PAG™

Professional Broadcast Equipment

System RTI

Digital Run-Time Information System

Instruction Manual

CONTENTS

U4960A PAG DIGITAL SYSTEM RTI INSTRUCTION MANUAL

SECTION 1

OVERVIEW

PAG DIGITAL SYSTEM RTI

PAG System RTI is an accurate in-the-viewfinder display of run-time information. This direct and reliable information enables the user to confidently utilise available battery power, down to the last few seconds. Knowing the absolute potential of each battery taken on location saves space, time and money. Transporting more batteries than is necessary "just in case" is now a thing of the past.

In order to appreciate the full value of PAG System RTI, it should be noted that each product part will work independently; then there is added benefit when they are used in combination. Furthermore, this is the only system that is truly accurate when coping with random battery and load situations. This puts PAG System RTI beyond comparison with anything that has ever been presented to the Broadcast Industry.

Once System RTI has been fitted, and the simple set-up procedure completed, operation of the system is extremely user-friendly and straightforward.

The component parts are as follows:
PAGlok System RTI Camera Connector.
Digital Batteries.
Digital System RTI Batteries.
Digital Battery Reader.

All of these, with the exception of the Battery Reader, can be used with existing non-digital PAG products.

DIGITAL BATTERY READER

The Battery Reader and any PAG Digital battery make a very useful combination. This beautifully styled Battery Reader is light in weight (25g) and can be attached to a key-ring or neck-cord. The Battery Reader is powered by the host battery. By placing the Battery Reader across the battery terminals in either polarity, an instant read-out of available capacity in ampere-hours will be displayed on the backlit LCD screen. The Battery Reader is supplied with a free Conversion Card, which allows an assessment of the time that a PAG Digital Battery (from any state of charge) will run an item of equipment. But of course this is only a small part of PAG System RTI.

DIGITAL BATTERIES

PAG Digital SuperPacks and Digital System RTI batteries are extremely high quality, sealed, 'smart' batteries. Information passes digitally through the battery positive and negative terminals - there are no other connections. The true 'two-wire' system has been a feature of PAG batteries and charging systems for many years. The advantages are numerous. You can be assured that if the battery is connected, then so is the flow of information. This bi-directional information flow takes place in micro-seconds and has no influence on the DC characteristics of the battery. Research showed that it was best to split the battery range to satisfy two distinct market areas - one with the Digital SuperPack which can be used with the Battery Reader to give access to accurate capacity information, and the other with the Digital System RTI battery which extends the information to include run-time in the viewfinder.

SMART LOGIC CIRCUITS

The System RTI circuit within the battery is a tribute to the very latest state-of-the-art low power micro-electronics. The battery's microcontroller continually processes the mass of data which is required to make the battery information really accurate.

It is a fact that batteries perform in different ways under different conditions. By processing the many parameters of shifting data, the battery's microcontroller is able to make accurate predictions relating to the battery performance. These parameters include the efficiency of energy conversion at varying discharge rates, storage capacity, variations relative to temperature, cell chemistry and plate wear out characteristics over cycle life, as well as self discharge rates relative to time and temperature. Then there are many destructive, but sometimes reversible effects to which batteries are subjected. All these variables are taken into account by the microcontroller which matches the above data with stored information concerning the detailed characteristics of each cell type. All these parameters have been thoroughly investigated by our own laboratory and under many conditions of use and abuse. Much of the previously published information on cell performance and chemistry was found to be inadequate for use at our level, and very often incorrect.

PAGlok SYSTEM RTI CAMERA CONNECTOR

The PAGlok System RTI Camera Connector is a masterpiece of modern electronics and software development. In order to calculate and display run-time predictions to the needs of every individual user, the Camera Connector's microcontroller allows custom configuration. A sequence of menu screens are provided, which allow the operator to customise the

configuration of his system. The information, once entered, remains stored in non-volatile memory.

