V400

INSTRUCTION MANUAL

TIMESPACE

DESIGNED AND MANUFACTURED
IN THE UK

V400 OPERATING SOFTWARE
V1.4.0.323

THE V400 MANUAL IS AVAILABLE
ONLINE: **www.tspace.co.uk**

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List of Abbreviations

Abbreviation	Meaning
AUX	Auxiliary
bps	Bits per second
CD	Compact Disk
CE	European Conformity
COM	Communication (port)
DVR	Digital video recorder
EEC	European Economic Community
EMC	Electro-magnetic compatibility
EMG	Emergency (EMG Splash Screen)
FAT	File Allocation Table
FTP	File Transfer Protocol
FPS	Frames Per Second
GB	Gigabytes
GMT	Greenwich Mean Time
GND	Ground
GPS	Global positioning System
GSM	Global System for Mobile Communications
HDD	Hard Disc Drive
HR	Hour
IP	Internet Protocol
IPS	Images per second
kHz	Kilohertz
KPH	Kilometres Per Hour
LAN	Local Area Network
LED	Light-Emitting Diode
MAC	Media Access Control
MB	Megabytes
MBR	Master Boot Record
MED	Medium
mics	Microphones

MIN	Minute
MPH	Miles Per Hour
OSD	On-screen display
PAL	Phase Alternating Line
PC	Personal Computer
PCB	Printed Circuit Board
PTZ	Pan Tilt Zoom (camera)
RES	Resolution
RH	Relative Humidity
RMS	Root Mean Square
rtsp	Real Time Streaming Protocol
s	Second
SD	Secure Digital (card)
SDHC	Secure Digital High Capacity
SEC	Second
SMART	Self-Monitoring, Analysis and Reporting Technology
SMS	Short Message System
TB	Terabyte
TCP	Transmission Control Protocol
TFL	Transport for London
UK	United Kingdom
URL	Uniform Resource Locator (address of specific website or file on the internet)
USA	United States of America
USB	Universal Series Bus (cable system)
UTC	Co-ordinated Universal Time
V	Volts
VOR	Voice Operated Recording
Vrms	Root-mean-square Voltage
Wifi	Wireless local area network

1. About This Manual

This manual contains the information required for the installation and operation of the Timespace Technology V400 Digital Video Recorder (DVR).

This manual is divided into the following sections:

- Quick Start Guide
- User Guide
- Installation Guide
- Service and Maintenance
- Software
- Appendices

Where text in the body of the manual is shown in CAPITALS, this relates to one of the menu choices in the V400 menu system.

Within the V400 User Guide section of the Manual, links from menus to other menus or sub-menus are given as hyperlinks.

Detailed technical information can be found in the Appendices, along with certificates of conformity and type approval.

Recorded files can be viewed using PCLink200, Timespace's proprietary reading and archiving software package. Detailed information on viewing the recorded files is found in the manual for PCLink200.

2. Quick Start Guide

2.1 System Overview

V400 DIGITAL VIDEO/AUDIO RECORDING SYSTEM

V400 DIGITAL VIDEO / AUDIO RECORDER

REMOVABLE, SHOCK MOUNTED
HARD DISK CARTRIDGE

REMOVABLE SD CARD FOR DUAL RECORDING &
DOWNLOAD (OPTIONAL)

X301 REVIEWER / PROGRAMMER

Figure 1 V400 Digital Video/Audio Recorder

2.1.1   V400 Digital Video/Audio Recording System

The V400 is a digital video/audio surveillance recorder for use in mobile applications. The V400 includes an integrated Power Supply (11-50V) and can provide power to two external monitors, GPS, Modem and all 16 cameras.

Recordings are made on a removable hard disk cartridge inserted in the V400. Optionally recordings can be written to a removable SD card.

The recordings can be accessed by connecting the cartridge to a PC using the USB interface kit. Timespace PCLink200 application is a proprietary reading and archiving software package used to review the recordings.

The X301 Reviewer is used to program the menu settings on V400, check camera views and list the recorded files on the installed Hard Disk Cartridge.

The V400's integral GSensor records the vehicle's movement for X, Y & Z axis.

2.1.2   Programming – X301 Reviewer

The V400 is configured using a tiered menu system. The menu system is accessed using the X301 Reviewer (pictured below).

Figure 2 X301 Reviewer connected to V400 DVR.

 To enter Menu System press any of the four MENU arrow buttons.

To exit the Menu System or to move back up a level press the MENU EXIT button.

See the separate X301 Reviewer manual at http://www.tspace.co.uk/pdf/timespace-reviewer-manual.pdf for detailed information on the Reviewer's functions / controls.

2.1.3   Help Screens

 Each page on the menu system has an associated Help screen which describes the features on that page.

Pressing the HELP key on the <u>Reviewer</u> front panel will display the Help page. Use the UP/DOWN arrow keys to scroll through each help page.

The help pages included on the V400 are intended as a quick reference with more detailed descriptions contained in this V400 Manual.

3. User Guide – V400 Menu System

The V400 is configured using a tiered menu system. There are two top level menus through which all features and settings are configured.

The MAIN MENU relates to the recording functions, files and video output:


```
        MAIN MENU

 »NORMAL RECORDING
  TIMER RECORDING
  ALARM RECORDING
  SD RECORDING
  AUDIO RECORDING
  RECORDED FILES
  VIDEO OUTPUT



  SETTINGS MENU
```

The SETTINGS MENU is where the V400 and any connected equipment are configured:


```
        SETTINGS MENU

  SYSTEM SETTINGS
 »EXTERNAL EQUIPMENT
  ADVANCED
```

NB: Each menu, feature and setting is detailed in the following pages. Refer to the Table of Contents for reference to specific features, functions and settings.

A help system is included and can be displayed for each menu by pressing the HELP key on the Reviewer.

Navigation of the menu system is by using the arrow keys on the Reviewer.

All menu configuration items are changed instantly with the exception of the following which require a reboot:

- VIDEO STANDARD – switching between PAL/NTSC.
- BAUD RATE – changing the baud rate for GPS, GSensor and RS232.
- LANGUAGE FILE – when loading a language file from the hard disk cartridge.

3.1   Main Menu

```
          MAIN MENU

   »NORMAL RECORDING
    TIMER RECORDING
    ALARM RECORDING
    SD RECORDING
    AUDIO RECORDING
    RECORDED FILES
    VIDEO OUTPUT



    SETTINGS MENU
```

Recording modes in order of priority are:

1) ALARM RECORDING
2) TIMER RECORDING
3) NORMAL RECORDING

Only one mode is active at any one time. For example if ALARM RECORDING occurs during NORMAL RECORDING, ALARM RECORDING takes control but reverts back to NORMAL RECORDING once ALARM RECORDING has finished.

> **HINT:** A MANUAL OVERRIDE feature exists. If the DVR is recording from a configured recording setting, eg TIMER RECORDING or ALARM RECORDING, and a user attempts to stop recording (by pressing the REC button on the Reviewer or on the V400 front panel), a warning message will be displayed. "MANUAL OVERRIDE ENABLED". To disable MANUAL OVERRIDE, press the record key again. To cancel the action, press the MENU EXIT key.

Audio recording can be turned on or off for all recording modes. This selection is found on the AUDIO RECORDING menu where other specific audio settings can be configured.

> **NB**: Across the different recording modes, the V400 has some common settings, e.g.Images per Second (IPS). The IPS can be configured from 1 to 25 per camera. To save duplication, these options will only be documented in the first instance and subsequent features should be assumed to be the same unless explicitly stated.

3.1.1   Normal Recording

```
              NORMAL  RECORDING
     CAM RATE RES         CAM RATE RES
      1  »10   VHIGH       9   10   VHIGH
      2   10   VHIGH      10   10   VHIGH
      3   10   VHIGH      11   10   VHIGH
      4   10   VHIGH      12   10   VHIGH
      5   10   VHIGH      13   10   VHIGH
      6   10   VHIGH      14   10   VHIGH
      7   10   VHIGH      15   10   VHIGH
      8   10   VHIGH      16   10   VHIGH
     PRESS  0  TO  COPY  DOWN   COL  B/W

     REC TIME:  104HOURs  (4.33DAYs)
     TOTAL IPS:  160.0  OF  175.0  HELP
```

NORMAL RECORDING sets the normal recording configuration. Recording is activated by pressing the record button on the front of the V400 or the Reviewer. The V400 is also set to default record on power-up.

Connected cameras are identified by the relevant camera number being highlighted with either a red background (indicating colour) or a white background (indicating black & white).

Images per second (**RATE**) and resolution **(RES)** can be set individually for each camera.

RATE can be set to; "-" (OFF), 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12.5, 15, 20, 25 IPS

RES can be set to; LOW, MEDIUM, HIGH, V.HIGH, VV.HIGH and SUPER.

The REC TIME is an indication of the number of Hours (also shown as number of whole and part days) that the V400 will record for based upon the current settings and entire installed cartridge capacity.

TOTAL IPS – provides details of current IPS allocation within NORMAL RECORDING, as well as the total IPS available for NORMAL RECORDING.

HELP – provides details of currently configured RESOURCE ALLOCATION across the various recording functions. A further RESOURCE ALLOCATION MENU provides detailed explanation of IPS allocation across the various recording features.

> **HINT**: A "copy down" feature is available for configuring multiple camera settings. The settings for the currently selected camera will be copied down to all remaining cameras, subject to the global IPS limit. Press 0 to copy down.

By default all cameras are set to record in NORMAL RECORD mode, enabling quick deployment – just connect cameras and press the record button.

NB: the V400 is set to default record on power-up. Options to enable or disable recording at power-up are found in the SETTINGS>ADVANCED menu POWER STATE.

3.1.2   Timer Recording

```
        TIMER RECORDING
CAM RATE RES     CAM RATE RES
  1 »-    -        9  -    -
  2  -    -       10  -    -
  3  -    -       11  -    -
  4  -    -       12  -    -
  5  -    -       13  -    -
  6  -    -       14  -    -
  7  -    -       15  -    -
  8  -    -       16  -    -
PRESS 0 TO COPY DOWN  COL B/W
WHEN TIMER STOPS:  STOP REC.
RECORDING SCHEDULE...
TOTAL IPS:   0.0 OF 168.0 HELP
```

TIMER RECORDING sets daily on/off timers to provide timed recording. This menu sets the recording configuration and the times. During TIMER RECORDING the settings in this menu apply.

Images per second (**RATE**) and resolution **(RES)** can be set individually for each camera in the same way as for NORMAL RECORDING.

> **NB:** ensure cameras have been configured for TIMER RECORDING or no footage will be recorded during set times.

If AUDIO is required during TIMER RECORDING, this must be set up separately in the AUDIO RECORDING menu.

WHEN TIMER STOPS: At the end of a period of Timer recording the V400 can either STOP RECORDING or record in NORMAL RECORDING mode. The latter can be used if two recording styles are required based on time.

Enter the daily start and end times in the RECORDING SCHEDULE menu.

The total number of configured images per second (IPS) is displayed along with the maximum.

TOTAL IPS – provides details of current IPS allocation within TIMER RECORDING, as well as the total IPS available for TIMER RECORDING.

HELP – provides details of currently configured RESOURCE ALLOCATION across the various recording functions.

3.1.2.1   Recording Schedule

```
        ┌─────────────────────────┐
        │   RECORDING  SCHEDULE   │
        └─────────────────────────┘
      »DAILY  TIMER  DISABLED
       MON     :00  TO   17:00    COPY
       TUE  09:00  TO   17:00    DOWN
       WED  09:00  TO   17:00
       THU  09:00  TO   17:00
       FRI  09:00  TO   17:00
       SAT  00:00  TO   00:00
       SUN  00:00  TO   00:00

       PERIOD  TIMER  DISABLED
       FROM: 00:00     00/00/00
       TO:    00:00     00/00/00
```

A SCHEDULE of TIMER RECORDING TIMES can be set. This can be used e.g. to record between a start date and end date. If both DAILY TIMES and PERIOD TIMES are selected, the V400 will record only in the period and also only in the daily times shown.

DAILY TIMER DISABLED – disables timer recording.

RECORD OUTSIDE DAILY TIMES – sets the unit to record at all times other than those specified in the daily times schedule.

RECORD BETWEEN DAILY TIMES – sets the unit to record between the daily times specified in the schedule.

A COPY DOWN features is available to copy the times set for Monday on to all other days of the week.

A period of TIMER RECORDING can be set e.g. to record between a start date and end date. Options for this are PERIOD TIMER DISABLED, RECORD INSIDE PERIOD, RECORD OUTSIDE PERIOD.

NB: By default the TIMER SCHEDULE is set to Mon-Fri 9-5 and all day Sat/Sun. Selecting RECORD OUTSIDE DAILY TIMES will give a quick outside office hours style recording.

HINT: Times are entered in the SCHEDULE using the digit keys on the front panel of the Reviewer for number input.

3.1.3   Alarm Recording

ALARM RECORDING is activated by the alarm inputs. This menu sets the alarm recording configuration.

Alarm recording can be triggered by setting the function of the alarm input to be ALARM REC. Inputs can also be used to trigger other functions and modes of recording.

ALARM I/O menu – configures Alarm Recording and INPUT / OUTPUT options.

TOTAL IPS – provides details of current IPS allocation within ALARM RECORDING, as well as the total IPS available for ALARM RECORDING.

HELP – provides details of currently configured RESOURCE ALLOCATION across the various recording functions. A further RESOURCE ALLOCATION MENU provides detailed explanation of IPS allocation across the various recording features.

3.1.3.1   Alarm Inputs/Outputs

```
        ┌─────────────────────┐
        │    ALARM I/O MENU    │
        └─────────────────────┘

        »ALARM INPUTS
         ALARM OUTPUT / LEDs
         ALARM CAMERA CYCLER

         ALARM INPUT POST DELAY

         PRE-TRIG WRITE PROTECT: OFF
         POST-TRIGGER RECORDING: OFF
         ANALOG INPUT HYSTERESIS: 2V
```
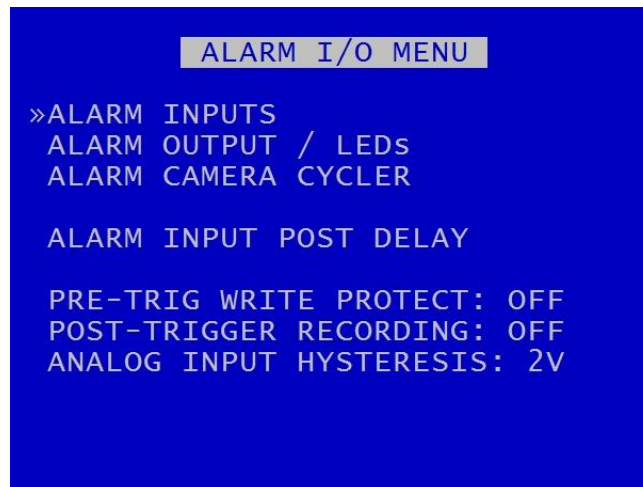
ALARM INPUTS menu – sets the active/inactive status of each alarm input and defines the function (action) of the V400 when the selected alarm is active.

ALARM OUTPUTS / LEDs menu – sets the conditions for the Alarm Outputs.

ALARM CAMERA CYCLER menu – configures the options for the V400 to automatically switch between cameras and the Health Page.

ALARM INPUT ALARM FILE provides an option for files to be marked as "ALARM" recordings, see link for further details.

ALARM INPUT POST DELAY – controls the number of seconds for which the alarm state is held once the alarm input has changed state.

PRE-TRIG WRITE PROTECT – specifies the duration prior to the alarm recording for which files will be marked as write protected. This assumes that another mode of recording was already writing files to disk before the alarm was triggered. Pre-trigger values are: OFF, 1SEC, 2s, 5s, 10s, 20s, 30s, 40s, 50s, 1MIN, 2, 5, 10, 20, 30, 40, 50 MINS, 1HOUR, 2HOURS.

POST TRIGGER RECORDING – specifies the duration of recording after the alarm trigger. Once post trigger has elapsed, recording will stop or return to the previous recording mode. Post-trigger values are: OFF, 1SEC, 2s, 5s 10s, 20s, 30s, 40s, 50s, 1MIN, 2, 5, 10, 20, 30, 40, 50MINS, 1HR, 2HRS.

ANALOG INPUT HYSTERESIS – specifies the voltage value difference that must occur in order to change the alarm state e.g. if the trigger is set to 14V, when 14V is met the trigger will switch. In order to switch back, a change of 2V must occur i.e. 14-2 = 12V. Available values are 1V, 2, 3,4, 5, 6, 7 and 8V.

NB: The V400 has 10 alarm inputs and 4 outputs on the side panel Molex connector.

3.1.3.2 Alarm Inputs

```
            ALARM INPUTS
IN ACTIVE FUNCTION      CAMS
1  »> 12V    NONE
2  > 12V     NONE
3  > 12V     NONE
4  > 12V     NONE
5  > 12V     NONE
6  > 12V     NONE
7  > 12V     NONE
8  > 12V     NONE
9  > 12V     NONE
10 > 12V     NONE
EMBED ALARM STATE MENU...
ALARM 1 IS INACTIVE @ (0.0V)
```

ALARM INPUTS menu sets the alarm inputs to be ACTIVE or INACTIVE. If an alarm input number is highlighted with a white background, this indicates its current state is active. No highlight indicates the state is inactive.

Use the left and right menu buttons on the Reviewer to set the active voltage. For a 24V vehicle system, use typically <12V or >12V. For a 12V vehicles system, use typically <6V or >6V.

> **NB**: There is a priority order on the Alarm Inputs. The lower numbered Alarm Inputs take priority over the higher numbers. For example, if Alarm Input one is wired to the Reversing sensor, and is set to to trigger Normal Recording when the Reversing sensor is activated, this alarm will take priority over any other alarm currently triggered.

FUNCTION lists the available ALARM INPUT FUNCTIONS for selection.

EMBED ALARM STATE menu configures options for adding text to recorded images.

ALARM 1 IS INACTIVE @ - Shows the current state of each of the alarm inputs. The corresponding number for each alarm input will be highlighted (white background) for ACTIVE and not highlighted for INACTIVE. To view the current state for each alarm input, use the arrow keys on the Reviewer to move up and down to each alarm number. The voltage is also shown.

ALARM INPUT FUNCTIONS

NONE	-	No action
NORM REC	-	Switches NORMAL RECORDING on
ALARM REC	-	Switches ALARM RECORDING on.
SWITCHER	-	Sets the Video Switcher (MAIN VIDEO OUT) to the selected camera.
TIMER REC	-	Switches TIMER RECORDING on
SMS MSG	-	Send one of the six user defined SMS text messages (GSM modem required).
HEALTH PAGE	-	Displays the DVR Health Page.
PTZ PRESET	-	Accesses the PTZ preset camera positions. 8 presets are available (setup using the PTZ menu) and a trigger can be used to invoke that position upon alarm State change.
SWITCHER 2	-	Sets the Video Switcher2 (AUX VIDEO OUT) to the selected camera (V400-16 only).
IGNITION	-	Linked to POWER OPTIONS menu to control how the V400 behaves on ignition
INDICATOR L etc	-	Various vehicle alarm inputs - tags the particular alarm inputs as used for: INDICATOR L, INDICATOR R, BRAKE, SIDE LIGHTS, HEAD LIGHTS, FOG LIGHTS, HORN, BULL HORN, SIREN, BLUES, HAZARD WARN, DOOR, REVERSE, HANDBRAKE, ACCEL'TION
CAM CYCLER	-	Automatically switches between cameras and the health page as configured in the ALARM CAMERA CYCLER menu from the ALARM I/O menu page.
MULTIVIEW	-	Sets the main switcher to Multi Camera view (12/16 camera models)
AUDIO REC	-	Must be used in conjunction with the AUDIO RECORDING menu, i.e. enabling AUDIO RECORDING FOR NORMAL, TIMER, ALARM or SD RECORDING.
BEEP TEST	-	This is used for test purposes only and is not required by users.
POWER DOWN	-	Instructs the DVR unit to power down when the alarm is triggered
EMG SPLASH	-	Displays the DVR Splash Page.
DOOR 1-3	-	tags the alarm inputs as used for doors
RAMP	-	tags the alarm inputs as used for the ramp
PUSHBUTTON1 & 2	-	tags the alarm inputs as used for additional buttons/triggers specified by the user

Alarm inputs tagged as INDICATOR L/R or BRAKE will be displayed accordingly in future releases of PCLink when playing back recorded footage.

Each of the 10 alarm inputs can be set to turn on/off the selected FUNCTION. The FUNCTION defines the action of the V400 when the selected alarm input is active. The function is active for the duration of the alarm (plus post trigger time if selected - see ALARM INPUTS/OUTPUTS MENU).):

If a recording mode is used as an alarm function, the settings are as per the settings in the relevant recording mode menu e.g. If NORM REC is selected, the settings in NORMAL RECORDING are used.

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3.1.3.3   Embed Alarm State

```
    EMBED ALARM INPUT STATE

ALARM IN     EMBED     TEXT
    1       »NO        ALARM 1
    2        NO        ALARM 2
    3        NO        ALARM 3
    4        NO        ALARM 4
    5        NO        ALARM 5
    6        NO        ALARM 6
    7        NO        ALARM 7
    8        NO        ALARM 8
    9        NO        ALARM 9
   10        NO        ALARM 10
POSITION:    TOP
```

The EMBED ALARM INPUT STATE menu configures options for adding text to recorded images.

8 user defined characters can be entered per input and positioned either top or bottom of the image. The text will display on the footage for the duration of the alarm, plus any post alarm duration.

POSITION – select TOP or BOTTOM

Text is entered using the Text and Number Input keys on the Reviewer.

The text will be embedded on all camera views simultaneously and will appear on all selected cameras during playback in PCLink200.

3.1.3.4   Alarm Outputs

ALARM OUTPUT menu sets the conditions for the Alarm outputs. This determines whether the V400 alarm output goes closed (pull to GND) or open circuit when any of the set conditions are met.

ALARM OUTPUT CLOSED/OPEN **WHEN…**

TEST OPEN/CLOSED	- Sets the input to OPEN/CLOSED for testing purposes.
ALARM OCCURRED	- An ALARM event has occurred.
RECORD LED	- The front panel record LED is active.
DISK LED	- The front panel disk LED is active.
SD RECORDING	- SD recording is occurring.
FAIL LED	- The front panel fail LED is active.
SERVICE LED	- The front panel service LED is active.
FRONT LEDS	- Any of the front panel LEDs are active.
CAM DISCONNECTED	- Any camera is disconnected.
GSENSOR TRIGGER	- Any of the XP200 GSensor configured thresholds are reached / exceeded.
LAN ACTIVE	- Files are being transferred via the LAN interface.
HD WP %	- A percentage of the hard disk cartridge contains Write Protected files: 25, 50, 60, 70, 80, 90 and 99%.
HD FULL %	- A percentage of the hard disk cartridge if full; 25, 50, 60, 70, 80, 90 and 99%.
AUDIO VOR	- Voice Operated Recording. If the detected level of audio input reaches a certain percentage (25%, 50%, 75%) the alarm output can be triggered. If using this trigger as an alarm *input*, a wire link will need to be in place on the V400 rear panel to take the alarm out to an alarm input (see for wiring pinout).
CURRENT STATE	- Indicates when each alarm output is CLOSED or OPEN (CLOSED showing alarm terminals are connected; OPEN showing alarm terminals are not connected).

3.1.3.5   Alarm Camera Cycler
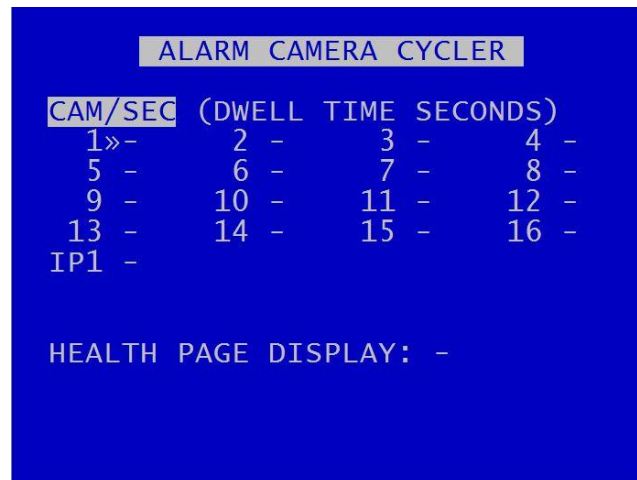
```
        ALARM  CAMERA  CYCLER

 CAM/SEC  (DWELL  TIME  SECONDS)
   1»-      2 -      3 -      4 -
   5 -      6 -      7 -      8 -
   9 -     10 -     11 -     12 -
  13 -     14 -     15 -     16 -
 IP1 -


 HEALTH  PAGE  DISPLAY:  -
```

The ALARM CAMERA CYCLER menu configures the options for the V400 to automatically switch between cameras and the Health Page.

Set the number of seconds for each camera to show in the camera cycle. Available values are 1, 2, 3, 4 , 5, 10, 20, 30 seconds.

HEALTH PAGE DISPLAY – sets the number of seconds for which the camera cycler shows the Health Page in the Camera Cycler cycle.   Available values are 1 second, 2s, 3s, 4s, 5s, 10s, 20s and 30seconds.

3.1.3.6   Alarm Input Alarm File

```
     ALARM INPUT ALARM FILE

IN ALARM FILE
1  »NO
2   NO
3   NO
4   NO
5   NO
6   NO
7   NO
8   NO
9   NO
10  NO
```
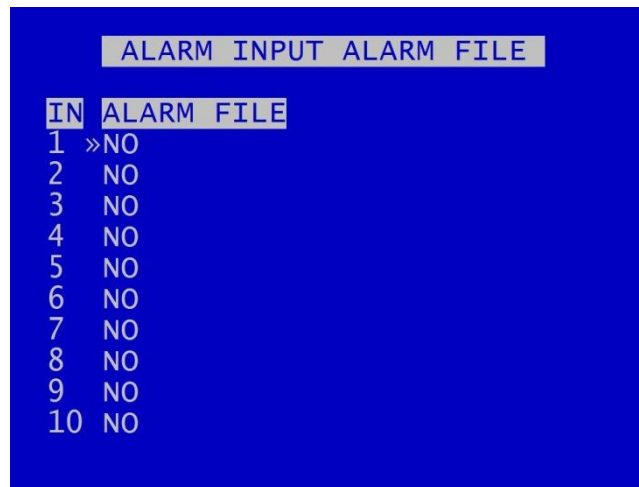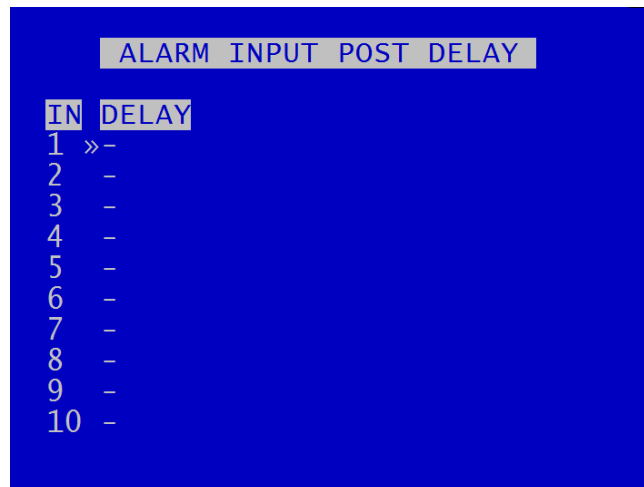
The Alarm Input Alarm File feature provides an option for files to be marked as ALARM recordings even if recording in NORMAL or TIMER RECORDING modes.

If any of the numbered ALARM INPUTS have the ALARM FILE setting set to YES, then the current recording file will be marked as an ALARM recording if this alarm is active.

This will make it easier to identify the correct file(s) when looking for alarm-triggered files on the HDD.

> **NB**: The current recording mode (i.e. NORMAL, TIMER, ALARM etc) does not change.

3.1.3.7　　Alarm Input Post Delay

ALARM INPUT POST DELAY menu controls the number of seconds for which the alarm state is held once the alarm input has changed state.

Available values are 0.5SEC, 1, 2, 3, 4, 5, 10, 30SECS, 1MIN, 5MINS, 10, 15, 20MINS.

3.1.4 SD Recording

```
              SD CARD

   STATUS: NOT PRESENT

   RECORDING ENABLE:»IF NORMAL REC
   LOCK OVERRIDE:    OFF
   HDD FAIL SD REC:  4 SECS

   RECORDING
   RECORDED FILES
   FILE COPY
   FILE SYSTEM
   INFO
   RESET (FORMAT)
```
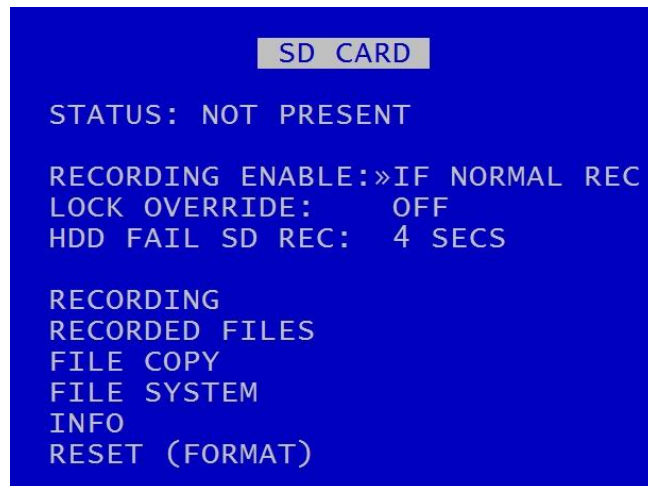
The V400 supports a single SD card for two functions;

RECORDING - The V400 can be configured to record up to 25 images per second to the SD card in addition to the primary recording to the cartridge. All additional data for example Audio and GPS are also included within the SD recorded files.

FILE COPY - Files that are recorded on the V400 cartridge can be selected and copied to the SD card for review on a PC.

The SD Card menu shows the current Status of the SD card i.e. PRESENT, NOT PRESENT, LOCKED or RECORDING TO SD.

RECORDING ENABLE lists the available modes of recording for the SD card.

- OFF   – SD recording is OFF, no SD recording.
- ON   – SD recording onto SD card all the time.
- IF NORMAL REC– SD recording only occurs if the V400 is recording in Normal mode.
- IF TIMER REC   – SD recording only occurs if the V400 is recording in Timer mode.
- IF ALARM REC   – SD recording only occurs if the V400 is recording in Alarm mode.

LOCK OVERRIDE options OFF or ON can be used to override the physical lock status of the SD card. For example if an SD card is inserted with the lock enabled, this usually prevents any data being written, however the V400 can override this.

