GradeShift UDL Instruction Manual

1. Quick Guide

Figure 1 - GradeShift UDL

Figure 2 - LED Indications
STEP 1. SITE SURVEY

Use a Signal Analyser (available from the CSL shop) to determine if sufficient base stations are available at the site and that they can supply sufficient signal strength. This will determine the optimum location for the DualCom’s aerial to be mounted.

<table>
<thead>
<tr>
<th>LED Label</th>
<th>Description</th>
<th>LED STATUS</th>
</tr>
</thead>
</table>
| Green               | GPRS Signal Strength                | ON: Strong Signal strength  
                      |                                    | Flashing: Acceptable Signal strength  
                      |                                    | OFF: Low Signal Strength, not acceptable  
                      |                                    | Other: LED off and Red Fault; LED on indicates no signal |
| Yellow              | Communications                      | ON: Input is triggered or Dial Capture is in progress  
                      |                                    | Flashing: Sending a message to Gemini and ARC  
                      |                                    | OFF: No communication is in progress  
                      |                                    | Other: Rapidly flashes to show successful communication |
| Red                 | Fault                               | ON: Fault present see troubleshooting section  
                      |                                    | Flashing: NVM contains factory defaults  
                      |                                    | OFF: No faults exist  
                      |                                    | Other: On for 2 seconds indicates communication failure |
| Blue                | Ready                               | ON: Unit is ready to send messages to Gemini and ARC  
                      |                                    | Flashing: N/A  
                      |                                    | OFF: Unit is busy and not ready to send new messages  
                      |                                    | Other: LED off and Red Fault; LED on indicates programming file is yet to be downloaded (usually takes 5-8 mins from power up with good signal) |
| Service (SYC)       | Network Status                      | ON: SIM card registered on network  
                      | (next to aerial socket)             | Flashing: There is insufficient power or no power connected to the DualCom  
                      |                                    | OFF: Rapid flashing indicates unit is not registered to network |

**SITING THE AERIAL**

**DO...**

INSTALL VERTICALLY IN AN OPEN SPACE.

COMPLETE A SIGNAL TEST BEFORE INSTALLING IN THE FINAL POSITION.

**DON’T...**

INSTALL CLOSE TO METAL OR SOURCES OF INTERFERENCE, I.E. WIRING, LIGHTING, ELECTRICAL INSTALLATIONS, COMPUTERS, MONITORS, ROUTERS & OTHER EQUIPMENT.
STEP 2. INSTALLATION

a. Ensure the aerial is mounted and connected in the correct position to achieve maximum signal strength. Apply power and wait for 5-8 minutes for the unit to connect to the network and download its programming file. Once completed the Green Signal Strength LED should be on or flashing, indicating an acceptable signal, the Red Fault LED should be off and the Blue Ready LED will be on. A percentage will also be shown on the SSD (Seven Segment Display) which should be 40% or higher. Now the GradeShift can be located into a suitable enclosure for the grade of installation.

b. Wire the input triggers, attach the RS232/485 cable or connect the Control Panel’s Digi-Modem PSTN terminals to the GradeShift’s Dial Capture terminals (refer to wiring diagrams in Section 2 of this document). For a dual path device remember to connect for PSTN or LAN.

c. Connect the fault output terminals to the Control Panel as required (refer to wiring diagrams in Section 2 of this document).

d. Power down the the Power Supply Unit (PSU), connect 9-30volts DC supply to the GradeShift’s power terminals and repower the PSU. Note that any voltage below 12v will indicate a low battery warning.

e. For installations using Dial Capture no GradeShift configuration is required. Simply check that your Digi-Modem has an ARC telephone number (ie 01) and an account number (ie 1234), select your signalling format, connect the GradeShift and test.

f. For pin triggering installations, ensure that the panel is in its normal state then press and hold the Test/Learn button for 3 seconds until the Green Signal Strength LED and the Yellow Communications LED flash alternately. Please note it is recommended that this step is not carried out until the instructions above has been completed.

STEP 3. TEST & SELF LEARN USING THE BUTTON

To send test signals, tap the Test/Learn button (less than 1 second). The 7 SSD should change to c1, c2, c3, A. (A = the Gemini Platform acknowledges the alarm signal). Simultaneously, the Yellow Communications LED indicates comms progress. If available, GradeShift will test the secondary (wired) path using C1, C2, C3, A to indicate successful communication.

If the test is not successful the Red Fault LED will light for 2-3 seconds at the end of the sequence. The GradeShift will make multiple call attempts if unsuccessful.

To self-learn the inputs, push the Test/Learn button for 3-5 seconds. ‘Pi’ will be displayed during the self-learn process.

STEP 4. CHECK SIGNALS HAVE BEEN RECEIVED AT YOUR ARC

Once you have successfully tested your GradeShift, make sure that you check with your ARC to see that they are receiving signals. This can be achieved by calling your ARC or using their web based secure platform.
INSTRUCTION MANUAL

1. ADVANCED INSTRUCTIONS

1.1 LINE FAULT

Ensure you wire the fault output in accordance with the standard you wish to adhere to. For further information on the different options please follow the wiring diagrams in Section 2 and the full Installation Manual available via the Installer Zone on the CSL website: www.csldual.com/installer-zone

1.2 ENABLE/DISABLE PSTN/LAN

To enable/disable PSTN use the following A & B button sequence:

```
A A A A
B B B B
A A A
B B B
```

P (n is flashing). This disables PSTN

```
A A A A
B B B B
A A A
B B B
```

PI (n is on solid). This enables PSTN

To enable/disable LAN:

```
A A A A
B B B B
A A A A
B B B B
```

P (L is on solid). This enables LAN

```
A A A A
B B B B
A A A A
B B B B
```

PL (L is flashing). This disables LAN

INCREASE PSTN/RADIO FAIL (for 10 mins – engineer mode):

```
A A
B B
```

T

```
A A
B B
```

ENG

TE

1.3 FAIL TO COMMUNICATE MONITORING USING DIAL CAPTURE

If you want to monitor the Dial Capture connection, connect an output configured as PSTN line fault on your Control Panel to one of the GradeShift’s inputs. Designate that input as Dial Capture fail at your
ARC. For wiring instructions see Section 2.

RS232/485: for installations using RS232 or RS485 simply follow the wiring diagrams in Section 2.

LAN: For installations using LAN as a communication path connect a Cat5 (or higher).

2. WIRING DIAGRAMS

2.1 PIN TRIGGERING

In the operation, GradeShift is triggered by applying or removing zero volts to the input terminals 1-12. No external pull-up resistors will be required. This is generally achieved via the digital communicator outputs of an intruder alarm or similar Control Panel. GradeShift will signal alarm conditions and will generate the relevant messages and forward them via Gemini to the ARC. Installers are advised that the intended use should avoid situations where the rate of triggering exceeds the rate at which messages may be sent to, or received by, the ARC receiver.

2.2 DIAL CAPTURE
In this operation, GradeShift simulates and replaces the phone line connection to the Control Panel’s Digi-Modem.

The Control Panel’s Digi-Modem must use one of the following alarm formats: Fast Format, Contact ID or SIA. In the event the Control Panel needs to send a signal to the ARC, GradeShift will capture the message and forward it, via Gemini, to the ARC. The Digi-Modem must have an ARC telephone number (ie 01) and account number (ie 1234) programmed for Dial Capture to work.

If you want to monitor the Dial Capture connection, you will need to connect an output configured as PSTN line fault on your Control Panel to one of the GradeShift’s inputs. That input then needs to be designated as Dial Capture Fail at your ARC.

2.3 PSTN

2.4 RS232/485
For further instructions on Control Panel programming please review the how to guides on the Installer Zone of our website: www.csldual.com/installer-zone

3. TROUBLE SHOOTING

Q. The Red Fault LED is continuously flashing, what does this mean?

A. This happens when the unit is first powered and needs to download its configuration file from the Gemini Platform which can take 5-8 minutes. You must ensure that the Yellow Service (SVC) LED is flashing every 3-5 seconds, which indicates that the unit is connected to the mobile network.

Q. The GradeShift repeats the ‘power-up’ sequence but never completes it.

A. The power supply has a low output voltage or is unable to supply the current required by the GradeShift when it is activated. Check the power supply with a multimeter. Also, test the GradeShift’s operation when powered by a ‘known good’ 12 volt battery.