When a Digital System RTI battery is connected, the battery's current-loaded information is combined with the load of the camera by the PAGlok System RTI Camera Connector. The PAGlok Connector directs its video overlay circuit to display the information in a pre-programmed screen position of the viewfinder, which is first expressed in ampere-hours, then this changes when the camera enters the record state, to display the remaining run time in hours, minutes and seconds. This figure is instantaneously updated against any change of load, such as the addition or subtraction of the camera light. It is assumed by System RTI that the level of power being consumed prior to standby will be resumed when the camera is next switched into record. The run-time for that power consumption will be displayed with only the standby current being subtracted. In this standby situation characters are displayed in grey rather than white. A three position switch is incorporated to control the display of RTI: (On) display on all the time. (Auto) displays at user-variable time intervals. (Off) Until over-ridden.

Nearing the end of discharge, all three positions can be over-ridden giving a final warning, the duration of which can be selected from the set up menu pages.

SOFTSTART

There is a power output port for the camera light on the side of the PAGlok Connector, with a three position switch - off, manual or automatic. This power port can accommodate lamps of up to 100W. The lamp is run through the unique PAG Softstart anti-surge, cold filament pre-warm circuit. The circuit extends the life of the filament, prevents the surge current of a cold filament from prematurely operating the recorder low-voltage cutout circuit, or interfering with the recorded signal. In the automatic mode, the light is controlled from the camera's own record function switch. When the camera is switched to standby the light is automatically turned off.

SECTION 2

GETTING STARTED

2.1 PAGlok System RTI Camera Connectors are supplied with all component parts necessary for fitting to the camera. Please follow the detailed fitting instructions specific to your camera model which are included with the kit (see Section 5, Page 17).

2.2 Camera models which have integral viewfinders (no flying lead to the viewfinder) will require additional work to terminate the VFI cable to the camera, and this operation should be performed by a suitably qualified camera technician.

2.3 Fit a charged Digital System RTI battery to the camera, and turn the camera 'ON'. A normal viewfinder image should be visible, overlaid by the RTI battery capacity reading.

2.4 It will be likely that the user will wish to adjust the various settings, including the position of the RTI overlay within the viewfinder. Please refer to Section 3 'The Menu System' for details.

2.5 It is important that the RTI installation is now commissioned on the camera by running it through the 'Learn' procedure (see Section 3.4, Page 13 'The Learn Mode').

IMPORTANT: The accuracy of System RTI is dependant upon the Learn Mode procedure being followed with great care. System RTI will then far surpass anything that has ever been presented to the Broadcast Industry.

SECTION 3

MENU SYSTEM

3.1 OVERVIEW

3.1.1 The menu system can only be entered if a PAG System RTI or Digital battery is connected to the camera.

3.1.2. There are three main menu sections. One allows the user to edit the system configuration, one allows the user to interrogate screens providing information on power usage and battery details, and one allows the camera to automatically learn the characteristics of the specific camera to which it is fitted.

3.1.3 The first menu section consists of three pages, and is concerned with System Configuration. This section permits configuration for NTSC or PAL, and allows the run-time display format to be selected as hours/minutes/seconds, minutes/seconds or percentage, if so desired. The position and intensity of the character overlay can be varied, and the display time intervals can be selected. The timing of the final warning display (which will appear in the viewfinder regardless of any other settings) can also be chosen from this part of the menu.

3.1.4 The second menu section consists of two pages concerning power usage and battery data. The power usage page displays battery voltage, current consumption and Watts. This is a dynamic display, which changes with load. The readings are accurate to one decimal place and there is a moving bar under each figure to graphically display any changes taking place. The battery information page provides details such as battery type, actual capacity, temperature and the number of cycles to date.

3.1.5 The third menu section consists of five pages which allow the Learn mode to be entered, and contain step by step instructions which will allow the automatic gathering of your specific camera's settings.

3.2 USING THE MENU SYSTEM

3.2.1 The menu system can only be entered within the first four seconds of turning on the camera. This entry method is deliberate, and cannot be achieved accidentally. Connect the battery then turn the

camera ON, and immediately operate the Run-Time OSD (On-Screen Display) switch repeatedly until the menu appears in the viewfinder.

3.2.2 While in the menu system, the PAGlok connector port switches assume special functions as follows:

OSD Switch: Each operation of the switch shifts the cursor down to select any given line on a menu page. The cursor will automatically cycle back round to the top of the page with continued operation of the switch.

