STARLOG

Remote Telemetry Unit Cellular Phone System and PDL Interfaces

Models
6804C, 6804D, 6805, 6807

CE

User Manual Supplement
6213

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1. INTRODUCTION

The Model 6805 Remote Telemetry Unit (RTU) is a low power data communication modem designed to remotely interrogate Data Loggers. It is suitable for voice grade circuits such as direct line or switched telephone networks. This RTU meets CCITT V.21/V.22 and Bell 103, 212A standards and operates at 300 or 1200 baud.

Its features include:

- Automatic Answer & Dial
- Five-digit Audible Coded Message (ACM)
- Communication via telephone lines or radio link
- Three power modes (12V DC, 240 V AC or solar)
- Optional synthesized voice communication message communication

The RTU is supplied with a weatherproof enclosure and a mounting frame (model 6103C) fitted within. Both the STARLOG Data Logger and Field Termination Strip or Telemetry Switch fit in this enclosure.

RTU Firmware 3V8 enables an RTU with or without the speech option to be used with a STARLOGGER, MACRO or Portable Data Logger.

The RTU can be programmed to initiate a call in case of alarm conditions and to transmit a spoken or digital (ACM) message. A synthesized voice option is available which speaks programmable phrases like, “Water level 4 metres.” The ACM facility allows a user to listen to a sequence of audible tones which represent, for example, the current water level or temperature at the logging site.

The following models exist:

Model 6805–10	12V DC powered
Model 6805–20	240V AC mains powered
Model 6805–30	Solar powered (via internal 12V battery backup)

The Model 6805–30 Solar Powered RTU is designed to be interrogated once or twice a day. For continuous or more frequent interrogation, UNIDATA suggests that dedicated telephone lines be used and continuous power is supplied to the RTU. For remote sites where there is no power available UNIDATA suggests that the Solar Powered RTU is powered via a large solar panel and battery (available through UNIDATA).

2. MODEM PRINCIPLES

The word modem is a contraction of (MO)dulator (DEMO)dulator. It converts digital data from a series of “high” and “low” voltage levels to a corresponding series of frequencies, which can be transmitted via telephone grade lines to a remote receiving modem and vice versa. Obviously, the receiving modem must be “tuned” to the same frequencies that the transmitting modem is generating. Thus modems are always configured as “complementary pairs”. ie, a modem set to **originate** can only converse with a modem set to **answer**.

There are many modem standards used throughout the world for general purpose digital communication. This modem is able to operate in most common standards used in the world. These are 300/300 baud full duplex (CCITT V21 or Bell 103) and 1200/1200 baud full duplex (CCITT V22 or Bell 212A).

Before two modems can communicate with one another, the user’s modem must be configured to the **same** standards and the **complementary** transmit/receive frequencies of the remote modem.

3. HOW THE RTU WORKS

The RTU's features are selectable via switches inside the cover (see Section 6) and through using the RTU's internal firmware. This section describes the role that the firmware plays.

The firmware (version 3V8) enables the RTU to be used—with or without the speech option—with a STARLOG Data Logger. Basically, RTU firmware controls the operation of the RTU including interpreting and acting out commands sent from either a computer or a Logger.

3.1. Sending Commands

There are two ways to send commands to the RTU; transparently through the STARLOG Software Package, and manually, by sending the command in ASCII characters (this can be done using the MDL Diagnostics menu of STARLOG Software or by adding the command to the PDLIO program).

The RTU firmware commands are usually sent from the PDLIO program within STARLOG Software. Using STARLOG Software you generate a Scheme and program a Logger with this Scheme. The Scheme includes details of how the Logger communicates with a computer (in this case, through a modem and an RTU).

When the computer communicates with the Logger, it refers to the these Scheme details and thus knows how to communicate with the RTU.

3.1.1. Using STARLOG Software Menus

For instance, to hang up the RTUusing the MDL Diagnostics menu:

1. Run STARLOG Software and select first the **Test a Logger,** then the **MDL Diagnostics** menu.
2. Type, TTT.
3. Press Enter.

3.1.2. Adding A Command to the PDLIO Program

For instance, to hang up the RTU by adding the command to PDLIO:

1. Run any program which allows you to edit ASCII files.
2. Open the PDLIO file.
3. Add the following line:

   ```
   SEND  TTT
   ```

4. Save the updated version of PDLIO as an ASCII file.

Refer to **Using STARLOG Software** in Section 5 and to the STARLOG Data Logger Programming supplement (6201) for more details about the SEND command.

3.2. Commands

The commands which control the RTU are:

TTT Hang up the RTU

Hangs up the line and turns the power off.

Q0x Address Code

Select the appropriathe logger on a telemetry switch.

4. INSTALLATION

The standard RTU consists of:

- weatherproof enclosure with cable glands
- mounting frame for modem, already fitted
- auto answer/dial modem, already fitted
- telephone line cable, already fitted
- cable to Logger (Order Model 6602S for Portable Data Logger or Model 6602T for the STARLOGGER or Macro Data Logger)
- provision for power supply connection

» Note: The power supply is used for the modem only. If a Data Logger is installed, it requires its own supply (normally fitted).

4.1. 12VDC Powered RTU (Model 6805–10)

This model is powered with 12VDC, e.g. from a customer supplied battery. It is recommended that a lead-acid type be used.

To install the power connection proceed as follows:

1. Fit 2 leads from the power source through one cable gland
2. Bare the ends of the leads approximately 8mm
3. Connect the leads from the battery to the appropriate terminals in the modem, ie,Battery +ve and Battery -ve.
4. Ensure the leads are connected with the correct polarity.

4.2. 240VAC Mains Powered RTU (Model 6805–20)

This model is powered with 240VAC mains power. It uses an AC/DC adapter which plugs into a mains power socket.

To install the power connection proceed as follows:

1. Fit both leads from the AC/DC adapter through one cable gland
2. Bare the ends of the leads approximately 8mm
3. Connect the leads to the appropriate terminals in the modem, ie, Battery +ve and Battery -ve.

4. Check the connection on the AC/DC adapter cable that the polarity is correct.
5. Set voltage on AC/DC adapter to 12V

4.3. Solar Powered RTU (Model 6805–30)

This model is powered with a solar recharge system which consists of a solar panel and a battery. The battery is factory fitted and mounted inside the RTU below the modem.

In conditions of typical sunlight, this model (with the standard battery and panel) may be interrogated twice a day. (Measured in Australian conditions.)

To install the power connection proceed as follows:

1. Fit both leads from the solar panel through one cable gland
2. Connect the solar unit cable to the terminals in the modem, ie, Solar +ve and Solar -ve.
3. Connect the leads from the battery housed in the weatherproof enclosure into the modem terminals, ie Battery +ve and Battery -ve.
4. Ensure the leads are all connected with the correct polarity.

5. STARLOG DATA LOGGER

5.1. Installation

A STARLOGGER, Macro Data Logger (MDL) or Portable Data Logger (PDL) can be installed in the RTU enclosure to collect data in the field. This data can be transmitted via telephone lines to any receiving modem at any time. Field terminations from monitoring instruments are made directly to the field termination strip which is connected to the Logger and fitted inside the weather proof enclosure of the modem.

To install the Logger proceed as follows:

1. Place the Logger into the reserved space below the modem
2. Connect cable from the field termination strip to the Logger connector labelled INPUT SIGNALS
3. Connect modem cable to the Logger connector labelled COMPUTER
4. Provide a power source to the modem as described above

5.2. Desktop Modem

To recover the signal from the telephone line at the receiving computer end requires the use of an appropriate desktop modem. This is connected to a serial port (COM: port) on the computer. In general, this modem must be configured to operate properly with the remote modem of the RTU. This is done through the use of a communication software package running on the computer. Most desktop modems are configured using what is called a “Hayes compatible set of AT commands.” The desktop modem manual should be consulted for further details.

5.3. Using Starlog Software

Using STARLOG Software (version 2), it is possible to carry out loading and unloading of the data logger over the telephone line.

5.3.1. Setting Up the Scheme

The Scheme must be defined for communication via modem. To do this:

1. Run STARLOG Software and first select the **Maintain Schemes** menu, then either the **Edit A Scheme** or **Create a Scheme** menu. Select the **Hardware Details** option and finally, **Communication.**

2. In the **Communication** menu, set the **Communication Mode** to **Via Modem**. Other settings include:

Serial Com Port	**com1**
Baud Rate 1200	
Communication Mode	**Via Modem**
Modem Setup String	**AT E0 V1 X0 B2**
Telephone Number	

Refer to the Modem manual.

3. Ensure that the **Baud Rate** entered here matches the Baud Rate of both the Desktop Modem and the RTU. (The RTU operates at either 300 or 1200 baud.)