Q. The Red Fault LED is on, what is the problem?

A. Please refer to the error code on the SSD and the error code list at the end of this document.

Q. Triggering via ‘Dial Capture’ does not seem to work.

A. During communication between the Control Panel and the GradeShift, the display should show ‘DC’. If ‘DC’ is displayed, but c1, c2, c3, A is not, the panel may not be compatible or is configured to send a protocol that GradeShift does not recognise. If available, check the Control Panel’s programming and select an alternate signalling format. Please check our online compatibility table for the latest list of compatible Control Panels and formats: www.csldual.com.
Q. The ARC is not receiving messages.

A. In most cases the GradeShift will explain the reason a signal cannot be sent to your ARC using an error code shown on the SSD. If, after trying to rectify the displayed fault, the GradeShift can still not transmit to your ARC please contact CSL Technical Support.

4. ERROR CODES

In the event of an issue the GradeShift will display an error code on the SSD. This is the letter ‘E’ followed by a number. A list of error codes is shown on pages 10 and 11 along with the potential solution. During operation, an Error Code may be displayed for up to 4 minutes. During this time, if the fault is corrected, or another error of higher priority occurs then the display will indicate the new value.

<table>
<thead>
<tr>
<th>Error Code (E+)</th>
<th>Description</th>
<th>What you should do</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Errors</td>
<td></td>
</tr>
<tr>
<td>‘Lo’</td>
<td>Low supply voltage</td>
<td>Check supply voltage</td>
</tr>
<tr>
<td>1</td>
<td>NVM missing or not fitted correctly</td>
<td>Check NVM fitted correctly</td>
</tr>
<tr>
<td>2</td>
<td>NVM data error. Not programmed correctly</td>
<td>Check NVM programming. Call CSL Technical Support</td>
</tr>
<tr>
<td>3</td>
<td>NVM checksum fault</td>
<td>Check NVM programming. Call CSL Technical Support</td>
</tr>
<tr>
<td>4</td>
<td>Power Fault. Voltage low etc.</td>
<td>Check supply voltage is in the 10 - 30 volt range at all times</td>
</tr>
<tr>
<td>5</td>
<td>485 Bus Port enabled but comms have failed</td>
<td>Check the 485 Bus Port connections to the Control Panel or the Plug-on Adapter</td>
</tr>
<tr>
<td>10</td>
<td>Radio. No base stations detected</td>
<td>Check serial connection and base station signals</td>
</tr>
<tr>
<td>11</td>
<td>Radio. Not registered on any GPRS network</td>
<td>Check SIM card and base station signals. Call CSL Technical Support</td>
</tr>
<tr>
<td>12</td>
<td>Radio. No response from radio module</td>
<td>Check module is fitted correctly. Check power. Call CSL Technical Support</td>
</tr>
<tr>
<td>13</td>
<td>SIM card missing or not fitted correctly</td>
<td>Check SIM card is fitted correctly</td>
</tr>
<tr>
<td>14</td>
<td>SIM card locked/disabled. No radio path operation possible</td>
<td>PUK Code required to unlock SIM. Call CSL Technical Support</td>
</tr>
<tr>
<td>15</td>
<td>SIM card PIN number is wrong</td>
<td>Check SIM PIN number in NVM. Call CSL Technical Support</td>
</tr>
</tbody>
</table>
Critical Errors:
To alert the User and Installer to critical error conditions, after the normal sounder beeps have timed out the GradeShift unit will continue to beep once every 5 minutes.

5. SUPPORT

For assistance please telephone or email our CSL Technical Support. Before doing so please review the Installation Manual and How To Guides on the Installer Zone of our website:  
www.csldual.com/installer-zone

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Description</th>
<th>What you should do</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Radio module faulty</td>
<td>Power down. Wait 1 minute. Re-power &amp; re-check. Call CSL Technical Support</td>
</tr>
<tr>
<td>18</td>
<td>Radio. Interference or jamming signals detected</td>
<td>Check local radio environment. Use a CSL Signal Analyser</td>
</tr>
<tr>
<td>21</td>
<td>PSTN line DC voltage = low or none</td>
<td>Check PSTN connections to A&amp;B terminals</td>
</tr>
<tr>
<td>22</td>
<td>PSTN. A phone, fax, etc. on the same line is off hook</td>
<td>Check for another phone, fax, etc. on the same line as DualCom or disable detection in the NVM</td>
</tr>
<tr>
<td>23</td>
<td>PSTN. Incoming ringing detected</td>
<td>Disable incoming ringing with Telephone supplier or disable detection in the NVM</td>
</tr>
<tr>
<td>24</td>
<td>PSTN dialling attempt. No dial tone</td>
<td>Check PSTN connections and that the service is available</td>
</tr>
<tr>
<td>25</td>
<td>PSTN. All call attempts have failed</td>
<td>Check PSTN connections and that the service is available</td>
</tr>
<tr>
<td>26</td>
<td>PSTN. Three successive call attempts have failed</td>
<td>Check PSTN connections and that the service is available</td>
</tr>
<tr>
<td>31</td>
<td>Radio. GPRS fault</td>
<td>Check SIM card fitted correctly. Check GPRS service</td>
</tr>
<tr>
<td>32</td>
<td>Radio. GPRS communications failure</td>
<td>Check SIM card fitted correctly. Check GPRS service. Check NVM programming</td>
</tr>
<tr>
<td>41</td>
<td>LAN Ethernet Cable (e.g. Cat5) not connected</td>
<td>Check Ethernet Cable is connected to LAN (IP) card. Check LAN cable is correctly connected to LAN Router/Hub/Switch at other end</td>
</tr>
<tr>
<td>43</td>
<td>No response from the Default gateway.</td>
<td>Check LAN wiring. Router, power supplies and DualCom’s IP programming. Call CSL Technical Support</td>
</tr>
<tr>
<td>44</td>
<td>(the Router to the Internet)</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>LAN communications failed</td>
<td>Check DualCom’s IP programming. Check Router is not firewalled. Call CSL Technical Support</td>
</tr>
<tr>
<td>47</td>
<td>No response from WAN ping address</td>
<td>Check DualCom’s IP programming. Check Router is not firewalled. Check Gemini Secondary Polling Server. Call CSL Technical Support</td>
</tr>
<tr>
<td>47</td>
<td>Invalid Router, Gateway or WAN address</td>
<td>Check DualCom’s IP programming</td>
</tr>
<tr>
<td>51</td>
<td>Radio path. All call attempts have failed</td>
<td>Check all Radio settings in the NVM. Call CSL Technical Support</td>
</tr>
<tr>
<td>99</td>
<td>NVM data error. Not programmed correctly</td>
<td>Check NVM programming. Call CSL Technical Support</td>
</tr>
</tbody>
</table>
6. OPTIONAL EXTRAS

All the products below are available to order via your ARC or the CSL Installer Shop.

<table>
<thead>
<tr>
<th>Part number</th>
<th>Product variant</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS2056</td>
<td>Aerial Extension, 5m lead</td>
</tr>
<tr>
<td>CS2057</td>
<td>Hi-gain Aerial with 5m lead (2.15 dBi) (for internal or external use)</td>
</tr>
<tr>
<td>CS2357</td>
<td>Covert Aerial with 5m lead (for internal or external use)</td>
</tr>
<tr>
<td>CS2367</td>
<td>Signal Analyser (2G/3G GPRS/GSM) (figure XX)</td>
</tr>
<tr>
<td>CS1520</td>
<td>Tamper protected Grade 2 Power Supply</td>
</tr>
<tr>
<td>CS1530</td>
<td>Tamper protected Grade 3 Power Supply</td>
</tr>
<tr>
<td>CS0720</td>
<td>Lo-cost ADSL (Broadband) Filter</td>
</tr>
</tbody>
</table>

