-7}$
				Sensitivity	100 mV RMS
				Input impedance	1 Mohm
				Single period measurement	
				range	1 sec.
				resolution	1 mS
				E.g. PHILIPS	PM6611 + PM9679
			X	<u>SIGNAL GENERATOR</u>	
				Frequency range	550 kHz - 30 MHz R1118: 100 kHz - 30 MHz
				Output impedance	50/75 ohm
				Output voltage	1 uV - 100 mV EMF
				Modulation	AM, 30%, 1000 Hz
				E.g. PHILIPS	PM5326

NECESSARY TEST EQUIPMENT cont.:

T1127	N140X	S1300	R1117	
X				POWER SUPPLIES — T1127
		X	X	POWER SUPPLIES — R1117/S1300
		X		TEST BOX S1300
X				POWER METER
X				RF-AMMETER (Thermocross)
X		X		DUMMY LOAD for HF bands, 4 MHz to 25 MHz

POWER SUPPLIES

T1127:

V_{out}	26,5V DC
I_{out}	60A DC
E.g. 2 pcs. LAMBDA type	LMG24

R1117/S1300:

V_{out} 1	22V
I_{out} 1	1,5A
V_{out} 2	-45V
I_{out} 2	0,2A
E.g. SAILOR POWER SUPPLY type	N1402

TEST BOX S1300:

SP type S1300/01 TEST BOX

POWER METER:

Power range	500W
E.g. Bird Thruline Wattmeter	Model 43
plug-in element	500W 2-30 MHz
impedance	50 ohm

RF-AMMETER (Thermocross)

Current range	5A

E.g. HELWEG MIKKELSEN & CO. Copenhagen, Denmark
type TR-68x71 5A

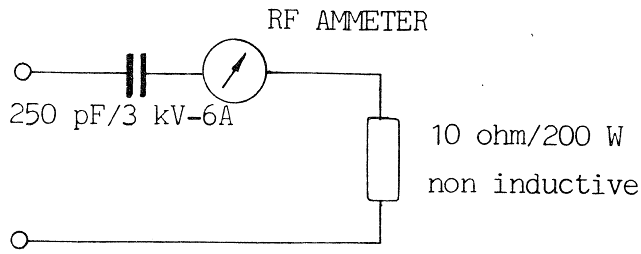
DUMMY LOAD for HF bands, 4 MHz to 25 MHz

Impedance	50 ohm
Frequency range	0-25 MHz
Power range	500W

E.g. BIRD Termaline Coaxial resistor Model 8401

T1127	N140X	S1300	R1117	
X				DUMMY LOAD for C.T. band 1.6 MHz to 4 MHz
			X	DUMMY LOAD for the C.T. band 1.6 to 4 MHz
			X	DUMMY LOAD for the HF bands 4 MHz to 25 MHz

DUMMY LOAD for C.T. band 1.6 MHz to 4 MHz



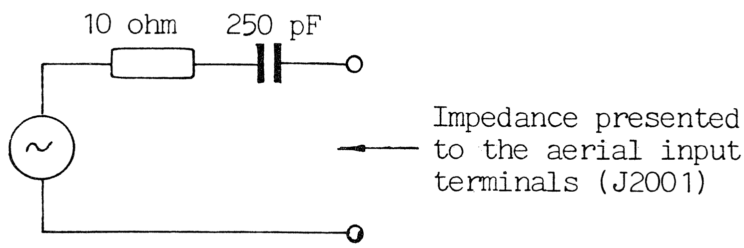
250 pF

E.g. DRALORIC 06 1291 TD 20x50 L
8 KV_S 250 pF ±20% R85

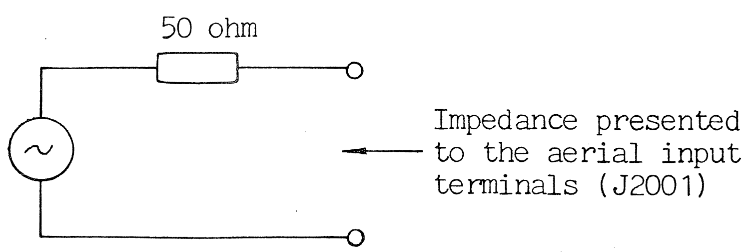
10 ohm

E.g. 10 pcs. DALE PH-25A-17, 100 ohm 5% 25W

DUMMY LOAD for the C.T. band 1.6 to 4 MHz



DUMMY LOAD for the HF bands 4 MHz to 25 MHz



E.g. SAILOR Rx DUMMY LOAD type H219.

3. TROUBLE-SHOOTING

Trouble-shooting should only be performed by persons with sufficient technical knowledge, who have the necessary test equipment at their disposal, and who have carefully studied the operation principles and structure of the unit in question.

Start to find out whether the fault is somewhere in the antenna circuit, the power source, or in the short-wave set.

For help with trouble-shooting in the short-wave set there is a built-in test meter and test meter switch, located behind the air filter on the power supply.

When the fault has been located to a certain unit look up the PERFORMANCE CHECK list in the instruction book and make relevant performance check to incircle the fault. Then look up the CIRCUIT DESCRIPTION. This section contains schematic diagrams, description of the modules and pictures showing the location of the components. (ADJUSTMENT LOCATIONS).
Typical AC and DC voltages are indicated on the schematic diagrams.

No adjustment must take place unless the service workshop has the necessary test equipment to perform the ADJUSTMENT PROCEDURE in question.

After repair or replacement of the module look up the section NECESSARY ADJUSTMENTS AFTER REPAIR to see, whether the unit has to be adjusted or not.

Anyway the unit has to have a complete FUNCTION CHECK after repair.

4. PERFORMANCE CHECK FOR N1401

In order to make the performance check easier, the function of the power supply for the different modes, in which the power supply can operate, are listed in the tables below.

4.1.
TABLE I, POWER SUPPLY FUNCTION.

This table indicates the outputs from the power supply and in which conditions the different outputs are present.
To achieve all these outputs, the power supply shall be connected to a shortwave set or controlled externally as indicated in 4.3. (table III) and 4.4. (table IV).

Used in	Use	Voltage (V)	Pin in J701		OFF	RECEIVER ONLY	STAND BY	ON	
			Common						keyed
Receiver		22	Chassis 10, 16 22, 23	11		X	X	X	X
		-45		12		X	X	X	X
Exciter		22		25				X	X
		-45		24		X	X	X	X
Transmitter	Va	1.4/2K						XD	XD
	Vg2	400		1					XD
	Vg2	400		4					XD
	Vg1	-60		18			X	X	X
	V_{driver}	28		7					XD
	Blower	220 AC	Between	33 36			X	X	X
	Filament	26.5	26, 27 Chassis	6			X	X	X
		26.5		9		X	X	X	X
		26.5		15			X	X	X
Receiver		8	Chassis	13		X	X	X	X

X voltage present

XD voltage present after delay

4.1.1.
The accuracy of voltages.

Following voltages are stabilized:

22V, Vg2, Vg1 and V_{driver}

22V and Vg2 = 400V within ±2%

Vg1 = -60V and V_{driver} = 28V within ±5%

Other voltages are not stabilized and will vary with input voltage and load.

4.2.
TABLE II, VOLTAGE CHECK WITH SUPPLY VOLTAGE METER.

This table indicates in which way the meter marked SUPPLY VOLTAGE can be used for checking different voltages inside the power supply.
Correct reading is when the pointer is in the middle of the green area.

NOTE: Va only reaches the green area when Va = 2kV (frequency above 4 MHz, pin 17 in J701 grounded).

This meter is only for checking, not for measuring voltages.

MAIN SWITCH / meter switch	OFF	RECEIVER ONLY	STAND BY	ON	
					keyed
input		X	X	X	X
Va				XD	XD
Vg2					XD
22V		X	X	X	X
V_{driver}					XD
Vg1			X	X	X

After use leave the meter switch in pos. input.

4.3.
TABLE III, CONTROL OF POWER SUPPLY.

This table indicates the state for the power supply, versus the control conditions. The MAIN SWITCH in position ON.

Control Conditions			State for P.S.	
Block P.S.	Transmitter start	Delay time past	Keyed	High Voltage present
pin 14 J701	pin 31 J701	30 secs		
grounded	22V	No		
grounded	0V	Yes		X
grounded	22V	Yes	X	X
open	22V	Yes		
open	0V	Yes		

4.4.
TABLE IV, CONTROL OF Va VERSUS FREQUENCY.

This table indicates how the high voltage Va is changed when the frequency is above or below 4 MHz.

Frequency	400/800W Control	High Voltage V_a
MHz	pin 17 J701	kV
below 4	open	1.4
above 4	grounded	2
0.405-0.535	grounded	2

5. ADJUSTMENT PROCEDURE FOR N1401

5.1.
ADJUSTMENT OF 22V.

5.1.1.
With the voltmeter in 30V range connect the + terminal to TP1 and the - terminal to chassis. The MAIN SWITCH in pos. ON (if the power supply is separate, load the 22V with 3 - 3.5A).

5.1.2.
Adjust with potentiometer R106 to the voltmeter reads 22.0V.

5.1.3.
Connect an oscilloscope to TP1 and check that the ripple is less than 200 mVpp.

5.1.4.
If possible variate the supply voltage and check that the 22V remains stable.

5.2.
ADJUSTMENT OF Vg2.

5.2.1.
With the voltmeter in 500 or 1000V range, connect the + terminal to TP2 and the - terminal to chassis. Key the short-wave set, but no drive to the PA stage (ex. A3J, no modulation). If the power supply is separate, key the power supply using the informations in TABLE III 4.3.

5.2.2.
Adjust with potentiometer R226 to the voltmeter reads 400V.

5.2.3.
Move the voltmeter to TP3, the reading shall remain 400V, even though TP4 is short-circuited to chassis. With the voltmeter on TP4 check that the voltage remain 400V when TP3 is short-circuited.

5.2.4.
Check that the voltage of TP5 is -60V.

5.2.5.
Check that the voltage of TP6 is 28V.

6. NECESSARY ADJUSTMENTS AFTER REPAIR

6.1.
AFTER REPAIR IN POWER UNIT I, PERFORM ADJUSTMENT IN ACCORDANCE WITH SECTION 5.1. ADJUSTMENT OF 22V.

6.2.
AFTER REPAIR IN POWER UNIT II, PERFORM ADJUSTMENT IN ACCORDANCE WITH SECTION 5.2. ADJUSTMENT OF Vg2.

7. FUNCTION CHECK FOR N1401

7.1.
FUNCTION CHECK WHEN THE POWER SUPPLY IS INSTALLED IN A SHORT-WAVE SET.

7.1.1.
Using TABLE II section 4.2. check that the reading on the meter marked SUPPLY VOLTAGE is correct.

7.2.
FUNCTION CHECK WHEN THE POWER SUPPLY IS SEPARATE.

7.2.1.
The power supply supplied with the correct input and controlled in accordance with TABLE III section 4.3. and TABLE IV section 4.4. Use TABLE II section 4.2. to check the function via the SUPPLY VOLTAGE meter.

7.2.2.
When the power supply is separate and unloaded the power consumption can give information about the condition of the circuit.

Input Voltage	OFF	RECEIVER ONLY	STAND BY	ON		
					Keyed 1.4KV	Keyed 2KV
	Iin	Iin	Iin	Iin	Iin	Iin
220V AC	0	0.1	0.4	0.5	0.75	0.75

7.3.
NOTES FOR SUPPLY VOLTAGE METER.

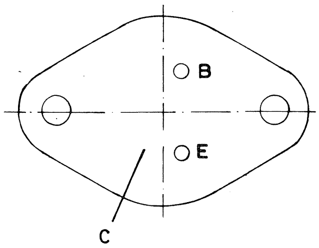
7.3.1.
In position Vg2 only Vg2 on pin 4 in J701 is checked.

7.3.2.
In N1401 the voltage -45V is used for the meter, when the meter switch is in position input.

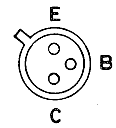
7.3.3.
Working frequency of converter. The frequency is between 300 - 500 Hz.

7.3.4.
In N1401 it is not possible to check the voltage 8V with the meter.

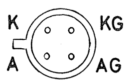
BOTTOM VIEW



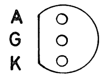
MJ 802
MJ 3000
2N5686



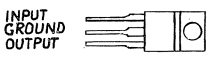
BC 141-10



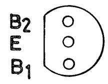
BRY 39



2N5064



MC7808



2N4871

SAILOR N1401

CIRCUIT DESCRIPTION N1401

HIGH VOLTAGE UNIT

The HIGH VOLTAGE UNIT is made by two transformers TR301 and TR302, the belonging rectifiers and filter components.

The high voltage can be either 1.4 kV or 2 kV dependent on whether relay RE301 is open or closed (400/800 W Control).

Switching on and off the high voltage unit takes place via relay RE701.

Resistors R301, R302 and R303 ensure that the voltage across the capacitors C314 - C319 are equal even if the leakage currents are different.

POWER UNIT I

This unit supplies receiver and the exciter with the voltages +22V and -45V. The filament to the transmitter is also supplied from POWER UNIT I.

The transformer TR101 outputs are rectified and filtered, one is the voltage -45V and unstabilized. The other voltage is positive and via the regulator, consisting of the transistors T101 and T102 and the 7.5V zener diode D103 stabilized to +22V, adjustment of +22V is made by R106.

The output +22V is secured against overload by the fuse F704 6.3A.

POWER UNIT II

This unit supplies the transmitter and the driver unit with stabilized voltages. The input to the DC-DC converter is stabilized in the regulator, consisting of the transistors T201 and T202 and the 7.5V zener diode D201.

The output from the regulator is fed to the DC-DC converter with the transistors T203 and T204 and the matching transformers TR201 and TR202. The four outputs of the transformer TR202 are thereby stabilized and adjustment of the voltages is made by R226. The ratio of the voltages is determined by the transformer TR202.

The output Vg1 -60V is present as soon as the unit is in function, whereas the outputs V_{driver} +28V and the two Vg2 +400V are controlled by the +22V to the relays RE201, RE202 and RE203 (Transmitter start).

The circuit for the Vg2 supply is made so that the currents to the screens in the PA tubes are limited due to R219 and R220. If a screen tends to emit, the increase of screen voltage is prevented due to a low impedance in the circuit consisting of R218 and the diodes D208 and D209.

The POWER UNIT II has built-in resistors for the TEST METER.

The output Vg1 -60V is present as soon as the unit is in function, whereas the outputs V_{driver} +28V and the two Vg2 +400V are controlled by the +22V to the relays RE201, RE202 and RE203 (Transmitter start).

The circuit for the Vg2 supply is made so that the currents to the screens in the PA tubes are limited due to R219 and R220. If a screen tends to emit the increase of screen voltage is prevented due to a low impedance in the circuit consisting of R218 and the diodes D208 and D209.

The POWER UNIT II has built-in resistors for the TEST METER.

DELAY UNIT

The DELAY UNIT starts when it is connected. Across the zener diode D401 there is a voltage of 7.5V and the capacitor C404 starts charging up via resistor R407, when the anode gate is 0.7V below the anode, the D404 is triggered and the capacitor C404 is discharged.

In order to ensure enough current in the gate, a negative going pulse 200 - 500 mS of 0.7V is fed to the gate via C403.

The discharge of C404 causes a positive pulse across R406. The SCR D405 is triggered and relay RE402 is closed.

Relay RE401 is controlled via the control input Block P.S., when both relays are closed control inputs are allowed to pass through the DELAY UNIT.

50 Hz CONVERTER

This unit supplies the blowers with AC voltages with a frequency of 50 - 60 Hz dependent on the input voltage. The converter consists of the transistors T501 and T502 and the matching transformers TR501 and TR502. The diodes D503 and D504 limit the voltage with reversal polarity across T501 and T502.

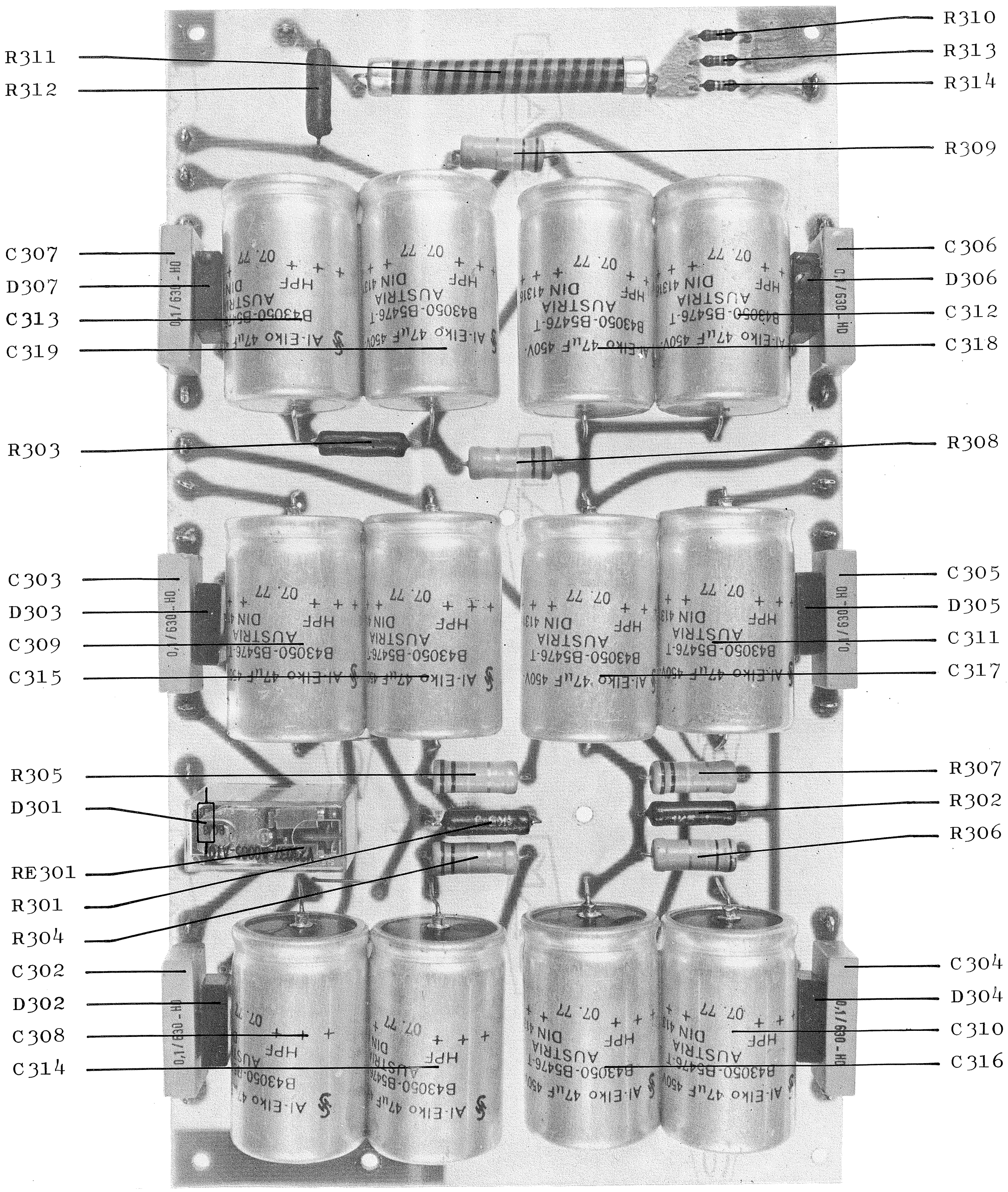
The diode D505 limits the peak current through the switch S701, because the capacitor C501 is charged up. R504, C502 and C503 suppress high voltages during switching T501 and T502.

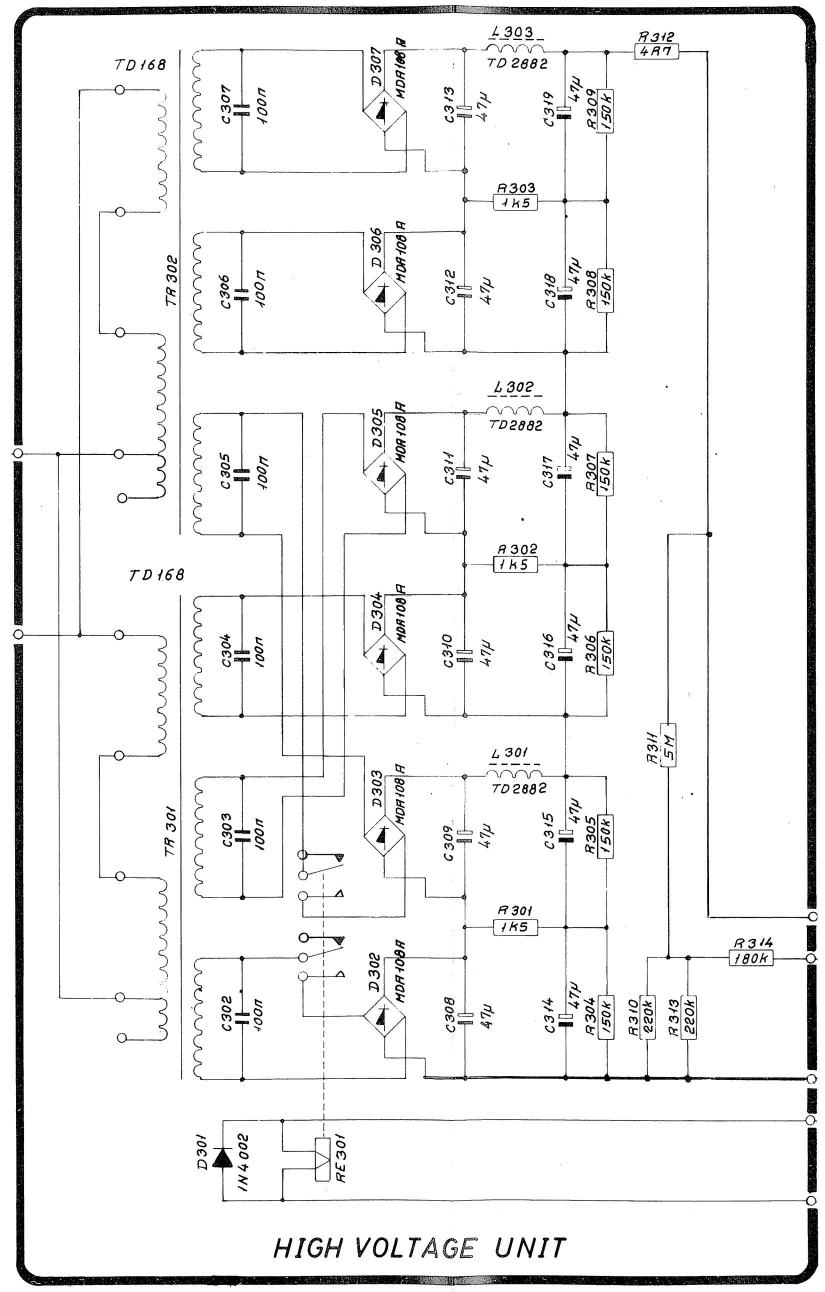
TEST METER

When using the SUPPLY VOLTAGE meter M601 and the switch S601, voltages are monitored. The resistors are placed either on the test meter print or in the different units.

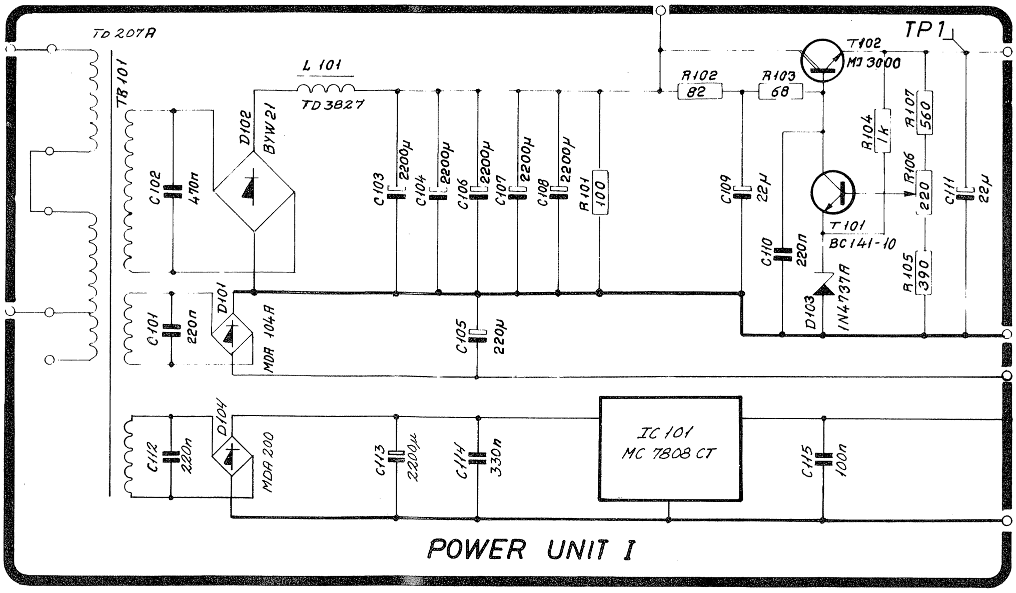
MAIN SWITCH

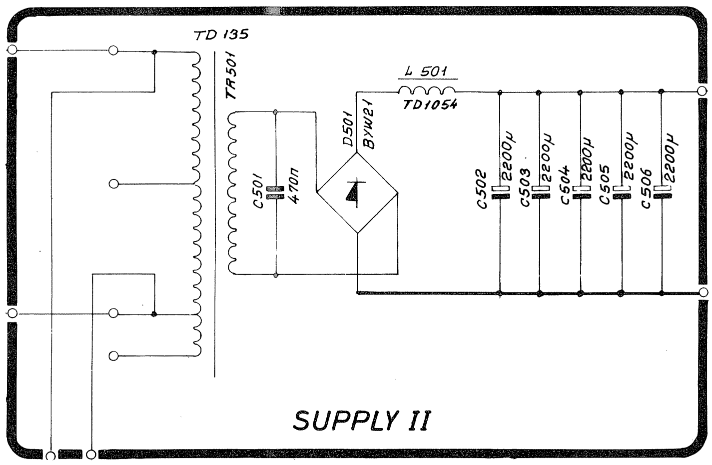
The switch S701 controls the function of the power supply and it is operated from the front.

