SERVICE NOTES

for the receiver

373 - 773

1957 For battery supply

Knobs:

At the left: volumecontrol
At the right: tuning

Push buttons:

From left to right:
1. Battery switch
2. Tone switch
3. P.U. switch
4. M.W.: 184-580 m (517 - 1630 kc/s)

Transistors

TR1 - marked with a red dot
TR2 - unmarked
TR3 - unmarked
TR4 - OC71
TR5 - OC71
TR6 - } 2OC72
TR7 - }
X1 - OA79

I.F.

455 kc/s

Battery

6 V

Loudspeaker

AD 3460 Z

Consumption

I tot : 12 mA without signal

I tot : 39 mA for 50 mW output

Dimensions

Length : 265 mm
Height : 175 mm
Depth : 85 mm

93 992 42. 1.05

Printed in Holland

R.F. Part

373-773

For the oscillator mixing stage use has been made of a self-oscillating mixing circuit.

The transistor TR1 is used as an oscillator in a grounded base-circuit. This circuit is shown simplified in fig. 1. The oscillator coil (S5, S6, S7) provides the necessary coupling between collector and emitter. The collector receives its direct voltage via the resistor R4, decoupled with capacitor C11 and the coils S7 and S). The base adjustment is achieved by means of the potentiometer circuit of the resistors R1 and R2.

The resistor R1 is decoupled with capacitor C13. In order to obtain matching of the emitter impedance on the oscillator coil, the former is connected, via the capacitor C14, to a tap of the coil. To obtain correct matching of the ferroceptor to the low input impedance of the transistor, the coupling is realised by means of the low impedance coupling windings S2 and S4.

Mixing of the oscillator and aerial signals now takes place in TR1 through the curve of the characteristic.

The desired I.F. signal is taken by means of the band-pass filter (S8,S9,S10,S11). In order to obtain energy adaptation to the band-pass filter, the collector is connected to a tap on the coil.

I.F. Part

Both transistors TR2 and TR3 are working as I.F. amplifier and are used in grounded emitter circuits.

The collector of TR2 receives its direct voltage, via the decoupling filter R12, C10, C23 and the coil S13. The base adjustment is achieved by the potentiometer circuit of the resistors R7 and R5, R6. The resistor R7 is decoupled by the capacitors C17 and C18. This voltage is applied to the base, via the low impedance couple winding S11. To obtain a stable direct current adjustment of the transistor, the resistor R10 is included in the emitter circuit.

In order to prevent that an I.F. negative feedback voltage arises across this resistor, it is decoupled with the capacitors C5 and C20. To prevent positive feedback, via the interior base-collector capacity (to be compared with Ca-g of a triode), a neutrodynisation circuit has been incorporated between collector and base. The collector alternating voltage is fed back to the base in phase opposition, by means of S14 and C19. To obtain energy adaptation to the band-pass filter the collector has been connected to a tap of the coil.

The amplified I.F. signal is applied in phase opposition to the base of TR3 via the band-pass filter (S12, S13, S14, S15, S16). In order to obtain matching to the low input impedance of TR3, the base is connected to a tap on the secondary. The base adjustment of this transistor is obtained by the resistors R13 and R14 connected as a potentiometer.

This potentiometer is decoupled with capacitor C24. The collector direct voltage is applied via coil S18.

The resistor R15, decoupled for IF by capacitor C26, stabilizes the adjustment of TR3. The collector is connected to a tap on the primary of the band-pass filter (S17, S18, S19, S20, S21) in order to obtain energy matching.

The coil S29 and the capacitor C25 ensure neutrodynisation of this stage. The I.F. signal is detected with a germanium diode OA79 in the ordinary way. Two voltages are taken from the detector, viz. a positive direct voltage for A.V.C. and an A.F. alternating voltage. The direct voltage is applied to the junction of R5 and R6. Depending on the strength of the signal received, the base voltage of TR2 becomes therefore more or less negative. Since the fixed base voltage will decrease in the case of increasing signal.

The amplification of a transistor is highly dependent on the base voltage, which means that the amplification decreases with a lower voltage on the base.