SPECIFICATIONS
<table>
<thead>
<tr>
<th>Dimensions</th>
<th>21 mm (h), 132mm (w), 94mm (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>140g including NVM and SIM</td>
</tr>
<tr>
<td>Temperature</td>
<td>-20°C to +60°C transit, -10°C to +50°C operating</td>
</tr>
<tr>
<td>Humidity</td>
<td>0 - 80% non-condensing</td>
</tr>
<tr>
<td>Mounting</td>
<td>Any orientation</td>
</tr>
<tr>
<td>Warranty</td>
<td>5 years</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>9.0v - 30.0v DC</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>Quiescent = 20 mA, signalling = 150 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LED Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LED</strong></td>
</tr>
<tr>
<td>Green</td>
</tr>
<tr>
<td>Yellow</td>
</tr>
<tr>
<td>Red</td>
</tr>
<tr>
<td>Blue</td>
</tr>
<tr>
<td>Service (SVC)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radio Path</th>
<th>2G GSM and 3G GPRS services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial</td>
<td>50 ohm (nominal) on MMCX socket</td>
</tr>
<tr>
<td>Operation Method</td>
<td>Store and Forward (SIA) Pass Through (Fast Format/CID)</td>
</tr>
<tr>
<td>CIE Interconnections</td>
<td>Input ‘pin triggering’ (Parallel) 12 channels, Analogue (Dial Capture), RS232 Serial, RS485 Bus</td>
</tr>
<tr>
<td>RCT Protocols</td>
<td>Fast Format/Contact ID/SIA</td>
</tr>
<tr>
<td>Input Terminals</td>
<td>Max +30v, Min 0v DC (reference supply 0v terminal) 100k pull-up resistor to +5v</td>
</tr>
<tr>
<td>Low Battery</td>
<td>9.8v falling, 12.0v recovery</td>
</tr>
<tr>
<td>Fault Output</td>
<td>Changeover contacts (60v max, 100mA max)</td>
</tr>
<tr>
<td>Aux Output</td>
<td>Normally Open contact, may be inverted (60v max, 100mA max)</td>
</tr>
<tr>
<td>General Purpose outputs</td>
<td>Four. Each switched to 0v (30v max, 100mA)</td>
</tr>
<tr>
<td>User Serviceable Parts</td>
<td>There are no user serviceable parts within the GradeShift</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable for use in alarm systems complying to:</td>
</tr>
<tr>
<td>EN50136-1:1998 Security Grade 4/DP3</td>
</tr>
<tr>
<td>EN50136-2:2012 SP3 (RADIO)</td>
</tr>
<tr>
<td>SSF 114 v2 Larmklass 2</td>
</tr>
<tr>
<td>EN50131-10 Type Y</td>
</tr>
<tr>
<td>ATS Classification: EN50136 AT55/SP3</td>
</tr>
<tr>
<td>ATS 5 parameters: D3/M3/T4/S2/13/A3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN50136/EN50131 Environmental class II</td>
</tr>
<tr>
<td>Device should not come into contact with water</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN55022</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD6662:2010 and Industry Agreement 1501:2015</td>
</tr>
</tbody>
</table>
INTRODUCTION

The DualCom GradeShift is an advanced digital communication device for secure alarm reporting to an Alarm Receiving Centre (ARC) utilising the CSL Gemini Platform. Its new slim profile design is ideal for situations where there is limited space within the control equipment and simple, fast installation is required. Using Dial Capture, pin triggering, RS232 or a 485 bus, the GradeShift can be connected to a large range of alarm Control Panels or other control equipment to provide signalling in SIA, Contact ID or Fast Format for many types of applications including security systems installed to EN50136 Grade 2/3/4, PD:6662:2010 and to the Industry Agreement 1501:2015.

The GradeShift is supplied with a CSL DualCom WorldSIM® and transmits alarm signals via CSL’s Gemini Platform to an ARC via a radio, LAN or PSTN path. GradeShift monitors all of its paths continuously and reports faults to the control panel via relay outputs. In addition, Gemini continuously monitors the polling calls from the GradeShift to detect and report to the ARC total path or equipment failure in accordance with European requirements for Alarm Transmission Systems (ATS).

When a message is initiated by the changing voltage situations on GradeShift’s input terminals, Dial Capture connection or RS232/485 bus connection, the GradeShift will establish a communication to the receiving equipment. Successful communication will be indicated to the GradeShift by an acknowledgment signal from the receiving equipment, which will result in call completion and the return of the GradeShift to its quiescent condition. Where the correct acknowledgment signal is not received from the receiving equipment then the GradeShift will repeat the call process for a pre-set number of attempts on the other available paths or until the call is successfully passed to the receiving equipment. If the message cannot be successfully passed, upon request, the fault output may be programmed to operate. (See section 3.3 for relay programming.)
2.1 Site Survey

2.1 BEFORE YOU BEGIN... SITE SURVEY

Before installing the GradeShift it is strongly recommended that a network site survey is performed to ensure adequate signal strength is available. This can be completed by using a CS2367 2G/3G Signal Analyser (see CSL’s Installer Shop) or by using the GradeShift signal reading. In either case the reading should be taken in the location where the aerial is going to be installed (usually beside the Control Panel).

If there is only a low or no radio signal at the proposed site, the GradeShift will be unable to use the radio path for alarm reporting, polling or programming of the GradeShift (or the associated Control Panel). An insufficient quantity of base stations and/or weak radio signals will also result in an unreliable radio path.

It is recommended that GradeShift has a minimum of 2 base stations available with 40% or greater signal strength on one and at least 30% on the other.
2.2 Aerial Siting

2.2 AERIAL SITING

The aerial should be mounted vertically at the point of strongest signal. This is usually the highest point in the building (often the loft area).

As large metal structures can affect radio signals avoid installing the aerial directly under metal roofs or within metal skinned buildings. This will reduce the signal strength and may inhibit operation completely. If this is unavoidable, the strongest signal will be found away from the metal roof or close to large external windows or skylights.

Avoid installing the aerial close (2 metres) to cable runs, ducting, structural metalwork, metal pipes, water tanks and electronic equipment, e.g. photocopiers, fax machines etc. These can have similar effects to metal structures.

Ensure the aerial is connected to the aerial connector (see figure 1), then apply power to the unit and wait 1-2 minutes for the unit to connect to the network. During this time the yellow SVC LED will flash regularly and once completed, the green signal LED will indicate the radio signal strength.

<table>
<thead>
<tr>
<th>On constantly</th>
<th>Strong Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing</td>
<td>Acceptable Signal</td>
</tr>
<tr>
<td>Off</td>
<td>Low Signal (aerial should be re-sited or alternative version used)</td>
</tr>
</tbody>
</table>

Reliable operation is unlikely with a low signal strength. If the GradeShift’s display shows that the signal strength is low you should improve the signal strength. This may be achieved by repositioning the aerial. The aerial lead should not be cut therefore repositioning the aerial may require that the GradeShift is also repositioned.

To aid repositioning, the optional extra CS2056 Aerial Extension lead (5m) is available. When used, it will reduce the signal by approx 10%. Therefore, the aerial must be re-positioned to improve the signal strength by at least 10% in order to provide any benefit.

For full survey and aerial siting information, see the How To Guides in Chapter 3.
2.3 Installation

2.3 INSTALLATION

The GradeShift should be installed within an enclosure suitable for the overall security grade to which the system is being certified. The unit should be fixed securely using the mounting points provided. The GradeShift may be mounted in any orientation.

The CS5301-01 shall be installed by a Service person and be powered by a Limited Power Source in accordance with Clause 2.5 of EN 60950-1 or equivalent, not exceeding the maximum voltage of 30 Vdc, capable of delivering a minimum current of 200mA and be current limited (fused) to 1A. It shall be installed inside an enclosure of another I&HAS component which shall be that of a CIE conforming to EN 50131-3, or a PSU conforming to EN 50131-6.

A metal enclosure is recommended for physical robustness and electrical screening purposes. CSL’s CS1520 and CS1530, security grade 2 and 3 power supplies are available to purchase for the CSL installer shop. These power supplies have mountings and screw retainers for a GradeShift, a space for a 7 amp/hour battery(s) and plenty of room for wiring.

GradeShift can be triggered via outputs from the Control Panel via RS232 or 485 bus, or using Dial Capture. Check for Control Panel compatibility and the connection options at link to go here.

IF THE GRADESHIFT IS UNABLE TO CONNECT TO A NETWORK, OR THE SIGNAL STRENGTH IS TOO LOW FOR USE, THE RED FAULT LED WILL BE ON. GRADESHIFT SHOULD ONLY BE USED WITH A STRONG OR ACCEPTABLE SIGNAL STRENGTH. IF THE SIGNAL STRENGTH IS LOW OR THE GREEN SIGNAL LED IS OFF AND THE RED FAULT LED IS ON RE-SITE THE AERIAL. USE AN ALTERNATE VERSION OR EXTENSION CABLE TO LOCATE THE AERIAL WHERE THERE IS A STRONG OR ACCEPTABLE SIGNAL.

CONNECTION USING THE PIN TRIGGERING INPUTS

In this operation, the GradeShift is triggered by applying, or removing, zero volts to the input terminals 1-12.

No external pull-up resistors will be required.

This is generally achieved via the digital communicator ‘pin triggering’ outputs of an intruder alarm or similar Control Panel. The GradeShift will signal alarm conditions and will generate the relevant messages, and forward them via Gemini to the ARC.