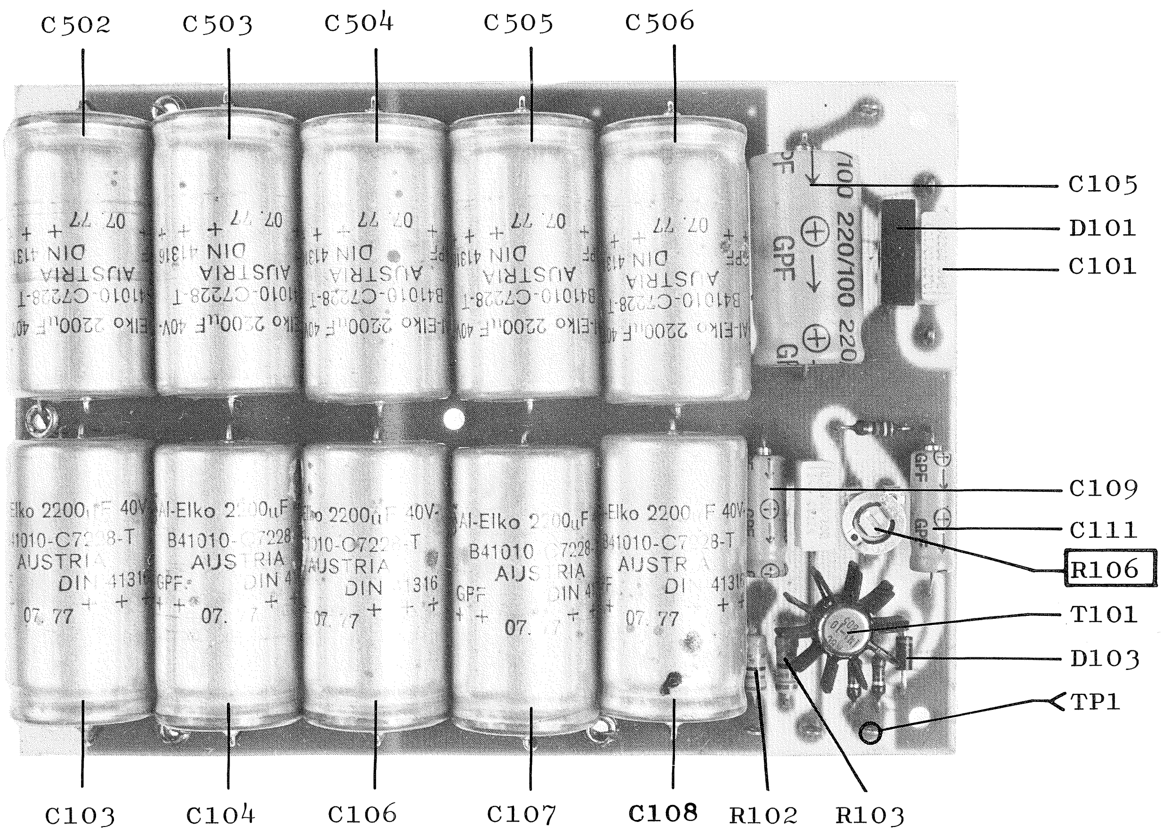




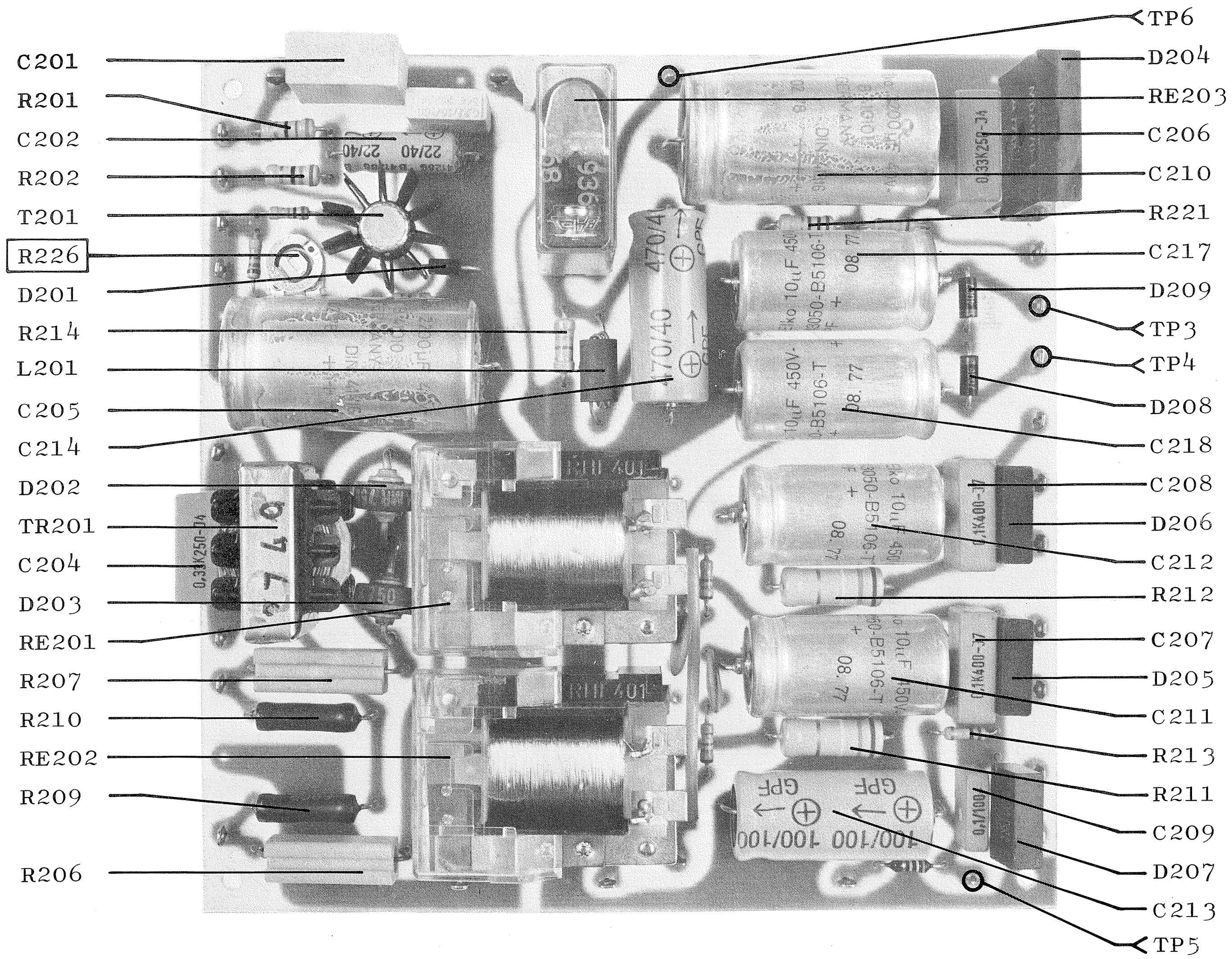
HIGH VOLTAGE UNIT N1401

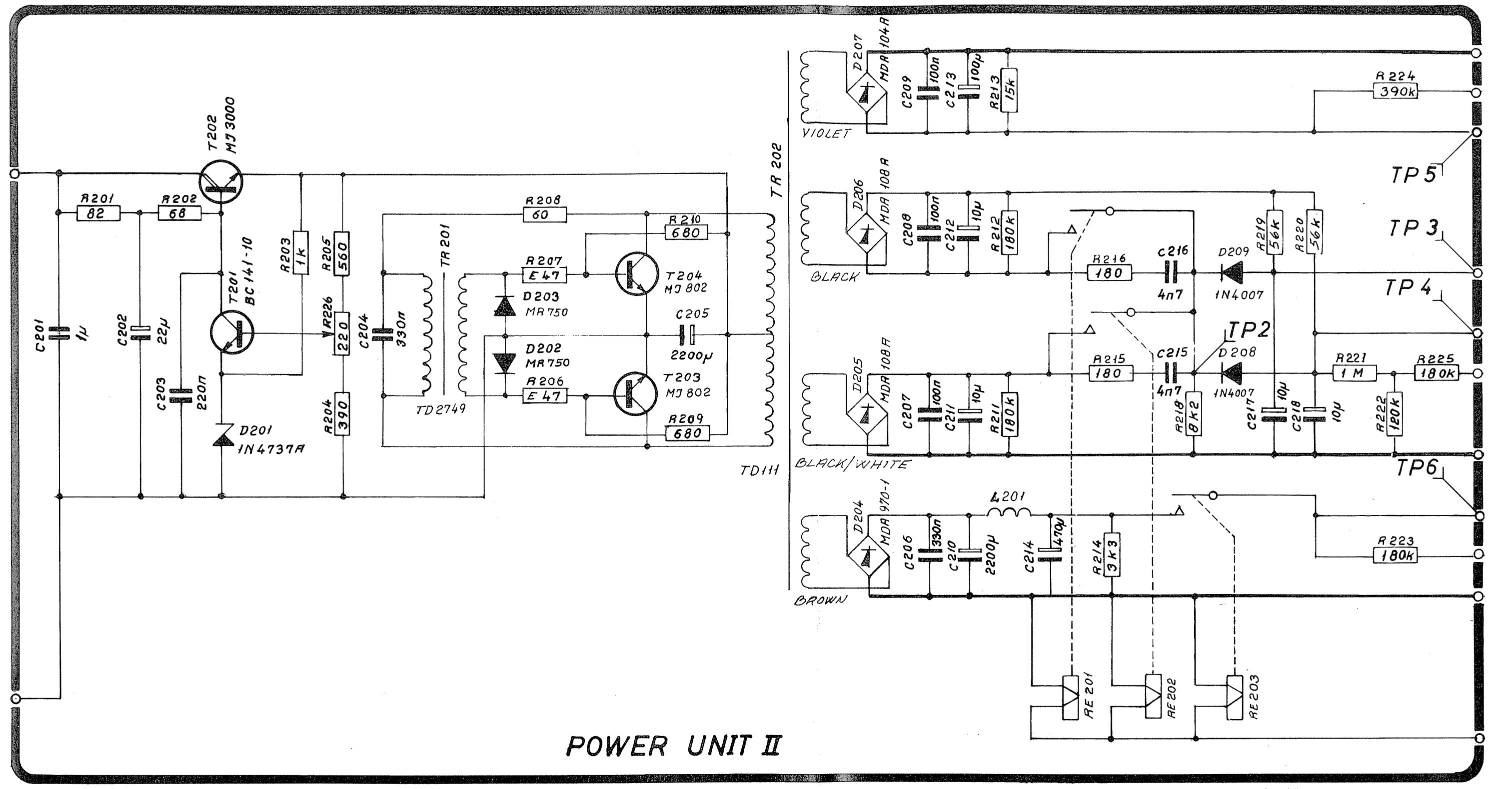


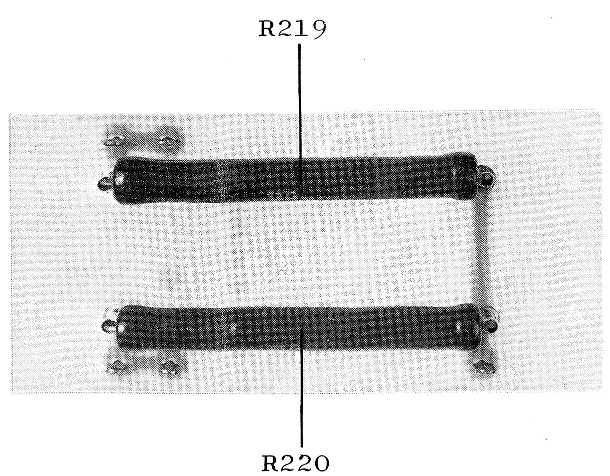


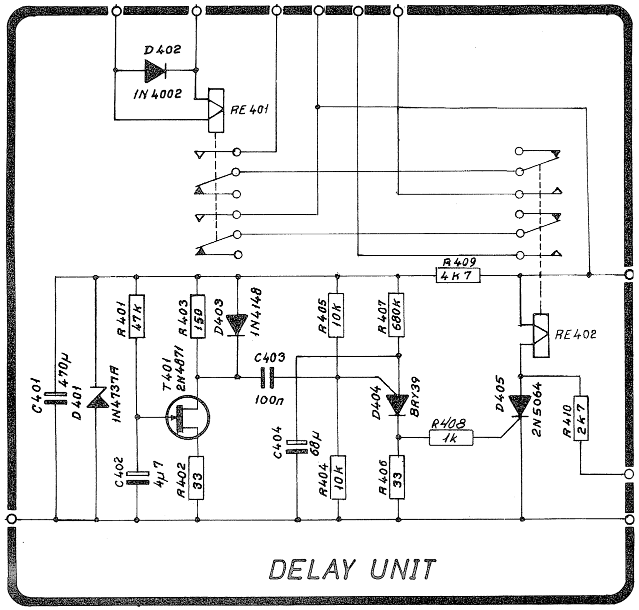


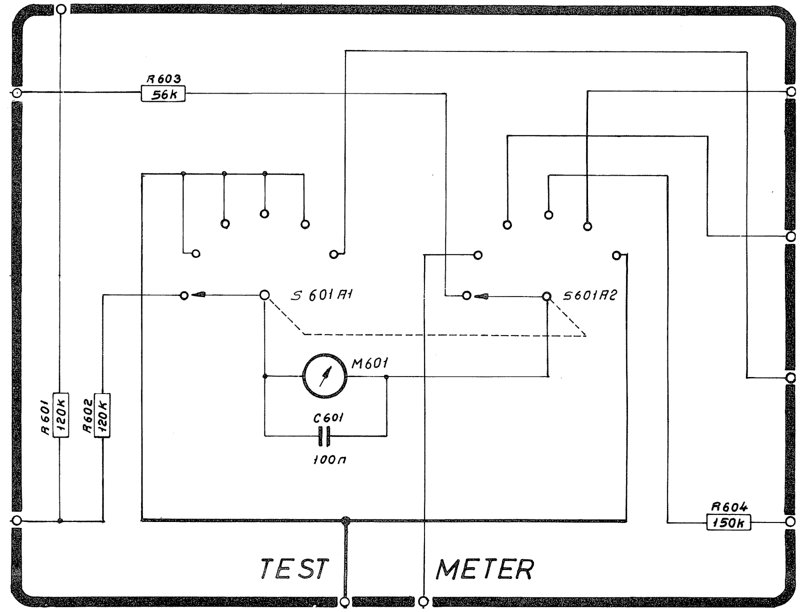
POWER UNIT I & SUPPLY II N1401

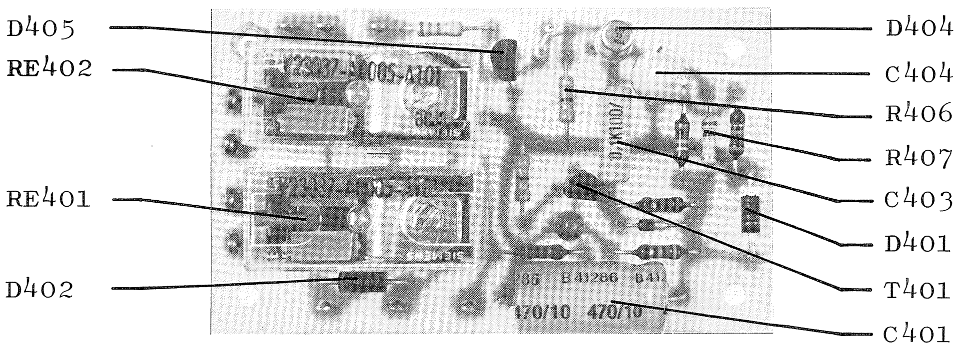

C201
R201
C202
R202
T201
R226
D201
R214
L201
C205
C214
D202
TR201
C204
D203
RE201
R207
R210
RE202
R209
R206
TP6
D204
RE203
C206
C210
R221
C217
D209
TP3
TP4
D208
C218
C208
D206
C212
R212
C207
D205
C211
R213
R211
C209
D207
C213
TP5

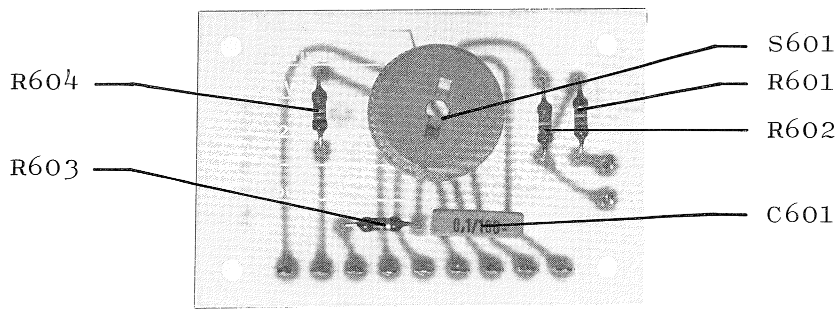

POWER UNIT II
TP5
TP3
TP4
TP2
TP6
VIOLET
BLACK
BLACK/WHITE
BROWN
TR202
TR201
TD2749
TD111
T202 MJ3000
T201 BC141-10
T204 MJ802
T203 MJ802
D201 1N4737A
D203 MR750
D202 MR750
D209 1N4007
D208 1N4007
RE201
RE202
RE203
L201


R219
R220





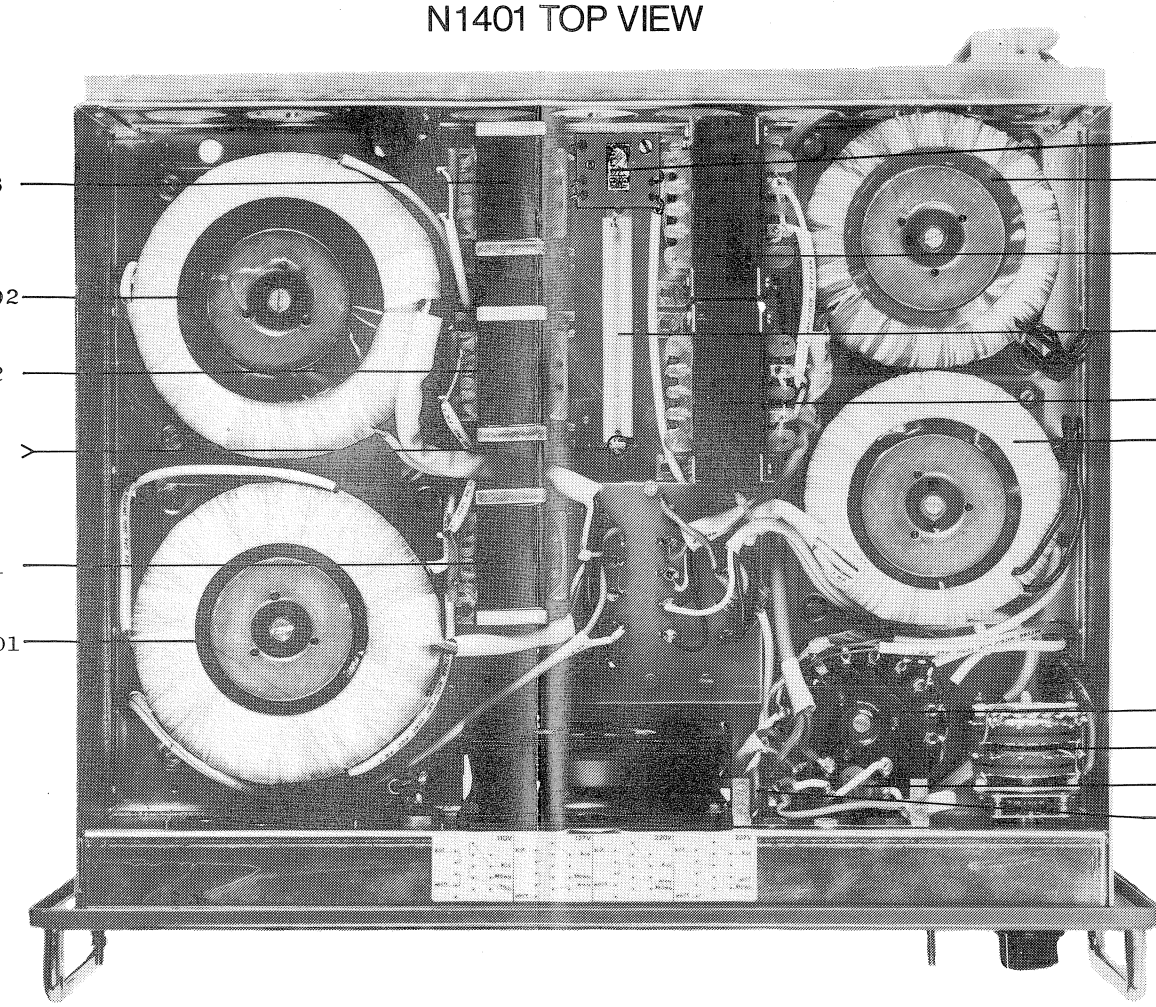




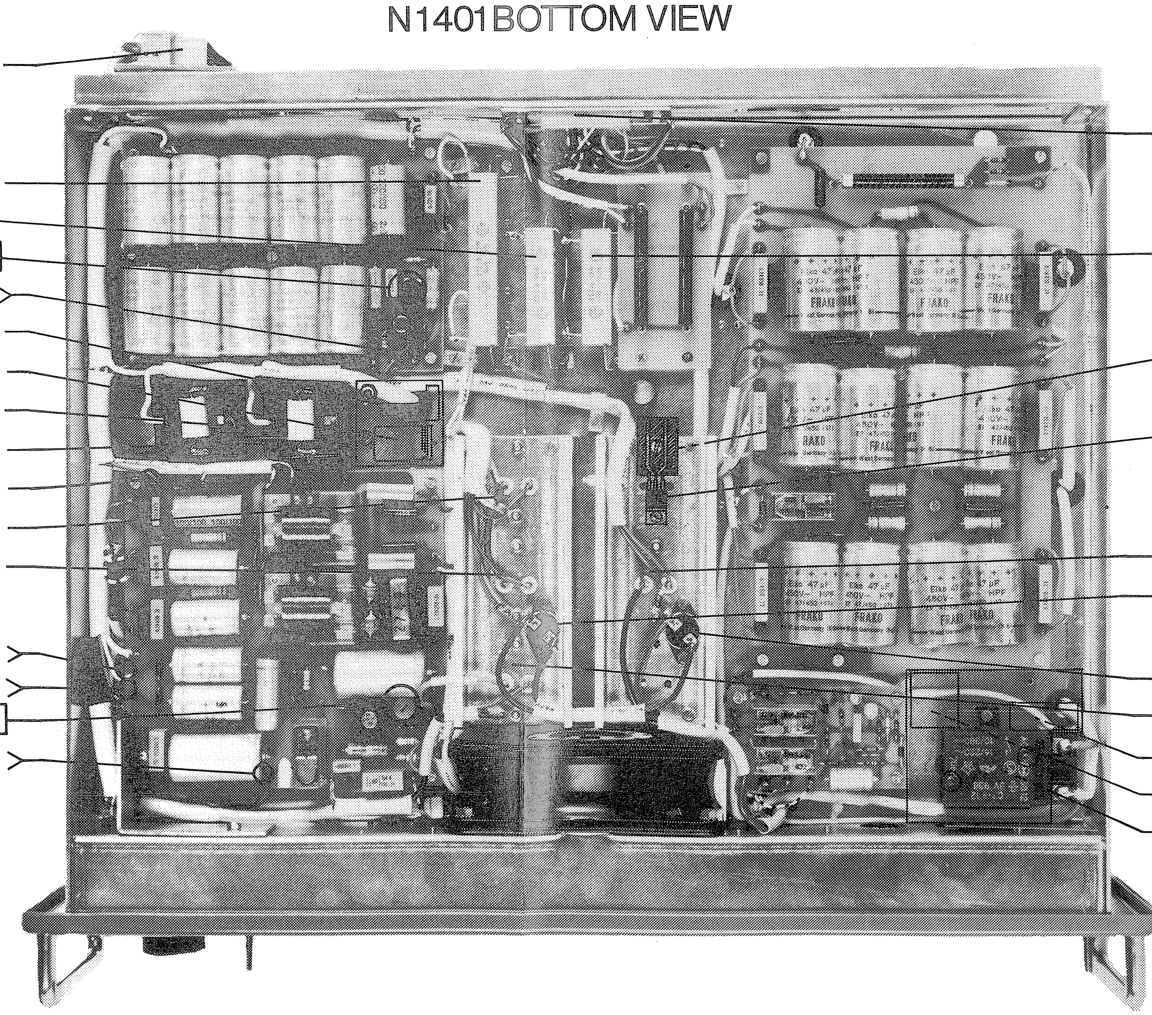
DELAY UNIT & TEST METER N1400/N1401

N1401 FRONT VIEW

N1401 TOP VIEW



N1401 BOTTOM VIEW



b POWER UNIT I N1401

Symbol	Description			Manufact.	
R101	Resistor	100 ohm 10%	15W	Vitrohm	222-0
R102	Resistor	82 ohm	0.5W	Philips	2322 212 13829
R103	Resistor	68 ohm	0.5W	Philips	2322 212 13689
R104	Resistor	1kohm	0.33W	Philips	2322 211 13102
R105	Resistor	390 ohm	0.33W	Philips	2322 211 13391
R106	Potentiometer	220 ohm		Draloric	70 WTD-K-C
R107	Resistor	560 ohm	0.33W	Philips	2322 211 13561
C101	Capacitor polyester	0.22uF	100V	ERO	MKT1822-422/0
C102	Capacitor polyester	0.47uF	100V	Philips	2222 341 29474
C103	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C104	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C105	Capacitor electrolytic	220uF	100V	Siemens	B41010-D9227-T
C106	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C107	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C108	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C109	Capacitor electrolytic	22uF	40V	Siemens	B41283-B7226-T
C110	Capacitor polyester	0.22uF	100V	ERO	MKT1822-422/0
C111	Capacitor electrolytic	22uF	40V	Siemens	B41283-B7226-T
C112	Capacitor polyester	0.22uF	100V	ERO	MKT1822-422/0
C113	Capacitor electrolytic	2200uF	16V	ROE	EG 00 KE 422D
C114	Capacitor polyester	0.33uF	100V	ERO	MKT1822-433/0
C115	Capacitor polyester	100nF	100V	ERO	MKT1822-410/0
L101	Coil			Tradania	TD3827
TR101	Transformer			Tradania	TD207A
D101	Diode bridge			Motorola	MDA 104A/MDA 204
D102	Diode bridge			Motorola	BYW21
D103	Diode zener	7.5V	1W	Motorola	1N4737A
D104	Diode bridge			Motorola	MDA 200
TR101	Transistor			Siemens	BC141-10
TR102	Transistor			Motorola	MJ3000
IC101	Integrated circuit			Motorola	MC7808 CT

a Power unit II N1400/N1401

Symbol	Description				Manufact.	
R201	Resistor	82 ohm		0,5W	Philips	2322 212 13829
R202	Resistor	68 ohm		0,5W	Philips	2322 212 13689
R203	Resistor	1Kohm		0,33W	Philips	2322 211 13102
R204	Resistor	390 ohm		0,33W	Philips	2322 211 13391
R205	Resistor	560 ohm		0,33W	Philips	2322 211 13561
R206	Resistor	0,47 ohm	10%	4W	Vitrohm	206-0
R207	Resistor	0,47 ohm	10%	4W	Vitrohm	206-0
R208	Resistor	60 ohm	5%	23W	Vitrohm	222-0
R209	Resistor	680 ohm		4,2W	Philips	2322 330 22681
R210	Resistor	680 ohm		4,2W	Philips	2322 330 22681
R211	Resistor	180Kohm		1,15W	Philips	2322 214 13184
R212	Resistor	180Kohm		1,15W	Philips	2322 214 13184
R213	Resistor	15Kohm		0,33W	Philips	2322 211 13153
R214	Resistor	3,3Kohm		0,5W	Philips	2322 211 13332
R215	Resistor	180 ohm		0,33W	Philips	2322 211 13181
R216	Resistor	180 ohm		0,33W	Philips	2322 211 13181
R218	Resistor	8,2Kohm	5%	30W	Vitrohm	224-0
R219	Resistor	56Kohm	5%	12W	Danotherm	GAN 12
R220	Resistor	56Kohm	5%	12W	Danotherm	GAN 12
R221	Resistor	1Mohm		0,5W	Philips	2322 212 13105
R222	Resistor	120Kohm		0,33W	Philips	2322 211 13124
R223	Resistor	180Kohm		0,33W	Philips	2322 211 13184
R224	Resistor	390Kohm		0,33W	Philips	2322 211 13394
R225	Resistor	180Kohm		0,33W	Philips	2322 211 13184
R226	Potentiometer	220 ohm			Draloric	70 WTD-K-C
C201	Capacitor polyester		1uF	100V	ERO	MKT1822-510/0
C202	Capacitor electrolytic		22uF	40V	Siemens	B41283-B7226-T
C203	Capacitor polyester		0,22uF	100V	ERO	MKT1822-422/0
C204	Capacitor polyester		0,33uF	250V	ERO	MKT1822-433/2
C205	Capacitor electrolytic		2200uF	40V	Siemens	B41010-C7228-T
C206	Capacitor polyester		0,33uF	250V	ERO	MKT1822-433/2
C207	Capacitor polyester		0,1uF	400V	ERO	MKT1822-410/4
C208	Capacitor polyester		0,1uF	400V	ERO	MKT1822-410/4

b Power unit II N1400/N1401

Symbol	Description			Manufact.	
C209	Capacitor polyester	0,1uF	100V	ERO	MKT1822-410/0
C210	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C211	Capacitor electrolytic	10uF	450V	Siemens	B43050-B5106-T
C212	Capacitor electrolytic	10uF	450V	Siemens	B43050-B5106-T
C213	Capacitor electrolytic	100uF	100V	Siemens	B41010-A9107-T
C214	Capacitor electrolytic	470uF	40V	Siemens	B41010-A7477-T
C215	Capacitor ceramic	4,7nF	400V	Ferroperm	9/0138,9
C216	Capacitor ceramic	4,7nF	400V	Ferroperm	9/0138,9
C217	Capacitor electrolytic	10uF	450V	Siemens	B43050-B5106-T
C218	Capacitor electrolytic	10uF	450V	Siemens	B43050-B5106-T
T201	Transistor			Siemens	BC141-10
T202	Transistor			Motorola	MJ3000
T203	Transistor	matched pair		Motorola	MJ802
T204	Transistor			Motorola	MJ802
D201	Diode zener		7,5V	Motorola	1N4737A
D202	Diode			Motorola	MR750
D203	Diode			Motorola	MR750
D204	Diode bridge			Motorola	MDA970-1
D205	Diode bridge			Motorola	MDA108A/MDA208
D206	Diode bridge			Motorola	MDA108A/MDA208
D207	Diode bridge			Motorola	MDA104A/MDA204
D208	Diode			Motorola	1N4007
D209	Diode			Motorola	1N4007
L201	Coil			S.P.	Drg.No. TL067
TR201	Transformer			Tradania	TD2749
TR202	Transformer			Tradania	TD111
RE201	Relay			AEG	RHL401 24V/02
RE202	Relay			AEG	RHL401 24V/02
RE203	Relay			PASI	KH/A BV 936