HDD FAIL SD REC sets the number of seconds that the V400 will continue to record to the SD card when a FAIL to write to the hard disk drive (HDD) is detected. Available values are 4SECS, 6, 10, 20, 40SECS, 1MIN, 2, 5MINS. After the configured time has elapsed, the V400 will reboot in an attempt to continue writing to the HDD after boot up. If the HDD fails due to a crash the SD will carry on recording for the selected period so that the crash events are stored.

RECORDING menu configures the SD card recording setup.

RECORDED FILES menu displays a list of the files on the SD card.

FILE COPY menu is used when copying files from the V400 cartridge to the SD card.

FILE SYSTEM menu configures options for recording on the SD card.

INFO page includes details such as; Size, % used, SD serial number etc.

RESET gives options for deleting files on the SD card .

3.1.4.1   SD Card Recording

SD CARD RECORDING menu - The V400 can be configured to record up to 25 images per second (IPS) to the SD card in addition to the primary images per second being recorded to the cartridge. All additional data e.g. audio and GPS are also included within the SD recorded files.

Images per second and Resolution can be set independently, per channel, from the V400's primary mode of recording e.g. if the V400 is Normal Recording with a RES of SUPER, the SD recording files can be set to MED.

For details of resolution options see the section on NORMAL RECORDING.

TOTAL IPS – provides details of current IPS allocation within SD CARD RECORDING, as well as the total IPS available for SD CARD RECORDING.

HELP – provides details of currently configured RESOURCE ALLOCATION across the various recording functions. .

3.1.4.2   SD Card Recorded Files

```
      SD CARD RECORDED FILES
FIRST / LAST PAGE
PAGE  1  OF  5
W__GA FILTER OFF          SIZE MB
_____ 11:32:28 26/07/16 31.7
_____ 11:32:24 26/07/16 3.3
_____ 11:30:38 26/07/16 28.9
W_____ 11:28:36 26/07/16 3.1
W_____ 11:50:00 21/06/16 296.1
_____ 11:40:00 21/06/16 387.9
_____ 11:30:00 21/06/16 387.9
_____ 11:20:00 21/06/16 387.8
»W_____ 11:10:00 21/06/16 387.9
_____ 11:00:00 21/06/16 387.8
```

The SD CARD RECORDED FILES menu lists the files recorded on the SD card.

The files cannot be played back on the V400, and must be viewed through PCLink200.   Navigation of the file list pages are via the left/right arrow menu keys when PAGE or FIRST/LAST page is highlighted.

HINT: Files can be write-protected by scrolling down to the file and pressing the left arrow key, a W should appear next to the file. Pressing left again will remove the write-protect.

3.1.4.3   SD Card File Copy

```
         SD CARD FILE COPY

  SIZE  GB: -        USED: -
  AVAIL GB: -        WP:   -
  FILES:    -

 »HDD RECORDED FILES...

  COPY HDD FILES TO SD CARD
  FROM:     00:00   00/00/00
  TO:       00:00   00/00/00
  FILES:    0
  SIZE GB: 0.00     COPY FILES
```

SD CARD FILE COPY is used to copy recorded files from the V400 cartridge to the SD card. A link to the main cartridge HDD files give quick access to see what is on the cartridge. Some SD statistics are given to aid in the select process e.g. size and capacity used.

Use HDD RECORDED FILES to view the files on the hard disk.

COPY HDD FILES TO SD CARD by entering the start/end date & time of the period you wish to copy and then move the cursor down to select COPY FILES.

If there is enough free capacity on the SD card, the copy will begin. Progress of the copy will be displayed as a percentage and incremental file count as each file is copied.

WARNING: If other Menu buttons are pressed during the FILE COPY, the action will be aborted. It is necesary to alow the FILE COPY to finish before attempting any other Menu/programming options.

A message will be displayed on the SD CARD FILE COPY menu screen when the FILE COPY is complete.

If the period requested spans multiple files, all files are copied to the SD card for that period. Files are not cut / clipped. In the following example, all four files would be copied, even though files 1 & 4 only include a portion of the period requested;
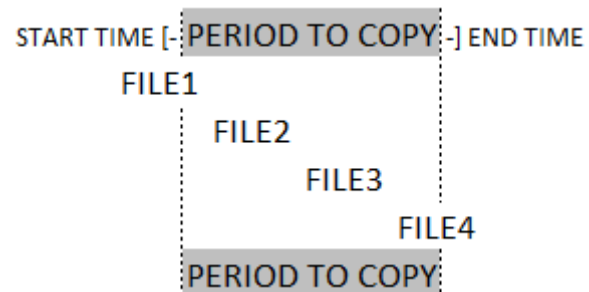
Figure 3 SD Card File Copy

3.1.4.4   SD Card File System

```
        ┌─────────────────────────────┐
        │      SD CARD FILESYSTEM      │
        │                             │
        │  RECORDING MODE: »LOOP RECORD│
        │                             │
        │  FILE LENGTH:     10 MINUTES │
        │                             │
        │  FILENAME TEXT:              │
        │                             │
        │                             │
        │  FILE SYSTEM CHECK MENU...   │
        │                             │
        │                             │
        └─────────────────────────────┘
```
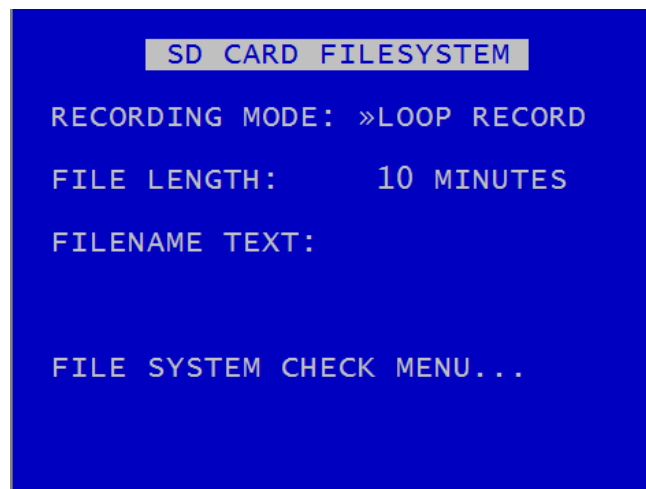
SD CARD FILE SYSTEM menu configures options for recording on the SD card.

RECORDING MODE can be set to LOOP RECORD (oldest files will be overwritten first when the hard disk cartridge is full); or SINGLE PASS recording (recording will stop when the hard disk cartridge is full).

FILE LENGTH controls how often a new file is created.   A new file is created each time recording starts. The fill will be named with the date/time when the recording started. The next file will be started as per the file length settings or when next time boundary is met.

File length options are 1MINUTE, 5MINUTES, 10MINUTES, 1HOUR. For further details refer to File System menu for the main hard disk cartridge.

FILENAME TEXT - prefixes the recording files with user-defined characters . Characters can be entered using the Text and Number Input keys on the Reviewer.

FILE SYSTEM CHECK MENU configures system checking and the creation of system logs for SD CARD RECORDING.

3.1.4.5   SD Card File System Check

```
        SD CARD FILE SYSTEM CHECK

  ON POWER SWITCH ON:
    »QUICK CHECK AND CORRECT

  ON POWER SWITCH OFF:
     FULL CHECK AND CORRECT

  PERFORM CHECK ONLY NOW

  PERFORM CHECK & CORRECT NOW
```
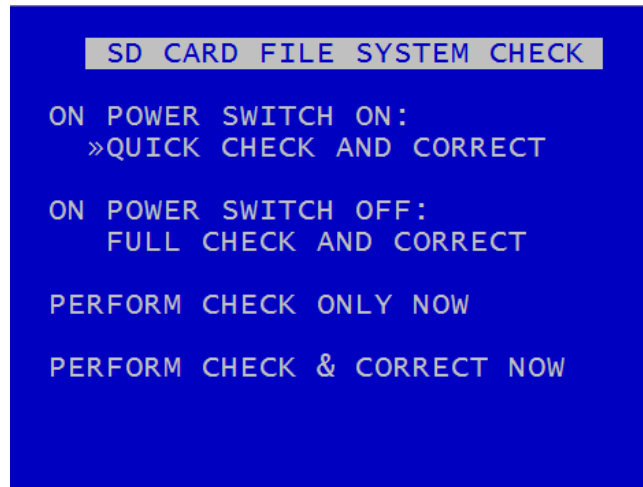
SD CARD FILE SYSTEM CHECK menu configures whether the file system is checked and/or corrected at power-up and whether a system log is created.

ON POWER SWITCH ON – options are NO CHECK, QUICK CHECK AND CORRECT, FULL CHECK AND CORRECT.

Options are available to CREATE SYSTEM LOG or DO NOT CREATE SYSTEM LOG.

ON POWER SWITCH OFF – NO CHECK, QUICK CHECK AND CORRECT, FULL CHECK AND CORRECT.

PERFORM CHECK ONLY NOW – will check the files and file system and report any errors but will not attempt to fix anything.

PERFORM CHECK & CORRECT NOW – will perform a file and file system check and fix any errors that are found.   It also rewrites the FAT and BOOT sectors.

NB: No files/data are deleted during the CHECK & CORRECT function.

3.1.4.6   SD Card Info

```
            SD CARD INFO

      -   SIZE IN GIGABYTES
      -   USED
      -   WRITE PROTECTED
      -   FILES
      -   START DATE
      -   END   DATE
      -   DAYS RECORDING

      -   CARD MANUF. ID
      -   CARD NAME
      -   CARD SERIAL NUMBER
```
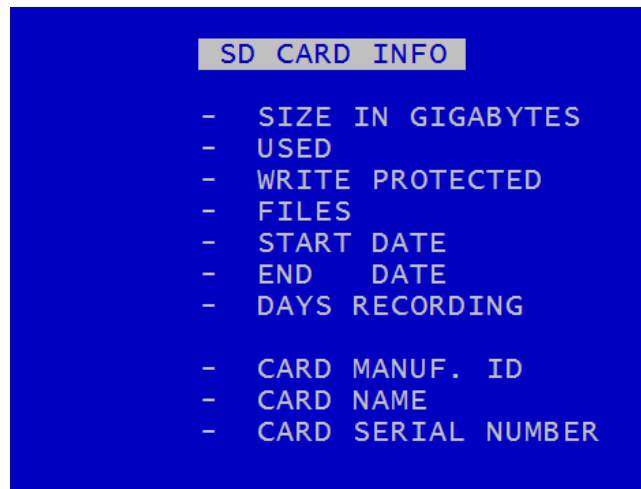
SD CARD INFO menu provides information about the use of the SD card:

- ° Size in Gigabytes
- ° Gigabytes used
- ° Write protection status
- ° Files
- ° Start date
- ° End date
- ° Days Recording
- ° Card Manufacturer ID
- ° Card Name
- ° Card Serial Number

3.1.4.7   SD Card Reset
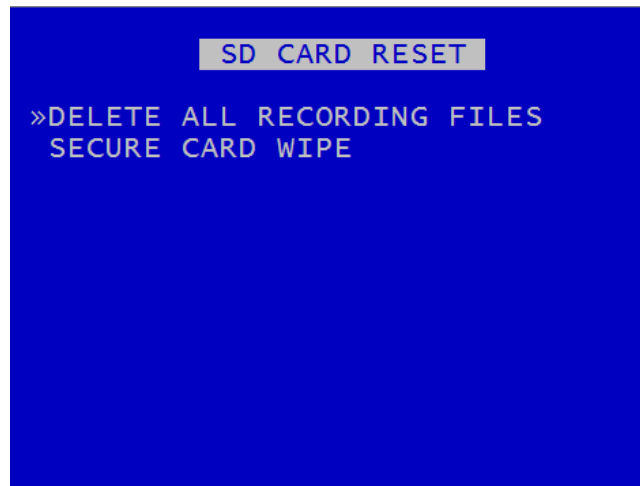
SD CARD RESET gives 2 options for deleting files:

DELETE ALL RECORDING FILES

SECURE CARD WIPE

3.1.4.8   Deleting SD Recording Files

```
 DELETE ALL SD RECORDING FILES

WARNING:
THIS OPERATION DELETES
ALL FILES ON SD CARD!

PRESS EXIT TO ABORT AT ANYTIME
AND RETURN TO PREVIOUS MENU OR
PRESS RIGHT MENU ARROW TO
DELETE ALL FILES ON SD CARD: »
```
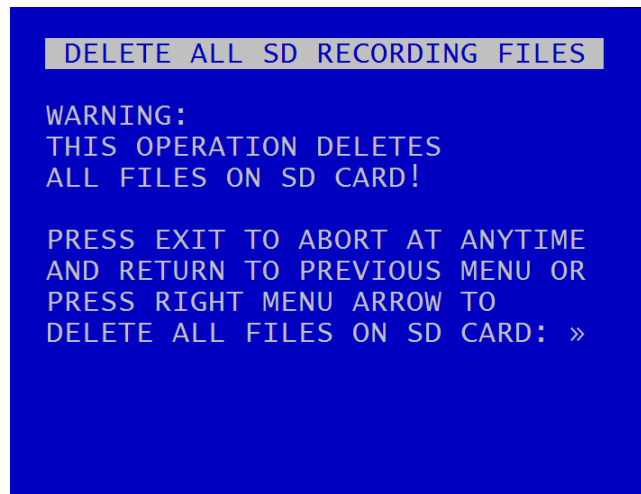
DELETE ALL SD RECORDING FILES will remove all recordings from the SD card including write-protected files. Only do this if you want to completely remove all recordings – there is NO undo option. Press the right menu button to go to a warning screening, press right again to carry out this action. Pressing Menu Exit will abort this procedure.

WARNING: THERE IS NO "UNDO" OPTION. SELECTING "DELETE ALL FILES ON SD CARD" WILL COMPLETELY REMOVE ALL RECORDINGS ON THE SD CARD.

3.1.4.9   Secure SD Card Wipe

```
      SECURE  SD  CARD  WIPE
WARNING:
THIS OPERATION PERMANENTLY
DESTROYS ALL DATA ON THE CARD.

SECURE WIPE MAY TAKE A FEW
HOURS DEPENDING ON CARD SIZE.

PRESS EXIT TO ABORT AT ANYTIME
AND RETURN TO PREVIOUS MENU OR
PRESS RIGHT MENU ARROW TO
SECURE WIPE THE SD CARD: »
```
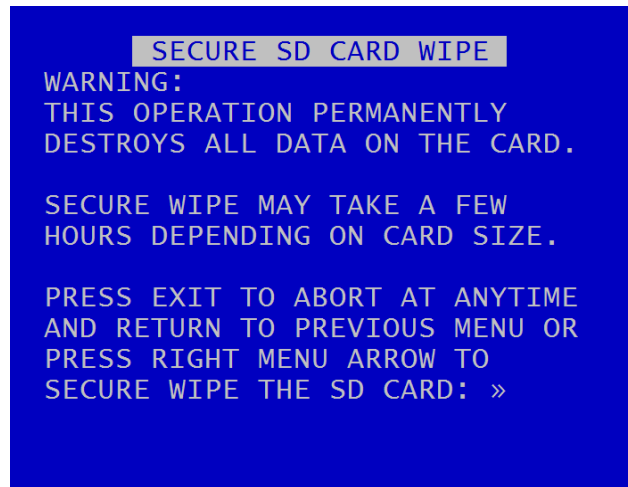
SECURE SD CARD WIPE will permanently delete all recording files on the SD card. This should only be used if files need to be completely destroyed. NO files will be able to be recovered. A final warning message will appear before this function is carried out. Pressing Menu Exit will abort.

WARNING: THERE IS NO "UNDO" OPTION. SELECTING "SECURE WIPE THE SD CARD" WILL COMPLETELY REMOVE ALL RECORDINGS ON THE SD CARD.

3.1.5   Audio Recording

```
          AUDIO RECORDING
USE FOR NORMAL RECORDING: »OFF
USE FOR TIMER RECORDING:   OFF
USE FOR ALARM RECORDING:   OFF
USE FOR SD CARD RECORDING: OFF

CHANNELS:                STEREO
SAMPLING RATE:          16.0 kHz
SAMPLING RESOLUTION:    16 BITS
AUDIO IN SENSITIVITY: 1.00 Vrms
INPUT 1 LEVEL:    3% (-31 dB)
INPUT 2 LEVEL:    1% (-37 dB)
AUDIO ADVANCED...
AUDIO TEST FILES...
```
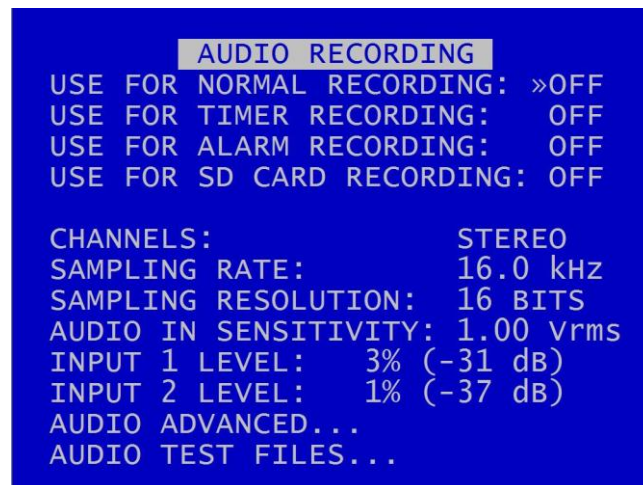
AUDIO RECORDING menu allows configuration of the audio recording parameters. Audio can be enabled or disabled (ON / OFF) for the following recording types; NORMAL, TIMER, ALARM and SD CARD.

The V400 has a built in preamplifier so mics can be connected directly to the side panel interface.

CHANNELS can be set to STEREO, MONO-R, MONO-L.

SAMPLING RATE can be set to 8kHz, 16, 32, 44.1 or 48kHz.

SAMPLING RESOLUTION is set to 16BITS, giving CD-quality audio recording.

AUDIO IN SENSITIVITY – The V400 is configurable so that the line-level input range can be set from 0.12 - 2.0Vrms (sensitivity).

INPUT LEVELS – when recording, input levels will be shown as NOT RECORDING or as a percentage so the V400 can be setup to avoid distortion. The sensitivity configuration will be dependent on the environment of the installation.

Individual audio channels can be played back using PCLink200 PC software.

AUDIO ADVANCED – configures further settings for AUDIO RECORDING.

AUDIO TEST FILES – allows the user to play files with *just* the audio so as to test the audio function. No video will play during the audio test.

3.1.5.1   Audio Advanced Menu

```
        ┌──────────────────────────┐
        │     AUDIO ADVANCED       │
        └──────────────────────────┘

      »TEST MENU...
       REVIEWER CHANNEL:   1 ONLY
       PLAYBACK VOLUME:    MUTE




       AUDIO IN SENSITIVITY: 1.00 Vrms
       INPUT 1 LEVEL:    2% (-35 dB)
       INPUT 2 LEVEL:    2% (-36 dB)
```

AUDIO ADVANCED menu gives further options for configuring Audio features.

> **NB**: Audio playback from the V400 via the Reviewer is currently only available for test purposes.
>
> To listen to audio from recorded video footage, recorded files must be played back via PCLink.
>
> See AUDIO RECORDING > AUDIO TEST FILES and AUDIO ADVANCED > TEST MENU for further information.

TEST MENU – provides options for testing the Audio function..

REVIEWER CHANNEL and PLAYBACK VOLUME – for test purposes only as described above. Available audio test values are MUTE, LOW, MEDIUM, HIGH, FULL
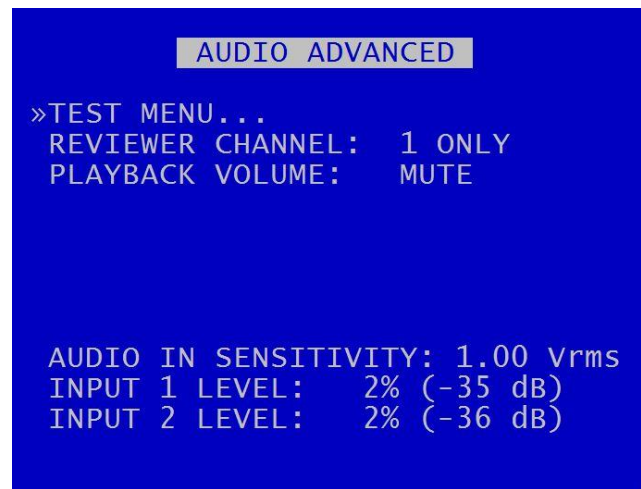
AUDIO IN SENSITIVITY – can be set from 0.12 - 2.0Vrms.

INPUT LEVEL - when recording, input levels will be shown as NOT RECORDING or as a percentage so the V400 can be setup to avoid distortion. The sensitivity configuration will be dependent on the environment of the installation.

3.1.5.2   Audio Test Menu

```
                  TEST MENU
»TEST START/STOP
 TEST WAV                SINE
 TEST DURATION           1  SECS
 HPOUT LOOPBACK          OFF
 LOP LOOPBACK            OFF
```
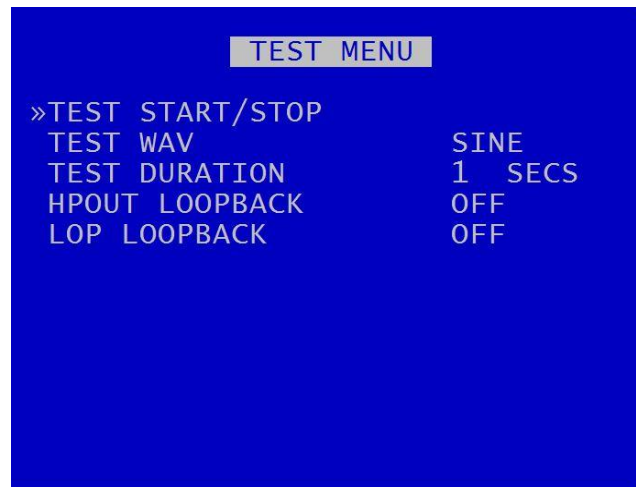
TEST START/STOP – will commence or stop the audio test.

TEST WAV – for Timespace test purposes only.

HPOUT LOOPBACK – can be selected to OFF/ON. This provides high power output for listening to live audio being recorded using the speaker on the Reviewer.

LOP LOOPBACK – can be selected to OFF/ON. This provides high power output for listening to live audio using the V400's interface panel audio output socket.

3.1.6   Recorded Files

```
          RECORDED FILES
   FIRST / LAST PAGE
   PAGE  1  OF  8
   W__GA FILTER OFF        SIZE MB
   _____ 13:06:30 02/08/16 6.1
   _____ 13:01:00 02/08/16 6.0
   W____ 14:24:54 27/07/16 14.4
  »W____ 14:20:00 27/07/16 305.3
   _____ 14:16:16 27/07/16 229.6
   _____ 14:10:00 27/07/16 20.9
   _____ 14:09:44 27/07/16 16.2
   _____ 14:06:48 27/07/16 117.1
   _____ 14:02:40 27/07/16 42.4
   _____ 12:50:00 27/07/16 86.7
```

RECORDED FILES menu lists the recorded files on the HDD and allows the user to select a file to play or to change the write-protect state of a file.

Files are shown in chronological order, most recent file first. Files are displayed by;

> **HH:MM:SS   DD/MM/YY   SIZE MB**

File status indicators shown to the left of the file include;

> **A   - Alarm**
> **W   - Write protected**
> **G   - GSensor**

A file may have multiple statuses. For example a write protected alarm file could have; A W _ _ _

A file with a W status will not be overwritten on Loop Recording.

HINT: The W status can be added or removed by pressing the Left Menu Navigation key when the cursor is next to the recorded file.

Navigation is using the Menu Navigation keys on the Reviewer as follows:

FIRST / LAST PAGE   – Left key = go to last page; Right key = go to first page
PAGE   – Left key = go to next page; Right key = go to previous page; Up/Down keys
                                           = move cursor to a file

The files can be filtered into the following groups:

- Write protect
- GSensor Alarm
- Alarm Recording

By highlighting the letter (file status indicator), RECORDED FILES will be filtered by that status, e.g. show all Write-protected files, all Gsensor Alarm files or all Alarm Recording files..

HINT: To higlight a file status indicator, use the right arrow key to scroll through W, G, A. The selected letter will have a white background, and a message "FILTER ON" will be displayed.

Continuing to scroll with the right arrow button will take the selection back to "FILTER OFF".

3.1.7   Video Output

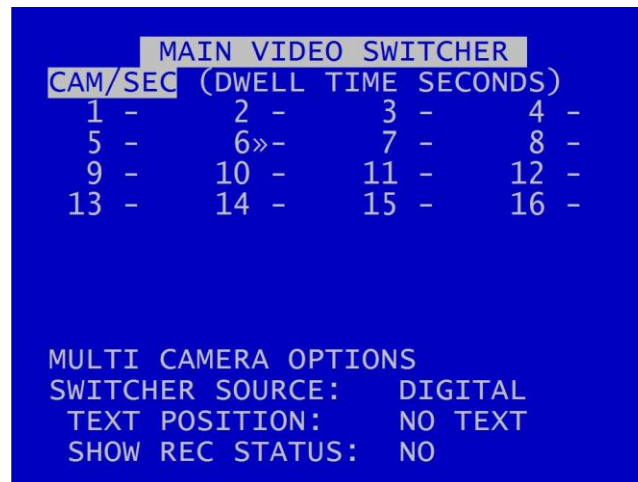VIDEO OUTPUT menu controls the automatic switching and dwell time of cameras on the two video outputs:

MAIN VIDEO SWITCHER – main video output

AUX VIDEO SWITCHER – auxiliary video output

When in Auto mode (selected by pressing the Auto key on the Reviewer), the video output will switch between the configured cameras for the set period of time.

Single camera output is selected by pressing the camera number on the Reviewer.

3.1.8   Main Video Switcher

```
        MAIN VIDEO SWITCHER
 CAM/SEC (DWELL TIME SECONDS)
    1 -     2 -     3 -     4 -
    5 -     6»-     7 -     8 -
    9 -    10 -    11 -    12 -
   13 -    14 -    15 -    16 -




 MULTI CAMERA OPTIONS
 SWITCHER SOURCE:    DIGITAL
  TEXT POSITION:     NO TEXT
  SHOW REC STATUS:   NO
```

MAIN VIDEO SWITCHER menu controls the video output on the Main Switcher.

CAM/SEC – Set the desired camera DWELL time (in seconds) next to each camera that is to be included in the switcher sequence.

MULTI CAMERA OPTIONS – allows the simultaneous viewing of a number of cameras at the same time. The output is split into tiles per camera. Multi view can be included in the Auto switching sequence.

SWITCHER SOURCE – select from DIGITAL or ANALOG. ANALOG is a live camera image from the selected camera(s). DIGITAL is a processed image from the selected camera.

TEXT POSITION – Sets the position of the time/date text on the screen.   Options are: NO TEXT, BOTTOM HIGH, BOTTOM MIDDLE, BOTTOM LOW, TOP HIGH, TOP MIDDLE, TOP LOW.

SHOW REC STATUS – Select YES/NO to determine whether the recording status is shown on the embedded text in MULTI CAMERA setup.

NB: this does not affect the date/time being recorded into the images; this is set in SETTINGS MENU / SYSTEM SETTINGS > CAMERA SETTINGS.

3.1.8.1   Multi Camera Options

```
     MULTI CAMERA OPTIONS
»MULTI CAMERA SETUP...

 MULTI CAMERA VIEW...

 MULTI CAMERA(SEC): -
  TEXT POSITION:    NO TEXT
  SHOW REC STATUS:  NO
```

MULTI CAMERA SETUP – configures which cameras are to be displayed simultaneously in the MULTI CAMERA VIEW.

MULTI CAMERA VIEW – provides a "preview" of the multi camera setup.

MULTI CAMERA (SEC) – sets the number of seconds for which the MULTI CAMERA VIEW is displayed. Available options are: 1SEC, 2, 3, 4, 5, 10, 20, 30SECS.

TEXT POSITION – sets the position of the time/date text on the MULTI CAMERA view. Select from NO TEXT, BOTTOM HIGH, BOTTOM MIDDLE, BOTTOM LOW, TOP HIGH, TOP MIDDLE, TOP LOW.

3.1.8.3   Multi Camera Setup
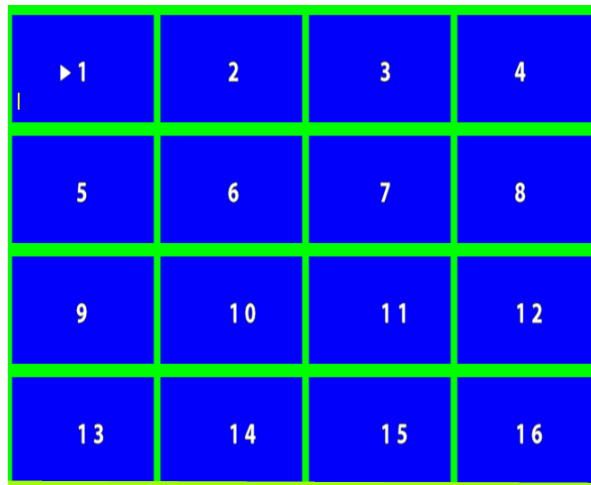
Configures which cameras are to be displayed simultaneously. Each tile can be set to display a sixteenth view of a camera. If the same camera number is set to four tiles in a square then a quarter view will be shown.

Cameras for each tile are selected using the left/right Menu Navigation keys on the Reviewer to scroll through the camera number options. Move along/up/down the tiles using the up/down Menu Navigation keys.

> **HINT:** Pressing the Auto key on the Reviewer will switch the video output between the configured cameras for the set period of time. Single camera output is selected by pressing the camera number on the Reviewer.

3.1.8.4   Multi Camera View

MULTI CAMERA VIEW displays multiple camera outputs as per the current settings configured in
[MULTI CAMERA SETUP](#).

3.1.9   Auxiliary Video Switcher

```
            AUX VIDEO SWITCHER
   CAM/SEC (DWELL TIME SECONDS)
      1»1      2 -      3 -      4 -
      5 -      6 -      7 -      8 -
      9 -     10 -     11 -     12 -
     13 -     14 -     15 -     16 -




   MULTI CAMERA OPTIONS
   SWITCHER SOURCE:    DIGITAL
    TEXT POSITION:     NO TEXT
    SHOW REC STATUS:   NO
```

AUX VIDEO SWITCHER configures the settings for the auxiliary (secondary) video output.

Different versions of the V400 have different features available on AUX VIDEO SWITCHER as follows:

T708 (8-camera version) – AUX VIDEO provides a secondary switcher output for video only.

T712 (12-camera) and T716 (16-camera) – AUX VIDEO provides a secondary switcher output for both video and MULTI CAMERA views.

AUX VIDEO SWITCHER settings, e.g. for MULTI CAMERA (if available for that model) and TIME/DATE POSITION are configured in the same way as for MAIN VIDEO SWITCHER.

