Alchemist Ph.C HD

Motion Compensated Conversion Platform

Operator's Manual

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Contents

Safety Information

Explanation of Safety Symbols

GB

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

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT REMOVE COVERS
NO USER SERVICEABLE PARTS
REFER SERVICING TO QUALIFIED PERSONNEL ONLY

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 :

F

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 :

ATTENTION
RISQUE DE CHOC ELECTRIQUE
NE PAS RETIRER LE COUVERCLE
NE PAS INTERVENIR SANS L'AGREMENT DU SERVICE QUALIFIE

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 changr 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

D

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 wartenden Teile im Geräteinneren.
Dieses Gerät sollte nur von geschultem Personal gewartet werden

Sicherheits-Warnhinweise

ACHTUNG
Gefahr von Elektroschocks.
Abdeckungen nicht entfernen
Keine vom Benutzer zu wartende Teile
Wenden Sie sich ausschließlich
an qualifiziertes Personal

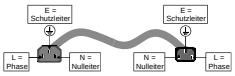
Die angeführten Service-/Reparatur-Anweisungen sind ausschließlich von qualifiziertem Service-Personal auszuführen. Um das Risiko eines lektroschocks zu reduzieren, führen Sie ausschließlich die im Benutzerhandbuch eschriebenen Anweisungen aus, es sei denn, Sie haben die entsprechende Qualifikation.
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 Nullleiter 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

ESP

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 dentro.
Esta unidad sólo debería ser tratada por personal cualificado.

Advertencias de Seguridad

ADVERTENCIA
RIESGO DE CHOQUE ELECTRICO
NO QUITAR LAS PROTECCIONNES
ELEMENTOS NO ACCESIBLES AL USUARIO.
SERVICIO SOLAMENTE A PERSONAL CUALIFICADO

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 en el original-)
AZUL conectado a N (Conductor Neutro -Neutral en el original-)
MARRÓN conectado a L (Conductor Fase -Live en el 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.

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 försörjd från ett strömsystem som är försedd med jordadanslutning ⏚ samt ha en neutral anslutning som lätt identifierbar.**
- **Vägguttaget som strömförsörjer apparaten bör finnas i närheten samt vara lätttillgänglig.**

Strömkontakter i länder utanför USA

Apparaten utrustas normalt med en strömkabel med standard IEC gjuten honkontakt på ena änden samt en standard IEC gjuten hankontakt på den andra änden. Om man måste avlägsna den gjutna hankontkaten, 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.

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 servicerbare 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 strømkabel med et standard IEC støbt løst hunstik i den ene ende og et standard IEC støbt hanstik 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.

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, ellet 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 suojamaajohdin E-napaan
SININEN nollajohdin N-napaan
RUSKEA vaihejohdin L-napaan

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

Símbolos de Segurança

P

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:

Condutor VERDE/AMARELO ligado a E (Terra)
Condutor AZUL ligado a N (Neutro)
Condutor CASTANHO ligado a L (Vivo).

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

CAUTION
RISK OF ELECTRIC SHOCK DO NOT REMOVE COVERS NO USER SERVICEABLE PARTS REFER SERVICING TO QUALIFIED PERSONNEL ONLY

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 εξασφαλίζετε 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.**

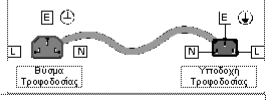
Σύνδεση τροφοδοσίας σε χώρες εκτός των ΗΠΑ

Ο εξοπλισμός συνοδευέται 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 αφαιρέσετε το σταθερό βύσμα τροφοδοσίας μην το επαναχρησιμοποιείτε, θεωρείται άχρηστο. Ο χρωματικός οδηγός για το καλώδιο τροφοδοσίας είναι ο παρακάτω :

ΠΡΑΣΙΝΟ/ΚΙΤΡΙΝΟ καλώδιο συνδέεται στο E (Προστατευτικός Αγωγός Γείωσης)

ΜΠΛΕ καλώδιο συνδέεται στο N (Ουδέτερο Αγωγό)

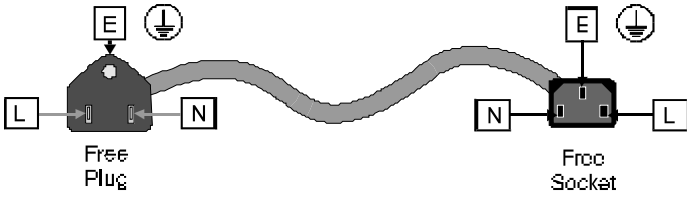
ΚΑΦΕ καλώδιο συνδέεται στο L (Αγωγό Φάσης)



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

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:

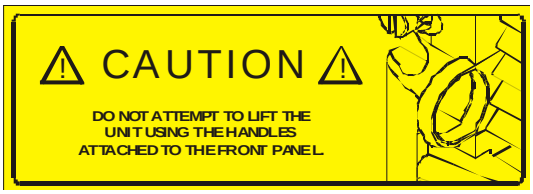


- "GREEN lead connected to E (Protective Earth Conductor)
- "BLACK lead connected to L (Live Conductor)
- "WHITE lead connected to N (Neutral Conductor)

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.*

Handling Instructions



Safety Standard

Alchemist Ph.C HD. conforms to the following standard:

EN60950-1: 2001
Safety of Information Technology Equipment.

EMC Standards

This unit conforms to the following standards:

EN 55103-1: 1996 (Environment E4)
Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1. Emission

EN 55103-2: 1996 (Environment E2)
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:2004

EMC Environment

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

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 1694 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.

Information and Notices

About this Manual

This manual contains information for the operation of the Alchemist Ph.C HD unit.

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

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 unauthorized 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:

- Alchemist Ph.C HD
- Power cable
- Installation Manual
- Operation Manual

Software Version Amendments

This unit is fitted with V4.0 of the software.

Manufacturers Notice

Important Notice

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

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 free of charge 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 Web site at: http://www.snellwilcox.com/support

Product Support Request Form

***** Indicates required information.

Name:*	
Company:*	
Address:*	
Postal/Zip Code:	
Country:*	
Telephone:*	
Fax:	
Email*	
Local S&W Center:*	
Product Name:*	
Product Type:*	
Unit Serial Number:*	
Fault/Spare Part Information:* (please advise us how many units show this fault and the system layout showing all other manufacturers' products)	
Preferred Method of Contact:*	

Please mail to:	**Service contact information:**
Snell & Wilcox Ltd., Southleigh Park House, Eastleigh Road, Havant, Hants, PO9 2PE. United Kingdom.	Tel: +44 (0) 2392 489058 Fax: +44 (0) 2392 489057 Web: http://www.snellwilcox.com/support Ftp: ftp//ftp.snellwilcox.com/support

Section 1: Introduction

Description

The Alchemist Ph.C HD's conversion quality is guaranteed through the utilization of the company's Emmy® award-winning Ph.C motion measurement technology. Ph.C algorithms, which have been continuously refined since the introduction of the first Alchemist Ph.C in 1992, have been optimized to prevent motion-related artifacts in high-definition video. The resulting output images are clear, sharp and free from the motion artifacts commonly associated with standards conversion.

With Alchemist Ph.C HD, high-definition content including news, sports, live events and entertainment programming can now be broadcast around the globe in multiple high-definition standards and formats without degradation of image quality. Alchemist Ph.C HD automatically processes image movement to produce clear, smooth motion with the widest range of input material on the largest HD video displays.

Alchemist Ph.C HD provides a complete one-box system solution that can easily integrate into any broadcast facility. It features the ability to convert between all commonly used HD broadcast standards and formats and has been architected to accommodate new standards as they emerge, thus future-proofing the investment of customers. Alchemist Ph.C HD is also capable of cross conversion, up conversion and down conversion of the same and different frame rates, making it a truly universal conversion platform.

Features

- Compact 3RU size - practical for portable applications as well as mobiles, studio installation and rental
- Top performance: Ultimate in video conversion performance using Ph.C - no complaints about conversion quality!
- User Interface: Intuitive color touch screen
- Dual redundant PSUs: helps ensure continuous on-air live operation
- Video I/Os: HD SDI
- Audio I/Os: Embedded and AES
- CleanCut video cuts at the input appear as cuts at the output, maintaining the precise look of the material
- Ability to seamlessly handle timecode whilst performing a frame-rate conversion.
- All in one box: easy installation and low engineering risk

Alchemist Ph.C HD Conversions				Output					
				HD SDI				SD SDI	
				1080i		720p		576i	480i
				25	29.97	50	59.94	25	29.97
Input	HD SDI	1080i	25	Pass Thru	Cross Frame	Cross	Cross Frame	Down	Down Frame
			29.97	Cross Frame	Pass Thru	Cross Frame	Cross	Down Frame	Down
		720p	50	Cross	Cross Frame	Pass Thru	Cross Frame	Down	Down Frame
			59.94	Cross Frame	Cross	Cross Frame	Pass Thru	Down Frame	Down
	SD SDI	576i	25	Up	Up Frame	Up	Up Frame	Pass Thru	Cross Frame
		480i	29.97	Up Frame	Up	Up Frame	Up	Cross Frame	Pass Thru

Technical Profile

Signal Inputs	
Serial Digital	2 x 75 Ohm SD/HD Serial Digital with embedded audio (4 Groups) Input Standards: 1.5 Gbit/s HD-SDI SMPTE292M/SMPTE299M 270M Mbit/s SD-SDI SMPTE259M
Reference	2 x loop-through HDTV Trisync/SD Bi-sync (Black & Burst) SMPTE 240M/ 274M,with auto selection dependant on output standard
Audio AES	8 channels unbalanced AES-3 via BNC connectors (75 Ohm)
Signal Outputs	
Serial Digital Primary (Output A)	2 x 75 Ohm SD/HD Serial Digital with embedded audio (4 Groups) Output Standards: 1.5 Gbit/s HD-SDI SMPTE292M/SMPTE299M 270M Mbit/s SD-SDI SMPTE259M
Serial Digital Secondary (Output B)	2 x 75 Ohm SD/HD Serial Digital with embedded audio (4 Groups) Output Standards: 1.5 Gbit/s HD-SDI SMPTE292M/SMPTE299M 270M Mbit/s SD-SDI SMPTE259M
Audio AES	8 channels unbalanced AES-3 via BNC connectors (75 Ohm)
Communication Connections	
RollCall	Connection to a RollCall network via BNC connector, RS422, Ethernet.
Control Functions	
Input Select	Input A, Input B
Input Blanking	Left, Right, Top Bottom
Input Loss	Input, Freeze, Black
Input Standard	**SD** 525, 625 **SD/HD** Auto 525, 625,720p 50, 720p 59, 1080i 50, 1080i 59 **SD/HD with FilmTools** 525PsF29, 525i59, 625PsF23/24/25, 625i47/48, 625i50, 720P50, 720P59/60, 1080PsF23/24/25, 1080PsF29/30, 1080i47/48, 1080i50, 1080i59/60

Output Standard Primary	**SD** 525, 625 Colorimetry **SD/HD** Auto 525, 625,720p 50, 720p 59, 1080i 50, 1080i 59 Colorimetry **SD/HD with FilmTools** 525PsF29, 525i59, 625PsF23/24/25, 625i47/48, 625i50, 720P50, 720P59/60, 1080PsF23/24/25, 1080PsF29/30, 1080i47/48, 1080i50, 1080i59/60 Colorimetry
Output Standard Secondary	(Same rate as primary) **SD** 525, 625 Colorimetry **SD/HD** Auto 525, 625, 720p 50, 720p 59, 1080i 50, 1080i 59 Colorimetry **SD/HD with FilmTools** 525PsF29, 525i59, 625PsF23/24/25, 625i47/48, 625i50, 720P50, 720P59/60, 1080PsF23/24/25, 1080PsF29/30, 1080i47/48, 1080i50, 1080i59/60 Colorimetry
Output Blanking	Left, Right, Top, Bottom
Output Blanking Color	Red, Green, Blue
Luma Gain, Chroma Gain, Black Level	±6 dB in 0.01 dB steps
Detail Enhancement (Enhance)	Horizontal and vertical in 0 to 100% in 1% increments.
Alias Suppression	Horizontal and vertical from -50 to +50.
Noise Reduction	Noise Reducer: On/Off Luma Strength: 0 to 30 in steps of 1 unit. Chroma Strength: 0 to 30 in steps of 1 unit Weighting: White, Uniform, Black Bias: ± 7 in steps of 1 unit. Overlay Split Screen
Pattern	Enable/Disable 100% Bars, Tartan, Sweep, 75% Bars, Pluge, Pulse & Bar, SMPTE Bars, Ramp, Burst
Freeze	On/Off

Monochrome	On/Off
RGB Legalizer	On/Off, 700mV, 721mV, 735mV
Luma Clipper	On/Off White Max: 90% to 109% in steps of 1% White Knee 60% to 109% in steps of 1% Black Min.: -7% to 10% in steps of 1% Black Knee: -7% to 60% in steps of 1%
Conversion Functions	
Convert	Ph.C™ Motion Compensation,CleanCut™
Modes	Up Conversion Down Conversion Cross Conversion Standards Conversion
Ph.C Area	5 user definable keys with overlays to define active and inactive areas
Aspect Ratio Conversion	Fixed and custom aspect ratio conversions, which can be manually configured, stored and recalled from memory.
CleanCut™	On/Off F1/F2/Any
Transition Control	On/Off Field 1, Field 2, Any Field Slew Duration: Absolute or proportional. Slew Duration Modes: Slow Out, Linear, Standard S-Curve, S-Curve, Slow In.
Aperture	Presets for Sharp, Normal and Anti-Alias (Can be fine-tuned using Anti-Alias controls).
Audio Functions	
Audio Select	Embedded, AES
Audio Channel Selection	Group 1 pair 1, Group 1 pair 2 Group 2 pair 1, Group 2 pair 2 Group 3 pair 1, Group 3 pair 2 Group 4 pair 1, Group 4 pair 2 AES1, AES2 AES3, AES4 AES5, AES6, AES7, AES8
Audio Type	PCM, Data
Name	User can specify name of each audio pair
Tone	On/Off, 1KHz -20dBFS, 4KHz -20dBFS, 1KHz -18dBFS, 4KHz -18dBFS
Mono	On/Off

Mute	On/Off
Pair Audio Delay	Audio delay for each pair can be adjusted independently.

Timecode Functions (Optional)

Input Timecode Setup

SD Source

VITC	VITC SMPTE 12M/SMPTE266M
LTC	LTC Connector SMPTE 12M

HD Source

Emb VITC	Embedded VITC SMPTE RP188
EMB LTC	Embedded LTC SMPTE RP188
LTC	LTC Connector SMPTE 12M
Frame Count Max	Auto, Detect, 24, 25, 30

Output Timecode Setup

Output A

Frame Count Max	Auto, 24, 25, 30
Drop Frame Mode	DF/NDF Synchro and Freerun modes only. 59.94 output rates only.

SD VITC

625 Range	Lines 6/319 and 20/333 SMPTE 12M and SMPTE 266M
625 Default	Lines 19/332 and 21/334 SMPTE 266M
525 Range	Lines 10/273 and 17/280 SMPTE 12M and SMPTE 266M)
525 Default	Lines 14/277 and 16/279 SMPTE 266M and RP164

SD Activate

VITC	Enables insertion of VITC
Repeat	Enables repeat of VITC two lines after selected line

HD Activate

Embedded VITC	Enables insertion of VITC
Embedded LTC	Enables insertion of embedded LTC
LTC	Always enabled, follows output A

Timecode Control

Input Timecode	Status Display Input timecode from selected source and DF/NDF state.
Output A Timecode	Status Display Output timecode generated by the Alchemist and DF/NDF mode.
Output B Timecode	Status Display Output timecode generated by the Alchemist and DF/NDF mode.
Timecode Entry	00:00:00:00 to 23:59:59:29 Presets 01:00:00:00, 10:00:00:00
Input Trigger	Set from Input timecode or the timecode entry window. Synchro & Freerun modes.
Manual Trigger	Manual trigger Synchro and Freerun modes.
Output A Load	Set from Input timecode or the timecode entry window. Synchro & Freerun modes.
Output B Load	Set from Input timecode or the timecode entry window. Synchro & Freerun modes.
Prerun	Synchro Prerun mode setup time.
EE Window	EE mode continuity window.
Mode	Synchro, EE, Freerun, Trigger Load.

FilmTools Functions (Optional)

FilmTools Enable	On, Off

Input Cadence Alignment Control

Auto	Cadence defined by internal sequence detector unless PsF standard is detected.
Detect	Cadence defined by internal sequence detector in all cases.
1:1	Incoming content interpreted as 1:1 cadence.
2:2 F1/2 (PsF)	Incoming content interpreted as 2:2 F1/2 (PsF) cadence.
2:2 F2/1	Incoming content is interpreted as 2:2 F2/F1 (PsF) cadence.
2:3 TC Datum	Incoming content interpreted as continuous 2:3 cadence derived from continuous input time code by identifying the specific 2:3 frame type and timecode of an input datum frame.

2:3 TC 0 and 5	Incoming content interpreted as continuous 2:3 cadence defined by a specific relationship to the frame count of non-drop frame input timecode.
2:3 Freerun	Incoming content interpreted as continuous 2:3 cadence derived from an internal free running 2:3 cadence generator.

Output Cadence Alignment Control

Off	Outgoing content follows input.
2:2 F1/2 (PsF)	Outgoing content is generated with 2:2 F1/2 (PsF) cadence.
2:2 F2/1	Outgoing content is generated with 2:2 F2/1 cadence.
2:3 TC Datum	Outgoing content is generated with continuous 2:3 cadence derived from continuous output timecode by identifying the specific 2:3 frame type and timecode of an output datum frame.
2:3 TC 0 and 5	Outgoing content is generated with continuous 2:3 cadence defined by a specific relationship to the frame count of non-drop frame timecode.
2:3 Freerun	Outgoing content is generated with continuous 2:3 cadence derived from an internal free-running 2:3 cadence generator.

FilmTools Control Setup

Mode

Auto	Automatically selects between synchronized or interpolated conversion depending on the input and output formats.
Synchronize	Forces conversion by synchronization.
Interpolation	Forces conversion by interpolation.

Film Aperture

Normal	Maximizes vertical resolution from incoming film material. Optimum for most applications.
Sharp	Maximum possible vertical resolution, less tolerant of film sequence detection errors.
Safe	Most tolerant of film sequence detection errors.

FilmTools Detection Setup

Video Enable	On: Allows the sequence detector to positively identify content as 1:1 (video). Off: The sequence detector will not identify video.

Film Enable

Any	Allows the sequence detector to identify film of any cadence.
2:2	Forces the sequence detector to identify film as 2:2 cadence only.
2:3	Forces the sequence detector to identify film as 2:3 cadence only.
Animation	Optimized sequence detection algorithm for animation only.
Off	The sequence detector will not identify any content as film.
Bias	Normal, Video 1, Video 2, Film 1, Film 2

Window Control	Allows sequence and cut detection to be restricted to specific areas of the image. Settings are: • Auto • Track Input Blanking • User (Defined by User window slider controls)
Window Overlay	Enables an overlay that permits adjustment of the sequence cut/detection region. Settings are: • Off • Darken • Greyed

Dolby®E (Optional)

Processing

Dolby®E - 1 Channel	1 Dolby®E transcoder path • 1 x Dolby®D/E decoder • 1 X Dolby®E encoder • Includes delays and rate converter
Dolby®E - 2 Channel	2 Dolby®E transcoder paths • 2 x Dolby®D/E decoder • 2 x Dolby®E encoder • Includes delays and rate converter

Controls (per Dolby®E Channel)

Source	Any Embedded or AES Input Group 1 pair 1, Group 1 pair 2 Group 2 pair 1, Group 2 pair 2 Group 3 pair 1, Group 3 pair 2 Group 4 pair 1, Group 4 pair 2 AES1, AES2, AES3, AES4, AES5, AES6, AES7, AES8
Decode Input Alignment	Dolby®E is co-timed, advanced or delayed by one frame
Auto Re-align	Automatic correction of guard band errors
Map AES monitor	Enables automatic assignment of decoded Dolby®E audio to AES outputs (Embedded outputs unchanged)
Map decode	Enables automatic assignment of decoded Dolby®E audio to both embedded and AES outputs
Status	• Source type • Bit depth • Program configuration • Decoder source
Encode Output Alignment	Dolby®E is co-timed, advanced or delayed by one frame

Controls (Output)	
Audio Channel Selection	Selectable for each output pair (1 to 8) AES [1:8] EMB [1:8] DEC1[1:4] DEC2 [1:4] ENC1 ENC2
Input Type	PCM – treat as PCM audio, rate-convert, delay and co-time Data – treat as data, and delay and co-time Dolby®E – automatic detection, pass through Dolby®E transcoder chain, delay and co-time. Up to two inputs may be selected depending on options loaded.
Status	
Messages	Booting, System OK, Fan Fail, Diagnostics Active, System Overheating, PSU Fault, Version Unknown.
System Functions	
RollCall	Unit ID, Unit Name, Log Server Name, RollTracks (1 - 8), Log Items.
Ethernet	DHCP or manually configured.
Panel Controls	Calibrate, Clean, Timeout, Dim
Setup	Shaped Horizontal Blanking (On/Off), Active Line Length (On/Off), Analog Blanking (On/Off), Auto AES re-align, Minimum Delay
Info	System (Version and build number) MIO (Version and build number) HMI (Version and build number) ME (Version and build number) FRP (Version and build number) Options fitted
Debug	Tools: Input TC Overlay, Output A TC Overlay, Output B TC Overlay Diagnostics: MIO Autotest, HMI Autotest, ME Autotest
Memory Functions	
Memory	Up to 6 user setups can be saved in memory.
Power	
Input Voltage Range	100 V to 240 V rms., 50/60 Hz
Mains Fuse Rating	T 8 AH 250 V. (Each Power supply)
Maximum Input Current	7 - 3 A (Each Power supply)
Power Consumption	500 W

Mechanical	
Temperature	0 to 35° C operating
Cooling	Axial fan, front-to-rear airflow
Weight	Approximately 20 kg
Case Type	3 RU Rack Mounting
Dimensions	483 mm x 563 mm x 132 mm (w, d, h)

Installation

Unpacking the Unit

The unit is packed in a single cardboard box. The contents are as follows:

- Alchemist Ph.C HD unit
- 2 Power cables
- 1 Operating Manual
- 1 Installation Manual

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

Retain the packaging; this must be used in the event that the unit is returned to Snell & Wilcox.

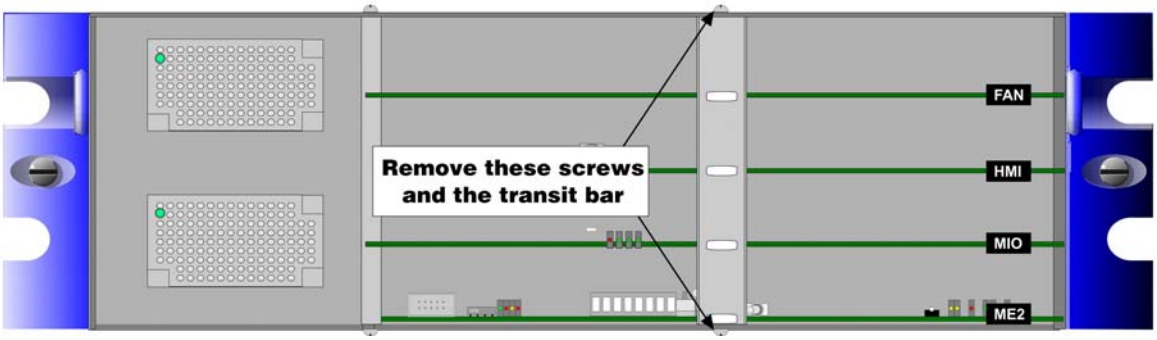
Warning! *The ALCHEMIST Ph.C HD. unit weighs more than 18 kg. Appropriate manual handling precautions should be taken when lifting the unit.*

.

Removing the Transit Bar

The unit will function with the transit bar in place; however, before installing it into an enclosure, the transit bar must be removed.

To remove the transit bar, open the front panel and remove the two screws and the transit bar as shown in the diagram below.



Warning! *The transit bar must be in place before transporting the Alchemist Ph.C. Failure to do so may result in damage to the unit.*

If you remove the transit bar to install the unit in an enclosure, ensure that you retain the transit bar and screws.

Connecting Power to the Alchemist Ph.C

Note: Before connecting power to the unit please refer to the safety warnings on page 6.

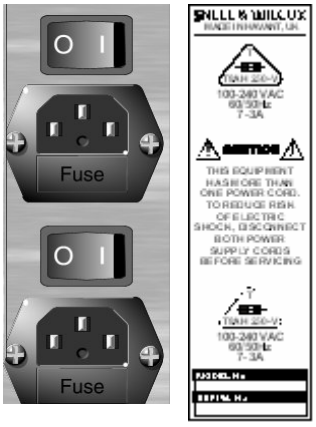
Power Inlets and Power Supply Switches

Mains power is supplied to the unit via two fused, filtered IEC connectors. The lower IEC connector (as viewed from the rear of the unit) powers the lower PSU.

The rated current for each power supply is 7 - 3 A 100 V 240 V 50/60 Hz.

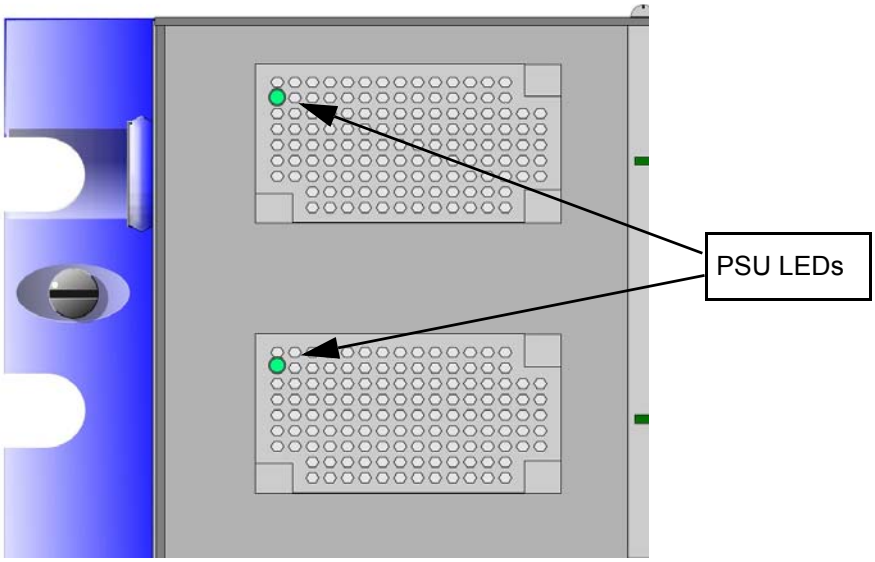
The fuse rating for each power supply is T 8 AH 250 V.

The On/Off switches for the power supplies are located on the rear panel adjacent to the power inlet connectors.



Power Supply LEDs

When illuminated the green LED's indicate that the power supplies are operational.



Power Supplies

The Alchemist Ph.C HD supports dual power supplies for redundancy.

For dual redundancy operation both power supplies must be powered up and functioning. The unit will work correctly with only one supply operating but would not have dual redundancy under those conditions.

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

Supply Voltage

The unit automatically senses the nominal supply voltage and sets itself up accordingly. No voltage adjustment procedure is required.

Environment

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

Caution! *The ventilation holes on the rear of the unit must not be obscured or damage to the equipment may result.*

If the unit is to be rack mounted, first open the front panel; details are given above. The fixing “ears” behind the panel will be revealed and the unit can be mounted in the rack.

Warning! *The ALCHEMIST Ph.C HD. unit weighs more than 18 kg. Appropriate manual handling precautions should be taken when lifting the unit.*

Under no circumstances should the grip handles be used to lift the ALCHEMIST Ph.C HD. unit.

Handling Precautions

- Touchscreen and TFT-LCD
- Do not press or scratch the display using any object with a sharp edge or end.
- Do not use or store the product under a condition where it will be exposed to after, organic solution or acid.
- Do not use under direct sunlight.
- Do not disassemble the touchscreen.
- Clean with a soft cloth or a soft cloth with a neutral detergent or alcohol. When contaminated by chemicals wipe them off immediately with caution so as to not to cause injury to the human body.
- The LCD Polarizer is made of a soft material and must be handled carefully.
- Wipe off water drops or finger grease immediately. Long term contact with water may cause discoloration or spots.
- The TFT-LCD module incorporates glass that may break or crack if abused. Please handle with care.
- Do not expose the module to direct sunlight or intense ultraviolet rays for long periods.
- If LCD panel breaks, it is possible that the liquid crystal may escape from the panel. Avoid contact with the eyes or mouth. If the liquid crystal comes in contact with any part of the body or clothes it should be washed off immediately with soap and water.

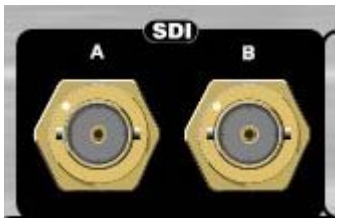
Connections

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

Inputs

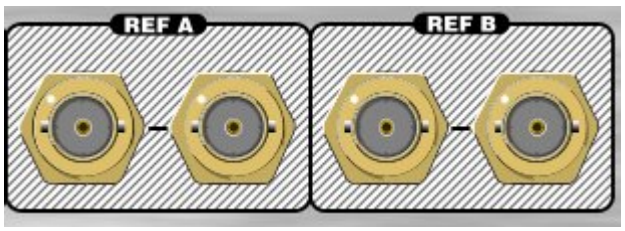
SDI A, SDI B

These are the two SDI inputs via BNC connectors for 75 Ohms.



Genlock Reference Ref A and B

Two pairs of loop-through BNC connectors for 75 Ohms are provided that may be connected to external sources of reference signals.



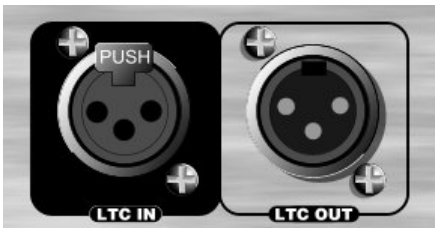
AES Inputs

These are the 8 AES inputs via BNC connectors for 75 Ohms.

LTC IN

A standard Longitudinal Time Code signal may be connected to this XLR connector.

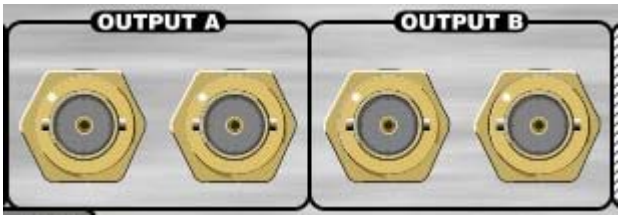
This input requires a mating male locking XLR connector. To remove the connector the release tab must be pushed in.



Outputs

Output A & Output B

Alchemist Ph.C HD provides two pairs of HD/SD serial digital outputs.



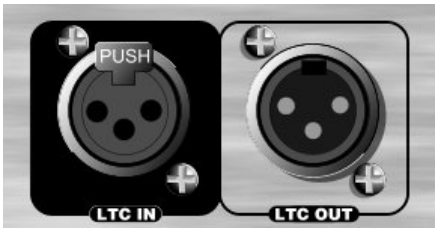
AES Outputs

These are the 8 AES outputs via BNC connectors for 75 Ohms.

LTC Out

This XLR connector provides a standard Longitudinal Time Code signal.

This output requires a mating female XLR connector.



Communication Connections

RollCall

The unit can be controlled via RollCall using the BNC connector, the Remote RS-422 9-way D-type connector, and Ethernet (control 10/100).

RS422

This port is for factory use only.

Pin	Function	Direction
1	Ground	
6	Tx signal common	
2	Transmit A	A Ph.C → Remote
7	Transmit B	A Ph.C → Remote

Pin	Function	Direction
3	Receive B	A Ph.C ← Remote
8	Receive A	A Ph.C ← Remote
4	Rx signal common	
9	Ground	
5	Spare	

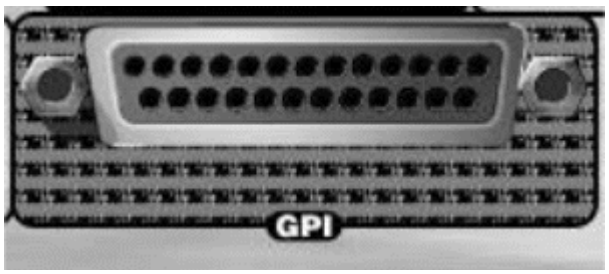
Control 10/100

This RJ45 connector socket allows the unit to be connected to the RollCall 32-bit Control panel via an Ethernet connection.

Warning! *This connector is not intended for direct connection to a telecommunications network.*

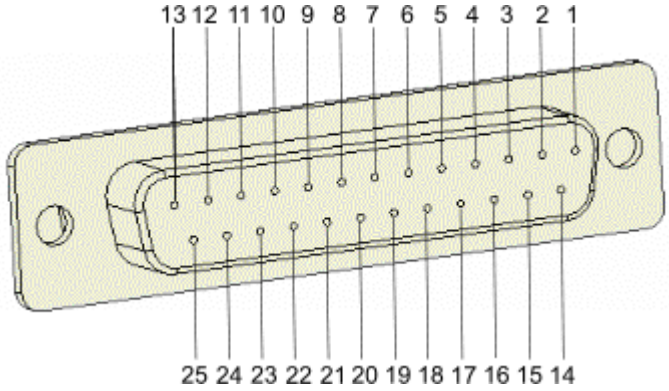
GPI

The General Purpose Interfaces (GPI's) are accessed via a 25 way D type female connector. In the table GPI refers to inputs and GPO refers to outputs.



Pin	Function
2	GPI 0 Signal
14	GPI 0 Return
3	GPI 1 Signal
15	GPI 1 Return
4	GPI 2 Signal
16	GPI 2 Return
5	GPI 3 Signal
17	GPI 3 Return
6	GPI 4 Signal
18	GPI 4 Return
7	GPI 5 Signal
19	GPI 5 Return
8	GPO 4 Signal
20	GPO 4 Return
9	GPO 5 Signal
21	GPO 5 Return
10	GPO 0 Signal
22	GPO 0 Return
11	GPO 1 Signal
23	GPO 1 Return
12	GPO 2 Signal
24	GPO 2 Return
13	GPO 3 Signal
25	GPO 3 Return
1	Ground

GPI Connector Pin Numbers (D-type female connector on the unit)



The output (GPO) characteristics are as follows:

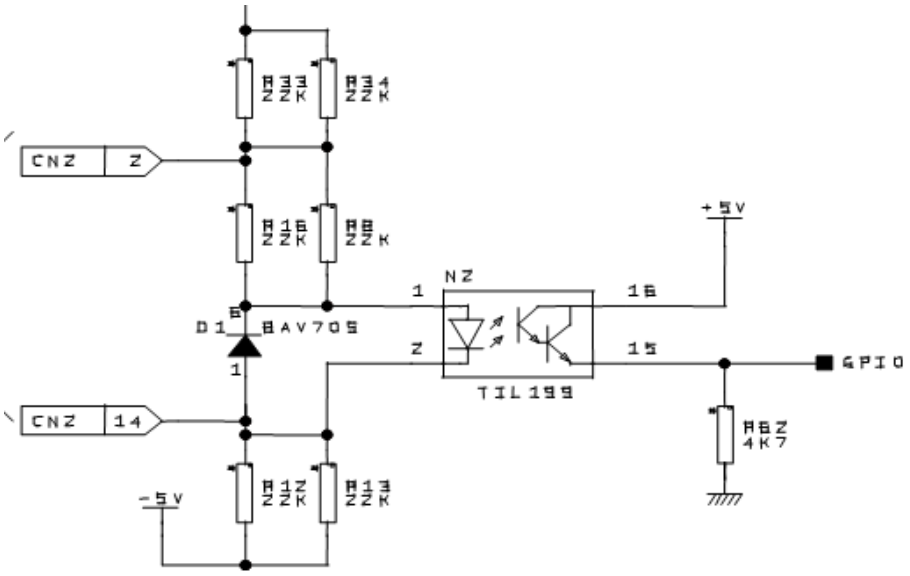
Operating Voltage Range	0 to ±60 V
(DC/AC peak)	
Maximum Load current	1.0 A (AC/DC)
Maximum On-State Resistance @ Tamb =+25°C	500 mOhm
Minimum Off-State Resistance	
@Tamb =+25°C,V=±48V	100 MOhm

GPI Overview

The GPI provides contact closure tally outputs that can be used to turn on lamps etc.

The equivalent circuit of the GPI input is shown on the next page.

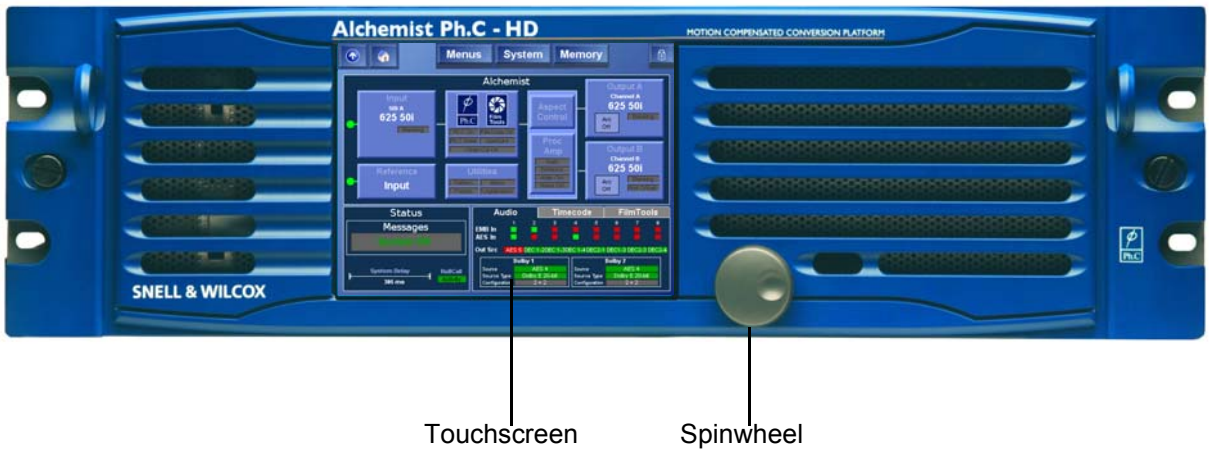
Note: On a standard machine when delivered, GPI inputs 0 to 5 select machine memories 1 to 6 and GPI outputs 0 to 5 provide tally outputs indicating which memory is selected



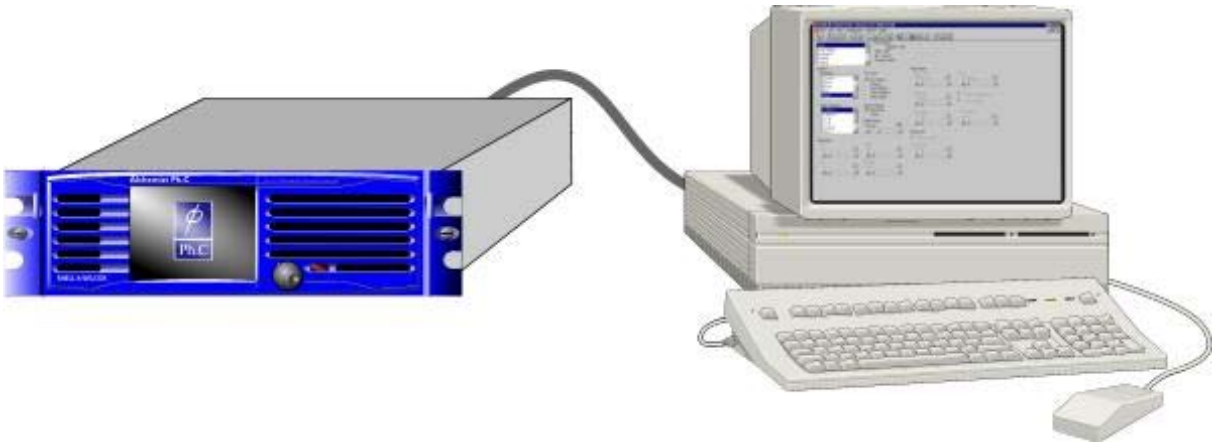
Section 2: Operation

General Operating Principles

The Alchemist Ph.C HD is operated by means of the touch screen and the spin wheel located on the front of the unit.



Alternatively, the Alchemist Ph.C HD can be operated by means of a remote control panel via the RollCall system.



All of the operational parameters and selections available through the Alchemist Ph.C HD's touch screen front panel are available using the RollCall Control panel on a RollCall enabled network.

Refer to the touch screen control section for descriptions of the configuration and operation parameters.

Operation Using the Front Panel Touch Screen Interface

Overview

At start-up, the Home screen appears, displaying a block diagram of the unit's current functionality and details of current selections.

Items highlighted in yellow indicate that the control setting has been changed from its default value.

All operational parameters and selections can be made by touching items on the screen. Settings can be changed using scroll bars or by using the spinwheel.

Main Toolbar Selections

- When a main toolbar item is selected, a green bar will appear under the item.
- Touching the **Back** button returns the display to the previously selected screen.
- Touching the **Home** button returns the display to the Home screen from any stage in the menu hierarchy.
- Touching the **Menus** button reveals the last selected menus screen.
- Touching the **System** button reveals the System screen.
- Touching the **Memory** button reveals the Memory screen.

Warnings and Notifications

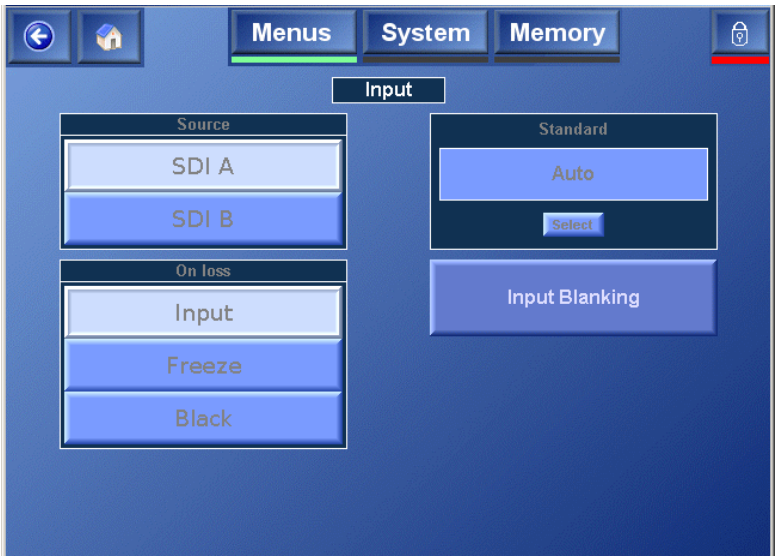
If there is a major problem with a function, the color of the item on the Home screen will change from a blue background to red as shown in the example below. In this case, a problem is indicated with the input selection, for example, the signal may have been lost.

Similarly, if there is a minor problem with a function, the color of the item on the Home screen will change from a blue background to orange.

Note: *If a control setting has been changed from the default or preset value, the function will become highlighted in yellow on this screen.*

Panel Lock

The lock icon shows that the panel is unlocked and is operational. When this item is selected, the panel will be locked. A red line will appear under the lock icon to indicate this.



To unlock the panel, touch the lock icon, a dialog box will appear. Select **Yes** to unlock the panel or **No** to keep the panel locked

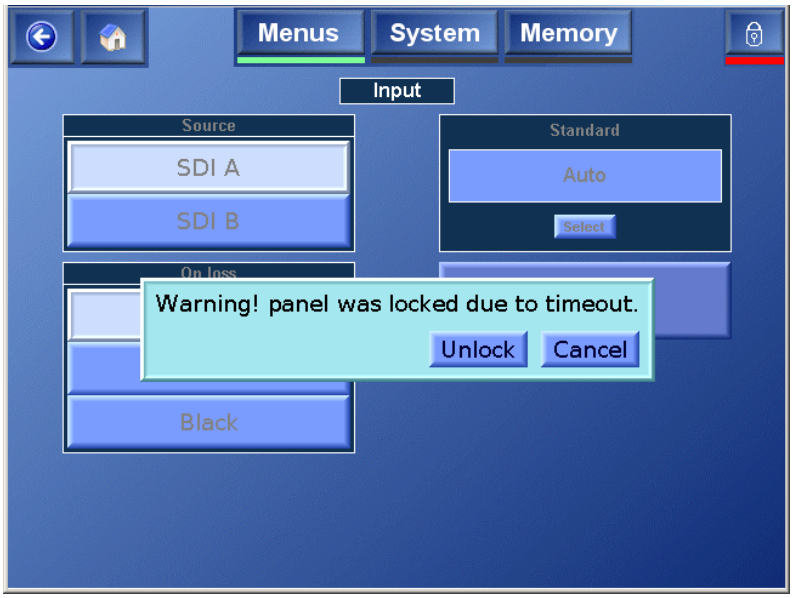
Note: *When the panel is locked, functions may still be selected but settings cannot be changed. This condition is indicated by the items appearing dimmed.*

Timeout

The panel will automatically lock after a timeout period and the dialog box shown below will appear.

Select **Unlock** to unlock the panel or **Cancel** to leave the panel locked.

The timeout period can be changed on the **System** screen. See page 95 for more information.



Selecting Parameters and Making Adjustments

In the example below, the Proc Amp item has been selected. This reveals a screen that allows the Proc Amp controls to be selected. The Gain is selected, the Gain adjustment screen appears.

The values may be changed by using:

- The spinwheel. This allows the last selected control (highlighted green) to be adjusted.
- The sliding scroll bar (Change Value).
- The Reduce − or Increase + (by fixed increments) Value control.
- The Preset function ⏭.
- The direct Value Entry function.
- The preset values are shown above the ⏭ symbol.

When the direct Value Entry function is activated, a numerical keypad will be displayed. Values may be entered by touching the numbers on the keypad. This value will be shown in a box at the top right of the keypad area.

Selecting **OK** enters the value and removes the keypad from the screen.

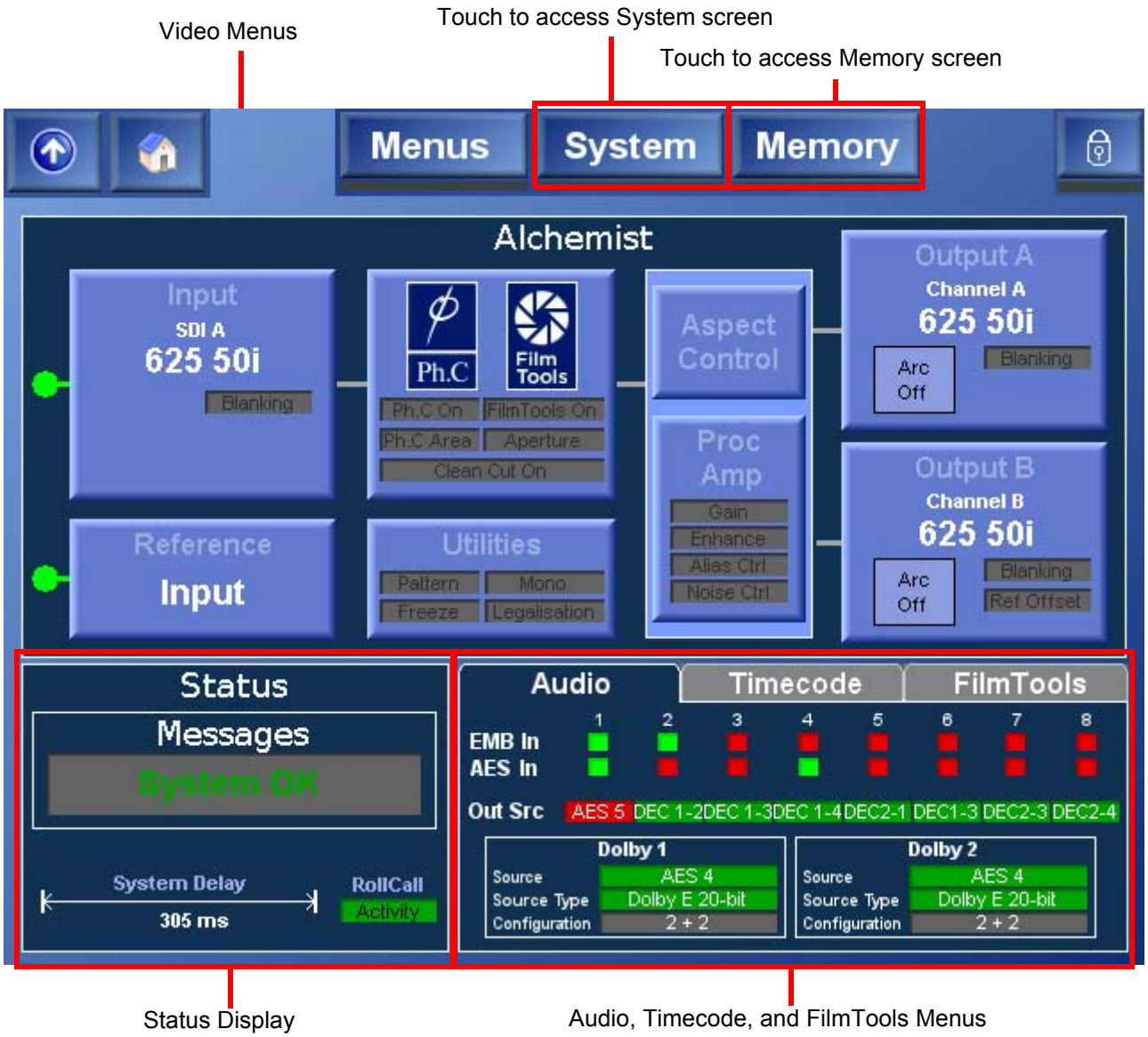
Selecting **Cancel** removes the keypad from the screen without accepting the value.

