





































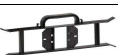






Geoscan Research		Repairs and Maintenance Components					v25 20 June 2023	
The following list of components are the ones most commonly required. If you have any doubts about which components to buy etc. then do please contact us. Wiring details for data dump leads are given at the end.								
Suggested suppliers are RS and Farnell who have outlets around the world. The RS and Farnell part numbers given below should be recognised on their international websites.								
RS Components : https://uk.rs-online.com								
Farnell : https://uk.farnell.com			Farnell is known as Newark in the USA :			https://www.newark.com		
Instructions provided in the Notes that are highlighted in yellow are very important !!								
Description	Image	RS Part Number	Farnell Part Number	Other Suppliers and Part Number	Manufacturer	Manufacturer Part Number	Where Used	Notes
Memory Module GR881		200-6577	-	https://greenwichinstruments.com/	Greenwich Instruments	GR881-HT	FM18, RM15	See instructions below for "Changing the FM18 or FM36 memory Module" or see RM15 Manual Appendix C. Also refer to "Changing the RM15 Memory Module" instructions given below
Memory Module GR3281		200-6583 Greenwich Instruments	Alternative 2518737 Maxim/AD/Dallas	https://greenwichinstruments.com/	Greenwich Instruments / Alternative	GR3281-HT / DS1230Y-100+	FM36, RM15	See instructions below for "Changing the FM18 or FM36 memory Module" or see RM15 Manual Appendix C. Also refer to "Changing the RM15 Memory Module" instructions given below
Battery Pack Holder		-	3530792 (pack 5)	CPC: BT00839 or BT06500 https://cpc.farnell.com	Pro Power	A-305/IT 03.0100 or MP000320	RM4, RM15, FM9, FM18, FM36	You may need to trim one of the lugs, the rectangular one on the reverse side to PP3 clip, to enable the battery to touch the contact. BT06500 is a suggestion not yet tested. Size looks OK.
Battery, NiMH, AA, IEC Code: HR6		908-4076 (each, pack 4, 2.4Ah)	3923702 (pack 4, 2.5Ah)	CPC: BT05805 https://cpc.farnell.com	Duracell	Duracell Ultra	RM4, RM15, FM9, FM18, FM36	Total of 8 batteries required. Alternatives available in many supermarkets etc. You may need to trim one of the lugs, the rectangular one on the reverse side to PP3 clip, to enable the battery to touch the contact.
Battery Charger, RM15, RM4, FM9, FM18, FM36, 18V dc, 830mA - SERIES RESISTOR REQUIRED		706-6464	2815685	-	Mean Well	GE12I18-P1J		Charger plug required as well (next). RM15: an 18 ohm resistor in series with the positive line is required. RM4, FM9, FM18, FM36: a 100 ohm resistor in series with the positive line is required.
Meanwell Charger UK AC Plug		178-3436	2848281	-	Mean Well	AC plug-UK		
Meanwell Charger Mixed AC Plugs		178-3439	2848282	-	Mean Well	AC plug-MIX		
Resistor 100 ohms, 0.6W,		848-7247 (each pack of 25)	1771963 (each, minimum of 25)	-	Vishay	MRS25000C100 0FRP00	RM4, FM9, 18, 36 Charger	
Resistor 18 ohms, 0.6W		683-3134 (each pack of 25)	9465065 (each, minimum of 10)	-	Vishay	MRS25000C180 9FCT00	RM15 charger	
Battery, CR2450 type		457-4634 (Panasonic)	4199194 (Renata) 2065173 (Multicomp)	-	-	-	FM256	When changing the battery, take care to not overbend the retaining arm in the battery holder. There are many other brands also available.