An A.V.C. is therefore obtained in this way.
The transistor TR2 serves also as a P.U. pre-amplifier.
The decoupling capacitors C17, C18 are disconnected from earth by means of SK1 and connected to the pick-up box via the resistor R38. The A.F. signal is now led back to the base of TR2 via the capacitors C18, C19 and the coil S11. The coil S11 has for A.F. an insignificant small impedance, so that no losses can occur in it. The amplified A.F. signal will stand over the collector resistor R12, as the impedance of S13 for A.F. is also neglegible.

The decoupling capacitors C10 and C23 are disconnected from earth by means of SK2 and connected to the top of the volume control.
The detection circuit of the volume control is disconnected by the same switch. At the same time SK2 switches the transistors TR1 and TR3 out of tension in the p.u. position.

A.F. Part

The A.F. signal derived from the p.u. pre-amplifier TR2 or detector is applied via R8 and C12 to the base of TR4.

The base adjustment of TR4 is achieved by means of a potentiometer formed by the resistors R18 and R34. The collector receives its direct voltage by the resistor R21.

The direct current adjustment is stabilized by the resistor R11 decoupled with C40 in the emitter circuit.
The collector alternating current is applied via the filter C39, R37 and the coupling capacitor C33 to the base of TR5.
The base adjustment of TR5 is obtained by the potentiometer connection R25 and R35, R32. The resistor R26, decoupled by C35, is intended for stabilisation of the direct current adjustment. The collector receives its direct voltage through the primary of the driver transformer.
As by over-modulation of TR5 in S22 oscillations may occur a RC filter consisting of R27 and C36 is connected across the coil. This resistor and capacitor are dimensioned such that these oscillations phenomenae cannot occur.

A negative feedback voltage is applied to the base of TR5 from the secondary of the output transformer. By including C37 in the negative feedback circuit a phase compensation is obtained for the higher frequencies, and thus noise suppression is achieved.

The alternating voltages generated in the secondary sections (S23,S24) of the driver transformer are applied in phase opposition to the base of output transistors TR6 and TR7, which are connected in push-pull.

A fixed base adjustment is achieved by the potentiometer R28, R29 and R30, R31.

As the collector current of transistors is dependent on the ambiant temperature, viz. an increasing collector current with increasing temperature, a stabilization has been provided in the base circuit by a N.T.C. resistor (R31).
By the decrease of the value of R31 with increasing temperature, the base voltage will fall. For this reason the increase of the collector current is practically wholly prevented.
Since the loudspeaker is not independent on the frequency, a variable collector load will take place, so that phase displacements can occur, which give way to parastic oscillation. To prevent this, the RC part R33, C38 is applied in parallel to the primary of the output transformer.
The load becomes independent of the frequency with a correct choice of these parts.

The alignment of the receiver.

The general rule is:

Volume control to maximum.
Connect a voltmeter to the loukspeaker terminals via a trimming transformer.
The cores of the I.F. band pass filters should be screwed out first before trimming. The signals applied are modulated with 400 c/s.
Unless otherwise stated the signals are applied to the ferroceptor with a coupling frame (see fig. 5).
Trimming point 1 is at the extreme left and trimming point 2 at the extreme right of the scale.
Adjust the pointer to trimming point 1 with the gang capacitor in its minimum position.
When the capacitors C19 and C25 are replaced, a wire-wound trimmer of 50 pF (907/10-50E) is used for that purpose.
These trimmers must be adjusted beforehand to 34 pF.

Waverange		Press in push-button	Signal	Pointer on trimming point	Damp with 10000 Ohm	Trim for max. output voltage	Indication
I.F. Band pass filters			455 kc/s via 33000 pF base TR3			S20, 21-S17,18,19	
		M.W.	455 kc/s via 33000 pF Base TR2	1		S12,13,14-S15,16	
			455 kc/s via 33000 Ohm collector TR1			S8,9 -S10	
R.F. and oscillator circuits	M.W.		512 kc/s	2	S3	S5, 6	Repeat
		M.W.	550 kc/s	tune to signal applied	Remove damping of S3	S1	
			1630 kc/s	1	S3	C4	
			1500 kc/s	tune to signal applied	Remove damping of S3	C3	

LIST OF PARTS

When ordering always quote:

