

# **Puritan Ph.C**

## **Motion-compensated Noise Reducer**

# **Operator's Manual**

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Snell & Wilcox Ltd., Southleigh Park House, Eastleigh Road, Havant, Hants, PO9 2PE, United Kingdom.

For General Enquiry's contact: Tel: +44 (0) 2392 489000 Fax: +44 (0)23 9245 1411

For Technical assistance contact: Tel: +44 (0) 2392 489058 Fax: +44 (0) 2392 489057

Web: <http://www.snellwilcox.com/support> Ftp: <ftp://ftp.snellwilcox.com/support>

### Explanation of Safety Symbols



- This symbol refers the user to important information contained in the accompanying literature. Refer to manual.
- This symbol indicates that hazardous voltages are present inside. No user serviceable parts inside. This unit should only be serviced by trained personnel.

### Safety Warnings



Servicing instructions where given, are for use by qualified service personnel only. To reduce risk of electric shock do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel.

- To reduce the risk of electric shock, do not expose this appliance to rain or moisture.
- Always ensure that the unit is properly earthed and power connections correctly made.
- This equipment must be supplied from a power system providing a PROTECTIVE EARTH (⊕) connection and having a neutral connection which can be reliably identified.
- The power outlet supplying power to the unit should be close to the unit and easily accessible

### Power connection in countries other than the USA

The equipment is normally shipped with a power cable with a standard IEC moulded free socket on one end and a standard IEC moulded plug on the other. If you are required to remove the moulded mains supply plug, dispose of the plug immediately in a safe manner.

The colour code for the lead is as follows:

- GREEN/YELLOW lead connected to E (Protective Earth Conductor)
- BLUE lead connected to N (Neutral Conductor)
- BROWN lead connected to L (Live Conductor)



- Caution If the unit has two mains supply inputs ensure that both power cords are plugged into mains outlets operating from the same phase.

### Légende :



- Ce symbole indique qu'il faut prêter attention et se référer au manuel.
- Ce symbole indique qu'il peut y avoir des tensions électriques à l'intérieur de l'appareil. Ne pas intervenir sans l'agrément du service qualifié.

### Précaution d'emploi :



Les procédures de maintenance ne concernent que le service agréé. Afin de réduire le risque de choc électrique, il est recommandé de se limiter aux procédures d'utilisation, à moins d'en être qualifié. Pour toute maintenance, contacter le service compétent.

- Pour réduire le risque de choc électrique, ne pas exposer l'appareil dans un milieu humide.
- Toujours s'assurer que l'unité est correctement alimentée, en particuliers à la liaison à la terre.
- La source électrique de cet équipement doit posséder une connexion à la terre (⊕), ainsi qu'une liaison « neutre » identifiable.
- La prise électrique qui alimente l'appareil doit être proche de celle-ci et accessible.

### Câble secteur de pays autres que les Etats-Unis

L'équipement est livré avec un câble secteur au standard IEC, moulé mâle/femelle. Si vous souhaitez changer la prise mâle de votre cordon, voici les codes couleurs des fils :

- Le fil VERT/JAUNE est connecté à T (Terre)
- Le fil BLEU est connecté à N (Neutre)
- Le fil MARRON est connecté à P (Phase)



- Attention si l'appareil a 2 alimentations, s'assurer que les cordons soient branchés sur la même phase.

### Erklärung der Sicherheitssymbole



- Dieses Symbol weist den Benutzer auf wichtige Informationen hin, die in der begleitenden Dokumentation enthalten sind.
- Dieses Symbol zeigt an, dass gefährliche Spannung vorhanden ist. Es befinden sich keine vom Benutzer zu wartende Teile im Geräteinneren. Dieses Gerät sollte nur von geschultem Personal gewartet werden

### Sicherheits-Warnhinweise



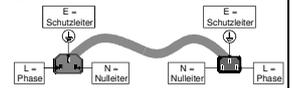
Die angeführten Service-/Reparatur-Anweisungen sind ausschließlich von qualifiziertem Service-Personal auszuführen. Um das Risiko eines Elektroschocks zu reduzieren, führen Sie ausschließlich die im Benutzerhandbuch eschriebenen Anweisungen aus, es sei denn, Sie haben die entsprechende Qualifikation. Wenden Sie sich in allen Service-Fragen an qualifiziertes Personal.

- Um das Risiko eines Elektroschocks zu reduzieren, setzen Sie das Gerät weder Regen noch Feuchtigkeit aus.
- Stellen Sie immer sicher, dass das Gerät ordnungsgemäß geerdet und verkabelt ist.
- Dieses Equipment muss an eine Netzsteckdose mit Schutzleiter angeschlossen werden und einen zuverlässig identifizierbaren Nulleiter haben.
- Die Netzsteckdose sollte nahe beim Gerät und einfach zugänglich sein.

### Netzanschluss in anderen Ländern als der USA

Das Equipment wird im Normalfall mit einem Netzkabel mit Standard IEC Anschlussbuchse und einem Standard IEC Anschlussstecker geliefert. Sollten Sie den angeschweißten Stecker auswechseln müssen, entsorgen Sie diesen bitte umgehend. Die farbliche Belegung des Netzkabels ist wie folgt:

- GRÜN GELB E = Schutzleiter (⊕)
- BLAU N = Nulleiter
- BRAUN L = P = Phase



- Achtung: Wenn das Gerät zwei Anschlussbuchsen hat, stellen Sie bitte sicher, dass beide Netzkabel mit der selben Phase in die Netzsteckdose gesteckt werden.

### Explicación de los Símbolos de Seguridad



- Éste símbolo refiere al usuario información importante contenida en la literatura incluida. Referirse al manual.
- Éste símbolo indica que voltajes peligrosos están presentes en el interior. No hay elementos accesibles al usuario interno. Esta unidad sólo debería ser tratada por personal cualificado.

### Advertencias de Seguridad



Las instrucciones de servicio cuando sean dadas, son sólo para uso de personal cualificado. Para reducir el riesgo de choque eléctrico no llevar a cabo ninguna operación de servicio aparte de las contenidas en las instrucciones de operación, a menos que se esté cualificado para realizarlas. Referir todo el trabajo de servicio a personal cualificado.

- Para reducir el riesgo de choque eléctrico, no exponer este equipo a la lluvia o humedad.
- Siempre asegurarse de que la unidad está propiamente conectada a tierra y que las conexiones de alimentación están hechas correctamente.
- Este equipo debe ser alimentado desde un sistema de alimentación con conexión a TIERRA (⊕) y teniendo una conexión neutra fácilmente identificable.
- La toma de alimentación para la unidad debe ser cercana y fácilmente accesible.

### Conexión de alimentación en otros países que no sean USA

El equipo es normalmente entregado con un cable de alimentación con un enchufe hembra estándar IEC en un extremo y con una clavija estándar IEC en el otro. Si se requiere eliminar la clavija para sustituirla por otra, disponer dicha clavija de una forma segura. El código de color a emplear es como sigue:

- VERDE/ AMARILLO conectado a E (Conductor de protección a Tierra -Earth in the original-)
- AZUL conectado a N (Conductor Neutro -Neutral in the original-)
- MARRÓN conectado a L (Conductor Fase -Live in the original-)



- Advertencia Si la unidad tuviera dos tomas de alimentación, asegurarse de que ambos cables de alimentación están conectados a la misma fase.

**Simboli di sicurezza:**

I

- ⚠ Questo simbolo indica l'informazione importante contenuta nei manuali appartenenti all'apparecchiatura. Consultare il manuale.
- ⚠ Questo simbolo indica che all'interno dell'apparato sono presenti tensioni pericolose. Non cercare di smontare l'unità. Per qualsiasi tipo di intervento rivolgersi al personale qualificato.

**Attenzione:**

Le istruzioni relative alla manutenzione sono ad uso esclusivo del personale qualificato. E' proibito all'utente eseguire qualsiasi operazione non esplicitamente consentita nelle istruzioni. Per qualsiasi informazione rivolgersi al personale qualificato.

- Per prevenire il pericolo di scosse elettriche è necessario non esporre mai l'apparecchiatura alla pioggia o a qualsiasi tipo di umidità.
- Assicurarsi sempre, che l'unità sia propriamente messa a terra e che le connessioni elettriche siano eseguite correttamente.
- Questo dispositivo deve essere collegato ad un impianto elettrico dotato di un sistema di messa a terra efficace.
- La presa di corrente deve essere vicina all'apparecchio e facilmente accessibile.

**Connessione elettrica nei paesi diversi dagli Stati Uniti**

L'apparecchiatura normalmente è spedita con cavo pressofuso con la presa e spina standard IEC. Nel caso della rimozione della spina elettrica, gettarla via immediatamente osservando tutte le precauzioni del caso. La leggenda dei cavi è la seguente:

VERDE/GIALLO cavo connesso ad "E" (terra)  
BLU cavo connesso ad "N" (neutro)  
MARRONE cavo connesso ad "L" (fase)



- ⚠ Attenzione! Nel caso in cui l'apparecchio abbia due prese di corrente, assicurarsi che i cavi non siano collegati a fasi diverse della rete elettrica.

**Forklaring på sikkerhedssymboler**

DK

- ⚠ Dette symbol gør brugeren opmærksom på vigtig information i den medfølgende manual.
- ⚠ Dette symbol indikerer farlig spænding inden i apparatet. Ingen bruger servicebare dele i apparatet på brugerniveau. Dette apparat må kun serviceres af faglærte personer..

**Sikkerhedsadvarsler**

Serviceinstruktioner er kun til brug for faglærte servicefolk. For at reducere risikoen for elektrisk stød må bruger kun udføre anvisninger i betjeningsmanualen. Al service skal udføres af faglærte personer.

- For at reducere risikoen for elektrisk stød må apparatet ikke udsættes for regn eller fugt.
- Sørg altid for at apparatet er korrekt tilsluttet og jordet.
- Dette apparat skal forbindes til en nettilslutning, der yder BESKYTTENDE JORD (⊕) og 0 forbindelse skal være tydeligt markeret.
- Stikkontakten, som forsyner apparatet, skal være tæt på apparatet og let tilgængelig.

**Nettilslutning i andre lande end USA**

Udstyret leveres normalt med et strøm kabel med et standard IEC støbt løst hunstik i den ene ende og et standard IEC støbt hunstik i den anden ende. Hvis et af de støbte stik på strømkablet er defekt, skal det straks kasseres på forsvarlig vis. Farvekoden for lederen er som følger:

GRØN/GUL leder forbundet til J (Jord)  
BLÅ leder forbundet til 0  
BRUN leder forbundet til F(Fase)



- ⚠ Forsigtig Hvis enheden har to lysnetindgange, skal der sørges for at begge ledninger tilsluttes lystnetudgange fra den samme fase.

**Förklaring av Säkerhetssymboler**

S

- ⚠ Denna symbol hänvisar användaren till viktig information som återfinns i litteraturen som medföljer. Se manualen.
- ⚠ Denna symbol indikerar att livsfarlig spänning finns på insidan. Det finns inga servicevänliga delar inne i apparaten. Denna apparat få endast repareras av utbildad personal.

**Säkerhetsvarningar**

Serviceinstruktioner som anges avser endast kvalificerad och utbildad servicepersonal. För att minska risken för elektrisk stöt, utför ingen annan service än den som återfinns i medföljande driftinstruktionerna, om du ej är behörig. Överlåt all service till kvalificerad personal.

- För att reducera risken för elektrisk stöt, utsätt inte apparaten för regn eller fukt.
- Se alltid till att apparaten är ordentligt jordad samt att strömtillförseln är korrekt utförd.
- Denna apparat måste bli försörd från ett strömsystem som är försedd med jordanslutning (⊕) samt ha en neutral anslutning som lätt identifierbar.
- Vägguttaget som strömförsörjer apparaten bör finnas i närheten samt vara lättillgänglig.

**Strömkontakter i länder utanför USA**

Apparaten utrustas normalt med en strömkabel med standard IEC gjuten hankontakt på ena änden samt en standard IEC gjuten hankontakt på den andra änden. Om man måste avlägsna den gjutna hankontakten, avyttra denna kontakt omedelbart på ett säkert sätt. Färgkoden för ledningen är följande:

GRÖN/GUL ledning ansluten till E (Skyddsjordad ledare)

BLÅ ledning ansluten till N (Neutral ledare)  
BRUN ledning ansluten till L (Fas ledare)



- ⚠ Varning! Om enheten har två huvudsakliga elförsörjningar, säkerställ att båda strömkablarna som är inkopplade i enheten arbetar från samma fas.