4. If you don't enter a Telephone Number (of the RTU) here, you will be asked to enter it during Loading or Unloading.

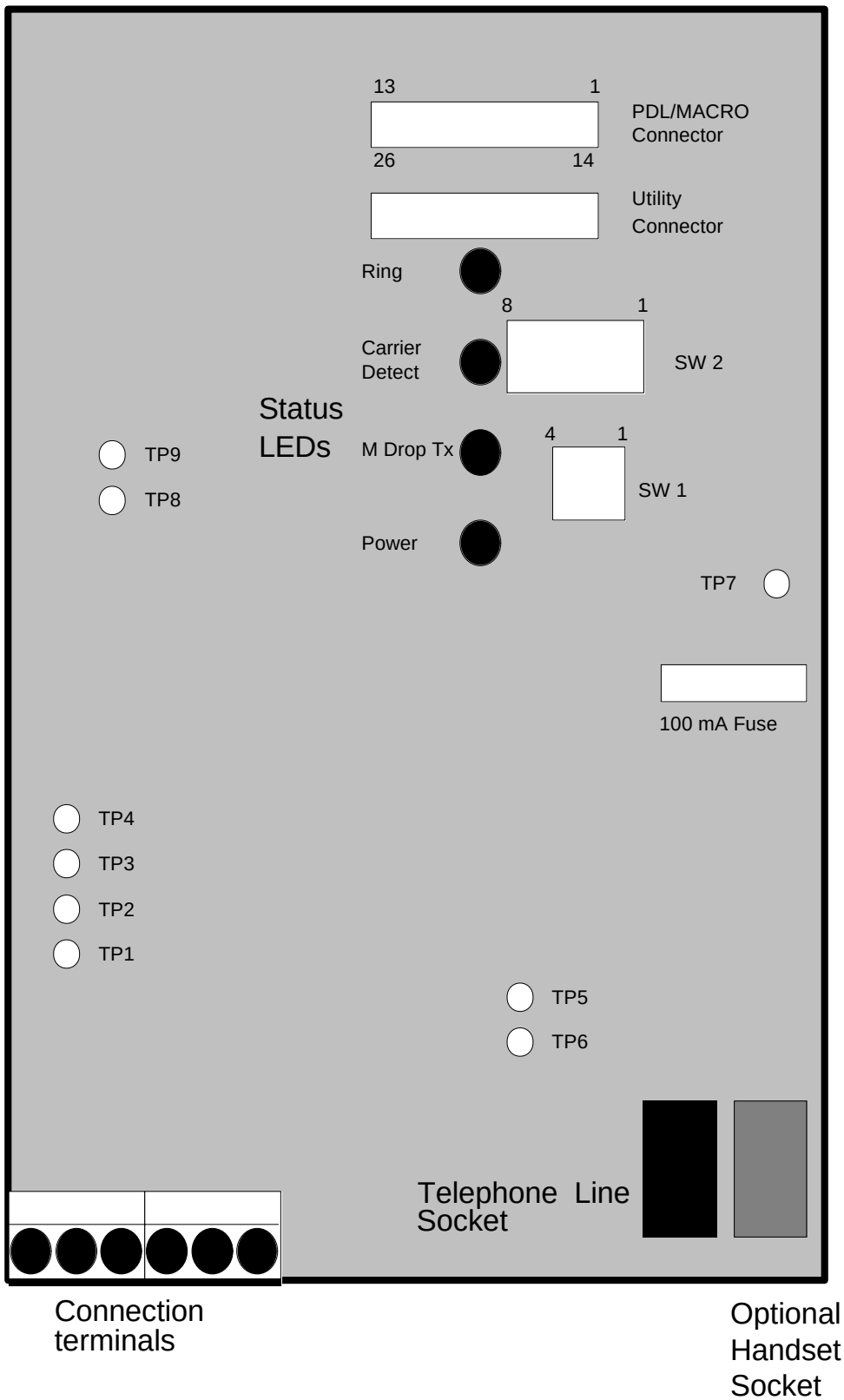
5.3.2. Commands Used In the Software

You may want to control the Logger from the **MDL Diagnostics** menu (see page 3) or to generate your own customised communication program by manually altering the PDLIO portion of the software package. The following commands are used to control a desktop modem from PDLIO:

BAUD	sets the baud rate of the COM: port being used
COM	defines which COM: port to use (1 or 2)
DIAL	instructs the modem to dial a telephone number
HANGUP	instructs the desktop modem to hangup
LOGGER	instructs an RTU to put online logger *n* (Q command)
RETRY n	instructs the modem to try n times to dial a number
SEND	outputs a string to the selected COM: port. This could be used to send "AT" commands or the TTT command.

Refer to the STARLOG Data Logger Programming Supplement (Supplement 6201) for more details about the above commands and others.

6.


13
1
PDL/MACRO Connector
26
14
Utility Connector
Ring
8
1
Carrier Detect
SW 2
Status LEDs
M Drop Tx
4
1
SW 1
TP9
TP8
Power
TP7
100 mA Fuse
TP4
TP3
TP2
TP1
TP5
TP6
Telephone Line Socket
Connection terminals
Optional Handset Socket

INDICATORS AND SWITCHES

The modem has 4 LED status indicators and two sets of DIL switches inside the cover. These select the mode of operation of the modem.

6.1. DIL Switch 1 (SW1)

This is a 4 way switch with the following functions:

SW1	OFF	ON	FUNCTION
1	CCITT	Bell	Communication Standard
2		Enabled	Continuous power-up, e.g., KNS system
3	Disabled	Enabled	Power-up from external relay
4	Disabled	Enabled	Power-up from PDL pulse

6.2. DIL Switch 2 (SW2)

This is an 8-way switch with the following functions:

SW2	OFF	ON	FUNCTION
1	5 minute	30 minute	Timeout
2 3	must be ON 1200 baud	must be ON 300 baud	Baud rate
4	not implemented	Telephone network	Telephone Communications
5	Dial-up from logger number & send identifying message	Disabled	Identifying message when dialling
6	Speech mode. Speaks the string pointed to by the pointer at ADDR 244 (terminated by 0).	Audible Coded Message mode Beep 16 bit binary value (in decimal) held in ADDR 244 of PDL.	Audible Coded Message/Speech Option

7	On 20th ring.	On 3rd ring.	Auto answer
8	Tone dialling (DTMF)	Decadic dialling (pulse)	Dialling mode

» Note: Switches 5 through 8 are used for Site ID (as in the KNS system).

6.3. Standard Switch Settings

The following switch settings are generally used when communicating with a STARLOG system.

SW1

S1 — OFF
S2 — OFF
S3 — OFF
S4 — ON

SW2

S1 — ON
S2 — ON
S3 — OFF
S4 — ON
S5 — OFF
S6 — ON
S7 — ON
S8 — OFF

6.4. LED Status Indicators

There are four LED indicators on the modem and three of these are in use. The following describes their function:

POWER	The modem is powered-up, i.e., communicating.
CARRIER DETECT	An appropriate carrier is being received from a remote modem.
RING	A ring signal is being received.
M DROP TX	The RTU has been selected by a Q code.

7. AUTO ANSWER MODE

The modem is designed to automatically answer an incoming call. This enables the user to dial up the logging site, via a suitable desktop modem and computer, and interrogate the Data Logger, load a scheme, unload data etc.

The following procedure should be followed:

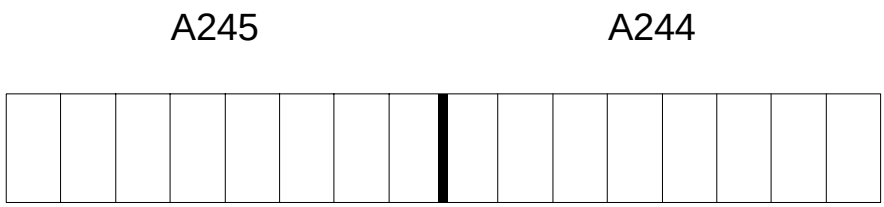
1. Initiate the call from STARLOG Software (**Unload** or **Load** or **Program** or **Test a Logger**) or an appropriate communications software package.
2. The modem will sense the ring signal and turn itself on. The answer delay may be set, by S7 of SW2, to be long or short, ie, twenty rings or three rings. After this delay, the modem will return an answering tone (carrier).
3. The desktop modem will sense this carrier as being the correct one and also return a corresponding carrier. Communication should now be established.

7.1. Audible Coded Message Option

It is possible to interrogate a Logger, connected to an RTU, for a limited amount of information, even when an originating modem is not used, by programming the logger for the Audible Coded Message option.This option enables a 16 bit value, stored at address 244/245 of the Data logger, to be “beeped” to the user. It is enabled by S6 of SW2 and is brought into operation when the RTU **answers** an incoming call but does not detect an originating modem.

For example, the user wants to know what values are being read on analog channels 0 and 1 (A0 and A1). The user knows that this data is stored at addresses 16 and 17. So, the user programs the logger to put the byte read at A16 into A244 and that at A17 into A245 (refer to the Starlog Programmers Supplement for details). When the user rings up the modem, he will firstly hear the answering carrier being sent. If the modem doesn’t detect a return carrier within approximately 15 seconds, it will turn its carrier off and then beep" the 16 bit value to the originator of the call. It will do this twice and then hang up the phone.