Users are advised that the intended use should avoid situations where the rate of triggering exceeds the rate at which messages may be sent to, or received by the ARC’s receiver.

Connection of the input to outputs, fault relay and power connections are shown in Figure 3.

Figure 3 - Example of connection with a Control Panel
IN CERTAIN SITUATIONS THE INPUTS MAY BE TRIGGERED FOR OTHER APPLICATIONS, I.E. ENVIRONMENTAL CONTROL, CCTV, EQUIPMENT MONITORING. THIS OPERATION IS ACCEPTABLE PROVIDING THE INPUTS ARE TRIGGERED FROM A COMMON POWER SOURCE. THIS MEANS THAT 0V IS COMMON BETWEEN THE GRADESHIFT AND OTHER PSUs.

**CONNECTION USING DIAL CAPTURE**

In this operation, the GradeShift simulates and replaces the phone line connection to the Control Panel’s digi/modem.

The Control Panel’s digi/modem must use one of the following alarm formats: Fast Format, Contact ID or SIA. In the event the Control Panel needs to send a signal to the ARC, the GradeShift will capture the message and forward it via Gemini to the ARC.

The Control Panel’s digi/modem must have an ARC telephone number, an account number and the correct signalling format for Dial Capture to work. Check your Control Panel configuration for any other settings that may apply.

To monitor the Dial Capture connection, connect a Control Panel output, configured as ‘PSTN Line Fault’ to one of the GradeShift’s pin triggered input terminals. Inform the ARC that that pin triggered channel is ‘Dial Capture Fail’.
For alarm transmission assurance, connect the GradeShift’s Aux output, configured as ‘Comms Failure’ to one of the Control Panel’s inputs and designate that input as ‘Comms Failure’.

For full Dial Capture and compatible Control Panel information, see the how to guides in chapter 3 and the compatibility charts at: link to go here.

A MIXTURE OF DIAL CAPTURE AND PIN TRIGGERING IS NOT RECOMMENDED WITHOUT FIRST CONTACTING CSL TECHNICAL SUPPORT

CONNECTION USING THE 485 BUS

Where the Control Panel uses a 485 bus to connect to keypads it may also be used to connect to a digi/modem or a communications device, and where this is possible then a GradeShift may be connected. Refer to the Control Panel’s manual.

When a suitable Control Panel and the GradeShift are connected via a 485 Bus, then:

a). Alarm messages that are generated by the Control Panel may be passed to the ARC via the GradeShift and the Gemini platform. For this to work, the Control Panel’s communication presets must be correctly programmed. Check your Control Panel’s configuration for any other settings that may apply.

b). The Control Panel’s settings and logs may be passed to, or changed by its associated computer software using Up/download (UDL). UDL may be initiated by the operator at the associated computer or by the user at the Control Panel.

For full 485 bus and compatible Control Panel information, see the how to guides in chapter 3 and the compatibility charts at: link to go here.

CONNECTION USING RS232 SERIAL

Where the Control Panel uses a RS232 serial lead/port to connect to a digi/modem or a communications device, then a GradeShift may be connected. Refer to the Control Panel’s manual.

When a suitable Control Panel and the GradeShift are connected via a RS232 serial lead, then:
a). Alarm messages that are generated by the Control Panel may be passed to the ARC via the GradeShift and the Gemini platform. For this to work, the Control Panel’s communication presets must be correctly programmed. Check your Control Panel’s configuration for any other settings that may apply.

b). The Control Panel’s settings and logs may be passed to, or changed by its associated computer software using Up/download (UDL). UDL may be initiated by the operator at the associated computer or by the user at the Control Panel.

For full RS232 Serial connection and compatible Control Panel information, see the how to guides in chapter 3 and the compatibility charts at: link to go here.

**OUTPUTS 01-04**

The GradeShift features 4 switch negative (0v) outputs which can control up to 100mA when enabled/active. These outputs have a range of uses, e.g. to trigger CCTV equipment, to remotely reset a Control Panel, remote control of gates and lights.

For a full list of all the output options, see the how to guides in chapter 3

**CONNECTING THE FAULT & AUX OUTPUTS**

The GradeShift features a volt free changeover Fault output and a volt free switched Aux output. These outputs can control up to 100mA.

These outputs can indicate a range of faults and are typically wired to the Control Panel inputs. The most popular options can be selected using the GradeShift’s A&B buttons and these are shown below. For a full list of all the Fault & Aux output options, see the how to guides in chapter 3.

<table>
<thead>
<tr>
<th>A &amp; B Selection</th>
<th>Fault Output Relay</th>
<th>Aux Output Relay</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal Operation</td>
<td>Aux Output operation is unchanged by selecting this option.</td>
<td>Fault Output = operation defined before EN50131/PD6662 introduced. Fault operation requires the Fault Output only. Selecting this option does not change the previous operation of the Aux Output.</td>
</tr>
<tr>
<td>2</td>
<td>BSIA Form 175 operation</td>
<td>Aux Output operation is unchanged by selecting this option.</td>
<td>Fault Output = PD6662 compliance Fault operation requires the Fault Output only. Selecting this option does not change the previous operation of the Aux Output.</td>
</tr>
<tr>
<td>3</td>
<td>Radio path fault</td>
<td>Wired path fault</td>
<td>Fault Output = PD6662 compliance Aux Output = PD6662 compliance Fault operation requires the use of Fault AND Aux Outputs.</td>
</tr>
<tr>
<td>4</td>
<td>Radio &amp; Wired path faults</td>
<td>Radio OR Wired path faults</td>
<td>Fault Output = PD6662 compliance Aux Output = PD6662 compliance Fault operation requires the use of Fault AND Aux Outputs.</td>
</tr>
</tbody>
</table>

The Control Panel may include ATS path fault reporting that conforms to the BSIA Form 175 method.

Where this is available then follow all 3 steps below:
a) Connect the GradeShift’s Fault output to the Control Panel’s path fault input

b) Connect the Control Panel’s ATS Test output to the GradeShift’s Test (T) input

c) Use the GradeShift’s A&B buttons to select option 2 in the table above. See the GradeShift’s menu list in the Annex for output relay selection.

**PLEASE CONTACT CSL TECHNICAL SUPPORT IF A CHANGE IS REQUIRED TO THE DEFAULT FUNCTIONS OF ANY OF THE OUTPUTS**

**POWER UP**

On first power-up, the GradeShift’s blue, yellow, green and red LEDs will switch on for 3 seconds. The unit will establish a connection with, and register on, the radio network. During this time the yellow SVC LED will flash regularly. Once completed, the yellow SVC LED will flash once every 3 seconds and the green signal LED will show the radio signal strength, if available. See figure 2 for LED indications.

The GradeShift is supplied with ‘factory default’ settings. This is indicated by the red fault LED flashing regularly. The first call the GradeShift will make will be to CSL’s Gemini Platform to automatically download its operational settings, e.g. its chip number - please allow 5-8 minutes for the download.

**SELF-LEARNING FOR PIN TRIGGERING APPLICATIONS**

For applications using input ‘pin triggering’, the GradeShift needs to identify the ‘normal’ (non active) state of the inputs. To complete this, ensure the Control Panel is in the normal mode, i.e. no alarm conditions are outstanding. Then press the Test/Learn button (for 3-5 seconds) until ‘Pi’ is displayed (the ‘i’ will be moving left-right). Release the Test/Learn button.

Where self-learning changes the ‘normal’ state of an input then a restore signal will be sent to your ARC.

For a full list of all the pin triggering connections and self learning, see the how to guides in chapter 3.

**CONNECTING A PHONE LINE**

For ADSL telephone lines (i.e. Broadband) please use the CS0720 Broadband Filter provided in the GradeShift box (for PSTN installations only). Figure 5 shows the typical wiring necessary for this installation using terminals A&B on the GradeShift. For further information on telephone lines and connection options see the how to guides in chapter 3.

Where a dual-path GradeShift is installed but no telephone line is available, disable the telephone line using the A&B buttons. See the A&B presetting instructions in the Appendix.

Note:

Terminals A & B are for connection to a PSTN line.

Terminals A1 & B1 provide serial connection to other PSTN devices (i.e a telephone handset) within the property.

Terminals DI & AL are designed for Dial Capture connection from the Control Panel. The DI & AL terminals **must never** be connected to a live PSTN line.
CONNECTING THE LAN/IP PATH

For LAN installations, connect an Ethernet cable (not provided) to your router/switch via the RJ45 socket located on the GradeShift.