The Del button clears the last number entered.

Selecting Specific Functions

The Alchemist Ph.C's functions are grouped into seven main areas:

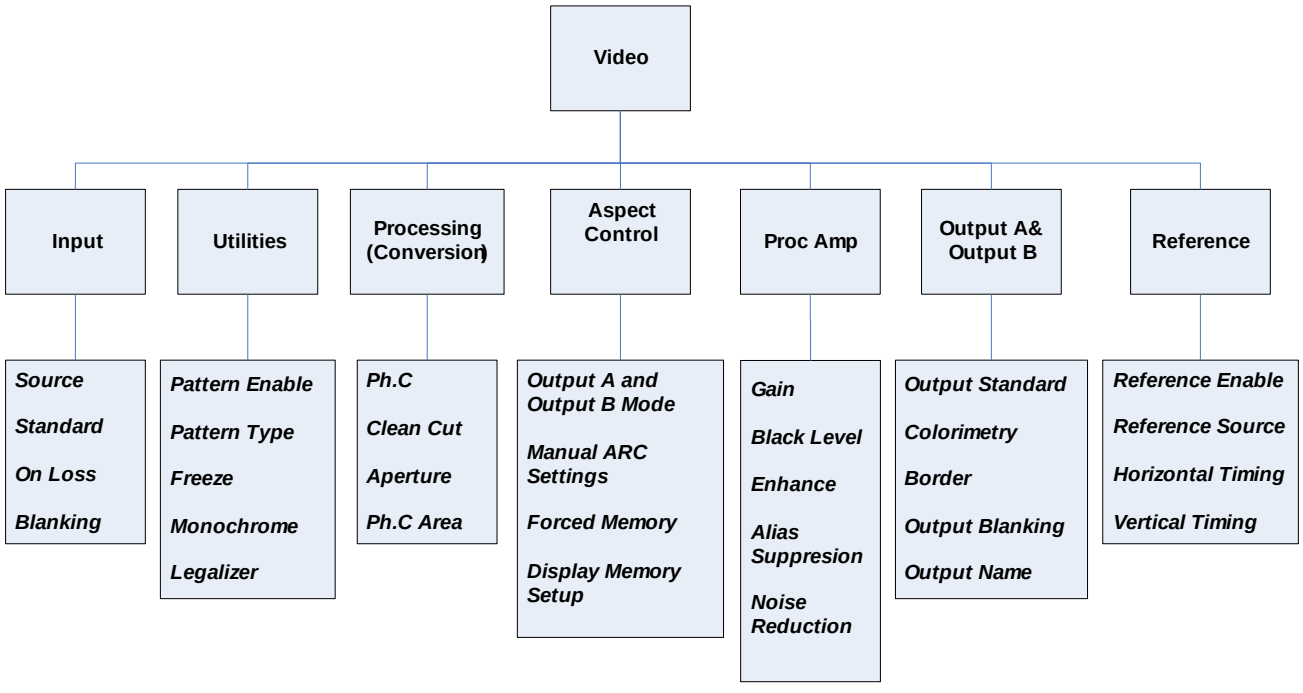
- **Video Menus:** The Video menus are used to configure and control the unit's video functions. For more information, refer to page 26.
- **Audio Menus:** The Audio menus are used to configure and control the unit's audio and Dolby E functions. For more information, refer to page 60.
- **Timecode Menus:** The Timecode menus are used to configure and control the unit's timecode functions. For more information, refer to page 71.
- **FilmTools Menus:** The FilmTools menus are used to configure and control the unit's film conversion functions. For more information, refer to page 79
- **Status Display:** The Status display, on the unit's Home screen, displays messages and warnings about the unit's state and provides basic information about the settings and functions. For more information, refer to page 94.
- **System:** The System screen is used to control the unit's RollCall setup, configure the touch panel, and provides informational and diagnostic tools. For more information, refer to page 95.
- **Memory:** The Memory screen is used to store system configurations so that they can be recalled later. For more information, refer to page 106.



Video Menus

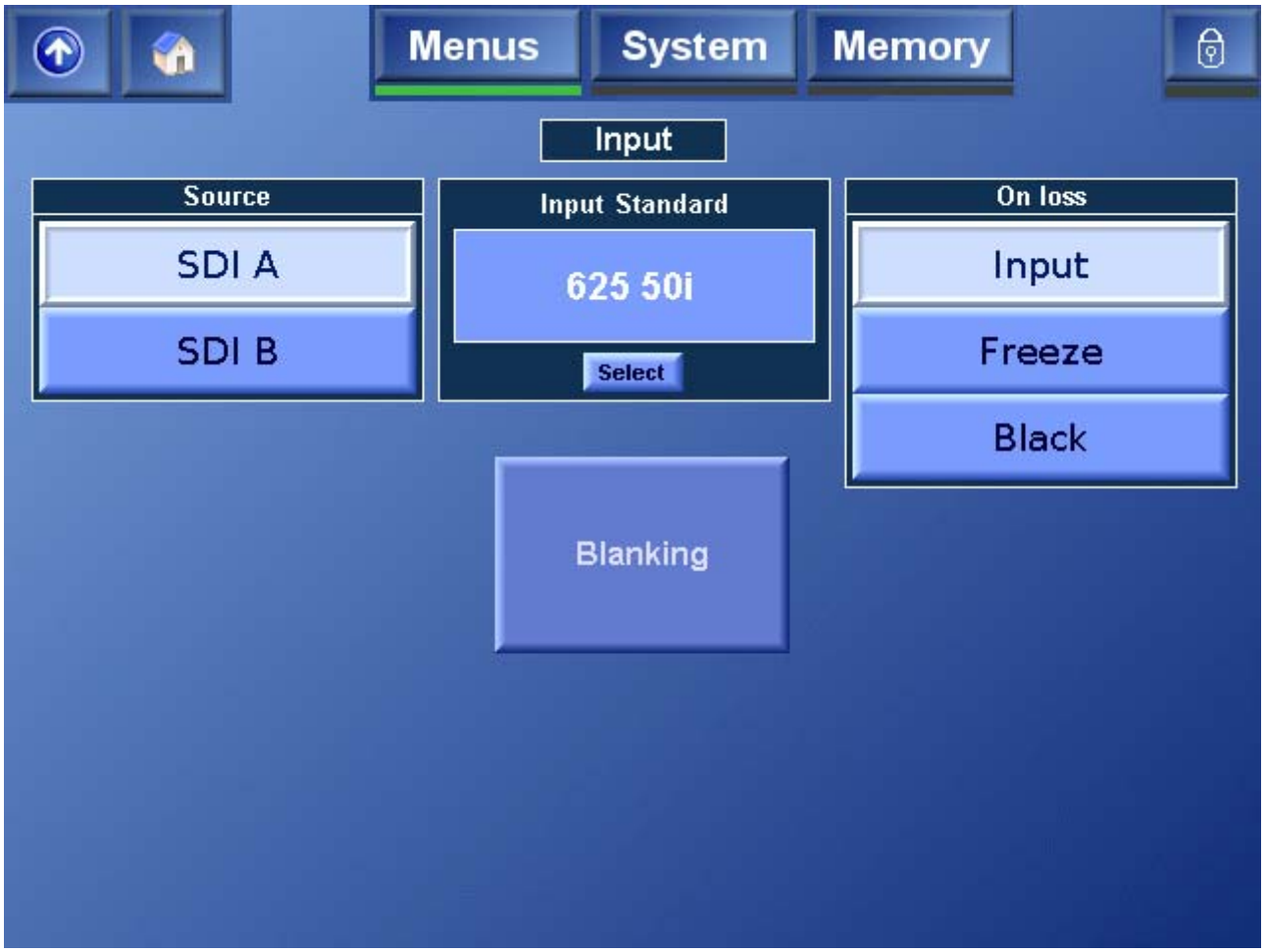
This section describes the Alchemist Ph.C HD video functions, which include the following configuration settings and controls:

- **Input:** Use these settings to specify the input source, input, actions that the unit should take upon signal loss and the input blanking settings. See “Input” on page 27.
- **Conversion:** Use these settings to enable or disable the Ph.C, and Clean Cut features, specify Aperture settings, and to set up Ph.C areas that can be used, for example, to protect transparent logos. See “Conversion” on page 30.
- **Aspect Control:** Use these settings to define the input aspect ratio, select preset output aspect ratios, and to perform custom aspect ratio adjustments. See “Aspect Control” on page 35.
- **Proc Amp:** Use these settings to adjust image gain and black level, enhance the image, and apply alias suppression and noise reduction. See “Proc Amp” on page 43.
- **Output A & Output B:** Use these settings to define the output standards, colorimetry settings, output border settings, output blanking, and to change the output names if desired. See “Output A and Output B” on page 47.
- **Reference:** Use these settings to enable and specify the source of the reference signal, and to adjust the relative timing of the reference signal to the output signal. See “Reference” on page 53.
- **Utilities:** Use these settings to enable a test pattern, specify the test pattern to be displayed, freeze the output picture, display the output as a mono-chrome image, and configure gamut legalisation. See “Utilities” on page 55.



Input

When **Input** is selected, the Input screen appears. Use this screen to specify the input signal options.



Source
This allows either SDI A or SDI B to be selected as the input signal for the unit.

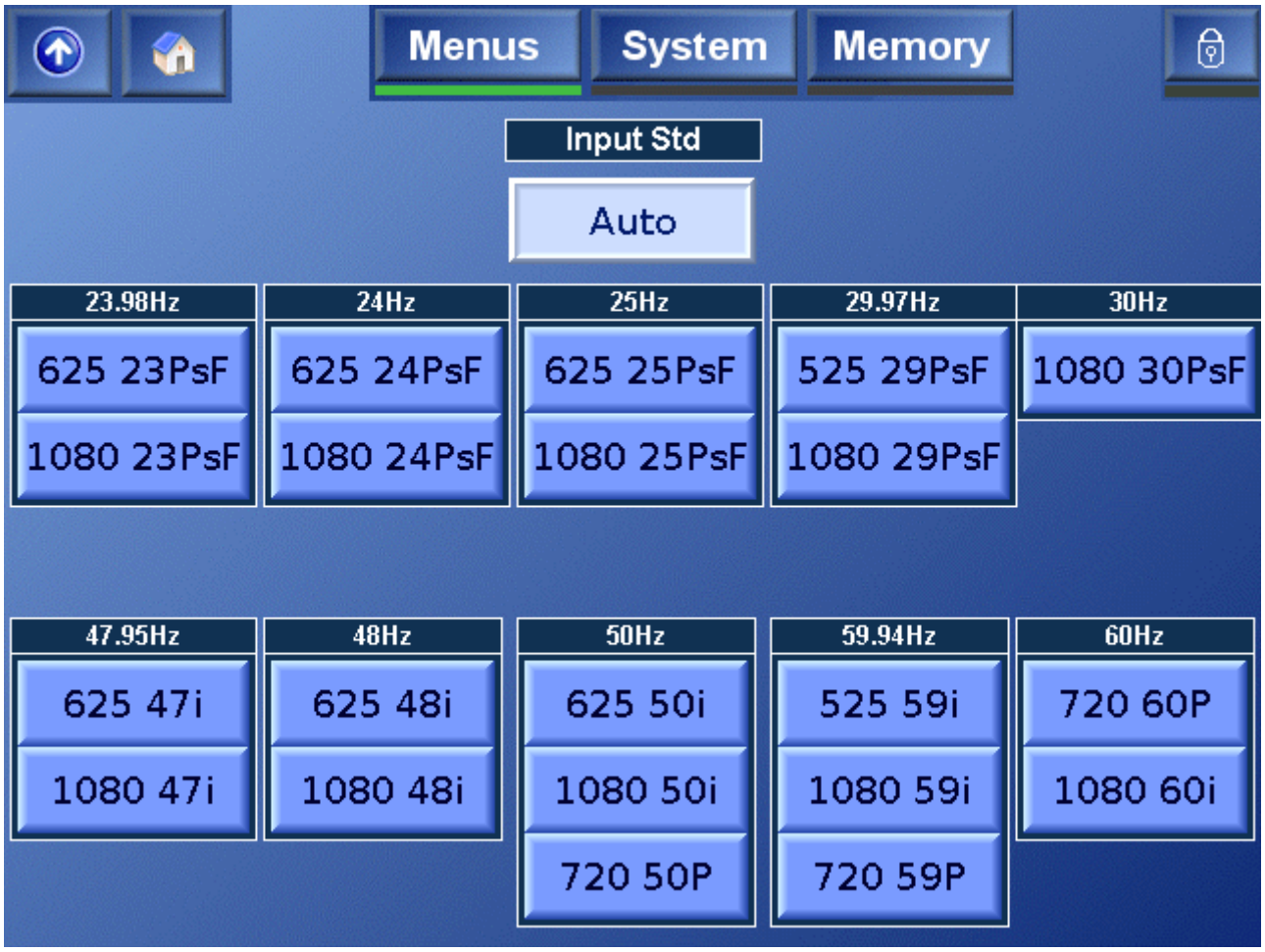
Standard

To view the input standard, press Select. The unit automatically detects the input standard. The standards that the unit can detect are displayed

Note:

If a standard is not available it will appear greyed-out.

For example, if the FilmTools option has not been purchased, or has not been enabled, the standards related to film-based input cannot be selected.



Note:

If the unit does not recognize the input standard, it will report an input loss or error.

On Loss

This specifies the action the Alchemist Ph.C HD will take in the event of an input loss.

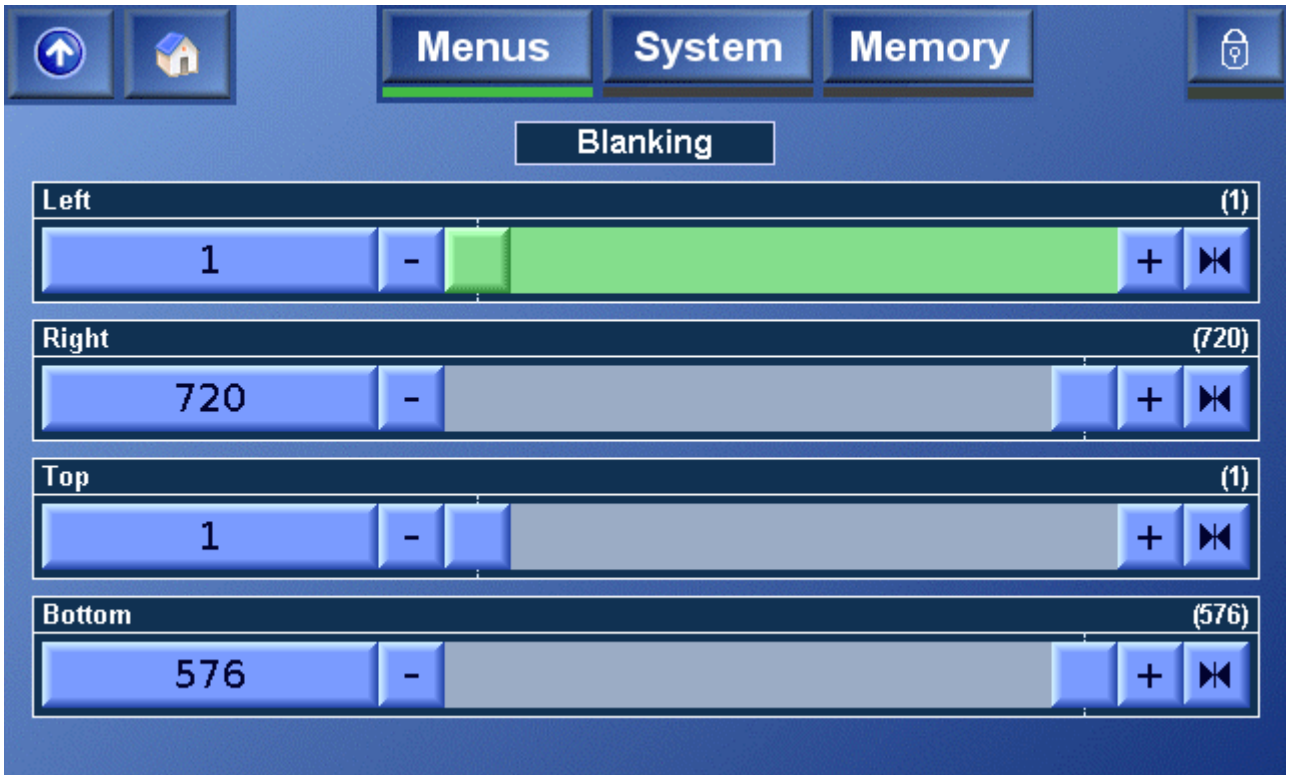
Colorimetry

This function controls the color space conversion standard of the input signal. To specify the Colorimetry setting, touch **Select** and in the dialog box that appears, choose one of the following options:

Auto	The most appropriate color space conversion for the signal is selected, as determined from the definition of the output video standard.
REC 601	Color space conversion to REC 601 standards is applied.
SMPTE 240	Color space conversion to SMPTE 240 standards is applied.
SMPTE 274	Color space conversion to SMPTE 274 standards is applied.
BT 709	Color space conversion to BT 709 standards is applied.
None	No color space conversion is applied.

Blanking

The Blanking function allows the adjustment of input blanking. It is used where the source video is known to have pixels/lines at the edge of the picture that are not required to be displayed. When set, the unit will blank any output data generated by the input data, regardless of the display control settings. The preset values are shown above the ⏮ symbol.

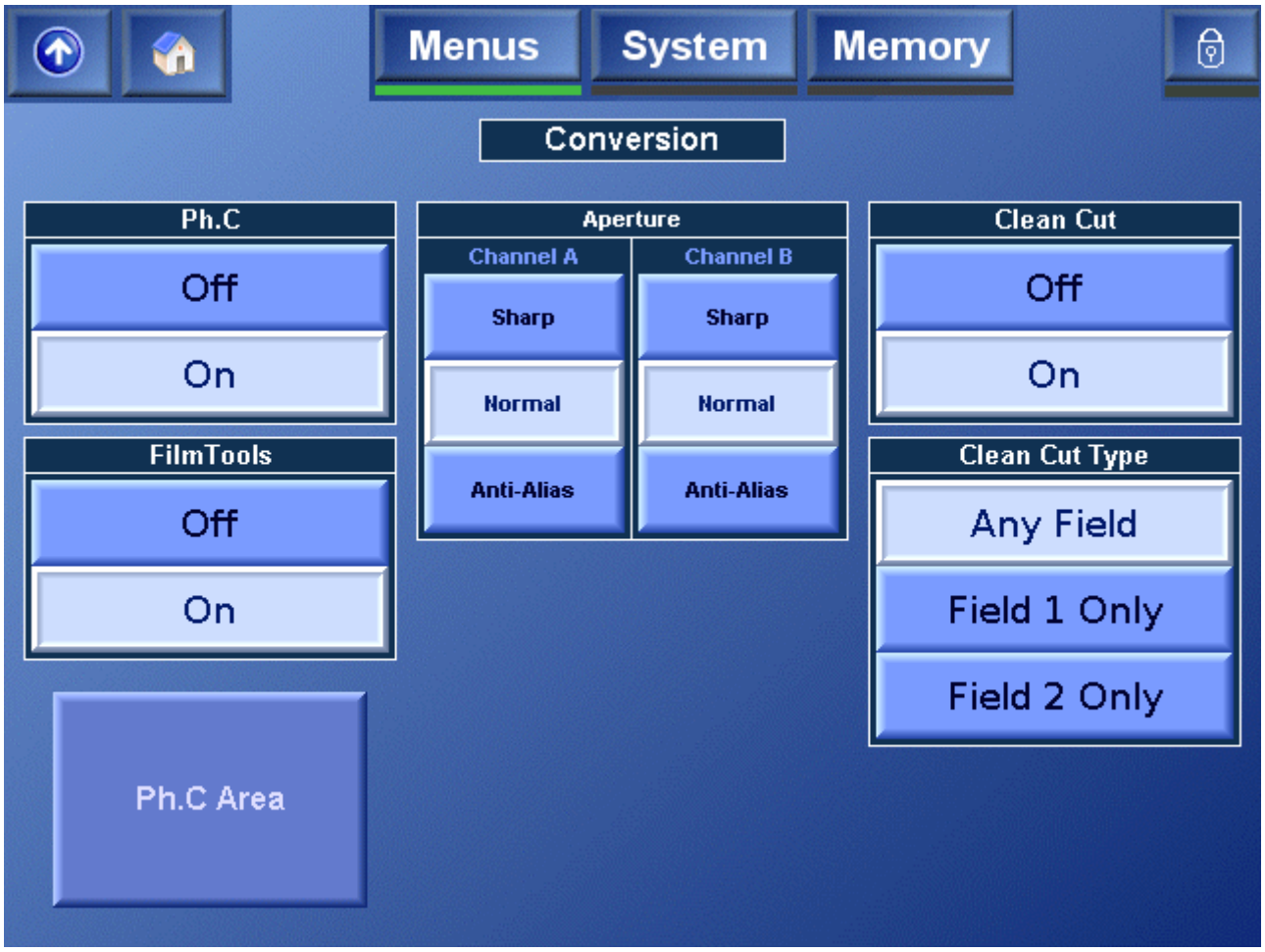


Left	Adjusts the left-hand edge of blanking. A setting of 1 indicates that no input pixels that are normally visible should be blanked, 2 causes the first input pixel to be blanked, etc.

Right	Adjusts the right-hand edge of blanking. A value equal to the number of active pixels per line in the current input standard indicates that no input pixels that are normally visible should be blanked. Subtracting 1 from this causes the last input pixel to be blanked, etc.
Top	Adjusts the top edge of blanking. A setting of 1 indicates that no input lines that are normally visible should be blanked, 2 causes the first input line to be blanked, etc.
Bottom	Adjusts the bottom edge of blanking. A value equal to the number of active pixels per line in the current input standard indicates that no input lines that are normally visible should be blanked. Subtracting 1 from this causes the last input line to be blanked, etc.

Conversion

When **Conversion** is selected, the screen shown below is displayed. This function allows conversion options to be selected.



Ph.C (Phase Correlation)

On selects motion compensated conversion and **Off** selects linear conversion.

FilmTools

On enables the FilmTools options and **Off** disables the FilmTools options.

For more information about FilmTools, see “FilmTools” on page 79 and “Appendix D: FilmTools” on page 133.

Aperture

The Aperture settings are provided to maximize vertical resolution without introducing alias.

The optimal Aperture setting is dependant on the quality of the source and the conversion being performed. For example, down converting sharp HD content to SD demands greater care with setup than an HD to HD cross conversion.

Each Aperture can be fine tuned using the Alias Suppression control. See “Alias Suppression” on page 45.

For each channel (A or B), the following Aperture adjustments can be made:

- **Sharp** preserves the most vertical resolution from the input pictures.
- **Normal** provides the best compromise for typical input pictures.
- **Anti-Alias** is designed to prevent objectionable aliases in the output pictures.

CleanCut

Note: *When the FilmTools option is enabled, the CleanCut concept of forcing a cut on field one or field two is not necessarily applicable.*

CleanCut ensures no interpolation occurs between images either side of a cut. Under extreme circumstances, it may be necessary to disable CleanCut under the rare circumstance of a false cut being detected.

Any Field	Cuts are Output on the closest Output field boundary to the detected input cut.
Field 1 Only	Cuts are restricted such that the first field of a new scene always begins on a field one.
Field 2 Only	Cuts are restricted such that the first field of a new scene always begins on a field two.

When configuring the Alchemist Ph.C to use both interlaced and progressive Outputs, two factors must be considered when setting CleanCut options:

- Output A is always the primary Output and Output B is always the secondary Output.
- Field based cuts can only be made with an interlaced input.

When both interlaced and progressive Outputs are required, and field-specific cuts are required on the interlaced Output, Output A must be interlaced and Output B progressive. If the Outputs are configured the other way around, there is no way of ensuring that cuts will occur on the correct field.

The table below illustrates the relationships between Primary/Secondary Outputs, the selected CleanCut mode, and the resulting cuts.

Output Format		**CleanCut**		
Primary (A)	**Secondary (B)**	**Cut Any Field**	**Cut Field 1**	**Cut Field 2**
i	i	✓	✓	✓
i	P	✓	✓	✓
P	i	✓	x	x
P	P	✓	x	x

i = Interlaced (525, 625, 1080i 50, 1080i 59)

P = Progressive (720p 50, 720p 59)

Using the Alchemist Ph.C HD as a Frame Synchronizer

In instances where the input and Output are both interlaced, and of the same frame rate, the Alchemist Ph.C. HD functions as a frame synchronizer.

If interlaced Output (in which the unit functions as a frame synchronizer) and progressive Output are both required, the interlaced Output should be set to Output A and the progressive Output should be set to Output B. If configured the other way it cannot be guaranteed that input dominance will be maintained.

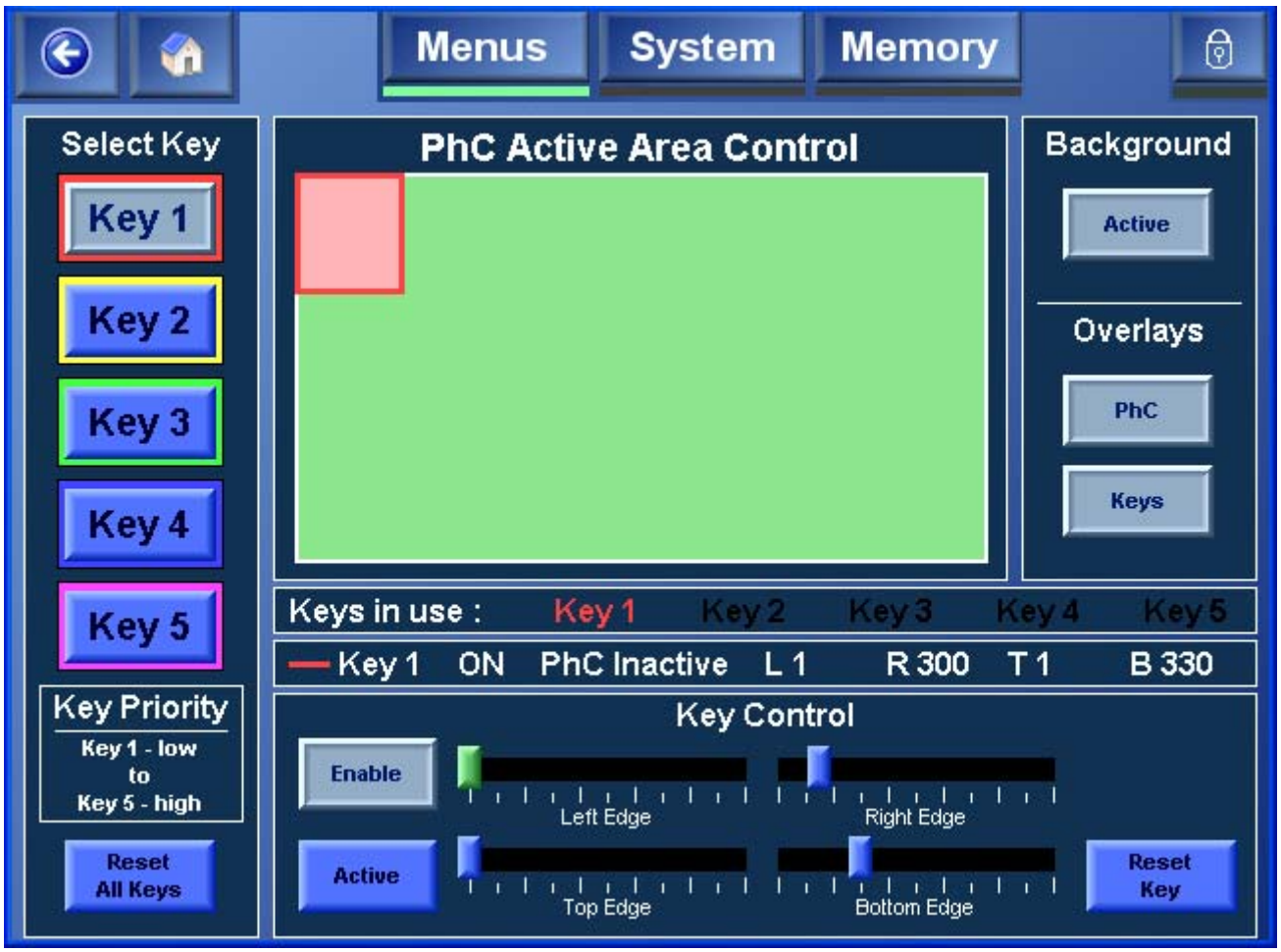
Primary (A)	Secondary (B)	Frame Synchronization
i	i	✓
i	P	✓
P	i	x
P	P	x

i = Interlaced (525, 625, 1080i 50, 1080i 59)

P = Progressive (720p 50, 720p 59)

Ph.C Area

Selecting **Ph.C Area** on the Conversion screen reveals the Ph.C Area screen.



The controls on the Ph. C Area screen allow Ph.C motion compensation to be disabled on certain areas of the image. Typical applications for this feature include protecting static computer generated captions overlaid onto dynamic sports coverage, or very small, low contrast, or transparent logos in front of dynamic action.

This is done by specifying an **active** area and/or an **inactive** area of the image. The inactive area, when **Enabled**, is converted linearly. Any region outside the active area, if **Enabled**, will also be converted linearly. The remainder of the image will be converted using Ph.C motion compensation. To assist set up, a colored **Overlay** may be activated.

The active area is shown in green, inactive in red.

Up to five Key areas can be specified. These Key areas are numbered in ascending priority. That is, Key 2 has priority over Key 1, and so on. If two Keys overlap, the action specified for the area with the higher priority occurs.

Example source with dynamic video and logo.

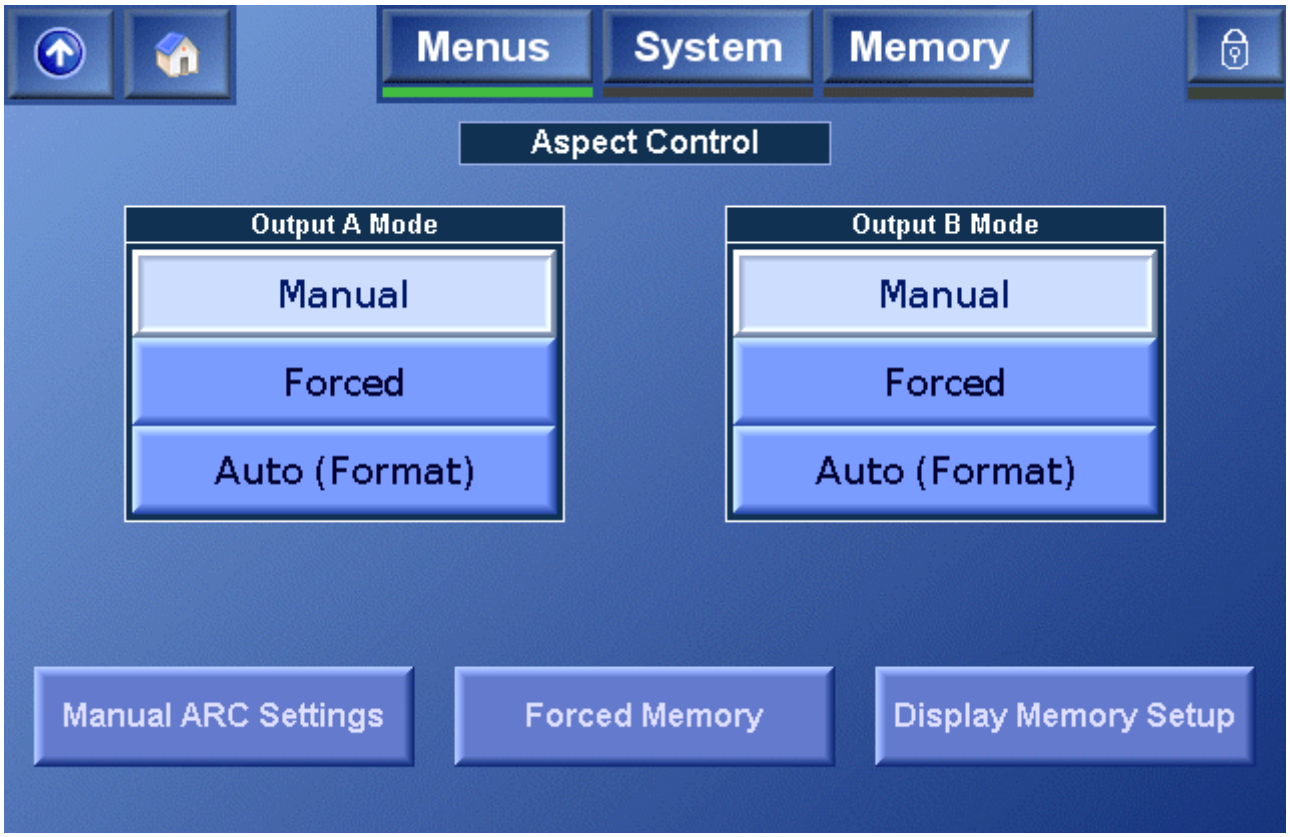
Colored overlay after adjustment to convert the source shown on the right.

Select Key	To select a Key, press the corresponding Key button (**Key 1** to **Key 5**). After selecting the Key, use the Key Controls to set up the Key area.
Reset All Keys	Press **Reset All Keys** to return all of the Keys to their default settings.
Key Control	When the **Enable** option is selected, the Key area is enabled and can be adjusted. When the **Active** option is selected, the Key area will use motion-compensated conversion, and the Key overlay, if displayed, will appear in green. When it is not selected, the Key area will use linear conversion, and the Key overlay, if displayed, will appear in red. Use the slider controls (**Left Edge**, **Right Edge**, **Top Edge**, and **Bottom Edge**) to adjust the size and position of the selected Key area. Press **Reset Key** to return the selected Key to its default settings, leaving the other Keys unchanged.
Background	When the **Active** option is selected, the background area uses Ph.C motion compensated conversion, and the background overlay, if displayed, appears in green. When the **Active** option is not selected, the background area uses linear conversion, and the background overlay, if displayed, appears in red.

Overlays	Select **Ph.C** to display the Ph.C overlay. Select **Keys** to display the Key overlays.
Keys in use	This line displays the Keys that are currently in use. When a Key is in use, its name is displayed in the color that corresponds to its Select Key button. When a Key is not in use its name is displayed in black.
Key *n* (Where n is the selected Key.)	This line displays the following information about the currently selected key: Whether the Key is On or Off. Whether Ph.C is Active or Inactive. The positions, in pixels, of the Left Edge, Right Edge, Top Edge, and Bottom Edge.

Aspect Control

When **Aspect Control** is selected, the screen shown below is displayed. The aspect control functions are used to control the size and shape of the output picture.



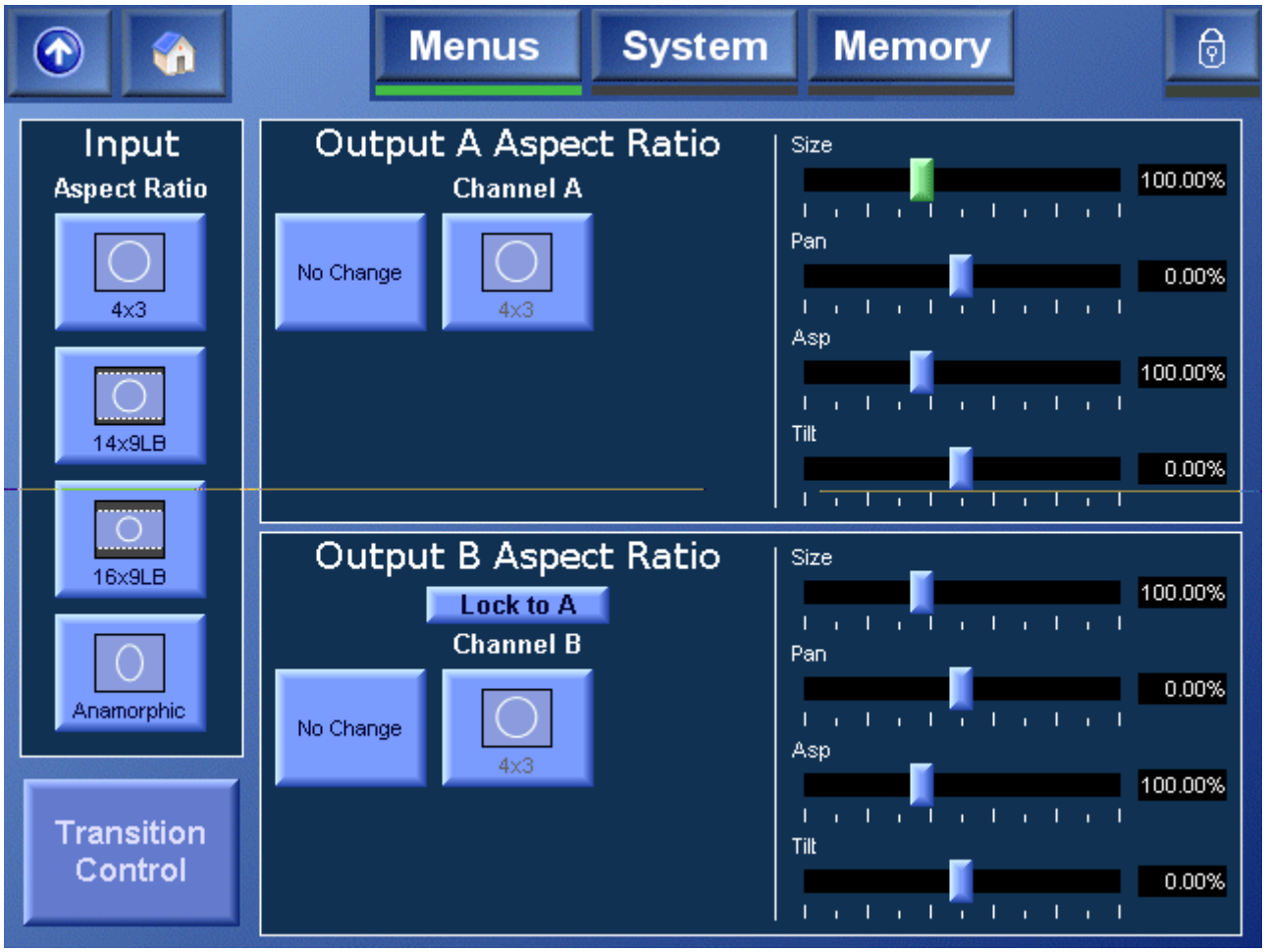
For both Output A and Output B, the Aspect Ratio Conversion mode is selected from the following modes.

The Forced and Auto modes offer a means to select one of the four preconfigured display memories. Each display memory stores size, tilt, pan and an SMPTE

2016 code. Each display memory has a default configuration that can be reconfigured as required.

Manual	This mode allows the ARC settings to be manually adjusted. Touch **Manual ARC Settings** to access the manual ARC controls
Forced	This mode forces the display memory specified on the Forced Memory screen to be used. The settings for the Forced Memories are specified on the Display Memory Setup screen.
Auto (Format)	This mode automatically recalls the relevant display memory based in the Input/Output selection.

Manual Aspect Control



The aspect ratio conversion performed by the Alchemist Ph.C HD is determined by several interrelated factors:

- The current input standard
- The selected input aspect ratio
- The current output standard
- The selected aspect ratio conversion
- Fixed aspect ratio adjustments

Input Aspect Ratio

The available input aspect ratio options are determined by the current input standard. Only those aspect ratios that are appropriate to the input standard will be displayed.

To specify the input aspect ratio, touch the button that corresponds to the actual input aspect ratio.

In turn, the selected input aspect ratio will determine the output aspect ratio options that are available for selection.

Note that if the input standard is changed, the possible input aspect ratios will also change and the input aspect ratio will need to be reselected.

Output Aspect Ratio (A and B)
The available output aspect ratio conversions are determined by the selected input aspect ratio and the current output standard. Only those common aspect ratio conversions that are appropriate to both are displayed.

To specify the output aspect ratio, touch the button that corresponds to the desired output aspect ratio.

To lock the Channel B aspect ratio to that of Channel A, Select **Lock to A**.

After selecting the output aspect ratio, the slider bars on the right are automatically adjusted to achieve the desired aspect ratio conversion.

Note: *Note that if the input standard, selected input aspect ratio, or output standard is changed, the possible output aspect ratio options will also change and the output aspect ratio will need to be reselected.*

Aspect Ratio Adjustments
After the input and output aspect ratios have been set, these controls will have been automatically adjusted to achieve the desired conversion. However, it is possible to adjust aspect ratio conversion using these controls. For example, after selecting the aspect ratio conversion, the output image could be slightly overscanned by adjusting the size control.

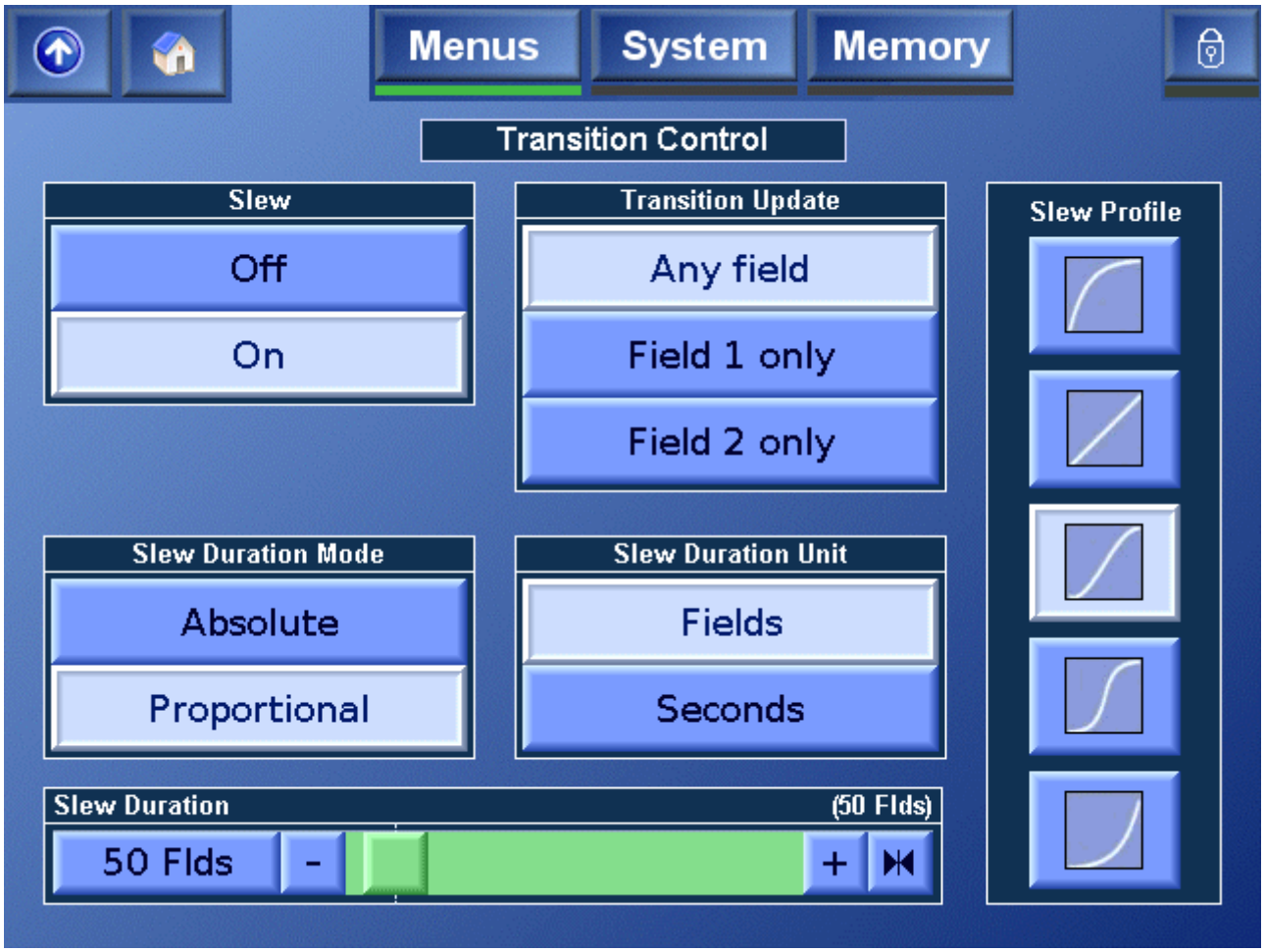
To adjust these controls, move the slider bars as required.

Size	This adjusts the size of the whole image. Both vertical and horizontal size change together while maintaining the aspect ratio of the image. The range of control is from 40% to 200% in 0.01% steps.
Pan	This adjusts the horizontal position of the output image. The range of control is ±75% in 0.01% steps.
Asp	This adjusts the horizontal size of the image, allowing the shape (aspect ratio) of the output image to be changed. The range of control is from 50% to 150% in 0.01% steps.
Tilt	This adjusts the vertical position of the output image. The range of control is ±75% in 0.01% steps.

Note that if manual changes are made to the aspect ratio adjustments, they will be retained after the unit has been turned off. However, if a new fixed mode is selected they will be lost. If adjustments are made, store the setup in a user memory so that it can be recalled later.

Transition Control

When **Transition Control** is selected, the screen shown below is displayed. These controls are used to define the temporal control of a slewed transition. The profile is illustrated graphically on the front panel's button.



Slew On/Off

These controls enable or disable the transition control settings.

Transition Control

Any	Slew transitions will occur on either field 1 or field 2.
Field 1 only	Slew transitions will only occur on a field 1.
Field 2 only	Slew transitions will only occur on a field 2.

Slew Duration Mode

Absolute	The aspect ratio change will occur over the period defined by the Slew Duration control.
Proportional	The aspect ratio change will occur over the period defined by the Slew Duration control after scaling by the magnitude of the aspect ratio change. For example, given a slew duration setting of 10 fields, a size change from 50% to 100% will take 10 fields; a size change from 50% to 200% will take 20 fields. That is, each scaling by a factor of 2 occurs over the period defined by the slew duration setting.

Slew Duration Unit

Fields	Slew duration will be defined in number of fields.
Seconds	Slew duration will be defined in number of seconds.

Slew Duration
This control defines the time it takes for a slewed transition to occur. The duration can be defined in fields or seconds according to the Slew Duration Units control.

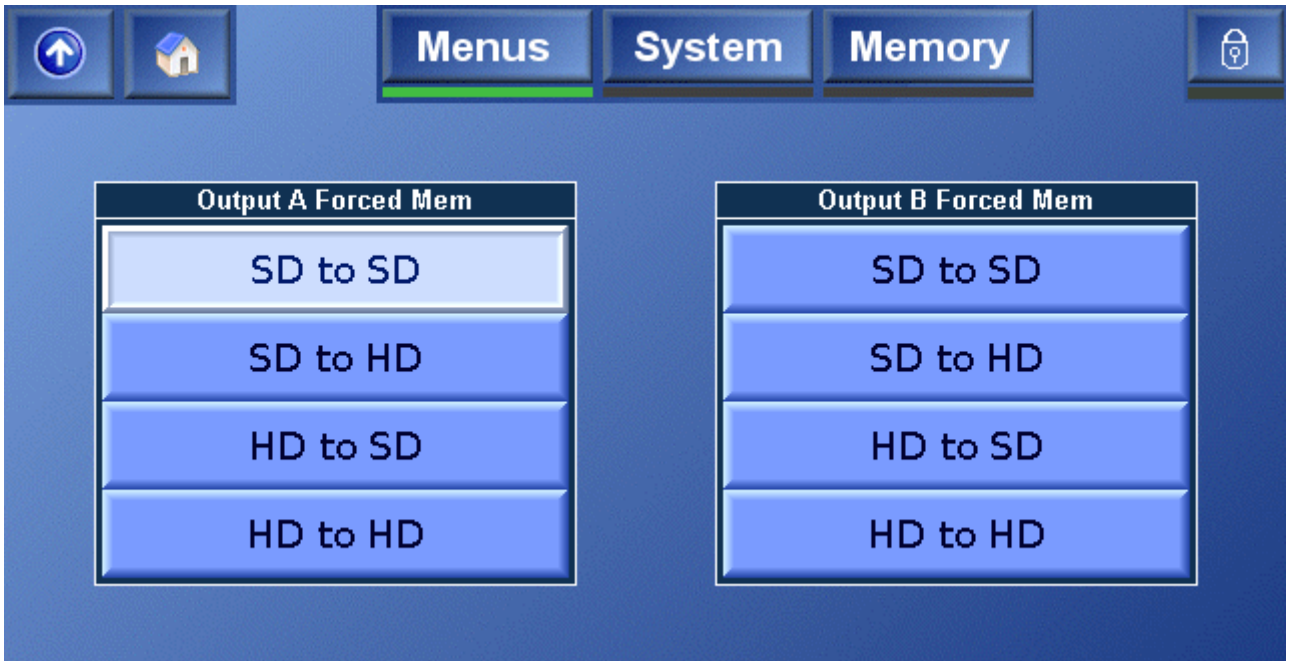
The actual duration of the transition between different aspect ratios also depends on the Slew Duration Mode control.