1. Code number and colour.
2. Description.
3. Type number of the set.

Description	Code number
push button unit	A3 768 48
Cabinet	A3 005 63
Loudspeaker grill	A3 686 17
Grill in lid	P5 350 26/31
Knob volume control colour code VP	P4 077 40/17
Knob tuning colour code VP	P4 077 41/17
Spring for fixing coil can narrow	A3 652 75
Spring for fixing coil can broad	A3 652 58
Spring in drive	89 312 10.3
Handle	A3 755 90
Push button	A9 023 49
Dial U.S.A.	A3 924 66
Canada	A3 924 54
	vG/AB

For service purposes the mixing transistor TR1 can be replaced by the OC44 without taking special measures.
The I.F. transistors TR2 and TR3 can be replaced by the OC45.
Then C19 and C25 must be replaced by a 22 pF capacitor.
To this effect a 50 pF wire trimmer (907/50) should be used, which have been adjusted to 22pF before.

S1)		A3 803 09
S2)		
S3)		
S4)		
S5)		
S6)		A3 128 39
S7)		
S8)		
S9)		
S10)		A3 128 40
S11)		
C15)		A3 128 42
C16)	195 pF	
S12)		
S13)		
S14)		
S15)		
S16)		
C21)	195 pF	
C22)	195 pF	
S17)		
S18)		
S19)		
S20)		A3 128 41
S21)		
C27)	195 pF	
C28)	195 pF	
S22)		
S23)		A3 161 80
S24)		
S25)		
S26)		9 18/08
S27)		
C1)		49 002 04
C2)		
C3	30 pF	9 08/30E
C4	30 pF	9 08/30E
C7	3000 pF	9 05/[illegible]K
C10	3,2 uF	9 09/E3,2
C11	47000 pF	C296 AA/A47K
C12	3,2 uF	9 09/E3,2
C13	47000 pF	C296 AA/A47K
C14	10000 pF	9 04/10K
C17	47000 pF	C296 AA/A47K
C18	3,2 uF	9 09/E3,2
C19	50 [illegible]F	9 07/50E
C20	0,1 uF	C296 AA/A100K
C23	0,1 uF	C296 AA/A100K

C24	0,1 uF	C296 AA/A100K
C25	50 pF	9 07/50E
C26	0,1 uF	C296 AA/A100K
C30	2350 pF	9 05/2K4
C31	100 uF	9 09/B100
C32	50 uF	9 09/B50
C33	3,2 uF	9 09/E3,2
C34	0,1 uF	C296 AA/A100K
C35	100 uF	9 09/B100
C36	1500 pF	9 04/330E
C38	0,1 uF	C296 AA/A100K
C39	47000 pF	C296 AA/A47K
C40	100 uF	9 09/B100
R1	2200 Ohm	9 02/2K2
R2	8200 Ohm	9 02/8K2
R3	2200 Ohm	9 02/2K2
R4	1000 Ohm	9 02/1K
R5	10000 Ohm	9 02/10K
R6	22000 Ohm	9 02/22K
R7	0,15M Ohm	9 02/150K
R8	2200 Ohm	9 02/2K2
R10	680 Ohm	9 02/680E
R11	1800 Ohm	9 02/1K8
R12	2200 Ohm	9 02/2K2
R13	3900 Ohm	9 02/3K9
R14	22000 Ohm	9 02/22K
R15	560 Ohm	9 02/560E
R16	220 Ohm	9 02/220E
R17	12000 Ohm	9 02/12K
R18	15000 Ohm	9 02/15K
R19	390 Ohm	9 02/390E
R20	1000 Ohm	9 02/1K
R21	6800 Ohm	9 02/6K8
R22	16000 Ohm)	
R23	4000 Ohm)	B1 639 65
R24	1500 Ohm	9 02/1K5
R25	22000 Ohm	9 02/22K
R26	680 Ohm	9 02/680E
R27	560 Ohm	9 02/560E
R28	1000 Ohm	9 02/1K
R29	2200 Ohm	B8 300 43B/2K2
R30	82 Ohm	9 00/82E
R31	130 Ohm	B8 320 01A/130E
R32	33000 Ohm	9 02/33K
R33	330 Ohm	9 02/330E
R34	82000 Ohm	9 02/82K
R35	27000 Ohm	9 02/27K
R36	4700 Ohm	9 02/4K7
R37	0,[illegible] M Ohm	9 02/470K
R38		