The 16 bit value is coded as follows:



A244 contains the Least Significant Byte

A245 contains the Most Significant Byte

This 16 bit binary value is converted to a decimal equivalent

eg 0000 0000 1111 1111 = 00FF (Hex) = 255 (Decimal)

The Audible Coded Message will always give 6 digits, so it would actually send 000255.

The digits are

0 - one long beep (1 sec) _

1 - one short beep (0.25 sec) .

2 - two short beeps (2 x 0.25 sec) ..

.

.

.

9 - nine short beeps .....

Therefore, 000255 would be: _ _ _ .. ..

There is a relatively long break (1 sec) between each set of tones and a larger break (5 sec) between the beeps being repeated.

eg, A244 = 0 A245 = 255

ie, 1111 1111 0000 0000 = 065 280 (Decimal)

tones: _ .... _

8. AUTO DIAL MODE

The modem will dial a telephone number stored in Logger memory when powered up by either the Logger or an external potential free contact. This telephone number may be stored anywhere* in user memory with the first address used being stored in addresses 240 and 241. For example:

If the first digit of the telephone number is stored at address 1124 (block 4, location 100) then, address 240 = 100 and A241 = 4.

Thereby telling the modem where to find the number to dial.

The telephone number is stored as one digit per address and is coded as the digit's decimal ASCII code.ie,

```
0 = 48
1 = 49
2 = 50
3 = 51
4 = 52
5 = 53
6 = 54
7 = 55
8 = 56
9 = 57
3 sec pause = 40
```

```
Eg, for a telephone number of 457 4375
A1124 = 52, A1125 = 53, A1126 = 55, ...,
A1130 = 53, A1131 = 0
```

Note that the address following the last digit **must** contain a 0. This enables the modem to determine the end of the telephone number.

Dialling may take place using Decadic (Pulse) dialling or, if available, Tone (DTMF) dialling. These are selected by S8 of SW2.

* Ensure that the telephone number stored in memory does not cross block boundaries.

8.1. Auto Dial Power-up

The modem may be powered-up to dial out in two ways; by the Data Logger or by an external potential free contact.

8.1.1. Data Logger

The Logger may be programmed to output a pulse which will power the modem up. This is done using the PULSE y instruction which outputs a $5y^2$ micro second pulse from pin 17 on the INPUT SIGNALS connector and from pin 25 on the COMPUTER connector. The pulse is from an open collector source and will not be *visible* unless the pin is pulled up to 5 Volts.

A pulse of no less than 72 ms (y=120) is required to be reliable and, hence, is recommended.

i.e., `PULSE 120` (which generates the code `24,0,120,0`)

Upon being powered-up, the modem will begin dialling the number stored in the logger.

S4 of SW1 must be ON to enable this type of operation.

» Note: The pulse will only appear on pin 17 of the INPUT SIGNALS connector on Data Loggers purchased before approximately 1/4/88 (serial numbers less than approx 3000). A minor modification can be made to correct this problem.

8.1.2. External Contact

It is possible to power-up the modem by connecting the *external relay* terminals together. This is the terminal pair closest to the corner of the modem, ie, external relay + and external relay -.

When these are shorted together, the modem will power-up and begin its dial out sequence. A relay is the obvious device to achieve this.

S3 of SW1 must be ON to enable this mode of operation.

8.2. Auto Dial Message

When dialling out, it is possible to send an identifying message to the receiver. This is especially advantageous if the user has more than one logging site.

The message, like the telephone number, is stored at any available user memory locations with the first location stored in addresses 242 and 243.

Address	Meaning
242	Location
243	Block

NOTE:
address = block x 256 + location

```
eg,     1280 = 5 x 256 + 0
        Address 1280 = Block 5 Location 0
```

The message is stored as one character per address as an ASCII code (decimal).

eg, for a message of SITE 1 (stored in addresses 1280 etc.)

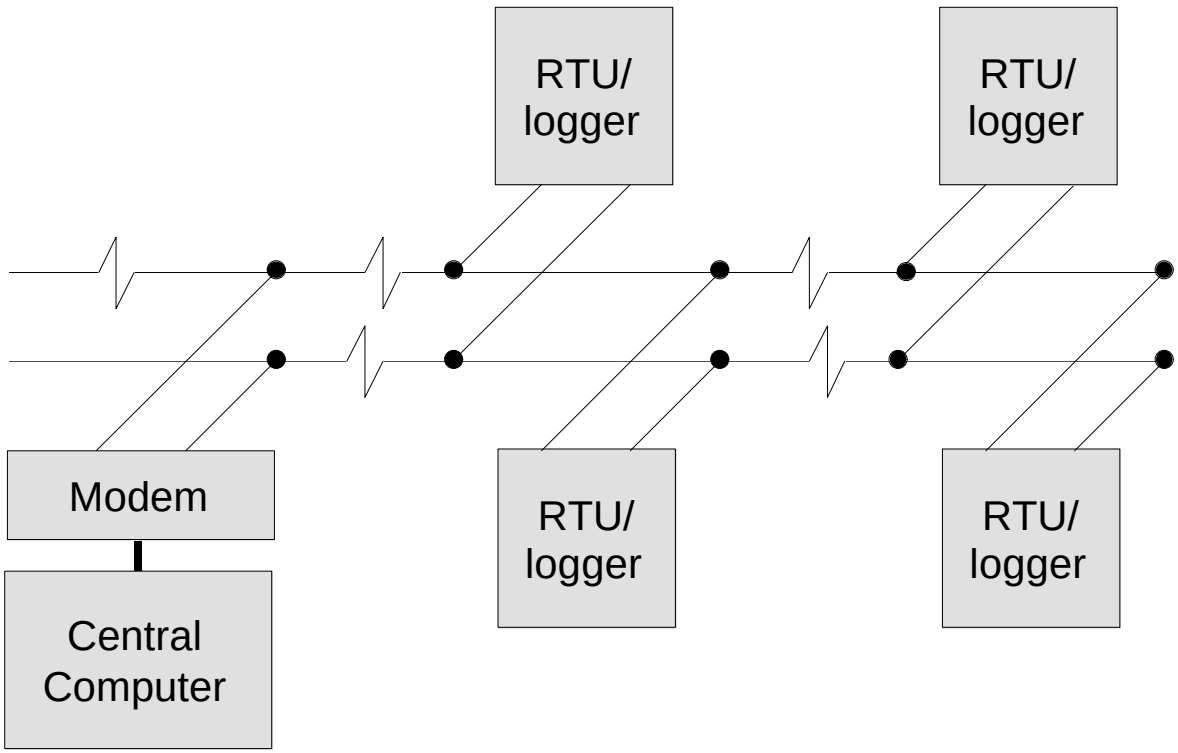
```
A242 = 0A243 = 5
A1280 = 83(S) A1281 = 73(I) A1282 = 84(T) A1283 =
69(E) A1284 = 32(Space) A1285 = 49(1) A1286 = 0
```

It is important that the message be terminated with a 0 to indicate to the modem where the end of the message is.

S5 of SW2 must be OFF to enable transmission of the message.

9. MULTIDROP MODE

You use the multidrop line communications mode where you do not want to use the telephone network. Instead, a simple two-wire connection is used. Using this mode, it is possible to connect a number of remote telemetry units to the



same pair of wires. It is selected by setting S4 of SW2 OFF and S2 of SW1 ON.

For the central computer to interrogate each individual RTU/logger, each RTU has an identification address. This address is set using switches S5, S6, S7 and S8 of SW2.

All RTUs must be powered up continuously to use this mode. The reason for this is so that each site can “listen” to the central computer for requests directed at it.

» NOTE: To operate in multidrop mode, you require an RTU with a serial number greater than 395 and also a firmware version of PDLTIO4A or greater.

9.1. How it Works

To operate correctly, a particular sequence of events must take place.

1. The RTU sites are powered up continuously in multidrop mode.
2. The central computer modem sends out an **originating** carrier onto the two wires. The RTUs should turn on their carrier LED, to acknowledge that a valid carrier is being received, and "listen" for a request from their address.

   NOTE: The central modem must be able to operate in half-duplex mode, i.e., be capable of sending a carrier continuously without receiving a carrier from a responding modem.
3. The computer interrogates a RTU/logger by sending an address code. The format of this code is Q0x (where x is 0–F). Q00 (for address 0), Q01 (address 1), etc.

   Upon receiving a Q, each RTU checks the next two digits. If these correspond to the address on switches 5, 6, 7, 8 of SW2, then the RTU will transmit an **answering** carrier and also turn on the LED labelled M Drop Tx.

   All subsequent get (G) and put (P) commands sent will be received by this RTU/logger.

