ELECTRICAL TEST INSTRUCTION

Checking the preamplifiers

Measuring arrangement

- Terminate loudspeaker output BU1 with a 4 Ω resistor.
- Unsolder the sheath of the screened wire of playback head K1 (on the p.c. board).
- Solder a 22 Ω resistor between the sheath and earth.
- Set Balance control R10 to mid-position and volume control R12 to minimum.
- Apply a signal of 180 mV - 250 Hz via a 22 kΩ resistor to junction K1 and the aforementioned 22 Ω resistor.
- Set the recorder to position "playback".
- The signal measured on the top of Balance Control R10 should now be 190 - 320 mV.
- The above-mentioned measurement should also be carried out for the right-hand channel.

Measuring the frequency response of the preamplifiers

- For the measuring arrangement see "Check of the preamplifiers". However, the volume control should be set to maximum.
- Apply a 1000 Hz signal, via a resistor of 22 kΩ, to junction K1 and this resistor so that the voltage on the top of balance control R10 is 10 mV. The voltage of the tone generator is then about 20 mV.
- Keep the input voltage constant. Measure at the undermentioned frequencies the voltage on the top of the balance control. For the values to be measured see the table below.

Measuring the sensitivity of the output amplifier (at full drive)

- Interrupt connection K1 - C2.
- Set the balance control to mid-position and the volume control to maximum.
- Terminate loudspeaker output BU1 with a 4-Ω resistor.
- Set the recorder to position "playback".
- Apply a 1000-Hz signal to the peak of balance control R10 so that the output voltage at the loudspeaker output is 4 V.
- The voltage applied should then be 80 - 140 mV.

Checking the current consumption

The no-load current consumption (i.e. when the drive cord has been removed) should be 20 - 26 mA.
The current consumption during playback (with an inserted cassette) should be 75 - 100 mA.
The above-mentioned currents have been measured between points 201 and 203 of switch SK2 at a supply voltage of 14.4 V.
The overall current consumption of both channels (when the motor is switched on) is:
during playback (with volume control to minimum) 350 mA
during playback (with fully driven output stage) 1100 mA

Tape speed check 1 - Adjustment of R302

The tape speed should be checked with test tape 4822 397 30005 on which an 800 Hz signal is modulated at intervals of 4.75 m.
Insert the cassette with the test tape into the recorder.
Set the recorder to position "playback".
The time lapsing between two 800 Hz signals should be between 98 - 102 secs. If this time is less than 98 secs, the speed is too high. If this time exceeds 102 secs, the speed is too low.
In the latter case the friction of one or more of the recorder parts (for instance, the pressure roller, the winding friction, the flywheel or the turntables) is probably too high. These parts should then be cleaned and lubricated again. If the speed should still be too low or too high, it can be adjusted by means of potentiometer R302.

Tape speed check 2

Open a cassette at one side and pull out the tape via the opening.
Take the recorder out of the cabinet and insert the cassette.
Position a stroboscopic (4822 395 90001 for 50 Hz and 4822 395 90002 for 60 Hz) next to the recorder and feed the tape alongside the disc.
If the recorder is now switched on, it can be read direct from the disc whether the speed is too high or too low.
If the speed is too low, this may be caused by the pressure roller, the winding friction, the flywheel or the turntables so that these parts have to be cleaned and lubricated again.
In case the speed is still not correct, it can be adjusted with R302.
The time required for fast winding a full cassette should be less than 60 secs.

Adjustment of R20, R120

R20, R120 should be so adjusted that the collector current of TS5, 6 - TS105, 106 is 50 mA.

PHILIPS

Service notes

RECORDERS
N 2602/00

The N2 602 is a stereo car cassette player with an output amplifier for motor-cars with a 12-V battery.