**Turvamerkkien selitys**

FI

- ⚠ Tämä merkki tarkoittaa, että laitteen mukana toimitettu kirjallinen materiaali sisältää tärkeitä tietoja. Lue käyttöohje.
- ⚠ Tämä merkki ilmoittaa, että laitteen sisällä on vaarallisen voimakas jännite. Sisäpuolella ei ole mitään osia, joita käyttäjä voisi itse huoltaa. Huollon saa suorittaa vain alan ammattilainen.

**Turvaohjeita**

Huolto-ohjeet on tarkoitettu ainoastaan alan ammattilaisille. Älä suorita laitteelle muita toimenpiteitä, kuin mitä käyttöohjeissa on neuvottu, ellei ole asiantuntija. Voit saada sähköiskun. Jätä kaikki huoltotoimet ammattilaiselle.

- Sähköiskujen välttämiseksi suojaa laite sateelta ja kosteudelta.
- Varmistu, että laite on asianmukaisesti maadoitettu ja että sähkökytkennät on tehty oikein.
- Laitteelle tehoa syöttävässä järjestelmässä tulee olla SUOJAMAALIITÄNTÄ (⊕) ja nollaliitännän on oltava luotettavasti tunnistettavissa.
- Sähköpistorasian tulee olla laitteen lähellä ja helposti tavoitettavissa.

**Sähkökytkentä**

Laitteen vakiovarusteena on sähköjohto, jonka toisessa päässä on muottiin valettu, IEC-standardin mukainen liitäntärasia ja toisessa päässä muottiin valettu, IEC-standardin mukainen pistoliitin. Jos pistoliitin tarvitsee poistaa, se tulee hävittää heti turvallisella tavalla. Johtimet kytketään seuraavasti:

KELTA-VIHREÄ suojamaajohtoin E-napaan  
SININEN nollajohtoin N-napaan  
RUSKEA vaihejohtoin L-napaan



- ⚠ Huom! Jos laitteessa on kaksi verkkojännitteen tuloliitäntää, niiden johdot on liitettävä verkkopistorasioihin, joissa on sama vaiheistus.

### Símbolos de Segurança



- O símbolo triangular adverte para a necessidade de consultar o manual antes de utilizar o equipamento ou efectuar qualquer ajuste.
- Este símbolo indica a presença de voltagens perigosas no interior do equipamento. As peças ou partes existentes no interior do equipamento não necessitam de intervenção, manutenção ou manuseamento por parte do utilizador. Reparações ou outras intervenções devem ser efectuadas apenas por técnicos devidamente habilitados.

### Avisos de Segurança

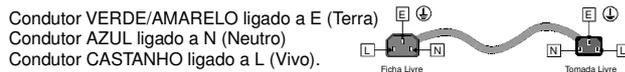


As instruções de manutenção fornecidas são para utilização de técnicos qualificados. Para reduzir o risco de choque eléctrico, não devem ser realizadas intervenções no equipamento não especificadas no manual de instalações a menos que seja efectuadas por técnicos habilitados.

- Para reduzir o risco de choque eléctrico, não expor este equipamento à chuva ou humidade.
- Assegurar que a unidade está sempre devidamente ligada à terra e que as ligações à alimentação estão correctas.
- O sistema de alimentação do equipamento deve, por razões de segurança, possuir ligação a terra de protecção (⊕) e ligação ao NEUTRO devidamente identificada.
- A tomada de energia à qual a unidade está ligada deve situar-se na sua proximidade e facilmente acessível.

### Ligação da alimentação noutros países que não os EUA

O equipamento é, normalmente, enviado com cabo de alimentação com ficha IEC fêmea standard num extremo e uma ficha IEC macho standard no extremo oposto. Se for necessário substituir ou alterar alguma destas fichas, deverá remove-la e elimina-la imediatamente de maneira segura. O código de cor para os condutores é o seguinte:



Atenção: Se a unidade tem duas fontes de alimentação assegurar que os dois cabos de alimentação estão ligados a tomadas pertencentes à mesma fase.

### Επεξήγηση των Συμβόλων Ασφαλείας



- Αυτό το σύμβολο παραπέμπει το χρήστη σε σημαντικές πληροφορίες που συμπεριλαμβάνονται στο συνοδευτικό εγχειρίδιο.
- Αυτό το σύμβολο υποδεικνύει ότι στο εσωτερικό υφίστανται επικίνδυνες ηλεκτρικές τάσεις. Στο εσωτερικό δεν υπάρχουν επισκευάσιμα μέρη. Αυτή η μονάδα πρέπει να επισκευάζεται μόνο από ειδικά εκπαιδευμένο προσωπικό.

### Προειδοποίηση Ασφαλείας

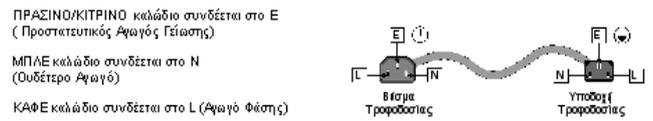


Οδηγίες επισκευής, όπου παρέχονται, αναφέρονται αποκλειστικά και μόνο σε εξειδικευμένο προσωπικό. Για να μειωθεί ο κίνδυνος ηλεκτροπληξίας, μην εκτελείτε επισκευές παρά μόνο τις συμπεριλαμβανόμενες στο εγχειρίδιο των οδηγιών, εκτός και αν έχετε τα απαραίτητα προσόντα για να το κάνετε. Όλες οι επισκευές να εκτελούνται από ειδικά εκπαιδευμένο προσωπικό.

- Για να μειώσετε τον κίνδυνο ηλεκτροπληξίας, μην εκθέτετε τη συσκευή σε βροχή ή υγρασία.
- Πάντα να εξασφαλίσετε τη σωστή γείωση της συσκευής και τη σωστή σύνδεση των συνδέσμων τροφοδοσίας.
- Ο εξοπλισμός πρέπει να τροφοδοτείται από ένα σύστημα τροφοδοσίας που να εξασφαλίζει ΠΡΟΣΤΑΤΕΥΤΙΚΗ ΓΕΙΩΣΗ (⊕) και να έχει καθορισμένες θέσεις ουδέτερου και φάσης.
- Ο εξοπλισμός που τροφοδοτεί τη συσκευή θα πρέπει να βρίσκεται κοντά στη συσκευή και να είναι εύκολα προσβάσιμος.

### Σύνδεση τροφοδοσίας σε χώρες εκτός των ΗΠΑ

Ο εξοπλισμός συνοδεύεται συνήθως από ένα καλώδιο τροφοδοσίας με ένα σταθερό βύσμα τροφοδοσίας ρεύματος τύπου πυραμίδας στη μια άκρη του και μια σταθερή υποδοχή τροφοδοσίας ρεύματος τύπου πυραμίδας στην άλλη άκρη του. Εάν χρειαστεί να αφαιρεστεί το σταθερό βύσμα τροφοδοσίας μην το επαναχρησιμοποιείτε, θεωρείται άχρηστο. Ο χρωματικός οδηγός για το καλώδιο τροφοδοσίας είναι ο παρακάτω:



ΠΡΟΣΟΧΗ! Αν η μονάδα έχει δύο τροφοδοτικά βερβιαθείτε ότι και τα δύο καλώδια τροφοδοσίας είναι συνδεδεμένα σε εξόδους τροφοδοσίας που βρίσκονται στην ίδια φάση.

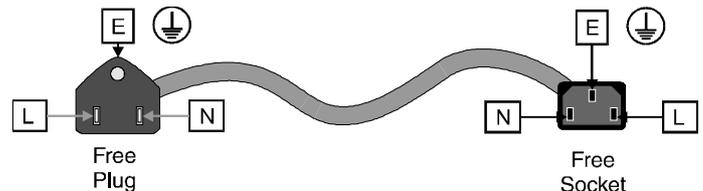
## Products employing Lithium batteries

**CAUTION**  
 This equipment contains a lithium battery.  
**There is a danger of explosion if this is replaced incorrectly.**  
 Replace only with the same or equivalent type.  
 Dispose of used batteries according to the instructions of the manufacturer.  
 Batteries **shall only** be replaced by trained service technicians.

## Power cable supplied for the USA

The equipment is shipped with a power cord with a standard IEC molded free socket on one end and a standard 3-pin plug on the other. If you are required to remove the molded mains supply plug, dispose of the plug immediately in a safe manner. The color code for the cord is as follows:

- GREEN** lead connected to E (Protective Earth Conductor)
- BLACK** lead connected to L (Live Conductor)
- WHITE** lead connected to N (Neutral Conductor)



## For products with more than one power supply inlet

**Caution:** To reduce the risk of electric shock plug each power supply cord into separate branch circuits employing separate service grounds.

## Rack Mounting the Enclosure



**This product must not be rack mounted using only the front rack ears.**



When rack-mounting the product, one of the following methods of installation must be used: -

- Place the unit on a suitably specified, and installed rack shelf and secure the product to the rack via the front rack ears or,
  - Fit the unit using the rear rack mount kit available from Snell & Wilcox by quoting the order code FGACK RACK-MNT-KIT.
-

## Explanation of Safety Symbols



This symbol refers the user to important information contained in the accompanying literature. Refer to manual.



This symbol indicates that hazardous voltages are present inside. No user serviceable parts inside. This unit should only be serviced by trained personnel.

## Safety Warnings



Servicing instructions, where given are for use by qualified service personnel only. To reduce risk of electric shock do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel.

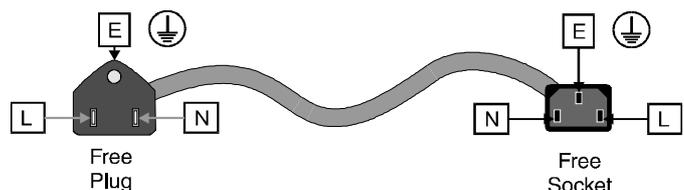
**WARNING** TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

- Always ensure that the unit is properly earthed and power connections correctly made.
- This equipment must be supplied from a power system providing a PROTECTIVE EARTH  connection and having a neutral connection which can be reliably identified.
- The power outlet supplying power to the unit should be close to the unit and easily accessible

### Power cable supplied for the USA

The equipment is shipped with a power cord with a standard IEC molded free socket on one end and a standard 3-pin plug on the other. If you are required to remove the molded mains supply plug, dispose of the plug immediately in a safe manner. The color code for the lead is as follows:

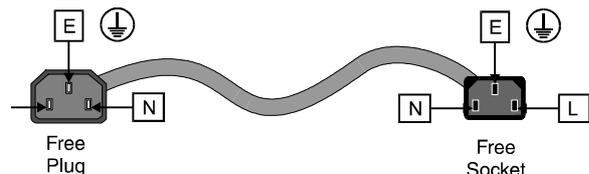
GREEN lead connected to E (Protective Earth Conductor)  
 WHITE lead connected to N (Neutral Conductor)  
 BLACK lead connected to L (Live Conductor)



### Power cable supplied for countries other than the USA

The equipment is normally shipped with a power cable with a standard IEC moulded free socket on one end and either a standard IEC moulded plug fuse (UK only) on the other. If you are required to remove the moulded mains supply plug, dispose of the plug immediately in a safe manner. The colour code for the lead is as follows:

GREEN/YELLOW lead connected to E (Protective Earth Conductor)  
 BLUE lead connected to N (Neutral Conductor)  
 BROWN lead connected to L (Live Conductor)



## Safety Standard

This unit conforms to the following standard:

**BS EN60950:1992** *Specification for safety of information technology equipment, including electrical business equipment.*



## EMC Standards

This unit conforms to the following standards:

### **BS EN 55103-1 : 1997**

Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1. Emission

### **BS EN 55103-2 : 1997**

Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2. Immunity

Federal Communications Commission Rules Part 15, Class A :1998

## EMC Environment

The product(s) described in this manual conform to the EMC requirements for, and are intended for use in, *either*

The commercial and light industrial environment (including, for example, theatres) E2

*or*

The controlled EMC environment (for example purpose-built broadcasting or recording studios), and the rural outdoor environment (far away from railways, transmitters, overhead power lines, etc.) E4

The applicable environment is stated in the Technical Profile section of the product operation manual under "*EMC Performance Information/Environment.*"

## EMC Performance Information

Please refer to the *Technical Profile/Specifications* section of the product operation manual.

## EMC Performance of Cables and Connectors

Snell & Wilcox products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

### COAXIAL CABLES

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 8281 or BBC type PSF1/2M.

### D-TYPE CONNECTORS

D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having "dimples" which improve the contact between the plug and socket shells, are recommended.

## About this Manual

This manual contains information for the operation of the Puritan unit.

Update/revision sheets should replace existing pages when supplied by the agent or Snell & Wilcox Ltd.

Note that the text in the lower left-hand corner of the page shows the release date in day, month, year sequence and the current revision.