SWITCHER SOURCE – select DIGITAL or ANALOGUE.

3.2   Settings Menu

3.2.1   System Settings
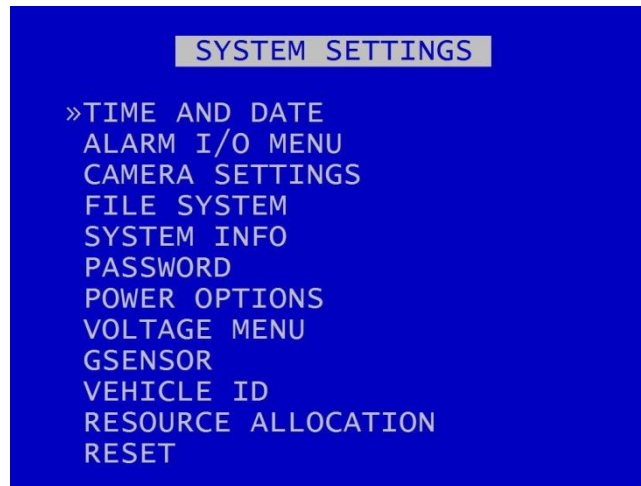
The SYSTEM SETTINGS MENU gives access to configure various system settings and to view system information.

3.2.2   Time And Date

```
┌─────────────────────────────────────┐
│          TIME AND DATE              │
│                                     │
│  TIME:»14:29:43                     │
│  DATE: 31/01/17                     │
│  MODE: DD/MM/YY                     │
│                                     │
│  SET CLOCK TO THESE SETTINGS...     │
│                                     │
│                                     │
│                                     │
│                                     │
│  SUMMERTIME ADJUST:    UK           │
│  SUMMER/WINTER TIME:   WINTER       │
│                                     │
└─────────────────────────────────────┘
```

TIME AND DATE menu displays the current time/date. New times/dates can be set by entering new values using keys 0-9 on the Reviewer.

SET CLOCK TO THESE SETTINGS – confirms and sets the new time/date.

The date display MODE can be switched between DD/MM/YY and MM/DD/YY. The chosen format will be used for date entry and display throughout the system.

> **NB:** date and time settings cannot be changed while the unit is recording.

Summer time adjustment can be selected for UK, EUR USA , NZ and OFF.

Summer time adjust automatically updates the system to daylight saving time, valid for the country selected. Adjustments are applied even if the system was powered off during the time change.

When the clock is put forward, the time is now summer time, which is winter time +1 hour. When the clock is put back, time reverts to winter time.

UK - At 1am on the last Sunday in March, the clock is put forward an hour. At 2am on the last Sunday in October, the clock is put back and hour.

Central Europe - At 2am on the last Sunday in March, the clock is put forward an hour. At 3am on the last Sunday in October the clock is put back an hour.

USA - At 2am on the second Sunday in March, the clock is put forward an hour. At 2am on the first Sunday in November, the clock is put back an hour.
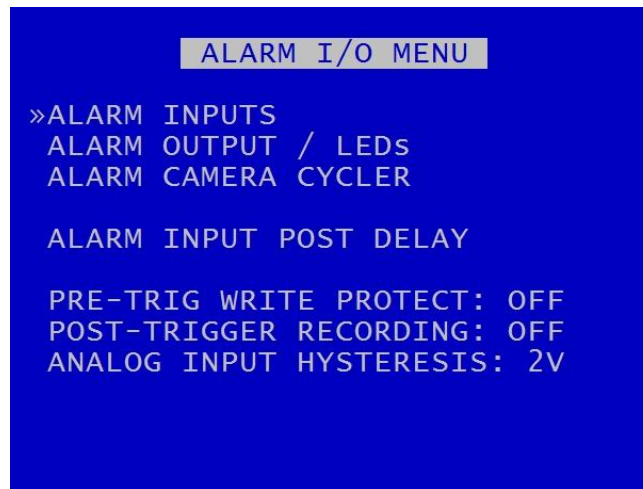
NZ – at 2am on the last Sunday in September, the clock is put forward an hour. At 3am on the first Sunday in April, the clock is put back an hour.

> **NB:** when time or date are changed, a hard disk re-format is recommended in order to reset the meta file.

3.2.3   Alarm Inputs/Outputs menu

```
       ALARM I/O MENU

»ALARM  INPUTS
 ALARM  OUTPUT / LEDs
 ALARM  CAMERA  CYCLER

 ALARM  INPUT  POST  DELAY

 PRE-TRIG WRITE PROTECT: OFF
 POST-TRIGGER RECORDING: OFF
 ANALOG INPUT HYSTERESIS: 2V
```

Alarm Inputs and Outputs can be configured as per the ALARM INPUTS/OUTPUTS menu in settings for ALARM RECORDING.
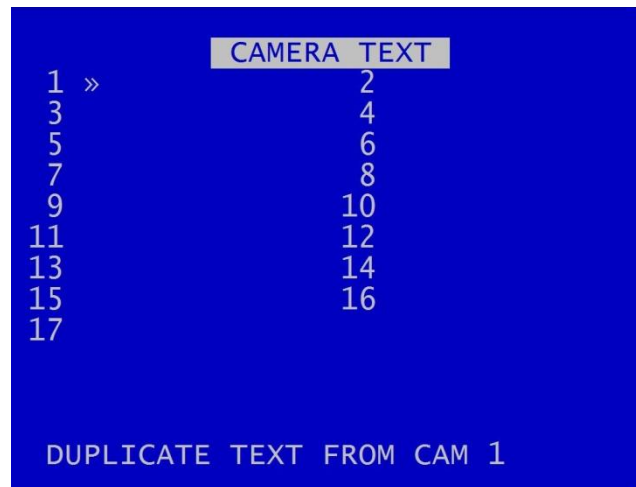
3.2.4   Camera Settings

CAMERA SETTINGS menu configures the CAMERA TEXT labels, timestamp position, VIDEO SETTINGS and camera disconnect time.

TIMESTAMP POS - the timestamp can be positioned either below (BOTTOM) or above (TOP) the main area of the recorded image and fine adjustment of position made with LOW/MIDDLE/HIGH settings. The timestamp can also be turned off (select NO TIMESTAMP) and will not be written in to the recorded images.

VIDEO SETTINGS - controls the video standard (PAL or NTSC).

CAMERA DISCONNECT TIME – this option allows disconnected cameras to be reported as connected for a set time period. This is useful in cases where a camera can take a while to boot and send its signal. If there is no signal after the timeout, the camera is treated as disconnected and is flagged in the service log.   Available options are OFF, 10SEC, 30SEC, 1MIN, 2MIN, 5MIN.

3.2.4.1   Camera Text

```
                   CAMERA  TEXT
     1  »                    2
     3                       4
     5                       6
     7                       8
     9                      10
    11                      12
    13                      14
    15                      16
    17


    DUPLICATE TEXT FROM CAM 1
```

Individual text for each camera can be inserted above the timestamp. This text, along with timestamp, will be shown on recorded images.

12 user-defined characters can be input per camera. Enter text using the Text and Number Input keys on the Reviewer.

DUPLICATE TEXT – feature is available for copying down text from camera 1 to all remaining cameras.

4.2.4.1 Video Settings – PAL and NTSC

```
        VIDEO SETTINGS

VIDEO STANDARD:        »PAL
```
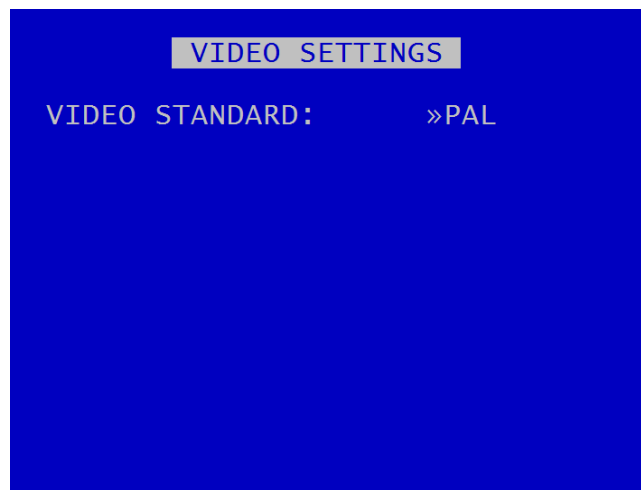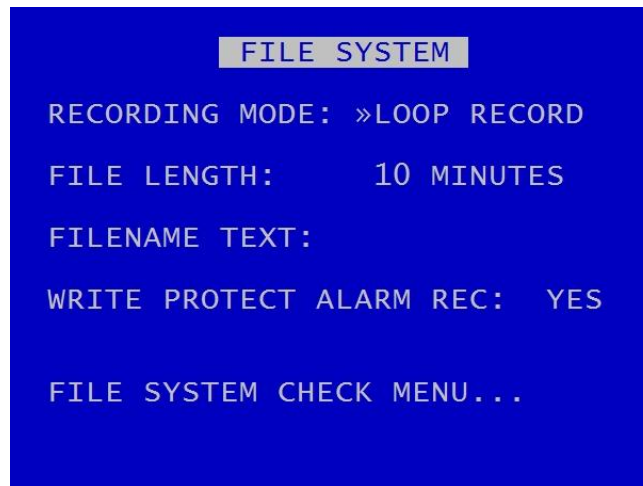
VIDEO SETTINGS menu controls the video standard, i.e. whether the unit is to operate with PAL or NTSC cameras.

NB: after changing the video standard setting, the unit will automatically reboot after 5 seconds for the change of setting to take effect. A red "Reboot Required" warning will flash on the screen before the reboot commences.

3.2.5   File System

```
          FILE SYSTEM

 RECORDING MODE: »LOOP RECORD

 FILE LENGTH:      10 MINUTES

 FILENAME TEXT:

 WRITE PROTECT ALARM REC:  YES


 FILE SYSTEM CHECK MENU...
```

FILE SYSTEM MENU Sets the parameters of the file system and how files are laid to disk.

RECORDING MODE sets either:

- LOOP RECORD (oldest files will be overwritten first when the hard disk cartridge is full) or
- SINGLE PASS recording (recording will stop when the hard disk cartridge is full).

FILE LENGTH – controls how often a new file is created. A new file is created each time recording starts. The file will be named with the date/time when the recording started. If continuous recording, the next file will be started as per the file length settings or when next time boundary is met. For example when using 10min files, if recording starts at 10:03, the first file will contain 7minutes of video and the second file will be started at 10:10. New files will then be created every 10 minutes, i.e.10:20, 10:30 etc.   Files can be configured for: 1 MINUTE, 5 MINUTES, 10 MINUTES, or 1 HOUR.

> **NB**: File size is limited to 4GB. After this limit is reached, a new file will be created.

FILENAME TEXT – prefixes the recording files with up to 12 user defined characters (0-9, A-Z, space). Text and numbers are entered using the Reviewer.

WRITE PROTECT ALARM REC – selects whether alarm recording files are write protected. If alarm files are write-protected they will not be deleted on LOOP recording. Select YES/NO.

FILE SYSTEM CHECK menu – configures whether the file system is checked (and possibly corrected) at power up and also if a system log is created.

3.2.5.1   File System Check
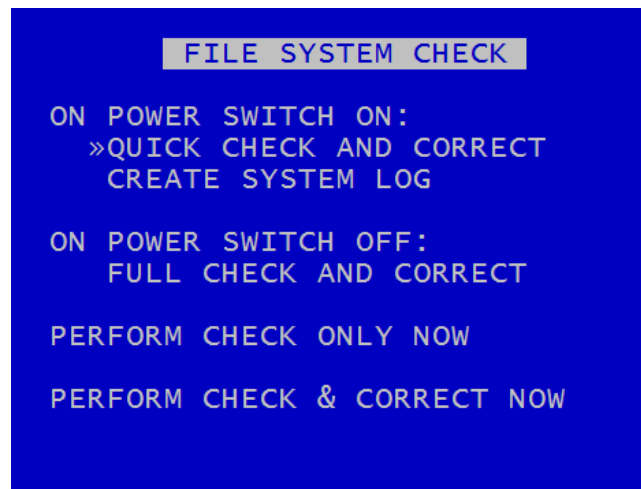
```
        FILE SYSTEM CHECK

ON POWER SWITCH ON:
   »QUICK CHECK AND CORRECT
    CREATE SYSTEM LOG

ON POWER SWITCH OFF:
    FULL CHECK AND CORRECT

PERFORM CHECK ONLY NOW

PERFORM CHECK & CORRECT NOW
```

FILE SYSTEM CHECK menu configures whether the file system is checked (and possibly corrected) at power up and also if a system log is created.

ON POWER SWITCH ON – select from options:

- No check / Quick check and correct / Full check and correct
- Create system log / do not create system log

ON POWER SWITCH OFF:

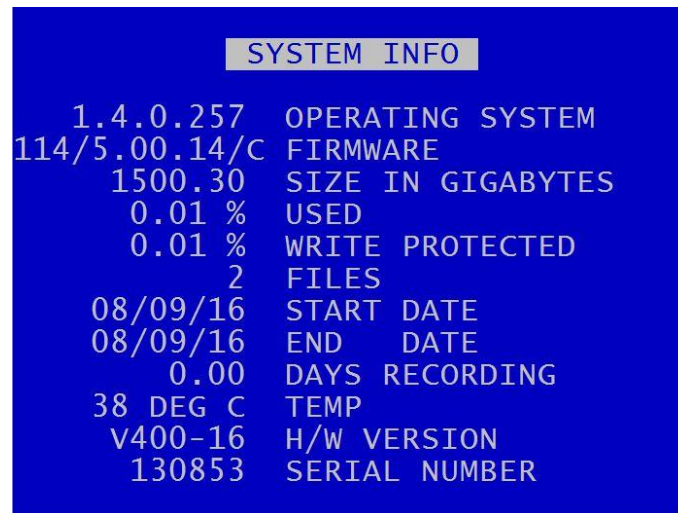- No check / Quick check and correct / Full check and correct

PERFORM CHECK ONLY NOW will check the files and file system and report any errors but will not attempt to fix anything.

PERFORM CHECK AND CORRECT NOW will perform a file and file system check and fix any errors that are found. It also rewrites the FAT and BOOT sectors.

NB: No XBA files/data are deleted during the check and correct function.

3.2.6   System Info

```
              SYSTEM INFO

    1.4.0.257  OPERATING SYSTEM
114/5.00.14/C  FIRMWARE
     1500.30   SIZE IN GIGABYTES
     0.01 %    USED
     0.01 %    WRITE PROTECTED
          2    FILES
    08/09/16   START DATE
    08/09/16   END   DATE
       0.00    DAYS RECORDING
    38 DEG C   TEMP
     V400-16   H/W VERSION
     130853    SERIAL NUMBER
```

SYSTEM INFO menu displays information about the system;

OPERATING SYSTEM – Currently installed/running software version.

FIRMWARE – Currently installed/running firmware version (FPGA build / H264 codec / PCB Rev).

SIZE IN GIGABYTES – Total size of installed hard disk cartridge.

USED – Percentage of hard disk cartridge used by any files.

WRITE PROTECTED – Percentage of cartridge used by write protected files.

FILES – Number of XBA files on the hard disk cartridge.

START DATE – The date of the first (oldest) file on the cartridge.

END DATE – The date of the last (newest) file on the cartridge.

DAYS RECORDING - The number of days between the start/end date. **NB:** that there may not be continuous recording files between the start/end dates.

TEMP – the temperature of the V400 unit.

H/W VERSION – The hardware model number of the DVR.

SERIAL NUMBER - Displays the V400 serial number.

3.2.7   Password Requirements

```
         PASSWORD

 PASSWORD REQUIRED FOR:

 RECORD:        NO
 MENU:          NO
 SWITCHER:      NO
 PLAY:          NO
 READ ONLY:     NO

 CHANGE PASSWORD...


»FTP/TELNET USERS
```

PASSWORD menu sets a password to restrict user access to five key areas of the system. A read-only access can be set that allows files to be viewed and limited features to be used.   For each area, select YES/NO.

RECORD - If set to YES, the record button on the front panel and the Reviewer are password protected.

MENU - If set to YES, access to the menu system is password protected.

PLAY – If set to YES, the controls to review recorded footage are password protected.

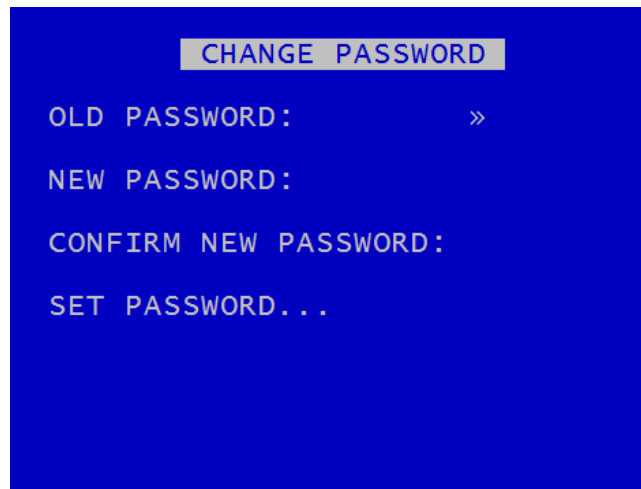SWITCHER - If set to YES, the button to activate auto switcher mode is password protected.

READ ONLY - If set to YES, the user cannot change any setting on the V400. The menu system can be browsed but no settings changed. If a setting change is attempted, the element will flash in RED for 2 seconds and not be changed. To exit read only mode, change read only to NO, at which point you will be prompted for the password.

If access to a password protected function is attempted, the user is prompted with the enter password screen. On correct password entry the password protection is temporarily disabled while that function is being used.

CHANGE PASSWORD – provides options for changing the password.

FTP/TELNET USERS – gives options to access the V400 by FTP/Telnet.

3.2.7.1   Change Password

```
╔═══════════════════════════════╗
║      CHANGE  PASSWORD         ║
║                               ║
║  OLD PASSWORD:          »     ║
║                               ║
║  NEW PASSWORD:                ║
║                               ║
║  CONFIRM NEW PASSWORD:        ║
║                               ║
║  SET PASSWORD...              ║
║                               ║
║                               ║
║                               ║
╚═══════════════════════════════╝
```
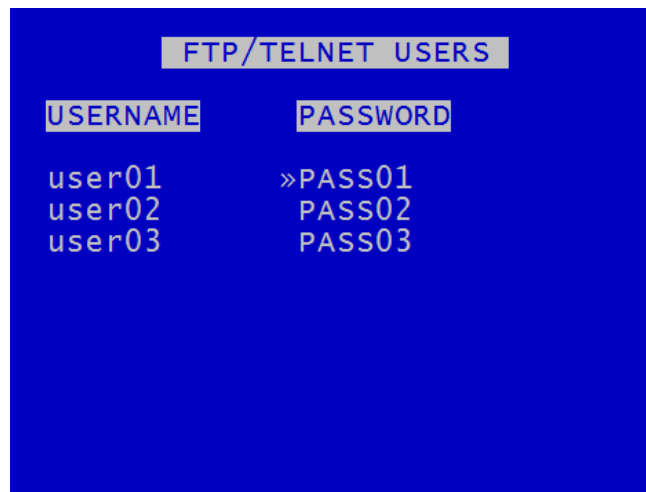
CHANGE PASSWORD menu provides options for changing the password.

Password can be changed by first entering the current password, followed by the new one (entered twice for verification). Password format is four digits only 0-9.   Enter numbers using the [Reviewer](#).

Default password is **0000** (four zeros).

In the event of a complete password lockout, contact your installer or Timespace for a master unlock code; email support@tspace.co.uk

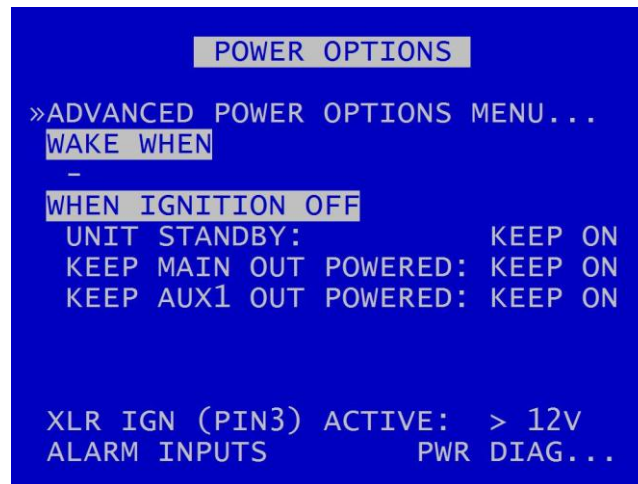### 3.2.7.2   FTP/Telnet User Passwords

FTP/TELNET USERS MENU gives the option to have three different passwords to access the V400 via FTP/TELNET.

The usernames are fixed; however the passwords can be set as required, and are case sensitive.

3.2.8   Power Options

```
          POWER OPTIONS

»ADVANCED POWER OPTIONS MENU...
 WAKE WHEN
  –

 WHEN IGNITION OFF
  UNIT STANDBY:          KEEP ON
  KEEP MAIN OUT POWERED: KEEP ON
  KEEP AUX1 OUT POWERED: KEEP ON



 XLR IGN (PIN3) ACTIVE:  > 12V
 ALARM INPUTS        PWR DIAG...
```

POWER OPTIONS menu configures the behaviour of the V400 when power is applied, when power is removed and when an input trigger is detected.

ADVANCED POWER OPTIONS MENU – provides further selections for waking the V400, and for configuring behaviour when the ignition is switched on or off, and in low-battery situations.

WAKE WHEN – displays current wake prompts, ie those selected in the ADVANCED WAKE MENU and ADVANCED IGNITION OFF menu. Shows either IGNITION, MOTION, TIME or a combination of these.

WHEN IGNITION OFF – sets the behaviour of the V400 when ignition is turned off. Options for SHUTDOWN or STANDBY are selected in the ADVANCED POWER OPTIONS MENU > ADVANCED IGNITION OFF MENU.

> **NB:** In order for the V400 to operate on ignition, the ignition feed should be connected to one of the V400 ALARM INPUTS and the ALARM INPUT FUNCTION set to IGNITION.

UNIT STANDBY – (only available if STANDBY has been selected in the ADVANCED POWER OPTIONS MENU > ADVANCED IGNITION OFF MENU).   Select from standby options: KEEP ON, 1MIN, 5, 10, 15, 20, 30, 35, 40, 45, 50MINS, 1HOUR, 2HOURS, 3HOURS, 4HOURS.

KEEP UNIT POWERED – (available if STANDBY has not been selected in ADVANCED POWER OPTIONS MENU > ADVANCED IGNITION OFF MENU).   Select from options KEEP ON, 1 MIN, 5, 10, 15, 20, 30, 35, 40, 45, 50, 1HOUR, 2HOURS, 3, 4HOURS.

KEEP MAIN OUT POWERED options – KEEP ON, OFF, 5MINS, 10, 15, 20, 30, 35, 40, 45, 50MINS, 1HOUR, 2HOURS, 3HOURS, 4HOURS.

KEEP AUX1 OUT POWERED options – KEEP ON, OFF, 5MINS, 10, 15, 20, 30, 35, 40, 45, 50MINS, 1HOUR, 2HOURS, 3HOURS, 4HOURS.

XLR IGN (PIN3) – is an alarm input from the ignition. The Active state can be set the same way as the ALARM INPUTS. The XLR IGN is located on pin 3 of the 5-pin power-in XLR (see Figure).

ALARM INPUTS – the V400 unit can also be woken up an ALARM INPUT change in state e.g. the ALARM INPUT for door open can wake the V400 up.
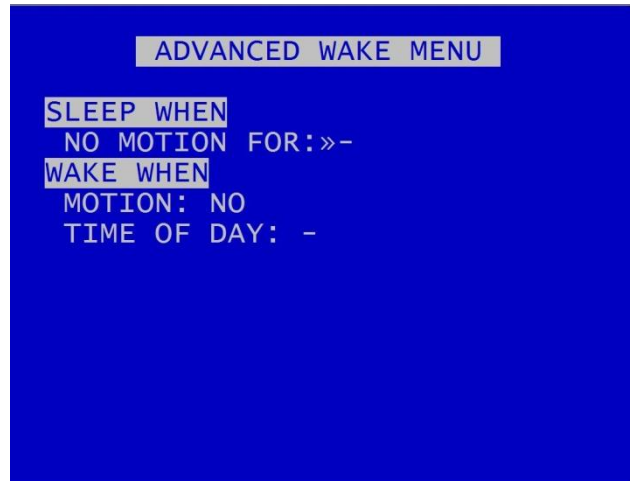
PWR DIAG – the POWER DIAGNOSTICS menu displays the current power consumption, broken down into components.

3.2.8.1   Advanced Power Options
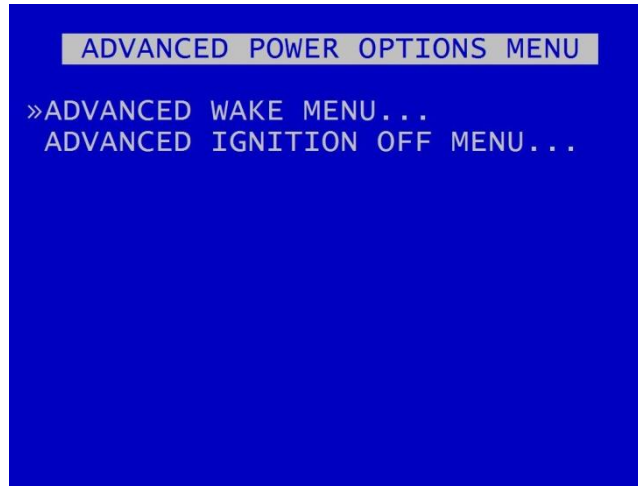
ADVANCED POWER OPTIONS MENU – provides links to the ADVANCED WAKE MENU and the ADVANCED IGNITION OFF MENU.

3.2.8.2   Advanced Wake Menu

```
      ADVANCED WAKE MENU

 SLEEP WHEN
  NO MOTION FOR:»-
 WAKE WHEN
  MOTION: NO
  TIME OF DAY: -
```

The V400 has a built in G-SENSOR for recording and detecting motion. The V400 can use the GSENSOR readings to wake up and/or to shutdown.

SLEEP WHEN – sets the V400 to sleep when NO MOTION is detected for a period of time. Select from available options: 1MIN, 2, 5, 10, 30, 35, 40, 45, 50MINS, 1HOUR, 2 HOURS.

NB: When setting the V400 to sleep on NO MOTION, ensure that one of the WAKE triggers is turned on e.g MOTION, TIME OF DAY or an ALARM INPUT. If a WAKE WHEN setting is not enabled, the V400 will sleep until the next power cycle.

WAKE WHEN - sets the V400 to wake upon given triggers.

MOTION – will be automatically shown as YES if the above SLEEP WHEN NO MOTION FOR setting has been selected. .

TIME OF DAY – can be set to trigger the V400 to wake at a particular time. Times can be set using the right and left Menu Navigation buttons to scroll through times in 15min increments.

HINT: Setting the wake up time is a useful feature for waking the V400 up during the night to download recorded footage via LANLink (part of Timespace's proprietary software suite)..

3.2.8.3   Advanced Ignition Off

```
  ADVANCED IGNITION OFF MENU

IGNITION OFF MODE:»S   DOWN
UNIT STANDBY:      CAMERAS OFF

ON LOW BATTERY:
 EXIT STANDBY THEN SHUTDOWN: YES
 NOMINAL VOLTAGE:        24V
 12V BATTERY THRESHOLD: <13.0V
 24V BATTERY THRESHOLD: <24.0V

TYPICAL POWER USAGE:
 SHUTDOWN - LESS THAN 1 WATT
 STANDBY  - AT LEAST 18 WATTS
```
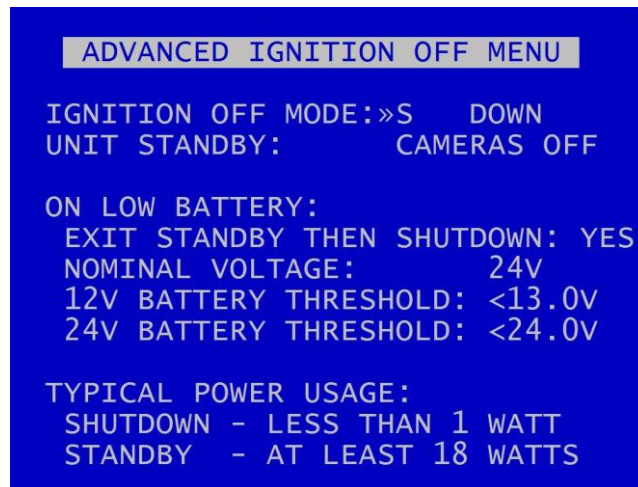
ADVANCED IGNITION OFF MENU provides options for the unit to be set to SHUTDOWN or STANDBY mode when ignition is off.

1.   Ignition ON > OFF

IGNITION OFF MODE – select SHUTDOWN or STANDBY. If set to SHUTDOWN, after the timeout period specified by KEEP UNIT POWERED (see main POWER OPTIONS menu page), the DVR will shut down and run in a low-power mode. The power requirements will depend on the MAIN and AUX POWERED settings (see main POWER OPTIONS menu page).

If set to STANDBY, after the timeout period specified by UNIT STANDBY settings (see main POWER OPTIONS menu page), the DVR will enter STANDBY mode where recording is disabled (the DVR otherwise functions normally).

If STANDBY is selected, an advisory warning will be displayed as below:

> **WARNING**
>
> STANDBY is NOT a low-power mode!
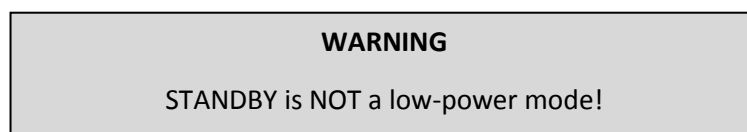
In STANDBY mode there is also a power-saving option to switch CAMERAS OFF (NB this only applies to the analogue cameras).

ON LOW BATTERY – when in STANDBY mode, the DVR can be set to exit STANDBY mode and to SHUTDOWN if the battery voltage level dips below the threshold voltage.

Set the nominal voltage of the battery (input voltage) to either 12V or 24V. Then the relevant 12V or 24V battery threshold as required.

The voltage must dip below the threshold for a few seconds before STANDBY mode will be exited and the DVR will SHUTDOWN.

