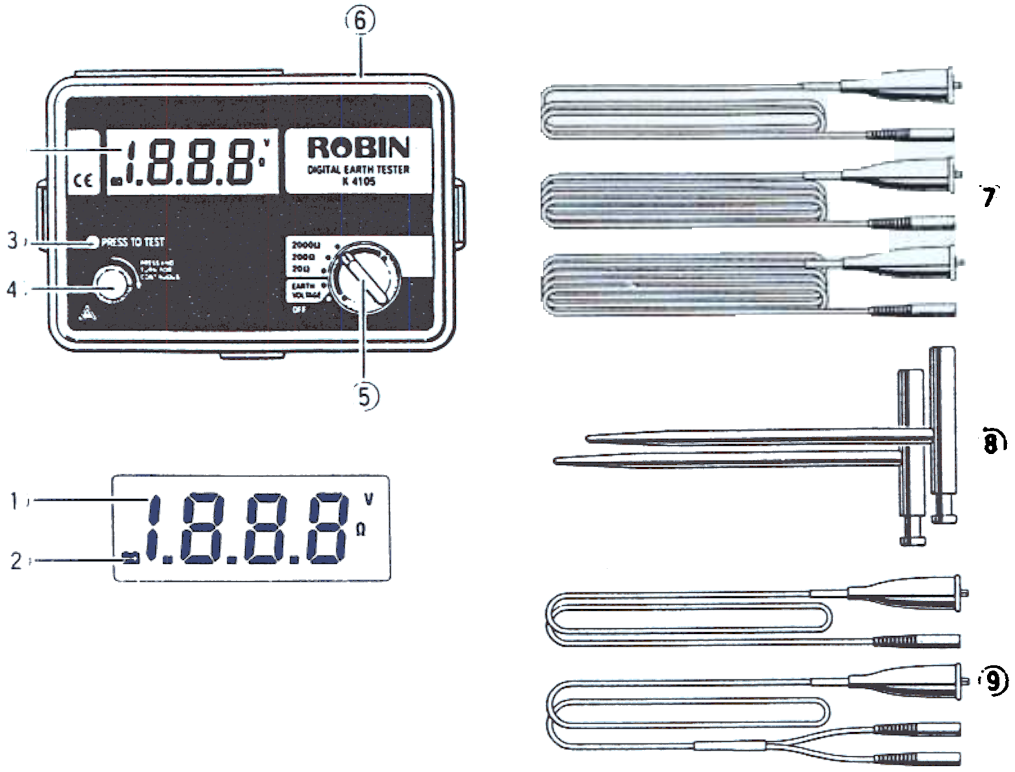
K4105

DIGITAL EARTH RESISTANCE TESTER



1. LCD Display. 2. Battery Replacement Symbol (Low Battery Symbol). 3. Green Measurement LED.
4. "Press To Test" Button. 5. Range Switch. 6. Terminals for Lead Connection. 7. Test Leads.
8. Auxiliary Earth Spikes. 9. Simplified measurement probe.

	Components of the product supplied. Description.	Visually inspect for clean unmarked appearance and for the following.
1.	K4105 Digital Earth Resistance Tester.	Calibration accuracy within the Lo and Hi 70% limits detailed on page 2. Operational integrity.
2.	Set of 3 Test Leads. Red, green and yellow, packed in a clear plastic bag.	Electrical continuity.
3.	2 x Auxiliary Earth Spikes.	Visual inspection.
4.	Set of 2 Simplified Measurement Probes. Red and green, packed in a clear plastic bag.	Electrical continuity.
5.	Certificate of Conformity.	Standard Robin form with correct serial number.
6.	Instruction Manual.	Correct Instruction Manual.
7.	Warranty Registration Card.	Standard Robin Warranty Registration Card.
8.	Carrying Strap in clear stapled bag.	Correct strap.
9.	6 x R6 1.5 Volt Alkaline Batteries	Correct type.
10.	Grey, PVC Carry Case containing a Foam Insert with 2 Zipped Compartments containing all the above.	Correct Case. Check zips function.
11.	Carton.	Correct carton with current address, logos and references.