## Important Notice

No responsibility is taken by the manufacturer or supplier for any non-compliance to EMC standards due to incorrect installation.

## Packing List

The unit is supplied in a dedicated packing carton provided by the manufacturer and should not be accepted if delivered in inferior or unauthorised materials. Carefully unpack the carton and check for any shipping damage or shortages. Any shortages or damage should be reported to the supplier immediately.

### Enclosures:

- Puritan Unit
- Operator's Manual
- Power cable
- Spare Fuse 6.3 A (T)
- RS422 Cable

## Manufacturers Notice

Copyright protection claimed includes all forms and matters of copyrightable material and information now allowed by statutory or judicial law or hereinafter granted, including without limitation, material generated from the software programs which are displayed on the screen such as icons, screen display looks etc.

Reproduction or disassembly of embedded computer programs or algorithms is prohibited.

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## Software Version Amendments

**Notes about Version Fitted - none**

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## ***Product Support Procedure***

If you experience any technical or operational difficulties with a Snell & Wilcox product please do not hesitate to contact us or utilize our online form to request assistance.

There is a lot of information you can give us that will enable us to diagnose your problem swiftly. Please read the following guidelines, as these suggestions will help us to help you.

### **Basic Information**

For Units ..... Please provide the exact product Model, unit Serial Number and Software Version information.

For Cards or Modules . Please provide the Sub-Assembly Number, card Serial Number and the Software Version information.

### **Basic Application**

Inputs ..... Please provide full details of the Input Signals being used including any references etc. and where they are being generated.

Outputs ..... Please provide full details of the Output Signals required and how they are being monitored.

System ..... Please provide a brief description of the system in which your S&W equipment is currently being used.

### **Basic Tests**

Preset Unit ..... Please use the Preset Unit function to return the settings back to the factory default.

RollCall ..... Is your unit currently connected to a RollCall capable PC? This software is obtainable for free and provides a very user friendly GUI for virtually all S&W equipment - perfect for complex products, large systems or those with passive front panels.

Card Edge Info. .... What is the status of the card edge LEDs or display? These can often provide information such as power status and input detection conditions.

Internal TPG ..... Many S&W products have an internal test pattern/tone generator. Please activate this to assist you with your problem analysis.

In addition to the above, please do not forget to provide us with all of the necessary contact information:

- Names
- Telephone & Fax numbers
- e-mail addresses
- Business address

A form has been provided for this information and will be found on the next page or an on-line form is available on the Snell & Wilcox website at:

<http://www.snellwilcox.com/support/request>

## Product Support Request Form

<b>Name: *</b>		
<b>Company:</b>		
<b>Address Details: *</b>		
<b>Post/ZIP Code:</b>		
<b>Country: *</b>		
<b>Telephone: *</b>		
<b>Fax:</b>		
<b>Email: *</b>		
<b>Local S&amp;W Center: *</b>		
<b>Product Name: *</b>		
<b>Product Type: *</b>	Switchers (i.e. Magic DaVE, Switchpack, Kahuna)	
	File & Data Transfer Products (i.e. RollCall, Memphis & Asteroid)	
	Video Products (i.e. Modular, Kudos Plus and Alchemist)	
<b>Unit Serial Number: *</b>		
<b>Fault/Spare Part Information: *</b>  (please advise us how many units show this fault and the system layout showing all other manufacturers' products)		
<b>* Preferred Method of Contact:</b>	e-mail	
	Phone	

- Item is required.

<b>Please mail to:</b> Snell & Wilcox Ltd., Southleigh Park House, Eastleigh Road, Havant, Hants, PO9 2PE. United Kingdom.	<b>Service Contact Information:</b> Tel: +44 (0) 2392 489058 Fax: +44 (0) 2392 489057 <a href="http://www.snellwilcox.com/support">http://www.snellwilcox.com/support</a> <a href="ftp://ftp.snellwilcox.com/support">ftp://ftp.snellwilcox.com/support</a>
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## Description

Film Grain, dirt, scratches and dropouts are examples of impairments that can be detected and repaired by the real-time operation of the Snell & Wilcox Puritan Noise Reducer. Puritan's software is flexible enough to allow the user to decide, at any time, whether or not to change settings or to protect regions within the picture.

Puritan utilizes Ph.C Phase Correlation, the multi-award-winning motion estimation technology unique to Snell & Wilcox, enabling the noise reduction circuitry to differentiate between noise and motion within the footage. The reduction of noise can therefore be carried out in areas of high movement, where existing commercial equipment would switch off. Puritan comprises a 6RU unit for stand-alone operation or can be connected to 3rd party equipment - details on application - to provide third party control.

Application Control:

The innovative design of Puritan ensures that the operator has full control over how the noise

reduction process is carried out. For general purpose material or material that has a lower commercial value, a single pass operation in most cases will be sufficient. Source material is played off tape (or film) directly into the equipment and passes through to the recording medium of your choice. Control of the parameters are from either the front panels or using RollCall, the powerful protocol common to Snell & Wilcox products. This application allows for a single pass from tape to tape with the minimum of user interaction.

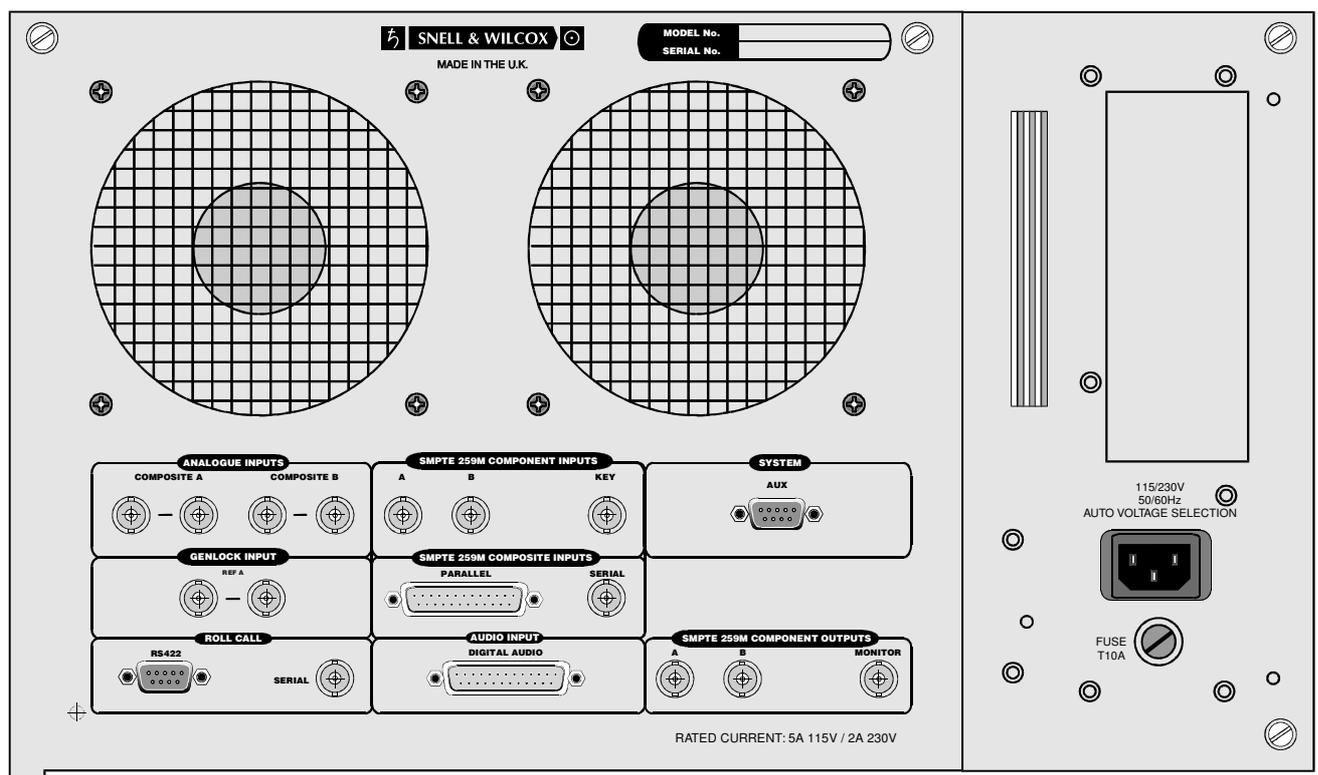
Alternatively, for more commercially sensitive material, timeline control can be applied with the addition of third party control platforms. This allows the operator to go back over specific areas of interest and amend the results to accurately match the users needs.

The real-time capability, coupled with the flexible system control, ensures that Puritan now makes the repair of all material commercially viable - fully maintaining the users high quality requirements whilst preserving the ever valuable bandwidth.



## Features

- Real-time restoration of a wide variety of film and video impairments
- Motion compensated processing using Ph.C technology
- State-of-the-art restoration algorithms collaboratively developed by BBC Research, Snell & Wilcox, INA, the University of Cambridge and the University of Delft.
- Motion compensated recursive filtering used to reduce broadband noise and film grain. The application of motion compensation to noise reduction substantially increases its effectiveness by allowing the noise reducer to function even with moving objects
- Motion compensated dirt and dropout concealment. By compensating for movement between frames, even large dirt and dropouts can be concealed. A sophisticated real-time picture analysis technique prevents picture content from causing false alarms
- Automatic vertical film scratch and two-inch video and helical scan scratch detection and concealment.
- Powerful wavelet-based spatial noise reduction techniques can be used to reduce noise and can be tuned to remove periodic impairments such as cross-effects and co-channel interference
- Suite of linear filters incorporating Gaussian, echo cancellation and other band-limiting filters
- Sophisticated non-linear enhancer. Edge detection and compression algorithms enhance low-level picture details without introducing overshoots or increasing noise content



# Technical Profile

## Signal Inputs

Serial Digital	To Rec 656 standard (with embedded audio) via 2 x BNC connectors.
Genlock Reference	Loop-through input via BNC connectors. Analog Black and Burst

## Signal Outputs

SMPTE 259M - C Outputs	2 off Outputs
Output Return Loss	Better than 17 dB at 270 MHz

## Communications

Network Control	RollCall via BNC connector
-----------------	----------------------------

## System

Input Select	SDI-A, SDI-B
Input Standard Select	625, 525 or Auto Select
Input Type	Video, Film
Film Phase	Auto 2:2 phase detect. Overrides: f1>f2, f2:f1 (625) Auto 3:2 phase detect. 660ms ( 625Lines 50Hz )
Latency	Off / Input / External Reference
Genlock	0 to 863 pixels (625)
Genlock Horizontal Timing	0 to 857 pixels (525) in steps of 1 pixel.
Genlock Vertical Timing	0 to 624 (625) or 0 to 524 (525) lines in steps of 1 line
Utilities	Monochrome
<i>Demonstration Keys</i>	Allows split screen facilities to monitor effect of digital filtering applied to the key area only Off, H-Split, V-Split, H-Repeat, PhC Repeat
Rollcall	RollCall Name
Patterns	LogServer and Logging On/Off Internal Test patterns Black/EBU Bars/100% Bars/100% Ramp/UV Ramp/Y Sweep/UV Sweep/Bowtie

## Signal Processing Specifications

### Dirt

(Controls the parameters of the dirt detector)	
Level	Sets for dirt filter -3 to -1, Normal, 1 to 9
Type	Controls the type of dirt to be filtered:- All, White + Dust, Black + Dust, White, Black, Black + White, Dust
View	View detected dirt and protected areas

### Tramline Scratch

Scratch strength	Variable 1-4, Full
Scratch Width	Variable scratch width setting, range 1 to 5
Overshoot	Scratch overshoot correction 1 to 4
View	View detected scratch.

## Signal Processing Specifications

### Noise and Grain Recursive Filter

(Motion-compensated Recursive Noise reduction)	
Level	This defines the maximum amount of recursive noise reduction, level 0-15
Threshold	This defines the sensitivity of the recursive filter to movement, level Auto/1-15
Fallback	This defines the amount of spatial fallback, level 0-15
View	View corrected recursive noise

### Enhancer

(Spatial 2D enhancer utilizing separately derived non-linear and linear edge detection and compression)	
Gain	range -7 to +31
Coring	range 0 to 4
Horizontal Boost	1MHz to 5MHz
Frequency	
H/V Balance Advanced	range -15 to +15
Diagonal Control	range -2 to +2
Adaptation	off/med/full

### Dropout

(Non correlated dropout enable/disable)	
Level	On/Off
View	View detected dropouts

### Spatial Filter

(Multiband spatial filter)	
Luminance/Chrominance	AUTO, 0- 31 Level Setting for each band
Spatial band	high frequency diagonal, vertical, horizontal low frequency diagonal, vertical, horizontal
View	View detected noise for <u>all</u> spatial bands
Solo	View detected noise <u>within</u> selected band
Keys	
Keys 1 to 4	Up to 4 rectangular user defined keys can be specified to control the area processed by the dirt or scratch filter. If none of the keys are enabled the entire picture is processed. The keys are processed on a priority basis, highest enabled key number has priority. Key controls for each key are:-

Key	Key Enable
Dirt/Tramline	Select which filter is to be processed by the key
Left	Left key coordinate in Y pixels
Width	Key width in Y pixels
Top	Top of key as a percentage of picture height
Height	Height of key as a percentage of picture height
Invert	Process area outside the key
View	Colored overlay for key if key is enabled.