   If the Q address does not correspond to the address switches, then the RTU stops transmitting its answering carrier(if it was transmitting), turns off its LED and listens for the next Q code.
4. If the RTU loses the carrier from the central modem, it turns off its carrier LED then waits for a valid carrier.

9.2. STARLOG Software

In order to use STARLOG Software when using the Remote Telemetry Unit in multidrop mode, you must establish communication between the central modem and the RTU. This includes causing the central modem to send an originating carrier, then transmitting Q codes from the MDL Diagnostics menu.

9.2.1. Scheme Test Mode

To interrogate a RTU/logger from **Scheme Test Mode**, you will want to send an address code (eg. Q00). You can do this easily from the **MDL Diagnostics** menu. Providing a carrier is being sent from the central modem, the Q codes can be sent by typing them at the keyboard.

9.2.2. Modifying Command Files for Multidrop Mode

To unload and load multiple sites you will want to modify the unload and load command files for PDLIO, SCHEME_U.LCF and SCHEME_L.LCF.

For example,

If the command

```
LOGGER 3
```

appears in the .LCF file, this actually results in the code

```
Q03
```

being sent by the central computer.

You simply add these commands to the existing .LCF file to load and unload many loggers one after the other.

9.3. LED Status Indicators (see section 5.1)

For RTUs with firmware versions KNS or MULTDROP, the unused LED has a function when in multidrop mode. It is ON when the RTU has been selected by an appropriate Q code.

10. SPEECH OPTION

The modem may be fitted with an option to provide the user with synthesised speech. If fitted, it is enabled by setting Switch 6 of the DIL Switch 2 in the OFF position.

This option may be used when the modem answers or initiates a call.

The information to be “spoken” is taken from a specified area of memory in the Data Logger. This area is designated in addresses 244 and 245.

Address 244	=Location
Address 245	=Block

This ’points’ to the first byte in what is referred to as the “speech string”.

10.1. Speech String

The speech string must be in a specified format. It is the user’s responsibility to write the logger program to place the information required into this string. The speech string must be contained in only one block of memory, i.e., it must not cross the boundary of two blocks.

There are three types of data in the string:

a) byte corresponds directly to a word.

```
eg.  0 - zero                    11 - site
```

b) termination of string byte - 255

c) byte signals the following word is to be converted into a decimal number - 200, i.e. 200 LSB MSB

```
eg.  200 0 1 - two five six
```

Note: leading zeros are omitted. If only a single byte is to be converted, the MSB must equal zero.

```
eg.  11  200  2  0  18  15  200  255  255  255
```

site two (pause) level six five five three five

10.2. Dialling

The modem initiates a call. If answered by a person, the modem will wait for a short period and then “speak” the string. It will repeat itself five times (or thirty times using Firmware 3V7).

10.3. Answering

The modem answers then sends its answer and carrier tones. If not answered by another modem, it speaks the string another five times (or 30 times using Firmware 3V7).

» Note: The setting of S6 determines whether Audible Coded Message or Speech is selected.

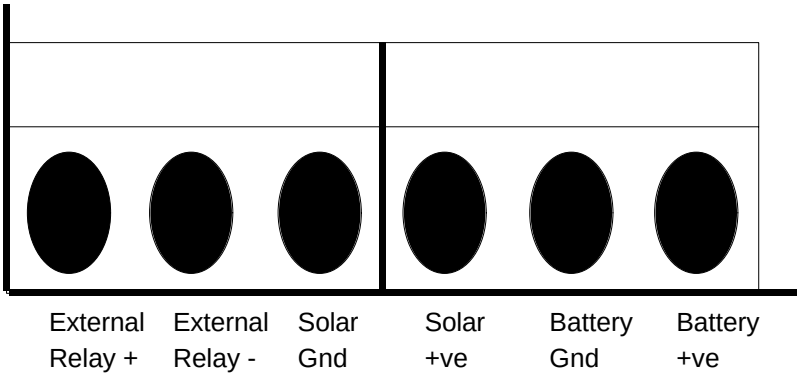
10.4. Word Table – Firmware 3V7

Byte	Word	Byte	Word
0	zero	15	level
1	one	16	channel
2	two	17	value
3	three	18	(~600ms pause)
4	four	19	danger
5	five	20	A
6	six	21	B
7	seven	22	D
8	eight	23	alarms
9	nine	24	pump
10	point	25	percent
11	site	26	tank
12	millimetres	27	litres per sec
13	metres	28	per sec
14	river level		

10.5. Word Table Firmware 3V8

Byte	Word	Byte	Word
0	zero	15	level
1	one	16	speed
2	two	17	kilo
3	three	18	(~600ms pause)
4	four	19	hour
5	five	20	direction
6	six	21	degrees
7	seven	22	from north
8	eight	23	temperature
9	nine	24	celcius
10	point	25	percent
11	site	26	per
12	milli	27	second
13	metres	28	rainfall
14	river		wind

11. TERMINAL BLOCKS



The modem has three pairs of terminal blocks in the lower left corner.

If the power is supplied by either a 12V battery or from a mains adaptor, the power leads are connected to the third terminal pair with the appropriate polarity (Battery +ve and Battery Gnd).

Use of a solar recharge system requires the use of the second terminal pair (Solar +ve and Solar Gnd). The recharge leads are connected to this pair while the battery is again attached to the third pair.

WARNING Damage may result if the power source or solar recharge system is connected with the wrong polarity.

The first terminal pair is used to power-up the RTU via an external potential free contact (relay).

12. CONNECTORS

The modem has two flat ribbon, male connectors. The connector closest to the edge of the unit - **PDL Connector** - connects the modem to the Data Logger using the appropriate cable. The second - **Utility Connector** - is used with other equipment such as the 4 way or 8 way Telemetry Switches (6805D, 6805E).

Also provided are two telephone line sockets to enable connection of the modem to the telephone line and an external handset. Under normal use, the telephone line socket will be the only one used. However, if the user requires that the telephone line be capable of operating with a normal telephone, it is possible to connect a handset to the socket to provide normal facilities without removing any modem connections.

The pinouts for the flat ribbon connectors are as follows:

12.1. STARLOGGER, Macro and Portable Data Logger

1	Ground
2	Raw MDL received data
3	Raw MDL transmitted data
4	Disable PDL power down when grounded
6	Raw PDL received data
7	PDL 9600 baud select
8	PDL 1200 baud select
14	MDL Request to Send (RTS)
16	MDL 1200 baud select
19	Raw PDL transmitted data
20	PDL 300 baud select
25	PDL pulse
26	not connected

All other pins reserved.

12.2. Utility

1	Transmitted data before processor (RS-232)
2	+12V
3	+5V
4	Ground
10	Received data before processor
11	Transmitted data after processor
12	D1
13	D3
14	Received data after processor (RS-232)
15	–12V
18	Seize relay control
20	D0
21	D7
22	D4
23	D2
24	D6
25	D5
26	not connected

All other pins reserved

13. TEST POINTS

There are nine test points on the modem. These are as follows:

1	+5V
2	Ground
3	Power down (ground for a few seconds to power modem down)
4	Ring detect (ground for a few seconds to begin auto answer sequence)
5	+12V
6	–12V
7	Telephone line signal
8	RxD before processor
9	TxD after processor

Notes: Test points 1, 5 and 6 only have power available if RTU is powered up (LED=ON).

Test points 4 and 5 have a standby voltage of 5V applied continuously via a 100k pullup resister.

14. SPECIFICATIONS

Remote Telemetry Unit (Models 6805–10, 6805–20, 6805-30)

Transmit level:	-9 dBm (into 600 ohms)
Carrier detect level:	> -49 to -42 dBm (at modem IC)
Ring detect delay:	6 or 66 seconds
Auto disconnect:	6 - 15 seconds
Power consumption:	12V DC, 170 mA active, 10µA standby
	Model 6805–10 12V DC
	Model 6805–20 240V AC
	Model 6805–30 13V DC solar panel, 1.2Ah battery
Baud rate:	CCITT V22 (1200 baud full duplex)
	Bell 212A (")
	CCITT V21 (300 baud full duplex)
	Bell 103 (")
Enclosure:	UV stabilised polycarbonate, IP67
Size/Weight:	280mm H x 190mm W x 180mm D/5kg
Telecom Approval:	C83/3/18

Telemetry Switch (Models 6805D and 6805E)

# of Switches:	Model 6805D – 4, Model 6805E – 8
Power:	5V DC, 65 mA active, nil standby from Model 6805 RTU power supply
Logger Interface:	To Model 6804C/D PDL Interfaces or RS-232 line driver (MACRO)
RTU Interface:	Cable provided
Isolation:	400V relay isolated

PDL Direct Interface (Model 6804D)

Signals:	4-wire, 10 metre maximum
Size:	53mm x 35mm x 10mm
Mounting:	Direct onto PDL COMPUTER connector
Power:	12V DC, 4mA (from RTU)

PDL Isolated Interface (Model 6804C)

Signals:	6 core, 500 metre maximum
Isolation:	1500V
Size:	100mm H x 60mm W x 25mm D
Mounting:	Direct onto PDL COMPUTER connector
Power:	12V DC, 20mA (from external supply)

15. TELEMETRY SWITCH

This multiplexing module interfaces to the RTU and enables interrogation of up to eight remote Data Logging systems located at the one site.