Slew Profile

 (Slow Out)	The slew's rate of change exponentially changes from an initial maximum rate of change down to zero.
 (Linear)	The slew maintains a constant rate of change from beginning to end.
 (Standard S-Curve)	The slew's rate of change ramps up from zero at the beginning and down to zero to the end with maximum rate of change in the middle.
 (S-Curve)	The slew's rate of change ramps up and down exponentially with a higher maximum rate of change in the middle.
 (Slow In)	The slew's rate of change exponentially increases from zero up to the maximum rate of change.

Forced Memory

The selections on the Forced Memory screen allow the display memory that will be used when in the Aspect Control mode is Forced. These display memories are configured on the Display Memory Setup screen.

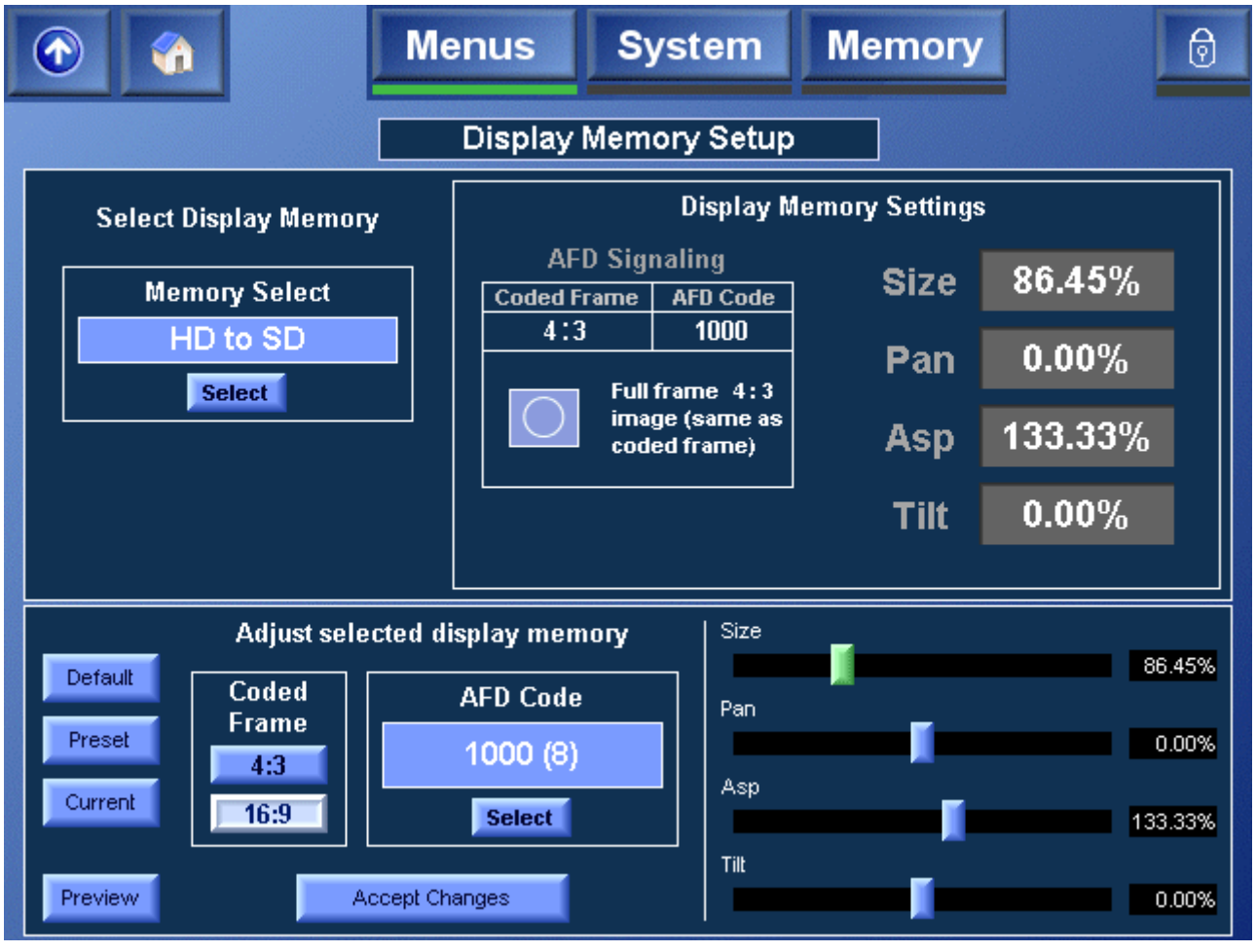


Display Memory Setup

The Display Memory Setup screen allows the display memories to be configured. Each display memory has a default configuration, but this configuration can be changed as required.

Default Settings

	ARC Settings	AFD Code	Coded Frame	Description
SD to SD	1:1	1000	4:3	Full frame 4:3 image, same as coded frame.
SD to HD	Size 100% ASP75%	1001	16:9	Pillarbox 4:3 image horizontally centered in coded frame.
HD to SD	Size 75% ASP133.33%	1010	4:3	Letterbox 16:9 image vertically centered in coded frame (all image areas protected).
HD to HD	1:1	1000	16:9	Full frame 16:9 image same as coded frame.

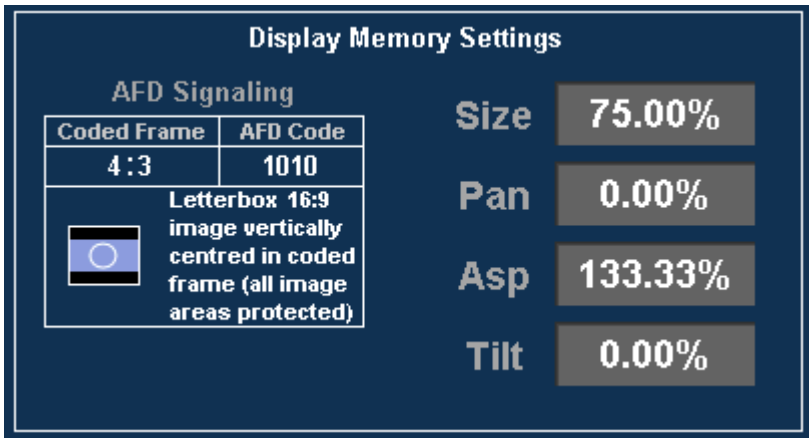


Select Display Memory

- Click **Select** to choose the display memory to be shown and, if required, modified.

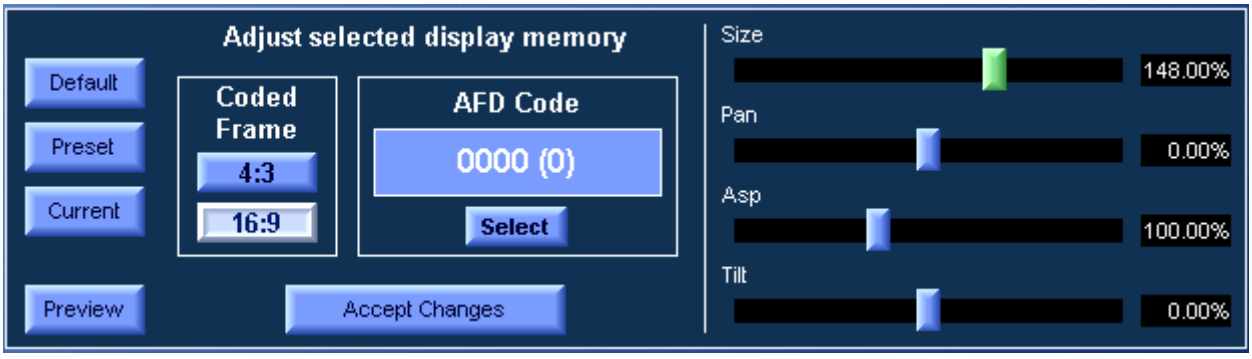
Display Memory Settings

The current display memory settings are displayed in this section.



Adjust Selected Memory Display

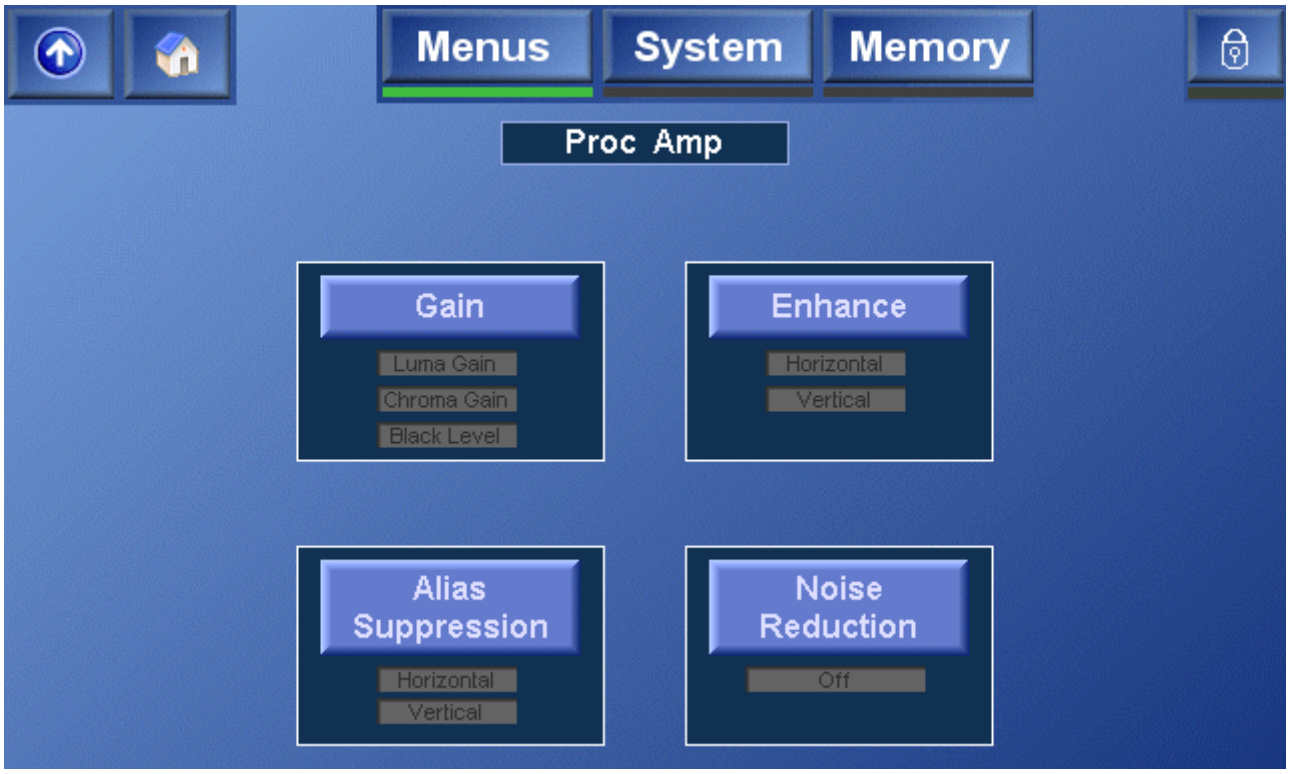
This section allows the display memory settings to be configured.



Default	Recalls the default settings for the selected memory.
Preset	Resets the Size, Pan, Asp, and Tilt settings to their preset values. **Size:** 100% **Pan:** 0.00% **Asp:** 100% Tilt: 0.00%
Current	Recalls the current settings stored in the selected memory.
Preview	Allows the user to preview the ARC adjustments being made.
Coded Frame	Sets the coded frame as either 4:3 or 16:9
AFD Code	Click **Select** to choose the desired 4 bit coded frame.
Size, Pan, Asp, Tilt	Use the sliders to adjust the values as required.
Accept Changes	Stores the adjustments into the selected memory

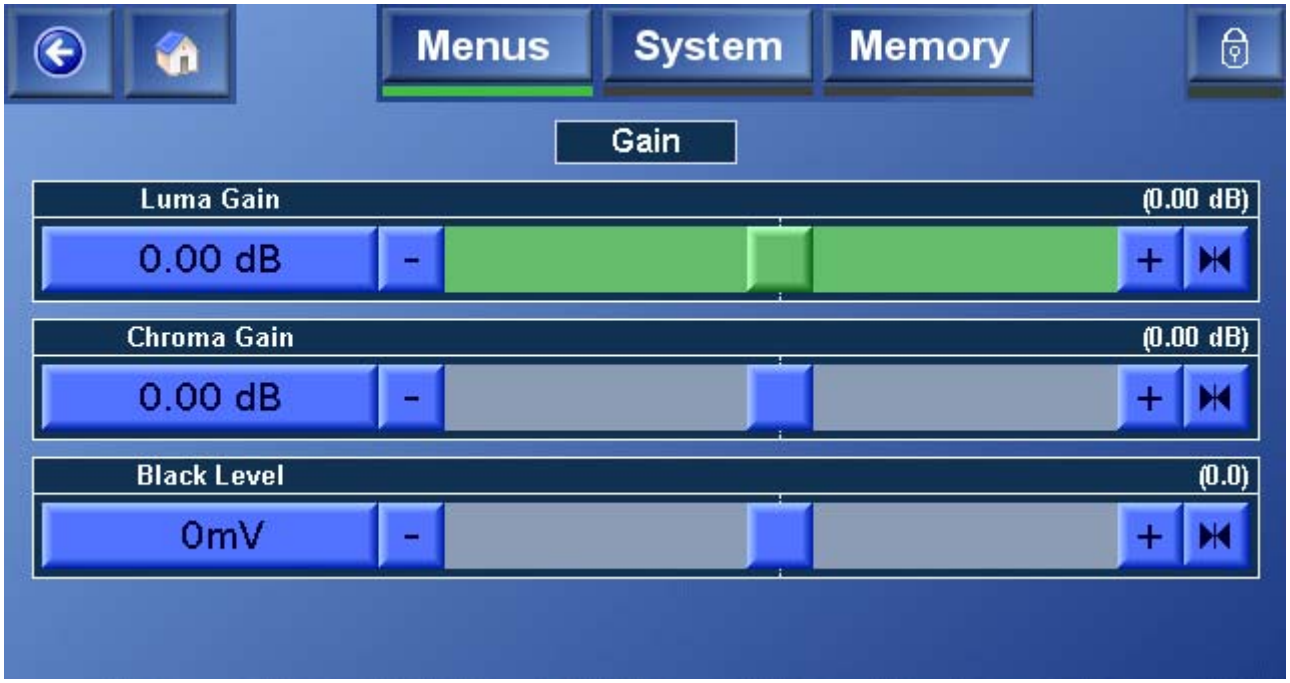
Proc Amp

When **Proc Amp** is selected, the screen shown below is displayed.



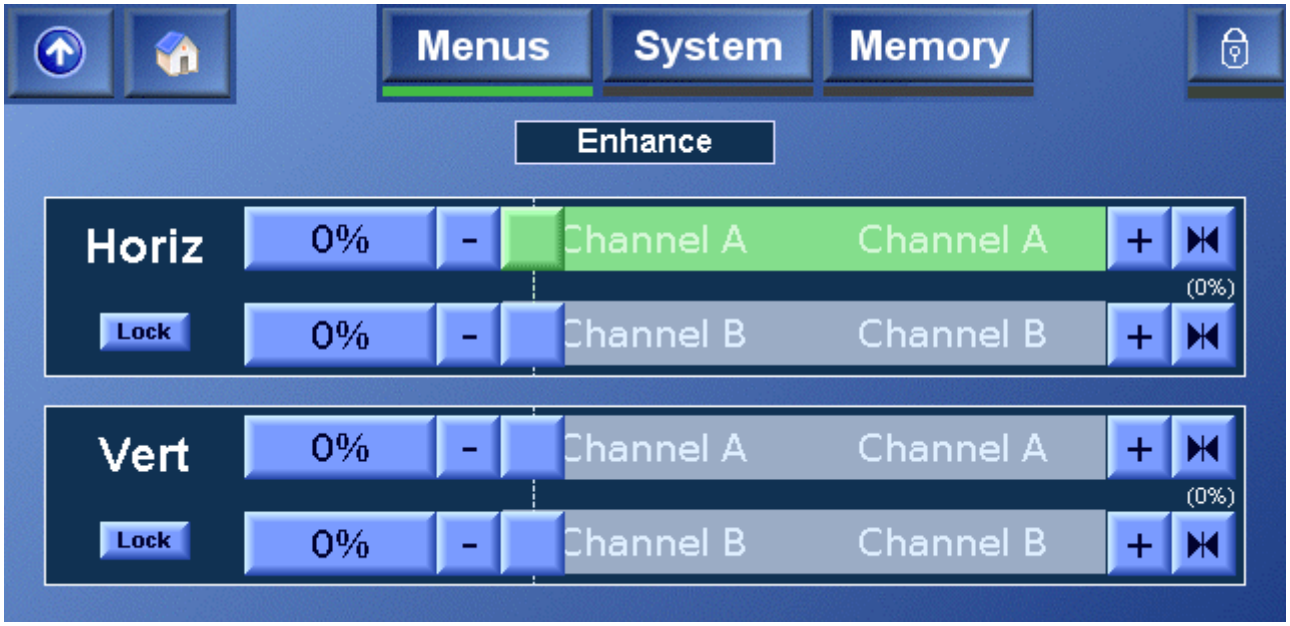
Gain

When **Gain** is selected, the screen shown below is displayed, where the luminance, chrominance and black level settings can be adjusted.



Enhance

When **Enhance** is selected, the screen shown below is displayed. This controls the amount of detail enhancement that may be applied.



Horiz(ontal) This adjusts the levels of high frequency horizontal information to make the output pictures appear sharper. The enhancer range is 0 to 100% in 1% steps and the default value is 0.

Vert(ical) This controls the amount of detail processing in the vertical filters. The enhancer adjusts the levels of high frequency vertical information to make the output pictures appear sharper. The enhancer range is 0 to 100% in 1% steps and the default value is 0.

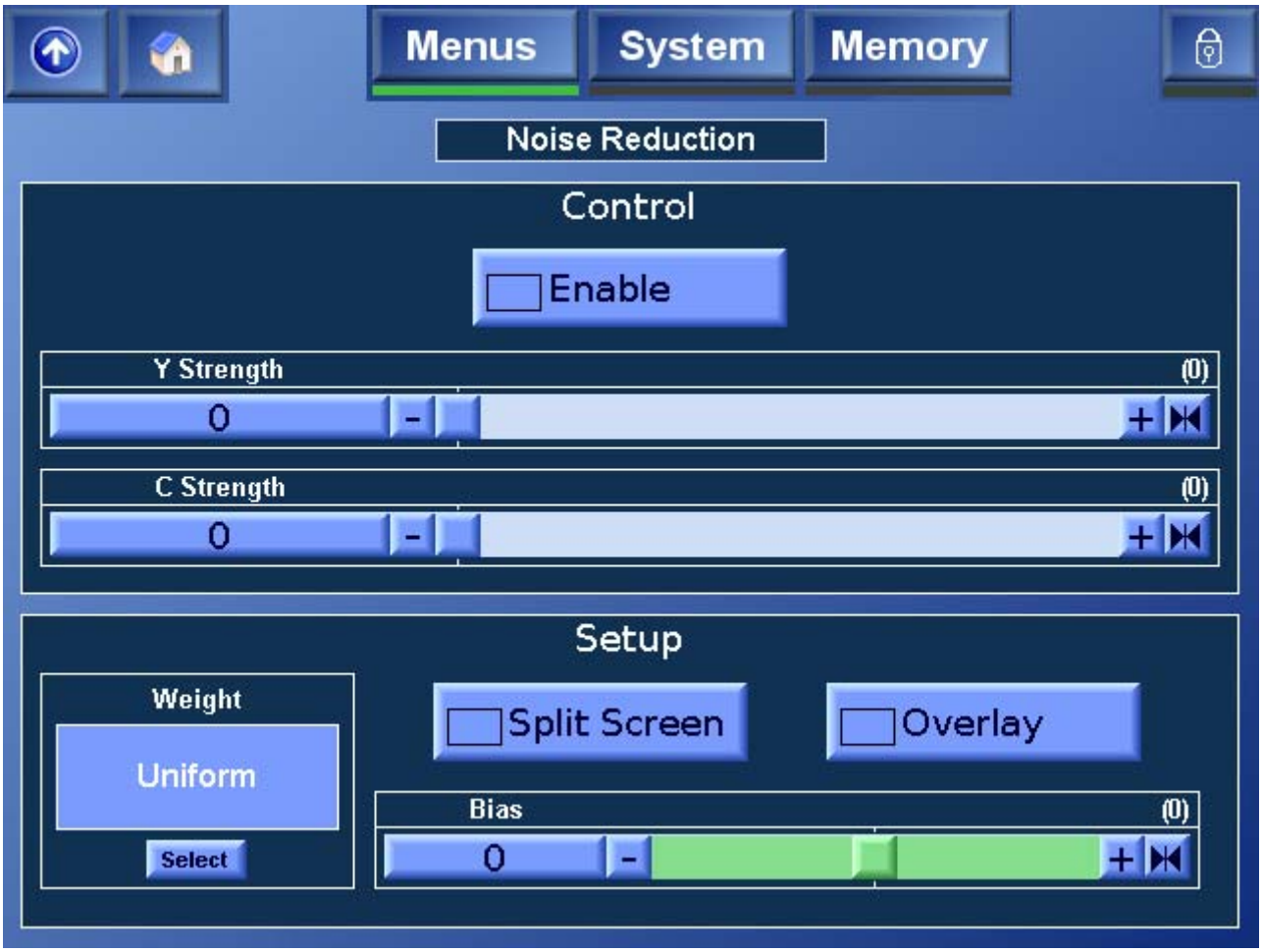
Alias Suppression

When **Alias Suppression** is selected, the screen shown below is displayed.

Horiz(ontal)	This works in sympathy with the Aperture control and allows the user to suppress horizontal alias in the output picture. The range of adjustment is -50 to +50 and the default value is 0.
Vert(ical)	This works in sympathy with the Aperture control and allows the user to suppress vertical alias in the output picture. The range of adjustment is -50 to +50 and the default value is 0.

Noise Reduction

When **Noise Reduction** is selected, the screen shown below is displayed. The controls on this screen enable various amounts of noise reduction to be applied to the signal. By default, noise reduction is not enabled. For more information, see “Appendix A: Noise Reduction” on page 107.



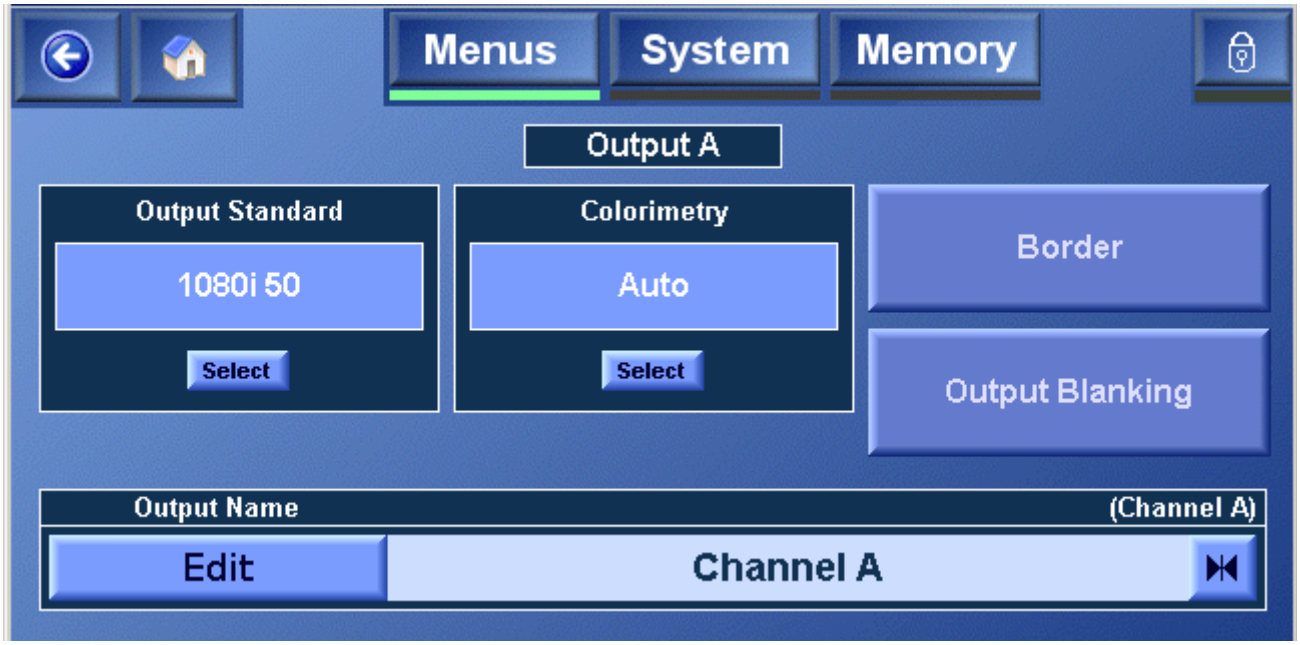
Enable	Select this check box to enable noise reduction. By default noise reduction is disabled.
Y Strength	This adjusts the amount of noise reduction applied to the luminance signal. The range of adjustment is from 30 to 0 in steps of 1. The preset value is 0.
C Strength	This adjusts the amount of noise reduction applied to the chrominance signal. The range of adjustment is from 30 to 0 in steps of 1. The preset value is 0.
Weight	When the source material is biased towards white or black, this setting enables noise reduction to be concentrated on the whites or blacks. Touch **Select** to specify the noise reducer weighting. **Uniform**: Provides uniform noise reduction. **Black**: Concentrates noise reduction on the blacks. **White**: Concentrates noise reduction on the whites. The preset value is Uniform.

Bias	The noise reduction adaptation algorithm distinguishes between static (or temporal) and moving (or spatial) regions of the image. This setting allows the algorithm to be adjusted towards temporal (a positive value) or spatial (a negative value) processing. The range of adjustment is ±7 units. The preset value is 0.
Overlay	An overlay feature is available to assist in adjusting the bias settings. When the overlay is enabled, colored regions indicate areas of the image where spatial processing is being used, and monochrome regions indicate where temporal processing is being used.
Split Screen	Select **Split Screen** to display a split screen view of the output image. One side of the screen displaying the image without noise reduction applied, and the other side showing the image with noise reduction applied.

The Luma Strength, Chroma Strength, and Weight settings are independent of, and have no effect on, the overlay.

Output A and Output B

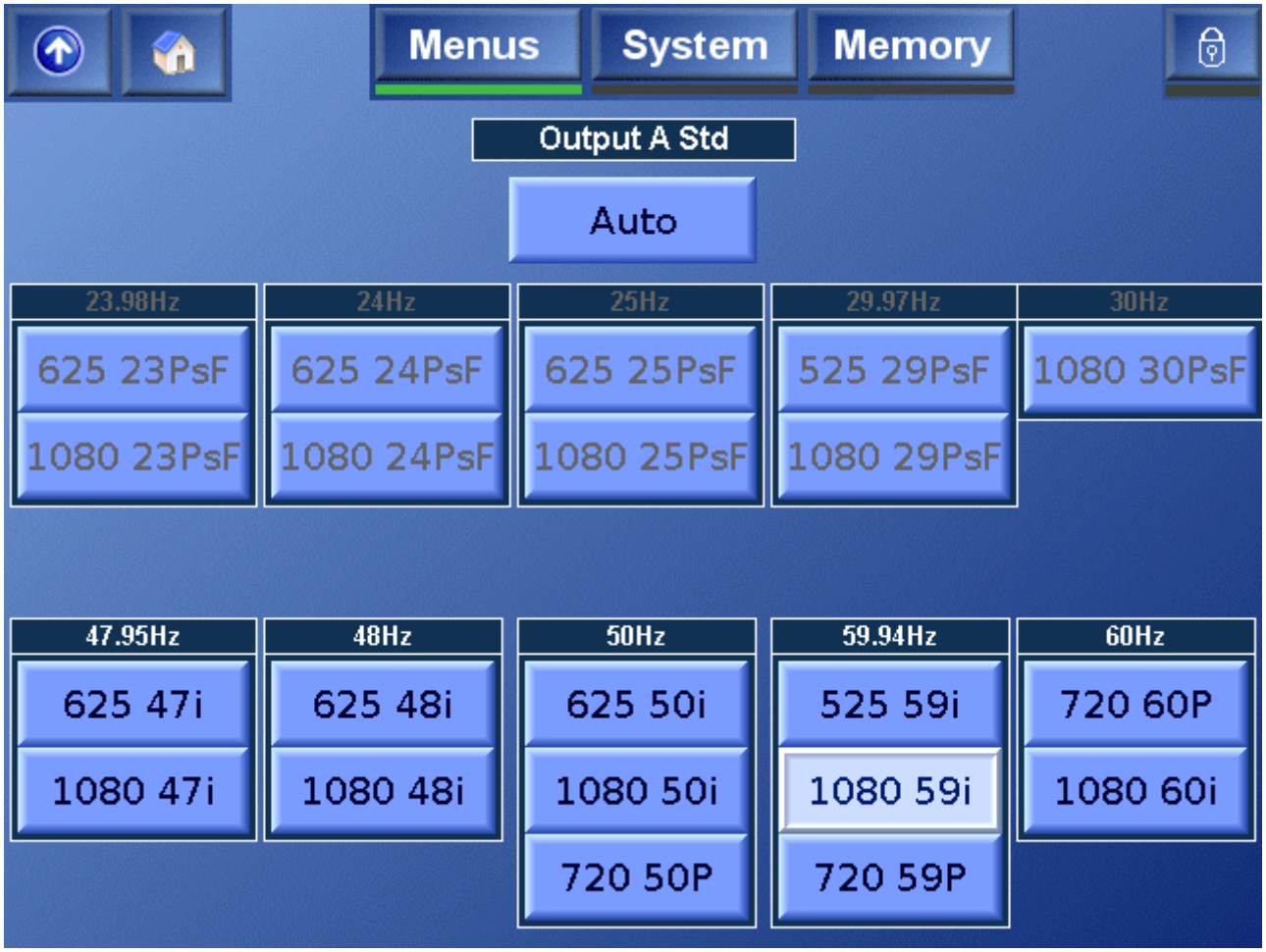
When the Output A item is selected, the screen shown below is displayed. This screen allows various options to be selected for the output signal.



Output Standard

This screen allows the output standard to be selected.

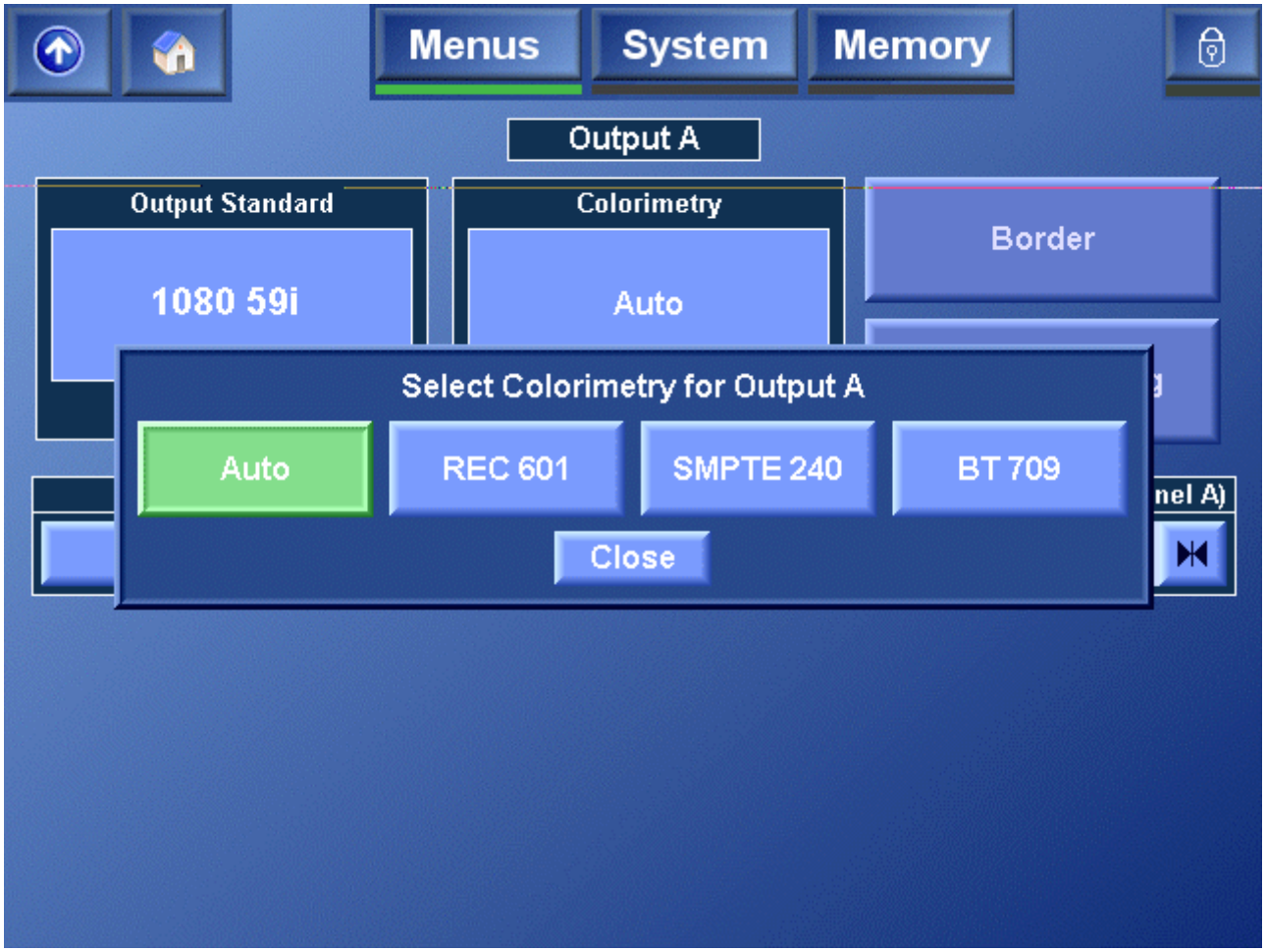
This allows the required output format to be chosen. After selection this format will be displayed in the Output Standard box.



Output B must be of the same frame rate as specified for Output A. When selecting the Output B standard, the available choices are determined by the Output A standard. For example, if 1080i 59 is selected as the Output A standard, only 525i 59, 1080i 59, and 720p 59 may be selected as the Output B standard.

Colorimetry

This function controls the color space conversion that is applied to the signal.

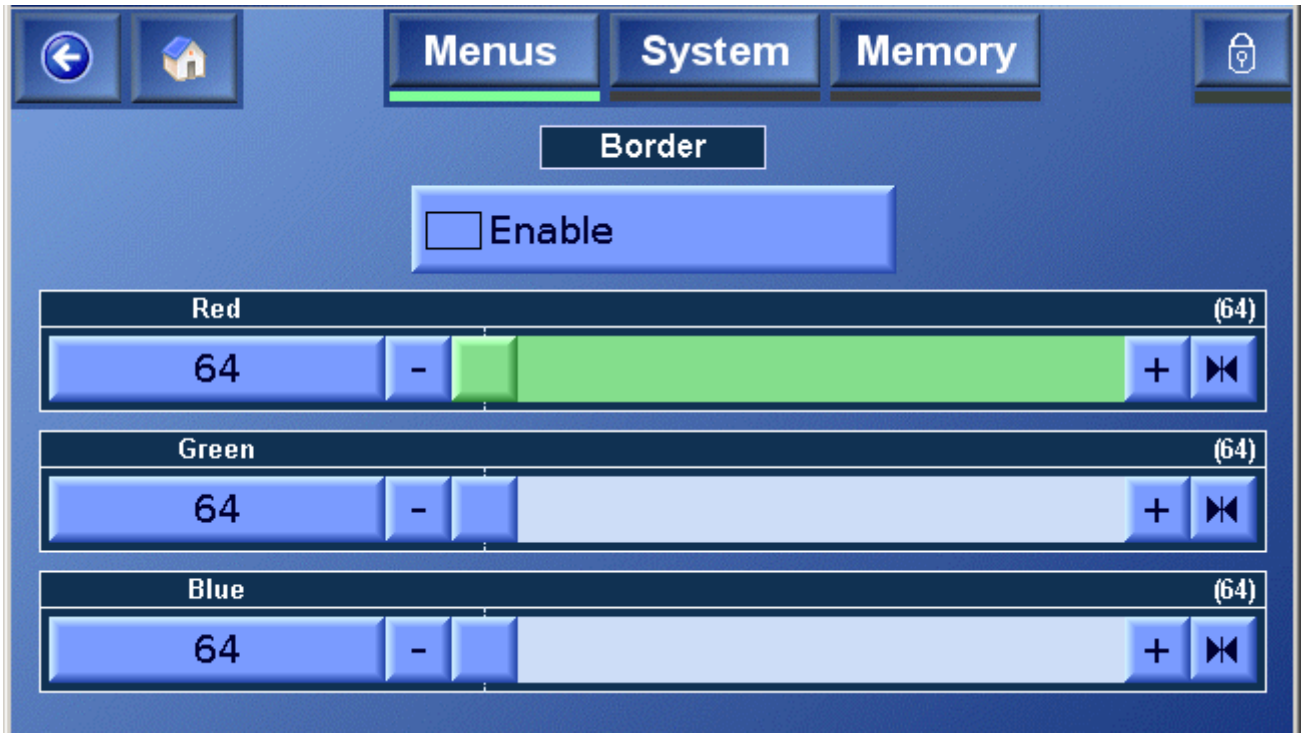


To specify the Colorimetry setting, touch **Select** and in the dialog box that appears, choose one of the following options:

Auto	The most appropriate color space conversion for the signal is selected, as determined from the definition of the output video standard.
REC 601	Color space conversion to REC 601 standards is applied.
SMPTE 240	Color space conversion to SMPTE 240 standards is applied.
SMPTE 274	Color space conversion to SMPTE 274 standards is applied.
BT 709	Color space conversion to BT 709 standards is applied.
None	No color space conversion is applied.

Border

This screen allows the user to adjust the appearance of any blanking border around the active picture. By default, the color of any border around the active picture is black. However, the user can adjust this to any desired color.



The border color is controlled by adjusting the amount of Red (R), Green (G) and Blue (B) in the border. The RGB values are displayed as 10-Bit digital video levels.

The default value for all the border colors is 64 which produces a black border. Note also that when the border is enabled and its color adjusted away from black then there is often a black band between the active picture and the color border.

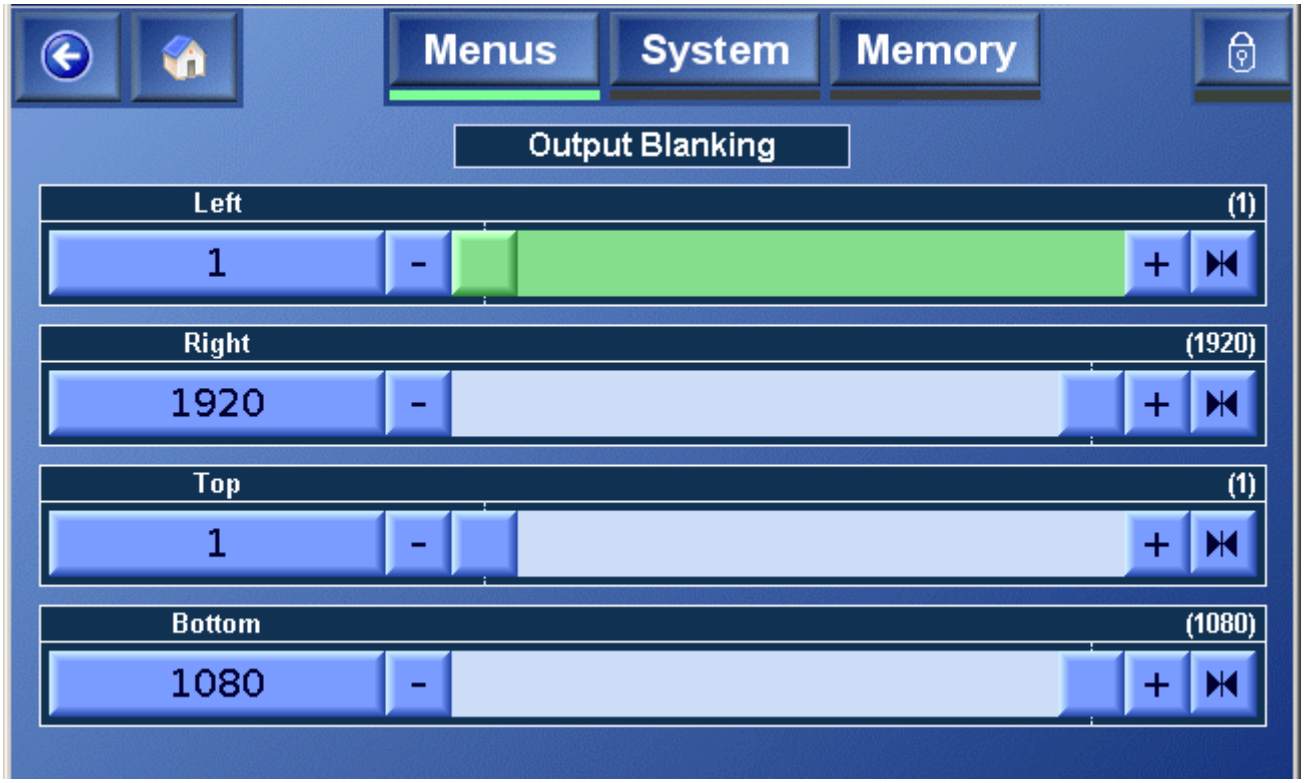
This occurs when the active picture does not completely fill the digital active line length of the input standard. To remove this black band the input blanking should be adjusted via the Input-Active menus to match the blanking of the incoming program material.

To activate the border, select **Enable**. If the border is not enabled then it will appear black regardless of the settings of the red, green and blue border values.

Output Blanking

This function allows the adjustment of output blanking. It is used where the source video is known to have pixels/lines at the edge of the picture that are not required

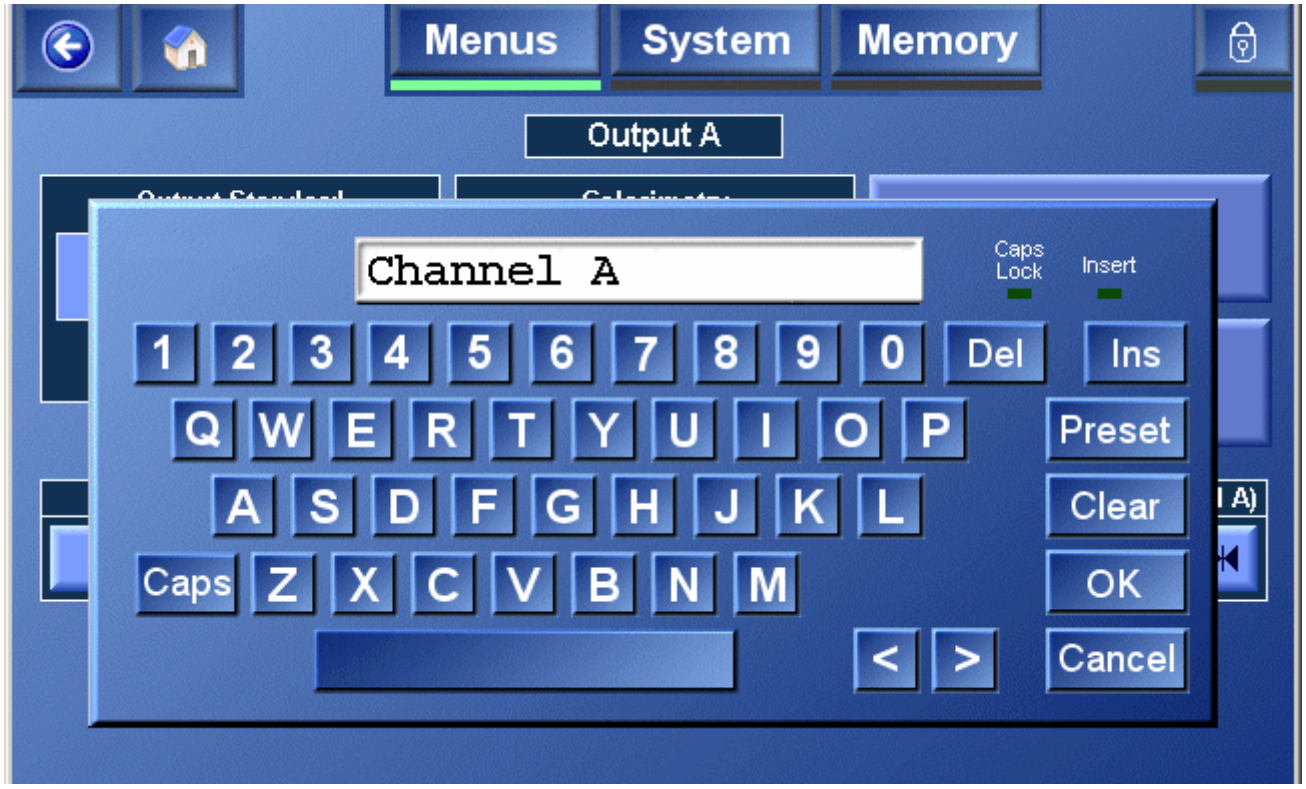
to be displayed. When set, the machine will blank any output data generated by the input data, regardless of the display control settings.



Left	This adjusts the left-hand edge of blanking. A setting of 1 indicates that no input pixels that are normally visible should be blanked, 2 causes the first input pixel to be blanked, etc.
Right	This adjusts the right-hand edge of blanking. A value equal to the number of active pixels per line in the current input standard indicates that no input pixels that are normally visible should be blanked. Subtracting 1 from this causes the last input pixel to be blanked, etc.
Top	Adjusts the top edge of blanking. A setting of 1 indicates that no input lines that are normally visible should be blanked, 2 causes the first input line to be blanked, etc.
Bottom	Adjusts the bottom edge of blanking. A value equal to the number of active pixels per line in the current input standard indicates that no input lines that are normally visible should be blanked. Subtracting 1 from this causes the last input line to be blanked, etc.