Typical power usage for the SHUTDOWN and STANDBY options are:

SHUTDOWN – less than 1W
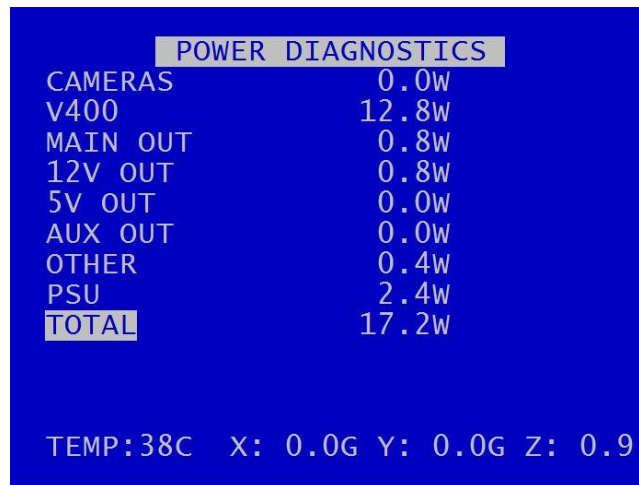
STANDBY – at least 18W

2.   Ignition OFF > ON

If the DVR is SHUTDOWN and in low-power mode, the DVR will power-up.

If the DVR is STANDBY, the standby mode will be exited and standard operation is resumed. The power to analogue cameras will be restored.

Notes

i.   If the DVR is set to perform a file system check ON POWER SWITCH OFF (see FILE SYSTEM > FILE SYSTEM CHECK MENU > ON POWER SWITCH OFF), the DVR will perform this check in both SHUTDOWN and STANDBY modes.
ii.   If the ignition is switched on during the file system check the check is aborted.
iii.   If the ignition is switched on during the SHUTDOWN before the DVR enters low-power mode, then the SHUTDOWN is aborted and standard operation is resumed.

3.2.8.4   Power Diagnostics

```
         POWER DIAGNOSTICS
CAMERAS              0.0w
V400               12.8w
MAIN OUT            0.8w
12V OUT            0.8w
5V OUT             0.0w
AUX OUT            0.0w
OTHER             0.4w
PSU               2.4w
TOTAL            17.2w



TEMP:38C  X: 0.0G Y: 0.0G Z: 0.9
```

POWER DIAGNOSTICS page displays the current power consumption, broken down into various sections e.g. Cameras, GPS.

It also displays current temperature and GSensor co-ordinates.

3.2.8.5   Voltage Menu

```
         VOLTAGE  MENU
INPUT                23.8v
PSU OUT              12.4v
MAIN OUT             12.4v
AUX OUT              12.4v
12V OUT              12.4v
5V OUT                5.1v
XLR IGN (PIN3)       24.0v

ALARM IN 1-5
 0.0v  0.0v  0.0v   0.0v   0.0v
ALARM IN 6-10
 0.0v  0.0v  0.0v   0.0v   0.0v
```

VOLTAGE MENU page displays the current Voltage supply, broken down into various sections e.g. Main video output, Alarm Inputs

NB: The POWER DIAGNOSTICS and VOLTAGE MENU pages may be useful during installation and troubleshooting.

3.2.9   GSensor

```
                  GSENSOR

   BRAKE      G    ACC         G
   01:06   0.02   04:59    0.02
   01:00   0.02
   00:56   0.02   LAT         G
   00:51   0.02   01:15    0.03
   00:45   0.02   01:09    0.03
   00:40   0.02   01:00    0.03
   UP         G   00:54    0.03
   04:59   0.03   00:49    0.03
   02:37   0.03   00:42    0.03
                  »RESET ALARM
   GSENSOR SETUP    RESET READINGS
```

GSENSOR menu configures settings for the V400's built-in Timespace XP200 Accelerometer.

The XP200 is a GSensor device that provides X, Y and Z axes data internally to the V400. Data is displayed and recorded into each image along with optional GPS data.
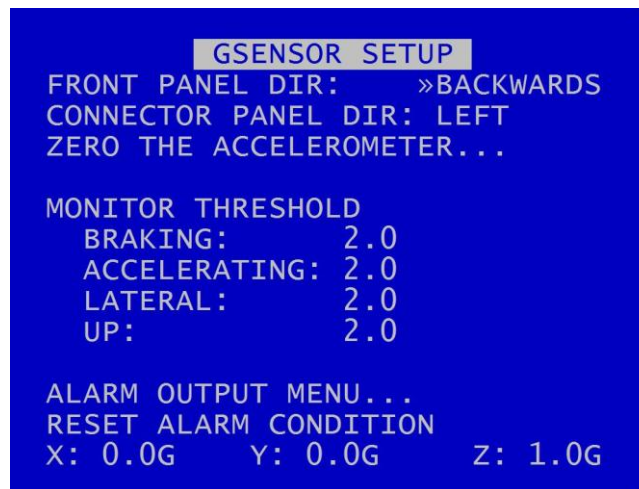
GSensor readings are displayed for;

BRAKE   - Measurement of decreasing forward motion.
ACC   - Measurement of increasing forward motion.
LAT   - Measurement of lateral movement.
UP   - Measurement of upwards motion.

GSENSOR SETUP   - sets up the GSensor positioning.

RESET READINGS   - Clears all current readings within this hour.
RESET ALARM   - Clears the alarm condition.

3.2.9.1   GSensor Setup

```
        GSENSOR SETUP
FRONT PANEL DIR:     »BACKWARDS
CONNECTOR PANEL DIR: LEFT
ZERO THE ACCELEROMETER...

MONITOR THRESHOLD
  BRAKING:      2.0
  ACCELERATING: 2.0
  LATERAL:      2.0
  UP:           2.0

ALARM OUTPUT MENU...
RESET ALARM CONDITION
X: 0.0G    Y: 0.0G      Z: 1.0G
```

GSENSOR SETUP menu displays the GSensor configuration. The GSensor is calibrated as part of the manufacturing process in a controlled environment and should not require calibration during the installation process.

Set the FRONT PANEL DIRECTION, e.g. front panel set to FORWARDS means the V400 front panel is facing the front of the vehicle.
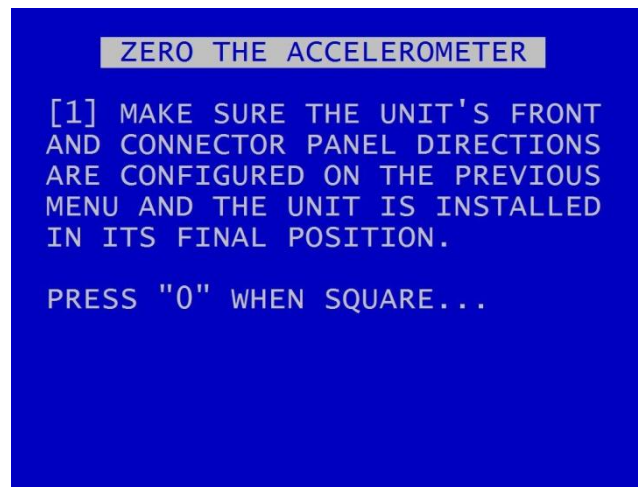
The CONNECTOR PANEL DIRECTION must then be set to LEFT, RIGHT, UP, DOWN, FORWARDS or BACKWARDS depending on the mounting position.

ZERO THE ACCELEROMETER– Once the panel directions are set, the GSensor orientation must be confirmed. Select ZERO THE ACCELEROMETER and follow the instructions on the screen.

GSensor threshold triggers (for BRAKING, ACCELERATING, LATERAL and UP) can be configured from 0.1 - 2.0. If the set value is exceeded an alarm can be raised (used in conjunction with alarm outputs). A link to the ALARM OUTPUT menus gives quick access to configure the required action.

RESET ALARM CONDITION – clears the alarm condition.

3.2.9.2   Zero the Accelerometer

```
 ZERO THE ACCELEROMETER

[1] MAKE SURE THE UNIT'S FRONT
AND CONNECTOR PANEL DIRECTIONS
ARE CONFIGURED ON THE PREVIOUS
MENU AND THE UNIT IS INSTALLED
IN ITS FINAL POSITION.

PRESS "0" WHEN SQUARE...
```
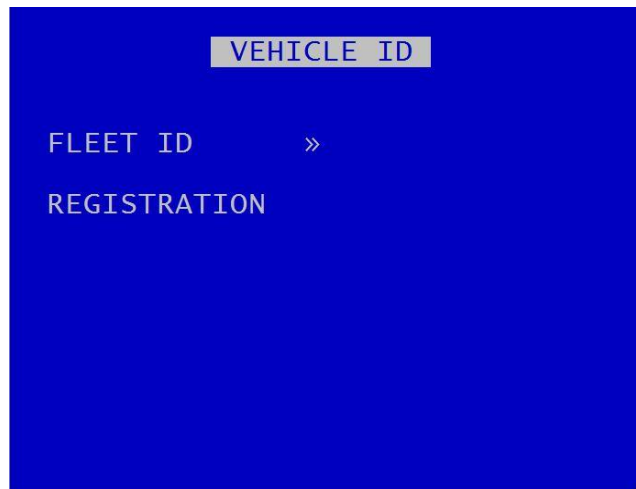
Once the V400 is installed in its final operating position, the GSensor readings must be zeroed by entering "0" when on the ZERO THE ACCELEROMETER screen.

A second screen will confirm that this has been done.

```
 ZERO THE ACCELEROMETER
[2] DONE!
```
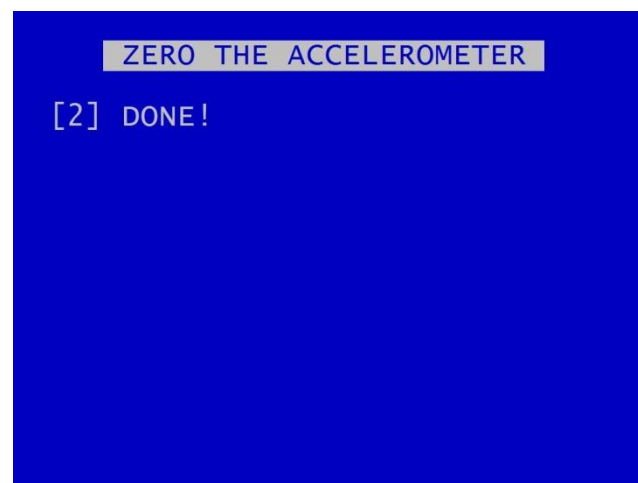
3.2.10 Vehicle ID

This menu page allows entry of the vehicle's fleet ID number and registration number. This is recorded in system and health logs and makes it easier when using LANLink to identify the vehicle in which the recorder is fitted.

Vehicle ID and registration number details can be entered using the Text and Number Input keys on the Reviewer.

3.2.11 Resource Allocation
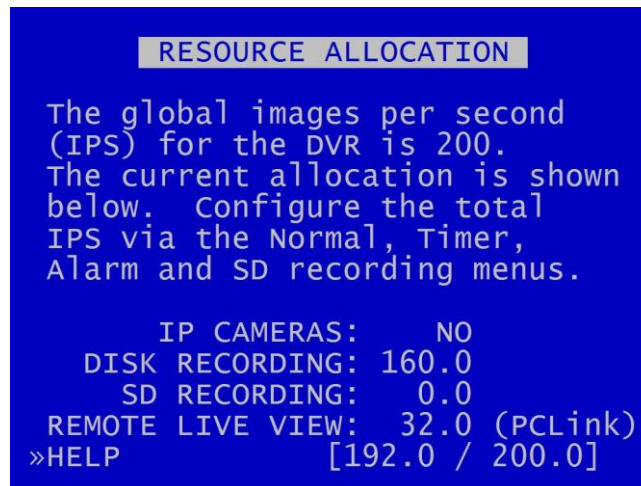
The RESOURCE ALLOCATION page provides details of the images per second (IPS) allocation as currently configured on the V400. The IPS allocation values shown indicate the quantity of IPS currently assigned to IP Cameras, Disk Recording, SD Recording and Remote Live View.

The IPS allocation across e.g. cameras, HD cartridge and SD card recording can be configured via the NORMAL RECORDING, TIMER RECORDING, ALARM RECORDING, SD RECORDING and IP CAMERAS menus.

The IPS value shown for Disk Recording is the highest IPS configured on the NORMAL RECORDING, TIMER RECORDING OR ALARM RECORDING menus.

The IPS value shown for SD Recording is the IPS configured on the SD Recording menu.

The IPS value shown for Remote Live View is automatically allocated and is the actual IPS currently set for this mode. If is not in use, the table will display 0.0 IPS.

HELP – provides further explanations on IPS allocation, and global IPS limits for the different models of DVR.

3.2.11.1 Resource Allocation Menu
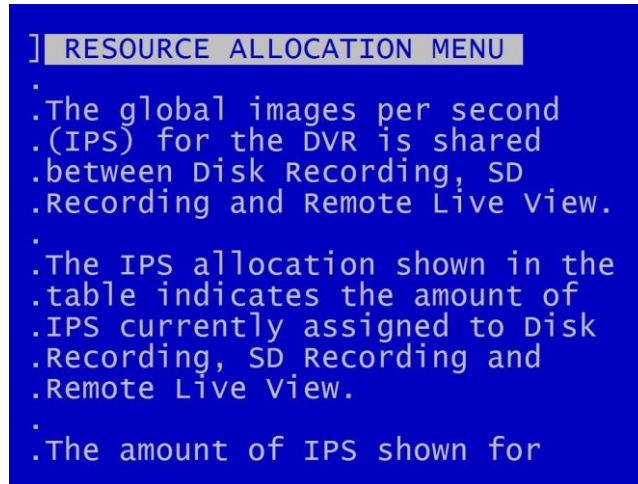
The global total number of images per second (IPS) for the V400 is shared between Hard Disk Recording, SD card recording, and Remote Live View. For the different versions of the V400 unit the global IPS limits are as follows:

V400 model	Global IPS limit
V400-08	100
V400-12	150
V400-16	200
V400-16S	100

The IPS allocation values shown on the RESOURCE ALLOCATION page indicate the quantity of IPS currently assigned to Disk Recording, SD Recording and Remote Live View.

The IPS value shown for Disk Recording is the highest IPS configured on the NORMAL RECORDING, TIMER RECORDING OR ALARM RECORDING menus.

The IPS value shown for SD Recording is the IPS configured on the SD Recording menu.

The IPS value shown for Remote Live View is automatically allocated and is the actual IPS currently set for this mode. If Remote Live View is not in use, the table will display 0.0 IPS.

If the total global IPS is allocated to Disk Recording then no IPS will be available for SD Recording or Remote Live View.

If the total global IPS is allocated to Disk Recording and SD Recording, then no IPS will be available for SD Recording or Remote Live View.

If the IPS available for Remote Live View does not meet the camera requirement for Remote Live View, then as many cameras as possible will be configured using available remaining IPS.

If a priority camera is required, then it will be configured first. Remaining cameras are configured by camera number, lowest to highest.

A minimum of 2.0 IPS is required to show each live camera over Remote Live View.

Configure the V400 IPS via the NORMAL RECORDING, TIMER RECORDING, ALARM RECORDING, SD RECORDING and IP CAMERAS menus. The remaining available IPS (up to the global maximum) will be available for Remote Live View.

3.2.12 Reset

The RESET menu provides options for resetting the system and/or deleting files. The following options are available.

DELETE ALL RECORDING FILES
SECURE DISK WIPE

WARNING: THERE IS NO "UNDO" FUNCTION IF THESE OPTIONS ARE SELECTED.

USER PROFILES – three User Profiles can be configured with different settings for different uses or recording modes.

MENU LANGUAGE – can be set between ENGLISH (default) or FROM DISK.

When FROM DISK is selected, the V400 will load a language file from the cartridge with MENU and HELP text translated into a given language. The language template is pre-loaded to the cartridge by the user at the point of installation.

The language file will not be removed when running DELETE ALL RECORDING FILES.

NB: A power cycle is required before the new language settings will take effect.

3.2.12.1 Delete All Recording Files

```
   DELETE ALL RECORDING FILES

   WARNING:
   THIS OPERATION DELETES
   ALL FILES ON DISK!

   PRESS EXIT TO ABORT AT ANYTIME
   AND RETURN TO PREVIOUS MENU OR
   PRESS RIGHT MENU ARROW TO
   DELETE ALL FILES ON DISK: »
```
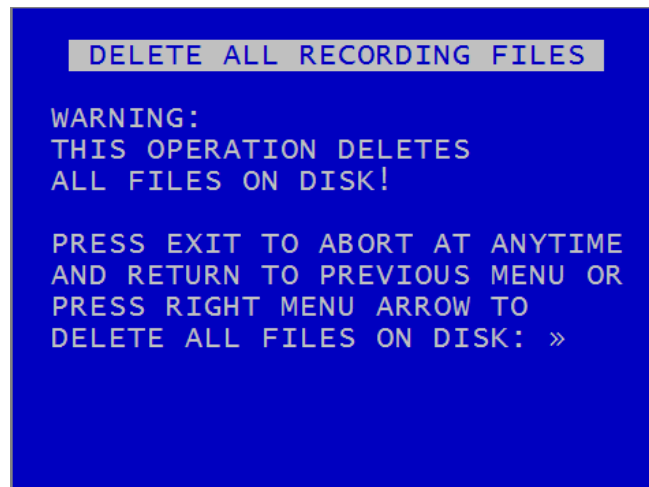
DELETE ALL RECORDING FILES – will remove all recordings from the hard disk, including write-protected files.

Only select this option if you want to completely remove all recordings – there is NO undo option. Press the right menu button to go to a warning screening, press right again to carry out this action. Pressing Menu Exit will abort this procedure.

WARNING: THERE IS NO "UNDO" OPTION. SELECTING "DELETE ALL FILES ON DISK" WILL COMPLETELY REMOVE ALL RECORDINGS.

3.2.12.2 Secure Disk Wipe

```
          SECURE DISK WIPE
WARNING:
THIS OPERATION PERMANENTLY
DESTROYS ALL DATA ON THE DISK.

SECURE DISK WIPE MAY TAKE A FEW
HOURS DEPENDING ON DISK SIZE.

PRESS EXIT TO ABORT AT ANYTIME
AND RETURN TO PREVIOUS MENU OR
PRESS RIGHT MENU ARROW TO
SECURE WIPE THE HARD DISK: »
```
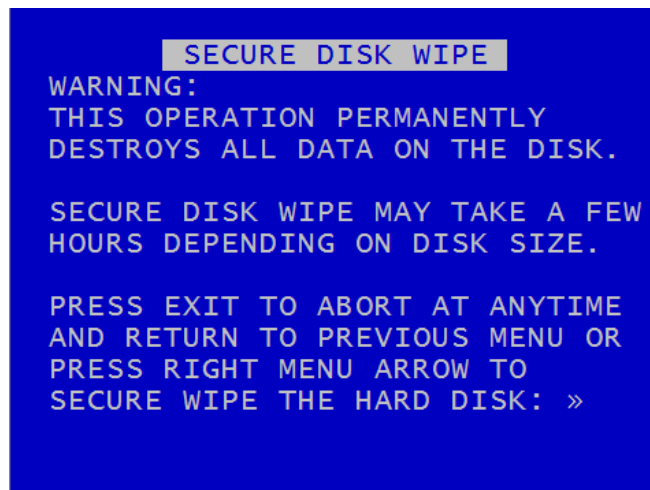
SECURE DISK WIPE – will permanently delete all recording files on the hard disk. This option should only be selected if files need to be completely destroyed.

WARNING : SELECTING "SECURE WIPE THE HARD DISK" WILL MEAN <u>NO</u> FILES CAN BE RECOVERED.

A final warning message will appear before this function is carried out. Pressing <u>Menu Exit</u> will abort.

3.2.12.3 User Profiles

```
              RESET

»DELETE ALL RECORDING FILES
  SECURE DISK WIPE

  USER PROFILE 1:  USER 1
  USER PROFILE 2:  USER 2
  USER PROFILE 3:  USER 3

  PROFILE:         DEFAULTS
  LOAD PROFILE...
  SAVE PROFILE...

  MENU LANGUAGE:  ENGLISH
```

Three User Profiles can be configured with different settings for different uses or recording modes. This gives the user an easy way of quickly switching between types of recording required without having to setup the V400 each time. Each profile can be named individually.

In addition to the three user profiles, the V400 Default menu settings can be loaded.

PROFILE – select between DEFAULT and USER 1, 2 or 3.

LOAD PROFILE – loads the profile selected above.

SAVE PROFILE will write the currently loaded settings back to the flash memory, using the selected PROFILE name.

Example; User sets up NORMAL recording with 1 camera 5IPS, HIGH resolution. Go to the RESET menu and overwrite USER 1 with *"1CAM HIGH"*, then change the PROFILE to *1CAM HIGH* and select SAVE PROFILE. Change settings for ALARM on 2 cameras, then overwrite USER 2 with "*2CAM ALARM*", change the PROFILE to *2CAM ALARM* and select SAVE PROFILE. You now have 2 user defined profiles to easily switch between by LOADING the specified profile.
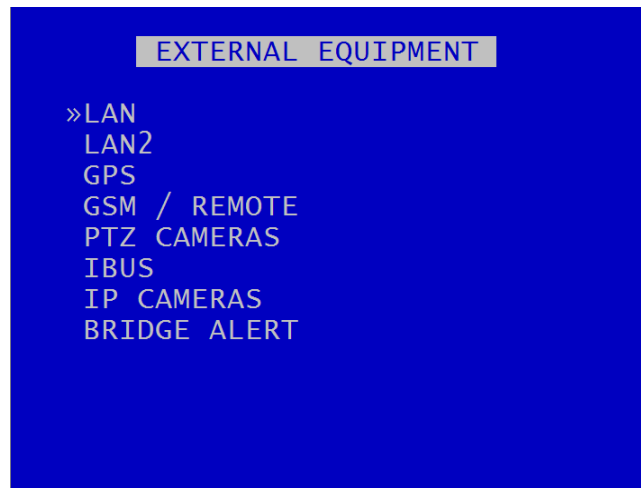

HINT: Save up to 3 of your most common settings using the USER PROFILES to allow quick switching between different types of recording mode for different installations. e.g.

USER PROFILE 1 - Normal record 8 cameras with audio.
USER PROFILE 2 - Normal record 14 cameras with GPS and SMS alert.
USER PROFILE 3 - Alarm record 4 cameras based on an external input.

3.3   External Equipment Menu

```
          EXTERNAL EQUIPMENT
     »LAN
      LAN2
      GPS
      GSM / REMOTE
      PTZ CAMERAS
      IBUS
      IP CAMERAS
      BRIDGE ALERT
```

The V400 provides some common interfaces so that external equipment can be connected and configured for use with the DVR. For example;

LAN PORT 1 RJ45 socket for hard wiring a network cable, linking to a Wifi bridge or 3G router.

LAN PORT 2 RJ45 socket for connecting to the Transport for London diagnostic interface (**IBUS).**

Molex connector for wiring a GPS unit, GSM modem or other equipment to take advantage of the V400 RS232 commands.

3.3.1   LAN

```
                         LAN

    STATUS: CONNECTED
    IP ADDRESS:      » 10.  0. 22.200
    SUBNET MASK:       255.255.  0.  0
    GATEWAY:            10.  0.  0.254
    DNS PRIMARY:         8.  8.  8.  8
    DNS SECONDARY:       8.  8.  4.  4
    USE DHCP:          NO

    APPLY IP SETTINGS ABOVE
    PING TEST...
    TIME ADJUST PORT:              8463
    MAC:          00:0f:b4:01:ff:25
```
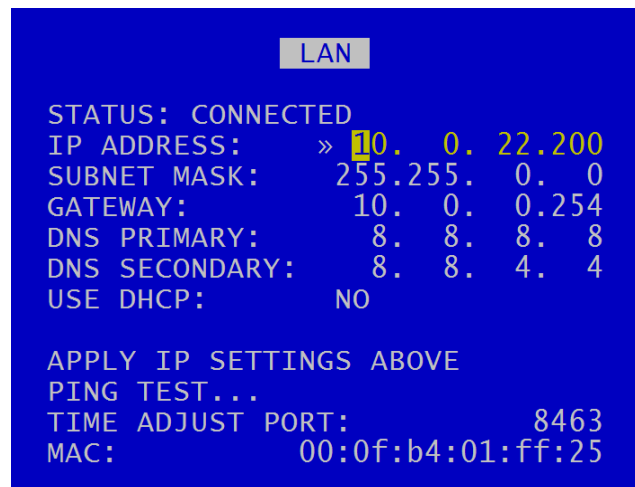
The LAN menu Allows the user to change the parameters of the LAN system. LAN STATUS indicates whether the V400 is currently connected to a LAN or not.

IP ADDRESS - Enter the static (fixed) IP address that the V400 is to be assigned on the local area network. The default IP address is **10.0.0.200**
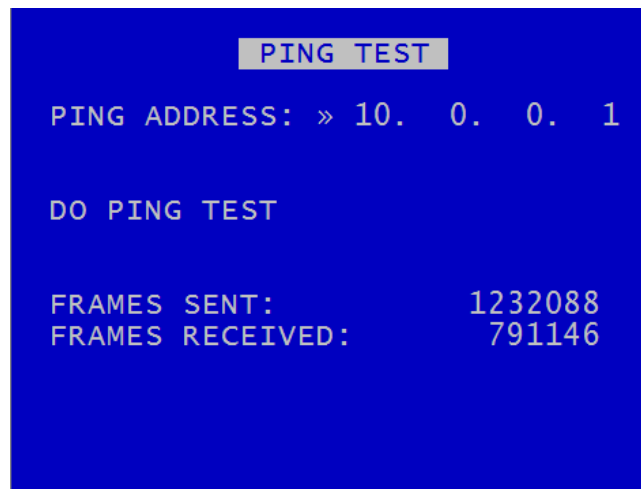
SUBNET MASK - Enter the subnet mask as applicable for the LAN the V400 is connected to. The defaults is 255.255.255.0

GATEWAY - Enter the gateway IP address of the default gateway the V400 will communicate with on the LAN.

PING TEST - enables the user to enter a destination IP address to send a network packet to testing connectivity.

MAC is the unique hardware identifier for the network interface on the V400.

3.3.1.1   Ping Test

```
                    PING TEST

    PING ADDRESS: » 10.  0.  0.  1


    DO PING TEST


    FRAMES  SENT:           1232088
    FRAMES  RECEIVED:        791146
```

PING TEST menu enables the user to enter a destination IP address to send a network packet to testing connectivity.

FRAMES SENT / RECEIVED updates in real-time to show how many data packets are being transferred to and from the V400. These are global values and not specifically related to only the ping test.

3.3.2   LAN 2

```
                    LAN2

  IP ADDRESS:  »192.168. 10. 30
  APPLY IP SETTINGS ABOVE

  IBUS...
  IP CAMERAS...




  MAC:         00:0f:b4:81:ff:25
```

The LAN 2 menu allows the user to change the IP address of the LAN2 port.

IP ADDRESS – enter the static (fixed) address that the V400 is to be assigned to on the secondary local area network. The default IP address is 192.168.10.30.

> **NB**: the LAN2 port has dual use for IBUS and IP CAMERAS.

MAC is the unique hardware identifier for the network interface on the V400.

3.3.3   GPS

```
               GPS

   EMBED GPS POSITION:   »NO
   EMBED GPS SPEED:       NO
   SPEED UNITS:           MPH
   SYNC CLOCK WITH GPS:   NO
   GMT OFFSET:           +00:00

   GPS BAUD:             4800 bps

   STATUS: CONNECTED
   00011.4105W        5220.7012N
      0 MPH
```

The GPS menu is the setup menu for the Global Positioning System serial connection.

The V400 can receive GPS data through the serial port and embed the data into recorded images. GPS data includes positioning and speed, and users can optionally turn these on or off. When turned on, the data will be recorded with each image.

If the user decides not to embed GPS data then it will not appear on the screen during playback in PCLink. However the data is still included in the XBA files, therefore the speed dials will still operate in PCLink.

The V400 is compatible with the standard NMEA-0183 GPS protocol. A suitable GPS serial unit can be wired to the V400 (see diagram).

EMBED GPS POSITION – When set to YES will embed the position information in recorded images.

EMBED GPS SPEED – When set to YES will embed the speed information in recorded images.

SPEED UNITS can be set for miles per hour (MPH) or kilometres per hour (KPH).

SYNC CLOCK WITH GPS - The V400 can be configured to synchronize the clock with the data and time information received from the GPS unit. When set to YES the V400 will synchronize the clock on power up.

GMT OFFSET - the GPS uses GMT time. If the unit is not in the GMT zone, a GMT OFFFSET is required in order to give the correct time zone for the location of the unit. Select + or – and the number of hours.

GPS BAUD – sets the baud rate at which the V400 will communicate with the GPS.

> **NB**: When the baud rate is changed, it may be necessary to reboot the V400 in order that it can detect the GPS unit.

STATUS – indicates whether or not a GPS unit has been detected. The status will be DISCONNECTED if not unit is detected or TRACKING SATELLITES if connected but no GPS lock has been established yet. If CONNECTED, GPS data/coordinates will appear.

3.3.4 GSM / Remote

```
        GSM / REMOTE

  RS232: »GSM CONTROL

  GSM MODEM CONTROL
  SMS MESSAGES...
  HEALTH OVER SMS...


  GSM MODEM NOT AVAILABLE
  VIEW STATUS...
  RESET MODEM
  MODEM LOOPBACK TEST
```

The GSM/REMOTE menu configures settings for the serial port to either communicate with a GSM modem or other external equipment. The V400 supports a token-based command structure so that it can be integrated and controlled by 3rd party applications. See RS232 EXTERNAL CONTROL section of the manual.

RS232 - GSM CONTROL or BRIDGE ALERT can be selected. A selection of data rates are available; 2400bps, 4800, 9600, 14400, 19200, 38400, 57600, 115200bps.

GSM MODEM CONTROL - port is set to send/receive data to a modem.

SMS MESSAGES - SMS messages can be setup and triggered by the V400.

HEALTH OVER SMS - will send the V400 health status

VIEW STATUS   - gives statistics of SMS messages sent and received.

RESET MODEM – will clear the modem statistics and send a modem reset command to the GSM modem.

MODEM LOOPBACK TEST – with a special test plug fitted on the modem port, it is possible to LOOPBACK test and confirm the hardware is functional.

3.3.4.1   SMS Messages

```
        ┌─────────────────────────┐
        │       SMS MESSAGES       │
        └─────────────────────────┘

        »EDIT MESSAGES...

         SEND SMS:  NEVER
         USING:     MSG1
         SEND SMS NOW

         CONFIGURE ALARM INPUTS...
```

The SMS MESSAGES menu sets up how SMS messages are set up and triggered by the V400. Six different SMS messages can be configured with different text and recipients. Four lines of text can be inputted and additionally GPS location and speed can included in the SMS.

EDIT MESSAGES – configures the SMS messages.

