

# Trader

## SERVICE SHEET

A four-band AM/FM portable radio, the Panasonic TF-1405L can be operated either from internal batteries or from a.c. mains. A battery-saver circuit incorporated can be switched in when required; it functions by reducing the audio output circuit current drain. Conversion from internal battery to a.c. mains operation is automatic on insertion of the connector terminating the mains lead supplied.

Wavebands covered are long and medium on AM, using an internal ferrite aerial, short wave AM and the FM broadcast band on VHF, for both of which an external telescopic aerial provides reception.

Special features of the RF-1405L include a 4-LED display to indicate tuning, audio output level, battery condition and radio "on". These indicators can be switched out to prolong battery life. A six-button switch unit (actually comprising three switches with separate on and off buttons) is used for switching the LED display, operating the battery-saver circuit, and switching the radio on and off.

Controls are rotary, on the front face, for main tuning, fine tuning (band-spread) on SW, waveband selection, volume and tone. A slide switch at the receiver side selects radio or "phono", to switch out the radio when an external audio input is applied.

These inputs include those from an external amplifier, record player or tape recorder, via a 5-pin DIN socket. Outputs are to an external amplifier, via the DIN socket, and to an earphone or external loudspeaker.

The complete RF-1405L is housed in a two-part black and silver plastics cabinet. A hinged carrying handle is fitted.

The version described in this TRADER Service sheet is the RF-1405LBE, which is that for the UK. Versions for other areas differ mainly in the a.c. power supply, and intermediate frequencies.

### Brief Specification

Power supplies	4 HP11 (or equivalent) 1.5V batteries (6.0V d.c.) 240V 50Hz a.c. mains
Consumption	9W on 240V a.c. mains
Fuse	150mA anti-surge miniature cartridge (in mains input)
Indicators	4 LED
Wavebands	AM: LW 150 to 285kHz (1060 to 2000m) MW 520 to 1610kHz (187 to 587m) SW 5.9 to 18MHz (16.7 to 50.8m) FM: VHF 87.5 to 108MHz.
Intermediate frequencies	AM: 468kHz FM: 10.7MHz
Audio output	2W sinewave maximum.
Input	Record player (ceramic cartridge) or tape recorder (via 5-pin DIN socket)
Outputs	External amplifier or tape recorder (via 5-pin DIN socket) Earphone or external loudspeaker (impedance 8 ohms, via 3mm jack)
Loudspeaker	3½in (90mm) round, impedance 8 ohms
Transistors	15
Integrated circuit	1
Diodes	18
Dimensions and weight	<i>Height</i> <i>Width</i> <i>Depth</i> <i>Weight</i>
(handle retracted, without batteries)	6¼in      10½in      4in      3lb 8oz
	(158mm) (266mm) (100mm) (1.6kg)
Manufacturer	Matsushita Electric Trading Co. Ltd, Osaka, Japan.
UK Distribution and Service	National Panasonic (UK) Ltd., 308 to 318 Bath Road, Slough, Berks. Slough 34522.

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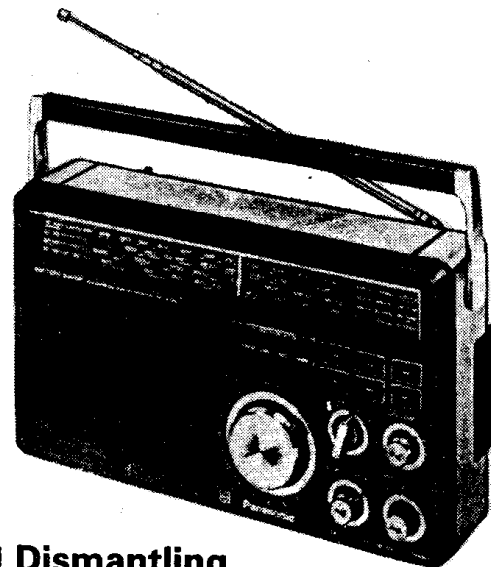
National

Panasonic

RF-1405L

Portable radio

Part 1



### Dismantling

(see interior view diagram)

1. Disconnect mains lead (if in use) from receiver, open battery compartment cover and remove batteries.
2. To remove the cabinet back (containing the power supply unit and the telescopic aerial):
  - (a) Remove 2 long screws from the back face entering holes A.
  - (b) Remove 4 short screws B from the cabinet bottom edge.
  - (c) Carefully part the back from the cabinet.
3. To remove the cabinet back completely, the d.c. power supply and telescopic aerial leads must be disconnected from the main p.c. board. Proceed as follows:
  - (a) Pull up the coloured square plastic connector body as far as it will go.
  - (b) Ease out the now freed corresponding colour lead.

(The leads are refitted in the reverse sequence; pressing down the square connector body locks in the lead.)
4. To remove the *main p.c. board*:
  - (a) Tune the receiver until the dial cursor is at the right hand end of the scale, as seen from the receiver back (see interior view).

(b) Remove the fine tuning, volume, tone and waveband control knobs from the receiver front.

(c) Disconnect the blue earth bonding lead from the p.c. board top left hand corner.

(d) Remove 5 washered screws C, free the cable forms, and ease out the p.c. board from the right hand edge, taking care when freeing the radio/phone switch toggle from the actuator D.

(Note that actuator D is a free sliding fit in the cabinet side; if completely dismantling the receiver or working on the main board for some time, it is advisable to remove the actuator and store it carefully, to avoid mislaying it.)

5. With the main p.c. board removed, to the extent of the leads, access is gained to the tuning sub-chassis, in which are housed the indicator LED and control switch p.c. boards.

6. To remove the *tuning chassis complete*, release 5 screws E (note the cable cleat secured by the lowest screw E), and ease off the tuning control knob.

7. To remove the *LED board*, prise apart the moulded lugs L at either side of the board.

8. To remove the *switch board*, release 2 screws F (these also secure the protective transparent cover.)

9. To remove the *loudspeaker*, release 3 screws G to free the speaker rim clamps.

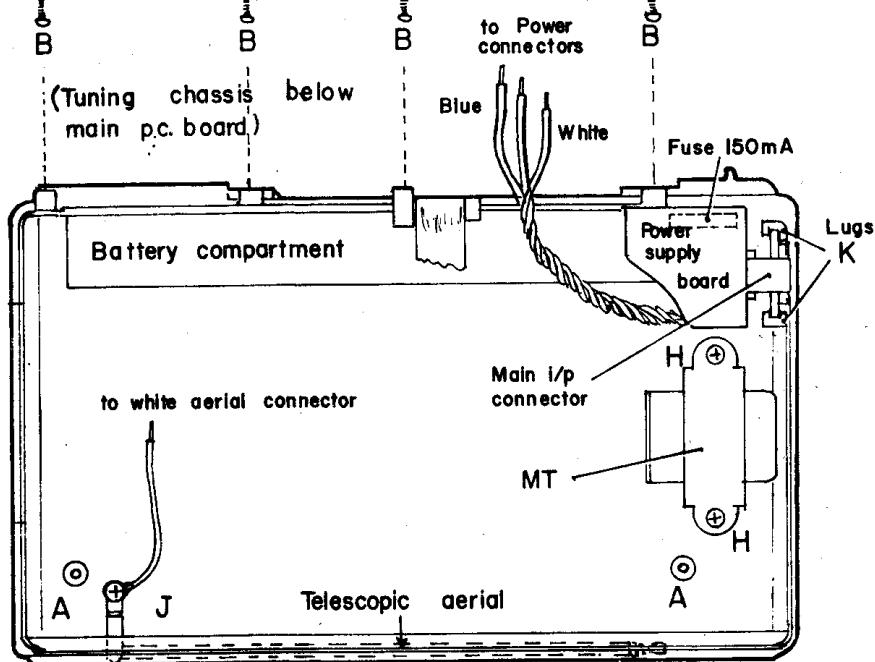
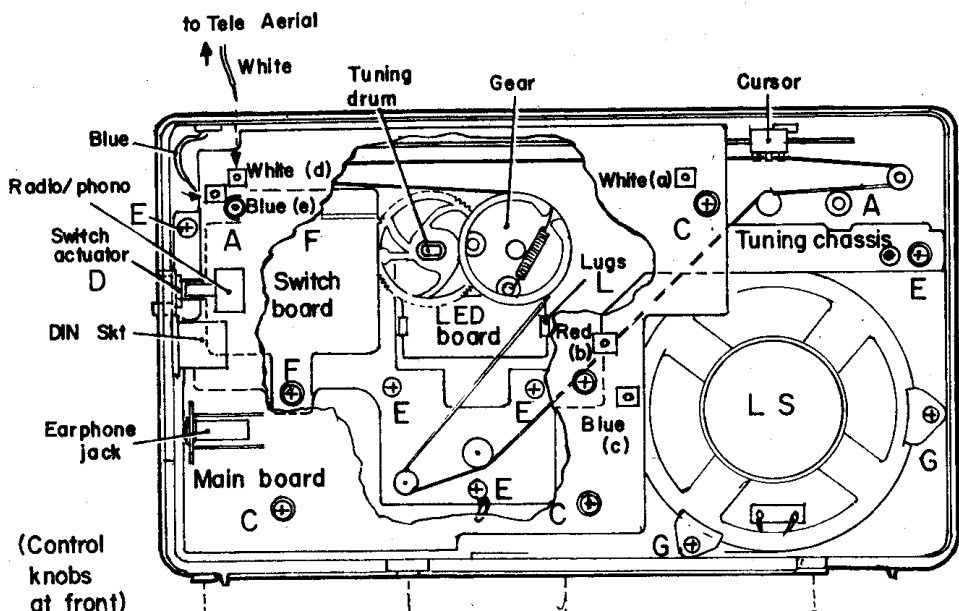
10. To remove the *mains power unit* assembly from the cabinet back, ease the integral mains input connector and p.c. board out from the moulded slots K in the cabinet back side.