High voltage unit N1401

Symbol	Description			Manufact.	
R301	Resistor	1,5 Kohm	4,2W	Philips	2322 330 22152
R302	Resistor	1,5 Kohm	4,2W	Philips	2322 330 22152
R303	Resistor	1,5 Kohm	4,2W	Philips	2322 330 22152
R304	Resistor	150 Kohm	1,15W	Philips	2322 214 13154
R305	Resistor	150 Kohm	1,15W	Philips	2322 214 13154
R306	Resistor	150 Kohm	1,15W	Philips	2322 214 13154
R307	Resistor	150 Kohm	1,15W	Philips	2322 214 13154
R308	Resistor	150 Kohm	1,15W	Philips	2322 214 13154
R309	Resistor	150 Kohm	1,15W	Philips	2322 214 13154
R310	Resistor	220 Kohm	0,33W	Philips	2322 211 13224
R311	Resistor	5 Mohm 20%	2W	Vitrohm	177-0
R312	Resistor	4,7 ohm	4,2W	Philips	2322 330 22478
R313	Resistor	220 Kohm	0,33W	Philips	2322 211 13224
R314	Resistor	180 Kohm	0,33W	Philips	2322 211 13184
C302	Capacitor polyester	0,1uF	630V	ERO	MKT1822-410/6
C303	Capacitor polyester	0,1uF	630V	ERO	MKT1822-410/6
C304	Capacitor polyester	0,1uF	630V	ERO	MKT1822-410/6
C305	Capacitor polyester	0,1uF	630V	ERO	MKT1822-410/6
C306	Capacitor polyester	0,1uF	630V	ERO	MKT1822-410/6
C307	Capacitor polyester	0,1uF	630V	ERO	MKT1822-410/6
C308	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C309	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C310	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C311	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C312	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C313	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C314	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C315	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C316	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C317	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C318	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T
C319	Capacitor electrolytic	47uF	450V	Siemens	B43050-B5476-T

a

High Voltage unit N1401

Symbol	Description	Manufact.	
TR301	Transformer	Tradania	TD168
TR302	Transformer	Tradania	TD168
D301	Diode	Motorola	1N4002
D302	Diode bridge	Motorola	MDA 108A /MDA208
D303	Diode bridge	Motorola	MDA 108A /MDA208
D304	Diode bridge	Motorola	MDA 108A /MDA208
D305	Diode bridge	Motorola	MDA 108A /MDA208
D306	Diode bridge	Motorola	MDA 108A /MDA208
D307	Diode bridge	Motorola	MDA 108A /MDA208
RE301	Relay	Siemens	V23037-A00005-A101

a Delay unit N1400/N1401

Symbol	Description				Manufact.	
R401	Resistor	47Kohm		0,33W	Philips	2322 211 13473
R402	Resistor	33 ohm		0,33W	Philips	2322 211 13339
R403	Resistor	150 ohm		0,33W	Philips	2322 211 13151
R404	Resistor	10Kohm		0,33W	Philips	2322 211 13103
R405	Resistor	10Kohm		0,33W	Philips	2322 211 13103
R406	Resistor	33 ohm		0,33W	Philips	2322 211 13339
R407	Resistor	680Kohm		0,33W	Philips	2322 211 13684
R408	Resistor	1Kohm		0,33W	Philips	2322 106 13102
R409	Resistor	4,7Kohm		0,33W	Philips	2322 211 13472
R410	Resistor	2,7Kohm		0,33W	Philips	2322 211 13272
C401	Capacitor electrolytic	470uF		10V	Siemens	B41283-A3477-T
C402	Capacitor tantal	4,7uF		35V	ERO	ETP2E 4.7/35
C403	Capacitor polyester	0,1uF		100V	ERO	MKT 1822-410/0
C404	Capacitor tantal	68uF	±10%	16V	ERO	ETQ5 68/16 ±10%
T401	Transistor UJT				Motorola	2N4871
D401	Diode zener			7,5V	Motorola	1N4737A
D402	Diode				Motorola	1N4002
D403	Diode				Texas	1N4148
D404	Diode SCR				Philips	BRY39
D405	Diode SCR				Motorola	2N5064
RE401	Relay				Siemens	V23037-A0005-A101
RE402	Relay				Siemens	V23037-A0005-A101

Supply II N1401

Symbol	Description			Manufact.	
C501	Capacitor polyester	0,47uF	100V	Philips	2222 341 29474
C502	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C503	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C504	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C505	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C506	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
L501	Coil			Tradania	TD1054
TR501	Transformer			Tradania	TD135
D501	Diode bridge			Motorola	BYW21

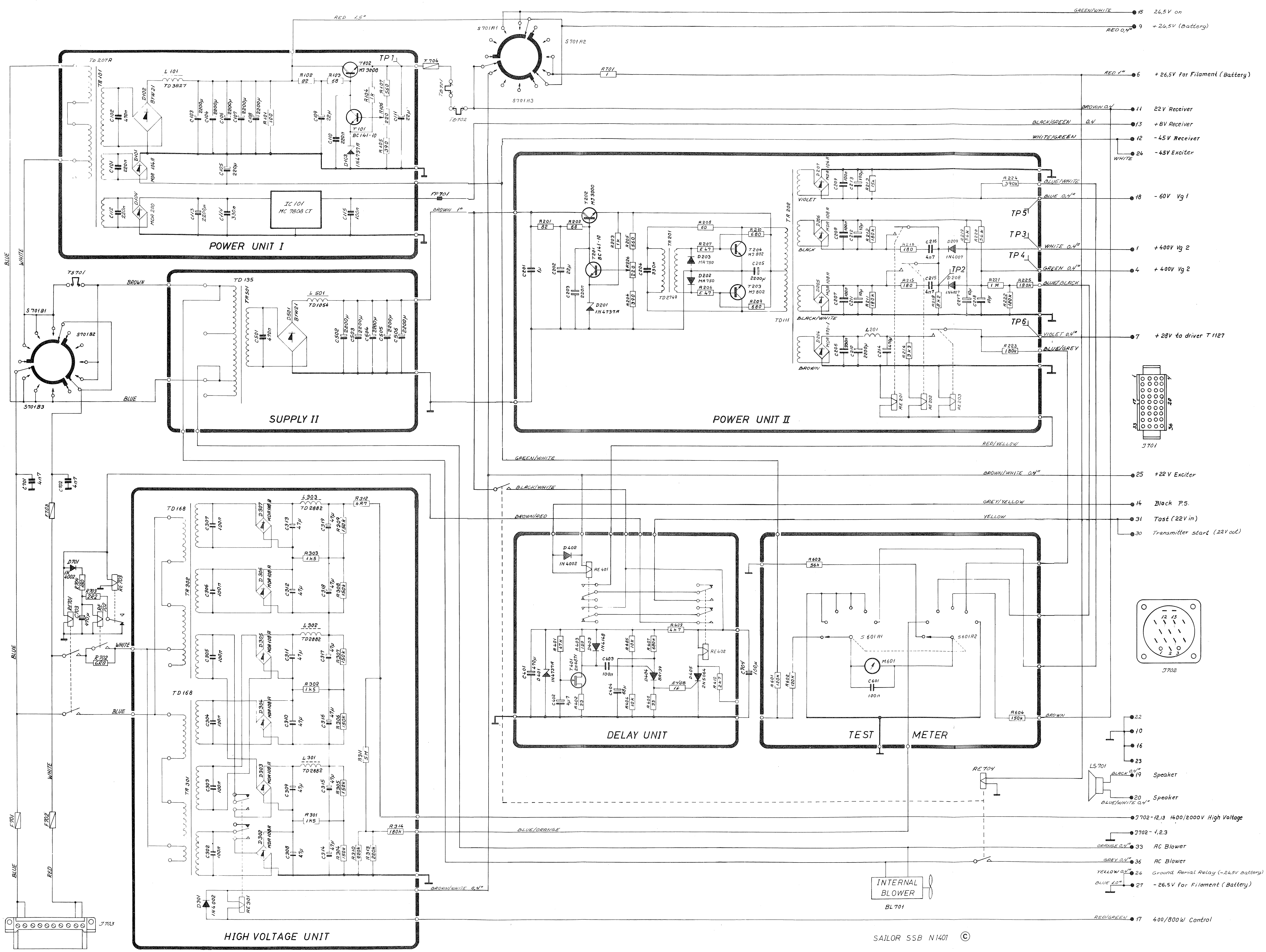
Testmeter N1400 /N1401

Symbol	Description			Manufact.	
R601	Resistor	120Kohm	0,33W	Philips	2322 211 13124
R602	Resistor	120Kohm	0,33W	Philips	2322 211 13124
R603	Resistor	56Kohm	0,33W	Philips	2322 211 13563
R604	Resistor	150Kohm	0,33W	Philips	2322 211 13154
C601	Capacitor polyester	0,1uF	100V	ERO	MKT1822-410/0
M601	Meter			Aug.Eklöw	MG20 Drg. No. 9-3-21496
S601	Switch			ITT	RBP 12F 2x6NCC

c

Chassis N1401

Symbol	Description			Manufact.	
R701	Resistor	1 ohm 10%	15W	Vitrohm	220-0
R702	Resistor	6,8 ohm	25W	Danotherm	GRF25L-6,8 ohm
R703	Resistor	2,2 ohm	4W	Philips	2322 329 34228
R704	Resistor	180 ohm	4W	Philips	2322 329 04181
C701	Capacitor ceramic	4,7 nF	5KV	Ferroperm	9/0138,9
C702	Capacitor ceramic	4,7 nF	5KV	Ferroperm	9/0138,9
C703	Capacitor electrolytic	470 uF	16V	Siemens	B41283-A4477-T
C701	Diode			Motorola	1N4002
	<u>At 220V AC</u>				
F701	Fuse		10A	Wickmann	314010
F702	Fuse		10A	Wickmann	314010
F703	Fuse		6A	Wickmann	314006
F704	Fuse		6,3A	ELU	5x20mm 6,3A
	<u>At 110V AC</u>				
F701	Fuse		20A	Wickmann	314020
F702	Fuse		20A	Wickmann	314020
F703	Fuse		10A	Wickmann	314010
F704	Fuse		6,3A	ELU	5x20mm 6,3A
S701	Switch			NSF	HD 120231S MSD 2
RE701	Relay	Ag/CdO Contacts		PASI	CR/B-BV-938
RE702	Relay			PASI	KH/A-BV-1074
RE703	Relay			PASI	MS/K-13-C
RE704	Relay			PASI	KS/U-BV-998
BL701	Blower	220V AC		PAPST	Typ 4550N
LS701	Loudspeaker			Philips	2422 257 34438
TB701	Thermal Breaker			Elmwood	2455 R-21-910
TB702	Thermal Breaker			Elmwood	2455 R-21-910
TS701	Thermostat			Elmwood	2455 R-88-915
J701	Receptacle			Molex	1772-2
J702	Socket			Hirschmann	Meb 160
J703	Plug			Weidmüller	STV 2/10-3338,6


POWER UNIT I
SUPPLY II
POWER UNIT II
HIGH VOLTAGE UNIT
DELAY UNIT
TEST METER
INTERNAL BLOWER
BL701
J701
J702
J703
15 26,5V on
9 +26,5V (Battery)
6 +26,5V for Filament (Battery)
11 22V Receiver
13 +8V Receiver
12 -45V Receiver
24 -45V Exciter
18 -60V Vg1
1 +400V Vg2
4 +400V Vg2
7 +28V to driver T1127
25 +22V Exciter
14 Block P.S.
31 Tast (22V in)
30 Transmitter start (22V out)
19 Speaker
20 Speaker
J702-12,13 1400/2000V High Voltage
J702-1,2,3
33 AC Blower
36 AC Blower
26 Ground Aerial Relay (-26,5V Battery)
27 -26,5V for Filament (Battery)
17 400/800W Control
IC101 MC 7808 CT
TP1
TP2
TP3
TP4
TP5
TP6
SAILOR SSB N1401 ©

Sailor

Sailor

INSTRUKTIONSBOG FOR SAILOR N 1400

INSTRUCTION BOOK FOR SAILOR N 1400

A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS:

GENERAL DESCRIPTION

SAILOR N1400 is a DC power supply intended to supply a SAILOR SSB short-wave set, when the set has to be supplied from a 24V battery.

SAILOR N1400 has a MAIN SWITCH which controls all power supply to the short-wave set. All fuses for the short-wave set are located behind the AIR FILTER.

SAILOR N1400 has a built-in delay unit which ensures the proper sequence for applying voltages to the transmitter, regardless of how the MAIN SWITCH is operated.

SAILOR N1400 with MAIN SWITCH in position RECEIVER ONLY. Only the receiver is supplied and low power consumption is achieved.

SAILOR N1400 with MAIN SWITCH in position STAND BY, filament and negative bias are supplied to the transmitter.

SAILOR N1400 has a meter which controls the input voltage. A switch behind the AIR FILTER makes it possible with the same meter to check the voltages inside the set.

SAILOR N1400 is provided with thermal breakers which switch off the set, if the temperature inside the power supply gets too high.

SAILOR N1400 has a built-in loudspeaker for the connected receiver.

SAILOR N1400 fits into SAILOR 19" rack system.

TECHNICAL DATA

The power supply N1400 delivers all necessary voltages to a SAILOR SSB short wave set with an output power of 800 W PEP in the frequencies range 4 - 27.5 MHz. In the frequency range 1.6 - 4 MHz the plate voltage is reduced in order to limit the output power to 400 W PEP. When N1400 is used for 405 - 535 kHz transmitters the plate voltage is the same as when the frequency range is 4 - 27.5 MHz.

Input voltage: Normal voltage 26.5V DC ±10%

Input current:

Input current (24V DC)	1.6 - 4 MHz	4 - 27.5 MHz
Receiver only	1.8A	1.8A
Stand by	8.2A	8.2A
On	9.0A	9.0A
Tune (full PEP 2-tone)	41A	55A
SSB Normal Speech	34A	43A
A3H Normal Speech	40A	52A
A2H telegraphy Key up/down	19/41	21/55
A1 telegraphy Key up/down	19/49	21/68

Output voltages:

DC unstabilized

Va	1.4/2 KV
$V_{filament}$	=input
-45V	-45V

DC stabilized

V_{driver}	28V ±5%
V_{g1}	-60V ±5%
22V	22V ±2%
* 8V	8V ±5%
$2xV_{g2}$	400V ±2%

The currents from Vg2's are limited to protect the screen in the PA tubes.

AC unstabilized

Blower supply 50 - 60 Hz

Operation temperature range: -15^{o}C to $+55^{o}$C

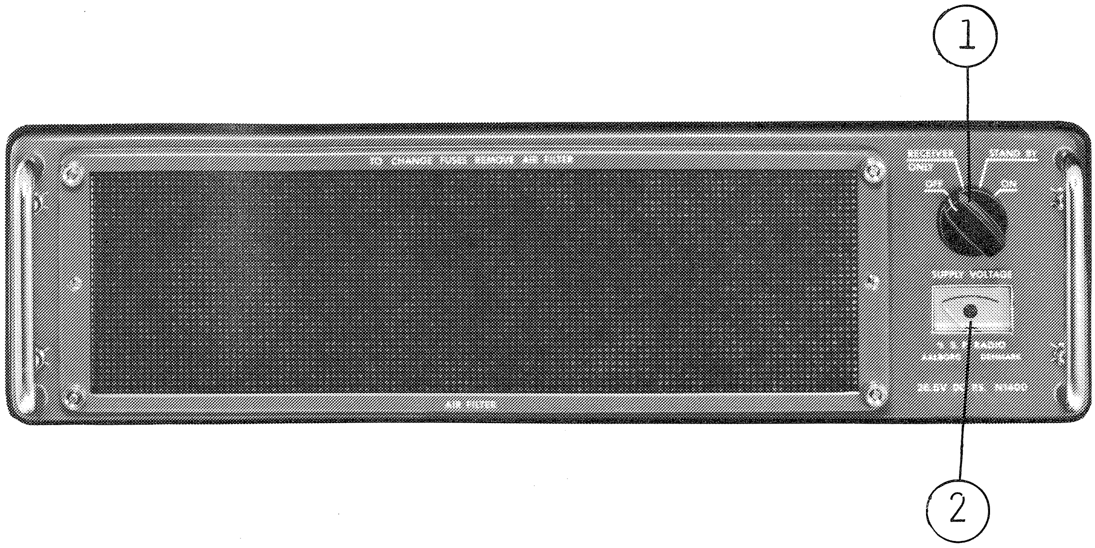
Cooling:

With MAIN SWITCH in position STAND BY and ON the internal blower is running. If the inside temperature gets too high thermal breakers disconnect the 22V and stop the set until it has cooled down.

When MAIN SWITCH is in position RECEIVER ONLY and the internal temperature exceeds $+55^{o}$C the internal blower starts automatically, when the temperature falls below $+40^{o}$C the blower stops. (Valid for power supplies N1400 with serial number higher than 173759).

* Power supplies N1400 with a serial number below 174144 do not have the 8V supply.

CONTROLS



(1) MAIN SWITCH

Switching between the functions.

OFF

The set is switched off.

RECEIVER ONLY

The receiver is supplied with power and ready for use.

STAND BY

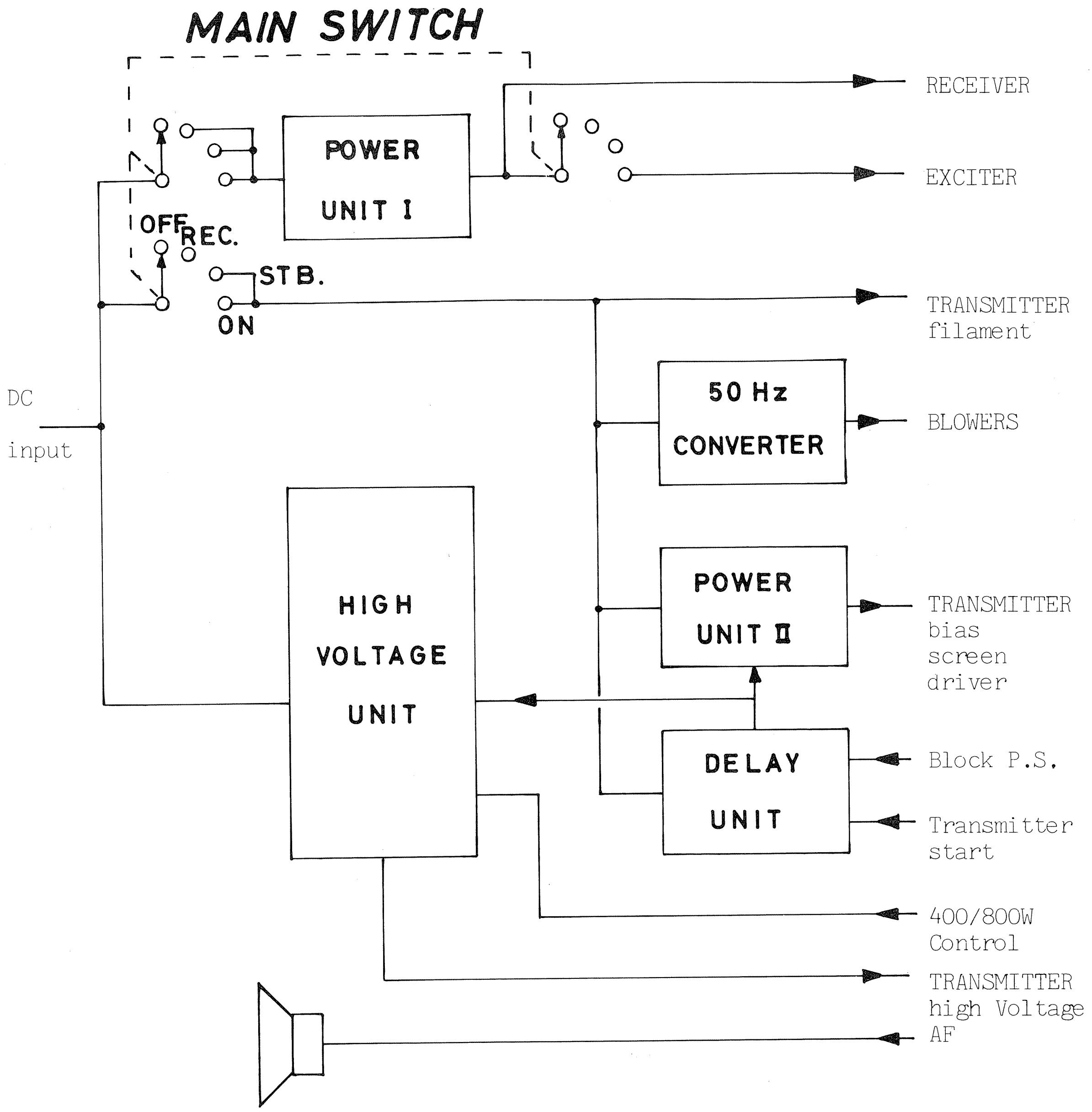
Internal blower starts and voltages are supplied to the transmitter in order to make it ready for use.

ON

The transmitter is ready for use if it has been in position STAND BY or ON for a period equal to or longer than the delay time.

(2) SUPPLY VOLTAGE METER

Meter checking the input voltage to the set. Internal voltage check, by using the switch located behind the AIR FILTER it is possible to check different voltages in the set.



POWER SUPPLY N1400

The function of the power supply is controlled from MAIN SWITCH, DELAY UNIT and the control inputs Transmitter start and Block P.S.

POWER UNIT I is connected in positions RECEIVER ONLY, STAND BY and ON. It supplies the RECEIVER and the EXCITER. The EXCITER in position ON only.

POWER UNIT II is connected in positions STAND BY and ON. The output bias is present, whereas the outputs screen and driver follows the Transmitter start control input if the power supply N1400 is not blocked via the control input Block P.S.

50 Hz CONVERTER is connected in positions STAND BY and ON, the internal blower runs and AC is supplied to the transmitter blower.

HIGH VOLTAGE UNIT is only in function in position ON when the control inputs Transmitter start and Block P.S. are present. The size of the HIGH VOLTAGE is controlled via the control input 400/800W Control.

DELAY UNIT is started in position STAND BY and runs in STAND BY and ON while filament is supplied to the transmitter tubes. After the delay time, the control inputs Transmitter start and Block P.S. are allowed to pass through the DELAY UNIT.

SERVICE

1. MAINTENANCE
2. NECESSARY TEST EQUIPMENT
3. TROUBLE-SHOOTING
4. PERFORMANCE CHECK
5. ADJUSTMENT PROCEDURE
6. NECESSARY ADJUSTMENTS AFTER REPAIR
7. FUNCTION CHECK

1. MAINTENANCE

1.1.
When the SAILOR SHORT WAVE SET type 1000 has been correctly installed, the maintenance can, dependent on the environment and working hours, be reduced to a performance check at the service workshop at intervals not exceeding 5 years. A complete performance check list is enclosed in the PERFORMANCE CHECK section.

Also inspect the antennes, cables and plugs for mechanical defects, salt deposits, corrosion and any foreign bodies.

Along with each set a TEST SHEET is delivered, in which some of the measurings made at the factory are listed. If the performance check does not show the same values as those on the TEST SHEET, the set must be adjusted as described under ADJUSTMENT PROCEDURE.

Any repair of the set should be followed by a FUNCTION CHECK of the unit in question.