SEND SMS – allows the user to select when to send an SMS message;

NEVER   - Never.
MONTHLY   - On the 1st of every month (at midnight).
WEEKLY   - Every Monday (at midnight)
DAILY   - At midnight every day.
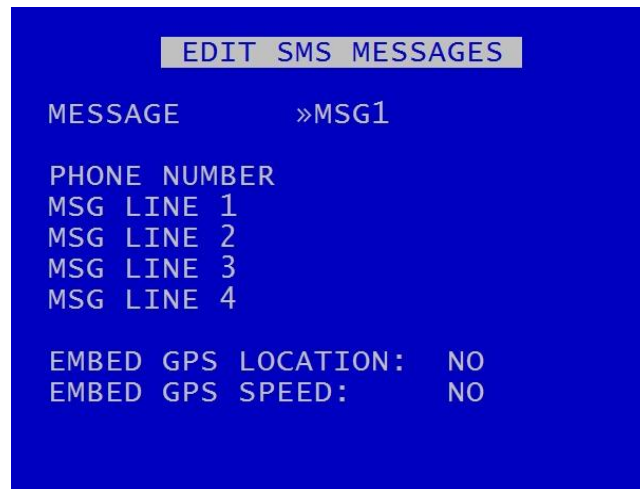POWER UP   - When the V400 powers up

This may be useful as a test to confirm the V400/Modem is still on and functioning. It is also useful to keep alive a prepay SIM card as some cards may timeout due to inactivity (subject to mobile operator rules).

USING – allows the user to select which one of six SMS messages is to be sent. Messages are set up in EDIT SMS MESSAGES.

SEND SMS NOW - tests the GSM/SMS connection by sending a message using one of the six configured messages.

CONFIGURE ALARM INPUTS – allows the user to set up SMS messages as ALARM INPUTS.

3.3.4.2   Edit SMS Messages

```
        EDIT SMS MESSAGES

MESSAGE         »MSG1

PHONE NUMBER
MSG LINE 1
MSG LINE 2
MSG LINE 3
MSG LINE 4

EMBED GPS LOCATION:   NO
EMBED GPS SPEED:      NO
```

EDIT SMS MESSAGES menu allows the user to configure six different messages configured with different text and recipients.

MESSAGE – shows which of the six available SMS messages is currently being configured.

PHONE NUMBER – allows the user to insert the number of the phone for receiving SMS messages.

MSG LINE 1-4 – allows the user to insert text into the body of the SMS messages. Text and Number Input is via the keys on the Reviewer.

EMBED GPS LOCATION and EMBED GPS SPEED – allows the user to select whether GPS location and speed are added to the SMS messages.

3.3.4.3   Health Over SMS

```
        HEALTH OVER SMS

  PHONE NUMBER »

  SEND SMS:      NEVER
  DAILY TIME:  12:00

  INCLUDE IN SMS
  CAMERA1 TEXT:    NO
  FILENAME TEXT:   NO

  SEND SMS NOW

  LAST REQUEST   NOT KNOWN
```

HEALTH OVER SMS menu will send the V400 health status including recording state, last recorded file, camera status/faults, disk service conditions, GPS location and serial number.

The feature can be setup to send an SMS at a scheduled time or if queried by an incoming SMS. The incoming SMS must only include the words "SEND SMS NOW" and will then send an outgoing SMS to the phone number as configured in the menu settings.

PHONE NUMBER - Mobile number to send SMS health message to.

SEND SMS selects when to send an SMS message. Select between NEVER, AT DAILY TIME and POWER UP.

DAILY TIME - Specify the daily time the SMS message is to be sent when AT DAILY TIME is selected on the menu. Times are input using the Text and Number Input keys on the Reviewer.

INCLUDE IN SMS – Allows the user to include Camera Text and/or Filename Text in the SMS message. Select YES/NO.

SEND SMS NOW - Send a health message to the phone number specified now.

LAST REQUEST – provides details on timing of last request.

NB: The SEND SMS NOW option cannot be invoked if connected to the V400 via RemoteLink using the GSM modem connection. If this option is invoked, the RemoteLink connection will be dropped and no SMS will be sent.

The Health SMS message contains:

1. Type or reason for health SMS
2. Sending unit info
3. GPS info
4. Camera info
5. Time info
6. LED info
7. Service log info (which may be related to service/fail LED):

See APPENDIX 7 – HEALTH SMS MESSAGE FORMAT for further details on how to read the messages and integrate with other systems.
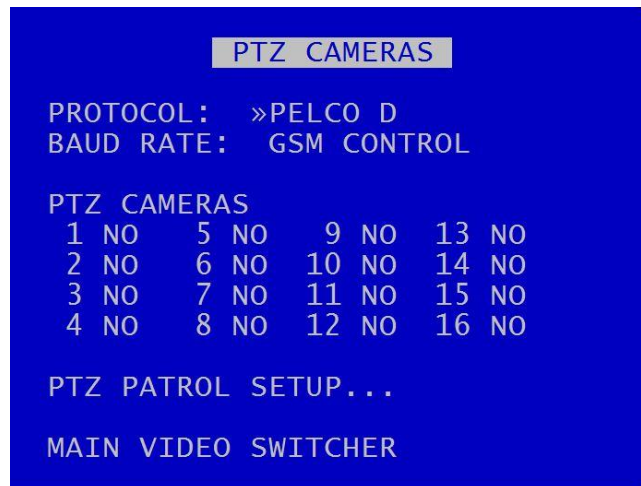
3.3.4.4 GSM Status

GSM STATUS gives statistics of SMS messages sent/received as well as calls and image transfers.

Using the RESET MODEM function on the GSM/REMOTE menu will clear the statistics and send a modem reset command to the GSM modem.

3.3.5   PTZ Cameras

```
            PTZ CAMERAS

  PROTOCOL:  »PELCO D
  BAUD RATE:  GSM CONTROL

  PTZ CAMERAS
   1 NO    5 NO    9 NO   13 NO
   2 NO    6 NO   10 NO   14 NO
   3 NO    7 NO   11 NO   15 NO
   4 NO    8 NO   12 NO   16 NO

  PTZ PATROL SETUP...

  MAIN VIDEO SWITCHER
```

PTZ CAMERAS menu allows control over a Pan, Tilt, Zoom camera when connected to the V400's serial port. An RS232-to-RS485 convertor will be required – example convertor; **EXTERNAL LINK, Farnell code; 1683075.**

Supported PTZ protocols are;

- Pelco D
- Pelco P
- Visca (Sony)

BAUD RATE – A selection of baud rates are available for the cameras: 2400bps, 4800, 9600, 14400, 19200, 38400, 57600, 115200. This baud rate setting is linked to the baud rate under the GSM / REMOTE SETTINGS menu. Only one of GSM or PTZ can be used at a time. Please refer to the Camera manufactures instructions on how to configure the camera baud rate.

PTZ CAMERAS – the V400 can support multiple PTZ cameras assuming that they are all the same protocol and baud rate. PTZ has its own addressing system. Set each required PTZ camera to YES. The PTZ mode will enable PTZ controls and functions using the Reviewer.

PTZ PATROL SETUP – menu configures the PTZ cameras.

MAIN VIDEO SWITCHER – provides a link to the MAIN VIDEO SWITCHER for configuring camera dwell times etc.

3.3.5.1   PTZ Patrol Setup
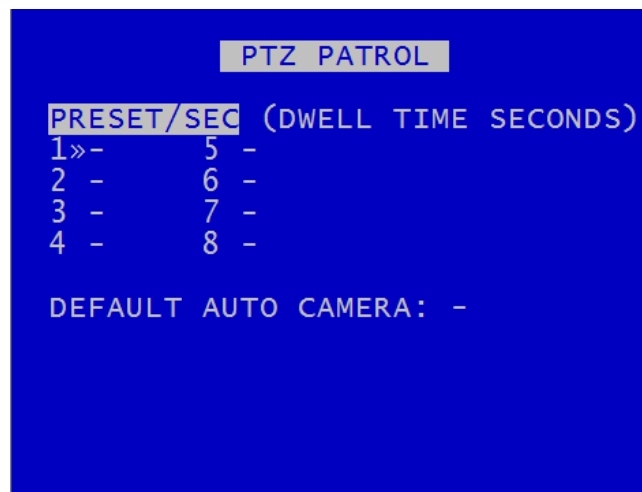
The PTZ PATROL menu configures the PTZ cameras to switch between preset positions as set by the user. This is similar to setting up the Main Video Switcher.
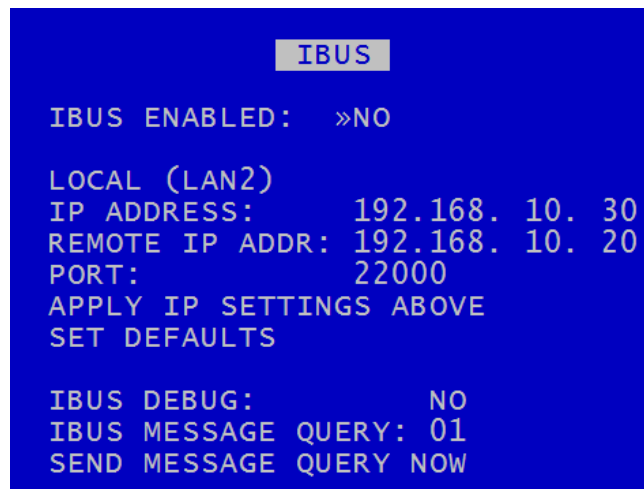
The main PTZ are functions are to move the camera Left, Right, Up, Down, Zoom in and Zoom out. There are advanced features for setting up focus behaviour and additionally the V400 can access the cameras internal menus (if the camera supports it).

The V400 can also store 8 different user defined camera positions, for example preset position 1 could be a scene view overlooking a car park, preset position 2 could be zoomed in close to the entrance, preset position 3 could be pointed at the exit. The presets can be accessed by pressing the number keys on the X301 Reviewer for quick panning to locations. The presets can also be triggered via ALARM INPUTS.

NB: Some PTZ cameras will self enumerate in terms of PTZ addressing, some require physically setting using dip-switches (see manufactures instructions for details). You must connect the camera to the same DVR channel number as the PTZ addressing. If not, the controls within PCLink and the Reviewer may be associated with different connected cameras. If you are connecting self addressing PTZ cameras, they should be connected consecutively starting on channel 1.

DEFAULT AUTO CAMERA

3.3.6 IBUS

```
                    IBUS

  IBUS ENABLED:   »NO

  LOCAL (LAN2)
  IP ADDRESS:       192.168. 10. 30
  REMOTE IP ADDR: 192.168. 10. 20
  PORT:             22000
  APPLY IP SETTINGS ABOVE
  SET DEFAULTS

  IBUS DEBUG:           NO
  IBUS MESSAGE QUERY: 01
  SEND MESSAGE QUERY NOW
```
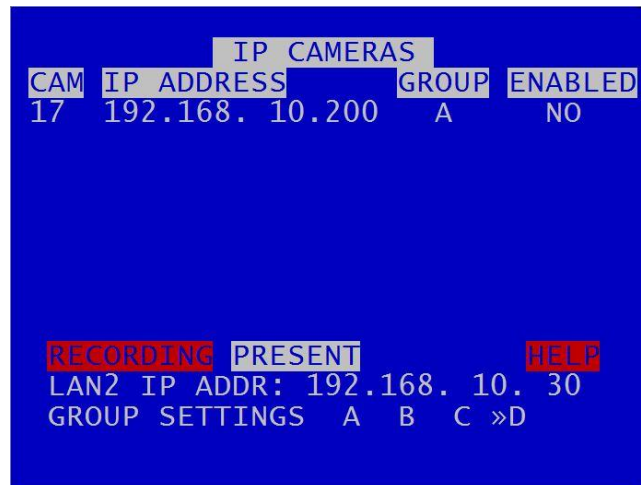
Timespace has developed a diagnostic interface in conjunction with Transport for London (TFL) to monitor the status, performance and health of Timespace X200, X300, V400 and V500 digital video recorders on London Buses.

IBUS menu Details are found in Appendix 5.

NB: IP address settings cannot be changed while recording is in progress – a warning will be displayed. Stop recording and amend settings as required before recommencing recording.

3.3.7   IP Cameras

```
              IP CAMERAS
CAM IP ADDRESS        GROUP ENABLED
17  192.168. 10.200     A     NO




    RECORDING PRESENT           HELP
    LAN2 IP ADDR: 192.168. 10. 30
    GROUP SETTINGS  A  B  C »D
```

The IP CAMERAS menu configures settings for the single IP camera input supported by the V400 unit.

IP ADDRESS – must be set to the IP address of the IP camera.

GROUP SETTINGS – identifies which group (A, B, C, D) the IP camera is allocated to. Groups are used to configure the username, password and camera stream URL in order for the V400 to receive data from the IP camera. The camera details for each group are input in the GROUP SETTINGS menu page.

ENABLED – select YES/NO. When set to YES, this allows the IP camera stream to be recorded.

LAN2 IP ADDR – the IP camera's address and LAN2 IP address must be configured for the same network.

> **NB**: the local IP address and Group Settings cannot be changed while recording is in progress – an "IP CAMERA WARNING" will be displayed. Stop recording and amend the IP address and settings as required before recommencing recording.

To test connectivity of the IP Camera, configure the unit so it is not recording, configure the IP camera and set ENABLED to YES. If the IP Camera is present, the CAM number will be highlighted with a white background.

If the IP Camera is not present, or there is a fault, the CAM number will remain unhighlighted.

To check if the IP Camera is being recorded, set ENABLED to YES. The CAM number will be highlighted with a red background.

IP camera live footage can be viewed using the Reviewer. Use the Camera Switcher keys to select the IP Camera.

HELP – provides more information on RESOURCE ALLOCATION

NB: the IP camera stream will only be recorded as long as the unit is recording in another mode i.e. NORMAL RECORDING, TIMER RECORDING etc.

NB: the connection of one IP camera requires 100IPS, thus reducing the available IPS for other recording functions.

For further information on IPS allocation, see RESOURCE ALLOCATION and RESOURCE ALLOCATION MENU.

3.3.7.2   Group Settings
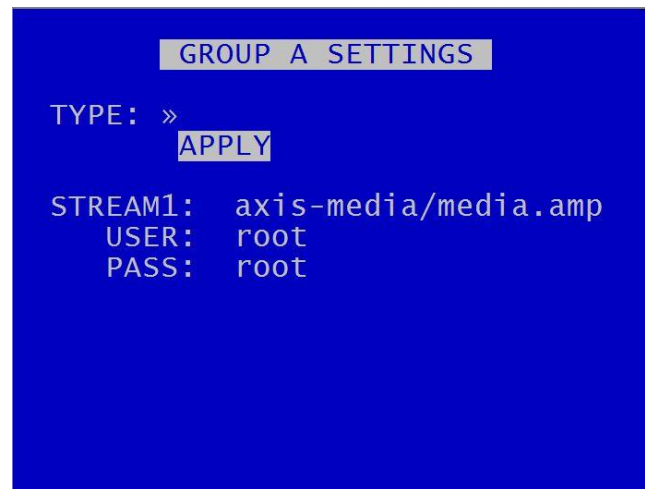
The GROUP SETTINGS menus define the network URLs which allow the unit to open up a network stream for recording the IP Camera.

TYPE – states the type of camera set to the specified GROUP SETTING. Use the right menu button to select from the available options.

STREAM – the stream will need to be discovered using Onvif device manager or equivalent third party application or IP camera documentation.
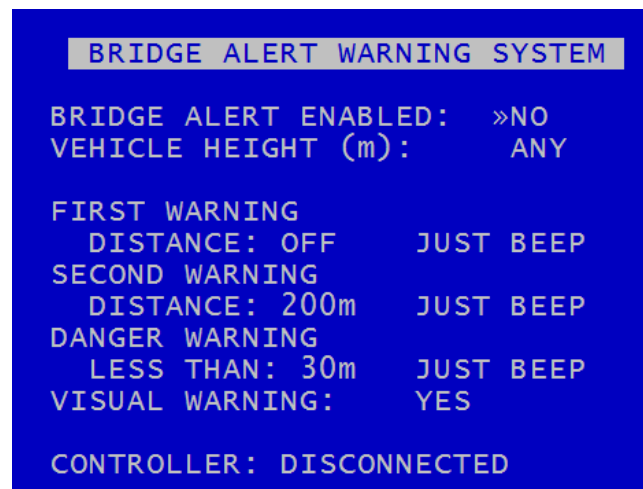
USER – the username

PASS – the password

Details of USER name and PASSWORD should be found in the support documentation for the individual cameras purchased by users.

On default each group path has been set to a particular camera type which has been tested by Timespace.

> **NB:** Available camera options will be updated by Timespace and included in subsequent software releases. Users can also obtain an current list of cameras by contacting Timespace at support@tspace.co.uk. The update will be provided as a TCONFIG file which can be uploaded using the LOAD SOFTWARE/SETTINGS option in the ADVANCED MENU.

3.3.8   Bridge Alert

```
   BRIDGE ALERT WARNING SYSTEM

 BRIDGE ALERT ENABLED:   »NO
 VEHICLE HEIGHT (m):      ANY

 FIRST WARNING
   DISTANCE: OFF    JUST BEEP
 SECOND WARNING
   DISTANCE: 200m   JUST BEEP
 DANGER WARNING
   LESS THAN: 30m   JUST BEEP
 VISUAL WARNING:     YES

 CONTROLLER: DISCONNECTED
```

The BRIDGE ALERT WARNING SYSTEM menu enables BRIDGE ALERT and configures its settings. BRIDGE ALERT WARNING SYSTEM IS an early warning system to notify the driver of any low bridges near the vehicle.

BRIDGE ALERT ENABLED – select ON/OFF

VEHICLE HEIGHT – set the height of the vehicle (to a maximum of 10m). Use the left/right Menu Navigation keys on the Reviewer to increase/decrease the vehicle height.

Bridge Alert has 3 different stages of warning: FIRST WARNING, SECOND WARNING, DANGER WARNING. For each warning, the warning distance and warning sound can be set.

DISTANCE – Bridge Alert will activate when the vehicle is the selected distance from the low bridge. Options are 600m, 500, 400, 350, 300, 250, 200, 150, 120, 100m, OFF.

Options for warning sounds are:

NO SOUND – No audio. LEDs flash only when activated.

JUST BEEP – 4 beeps with flashing LEDs when activated.

JUST VOICE – LEDs flash followed by voice message stating the distance to the low bridge.

BEEP AND VOICE – 4 beeps with flashing LEDs followed by voice message.

> **NB:** FIRST and SECOND WARNING will output once each.
>
> DANGER WARNING will output continuously until the vehicle moves away from the low bridge, or until the warning is silenced via the controller switch on the Bridge Alert unit.

VISUAL WARNING – this provides the option to display information on the driver monitor when Bridge Alert has been activated.

CONTROLLER – shows the status of Bridge Alert:

DISCONNECTED – No Bridge Alert controller is present

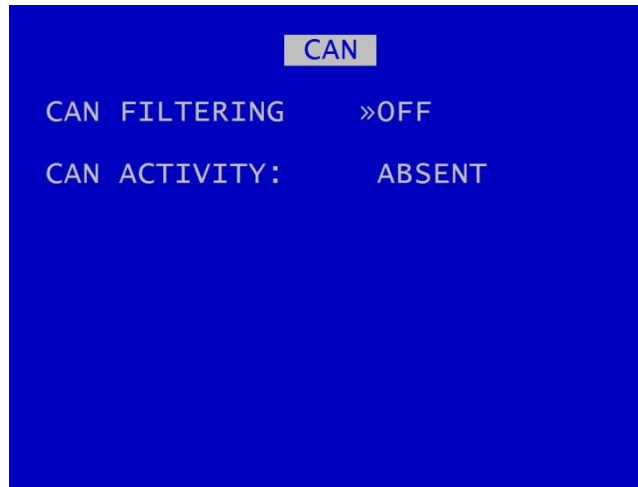CONNECTING – Bridge Alert controller is present and is communicating with the V400.

CONNECTED – NO GPS – Bridge Alert is present, but there is no GPS signal

CONNECTED – GPS OK – Bridge Alert is present and there is a GPS signal. A green LED will be present on the Bridge Alert controller.

Figure 4 Bridge Alert Control Unit

3.3.9   CANLink

Timespace has developed a vehicle CAN (Controller Area Network) reporting system. A secure CAN interface enables the DVR to record CAN data and download vehicle CAN information via the vehicle depot's Wifi/LANLink system.

The CAN menu screen shows CAN activity as either ABSENT or DETECTED. This is useful for diagnosing connection issues.

CAN FILTERING can be selected to be OFF or ON. When filtering is turned ON, only a subset of messages is recorded. These are mainly FMS, bus, truck and other J1939* messages. With filtering OFF, all CAN messages are recorded.

*Society of Automotive Engineers standard SAE J1939 is the vehicle bus recommended practice used for communication and diagnostics among vehicle components.

3.4   Advanced Menu

```
        ┌─────────────────────┐
        │      ADVANCED       │
        └─────────────────────┘

   POWER STATE: »RECORD
   ENABLE RECORD BUTTON: YES
   LIVE VIEW:            NO
   SPLASH SC EEN:        OFF
   HEALTH PAGE DISPLAY:  OFF
   FAIL QUOTA/DAY:       10/DAY
   VIEW SERVICE LOG...

   LOAD SOFTWARE/SETTINGS...
   SAVE SOFTWARE/SETTINGS...
```

ADVANCED menu contains advanced options that normally do not need to be edited after installation.

POWER STATE – Set if the V400 will RECORD AT POWER UP, DO NOT RECORD or USE LAST STATE. If use last state is selected the unit will record on power up if it was recording when power was disconnected. If it was not recording when power was disconnected, it will return to this state on power up.

ENABLE RECORD BUTTON – controls whether the record button on the front panel of the V400 DVR can be used to start and stop recording (enable/disable).

LIVE VIEW – if set to YES, live view of camera will be displayed even if the disk cartridge is removed. If set to NO and the cartridge is not present, the initialisation screen is shown.

SPLASH SCREEN controls the length of time an operator logo will be displayed. A .bmp file can be loaded / displayed on boot up. The .bmp must be in a specific format and copied onto the cartridge. See Appendix 4 – Splash Screen for further details.

HEALTH PAGE DISPLAY – controls the length of time the unit health status will be displayed for on boot up

FAIL QUOTA/DAY – sets how many fail messages that must occur for any given day before the FAIL LED is lit. During normal operation it may be acceptable to receive a certain number of fail events before action is required. Set as applicable. Available options are NEVER, 1/DAY, 2, 5, 10, 20, 50/DAY.

VIEW SERVICE LOG – displays any service messages that have been logged by the system.

LOAD SOFTWARE/SETTINGS – provides options for loading new/upgraded software and/or settings.

SAVE SOFTWARE/SETTINGS – provides options for saving the current settings.

3.4.1   Health Page Display

HEALTH PAGE DISPLAY controls the length of time the unit health status will be displayed for on boot up. The health page includes a simple traffic light status and may include service/fail code conditions as well as the current recording state. The health page can also be activated via an alarm input.

FAIL QUOTA/DAY – sets how many fail messages that must occur for any given day before the FAIL LED is lit. During normal operation it may be acceptable to receive a certain number of fail events before action is required. Set as applicable.

3.4.2   Service Log

```
              SERVICE LOG

»LOG IS EMPTY



      MODE:
      CODE:
   DEVICE:
   DETAIL:


   RESET SERVICE LOG...
   WRITE LOG TO: HD SD
```

VIEW SERVICE LOG – displays any service messages that have been logged by the system.

Messages can be scrolled through and reviewed. Details of date/time and service/fail codes are shown.

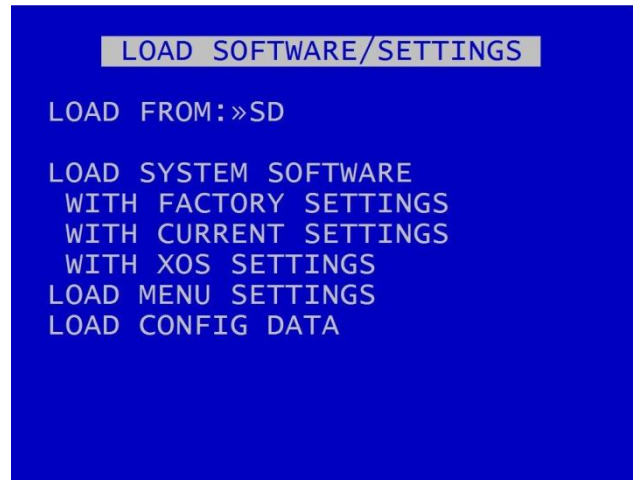RESET SERVICE LOG – clears the service log.

3.4.2.1   Reset Service Log

SERVICE LOG RESET menu – clears any service log messages.

Press the right arrow key, and then again to confirm.

> **HINT:** Clearing the service log will clear the front panel service/fail LEDs.

3.4.3   Load Software/Settings

LOAD SOFTWARE/SETTINGS menu provides options for loading new/upgraded software and/or settings. An .XOS file should be copied onto the cartridge or SD card using a PC then inserted into the V400. Settings can also be copied from another V400 unit.

LOAD FROM – select HD (to load from the hard disk drive) or SD (to load from the SD card).

LOAD SYSTEM SOFTWARE – select from the options to load software either:

> WITH FACTORY SETTING (load the XOS software with Timespace factory default settings).

> WITH CURRENT SETTINGS (load the XOS software but retain settings as installed in the currently configured DVR).

> WITH XOS SETTINGS (load the XOS software with settings from the HD cartridge or an SD card).

LOAD MENU SETTINGS – used to copy menu settings from another DVR unit and replicate these on the second DVR.

LOAD CONFIG DATA – load eg settings for a new IP Camera via a TSCONFIG file. See IP Camera GROUP SETTINGS menu for more information.

WARNING: Caution should be taken to ensure that power is not lost during an upgrade.

3.4.4   Save Software/Settings

SAVE SOFTWARE/SETTINGS provides options for saving the current settings. The current software and settings will be written to the HD cartridge or SD card.

Select SAVE TO: HD to save to the hard disk drive, or SD to save to the SD card.

SAVE SYSTEM SOFTWARE   – save the .XOS file.

SAVE MENU SETTINGS   – save menu settings to transfer to another unit.   NB: it is possible to save the menu settings and remove parts not required, retaining only the small section which includes the required settings.

SAVE CONFIG DATA   – save the CONFIG data on to either the selected HD or SD card.

4. System Information And Security

4.1   Language Selection

By default the V400 menu system is displayed in the English language.

Timespace Technology can provide a language template file which the user can translate and return to Timespace Technology for incorporation into the V400 software. This will allow all text displayed on the [Reviewer](#) to be in the users preferred language.

Language is selected in the SYSTEM SETTINGS > RESET menu. The V400 needs to be rebooted before the new language settings will take effect.

4.2   Video Standard – PAL and NTSC

The V400 offers the ability to switch between the different video standards, PAL and NTSC.

PAL (Phase Alternating Line) is the standard used in most European countries with the exception of France. The V400, when configured to use PAL, offers a maximum capture rate of 25 fields per second (per channel).

NTSC (*National Television Standards Committee*) is the standard used in the United States of America. The V400, when configured to use NTSC, offers a maximum capture rate of 30 fields per second (per channel).

Note that if the unit is configured for PAL and an attempt is made to play back NTSC recordings, the image will appear vertically 'squashed'. Similarly, if the unit is configured for NTSC and an attempt is made to playback PAL recordings, the image will be clipped.

4.3   File System

The V400 uses a proprietary file type with the file extension .XBA. Images from multiple cameras along with audio, GPS and other meta data are stored in these files. The V400 stores XBA files on the cartridge in a loop over the physical disk and does not use a fragmented file structure. The V400 uses a linking mechanism (FAT area) for PC compatibility. This compatibility conforms to the Microsoft standard FAT32 file system that is compatible on all PCs and many other systems.

Two types of File System behaviour are available on the V400; Loop and Single Pass.

Loop Recording
The V400 will automatically delete the oldest recordings first when the Hard Disk Cartridge is full (with the exception of write-protected files). Write-protection can be used to keep Alarm recordings but loop the background (Normal) recording.

Single Pass Recording

The V400 records until the Hard Disk Cartridge is full and then stops.

Recordings may be deleted in the SETTINGS > SYSTEM SETTINGS > RESET menu or loop recording enabled so that the oldest files will be overwritten first. The File System Recording Mode is set in the SETTINGS > SYSTEM SETTINGS > FILE SYSTEM menu.

4.4   Video Compression

The V400 records images, audio, GPS and other meta data into 1 Minute, 5 minute, 10 minute or 1 hour proprietary format files ending with the .XBA file extension. For security and optimisation reasons .xba files can only be viewed on a PC using the proprietary PCLink200 software or authorised Timespace partner software.

The images are compressed using **H264** video compression giving best of class quality and lowest image size. H264 is by its nature a predictive compression scheme meaning old images are used to predict future images. Every 2 seconds a new keyframe is recorded (an unpredicted image that stands on its own) and the remaining 2 seconds worth of images are predicted from this and from each other. The images can be searched easily with a granularity of 2 seconds (using the key frame) during playback.

A trade-off between image quality and file size can be made by selecting different levels of video quality on the V400: low, medium, high, v.high, v.v.high and super. The low setting uses greater compression than the higher settings and consequently less disk space is used.

As image quality rises however so does the resultant file size so a decision has to be made as to the level of image quality needed and the length of recording required to be stored on any given size of Hard Disk Cartridge. The V400 uses a constant bit-rate scheme so every image has a constant average size in bits relating to the quality setting. The following table lists the qualities and the corresponding kbits per image that results:

Super   200kbits per image
VV.High   140kbits per image
V.High   100kbits per image   ← Transport for London approved quality
High   70kbits per image
Medium   50kbits per image
Low   35kbits per image

An example duration of recording is easy to calculate:

1TByte disk, 10 images per second, V. High Quality
1,000,000,000 kBytes / (3600 seconds per hour x 10 IPS x 100kbits per image / 8 bits per byte)
= 1,000,000,000 / 450,000
= 2222 hours or <u>92 days</u>

The V400 records in 2CIF Frame Resolution 720 x 288 (pixels).

The V400 provides an on-screen calculator during setup when using the [Reviewer](). It shows how long the recordings will last before they are overwritten. This is based on the current quality, images per second settings and the installed cartridge size.

4.5   Audio

The V400 has two mic level audio inputs and two line level output channels via a 6 pin Molex connector.

The two input channels record in Stereo and can be assigned to different recording modes e.g. Normal Record, Timer Record, Alarm Record and SD Record. The audio channels can be played back individually or together when viewing footage in PCLink200 PC software. They can also be disabled during playback.

The V400 has a built in microphone pre-amp. This amplifies the microphone signal by 100 times. The gain of the audio input (post pre-amp) is also adjustable in the menu from 0.125V RMS to 2V RMS. This equates to a microphone levels of 1.25mV RMS to 20mV RMS.