### 2 Inch Scratch

(Filter targeted specifically at repetitive defects from 2 inch tape machines)	
Repeat	Special filter for correlated scratches
Rep Level	range 1 to 62
View	View detected scratch

**Signal Processing Specifications****Linear Filter**

(15 tap linear digital filter)

Mode

Brickwall with Boost, Brickwall,  
Gaussian

Cut-Off

Full bandwidth 4.2MHz to 2.5MHz  
Brickwall Low Pass.

Boost

Can be used to correct for HF  
loss with boost setting on full  
bandwidth. Level :  
None/1/2/3/4.5/6dB**Signal Processing Specifications**

Cut-Off

Extra low pass filters, no boost  
2.44MHz to 0.94MHz

Gaussian

Gaussian filters can be used to  
de-enhance previously enhanced  
material without substantial loss  
of horizontal resolution.

View

-4 to -40dB (6.75MHz) in 4dB  
steps.

View removed noise

# Installation

## Unpacking the Puritan

The unit is packed in a single flight case. The contents of the flight case are as follows:

- 1 Puritan unit
- 1 Power cable
- 2 Spare a.c. power fuses 6.3 A (T)
- 1 Operating Manual
- RS422 Cable

Unpack the flight case carefully and check for any shortages or shipping damage. Immediately report any shortages or damage to Snell and Wilcox Limited.

## POWER CONNECTIONS

### Power Supply

Mains power is supplied to the unit via a filtered IEC connector.

The mains power fuse rating is 6.3 A (T) and the rated current for the unit is 4.5 A at 115 V and 2.2 A at 230 V.

The power supply ON/OFF switch is located on the front of the power supply inside the front panel.



### CAUTION:

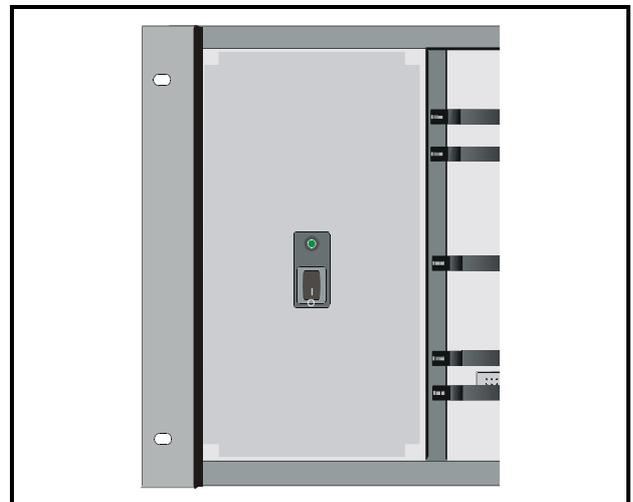
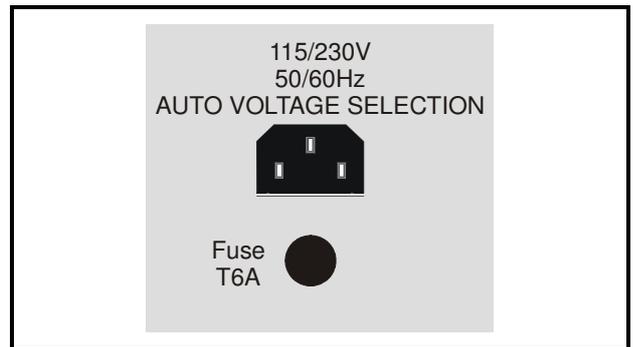
*Note that the fan ventilation holes on the rear panel must not be obscured.*

## Supply Voltage

The power supply is auto switching for the rated input voltages.

No voltage adjustment procedure is required.

**CAUTION THIS UNIT MUST NOT BE  
OPERATED WITHOUT  
AN EARTH CONNECTION.**



## Environment

Although ruggedly constructed to meet the normal environmental requirements, it is important that there is a free flow of air at the front and rear to dissipate the heat produced during operation. Installations should be designed to allow for this.

If servicing is to be carried out in situ allow space (approximately 230mm) at the rear for the rear panel to be hinged down.

## Remote Control

The unit may be controlled via the RollCall remote control system from an active front panel.

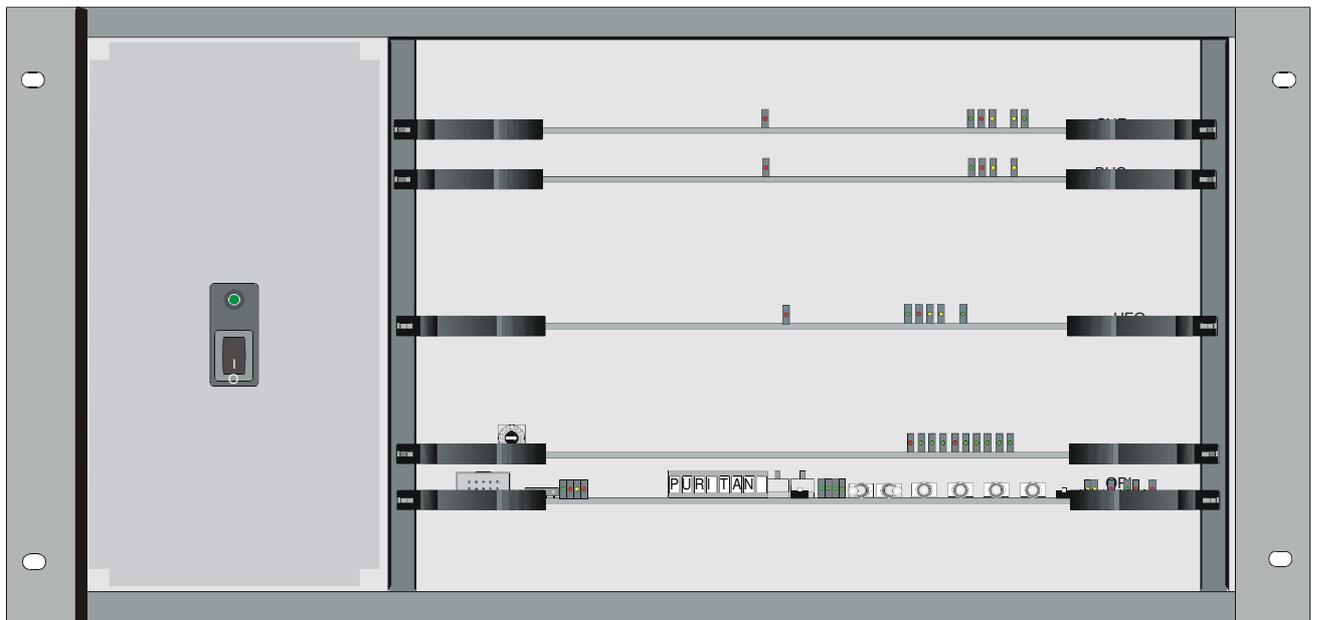
For details of the menu system see Section 4 page 4.18, and for details of the RollCall system consult the Modular System Operation manual.

## OPENING THE FRONT PANEL

To open the front panel start by grasping the panel at either end, lifting up the two black levers, pulling the panel slightly forward and then hinging it to the left.

The Rack mount fixing “ears” are revealed when the panel is open.

Refit the front panel by pushing it back into position (the levers will click into place)

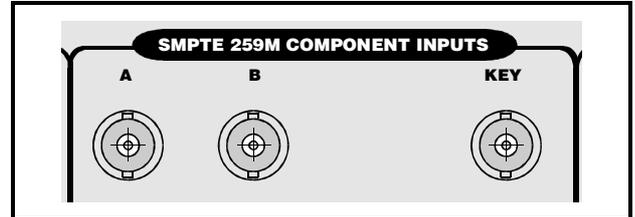


## CONNECTIONS

All the connectors are mounted on the rear panel of the unit and are appropriately annotated.

### SMPTE259M Component Inputs – A ,B

These are the two SDI serial digital inputs.

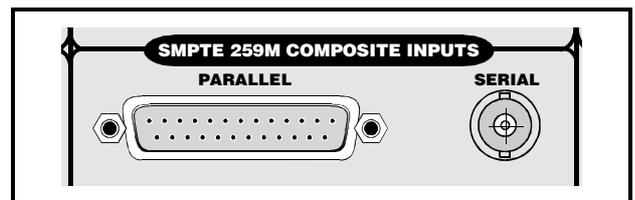


### SMPTE259M Component Inputs - KEY

This input is not used.

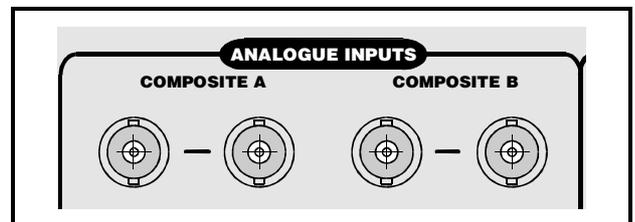
### SMPTE259M Composite Inputs

These inputs are not used.



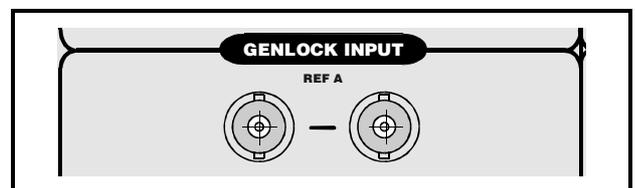
### Analogue Inputs

These inputs are not used.



### Genlock Input

An external analog reference signal may be connected to these loop-through BNC connectors.

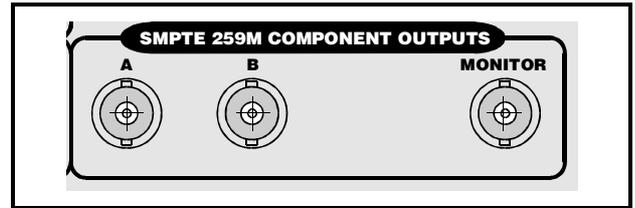


### SMPTE259M Component Outputs

Puritan provides two serial D1 outputs.

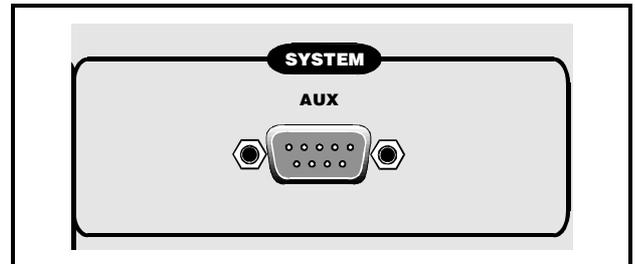
#### Monitor

This is provided for factory test only.



### System Aux

This is a RS422 slave interface which may be used to control Puritan by a control device.



### RollCall

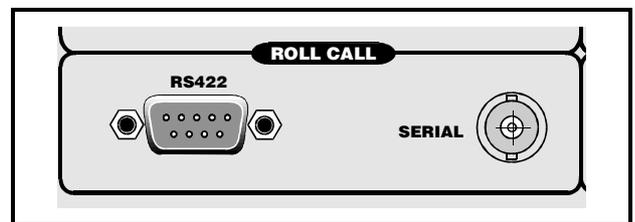
The unit can be controlled via this BNC connector using RollCall.

The RollCall system should be connected using 75 Ohm "T" pieces in a similar manner to an "Ethernet" system. Both extremities of the system must be terminated in 75 Ohms. The RS422 input is not used.

A unique address for each unit on the RollCall system must be set. This is done from the Setup-RollCall Menu

If an address is already in use the RollCall™ the address must be changed and the power cycled.

Note that in a RollCall™segment, all units must have different unit address codes. For more information see RollCall™ section.



**Note** The coaxial link is bi-directional and therefore must not be passed through signal switching networks. Also, to allow hum and noise cancellation the screen of the coaxial connection must not be earthed.

### Switching On

Open the control panel. Check that power is connected to Puritan and that the power supply is switched ON by pressing the black rocker switch on the Power Units. The alphanumeric display will appear on the control panel.