Check the LAN LED indications. These LEDs are on the end of the LAN Socket. The orange LED should be on and the green LED should be flashing.

| Orange | A physical cable has been made at both ends |
| Green  | Connection is established                   |
| Flashing green | Data is being transmitted                  |
| Off    | No connection has been made                |

Please note that where static IP addresses are required the DNS server IP address is required.

Where communication errors are present these will be shown as ‘E’ numbers on the GradeShift’s display. See Error Codes in the Quick Guide Error Codes section.

TESTING THE GRADESHIFT

The GradeShift communications can be tested by:

1. Tapping the Test/Learn button (less than 1 second) – this sends a test message on all paths to the ARC.

2. Triggering a ‘pin triggered’ input – this sends the relevant signal to the ARC.

3. Activate a Dial Capture sequence on the Control Panel – this sends the relevant signal to the ARC in the format that the control equipment is using.
During a test call, the display will show \textbf{c1, c2, c3, A} to indicate successful communication with the ARC. Note: these test calls go directly from the GradeShift and do not fully indicate that all alarms signals from the Control Panel can be passed successfully.

The GradeShift path monitoring can be tested by:

1. Reduce the path fault delays to minimum using the A&B buttons. See the Appendix.
2. Disconnect the radio aerial. Confirm a radio path fault message is sent to the ARC. Replace the radio aerial.
3. Disconnect the PSTN line. Confirm a PSTN path fault message is sent to the ARC. Re-connect the PSTN line.
4. Unplug the LAN cable. Confirm a LAN (IP) path fault message is sent to the ARC. Re-connect the LAN cable.

During the path fault testing, the display will show \textbf{c1, c2, c3, A} to indicate successful passing of the fault messages to the ARC.

\textbf{THE GRADESHIFT TEST/LEARN BUTTON IS ONLY INTENDED TO TEST CONNECTIVITY FROM THE GRADESHIFT TO THE GEMINI PLATFORM AND THE ARC.}

\textbf{IT IS STRONGLY RECOMMENDED THAT COMMISSIONING AND SERVICE TESTING SHOULD BE INITIALISED FROM THE CONTROL EQUIPMENT TO ENSURE A FULL END-TO-END TEST IS SUCCESSFUL.}

\textbf{PLEASE NOTE}

Make a note the SIM card number ID Number (ICCID), e.g. 89353 000 1234 5678 9012, the NVM ‘chip’ number and any security access numbers on the site records that will be stored at your office.

\textbf{WHERE GRADESHIFT IS SUPPLIED AS A DUAL PATH SIGNALLING DEVICE AND THE PRODUCT IS NOT FULLY INSTALLED TO THE APPROPRIATE DUAL PATH SPECIFICATION THEN THE PRODUCT MAY NOT OPERATE AS DESIGNED.}
2.4 Advanced Instructions

2.4 ADVANCED INSTRUCTIONS

RESET

The RESET button may be pressed at any time to immediately stop an alarm transmission. This will be followed by a complete power-up sequence. Calls that have not been sent before the reset will be stored and sent when the radio path is re-established. Pressing the RESET button will not clear any saved or downloaded settings.

To clear any pending calls stored in the NVM, plus to reset the polling delay to 45mins and to clear the Plug-on Adapter memory, press and hold the A button then briefly press the RESET button. Continue to press the A button until the GradeShift ‘beep-beeps’ to acknowledge this function.

FAULT LED INDICATION

The fault LED indicates a problem detected by the GradeShift. An error code will be displayed on the seven segment display (SSD). For reference please consult the error code list in the quick guide appendix. If the fault LED is flashing it is likely the GradeShift’s operational settings have not been downloaded yet.

MONITORING (POLLING)

To meet the EN50131 requirements for path monitoring on Grade 1-4 installations, the GradeShift sends regular polling calls to the Gemini network on all connected paths (i.e. Radio, PSTN and/or the LAN (IP) path).

The Installer should ensure that a reporting action has been agreed with the ARC for path failure reports from the Gemini Network.

To make installation easier, the GradeShift is supplied with polling disabled for 45 minutes. Polling will start automatically 45 minutes after power-up or reset.

For some testing functions it may be advantageous to turn Radio polling off. See the Appendix for the A&B buttons to disable polling. Polling will be re-enabled by the A&B buttons or when power is cycled or when the GradeShift is reset. One of DualCom’s advanced features is that it can poll at different rates. The polling rate may increase (priority rate) on one path should there be a failure on the alternate path.

When the Primary path is functioning correctly the polling frequency and fault reporting time of the Secondary path will be at intervals greater than that of the designated Primary path. In the event of failure of the Primary path, the polling frequency and fault reporting time of the Secondary path will increase to equal the performance of the primary path (priority rate). The increased polling frequency and fault reporting time will continue until the fault is cleared or a period of 120* hours elapses (whichever is the sooner), after which the reporting time of the secondary path will return to its original fault reporting time. For information relating to fault reporting times please contact CSL.

End users should be aware that the increased (priority rate) polling frequency on a PSTN line is likely to
interfere with, or inhibit use of any non-alarm related apparatus/services connected to a PSTN line that is shared with the DualCom. In such cases it is recommended to use an ex-directory 'Incoming Calls Barred' (ICCB) telephone line dedicated to DualCom use.

The DualCom’s polling rates may also be configured to avoid compromising a shared telephone line with frequent (priority rate) polling calls during the unset condition. In the event of a fault in the primary path during the Unset condition the Secondary polling frequency can be configured to run at an interim frequency greater than the standard rate but lesser than the priority rate. Agreement to such an action should be confirmed in writing by the customer (end user); with the relevant notification stating that this action is compatible with the risk assessment and/or the requirements of any interested party, for example an insurer. This feature is only available upon request.

Connecting other telecoms equipment in parallel to the analogue telephone line used by DualCom can stop the unit sending polling calls and alarm calls to an Alarm Receiving Centre. Parallel connection should never be used for DualCom PSTN connection when it is used in a security system. This connection option cannot cancel or ‘hold’ incoming or outgoing calls to other telephone equipment on the same line, and these functions will inhibit DualCom from making polling & alarm calls to the ARC.

WHERE POLLING HAS BEEN DISABLED FOR TESTING PURPOSES REMEMBER TO RE-ENABLE POLLING WHEN TESTING IS COMPLETED.

Variable or “priority rate” polling features

One of DualCom’s advanced features is that it can poll at different rates. The polling rate may increase (priority rate) on one path should there be a failure on the alternate path.

When the Primary path is functioning correctly the polling frequency and fault reporting time of the Secondary path will be at intervals greater than that of the designated Primary path. In the event of failure of the Primary path, the polling frequency and fault reporting time of the Secondary path will increase to equal the performance of the primary path (priority rate). The increased polling frequency and fault reporting time will continue until the fault is cleared or a period of 120* hours elapses (whichever is the sooner), after which the reporting time of the secondary path will return to its original fault reporting time. For information relating to fault reporting times please contact CSL.

End users should be aware that the increased (priority rate) polling frequency on a PSTN line is likely to interfere with, or inhibit use of any non-alarm related apparatus/services connected to a PSTN line that is shared with the DualCom. In such cases it is recommended to use an ex-directory 'Incoming Calls Barred' (ICCB) telephone line dedicated to DualCom use.

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same line, and these functions will inhibit DualCom from making polling & alarm calls to the ARC.
2.5 Appendix

2.5 APPENDIX SPECIFICATIONS

Dimensions
21 mm (h), 132mm (w), 94mm (d)

Weight
140g including NVM and SIM

Temperature
-20°C to +60°C transit, -10°C to +50°C operating

Humidity
0 - 80% non-condensing

Mounting
Any orientation

Warranty
5 years

Power Requirement
9.0v - 30.0v

Current Consumption
200 mA max

LED Indications
Green = Signal Strength
Yellow = Communication Status
Red = Fault
Blue = Ready to Communicate
SVC = Network Status

Radio Path
2G GSM and 3G GPRS services

**Aerial**

50 ohm (nominal) on MMCX socket

**Operation Method**

Store and Forward (SIA) Direct (Fast Format/CID)

**CIE Interconnections**

Input 'pin triggering’ (Parallel) 12 channels, Analogue (Dial Capture) RS232 Serial, RS485 Bus

**RCT Protocols**

Fast Format/Contact ID/SIA

**Input Terminals**

Max +30v, Min 0v DC (reference supply 0v terminal) 100k pull-up resistor to +5v

**Low Battery**

9.8v falling, 12.0v recovery

**Fault Output**

Changeover contacts (60v max, 100mA max)

**Aux Output**

Normally Open contact, may be inverted (60v max, 100mA max)

**General Purpose outputs**

Four. Each switched to 0v (30v max, 100mA)

**User Serviceable Parts**

There are no user serviceable parts within the GradeShift

**Standards**

Suitable for use in alarm systems complying to:

- EN50136-2:2012 SP3 (RADIO)
- SSF 114 v2 Larmklass 2
- EN50131-10 Type Y
ATS Classification: EN50136 ATS5/SP3


Environmental

EN50136/EN50131 Environmental class II. Device should not come into contact with water

Emissions

EN55022

Installation

PD6662:2010 and Industry Agreement 1501:2015

Variable or “priority rate” polling features

Dualcom poll rates and fail times increase when a path failure is detected and step back after 120hrs to the remaining path’s standard fail time.