Menu setting	Microphone sensitivity (full scale)
0.125V RMS	1.25mV RM
0.25V RMS	2.5V RMS
0.5V RMS	5V RMS
1.0V RMS	10V RMS
2V RMS	20V RMS

The microphone is also phantom powered at a voltage of 2.7V making it suitable for use with most electret or electret/condenser microphones including a wide range of small microphone cartridges
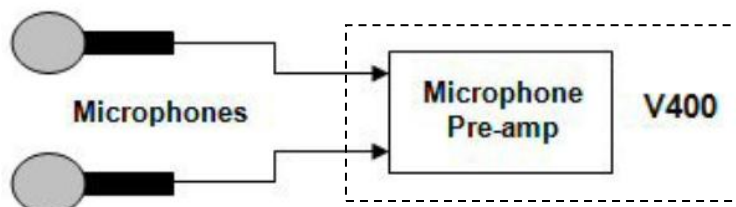

Figure 5 Microphones

Audio sampling rate determines how much high frequency content there is in the recording. The V400 samples at 44.1kHz which offers near perfect reproduction. The audio sampling resolution determines the amount of noise in a system. The V400's 16 bit sampling resolution is C.D. quality with imperceptible noise, as long as the user sets the recording level to the maximum possible (without clipping) to use the full dynamic range.

If wiring a line-level microphone, click on the link for further instructions.

4.6   PC Access Precautions

The V400 file system uses a standard FAT32 file system so that a PC can read the contents. The PC will access the cartridges in a different way to the V400. The V400 will not be able to read every FAT32 file system written by the PC and it is therefore important to restrict what the PC does to the file system.

Permitted on a PC

- Reading the .xba files
- Modifying the write-protect status of files
- Performing disk utilities that read the disk (e.g. Scandisk) but do not modify disk

Not Permitted on a PC

All write accesses to the disk if it is to be reused in an V400. These include:

- Formatting the disk on PC (including any Disk Manager MBR checks/fixes)
- Defragmenting the disk
- Deleting files
- Renaming files
- Generating new files
- Creating a recycle bin on the disk

NB: if any of the above non permitted actions are used, the cartridge will need to be reformatted on the V400 using the Reviewer. This will erase all data on the cartridge and format it correctly for further use in the V400.

4.7   PC Network Access

The V400 can be accessed through a number of PCLink Suite Applications, included in the USB Kit. Files can be downloaded, images viewed, V400 controlled and settings adjusted over LAN.

Each feature runs over the LAN using a specific protocol and on a specific network port.

Security measures on a network such as Firewalls, encryption and MAC address filtering may need to be adjusted in order to achieve this. Security applications such as Norton and Symantec on the PC may need to be configured to allow the PCLink Suite applications to operate correctly. Any installed network or local PC firewalls (including Windows Firewall) may have to be instructed to allow the use of these ports to communication between the PC and the V400.

Ports:

- PCLink200 uses UDP, FTP and Telnet.
- UDP port 69 (standard TFTP port),
- FTP TCP port 21 (standard FTP port).

- Telnet TCP port 23 (standard Telnet port).
- RemoteLink UDP port 5465 (X200 only).
- LANLink UDP port 69 (standard TFTP port).

4.8   Watermark and Sequencing

4.8.1   Watermark

The V400 uses a fragile watermark. Any modification to the recorded file will destroy the watermark.

The image, audio and ancillary (meta) data that makes up the recorded file is passed though a function that generates a "magic number" or hash code from the data. A hash code is created automatically by the V400 every ¼ of a second for each ¼ second of data. Each hash is then passed though an encryption function and then stored in the file.

A sequencing number ensures that all hash codes and corresponding data are present and where multiple files exist that no files are missing.

To check that a number of files have not been altered or modified in any way, the watermark checking program (e.g. PCLink) recalculates the encrypted hashes (watermarks) and checks these against the watermarks provided in the file. If all the watermarks match the recorded file has not been tampered with. The watermark is "destroyed" when the encrypted hash code stored in the file and the encrypted hash code of the data do not match. PCLink produces a report which can be used in court to validate recorded files.

The watermark is always on the V400 i.e. all recordings have the watermark embedded in real-time as the footage is laid to disk, it cannot be turned off. Within PCLink200, you can generate a report for a number of files. You can also select a file for watermark checking.

Encryption type;

- ▪   Hashing function: SHA256

- ▪   Encryption function: AES256

4.8.2   Sequencing

In addition to every ¼ second being protected by a Watermark, each watermark has its own unique sequence number. This protects any images being removed from a file and protects any files being removed from a sequence of files.

4.8.3   Watermark / Sequencing Report

Within PCLink200, a report can be produced against an image, file and/or sequence of files.

PCLink will analyse the data against the encrypted hash and analyse the data's sequence numbering. If any images have been modified, any images removed or any files removed, PCLink will identify them and report accordingly.

Files fail if:

- Any video/audio/meta data frame (other than the last in a non-closed file) had an invalid watermark

- Video/audio/meta frames were missing or out of sequence (in newly generated files)

- Files passed to the checker were not in sequence (in newly generated files)

- Files are missing their sequence frame (in newly generated files) in properly closed files.

- Time Adjust TCP port 8463 (can be configured within the V400 menu system).

Authentication

FTP / Telnet username; tspace01
FTP / Telnet password; TS01480

5. System Interfaces

5.1.1 GPS

The Global Positioning System (GPS) is a worldwide radio-navigation system able to calculate position using triangulation based upon satellite signals. The GPS must be positioned so its antennae have a clear line of sight of the sky – obstructions such as foliage and reflected signals in built-up areas can reduce the accuracy.

The V400 can be fed GPS data and embed coordinates into images for location identification and real-time mapping playback in PCLink200.

The V400 uses the NMEA-0183 Interface Standard. GPS data is received into the V400 GPS port using a single serial data line.

The V400 has been tested with the following GPS receivers:

- Garmin GPS16 LVS & GPS18 LVC & GPS18x LVC
- Byonics GPS2 - **EXTERNAL LINK**
- RoyalTek Sapphire Serial GPSr
- Fortuna U2 Smart GPS

NB: When using the Garmin GPS18 LVC the V400 baud rate must be set to 192,00.

Connection

The GPS receiver is connected to V400 through the 18 way Molex connector. Pin 17 is used by the V400 to receive GPS data. The V400 can provide +5V or 12V power to the GPS mouse on the 18 way Molex connector.
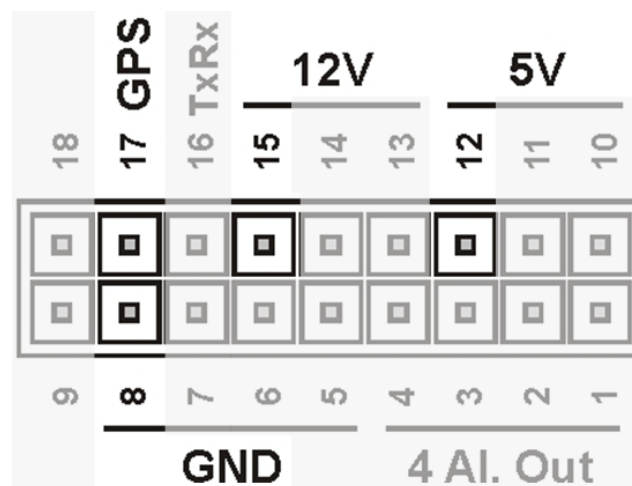

Figure 6 GPS Connection

Options

The V400 GPS menu options allow the embedding of GPS position and speed, assuming a valid GPS signal is being received and the data passed correctly to the V400.

If a GPS receiver is connected but satellite lock has been lost then it is still possible to record the data but it will not indicate position, speed, date or time and the actual content may vary according to the type of GPS receiver employed.

The V400 Digital Video Recorder includes a clock which is used to timestamp recording files and overlay the date and time on recorded images. Although accurate, the V400 can be configured to synchronize the clock with the date and time information received from the GPS receiver.

When a GPS unit is plugged into the V400, and it has locked onto the satellites it then sends GPS time and position and other data every second. If after 10 seconds the V400's internal clock is consistently +/- 2 seconds compared to the GPS unit then the time error is noted. On the next power cycle the time error is corrected.

Local Standard Time - The time received from the GPS receiver is always UTC (Coordinated Universal Time) which is the same as GMT (Greenwich Mean Time). In order to correctly work out the error between the local standard time (used by the V400's internal clock) and that received from the GPS receiver, the system must be set with the correct time zone offset.

GPS Baud Rate - Set the V400 data rate according to the GPS mouse you are using. Rates configurable include; 2400, 4800, 9600 and 19200, 38400 bps.

NB: It may be necessary to change the baud rate on the GPS mouse and set it to a specific rate in line with the V400 setting. Reference the GPS mouse product instructions to configure the baud rate then power off/on the V400 (whilst connected to the GPS).

5.2   Remote Operation (GSM / LAN / Wifi / 3G) – Telnet / FTP

The V400 system provides a number interfaces to remotely control and configure the recorder as well as reviewing recorded footage and displaying live camera views.
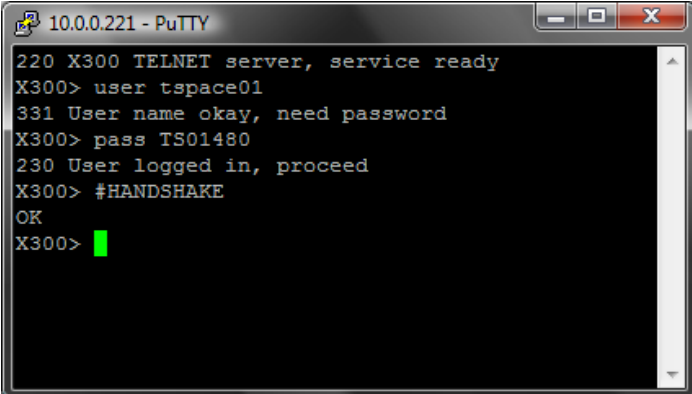
A **GSM** modem can be connected to the **Serial** port on the V400 and used to dial in to the V400 to view live camera images and configure the V400 menu settings. **SMS** messages can be configured to send texts alerts for example on an Alarm input. SMS messages can also be configured to send the system Health update upon power up or configured time.

The V400 has a comprehensive set of **RS232** control commands that run over the **Serial** port. This open architecture allows full integration with third party hardware/software. Please refer to the RS232 Control section of this manual for details on RS232 external control of the V400.

In addition to the RS232 support, the V400 provides a **Telnet** interface over TCP/IP. The same command set detailed in the RS232 section can be used over Remote Live View using the Telnet protocol.

A simple test to check connectivity between PC and V400 you can try following with a Telnet client (e.g. Putty, Termite);

- Telnet (port 23) to 10.0.0.200 (default V400 IP)

- Enter the username; tspace01

- Enter the password; TS01480

- Type **#HANDSHAKE**; you should receive **OK**.

The V400 supports **FTP** over TCP/IP using the LAN socket. The V400 FTP server allows video files to be downloaded using either a hard-wired, wireless or 3G IP connection. A web browser can be used to FTP onto the V400 by typing the following in the address bar;

ftp://tspace01@10.0.0.200/ (default IP). This will prompt for the password.

ftp://tspace01:TS01480@10.0.0.200/ (default IP). This will log straight in.

Supported browsers are: Microsoft **Internet Explorer** & Mozilla **FireFox**. A third party FTP client can also be used, for example **FileZilla**. If prompted, the FTP authentication details are;

Username: tspace01
Password: TS01480

PCLink Remote features include; *Live View, Playback, Configuration***.** A brief overview of the applications included in PCLink Suite can be found on the PCLink Suite page of this manual. For detailed application instructions, see the separate PCLink Suite manual available here; www.tspace.co.uk.

5.3   RS232 / TELNET External Control

The V400 software includes external control via RS232 (side panel connector) or via Telnet over Remote Live View and provides functions:

- Files can be created and written into on the V400 hard drive. The files can also be read back.
- The V400 can be controlled via Commands. This allows many displays and recording functions to be carried out by an external device.

These two features are enabled under the SETTINGS > EXTERNAL EQUIPMENT > GSM / REMOTE SETTINGS menu by changing the RS232 setting to a BAUD RATE e.g. 115,200.

Baud rates of 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200 can be selected. The external commands operate over the RS232 port. This port is also used for GSM modem control. GSM control cannot be performed at the same time as external control.

Connect the V400 RS232 port to a PC using a serial cable. Some modern PCs do not come with a serial port, you can however use a USB Serial Adaptor. Two adaptors that we have tested here are:

- NEWLink – www.newlinkproducts.co.uk
- FTDI - FT232R – www.ftdichip.com

The COM port number will vary depending on your PC and which cable you have. For example on a laptop the NEWLink cable was assigned COM10.

5.4 USB Interface Kit

The purchase of USB Kit T605-USB includes the necessary licence for use of PCLink Suite software including free of charge updates on a single PC (reasonable use policy allows installation on a secondary portable PC; laptop). Timespace Technology does not authorise the unlicensed usage of PCLink Suite software.

The USB Kit provides all hardware and software necessary to review and archive recordings on a PC from a Hard Disk Cartridge when it has been removed from the V400 Digital Recorder. No additional device drivers are required for the USB Interface Kit when using Windows 2000, XP, Vista or Windows7.

Kit Contents:

- 1x USB / IDE Interface Lead
- 1x PCLink200 Software CD

Connecting to a PC using the USB Interface Kit

1. Remove the Hard Disk Cartridge from the V400.
2. Plug the multi-pin D shaped IDE USB lead into the rear of the cartridge and then plug the smaller USB connector into an available USB port on the PC.

Once the disk has been connected, the PC should take a few seconds to detect the disk and Windows should automatically assign a drive letter to it. The drive should be viewable in Windows Explorer with .XBA files visible with their associated icon (assuming PCLink Suite is installed);

Recording files can now be viewed using PCLink200;

- Individual files can be opened directly from Windows Explorer by double clicking.
- Up to 15 files can be opened by selecting them and using RIGHT CLICK > OPEN WITH PCLINK200.
- .XBA files can be dragged from a Windows Explorer window and dropped onto the main area of the PCLink200 window.
- The entire cartridge can be loaded by opening PCLink200 and selecting the AUTOLOAD option.

A specific folder can be loaded from within PCLink200; FILE menu, LOAD FOLDER

6. Installation Guide

6.1 Safety

The V400 meets the requirements of BS EN60950 (Safety Requirements of Information Technology Equipment).

The V400 is designed to be powered from an external power source which complies with the Low Voltage Directive (73/23/EEC).

The V400 is designed for indoor use in the temperature range -10° to +50°C, 20% to 80% RH (non-condensing).

6.2 Environmental

The V400 may be operated in ambient temperatures from -10°C to +50°C. This specification applies in still air and ambient temperature measured 15cms above the centre of V400.

If the V400 is to be mounted in an enclosure is important that the internal temperature inside the enclosure does not exceed the specification above and any new enclosure design should be tested.

6.2.1 Shock And Vibration

Consideration should be paid to the mounting position so that the levels of shock and vibration that may be encountered are minimized.

6.2.2 EMC

The V400 complies with the relevant EEC, Automotive 'E' Mark and EMC standards for this type of product.

6.2.3 Conformity

EMC Conformity (CE Mark); Meets the European Council Directive 89/336/EEC (EMC Directive) relating to EMC Emissions - EN61000-6-3(2001) and EMC Immunity – EN61000-6-1(2001).

EMC Conformity (E Mark); Meets the Type Approval requirements of European Commission Directive 95/54/EC.

CFR47:2009 Class A, Part 15 - Radiated Emissions and Conducted Emissions.

(conformity certificates can be found in Appendix 3).

6.2.4   Recycling

When the product has reached its end of life and requires disposal, recycling instructions are available upon request.

6.3   Warnings

- **The use of hard disk cartridges other than those supplied by Timespace Technology will invalidate the warranty of the V400 recorder and will constitute a breach of the V400 operating software copyright.**

- **The purchase of USB kit T605-USB includes the necessary license for use of PCLink Suite software on one pc, including free of charge updates. Reasonable use allows a second installation on a portable computer provided both installations are not used simultaneously. Timespace Technology does not authorise the unlicensed usage of PCLink Suite software.**

- **The V400 recorder must always be mounted so that there is a free flow of air around it. If it is mounted in an enclosure, it is essential that adequate ventilation is provided, and it is recommended that a fan is incorporated in the enclosure design.**

- **Hard disk cartridges are sensitive to shock, vibration and humidity and must be used within operating temperature range as detailed in the V400 specification in the Appendices.**

- **It is highly recommended that recording is stopped before power is removed from the V400 to avoid loss of data. It is also recommended to stop recording before the cartridge or SD card is removed.**

- **Cartridges should be safely removed from windows operating system environment prior to removing power/USB cable. Data loss or corruption may occur if this is not followed.**

- **Do not wet the product when cleaning.**

- **This product contains a lithium battery. Do not recharge, open, heat or dispose of in fire. Dispose of according to local regulations.**

- **V400 may become unusable if power to the unit is lost during a software upgrade.**

6.4   V400 Connections

6.4.1   V400 Front Panel

Figure 7 V400 Front Panel

REC (RECORD) BUTTON
Turns configured recording mode on and off. Button can be disabled within menu settings.

LEDs
Power   - Illuminated when the V400 is powered (Green LED).
Rec   - Illuminated Red when the V400 is recording.
Disk   - Pulses Green/Red when the V400 is reading/writing to/from the Cartridge. Solid Red
indicates no disk is present / detected.
SD   - Pulses Orange when the V400 is recording to the SD card.
Fail   - Illuminated Red when any of the Fail conditions are met (refer to Service / Fail page).
Service - Illuminated Orange when any of the Service conditions are met (refer to Service / Fail page)

At Power On   - All LEDs will illuminate whilst the V400 initialises and will remain lit during system
check (menu disabled) until the unit is operational. Once operational only the Power LED will remain
illuminated unless recording is taking place.

120

CARTRIDGE LOCK

Locked   - Securely locks the removable cartridge in place and enables it for use.
Unlocked   - Turns off the cartridge lock, releasing the cartridge lock for removal.

SD CARD

The V400 supports a single SD card for two configurable functions:

Dual Recording - The V400 menu settings can be configured to record up to 25 images per second to the SD card in addition to primary images per second being recorded to the cartridge.

File Download   - Files that are recorded on the V400 Cartridge can be selected and copied to the SD card for review on a PC.

SD Compatibility The V400 supports **SanDisk SDHC** (Secure Digital High Capacity) cards **only**. Sizes include 4GB, 8GB, 16GB and 32GB. Both 15 and 30MB/s SD cards are compatible however for best Audio playback results, 30MB/s is recommended.

6.4.2   Reviewer Connector

Connect the Reviewer to V400 Reviewer socket using a RJ45 cable.

Signals for this connector are as follows:
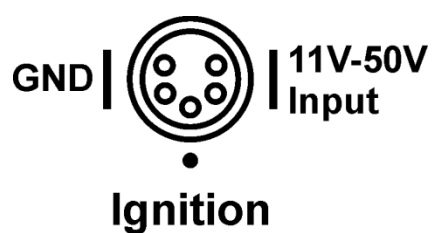
1   Video out
2   Video ground
3   Audio ground
4   RS232 Rx
5   RS232 Tx
6   Audio out (line level)
7   Power ground
8   12V

12V is supplied (regulated) to the Reviewer from the V400.

6.4.3   V400 Side Panel Interface /Connections

POWER CONNECTOR	VIDEO CONNECTORS

POWER OUTPUTS

- 5V – 2A resettable fuse, 4A trip (10W global across the three 5V outputs on the Molex).

- 12V – 2A resettable fuse, 4A trip (24W global across the three 12V outputs on the Molex).

- 16 Camera outputs – 0.2A resettable fuse, 0.4A trip (2.4W per channel).

- Main video output – 12V 2A resettable fuse, 4A trip (24W)

- Aux video output – 12V 2A resettable fuse, 4A trip (24W)

LAN PORTS
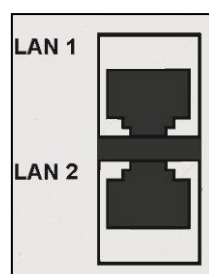
LAN1 - User configurable in menu settings.

LAN2 - TFL IBUS interface configurable in menu settings.

Figure 8 V400 Side Panel Interface/Connections

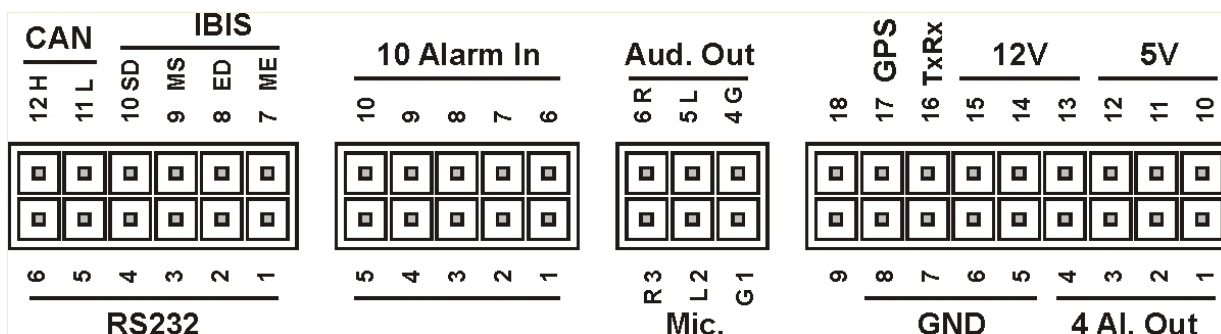## 6.4.4   Molex Side Panel Connectors

Figure 9 V400 Molex Side Panel Connectors

	PIN	Description	I/O	Type
RS232	1	DCD, Data Carrier Detect	<	Detect modem status
	2	RD, Receive Data	<	Serial data
	3	TD, Transmit Data	>	Serial data
	4	RTS, Request to Send	>	Handshaking
	5	CTS, Clear to Send	<	Handshaking
	6	GND, Ground		
IBIS	7	ME		WBEM-
	8	ED		WBED+
	9	MS		WBMS-
	10	SD		WBSD+
CAN	11	L		Low output
	12	H		High output
ALARM IN	1-10	0-30V input range, switching configurable <2, 2-24, >24V		
MIC / AUDIO OUT	1	GND, Ground		
	2	Left channel audio in	<	

	3	Right channel audio in	<
	4	GND, Ground	
	5	Left channel audio out	>
	6	Right channel audio out	>
ALARM OUT	1-4	Active pull to GND, Ground	
GND	5-8	GND, Ground	
	9	No connection	
5V	10-12	+5V 2A resettable fuse (10W global across the three 5V outputs).	>
12V	13-15	+12V 2A resettable fuse (24W global across the three 12V outputs).	>
TxRx	16	Expansion pin	
GPS	17	RD Receive Data	<
	18	No connection	

< to V400

> from V400

6.4.5   Ethernet Connector

The V400 provides 2x RJ45 connectors;

LAN1 - User configurable standard network interface. Configurable IP address, Subnet and Gateway within the SETTINGS > EXTERNAL EQUIPMENT > LAN menu.

LAN2 - Transport for London IBUS diagnostic interface. Configurable IP address and Enable / Disable / Debug options. Proprietary interface; cannot be used for secondary LAN interface. See IBUS page for further information.

Connect via a standard RJ45 Remote Live View cable (straight i.e. pins 1-1, 2-2, 3-3 etc.) to Remote Live View hub, switch, router, wireless LAN adaptor or 3G modem.
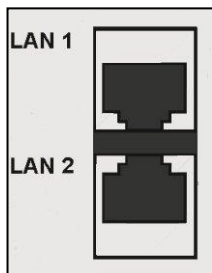
Figure 10 Ethernet Connector

Internal Connections: 1 Tx+, 2Tx-, 3 Rx+, 4 NC, 5 NC, 6 Rx-, 7 GND, 8 GND

6.5   Installation Instructions

The V400 is designed to be mounted on its base plate; horizontally or vertically in any axis, but on a strict perpendicular angle. For wall mounting with the V400 horizontal, the right angle plate accessory must be used.

It is recommended to power the V400 via the two power input pins on the 5 pin XLR connector. For maximum reliability, Timespace recommends that the power feed should be split and wired to both pins. In addition, it is recommended to wire an ignition feed to ALARM1 on the Molex connector.

The V400's built-in GSensor must be configured during the installation process. Once the V400 is installed, the direction of the front and side panel must be set e.g. Front panel FORWARDS means the V400 front panel is facing the front of the vehicle, therefore the Connector Panel must be either LEFT, RIGHT, UP or DOWN depending on the mounting position. After configuring the V400 orientation, the GSensor readings must be zeroed.

6.5.1   Installation Check List (Example)

REQUIRED / RECOMMENDED

Mount the V400 in position on the base plate or right angle bracket

Set the GSENSOR orientation (which way is the V400 mounted)

Zero the GSENSOR readings

Setup camera rate/quality as required e.g. NORMAL RECORD

Setup the ALARM INPUTS for ignition, indicator L/R, brake, reverse, other…

Set the POWER OPTION to WAKE WHEN IGNITION "YES"

Set the POWER OPTION to WHEN IGNITION OFF "KEEP ON FOR 30 MINS"

Set POWER STATE to RECORD

Set ENABLE RECORD BUTTON to NO

OPTIONAL

Setup the ALARM INPUTS for ignition, indicator L/R, brake, reverse, other…

Setup the SD recording parameters if SD is being used (format SD card)

Enable AUDIO and set the sensitivity (if mics being used)

Setup the VIDEO OUTPUT for MAIN and AUX to display camera output

Add vehicle ID / Registration number to the Camera text

Enable GPS (and set correct BAUD rate)

Enable IBUS (Transport for London diagnostic reporting)

6.5.2   Mechanical Data / Fixing Specification

(measurements shown in mm);

Figure 11 V400 Measurement Data

Min 200 Typically 210
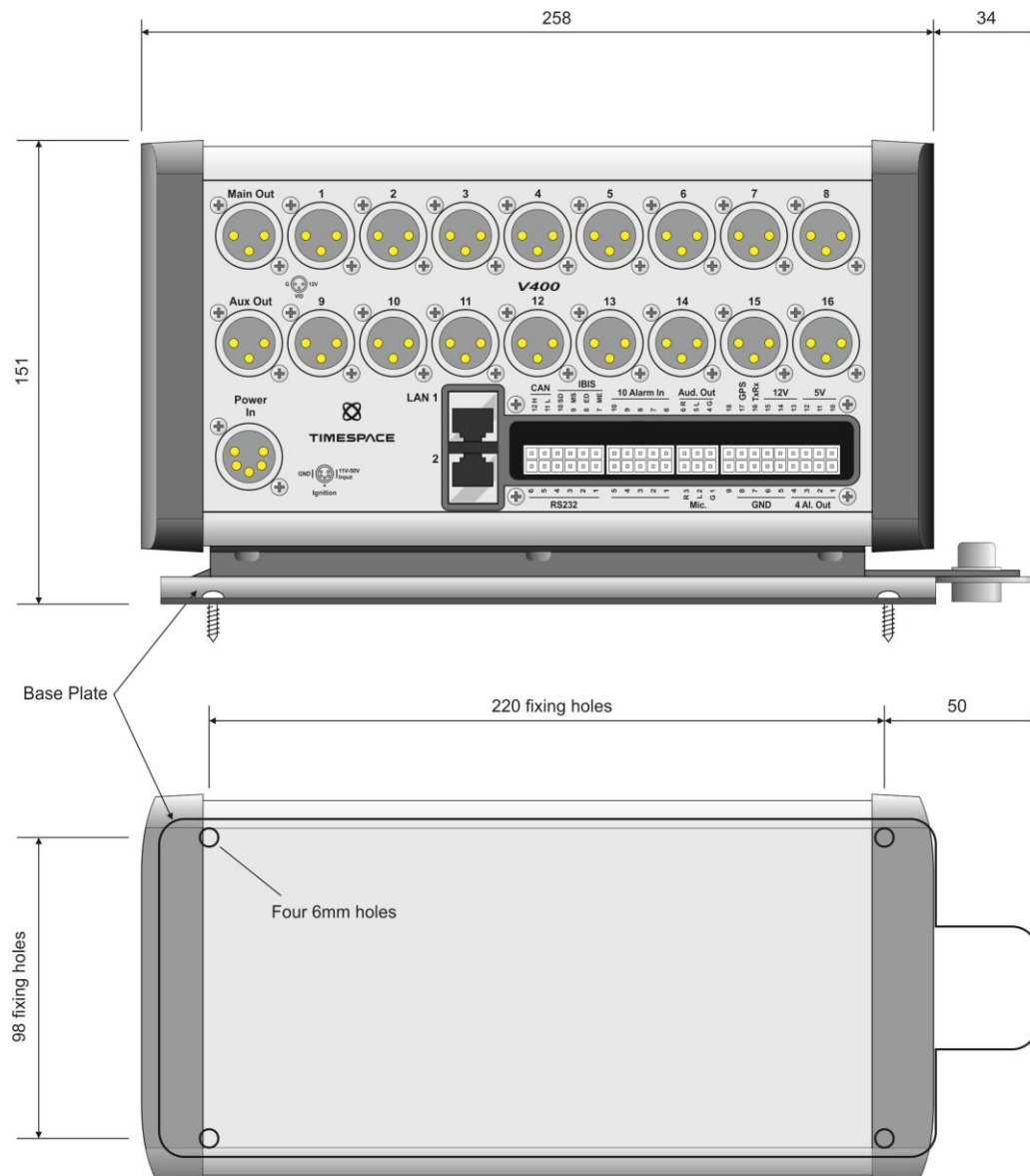
126
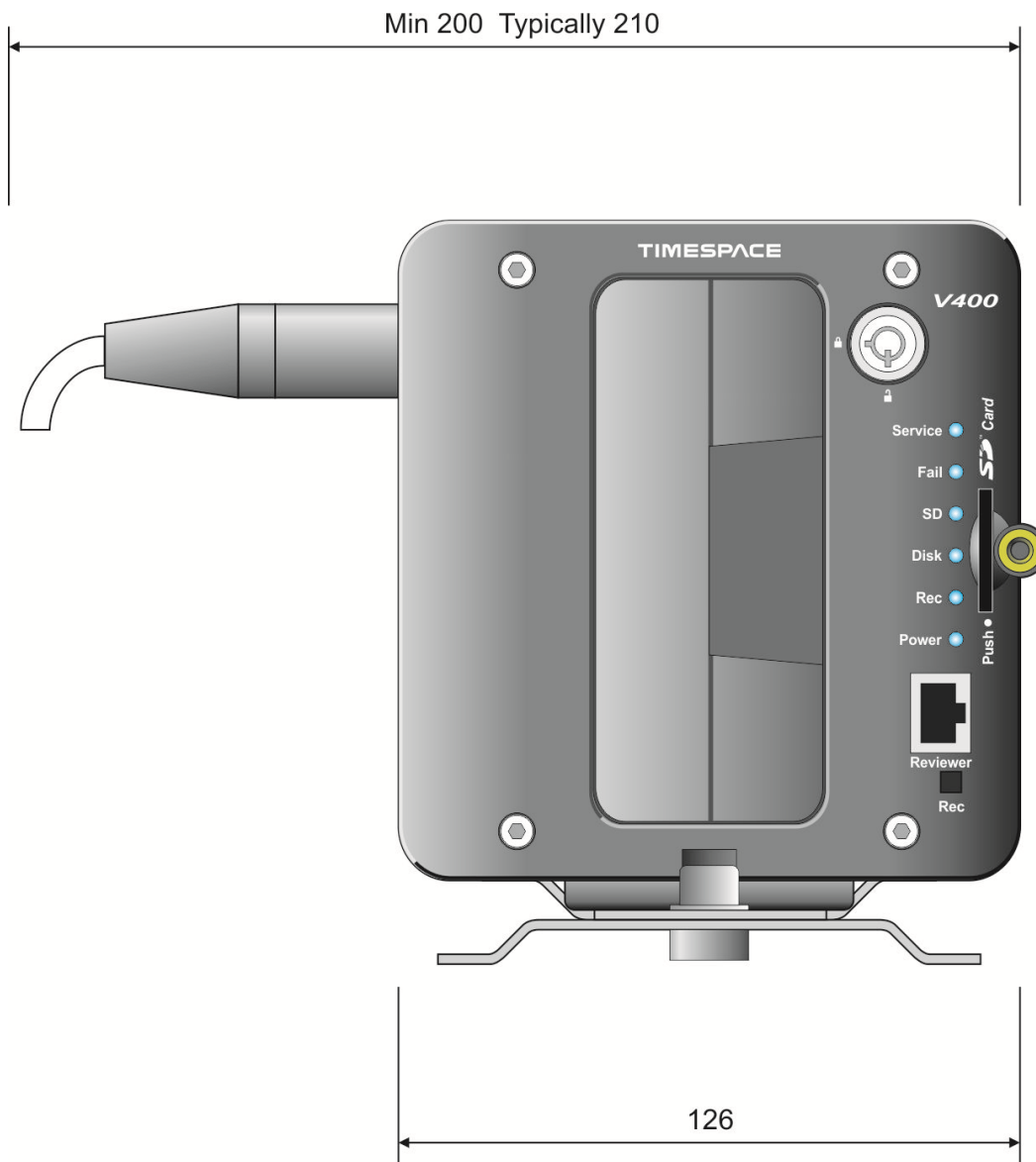
Figure 12 V400 Front Panel Measurement Data