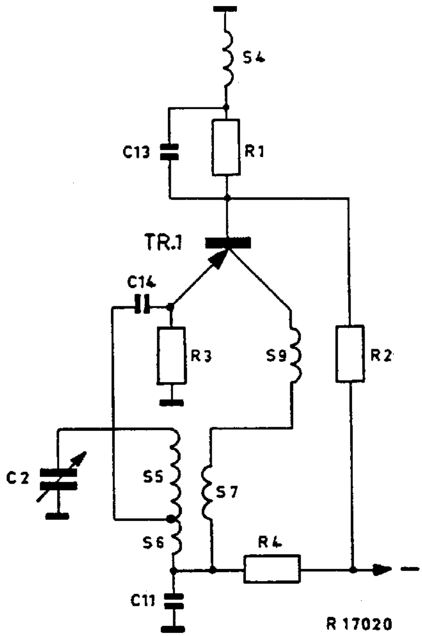


Fig.1

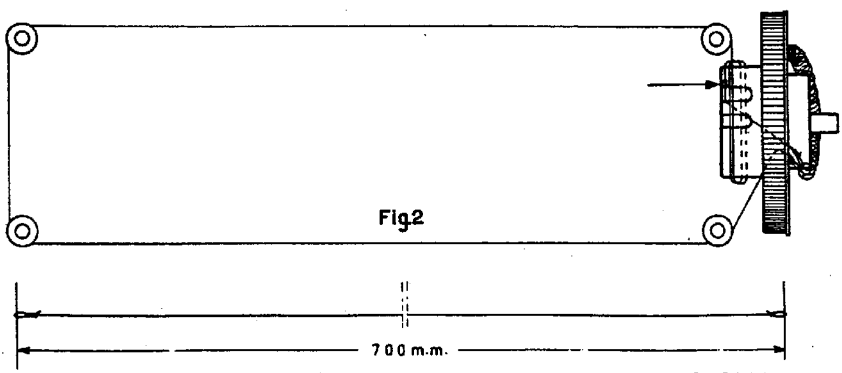


Fig.2

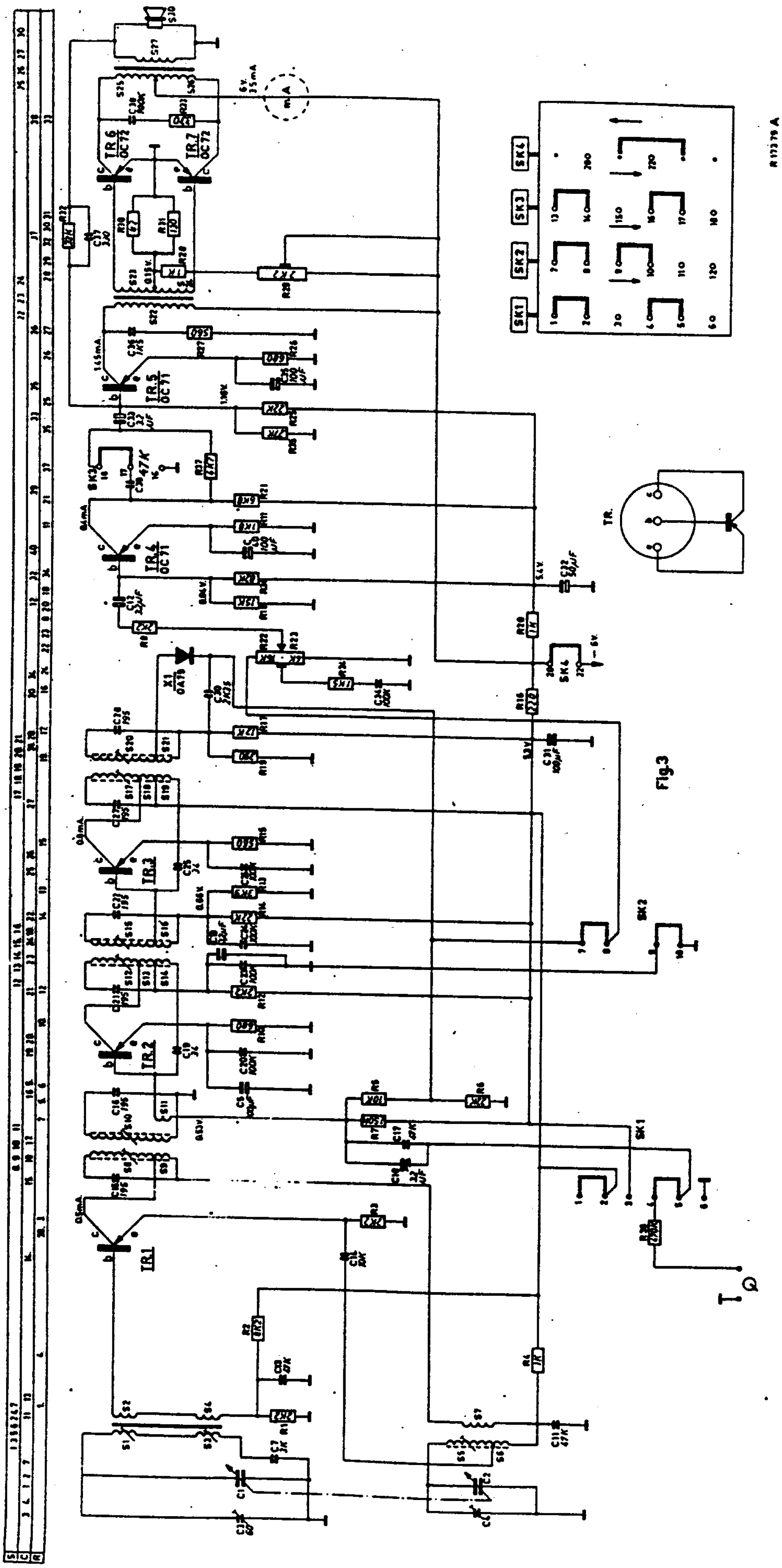

TR1
TR.2
TR.3
TR.4 OC71
TR.5 OC71
TR.6 OC72
TR.7 OC72
SK1
SK2
SK3
SK4
R 17279 A

Fig.3

S	D. C. B. A. 22. 24. 23. 25. 26. 27.