TECHNICAL DATA

Tape speed	: 4.75 cm/sec.
Supply voltage	: 11-16 V (the player is supplied with the -pole connected to the chassis of the car)
Tape width	: 3,81 mm in compact cassette
Number of tracks	: 2 x 2 stereo
Frequency range	: 60-10.000 Hz ± 8 dB
Output power	: 2 x 4 W with a 4 Ω loudspeaker impedance 2 x 2.5 W with a 8 Ω loudspeaker impedance

Transistors

2 x BC149B	Pre-amplifier
3 x BC148B	Pre-amplifier. motor speed regulator
2 x BC148	Driver stage
2 x BC148C	Automatic stop switch
2 x BFY51	Driver stage
2 x AD161/AD162	Output stage (pair of transistors)
1 x AD162	Motor speed control

Diodes

1 x OA91	Automatic stop switch
3 x BA114	Motor speed control

Accessories

Isolating transformer (N6 709 for motor-cars in which the +pole of the accumulator is connected to the chassis)

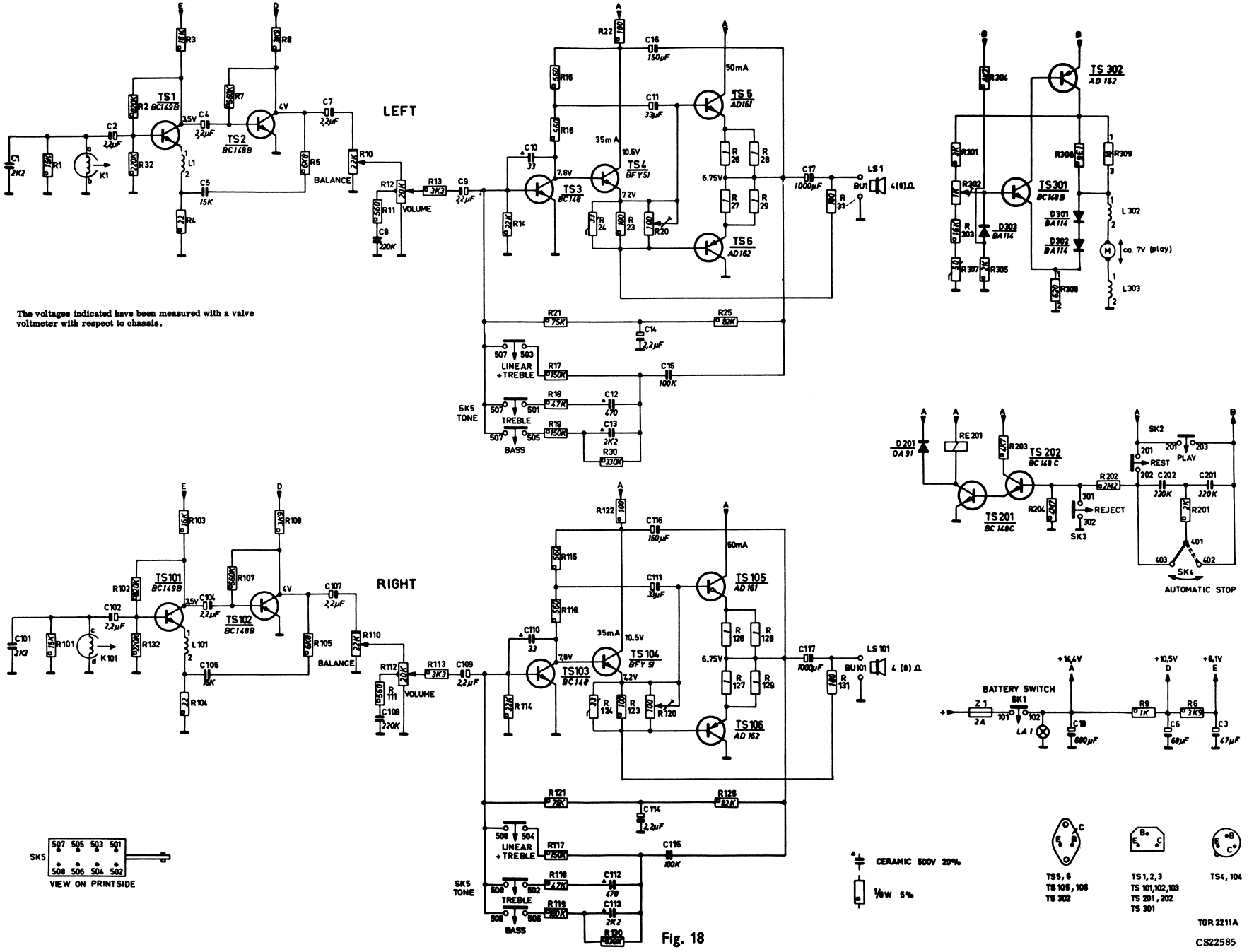
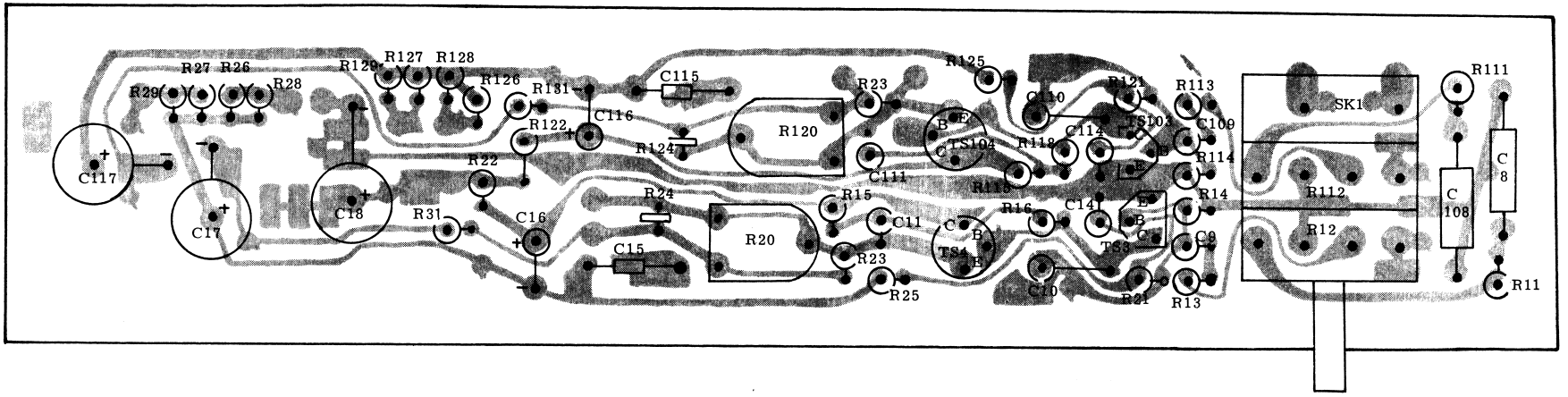
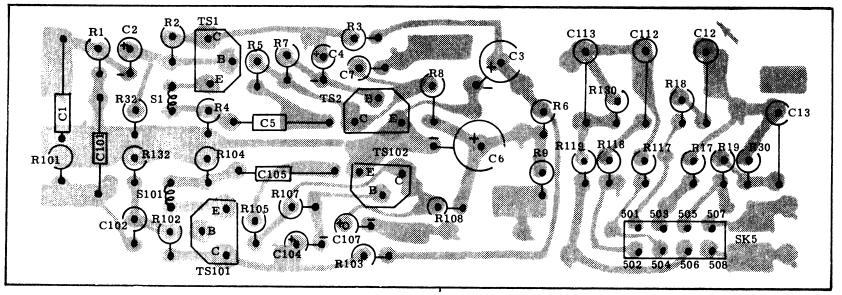
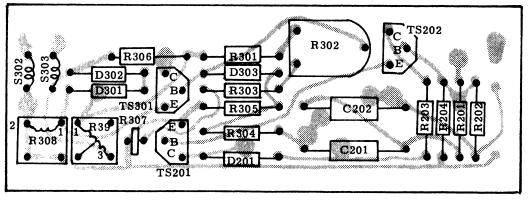