Output Name

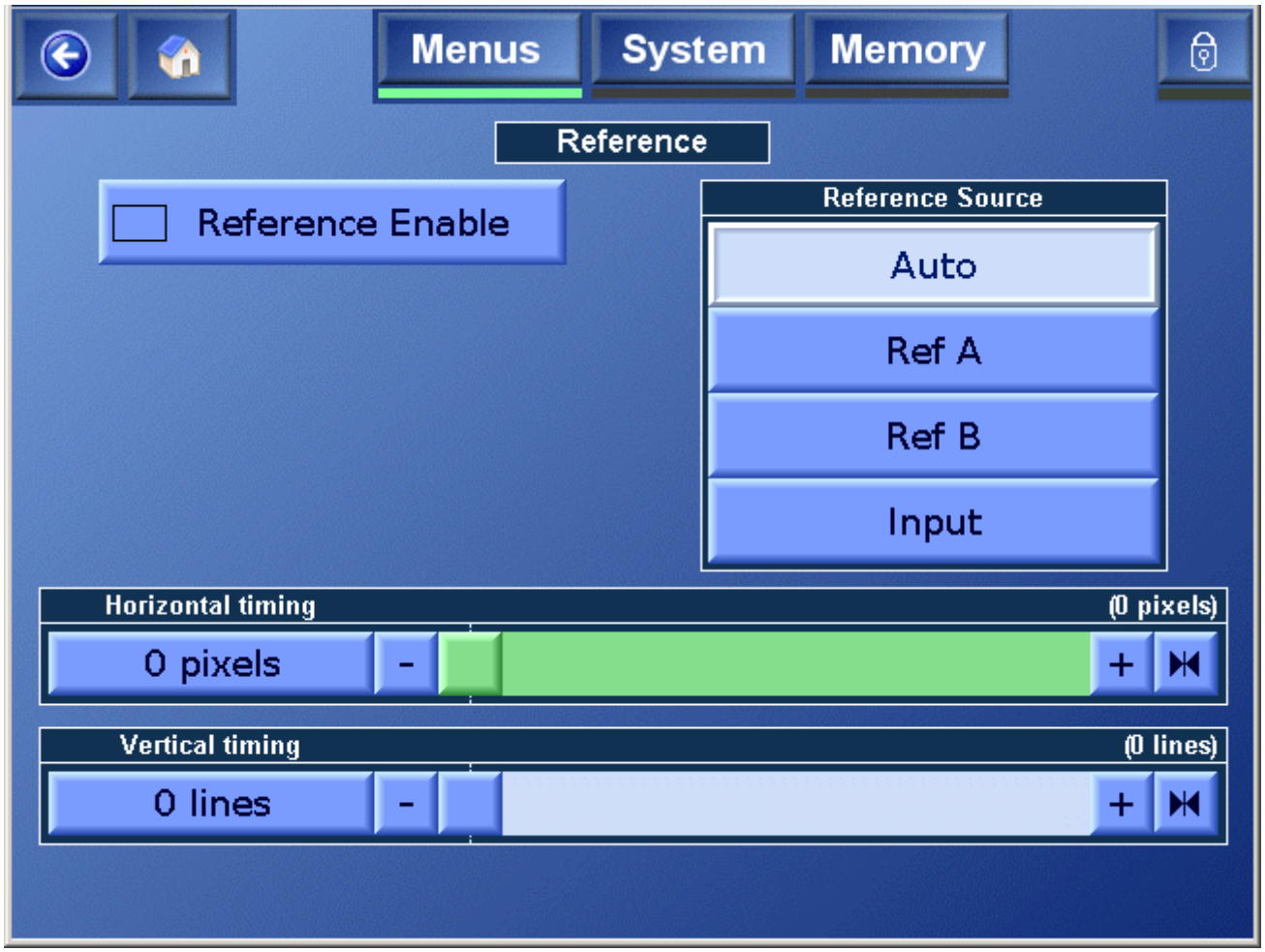
To change the name of the output select the **Edit** item and use the keyboard to edit the text. Select **OK** to enable the new name.



Note: *This name will replace the name appearing on all other screens.*

Reference

When **Reference** is selected, the screen shown below is displayed.



Reference Enable

This allows the genlock function to be turned ON or OFF. When **Enable** is checked the unit will genlock to the selected reference source.

When **Enable** is unchecked the unit will ignore any reference signals and will be in the free-run mode.

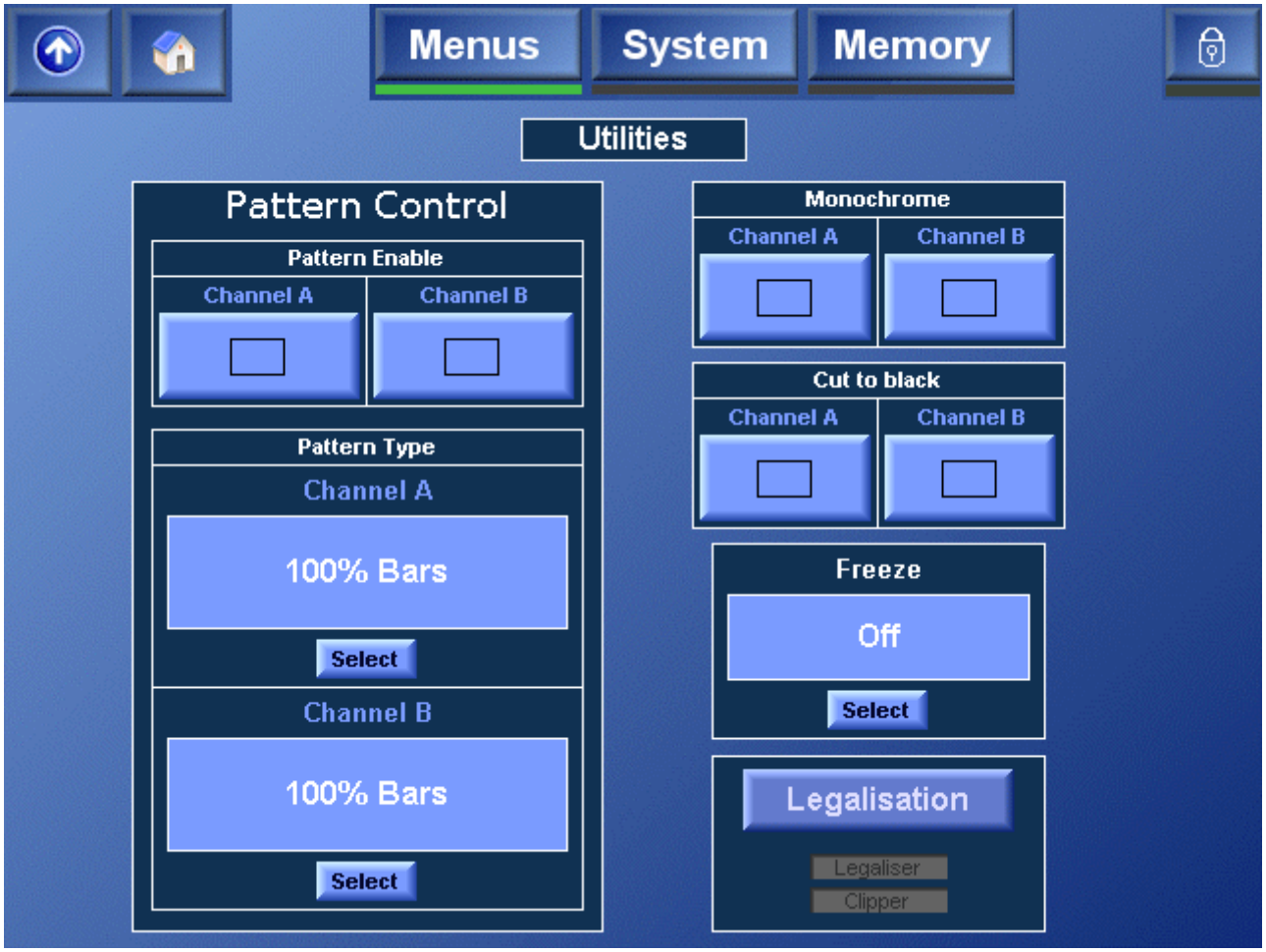
Reference Source

This allows the reference source to be selected.

Auto	When reference source is set to **Auto**, the system will look at each of the reference inputs and pick the one most appropriate to the current output standard. This process is triggered by one of two events; either **Auto** has just been selected, or the output standard has changed. Once the reference has been picked the system will continue to use that reference until another trigger event occurs. When selecting the correct reference, a reference that is the same standard as the output would be considered the most appropriate, followed by a reference of the same frame rate. If neither of these is available, then the system will look to see if there are any references applied and if so, will lock to that. If reference A and B 'score' the same (whether there is a match or not) then reference A is favored. Auto should be used in the majority of cases.
Ref A	Forces the unit to operate from the external reference A input. It will force it to be used regardless of whether it is the correct standard or not, or indeed if there is a reference signal connected at all. Therefore this setting should be used with caution.
Ref B	Forces the unit to operate from the external reference B input. It will force it to be used regardless of whether it is the correct standard or not, or indeed if there is a reference signal connected at all. Therefore this setting should be used with caution.
Input	The unit will be locked to the input signal.
Horizontal Timing	This allows the horizontal timing of the reference signal to be adjusted.
Vertical Timing	This allows the vertical timing of the reference signal to be adjusted.

Utilities

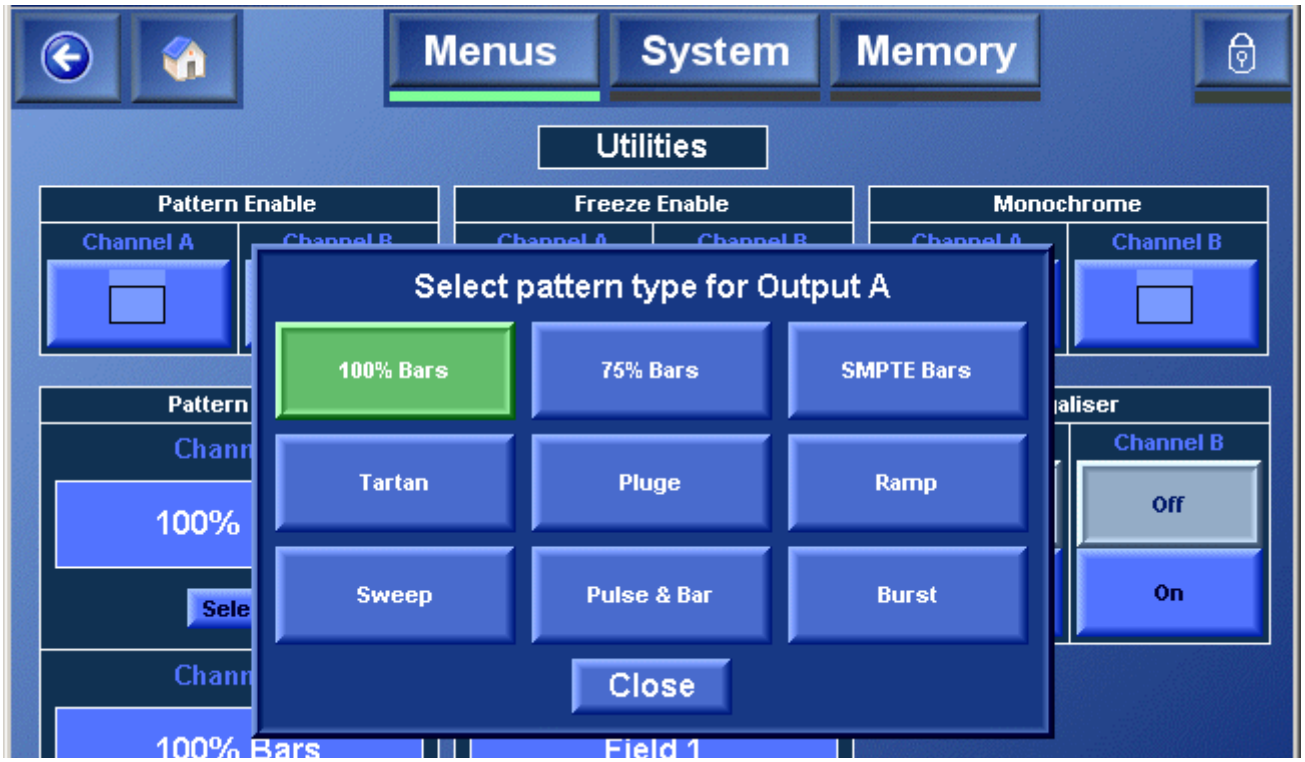
When the **Utilities** item is selected, the screen shown below is displayed.



Pattern Enable (Channel A and B)
When checked, the selected output will become the pattern chosen by the **Pattern Type** function.

Pattern Type

To choose the pattern for the Channel A or Channel B output, touch **Select**. The available pattern types are:



100% Bars	75% Bars	SMPTE Bars
Tartan	Pluge	Ramp
Sweep	Pulse & Bar	Burst

Freeze

To freeze the output, touch **Select**, and in the window dialog that appears, touch **Frame Freeze**. To un-freeze the picture, touch **Off**.

Monochrome

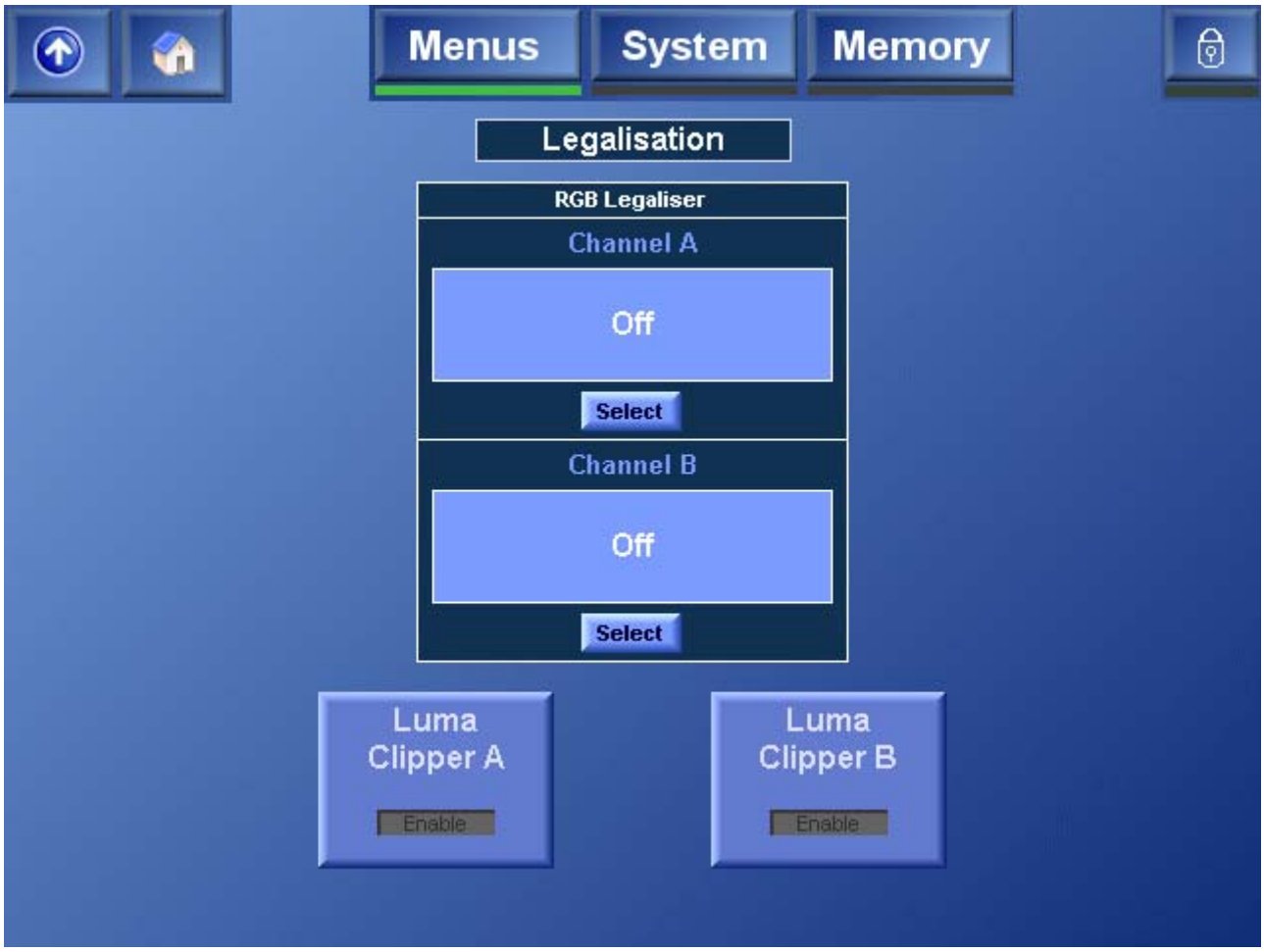
When checked, the selected output will become a monochrome picture.

Cut to black

When selected, the corresponding output channel will cut to black.

Legalisation

Gamut legalisation ensures that both the HD and SD outputs of the unit meet specified color limits. Touch **Legalisation** to enable or specify a legalisation selection.



RGB Legaliser Channel A & Channel B

Touch **Select** to specify a legalisation selection.

The available selections are:

Off	This selection disables gamut legalisation.
700mV	RGB Lo 0mV, RGB Hi 700mV, will comply with area mask set to 1% or greater.
721mV	RGB Lo -21mV, RGB Hi 721mV, will comply with area mask set to 0% or greater.
735mV	RGB Lo -35mV, RGB Hi 735mV, will comply with area mask set 0% or greater.

Area mask defines the percentage of total pixels in the image that may be out of gamut without reporting that the signal has a RGB gamut error.

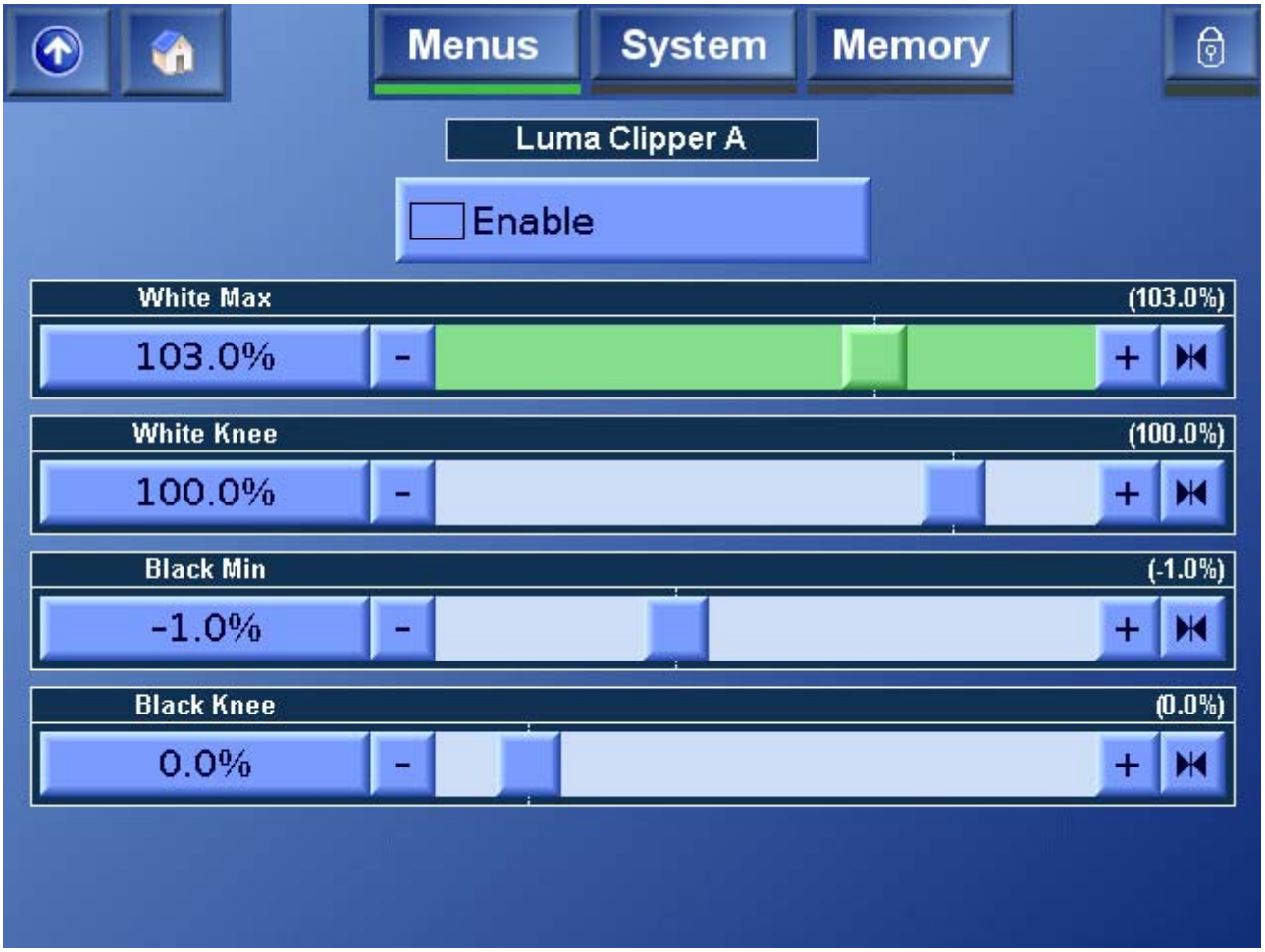
Note: *The 735mV selection should be used in conjunction with the luma clipper (set at presets) to generate images that adhere to EBU R103-200 specification.*

For more information about legalisation, see “Appendix C: RGB Legalizer and Luma Clipper” on page 129.

Luma Clipper A & B

When luminance levels are too high or too low devices such as encoders and displays can have problems. The luma clipper is used to limit signals above and below predefined limits. Minimum and maximum limits can be set, in addition a knee allows for a graduated transition to the limit.

Touch **Luma Clipper A** or **Luma Clipper B** to adjust luminance levels.



Enable	Select this option to enable the clipper.
White Max	This sets up the upper limit (hard clip point) of the clipper. The range is minimum 90% (852 digital 10-bit value) to maximum 109% (1019) with increments of 1%. Preset is 103% (966).
White Knee	This sets up the knee for the maximum white limit of the clipper. This can be set up to give a “soft clip” from this knee point to the hard white clip point. The range is minimum 60% (590) to maximum 109% (1019) with increments of 1%. Preset is 100% (940).
Black Min	This sets up the lower limit (hard clip point) of the clipper. The range is minimum -7% (4) to maximum 10% (152) with increments of 1%. Preset is -1% (55).

Black Knee	This sets up the knee for the minimum black limit of the clipper. This can be set up to give a “soft clip” from this knee point to the hard black clip point. The range is minimum -7% (4) to maximum 60% (590) with increments of 1%. Preset is 0% (64).

Note: *Luma clipper preset values configure the clipper to meet luma limits as specified by EBU R103-200.*

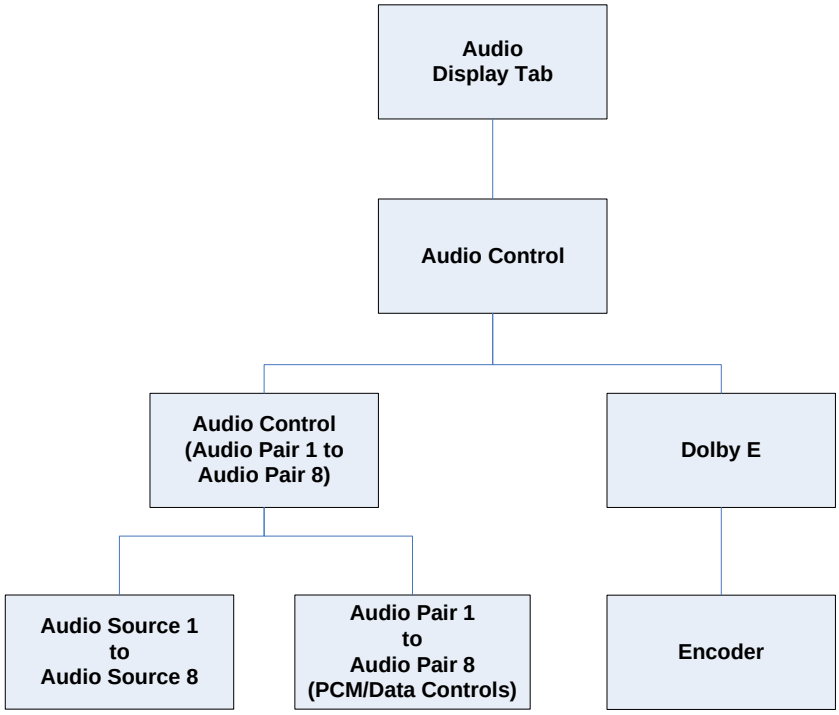
To achieve a hard white clip set the **White Max** and **White Knee** to the same value. Similarly to achieve a hard black clip set the **Black Min** and the **Black knee** to the same value.

For more information about the luma clipper, see “Appendix C: RGB Legalizer and Luma Clipper” on page 129.

Audio Menus

This section describes the Alchemist Ph.C HD audio functions, which include the following configuration settings and controls:

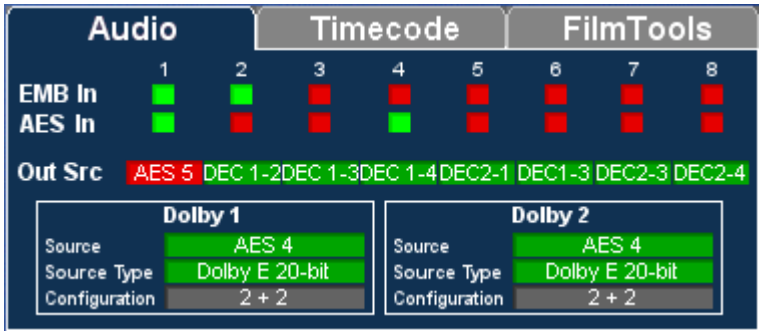
- **Audio Display Tab:** The Audio display tab shows audio input / ouput status/ Dolby source and types and the Dolby program configuration. See “Audio Display Tab” on page 61.
- **Audio Control:** The Audio Control page provides access to the main audio setup and Dolby E configuration pages and allow the unit’s overall audio delay to be set. See “Audio Control ” on page 62.
- **Audio Control (Audio Pair 1 to Audio Pair 8):** These pages allows the user to configure each of the audio outputs. See “Audio Control (Audio Pair 1 to Audio Pair 8) ” on page 63.
- **Audio Source 1 to Audio Source 8:** These pages allow the user to specify the input sources for each the the audio pairs. See “Audio Pair 1 Source to Audio Pair 8 Source” on page 66.
- **Dolby E:** The Dolby E menu enables the Dolby E channels to be configured. See “Dolby E” on page 67.
- **Encoder:** The settings on the Encoder page allow tone, mute and delay off-set to be applied to the Dolby encoder output.See “Encoder” on page 70.



For additional information about the Alchemist Ph.C - HD’s audio processing and Dolby E functions, refer to “Appendix E: Dolby E” on page 161.

Audio Display Tab

The Audio display tab on the Home screen illustrates Audio Input / Audio Output status, Dolby sources and types and the Dolby program configuration.



EMB In

The **EMB In** indicators display the EMB input status.

- Green indicates that a valid embedded input signal is present.
- Red indicates that no embedded input signal is present.

AES In

The **AES In** indicators display the AES input status.

- Green indicates that a valid AES input signal is present.
- Red indicates that no AES input signal is present.

Out Src

These indicators display the audio output pair status.

- The text for each describes the selected source currently routed to each output.
- Green indicates that the selected source is valid.
- Red indicates that the selected source is not valid.

Dolby 1 / Dolby 2 Source

This indicates the input source that is routed to the respective Dolby channel decoder.

- Green indicates a valid Dolby E or Dolby D signal
- Yellow indicates a valid PCM signal
- Red indicates that no Dolby E, Dolby D or PCM signal is present.

Dolby 1 / Dolby 2 Source Type

This indicates the bitstream format that is being routed to the respective Dolby channel decoder.

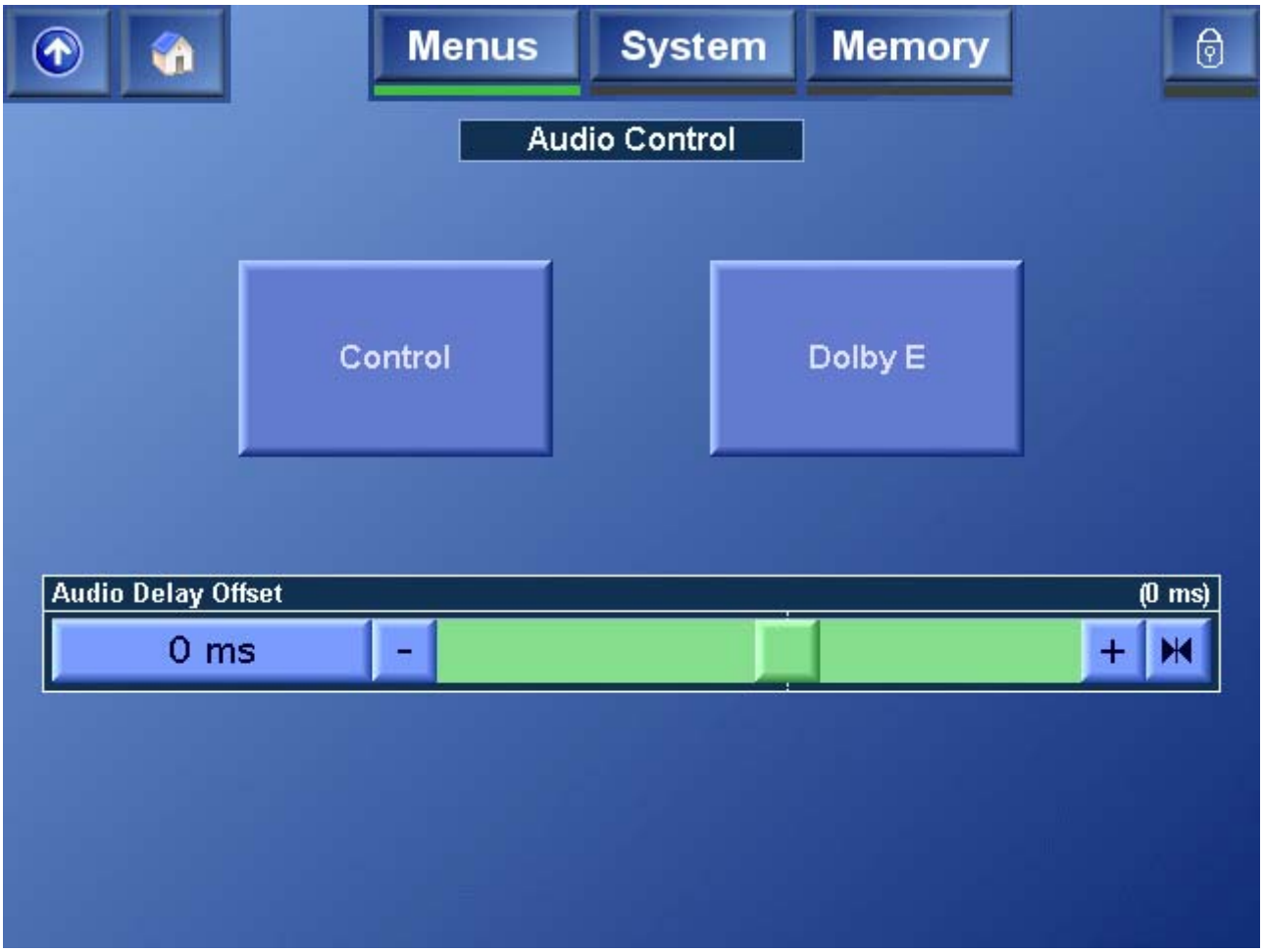
- Green indicates a valid Dolby E or Dolby D signal.
- Red indicates that there is no valid Dolby E or Dolby D signal.
- Yellow indicates a valid PCM signal.

Dolby 1 / Dolby 2 Configuration

This displays the Dolby program configuration being routed to the respective Dolby channel decoder.

Audio Control

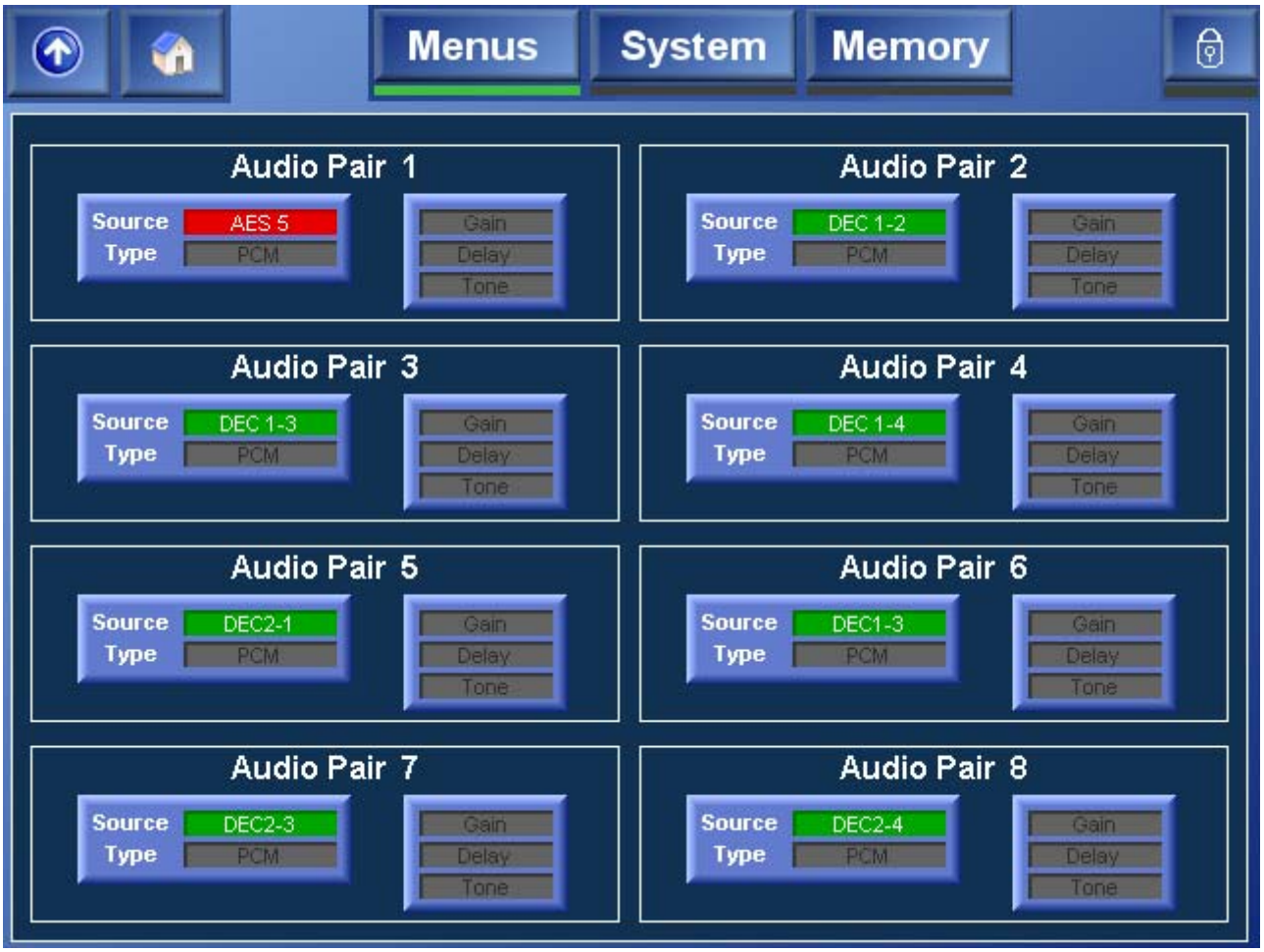
The Audio Control page is accessed by touching anywhere on the audio tab.



Audio Delay Offset	This allows the overall audio delay of the unit to be set. This value will be displayed on the Audio Channel Control screens.
Note:	*Any audio delay added to individual PCM or Dolby channels is added to this delay.*
Control	Touch the **Control** button to access the audio control pages from which the Alchemist's audio setup can be configured.
Dolby E	Touch **Dolby E** to access the Dolby E setup page.

Audio Control (Audio Pair 1 to Audio Pair 8)

This page allows the user to configure each of the audio outputs.



For each of the Alchemist Ph.C – HD's eight audio pairs the following information is shown.

Source This displays the source that has been configured for each of the output audio pairs. If the source is present and valid, it is displayed in green. If the source is absent, or invalid. it is displayed in red.

Type In the absence of Dolby E output, this displays whether the output is AES audio or data.

Gain If the Gain indicator is yellow, the gain on the channel has been changed from the default setting. This indicator applies only to PCM.

Delay If the Delay indicator is yellow, the Delay on the channel has been changed from the default setting. This indicator applies only to PCM / Data signals.

Note that this differs from the global audio delay offset, applied to all channels, that is adjusted on the Audio Control page.

Tone If the Tone indicator is yellow, the output channel is currently producing a tone. This indicator applies only to PCM / Data signals.

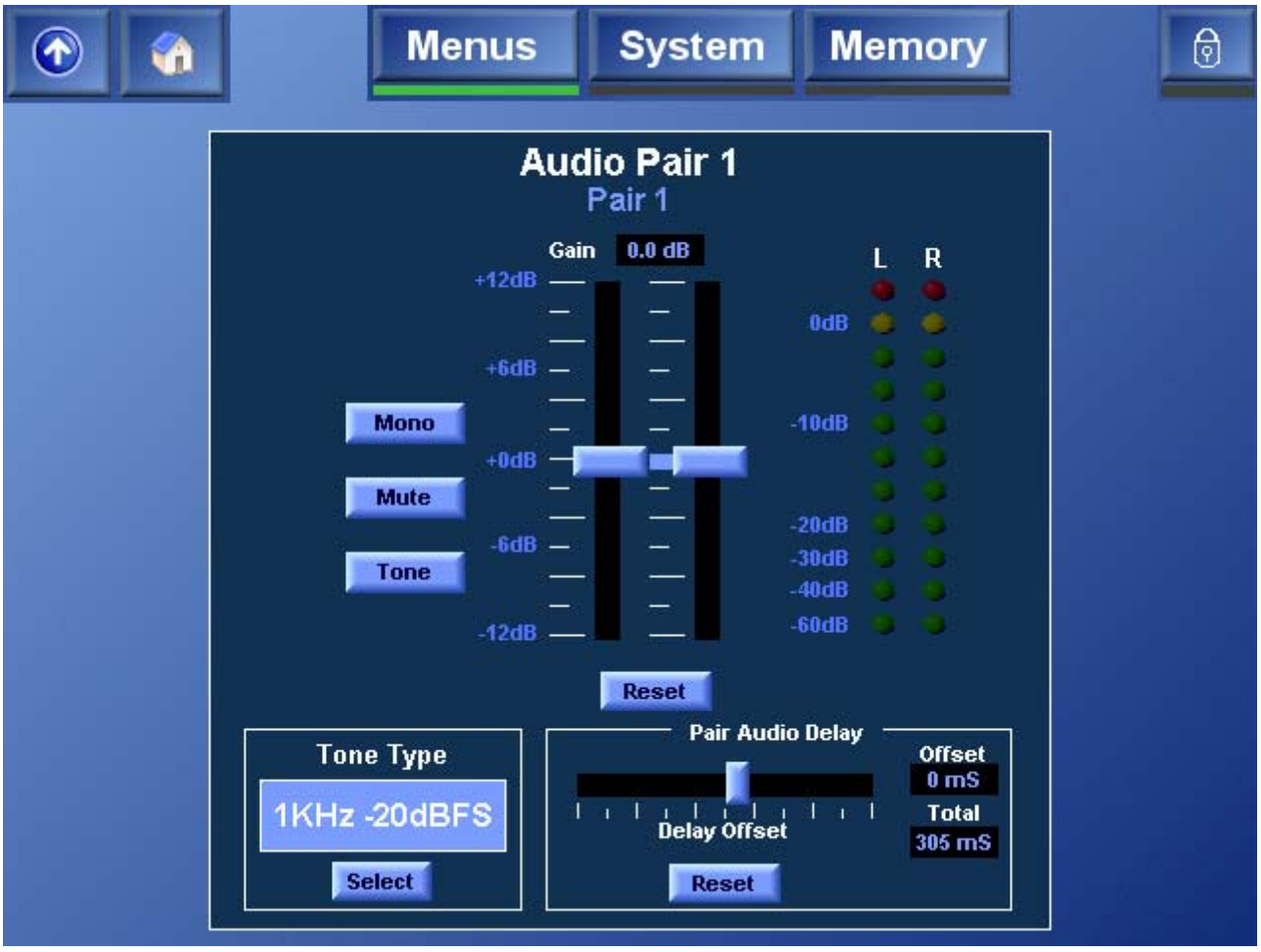
Touch **Source/Type** to specify the input source and type.

Touch **Gain/Delay/Tone** to adjust the channel gain and delay options.

Audio Pair 1 to Audio Pair 8 (PCM/Data Controls)

The settings on the Audio Control pages enable the channel gain, delay, Tone, Mute and Mono options to be adjusted.

These settings are only applicable to PCM audio / Data only. Dolby E tone and gain options are configured from the Dolby E pages.



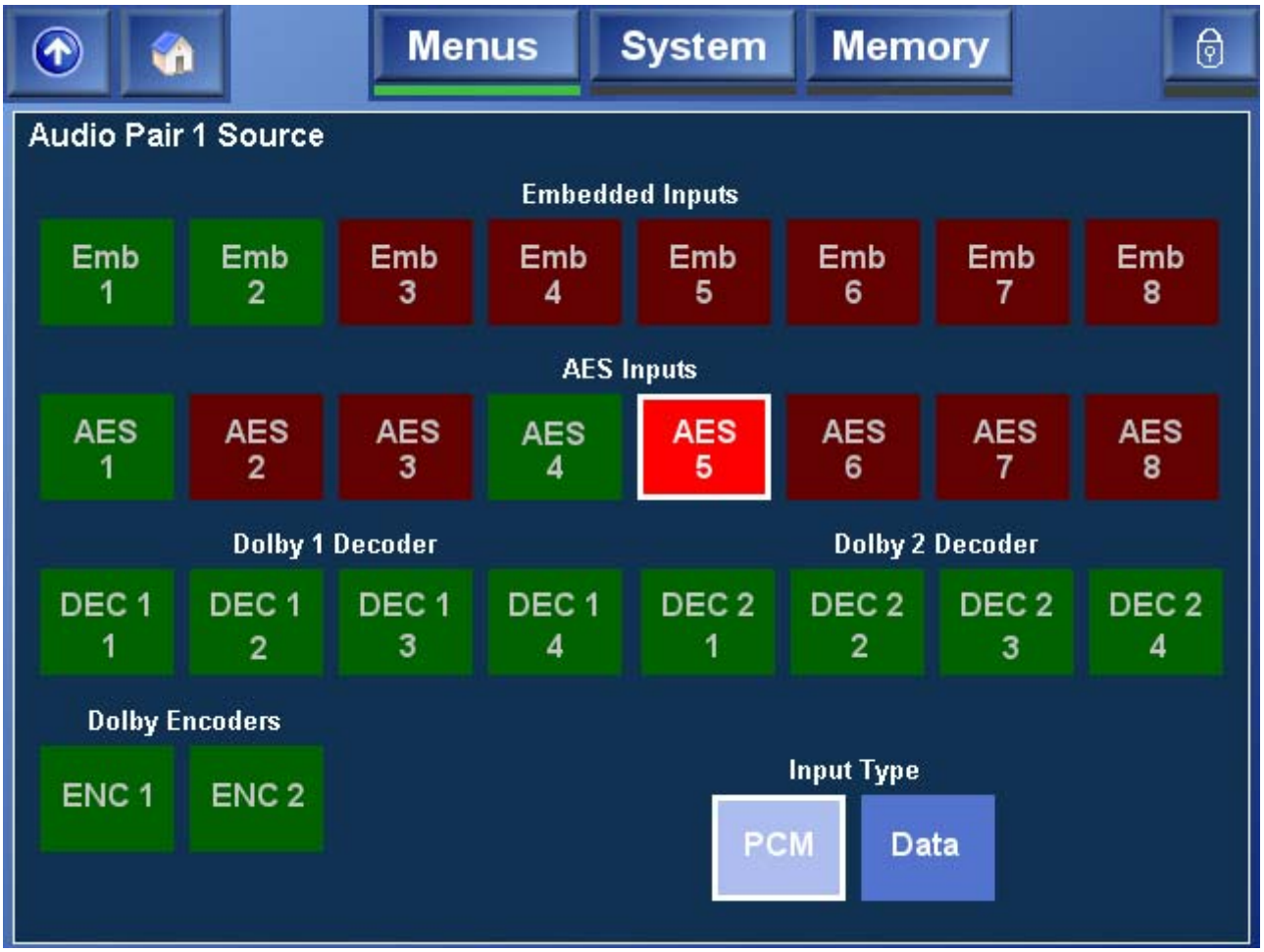
Gain This allows the gain of the left and right channels of the pair to be adjusted. The range of control is ±12 dB.

Touch **Reset** to return the gain control to its preset value of 0 dB.

Mono	Touch the **Mono** button to take an average of the left and right channels and apply that average to both.
Mute	When selected, both channels will be muted.
Tone	Touch tone to generate the tone specified in the **Tone Type** section.
Tone Type	The audio pair may be assigned a fixed frequency tone. To change the tone type, touch **Select** and in the dialog that appears, select the tone type.
Pair Audio Delay **(PCM/Data Audio Only)**	The audio delay for each pair can be adjusted individually. This delay is added to the global audio delay and the unit's internal processing delay. The total delay for the pair is displayed in the Total field. The values of this delay vary according to the conversion being made and are listed in the "Latency Tables" appendix of the Alchemist Ph.C – HD Operator's manual. To change the delay offset for the audio pair, use the slider bar. ***Note:*** *the system latency is dependent on the following user controls - input standard, output standard, FilmTools, Min Delay and Synchro Timecode conversion.* *In Timecode synchro mode, the system delay can change by a maximum of one output standard frame. The modified system delay is displayed on the Home page.*

Audio Pair 1 Source to Audio Pair 8 Source

The settings on these pages enable the input source for any of the eight audio output pairs to be specified.

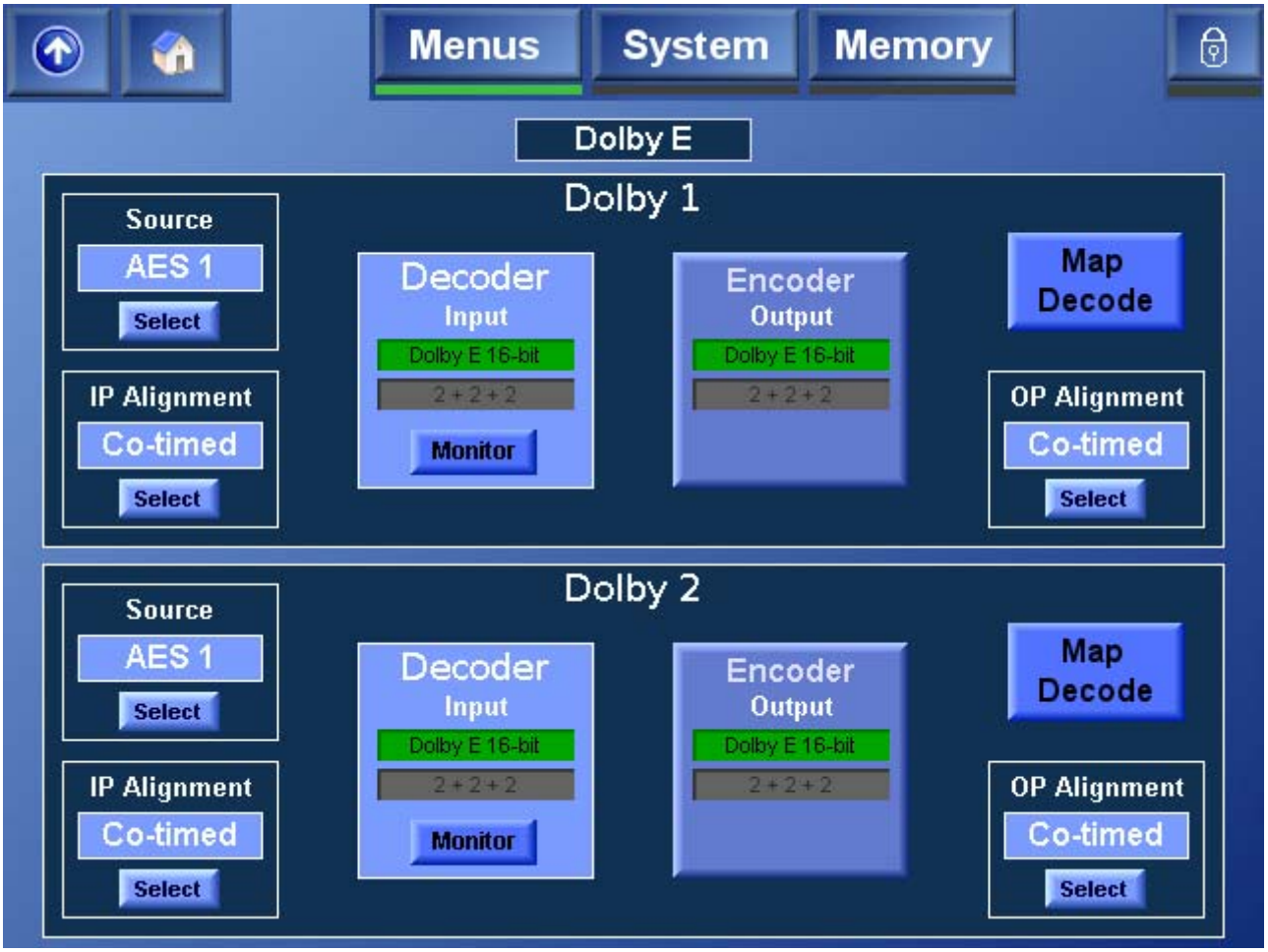


Inputs that have a valid source present are displayed in green. Inputs that do not a have a valid source present are displayed in red. When selected as the input for the audio pair, the source is illuminated.

To select the audio type, touch PCM or Data. These options are not available if a Dolby source has been specified.