K4105 Digital Earth Resistance Tester

Range	Tol %	+Dig	Applied	Tol +/-	Lo Limit	Hi Limit	Lo 70%	Hi 70%
AC Volts								
200V	1	4	50.00 50Hz	0.9	49.1	50.9	49.4	50.6
			100.00 50Hz	1.4	98.6	101.4	99.0	101.0
			150.00 50Hz	1.9	148.1	151.9	148.7	151.3
			190.00 50Hz	2.3	187.7	192.3	188.0	192.0
Resistance								
20	2	10	1.000 Ω	0.12	0.88	1.12	0.90	1.10
			10.000 Ω	0.30	9.70	10.30	9.80	10.20
200	2	3	10.00 Ω	0.5	9.5	10.5	9.7	10.4
			100.00 Ω	2.3	97.7	102.3	98.4	101.6
2000	2	3	100.0 Ω	5	95	105	97	104
			1000.0 Ω	23	977	1023	984	1016

Authorised _____ Service Manager

Date 07/01/2000

Service Manual: ~~Model 4105~~ K4105

1. Scope

This service manual applies to digital earth tester ~~Model 4105.~~ K4105

2. Contents

This document consists of the following sections.

(1) Component Layout

(2) Disassembly

(3) Calibration

(4) Trouble-shooting

3. Component Layout

See Figure 1

4. Disassembly

4.1 Removing Battery Compartment Cover

(1) Untighten two screws (20) and remove Battery Compartment Cover from the instrument.

4.2 Removing Back Case

(1) Untighten four back-case-fixing screws (15).

(2) Peel Terminal Plate (17) off Back Case using a pair of tweezers.

(3) Untighten five Terminal-Block-fixing screws (16).

Use causiton not to lose plain washers each of which is put throuth the screw.

(4) Remove Back Case (14) from Front Panel (5).

4.3 Removing PCB

(1) Untighten three Terminal-Block(12)-fixing screws(13).

(2) Lift Main PCB(9) from Front Panel(5) a little, so that Display-PCB-screw can be reached.

(3) Untighten four Display-PCB-fixing screws.

(4) Remove both Main PCB and Display PCB from Front Panel.

Take note the position of Range Switch.

5. Calibration

5.1 Required Equipment and Tools

(1) Varible resistance box (0-200 ohms)

(2) AC voltage generator (0-200V)

(3) Frequency counter (can measure about 820Hz)

(4) DC voltage generator (6-9V, output current more than 50mA)

(5) Digital multimeter (for current consumption monitoring; unnecessary if the DC voltage generator has a current monitor on it.)

(6) Calibration screw driver

(7) Two 500 ohm resisters (for testing effect of earth resistance of auxiliary earth bars)

(8) Test lead (Use the green wire of the M-7095 lead set, or a lead less than 1 meter long and more than 3.3mm in outside diameter to reduce the effect of test lead resistance.)

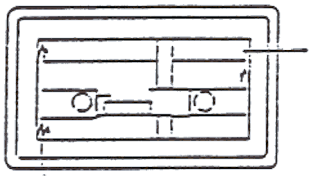
5.2 Preparation

(1) Peel Name Plate off Front Panel.

(2) Remove the batteries from the battery compartment

(3) Connect + and - terminals of the DC voltage generator to the battery connectors observing correct polarity.

DC voltage generator connection



to - terminal

to + terminal

5.3 V Range and Low Battery Voltage Calibration

(1) Set Range Switch to "EARTH VOLTAGE."

(2) Using connection leads, connect P and E terminals to the AC voltage generator.

(3) Set the DC voltage generator to 9V and the AC voltage generator to 190V.
Adjust VR1 so that display reads 190.0.

(4) Remove the connection leads from P and E terminals and set the DC voltage generator to 6V.
Adjust VR3 so that the display indicates "BATT."
Set the DC voltage generator to 6.3V and check that "BATT" disappears.

5.4 Earth Resistance Range Calibration

(1) Make connections as shown on the next page.

(2) Set Range Switch to 20 ohms.

(3) Press Test Button and turn it clockwise. Check if the button is locked down and the operation LED lights up.

(4) Replace the resistnace box with the frequency counter. Adjust VR2 so that the counter reads 820+/-5Hz.