10. To remove the *mains transformer*, release 2 screws H.

11. To free the *telescopic aerial* assembly, release screw J and pull aerial base out through cabinet top edge.

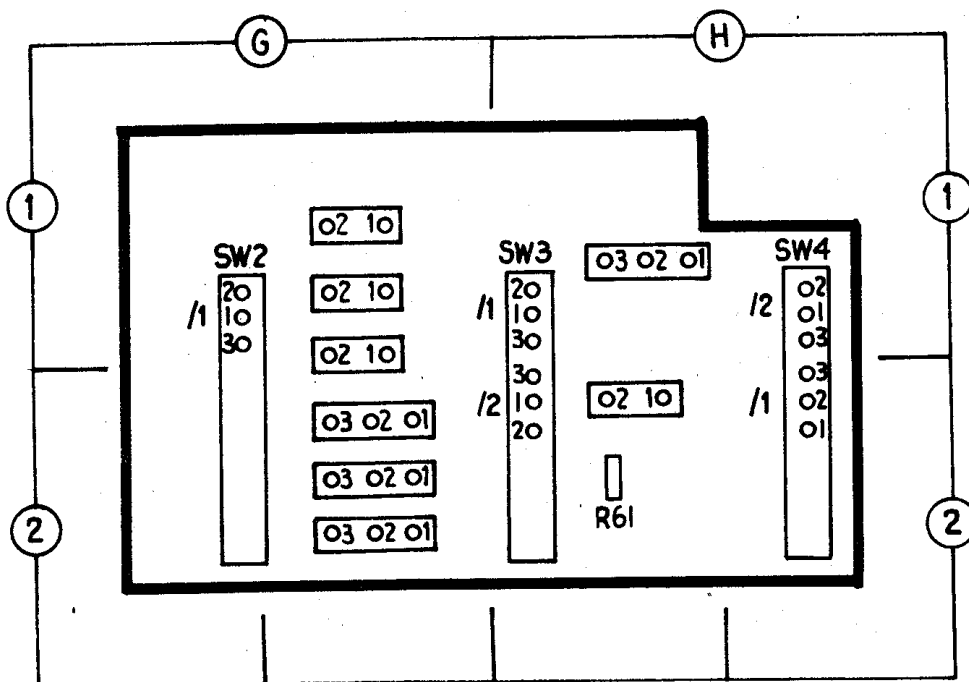
**RE-ASSEMBLY NOTE.** When refitting the main p.c. board, check that the tuning gang spindle is turned fully anti-clockwise and that the shaft end is correctly orientated so as to enter the corresponding hole in the tuning drum. Before tightening down the board screws C, rotate the tuning knob and check that the dial cursor correctly traverses the scale.

(Handle omitted)



Interior view

Control switch board



**Components**

VHF TUNER

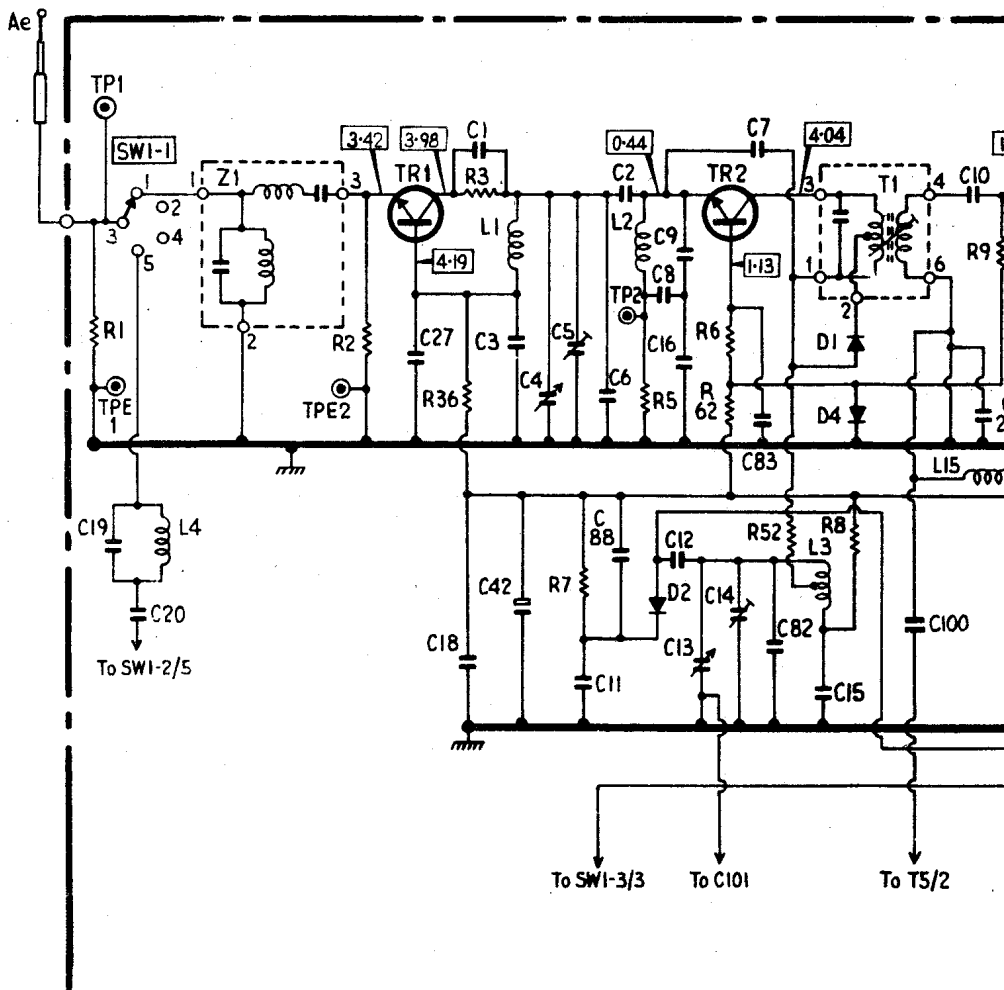
**Resistors**

- R1 56kΩ A1
- R2 5.6kΩ B1
- R3 330Ω B1
- R4 47Ω B1
- R5 560Ω B1
- R6 10kΩ B1
- R7 100kΩ A1
- R8 270Ω A1
- R9 22kΩ B1
- R10 1kΩ B1
- R15 47Ω A2
- R16 47kΩ B1
- R17 39kΩ B1
- R18 22kΩ B2
- R19 470Ω B2
- R20 220kΩ A1
- R21 560kΩ A1
- R22 1.5kΩ B1
- R23 10Ω B1
- R24 47Ω A2
- R25 470kΩ A1
- R26 47kΩ A1
- R27 82kΩ A2
- R28 15MΩ A2
- R29 22kΩ A2
- R30 2.2kΩ A2
- R31 680Ω A2
- R32 680Ω A2
- R36 150Ω B1
- R51 180kΩ B1
- R52 6.8Ω A1
- R55 560Ω B1
- R56 220Ω B1
- R57 1.2kΩ B1
- R58 100Ω B1

**Capacitors**

- C1 0.001uF B1
- C2 3.5pF B1
- C3 0.022uF B1
- C4 Tuning A1
- C5 Trimmer A1
- C6 18pF B1
- C7 10pF B1
- C8 330pF B1
- C9 56pF B1
- C10 0.01uF B1
- C11 330pF A1
- C12 10pF A1
- C13 Tuning A1
- C14 Trimmer A1
- C15 0.01uF A1