Lamp Switch: Enables the user to make a selection from the options available on the selected line. Operation of the switch between AUTO and OFF will cycle through the options available. Operating the switch between AUTO and ON will reverse the order of presentation. While in the menu system, the lamp switch will not operate a lamp which is plugged into the RTI PAGlok lamp port except when the Power Screen is being interrogated (see section 3.3.3.(iv)).

3.2.3 Lines suffixed with a colon (:) allow user commands or input to be made.

3.2.4 RTI will automatically exit the menu system if the camera enters 'Record', or if 'Record' while in the menu. Exceptions to this are:

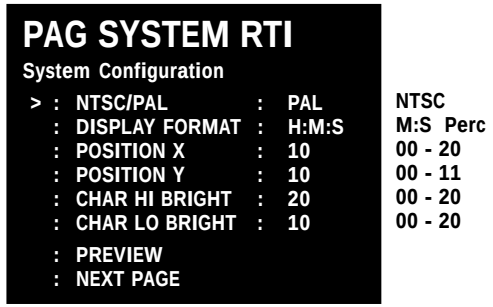
(i) If you are in the 'Power Usage' screen, where it is often desired to run the recorder to check the power consumption.

(ii) If you are in the 'Learn' mode, where it is necessary to run the recorder through the low-voltage cutoff point.

3.3 System Configuration, Power Screen and Battery Information Screen.

3.3.1 Enter the menu system as described in 3.2.1 above. This will present the first of the three System Configuration pages.

3.3.2 System Configuration Page 1.



(i) NTSC / PAL: Move the cursor using the OSD switch until it is pointing to this line. The system may be configured for either NTSC or PAL. Toggle the lamp switch until the desired format is shown. Operate the OSD switch to move the cursor down to the next line.

(ii) DISPLAY FORMAT: The system may be configured to display remaining battery power in hours/minutes/seconds, minutes/seconds, or percent-age of maximum available capacity. Toggle the lamp switch until the desired format is shown. Operate the OSD switch to move the cursor down to the next line.

(iii) POSITION X: The system may be configured to display the RTI overlay in any position on the screen. The 'X' or horizontal position may be adjusted as follows: position '00' is to the left of the screen, position '20' is to the right of the screen. Toggle the lamp switch until the desired position is shown. Toggling between AUTO and ON increases the setting, and toggling between AUTO and OFF decreases the setting. NOTE: in some viewfinders, positioning the overlay too far to the left or right in the screen will result in the overlay being broken up and 'wrapping round'. Reposition as necessary to avoid this. Operate the OSD switch to move the cursor down to the next line.

(iv) POSITION Y: The 'Y' or vertical position may be adjusted as follows: position '00' is to the top of the screen, position '11' is to the bottom of the screen. Toggle the lamp switch until the desired position is shown. Toggling between AUTO and ON increases the setting, and toggling between AUTO and OFF decreases the setting. Operate the OSD switch to move the cursor down to the next line.

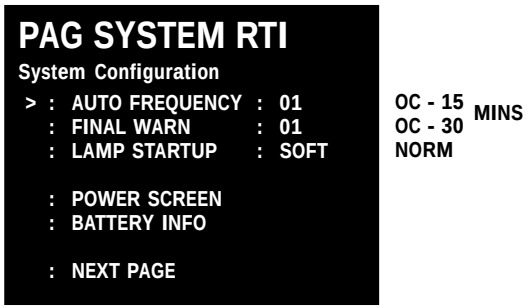
(v) CHAR HI BRIGHT: While in 'Record' mode the RTI overlay is normally displayed in bright characters while. The intensity may be adjusted as follows: level '00' is fully dim, and level '20' is fully bright. Toggle the lamp switch until the desired level is shown. Toggling between AUTO and ON increases the setting, and toggling between AUTO and OFF decreases the setting. Operate the OSD switch to move the cursor down to the next line.

(vi) CHAR LO BRIGHT: The RTI overlay is normally displayed in half-bright characters when 'Standby' mode is entered from 'Record'. The intensity may be adjusted as follows: level '00' is fully dim, and level '20' is fully bright. Toggle the lamp switch until the desired level is shown. Toggling between AUTO and ON increases the setting, and toggling between AUTO and OFF decreases the setting. Operate the OSD switch to move the cursor down to the next line.