(5) Connect the resistance box to the unit to calibrate again and set the box to "0 (or 0.1) ohm.
Adjust VR5 so that the display reads 0.00 to 0.02 ohm.
Note: If dispay readings are unstable in the following steps, reverse connection of the DC voltage generator's plug to the socket outlet of mains supply.

(6) Set the resistance box to *19 (or 19.1) ohms. Adjust VR4 so that the display reads 18.72 to 19.28 ohms.

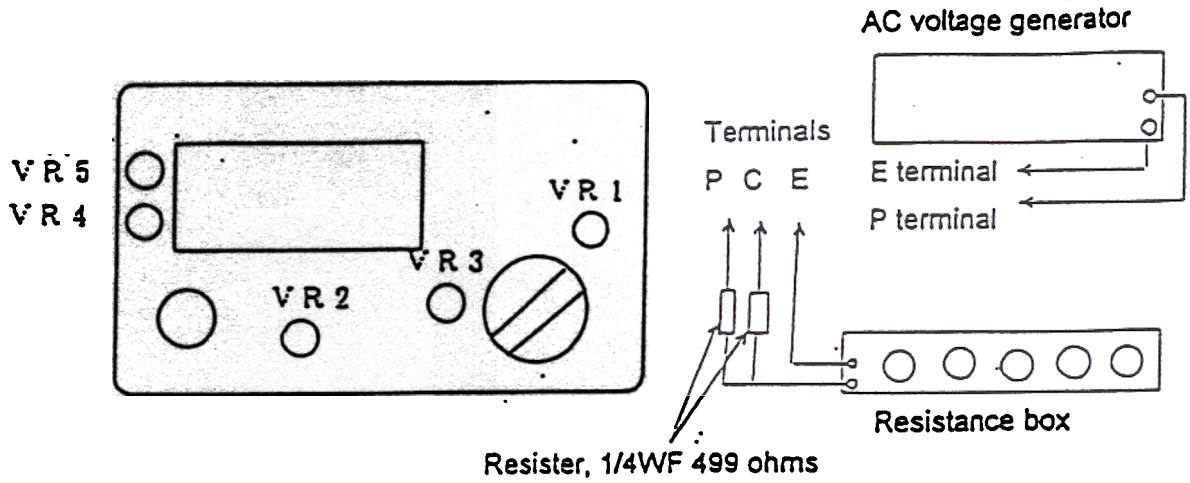
(7) Set the resistance box to *190 (or 190.1) ohms. Check that the display reads 187.2 to 192.8 ohms.

(8) Set the resistance box to *1900 (or 1900.1) ohms. Check that the display reads 1872 to 1928 ohms.

(9) If readings do not meet the tolerances in steps (7) and (8), re-adujst VR4 so that readings satisfy accuracy on all of 20, 200 and 2000 ohm ranges.