LEFT
RIGHT
TS1 BC149B
TS2 BC148B
TS3 BC148
TS4 BFY51
TS5 AD161
TS6 AD162
TS101 BC149B
TS102 BC148B
TS103 BC148
TS104 BFY51
TS105 AD161
TS106 AD162
TS201 BC148C
TS202 BC148C
TS301 BC148B
TS302 AD162
BALANCE
VOLUME
LINEAR +TREBLE
TREBLE
BASS
SK5 TONE
REJECT
REST
PLAY
AUTOMATIC STOP
BATTERY SWITCH
ca. 7V (play)
The voltages indicated have been measured with a valve voltmeter with respect to chassis.
VIEW ON PRINTSIDE
CERAMIC 500V 20%
1/2W 5%
TS5, 6
TS 105, 106
TS 302
TS 1, 2, 3
TS 101, 102, 103
TS 201, 202
TS 301
TS4, 104
TGR 2211A
CS22585

Fig. 18







Modifications during production Bc 950

1. To increase the friction between the capstan and the tape, the capstan in tape recorders, marked WR02/47/68, has been roughened by heating. The code number of this capstan remains the same.

2. A wire has been fitted between the lampholder of LA1 and earth to prevent crackling sounds when the cassette container is operated. The wire has been fitted in recorders marked WR02/907 and higher.

3. Diodes D201, D301, D302 and D303 and transistors TS4 and TS104 have been modified as follows:
   D201 has become BA148; code number 4822 130 30256.
   D301 – D302 has become OF156; code number 4822 130 40182.
   D303 has become BAX13; code number 4822 130 40182.
   TS4, TS104 has become 2N2219; code number 4822 130 40496.
   The diodes stated in the Service Notes may be used for service purposes.

4. To improve the location of the wiring, we have changed the positions of TS5 and TS106.
   This modification has been introduced in recorders marked WR02/920.

5. To obtain a greater sensitivity of the playback amplifier, the value of R17 and R117 has been increased to 220 KΩ.
   This modification has been introduced in recorders marked WR02/933.

6. To prevent the transistors from becoming defective when the supply voltages are applied in the wrong way, a diode D202 (MR2262R) has been connected between the "+" and the " ".
   If the supply voltage is applied incorrectly, Z1 will burn out immediately. However, other parts do not become defective.
   The code number of D202 with fixing bracket is 4822 218 30039.
   This modification will be introduced in recorders with serial number 45000.
   In case the N 2602 will be used in cars having a car battery with "+" to ground, the polarity of the N 2602 has to be changed according to the mounting instructions, point 1.
   Moreover the connection from the blocking diode to the printed circuit board has to be removed (e.g. by cutting the wire).

Under certain circumstances, especially if 8Ω-loudspeakers are connected to these sets, it may occur that H.F.-oscillation arises resulting in distorted reproduction of sound.

In order to prevent this the sets have to be modifind as follows:

1. Connect collector TS3 and/or TS103 via a capacitor of 4700 pf to earth.

2. Remove C10 and/or C110.

In sets stamped 942 and higher above modifications have already been introduced.

Note: When using 4Ω-loudspeakers the maximum output can be obtained, so that the chance of H.F.-oscillating becomes considerably smaller. Therefore it is recommendable to supply only 4Ω-loudspeakers with the set N2602.