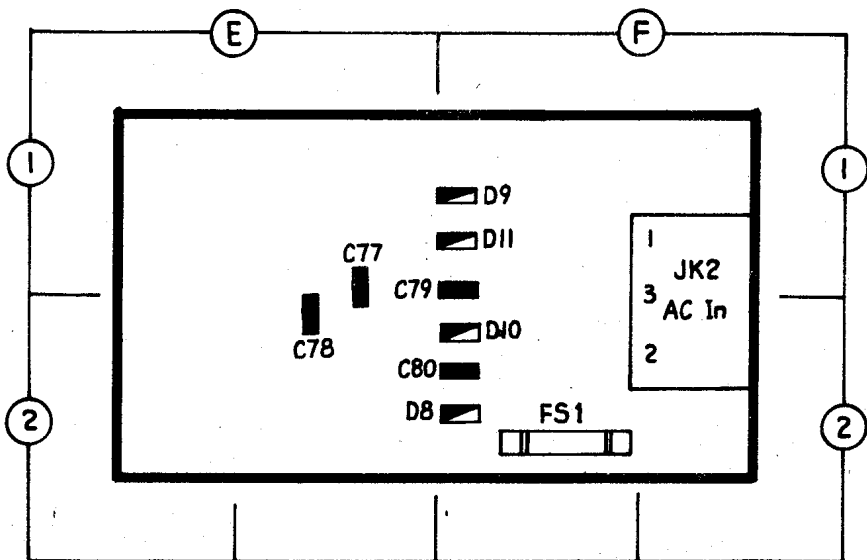
C	19	20	27	18	1	3	4	5	6	8	16	9	14	7	15	10
R	1		2	36	3	7	5		6	62	52	8				9
L	4					1			2				3	T1		15



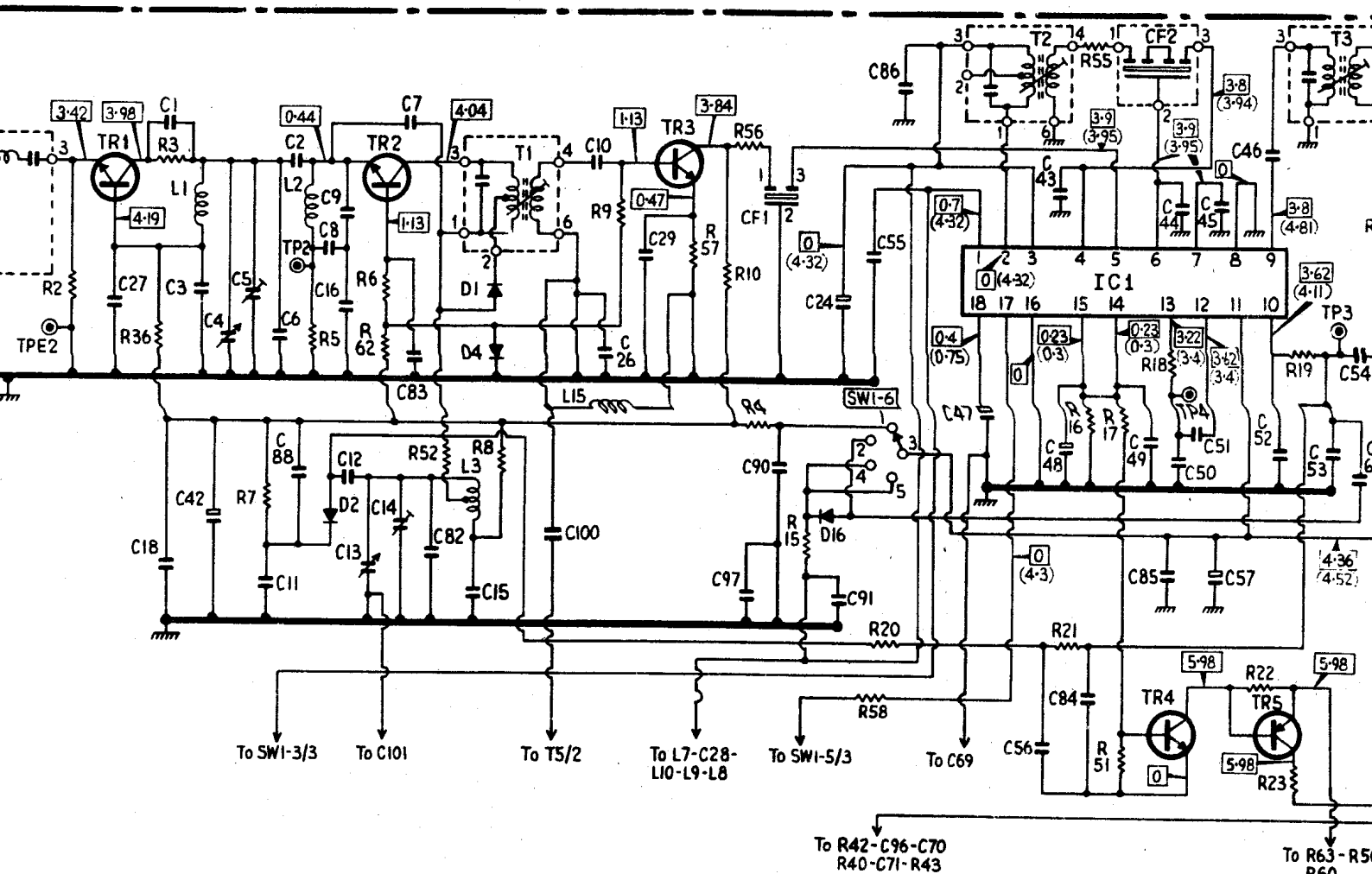
- C16 0.01uF B1
- C18 0.01uF B1
- C19 4pF A1

- C20 27pF A1
- C24 1uF B1
- C26 0.01uF B1
- C27 0.01uF B1
- C29 0.01uF B1
- C42 100uF B1
- C43 220pF B1
- C44 0.022uF B2
- C45 0.047uF B2
- C46 0.01uF B2
- C47 100uF B1
- C48 4.7uF B1
- C49 0.022uF B1
- C50 0.068uF B1
- C51 0.1uF B1
- C52 0.01uF B1
- C53 0.022uF B1
- C54 0.047uF A1
- C55 5pF A2
- C56 0.068uF A1
- C57 470uF A2
- C59 1uF A2
- C60 0.022uF A2
- C61 0.001uF A2
- C62 33uF A2
- C67 0.068uF A1
- C82 10pF A1
- C83 0.01uF B1
- C84 330pF A1
- C85 0.047uF B1
- C86 330pF B2
- C88 100pF A1
- C90 0.01uF A2
- C91 0.022uF A2

**Power supply board**



27	18	1	4	5	6	8	16	9	14	7	15	10	26	29	97	90	91	24	55	86	47	43	49	50	44	45	46	53	67
2	36	3	7	5	6	52	8	9	57	10	56	4	15	58	20	21	55	17	51	18	22	23	19						
		1		2		3	T1	15								T2													T3



C20	27pF	A1
C24	1uF	B1
C26	0.01uF	B1
C27	0.01uF	B1
C29	0.01uF	B1
C42	100uF	B1
C43	220pF	B1
C44	0.022uF	B2
C45	0.047uF	B2
C46	0.01uF	B2
C47	100uF	B1
C48	4.7uF	B1
C49	0.022uF	B1
C50	0.068uF	B1
C51	0.1uF	B1
C52	0.01uF	B1
C53	0.022uF	B1
C54	0.047uF	A1
C55	5pF	A2
C56	0.068uF	A1
C57	470uF	A2
C59	1uF	A2
C60	0.022uF	A2
C61	0.001uF	A2
C62	33uF	A2
C67	0.068uF	A1
C82	10pF	A1
C83	0.01uF	B1
C84	330pF	A1
C85	0.047uF	B1
C86	330pF	B2
C88	100pF	A1
C90	0.01uF	A2
C91	0.022uF	A2

C93	0.1uF	A2
C96	0.0015uF	A2
C97	100pF	B1
C100	100pF	B1

**Transistors**

Tr1	2SC1674	B1
Tr2	2SC1674	B1
Tr3	2SC1675	B1
Tr4	2SC828	B1
Tr5	2SA564	B1
Tr6	2SC828	A2

**Integrated circuit**

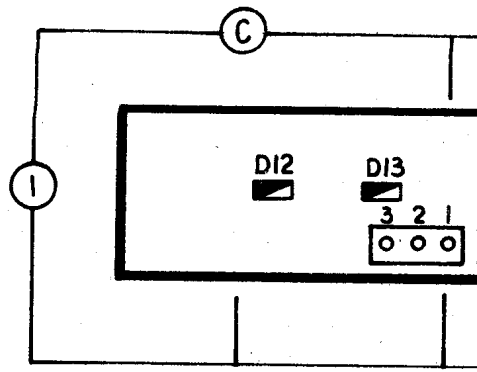
IC1	AN7220A	B2
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**Diodes**