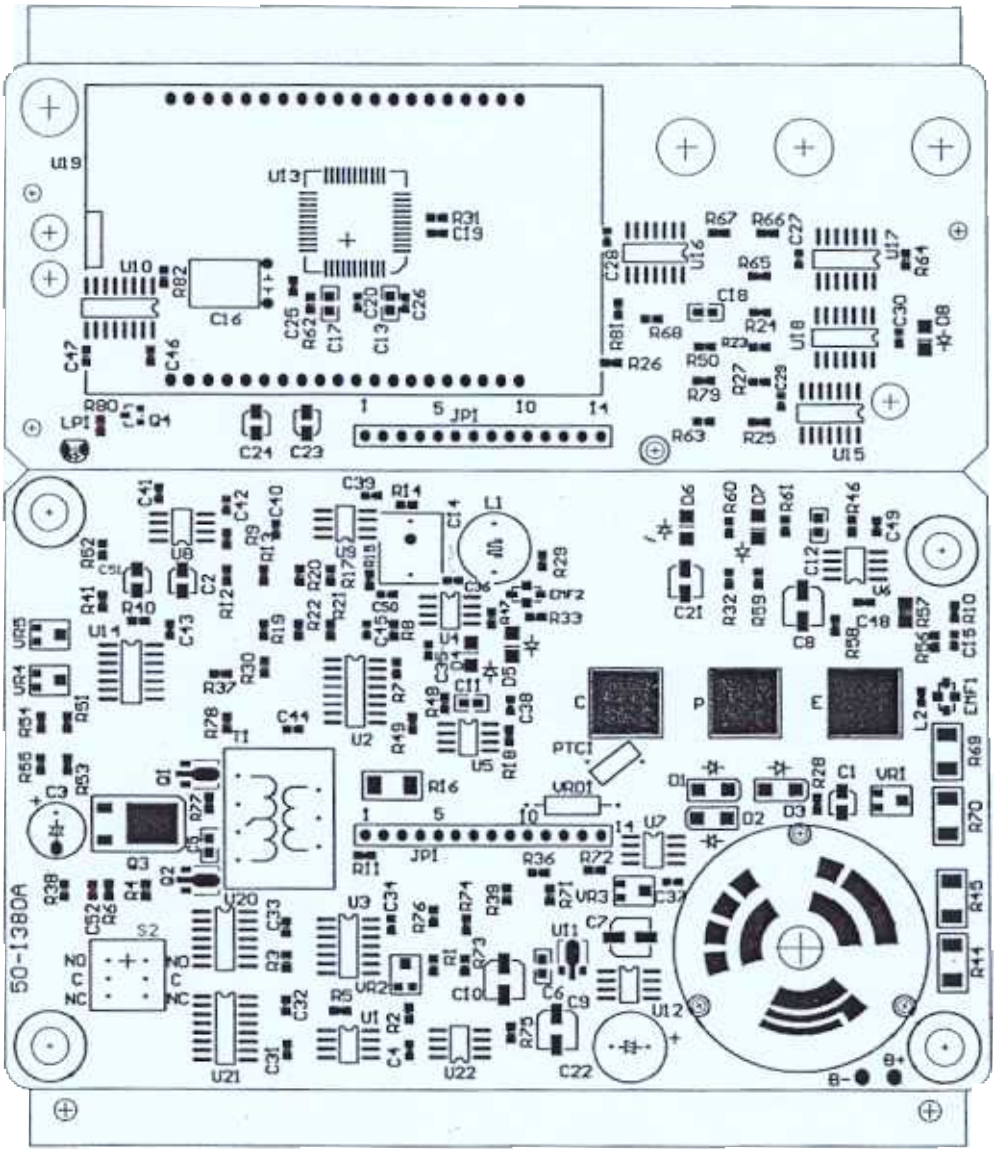
* When using a lead other than the green wire of the M-7095 lead set, add 0.1 ohm. This is to cancel the lead resistance.

Connection and VRs location



6. Trouble-shooting

Symptoms	Possible Causes	Recommended Remedies
The display blanks when Range Switch is set to any position other than OFF.	Fault in the circuit	If current consumption is not 30-50mA, replace PCB
	Battery voltage is low.	If battery voltage is below 6V, replace batteries.
The display does not read in ACV measurement	A break in a test lead	Repair or replace the test lead. If test leads are OK, follow remedies below.
	Faulty Terminal Block	1) Check each terminal for continuity. If there is a break, Replace Terminal Block.
	A terminal has poor connection with PCB pattern.	2) Check continuity between each terminal and relevant PCB pattern. If there is poor connection, clean the PCB pattern or tighten the terminal. If no problem is found in 1) or 2), replace PCB.
The display shows overrange indication and three decimal points in earth resistance measurement	Exessive earth resistnace at auxiliary earth bars (connected to P or C terminal).	1) Give water to the ground around the bars. 2) Relocate the bars. 3) Change the depth of the tip of each bar.
The display shows overrange indication, unable to make earth resistance measurement	A break in a test lead	Check the lead to E terminal for continuity.
	Fault in the circuit	If there is no break in the lead, Replace PCB.
Inaccurate readings in earth resistance measurement	Effect of earth voltage	Check earth voltge before making measurement.
	Effect of earth resistnace at auxiliary earth bars	Check if three decimal points are shown on the display.
	The instrument is out of calibration	If no problem is found in the above checks, follow section 5 for calibration.