C	11. 1. 7. 14. 6. 13. 2. 18. 17. 5. 20. 10. 19. 23. 31. 24. 28. 25. 30. 34. 32. 40. 12. 35. 36. 39. 33. 37. 38.
R	3. 1. 4. 2. 38. 7. 5. 10. 12. 14. 13. 15. 6. 19. 17. 16. 8. 24. 11. 21. 18. 26. 27. 34. 20. 25. 35. 31. 30. 37. 29. 28. 32. 33.

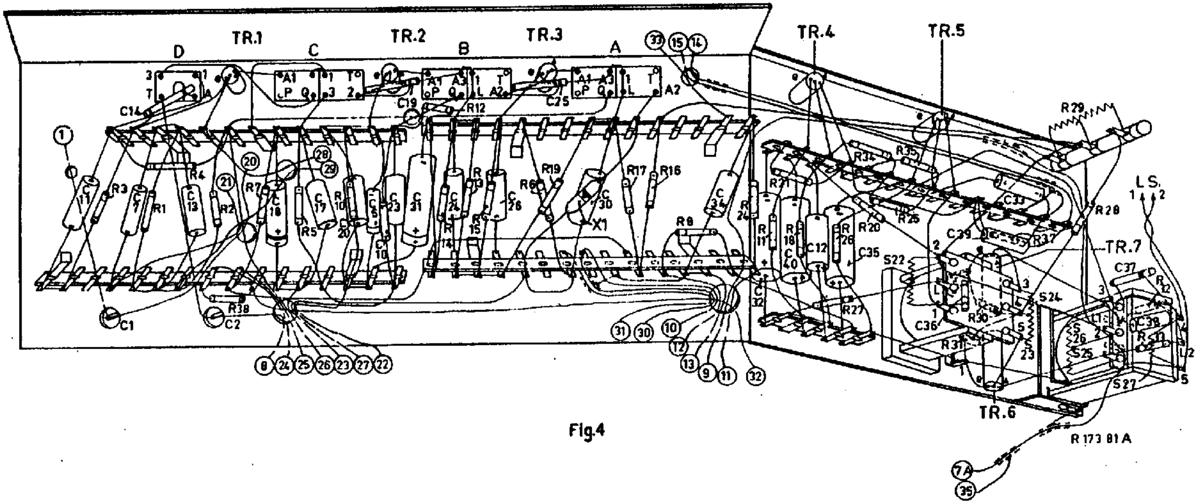
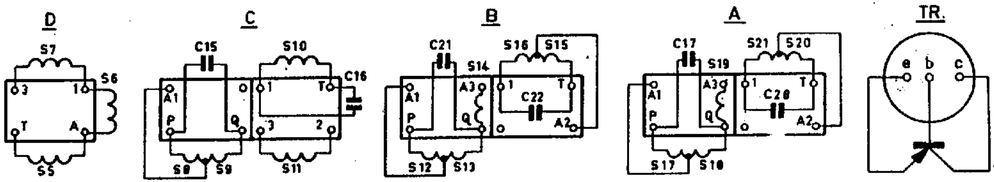