D1	OA90	B1
D2	RVDS113	A1
D4	RVDVD12-	
	7LE	B1
D16	OA90	A2

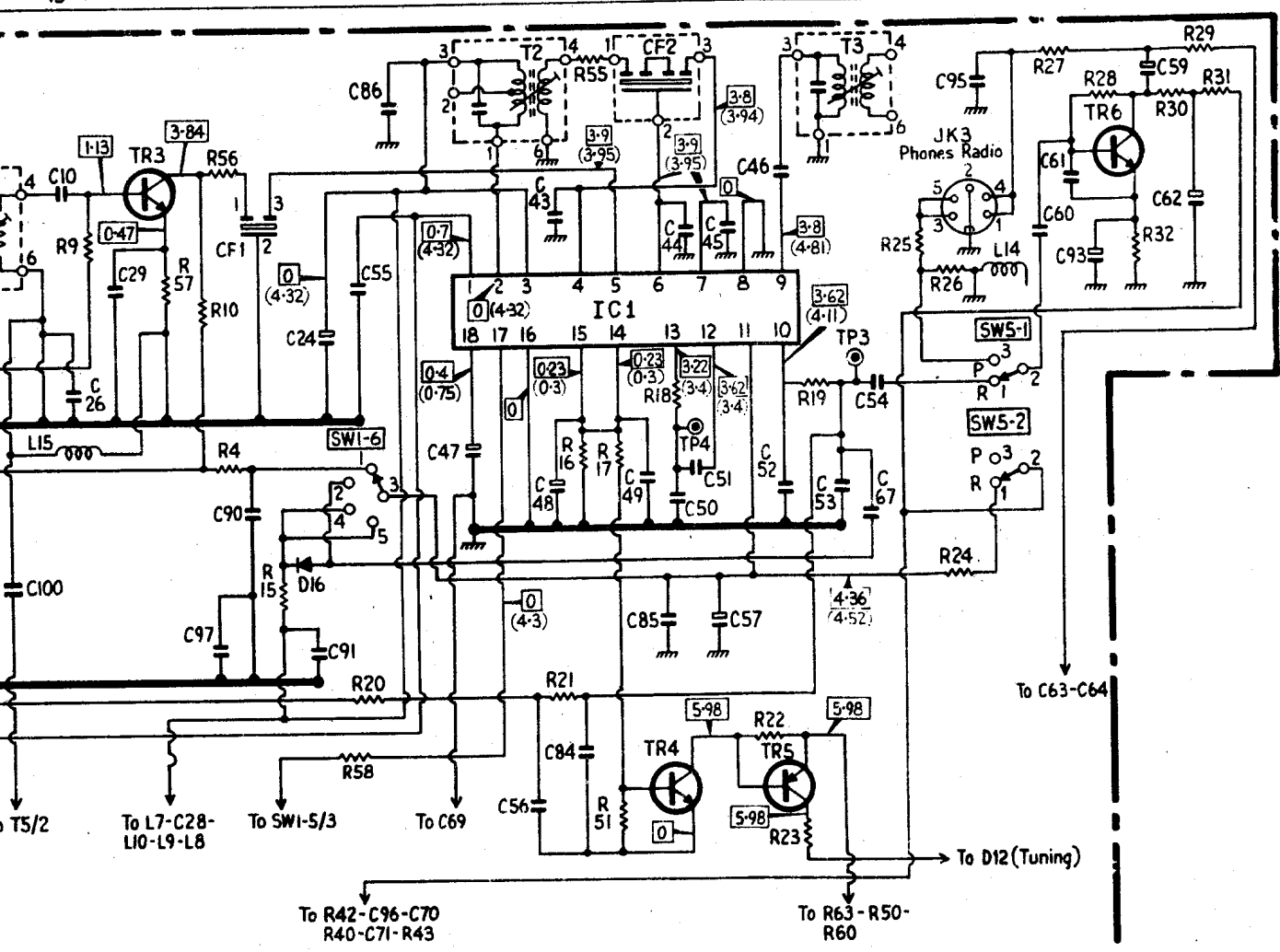
VHF tu

LED b



(Continued in TRADER Service sheet 3)

100	10	26	29	97	90	91	24	55	86	47	56	48	84	49	85	50	44	45	46	53	67	54	95	60	61	93	59	62		
	9	57	10	56	4	15	58	20			21	16	55	17	51	18		22	23	19		25	26	24	27	28	32	30	29	31
	15																													



VHF tuner

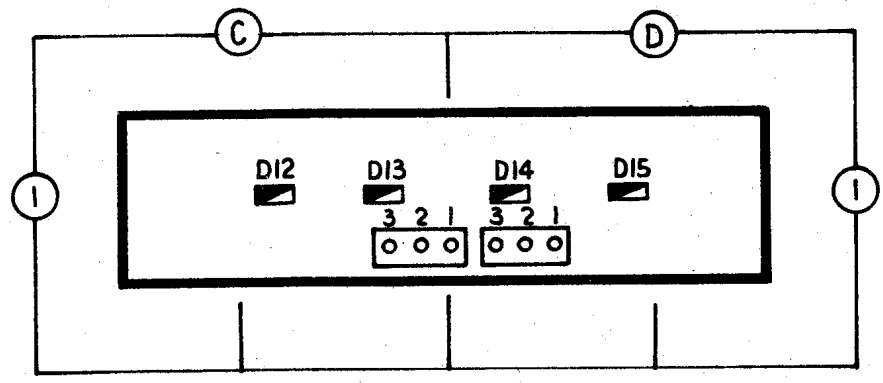
- C93 0.1uF A2
- C95 0.0015uF A2
- C97 100pF B1
- C100 100pF B1

- Transistors**
- Tr1 2SC1674 B1
  - Tr2 2SC1674 B1
  - Tr3 2SC1675 B1
  - Tr4 2SC828 B1
  - Tr5 2SA564 B1
  - Tr6 2SC828 A2

- Integrated circuit**
- IC1 AN7220A B2

- Diodes**
- D1 OA90 B1
  - D2 RVDS113 A1
  - D4 RVDVD12-7LE B1
  - D16 OA90 A2

LED board



(Continued in TRADER Service sheet 3463)

# Trader

## SERVICE SHEET

(Continued from TRADER Service sheet 3462)

### Alignment

**Equipment required**

AM signal generator covering 145 to 1500kHz, 5.9 to 10.7MHz, modulated 400Hz at 30%.

FM signal generator covering 10.7MHz, 87 to 106MHz, modulation 400Hz at 30%, deviation  $\pm 25$ kHz.

Sweep marker generator, sweeping 10.7MHz  $\pm 100$ kHz

Oscilloscope

Suitable output meter (VTVM)

Input matching components as detailed in text

**Preliminaries**

Allow receiver and test equipment to warm up before starting alignment. Progressively reduce signal input as circuits come into alignment so as to prevent agc action on AM, "limiting" on FM. Check that radio/phono switch is set to "Radio". Ensure that a known good battery or 6.0V d.c. supply is used to power the receiver.

Set volume control to maximum, tone control to midpoint, and LED

indicator switch to OFF. Check that dial cursor travels correctly to limits at either end of scale.

For location of coils and trimmers, see alignment and main p.c. board diagrams.

**Procedure**  
**AM**

**I.F. Stages**

Select "MW". Tune receiver to a no-signal point on the scale. Connect AM signal generator output via an inductive loop to the ferrite aerial. Connect output meter across loud-speaker terminals. Tune signal generator to 468kHz, modulated, and adjust AM IFT T2 for maximum.

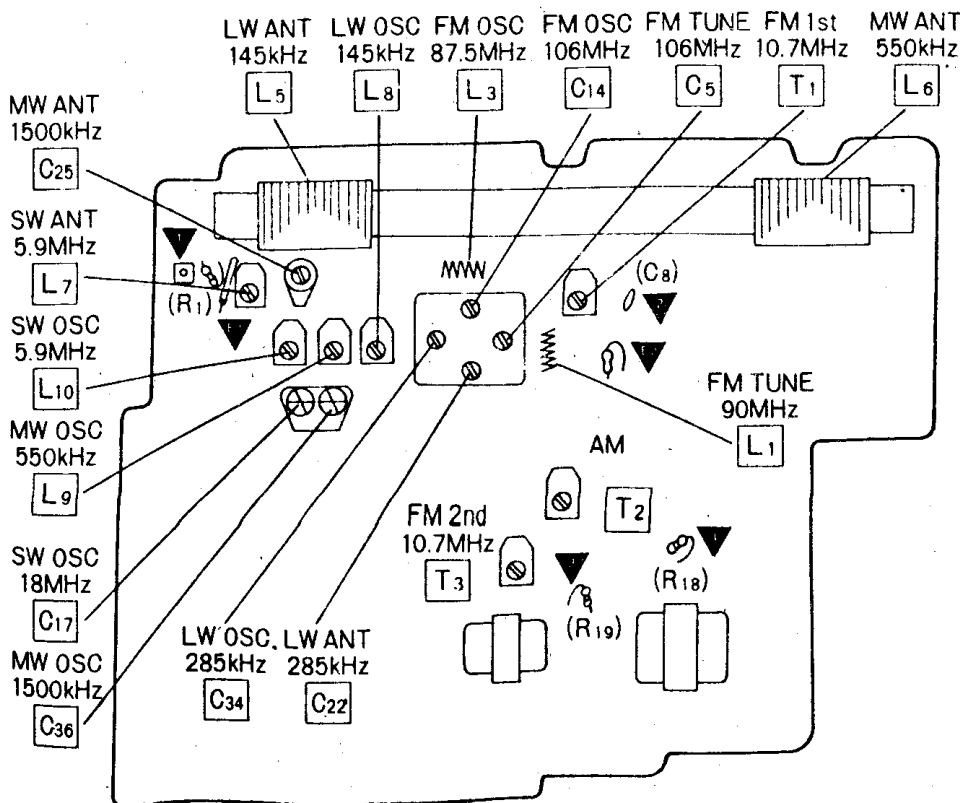
**R.F. Stages**

Connect AM signal generator output, modulated, via inductive loop to ferrite aerial for LW and MW ranges. Connect output meter across loud-speaker terminals.