## Operation

### GENERAL OPERATING PRINCIPLES

There are three methods of operating the Puritan:

- 1) By using the front panel controls as described in this manual.
- 2) By using a remote control PC or Shoebox via the RollCall control system.

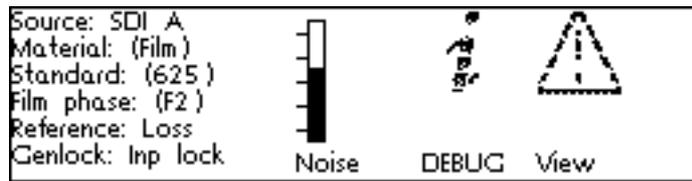
### OPERATION USING THE FRONT PANEL CONTROLS

#### *The Puritan Front Panel*



The Puritan front panel comprises a Display Window, eight Soft Push Buttons (four buttons located on each side of the Display Window), four Spin Wheels (located below the Display Window), three Generic Push Buttons (**preset** , **home**  and **back** ) and seventeen Dedicated Push Buttons (located on the right hand side of the Front Panel). There is an LED inside each Dedicated Push Button.

### *The Home Status Screen*



When the Puritan unit has powered up, the Home Status Screen is displayed in the Display Window. The Home Status Screen displays the current system set-up. This includes the status of input signals, the noise level, and an animated graphic showing film or video, indicating the presence of a valid input.

The space to the right of the Noise bar is reserved for information icons and warning icons.

The Home Status Screen may be accessed from any position in the menu hierarchy by pressing the **home**  button.

**Input Signal Status**

Up to five lines indicating Input Signal Status may be displayed:

Line	Title	Possible Value	Explanation
1	InputSource	SDI A SDI B	Input A Input B
2	SourceMaterial	Film Video (Film) (Video) Error	Manual Film mode Manual Video mode Automatic Film mode Automatic Video mode Manual is not the same as automatic
3	Standard	625 525 (625) (525) Loss Error	Manual 625 Manual 525 Automatic 625 Automatic 525 Input Loss Manual is not the same as automatic
4	Film Phase 625 lines	F1 F2 (F1) (F2) 1:1 (1:1) Error	Manual field 1 Manual field 2 Automatic field 1 Automatic field 2 Video mode set manually Video mode detected automatically Manual is not the same as automatic
4	Film Phase 525 lines	(3:2) F1,F2,F3,F4,F5 1:1 (1:1) Error	Automatic 3:2 detection Fixed 3:2 offset Video mode set manually Video mode detected automatically Manual is not the same as automatic
5	Reference	(625) (525) Input Error	Reference input is 625 lines Reference input is 525 lines In input locked mode the external reference input is not used Reference standard is not the same as input standard
6	Genlock	Free Run Ref Lock Input Lock	Free Running Locked to reference Locked to input

**Noise Bar**

The Noise bar provides a visual indication of the noise floor level.

### **Navigation, Menu Selections and Settings**

A menu may be selected by pressing one of the 17 circular Dedicated Push Buttons on the right hand side of the Front Panel. The corresponding menu is then displayed in the Display Window.

The following Dedicated Push Buttons are available:

- The noise and grain filters **recursive**, **spatial** and **linear**.
- The **enhancer**.
- The film filters **dirt** and **tramline**.
- The video filters **dropout** and **2 inch**.
- The tramline keys **1**, **2**, **3** and **4**.
- The menus **profile**, **memory**, **input**, **setup** and **utils**.

When a menu has been selected, up to eight labels may appear in the Display Window (up to four on each side). Each label is associated with its adjacent square Soft Push Button.

On pressing a Soft Push Button:

- If the label is the name of a sub-menu, that sub-menu will be displayed in the Display Window.
- If the label indicates a setting option, it will become illuminated; any previously illuminated label indicating an alternative option for that setting will cease to be illuminated.
- If the label indicates a toggle setting it will change its state from not illuminated (disabled) to illuminated (enabled) or vice versa.

---

If a filter or a key is enabled, the LED in the corresponding Dedicated Push Button is illuminated. If the "View" setting for a filter or a key is enabled, the LED in the corresponding Dedicated Push Button flashes.

In some menus and sub-menus, a numeric setting or a list of options may appear above one or more of the four Spin Wheels located below the Display Window. By rotating the appropriate Spin Wheel the value of the numeric setting may be increased or decreased, or a higher or lower option may be selected from the list.

Pressing the **back**  button effects a return to the last menu that was visited. Up to 20 menus may be retraced using this function.

Pressing the **preset**  button returns all settings of the displayed menu to default settings.

Pressing the **home**  button effects a return to the Home Status Screen.

## ***FILTER MENUS***

### **Recursive Filter**

#### **Overview.**

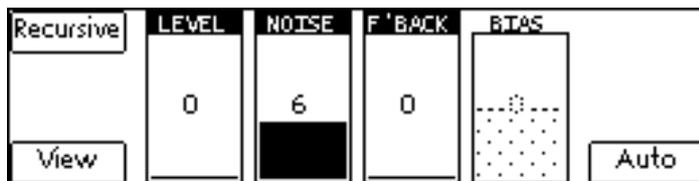
Recursive filters reduce noise by temporally averaging successive pictures. Utilising a delay of exactly one picture or frame, noise can be reduced in stationary areas without loss of spatial (horizontal and vertical) resolution.

Until now, areas of movement in the picture have resulted in the recursive filter adapting its noise reduction level using sophisticated control logic in order to ensure that picture detail is preserved, and artifacts are avoided. However, by building on this existing control logic and introducing PhC motion compensation, areas of movement can now be temporally noise reduced just as effectively as stationary areas. This is the difference between motion adaptive, and motion compensated noise reduction, and is one of the reasons why this recursive filter gives such impressive results.

Another feature unique to this recursive filter is its sophisticated spatial fallback option. Previously, spatial filtering has been cascaded with recursive filtering such that the spatially filtered video is used as the input to the recursive filter. Now, for the first time, the recursively-filtered picture is blended with a spatially filtered picture. This technique allows a higher level of noise reduction when the recursive is unable to perform optimally, for example after a scene change as the recursive filter builds up to an optimum level after a few fields. In this case, the spatially filtered video takes precedence, and over a few fields the spatial contribution decreases as the recursive contribution increases. This blending function is controlled by complex logic to allow a seamless transition, thus resulting in a uniform level of noise reduction across the entire picture.

Moreover, a complex noise-floor measurement algorithm is introduced to allow automated adjustment of the threshold control to a level that is just above the noise floor. This allows optimum noise reduction over any noisy source material.

#### **Controls.**



#### **Enable**

The “Recursive” button may be toggled to enable and disable the recursive filter.

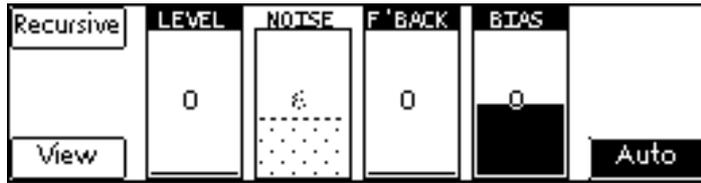
#### **View**

The recursive “View” control allows the user to directly view the difference between the current and previous pictures in effect the amount of noise reduction the recursive filter is currently achieving. To see the “view image” the filter must be enabled.

#### **Level**

The “LEVEL” control changes the amount of noise reduction for both luminance and chrominance by limiting the maximum level of noise reduction, where 15 is maximum and 0 is minimum. The actual level of noise reduction is dynamically adjusted on a pixel-by-pixel basis with regard to the noise reduction setting for the same pixel in the previous frame. Other factors such as movement contribute to the current pixel setting. This mechanism ensures that the optimum level of noise reduction is applied to each pixel. Noise

The “NOISE” control sets the threshold for the motion detector. The lowest level of 0 gives the greatest sensitivity to motion, but allows more noise to break through, while 15 gives the greatest noise reduction but can lead to excessive filtering of low-level textures. When this is set to auto the threshold is dynamically set to an appropriate value for the current input noise level.



**Auto Threshold Bias**

The “Auto” button provides access to the auto threshold mode. The noise detection algorithm may be given a subjective bias to give more or less noise reduction. When the “Auto” button is enabled, the “NOISE” control changes to “BIAS” control. Modification of the bias should not be necessary under normal circumstances.

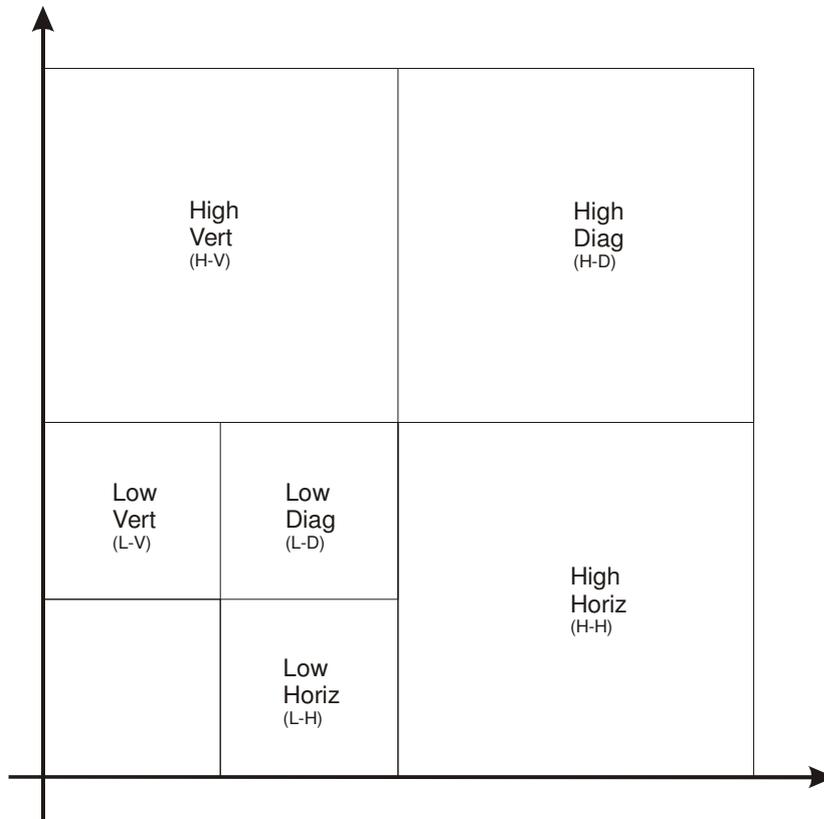
**Fallback**

The “F’BACK” control adjusts the level, or strength, of spatial filtering used in the spatial/recursive blend. It does not adjust the ratio of the blend; this is done automatically to give the optimum results.

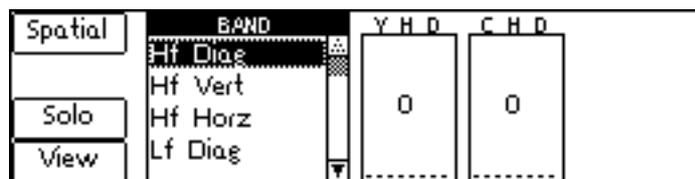
**Spatial Filter**

**Overview.**

The spatial filter is a wavelet based spatial decomposition filter. The image is decomposed to form 9 bands of different horizontal and vertical resolutions. Each band may be filtered at a different level; this allows the filter to effectively target impairments with specific spatial characteristics such as cross-colour, whilst leaving other picture detail unaltered. The different bands of the filter can be seen in the diagram below.



## Controls



### Enable

The "Spatial" button may be toggled to enable and disable the spatial filter.

### Solo

The "Solo" button allows the user to view the noise reduction in an individual band. The band is selected using the "BAND" control. To view this single band's contribution, both "Enable" and "View" must be selected.

### View

The spatial "View" button allows the user to see how much of the impairment is being removed by the spatial filter. This facility makes it easier to select the appropriate level and band to specifically target the impairment whilst preserving the image detail. To see the overall effect of the spatial band filtering (all bands) the "View" must be selected and the "Solo" disabled.

### Band

The "BAND" control selects the active band of the filter for control and adjustment purposes. To check the level of the nine bands use this control to scan through each band in turn. This control is also used to determine which band will be active when "Solo" is enabled. The bands are:-

Band	Luma Level	Chroma Level	Description
H-D	Y H-D	C H-D	High Frequency Diagonal
H-V	Y H-V	C H-V	High Frequency Vertical
H-H	Y H-H	C H-H	High Frequency Horizontal
L-D	Y L-D	C L-D	Low Frequency Diagonal
L-V	Y L-V	C L-V	Low Frequency Vertical
L-H	Y L-H	C L-H	Low Frequency Horizontal

### Luma and Chroma Level

The level of filtering in each band can be individually controlled for luma and chroma. To adjust the level in the specific band, use the "BAND" control to select the desired band then adjust the level to achieve the desired level of filtering. The title above the bar graph of the level indicates which band has been selected.