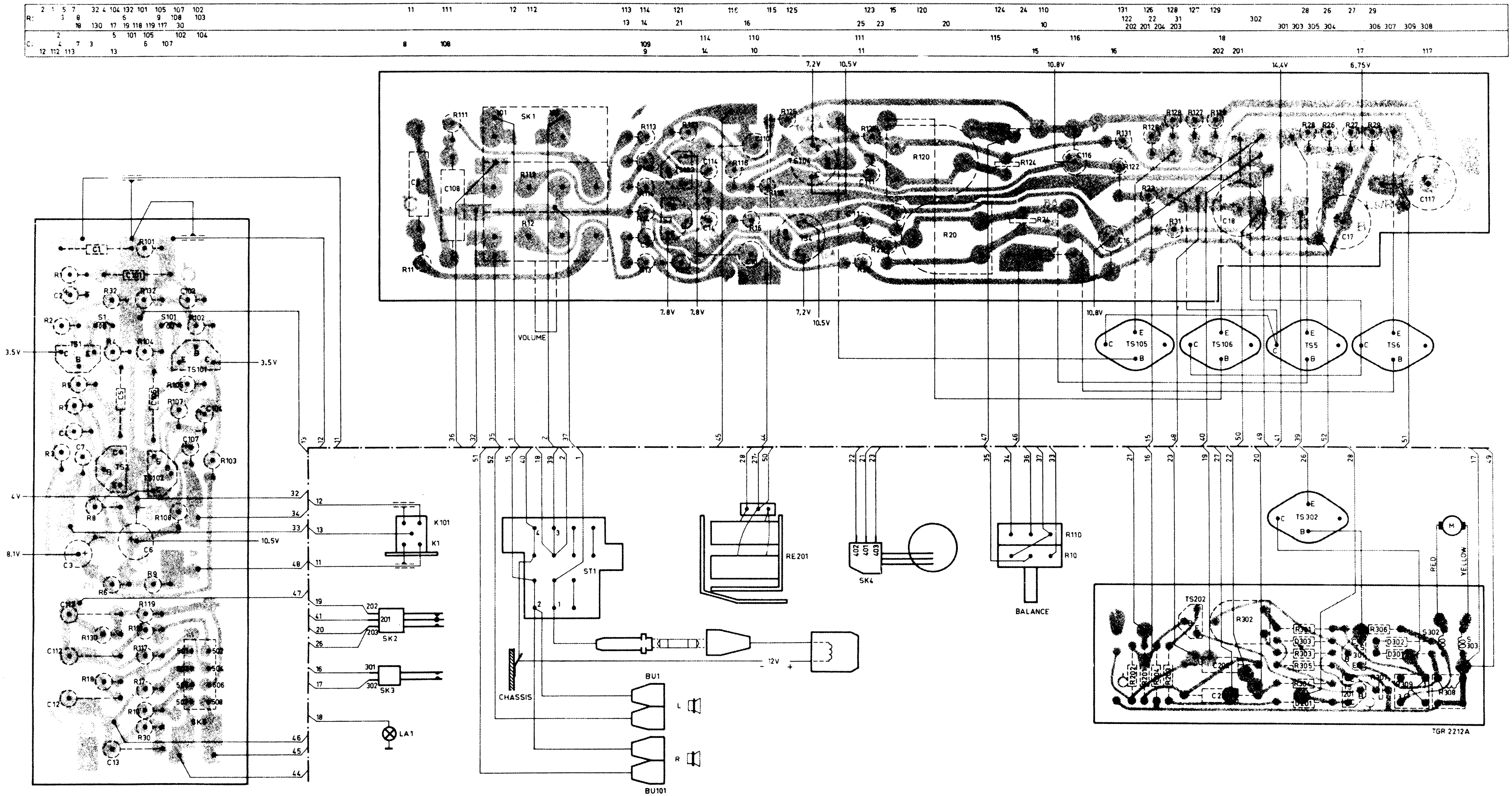

VOLUME
BALANCE
CHASSIS
SK1
SK2
SK3
SK4
ST1
K101
K1
RE201
R110
R10
LA1
BU1
BU101
TS105
TS106
TS5
TS6
TS302
TS202
TS101
C117
C108
7.2V
10.5V
10.8V
14.4V
6.75V
7.8V
3.5V
4V
8.1V
12V
RED
YELLOW
TGR 2212A

Fig. 17