LW (select "LW")

1. Tune signal generator and re-

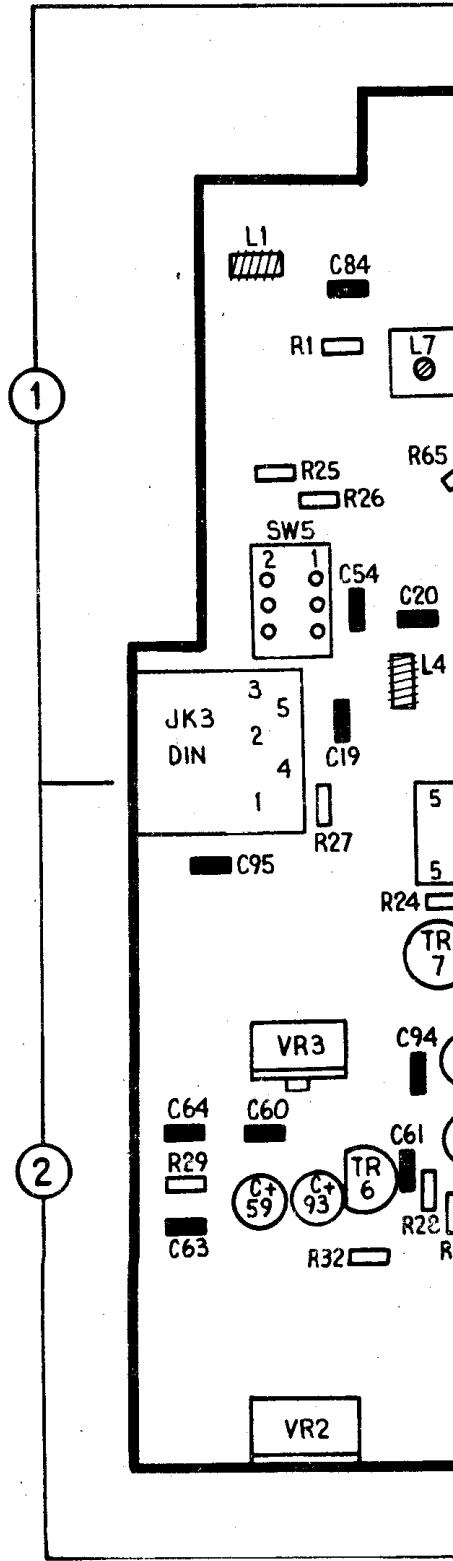
### Alignment



# 3463

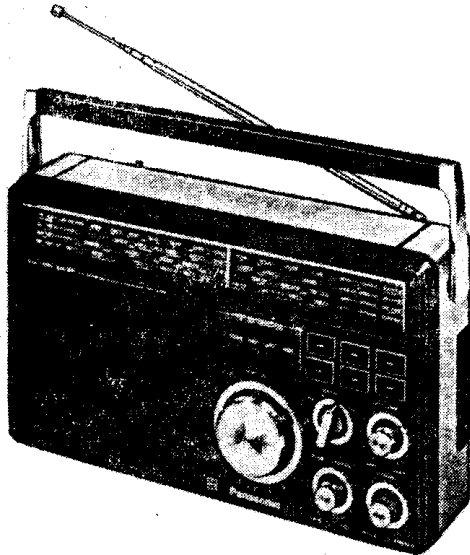
National  
**Panasonic**  
**RF-1405L**

Portable radio  
Part 2



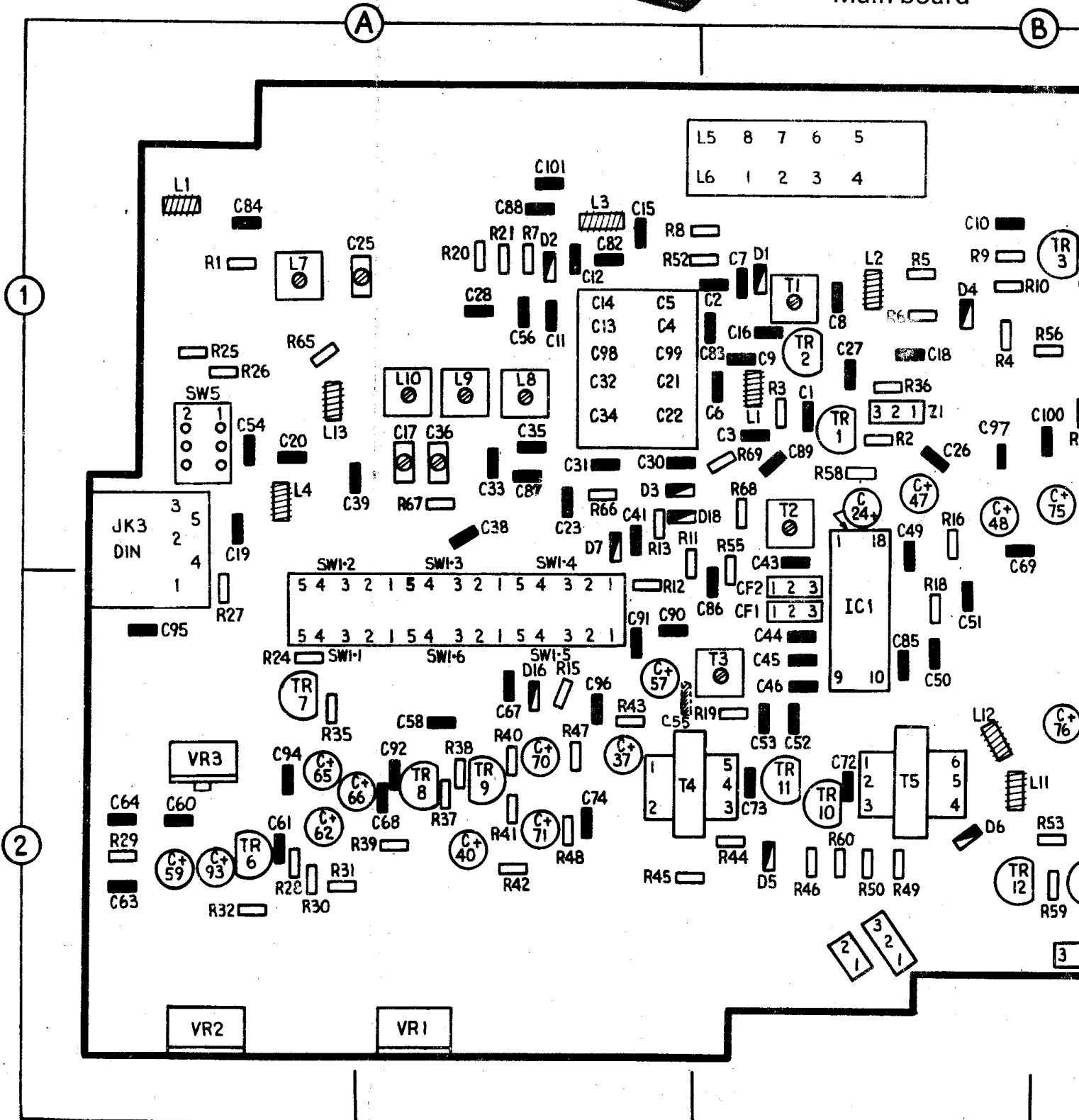
# 3463

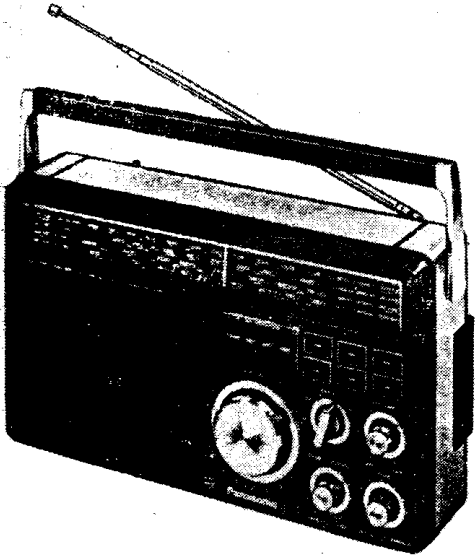
National  
**Panasonic**  
**RF-1405L**  
 Portable radio  
 Part 2



1. Tune signal generator and receiver to 145kHz. Adjust LW oscillator coil **L8** for maximum result.
2. Retune generator and receiver to 285kHz. Adjust LW oscillator trimmer **C34** for maximum result.
3. Repeat steps 1 and 2 for optimum result.
4. Tune signal generator and receiver to 145kHz. Adjust LW aerial coil **L5** (by sliding this along ferrite rod) for maximum result.
5. Retune generator and receiver to 285kHz. Adjust LW aerial trimmer **C22** for maximum result.
6. Repeat steps 4 and 5 for optimum result.