Dolby E

The Dolby E menu enables the Dolby E channels to be configured. Each channel consists of a dedicated Dolby E encoder and decoder module. The Dolby E page is divided in two. The top half of the page contains the controls for Dolby channel 1 and the bottom half of the page contains the controls for Dolby channel 2.



Source This displays the input on which the Dolby E input stream is present. It can be present on either AES pairs 1 to 8, or on Embedded pairs 1 to 8.

To specify a different input source, touch **Select**.

IP Alignment This displays the Dolby E input alignment, which can be:

- **Advanced** by one input frame.
- **Co-timed** with the video signal.
- **Delayed** by one input frame.

To change the input alignment, touch **Select**.

The input alignment needs to be selected based upon what devices are upstream from the Alchemist.

Decoder Input This displays the input to the Dolby decoder channel, the Dolby E/D program configuration and associated bit depth.

Monitor

The Monitor function enables a predefined method of operation in which decoded audio pairs are automatically assigned to specific AES outputs, thus maintaining program configuration. No change is made to the embedded output mapping, and the mapped AES outputs will not be subjected to any audio gain or delay processing.

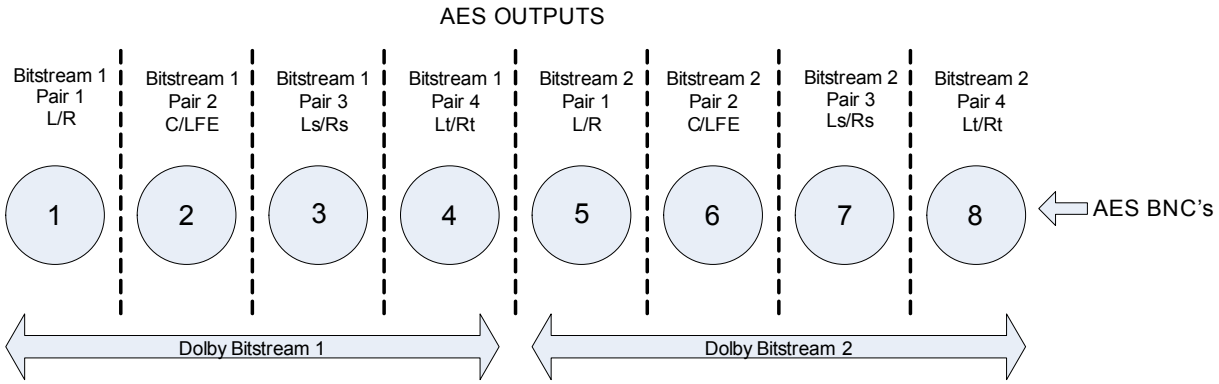
This control overrides any other mapping to the relevant 4 AES outputs.

In this mode:

- Dolby E Bitstream 1 will always be decoded to AES outputs 1 to 4.
- Dolby E Bitstream 2 will always be decoded to AES outputs 5 to 8.

Both outputs will adopt the same structure and configuration as the Dolby E.

For example, if Dolby E Bitstream 1 and 2 both have a 5.1 + 2 program configuration, the output on the AES BNC outputs would be structured as shown in the diagram below.



Encoder Output

This displays the output from the Dolby encoder channel, the Dolby E program configuration and associated bit depth.

Touch this control to access the **Encoder** options page, on which a tone for the Dolby channel can be configured and applied, a mute can be applied to the channel, and the channel delay offset can be specified. See page 70 for more information.

Map Decode

The Map Decode function enables a predefined mode of operation in which decoded audio pairs will be automatically assigned to specific embedded and AES channels, thus maintaining program configuration.

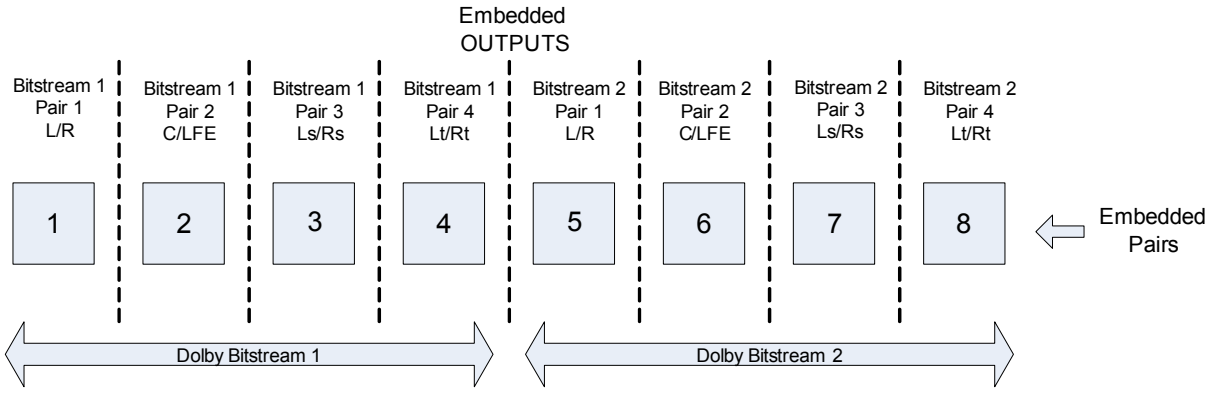
This mapping for the embedded outputs will override any other mapping to these 4 embedded outputs. The AES mappings can be overridden by the Decoder Monitor function.

In this mode:

- Dolby E Bitstream 1 will always be decoded and embedded on channels 1 to 4.
- Dolby E Bitstream 2 will always be decoded and embedded on channels 5 to 8.

Both outputs will adopt the same structure and configuration as the Dolby E.

For example, if Dolby E Bitstream 1 and 2 both have a 5.1 + 2 program configuration, the output embedded within the SDI will be structured as follows.



OP Alignment

This displays the Dolby E output alignment, which can be:

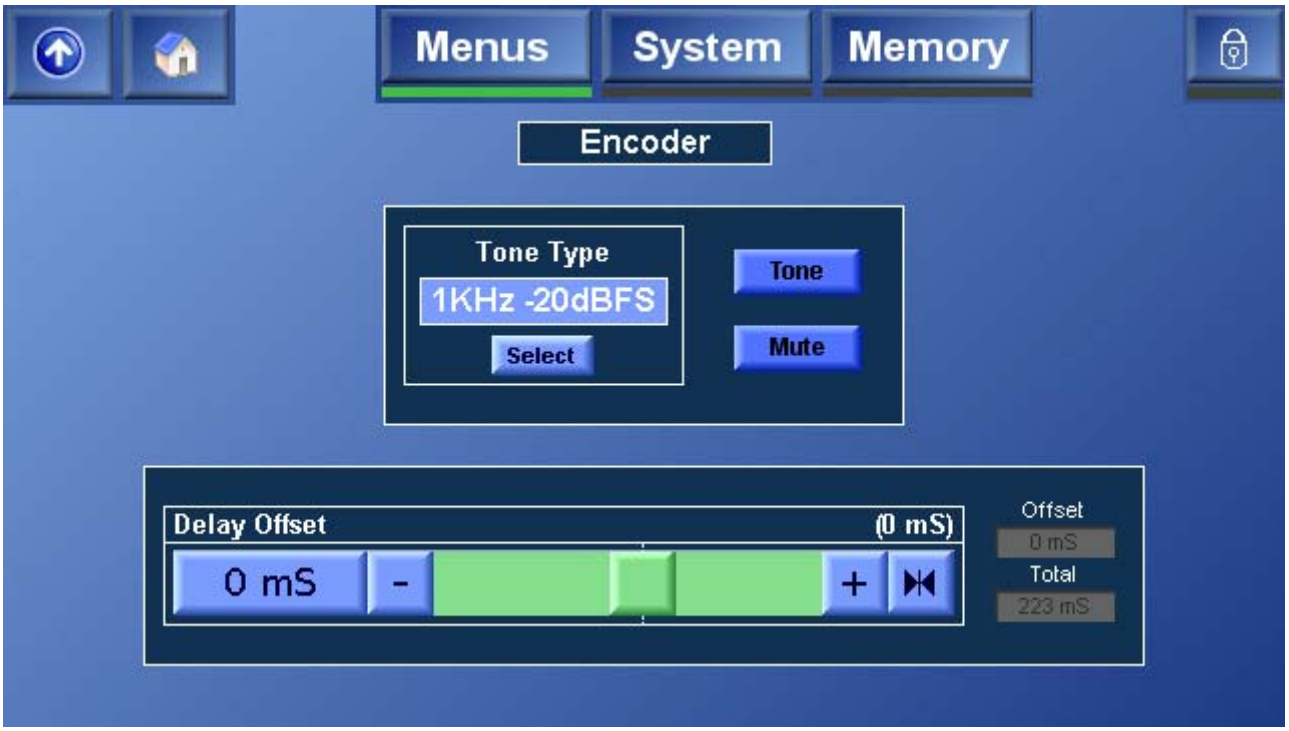
- **Advanced** by one output frame.
- **Co-timed** with the video signal.
- **Delayed** by one output frame.

To change the output alignment, touch **Select**.

The output alignment needs to be selected based upon what devices are downstream from the Alchemist.

Encoder

The settings on the **Encoder** page allow tone, mute and delay offset to be applied to the Dolby encoder output.



Tone Type

The Dolby encoder may be assigned a fixed frequency tone. To change the tone type, touch **Select** and in the dialog that appears, select the tone type.

Note: *Program configuration and Metadata follow the input to the decoder. Any program configuration which utilizes a .1 / LFE channel will contain a 100Hz test tone when the **Tone** is activated.*

Tone

Touch **Tone** to generate the tone specified in the **Tone Type** section.

Mute

Touch **Mute** to apply a mute to the Dolby encoder output.

Delay Offset

The audio delay for each Dolby encoder channel can be adjusted individually. The total delay for the pair is displayed in the Total field and is the sum of:

System Delay + Dolby Input Alignment + Dolby Output Alignment + Master (Global) Delay + Individual Channel Delay (configured here).

The values of the system delay vary according to the conversion being made and are listed in the “Latency Tables” appendix of the Alchemist Ph.C – HD Operator’s manual.

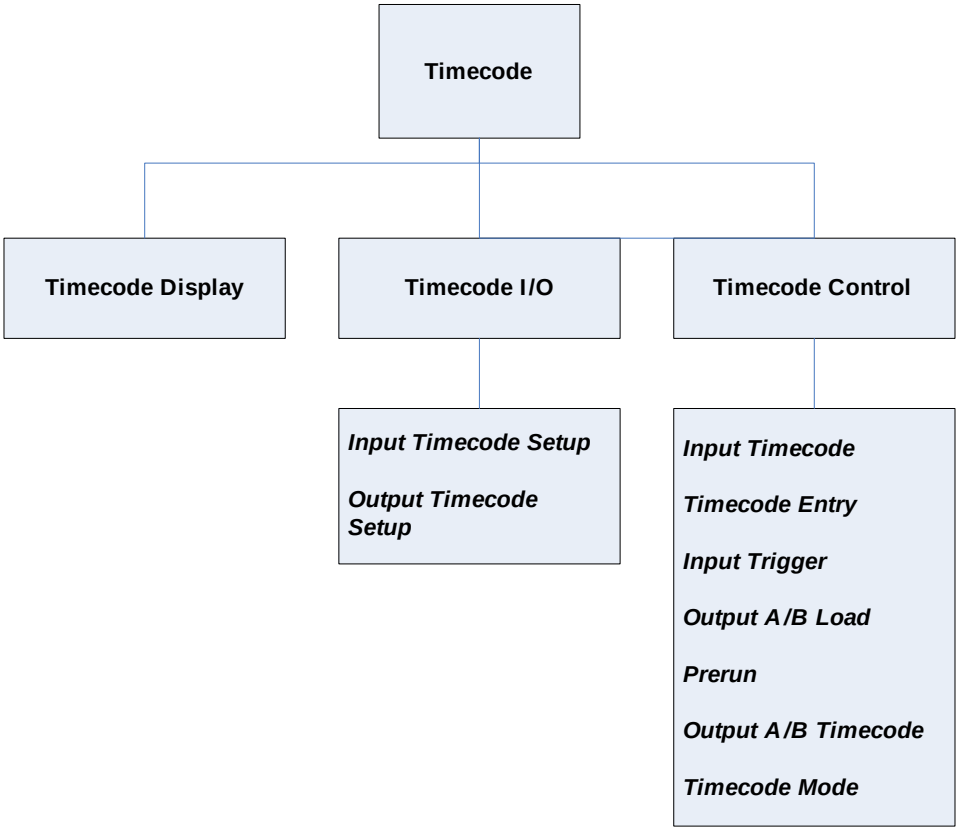
To change the delay offset for the audio pair, use the slider bar.

Timecode Menus

This section describes the Alchemist Ph.C HD timecode functions, which include the following displays, configuration settings and controls:

- **Timecode Display:** Timecode information is displayed on the Timecode tab in the lower right of the Home screen. See “Timecode Display” on page 72.
- **Timecode I/O:** Use these settings to settings to setup input timecode sources and output timecodes. See “Timecode Setup” on page 73.
- **Timecode Control:** Use these settings to specify timecode input triggers, output loads, prerun times and the timecode mode. See “Timecode Control” on page 76.

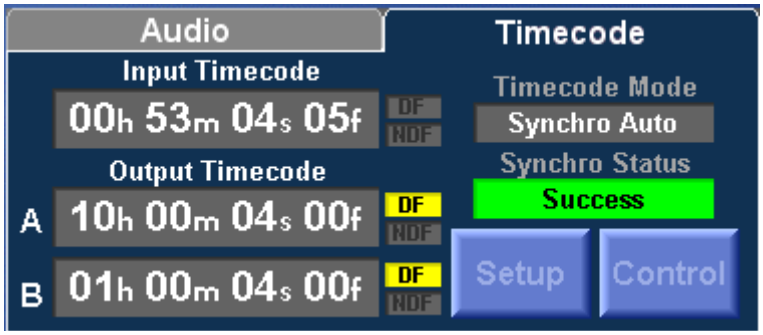
Note: *The Alchemist Ph.C Timecode functions are optional. If the Timecode option has not been purchased, these functions are not available.*



For additional information about timecodes, refer to “Appendix B: Timecode” on page 111.

Timecode Display

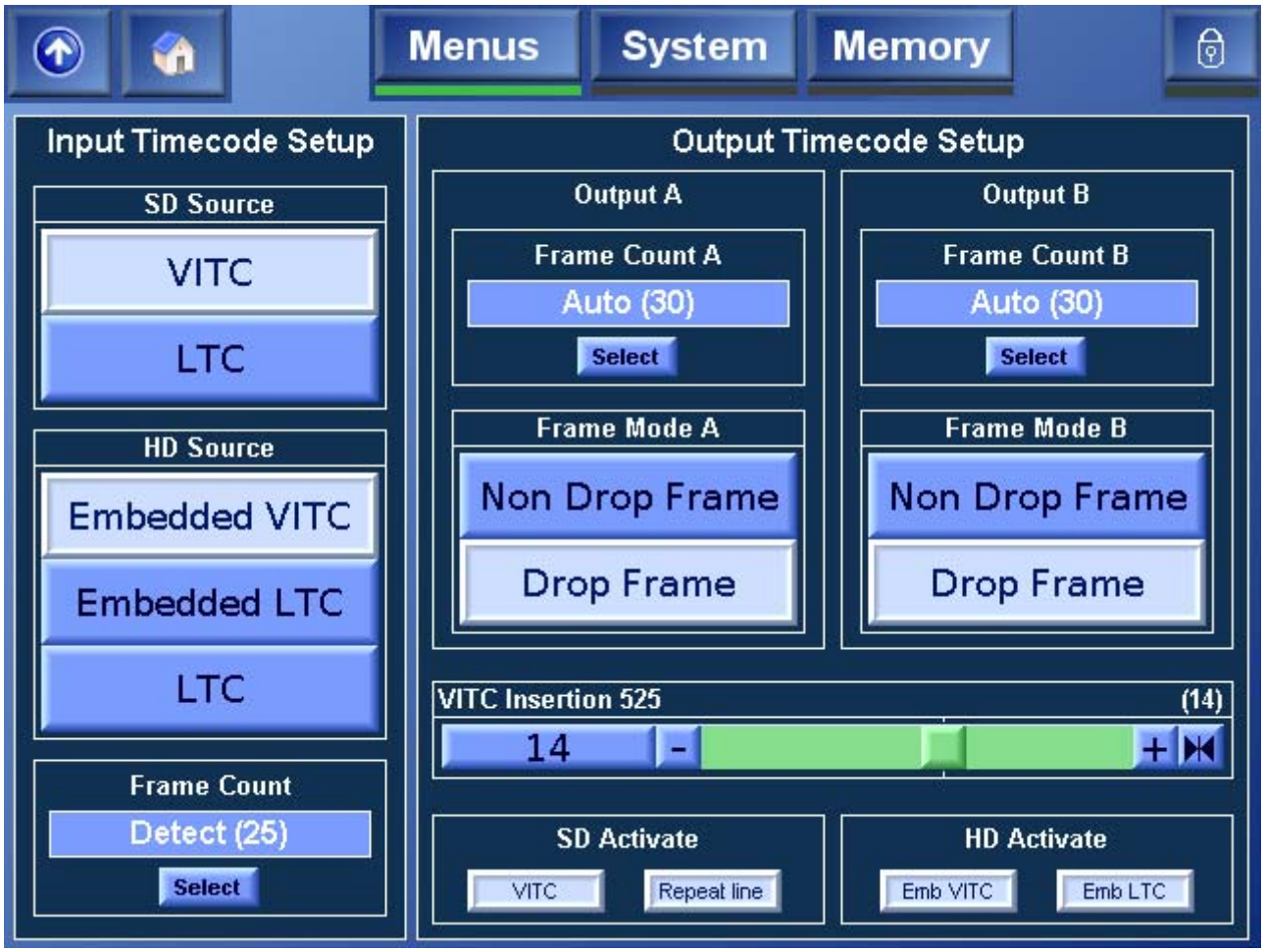
The Timecode display tab on the Home screen displays the current input and output timecodes, the selected timecode mode and synchro status of the unit, and provides access to the Timecode Setup and Timecode Control menus.



Input Timecode	This displays the current timecode from the specified timecode source.
Output Timecode A & B	These fields display the timecodes currently being generated for outputs A and B respectively.
DF / NDF	These indicators show whether the corresponding timecode is a drop frame or non-drop frame. • When **DF** is illuminated, the timecode is drop frame. • When **NDF** is illuminated, the timecode is non-drop frame. • When neither is illuminated, the principle of drop frame / non-drop frame is not applicable.
Timecode Mode	This field displays the currently selected timecode mode.
Synchro Status	This field displays the current status of timecode synchronization. For example: • **Prerun** indicates that the timecode is in the prerun phase preceding a synchro start event. • **Success** indicates that the synchro start event has occurred successfully.
Setup	Touch the **Setup** button to access the Timecode Setup menu.
Control	Touch the **Control** button to access the Timecode control menu.

Timecode Setup

When **Setup** is selected, the screen shown below is displayed. The controls on this screen allow timecode input sources and outputs to be configured.



Input Timecode Setup

SD Source	These options specify the source of SD timecode input. *VITC:* The SD input video timecode is read from the VITC signals. (SMPTE 12M/SMPTE 266M) *LTC:* The SD input video timecode is read from the Longitudinal Timecode Connector (LTC). (SMPTE 12M)
HD Source	These options specify the source of the HD timecode input. *Emb VITC:* The HD input video timecode is read from the embedded VITC signals. (SMPTE RP188) *EMB LTC:* The HD input video timecode is read from the embedded LTC signals. (SMPTE RP 188) *LTC:* The HD input video timecode is read from the LTC connector. (SMPTE 12M)
Frame Count	This option specifies the maximum frame number the input timecode will reach before it resets to zero. This information is essential for timecode arithmetic. *Detect:* Measures the frame count max from the input timecode. *Format:* Assumes that the timecode was generated to match the frame rate of the video. *24/25/30:* Forces the input frame count max to the specified setting. This allows material that may have been generated with the wrong frame count max limit (for example, slow PAL) to be accommodated.

Output Timecode Setup

Outputs A and B can be configured independently and have separate controls, allowing different timecode values to be displayed. However, the Timecode mode is always common to Output A and Output B.

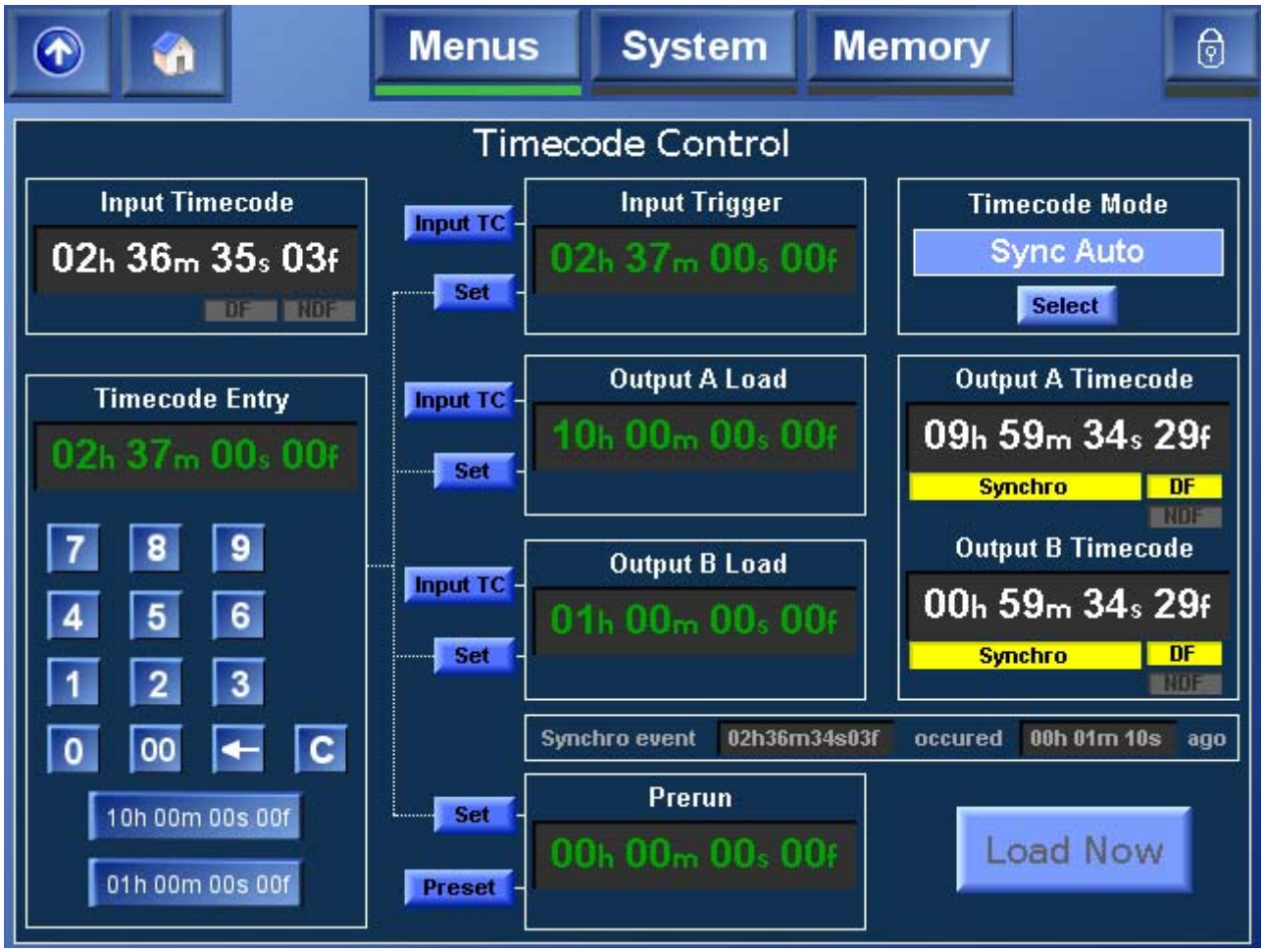
Note: *Both outputs will adopt the same configuration for Timecode Mode.*

Frame Count (Output A & B)	These options specify the maximum number the output timecode frame will reach before it resets to zero. *Auto:* Assumes that the timecode is generated to match the specified frame rate of the output video. *24/25/30:* Forces the output frame count max to the specified setting. This allows the user to pre-compensate for later changes in playback speed, of the material generated by the Alchemist. Slow PAL for example.

Drop Frame Mode (Output A & B)	This setting is only relevant to 59.94Hz output. When enabled, the first two frame numbers (00 and 01) are omitted from the count at the start of each minute, except minutes 00, 10, 20, 30, 40, and 50. Note that if the Alchemist is configured to E-E timecode mode, and is performing 30 fps – 30 fps timecode conversion, the output drop/non-drop type follows the input. For example, 59.94Hz DF input will automatically give a 59.94Hz DF output and vice versa. *On:* Forces the output timecode to be drop frame. On can only be selected if the output timecode is 30 fps. *Off:* Forces the output timecode to be non-drop frame. Off can only be selected if the output timecode is 30 fps.
SD VITC Insertion Line	This specifies, for an SD output, which line of vertical blanking the first insertion of VITC signal occurs on. If enabled, the second insertion will occur two lines below. **625 Default:** Lines 19/332 and 21/334 (SMPTE 266M) **525 Default:** Lines 14/277 and 16/279 (SMPTE 266M and RP164) **625 Range:** Between lines 6/319 and 20/333 (SMTPE 12M and SMPTE 266M) **525 Range:** Between lines 10/273 and 17/280 (SMPTE 12M and SMPTE 266M) Note that the range refers to the first insertion line, not the second.
SD Activate	This option enables/disables the timecode output format for SD output. The options are VITC or Repeat Note that the LTC via XLR is always enabled.
HD Activate	This option enables/disables the timecode output format for HD output. The options are Emb VITC or EMB LTC Note that the LTC via XLR is always enabled.

Timecode Control

When **Timecode Control** is selected, the screen shown below is displayed.



Input Timecode

This displays the input timecode read from the specified source.

Drop Frame will be illuminated when a drop frame timecode is detected on the source timecode.

Timecode Entry

This option allows the desired timecode value to be entered. Preset values of 10h 00m 00s 00f and 01h 00m 00s 00f are available.

Input Trigger

The input trigger is the value of the source timecode that will cause an output timecode event to occur.

To specify the timecode at which the trigger event will occur, do one of the following:

- Using the Timecode Entry keypad, enter a new timecode, and then touch the **Set** button next to the Input Trigger box.
- Touch the **Input TC** button next to the Input Trigger box. This sets the time-code to the input timecode value.

Output A Load

This specifies the value that will be inserted in the output A timecode when the input trigger event occurs.

To specify a new timecode value, do one of the following:

- Using the Timecode Entry keypad, enter a new timecode, and then touch the **Set** button next to the Output A Load box.
- Touch the **Input TC** button next to the Output A Load box. This sets the timecode to the input timecode value.

Output B Load

This specifies the value that will be inserted in the Output B timecode when the input trigger event occurs. This setting is independent of Output A; however, both outputs will adopt the same Timecode Mode.

To specify a new timecode value, do one of the following:

- Using the Timecode Entry keypad, enter a new timecode, and then touch the **Set** button next to the Output B Load box.
- Touch the **Input TC** button next to the Output B Load box. This sets the timecode to the input timecode value.

Note: The output LTC XLR connector will always deliver Output A timecode.

Prerun

This control is only used when performing a Synchro Prerun timecode conversion. It specifies the amount of time before the input trigger that the user would like continuous timecode output.

To specify a new prerun value, do one of the following:

- Using the Timecode Entry keypad, enter a new timecode, and then touch the **Set** button next to the Prerun box.
- Touch the **Preset** button next to the Prerun box. This sets the value to the default value of 00h 03m 00s 00f.

Output A Timecode

This displays the current value of the timecode being generated for Output A, as specified by the Timecode mode. If configured to be drop frame, the Drop Frame indicator is illuminated.

Output B Timecode

This displays the current value of the timecode being generated for Output B, as specified by the Timecode mode. If configured to be drop frame, the Drop Frame indicator is illuminated.

Timecode Mode

This control selects the timecode mode to be used by the Alchemist. For descriptions of each mode, refer to “Appendix B: Timecode” on page 111.

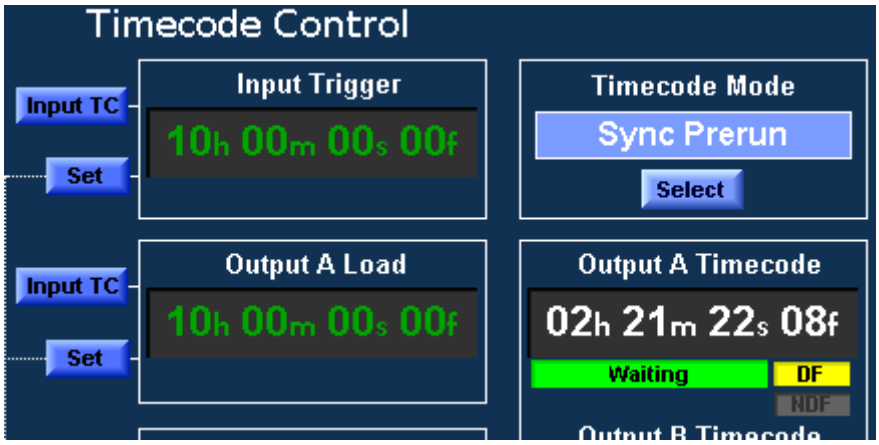
The available timecode modes are:

- Synchro Auto
- Synchro Prerun
- Synchro Manual
- E-E
- E-E Regen
- Freerun
- Trigger Load

Timecode Control Warnings

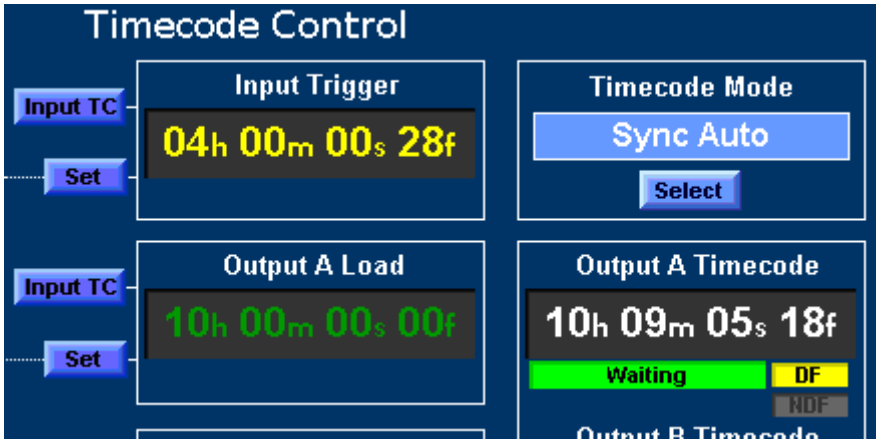
The timecode displays for the Input Trigger, Output Loads, and Prerun change color to indicate valid or invalid values.

Green — Indicates that the value is valid, and that the corresponding event will occur when the specified timecode is reached.



Yellow — Indicates that the value is not currently valid, but if certain conditions, such as the input standard or timecode type change, the corresponding event may occur.

For example, if the Input Trigger timecode is set to occur on a frame that does not exist in the current input standard, the value appears in yellow. However; if before the Input Trigger timecode is reached, the input standard changes to one in which the specified frame occurs, the input trigger event will occur.



Red — The specified value is not valid, and will not be so under any circumstances.

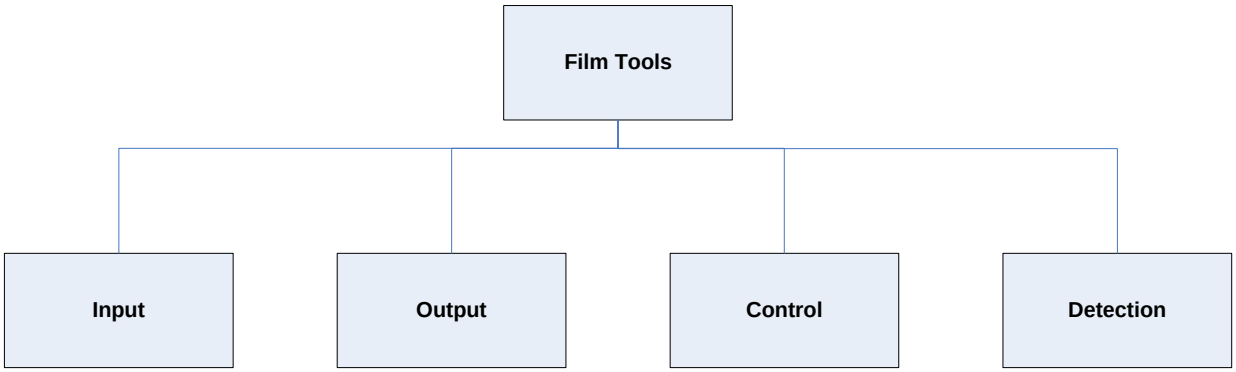
FilmTools

This section describes the Alchemist Ph.C HD FilmTools functions, which include the following controls:

- **Input Cadence:** Use this menu to define the film cadence of the incoming content. See “FilmTools Input” on page 81.
- **Output Cadence:** Use this menu to control the cadence of the converted content. See “FilmTools Output” on page 86.
- **Control:** Use this menu to specify user-specified FilmTools control options. See “FilmTools Control” on page 90.
- **Detection:** Use this menu to control the bias and internal detection algorithm. See “FilmTools Detection” on page 91.

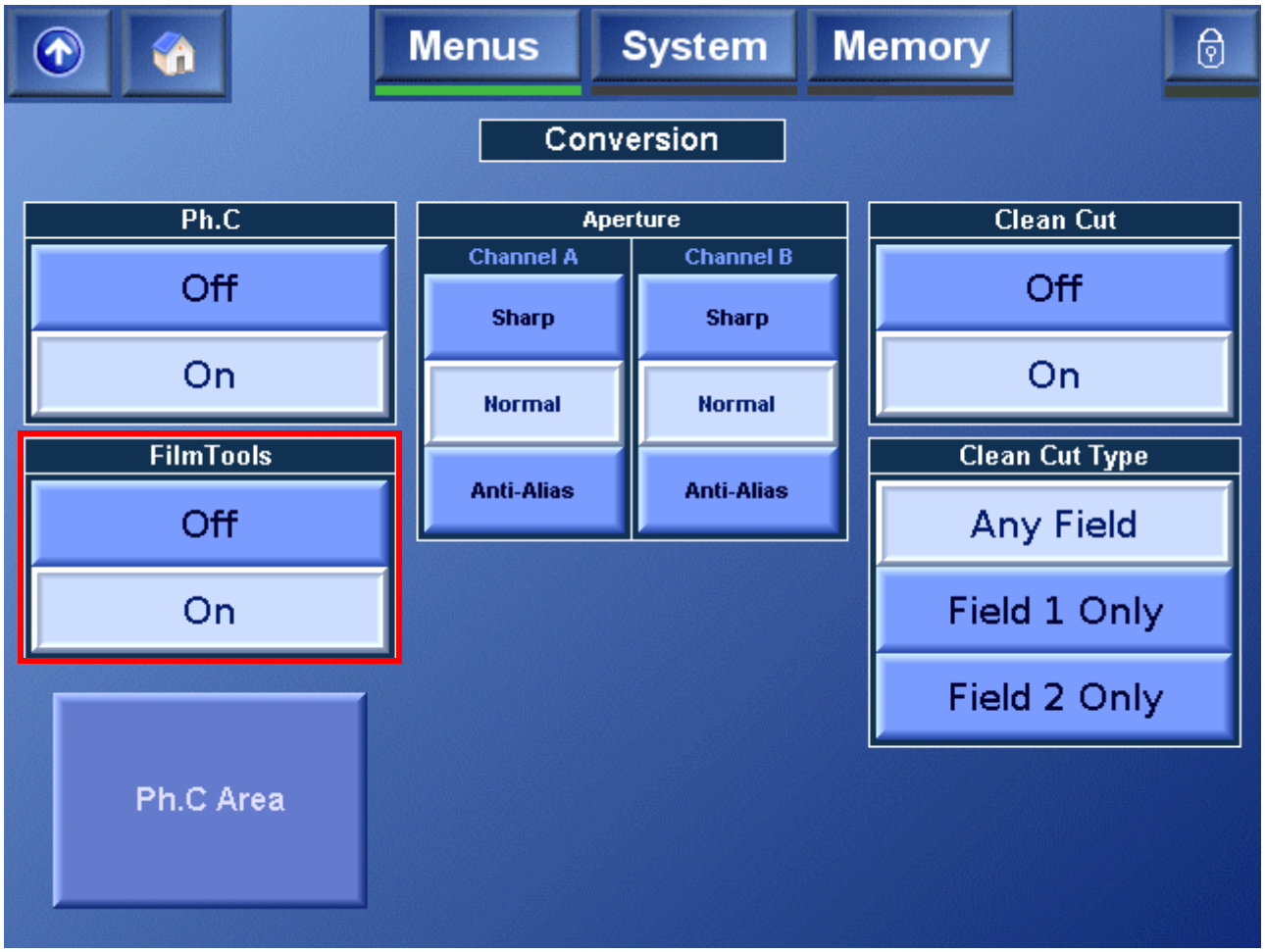
Note: *The Alchemist Ph.C FilmTools functions are optional. If the FilmTools option has not been purchased, these functions are not available.*

For more information, see “Appendix D: FilmTools” on page 133.



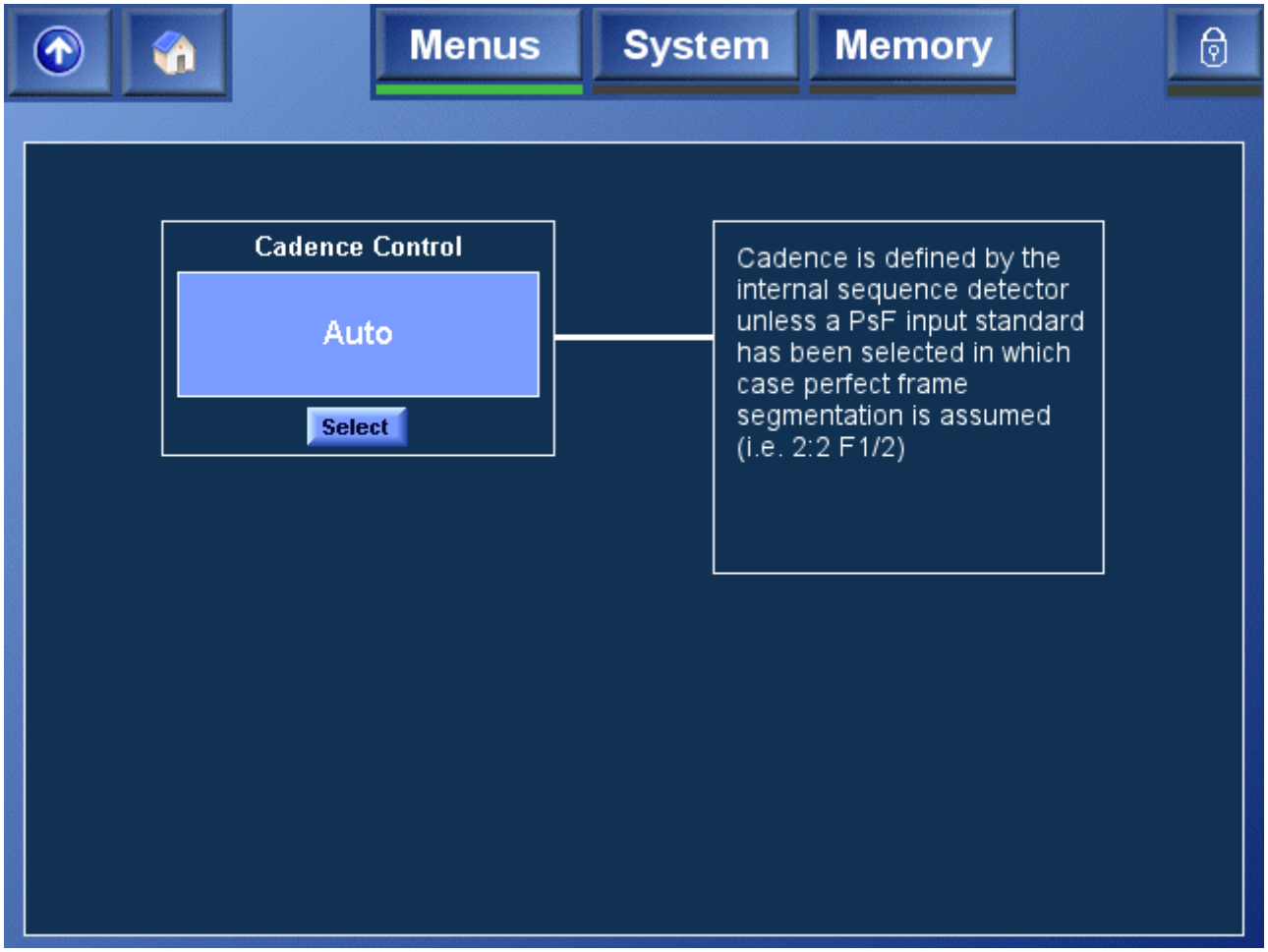
Enabling FilmTools

The FilmTools option is enabled and disabled from the **Conversion** menu.

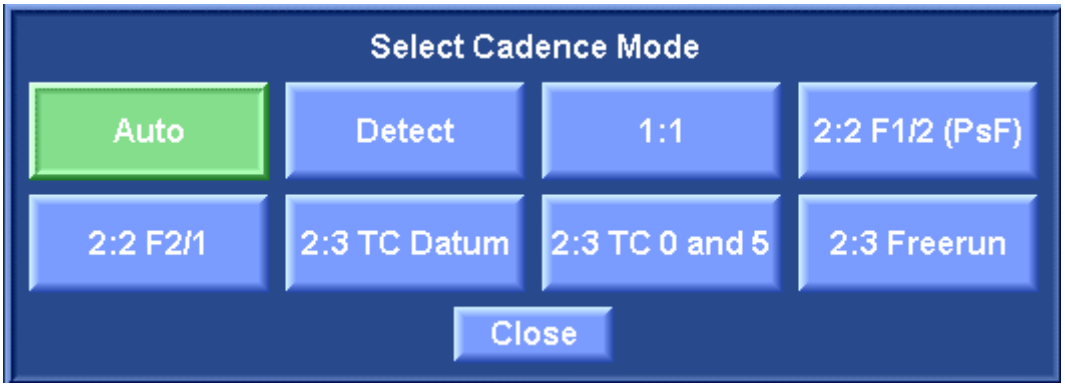


FilmTools Input

The **Input Cadence** menu allows the user to define a film cadence for the incoming content. A single continuous and perfect cadence can be defined flawlessly by its relationship to timecode, or by aligning an internal free-running cadence generator. If the content contains discontinuous or mixed cadence, or if the cadence is unknown before conversion, the Detect mode performs real-time analysis to assign cadence.



To select the Cadence Mode, in the **Cadence Control** section, touch the **Select** button. Then, from the **Select Cadence Mode** dialog, choose the required cadence.



Auto
Cadence is defined by the internal sequence detector unless a PsF input standard has been selected, in which case perfect frame segmentation is assumed (i.e. 2:2 F1/2)

This is the default selection.

Detect
Cadence is defined by the internal sequence detector (even when PsF inputs are selected).

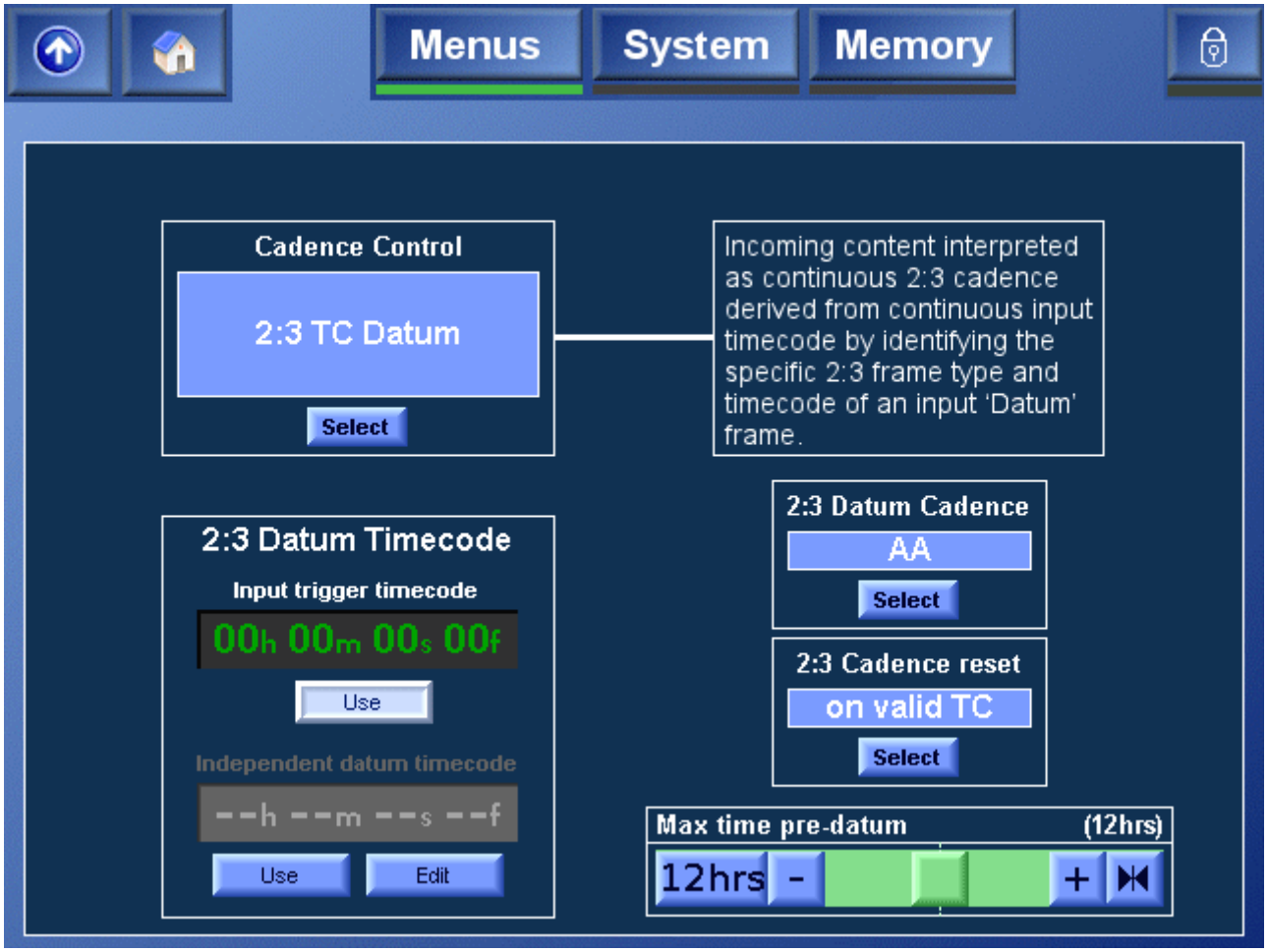
1:1
Incoming content is interpreted as 1:1 cadence (field by field or frame by frame motion).

2:2 F1/2 (PsF)
All incoming content is interpreted as 2:2 F1/2 (PsF) cadence.

2:2 F2/1
All incoming content is interpreted as 2:2 F2/1 cadence.

2:3 TC Datum
Incoming content is interpreted as continuous 2:3 cadence derived from continuous input timecode by identifying the specific 2:3 frame type and timecode of an input 'Datum' frame

For more information, refer to “Appendix D: FilmTools” on page 133..



2:3 Datum Cadence
This control defines the 2:3 cadence of the Datum frame when the input cadence control is 2:3 TC Datum mode. For more information, see “Understanding 2:3 Datum Cadence” on page 156.

2:3 Cadence Reset

On Valid TC (Default)	Input 2:3 cadence will be defined according to the 2:3 Datum Cadence and Timecode controls when stable input timecode has been detected. The input timecode may be greater or less than specified 2:3 Datum Timecode.
At Datum	Input 2:3 cadence will be defined according to the 2:3 Datum Cadence and Timecode controls. The cadence reset occurs when the input timecode is equal to the 2:3 Datum Timecode.