Data Loggers connected to the Telemetry Switch may be located up to 10 metres from the switch (using the PDL Direct Interface - model 6804D) or 500 metres distant (using the Isolated Interface - model 6804C).

Two models of the Switch exist:

- Model 6805D Telemetry Switch - 4 Way
- Model 6805E Telemetry Switch - 8 Way

The 4 way Switch can provide multiplexing of up to four systems.

When connected to the Telemetry Switch, the Audible Coded Message or speech options can be used only if a logger (connected to Q00, see page 31) is set to a communication rate of 1200 Baud.

The module consists of a circuit board with a row of terminals located at one edge, 3 wire links and a 26 pin flat ribbon male connector. The terminals connect the Data Logging systems to the Telemetry Switch while the connector is used to connect the Switch to the RTU by the cable provided.

15.1. Terminal Description

There are forty one terminals for connection to multiple Data Logging systems.

Terminal	Description
1	Common
2	Signal Ground 0
3	12/Gnd (Link 3)
4	Tx Logger 0
5	Rx Logger 0
6	Common
7	Signal Ground 1
8	12/Gnd (Link 3)
9	Tx Logger 1
10	Rx Logger 1
11	Common

Table continued on next page.

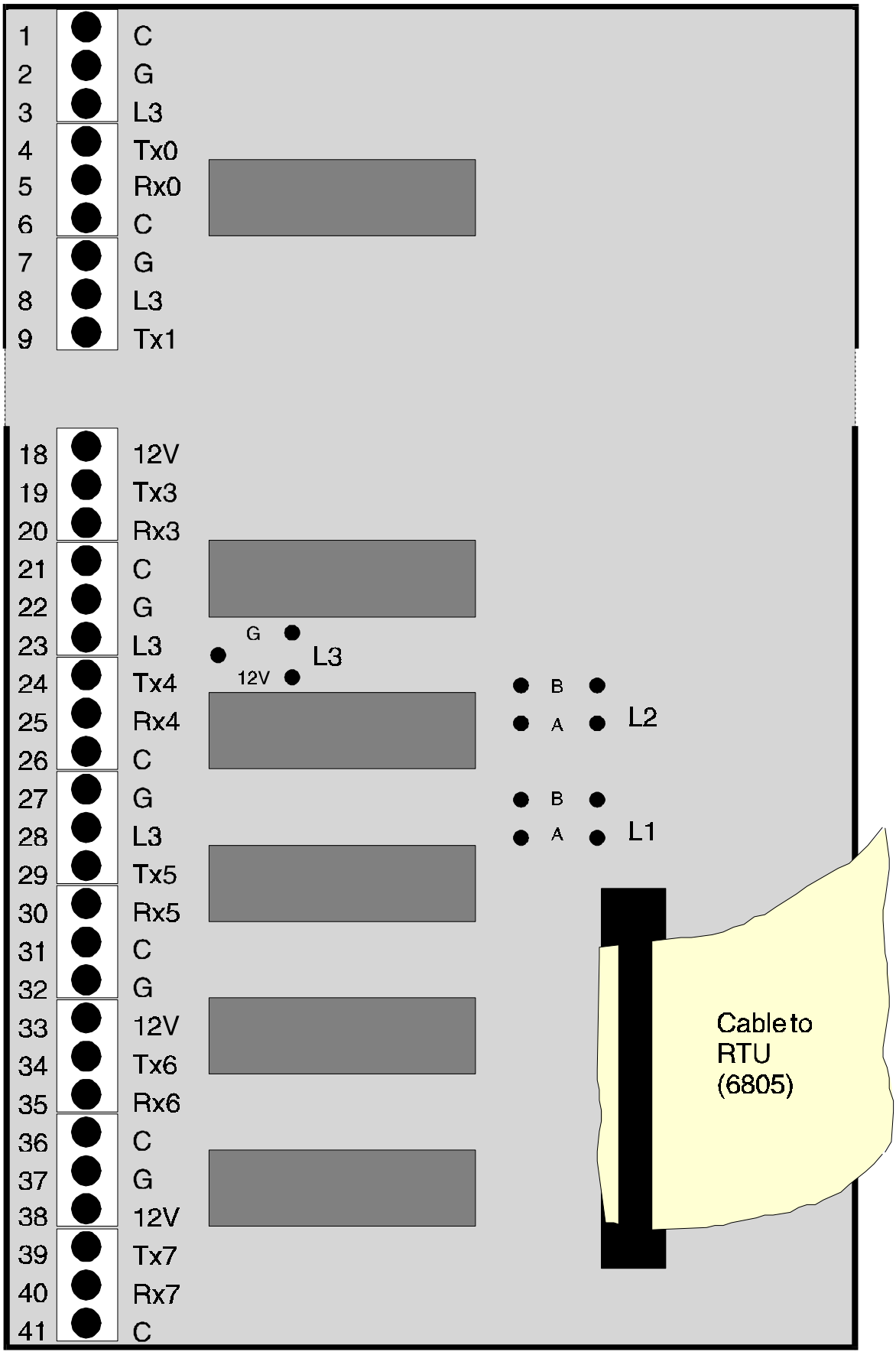
Table continued from previous page.

Terminal	Description
12	Signal Gnd 2
13	12V
14	Tx Logger 2
15	Rx Logger 2
16	Common
17	Signal Gnd 3
18	12V
19	Tx Logger 3
20	Rx Logger 3
21	Common
22	Signal Gnd 4
23	12/Gnd (Link 3)
24	Tx Logger 4
25	Rx Logger 4
26	Common
27	Signal Gnd 5
28	12/Gnd (Link 3)
29	Tx Logger 5
30	Rx Logger 5
31	Common
32	Signal Gnd 6
33	12V
34	Tx Logger 6
35	Rx Logger 6
36	Common
37	Signal Gnd 7
38	12V
39	Tx Logger 7
40	Rx Logger 7
41	Common

Notes:

» Terminals 3, 8, 23 and 28 are either grounded or at 12V depending on the position of link 3.

» The common terminal for each set is grounded continuously while the Signal Ground is only grounded when the appropriate relay is selected.


1 C
2 G
3 L3
4 Tx0
5 Rx0
6 C
7 G
8 L3
9 Tx1
18 12V
19 Tx3
20 Rx3
21 C
22 G
23 L3
24 Tx4
25 Rx4
26 C
27 G
28 L3
29 Tx5
30 Rx5
31 C
32 G
33 12V
34 Tx6
35 Rx6
36 C
37 G
38 12V
39 Tx7
40 Rx7
41 C
G
12V
L3
B
A
L2
B
A
L1
Cable to
RTU
(6805)

» Links 1 and 2 enable four of the eight channels to be selected as either true RS-232 communication channels or Logger compatible channels.

15.2. Link Options

Three links on the Telemetry Switch are used to select appropriate options.

15.2.1. Links 1 and 2

Links 1 and 2, labelled L1 and L2 on the module, are used to select the type of communication being used for channels 0, 1, 4 and 5. When both links are in position A (see diagram), the module will accept signals which use standard logger communication levels and when in position B, will accept true RS-232 levels.

» Note: Channels 2, 3, 6 and 7 will only accept signals of standard logger communication levels.

15.2.2. Link 3

Link 3 selects the voltage level output at pins labelled as L3 (3, 8, 23 and 28) when the appropriate channel is selected. When in position 12V, the output from the terminal is 12V and when in the G position, the terminal will be grounded.

When used with a data logger, this output should be at 12V. It is then used to 'inform' the logger that the telemetry switch is present and wishes to communicate with it.

Other devices which have a 'sense' pin that needs to be grounded should use the terminal with L3 in the G position. (eg SECWA Gas Sola Flow systems).

» Note: Channels 2, 3, 6 and 7 only provide a 12V output.

15.3. Using Version 2 Software to Select Loggers

In order to use STARLOG Software when using the Telemetry Switch of the Remote Telemetry Unit, you must establish a communication line between the modem (at your computer) and a logger on the switch. To select the Logger (activate the Switch) you will want to send a Q code. (See Step 3 in section 8.1 Multidrop Mode: How it Works.)

There are two ways to send a Q code: by editing the .LCF file (a scheme file used for logger communication which is generated by the software when you

create a scheme) or by sending a Q code direct from the **MDL Diagnostics** menu of the **Scheme Test Mode**.

15.3.1. Modifying the .LCF file

Two .LCF files are used by the PDLIO program to unload and load a logger. They are SCHEME_U.LCF and SCHEME_L.LCF.