(vii) PREVIEW: The above settings may be previewed. Operate the lamp switch to initialise the preview, which will show the character brightness in both intensities, and their position. The preview will be shown twice, and will then automatically return to the menu page. The complete cycle lasts for 5 seconds. Operate the OSD switch to move the cursor down to the next line.

(viii) NEXT PAGE: Page 2 of the System Configuration menu is entered by operating the lamp switch with the cursor pointing to 'next page'.

3.3.3 System Configuration Page 2.

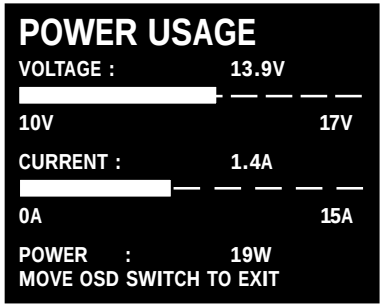


(i) AUTO FREQUENCY: Move the cursor using the OSD switch until it is pointing to this line. In normal operation, the RTI overlay can be displayed automatically at pre-determined intervals by setting the OSD switch to 'Auto'. The frequency of display may be selected within the range '00' to '15' minutes by toggling the lamp switch until the desired time interval is shown. Toggling between AUTO and ON increases the setting, and toggling between AUTO and OFF decreases the setting. The minimum setting '00' turns off the feature. Operate the OSD switch to move the cursor down to the next line.

(ii) FINAL WARNING: In normal operation the RTI overlay can be arranged to come on and stay on, regardless of the position of the OSD switch, at a set time before the recorder shuts off. This is known as the final warning. The time that it comes on can be adjusted from 30 minutes to zero. The minimum setting '00' stops the final warning from being given. Operate the OSD switch to move the cursor down to the next line.

(iii) LAMP STARTUP: The Softstart lamp anti-surge feature can be enabled or disabled. Toggle the lamp switch to select 'soft' or 'norm' as required. Operate the OSD switch to move the cursor down to the next line.

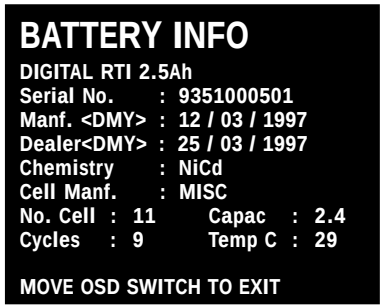
(iv) POWER SCREEN:



An information screen showing power usage may be accessed from this point. Operating the lamp switch enters the screen. While you are in this screen the lamp switch will control the lamp normally so that power consumption can be assessed. When the screen is closed, the lamp will automatically be turned off. Similarly, the Record function may be operated, but the viewfinder will continue to show the power screen. If this

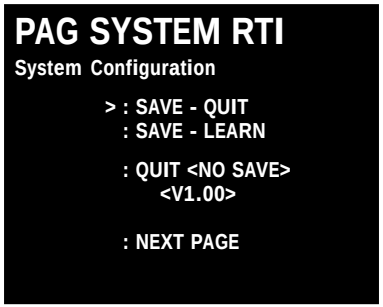
screen is closed while the recorder is running, RTI will automatically exit to normal operating mode. Operating the OSD switch returns to the System Configuration menu.

(v) BATTERY INFO:



An information screen showing a variety of stored battery data may be accessed from this point. Operating the lamp switch enters the screen. Operating the OSD switch returns to the menu.

(vi) NEXT PAGE: Page 3 of the System Configuration menu is entered by operating the lamp switch with the cursor pointing to 'next page'.



3.3.4 System Configuration Page 3.

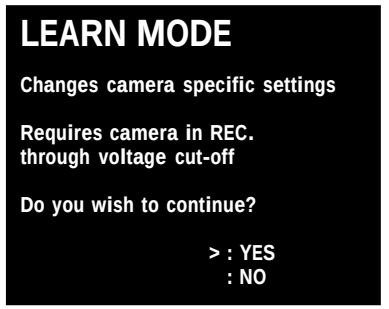
(i) SAVE + QUIT: Move the cursor using the OSD switch until it is pointing to this line. Operation of the lamp switch will save all new configuration settings, and exit to normal operational mode without entering the 'Learn' mode.