2:3 Datum Timecode

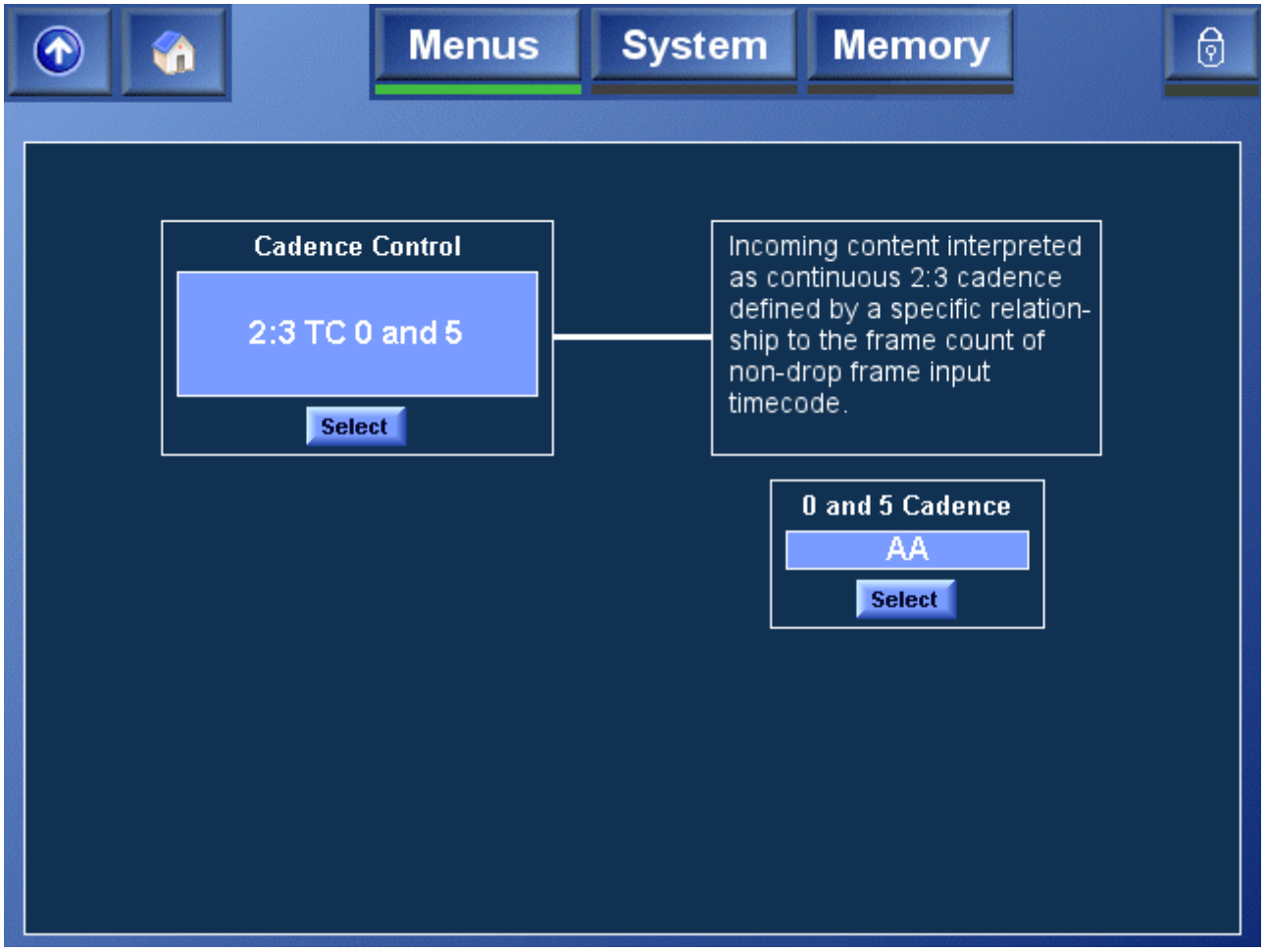
Input Timecode Trigger (Default)	(Default) The 2:3 Datum Timecode is automatically set to match the timecode “Input Trigger” value.
Independent Cadence Trigger	The 2:3 Datum Timecode can be set to any required frame.

Max Time Pre-Datum

0 – 23 hours (Default 12 hours)	Defines the start of the Cadence Window. Only applicable when 2:3 Cadence Reset is set to “On Valid TC”. For more information, “Understanding Datum TC Conversion” on page 154.

2:3 TC 0 and 5

Incoming content is interpreted as continuous 2:3 cadence defined by a specific relationship to the frame count of non-drop frame input timecode.

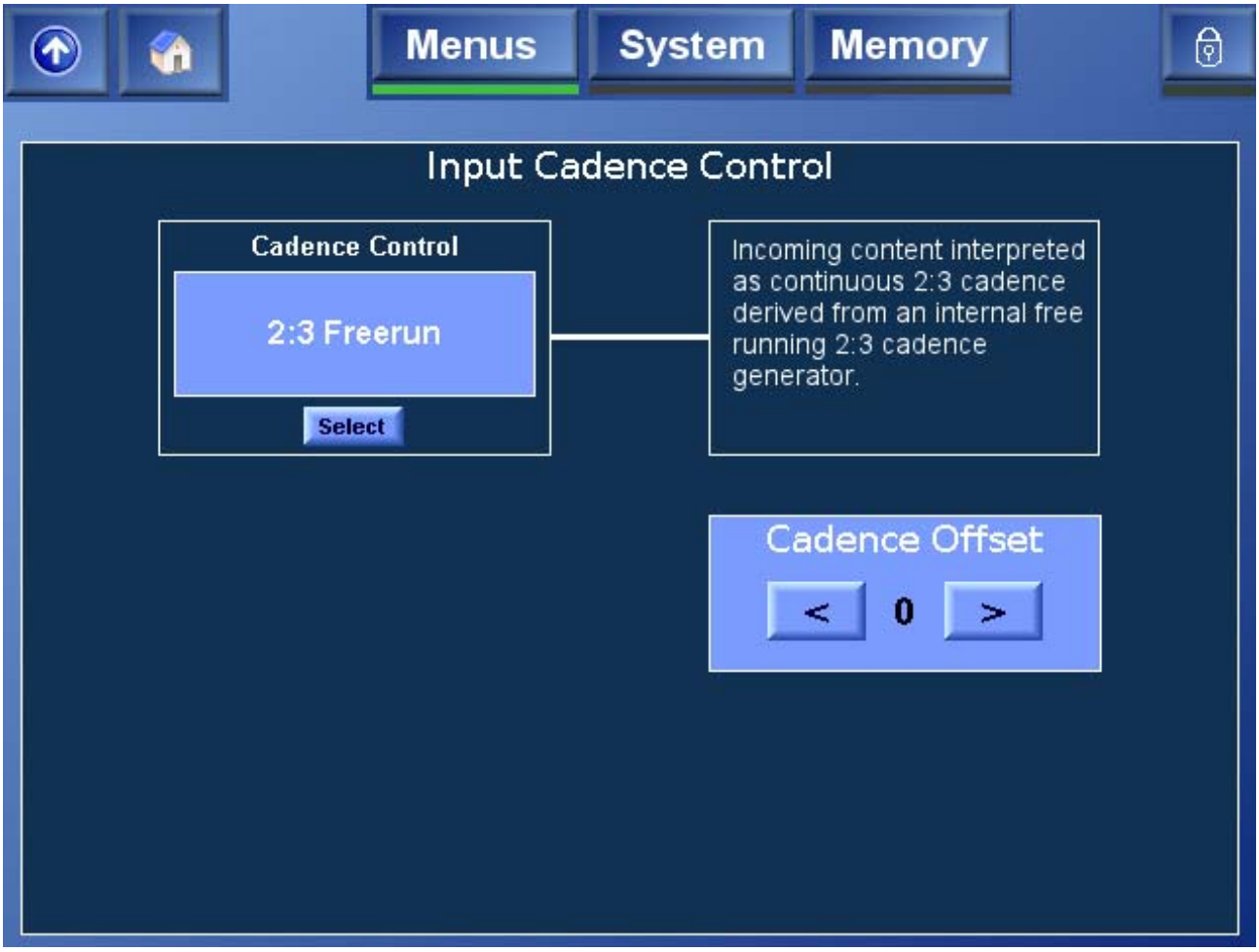


0 and 5 Cadence

This control defines the phase of the relationship between frame count and input timecode. When frame count values of 0 and 5 are present, the 2:3 cadence is interpreted as the selected frame type.

For more information, see “Understanding 2:3 Datum Cadence” on page 156.

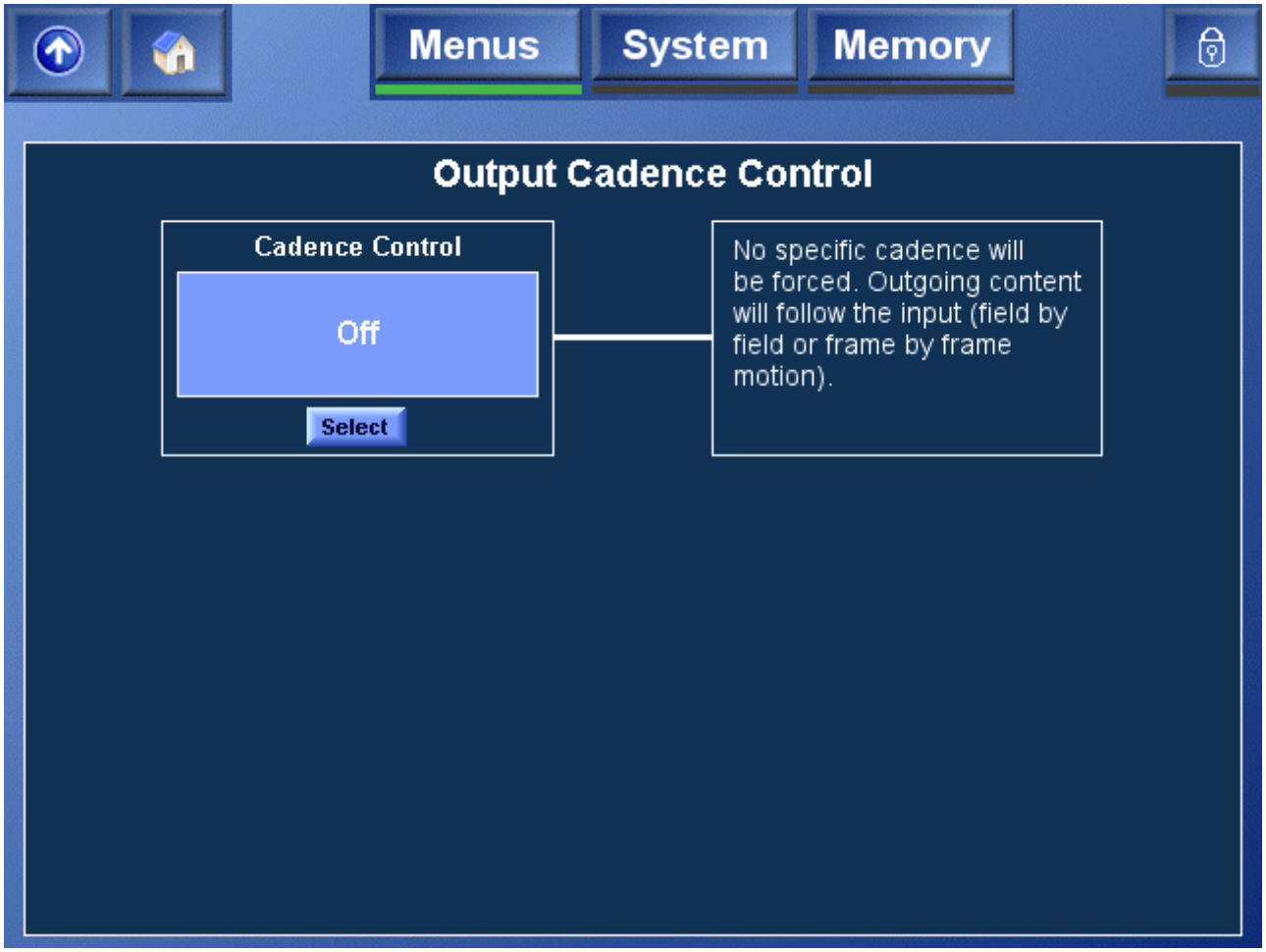
2:3 Freerun
Incoming content is interpreted as continuous 2:3 cadence derived from an internal free-running 2:3 cadence generator.



Cadence Offset
This control enables the cadence of the free-running 2:3 cadence generator to be offset.

FilmTools Output

The FilmTools Output Cadence Control menu enables the user to control the cadence of the converted content. This menu allows the user to select the required cadence including any required relationship with the output timecode.



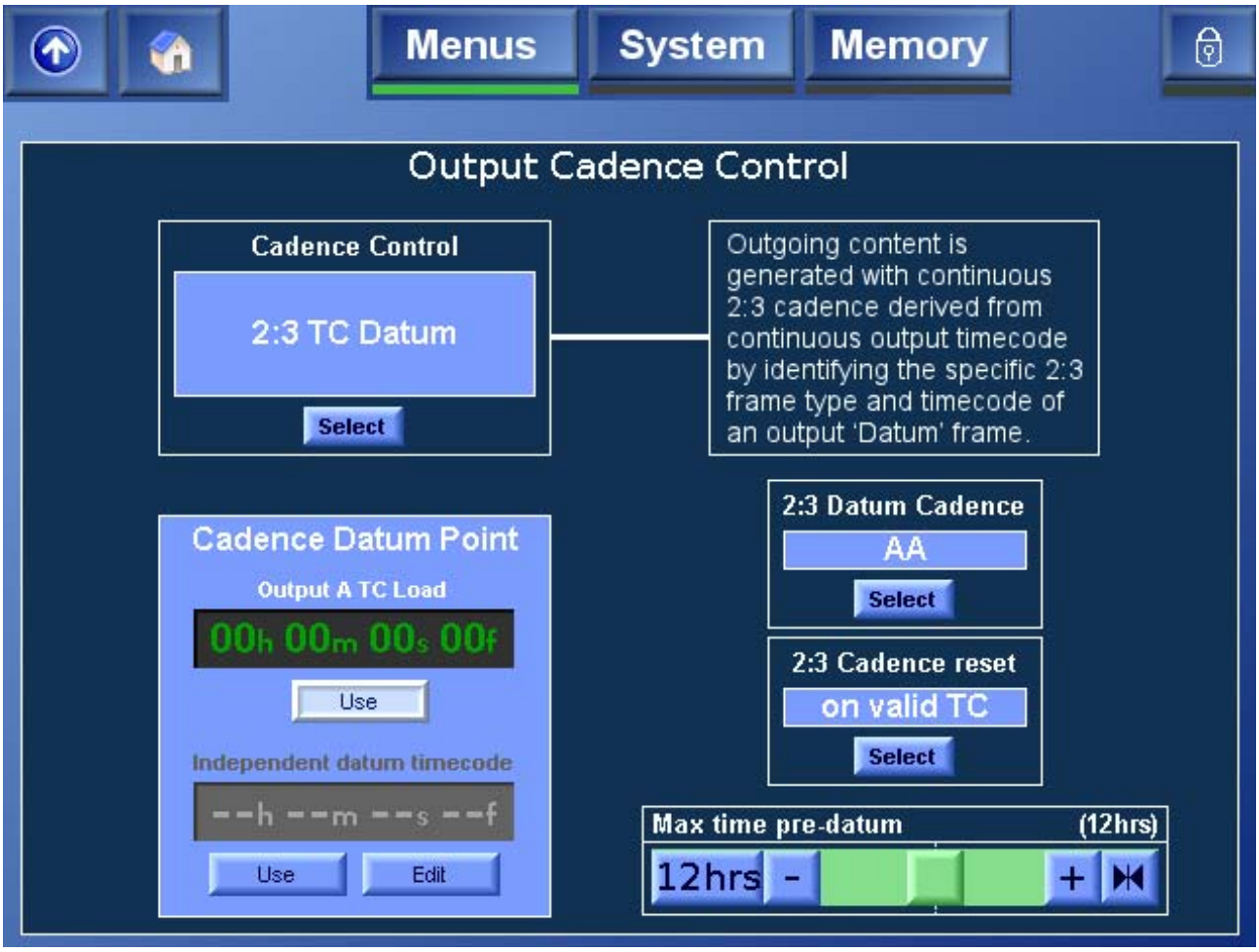
Off
No specific cadence will be forced. Outgoing content will follow the Input (field by field or frame by frame motion).

2:2 F1/2 (PsF)
Outgoing content is generated with 2:2 F1/2 (PsF) cadence.

2:2 F2/1
Outgoing content is generated with 2:2 F2/1 cadence.

2:3 TC Datum

Outgoing content is generated with continuous 2:3 cadence derived from continuous output timecode by identifying the specific 2:3 frame type and timecode of an output 'Datum' frame.



2:3 Datum Cadence

This control defines the 2:3 cadence of the Datum frame when the input cadence control is 2:3 TC Datum mode.

2:3 Cadence Reset

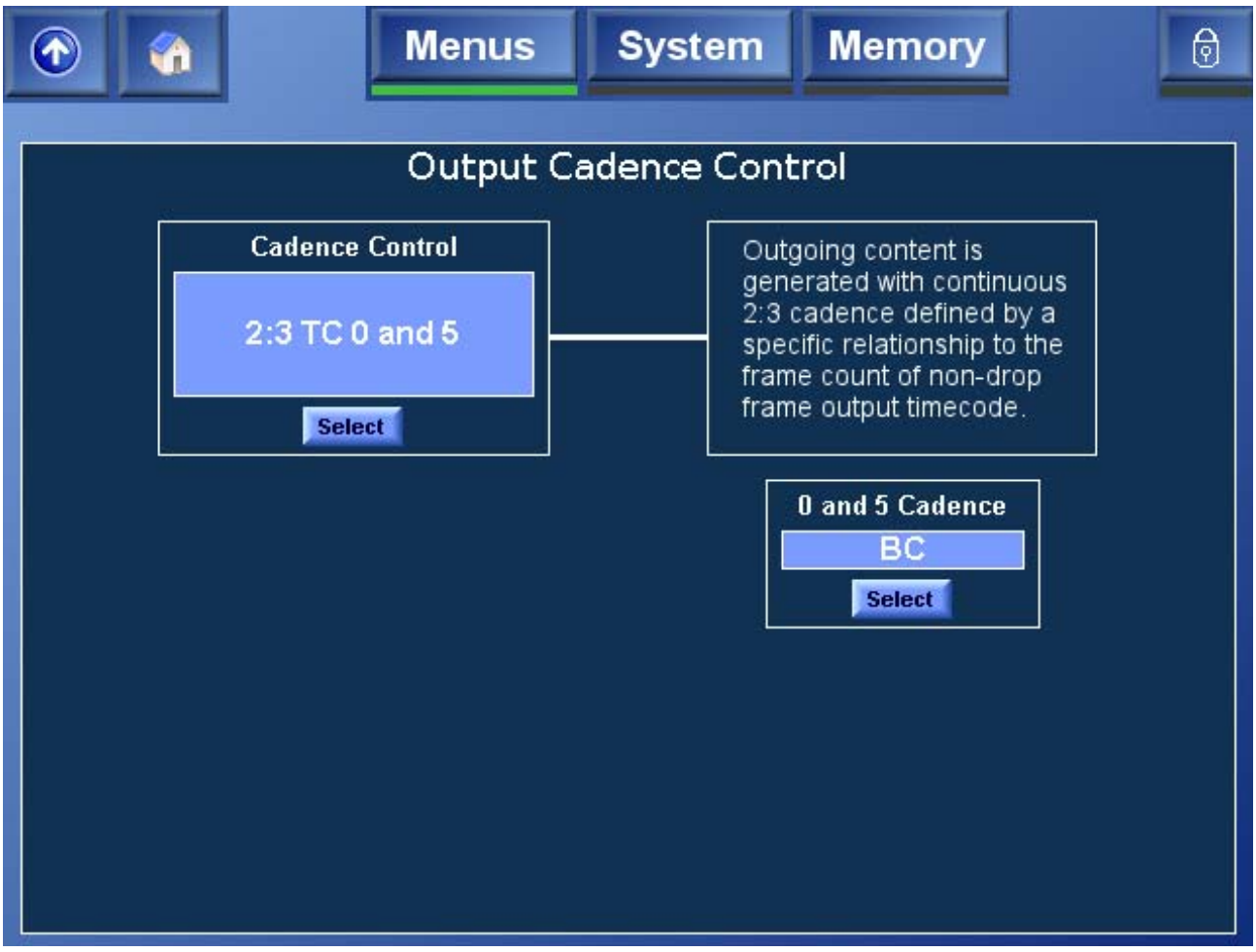
On Valid TC (Default)	Output 2:3 cadence will be defined according to the 2:3 Datum Cadence and Timecode controls when stable output timecode has been detected. The output timecode may be greater or less than specified 2:3 Datum Timecode.
At Datum	Output 2:3 cadence will be defined according to the 2:3 Datum Cadence and Timecode controls. The cadence reset occurs when output timecode is equal to the 2:3 Datum Timecode

2:3 Datum Timecode

Output Load A Timecode (Default)	The 2:3 Datum Timecode is automatically set to match the "Output A Load" timecode.
Independent Cadence Trigger	The 2:3 Datum Timecode can be set to any required frame.

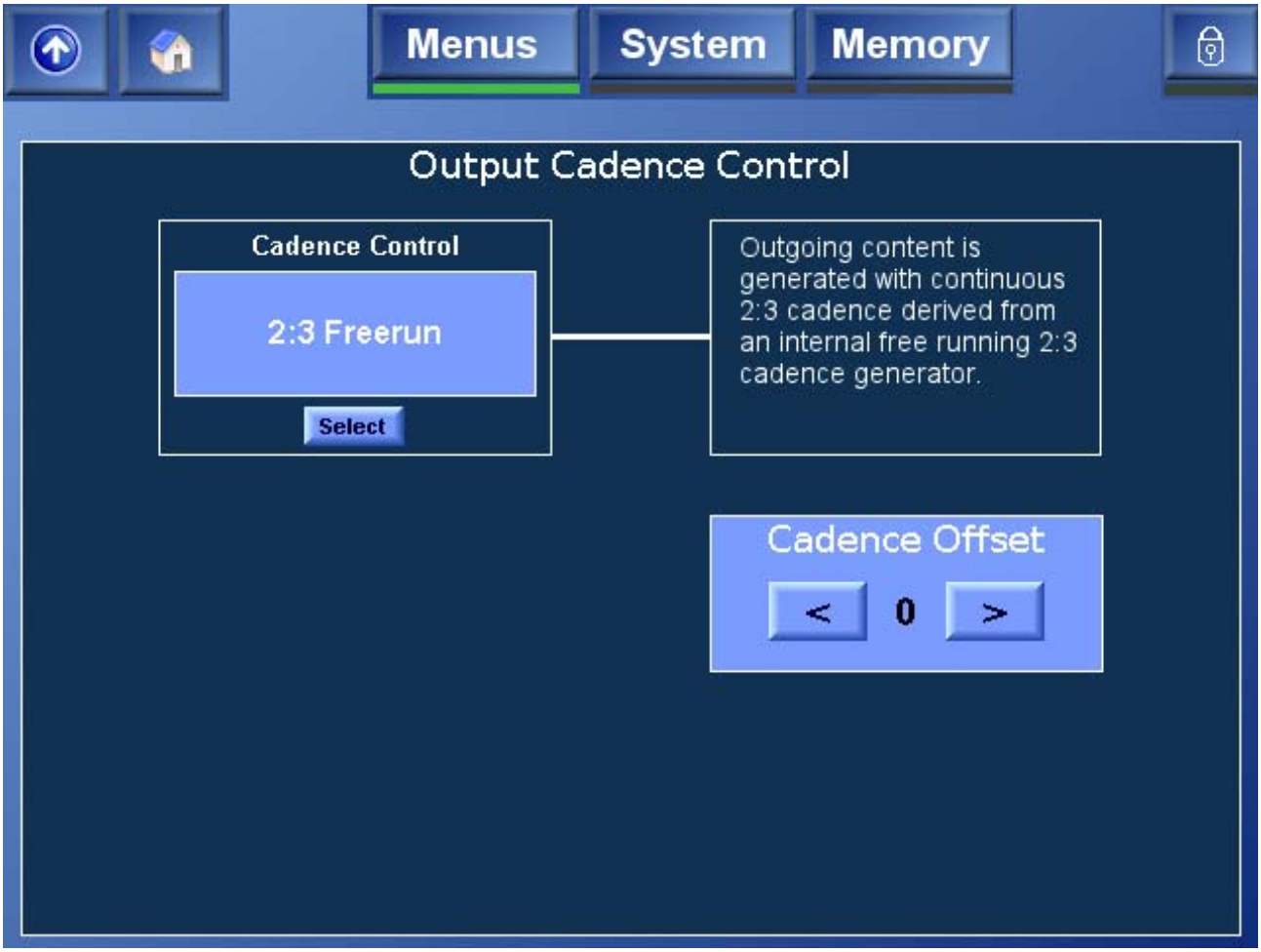
Max time pre-datum
This control defines the start of the Cadence Window. It is only applicable when 2:3 Cadence Reset is set to "on valid TC". The default value is 12 hours.

2:3 TC 0 and 5
Outgoing content is generated with continuous 2:3 cadence defined by a specific relationship to the frame count of non-drop frame output timecode.



0 and 5 Cadence
This control defines the phase of the relationship between frame count and output timecode. When frame count values of 0 and 5 are present, the 2:3 cadence is interpreted as the selected frame type.

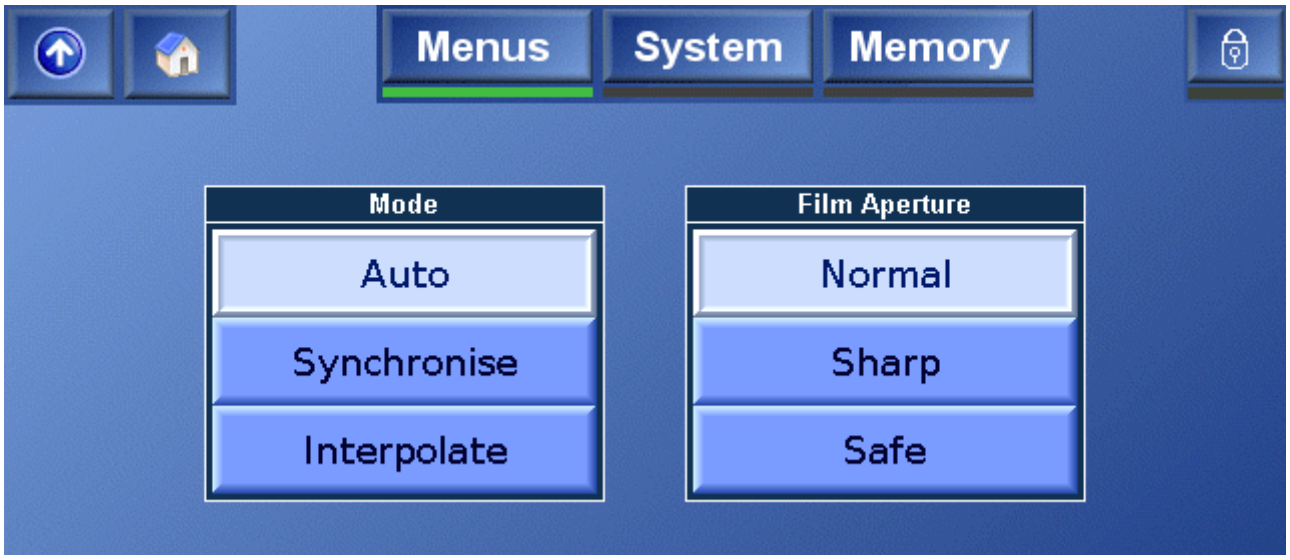
2:3 Freerun
Outgoing content is generated with continuous 2:3 cadence derived from an internal free-running 2:3 cadence generator.



Cadence Offset
This control enables the cadence of the free-running 2:3 cadence generator to be offset.

FilmTools Control

The FilmTools Control menu enables the FilmTools Mode and Film Aperture settings to be specified.



Mode

Auto (Default)	Selects between synchronized or interpolated conversion as appropriate depending on the input and output formats specified. See “Conversion Tables” on page 151. Interpolation gives the smoothest motion profile. Synchronize disables temporal interpolation and maintains clean frames. Note synchronize mode can cause field/frame drops or repeats depending on the input and output frequencies selected.
Synchronize	Forces the conversion by synchronization.
Interpolation	Forces the conversion by interpolation.

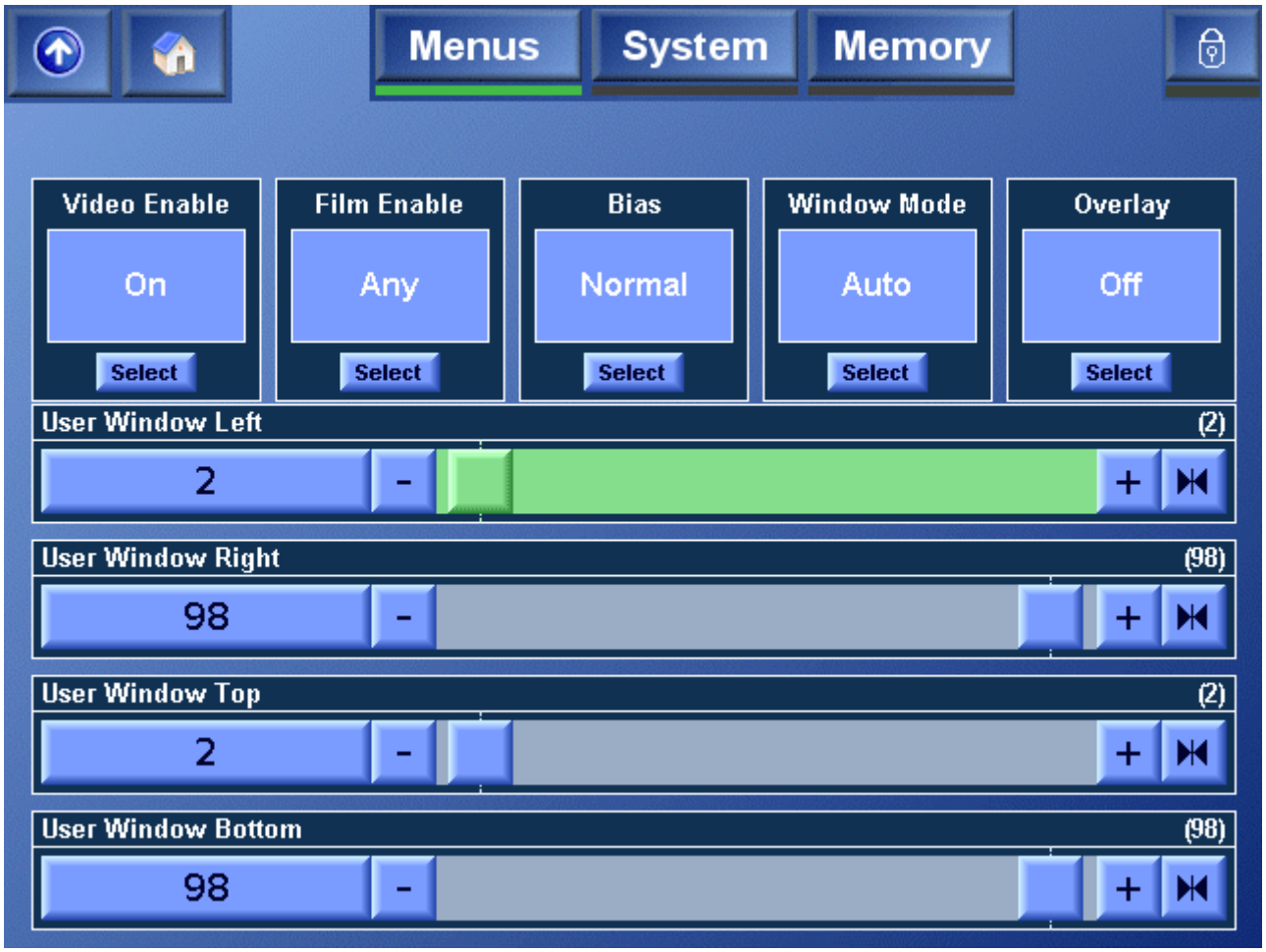
Film Aperture

Normal (Default)	This aperture maximizes the vertical resolution from the incoming film material. This is the optimum aperture for most applications.
Sharp	This aperture maintains maximum possible vertical resolution with the result that it is less tolerant to film sequence detection errors
Safe	This aperture is film safe. It is the most tolerant to film sequence detection errors. Note this mode is useful in applications where the film content contains mixed cadence regions.

FilmTools Detection

The FilmTools **Detection** menu controls the internal sequence detection algorithm.

The Alchemist utilizes a complex integrated detection algorithm to identify content type and cadence information. This algorithm has been optimized so that the maximum possible range of material can be converted in a single pass. In some rare cases it may be desirable to bias the algorithm using the following controls.



Video Enable

On (default)	Allows the sequence detector to positively identify content as 1:1 (video).
Off	The sequence detector will never identify content as video.

Film Enable

Any	(Default) Allows the sequence detector to identify film of any cadence. This maybe 2:2, 2:3, discontinuous 2:3, orphan fields, varispeed or animation.
2:2	Forces the sequence detection to identify film content as 2:2 cadence only. Content maybe F1/2 or F2/1.
2:3	Forces the sequence detection to identify film content as 2:3 cadence only. The 2:3 cadence may be discontinuous.
Animation	Optimized sequence detection algorithm specifically for animation.
Off	The sequence detector will not identify content as film.

Bias

Normal (Default)	This is the optimum setting for most applications. The detection algorithms have been optimized to give the most accurate results for the greatest possible range of material.
Video 2, Video 1, Film 1, Film 2	In some rare cases in may be desirable to bias the sequence detector such that it is more likely to detect video or more likely to detect film. Video 2 biases more strongly towards video than Video 1. Similarly Film 2 biases more strongly towards film than Film 1.

Window Control

This control allows the sequence and cut detection to be restricted to specific areas of the image. A typical detection application would be to avoid sequence detection errors caused by artifacts near the images edges. A typical cut detection application would be to prevent the detection of cuts occurring within a specific region of the image.

Auto (Default)	The sequence/cut detection region will be set to default values.
Track Input Blanking	The sequence/cut detection region will track with the settings for input blanking.
User	The user may manually define a specific sequence/cut detection region.

Window Overlay

The overlay permits adjustment of the active sequence/cut detection region.

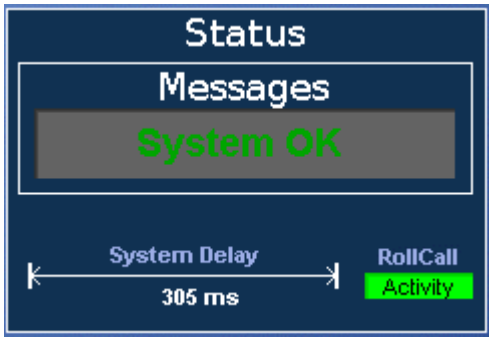
Off (Darken)	The sequence/cut detection region overlay is disabled.
Darken	The active sequence/cut detection region is shown with reduced luminance.
Greyed	The active sequence/cut detection region is shown in mono

User Window

Left 0%-100% (Default 1%)	Defines the left edge of the detection region as a percentage of the picture width.
Right 0%-100% (Default 99%)	Defines the right edge of the detection region as a percentage of the picture width.
Top 0%-100% (Default 1%)	Defines the top edge of the detection region as a percentage of the picture height.
Bottom 0%-100% (Default 99%)	Defines the bottom edge of the detection region as a percentage of the picture height.

Status

The **Status** area provides information about the status of the unit.



Messages

This area displays the following messages about the state of the Alchemist Ph.C HD:

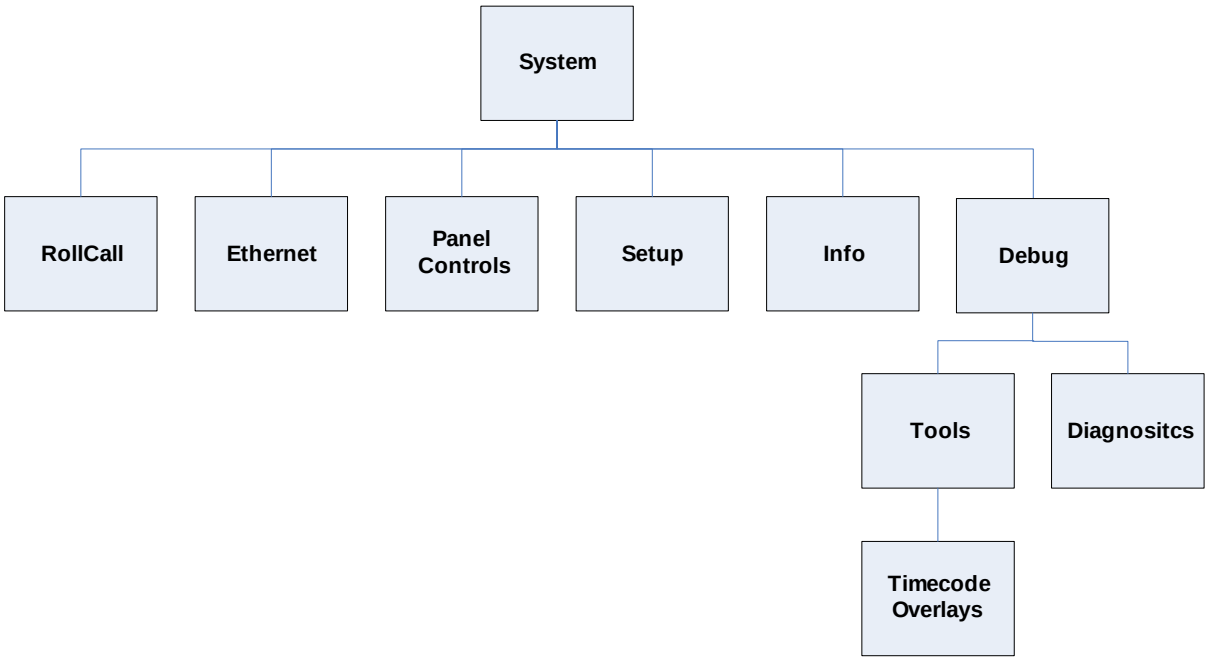
Booting	The unit is starting up.
System OK	The unit is functioning normally.
Fan Fail	The main cooling fan, at the rear of the unit, has failed. This condition may cause the unit to overheat.
Diagnostics Active	One of the diagnostic tests, available on the Diagnostics screen is currently running.
System Overheating	The unit's temperature is higher than recommended. If the temperature continues to rise, the unit will shut down critical cards and the display screen will go blank. However, the fans will continue running to cool the unit. After the unit has cooled sufficiently, it may be restarted.
PSU Fault	A problem has been detected with one of the power supply units. Note that on units fitted with two power supplies, if one supply is turned on but the other is not, a PSU fault will be reported.
Version Unknown	The combination of components comprising the Alchemist Ph.C. is not recognized.

If there is more than one message to be displayed, the display will cycle through them continuously.

System Functions

This section describes the Alchemist Ph.C HD system functions, which include the following configuration settings and controls:

- **RollCall:** Use these settings to specify the Alchemist Ph.C's RollCall information, set up RollTracks, and specify what information should be logged. See "RollCall" on page 96.
- **Ethernet:** Use the Ethernet controls to specify whether the unit receives its IP address dynamically or, if it does not, to specify the unit's IP address. See "Ethernet" on page 99.
- **Panel Controls:** Use these settings to calibrate to touch screen, temporarily de-activate the touch screen so that it can be cleaned, and specify panel timeout settings. See "Panel Controls" on page 99.
- **Setup:** Use these settings to enable or disable shaped horizontal blanking, active line length type, and analog blanking. See "Setup" on page 101.
- **Info:** The system information screen displays version information about the Alchemist Ph.C. See "Info" on page 102.
- **Debug:** Use the Tools menu to access the Timecode Overlays screen, and the Diagnostics screen to perform diagnostic tests on the Alchemist Ph.C. See "Debug" on page 103.



RollCall

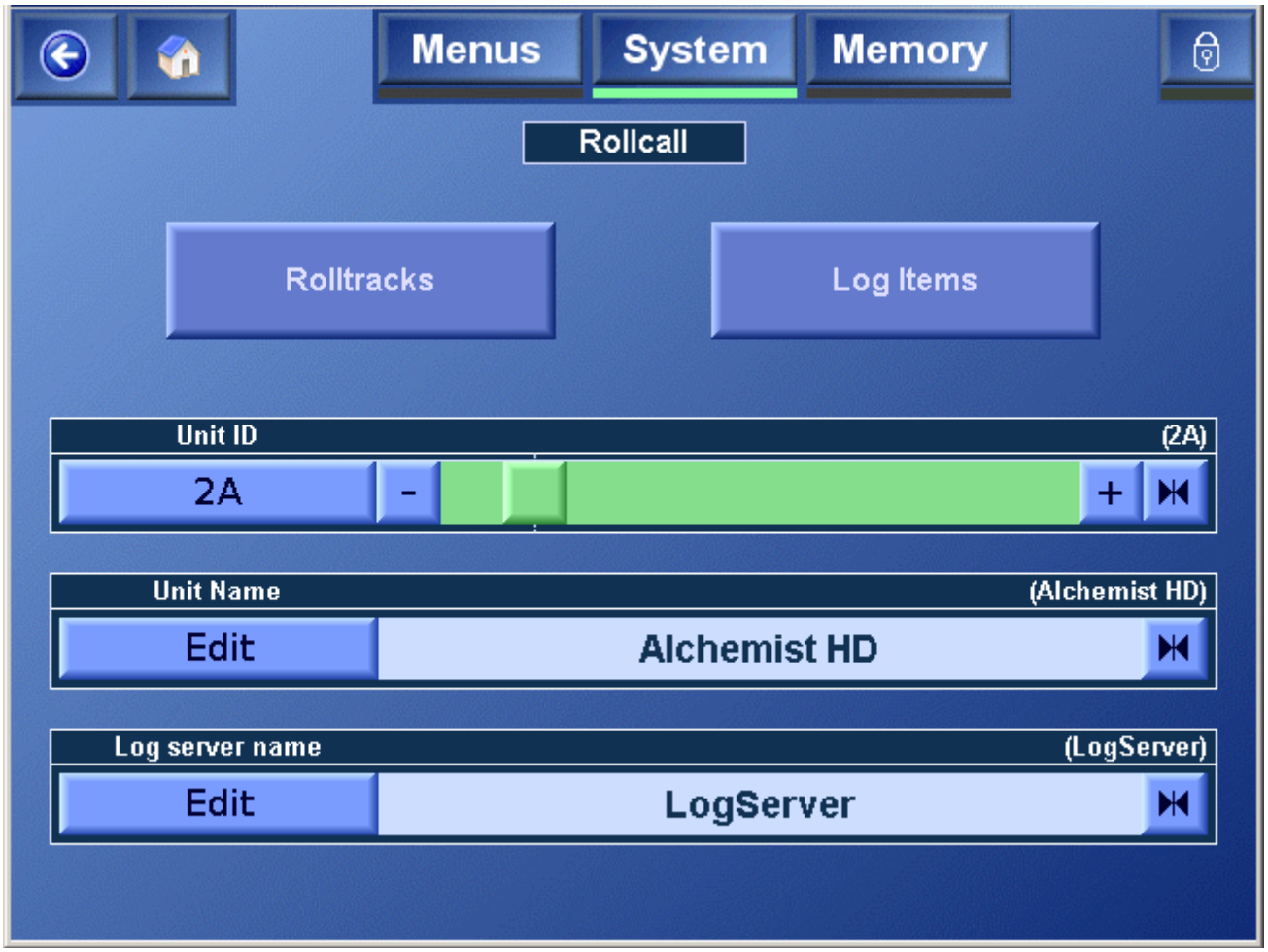
These controls allow information to be sent, via the RollCall™ network, to other compatible units connected on the same network.

Unit ID

This item allows the address of the unit to be set.

To change the ID, do one of the following:

- Use the scroll bars to scroll through the list of addresses (in Hex). The range is from 10 to FF.
- Select the ID box, use the keypad to enter the new address and then select **OK**.



Name

This allows the name of the unit as it appears on the RollCall network, to be changed.

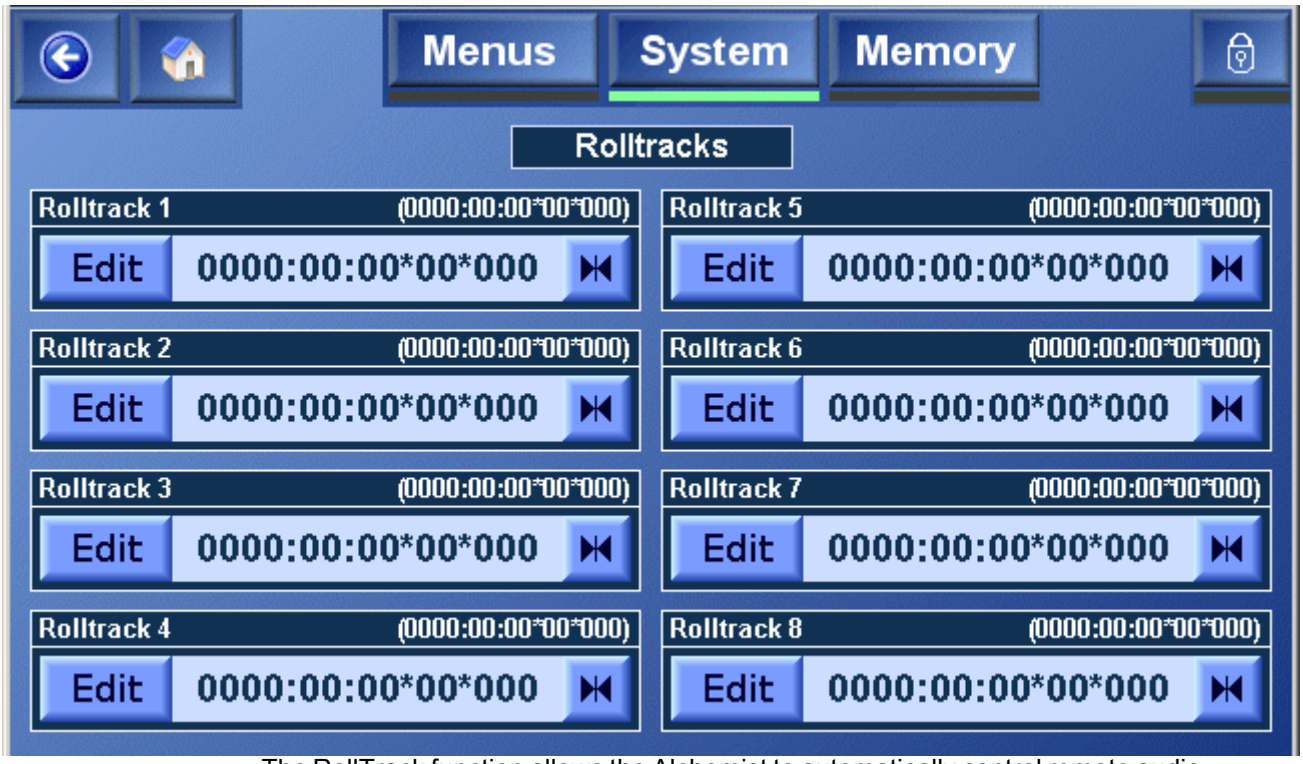
To change the name select the **Edit** item and use the keyboard to edit the text. Select OK to enable the new name.

Log Server name

This allows the name of the Logging server on the RollCall network, to be changed in a similar manner to that described above.

RollTracks

When RollTracks is selected, the screen shown below is displayed.



The RollTrack function allows the Alchemist to automatically control remote audio delay modules using the RollCall system.

As the delay through the Alchemist varies according to the conversion mode, delay modules connected via the RollTrack system will automatically have their delay updated to match.

The delay sent out via the RollTrack system matches the internal audio delay of the Alchemist.

For more detailed information, see “Appendix G: RollTrack Audio Delay Tracking” on page 189.

The destination for the delay information is set from the RollTrack address as follows:

Up to 6 audio delays may be selected as a destination. Selecting any of the six Address edit buttons produces an address editing keyboard.

The string characteristics of a RollCall address are:

0000:00:00x00x00	The first set of digits identifies the network address, in hexadecimal. This is usually 0000.
0000:00:00x00x00	The second set of digits identifies the enclosure address, in hexadecimal.
0000:00:00x00x00	The third set of digits identifies the slot address of the delay module, in hexadecimal.
0000:00:00x00x00	The fourth set of digits identifies the connection or channel number, in decimal.
0000:00:00x00x00	The last set of digits identifies the unit ID, in decimal.