Single Pole Single Throw (SPST) Momentary Push Button Switch		236-9373	-	-	APEM	IPR3SAD-2	FM256, CF6, CF51, MSP40, MSP25	
Short Knoblet, M6 x 10		702-7548	-	-	RS Pro	-	PA5, PA20 Rectangular Bracket	
Long Knoblet, M6 x 20		702-7557	-	-	RS Pro	-	PA5, PA20 Rectangular Bracket, CF51	
Spring loaded latch pair, Stainless Steel		206-4630 (pack 2)	-	-	Savigny	40002 EIB	PA20	
USB 2.0 Data Dump Cable. Male Mini USB B to Male USB A, 2m		252-062	-	-	Bulgin	PX0441/2M00	RM85	
USB to RS232 Serial Adaptor		-	-	CPC: CS34987 https://cpc.farnell.com	Newlink	NLUSB-0039	DL10, RM15, FM9, FM18, FM36, FM256	Not all adpters work correctly. We have found those with a Prolific chip set are more likely to work. Choose one with that spec if you are unable to source this part from your region.
Cap, Assembly Tool, Free		841-8995	314407	-	Bulgin	PX0734	Widely used	
Cap, Assembly Tool, Chassis		504-4588	314390	-	Bulgin	PX0733	Widely used	
Socket, Free, 2 pole		489-532	314213	-	Bulgin	PX0736/S	PA5, PA20	Instructions for assembly: see RM85 Manual Appendix E, RM15 Manual Appendix G. ENSURE INSERT IS PROPERLY SEATED !
Socket, Free, 6 pole		489-560	314237	-	Bulgin	PX0739/S	PA5, PA20, Chargers, Data Dump Leads	Instructions for assembly: see RM85 Manual Appendix E, RM15 Manual Appendix G. ENSURE INSERT IS PROPERLY SEATED !
Plug, In-Line, 6 pole		489-576	314328	-	Bulgin	PX0740/P	PA5, PA20	Instructions for assembly: see RM85 Manual Appendix E, RM15 Manual Appendix G. ENSURE INSERT IS PROPERLY SEATED !
Plug, Chassis, 2 pole		489-526	314249	-	Bulgin	PX0735/P	PA5, PA20, RM15, RM85	Instructions for assembly: see RM85 Manual Appendix E, RM15 Manual Appendix G. ENSURE INSERT IS PROPERLY SEATED !
Plug, Chassis, 6 pole		489-554	314262	-	Bulgin	PX0738/P	RM15, RM85, FM9,18,36, FM256	Instructions for assembly: see RM85 Manual Appendix E, RM15 Manual Appendix G. ENSURE INSERT IS PROPERLY SEATED !
Socket, Chassis, 6 pole		483-944	314298	-	Bulgin	PX0738/S	RM15, RM85 GPS Adapter	Instructions for assembly: see RM85 Manual Appendix E, RM15 Manual Appendix G. ENSURE INSERT IS PROPERLY SEATED !
Socket, 9 way 'D' Connector		473-896 608-0579	-	-	RS Pro Hirose	- HDEB-9S(05)	Data Dump Leads	Pin Pitch = 2.74mm

D' Connector Shell, 9 way		484-789	469889	-	MH Connectors	MHDPK9-K	Data Dump Leads	
Plug, 4mm, Black		-	1101101	-	Deltron Components	550-0100-01	PA5, PA20	
Plug, 4mm, Red		-	1101098	-	Deltron Components	550-0500-01	PA5, PA20	
Plug, 4mm, Green		-	1101102	-	Deltron Components	550-0400-01	PA5, PA20	
Plug, 4mm, Blue		-	1101103	-	Deltron Components	550-0200-01	PA5, PA20	
Plug, 4mm, Yellow		-	1101104	-	Deltron Components	550-0700-01	PA5, PA20	
Plug, 4mm, White		-	1101105	-	Deltron Components	550-0600-01	PA5, PA20	
Socket, 4mm, Black		-	1101113	-	Deltron Components	563-0100-01	PA5, PA20	
Socket, 4mm, Red		-	1101100	-	Deltron Components	563-0500-01	PA5, PA20	
Socket, 4mm, Green		-	1101115	-	Deltron Components	563-0400-01	PA5, PA20	
Socket, 4mm, Blue		-	1101117	-	Deltron Components	563-0200-01	PA5, PA20	
Socket, 4mm, White		-	1101118	-	Deltron Components	563-0700-01	PA5, PA20	
Socket, 4mm, Yellow		-	1101119	-	Deltron Components	563-0600-01	PA5, PA20	
Cable Drum for 50m Cable		-	-	Canford: 35-5002	Canford	CDP266	PA5, PA20 Cable Drum	You will need to drill a 27.18-27.77 mm hole in the screw mounted plate, and file a notch, in order to mount a Plug, chassis 2 pole, Bulgin connector and cap in place.
Arctic PVC Cable, Orange, 3 Core 0.75 mm ² , diameter approx 6.7 - 7.1 mm		776-1963 (100m reel)	-	Canford: 33-324 (per metre) https://www.canford.co.uk	-	-	PA5, PA20 Cable Drum	Do NOT use more than 50m to avoid measurement errors in dry conditions. Parallel up blue and green wires for potential line - provides redundancy.
Cable, Orange. 30 strands of 0.2 or 0.25mm, approx 3mm diameter, Tri-rated		180-5952 (100m reel)	2528160 (per metre) 2501503 (100m reel)	-	RS Pro / Multicomp Pro	- / PP001257	PA5, PA20 jump leads, remote probe lead, extension leads, adapters	
Multicore Cable, 16-2-4A, Unscreened, 4 Core, 0.5 mm ² , 25 m, 6.3mm diameter		-	3372855 (25m reel)	-	Multicomp Pro	MP002385	Data Dump Leads	The cable type is not critical for data dump leads. Alternatives may be acceptable.
Cable Tidy		-	-	CPC: PL10040 https://cpc.farnell.com	Pro Elec	H FRAME	PA5, PA20 Extension Leads	
Releaseable Cable Ties, Small, 140mm		549-870	131-21410	-	HellermannTyton	131-21410 REL140-PA66-BK	PA5, PA20, cables	
Releaseable Cable Ties, Large, 250mm		549-886	1168950	-	HellermannTyton	131-22510 REL250-PA66-BK	PA5, PA20, cables	
Self-adhesive Cable Clip		404-437	-	-	RS Pro	-	PA20 Beams	This is a suggested replacement for the black clips that are afixed to the PA20 beams