A level of 0 means no filtering is applied. Increasing the level increases the filtering; 31 is the maximum.

### Linear Filter

#### Overview.

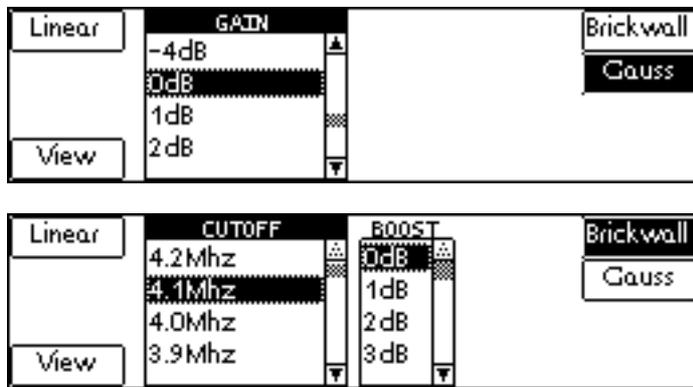
A suite of linear filters allows fine control of the horizontal bandwidth of the luminance signal.

Brickwall low-pass filters ranging from 2.5MHz to 4.2MHz provide good band-limiting facilities for MPEG encoders that use half resolution processing. These filters also provide variable peaking or boosting at each of the selected cut-off frequencies. The overall perception of picture sharpness can be raised by boosting prior to brickwall filtering.

The ten sets of Gaussian low-pass filters gently attenuate high frequencies and can be used to correct material which has previously been boosted or enhanced as well as reducing high frequency noise.

Similarly, five sets of Gaussian high-pass filters provide variable correction of high-frequency luminance that may have been attenuated from faulty distribution links or analogue VTR processes.

#### Controls



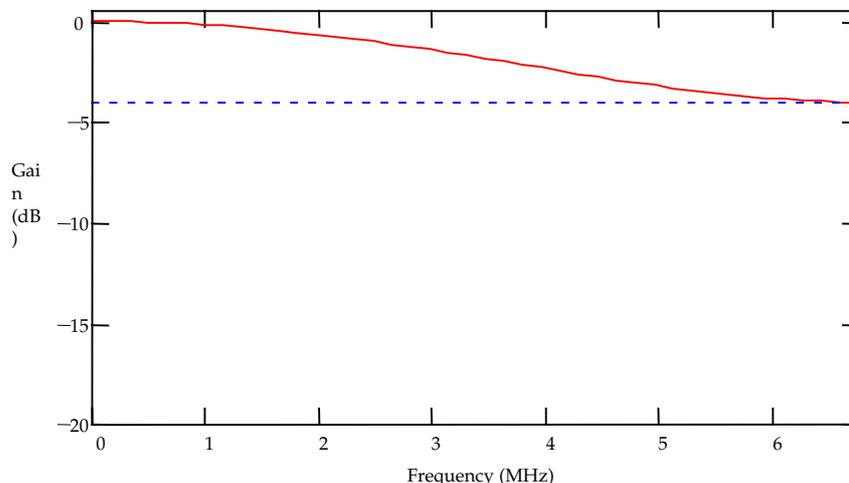
#### Enable

The "Linear" button may be toggled to enable and disable the linear filter.

#### Gaussian Low Pass

The *low-pass* filter mode is employed to noise reduce with less severity than the brickwall filter and/or to compensate for any irregularities in the luminance signal such as inherent high frequency gain.

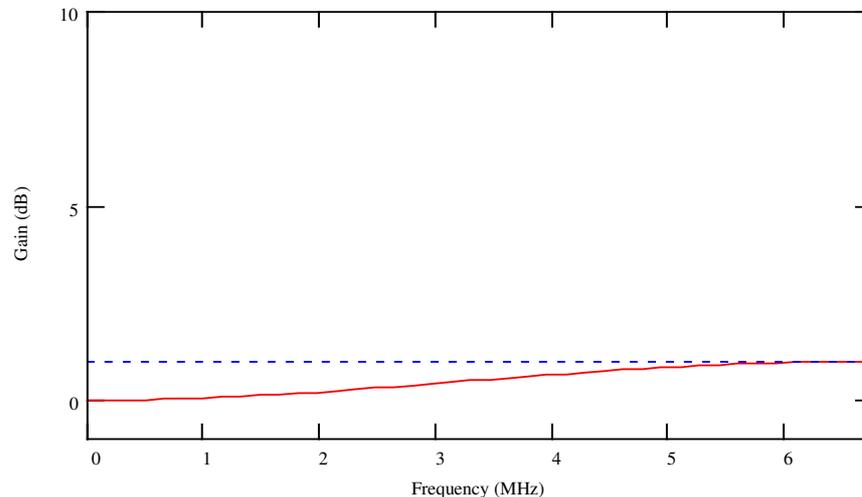
This mode has 10 user selectable levels at 6.75 MHz ranging from -4dB to -40dB in -4dB steps.



**Gaussian Low Pass Filter with -4dB Gain**

### Gaussian High Pass

The *high-pass* filter mode is employed to compensate for high frequency attenuation in the luminance spectrum. This high frequency attenuation may be mainly caused by stray capacitance inherent throughout the cables of an installation. This mode has 5 user selectable levels at 6.75 MHz: 1 dB, 2 dB, 3 dB, 4.5 dB, 6 dB.



**Gaussian High Pass Filter with 1 dB Gain**

### Brickwall Low Pass

The *brickwall low-pass* filter mode is employed to reduce noise resident in the high frequency region of the luminance spectrum.

This mode has 18 user selectable cut-off frequencies (specified at  $-6$  dB) ranging from 4.2 MHz down to 2.5 MHz in 0.1 MHz steps. The stop-band performance is  $-34$  dB or better with no boost.

In addition to the selectable cut-off frequencies the user can also select a given boost at each cut-off: 0 dB (no boost), 1 dB, 2 dB, 3 dB, 4.5 dB, 6 dB.

There are a further 6 Extra Low Pass filters with cutoffs from 2.44MHz to 0.92MHz, the boost at the cut off frequency is not available for these filters.

The boost value selected is the amount of gain applied to the filter response at the chosen cut-off frequency. The selectable boost facility is incorporated to allow the user to increase the perception of sharpness in the picture by boosting the contrast. The sharpness of a picture can sometimes be significantly reduced by filtering the high luminance frequencies so the inclusion of the extra boost helps to restore some of the sharpness to the picture. A boost of 6 dB will result in the cut-off frequency being increased by up to 0.4 MHz. The actual amount of boost selected will be a trade-off between cut-off and picture sharpness.

### Linear View

The linear view control allows the user to directly view the difference between the input and the output from the linear filter. The signal represents the value of the correction which would be applied to the picture. The polarity of the output signal can be either positive or negative depending on the polarity of the picture so the output is displayed on a grey pedestal. Positive correction values will extend towards white and negative correction values will extend towards black.

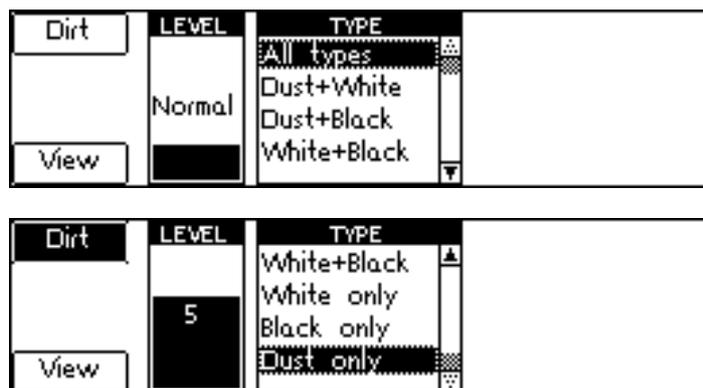
## Dirt

### Overview

Dirt is a very common form of impairment in both old and new film and can have a wide diversity of characteristics. The keys can be used to restrict this filter to a user-defined area of the picture.

### Controls

The dirt filter has two controls, Level and Type.



### Level

The default value for this control is **Normal** and should be used most of the time. It is an optimised setting.

If some low contrast picture content (such as helicopter rotor blades for example) is being damaged, then levels -1 to -3 can be used to correct this artefact.

On the other hand, if some residues or shadow of dirt are still present, then levels 1 to 3 can be used to reduce them.

Levels 5 to 9 are respectively more aggressive settings that can be used on pictures with slow or no movement when the level of dirt concealment with the Normal setting is not satisfactory.

Please note that with the "Dust only" setting, the level setting has no effect.

### Type

In many materials the types of dirt include black dirt, white dirt and dust. In this case the "All types" setting should be used. If there is only one type of dirt present, then there is no need to try to remove other types since it could lead to the introduction of artefacts. In this case, just select the type of dirt you want to remove. For example, if the material only contains small pieces of dirt (up to around 10 pixels wide in any direction), then the "Dust only" type should be used.

If the "Normal" level setting causes damage to complex or fast motion, one of two remedies may be used. If large pieces of dirt are present in these pictures, use the keys to disable the dirt filter in the area where the damage is occurring. If no large pieces of dirt are present, change the type setting to "Dust only".

The "Dust only" setting should be artefact free, but in the very unlikely case of some very small moving objects (such as lights, buttons or small details) disappearing or flashing, try to disable the dust by using from among the "White only", "Black only" and "White + Black" settings the one corresponding to your case.

### View

The "View" control allows the user to directly view what the filter is removing from the picture.

### Dirt Keys

Even though Puritan contains a sophisticated automatic dirt detection and repair algorithm, there will still be some instances where picture content matches the characteristics of dirt. In these cases, a key can be defined to restrict the area of detection and concealment of the algorithm within the picture. When processing a picture where the horizontal or vertical blanking extends into the normal active picture area, for example letterbox, a key can be assigned to the dirt to define the edge of picture.

See section on Keys below.

## **Tramline**

### **Overview**

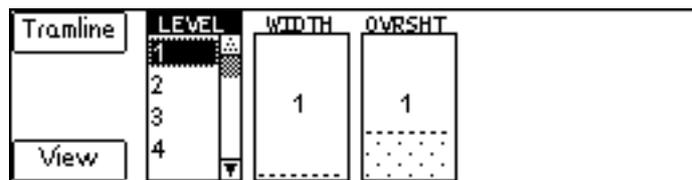
Tramline scratches are very common in both old and new film and can have a wide diversity of characteristics depending on the history of the film. They are predominantly caused when a particle has become lodged in the gate mechanism in the telecine and scratches the outer layers of the film as it passes through the gate. The resulting damage appears as a vertical line on each of the damaged film frames and is roughly in the same horizontal position from one frame to the next. The extent of the damage is extremely variable since it depends on the nature of the particle causing the damage and the dynamics of the telecine.

To overcome this problem, telecine manufacturers developed a wet-gate process that utilises a chemical substitute to fill-in the damaged surface of the film. Whilst this can be effective for small scratches, it has limitations for larger scratches and it is not an environmentally friendly process. Moreover, it conflicts with the objectives of archive preservers whose goal is to ensure the preservation of valuable archives without risking further damage by subjecting the film to a chemical process.

Puritan deals with scratches electronically, after the archives have been preserved onto a stable digital format.

Electronic detection of scratches requires a sophisticated algorithm because normal picture detail can appear to have the same characteristics as a scratch. Puritan utilises a wide range of criteria to distinguish the scratch from normal picture detail. Information such as scratch width and colour, as well as length and intensity are used to discern between real picture detail and scratches.

### **Controls**



The tramline filter controls allow the user to improve the selectivity of the automatic detection and concealment.

### **Enable**

The “Tramline” button may be toggled to enable and disable the tramline filter.

### **Tramline Width (*WIDTH*)**

The “WIDTH” control is the most important of the tramline filter controls. It restricts the algorithm to detect scratches of the selected width and narrower. By restricting the algorithm to narrower scratches it substantially reduces the probability of false alarm caused by picture detail.

### **Tramline Overshoot (*OVRSHT*)**

Most tramline scratches have an associated overshoot adjacent to the scratch. Hence a black scratch will have a white overshoot and vice-versa. However, the amount of overshoot is quite variable depending on the depth of the scratch, hence this control allows the user to vary the amount of overshoot correction which is applied.

### **Tramline Sensitivity (*LEVEL*)**

The tramline sensitivity control effectively determines the limits of detection of the algorithm. Some scratches are easier to detect than others and in such cases a low sensitivity setting could be used but where the scratch is vertically skewed or inconsistent throughout the frame, a higher sensitivity setting is required. Generally, the lowest sensitivity setting should be used to reduce the probability of false alarms.