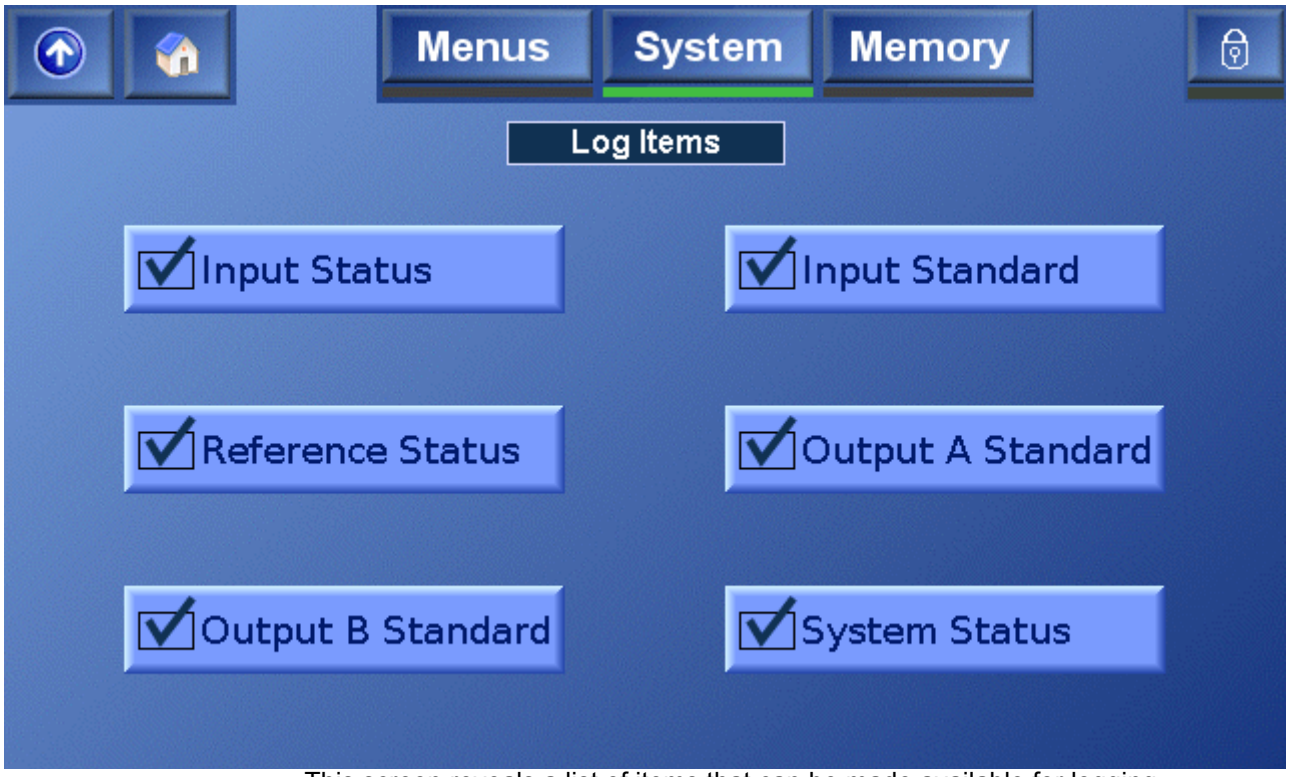
A more detailed description of these items is given in the RollTrack section (Appendix) at the end of this manual.

In a typical set-up, the network address will be 0000, the enclosure and slot address would match those of the destination module, and the channel number would be one of 14,15,16 or 17 and the unit ID should be set to the RollCall ID of the destination unit.

The Alchemist RollTrack output becomes active as soon as the enclosure address is set to be non zero and OK selected.

Log Items

When **Log Items** is selected, the screen shown below is displayed.



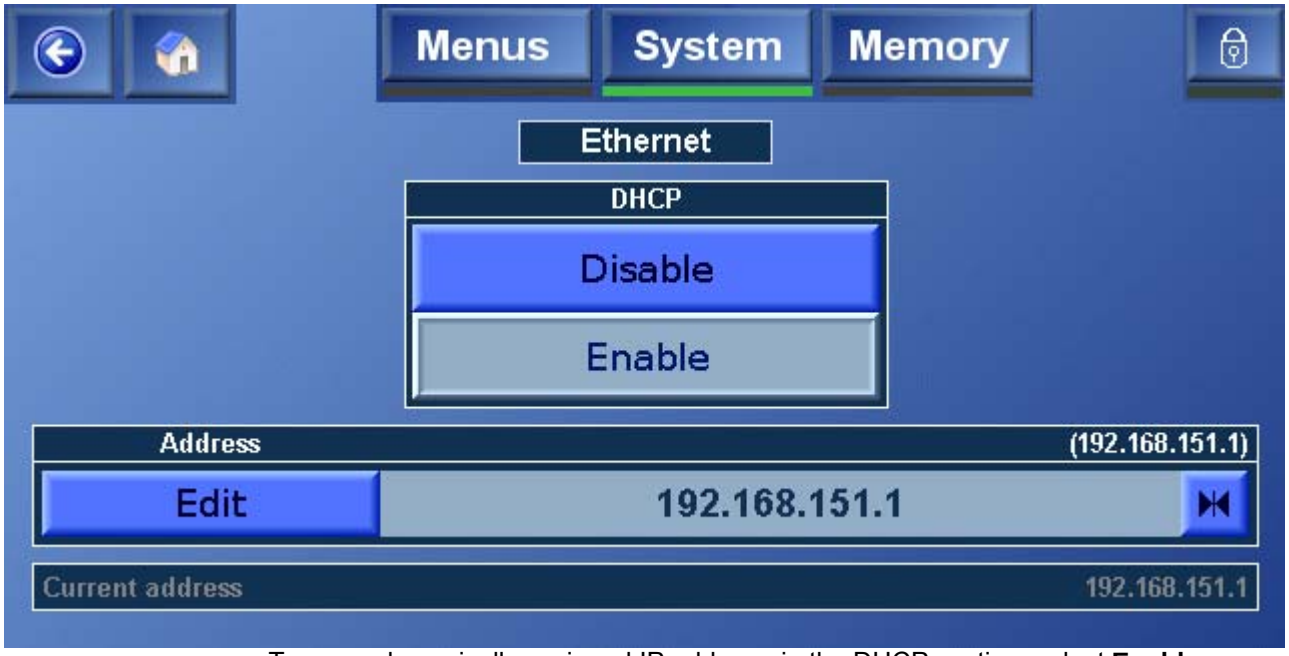
This screen reveals a list of items that can be made available for logging.

Input Status	When checked, a loss of input signal condition will be indicated to the logging device.
Input Standard	When checked, the current input standard will be available to the logging device.
Reference Status	When checked, a loss of reference signal condition will be indicated to the logging device.
Output Standard A & B	When checked, the current output standard will be available to the logging device.
System Status	When checked, system status log events will be available to the logging device.

Ethernet

The Alchemist Ph.C can connect to a RollCall 32-bit control panel via an Ethernet connection. The unit's IP address can either be dynamically assigned by a DHCP server, or manually assigned.

Use the Ethernet controls to specify whether the unit receives its IP dynamically (using DHCP) or, if it does not, to specify the unit's IP address.

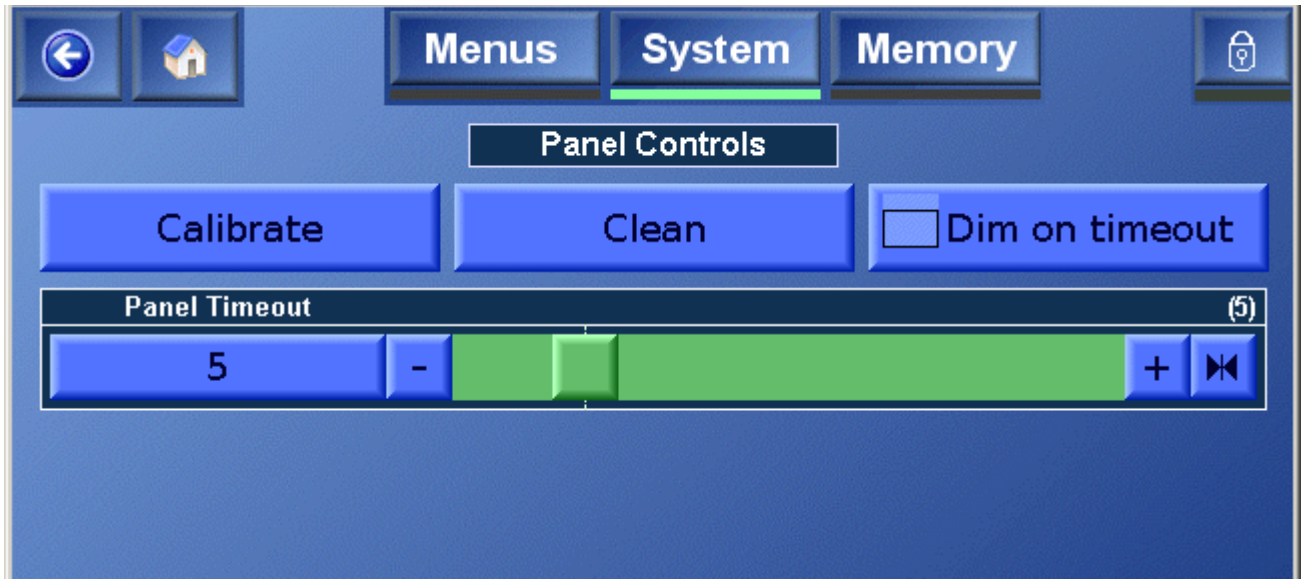


To use a dynamically assigned IP address, in the DHCP section, select **Enable**. The Alchemist Ph.C HD will receive its IP address from a DHCP server, and its address will be displayed in the Current Address information display.

To manually assign an IP address, in the DHCP section, touch **Disable**, then in the Address section, touch **Edit**. Use the keyboard to enter the IP address, and then touch **OK**.

Panel Controls

When **Panel Controls** is selected, the screen shown below is displayed.



Calibrate

This function allows re-calibration of the touch screen.

Press on the cursor area for a few seconds and the next screen will appear.

The calibration process will be completed when the Calibration Successful dialog appears on the screen as shown below.

Touch the screen anywhere to return to the **System** screen.

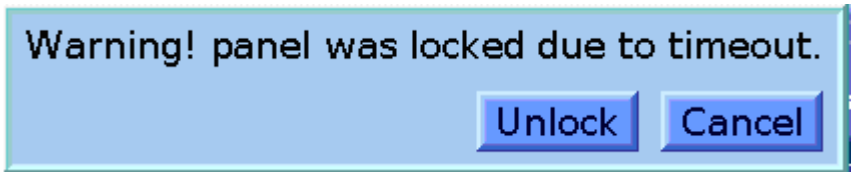
Clean

This allows the screen to be cleaned without activating any functions.

When the **Clean** function is enabled a representation of a countdown timer will appear on the screen. This timer will be reset to zero whenever the screen is touched during the cleaning process and will run for approximately 16 seconds after the last time the screen was touched; it will then return to the **System** screen.

Panel Timeout

If the touch screen has not been used for a certain period of time it will be come inoperative. If an attempt is made to operate the screen a dialog box will appear warning that the panel has been locked due to a timeout. Select **Unlock** to return to normal operation or **Cancel** to leave in the locked condition.



The period of time before the panel becomes locked can be set using the **Panel Timeout** control.

The time can be set from 1 to 30 minutes using the scrollbar or the keypad.

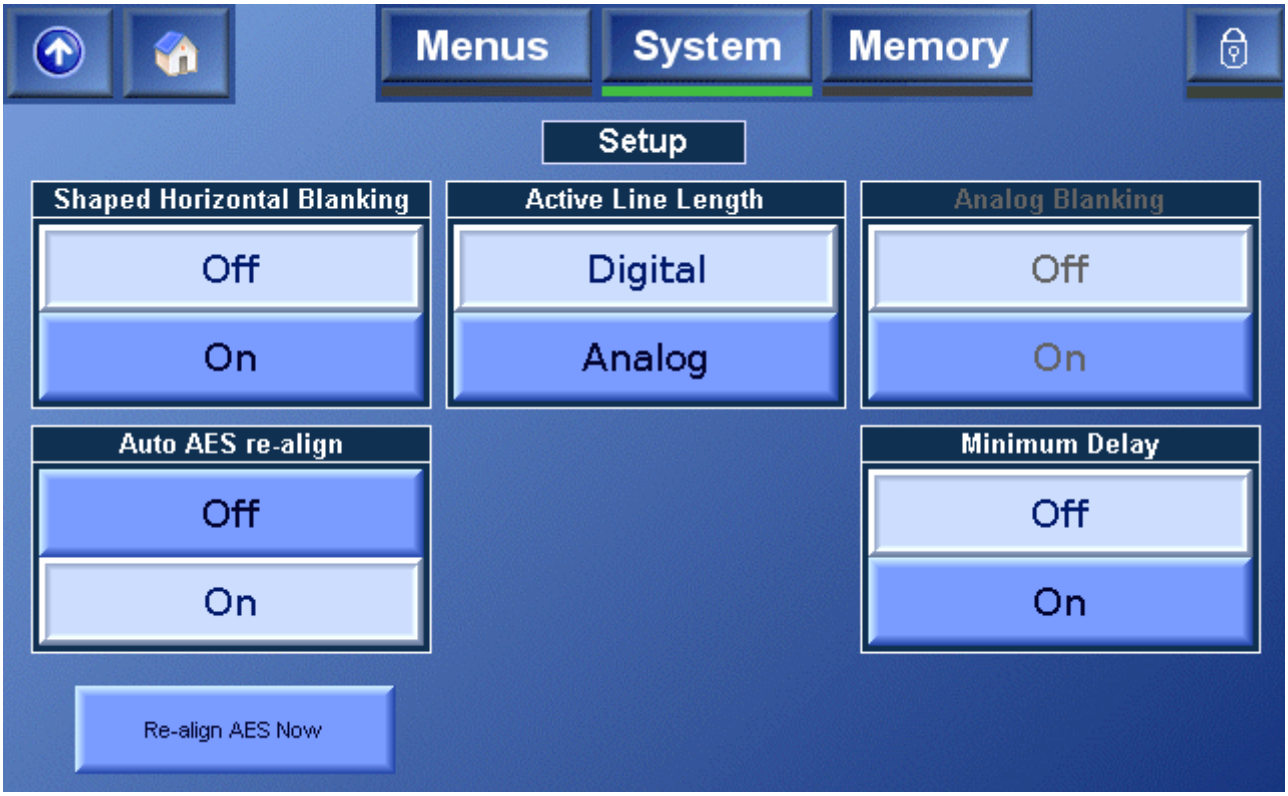
By setting the control to less than 1 minute the function will be turned off.

Dim

When selected the brightness of the panel will reduce to a minimum when the panel timeout occurs.

Setup

When **Setup** is selected, the screen shown below is displayed.



From the Setup screen, the following parameters can be configured:

- Shaped Horizontal Blanking
- Active Line Length
- Analog Blanking
- Auto AES re-align

Shaped Horizontal Blanking

When enabled, this option provides a blanking rise and fall time of 3 pixels (approximately 10% to 90%).

Active Line Length

When **Analog** is selected, the unit treats input 4:3 images as if they originated as analog signals. This enables the unit to compensate for analog line length differences between analog PAL and NTSC signals and preserve correct aspect ratio.

Analog Blanking

If Analog Active Line Length has been selected, this option applies appropriate analog blanking to both input and output signals.

Auto AES re-align

This allows the user to enable or disable the auto AES re-align feature.

When enabled, if a new AES input is applied to the Alchemist and that AES channel is routed to one of the audio outputs, all AES channels will be reset to re-align them. By default, Auto AES re-align is On.

Touch **Re-align AES Now** to manually trigger a reset to all AES channels.

Minimum Delay
If the FilmTools option is enabled, this control has no effect.

If the FilmTools option is disabled, when this control is Off, the latency through the Alchemist is approximately 220-336ms. This matches the latency of the unit with FilmTools enabled.

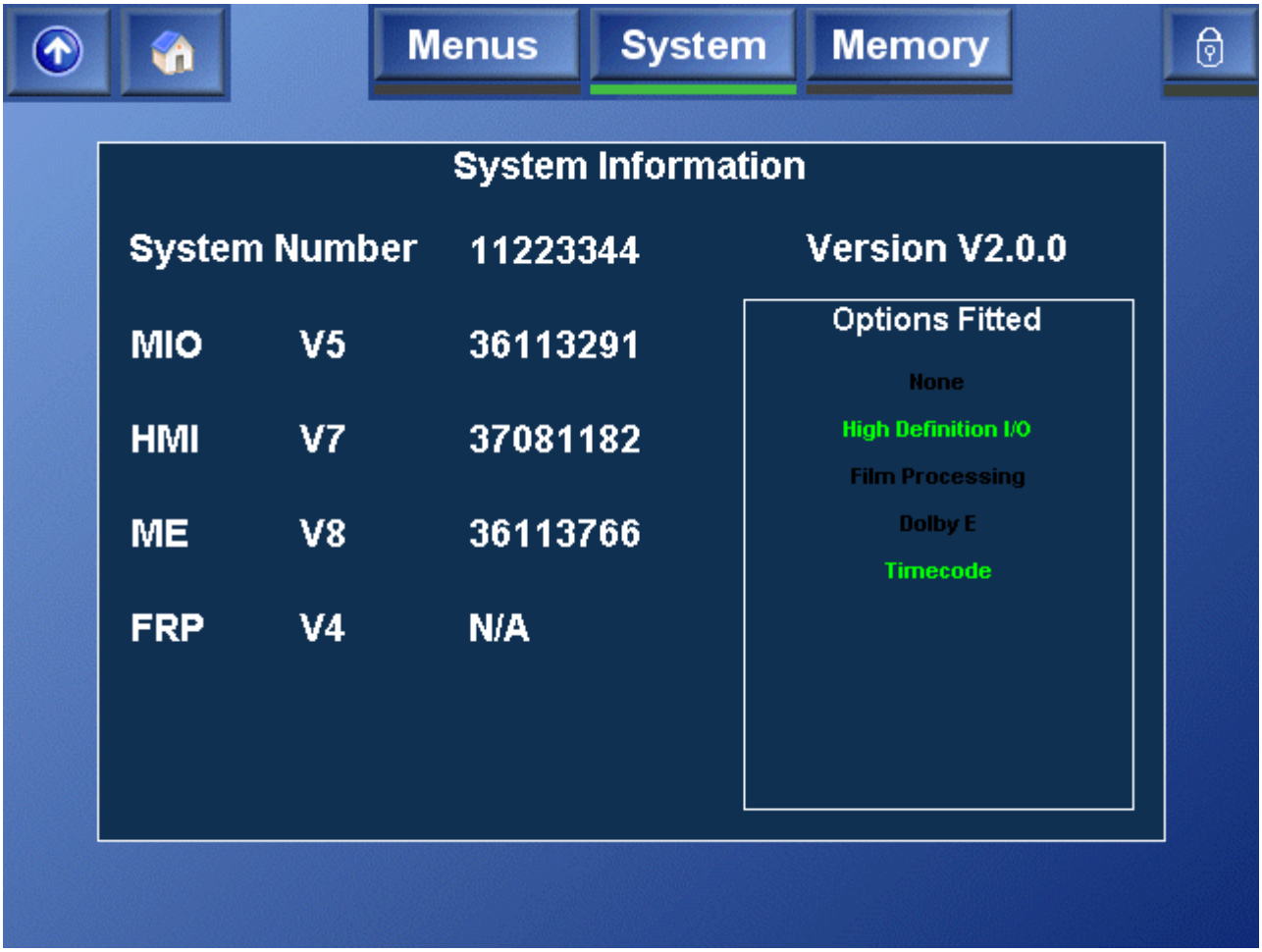
If a reduced latency is required, enabling this control reduces latency to approximately 135-205ms.

Info

When **Info** is selected, the System Information screen shown below is displayed.

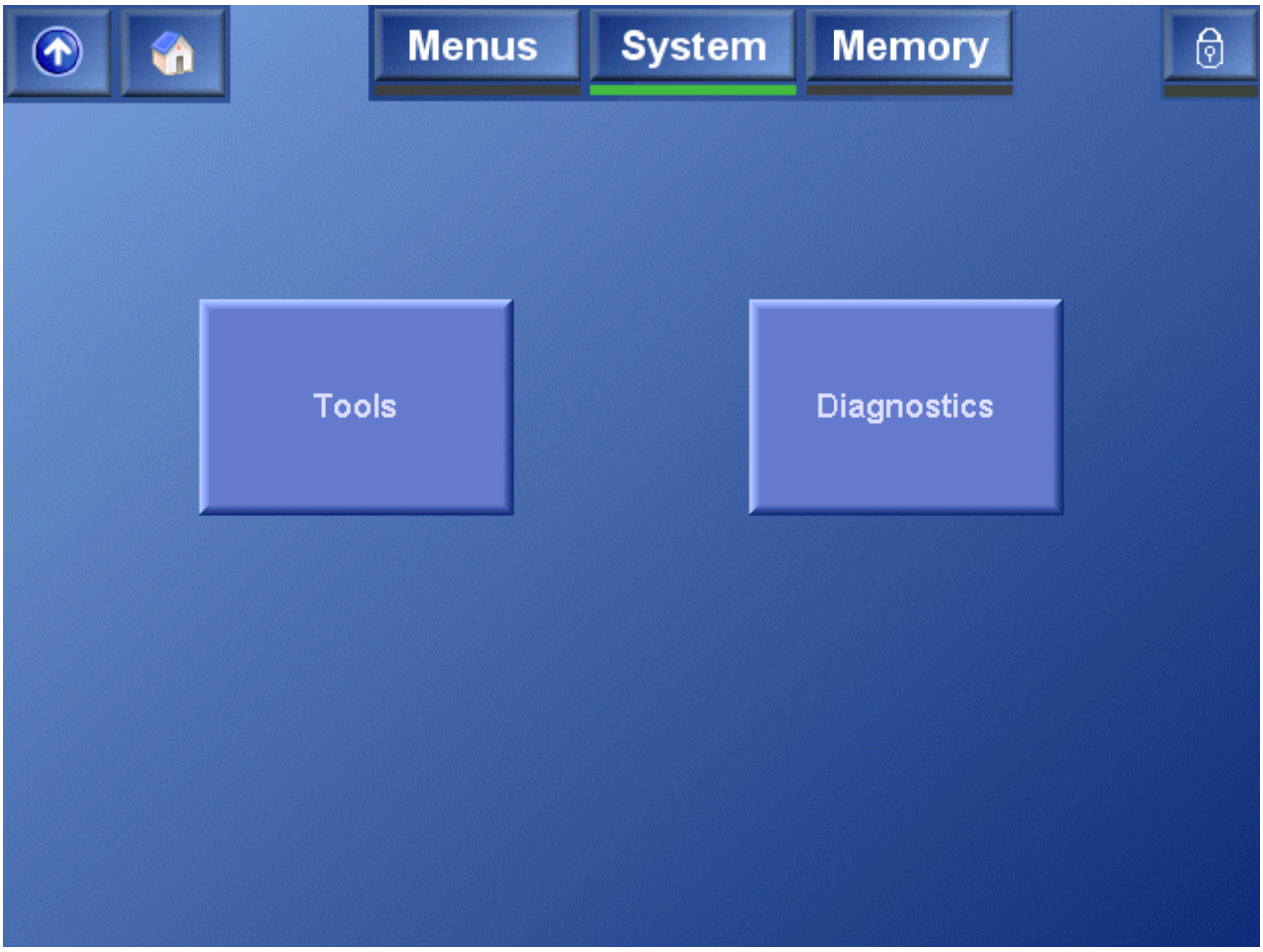
The System Information Screen displays information about the Alchemist Ph.C HD's software and hardware versions. This information is required when contacting Snell & Wilcox support.

System Information screen for unit with High Definition and Timecode options



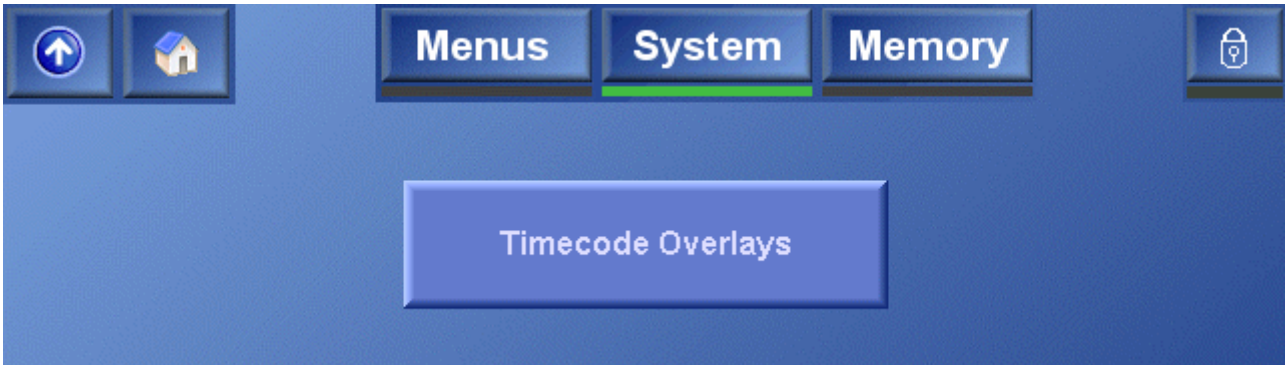
Debug

The **Debug** menu provides access to the Tools options and the Diagnostics screen.

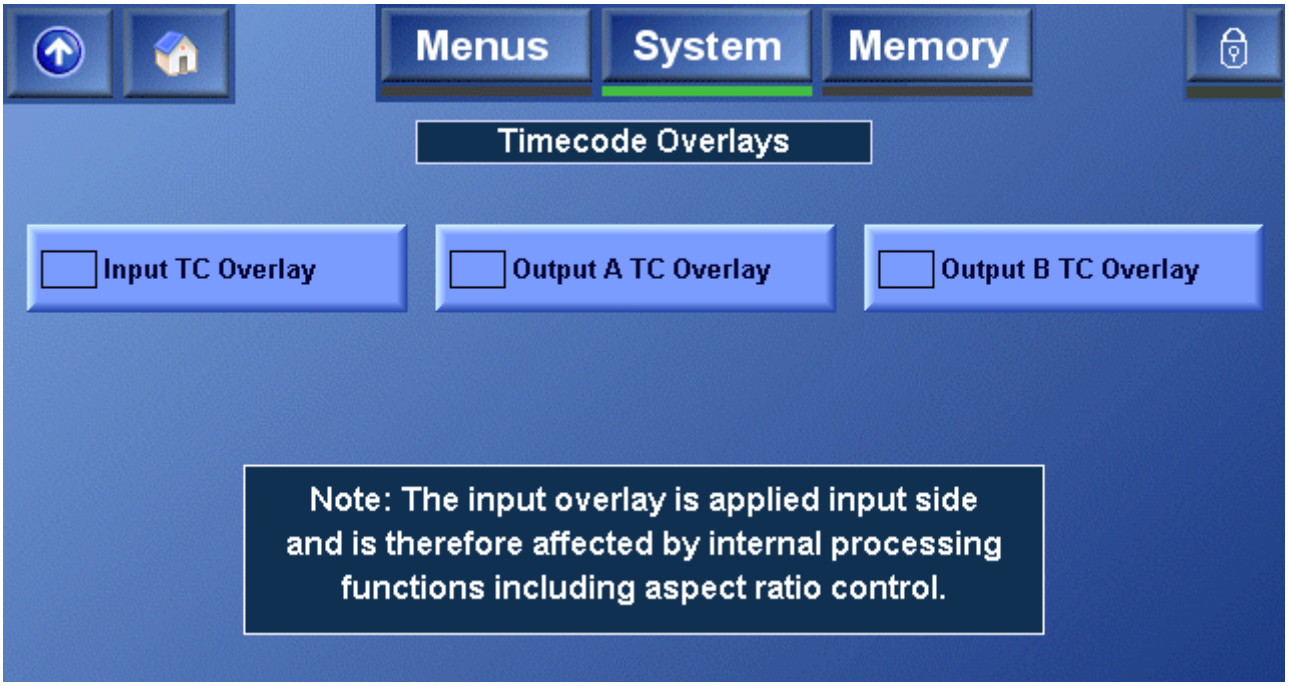


The Tools menu allows Timecode overlays to be shown on the output display, and the Diagnostics screen provides options that can be used to determine the source of potential system problems.

Tools (Timecode Overlays)



The only option currently available on the Tools menu is the **Timecode Overlays** screen.



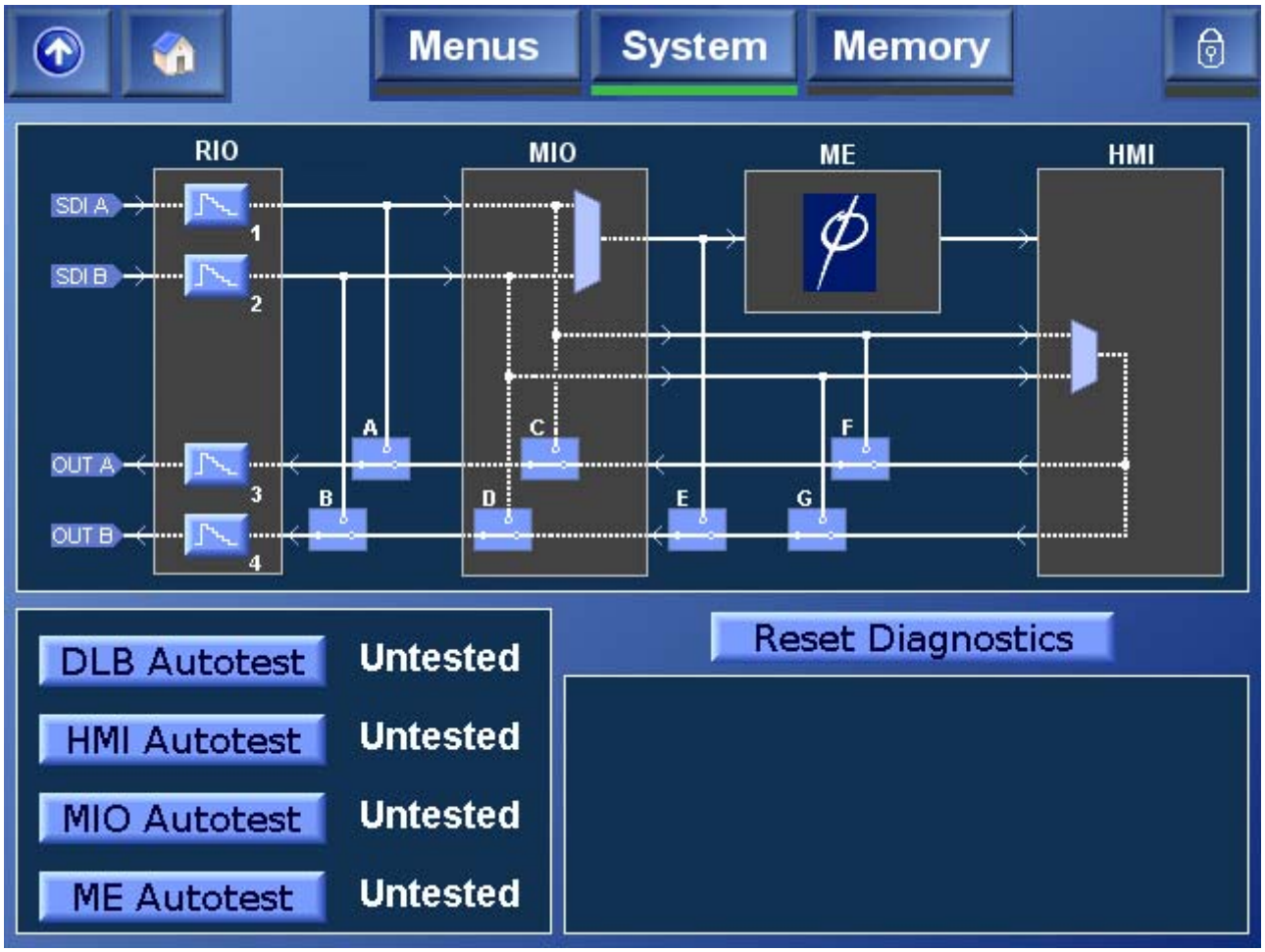
These options allow overlays, displaying any or all of the Input Timecode, Output A Timecode, and Output B Timecode to be displayed on the output.

To display any of the above, select the corresponding check box.

Note: *The input timecode overlay is applied in input space; therefore, it is processed before being displayed.*

Diagnostics

When **Diagnostics** is selected, the screen shown below is displayed.



The diagram at the top of the Diagnostics screen enables Snell & Wilcox support to determine the source of potential system problems; it should not be used unless instructed to do so by Snell & Wilcox support.

The Autotest functions enable the cards within the Alchemist Ph.C HD to perform self-tests.

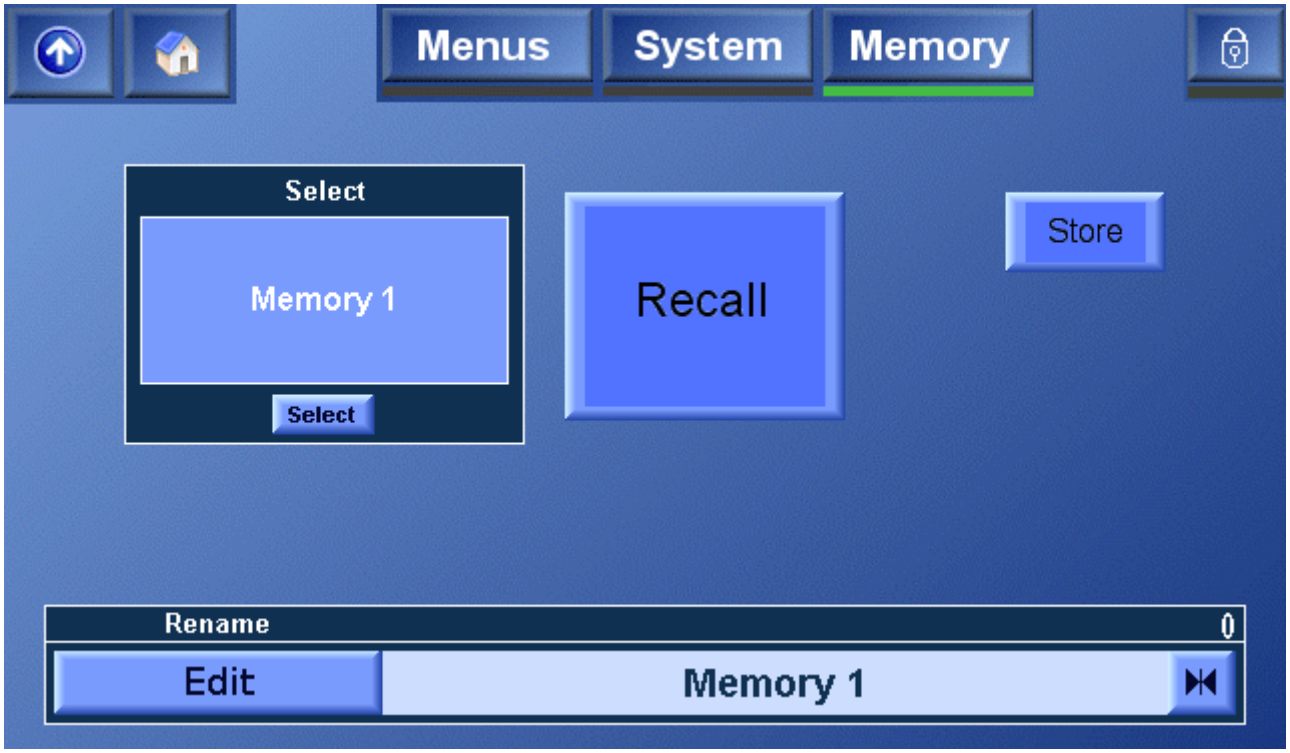
To perform a test on a card, press the corresponding **Autotest** button, a Running message will display, followed by a percentage indicating the progress of the test, until the test has completed when it will return a Pass or 'Failure' message.

Note: *The Alchemist Ph.C must be receiving a valid input signal before performing any autotests.*

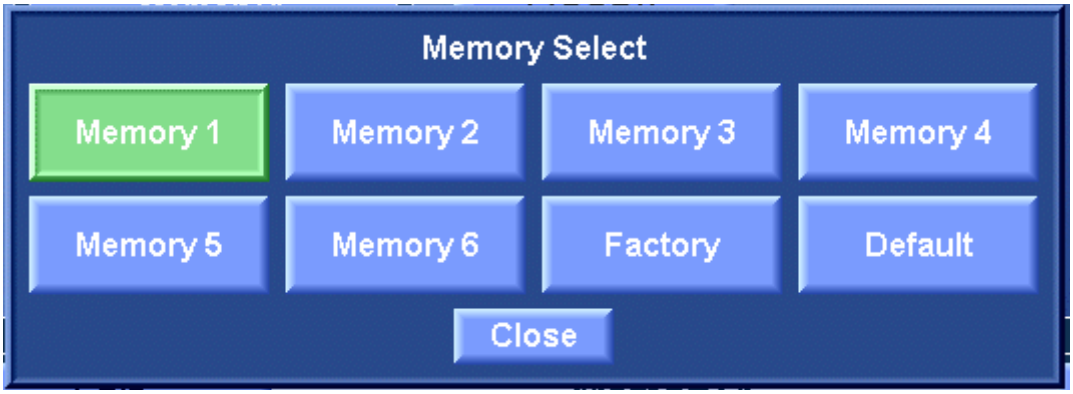
Memory

This function allows a number of particular setups of the unit to be saved and recalled. There are 6 user memory locations available plus default. All memories locations may renamed except the default position.

To change the memory name select the memory location (color will change to green) and then select **Edit**. This will reveal the keyboard and allow text to be entered. Select OK to save this new name and return to the Memory screen.



Memory Select



To Save a Current Setup in a Memory Location

- Select the memory location (color will change to green) and select **Store**.

To Recall a Setup from a Memory Location

- Select the memory location (color will change to green) and select **Recall**.
- Click **Factory** to return all of the unit's settings to their default settings. **This selection will delete all user memories.**
- Click **Default** to reset all of the unit's settings to their defaults, leaving all user memories intact.

Appendix A: Noise Reduction

Overview

V2.0 offers a comprehensive noise reducer to the standard Alchemist Ph.C - HD.

The noise reducer is an advanced adaptive spatial/temporal filter which has been optimized to preserve detail without introducing artifacts.

Pixel based adaption is achieved through careful analysis of the image to distinguish which pixels are moving and which are static. Static and low textured regions are better handled by the temporal processing as it permits the reduction of noise without any loss of resolution, whilst moving textured regions are better handled by the spatial processing as temporal processing may introduce smear.

The noise reducer is designed to remove low level noise such as noise generated by high levels of camera gain or “film grain” like noise.

Noise Reducer Controls

The noise reducer allows the following adjustments to be made.

Noise Reducer	On / Off Preset to Off.
Luma Strength	0 to 30 units in increments of 1 unit. Preset to 0.
Chroma Strength	0 to 30 units in increments of 1 unit. Preset to 0.
Weighting	White Uniform Black
Bias	±7 units in increments of 1 unit. Preset to 0.
Overlay	On / Off Preset to Off.

Setup

Basic Operation

Enable the filter and then experiment with various luma and chroma strengths. Optimum setup will offer clean images with minimal artifacts. Typical artifacts caused by excessive noise reduction can include loss of detail or in the extreme case smearing. In the first instance it is recommended the Bias is left in preset. If the source material is particularly biased towards black or white it may be desirable to adjust the weight to suit.

Advanced Setup and Operation

If the strength control doesn't offer the desired results, with demanding material it may be necessary to fine tune the bias control. With the overlay enabled, if you see moving regions which have little or no color on and around them, then reduce the bias. Alternatively, if the static regions have some color, then increase the bias. Once the bias has been configured the user should adjust the strength controls to compliment the new bias level. Optimum noise reduction is now in progress!

The following example shows how to use the overlay to achieve the optimum setting for the noise reducer. Three different scenarios show how to adjust the bias control using the overlay; in this example the background is static with foreground motion (the penguins).

Scenario 1 – Too much bias

In the above image it can be seen the moving regions (penguins) do not have enough color overlay on them. In this example the bias has been set too high. Some of the moving content may suffer from smearing (on higher strength levels) as a direct result of using the temporal processing.

Scenario 2 - Too little bias

In scenario 2 however, the majority of the static region has the color overlay present. This means the bias has been set too low. As some static regions are being spatially processed in this instant the noise reducer probably isn't generating the most optimal result.

Scenario 3 – Optimum bias

Scenario 3 shows the optimum setup. All moving regions are being spatially processed, and majority of static regions are being temporally processed. This configuration will offer the optimum noise reduction.

Appendix B: Timecode

Overview

For the first time the ability to seamlessly handle timecode while performing a frame-rate conversion is available with the Timecode option for Alchemist Ph.C - HD. The Alchemist now has the ability to monitor its input timecode and act upon it in a variety of user selectable ways to generate a standards converted output with correct timecode.

Set up and operation of the Timecode option in Alchemist Ph.C – HD is achieved through simple easy to use control screens. The dedicated setup page is used to configure timecode input and output controls, the main Timecode control page provides a one page status and operation window, allow the mode and trigger to be setup whilst monitoring the input.

Note: *The Alchemist Ph.C Timecode functions are optional. If the Timecode option has not been purchased, these functions are not available.*

Key Features

- Synchro modes guarantee the first program field/frame at the right timecode, ensuring that the first program field/frame is clean, with no interpolation and drastically improving workflow efficiency.
- Timecode processing available in all conversion modes, during frame standards conversion as well as up, down and cross conversion modes.
- Fully integrated latency compensation – Automatic audio, video and timecode alignment.
- Powerful, easy to use control interface.
- Eliminates the need for external timecode black boxes and infrastructure.
- Timecode processing available in all genlock modes.
- Range of timecode modes to accommodate all potential user applications.

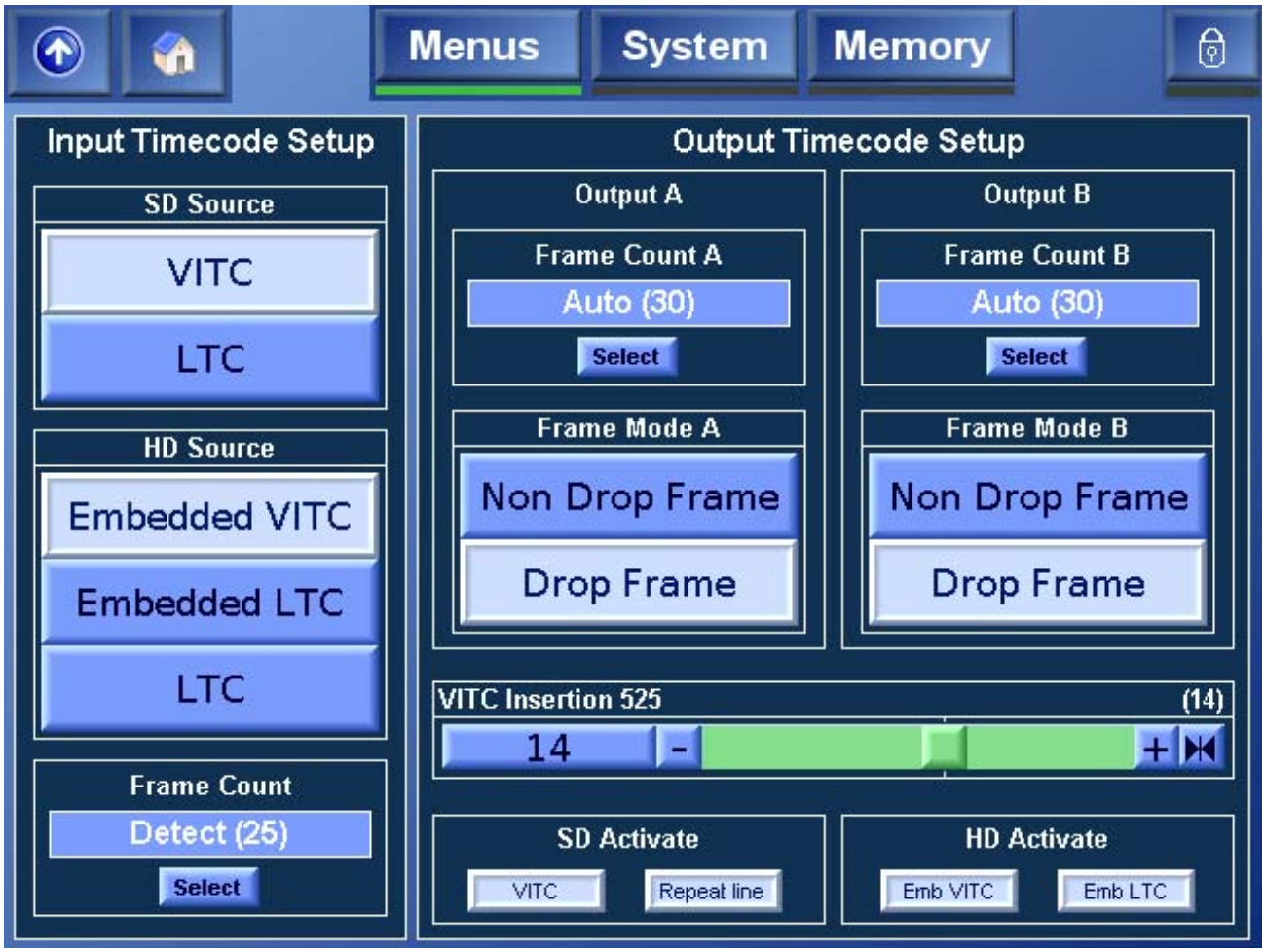
The Alchemist timecode insertion is based upon two timecode concepts. The first of these is the input timecode trigger (Input Trigger) and the second is the output timecode load (Output A/B Load).

The input timecode trigger is simply the value of the input video (source) timecode that will cause an output timecode event to occur. In other words when the input video timecode equals the specified trigger value the Alchemist will insert timecode according to the mode and user configuration selected.

The timecode output load is the value of the output timecode to be inserted on the video field/frame that the Alchemist generated from the input video field/frame with the trigger timecode value. Note that in doing this the Alchemist automatically compensates for its internal processing delay.

Control Interface

There are 2 principal timecode setup and operation pages, these can be accessed from the Timecode Tab on the home screen.



Input Timecode Setup

SD Source

This menu specifies the source of the SD timecode input.

VITC The SD input video timecode is read from the VITC signals (SMPTE 12M/SMPTE 266M).

LTC The SD input video timecode is read from the LTC connector (SMPTE 12M).

HD Source

Emb VITC	The HD input video timecode is read from the embedded VITC signals (SMPTE RP188).
Emb LTC	The HD input video timecode is read from the embedded LTC signals (SMPTE RP188).
LTC	The HD input video timecode is read from the LTC connector (SMPTE 12M).

Frame Count Max

This menu specifies the maximum frame number the input timecode will reach before it resets to 0. This information is essential for timecode arithmetic.

Detect	Detect will measure the frame count max from the input timecode.
Format	Format assumes timecode was generated to match the frame rate of the video.
24/25/30	This will force the input frame count max to the specified setting. This allows the user to accommodate material that may have been generated with the wrong frame count max limit. Slow PAL for example.

Output Timecode Setup

There are separate controls for outputs A and B as these can be configured independently. (Note both outputs will adopt the same configuration for “Timecode Mode”).

Frame count Max (Output A/B)

This menu specifies the maximum number the output timecode frame counter will reach before it resets to 0.

Auto	Auto assumes timecode is generated to match the specified frame rate of the output video.
24/25/30	This will force the output frame count max to the specified setting. This allows the user to pre-compensate for later changes in playback speed, of the material we generate. Slow PAL for example.

Drop Frame Mode

This menu is only relevant to 59.94Hz output. When enabled, the first two frame numbers (00 and 01) shall be omitted from the count at the start of each minute except minutes 00, 10, 20, 30, 40, and 50. Note if the Alchemist is configured to “E-E” timecode mode and is performing a 30 fps – 30 fps timecode conversion the output drop/non drop type will follow the input. E.g. 59.94Hz DF input will automatically give a 59.94Hz DF output and vice-versa.

On	**“**On” can only be selected if the output timecode is 30 fps. On will force the output timecode to be drop frame.
Off	“Off” can only be selected if the output timecode is 30 fps. Off will force the output timecode to be non-drop frame.

SD VITC Insertion Line

The menu specifies for an SD output which line of vertical blanking the first insertion of VITC signal occurs on. If enabled, the second insertion will occur 2 lines below.

625 Default	Lines 19/332 and 21/334 (SMPTE 266M).
525 Default	Lines 14/277 and 16/279 (SMPTE 266M and RP164).
625 Range	Between lines 6/319 and 20/333 (SMPTE 12M and SMPTE 266M).
525 Range	Between lines 10/273 and 17/280 (SMPTE 12M and SMPTE 266M).

Note the range refers the first insertion line not the second (repeat).