2. NECESSARY TEST EQUIPMENT

T1127	N140X	S1300	R1117	Equipment	
X	X	X	X	<u>OSCILLOSCOPE:</u>	
				Bandwidth	0-25 MHz
				Sensitivity	2mV/cm
				Input impedance	1 Mohm//30 pF
				Triggering	EXT-INT-ENVELOPE
				E.g. PHILIPS	PM3212
X		X	X	<u>PASSIVE PROBE:</u>	
				Attenuation	10x
				Input resistance DC	10 Mohm
				Input capacitance	15 pF
				Compensation range	10 pF - 30 pF
				E.g. PHILIPS	PM 9396
		X	X	<u>MULTIMETER:</u>	
				Sensitivity (f.s.d.)	1V
				Input impedance	10 Mohm
				Accuracy (f.s.d.)	±2%
				E.g. PHILIPS	PM2503
X	X			<u>MULTIMETER:</u>	
				Sensitivity	0.3V and 3A
				Input impedance	30 Kohm/V
				Accuracy (F.S.d.)	±1%
				Current range	100A
				Voltage range	500V, and 2.5 kV
				E.g. Unigor A43, with probe and shunt	

NECESSARY TEST EQUIPMENT cont.:

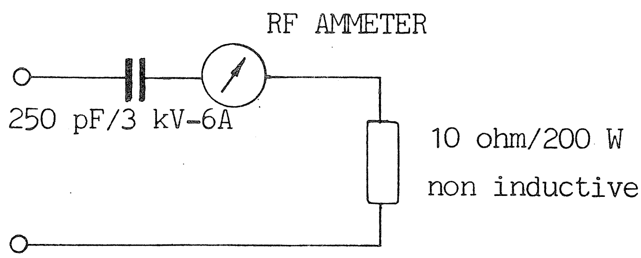
T1127	N140X	S1300	R1117	Equipment		
		X		<u>TONEGENERATOR:</u>		
					Frequency range	200 - 3000 Hz
					Output	1V RMS
					Output impedance	≦ 600 ohm
					E.g. PHILIPS	PM5107
			X	<u>AF VOLTMETER:</u>		
					Sensitivity (f.s.d.)	300 mV
					Input impedance	≧ 4 ohm
					Accuracy (f.s.d.)	±5 %
					Frequency range	100 Hz - 5 kHz
					E.g. PHILIPS	PM2503
		X	X	<u>FREQUENCY COUNTER:</u>		
					Frequency range	100 Hz - 40 MHz
					Resolution	0,1 Hz at f ≧ 10 MHz
					Accuracy	$1 \cdot 10^{-7}$
					Sensitivity	100 mV RMS
					Input impedance	1 Mohm
					Single period measurement	
					range	1 sec.
					resolution	1 mS
					E.g. PHILIPS	PM6611 + PM9679
			X	<u>SIGNAL GENERATOR</u>		
					Frequency range	550 kHz - 30 MHz R1118: 100 kHz - 30 MHz
					Output impedance	50/75 ohm
					Output voltage	1 uV - 100 mV EMF
					Modulation	AM, 30%, 1000 Hz
					E.g. PHILIPS	PM5326

T1127	N140X	S1300	R1117	
				POWER SUPPLIES
X				T1127: V_{out} 26,5V DC I_{out} 60A DC E.g. 2 pcs. LAMBDA type LMG24
		X	X	R1117/S1300: V_{out} 1 22V I_{out} 1 1,5A V_{out} 2 -45V I_{out} 2 0,2A E.g. SAILOR POWER SUPPLY type N1402
		X		**TEST BOX S1300:** SP type S1300/01 TEST BOX
X				**POWER METER:** Power range 500W E.g. Bird Thruline Wattmeter Model 43 plug-in element 500W 2-30 MHz impedance 50 ohm
X				**RF-AMMETER (Thermocross)** Current range 5A E.g. HELWEG MIKKELSEN & CO. Copenhagen, Denmark type TR-68x71 5A
X		X		**DUMMY LOAD for HF bands, 4 MHz to 25 MHz** Impedance 50 ohm Frequency range 0-25 MHz Power range 500W E.g. BIRD Termaline Coaxial resistor Model 8401

NECESSARY TEST EQUIPMENT cont.:

T1127	N140X	S1300	R1117	
X				DUMMY LOAD for C.T. band 1.6 MHz to 4 MHz
			X	DUMMY LOAD for the C.T. band 1.6 to 4 MHz
			X	DUMMY LOAD for the HF bands 4 MHz to 25 MHz

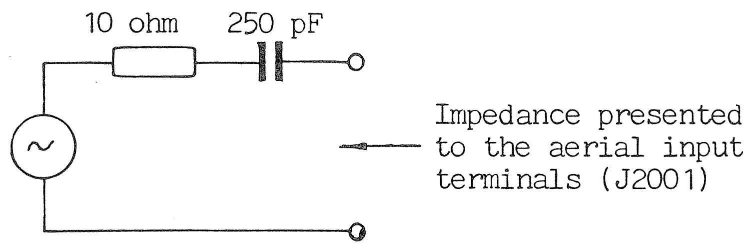
DUMMY LOAD for C.T. band 1.6 MHz to 4 MHz



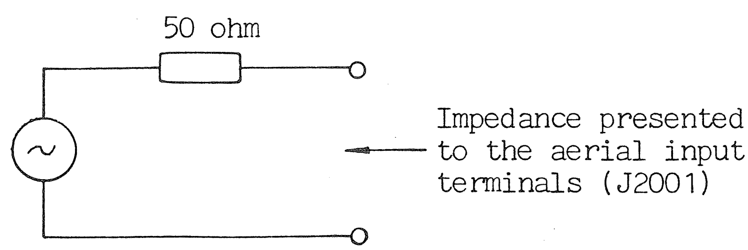
250 pF
E.g. DRALORIC 06 1291 TD 20x50 L
8 KV_S 250 pF ±20% R85

10 ohm
E.g. 10 pcs. DALE PH-25A-17, 100 ohm 5% 25W

DUMMY LOAD for the C.T. band 1.6 to 4 MHz



DUMMY LOAD for the HF bands 4 MHz to 25 MHz



E.g. SAILOR Rx DUMMY LOAD type H219.

3. TROUBLE-SHOOTING

Trouble-shooting should only be performed by persons with sufficient technical knowledge, who have the necessary test equipment at their disposal, and who have carefully studied the operation principles and structure of the unit in question.

Start to find out whether the fault is somewhere in the antenna circuit, the power source, or in the short-wave set.

For help with trouble-shooting in the short-wave set there is a built-in test meter and test meter switch, located behind the air filter on the power supply.

When the fault has been located to a certain unit look up the PERFORMANCE CHECK list in the instruction book and make relevant performance check to incircle the fault. Then look up the CIRCUIT DESCRIPTION. This section contains schematic diagrams, description of the modules and pictures showing the location of the components. (ADJUSTMENT LOCATIONS).
Typical AC and DC voltages are indicated on the schematic diagrams.

No adjustment must take place unless the service workshop has the necessary test equipment to perform the ADJUSTMENT PROCEDURE in question.

After repair or replacement of the module look up the section NECESSARY ADJUSTMENTS AFTER REPAIR to see, whether the unit has to be adjusted or not.

Anyway the unit has to have a complete FUNCTION CHECK after repair.

4. PERFORMANCE CHECK FOR N1400

In order to make the performance check easier, the function of the power supply for the different modes, in which the power supply can operate, are listed in the tables below.

4.1.
TABLE I, POWER SUPPLY FUNCTION.

This table indicates the outputs from the power supply and in which conditions the different outputs are present.
To achieve all these outputs, the power supply shall be connected to a short-wave set or controlled externally as indicated in 4.3. (table III) and 4.4. (table IV).

Used in	Use	Voltage (V)	Pin in J701		OFF	RECEIVER ONLY	STAND BY	ON	
			Common						keyed
Receiver		22	Chassis 10, 16 22, 23	11		X	X	X	X
		-45		12		X	X	X	X
Exciter		22		25				X	X
		-45		24		X	X	X	X
Trans-mitter	Va	1.4/2K							XD
	Vg2	400		1					XD
	Vg2	400		4					XD
	Vg1	-60		18			X	X	X
	V_{driver}	28		7					XD
	Blower	220 AC	Between	33 36			X	X	X
	Filament	26.5	26, 27	6			X	X	X
		26.5		9		X	X	X	X
		26.5		15			X	X	X
Receiver		8	chassis	13		X	X	X	X

X voltage present
XD voltage present after delay

PERFORMANCE CHECK FOR N1400 cont.:

4.1.1.
The accuracy of voltages.

Following voltages are stabilized:

22V, Vg2, Vg1, V_{driver} and 8V

22V and Vg2 = 400V within ±2%

Vg1 = -60V, V_{driver} = 28V and 8V within ±5%

Other voltages are not stabilized and will vary with input voltage and load.

4.2.
TABLE II, VOLTAGE CHECK WITH SUPPLY VOLTAGE METER.

This table indicates in which way the meter marked SUPPLY VOLTAGE can be used for checking different voltages inside the power supply.
Correct reading is when the pointer is in the middle of the green area.

NOTE: Va only reaches the green area when Va = 2kV (frequency above 4 MHz, or 405 - 535 kHz, pin 17 in J701 grounded).

This meter is only for checking, not for measuring voltages.

MAIN SWITCH / meter switch	OFF	RECEIVER ONLY	STAND BY	ON	
					keyed
input		X	X	X	X
Va					XD
Vg2					XD
22V		X	X	X	X
V_{driver}					XD
Vg1			X	X	X

After use leave the meter switch in pos. input.

4.3.
TABLE III, CONTROL OF POWER SUPPLY.

This table indicates the state for the power supply, versus the control conditions. The MAIN SWITCH in position ON.

Control Conditions			State for P.S.	
Block P.S.	Transmitter start	Delay time past	Keyed	High Voltage present
pin 14 J701	pin 31 J701	30 secs for N1400E 6 secs		
grounded	22V	No		
grounded	0V	Yes		
grounded	22V	Yes	X	X
open	22V	Yes		
open	0V	Yes		

4.4.
TABLE IV, CONTROL OF Va VERSUS FREQUENCY.

This table indicates how the high voltage Va is changed when the frequency is changed.

Frequency	400/800W Control	High Voltage Va
MHz	pin 17 J701	kV
below 4	open	1.4
above 4	grounded	2
0.405 - 0.535	grounded	2

5. ADJUSTMENT PROCEDURE FOR N1400

5.1.
ADJUSTMENT OF 22V.

5.1.1.
With the voltmeter in 30V range connect the + terminal to TP1 and the - terminal to chassis. The MAIN SWITCH in pos. ON (if the power supply is separate, load the 22V with 3 - 3.5A).

5.1.2.
Adjust with potentiometer R111 to the voltmeter reads 22.0V.

5.1.3.
Connect an oscilloscope to TP1 and check that the ripple is less than 200 mVpp.

5.1.4.
If possible variate the supply voltage and check that the 22V remains stable.

5.2.
ADJUSTMENT OF Vg2.

5.2.1.
With the voltmeter in 500 or 1000V range, connect the + terminal to TP2 and the - terminal to chassis. Key the short-wave set, but no drive to the PA stage (ex. A3J, no modulation). If the power supply is separate, key the power supply using the informations in TABLE III 4.3.

5.2.2.
Adjust with potentiometer R226 to the voltmeter reads 400V.

5.2.3.
Move the voltmeter to TP3, the reading shall remain 400V, even though TP4 is short-circuited to chassis. With the voltmeter on TP4 check that the voltage remain 400V when TP3 is short-circuited to chassis.

5.2.4.
Check that the voltage of TP5 is -60V.

5.2.5.
Check that the voltage of TP6 is 28V.

6. NECESSARY ADJUSTMENTS AFTER REPAIR

6.1.
AFTER REPAIR IN POWER UNIT I, PERFORM ADJUSTMENT IN ACCORDANCE WITH SECTION 5.1. ADJUSTMENT OF 22V.

6.2.
AFTER REPAIR IN POWER UNIT II PERFORM ADJUSTMENT IN ACCORDANCE WITH SECTION 5.2. ADJUSTMENT OF Vg2.

7. FUNCTION CHECK FOR N1400

7.1.
FUNCTION CHECK WHEN THE POWER SUPPLY IS INSTALLED IN A SHORT-WAVE SET.

7.1.1.
Using TABLE II section 4.2. check that the reading on the meter marked SUPPLY VOLTAGE is correct.

7.2.
FUNCTION CHECK WHEN THE POWER SUPPLY IS SEPARATE.

7.2.1.
The power supply supplied with the correct input and controlled in accordance with TABLE III section 4.3. and TABLE IV section 4.4. Use TABLE II section 4.2. to check the function via the SUPPLY VOLTAGE meter.

7.2.2.
When the power supply is separate and unloaded the power consumption can give information about the condition of the circuit.

Input Voltage	OFF	RECEIVER ONLY	STAND BY	ON		
					Keyed 1.4KV	Keyed 2KV
	Iin	Iin	Iin	Iin	Iin	Iin
24V DC	0	0.75	3	3	7.5	9.3

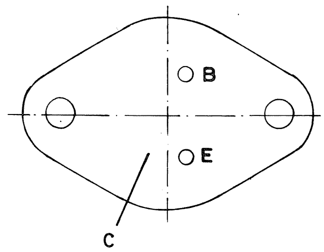
7.3.
NOTES FOR SUPPLY VOLTAGE METER.

7.3.1.
In position Vg2 only Vg2 on pin 4 in J701 is checked.

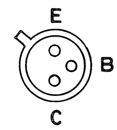
7.3.2.
In N1400 it is not possible to check the voltages -45V and 8V with the meter.

7.3.3.
Working frequency of converters. The frequency is between 300 - 500 Hz.

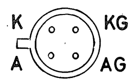
BOTTOM VIEW



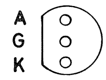
MJ 802
MJ 3000
2N5686



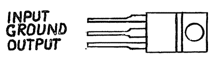
BC 141-10



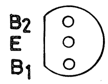
BRY 39



2N5064



MC7808



2N4871

HIGH VOLTAGE UNIT

The HIGH VOLTAGE UNIT is made by three DC - DC converter units, which are identical except for the first one, which is self-oscillating. The two next ones are driven from the preceding converter.

The high voltage can be either 1.4 kV or 2 kV dependent on whether the third converter is driven or not. The drive is controlled via relay RE301 (400/800 W Control).

The high voltage unit starts when +22V is supplied to the relays RE302 and RE303. RE302 has no time delay and supplies DC bias to the transistors T301 and T302 and opens up for the feed-back of AC via transformer TR301 and oscillation starts. After the delay time for RE303 (50 - 90 mS), the DC bias to T301 and T302 is disconnected and only AC is fed back. If an overload comes up, the collector-collector impedance is reduced, the feed-back disappears and the converter stops.

NOTE! In order to ensure the correct function of the converters during overload: the transistors T301 and T302 must have lower h_{FE} or the same as T303 - T306 (matched pairs).

When the high voltage is 1.4 kV the diodes D318 and D319 protect the rectifier circuits with D316 and D317 if an overload or a flash-over take place. C320. R324, D320 and D321 suppress high voltages during start and switching.

POWER UNIT I

This unit supplies the receiver and the exciter with the voltages +8V, +22V, -45V. and insulates the battery from the chassis.

The transistors T101 and T102 together with the matching transformers TR101 and TR102 are a DC-DC converter which gives two output voltages, the negative one is -45V and unstabilized. The other output is positive and via the regulator, consisting of the transistors T103 and T104 and the 7.5V zener diode D105 stabilized to +22V, adjustment of +22V is made by R111. The output +22V is secured against overload by the fuse F702 6.3A.

The diode D106 limits the peak current through the switch S701, because the capacitor C103 is charged-up.

POWER UNIT II

This unit supplies the transmitter and the driver unit with stabilized voltages. The input to the DC-DC converter is stabilized in the regulator, consisting of the transistors T201 and T202 and the 7.5V zener diode D201.

The output from the regulator is fed to the DC-DC converter with the transistors T203 and T204 and the matching transformers TR201 and TR202. The four outputs of the transformer TR202 are thereby stabilized and adjustment of the voltages is made by R226. The ratio of the voltages is determined by the transformer TR202.

The output Vg1 -60V is present as soon as the unit is in function, whereas the outputs V_{driver} +28V and the two Vg2 +400V are controlled by the +22V to the relays RE201, RE202 and RE203 (Transmitter start).

The circuit for the Vg2 supply is made so that the currents to the screens in the PA tubes are limited due to R219 and R220. If a screen tends to emit the increase of screen voltage is prevented due to a low impedance in the circuit consisting of R218 and the diodes D208 and D209.

The POWER UNIT II has built-in resistors for the TEST METER.

DELAY UNIT

The DELAY UNIT starts when it is connected. Across the zener diode D401 there is a voltage of 7.5V and the capacitor C404 starts charging up via resistor R407, when the anode gate is 0.7V below the anode, the D404 is triggered and the capacitor C404 is discharged.

In order to ensure enough current in the gate, a negative going pulse 200 - 500 mS of 0.7V is fed to the gate via C403.

The discharge of C404 causes a positive pulse across R406. The SCR D405 is triggered and relay RE402 is closed.

Relay RE401 is controlled via the control input Block P.S., when both relays are closed control inputs are allowed to pass through the DELAY UNIT.

50 Hz CONVERTER

This unit supplies the blowers with AC voltages with a frequency of 50 - 60 Hz dependent on the input voltage. The converter consists of the transistors T501 and T502 and the matching transformers TR501 and TR502. The diodes D503 and D504 limit the voltage with reversal polarity across T501 and T502.

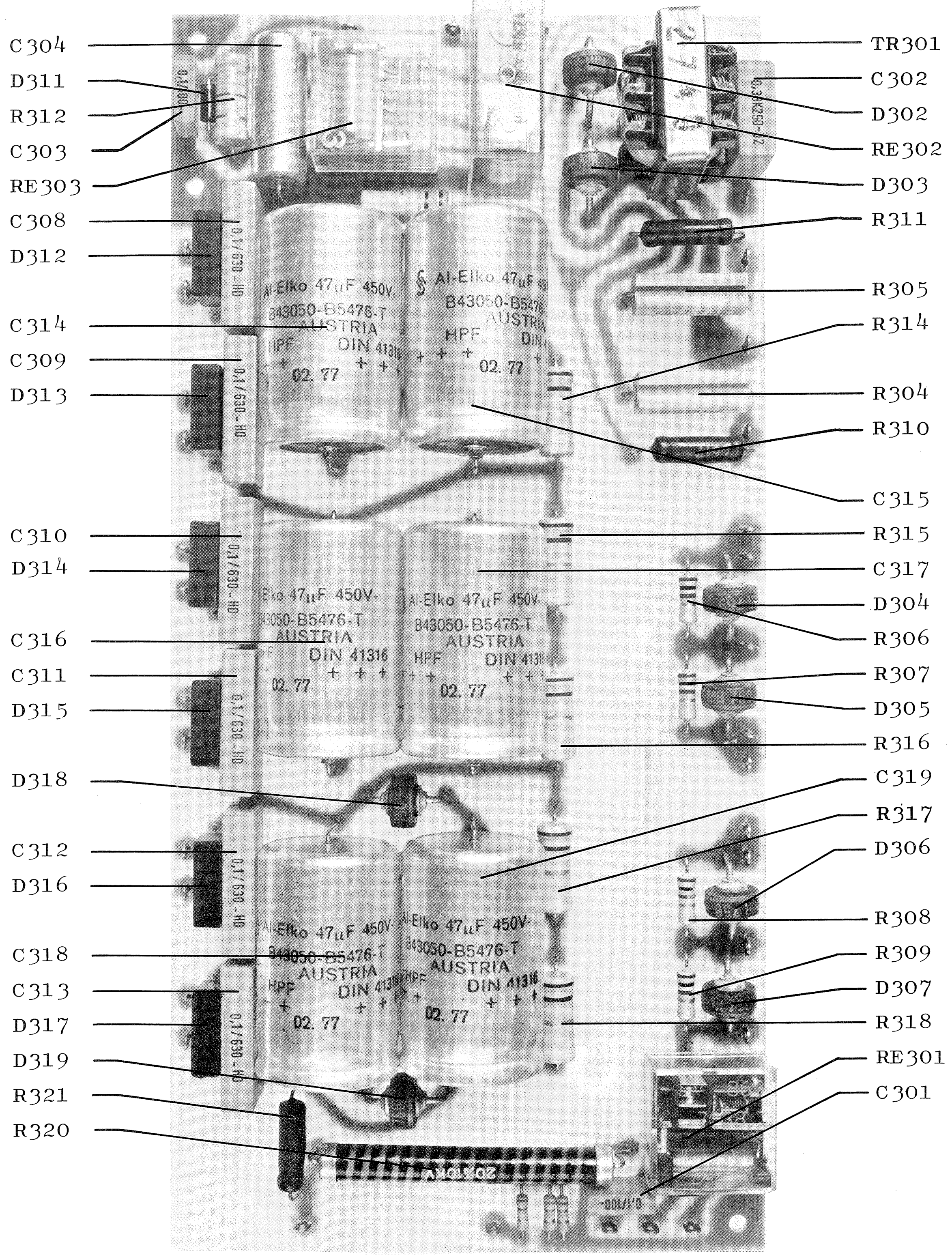
The diode D505 limits the peak current through the switch S701, because the capacitor C501 is charged up. R504, C502 and C503 suppress high voltages during switching T501 and T502.

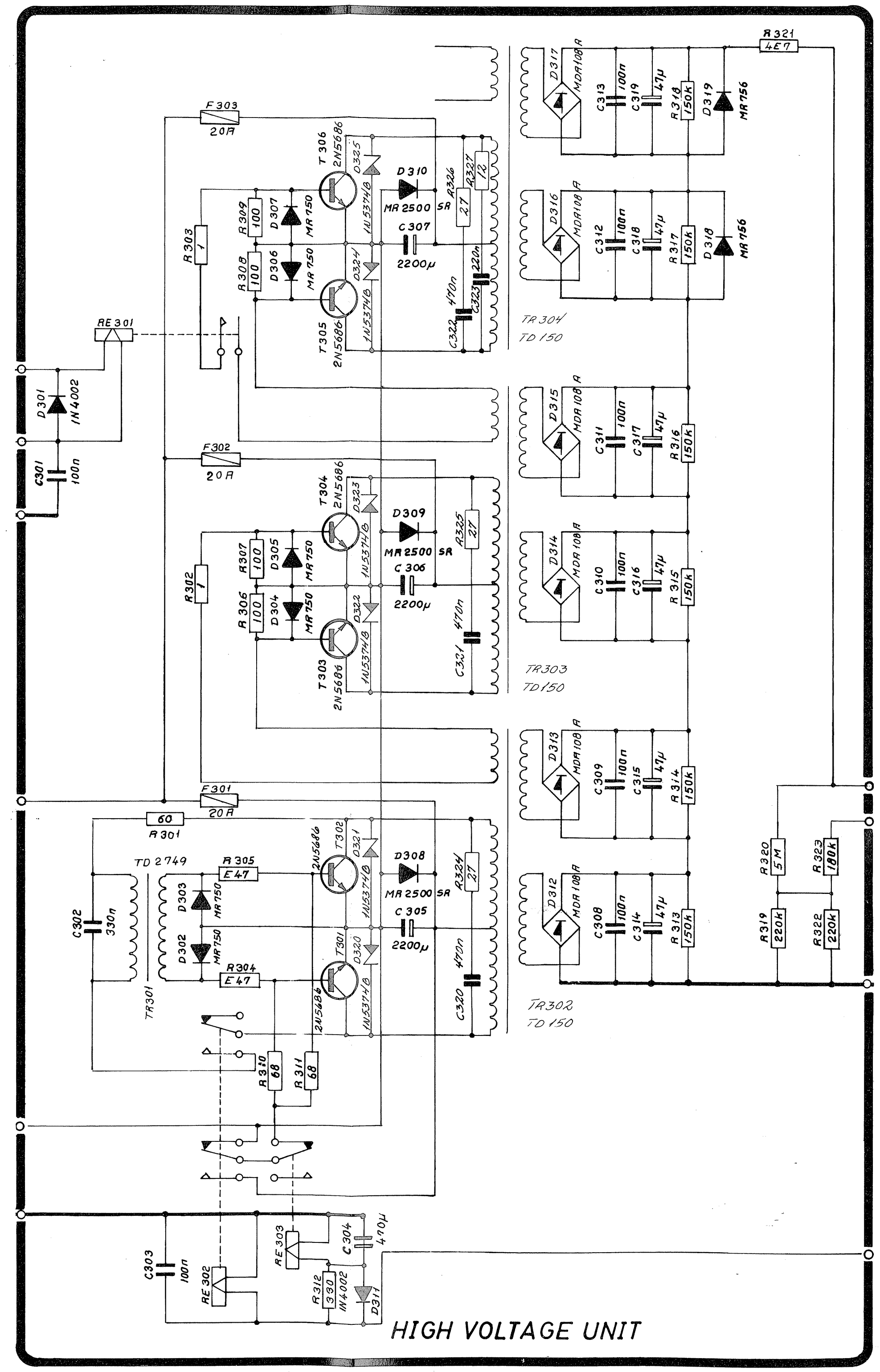
TEST METER

When using the SUPPLY VOLTAGE meter M601 and the switch S601, voltages are monitored. The resistors are placed either on the test meter print or in the different units.

MAIN SWITCH

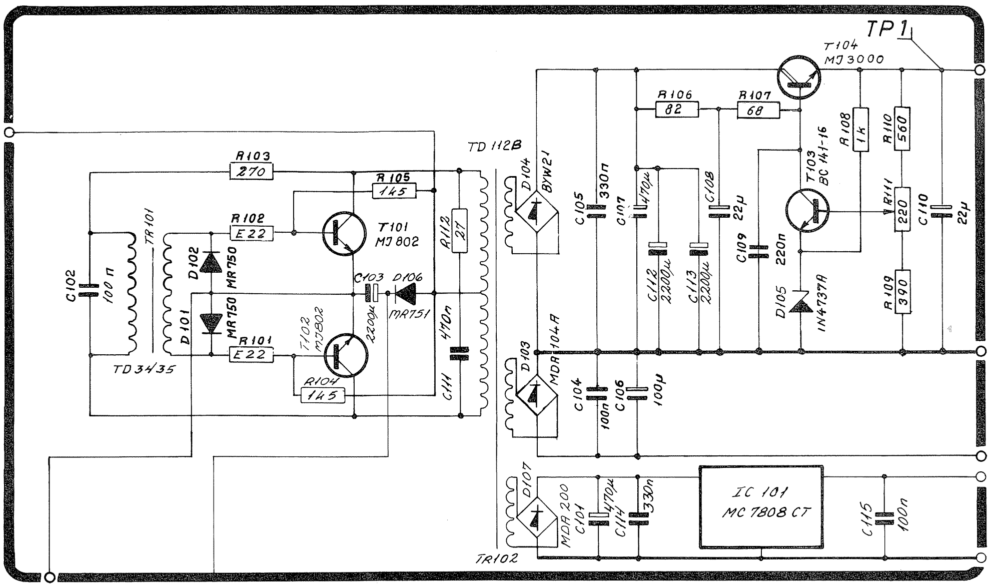
The switch S701 controls the function of the power supply and it is operated from the front.