ARC/ATS message holding (Path fail filtering)

Some ARC’s have the ability to hold path fail messages for up to 72hrs. This stops unnecessary false alarms due to network issues but should be agreed with the end user in writing.

Network Outage (Poll Fail Filtering)

The Gemini Platform will filter Poll Fail message in situation where we detect or know of a network outage. Alarm messages and path fails will still be delivered when received by Gemini Platform.

Device Performance

When installing a Dualcom device it should be connected to all the paths intended within the original order and tested according to the instructions via all paths. Failure to do so will inhibit its operation and may prevent delivery of alarm messages within the specified timeframe.

SUPPORT

For assistance please telephone or email our support team. Before doing so please review the full manual and how to guides in chapter 3

CSL Technical Support:

UK Tel: +44 (0)1895 474 444

Ireland Tel: 1800 855 695

Email: support@csldual.com

Hours: 08.30 to 18.00 weekdays, 10.00 to 16.00 Saturday
A & B BUTTONS & SEVEN SEGMENT DISPLAY (SSD)

The A & B buttons are used for setup and measurement functions.

When no buttons are pressed for a 1 minute period, the display will automatically return to the received radio signal strength (FSSI) display.

The GradeShift SSD has 3 distinct modes.

1. Power up - Reset Mode

   When initiating the power up sequence the SSD will show unit details of the software, low voltage (if applicable) and communication path status as per below.

   ![Diagram of 7 Segment Display - Reset Mode]

2. Communication Mode

   During communication to the ARC, via CSL’s Gemini Platform, or between the GradeShift and Control Panel the A & B buttons are disabled. The call status will be shown as per below.
3. Normal Mode

This ‘normal’ mode means that the GradeShift is not in power-up or reset mode and not in Communication mode.

The A&B buttons can select display options and Program the NVM.

When the A&B buttons are not pressed for 1 minute, the display will return to the received radio signal strength (FSSI) value (00-99).

Any Error Code will display for 1 minute before reverting to the FSSI value.

The menu options are described below which consist of a top menu structure along with sub menus:
The 7 Segment Display - Normal Mode, Top Level menu

F
A
→ Received Signal Strength % - RSSI
   Leave F displayed for 1 second = Display Signal Strength as a number between 00 and 99.

S
A
→ Status Menu
   Supply voltage, PSTN voltage, LED test, Firmware version number
   Press B button 3 times = Select the Status menu.
   See Table 31.

T
A
→ TEST call & Test path failures
   Press B button 2 times = Display Eng then tE.
   tE" = Speed-up the PSTN path failure detection and the radio path failure detection for 10 minutes.
   Press B button once = Display CSL (end and "tE" mode)
   Press B button 3 times = Start the Test Call sequence.

D
A
→ Call Downloader
   Press B button 3 times = Call the Downloader Server.
   Only select this option when instructed by CSL.
   Technical Support staff.

P
A
→ Program Menu
   Press B button 3 times = Select the Program menu.
   See Table 32.

E
A
→ Error Codes
   Leave E displayed for 2 seconds = Display the highest priority Error Code. E.g. E 22 = Error number 22.
   See Table 38.

L
0
→ Low Supply Voltage
   The Supply voltage is too low for correct operation, or it is dipping low when the DualCom is active.
The 7 Segment Display - Normal Mode - Status Menu

- **Supply Voltage**: Press B once = Display supply voltage. E.g. 13.8 = 13.8 volts.
- **PSTN Line Voltage**: Press A once = Display PSTN voltage. E.g. 51 = 51 volts.
- **LED test**: Press B button once = Switch on all LEDs and all display segments for 1 second.
- **Software Version Number**: Press A button once = Display the software version number.
- **Return to Normal Mode, Top Level menu**: See t in Table 30
The 7 Segment Display - Normal Mode - Program Menu

```
<table>
<thead>
<tr>
<th>P</th>
<th>i</th>
<th>B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Menu - Inputs (Self Learning)
Press B button 3 times = Select the input learn state.
(The i will toggle, LEDs will rotate), then...
Press B button 3 times = Learn the current input settings for all 8 or 16 inputs and the T 'Test ATS' input.
(The i will stop toggling), then...
Press A button = Complete Program inputs.

<table>
<thead>
<tr>
<th>P</th>
<th>4</th>
<th>B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Menu - 485 & Serial Port Menu
Press B button 3 times = Select the 485 & Serial Port menu.
See Table 34.

<table>
<thead>
<tr>
<th>P</th>
<th>n</th>
<th>B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Menu - PSTN
n flashing = PSTN disabled
n on = PSTN enabled
Press B button 3 times = Change PSTN state.

<table>
<thead>
<tr>
<th>P</th>
<th>A</th>
<th>B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Menu - PABX
A flashing = PABX disabled (no dial 9 pre-digit)
A on = Dial 9 pre digit before telephone number(s).
Press B button 3 times = Change PABX state.

<table>
<thead>
<tr>
<th>P</th>
<th>L</th>
<th>B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Menu - LAN
L flashing = LAN disabled
L on = LAN enabled.
Press B button 3 times = Change LAN state.

<table>
<thead>
<tr>
<th>P</th>
<th>r</th>
<th>B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Menu - Relay Menu
Fault relay output. Aux relay output.
Press B button 3 times = Select the Relay menu.
See Table 33.

<table>
<thead>
<tr>
<th>P</th>
<th>P</th>
<th>B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Menu - Polling
P flashing = Polling disabled.
P on = Polling enabled.
Press B button 3 times = Change Polling state.

<table>
<thead>
<tr>
<th>P</th>
<th>S</th>
<th>B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Menu - Radio Survey
Press B button 3 times = Select the Radio Survey state.
(The dots will toggle), then...
The number of GSM/GPRS radio base stations seen (greater than 15% signal strength) will be shown.

Return to Normal Mode, Top Level menu
See E in Table 30
```
STATUTORY NOTICES

Alarm Transmission Assurance

When a message is initiated by the changing voltage situations on GradeShift®'s input terminals, Serial or the Dial Capture connection, the GradeShift ® will establish a communication to the receiving equipment. Successful communication will be indicated to the GradeShift ® by an encrypted acknowledgment signal from the receiving equipment, which will result in call completion and the return of the GradeShift ® to its quiescent condition. Where the correct encrypted acknowledgment signal is not received from the receiving equipment then the GradeShift ® will repeat the call process for at least 10 attempts or until the call is successfully passed to the receiving equipment. If the message cannot be successfully passed then the GradeShift ® fault output will operate.

Signalling Security

GradeShift employs symmetrical ciphering techniques on all data passed on all paths. All data on the Radio path further undergoes ciphering techniques setup by MNOs on GSM/GPRS/2G/3G network layers. This method of encryption is compliant with EN50136.

Watchdog Function

Correct operation of the software used within this equipment is monitored by a 'watchdog' function that will reset the device should incorrect operation occur.

Intended Use

GradeShift is designed for use as a signalling device for use with intruder, fire and similar alarm systems. It will create messages when triggered by the changing voltage situations on GradeShift's input terminals (i.e. pin triggering) or when messages are sent by an associated Control Panel, and it will send these to an ARC receiver when a communication path is established via radio or wired means.

The intended use should avoid situations where the rate of triggering exceeds the rate at which messages may be sent to, or received by the ARC's receiver.
GradeShift includes a ‘message memory’ that will hold messages as they are triggered by the input terminals or when sent by a Control Panel. When a path to an ARC receiver is established, the messages will be sent from the ‘message memory’. When the ‘message memory’ is full of messages waiting to be sent then further triggering of the inputs or messages sent by a Control Panel, will create no further messages.