**Tramline Keys**

Even though Puritan contains a sophisticated automatic scratch detection algorithm, there will still be some instances where picture detail matches the selected scratch criteria. In these cases, a key can be defined to restrict the range of detection and concealment of the algorithm.

See section on Keys below.

**Tramline View**

The tramline "View" control allows the user to directly view the output from the detection/correction algorithm. The signal represents the value of the correction that would be applied to the picture to correct the scratch. The polarity of the output signal can be either positive or negative depending on the polarity of the original scratch so the output is displayed on a grey pedestal. Positive correction values will extend towards white and negative correction values will extend towards black. To see the "view image" the filter must be enabled. To use the "view" associated with an individual key, the tramline view and the key filter must both be enabled).

**Using the Tramline filter**

The following procedure is a useful guide to using the scratch filter.

1. Ensure that all keys are off so that the entire picture is filtered
2. Select the maximum sensitivity
3. Select maximum overshoot
4. Starting from the narrowest scratch width, gradually increase the setting until the scratch disappears. This adjustment can also be made in the View mode by adjusting the width control until the correction signal is clearly visible.
5. Reduce the sensitivity setting until the scratch becomes visible and then increase the setting by 1 level.
6. Reduce the overshoot range until the overshoots become visible as tramlines adjacent to the scratch and then increase the overshoot correction by one level to conceal the overshoots.

**Dropout****Overview**

Video drop-out can occur as a consequence of poor signal to noise ratio in an FM transmission link. The effect is seen as white or black dropouts which can last for many pixels and may have a leading and trailing edge. The frequency of the impairment is variable depending on the quality of the signal but in extreme cases the picture can be severely affected by the dropouts.

Puritan utilises a multilayer median filter to remove the dropout. It operates by rank filtering pixels from an odd number of aperture points yielding the median value.

When a pixel is judged to be in error it is replaced by the median value of the aperture and pixels judged not to be in error remain unaltered. The algorithm is very selective and will only repair pixels that match the specific profile of video dropouts. In fact, it is so selective that care must be taken to ensure that dropouts are concealed prior to unsteadiness correction. Otherwise overscanning the input (to allow correction of an unsteady source) would modify the dropout characteristics sufficiently to render the algorithm ineffective.

**Controls****Enable**

The “Dropout” button may be toggled to enable and disable the dropout filter.

**View**

The dropout “View” control allows the user to directly view the effectiveness of the detection/correction algorithm. The difference between the input and the corrected output is shown when view is active. Another way to consider this signal is that it represents the detected impairment that is subtracted from the input when view is turned off.

The polarity of the output signal can be either positive or negative depending on the polarity of the dropout so the output is displayed on a grey pedestal. Positive correction values will extend towards white and negative correction values will extend towards black. To obtain the "view" image, the filter must be enabled.

**2 inch Scratch****Overview**

This filter is designed to remove the horizontal scratches caused by damage to two-inch tape. The filter works by looking for the periodic characteristics of this defect to differentiate between the scratch and picture detail. This type of defect can also affect the pedestal level of the picture.

**Controls****Enable**

The “2 inch” button may be toggled to enable and disable the two inch filter.

**View**

The “View” control allows the user to optimally adjust the level setting by viewing where the scratches have been detected. To obtain the "view" image, the filter must be enabled.

**Repeat**

The “Repeat” control allows the user to use a stronger filter to remove correlated scratches, the strength can be adjusted by ‘Rep Level’. This mode would not normally be needed.

**Rep Level**

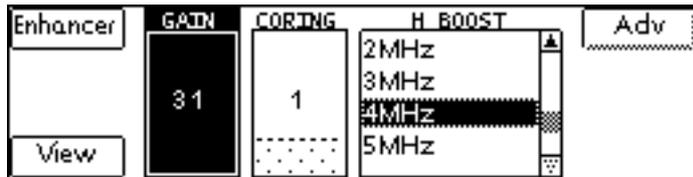
The “Rep Level” control allows the user to control the sensitivity of the filter. A low number means that the filter is not very sensitive, and may not detect many scratches. A high number means that the filter is able to detect many scratches, however there may be false alarms where periodic image detail is detected.

**Enhancer**

**Overview**

Enhancement is concerned with the sharpening of certain features such as edges and textures and is employed to improve the visual appearance of the pictures. The Puritan features an advanced linear luma enhancer.

**Controls**



**Enable**

The "Enhancer" button may be toggled to enable and disable the enhancer.

**Gain**

The "GAIN" control defines the amount of enhancement required. A positive value provides enhancement, whereas a negative value provides de-enhancement. The higher the value, the greater the amount of enhancement. Too high a value is likely to result in unwanted artefacts.

**Coring**

The purpose of the "CORING" control is to reduce or prevent the enhancement of noise in the picture. The noisier the material, the higher the coring should be.

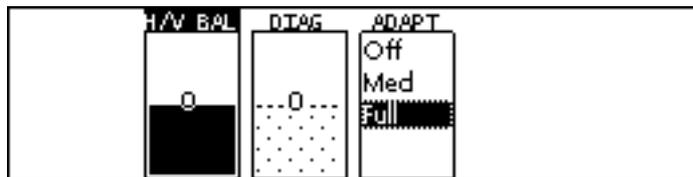
**View**

A "View" button is provided to visualise the enhancer signal in isolation. To obtain the "view" image, the enhancer must be enabled.

**Horizontal Boost**

The "H BOOST" control defines from which horizontal frequency the horizontal enhancement applies.

The "ADV" button accesses the following controls:



**H/V balance**

The "H/V BAL" control determines the horizontal and vertical enhancement ratio. A positive value provides more enhancement in the horizontal than in the vertical, whereas a negative value provides more enhancement in the vertical than in the horizontal.

**Diagonal**

The "DIAG" control determines diagonal enhancement. A null value provides as much enhancement in the diagonal as in the horizontal and vertical. A positive value provides more enhancement in the diagonal, and a negative value provides less enhancement in the diagonal than in the horizontal and vertical direction.

**Adaptation**

The “ADAPTION” control allows the user to control bright and dark adaptation. Enhancement is often not desired in the very bright and very dark areas of the pictures since it would result in unwanted artefacts. In order to lower the level of enhancement according to the brightness and darkness of the picture, three level of adjustment are provided: OFF, MID, FULL.

**ANCILLARY FUNCTIONS**

**Keys**

Puritan provides up to four user-definable rectangular keys that can be used to restrict the range of detection and concealment of the Dirt and Tramline filters. The keys are prioritised to allow overlapping and more complex shapes if necessary and are directly accessible from the front panel.

Key 1	LEFT	TOP	WIDTH	HEIGHT	Dirt
	359pix	5%	280pix	45%	Tramline
Invert					
View					
Key 2	LEFT	TOP	WIDTH	HEIGHT	Dirt
	70pix	5%	142pix	45%	Tramline
Invert					
View					
Key 3	LEFT	TOP	WIDTH	HEIGHT	Dirt
	70pix	49%	142pix	95%	Tramline
Invert					
View					
Key 4	LEFT	TOP	WIDTH	HEIGHT	Dirt
	300pix	55%	280pix	95%	Tramline
Invert					
View					

**Tramline Keys**

In normal operation the key colour overlay includes a soft edge to minimise the visibility of the scratch filter as it turns off an on at the key edge. The key includes the partially filtered area to indicate to the user the overall extent of the filter, which effectively extends the filtered area by 7Y pixels each side.

In the inverted mode, which is used to protect an area of the picture, the key width is deliberately modified (reduced by 7Y pixels each side) to indicate the area which is fully protected. If the key width were not reduced, then there would possibly be some damage to the periphery of the keyed area caused by the partial filtering of the soft edge.

**Key View**

The keys are colour-coded for easy identification.

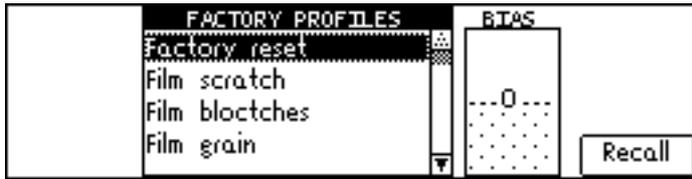
- key 1 - yellow
- key 2 - cyan
- key 3 - red
- key 4 - blue

If Key View and Tramline View is selected the Key view overrides the tramline view.

If Key View and Dirt View is selected, the Dirt View is visible, with a chroma outline on the left and right.

For each Key, the user may select either the Dirt filter or the Tramline filter.

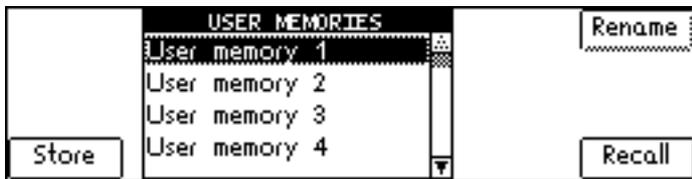
**Profiles**



This menu allows preset unit configurations to be recalled. The “Recall” button recalls the unit configuration stored in the highlighted slot of the “FACTORY PROFILES” selection.

The “BIAS” setting allows the user to increase or decrease the effect of the preset unit configuration by up to 100%, subject to the altered value of each setting being within its possible range.

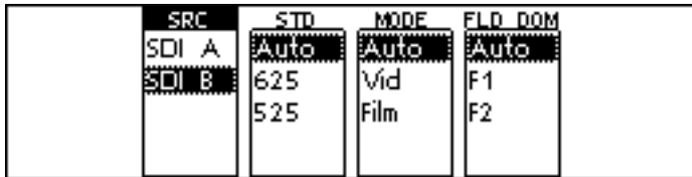
**Memory**



This menu allows unit configurations to be stored and recalled. “USER MEMORIES” accesses eight initially empty memory slots. The “Store” button stores the unit configuration in the highlighted slot, and the “Recall” button recalls the unit configuration previously stored in the highlighted slot.

The “Rename” button allows the user to change the name of the highlighted slot using the spinwheels.

**Input**

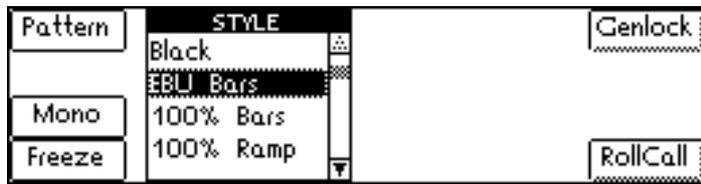


The “SRC” control selects the video input, and the menu displays the available options SDI A and SDI B.

The Puritan has the ability to automatically detect the video standard of the selected source, and will do so if the “Auto” option of the “STD” control is selected. The standard can be manually selected if required by selecting “625” or “525”.

If the “Auto” button of “MODE” is enabled, the Puritan automatically detects the mode (i.e. video or film). If required, the user may select the mode manually.

If the “Auto” button of “FLD DOM” is enabled the Puritan automatically detects the field dominance. If required, the user may select the field dominance manually.

**Setup****Pattern**

The “Pattern” button may be toggled to enable and disable the pattern. When enabled it produces a pattern as the output.

Patterns available under the “STYLE” control are:

- Black
- EBU Bars
- 100% Bars
- 100% Ramp
- Valid Ramp
- Y Sweep
- UV Sweep
- Bowtie

**Mono**

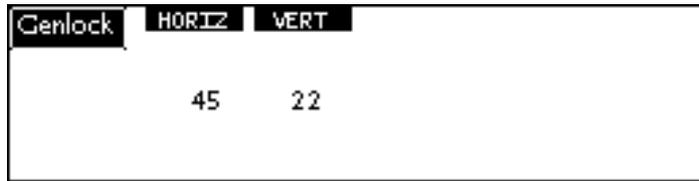
When enabled the chroma content of the picture will be removed and the picture will become monochrome.

**Freeze**

When enabled the picture will become frozen.

### Genlock

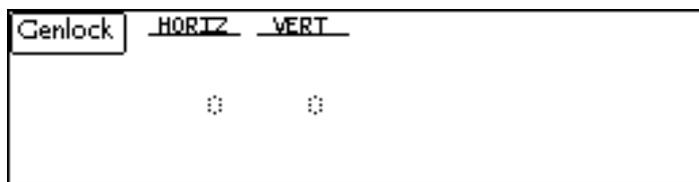
The “Genlock” button on the Setup screen accesses the following controls:



Incorporated onto the noise reduction card is a full frame synchroniser which allows the selected input to be referenced to a signal of the same line standard.

The menu system allows the synchroniser to be switched such that the genlock mode is on or off; this is done by toggling the “Genlock” button.