If you use the menus to create a Scheme, these files only include commands to load and unload one logger. You can add commands to these files so that the **Unload Data** and **Load Logger with Scheme** commands work on more than one logger.

The command to add is LOGGER *n*
where *n* is the address of the Logger.

```
For example,

        LOGGER 3

selects the logger with the address of 3.
```

You simply add these commands to the existing .LCF file (using a text editor or word processor) to load/unload different loggers one after the other.

(See the Programmer's supplement, #6201.)

15.3.2. Select a Logger in Scheme Test Mode

The LOGGER command described above actually sends an address code (Q code) to the RTU.

A Q code can be sent directly from a keyboard in the **Scheme Test Mode** section of STARLOG Software using the **MDL Diagnostics** menu.

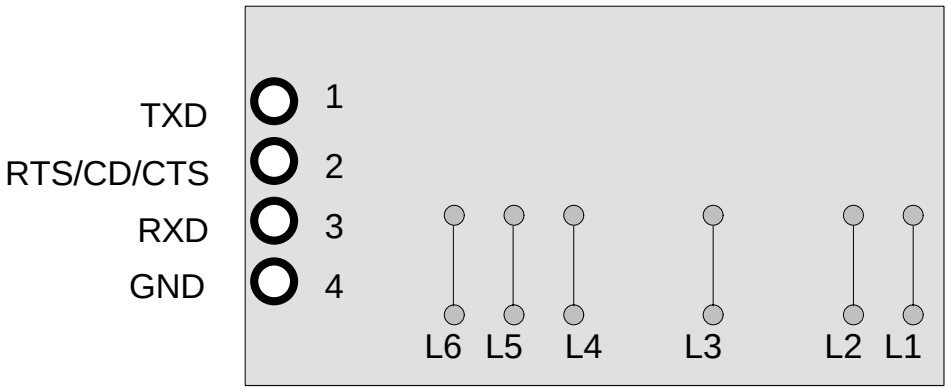
The correct syntax for a Q code is: Q0*n*

Therefore, to send the LOGGER 3 command, you would type Q03.

16. PDL DIRECT INTERFACE

The PDL Direct Interface is a PCB mounted directly on a 25 pin 'D' connector and contained inside the shroud.

The interface contains six links, four to select the appropriate baud rate and two to select between RS-232 signals or logger signals.



16.1. Links

Links 1 and 2 (L1, L2) are used to RS-232 levels or logger levels.

Links 3, 4, 5 and 6 are for baud selection.

L3 - 9600
L4 - 8000
L5 - 1200
L6 - 300

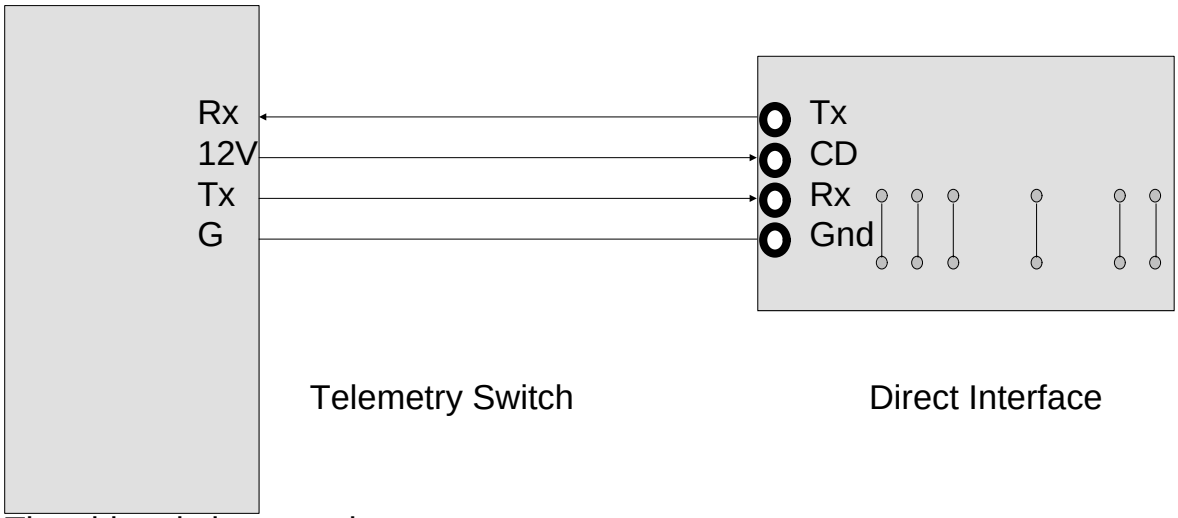
16.2. Connecting the Switch and Interface

The Telemetry Switch may be configured as either eight channels of logger signal levels or four RS-232 and four logger signal levels.

If the Switch is configured as logger levels, then L1 and L2 should be cut (open circuit).

If the switch is configured to RS-232 levels, then Interfaces connected to those four channels should have L1 cut and L2 in place (short circuit).

The signal connections shown on the following page should be used for all options.



The abbreviations used mean:

TXD	transmit data
RTS	request to send
CD	carrier detect
CTS	clear to send
RXD	receive data
GND	ground (common)

17. PDL ISOLATED INTERFACE

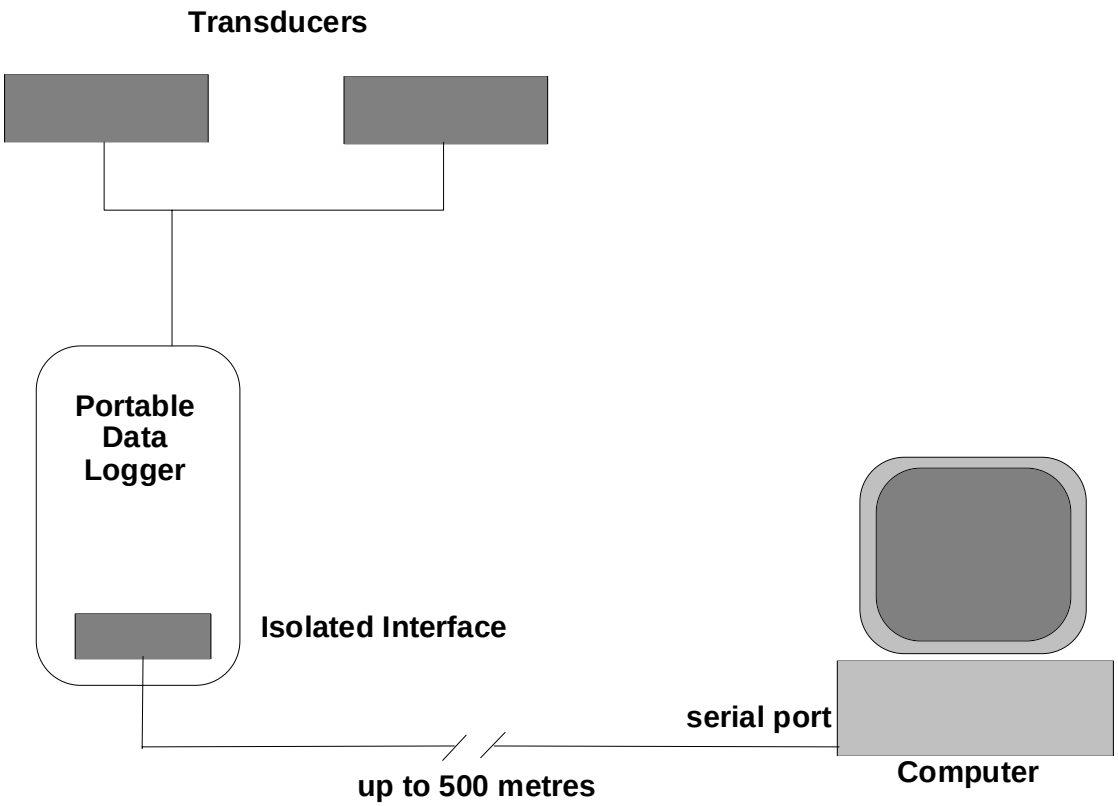
The PDL Isolated Interface is used where data logging systems are located up to 500 metres away from the Telemetry Switch to optically isolate the Data Logger. The Interface is designed to be plugged into the Data Logger's COMPUTER connector.

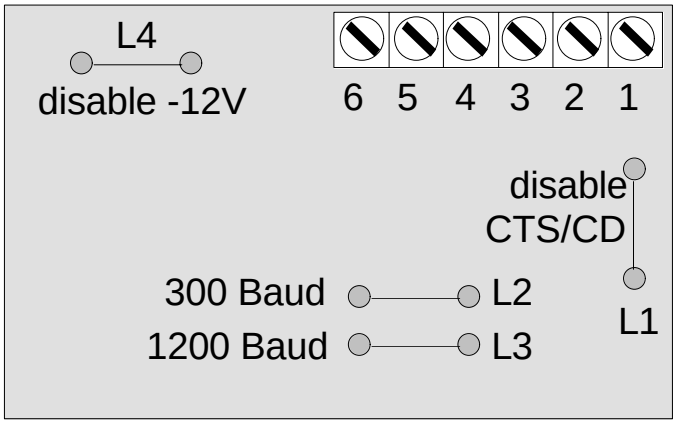
To connect the Interface to the Telemetry Switch, use a cable between the Switch terminals and terminal blocks within the Interface. (See Terminal Description on the next page.)