6.5.3   Mounting Plates

The V400 has a wide metal peg at the rear which slots in to the base plate. The front of the V400 can then be screwed down to the base plate using an **M8 bolt** (provided). A 6mm Allen key will be required.
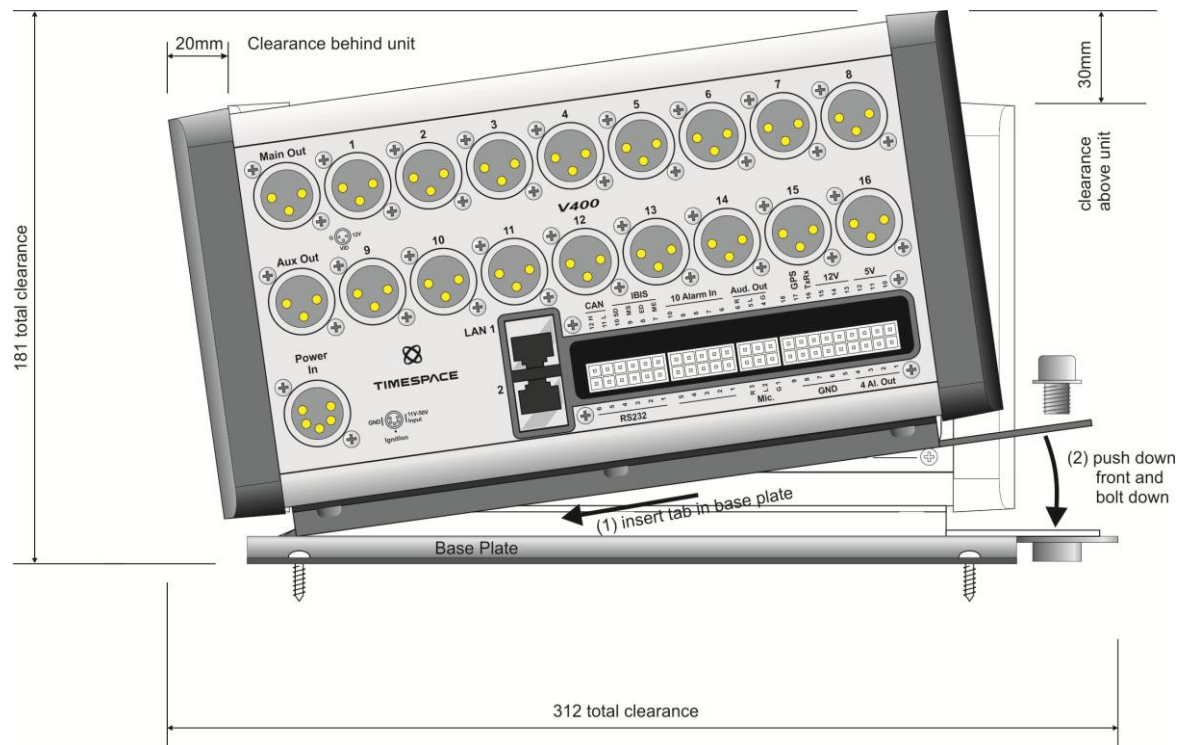
Figure 13 Mounting Plates

Base Plate

Right angle plate

(for horizontal wall mounting)
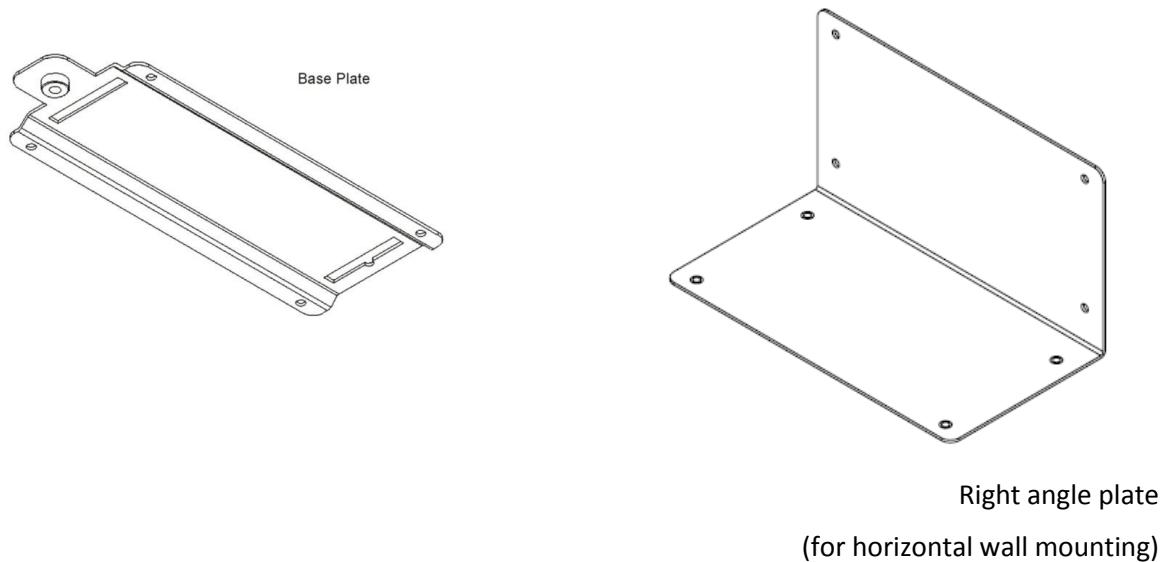
6.5.4   Alarm I/O Wiring

Alarm inputs are pulled to ground via a resistor so will read 0V if left disconnected or floating.

See Alarm **input** circuit below:
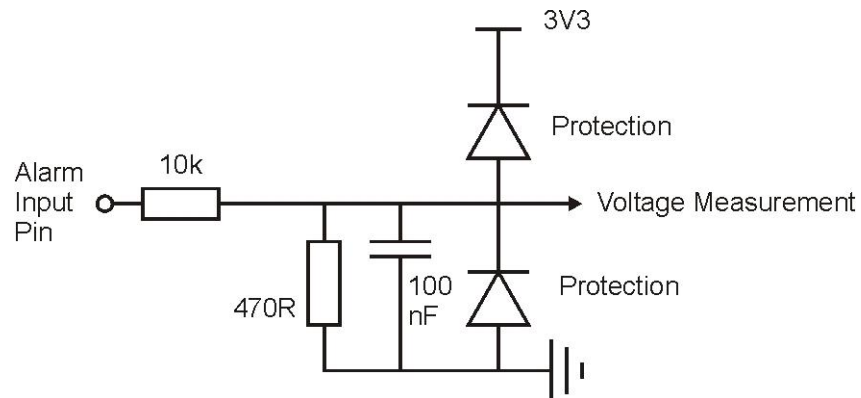
Alarm **output** circuit below:
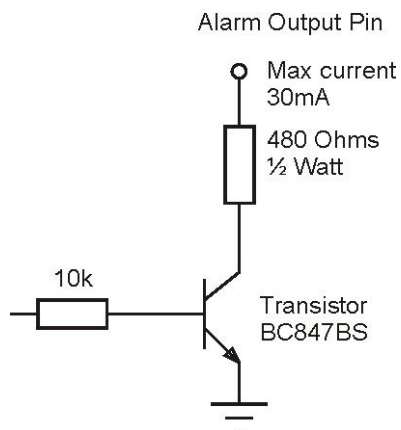
Figure 14 Alarm Input/Output Wiring

See ALARM INPUTS and ALARM OUTPUTS menus for specific trigger settings.

6.5.5   Wiring a line level microphone

The diagram below shows how to wire a line-level microphone into the V400. Two resistors are required per channel. This should remove with the need to reduce the level by mechanical means.
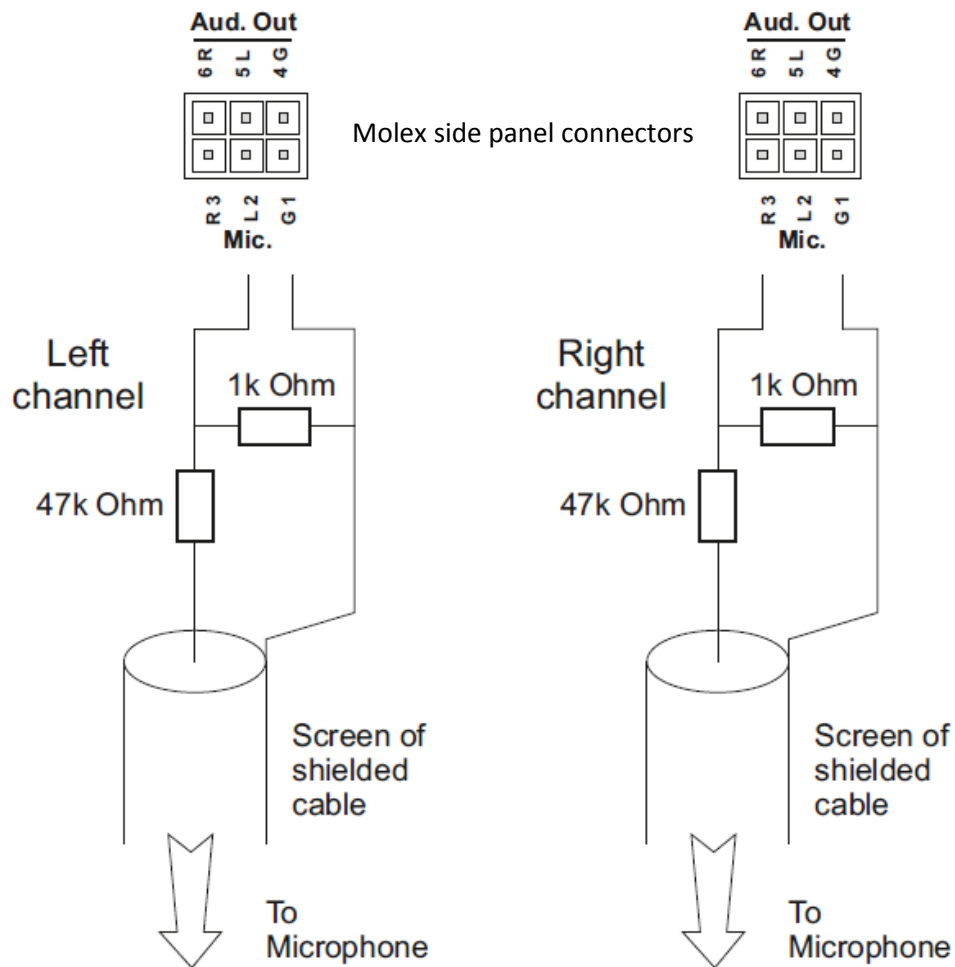
Figure 15 Wiring a line level microphone

6.5.6   Installation Spare Parts List

POWER CONNECTOR
Neutrik NC5FXX-B (solder bucket)

CAMERA INPUT / VIDEO OUTPUT
Neutrik NC3FXX-B (solder bucket)
Neutrik NC3FXX-HA (crimp)
Neutrik HA-3FXX (spare crimps, 50off per bag)

Crimp tool/Die (for the above)   Neutrik HX-R-BNC / DIE-R-HA-1

|	**Molex PN**	**Farnell PN**	**RS PN**
MOLEX CONNECTOR			
12 Way Molex Mini-Fit Jr Plug	39-01-2120	151-871	484-1805
10 Way Molex Mini-Fit Jr Plug	39-01-2100	151-870	484-1798
6 Way Molex Mini-Fit Jr Plug	39-01-2060	151-868	484-1760
18 Way Molex Mini-Fit Jr Plug	39-01-2180	996-3251	172-9027
Crimp Sockets for the above Molex (for wire size 18-24AWG)	39-00-0039	973-2195	172-9134
Crimp Tool (16-24AWG)	63819-0900	160-2636	501-083
Extraction Tool	11-03-0044	525-080	215-5900

MICROPHONES
Farnell – 335-9621
CPC – MP33125

Microphones must be wired with screened cable where the screen is connected to the GND and the centre core is connected to the microphone signal. Timespace have tested using 6m of Vandamme microphone cable (Vandamme part number 268001C, Farnell part number 798-289). Also possible is RG179 or RG59 video cable for short <6m runs

Neutrik connector Suppliers:

Canford - http://www.canford.co.uk
CLD Distribution - www.CLD-Dist.co.uk
Neutrik - http://www.neutrik.co.uk/

7. Service And Maintenance

7.1   Maintenance Regime

There is no requirement for regular maintenance or returning the DVR to Timespace Technology. There are no user-changeable parts in the DVR. The battery in the V400 is designed for a life in excess of 15 years.

7.2   Service And Fail LED

The Service and Fail LED's on the V400 front panel give a positive indication that a system fault has occurred.

If the Service LED is lit then the system will most likely be functional but may not be performing as intended. An example may be one of the cameras has failed.

If the Fail LED is lit then the system will not be functioning and requires immediately attention. An example may be that the hard disk cartridge has failed.

The Service/Fail conditions are stored on the V400 for review. Each condition has an identifiable code and associated description. The service log can be viewed here; SETTINGS MENU > ADVANCED > VIEW SERVICE LOG menu.

The LED will remain lit and the problem which caused the Service LED to light will be listed in the log until the log is reset by selecting RESET SERVICE LOG.

A full list of Service Codes is in the table on the next page.

7.3   Service Codes

SERVICE CODE / NUMBER		DESCRIPTION
SERV_CAMOPEN	1**	No current on power input to camera ** and no camera signal.
SERV_CAMSHORT	2**	Over-current on power input to camera ** and no camera signal.
SERV_CAMSIGNAL	3**	Camera disconnected for cameras 1-16 => codes 301-316.
SERV_CAMTYPE	4**	Check camera 1-16 => codes 401-416.
SERV_CAMDISC	811	Camera disconnected for camera.
SERV_HDDSMART	812	S.M.A.R.T Info.
SERV_LOWFPS	813	FPS lower than threshold.
SERV_TIMEERROR	815	Time error.
SERV_RTC_ERROR	816	RTC battery fail.
SERV_CHECKSIM	817	Modem send error - check simcard.
SERV_DIAL_OUT_FAIL	818	Modem error - dial out failed (image over gsm).
SERV_SMTP_FAIL	819	Failed to send email.
SERV_MAIN_VOUT	820	Incorrect voltage on Main video output.
SERV_AUX1_VOUT	821	Incorrect voltage on Aux1 video output.
SERV_AUX2_VOUT	822	Incorrect voltage on Aux2 video output.
SERV_AUX3_VOUT	823	Incorrect voltage on Aux3 video output.
SERV_EXT_LOG	835	External control log (ext command).
SERV_CAMDISC_REPEAT	840	Intermittent camera connection.
SERV_USR_RESET	863	Log reset by user.
SERV_HDD_DELETE_FILES	864	Operation to delete all recording files on HDD did not complete.
SERV_HDD_SECURE_WIPE	865	Secure disk wipe on HDD did not complete.
SERV_SD_DELETE_FILES	866	Operation to delete all recording files on SD did not complete.
SERV_SD_SECURE_WIPE	867	Secure disk wipe on SD did not complete.
SERV_BRIDGE_ALERT_NC	868	Bridge Alert controller is not connected.
SERV_UNSAFE_SHUTDOWN	870	Unit was not shutdown gracefully.
SERV_ACC_NO_CALIBRATION	898	Accelerometer not calibrated.
SERV_NOTRECORDING	899	special for IBUS - not recording
SERV_FAIL_HDD_PACKET_WRITE	900	HDD packet write fail.
SERV_FAIL_HDD_PACKET_READ	901	HDD packet read fail.
SERV_FAIL_HDD_SECTOR_WRITE	902	HDD sector write fail.
SERV_FAIL_HDD_SECTOR_READ	903	HDD sector read fail.
SERV_FAIL_SD_READ_WRITE	904	SD card read/write fail.
SERV_FAIL_SD_FAIL	905	SD card failure (replace and format SD card.)
SERV_FAIL_SD_ERROR	906	SD card error (replace SD card.)
SERV_FAIL_H264_CODEC_0	907	H264 Codec (0) Error (rebooting).
SERV_FAIL_H264_CODEC_1	908	H264 Codec (1) Error (rebooting).
SERV_FAIL_LOW_BATTERY	909	Low battery - recorder stopped.
SERV_FAIL_HDD_DIR_FULL	910	HDD full, failure to create file on Hard Disc.

SERV_FAIL_SD_DIR_FULL	911	SD card full, failure to create file SD Card.
SERV_FAIL_IPCAM_IPERR	912	IP Camera address incorrectly configured, doesn't match VLAN2 subnet.
SERV_FAIL_QUOTA_TEST	998	In-house fail quota testing.

8. Software

8.1   V400 Software And Updates

Timespace recorders use proprietary embedded software in the form of **.XOS** files. Software updates for Timespace DVRs and PCLink Suite are available through authorised distributors or by contacting Timespace support; support@tspace.co.uk. From PCLink V7.2 onwards, updates can be automatically downloaded within PCLink.

Software can be uploaded to the recorder by copying an XOS file onto the removable cartridge using the PC/USB interface, then inserting the cartridge into the recorder and navigating to the relevant menu (see below). An example of the .XOS file name is **V400 V1.1.0.xos**

Software Upload

1. Using the USB interface kit, copy the .XOS file from the PC to the cartridge, ensuring that no other XOS files exist on the disk.
2. Insert the cartridge into the V400 and turn the key lock to the locked position.
3. Once the V400 has initialised, use the [Reviewer](#) to navigate to the SETTINGS MENU > ADVANCED > and select LOAD SYSTEM UPGRADE.
4. There are three Load options to choose from;
    - LOAD WITH FACTORY SETTINGS (all menu settings will be reset to default values).
    - LOAD WITH CURRENT SETTINGS (menu settings will be maintained where possible).
    - LOAD WITH CARTRIDGE SETTINGS (menu settings will be loaded from the cartridge).

In all LOAD instances, the XOS will be loaded from the cartridge into the V400 internal flash memory. The "with cartridge settings" option will also load the *Settings* from the cartridge e.g. if replicating settings from another V400. The load will take approximately 30 seconds and when the V400 reboots, the current software version is displayed on screen. It can also be checked in the SETTINGS MENU > SYSTEM SETTINGS > SYSTEM INFO menu.

WARNING – V400 MAY BECOME UNUSABLE IF POWER TO THE UNIT IS LOST DURING A SOFTWARE UPGRADE.

Software can be downloaded from the recorder to the cartridge. This feature can be used to replicate settings from one recorder to another when setting up multiple units.

Software Download

1. With the cartridge locked in place in the V400, go to the SETTINGS MENU > ADVANCED and select the SAVE SYSTEM UPGRADE option.

This will save the current V400 Software and Settings to the **current.xos** file on the cartridge. The cartridge could then be used in another V400 to load the Software and Settings (using the above

LOAD WITH CARTRIDGE SETTINGS option). Also, the current.xos file could be copied from the cartridge onto a PC using the USB kit and kept as a master settings file.

PCLink Suite V7.2 onwards includes a software download feature for acquiring the current and future software release for PCLink Suite and Timespace Digital Video recorders.

From the **Help** menu within PCLink, select **Updates** and choose from the following;
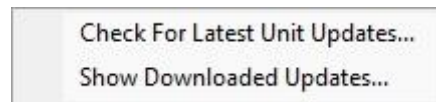
Check for Latest Unit Updates...   PCLink will connect to the internet and check for updates for PCLink, X200, X300and V400. If this is the being run for the first time, updates will be found and downloaded. If on subsequent checks no new versions are available, the download will be skipped. Some basic user information will be collected and the option to be included in future software and product notifications.
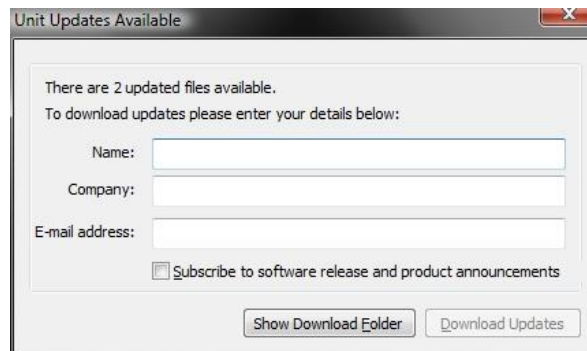
Show Downloaded Updates...   PCLink will open the local folder that the updates were downloaded to.

If updates are available for Timespace DVRs, the downloaded **.xos** files will be stored in the DVR sub folder e.g. *Update\X200\X200 V1.9.0.xos*

If a PCLink Suite update is available it will be downloaded as a .zip file using the PCs Internet browser, giving the user the opportunity to **save** the file to their preferred folder. Once complete, the file <u>must</u> be unzipped to a temporary folder and **TSSplash.exe** run (double clicked). This will initiate the PCLink installer.
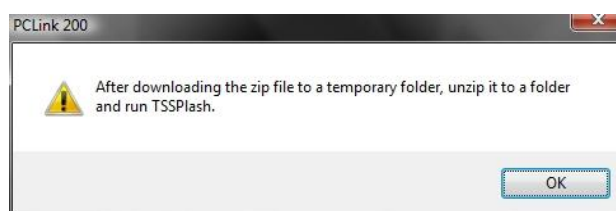
8.2 PCLink Suite

Timespace PCLink Suite consists of applications that allow Playback, Live View, Configuration and Download of recorded files from the X, K and V series range of digital video recorders.

Detailed instructions of each application within PCLink Suite can be found in the PCLink Suite manual, available on our website www.tspace.co.uk

NB: Connection of an IP Camera to enable Live Remote Live View will reduce the available IPS for other recording methods. For further details see IPS ALLOCATION and IPS ALLOCATION MENU.

Application overview;

PCLink200   - Review recorded footage via USB cable connected to removable cartridge.
                 - Review recorded footage over IP connection to the X300/V400.
                 - Live view of cameras (multi channel support).
                 - Remote configuration of X300/V400 menu settings.
                 - Download file remotely (separate FTP client can also be used to download files).

RemoteLink   - Review recorded footage over GSM / IP connection to the X200.
                 - Live view of cameras (single channel support).
                 - Remote configuration of X200 menu settings.

LANLink   - Automatic Health checking over IP connection.
                 - Automatic and scheduled downloading of footage.

XCommunicate - Download X200 files remotely (single file download support).

ImageLink   - X300/V400 can send a snapshot image to a PC using a connected GSM modem.

SafetyLink   - Review G-Sensor events that have exceeded the configured threshold.

Final page of main manual

9. Appendices

9.1 Appendix 1 – V400 specification and technical data

Performance

	V400-08	V400-12	V400-16
Standard	PAL	PAL	PAL
Video recording global image rate	100 IPS	150 IPS	200 IPS
Video inputs	8	12	16
Image rates Min – Max selectable by camera	1 – 25 IPS	1 – 25 IPS	1 – 25 ips
Image Resolution (pixels)	2CIF – 720 x 288	2CIF – 720 x 288	2CIF – 720 x 288
Image bit rate – quality setting	6 (Tfl setting VHigh)	6 (Tfl setting VHigh)	6 (Tfl setting VHigh)
Audio microphone input	2	2	2
Audio line out	2	2	2
Video out Main / Aux – Configurable	2	2	2
Video Streaming Live view – multi channel	25 IPS	25 IPS	25 IPS
SD Card recording global rate – multi channel	25 IPS	25 IPS	25 IPS
Hard disk cartridge option (GB)	250, 500, 750 or 1TB	250, 500, 750 or	1TB 250, 500, 750 or 1TB
SD card capability	4-32GB	4-32GB	4-32GB
G Sensor	3 axis	3 axis	3 axis
Alarm input (multi-voltage)	10 selectable 2V - 24V level	10 selectable 2V - 24V level	10 selectable 2V - 24V level
Alarm output	4 (Logic output)	4 (Logic output)	4 (Logic output)

Connections / Interfacing

	V400-08	V400-12	V400-16
Camera	3 pin XLR	3 pin XLR	3 pin XLR
Video out (Main and Aux)	3 pin XLR	3 pin XLR	3 pin XLR
Audio microphone in	6 way Molex mini	6 way Molex mini	6 way Molex mini
Audio line out	Fit Jr Plug	Fit Jr Plug	Fit Jr Plug
Timespace Reviewer	RJ45	RJ45	RJ45
LAN 1 WLAN/3G	RJ45	RJ45	RJ45
LAN 2 TfL IBUS	RJ45	RJ45	RJ45
GSM/GPS/RS232	18 way Molex mini Fit Jr Plug	18 way Molex mini Fit Jr Plug	18 way Molex mini Fit Jr Plug
Alarm inputs	10 way Molex mini Fit Jr Plug	10 way Molex mini Fit Jr Plug	10 way Molex mini Fit Jr Plug
Alarm/LED output – Configurable	18 way Molex mini Fit Jr Plug	18 way Molex mini Fit Jr Plug	18 way Molex mini Fit Jr Plug
Power input/output	5 pin XLR	5 pin XLR	5 pin XLR

General Features

- Auto record on power-up or single button start/stop recording
- Recorder status indicators (6 LEDs)
- Simultaneous record, live view and file download
- H.264 (MPEG-4 Part 10) compression
- Removable suspended hard disc media cartridge – lockable
- Simple, intuitive menu system with help screens
- Optional embedded GPS for position & speed
- Normal and alarm triggered recording
- Vehicle data recording
- 7 day programmable timer recording
- Local set-up and configuration using optional Timespace Reviewer
- Remote control via RS232 interface
- Times shutdown for power saving wake up on motion for security
- Hibernate with wake up on LAN
- Low temperature sensor and heater
- PTZ camera control for remote viewing
- Short circuit protection video inputs
- Multi ranging PSU with power monitoring diagnostics

Physical Characteristics

- Enclosure Extruded Aluminium, with moulded end caps
- Dimensions (mm) 292(l) x 132(w) x 143(h) including mounting plate
- IP rating IP50
- Operating temperature range -10 to +50 ºC (temperature sensor and heater function enabled)
- Humidity 10 – 90% r.h., non condensing
- Mounting options with quick release bracket Screw-mounted any axis orientation
- Power supply input 11 – 50V DC polarity protected
- Continuous power – without Reviewer 12W
- Continuous power – Cameras on (typical) 33W
- Continuous power – without Reviewer 0.5W hibernate mode
- Continuous power (maximum) 80W Ancillary equipment dependent
- Power up time to recording 20 seconds
- External power output 5V DC 2A / 12V 2A
- Weight – including removable cartridge and 2.61Kg
- mounting bracket

PCLink

- Remote set-up via LAN or Wi-Fi connection
- File download via Remote Live View (FTP)
- PC Multi Cam LiveView, playback, via optional Wi-Fi or 3G router
- Image search by time/date or file name – PCLink
- Quick review alarm event footage markers

Optional Features

- 25IPS global SD memory backup – SDHC 4GB up to 32GB
- (24 hours loop recording at 25IPS super, no audio / 32GB SD card)
- File download via SD card
- CAN bus recording interface
- IBIS communication protocol
- Wi-Fi / 3G / GPRS router

Security Features	Regulatory Approvals
• Proprietary single file video format XBA • User and Admin password protected functions • Each image watermarked (SHA-2 AES Authentication – 256 bit) • Embedded camera number, date and time in each image • 12 user programmable embedded characters per channel	• CE Mark • 89/336/EEC Generic • 95/54/EC Commercial Vehicles • ISO 9001, 2008 • RoHS • WEEE

9.2   Appendix 2 – 37 Way D-Type connector / 9 pin serial port

Very early versions of the V400 hardware had a 37 Way D-Type connector and 9 pin serial port in place of the Molex type connectors. Here are the details of the 37 way;
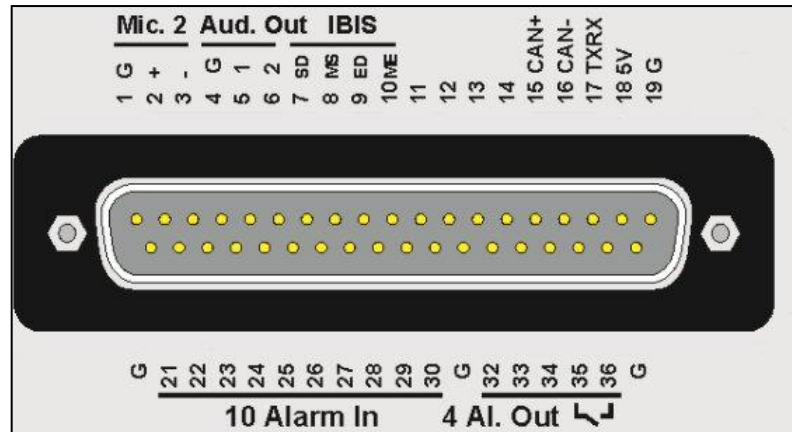
Figure 16 37 Way D-Type connector/9 pin serial port

Pin		Pin	
1	MIC RGND	20	GND
2	MIC RP	21	ALARM INPUT 1
3	MIC RN	22	ALARM INPUT 2
4	AUDIO OUT GND	23	ALARM INPUT 3
5	AUDIO OUTPUT 1	24	ALARM INPUT 4
6	AUDIO OUTPUT 2	25	ALARM INPUT 5
7	IBIS WBSD+	26	ALARM INPUT 6
8	IBIS WBMS-	27	ALARM INPUT 7
9	IBIS WBED+	28	ALARM INPUT 8
10	IBIS WBEM-	29	ALARM INPUT 9
11		30	ALARM INPUT 10
12		31	GND
13		32	ALARM OUTPUT 1
14		33	ALARM OUTPUT 2
15	CAN High OUTPUT	34	ALARM OUTPUT 3
16	CAN Low OUTPUT	35	ALARM OUT RELAY PIN1
17	CAN TXRX	36	ALARM OUT RELAY PIN2
18	OUTPUT +5V	37	GND
19	GND		

RS232 GPS CONNECTOR

9 way male D-type connector (DB9) which can be used to support 1 or 2 RS232 peripherals.