Main board





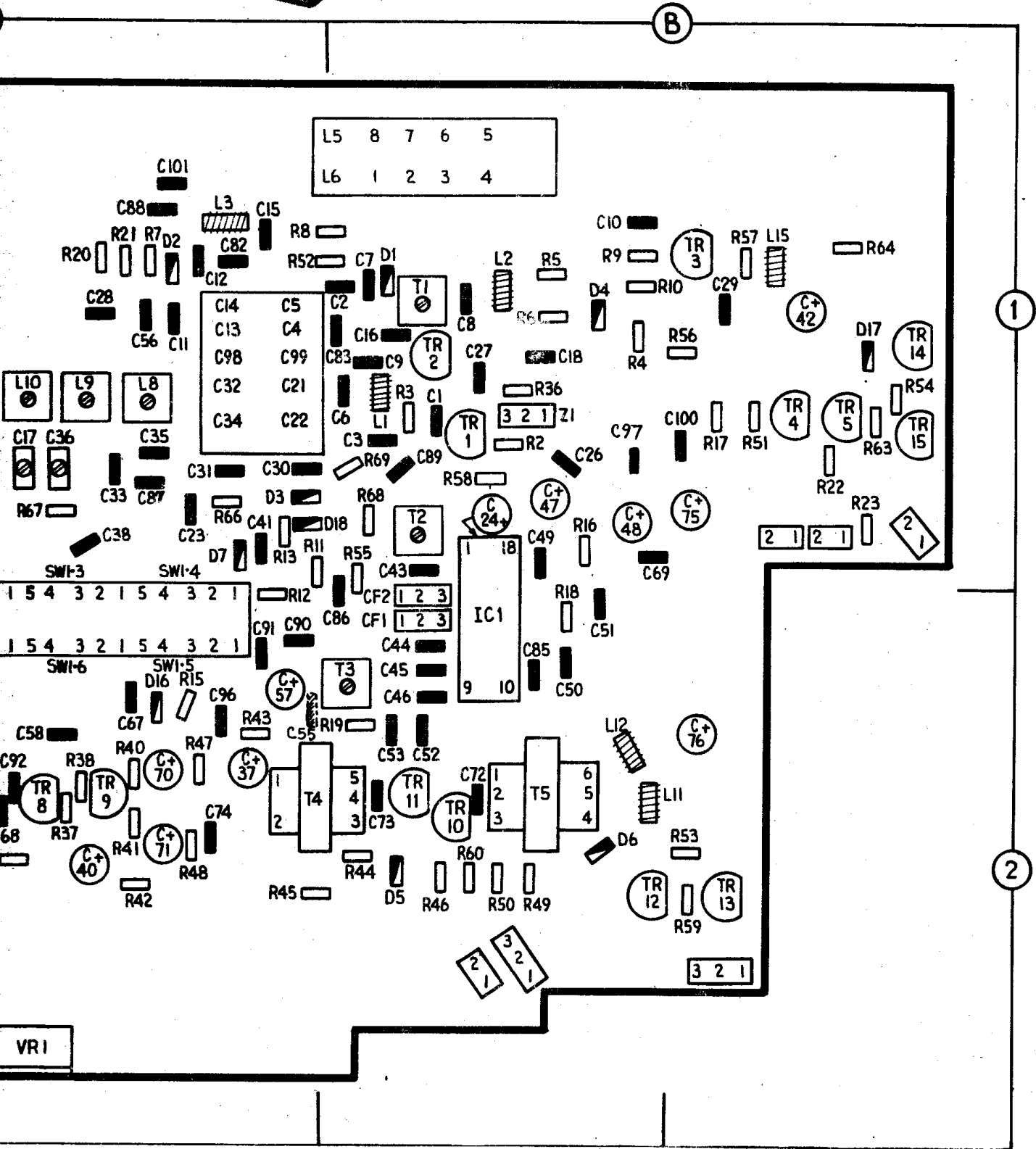
1. Retune generator and receiver to 145kHz. Adjust LW oscillator coil **L8** for maximum.
2. Retune generator and receiver to 285kHz. Adjust LW oscillator trimmer **C34** for maximum.
3. Repeat steps 1 and 2 for optimum result.
4. Tune signal generator and receiver to 145kHz. Adjust LW aerial coil **L5** (by sliding this along ferrite rod) for maximum.
5. Retune generator and receiver to 285kHz. Adjust LW aerial trimmer **C22** for maximum.
6. Repeat steps 4 and 5 for optimum result.

MW (select "MW")

7. Tune signal generator and receiver to 550kHz. Adjust MW oscillator coil **L9** for maximum.
8. Retune generator and receiver to 1500kHz. Adjust MW oscillator trimmer **C36** for maximum.
9. Repeat steps 7 and 8 for optimum result.
10. Tune signal generator and receiver to 550kHz. Adjust MW aerial coil **L6** (on ferrite rod) for maximum.
11. Retune generator and receiver to 1500kHz. Adjust MW aerial trimmer **C25** for maximum.

Main board

(Continued overleaf)





**Alignment (continued)**

12. Repeat steps 10 and 11 for optimum result.

**SW (select "SW")**

Inject modulated SW signals from AM generator to the telescopic aerial input point on the main p.c. board via a 10pF ceramic capacitor. Connect output meter across loudspeaker terminals.

13. Tune signal generator and receiver to 5.9MHz. Adjust SW oscillator coil L10 for maximum.

14. Retune generator and receiver to 18MHz. Adjust SW oscillator trimmer C17 for maximum.

15. Repeat steps 13 and 14 for optimum result.

16. Tune signal generator and receiver to 5.9MHz. Adjust SW aerial coil L7 for maximum.

**FM (select "FM")**

**I.F. Stages**

Connect FM signal generator via sweep marker generator, set to sweep 10.7MHz±100kHz, to test point 2 (junction R560/C8) via an 0.001uF capacitor. Connect oscilloscope probe to test point 3 (junction R19/C53/C54). Tune receiver to a no-signal point on the dial scale.

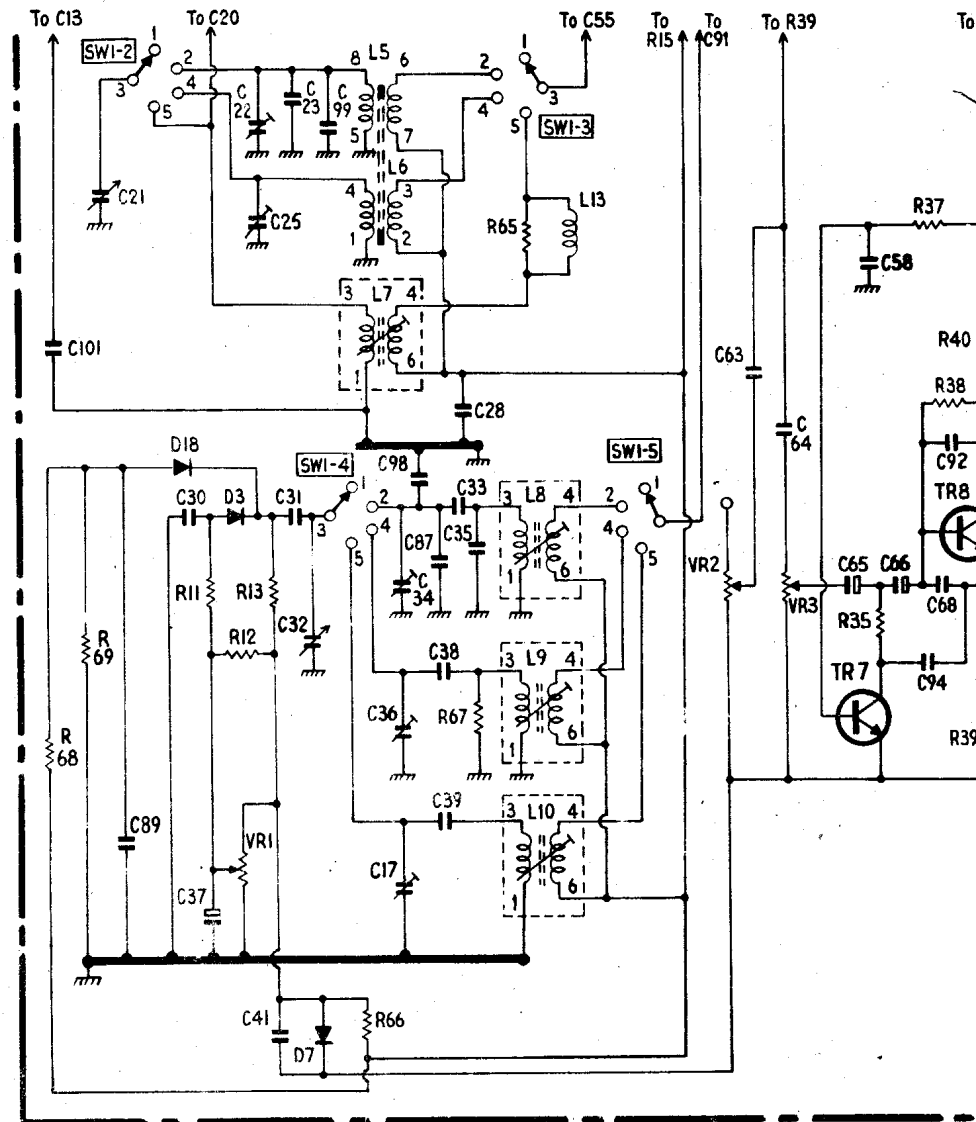
1. Adjust first AM IFT T1 for maximum amplitude of overall response at 10.7MHz.
2. Adjust second AM IFT (discriminator) T3 for symmetrical "S" curve with the straight part passing through zero at 10.7MHz.