The printed circuit board of the Interface has four links which determine the setup of the Interface. (See Link Description on the next page.)

17.1. Application

An application of the Isolated Interface is one that requires the Logger to be directly interrogated by an IBM PC or compatible computer. If the Logger is at a distance of less than 500 metres, the connection can be made directly from the Isolated Interface to the computer whereas if any greater distance is involved,





a modem must be incorporated at each end of the link between the Logger and the computer.

17.2. Terminal Description

Terminal	Description
1	+12 Volts
2	CTS/CD
3	–12 Volts (if L4 not inserted)
4	RXD
5	TXD
6	Ground

17.3. Link Description

Link	Description
L1	Disable CTS/CD (insert if Terminal 2 is not connected)
L2	Insert to select 300 Baud
L3	Insert to select 1200 Baud
L4	Disable - 12 Volts (insert if Terminal 3 is not connected)

Default: L1 = IN
L2 = IN/OUT

L3	=	IN/OUT
L4	=	IN

18. USING A CELLULAR PHONE WITH THE RTU

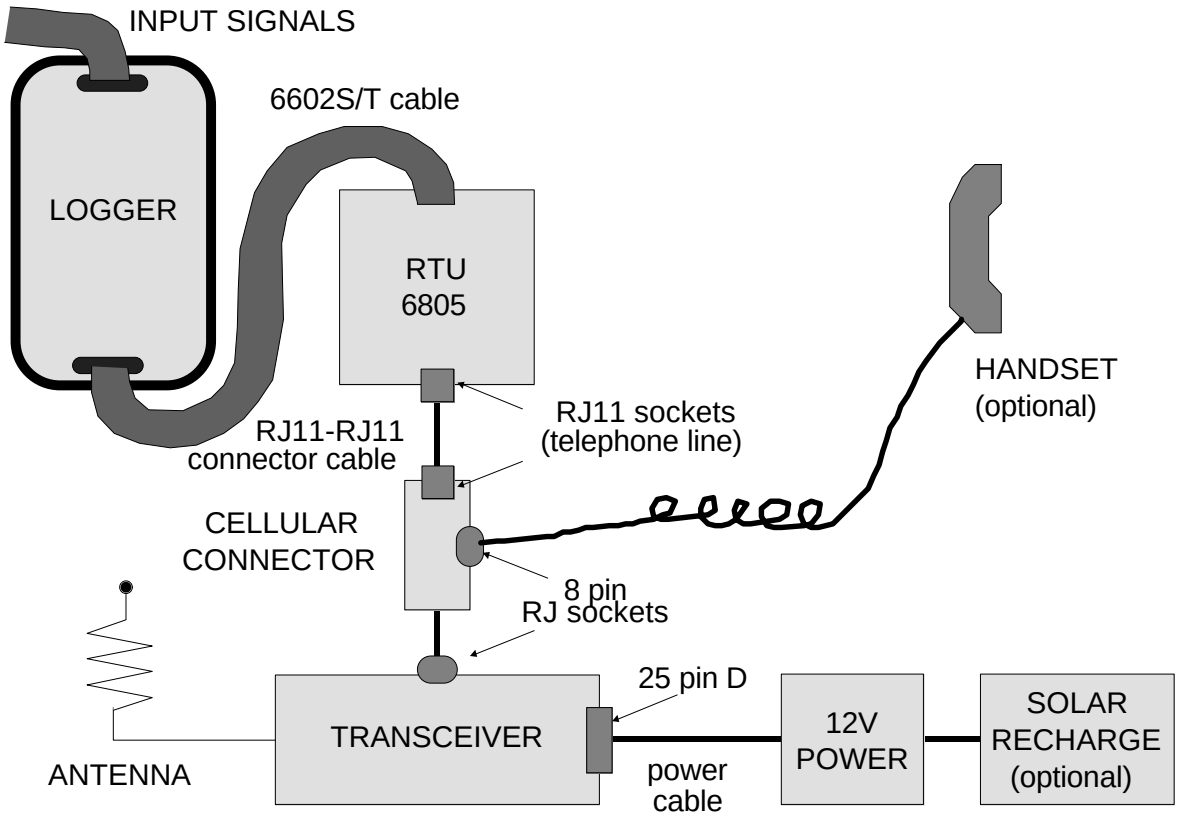


Figure 18.1 – Cellular Phone Connections

18.1. Introduction

The Data Logger and RTU may be interrogated via a Cellular Telephone System (6807A). This enables the user to load and unload the logger at a site which does not have a telephone line available and is especially useful when the logging system must be regularly moved to a different site or is at a temporary site.

The components of the Model 6807A Cellular Phone System are:

Model	Description

6807A	Cellular transceiver, cellular connector, handset, roof-mounted antenna and RJ11—RJ11 cable

An optional solar recharge system includes:

Model	Description
6904D	Solar panel (12W), batteries (50Ah)

18.2. Operating the Cellular System with the RTU

Operation of the RTU using a cellular phone is virtually the same as using a normal phone line. There are two main differences.

As already described in this supplement, the RTU waits a certain period for the ring after dialling a number stored in a logger, then, if it doesn't receive one, the RTU may enter speech mode (even when the speech option is not present). The length of time between dialling the number and receiving the ring is slightly longer when using the cellular system. So it may be necessary to add a few seconds delay to the end of the number dialled to ensure that the RTU waits for the ring. To add approximately 3 seconds delay, use ASCII code 40 (see Auto Dial Mode section). Although two or three delays should be adequate, it is recommended that you test each phone and location.

The other difference is that the RTU should be "hung up" from the computer end of the line, using the TTT command. This prevents a signal from the cellular connector (which can be mistaken for a signal from another modem) causing the RTU to stay on-line. This command should be added to both the SCHEME_U.LCF and SCHEME_L.LCF files, i.e.,

```
SEND TTT
```

18.3. Connections

18.4. Power Supplies

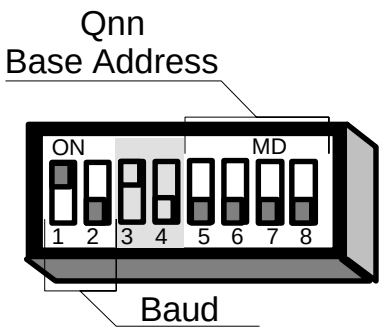
The cellular phone system will consume approximately 150mA from a 12V power supply when in the standby mode. This increases to approximately 500mA when communicating. This means that a high capacity power supply must be used as the system will consume approximately 5Ah per day (depend-

ing on the length of communication). It is recommended that you use at least a 30Ah battery in conjunction with an appropriately sized solar panel, e.g., 12W.

18.5. Handset Option

It is recommended that you disconnect the handset from the cellular system when unattended . This would act to deter thieves in two ways: the system is useless without the handset and it is not readily identified as a cellular phone without the handset.