DualCom devices must be installed according to the instruction manual and the original order configuration i.e. GPRS/PSTN or GPRS/IP devices require both paths to be connected and tested fully to the ARC.

**Alarm Transmission System testing**

Installers are reminded that each Alarm Transmission System is tested for correct operation and performance at least annually.

Test calls and normal alarms should be triggered from the Control Panel to ensure they are received correctly at the ARC within the defined time.

The radio path and the wired path should each be inhibited (e.g. remove aerial, test, replace then remove PSTN or LAN(IP), test, replace) to ensure the fault messages are received correctly at the ARC within the defined time on each of the connected paths.

When both paths are operational, from the moment that the GradeShift is triggered, a completed call to the ARC via the...

a). primary path (normally the radio path) should take no longer than 60 seconds.

b). secondary path (normally the wired LAN(IP) or PSTN) should take no longer than 120 seconds.

When only one path is operational, from the moment that the GradeShift is triggered, a completed call to the ARC via the one operational path should take no longer than 60 seconds.

If your DualCom is showing a fault or low signal strength, this must be addressed before leaving site.

If you are unsure how to test the device, need any explanation of fault messages or general advice please contact CSL support. Failure to install the device correctly or test regularly will inhibit its operation and delivery of alarm messages.

**ARC/ATS message holding (Path fail filtering)**

Where your Alarm Receiving Centre offers a facility to block the receipt of, or hold information relating to, ATP fault notification signals or messages pending receipt of further alarm information (e.g. pending the designation of a confirmed alarm as per BS 8243), agreement to such an action should be confirmed in writing by the customer (end user); with the relevant notification stating that this action is compatible with the risk assessment and/or the requirements of any interested party, for example an insurer.

In such cases the installer should make suitable arrangements, which should be confirmed in writing, for the customer to be alerted to any such ATP fault notification signals/messages when their alarm system is next unset, or after a period of 72** hours, whichever is the sooner.

Where ATP faults are subject to a delay in reporting to the Alarm Receiving Centre, confusion may arise...
if the end user is made aware of single path faults. It is therefore recommended in these cases that Single ATP faults are not reported to the Alarm System unless specified and agreed between the alarm company and the customer and recorded in the System Design Proposal and As-Fitted Document.

*120 hours minimum requirement in PD6669

**72 hours requirement PD6669

ATP = Alarm Transmission Path (eg. GPRS/PSTN/LAN)

Optimisation of devices

Where a fault in a communication path is not re-established within 120 hours of occurring, unless otherwise instructed by the ARC, Installer, or End-User, to protect the integrity of the remaining communication path whilst reducing the likelihood of false fails notifications being sent, CSL may change the fault reporting time, reduce the frequency of or suspend polling of the device. CSL will notify the ARC and/or Installer to any changes.

Where devices are not configured or installed as intended, or the recommendations set out in the installation manual have not been followed, CSL reserves the right to withdraw monitoring or downgrade the fault reporting times of the equipment until such time as CSL is notified that actions have been or will be undertaken to ensure that the installation recommendations have been, and will continue to be followed.

Network Outage (Poll Fail Filtering)

Mobile providers are regularly upgrading or maintaining their networks which may result in unplanned or planned loss of service. In these situations a loss of connectivity to DualCom device can occur which increases the risk of poll fail messages being delivered to the ARC primarily where the device is working on a single path only or the secondary path is unstable.

Gemini Platform monitoring systems detect issues due to network outages and apply filters prescriptively to hold poll fail messages during these times. This is to minimise disruption to ARC’s and Key holders during a known period of network instability.

CSL will typically inform ARC’s and Gemini Insight Users that a network outage is planned or in progress. During this time, path fails and alarm messages received by the Gemini Platform will be delivered to ARC’s. Poll fails received may be held and cancelled when the network outage is resolved and a restore is received.

European PSTN Approval

The CS5300 range of GradeShift products meet the requirements of the EU PSTN standard CTR21 and is approved for connection to any exchange line forming part of a Public Switched Telephone Network (PSTN).

AHCTR210 001 Declaration of Network Compatibility

The equipment has been approved in accordance with Council Decision 98//EC (5) for pan-European single terminal connection to the Public Switched Telephone Network (PSTN). However, due to
differences between the individual PSTNs provided in different countries, the approval does not, of itself, give an unconditional assurance of successful operation on every PSTN network termination point.

In the event of problems, you should contact your equipment supplier in the first instance.

AHCTR211 001  Statement to Notified Body, Vendor and User

The equipment has been approved in accordance with Council Decision 98/ /EC (5) for pan-European single terminal connection to the Public Switched Telephone Network (PSTN).

The equipment has been designed for use in all EU countries.

Approval Authority: CE0168
Approval Number for GradeShift range: 608777

RoHS & RoHS2

In 2003, the European Union issued Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) and this became law in July 2006. This Directive was updated in 2011 (RoHS2).

All products supplied by CSL from 1 June 2006 comply with the RoHS or RoHS2 Directives.

WEEE


CSL's electrical products are included under this directive as being 'IT & Telecommunication Equipment'.

All applicable products and shipping cartons supplied by CSL from 1 June 2006 are marked in accordance with the directive. This indicates to the user that they must not dispose of the item in the general unsorted municipal waste system but use the separate collection of WEEE.

CSL is a registered member of a UK WEEE recovery and recycling scheme.

Users are recommended to utilise their local municipal WEEE storage, collection, recycling and treatment services/facilities.

Where these are unavailable, users of CSL equipment are requested to contact CSL for details of the
free-of-charge CSL WEEE scheme for carriage, treatment, recovery and disposal.
GradeShift UDL Instruction Manual

3. How to guides
3.1 PSTN Connection

Telephone Line Connection

There are several different types of telephone line available from different service providers.

GradeShift requires an analogue telephone line connection. ‘Earth Loop Calling’ or ‘Earth Calling’ types of analogue telephone line cannot be used.

GradeShift cannot be directly connected to any type of digital telephone line.

Earth connection

In accordance with EN regulations GradeShift does not require an Earth connection at the telephone line terminals.

Analogue PSTN Telephone Line

The analogue PSTN is a communication network where the line from the exchange equipment and the service supplied to the subscriber is ‘analogue’, i.e. not ‘digital’.

A telephone line is always terminated at the user’s premises by an NTP (Network Termination Point) which is provided by the Telecoms Service Provider. This is a socket or connection where the user’s equipment can be connected. Some NTPs provide a socket and terminals for connection. In many cases, the NTP operates using power supplied from the exchange equipment via the telephone line.

Figure 1 Analogue PSTN Telephone Line
PSTN Line Connection Options

GradeShift’s PSTN connection requires an analogue telephone line (also called a POTS line). Analogue telephone lines often carry ADSL (Broadband) signals as well. Refer to ADSL later in this section.

Connecting other telecoms equipment in parallel to the analogue telephone line used by GradeShift can stop the unit sending polling calls and alarm calls to an Alarm Receiving Centre. Parallel connection should not be used for GradeShift when it is used in a security system.

There are several ways that a GradeShift may be connected to a PSTN telephone line particularly when other equipment needs to share the same telephone line. Some require that your Telecom Service Provider supplies particular line features. Some require GradeShift NVM programming options.

The highest security PSTN line for GradeShift (Recommended):

A PSTN line supplied as ‘outgoing calls only’, i.e. Incoming Ringing Barred,

AND the PSTN line is ex-directory,

AND the PSTN line goes to the GradeShift ONLY.

Other equipment can be connected to the GradeShift A1 & B1 terminals (i.e. series connection) to make outgoing calls only. See Figure 3.

The next best security option for a PSTN line (Recommended):

A PSTN line supplied with the ‘3-way calling’ feature,

AND the GradeShift NVM is programmed for ‘3-way calling’,

AND the PSTN line goes to the GradeShift ONLY.

Other equipment can be connected to the GradeShift A1 & B1 terminals (i.e. series connection) for incoming and outgoing calls. See Figure 3.

The ‘no security’ option ( NOT Recommended )

A PSTN line supplied without ‘outgoing calls only’ or the ‘3-way calling’ feature. This option cannot cancel or ‘hold’ incoming calls and these will inhibit the GradeShift from making a telephone call to the Alarm Receiving Centre.

Parallel Connection ( Do NOT use )

The GradeShift A & B terminals connect to the telephone line, and other equipment connects directly to the same telephone line. See Fig 2. This connection option can not cancel or ‘hold’ incoming or outgoing calls to other telephone equipment on the same line, and these will inhibit GradeShift from making polling & alarm calls to the ARC.