**R.F. Stages**

Connect FM signal generator output via FM dummy aerial to telescopic aerial input point on main p.c. board. Connect output meter across loudspeaker terminals.

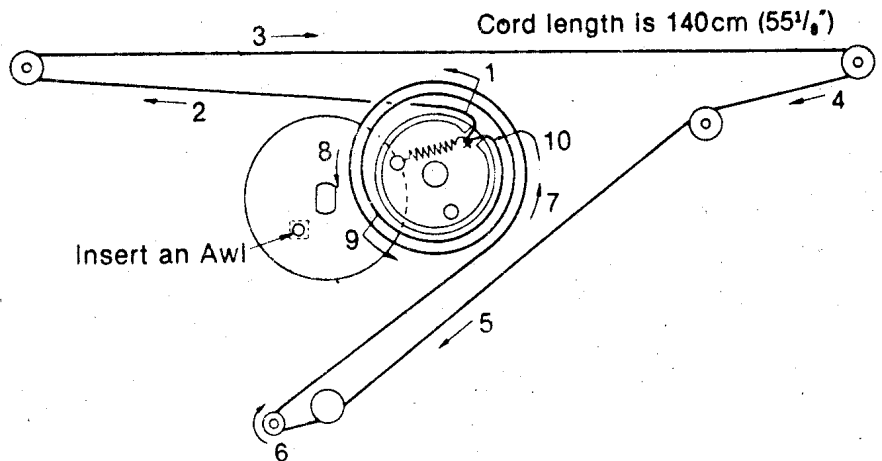
1. Tune signal generator to 87.5MHz, and receiver to the low frequency end of the scale. Adjust FM oscillator coil L3 (by varying turns spacing) for maximum.
2. Retune generator and receiver to 106MHz. Adjust FM oscillator trimmer C14 for maximum.
3. Repeat steps 1 and 2 for optimum result.
4. Tune signal generator and receiver to 90MHz. Adjust FM "Tune" coil L1 for maximum.
5. Retune generator and receiver to 106MHz. Adjust FM "Tune" trimmer C5 for maximum.
6. Repeat steps 4 and 5 for optimum result.

C	101	89	37	22	23	99	17	34	98	87	39	28	35	63	58	94	92
R	68	69	11	12	13	66	67	65	VR2	VR3	35	37	38				
L						5	6	7	8	9	10						

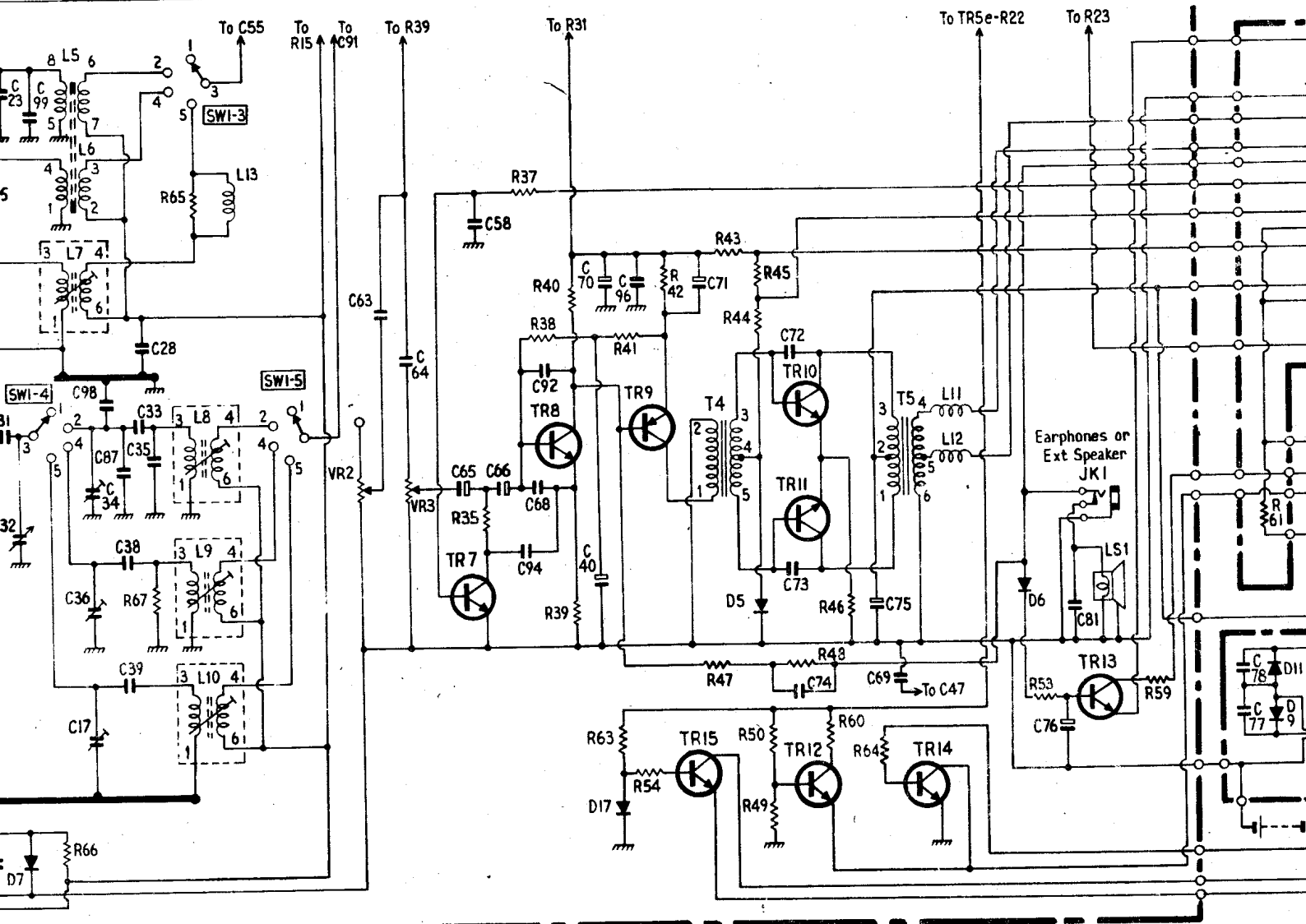


AM Tuner, audio output, power supply

**Dial cord routing**



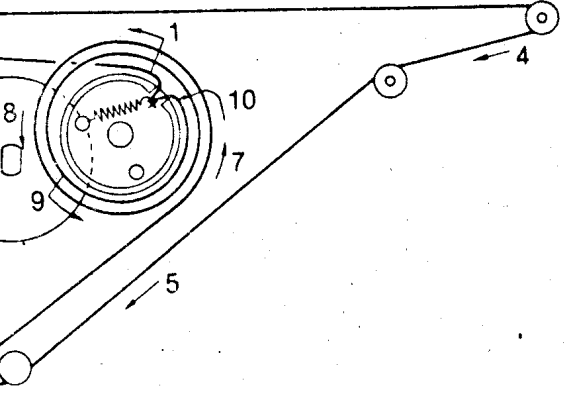
3	99	17	34	98	87	39	28	35	63	58	94	92	70	96	71	72	74	75	69	76	81	78	77	
31	32	17	36	98	38	39	33		64	65	66	68	40	63	42	43	45	48	49	46	64	53	59	61
66		67	65						VR2	VR3	35	37	40	63	42	43	44	50	49	60	64			
5	6	7	8	9	10										T4					T5	11	12		