PIN	TYPE	I/O	TYPE
3	TD, Transmit Data	>	Serial Data
2	RD, Receive Data	<	Serial Data
7	RTS, Request to send	>	Handshaking
8	CTS, Clear to send	<	Handshaking
4	DTR, Data terminal ready	>	V400 outputs 5V
6	DSR, Data set ready	<	Ignored by V400
1	DCD, Data carrier detect status	<	Detect modem
9	RI, Ring Indicator	<	Ignored by V400
5	GND, Ground		

> V400 output

< V400 input

Using a conventional cable (DB9 male to DB9 female straight through (1-1, 2-2, 3-3 etc.)) the V400 can be connected to a modem. Alternatively, two RS232 peripherals such as GSM modem and GPS device can be connected simultaneously. Here is an example of the wiring;

PIN	TYPE	I/O	TYPE
Device 1 (Modem)			
3	TD, Transmit Data	>	Serial Data
2	RD, Receive Data	<	Serial Data
7	RTS, Request to send	>	Handshaking
8	CTS, Clear to send	<	Handshaking
1	DCD, Data carrier detect status	<	Detect modem
5	GND, Ground		
Device 2 (GPS)			
4	5V, Supply (500mA max)	>	Power
9	RD, Receive Data	<	Serial Data
5	GND, Ground		

> V400 output
< V400 input

NB: In order to meet the EMC standards with which the V400 is compliant it is important that shielded cables are exclusively used. All of the signal grounds should be common inside the D-Type connector and connected to a metal back-shell in order that the cable run and D-Type connector are shielded.

Parts list;

37 WAY D TYPE (legacy part – see Appendix 2)
Farnell 154878 Multicomp

9 WAY RS232 (legacy part – see Appendix 2)
Farnell 1099052 Multicomp

AUDIO CONNECTOR
Neutrik NC3MXX-BAG

9.3   Appendix 3 – Certificates of conformity and type approval

EC Declaration of Conformity   (CE)

We   Timespace Technology Ltd
         Blackstone Road
         Huntingdon
         PE29 6TT
         United Kingdom

declare that the

V400 Digital Video Recorder

Meets the intent of the European Council Directive 89/336/EEC referred to as the Electromagnetic Compatibility (EMC) Directive. The product conforms to the following standards which have been listed in the Official Journal of the European Union.

EMC

Emissions - EN55022:2006 + A1

Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.

Conducted - EN55024:1998 +A1 +A2

Information technology equipment – Immunity characteristics – Limits and methods of measurement.

………………………………………………………………………

Dr ROBERT HEYLEN
TECHNICAL DIRECTOR
2nd November 2011

E11 TYPE APPROVAL

VCA Headquarters
1 The Eastgate Office Centre
Eastgate Road
Bristol, BS5 6XX
United Kingdom

Switchboard: +44 (0) 117 951 5151
Main Fax: +44 (0) 117 952 4103
Email: enquiries@vca.gov.uk
Web: www.vca.gov.uk

THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

COMMUNICATION CONCERNING THE TYPE-APPROVAL ([1]), OF A TYPE OF
COMPONENT ([1]) WITH REGARD TO RADIO INTERFERENCE SUPPRESSION
DIRECTIVE 72/245/EC, AS LAST AMENDED BY DIRECTIVE 2009/19/EC.

Type Approval No: e11*72/245*2009/19*6098*00

Reason for Extension: Not applicable

EC type-approval mark to be affixed on ESA: e11 03 6098

SECTION I

0.1.	Make (trade name of manufacturer): Timespace Technology Limited
0.2.	Type and general commercial description(s): V400 Digital Video Recorder. The V400DVR has three different versions, T716 (V400 with 16 cameras), T712 (V400 with 12 cameras), T708 (V400 with 8 cameras).
0.3.	Means of identification of type, if marked on the component ([1]) ([2]):Self adhesive label containing the part number
0.3.1.	Location of that marking: Top left of the digital video recorder
0.5.	Name and address of manufacturer: Timespace Technology Limited Blackstone Road Huntingdon Cambridgeshire PE29 6TT United Kingdom
	Name and address of authorised representative, if any: Not applicable
0.7.	In the case of components and separate technical units, location and method of affixing of the EEC approval-mark: Self adhesive label on the bottom of the digital video recorder

EAM239253

An executive agency of the Department for Transport
December 2009 Issue 1

02-Nov-11

72/245/EEC as last amended by 2009/19/EC

0.8.   Address(es) of assembly plant(s): See item 0.5

SECTION II

1.   Additional information (where applicable): See Appendix

2.   Technical service responsible for carrying out the tests: MIRA Limited

3.   Date of test report: 02 November 2011

4.   Number of test report: 1031658-001a

5.   Remarks (if any): See Appendix

6.   Place: BRISTOL

7.   Date: 02 NOVEMBER 2011

8.   Signature: A. W. STENNING
                                                                                      Head of Technical and Quality Group

9.   The type approval file deposited at the Administrative Service having delivered the
         type approval may be obtained on request

(¹)   Delete where not applicable.

(²)   If the means of identification of type contains characters not relevant to describe the vehicle, component
         or separate technical unit types covered by this type-approval certificate such characters shall be
         represented in the documentation by the symbol '?'(e.g. ABC??123??).

(³)   As defined in Annex IIA to Directive 70/156/EEC.

72/245/EEC as last amended by 2009/19/EC

APPENDIX

to EC Type Approval Certificate No: e11*72/245*2009/19*6098*00
concerning the type approval of an electric/electronic subassembly with regard to Directive
72/245/EEC as last amended by Directive 2009/19/EC

1.   Additional information:

1.1.   Electrical system rated voltage: 24V dc

1.2.   This ESA can be used on any vehicle type with the following restrictions: Negative
          earth vehicles only

1.2.1.   Installation conditions, if any: See manufacturer's instructions

1.3.   This ESA can only be used on the following vehicle types: Not applicable

1.3.1.   Installation conditions, if any: Not applicable

1.4.   The specific test method(s) used and the frequency ranges covered to determine
          immunity were: (please specify precise method used from Annex IX): Not applicable
          (non immunity related function)

1.5.   Laboratory accredited to ISO 17025 and recognised by the Approval Authority (for
          the purpose of this Directive) responsible for carrying out the test: MIRA Limited,
          Nuneaton, United Kingdom.

5.   Remarks: None

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December 2009 Issue 1

VCA
02-Nov-11
3
UK Approval Authority

9.4   Appendix 4 - Splash Screen

SPLASH SCREEN – Enables use of a .BMP file to be displayed, for example an Operator/Company logo. Can be set to 5, 10, 20, 30, 60 seconds, or Until Exit (which requires user interaction to clear).

A tool can be provided on request to create the Splash Screen image in the correct format, from an input source. The input source should not be more than 1.5mb and should be a simple image with plain colours, approx 720x576. An example images is show below;
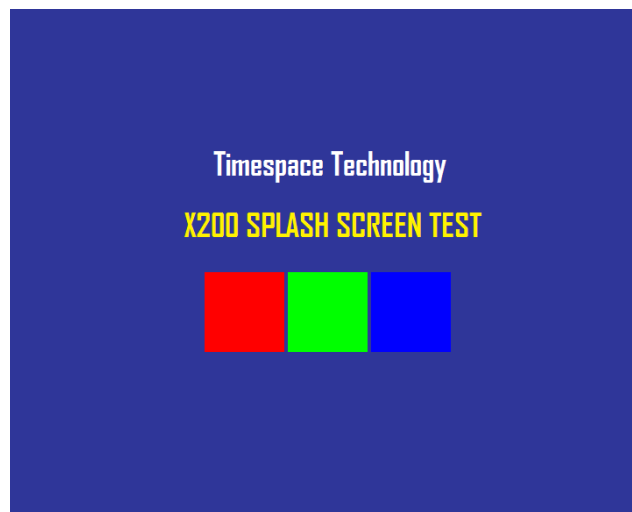
Once in the correct format (using the Timespace conversion tool), the image is placed on the V400 cartridge, named; Splash.ext. Once configured in the menu, the Splash Screen will be read from the disk and displayed.
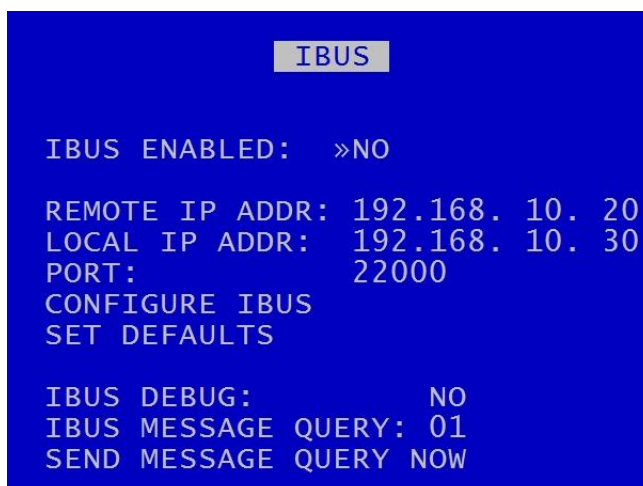
Please contact support@tspace.co.uk for the conversion tool.

9.5   Appendix 5 - Transport for London IBUS diagnostic interface

Timespace has developed a diagnostic interface in conjunction with Transport for London (TFL) to monitor the status, performance and health of Timespace X200, X300, V400 and V500 digital video recorders on London Buses.

Data strings are passed between the DVR and the IBUS system every 5 minutes. In addition to the scheduled data packets, the DVR can be queried by sending it a proprietary text string. Several different data sets can be retrieved according to the input string.

The IBUS feature is available in software **X200 V1.9.0** onwards, **X300 V1.1** onwards and **V400** and **V500 V1.0** onwards. The IBUS menu is accessed using the short code; **9001234** on the X200 and X300 and via the menu system on the V400 and V500. The short code can be entered from any menu using the number keys on the Reviewer.

```
                        IBUS

       IBUS ENABLED:   »NO

       REMOTE IP ADDR: 192.168. 10. 20
       LOCAL IP ADDR:  192.168. 10. 30
       PORT:           22000
       CONFIGURE IBUS
       SET DEFAULTS

       IBUS DEBUG:          NO
       IBUS MESSAGE QUERY: 01
       SEND MESSAGE QUERY NOW
```

IBUS ENABLED – The IBUS interface can be enabled/disabled by setting YES/NO accordingly.

IP ADDRESS – Sets the IP address of the receiving device (default IBUS LOCAL IP as above).

NB: IP address settings cannot be changed while recording is in progress – a warning will be displayed. Stop recording and amend settings as required before recommencing recording.

IBUS DEBUG - For testing purposes a debug mode can be enabled. This will increase the rate of messages sent out from the DVR to every 5 seconds. It is not recommended to leave debug turned on during normal operation.

The IBUS information can also be accessed using the RS232 command #IBUS. This command is only supported on the X300 & V400 over the serial port, no Telnet support.

Example setup of the IBUS interface on a **<u>V400</u>** DVR includes;
- Set recording parameters as required.
- Enter IBUS menu and set ENABLED to YES
- Navigate to the LAN menu and set the IP ADDRESS to 192.168.10.30 and the GATEWAY to 192.168.10.20

It is advised to set the correct date and time when enabling the IBUS feature and ensure no Service/Fail conditions are currently being displayed. **NB:** currently the V400 connects to the IBUS system's network port 4. In the case of the V400, LAN socket 1 is currently used for the IBUS interface.

9.6   Appendix 6 - Tokens / Protocol

The V400 is always looking for tokens to perform actions but no responses are monitored. The remote device should monitor the OK<R> messages that are returned. It is looking for all tokens apart from when writing file data. In this case only the "#ENDFILE<R>" is searched for.

All commands sent to the V400 are acknowledged, for example if the client sends #RECSTART<R>, OK<R> will be returned to the client to signify that the command was successfully carried out. In the case of commands like GETTIME and GETDATE, OK<R> will not be returned, but the data requested, followed by a <R>. In the case of PREVIOUSFILE and NEXTFILE, OK<R> will be replaced with either LAST<R> or FIRST<R> if there are no more files to play next or previous, respectively. When sending commands, the sender to the V400 can wait for an OK before sending another command, or one of the other variants listed above.

There may be a need for a hold off time between certain commands (e.g. 10 mS), as the V400 may take a finite time to do certain tasks. To add delay you could simply put spaces between one command and the next and these are ignored. The V400 does have a FIFO queue of 2048 bytes so can buffer data. Certain commands can be followed immediately with other commands for example:

```
#CAMERA_<1-16><R>#PLAY<R>                                -play a given camera
#SETTIME_<12:23:45><R>#SETDATE_<23/09/10><R>             -set time and date
```

Definitions

_	- A space
<>	- Parameter, don't include brackets
<R>	- return (char 13)
FAIL	- File system failed to create file, aborted
FAIL	- File name is illegal
OK	- Acknowledgement, Command carried out
CLIENT	- The external equipment that is connected to the V400 via RS232 or Telnet
BAUD Rate	- This shall be selectable from within a menu
<TEXT>	- Textual data

Writing files
Write File command: **#WRITEFILE,<FILENAME><R>**
Close File command: **#ENDFILE<R>**

A return <R> character at the end of the "#WRITEFILE" command will signify the beginning of the writing process. All data from this point onwards will be written into the

file specified. If the file system fails to create the file for any reason, FAIL<R> will be returned to the client.

A check is done on the file name length, if the user overruns (number of characters in total is greater than 60), FAIL<R> will be transmitted to the client, and the write command is aborted. The user should only use uppercase letters and numbers in the filename and the space character. The extension ".EXT" is automatically applied by the V400, for example

Command   Created file
#WRITEFILE,REPORT<R>   REPORT.EXT
#WRITEFILE,TICKET DATA 6 DEC 2010<R>   TICKET DATA 6 DEC 2010.EXT
If the file has been created effectively, OK<R> will be sent to the client. The client may now proceed to send the file data. When the token #ENDFILE<R> is received, the file is closed, and the client will be sent OK<R>. A new file may now be opened if required. In the example below, all the text in BOLD is written to the file "TICKETS.EXT"

#WRITEFILE,TICKETS<R>
DATE: 24/12/2011
TIME: 11:48:00
LOCATION: KINGS CROSS
#ENDFILE<R>

Reading files
Read File command: **#READFILE,<FILENAME><R>**

A return <R> character at the end of the #READFILE<R> command will signify the beginning of the reading process. Data will now be transmitted from the V400 to the client. The handshaking line CTS on port 1 may be used if required to pause the data flow. If the file system fails to open the file for any reason, FAIL<R> will be returned to the client. A check is done on the file name length, if the user overruns, FAIL<R> will be transmitted to the client, and the read command is aborted. If all is good, OK<R> is sent followed by the file data followed the token #ENDFILE<R>. The following example reads the file "TICKETS.EXT".

Sent to V400   Received from V400
#READFILE,TICKETS<R> DATE: 24/12/2011
                                TIME: 11:48:00
                                LOCATION: KINGS CROSS
                                #ENDFILE<R>

Recording
If for any reason recording stops, even if instructed to, the V400 will return
#RECSTOP<R>

#DISKREMOVED<R> will be sent under two conditions.

1) The disk is removed from the V400 at anytime post V400 initialization.
2) Live view always has been enabled and the V400 boots without a disk.

#DISKIN<R> will be sent under two conditions.

1) The disk is inserted into the V400 at anytime post V400 initialization.
2) Live view always has been enabled and the V400 boots with a disk.

Control Commands

#RECSTART\<R>	- start recording
#RECSTOP\<R>	- stop recording
#STOP\<R>	- stop playback
#PLAY\<R>	- start playback (standard)
#REPLAY\<R>	- play backwards (standard)
#WIND\<R>	- fast forwards (standard)
#REWIND\<R>	- rewind (standard)
#XPLAY_\<FACTOR>\<R>	- plays at the specified factor speed (-/+)
#CAMERA_\<1-16>\<R>	- camera to control
#LIVEVIEW\<R>	- switch to live view
#AUTOLIVEVIEW\<R>	- switch to live view automatic mode
#JOGFORWARD\<R>	- one frame backwards
#JOGBACKWARD\<R>	- one frame forwards
#GOTONEWESET\<R>	- go to the newest recording
#GOTOOLDEST\<R>	- go to the oldest recording
#GOTO_\<HH:MM- DD/MM/YY>\<R>	- go to time DD:MM:YY_HH:MM
#GOTO_\<HH:MM:SS-DD/MM/YY>\<R>	- go to time DD:MM:YY_HH:MM:SS
#SETTIME_\<HH:MM:SS>\<R>	- sets the time
#SETDATE_\<DD/MM/YY>\<R>	- sets the date
#GETTIME\<R>	- gets the time
#GETDATE\<R>	- gets the date
#NEXTFILE\<R>	- when playing, skips to the beginning of the next file
#PREVIOUSFILE\<R>	- when playing, starts at the beginning of the currently playing file. When stopped and #PREVIOUSFILE is issued twice, followed by a play, the previous file will begin playing from the beginning.
#GETFILETIMEDATE file.	- gets the current playing position of the currently play
#GETSTATS	- returns statistics
#DELETEALLREC	- removes all recording files from disk
#ALARMOUT<1-4>_0/1	- Turns ALARMOUT LED Output ON (1) or OFF (0)
#ALARMOUT<1-4>\<R>	- Returns the status of ALARMOUT, 0 or 1
#ALARMIN<1-10>\<R>	- Returns the status of ALARMIN, 0 or 1
#ALARMIN<1-10>1_0/1	- sets the state of the Digital input 1 ON(1) or OFF(0)
#CAMTEXT_\<1-16>_\<TEXT>\<R>	- writes text to the console at record time, Char 255 moves to the beginning of a new line. Maximum 49 characters per camera.
#DISKSTATUS	- returns #DISKREMOVED or #DISKIN
#MODESTATUS	- Returns #RECORD, #PLAY or #IDLE
#SETCAMTEXT_\<1-16>_\<TEXT>\<R>	- sets the camera text. This is fixed to 12 characters per camera.
#SETFILETEXT_\<TEXT>\<R>	- sets the filename text. Max 12 characters.
#LOGRESET\<R>	- resets the service log
#LOGREAD\<R>	- reads the service log and returns up to the 10 latest entries

#MULTIVON<R>   - Turns Multiview On
#MULTIVOFF<R>   - Turns Multiview Off
#LOG_<TEXT><R>   - Logs a text message to the V400's service log (does
                                          not light service LED). Sending RESET LOG as the text
                                          marks off the LANLink should read the messages up
                                          to. OK<R> is returned if the daily quota of 10 has not
                                          been reached, other wise 10/DAY<R> is returned

Commands in Detail

#GETFILETIMEDATE
Gets the current playing position of the currently playing file. Please use
#MODESTATUS to tell if the time you are reading is live play or if in idle mode, as the
time you receive will ways be the current/last position played.

#GETSTATS
Will return the following stats in the same format. #END<R> signifies end of file. The stats may
possibly grow in the future, but will be append to this list. Scanning for #END after the data has
been retrieved. Data may be scanned for by capturing just after the colon (:) and just before
the end of line <R>

        Capacity: 500.11GB
        Used: 0.38 %
        Write Protected: 0.00 %
        First File: 16:09:00 - 21/12/10
        Last File: 16:50:00 - 21/12/10
        Days Recording: 0.03
        Model Number: Hitachi HTS545050B9A
        Serial Number: 100924PBN400B7F2LW7L
        #END

#DELETEALLREC
The #DELETEALLREC command will stop the current recording and delete all recording files.
When complete, OK<R> will be returned
#LED1, #LED2, #ALARMOUT

The following 3 commands control the 2 digital outputs and the Alarm output. These
settings will be OK'd with the current hardware states of the V400.

#ALARMOUT1_0/1<R> – Sets the active state for the alarm output CLOSE/OPEN.
..
#ALARMOUT10_0/1<R>
#ALARMOUT<R> - Returns the status of the ALARMOUT port, 0 = off, 1 = on

#ALARMIN1 - #ALARMIN10
Each one of the alarm inputs can be virtually activated by using the following commands, which control each alarm input independently. These settings will be OK'd the current hardware states of the V400.

#ALARMIN1_0/1<R>
..
#ALARMIN10_0/1<R>

By using these commands, a camera may be assigned to each alarm input, thereby allowing recording on each channel to be selective and/or allow for a different set of recording rates between Normal and Alarm recording

The following commands will READ the status of the ALARMIN pots:

#ALARMIN1<R> - Returns the status of the ALARMIN1, 0 = off, 1 = on
..
#ALARMIN10<R> - Returns the status of the ALARMIN10, 0 = off, 1 = on

#CAMTEXT

#CAMTEXT_1_HELLO WORLD<R>   - "Hello world" will be written at the top left hand corner
#CAMTEXT_3_<255><255><255>HELLO<R>   - "Hello" will be written on the 4 line on camera 3

If text has been assigned to a camera, simply issuing blank text will clear all RS232 overlay text from that camera. A maximum of 49 characters may be sent to the screen including new line control codes. e.g. #CAMTEXT_3_<R> will clear the text (please note the space after 3)

#SETCAMTEXT_<1-16>_<TEXT><R>
Sets the camera text as via the Camera Options menu on the V400. 1-16 is the camera selection followed by the actual text. This is fixed to 12 characters per camera.

#SETFILETEXT_<TEXT><R>
Sets the filename text for the V400 file system to use. Max 12 characters.

#LOGRESET<R>   Resets the service log

#LOGREAD<R>   Reads the service log and returns up to the 10 latest entries

Examples

CAMERA_1<R>   switch to camera 1 (either in live/auto view or during playback)
XPLAY_0.5<R>   plays forward at half speed
XPLAY_-3.2<R>   plays in reverse at 3.2 times real time rate
XPLAY_10<R>   plays forwards at 10x speed
SETTIME_12:23:23<R>   sets the time in the format HH:MM:SS
SETDATE_23/09/05<R> sets the date in the format DD:MM:YY
#GETTIME<R>   to which 12:23:23<R> is returned
#GETDATE<R>   to which 23/09/05<R> is returned
#LED1_1<R>   turn LED1 on
#CAMTEXT_1_Hello><R>   writes "Hello" to the console at record time in the top left
corner.

A windows demonstration tool is available with source code upon request by emailing
support@tspace.co.uk

9.7   Appendix 7 - Health SMS Message Format

If a parameter is not known or not to be included (i.e. set to NO on the menu), then the char '-' is used in the message. Three examples are shown below;

1,076812,BUS AO52 WXA,-,-,L,CNCC,064253 280509,120510 240509,S,212756120509,S,17,MODEM SEND ERROR

1,076812,BUS AO52 WXA,HUNTINGDON12,-,L,CNCC,064518 280509,120510 240509,-,064353 280509,S,63,LOG RESET

1,076812,BUS AO52 WXA,HUNTINGDON12,-,L,CNCC,064518 280509,120510 240509,-,-,-,-,-

FIELD	DESCRIPTION	VALUE
<1. type>	Reason health SMS has been sent	"0" - SMS POWER-UP. "1" - SMS SEND DAILY. "2" - SMS SEND NOW. "3" - SMS SEND NOW via incoming SMS.
<2.serial_num>	Unit serial number.	"Serial num" - The V400 6-digit serial number.
<3.veh_id>	Optional camera 1 text.	"Camera1 text" - Camera1 text, up to 12 chars. "NO ID" - No camera 1 text specified.
<4.veh_id1>	Optional filename text.	"Filename text" - Filename text, up to 12 chars. "NO ID1" - No camera 1 text specified.
<5.gps_pos>	Current or last GPS position.	"ddmmm.mmmmX dddmm.mmmmX" - GPS position "NO GPS DATA" - No GPS data available.
<6.last_curr>	Indication that GPS position is last known or current GPS position.	"C" - GPS posn specified in 5 is the current position. "L" - GPS posn specified in 5 is the last know position i.e. NOT current.
<7.cams_conn>	List of cameras connected.	"C" - Colour camera is connected. "B" - Black and white camera is connected. "N" - Camera is NOT connected (i.e. disconnected).
<8.curr_ts>	Snapshot of current timestamp.	"Current timestamp" - Timestamp.
<9.last_rec_file_ts>	Timestamp of last recorded file.	"Last file timestamp" - Timestamp. "NO RECORDINGS" - There are no recordings on disk.
<10.led_status>	Service/Fail/Record LED status.	"R" - Record LED is ON. "S" - Service LED is ON.
<11.log_ts>	Timestamp of the last log entry.	"Log timestamp" - timestamp. "" - May be blank if no log.
<12.log_mode>	Log entry mode.	"Mode text" - Mode text. "NO MODE" - No mode text available. "" - May be blank if no log.
<13.log_code>	Log entry code.	"Code text" - Mode text. "NO CODE" - No code text available. "" - May be blank if no log.

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| <14.log_desc> | Log entry description. | "Desc text" - description text. |
| | | "NO LOG" - No logs available. |

DETAILED DESCRIPTIONS

A description of the expected content for each heading in the message follows:

<1. type>

        Description: The type of message or the reason the message has been sent (the fleet mgmt may wish to know if it is the daily message or one they have just requested).

        Content:

"0"   – SMS POWER-UP

"1"   – SMS SEND DAILY

"2"   – SMS SEND NOW

"3"   – SMS SEND NOW (via incoming SMS).

<2.serial_num>

        Description: The serial number of the V400 unit.

        Content:

Serial num   – The V400 6-digit serial number.

'–'   – Not known or not available.

<3.veh_id>

        Description: Camera 1 optional text (OTHER>CAMERA OPTIONS).

                      This is selected for inclusion in the message via the Health over SMS hidden menu.

        Content:

Camera1 text   – Camera1 text, up to 12 chars.

'–'   – No optional camera 1 text specified or not included in the menu.

<4.veh_id1>

        Description: Filename optional text (OTHER>FILE SYSTEM).

This is selected for inclusion in the message via the Health over SMS hidden menu.

Content:

Filename text   – Filename text, up to 12 chars.

'–'   – No optional filename text specified or not included in the menu.

<5.gps_pos>

        Description: The current or last known GPS posn (specified as longitude then latitude in degrees and minutes).

Content:

"ddmmm.mmmmX dddmm.mmmmX" – GPS posn

'–'   – No GPS data available.

<6.last_curr>

Description: An indication if the GPS posn is the current posn or last known.
Content:
"C"   – GPS posn specified in 5 is the current posn.
"L"   – GPS posn specified in 5 is the last know posn (i.e. NOT current).

<7.cams_conn>
Description: Camera status.
Content:
"C" – Colour camera is connected.
"B" – Black and white camera is connected.
"N" – Camera is NOT connected (i.e. disconnected)

Cameras are listed as 1234 etc, e.g. CCBN is a 4 camera system, where cam1,2=colour,
cam3=B&W, cam4 disconnected.
Camera systems are either 4 or 16.

<8.curr_ts>
Description: Current V400 system timestamp.
Format is "hhmmss ddmmyy" or "hhmmss mmddyy" depending on menu setting
(OTHER>TIME AND DATE mode option).
Note that there are no separator characters in the time and date strings due to message size
limitations.
Content:
Current timestamp   - Timestamp.

<9.last_rec_file_ts>
Description: The timestamp of the last recorded file (i.e. newest file).
Format is "hhmmss ddmmyy" or "hhmmss mmddyy" depending on menu setting
(OTHER>TIME AND DATE mode option).
Note that there are no separator characters in the time and date strings due to message size
limitations.
Content:
Last file timestamp   - Timestamp.
'–'   - There are no recordings on disk.

<10.led_status>
Description: V400 front panel LED status.
Contents:
"R"   - Record LED is ON.
"S"   - Service LED is ON.
"F"   - Fail LED is ON.
'–'   - No LEDs are on (with exception of the power LED).

The information under the remaining headings pertains to the last service or fail log (newest log).
If the Service and/or Fail LED are reported as ON under the previous heading, then the last service or fail log information is included in the message.

If no service or fail logs are available (e.g. if a service log reset has been performed), then no log information will be available.

<11.log_ts>
   Description: The timestamp of the last service log.
Format is "hhmmss ddmmyy" or "hhmmss mmddyy" depending on menu setting (OTHER>TIME AND DATE mode option).
Note that there are no separator characters in the time and date strings due to message size limitations.
   Contents:
Log timestamp – timestamp
"–"   – May be blank if no log.

<12.log_mode>
   Description: Service log mode, e.g. Service, Failure.
Contents:
Mode text – Mode text.
 "–"   – No mode available or no log available.

<13.log_code>
   Description: Service log code relating to mode.
   Contents:
Code text – Mode text.
 "–"   – No code available or no log available

<14.log_desc>
   Description: Reason for service log.
       Note: Due to message length constraints, this information may be partial or missing.
Desc text – Log description text.
 "–"   – No logs available.

SPECIAL NOTES

The timestamp format is either "hhmmss ddmmyy" or "hhmmss mmddyy" depending on the mode setting on the unit. Note the lack of ':' and '/' separators (the default setting is to include the separators).

If the message is too big for a single SMS, then the message is cut short starting with the Service Log entry description (i.e. the last entry). The service log info must be appended to the end as it is the only variable that has a changing length (with the exception of veh_id, veh_id1). All other variables (when available) are a fixed length. If they are not available (e.g. NO GPS DATA), then the info string is usually less chars than the real data, with the exception of NO LEDS for led_status.

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