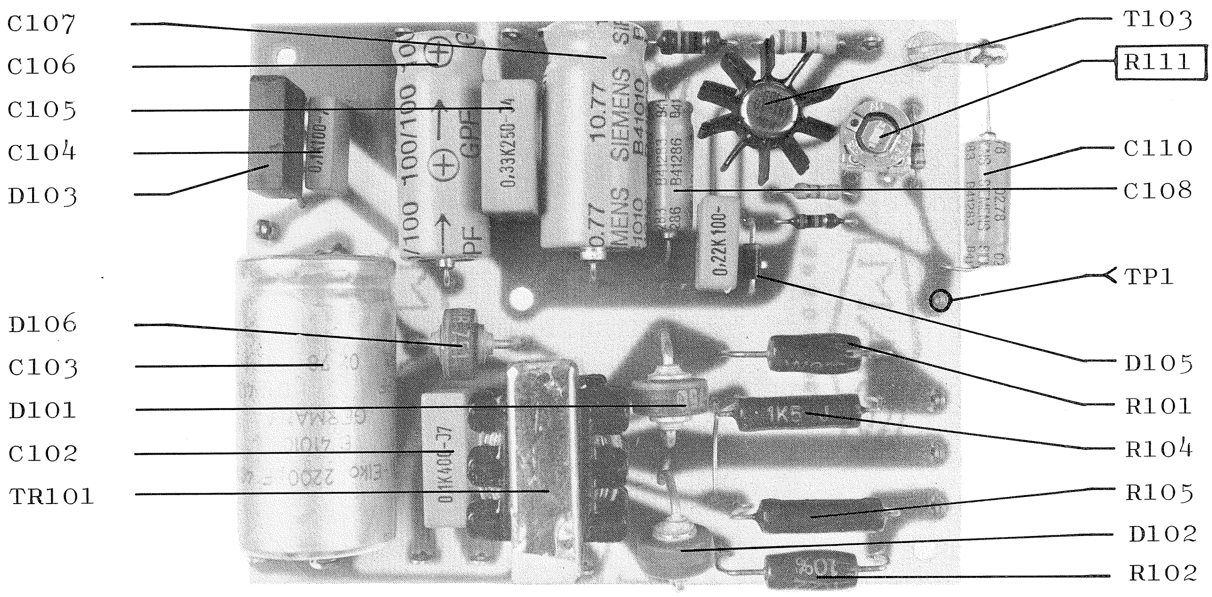


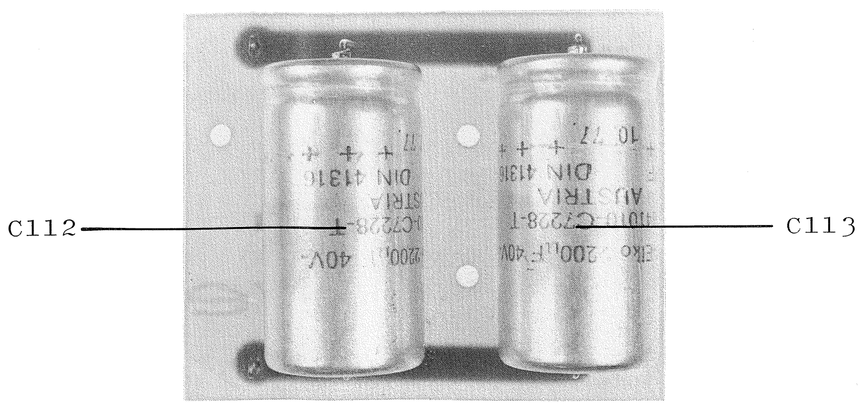


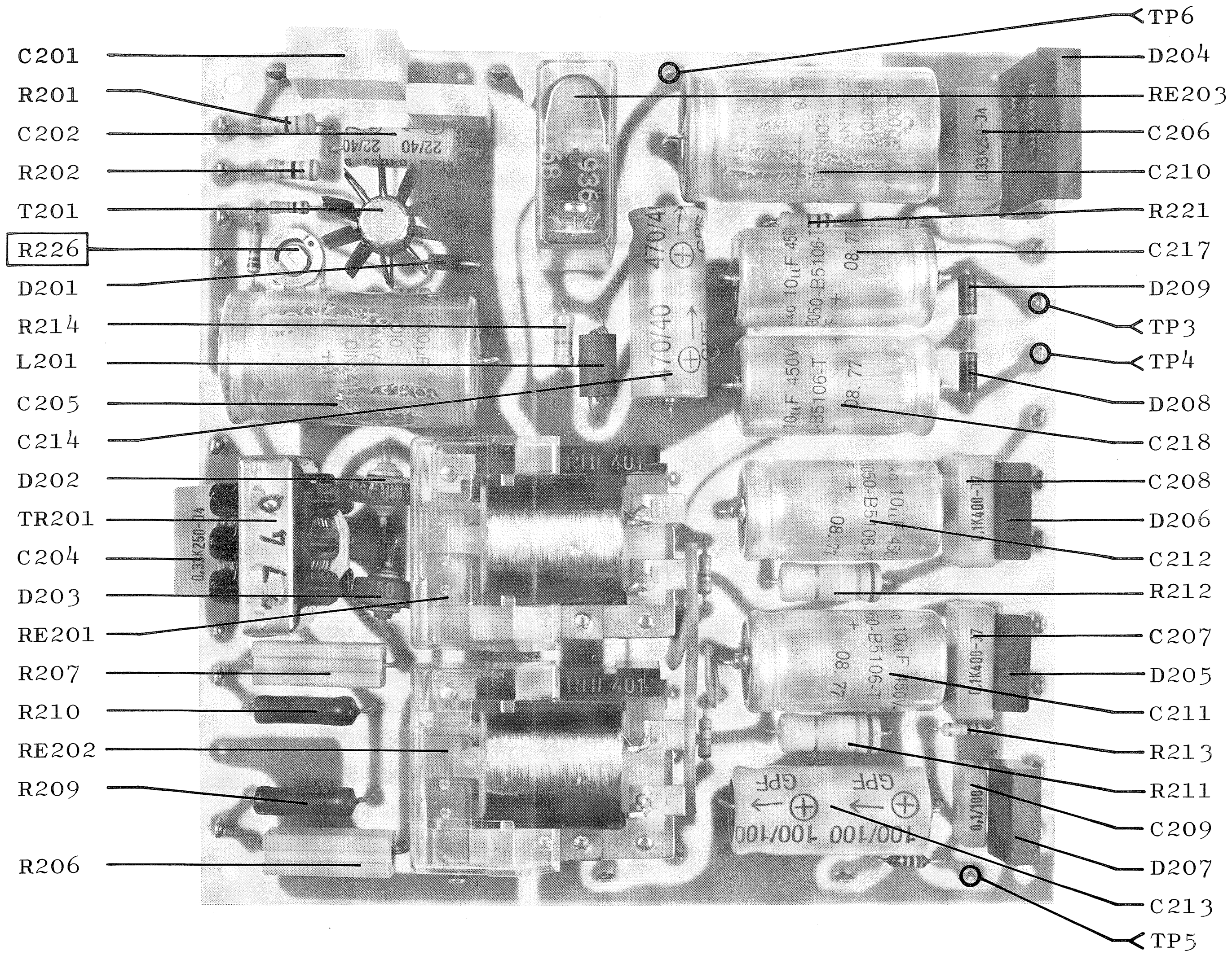
HIGH VOLTAGE UNIT N1400

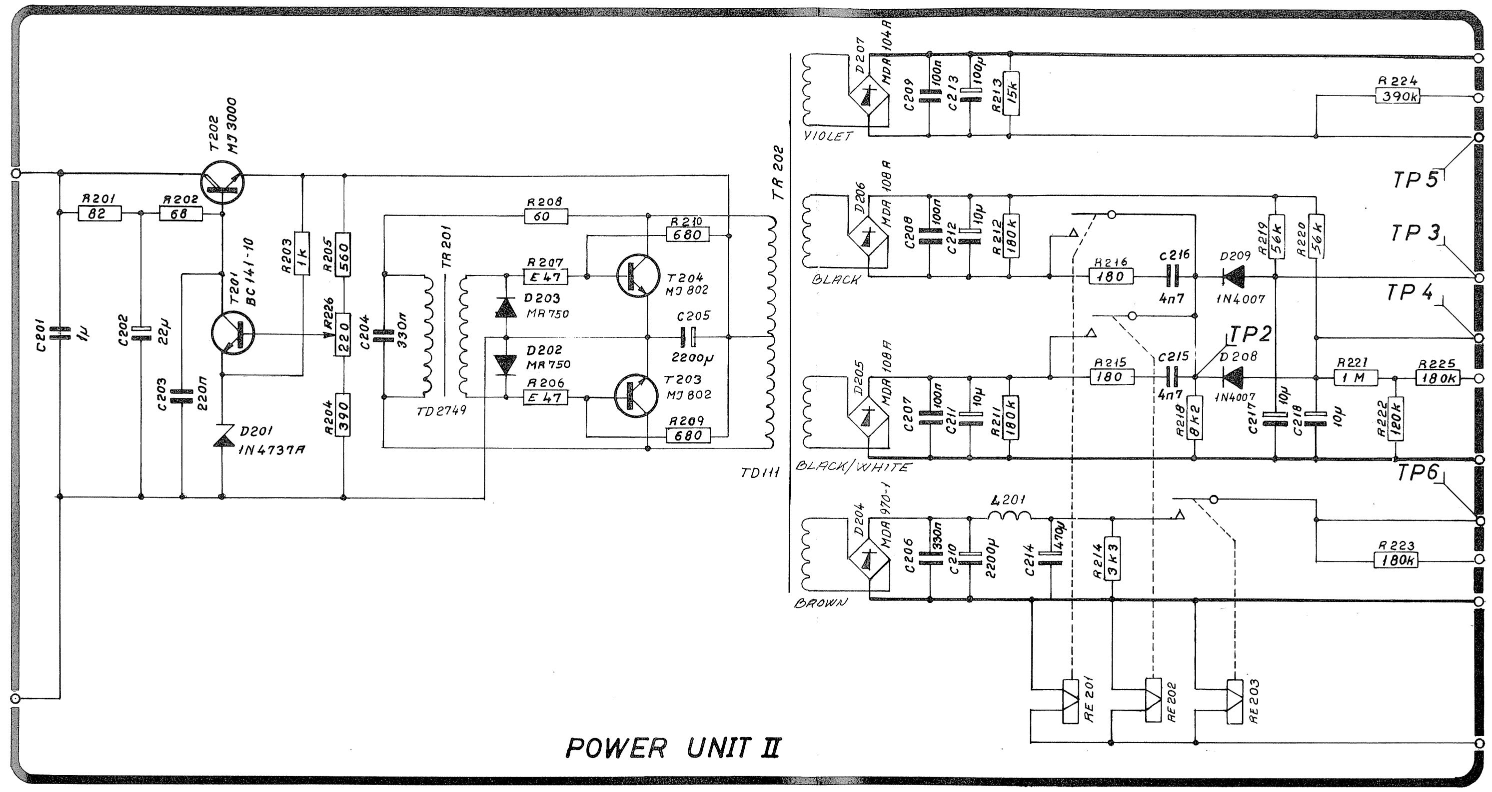
SAILOR N1400

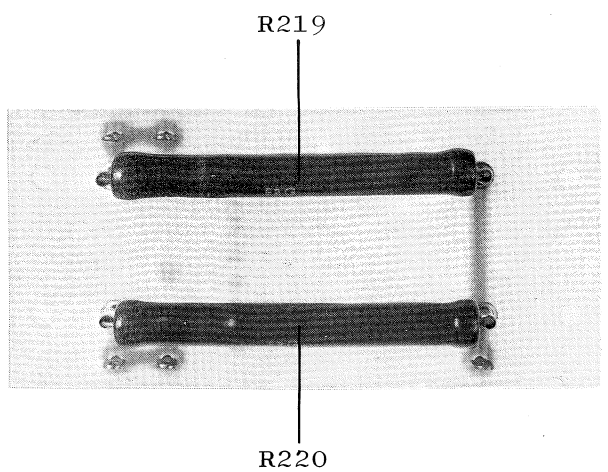


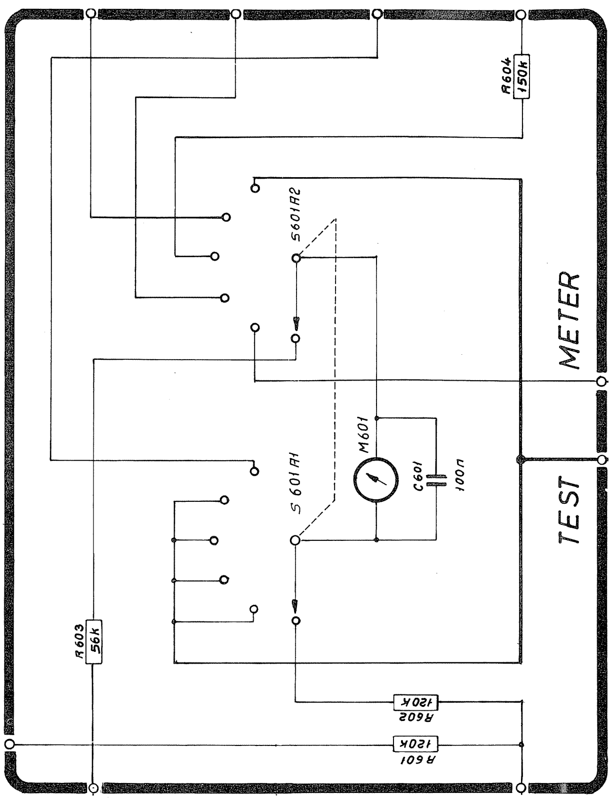


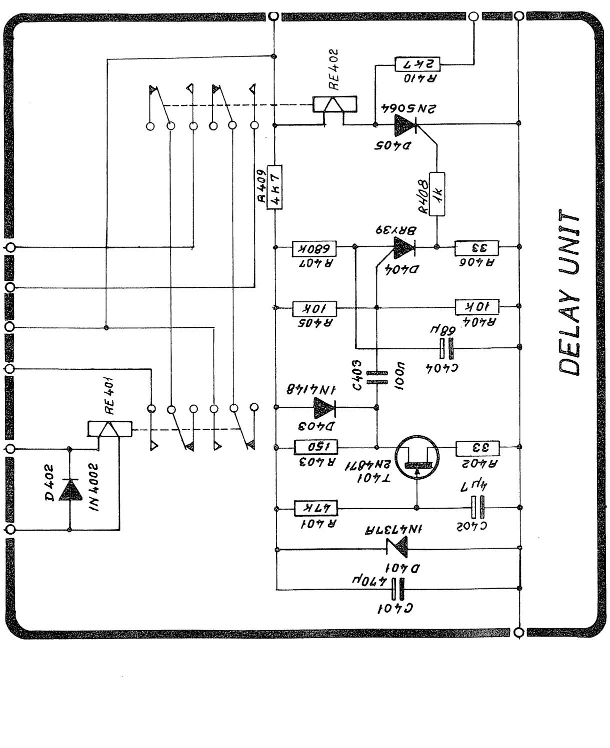


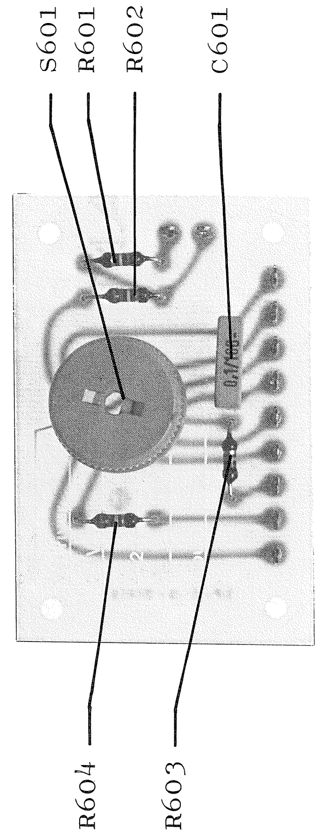

C201
R201
C202
R202
T201
R226
D201
R214
L201
C205
C214
D202
TR201
C204
D203
RE201
R207
R210
RE202
R209
R206
TP6
D204
RE203
C206
C210
R221
C217
D209
TP3
TP4
D208
C218
C208
D206
C212
R212
C207
D205
C211
R213
R211
C209
D207
C213
TP5

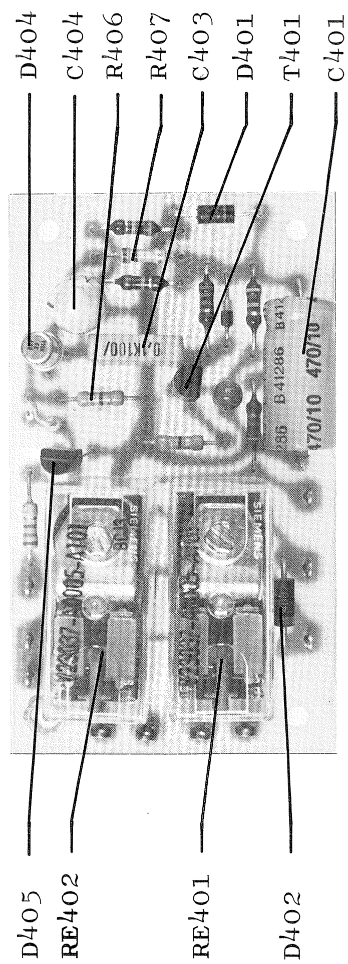

POWER UNIT II
TP5
TP3
TP4
TP2
TP6
VIOLET
BLACK
BLACK/WHITE
BROWN
TR202
TR201
TD2749
TD111
RE201
RE202
RE203

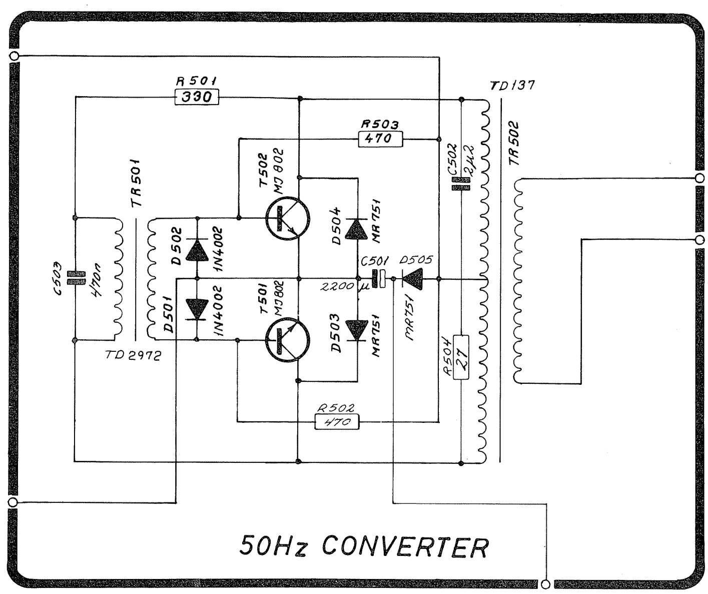

R219
R220

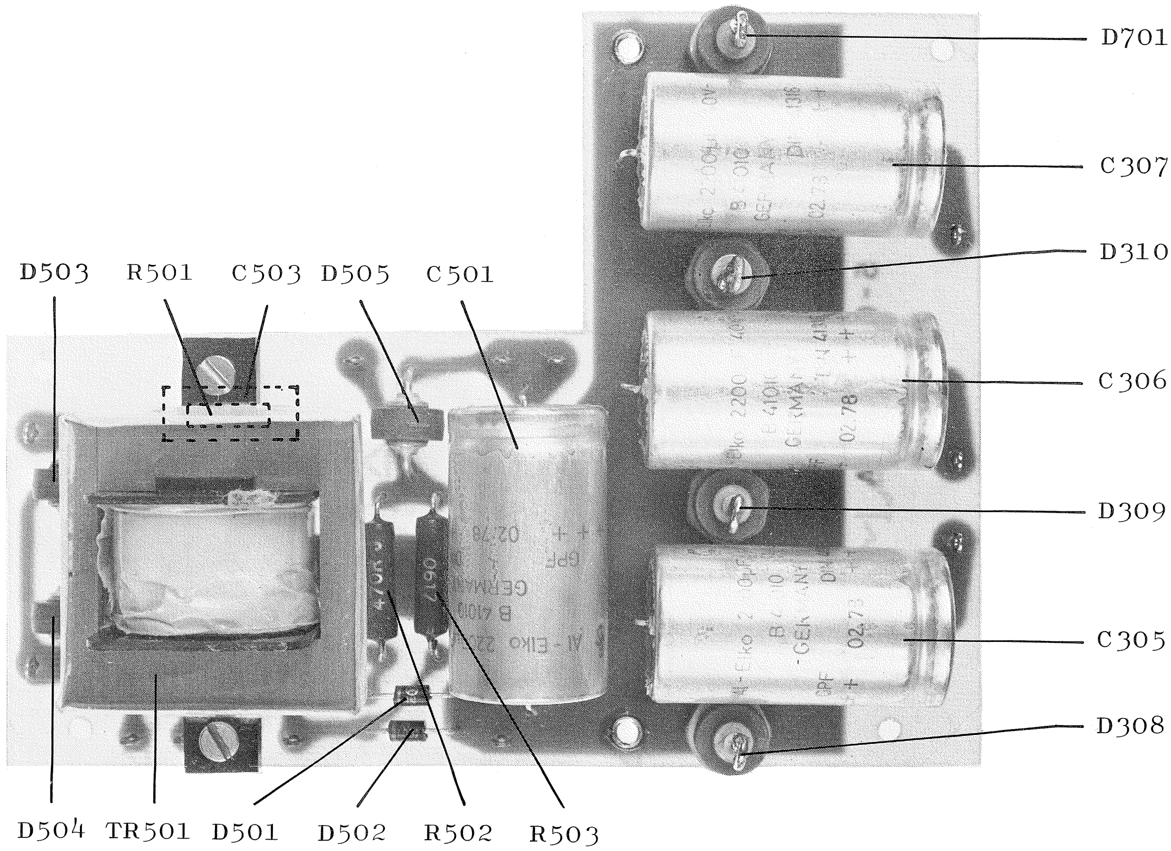

METER
TEST
S601A1
S601A2
M601
C601
100n
R601
120K
R602
120K
R603
56k
R604
150k


DELAY UNIT
RE401
RE402
D402
1N4002
R409
4K7
R410
2K7
D405
2N5064
R408
1K
D404
BRY39
R407
680K
R406
33
R405
10K
R404
10K
C404
68µ
C403
100n
D403
1N4148
R403
150
R402
33
T401
2N4871
R401
47K
C402
4µ7
D401
1N4731A
C401
470µ

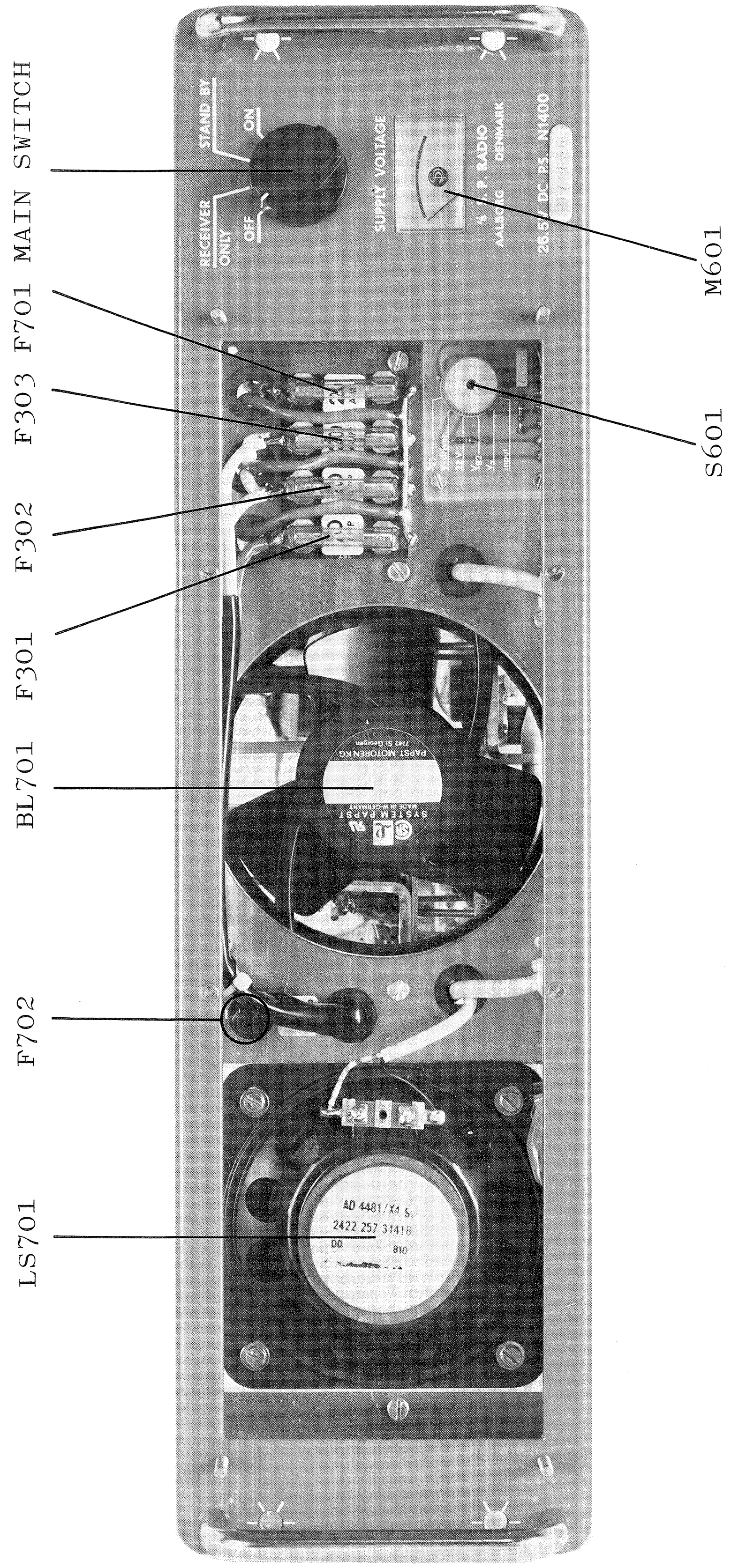

S601
R601
R602
C601
R604
R603


D404
C404
R406
R407
C403
D401
T401
C401
D405
RE402
RE401
D402

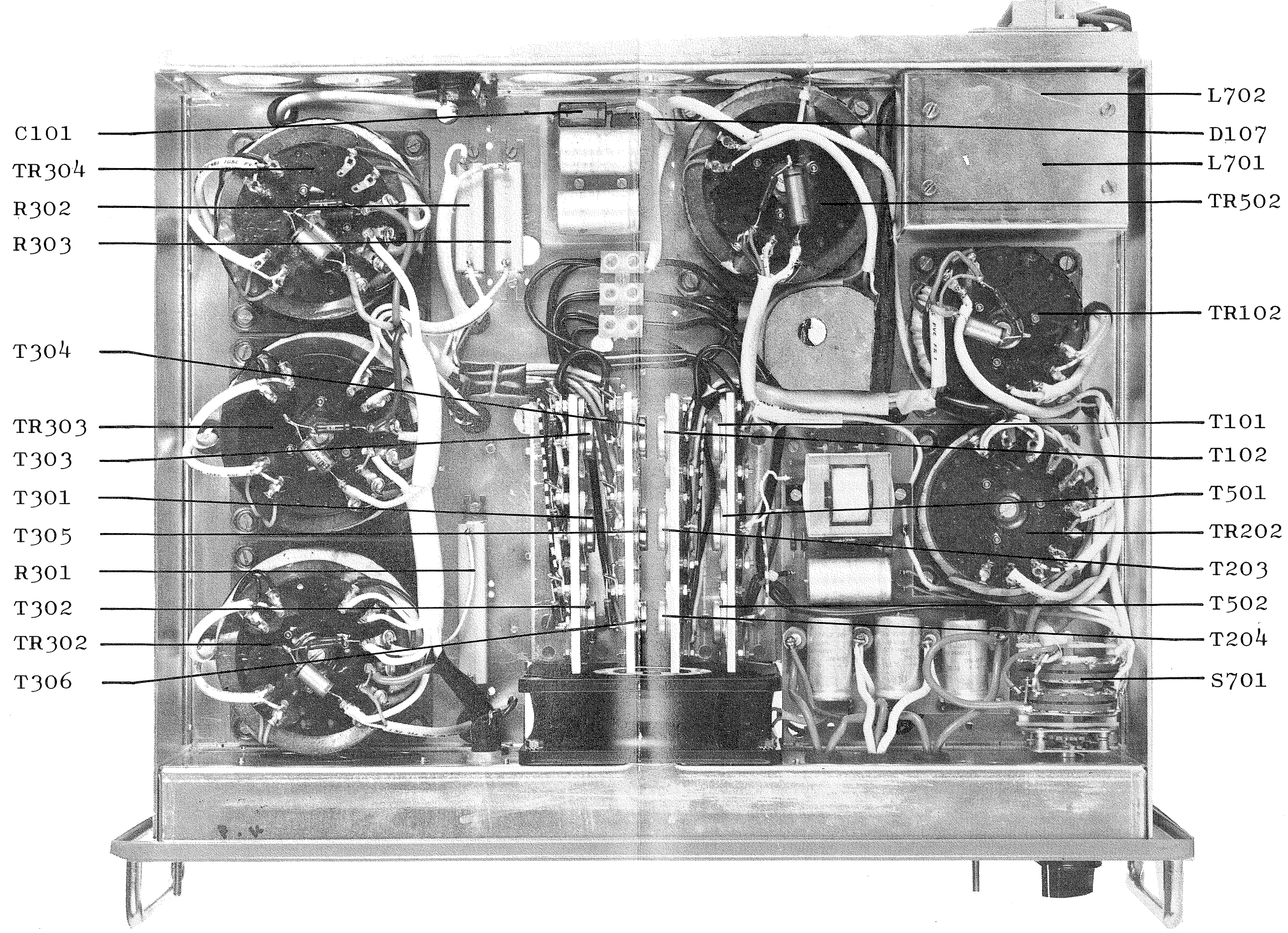

R501
390
R503
470
TD137
C502
2μ2
TR502
T502
MJ802
TR501
D504
MR751
D502
1N4002
C503
470n
C501
D505
2200μ
T501
MJ802
D501
1N4002
D503
MR751
MR751
R504
27
TD2972
R502
470
50Hz CONVERTER