Figure 2
PSTN Line Connection (GradeShift ALONE on line)

Your Telecom Service Provider should be asked to supply and fit an analogue line and an NTP with terminals near the alarm system. The alarm installer should then follow steps 1 & 2 below.

Series Connection (GradeShift & OTHER EQUIPMENT on line)

Your Telecom Service Provider should be asked to supply and fit an analogue line and an NTP with terminals near the alarm system. The alarm installer should then follow steps 1 to 3 below.

1. Connect 2 wires to the GradeShift's PSTN A & B terminals.

2. Connect the other end of the wires to the NTP connections for the incoming telephone line, marked A & B, or 2 & 5.

3. If the PSTN line used by GradeShift is shared with other customer apparatus (e.g. telephone, fax or answer machine) connect the GradeShift's terminals marked A1 and B1 to a new PSTN Master Socket. The customer may then plug their phone, fax etc, into that socket. See Fig 3.

A PSTN Master Socket type LJU2/4A is suitable and has screw terminals for connection. These can be obtained from many electrical distributors including:

- CPC          Part Number: TE 05285
- Maplin       Part Number: FT48C
- RS           Part Number: 472-534

Where the GradeShift's telephone line is shared with the customer’s phone/fax etc. you can avoid
GradeShift’s polling calls interfering with the customer’s calls.

Setup a programmable output on the panel to operate when the panel is set/unset. (When unset, the customer is likely to be in the premises and using the phone.) Connect this panel output to GradeShift’s ‘pin triggering’ terminal 4.

In this way, GradeShift will know when the telephone line is likely to be used and can avoid making polling calls that clash with the customer’s calls.

**PABX (Private Automatic Branch Exchange)**

A PABX is a telephone exchange in one business or building (where a dial 9 is needed for an outside line). It connects to one or more outside telephone lines and has two or more extensions within the business or building. See Figure 4.

GradeShift may be connected to one of the outside telephone lines where they are the analogue PSTN type. See Figure 4.

The extensions within the building may be analogue or digital. Where an extension is analogue, a normal phone or fax machine may be connected. GradeShift may be connected to this analogue extension. See Figure 4.

Where the PABX is mains powered and it is not battery backed-up then the extension line to the GradeShift may fail in the event of a mains failure. This may make this type of telephone connection unsuitable for GradeShift in alarm applications.

Where the extension is a digital line then a special ‘feature phone’ is usually required, provided by the manufacturer of the PABX equipment. GradeShift cannot be directly connected to any type of digital telephone line.
ADSL (Asynchronous Digital Subscriber Line) or ‘Broadband’

When an analogue PSTN telephone line also carries ADSL (Broadband) signals and it is used by a security system e.g. GradeShift, then an ADSL (Broadband) filter MUST be used.

A filter is used to separate the analogue telephone signals from the Broadband digital data signals because the phone or security system may be disrupted or completely inhibited if Broadband digital data is allowed into them from the telephone line.

The CSL CS0720 Broadband Filter is designed specifically for use with security systems.

This item meets all of the requirements of the British and European telephone and security standards. See Figure 5.

Other types of filter and plug-in filters should not be used for Series Connection of a security system to the telephone line.

The installer must ensure that the Broadband Filter is fitted in the wiring between the NTP and the GradeShift’s A&B terminals.

Other items connected to the GradeShift’s A1 and B1 terminals must be analogue equipment, i.e. phone, fax. Note that a computer or broadband modem will not work if connected here because the Broadband Filter will stop the entire broadband signal from reaching the GradeShift.
Q. Why is a Broadband Filter necessary?

A. When ADSL (Broadband) digital data is supplied on a normal PSTN telephone line then an ADSL (Broadband) Filter must be fitted between that telephone line and each item of ‘non digital’ equipment because:

1). The operation of ‘non digital’ equipment may be disrupted or completely inhibited if ADSL (Broadband) digital data is allowed into it from the telephone line.

2). The operation of the ADSL (Broadband) equipment may be disrupted or completely inhibited by the connection of unfiltered ‘non digital’ equipment to the telephone line.

‘Non digital’ equipment means anything that can be used on a normal analogue PSTN telephone line, e.g. a Phone, Fax, GradeShift, Control Panel Digi-Modem.
3.2 Connecting to a Control Panel by RS232 Serial Comms

Connecting to a Control Panel by RS232 Serial Comms

Several types of Control Panel use a RS232 Serial lead to connect to other items of the system.

The Control Panel’s RS232 Serial lead is normally used to a digi/modem or a communications device, and where this is possible then a GradeShift/DigiAir UDL may be connected.

The GradeShift/DigiAir UDL’s RS232 Serial connector must be connected to a Control Panel’s RS232 Serial connector or port.

Monitoring of the RS232 Serial lead is done by the Control Panel regularly passing messages to the unit connected to the RS232 Serial lead and checking that it replies. A failure to reply will result in the Control Panel reporting the loss, usually as a ‘tamper’.

The GradeShift/DigiAir UDL is also programmed to expect regular messages passed to it by the Control panel. A failure to receive these will result in the GradeShift/DigiAir UDL ceasing its polling calls to the Gemini network and this will cause a failure alarm message to be sent to the ARC.

What can the RS232 Serial lead be used for?

Depending upon the Control Panel type, the RS232 Serial lead can be used for:

a). The Control Panel generates an alarm message and sends it to an ARC.

In the event that the Control Panel needs to send an alarm message to the ARC, the GradeShift/DigiAir UDL will receive the message and forward it via the Gemini network to the ARC. The Control Panel’s alarm reporting protocol must use one of the following alarm formats: Fast Format, Contact ID or SIA.

For this to work, the Control Panel’s communications presets must be correctly programmed. Check your Control Panel’s configuration for any other settings that may apply.

b). Up/Download (UDL) the Control Panel’s settings and logs to its associated computer software. The Control Panel accepts an incoming UDL call from its associated UDL software via the Gemini Network and the GradeShift/DigiAir UDL.

c). Panel Initiated Up/Download (PIUDL) of the Control Panel’s settings and logs to associated computer software. The Control Panel makes an outgoing call via the GradeShift/DigiAir UDL and the Gemini network to its associated UDL software.

What Control Panels can be connected via a RS232 Serial lead to the GradeShift/DigiAir UDL?

Please refer to the list of compatible Control Panels on our website at: link to go here
3.3 485 Bus connection

Connecting to a Control Panel by RS485 Bus

Several types of Control Panel use a RS485 bus to connect to other items of the system.

The Control Panel’s RS485 bus is normally used to connect to keypads and input/output units. Some Control Panels also use the RS485 bus to connect to a digi/modem or a communications device, and where this is possible then a GradeShift/DigiAir UDL may be connected.

The GradeShift/DigiAir UDL’s RS485 connector must be connected to a Control Panel’s RS485 port or bus.

Monitoring of the RS485 Bus is done by the Control Panel regularly passing messages to all of the units connected to the RS485 Bus and checking that they each reply. A failure to reply will result in the Control Panel reporting the loss, usually as a ‘bus tamper’.

The GradeShift/DigiAir UDL is also programmed to expect regular messages passed to it by the Control panel. A failure to receive these will result in the GradeShift/DigiAir UDL ceasing its polling calls to the Gemini network and this will cause a failure alarm message to be sent to the ARC.

What can the RS485 Bus be used for?

Depending upon the Control Panel type, the RS485 Bus can be used for:

a). The Control Panel generates an alarm message and sends it to an ARC.

In the event that the Control Panel needs to send an alarm message to the ARC, the GradeShift/DigiAir UDL will receive the message and forward it via the Gemini network to the ARC. The Control Panel’s alarm reporting protocol must use one of the following alarm formats: Fast Format, Contact ID or SIA.

For this to work, the Control Panel’s communications presets must be correctly programmed. Check your Control Panel’s configuration for any other settings that may apply.

b). Up/Download (UDL) the Control Panel’s settings and logs to its associated computer software. The Control Panel accepts an incoming UDL call from its associated UDL software via the Gemini Network and the GradeShift/DigiAir UDL.

c). Panel Initiated Up/Download (PIUDL) of the Control Panel’s settings and logs to associated computer software. The Control Panel makes an outgoing call via the GradeShift/DigiAir UDL and the Gemini network to its associated UDL software.

What Control Panels can be connected via RS485 Bus to the GradeShift/DigiAir UDL?

Please refer to the list of compatible Control Panels on our website at: link to go here