日付	1995.08.07	対応回路図	00-1906D	図面番号	07-1202C
		対応PCB	50-1380B	名称	MODEL4105

M-4105回路図部品表

(00　1906D)

Designator	Part Type			Designator	Part Type			Designator	Part Type		
						D					
						A					
				R1	RK73H2A2kF	B					
					~~2.2k~~	B					
				R2	RK73H2A3kF						
				R3	RK73K2A47kJ						
				R4	RK73K2A47kJ						
				R5	RK73H2A10kF						
				R6	RK73K2A10kJ						
				R7	RK73K2A10kJ						
				R8	RK73K2A10kJ						
				R9	RK73K2A10kJ						
				R10	RK73K2A10kJ						
				R11	RK73H2A150F						
				R12	RK73H2A10kF						
				R13	RK73H2A10kF						
				R14	RK73H2A10kF						
				R15	RK73H2A10kF						
				R16	RK73K2H3.9kJ						
				R17	RK73K2A4.7kJ						
				R18	RK73K2A100kJ						
				R19	RK73K2A100kJ						
				R20	RK73K2A100kJ						
				R21	RK73K2A100kJ						
				R22	RK73K2A100kJ						
				R23	RK73K2A100kJ						
				R24	RK73K2A100kJ						
				R25	RK73K2A100kJ						
				R26	RK73K2A100kJ						
				R27	RK73K2A100kJ						
				R28	RK73H2A100kF						
				R29	RK73H2A100kF						
				R30	RK73H2A100kF						
				R31	RK73H2A100kF						
				R32	RK73H2A200kF						
				~~R33~~	~~RK73H2A150F~~	C					
				R36	RK73K2A3kJ						
				R37	RK73K2A3kJ						
				R38	RK73K2A3kJ						

M-4105回路図部品表

(00−1906D)

Designator	Part Type	Designator	Part Type		Designator	Part Type
		BT1	SUM3×6			
		EMF1	NFM40R01C101	C		
			~~NFM40R11C223~~	C		
		EMF2	NFM40R01C101	C		
U1	NJM555M	JP1	HEADER 14			
U2	uPD4053BG	L1	65-1091A			
U3	uPD4013BG	LP1	TLG124A			
U4	NJM2904M	PTC1	911P97E102YV10			
U5	NJM2904M	S1	4105SW			
U6	NJM2904M	S2	SPPH13-LB			
U7	NJM2904M	T1	65-1177			
U8	NJMOP-07M	VR1	TMC3KJB500			
U9	NJMOP-07M	VR2	TMC3KJB1k	B		
U10	uPD4053BG		~~500Ω~~	B		
U11	NJM78L05UA	VR3	TMC3KJB500			
U12	NJM7660M	VR4	TMC3KJB2k			
U13	TC7116CKW	VR5	TMC3KJB10k			
U14	uPD4066BG	VRD1	Z1047			
U15	TC4071BF					
U16	uPD4030BG					
U17	uPD4030BG					
U18	TC4069UBF					
U19	KLC-732P					
U20	uPD4001BG					
U21	TC4017BF					
U22	05BCOA					