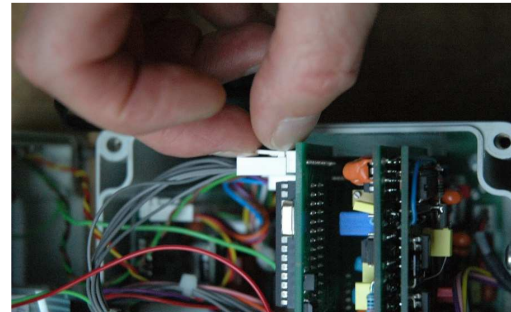
Changing the FM18 or FM36 Memory Module

Version 3 28/4/2022

Instructions

Tools required: small screwdriver supplied with the instrument to remove the lid and a flat bladed screwdriver with a blade about ¼ inch wide - the instrument screwdriver is not suitable. Make sure you are as anti-static as possible (for example avoid wearing nylon shirts etc) – preferably use a grounded anti-static mat. Avoid carrying out the operation in rooms fitted with nylon or plastic flooring. Avoid handling the memory module or PCB's unnecessarily, holding the PCB by the edge wherever possible.

- 1 Lay out a sheet of aluminium foil (approximately 50 x 50 cm) on a table.
- 2 Sit the instrument on the aluminium foil with the tube vertical at the edge of the table and the handle supported so that it is horizontal. Have a box or stack of books at the rear of instrument about 5cm high.
- 3 The instrument **MUST** be switched Off.
- 4 Unscrew the lid and very gently remove it vertically, ensuring the wires inside do not catch inside. Place the lid vertically on the box or stack of books.
- 5 There are three PCB's that plug into the motherboard. The board nearest the handle is the receiver PCB, the board in the centre is the A/D PCB and the board furthest from the handle is the microprocessor (uP) PCB that has the memory module on that is to be changed.
- 6 Unplug the uP PCB and raise it up slightly without straining any wires using your left hand. Next identify an 8-way connector on the right-hand side of the uP PCB, at the top, with 7 grey wires coming from it, and going to the keypad tail in the lid. Under this is a 2-way connector with brown and green wires going to the buzzer.
- 7 We will undo the top connector first. Use the fingernail of your centre finger to gently lever the two tabs on the right-hand side whilst you use the fingernail of the thumb to engage with the two very small tabs at the base of the housing to push the connector off the uP PCB. Do **NOT** pull on the wires or force things.