D701
C307
D310
C306
D309
C305
D308
D503
R501
C503
D505
C501
D504
TR501
D501
D502
R502
R503

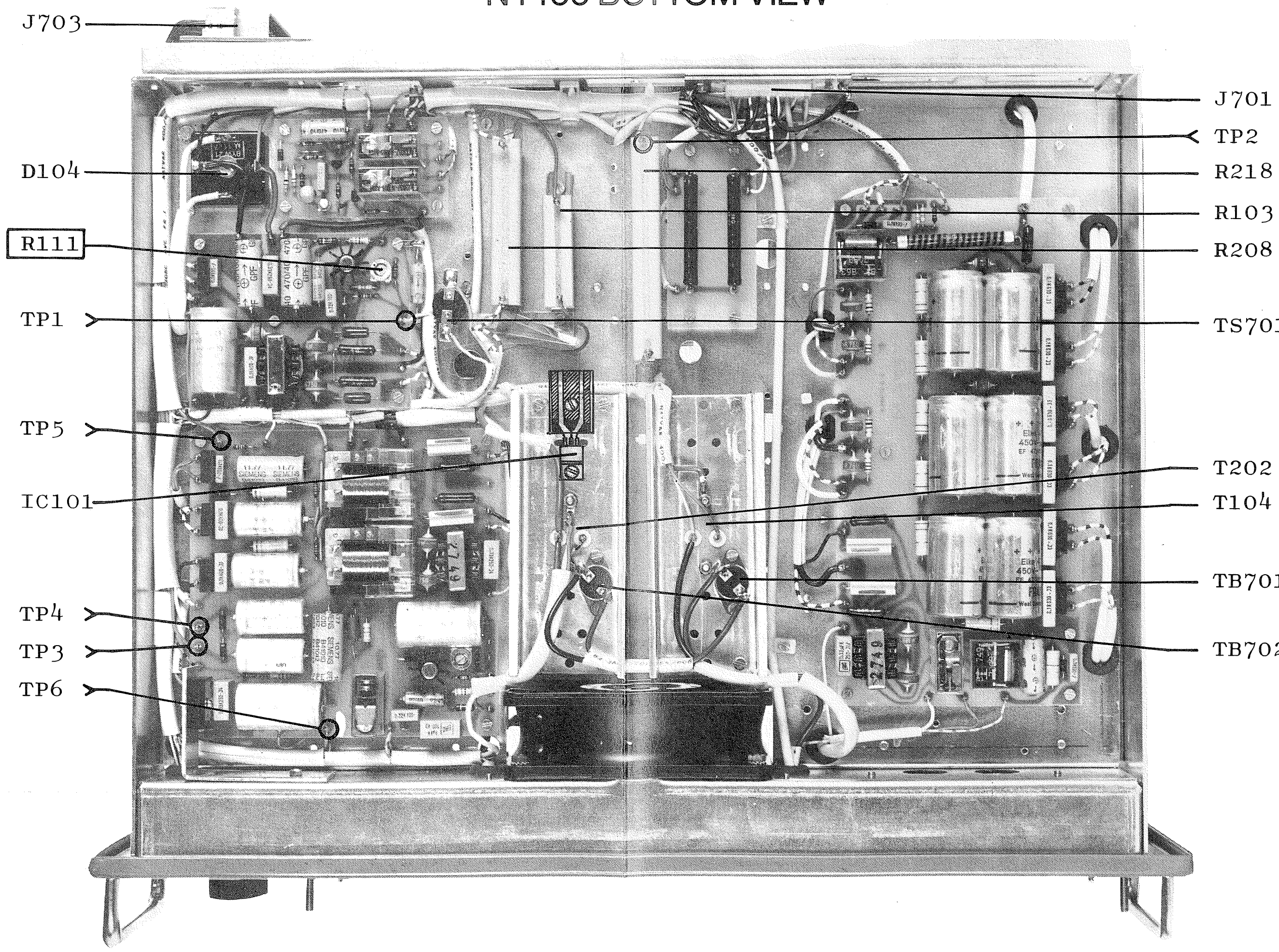
N1400 FRONT VIEW



N1400 TOP VIEW



N1400 BOTTOM VIEW



C Power unit I N1400

Symbol	Description			Manufact.	
R101	Resistor	0,22 ohm	4W	Philips	2322 329 34227
R102	Resistor	0,22 ohm	4W	Philips	2322 329 34227
R103	Resistor	270 ohm 5%	15W	Vitrohm	220-0
R104	Resistor	1,5 Kohm	4,2W	Philips	2322 330 22152
R105	Resistor	1,5 Kohm	4,2W	Philips	2322 330 22152
R106	Resistor	82 ohm	0,5W	Philips	2322 212 13829
R107	Resistor	68 ohm	0,5W	Philips	2322 212 13689
R108	Resistor	1Kohm	0,33W	Philips	2322 211 13102
R109	Resistor	390 ohm	0,33W	Philips	2322 211 13391
R110	Resistor	560 ohm	0,33W	Philips	2322 211 13561
R111	Potentiometer	220 ohm		Draloric	70 WTD-K-C
R112	Resistor	27 ohm	4,2W	Philips	2322 330 22279
C101	Capacitor electrolytic	470uF	25V	ROE	EB 00 GD 347 E
C102	Capacitor polyester	0,1uF	400V	ERO	MKT 1822-410/4
C103	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C104	Capacitor polyester	0,1uF	100V	ERO	MKT 1822-410/0
C105	Capacitor polyester	0,33uF	250V	ERO	MKT 1822-433/2
C106	Capacitor electrolytic	100uF	100V	Siemens	B41010-A9107-T
C107	Capacitor electrolytic	470uF	40V	Siemens	B41010-A7477-T
C108	Capacitor electrolytic	22uF	40V	Siemens	B41283-B7226-T
C109	Capacitor polyester	0,22uF	100V	ERO	MKT 1822-422/0
C110	Capacitor electrolytic	22uF	40V	Siemens	B41283-B7226-T
C111	Capacitor polyester	0,47uF	250V	ERO	MKC 1860-447/2
C112	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C113	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C114	Capacitor	0,33uF	100V	ERO	MKT 1822-433/0
C115	Capacitor	0,1uF	100V	ERO	MKT 1822-410/0
T101	Transistor	matched pair		Motorola	MJ802
T102	Transistor			Motorola	MJ802
T103	Transistor			Siemens	BC141-16
T104	Transistor			Motorola	MJ3000
D101	Diode			Motorola	MR750
D102	Diode			Motorola	MR750
D103	Diode bridge			Motorola	MDA104A/MDA204
D104	Diode bridge			Motorola	BYW21
D105	Diode Zener		7,5V	Motorola	1N4737A
D106	Diode			Motorola	MR751
D107	Diode bridge			Motorola	MDA200
IC101	Integrated circuit			Motorola	MC 7808 CT
TR101	Transformer			Tradania	TD3435
TR102	Transformer			Tradania	TD112B

a Power unit II N1400/N1401

Symbol	Description				Manufact.	
R201	Resistor	82 ohm		0,5W	Philips	2322 212 13829
R202	Resistor	68 ohm		0,5W	Philips	2322 212 13689
R203	Resistor	1Kohm		0,33W	Philips	2322 211 13102
R204	Resistor	390 ohm		0,33W	Philips	2322 211 13391
R205	Resistor	560 ohm		0,33W	Philips	2322 211 13561
R206	Resistor	0,47 ohm	10%	4W	Vitrohm	206-0
R207	Resistor	0,47 ohm	10%	4W	Vitrohm	206-0
R208	Resistor	60 ohm	5%	23W	Vitrohm	222-0
R209	Resistor	680 ohm		4,2W	Philips	2322 330 22681
R210	Resistor	680 ohm		4,2W	Philips	2322 330 22681
R211	Resistor	180Kohm		1,15W	Philips	2322 214 13184
R212	Resistor	180Kohm		1,15W	Philips	2322 214 13184
R213	Resistor	15Kohm		0,33W	Philips	2322 211 13153
R214	Resistor	3,3Kohm		0,5W	Philips	2322 211 13332
R215	Resistor	180 ohm		0,33W	Philips	2322 211 13181
R216	Resistor	180 ohm		0,33W	Philips	2322 211 13181
R218	Resistor	8,2Kohm	5%	30W	Vitrohm	224-0
R219	Resistor	56Kohm	5%	12W	Danotherm	GAN 12
R220	Resistor	56Kohm	5%	12W	Danotherm	GAN 12
R221	Resistor	1Mohm		0,5W	Philips	2322 212 13105
R222	Resistor	120Kohm		0,33W	Philips	2322 211 13124
R223	Resistor	180Kohm		0,33W	Philips	2322 211 13184
R224	Resistor	390Kohm		0,33W	Philips	2322 211 13394
R225	Resistor	180Kohm		0,33W	Philips	2322 211 13184
R226	Potentiometer	220 ohm			Draloric	70 WTD-K-C
C201	Capacitor polyester		1uF	100V	ERO	MKT1822-510/0
C202	Capacitor electrolytic		22uF	40V	Siemens	B41283-B7226-T
C203	Capacitor polyester		0,22uF	100V	ERO	MKT1822-422/0
C204	Capacitor polyester		0,33uF	250V	ERO	MKT1822-433/2
C205	Capacitor electrolytic		2200uF	40V	Siemens	B41010-C7228-T
C206	Capacitor polyester		0,33uF	250V	ERO	MKT1822-433/2
C207	Capacitor polyester		0,1uF	400V	ERO	MKT1822-410/4
C208	Capacitor polyester		0,1uF	400V	ERO	MKT1822-410/4

b Power unit II N1400/N1401

Symbol	Description			Manufact.	
C209	Capacitor polyester	0,1uF	100V	ERO	MKT1822-410/0
C210	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C211	Capacitor electrolytic	10uF	450V	Siemens	B43050-B5106-T
C212	Capacitor electrolytic	10uF	450V	Siemens	B43050-B5106-T
C213	Capacitor electrolytic	100uF	100V	Siemens	B41010-A9107-T
C214	Capacitor electrolytic	470uF	40V	Siemens	B41010-A7477-T
C215	Capacitor ceramic	4,7nF	400V	Ferroperm	9/0138,9
C216	Capacitor ceramic	4,7nF	400V	Ferroperm	9/0138,9
C217	Capacitor electrolytic	10uF	450V	Siemens	B43050-B5106-T
C218	Capacitor electrolytic	10uF	450V	Siemens	B43050-B5106-T
T201	Transistor			Siemens	BC141-10
T202	Transistor			Motorola	MJ3000
T203	Transistor	matched pair		Motorola	MJ802
T204	Transistor			Motorola	MJ802
D201	Diode zener		7,5V	Motorola	1N4737A
D202	Diode			Motorola	MR750
D203	Diode			Motorola	MR750
D204	Diode bridge			Motorola	MDA970-1
D205	Diode bridge			Motorola	MDA108A/MDA208
D206	Diode bridge			Motorola	MDA108A/MDA208
D207	Diode bridge			Motorola	MDA104A/MDA204
D208	Diode			Motorola	1N4007
D209	Diode			Motorola	1N4007
L201	Coil			S.P.	Drg.No. TL067
TR201	Transformer			Tradania	TD2749
TR202	Transformer			Tradania	TD111
RE201	Relay			AEG	RHL401 24V/02
RE202	Relay			AEG	RHL401 24V/02
RE203	Relay			PASI	KH/A BV 936

High Voltage unit N1400

Symbol	Description				Manufact.	
R301	Resistor	60 ohm	5%	23W	Vitrohm	222-0
R302	Resistor	1 ohm	10%	15W	Vitrohm	220-0
R303	Resistor	1 ohm	10%	15W	Vitrohm	220-0
R304	Resistor	0,47 ohm	10%	4W	Vitrohm	206-0
R305	Resistor	0,47 ohm	10%	4W	Vitrohm	206-0
R306	Resistor	100 ohm		0,5W	Philips	2322 212 13101
R307	Resistor	100 ohm		0,5W	Philips	2322 212 13101
R308	Resistor	100 ohm		0,5W	Philips	2322 212 13101
R309	Resistor	100 ohm		0,5W	Philips	2322 212 13101
R310	Resistor	68 ohm		4,2W	Philips	2322 330 22689
R311	Resistor	68 ohm		4,2W	Philips	2322 330 22689
R312	Resistor	330 ohm		1,15W	Philips	2322 214 13331
R313	Resistor	150 Kohm		1,15W	Philips	2322 214 13154
R314	Resistor	150 Kohm		1,15W	Philips	2322 214 13154
R315	Resistor	150 Kohm		1,15W	Philips	2322 214 13154
R316	Resistor	150 Kohm		1,15W	Philips	2322 214 13154
R317	Resistor	150 Kohm		1,15W	Philips	2322 214 13154
R318	Resistor	150 Kohm		1,15W	Philips	2322 214 13154
R319	Resistor	220 Kohm		0,33W	Philips	2322 211 13224
R320	Resistor	5 Mohm	20%	2W	Vitrohm	177-0
R321	Resistor	4,7 ohm		4,2W	Philips	2322 330 22478
R322	Resistor	220 Kohm		0,33W	Philips	2322 211 13224
R323	Resistor	180 Kohm		0,33W	Philips	2322 211 13184
R324	Resistor	27 ohm		4,2W	Philips	2322 330 22279
R325	Resistor	27 ohm		4,2W	Philips	2322 330 22279
R326	Resistor	27 ohm		4,2W	Philips	2322 330 22279
R327	Resistor	12 ohm		4,2W	Philips	2322 330 21129
C301	Capacitor polyester	0,1 uF		100V	ERO	MKT 1822-410/0
C302	Capacitor polyester	0,33 uF		250V	ERO	MKT 1222-433/2
C303	Capacitor polyester	0,1 uF		100V	ERO	MKT 1222-410/0
C304	Capacitor electrolytic	470 uF		16V	Siemens	B41283-A4477-T
C305	Capacitor electrolytic	2200 uF		40V	Siemens	B41010-C7228-T
C306	Capacitor electrolytic	2200 uF		40V	Siemens	B41010-C7228-T
C307	Capacitor electrolytic	2200 uF		40V	Siemens	B41010-C7228-T
C308	Capacitor polyester	0,1 uF		630V	ERO	MKT 1822-410/6
C309	Capacitor polyester	0,1 uF		630V	ERO	MKT 1822-410/6
C310	Capacitor polyester	0,1 uF		630V	ERO	MKT 1822-410/6
C311	Capacitor polyester	0,1 uF		630V	ERO	MKT 1822-410/6

a

High Voltage unit N1400

Symbol	Description			Manufact.	
C312	Capacitor polyester	0,1 uF	630V	ERO	MKT 1822-410/6
C313	Capacitor polyester	0,1 uF	630V	ERO	MKT 1822-410/6
C314	Capacitor electrolytic	47 uF	450V	Siemens	B43050-B5476-T
C315	Capacitor electrolytic	47 uF	450V	Siemens	B43050-B5476-T
C316	Capacitor electrolytic	47 uF	450V	Siemens	B43050-B5476-T
C317	Capacitor electrolytic	47 uF	450V	Siemens	B43050-B5476-T
C318	Capacitor electrolytic	47 uF	450V	Siemens	B43050-B5476-T
C319	Capacitor electrolytic	47 uF	450V	Siemens	B43050-B5476-T
C320	Capacitor polyester	0,47 uF	250V	ERO	MKC 1860-447/2
C321	Capacitor polyester	0,47 uF	250V	ERO	MKC 1860-447/2
C322	Capacitor polyester	0,47 uF	250V	ERO	MKC 1860-447/2
C323	Capacitor polyester	0,22 uF	250V	ERO	MKC 1860-422/2
T301	Transistor matched pair			Motorola	2N5686
T302	Transistor			Motorola	2N5686
T303	Transistor matched pair			Motorola	2N5686
T304	Transistor			Motorola	2N5686
T305	Transistor matched pair			Motorola	2N5686
T306	Transistor			Motorola	2N5686
D301	Diode			Motorola	1N4002
D302	Diode			Motorola	MR750
D303	Diode			Motorola	MR750
D304	Diode			Motorola	MR750
D305	Diode			Motorola	MR750
D306	Diode			Motorola	MR750
D307	Diode			Motorola	MR750
D308	Diode			Motorola	MR2500SR
D309	Diode			Motorola	MR2500SR
D310	Diode			Motorola	MR2500SR
D311	Diode			Motorola	1N4002
D312	Diode bridge			Motorola	MDA108A/MDA208
D313	Diode bridge			Motorola	MDA108A/MDA208
D314	Diode bridge			Motorola	MDA108A/MDA208
D315	Diode bridge			Motorola	MDA108A/MDA208
D316	Diode bridge			Motorola	MDA108A/MDA208
D317	Diode bridge			Motorola	MDA108A/MDA208
D318	Diode			Motorola	MR756

High Voltage unit N1400

Symbol	Description		Manufact.	
D319	Diode		Motorola	MR756
D320	Diode Zener	75V	Motorola	1N5374B
D321	Diode Zener	75V	Motorola	1N5374B
D322	Diode Zener	75V	Motorola	1N5374B
D323	Diode Zener	75V	Motorola	1N5374B
D324	Diode Zener	75V	Motorola	1N5374B
D325	Diode Zener	75V	Motorola	1N5374B
TR301	Transformer		Tradania	TD2749
TR302	Transformer		Tradania	TD150
TR303	Transformer		Tradania	TD150
TR304	Transformer		Tradania	TD150
RE301	Relay		PASI	MS/K BV 863
RE302	Relay		Siemens	V23037-A0005-A101
RE303	Relay		PASI	MS/K BV 749
F301	Fuse	20A	Wickmann	PL411020
F302	Fuse	20A	Wickmann	PL411020
F303	Fuse	20A	Wickmann	PL411020

b Delay unit N1400/N1401

Symbol	Description		Manufact.	
R401	Resistor 47Kohm	0,33W	Philips	2322 211 13473
R402	Resistor 33 ohm	0,33W	Philips	2322 211 13339
R403	Resistor 150 ohm	0,33W	Philips	2322 211 13151
R404	Resistor 10Kohm	0,33W	Philips	2322 211 13103
R405	Resistor 10Kohm	0,33W	Philips	2322 211 13103
R406	Resistor 33 ohm	0,33W	Philips	2322 211 13339
R407	Resistor 680Kohm	0,33W	Philips	2322 211 13684
R408	Resistor 1Kohm	0,33W	Philips	2322 106 13102
R409	Resistor 4,7Kohm	0,33W	Philips	2322 211 13472
R410	Resistor 2,7Kohm	0,33W	Philips	2322 211 13272
C401	Capacitor electrolytic 470uF	10V	Siemens	B41283-A3477-T
C402	Capacitor tantal 4,7uF	35V	ERO	ETP2E 4.7/35
C403	Capacitor polyester 0,1uF	100V	ERO	MKT 1822-410/0
C404	Capacitor tantal 68uF ±10%	16V	ERO	ETQ5 68/16 ±10%
T401	Transistor UJT		Motorola	2N4871
D401	Diode zener	7,5V	Motorola	1N4737A
D402	Diode		Motorola	1N4002
D403	Diode		Texas	1N4148
D404	Diode SCR		Philips	BRY39
D405	Diode SCR		Motorola	2N5064
RE401	Relay		Siemens	V23037-A0005-A101
RE402	Relay		Siemens	V23037-A0005-A101
	<u>For N1400E only.</u>			
R407	Resistor 120Kohm	0,33W	Philips	2322 211 13124

b

50 Hz converter N1400

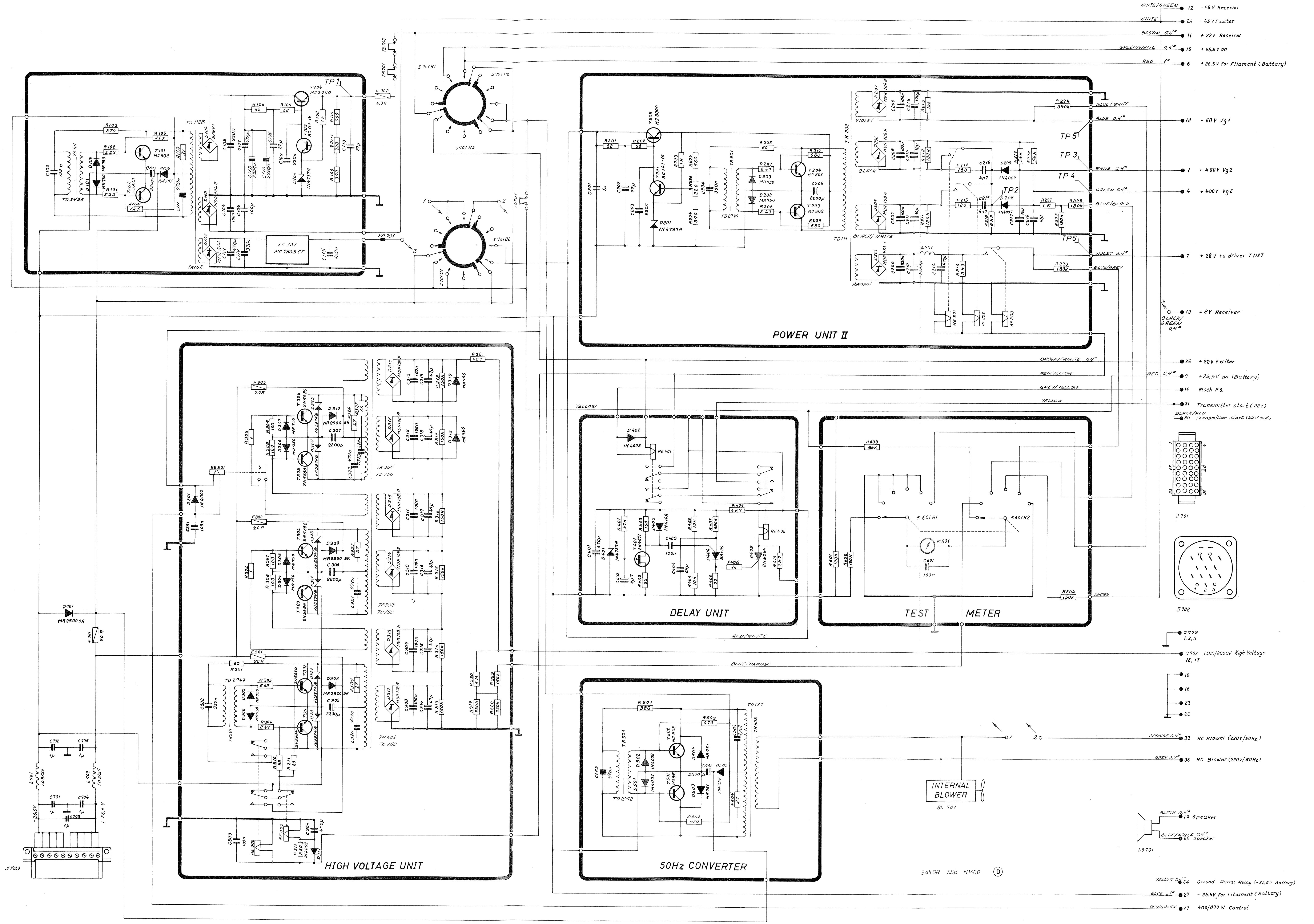
Symbol	Description			Manufact.	
R501	Resistor	330 ohm	4,2W	Philips	2322 330 22331
R502	Resistor	470 ohm	4,2W	Philips	2322 330 22471
R503	Resistor	470 ohm	4,2W	Philips	2322 330 22471
R504	Resistor	27 ohm	4,2W	Philips	2322 330 22279
C501	Capacitor electrolytic	2200uF	40V	Siemens	B41010-C7228-T
C502	Capacitor	2,2 uF	100V	ERO	MKC 1860-522/0
C503	Capacitor polyester	0,47uF	250V	ERO	MKC 1860-447/2
T501	Transistor	matched pair		Motorola	MJ802
T502	Transistor			Motorola	MJ802
D501	Diode			Motorola	1N4002
D502	Diode			Motorola	1N4002
D503	Diode			Motorola	MR751
D504	Diode			Motorola	MR751
D505	Diode			Motorola	MR751
TR501	Transformer			Tradania	TD2972
TR502	Transformer			Tradania	TD137

Testmeter N1400 /N1401

Symbol	Description			Manufact.	
R601	Resistor	120Kohm	0,33W	Philips	2322 211 13124
R602	Resistor	120Kohm	0,33W	Philips	2322 211 13124
R603	Resistor	56Kohm	0,33W	Philips	2322 211 13563
R604	Resistor	150Kohm	0,33W	Philips	2322 211 13154
C601	Capacitor polyester	0,1uF	100V	ERO	MKT1822-410/0
M601	Meter			Aug.Eklöw	MG20 Drg. No. 9-3-21496
S601	Switch			ITT	RBP 12F 2x6NCC

C Chassis N1400

Symbol	Description			Manufact.	
C701	Capacitor polyester	1 uF	100V	Philips	2222 341 29105
C702	Capacitor polyester	1 uF	100V	Philips	2222 341 29105
C703	Capacitor polyester	1 uF	100V	Philips	2222 341 29105
C704	Capacitor polyester	1 uF	100V	Philips	2222 341 29105
C705	Capacitor polyester	1 uF	100V	Philips	2222 341 29105
D701	Diode			Motorola	MR2500SR
L701	Coil			Tradania	TD3125
L702	Coil			Tradania	TD3125
F701	Fuse		20A	Wickmann	PL411020
F702	Fuse		6,3A	ELU	5x20 mm 6,3A
S701	Switch			NSF	HD 120231 S MSD 2
J701	Receptacle			Molex	1772-2
J702	Socket			Hirschmann	Meb 160
J703	Plug			Weidmüller	STV 2/10-3338.6
LS701	Loudspeaker			Philips	2422 257 34438
BL701	Blower		220V AC	PAPST	Typ 4550N
TB701	Thermal Breaker			Elmwood	2455R-21-910
TB702	Thermal Breaker			Elmwood	2455R-21-910
TS701	Thermostat			Elmwood	2455R-21-923
FP701	Ferroxcube beads			Kaschke	K3/1200/0.1Hz 4/2/7A



POWER UNIT II
HIGH VOLTAGE UNIT
DELAY UNIT
TEST METER
50Hz CONVERTER
INTERNAL BLOWER
BL 701
SAILOR SSB N1400
12 -45V Receiver
24 -45V Exciter
11 +22V Receiver
15 +26,5V on
6 +26,5V for Filament (Battery)
18 -60V Vg1
1 +400V Vg2
4 +400V Vg2
7 +28V to driver T1127
13 +8V Receiver
25 +22V Exciter
9 +26,5V on (Battery)
14 Block P.S.
31 Transmitter start (22V)
30 Transmitter start (22V out)
J701
J702
J702 1,2,3
J702 1400/2000V High Voltage 12,13
33 AC Blower (220V/50Hz)
36 AC Blower (220V/50Hz)
19 Speaker
20 Speaker
LS701
26 Ground Aerial Relay (-26,5V Battery)
27 -26,5V for Filament (Battery)
17 400/800W Control
J703
TP1
TP2
TP3
TP4
TP5
TP6

Sailor

Sailor

INSTRUKTIONSBOG FOR
SAILOR H1218

INSTRUCTION BOOK FOR
SAILOR H1218

A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS:

GENERAL DESCRIPTION

SAILOR H1218 is a microprocessor controlled automatic radiotelephone keying device for ships' alarm and distress message with the facility of programming the call sign of the ship's station.