Fig.4



R 17025 A

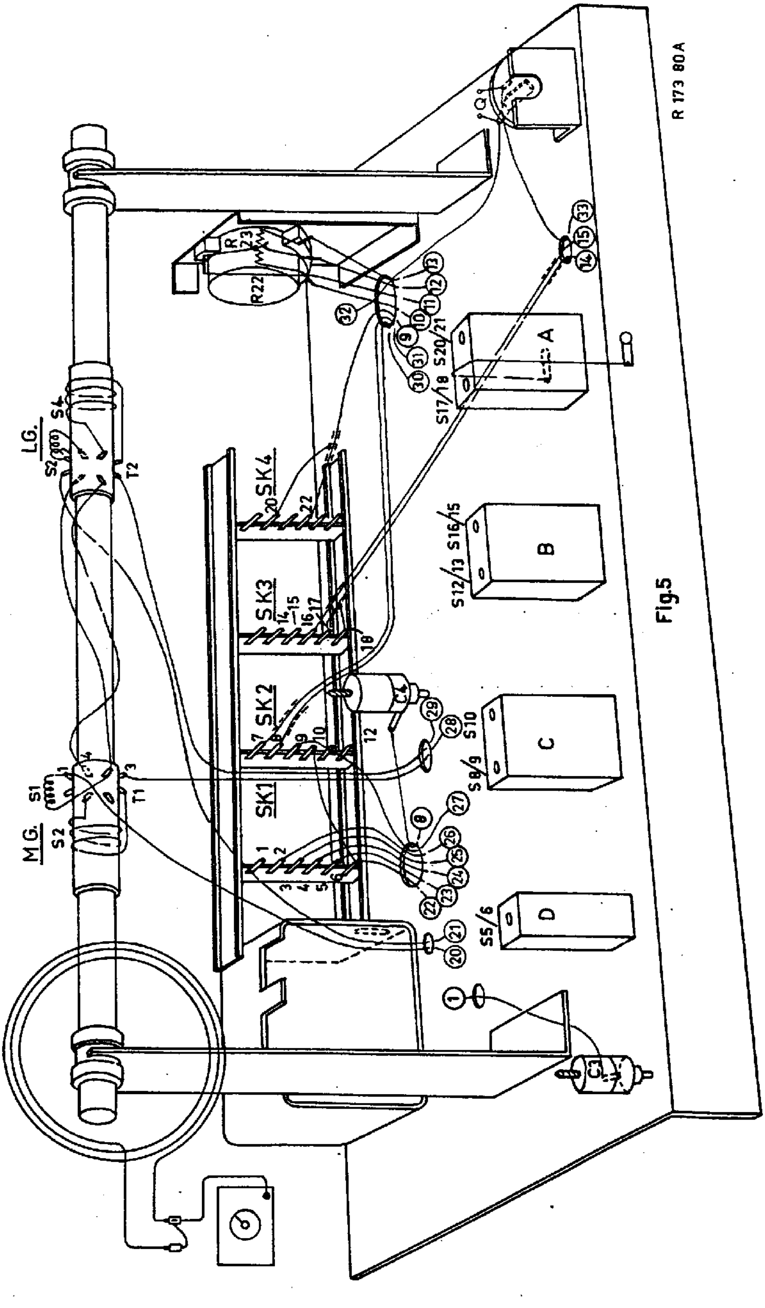

M.G.
S2
S1
T1
LG.
S2
S4
T2
SK1
SK2
SK3
SK4
R22
R
A
B
C