(ii) SAVE + LEARN: Move the cursor using the OSD switch until it is pointing to this line. Operation of the lamp switch will save all new configuration settings, and exit to the 'Learn' mode.

(iii) QUIT (NO SAVE): Move the cursor using the OSD switch until it is pointing to this line. Operation of the lamp switch will exit to normal operational mode without entering the 'Learn' mode, and without saving any new configuration settings.

(iv) NEXT PAGE: Move the cursor using the OSD switch until it is pointing to this line. Operation of the lamp switch will take you back to Page 1 of the System Configuration menu.

3.4 THE LEARN MODE



Page 1

Page 2

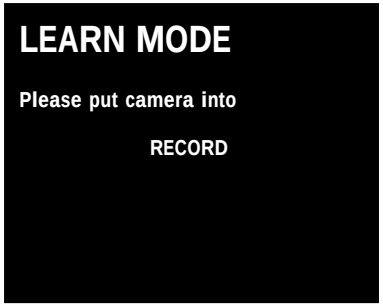
3.4.1 Learn Mode Page 1:

This is an easy-to-follow sequence of four pages which requires you to put the camera through a procedure of commands. These commands, enable the System RTI microcomputer to learn the many camera specific settings.

In 'Learn' mode, it is important that the camera is operated with all the electrical accessories you would normally use. The exception is the light, which you will notice is inhibited while in 'Learn' mode.

The 'Learn' mode must not be performed with a 12V battery; use only a 13.2V or 14.4V PAG System RTI or Digital battery which you will normally use on the camera. Ensure that a tape is inserted that will out-last the expected run-time of the battery. Choose a sufficiently discharged battery to run the camera two or three minutes prior to the low voltage cutoff (a capacity 0.5Ah is the minimum requirement).

Now use the OSD switch to move the cursor until it is pointing to 'YES' and then operate the lamp switch. This will automatically take you into 'Learn' mode page 2. If the camera has already been run through the learn mode, you can return to normal operational mode from this page by using the OSD switch to move the cursor until it is pointing to 'NO' and then operating the lamp switch.



Page 3

Page 4

3.4.2 Learn Mode Pages 2 to 4:
These pages take the user through the sequence necessary for RTI to learn the camera specific settings. Follow the on-screen instructions given for each page.

Many of the features and displays detailed in this section can be user customised or configured. This section assumes that the user has already familiarised him/herself with the menu system.

It is important that the RTI installation has been commissioned on the camera by running it through the 'Learn' procedure (see section 3.4 'The Learn Mode' above).

SECTION 4

INSTRUCTIONS FOR USE

4.1 CONNECTING A BATTERY

4.1.1 Connect a PAG Digital System RTI or Digital SuperPack battery to the camera. If you wish to use the menu system, refer to section 3 above, otherwise switch the camera ON (standby). The battery capacity remaining will be displayed as a digital overlay in the viewfinder, expressed in terms of Ampère hours to two decimal places.

4.1.2 If a battery other than a Digital System RTI or Digital SuperPack is connected, there will be no communication between the battery and the RTI PAGlok, and the phrase 'Not PAG Digital Battery' will be presented. It will not be possible to enter the menu system. Capacity and run-time information will not be available, but the camera will function normally.

4.1.3 Repeated partial discharge of the battery can result in temporary loss of usable capacity. It is undesirable to continue using a battery with such a regime, as the condition is liable to become irreversible. In this event, the capacity or run-time indication will be displayed with an 'X' at the end, to show that the service indicator in the battery has been set. A complete charge followed by a full discharge will clear the condition, and the 'X' suffix will be removed.

4.2 ON-SCREEN DISPLAY

4.2.1 The OSD switch has three positions - OFF, AUTO and ON.

4.2.2 The battery capacity remaining is always displayed when the camera is first powered up, before entering 'record' for the first time, irrespective of the setting of the OSD switch.