### Genlock Off



When the genlock is forced into the off state the output video will *not be locked* to the input or the reference video signal.

This is sometimes referred to as “free-running”. If the input and output were to be viewed on an oscilloscope the two traces would be seen to be moving one past the other.

### Genlock On (Default)

This mode forces the output to be locked to an analogue video signal of the same line standard.

Usually Genlock On will force the output to be locked to the signal that is connected to the reference input.

However, if the reference signal is invalid, or of a different line standard to that of the input, the synchroniser will lock the output to the input.

The status display will always indicate the mode of operation for the synchroniser.

In the event of an input loss (with the unit Genlocked to the input), the output will be momentarily disrupted when the input is returned. This effect can be minimised by ensuring the system is Reference Locked.

### Reference Format

The reference signal should be a normal analogue video signal. The nominal input level is 1 volt peak-to-peak.

If the loop-through facility is not required the signal should be terminated here by using a 75 Ohm BNC terminator.

**Genlock Offsets**

Provision has been made to allow the horizontal and vertical timing of the output to be varied in relation to the "referenced" signal, whether it be the input or the reference. This facility is useful when the output needs to be in synch with other units such as in a studio system. This will allow clean switching between multiple sources which may have different phase relationships.

**H-Lock**

This changes the Horizontal Genlock Offset.

## 525 line standard

Sample Range	0 to 1715
Duration of Sample	37ns
Preset	0 Samples

## 625 line standard

Sample Range	0 to 1727
Duration of Sample	37ns
Preset	0 Samples

**V-Lock**

This changes the Horizontal Genlock Offset.

## 525 line standard

Line Range	0 to 524
Preset	0 Lines

## 625 line standard

Line Range	0 to 624
Preset	0 Lines

**Genlock Status**

This is displayed on the home page.

**Using the Synchroniser**

Puritan contains a frame-synchroniser that is essentially just a variable delay which has a little in excess of 1 frame capacity. The purpose of the variable delay is to allow each unit to provide an output picture that is co-timed with other units in a studio system. Normally this is achieved by applying a studio reference signal to each unit in the studio and the variable delay automatically adjusts the output so it is horizontally and vertically phased-up with the studio reference.

The purpose is to allow clean switching between multiple sources which may have different phase relationships.

Another advantage of a synchroniser is that the stability of the output clock is directly related to the quality of the reference signal. This is fundamental, as the output video rate must be phase locked to the reference video signal. In some cases this is also important as it guarantees output clock stability even if the input disappears or is noisy.

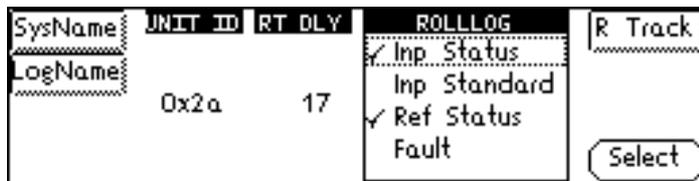
The penalty of using a synchroniser is that the input and output sides of the synchroniser are running at different clock rates and sooner or later the synchroniser will be forced to repeat or drop a video frame. A complete frame must be dropped to avoid interlace errors. This is fundamental and will almost certainly be undetectable.

If no reference is applied then the unit will automatically phase lock to the input as long as Genlock ON is selected. In this case there will be no necessity to repeat or drop a video frame and the output of each unit will be a fixed delay relative to the input.

With Genlock OFF the frame synchroniser will once again be running with different clock rates on each side and therefore will either repeat or drop a frame as necessary. The output clock stability will be very high because the read side XTAL will be set to the nominally correct frequency but will not be phase locked.

**RollCall**

The “RollCall” button on the Setup screen accesses the following controls:



“UNIT ID” is the RollCall address of this item of equipment. The unit number must be unique on each physical network segment. The Unit number must be set to 42 to allow a third party controller to control Puritan.

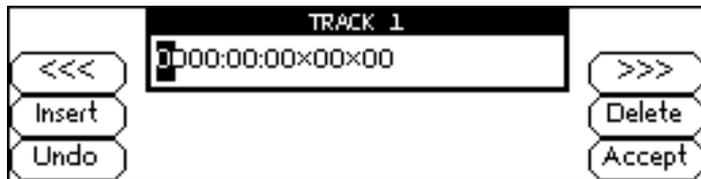


The “SysName” button allows the user to change the name by which this item of equipment will be seen on the Rollcall network.

**Audio Delay**

Track 1	AUD DLY	Track 5
Track 2		Track 6
Track 3	~340.0	Track 7
Track 4	mSec	Track 8

This function allows the value of the delay time produced by Archangel to be sent, via the RollCall™ network, to audio delay units connected on the same network. This enables compatible audio delay units to produce an audio delay dependent on this and other similar units. The audio delay unit will dynamically follow or track the received delay-time information allowing processed video signals to be timed correctly with audio signals. This automatic tracking system via the RollCall™ network is call RollTrack.



The destination for the delay information is set by the network code address as follows:

Selecting R Track in the Rollcall menu provides a sub-menu that allows up to 8 units (mainframes enclosures etc.) to be selected as a destination. A further sub-menu then appears to allow the code to be set up using the adjacent push buttons to edit the text. (The '<<<' and '>>>' buttons select the cursor position and the spinwheel selects the character; the preset button sets the text line to all zero's and the 'Accept' button accepts the network address) For more detailed information see the RollTrack section of this manual. The full network address has four sets of numbers.

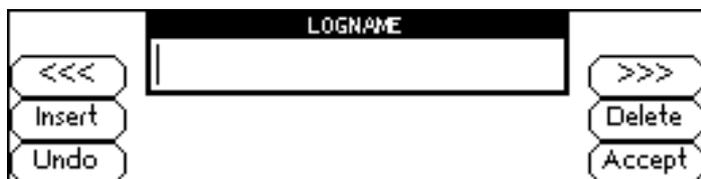
For example: 0000:10:01\*14

- The first set (0000) is the network segment code number
- The second set (10) is the number identifying the (enclosure/mainframe) unit
- The third set (01) is the slot number in the unit
- The fourth set (14) separated by an \* is the channel number.

Note that only channel numbers 14, 15, 16 & 17 should be used for audio delay cards.

Once a destination address for a unit has been set the OK function will return to the unit menu to allow another address to be set if required.

**Logging**



If a logging device is attached to the RollCall™ network, information about various parameters can be made available to such a device. The name of the logserver can be entered by using the LogName submenu in the Rollcall menu.

Selecting this item reveals a display that allows information about three parameters to be made available for logging.

**Input Loss**

When activated, a loss of input signal condition will be available for the logging device.

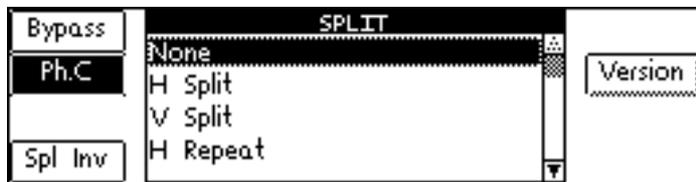
**Ref Loss**

When activated, a loss of External reference signal condition will be available for the logging device.

**EDH Errors**

When activated, EDH error reports will be available for the logging device.

**Utils**



**Bypass**

The "Bypass" button may be toggled to enable and disable the filters.

**Split**

When the "SPLIT" control is set to a value other than "None", the screen is split into two to allow filter previewing.

With "H Split" the right hand half of the screen is filtered.

With "H Repeat" the picture on the left hand half of the screen is repeated on the right hand half of the screen; the right hand half is filtered.

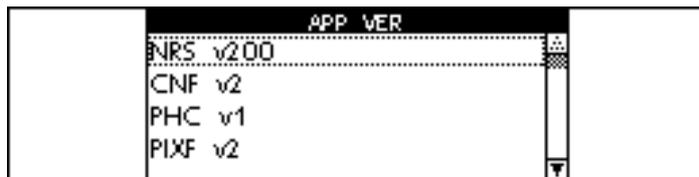
With "V Split" the lower half of the screen is filtered.

If "Spl Inv" is enabled, the split is inverted so that the left hand half of the screen is filtered for a setting of "H Split" or "H Repeat", and the upper half of the screen is filtered for a setting of "V Split".

**PhC**

With PhC selected, Phase Correlation is used to optimise the performance of the enabled filters.

**Version**



This control accesses a list of the software version used by each of the cards of the system and cannot be modified.

# Application Note

## Operating Hints & Tips

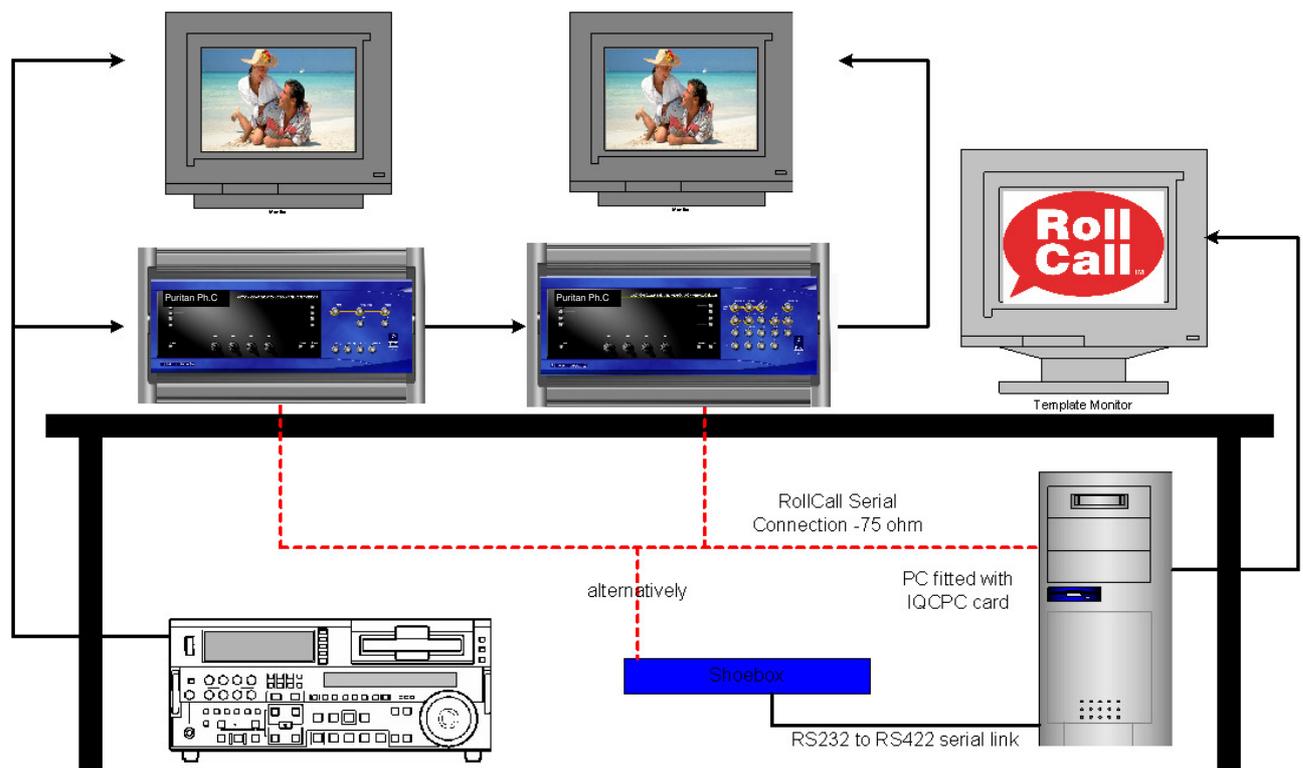
### System design

In normal operation use the units in the order One then Two (i.e. Unsteadiness/flicker correction first then noise/dirt/scratches second). The important feature of this is to remove the flicker before noise reduction.

The exception to this rule is when using dropout removal & 2 inch scratch removal. Both these filters rely on the exact dimensions of the impairment and so no overscan must be used. If unsteadiness correction is required then it must be done after the dropouts or/and 2inch scratches have been removed.

If the input material is definitely film or definitely video then the material type can be manually selected allowing a different aperture chosen. Care must be taken however – playing video material through the unit set in film mode will "tear the images apart" – This is so serious that it looks similar to a hardware fault on the unit.

When setting up key windows from a remote controller (e.g. Pandora Pogle) ensure that that the left-hand edge of the key is set to a smaller value than the right, and similarly the top must be less than the bottom. Failure to do this will result in 1 pixel square windows, which are hard to see. When controlled from the front panel or from a RollCall Template the controls are interlocked to ensure the values are always legal.



**Installation Connection**