SAILOR H1218 will key:
1) The radiotelegraph alarm signal which consists of a series of 12 dashes.

2) The distress message which consists of:
   a) the distress signal SOS sent 3 times,

   b) the word DE,

   c) the call sign of the ship sent 3 times,

   d) two dashes for direction finding.

SAILOR H1218 will repeat the keying of the distress message after the required pause.

SAILOR H1218 has possibility for restricting the keying only to the distress message.

SAILOR H1218 ship's station call sign programming can easily be carried out with normal handtools, no instrument is required.

SAILOR H1218 has audio-visual indication of the keyed signal.

SAILOR H1218 can be used as a normally closed or normally opened key.

SAILOR H1218 can be connected with handkeys which will be cut off when the automatic key is activated.

SAILOR H1218 is supplied directly with 24V DC.

TECHNICAL DATA H1218

<u>Mode of operation:</u> Alarm signal and/or distress message.

<u>Alarm signal:</u> The alarm signal consists of a serie of 12 dashes, each of 4 seconds ±0.1 second, separated by spaces of 1 second ±0.1 second.

On completion of the alarm signal the automatic keying device continue to key the distress message.

<u>Distress message:</u> The distress message consists of:

a) the distress signal SOS sent 3 times,
b) the word DE,
c) the ship's call sign sent 3 times,
d) two dashes of 11.6 seconds ±0.1 second each with an interval of 1.5 second ±0.1 second.

<u>Repetition time:</u> The distress message is repeated every eleven minute, until interruption or resetting.

<u>Ship's call sign capacity:</u> Max. 7 characters (letters or numbers).

<u>Keying speed:</u> 10 bauds (approximately 13 words/min.). The duration of one dot (one bit) is 0.1 second ±0.01 second.

<u>Keying time:</u> If the maximum number of characters (7 zeroes) is programmed the total duration of the distress message will be approximately 91 seconds.

<u>External keying current:</u> Max. 1A ohmic load.

<u>Operation temperature:</u> $-15^{o}C$ to $+55^{o}C$.

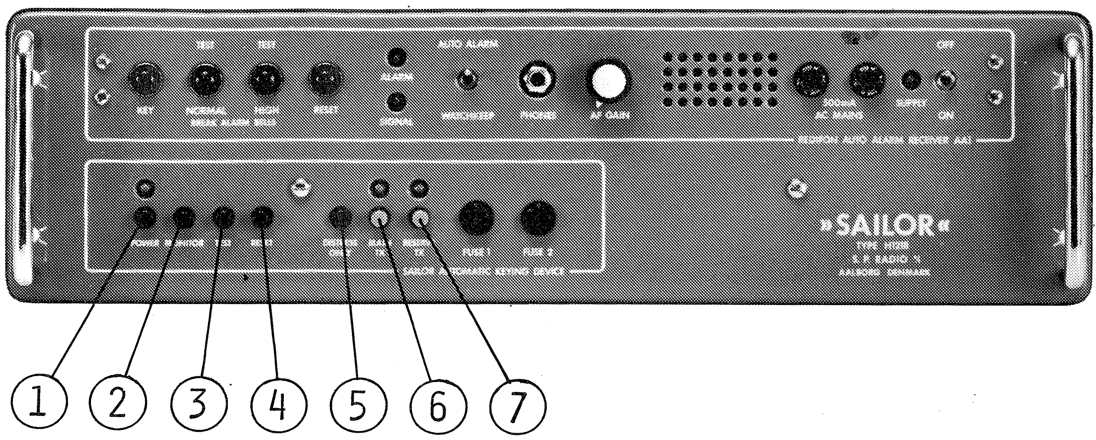
<u>Power supply:</u> Voltage: 24V DC -10%, +30%

Current: 0.4A

Reverse polarity protection is incorporated.

The unit does not earth either side of the supply.

CONTROLS



(1) <u>POWER</u>

Press POWER button to connect power supply with H1218.

(2) <u>MONITOR</u>

The built-in sound transducer will be activated by the automatic key after pressing the MONITOR button.

(3) <u>TEST</u>

For testing the Automatic Keying Device and the connected Auto Alarm Receiver press the TEST button. H1218 will then key the selected sequence (5) only to the Auto Alarm Receiver.
For monitoring press MONITOR button (2).

(4) <u>RESET</u>

When pressing the RESET button H1218 will momentarily stop in neutral position. When releasing the RESET button H1218 will start keying from the initial stage of the selected sequence (5).

(5) <u>DISTRESS ONLY</u>

While the DISTRESS ONLY button is pressed H1218 will only key the distress message. In released position H1218 will key the alarm signal followed by the distress message.

(6) <u>MAIN TX</u>

The main telegraph transmitter is keyed by H1218 in the selected mode (5) while the MAIN TX button is pressed. The signal lamp above the button is then activated by the automatic key.
For monitoring press MONITOR button (2).

(7) <u>RESERVE TX</u>

Operation as the MAIN TX button.

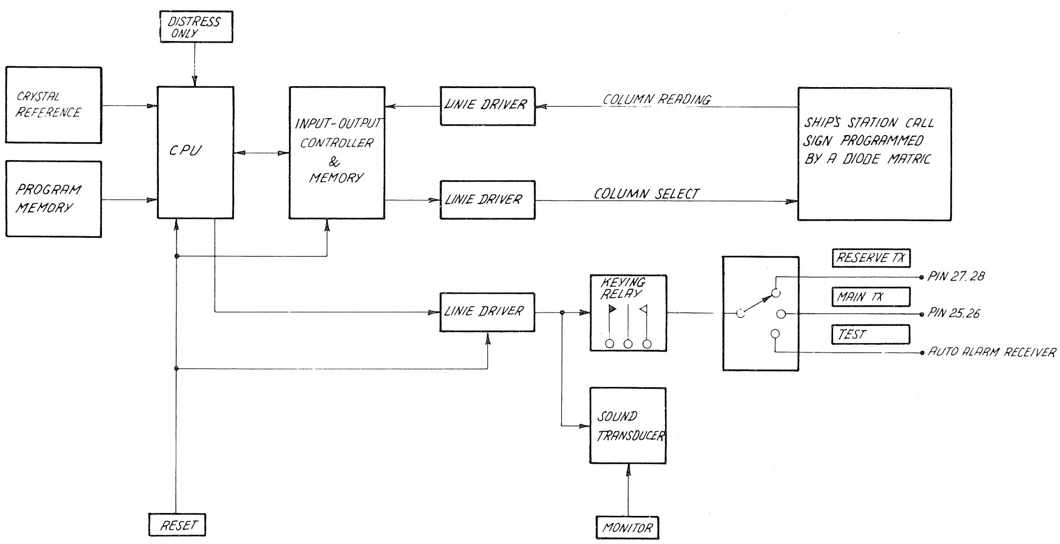
PRINCIPLE OF OPERATION

SAILOR Automatic Keying Device H1218 is to be connected to a transmitter like a handkey. H1218 replaces the handkey with a relay which is controlled by a microprocessor system.
See the schematic diagram.

Power is first applied to the system after a transmission switch has been activated. The CPU will then start executing the programme which is stored in the programme memory. One result of this is that H1218 will key: the a-larm signal and/or the distress message depending on the manual selected sequence. When the ship's station call sign is to be keyed the CPU has to read the contents of the diode matric. The characters of the ship's station call sign is fetched from the matric by reading the contents of the columns one by one through the input/output controller.

By activating the RESET switch the microprocessor system stops momentarily, leaving the keying relay in its neutral position. When releasing the switch the CPU and input/output controller are resat and the keying will start from the initial stage of the selected sequence.

The MONITOR switch enables the sound transducer to be activated by the key-ing.



PROGRAMMING OF H1218

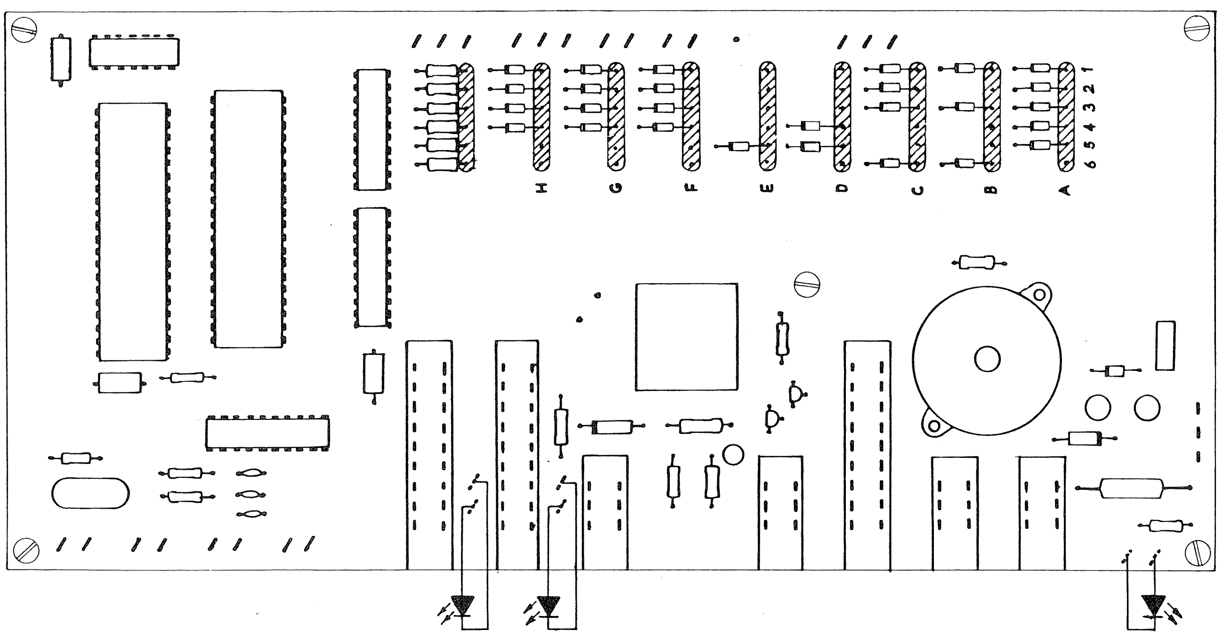
Programming of the Ship's Station Call Sign

The ship's station call sign is programmed by setting up a diode matric. The diodes are numbered by a letter (A to H) and a number (1 to 6). The letter indicates a column and the number indicates a row.

The programming is done by cutting out diodes in a column in accordance with the following table starting with the column marked by an "A". A cross in the table indicates which diodes that should be left on the printed circuit board.

After programming the call sign remember to program a space. Unused columns should be programmed for "Skip character" so that the keying time is kept to a minimum.

The figure shows the programming for keying OUWH.



PROGRAMMING EXAMPLE

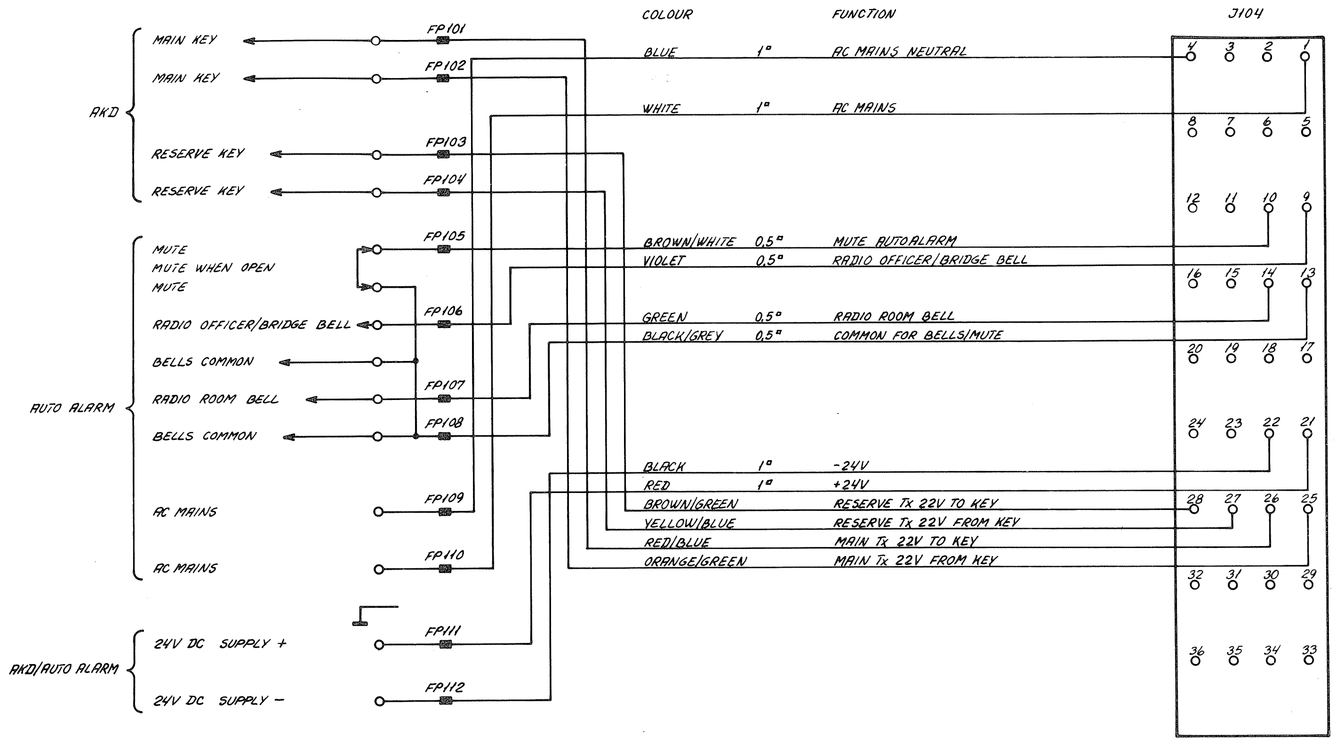
OUWH

CHARACTER SENT IN MORSE	DIODE ROW NO.					
	6	5	4	3	2	1
0						
1						X
2					X	
3					X	X
4				X		
5				X		X
6				X	X	
7				X	X	X
8			X			
9			X			X
A		X				X
B		X			X	
C		X			X	X
D		X		X		
E		X		X		X
F		X		X	X	
G		X		X	X	X
H		X	X			
I		X	X			X
J		X	X		X	
K		X	X		X	X
L		X	X	X		
M		X	X	X		X
N		X	X	X	X	
O		X	X	X	X	X
P	X					
Q	X					X
R	X				X	
S	X				X	X
T	X			X		
U	X			X		X
V	X			X	X	
W	X			X	X	X
X	X		X			
Y	X		X			X
Z	X		X		X	
SPECIAL						
.-.-.-	X		X		X	X
.-.-.	X		X	X		
Skip Character			X	X	X	X
Space		X				

H1218

INSTALLATION

The external connections to the SAILOR H1218 are attached to the rear contact board.



REAR CONTACTBOARD H1218

AKD

Main key: The terminals are connected to the keying relay when the MAIN TX button is pressed.
The terminals are connected for normal open operation from the factory. A normal closed contact can be established by moving the orange/green wire to the soldering terminal called Main TX, 22V from key (BREAK) on the H1218 PCB.

Reserve key: The terminals are connected to the keying relay when the RESERVE TX button is pressed.
The terminals are connected for normal open operation from the factory. A normal closed contact can be established by moving the yellow/blue wire to the soldering terminal called Reserve TX, 22V from key (BREAK) on the H1218 PCB.

AUTO ALARM

Mute: The Auto Alarm Receiver is muted when the terminals are not short-circuited.

Bells: The external bells connection from the Auto Alarm Receiver are connected to these four terminals.
See instruction book for Auto Alarm Receiver for max. current.

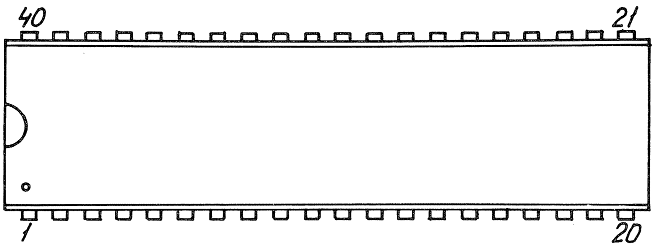
AC MAINS: Connect AC power for the Auto Alarm Receiver to these two terminals.

AKD/AUTO ALARM

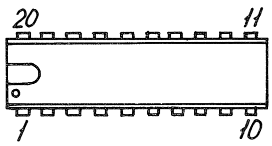
24V DC: Connect 24V DC supply for the AKD and Auto Alarm Receiver to these two terminals.

PIN CONFIGURATIONS

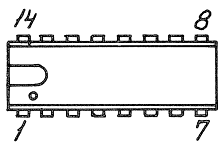
TOP VIEW



INS 8060 N
INS 8154 N

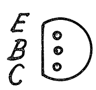


TBP 18S42N
SN 74 LS 241 N



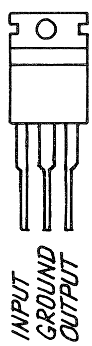
SN 74 LS 132 N

BOTTOM VIEW



BC 547

FRONT VIEW



LM 7805 CT

H1218A

Symbol	Description	Manufact.	
R101	Resistor 4.7Kohm±5% 0.33W	Philips	2322 211 13472
R102	Resistor 1Mohm±5% 0.33W	Philips	2322 211 13105
R103	Resistor 1Kohm±5% 0.33W	Philips	2322 211 13102
R104	Resistor 18Kohm±5% 0.33W	Philips	2322 211 13183
R105	Resistor 47Kohm±5% 0.33W	Philips	2322 211 13473
R106	Resistor 330 Ohm±5% 0.5W	Philips	2322 212 13331
R107	Resistor 1Kohm±5% 0.5W	Philips	2322 212 13102
R108	Resistor 1.8Kohm±5% 0.33W	Philips	2322 211 13182
R109	Resistor 1.8Kohm±5% 0.33W	Philips	2322 211 13182
R110	Resistor 1.8Kohm±5% 0.33W	Philips	2322 211 13182
R111	Resistor 1.8Kohm±5% 0.33W	Philips	2322 211 13182
R112	Resistor 1.8Kohm±5% 0.33W	Philips	2322 211 13182
R113	Resistor 1.8Kohm±5% 0.33W	Philips	2322 211 13182
R114	Resistor 4.7Kohm±5% 0.33W	Philips	2322 211 13472
R115	Resistor 1Kohm±5% 0.33W	Philips	2322 211 13102
R116	Resistor 100Kohm ±5% 0.33W	Philips	2322 211 13104
R117	Resistor 180 Ohm±5% 0.33W	Philips	2322 211 13181
R118	Resistor 330 Ohm±5% 0.33W	Philips	2322 211 13331
R119	Resistor 12 Ohm±5% 4.2W	Philips	2322 330 22129
C101	Capacitor, ceramic 33pF±10% 500V	KCK	HM60SJSH330K
C102	Capacitor, ceramic 150pF±10% 50V	KCK	HE80SJSH151K
C103	Capacitor, polyester 470nF±10% 100V	Siemens	B32512- D1474K
C104	Capacitor, polyester 470nF±10% 100V	Siemens	B32512- D1474K
C105	Capacitor, polyester 470nF±10% 100V	Siemens	B32512- D1474K
C106	Capacitor, electrolytic 1uF ±20% 50V	ROE	EKI 00 AA 110H
C107	Capacitor, electrolytic 10uF±20% 35V	ROE	EKI 00 AA 210F
C108	Capacitor, electrolytic 47uF±20% 25V	ROE	EKI 00 BB 247E
C109	Capacitor, polyester 220nF±20% 100V	Philips	2222 344 24224
C110	Capacitor, ceramic 10nF+80-20% 50V	KCK	HE70SJYF103Z
D101	Diode, silicon	Motorola	1N4002
D102	Diode, silicon	Philips	1N4148
D103	Diode, silicon	Philips	1N4148
D104	Diode, silicon	Philips	1N4148
D105	Diode, silicon	Philips	1N4148
D106	Diode, silicon	Philips	1N4148
D107	Diode, silicon	Philips	1N4148
D108	Diode, silicon	Philips	1N4148
D109	Diode, silicon	Philips	1N4148
D110	Diode, silicon	Philips	1N4148
D111	Diode, silicon	Philips	1N4148

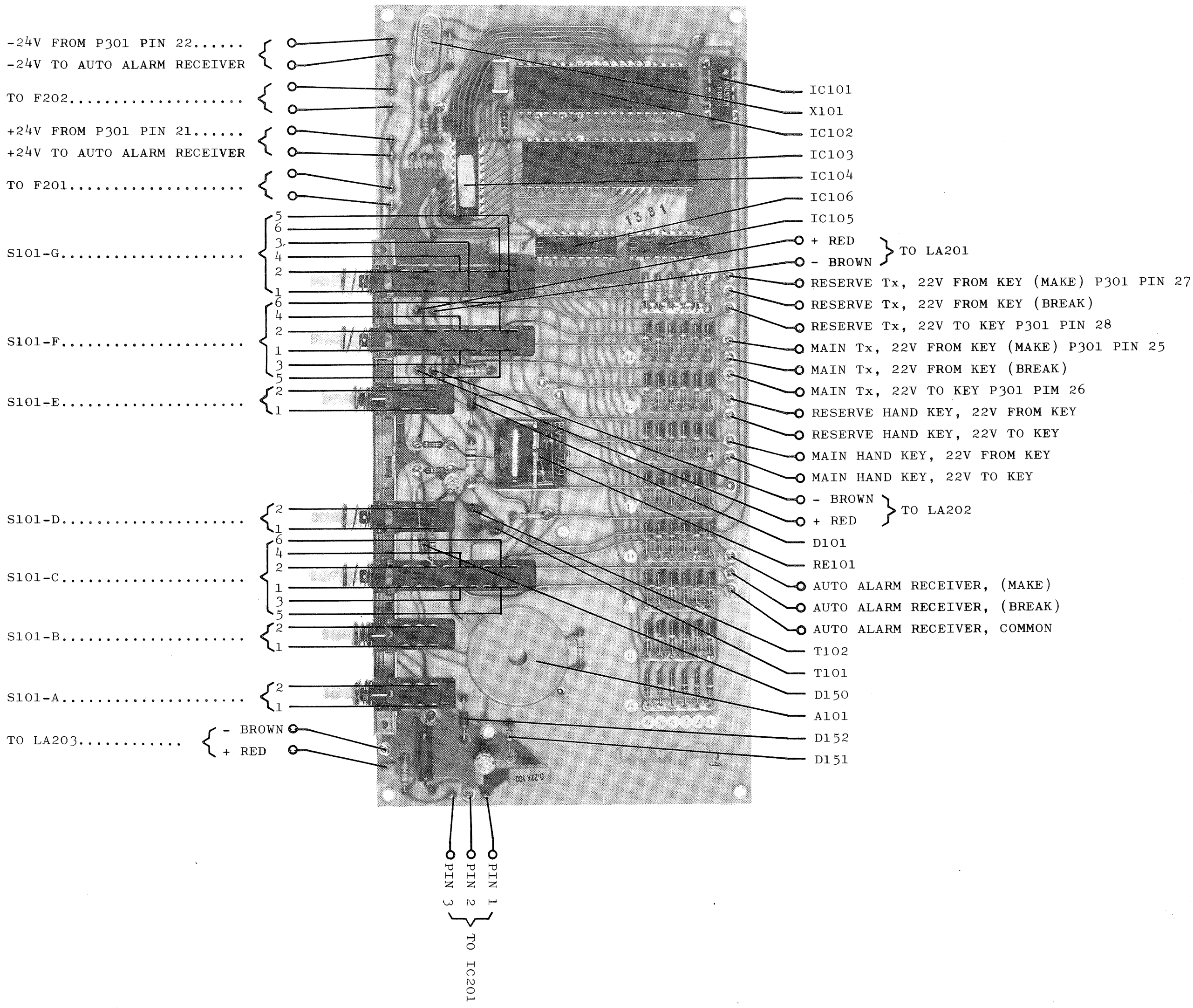
Symbol	Description		Manufact.	
D112	Diode, silicon		Philips	1N4148
D113	Diode, silicon		Philips	1N4148
D114	Diode, silicon		Philips	1N4148
D115	Diode, silicon		Philips	1N4148
D116	Diode, silicon		Philips	1N4148
D117	Diode, silicon		Philips	1N4148
D118	Diode, silicon		Philips	1N4148
D119	Diode, silicon		Philips	1N4148
D120	Diode, silicon		Philips	1N4148
D121	Diode, silicon		Philips	1N4148
D122	Diode, silicon		Philips	1N4148
D123	Diode, silicon		Philips	1N4148
D124	Diode, silicon		Philips	1N4148
D125	Diode, silicon		Philips	1N4148
D126	Diode, silicon		Philips	1N4148
D127	Diode, silicon		Philips	1N4148
D128	Diode, silicon		Philips	1N4148
D129	Diode, silicon		Philips	1N4148
D130	Diode, silicon		Philips	1N4148
D131	Diode, silicon		Philips	1N4148
D132	Diode, silicon		Philips	1N4148
D133	Diode, silicon		Philips	1N4148
D134	Diode, silicon		Philips	1N4148
D135	Diode, silicon		Philips	1N4148
D136	Diode, silicon		Philips	1N4148
D137	Diode, silicon		Philips	1N4148
D138	Diode, silicon		Philips	1N4148
D139	Diode, silicon		Philips	1N4148
D140	Diode, silicon		Philips	1N4148
D141	Diode, silicon		Philips	1N4148
D142	Diode, silicon		Philips	1N4148
D143	Diode, silicon		Philips	1N4148
D144	Diode, silicon		Philips	1N4148
D145	Diode, silicon		Philips	1N4148
D146	Diode, silicon		Philips	1N4148
D147	Diode, silicon		Philips	1N4148
D148	Diode, silicon		Philips	1N4148
D149	Diode, silicon		Philips	1N4148
D150	Diode, germanium		ITT	AA143
D151	Diode, zener 6,2V ±10%	0.4W	Philips	BZX 79 C6V2
D152	Diode, silicon		Motorola	1N4002