4.2.3 In the OFF position the run-time indication will not be displayed until the final warning time is reached. The timing for the final warning may be user-adjusted within the menu system (see paragraph 3.3.3 (ii) above).

4.2.4 In the AUTO position the run-time indication reading will be displayedautomatically at the intervals selected within the menu system (see paragraph 3.3.3 (i) above). The final warning will be displayed at the selected time.

4.2.5 In the ON position the run-time indication reading will be displayed continuously until the camera shuts off.

4.3 LAMP CONTROL

4.3.1 There are two controls available to the user - the lamp switch and the OSD (on-screen display) switch.

4.3.2 The lamp switch has three positions - OFF, AUTO and ON.

4.3.3 In the OFF position the lamp supply is disconnected, and the lamp will not operate.

4.3.4 In the AUTO position the lamp supply becomes available when the 'record' is entered. If the switch fitted to the lamp itself is already turned to the ON position, the lamp will illuminate automatically. The 'Softstart' feature, if turned on in the menu system (see paragraph 3.3.3 (iii) above) will ensure that the recorder does not spontaneously shut down due to the initial current surge. The lamp will be automatically turned off when 'record' is exited. Alternatively, the lamp can be turned off at any time by setting the lamp switch to OFF.

4.3.5 In the ON position the lamp supply is always available. If the switch fitted to the light itself is already turned to the ON position, the lamp can be turned on or off by means of the lamp switch, and the 'Softstart' feature (if enabled in the menu system) will be operative.

4.3.6 To ensure that the 'Softstart' feature (if enabled) operates, it is recommended that the switch on the lamp is left in the ON position, and that the lamp is controlled exclusively by means of the RTI lamp switch.

4.3.7 If a battery other than a PAG Digital System RTI or Digital SuperPack is connected to the camera, the lamp control features will still function, but the 'Softstart' feature will only be available if it has already been enabled in the menu. Only PAG Digital RTI or Digital SuperPack batteries allow access to the menu system.

4.4 USING SYSTEM RTI

4.4.1 Until the camera is put into 'record', the battery capacity remaining will be displayed as an overlay figure in the viewfinder. System RTI continually monitors the battery and the load placed on it. If the camera is left in 'standby' without entering 'record', the capacity reading will be decremented as energy is drawn from the battery.

This capacity reading is displayed regardless of the setting of the OSD switch.

4.4.2 If a PAG Digital System RTI battery is connected, the overlay will change to display the run-time information when 'record' is entered. The information may be displayed continuously, or auto-displayed at the desired intervals
(see section 4.2 'On-screen Display' above). The reading may be expressed in hours/minutes/seconds, minutes/seconds or percentage of battery capacity remaining (refer to section 3.3.2 (ii) above). The percentage indication will be resolved to 0.1% steps.

4.4.3 If a PAG Digital SuperPack is connected, the run-time prediction is not available, and when 'record' is entered an indication of battery capacity remaining will be displayed, resolved to 5% steps.

4.4.4 If the lamp switch is set to AUTO, the lamp will automatically come on when entering 'record', and it will automatically be turned off when 'record' is exited. See section 4.3 'Lamp Control' for full details.

4.4.5 When 'record' is exited, the run-time information is displayed in dim characters, and represents the run-time remaining for when the camera is next in 'record', based upon the current which was last seen by the system while in 'record'. The current consumed by the camera while in 'standby' is continuously monitored and subtracted from the run-time prediction.

4.4.6 System RTI responds immediately to changes in load, such as turning the lamp on or off. The revised run-time prediction or capacity indication is instantly updated and displayed.

4.4.7 When the camera is approaching the cutoff voltage, System RTI can provide a final warning. This will be displayed regardless of the setting of the OSD switch (see section 4.2 'On-screen Display').

4.4.8 When System RTI shows zero time remaining, the camera is about to shut down. The RTI PAGlok incorporates an over-discharge protection circuit which will disconnect the battery if it is discharged below 10.0V.

4.4.9 **It is inadvisable to store the camera with a battery connected.** Even though the camera may be turned OFF, it will continue to draw a small current which will eventually discharge the battery. The PAGlok System RTI connector will protect PAG Digital and Digital System RTI batteries against over-discharge in such situations.