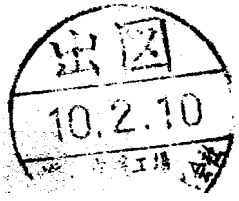
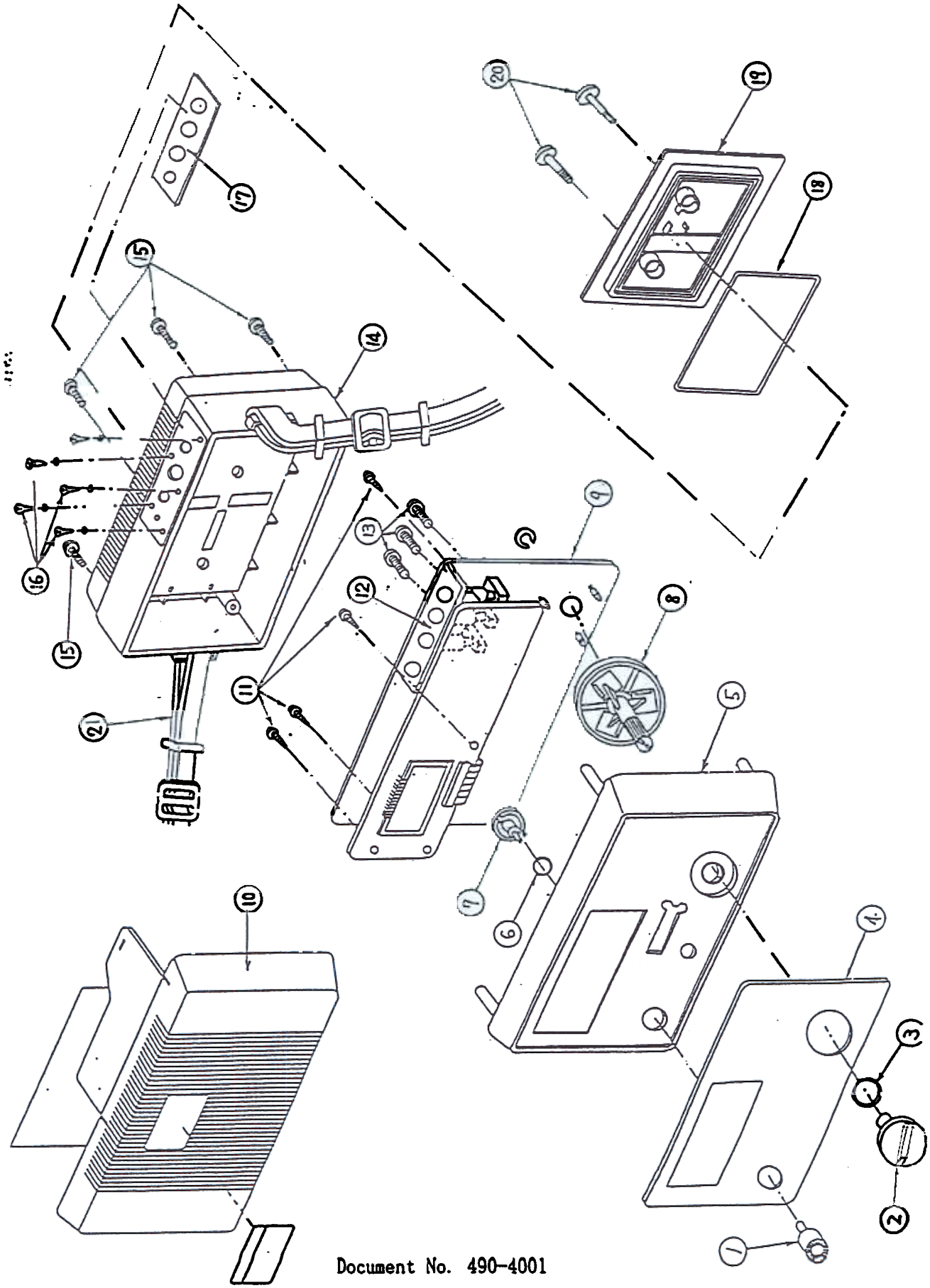


Fig. 1 Component Layout



7. Spare Parts List for K-4105

Number	Spare Part No.	Description	Note
(1)	0007516	Locking Knob	
	340503A-40-01	K-4105 range switch knob assembly (2), (3)	
(4)		Name plate K4105	
	0007990		
(5)		front panel assembly	With silicon tube 1.6dia.X0.8
	340503A-40-02	K-4105	
(6)	0007090	O-ring(N-7)	
(7)	0007510	Lock guide	
	340503A-20-01		
(9)		PCB assembly	With (8)
(10)		Front cover assembly	With model label
	340503A-40-03		
(11), (16)	0001303	B-tight screw +N2.3x8	
(12)	0007521	Connector block	
(13)	0002143	Screw +N M3x6 with sw	
(14)		Back case assembly	With battery contact
	340503A-40-04		
(15)	0001304	B-tight screw +N3x10	
(17)		Connector plate (3 colors)	
	0008031		
(19)		Battery compartment cover assembly	(18),(19)(20)
	340503A-40-05		
(21)		Shoulder strap	
	0007770		
	709500A	4105 earth leads M-7095	-
		4105 simplified-measurement-leads	M-7094
	709400A		
		carrying case	
	0007999	K-4105	
	0007749	Battery	