audio output, power supply

Dial cord routing

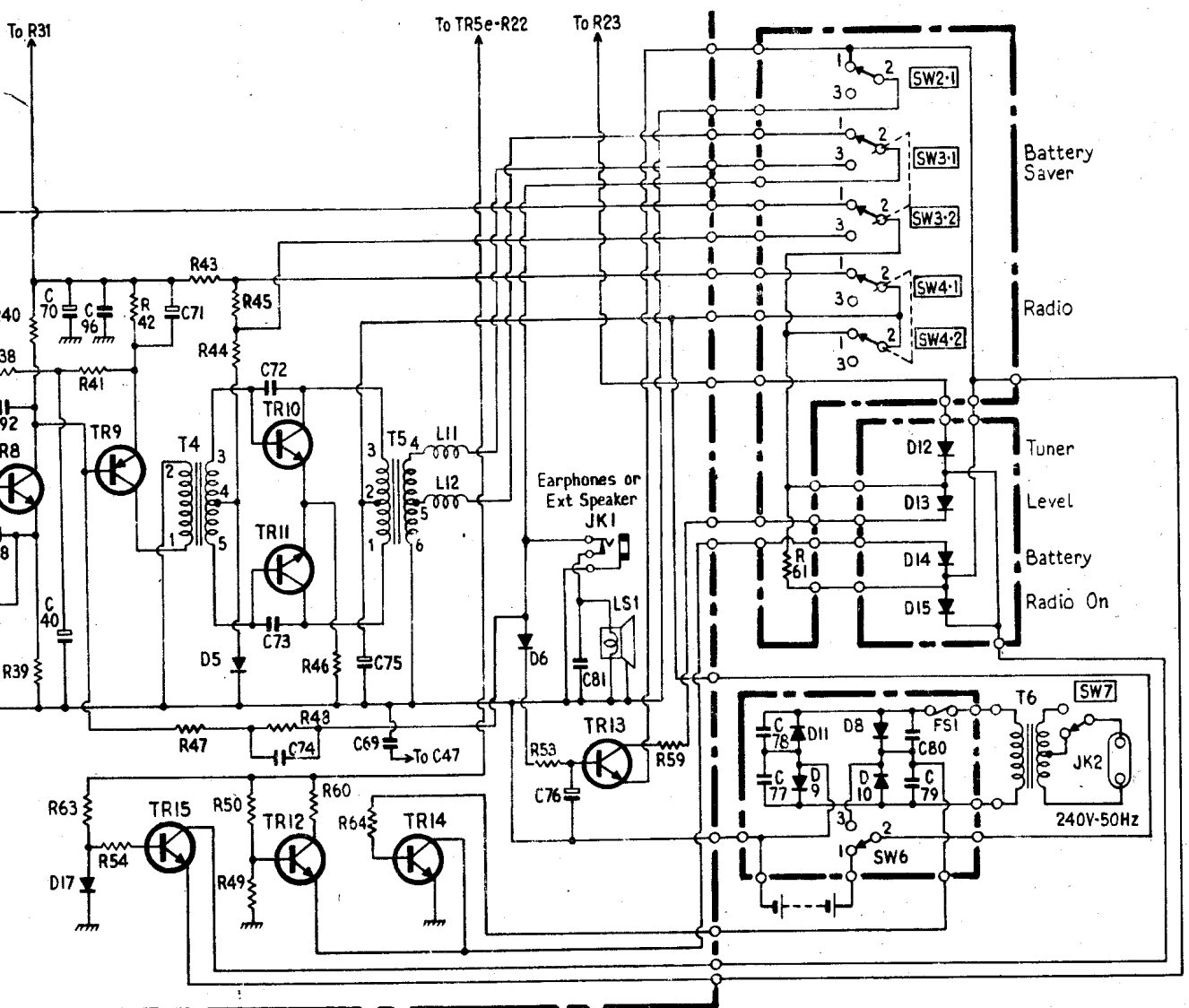
Cord length is 140cm (55 1/8")



Components

LMS (AM) TUNER AND AUDIO OUTPUT, POWER SUPPLY					
<b>Resistors</b>					
R11	220kΩ A1	R54	33kΩ B1	C28	0.68uF A1
R12	39kΩ A2	R59	680Ω B2	C30	330pF A1
R13	470kΩ A1	R60	820Ω B2	C31	18pF A1
R35	2.7kΩ A2	R61	10Ω H2	C32	Tuning A1
R37	220kΩ A2	R63	2.2kΩ B1	C33	220pF A1
R38	1MΩ A2	R64	47kΩ B1	C34	Trimmer A1
R39	150Ω A2	R65	1kΩ A1	C35	140pF A1
R40	22kΩ A2	R66	3.3kΩ A1	C36	Trimmer A1
R41	68kΩ A2	R67	100kΩ A1	C37	4.7uF A2
R42	390Ω A2	R68	47kΩ B1	C38	370pF A1
R43	100Ω A2	R69	15kΩ B1	C39	3900pF A1
R44	820Ω B2	<b>Potentiometers</b>		C40	2.2uF A2
R45	560Ω A2	VR1	50kΩ A2	C41	0.01uF A1
R46	0.47Ω B2	VR2	20kΩ A2	C58	0.001uF A2
R47	220kΩ A2	VR3	50kΩ A2	C63	0.047uF A2
R48	1MΩ A2	<b>Capacitors</b>		C64	0.033uF A2
R49	5.6kΩ B2	C17	Trimmer A1	C65	1uF A2
R50	2.7kΩ B2	C21	Tuning A1	C66	1uF A2
R53	6.8Ω B2	C22	Trimmer A1	C68	0.0047uF A2
		C23	47pF A1	C69	0.022uF B1
		C25	Trimmer A1	C70	470uF A2
				C71	47uF A2
				C72	0.022uF B1

92	70	96	71	72	74	75	69	76	78	80
68	40	63	42	73	45	48	49	81	77	79
7	38	39	41	54	43	44	50	53	59	61
				T4			T5	11	12	T6



**Components**

**LMS (AM) TUNER AND AUTO OUTPUT, POWER SUPPLY**

**Resistors**

R11	220kΩ	A1
R12	39kΩ	A2
R13	470kΩ	A1
R35	2.7kΩ	A2
R37	220kΩ	A2
R38	1MΩ	A2
R39	150Ω	A2
R40	22kΩ	A2
R41	68kΩ	A2
R42	390Ω	A2
R43	100Ω	A2
R44	820Ω	B2
R45	560Ω	A2
R46	0.47Ω	B2
R47	220kΩ	A2
R48	1MΩ	A2
R49	5.6kΩ	B2
R50	2.7kΩ	B2
R53	6.8Ω	B2

R54	33kΩ	B1
R59	680Ω	B2
R60	820Ω	B2
R61	10Ω	H2
R63	2.2kΩ	B1
R64	47kΩ	B1
R65	1kΩ	A1
R66	3.3kΩ	A1
R67	100kΩ	A1
R68	47kΩ	B1
R69	15kΩ	B1

**Potentiometers**

VR1	50kΩ	A2
VR2	20kΩ	A2
VR3	50kΩ	A2

**Capacitors**

C17	Trimmer	A1
C21	Tuning	A1
C22	Trimmer	A1
C23	47pF	A1
C25	Trimmer	A1

C28	0.68uF	A1
C30	330pF	A1
C31	18pF	A1
C32	Tuning	A1
C33	220pF	A1
C34	Trimmer	A1
C35	140pF	A1
C36	Trimmer	A1
C37	4.7uF	A2
C38	370pF	A1
C39	3900pF	A1
C40	2.2uF	A2
C41	0.01uF	A1
C58	0.001uF	A2
C63	0.047uF	A2
C64	0.033uF	A2
C65	1uF	A2
C66	1uF	A2
C68	0.0047uF	A2
C69	0.022uF	B1
C70	470uF	A2
C71	47uF	A2
C72	0.022uF	B1

C73	0.01uF	B1
C74	0.0033uF	A2
C75	220uF	B1
C76	1uF	B2
C77	0.01uF	E1
C78	0.01uF	E2
C79	0.01uF	E1
C80	0.01uF	E2
C81	0.047uF	Across speaker
C87	3pF	A1
C89	27pF	B1
C92	470pF	A2
C94	0.068uF	A2
C96	0.01uF	A2
C98	5pF	A1
C99	7pF	A1
C101	100pF	A1

**Transistors**

Tr7	2SC828	A2
Tr8	2SC828	A2
Tr9	2SA564	A2

Tr10	2SC1383	B2
Tr11	2SC1383	B2
Tr12	2SC828	B2
Tr13	2SC828	B2
Tr14	2SC828	B1
Tr15	2SC828	B1

**Diodes**

D3	RVSD113	A1
D5	RVDVD1170LE	B2
D6	OA90	B2
D7	RVDVD1272LE	A1
D8	RVDW06B	F2
D9	RVDW06B	F1
D10	RVDW06B	F2
D11	RVDW06B	F1
D12	RADSLP1011	C1
D13	RADSLP1011	C1
D14	RADSLP1011	D1
D15	RADSLP1011	D1
D17	RVDVD1272LE	B1
D18	RVSD113	B1

**Trader SERVICE SHEET 3463 National Panasonic RF-1405LB radio (2)**