Symbol	Description	Manufact.	
T101	Transistor	Philips	BC547
T102	Transistor	Philips	BC547
IC101	Integrated circuit	Texas	SN74LS132N
IC102	Integrated circuit	National	INS8060N
IC103	Integrated circuit	National	INS8154N
IC104	Integrated circuit	Texas	TBP18S42N
IC105	Integrated circuit	Texas	SN74LS241N
IC106	Integrated circuit	Texas	SN74LS241N
X101	Crystal f = 1MHz	Croven	A3300RX-00
A101	Sound transducer	Sonitron	SM2
RE101	Relay	Danotherm	MS/K,BV749
S101	Switch	Schadow	11084 06003

Symbol	Description			Manufact.	
IC201	Voltage regulator			National	LM7805CT
LA201	Diode, light emitting			Xciton	XC5053Y
LA202	Diode, light emitting			Xciton	XC5053Y
LA203	Diode, light emitting			Xciton	XC5053Y
F201	Fuse	time-lag	0.5A	ELU	5x20mm 0.5A
F202	Fuse	time-lag	0.5A	ELU	5x20mm 0.5A
P201	Plug			Molex	03-06-1363

Symbol	Description		Manufact.	
C301	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C302	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C303	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C304	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C305	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C306	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C307	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C308	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
FP301 to FP316	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A

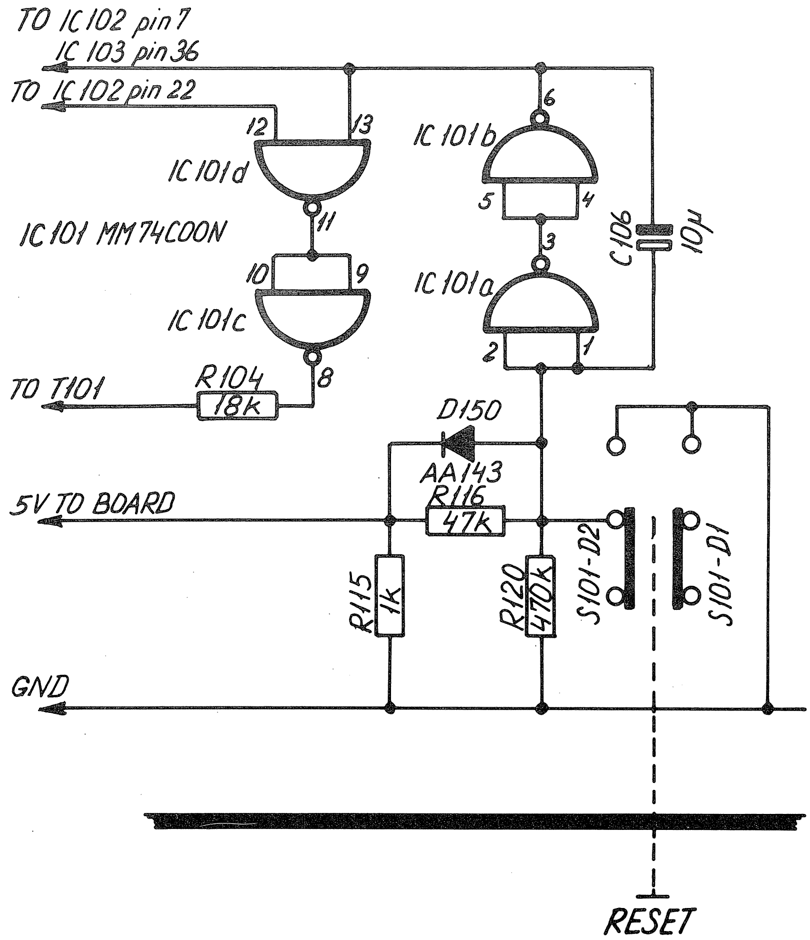
Symbol	Description		Manufact.	
C401	Capacitor, ceramic 4.7nF	5KV	Ferroperm	9/0138.9
C402	Capacitor, ceramic 4.7nF	5KV	Ferroperm	9/0138.9
C403	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C404	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C405	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C406	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C407	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C408	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C409	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C410	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C411	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C412	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C413	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
C414	Capacitor, polyester 0.1uF ±20%	100V	Philips	2222 344 24104
FP401 to FP422	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A
D401	Diode, silicon		Motorola	1N4002
RE401	Relay Takamizawa		ITT	LZ24H/LZ24/LZ24W



-24V FROM P301 PIN 22......
-24V TO AUTO ALARM RECEIVER
TO F202...................
+24V FROM P301 PIN 21......
+24V TO AUTO ALARM RECEIVER
TO F201...................
S101-G....................
S101-F....................
S101-E....................
S101-D....................
S101-C....................
S101-B....................
S101-A....................
TO LA203...........
- BROWN
+ RED
IC101
X101
IC102
IC103
IC104
IC106
IC105
+ RED
- BROWN
TO LA201
RESERVE Tx, 22V FROM KEY (MAKE) P301 PIN 27
RESERVE Tx, 22V FROM KEY (BREAK)
RESERVE Tx, 22V TO KEY P301 PIN 28
MAIN Tx, 22V FROM KEY (MAKE) P301 PIN 25
MAIN Tx, 22V FROM KEY (BREAK)
MAIN Tx, 22V TO KEY P301 PIM 26
RESERVE HAND KEY, 22V FROM KEY
RESERVE HAND KEY, 22V TO KEY
MAIN HAND KEY, 22V FROM KEY
MAIN HAND KEY, 22V TO KEY
- BROWN
+ RED
TO LA202
D101
RE101
AUTO ALARM RECEIVER, (MAKE)
AUTO ALARM RECEIVER, (BREAK)
AUTO ALARM RECEIVER, COMMON
T102
T101
D150
A101
D152
D151
PIN 3
PIN 2
PIN 1
TO IC201

Print H1218

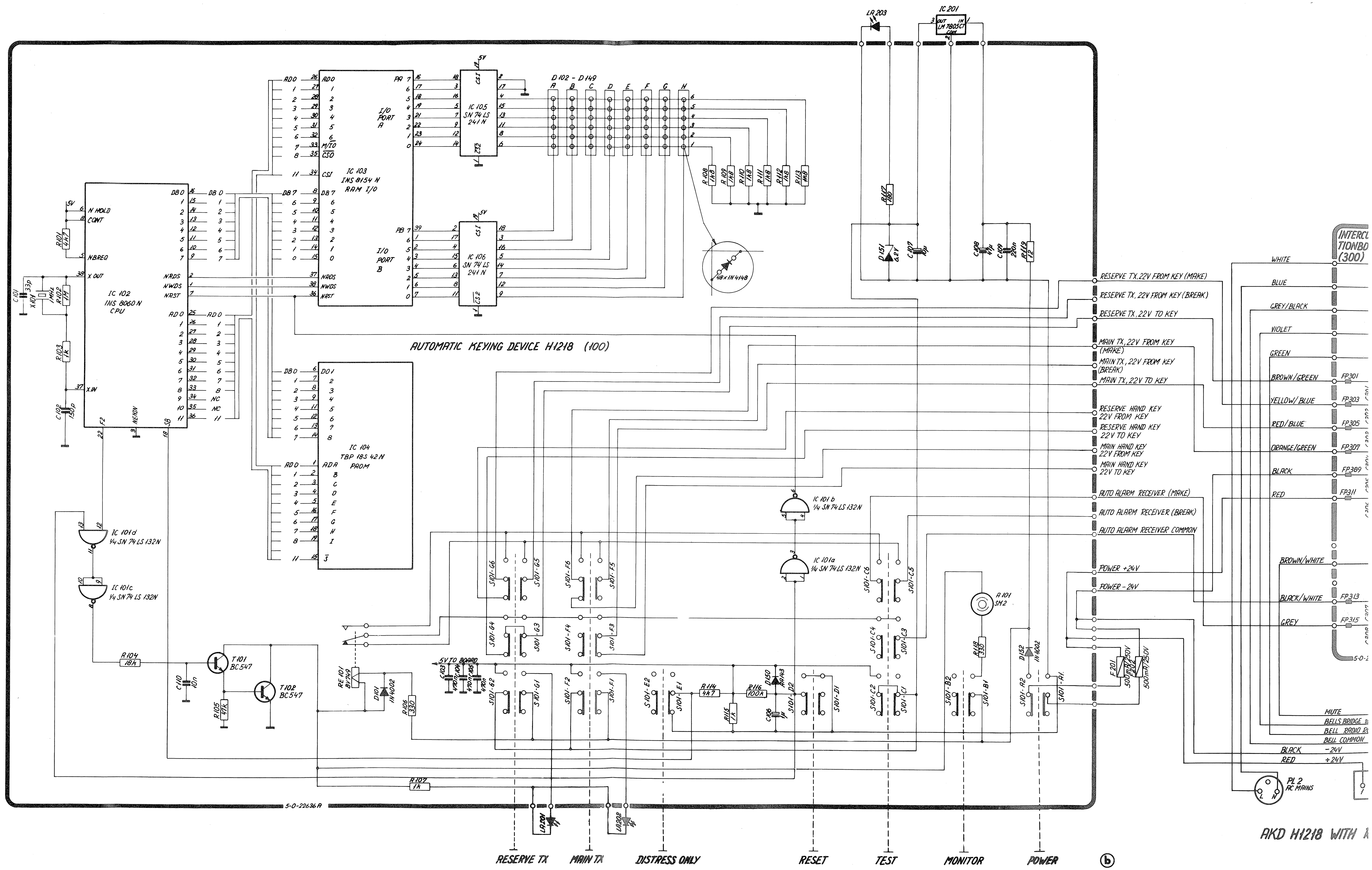
MODIFICATION OF THE RESET-CIRCUIT

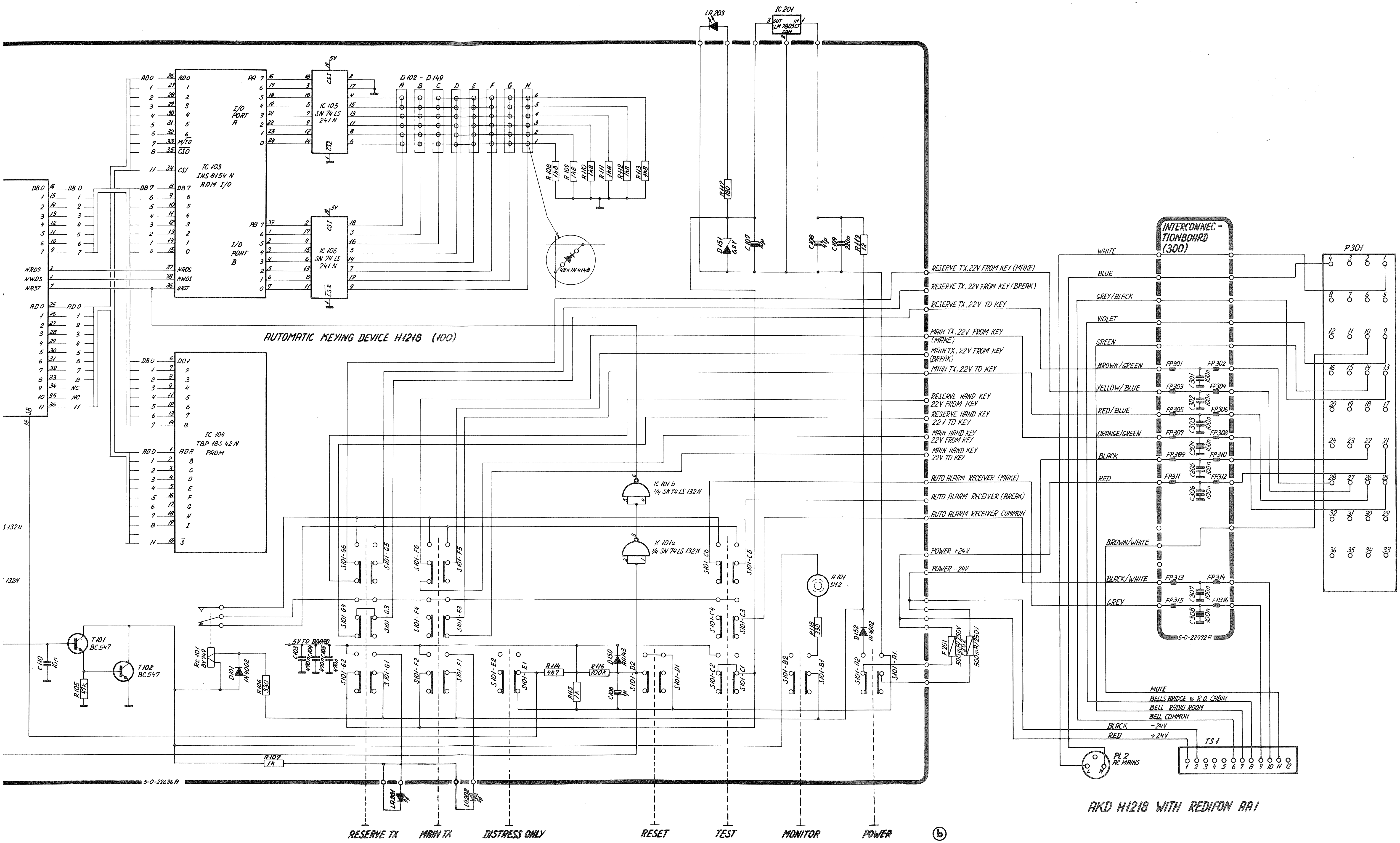


H1218

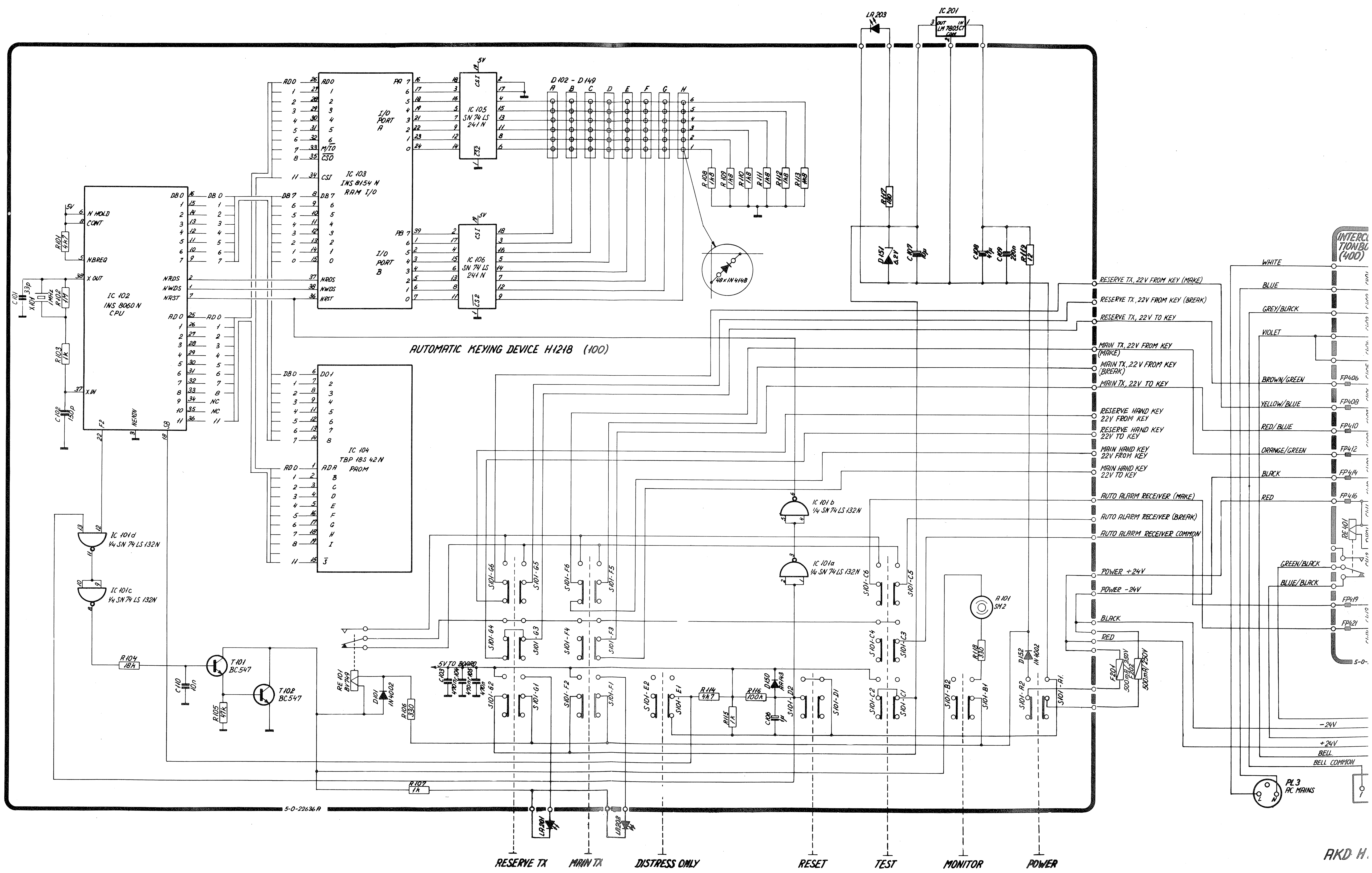
CORRECTION OF THE PARTS LIST

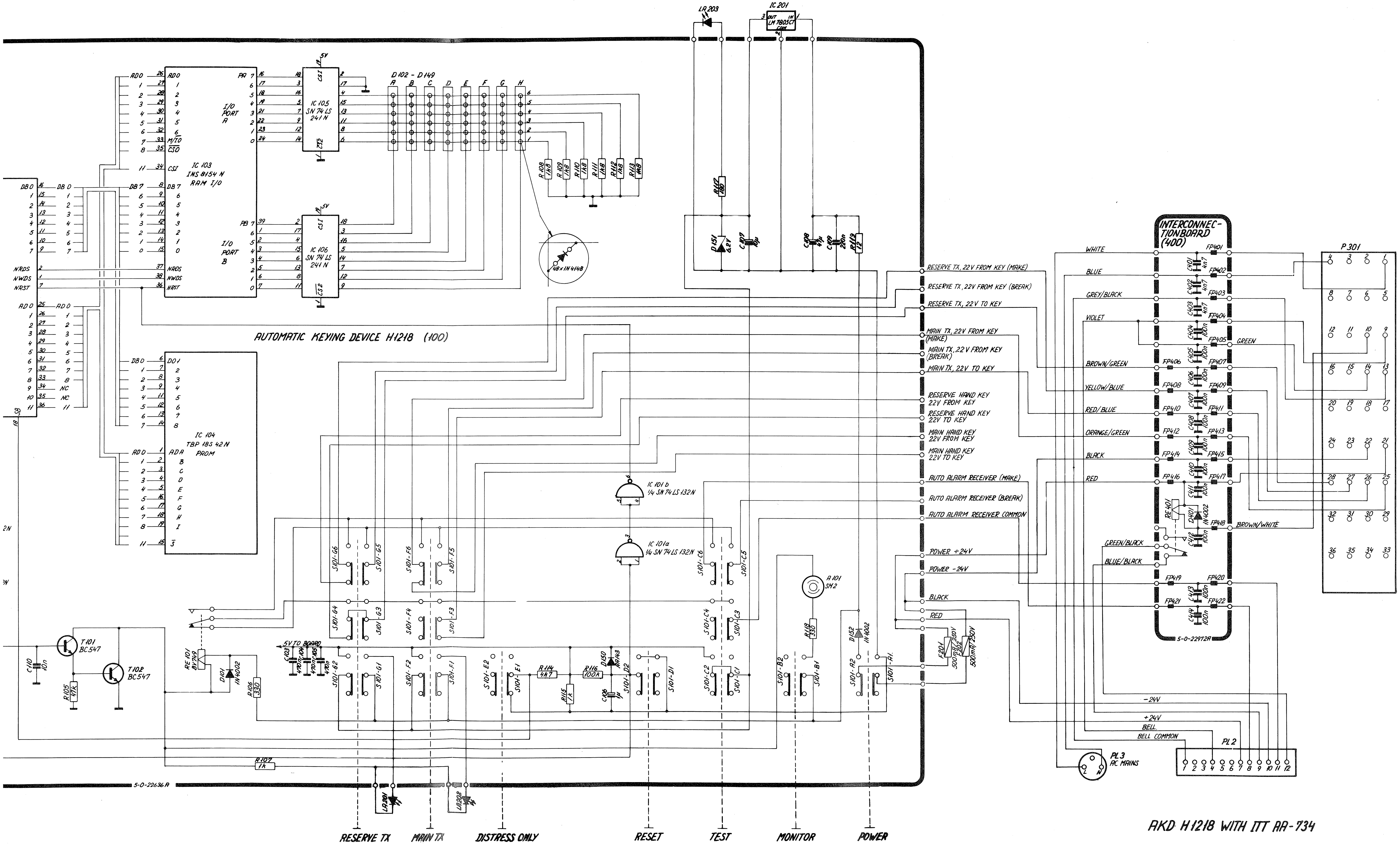
R116	Resistor	47 kohm ±5% 0.33W	Philips	2322 211 13473
R120	Resistor	470 kohm ±5% 0.33W	Philips	2322 211 13474
C106	Capacitor electrolytic	10 uF ±20% · 35V	ROE	EKI 00AA 210F
IC101	Integrated circuit		National	MM 74COON


AUTOMATIC KEYING DEVICE H1218 (100)
IC 102 INS 8060 N CPU
IC 103 INS 8154 N RAM I/O
I/O PORT A
I/O PORT B
IC 104 TBP 18S 42 N PROM
IC 105 SN 74 LS 241 N
IC 106 SN 74 LS 241 N
D 102 - D 149
48 x 1N 4148
IC 101d 1/4 SN 74 LS 132N
IC 101c 1/4 SN 74 LS 132N
IC 101b 1/4 SN 74 LS 132N
IC 101a 1/4 SN 74 LS 132N
T 101 BC 547
T 102 BC 547
RE 101 BV 749
D 101 1N 4002
D 152 1N 4002
LA 203
IC 201 LM 7805CT
5V TO BOARD
A 101 SM 2
RESERVE TX, 22V FROM KEY (MAKE)
RESERVE TX, 22V FROM KEY (BREAK)
RESERVE TX, 22V TO KEY
MAIN TX, 22V FROM KEY (MAKE)
MAIN TX, 22V FROM KEY (BREAK)
MAIN TX, 22V TO KEY
RESERVE HAND KEY 22V FROM KEY
RESERVE HAND KEY 22V TO KEY
MAIN HAND KEY 22V FROM KEY
MAIN HAND KEY 22V TO KEY
AUTO ALARM RECEIVER (MAKE)
AUTO ALARM RECEIVER (BREAK)
AUTO ALARM RECEIVER COMMON
POWER +24V
POWER -24V
WHITE
BLUE
GREY/BLACK
VIOLET
GREEN
BROWN/GREEN
YELLOW/BLUE
RED/BLUE
ORANGE/GREEN
BLACK
RED
BROWN/WHITE
BLACK/WHITE
GREY
MUTE
BELLS BRIDGE
BELL RADIO
BELL COMMON
-24V
+24V
PL 2 AC MAINS
5-0-22636 A
RESERVE TX
MAIN TX
DISTRESS ONLY
RESET
TEST
MONITOR
POWER
AKD H1218 WITH
b



AKD H1218 WITH REDIFON AA1


AUTOMATIC KEYING DEVICE H1218 (100)
IC 102 INS 8060 N CPU
IC 103 INS 8154 N RAM I/O
IC 104 TBP 18S 42 N PROM
IC 105 SN 74 LS 241 N
IC 106 SN 74 LS 241 N
IC 101a 1/4 SN 74 LS 132N
IC 101b 1/4 SN 74 LS 132N
IC 101c 1/4 SN 74 LS 132N
IC 101d 1/4 SN 74 LS 132N
IC 201 LM 7805CT
D102 - D149
48 x 1N4148
T101 BC547
T102 BC547
RESERVE TX, 22V FROM KEY (MAKE)
RESERVE TX, 22V FROM KEY (BREAK)
RESERVE TX, 22V TO KEY
MAIN TX, 22V FROM KEY (MAKE)
MAIN TX, 22V FROM KEY (BREAK)
MAIN TX, 22V TO KEY
RESERVE HAND KEY 22V FROM KEY
RESERVE HAND KEY 22V TO KEY
MAIN HAND KEY 22V FROM KEY
MAIN HAND KEY 22V TO KEY
AUTO ALARM RECEIVER (MAKE)
AUTO ALARM RECEIVER (BREAK)
AUTO ALARM RECEIVER COMMON
POWER +24V
POWER -24V
BLACK
RED
WHITE
BLUE
GREY/BLACK
VIOLET
BROWN/GREEN
YELLOW/BLUE
RED/BLUE
ORANGE/GREEN
GREEN/BLACK
BLUE/BLACK
-24V
+24V
BELL
BELL COMMON
PL3 AC MAINS
5-0-22636 A
RESERVE TX
MAIN TX
DISTRESS ONLY
RESET
TEST
MONITOR
POWER
AKD H



AKD H1218 WITH ITT AA-734