- 8 Remove the 2-way connector (with brown and green wires) located just underneath the 8-way connector in the same way.
- 9 You can now remove the uP PCB entirely.
- 10 Lay the PCB down on the aluminium foil with the 8-way and 2-way connectors on the left-hand side and the PCB edge connectors at the bottom. Identify the memory module in the bottom right-hand corner which will be a GR3281 for an FM36 or a GR881 for an FM18. Note the orientation of the writing relative to the PCB.
- 11 Keeping the PCB flat on the aluminium foil, slide initially just the tip of the screwdriver gently into the gap between the module and its socket. **VERY GENTLY** rotate the blade to lift the module slightly – do **NOT** use the screwdriver as a lever. Once the module is raised slightly, slide the blade further in and repeat the rotation to further raise the module out of its socket. Repeat until the module is prised out completely.
- 12 Whilst you are touching the aluminium foil, remove the new module from its packaging, avoiding touching the pins. Position the module over the empty socket on the uP PCB, taking great care to position the module the correct way round – the dot should be at the same end as the notch in the IC socket and towards the edge of the PCB.
- 13 Make sure each pin is in line with and started into the socket. Firmly but carefully press the module completely into the socket – it may be easier to press each row of pins into the socket in turn. Take great care to avoid bending the pins – check after inserting the module to see that none are bent underneath. Please note that the GR3281 modules supplied now have slightly thicker pins than the original modules, so the pin fit can be very tight – you may have to place two thumbs on top and two forefingers underneath whilst applying a very strong pressure to push the pins into the socket. If using the alternative DS1230Y then the pin fit can be a bit loose, so apply blobs of silicone sealant or other fixing material to the ends to keep in place.
- 14 We can now put the uP PCB back in place.
- 15 Slide the uP PCB gently into the Perspex PCB guides. Insert the PCB into motherboard, ensuring that you align the edge connect pins correctly – please check! **THEN CHECK AGAIN** because if you later power up the instrument with the PCB plugged in incorrectly you could damage it.

16 Next insert the brown/green 2-way connector into the uP 2-way connector – again support the PCB when doing this to avoid stress.

17 Next insert the 8-way connector with 7 wires into the 8-way connector at the top of the uP PCB– support the PCB when doing this to avoid stress.

18 Carefully place the lid on top of box – feed the keyboard tail into slot between the uP PCB and the battery pack compartment and check there are no wires near the box edges where they can be trapped and then screw the lid into place.

19 Switch on.

Resetting the FM18 or FM36

The display will show random characters and symbols and we need to access and change the Setup menu settings to obtain a normal display. Go through the motions of accessing the setup menu even though everything on the display will still appear random: step down through each Setup menu setting and change each setting away from the current value using first the left key then back to the previous value using the right key. Do this for each menu item. As you do this the display will still show random characters. Then press End Menu, turn off the instrument and then turn on again. You should now have a more normal display. Now go through the Setup menu again and ensure there are valid settings – often they will not be until corrected in this second pass. Now press End Menu again. Clear the memory.

The instrument should now be ready for use. **Please check all is well by collecting some data on the tabletop even if readings are full scale, along with some dummy data using Finish Line, and then dump of the data and check it looks correct. Do this before using it on a proper survey.**

RS232 Data Dump Cable Wiring

Note that a link is required inside the Bulgin 6 way connector for some cables

	Bulgin 6 way Connector			9 pin D Connector			
	Pin	Function	Wire	Pin	Function	Wire	
RM85	2	GND	Green	2	TX	Red	Can also use an RM15 or FM256 Data Dump Lead in an emergency
	3	RCV	Yellow	3	RCV	Yellow	
	4	CTS	White	5	GND	Green	
	5	RTS	Black	7	CTS	White	
	6	TX	Red	8	RTS	Black	
RM15	2	GND	Green	2	TX	Red	Can also use an FM18/36 Data Dump Lead in an emergency
	3	RCV	Yellow	3	RCV	Yellow	
	4	CTS	Link	5	GND	Green	
	5	RTS					
	6	TX	Red				
FM256 DL256	2	GND	Green	2	TX	Red	Can also use an FM18/36 Data Dump Lead in an emergency
	4	CTS	Yellow	5	GND	Green	
	6	TX	Red	7	CTS	Yellow	
FM18/36 DL10	3	GND	Green	2	TX	Red	
	4	CTS	Link	5	GND	Green	
	5	RTS					
	6	TX	Red				