DIL SW1



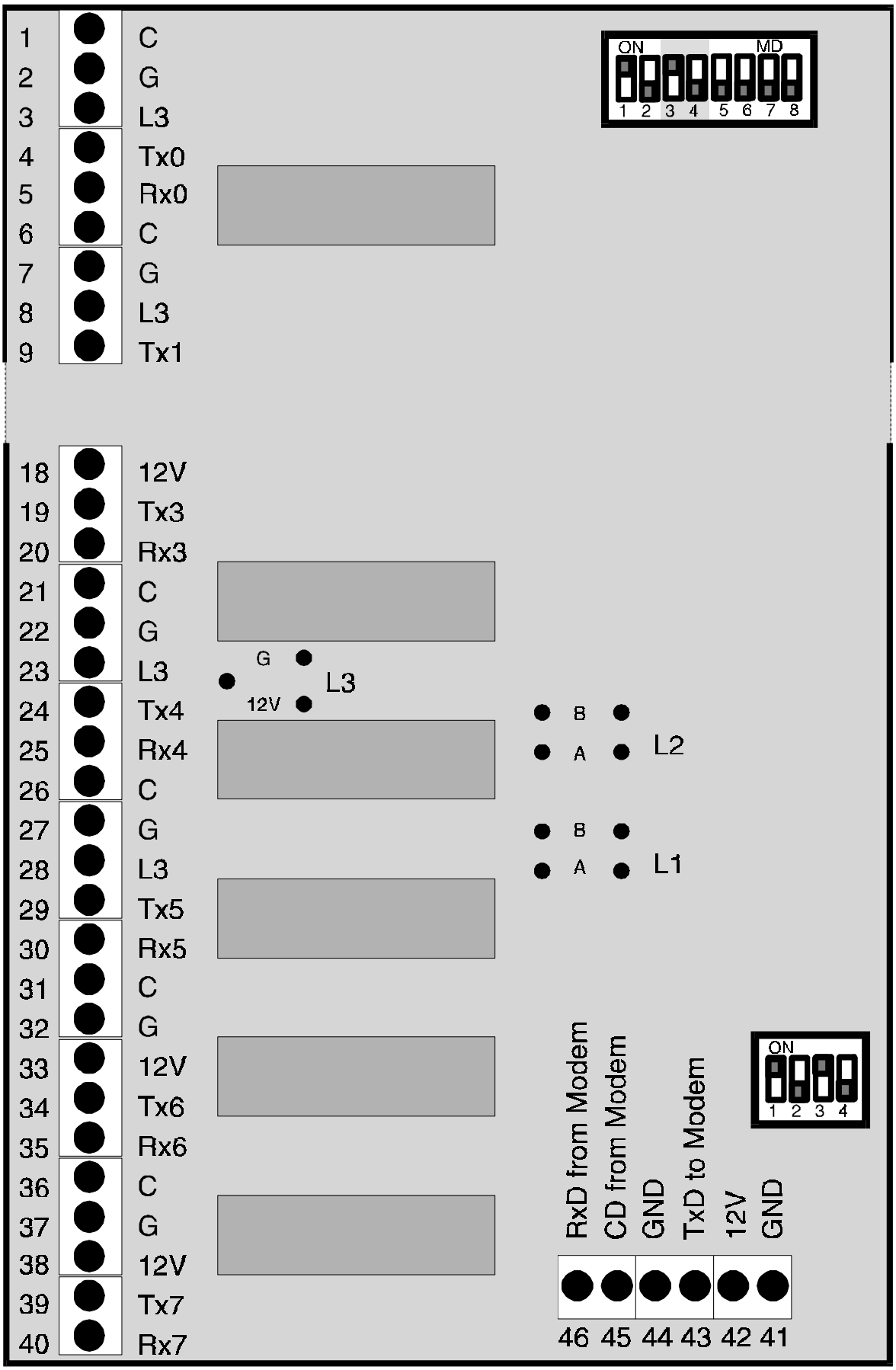
Battery consumption increases slightly when the handset is connected. When plugged in the power cable configures the unit to be powered on continuously, however, to reduce power consumption, the backlight on the handset shuts off after a short time.

*

*

*

DIL SW2



6804B/N Intelligent Multiplexer

19. MODEL 6804B/N INTELLIGENT MULTIPLEXER

To interrogate several loggers from one computer UNIDATA manufactures the Model 6804 Intelligent Mulitplexer.

19.1. Switch Settings – Baud Rate

1	2	BAUD Rate
0	0	300
1	0	1200
0	1	2400
1	1	9600

Default settings shown in picture and shaded in tables and marked *.

19.2. Switch Settings – Response Range

4	5	6	7	8	Response Range
0	0	0	0	0	Q00 to Q07
1	0	0	0	0	Q08 to Q0F
0	1	0	0	0	Q10 to Q17
					... ...
0	1	1	1	1	QF0 to QF7
1	1	1	1	1	QF8 to QFF

19.3. Switch Settings – Channel Functions

1	2	3	4	Chan 0,1,4,5
1	0	1	0	RS-232
0	1	0	1	TTL/PDL

19.4. Terminal Description

The Model 6804B/N Multiplexor offers 46 terminations. Terminations 1 through 40 function the same as the 6805D&E Telemetry Switch (see pages 27–29). The remainder of the terminations are used as described below.

Terminal	Description
41	Ground (–ve)
42	Power (+ve) 12V
43	TxD to Modem
44	Ground
45	CD from Modem
46	RxD from Modem

Appendix A
Previous Switch Settings

Firmware Versions PDLTIO2* and PDLTIO3*

DIL Switch 1 (SW1)

SW1	OFF	ON	FUNCTION
1	CCITT	Bell	Communication Standard
2	R E S E R V E D		
3	Disabled	Enabled	Power-up from external relay
4	Disabled	Enabled	Power-up from PDL

DIL Switch 2 (SW2)

SW2	OFF	ON	FUNCTION
1	not yet implemented	await Logger prompt	Data mode
2 3	must be ON 1200	ON 300	Baud rate
4	not implemented	Enabled	Telephone Communications
5	Disabled	Enabled	Identifying message when dialling
6	Disabled/ Enabled	Enabled/ Disabled	Audible Coded Message/Speech
7	Disabled	Enabled	Auto answer
8	Tone (DTMF)	Decadic	Dialling mode

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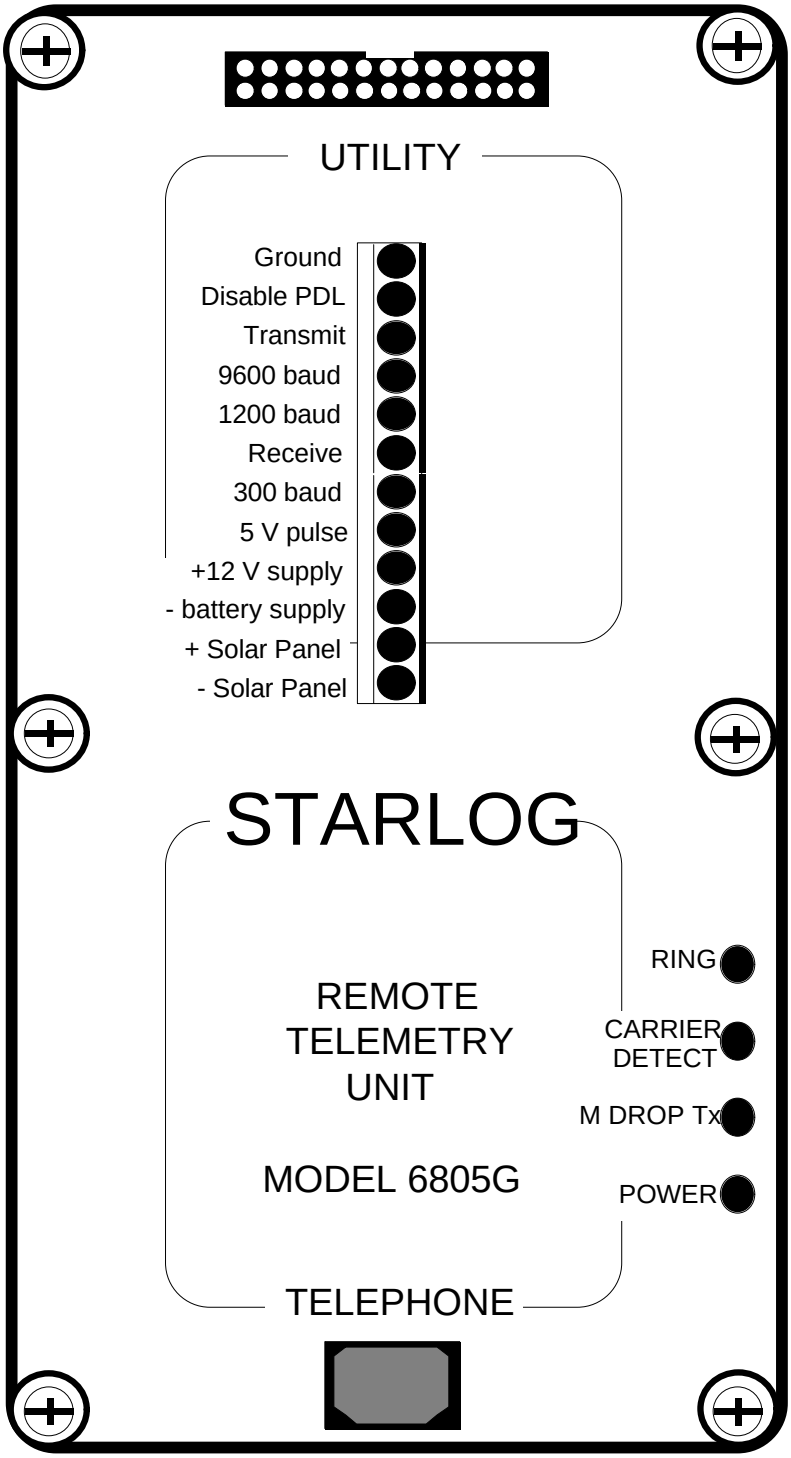
Appendix B
Model 6805G Remote Telemetry Unit

The Model 6805G Remote Telemetry Unit is designed to fit in a smaller space than the standard unit and offers all the functions described in this supplement. Easily accessible connections on its front cover enable you to connect it to a STARLOG Data Logger.



B.1. Internal Switches

The illustration below shows the location of DIL Switches 1 and 2 and seven Test Points on the PCB inside the Model 6805G RTU box . These function exactly as described in this supplement.

For switch settings see section 6.