D
S17/18
S20/21
S12/13
S16/15
S8/9
S10
S5/6
C1
C4
Q
R 173 80A

Fig.5

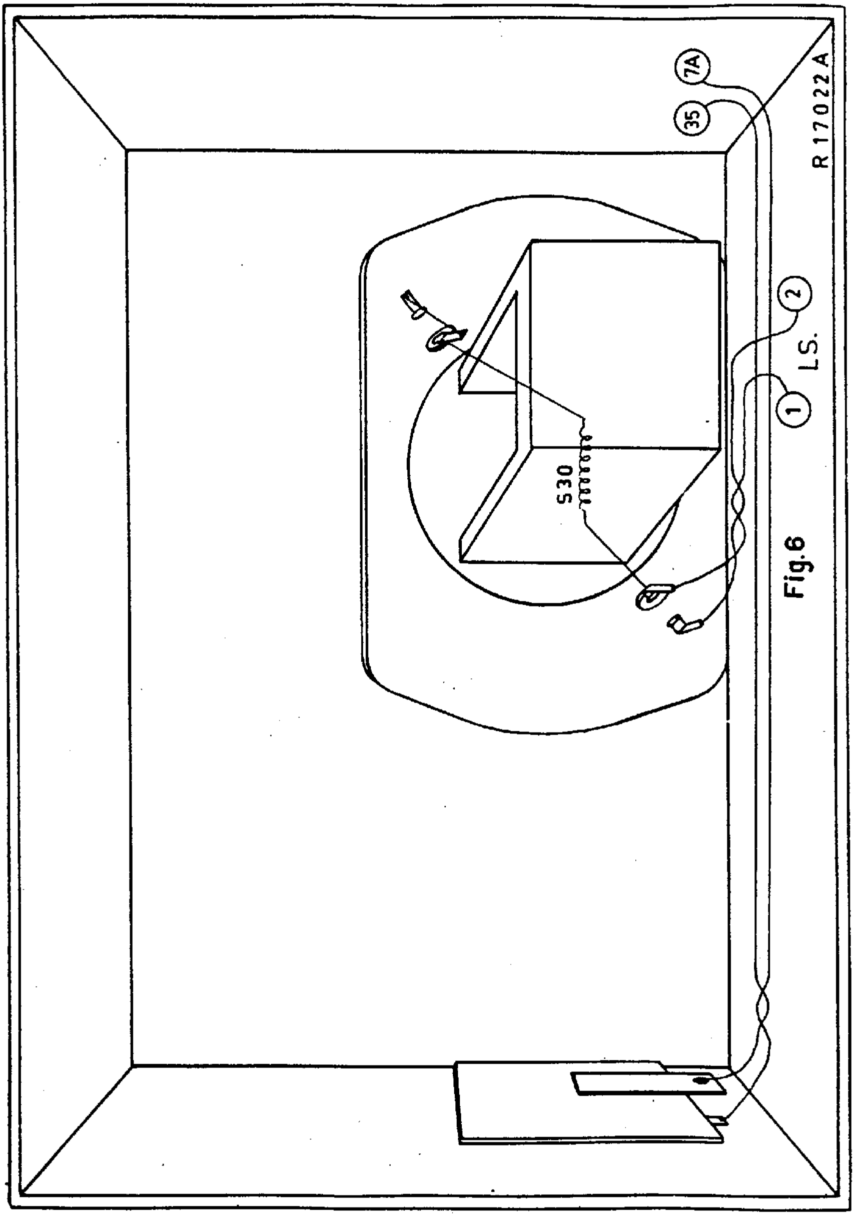


Fig.6