Activate

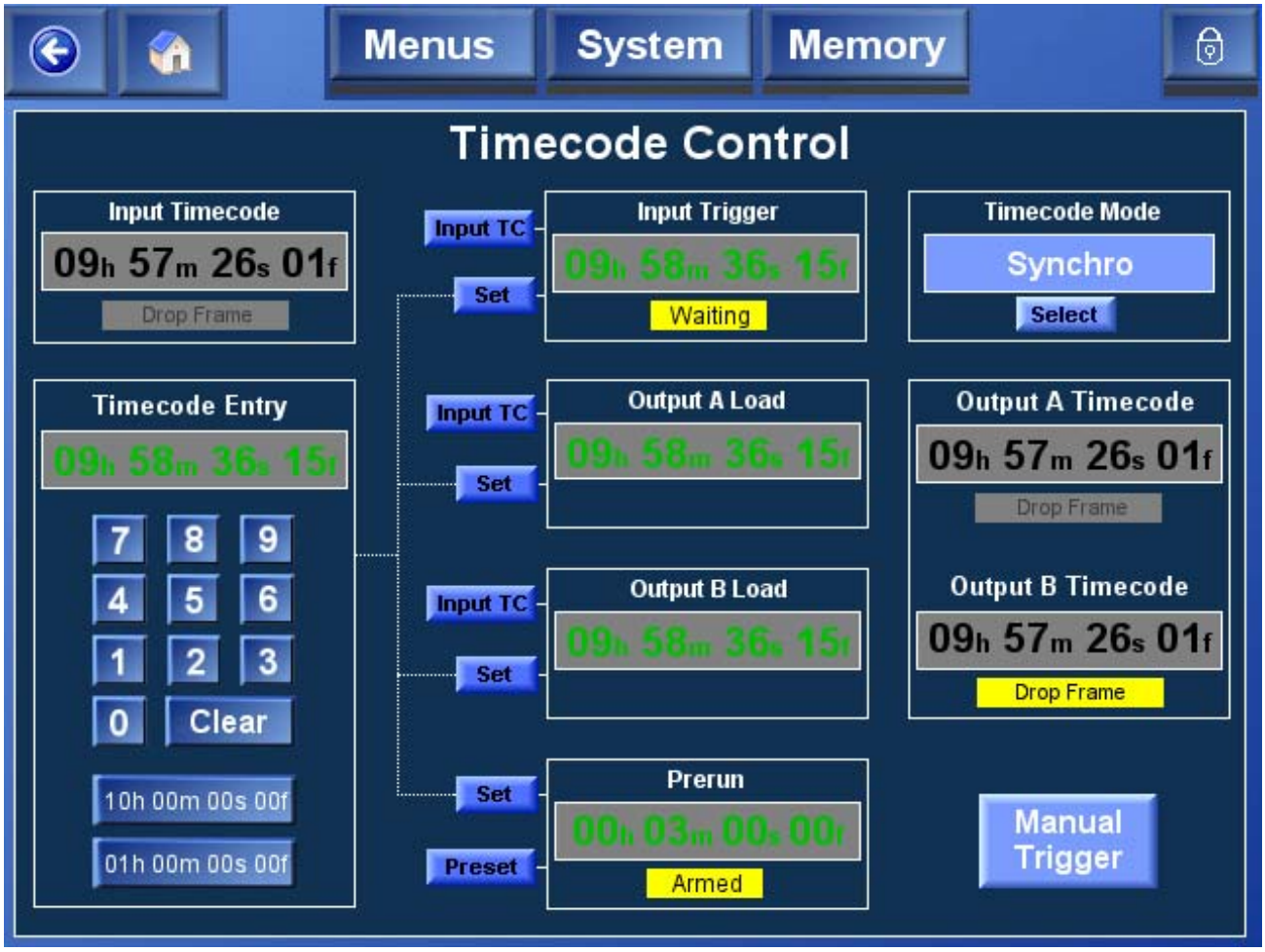
This menu allows the user to enable/disable the timecode output format. The options are:

SD Output: VITC / Repeat

HD Output: HD Emb VITC / HD Emb LTC

Note: LTC via the XLR is always enabled.

Timecode Control



Input Timecode

This displays the input timecode read from the specified source.

Drop Frame will be illuminated when drop frame timecode is detected on the source timecode.

Timecode Entry

Allows the user to enter the desired timecode value. Presets of 10h 00m 00s 00f and 01h 00m 00s 00f are available.

Input Trigger

The input trigger is the value of the source timecode that will cause an output timecode event to occur. The display indicates the timecode at which the trigger event will occur. To specify a different timecode the user can enter a new timecode using the “Timecode Entry” key pad and then press the “Set” button next to Input Trigger box. Alternatively pressing “Input TC” sets the trigger timecode to the current input timecode value.

Output A Load

The Output A load specifies the value which will be inserted in the output A timecode when the input trigger event occurs. As with the input trigger there is a timecode display which indicates the timecode to be inserted. To specify a

different timecode the user should set a new timecode using the “Timecode Entry” key pad and then press the “Set” button next to the Output A Load box. Alternatively pressing “Input TC” sets the Output A Load timecode to the current input timecode value.

Output B Load

The Output B load specifies the value which will be inserted in the output B timecode when the input trigger event occurs. This can be independent to output A; however both outputs will adopt the same “Timecode Mode” configuration. As with the input trigger there is a timecode display which indicates the timecode to be inserted. To specify a different timecode the user should set a new timecode using the “Timecode Entry” key pad and then press the “Set” button next to the Output B Load box. Alternatively pressing “Input TC” sets the Output B Load timecode to the current input timecode value.

Note: The output LTC XLR will always deliver output A timecode.

Prerun

This control is only required when performing a “synchro prerun” timecode conversion. The Prerun specifies the amount of time before the input trigger the user would like continuous output timecode. There is a timecode display which indicates the total prerun time. To specify a different time the user should set a new time code using the “Timecode Entry” key pad and then press “Set” button next to the Prerun box. This can be reset back to the default of 3 minutes using the “Preset” button.

Output A Timecode

This displays the current value of the timecode being generated for output A (as specified by “Timecode Mode”). If configured to drop frame the indicator will be illuminated.

Output B Timecode

This displays the current value of the timecode being generated for output B (as specified by “Timecode Mode”). If configured to drop frame the indicator will be illuminated.

E-E Window

This control is only required when performing an E-E regen or E-E frame rate conversion.

The user can specify the following E – E error window sizes:

Min, ½ sec, 1 sec, 2 sec, 5 sec

This control defines the size of the error between input timecode and output timecode before a reset will occur. A reset will realign the output timecode with the input (and thus cause a discontinuity in timecode).

Manual Trigger

This button allows the user to manually trigger the Synchro start event. It is only applicable to Synchro Manual and Freerun mode.

Timecode Mode

Seven “Timecode” modes are available to suit a wide range of applications – Synchro Auto, Synchro Prerun, Synchro Manual, E-E, E-E Regen, Freerun, and Trigger Load.

These modes fit into three main functions, depending on the job to be performed:

- Synchro
- EE
- Freerun

Timecode Modes at a Glance

Synchro Mode

This is the most sophisticated timecode mode available on the Alchemist Ph.C – HD and offers a fully automated single pass conversion of timecode and video in any genlock configuration, and ensures the first program field/frame is clean and occurs at the correct time code.

There are three Synchro Modes:

- Synchro Auto
- Synchro Prerun
- Synchro Manual

EE Mode

This mode is desirable in any application where the user would like the output timecode to mirror the input timecode as close as possible. This mode is ideal for converting rushes with discontinuous timecode or preview copies in different standards.

There are two EE modes:

- EE
- EE Regen

Freerun Mode

This mode is used for applications where a free running timecode generator is required; this mode could be used to stripe a tape with timecode.

Synchro Auto

This is the most sophisticated timecode mode available on the Alchemist and offers a fully automated single pass conversion of timecode and video in any genlock configuration

The user must configure an input trigger event, and set a desired output timecode load value. In our example the input trigger is 01h 00m 00s 00f and the output load value is 10h 00m 00s 00f. Once the Alchemist has detected 5 seconds of continuous input timecode it will action the “synchro start” event. After this event occurs there will be a few fields/frames of discontinuity in the audio, video and timecode output whilst the Alchemist performs the required timecode arithmetic and subsequently configures the system in such a way that guarantees:

- The output video will be clean (no interpolation) at the input trigger event
- The output timecode is generated in a manner which will result in the desired load value occurring at the specified input trigger event. This means both pre-program and program content will contain continuous timecode.

For the Alchemist to perform this mode:

- The source must contain a minimum of 5 seconds continuous timecode prior to the input trigger event. Any input timecode discontinuity will trigger a new synchro start event, as will changing input/output/reference setup.

- It may be necessary to increase the video processing latency by up to 1 frame. Any audio being routed through the Alchemist will automatically compensate for this additional delay and Snell & Wilcox external audio delays controlled by RollTrack will also accommodate the change. Users should be careful if using other external audio equipment as it is not possible to predict in advance the change in processing delay..

Synchro Prerun

This is similar to the Synchro Auto mode other than the user must specify the desired pre-run time. The pre-run specifies the amount of continuous output timecode prior to the output load timecode. Note: A synchro start event will not occur unless input timecode passes through the synchro start event timecode.

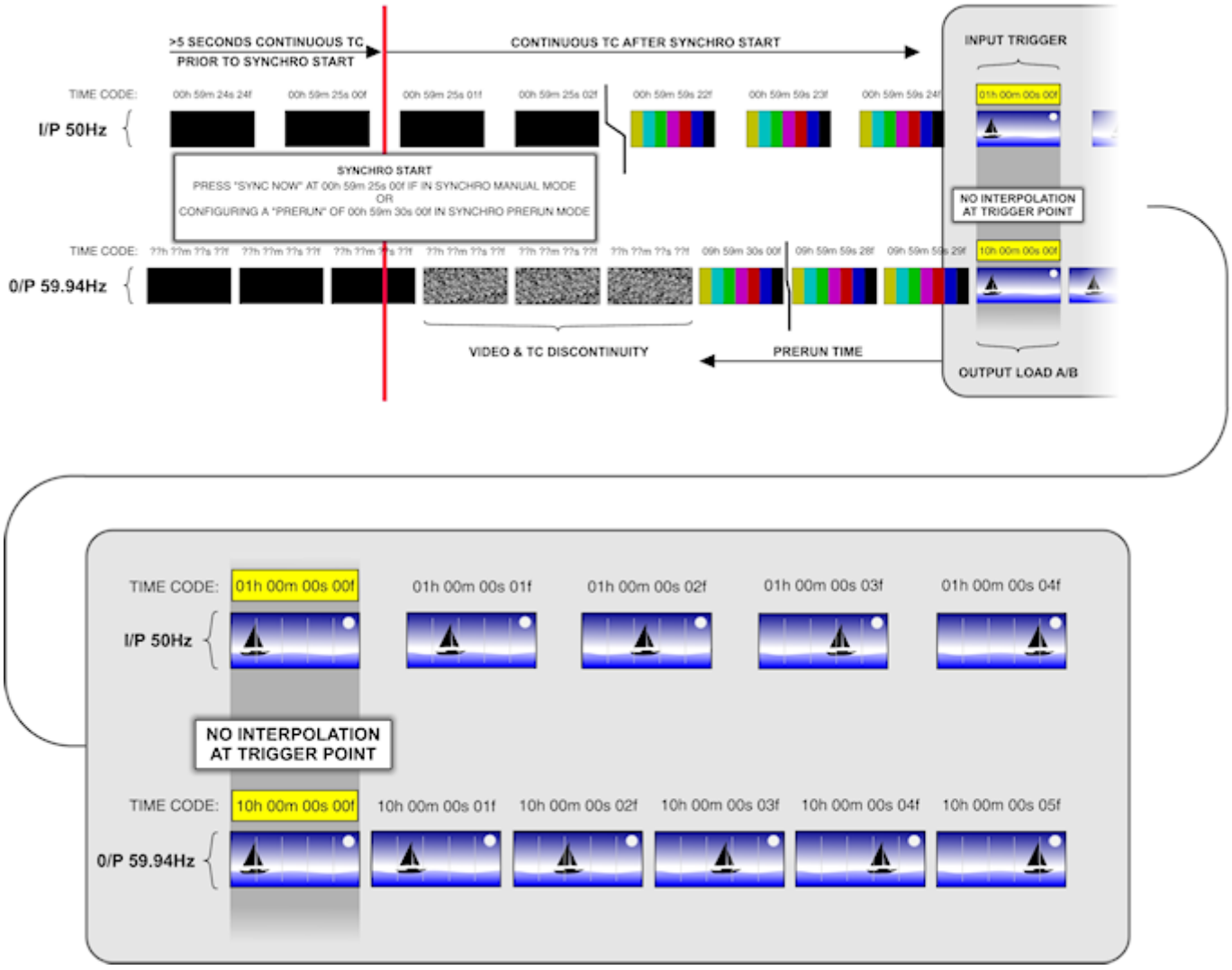
Synchro Start Event = Input Trigger Timecode – Prerun Timecode – 5 seconds

Synchro Start Event Complete = Input Trigger Timecode – Prerun Timecode

The Synchro process takes approximately 5 seconds to complete. The source must contain continuous timecode for a minimum of the prerun time plus 5 seconds before the input trigger timecode for correct operation. In our example the prerun value is set to 00h 00m 30s 00f, therefore the synchro start event will occur at the approximate input timecode 00h 59m 25s 00f.

Synchro Manual

This is identical to the Synchro Auto mode other than the user doesn't need to configure a prerun time. In this mode the user triggers the Synchro start event by pressing the "Manual Trigger" button. In all other aspects the conversion is the same as Synchro Prerun.



E-E

This mode is desirable in any application where the user would like the output timecode to track the input timecode with minimum error. There is no concept of input trigger or output load values as the translation of timecode is continuous.

When frame rate converting the incoming and outgoing timecodes are converted into a frame number and compared. If the difference between them is greater than the size specified by the "E-E Window" the output timecode is reset to match the input. The output timecode is effectively free running with resets where needed. The user may specify output timecode maximum frame count (when appropriate), and may select between non drop frame and drop frame timecode.

When performing a non frame rate conversion (i.e. input and output are the same frame rate) then the input timecode will simply be handed over to the output (with correct delay compensation). If the video gets synchronized (i.e. a field/frame drop or repeat) the timecode will replicate this behavior and drop or repeat, thus the input timecode is transparently passed from input to output. In this mode the maximum frame count and drop/non drop frame switches are disabled as they are

copied from the input. The output timecode will only free run if the input timecode is lost.

Note: Synchronizing events can be eliminated if the Alchemist is IO locked or the source is locked to the same reference as the Alchemist.

E-E Regen

Same performance as described above for E-E mode when frame rate converting.

When performing a non frame rate conversion (i.e. input and output are the same frame rate), the same timecode regeneration technique as in E-E mode with frame rate conversion. Thus the user can specify the output maximum frame count, whether the timecode is drop frame or non drop frame and set the window size. Setting the window to be large (e.g. several seconds) would be useful for converting rushes which contain sequences of a reasonable length and where it is desirable the output timecode doesn't contain any discontinuities.

Freerun

This mode is particularly useful for applications where there is no input timecode present. There is no concept of an Input Trigger event in this mode. The Alchemist will simply freerun from the current time. A new output load timecode can be specified and then manually loaded using the "Manual Trigger" button.

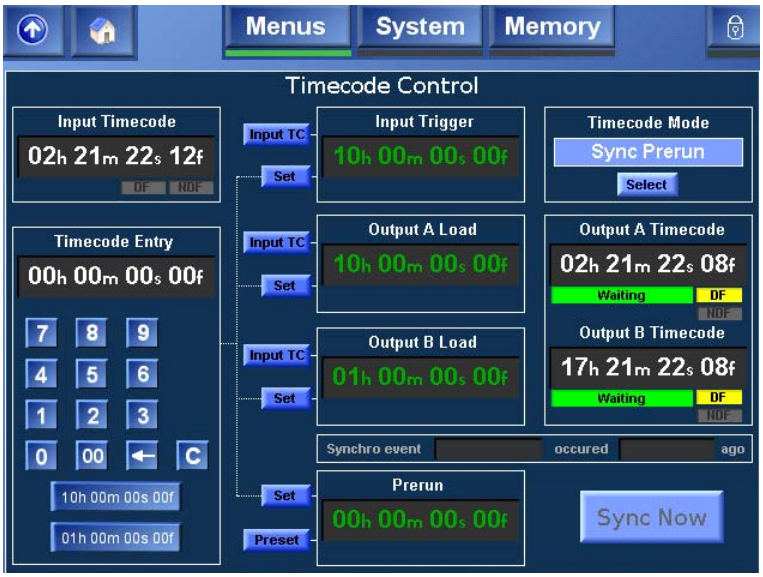
Trigger Load

The user must specify an Input Trigger timecode. At this specified time the Alchemist will load the outputs with the preconfigured output load timecodes and freerun thereafter.

Timecode Control Warnings

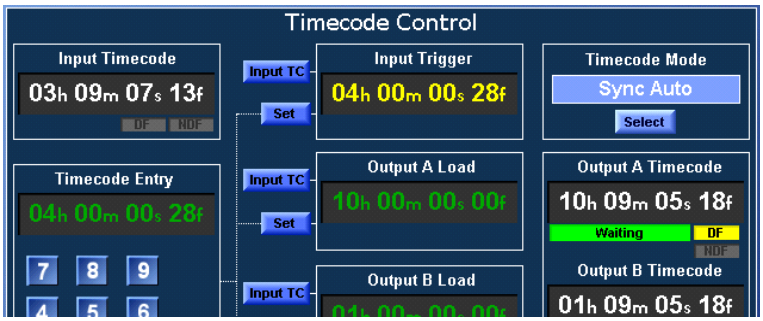
The timecode displays for the Input Trigger, Output Loads, and Prerun change color to indicate valid or invalid values.

Green	Indicates that the value is valid, and that the corresponding event will occur when the specified timecode is reached.



Yellow Indicates that the value is not currently valid, but if certain conditions, such as the input standard or timecode type change, the corresponding event may occur.

For example, if the Input Trigger timecode is set to occur on a frame that does not exist in the current input standard, the value appears in yellow. However; if before the Input Trigger timecode is reached, the input standard changes to one in which the specified frame occurs, the input trigger event will occur.



Red The specified value is not valid, and will not be so under any circumstances.

Operational Example

This section illustrates how the Timecode option would be setup, and the sequence of events that would occur while performing a Synchro Auto job.

In this scenario:

- The unit is performing a 1080/50i to 1080/59i drop frame conversion.
- The source tape starts at 09h 59m 00s 00f.
- The program starts at 01h 00m 00s 00f.
- The deliverable program must start at 10h 00m 00s 00f.

Timecode Control Page

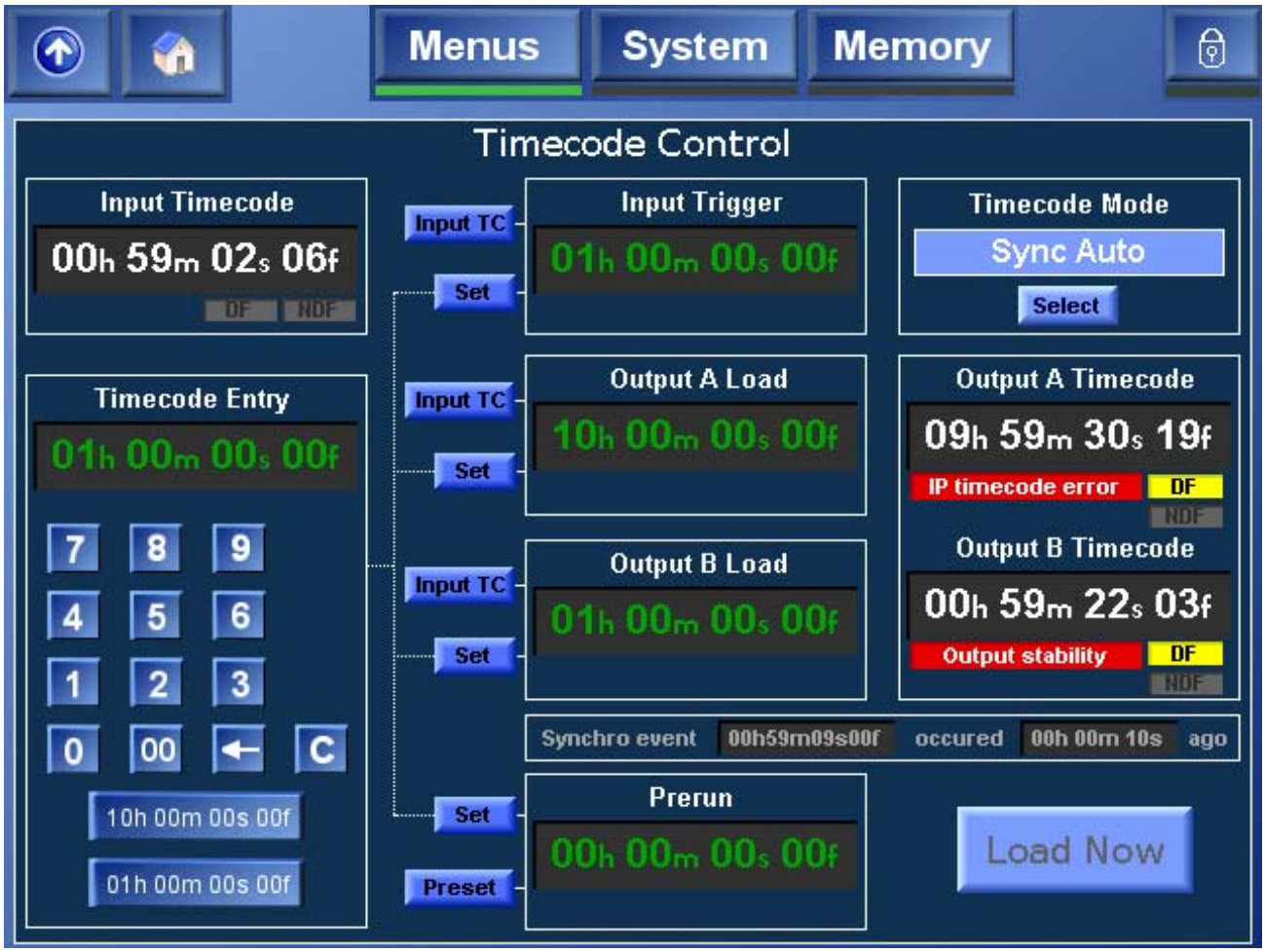
- The mode is set to Synchro Auto
- The Input Trigger has been set to 01h 00m 00s 00f.

- The Output A Load has been set to 10h 00m 00s 00f.
- The Output B Load has been set to 01h 00m 00s 00f.

The unit is now set up. Press play on the source deck.

After pressing the play button, waiting approximately 5 seconds before pressing record will eliminate discontinuity as the Alchemist locks up.

Input Timecode = 00h 59m 02s 06f

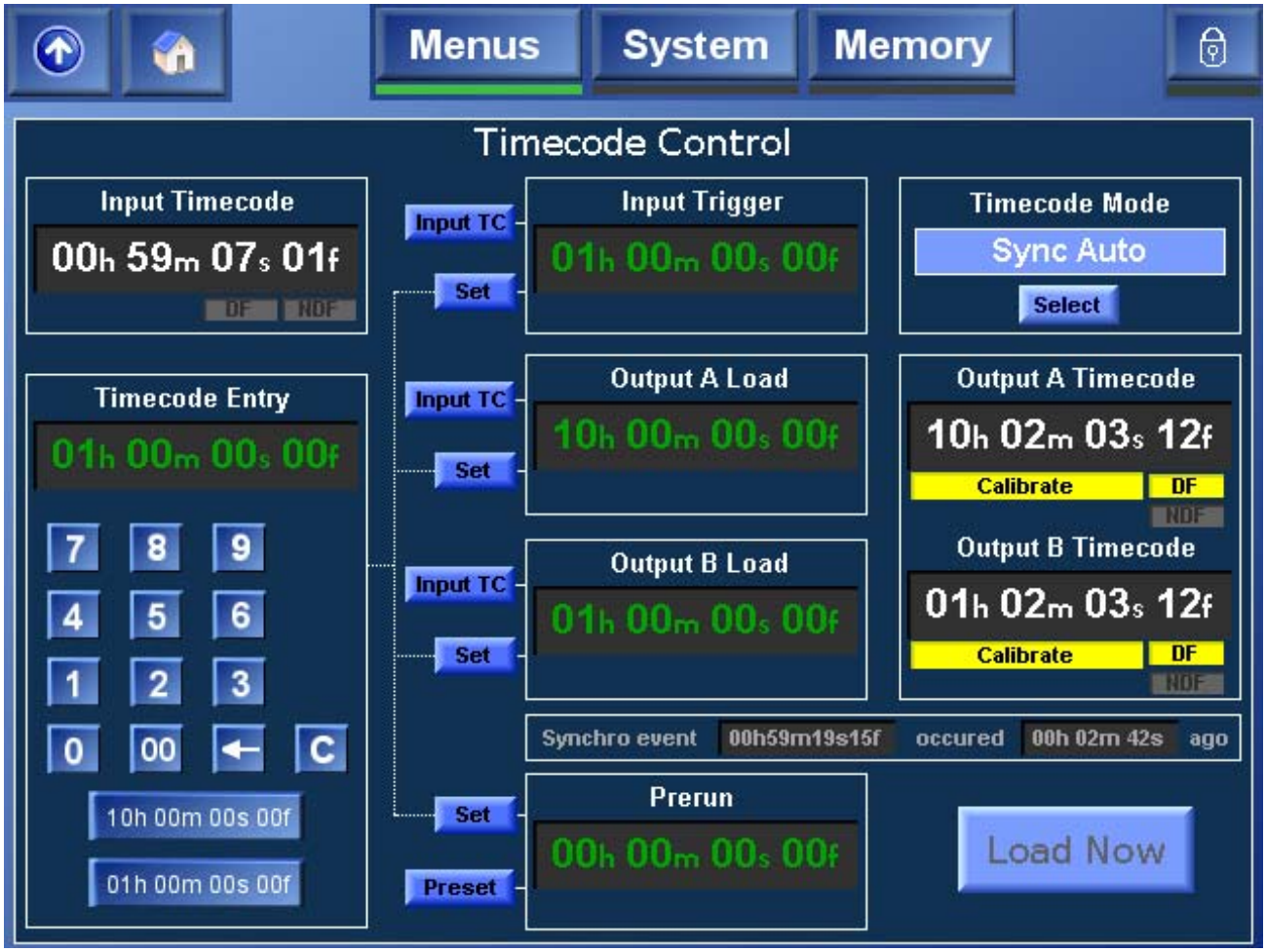


At this point, the timecode configuration has just been adjusted, and the unit is initializing.

Output A Timecode is displaying an IP timecode error, due to discontinuous input timecode.

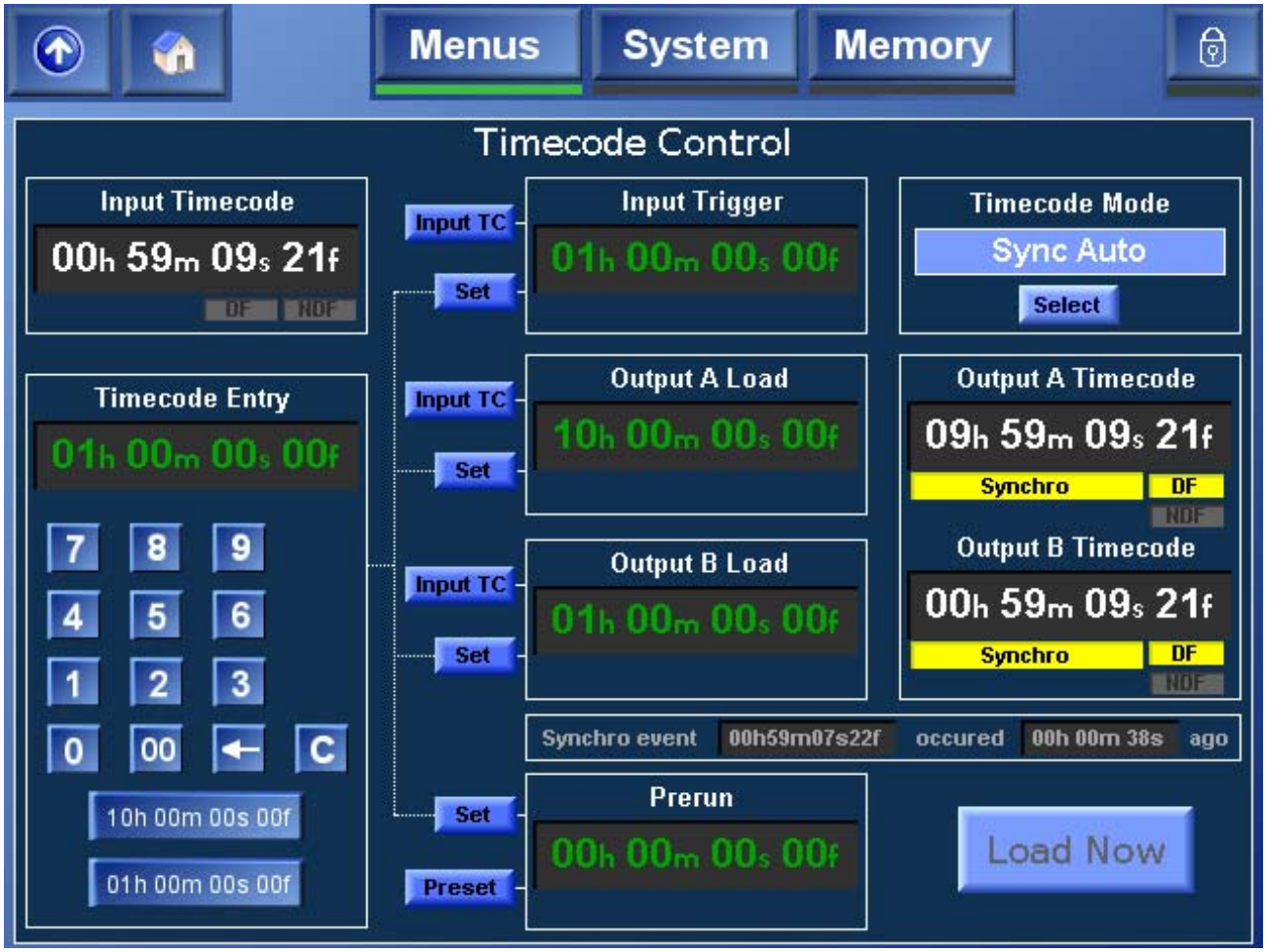
Output B Timecode is displaying an Output stability warning. This condition can be caused by anything that can alter the timecode arithmetic. For example, an I/O standard change, a reference change, or a genlock change.

Input Timecode = 00h 59m 07s 01f



As the Alchemist performs its timecode calculations, **Output A Timecode** and **Output B Timecode** now display Calibrate.

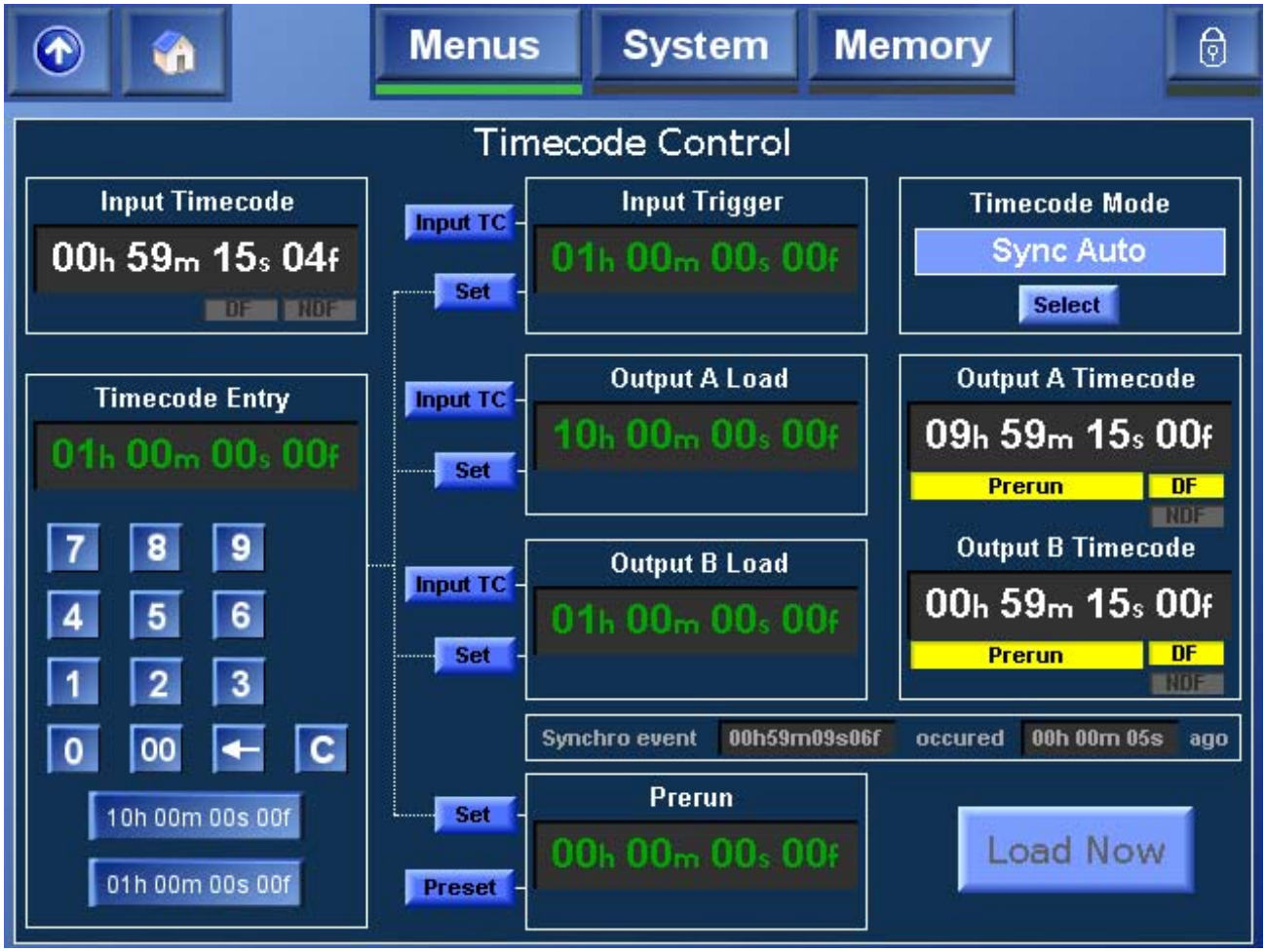
Input Timecode = 00h 59m 09s 21f



After the Alchemist has completed the timecode calculations, and now performs the necessary synchronization to ensure a clean program start, with the correct timecode, **Output A Timecode** and **Output B Timecode** now display Synchro. Press record on the output deck.

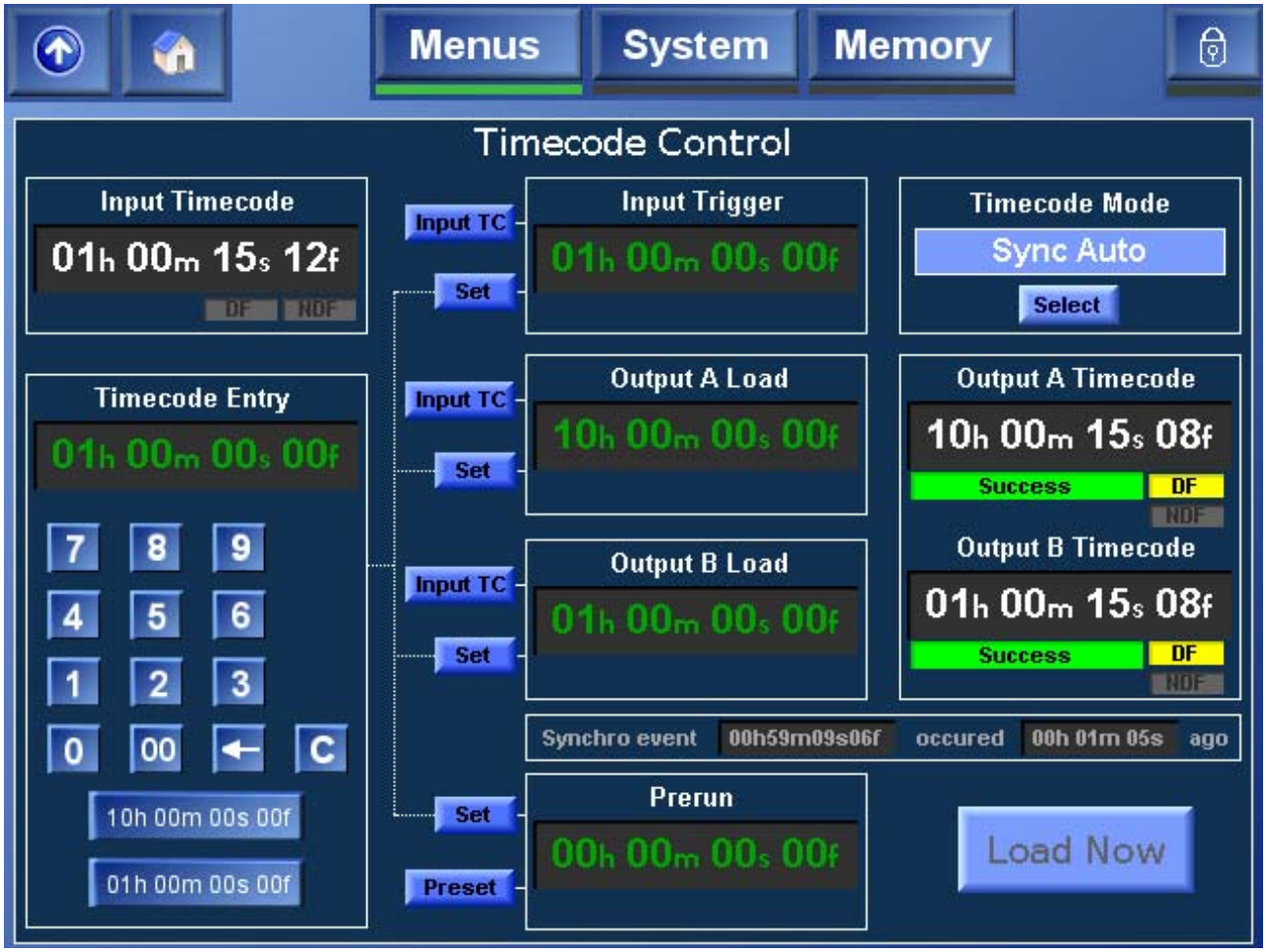
After pressing the play button, waiting approximately 5 seconds before pressing record will eliminate discontinuity as the Alchemist locks up.

Input Timecode = 00h 59m 15s 04f



The Alchemist is now in prerun. All discontinuities have occurred, and the output timecode is in prerun and ramping up to the specified load time. Prerun is displayed for both the **Output A Timecode** and the **Output B Timecode**.

Input Timecode = 01h 00m 15s 12f



The synchro conversion has successfully been performed. As specified, the Output A program started at 10h 00m 00s 00f and the Output B program started at 01h 00m 00s 00f, both with a clean field at the program start (no interpolation).

Note:

Note that the time the synchro event occurred, together with the elapsed time, can be confirmed on the Timecode Control screen.

This setup requires no further changes for similar jobs, just put the tape in.

Questions & Answers

Q1. *How will timecode be aligned with a 720p 50/59 video output?*
A1. As with other conversion modes (such as CleanCut and Frame Synchronizing) care should be taken using timecode when both interlaced and progressive outputs are required. In such a scenario it is recommended that the primary output (A) is configured to output interlaced and the secondary output (B) is configured to progressive. If configured the other way round and performing a “Synchro” timecode conversion, the insertion of the timecode load value and the clean program start could be early or late by a field on output B.

Q2. *What happens if I have set up a “Synchro Auto” conversion, but start playing the source VTR from a time post the specified input trigger timecode?*
A2. The Alchemist will simply interpret this as the user wanting to perform synchro event a long way in advance. The synchro event will occur, the arithmetic will be performed allowing for the wrap at 59h 59m 59s 24/29f and the Alchemist will be armed to ensure correct operation at the specified input trigger point.

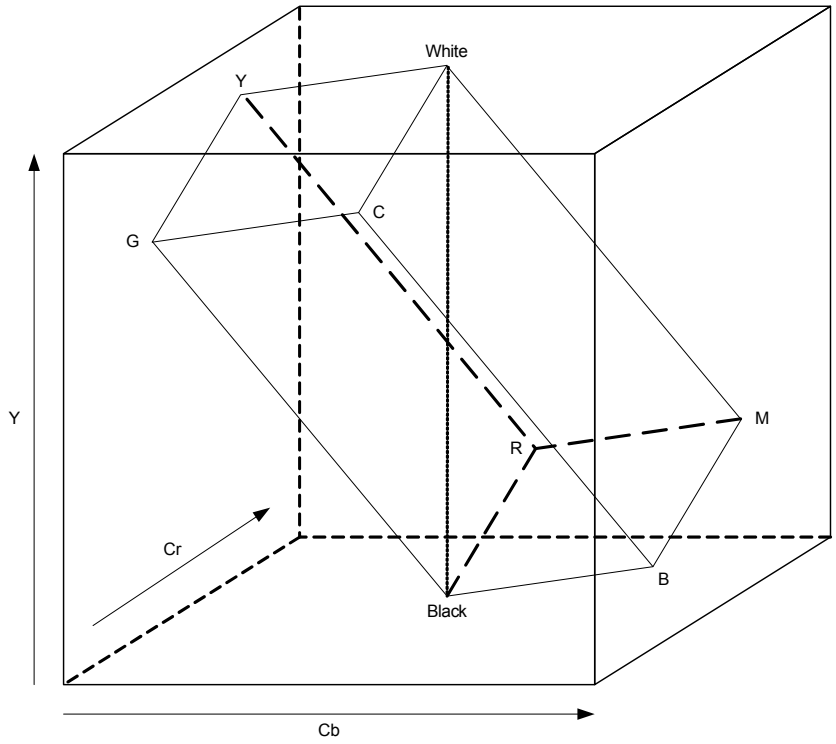
Q3. *Does my source need to be locked to the same reference as the Alchemist for the “synchro” timecode modes to work reliably?*
A3. No, the Alchemist will measure the input to derive its frequency and modify its timecode arithmetic accordingly. However, the Alchemist does assume the source is stable. If the source clock is fluctuating this could result in an incorrect timecode conversion.

Appendix C: RGB Legalizer and Luma Clipper

The Alchemist Ph.C HD incorporates an RGB legalizer and comprehensive luma clipper. The luma clipper can be used in combination with the “735mV” legalizer selection to generate images which adhere to EBU R103-200 specification.

RGB Legalizer Overview

Illegal colors are represented by values of RGB that are outside a nominal range (typically 0 to 700mV) when converted to analog values. Illegal RGB colors are easily generated in YCbCr space because of the differences in the valid colorspace between RGB and YCbCr. RGB occupies a restricted colorspace in the shape of a paralleloid within the YCbCr cube as illustrated in the diagram below.



It can be seen there are many YCrCb values which lie outside the RGB space, and would consequently generate illegal values when converted to analog for display.

Upon detection of illegal RGB colors, there are a variety of techniques to bring them back into legal colorspace. Most legalizers will simply de-saturate the chrominance, leaving the luminance unaltered. The legalizer in the Alchemist is more advanced, and is able to preserve the original saturation to a much greater extent by modifying the luminance and chrominance signals simultaneously, giving the best visually subjective results.

RGB Legalizer Controls

Off	Disables RGB legalisation.
700mV	RGB Lo 0mV, RGB Hi 700mV, will comply with area mask set 1% or greater,
721mV	RGB Lo -21mV, RGB Hi 721mV, will comply with area mask set 0% or greater.
735mV	RGB Lo -35mV, RGB Hi 735mV, will comply with are mask set 0% or greater.
Area Mask	Defines the percentage of total pixels in the image that may be out of RGB gamut without reporting that the signal has an RGB gamut error.

Note: *The 735mV selection should be used in conjunction with the luma clipper (set at presets) to generate images that adhere to EBU R103-200 specification.*

Luma Clipper Overview

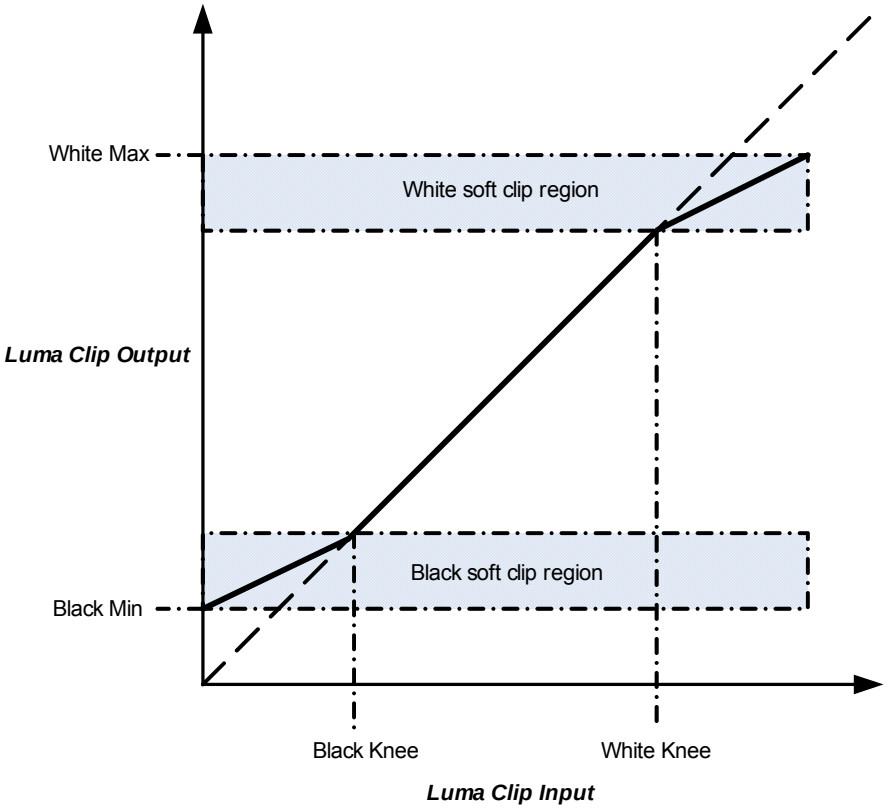
When luminance levels are too high or too low, devices such as encoders and displays can have problems. The luminance clipper is used to limit signals above and below predefined limits. Minimum and maximum limits can be set, in addition a knee that allows for a graduated transition to the limit.

Luma Clipper Controls

Luma Clipper Enable	This enables the clipper.
White Max	This sets up the upper limit (hard clip point) of the clipper. The range is minimum 90% (852 digital 10-bit value) to maximum 109% (1019) with increments of 1%. Preset is 103% (966).
White Knee	This sets up the knee for the maximum white limit of the clipper. This can be set up to give a “soft clip” from this knee point to the hard white clip point. The range is minimum 60% (590) to maximum 109% (1019) with increments of 1%. Preset is 100% (940).
Black Min	This sets up the lower limit (hard clip point) of the clipper. The range is minimum -7% (4) to maximum 10% (152) with increments of 1%. Preset is -1% (55).

Black Knee This sets up the knee for the minimum black limit of the clipper. This can be set up to give a “soft clip” from this knee point to the hard black clip point. The range is minimum -7% (4) to maximum 60% (590) with increments of 1%. Preset is 0% (64).

Note: *The Luma clip preset values configure the clipper to meet luma limits as specified by EBU R103-200.*



To achieve a hard white clip set the **White Max** and **White Knee** to the same value. Similarly to achieve a hard black clip set the **Black Min** and the **Black Knee** to the same value.

Appendix D: FilmTools

Overview

FilmTools are based on the tried and tested film handling capability of the Alchemist Platinum, providing broadcasters, content owners and facilities with a proven means of converting to, from and between frame based material with comprehensive integrated Timecode support as standard.

The addition of **FilmTools** greatly extends the range of supported video standards, providing the **Alchemist PhC-HD** with a unique range of capabilities and adds the all important processing modes necessary to enable you to handle the widest range of workflows possible, all to the best achievable quality.

With **FilmTools**, **Alchemist Ph.C-HD** is extended to handle frame based material at 23.98, 24, 25, 29.97 and 30Hz as well as SlowPAL formats at 23, 24, 47 and 48Hz. This I/O format flexibility is combined with three powerful Ph.C based technologies:

“DEFTplus” techniques allow the Alchemist PhC-HD to accurately identify and process the original film content in 59.94Hz sources. This robust identification of original material enables the conversion of 59.94Hz mixed film and video originated material, typical of episodics, to be performed at the highest quality.

“P-film” provides similar benefits to DEFTplus for those operating with 50Hz mixed media sources.

Video-to-Film processing allows the conversion of 50Hz or 59.94Hz interlaced formats to frame based 23.98Hz video, using a proprietary application of Ph.C motion compensation.

Combining the power of Ph.C, DEFTplus, P-Film and Video-to-Film processing, the FilmTools Option addresses the challenges of converting to, from, and between any of the many frame based material formats.

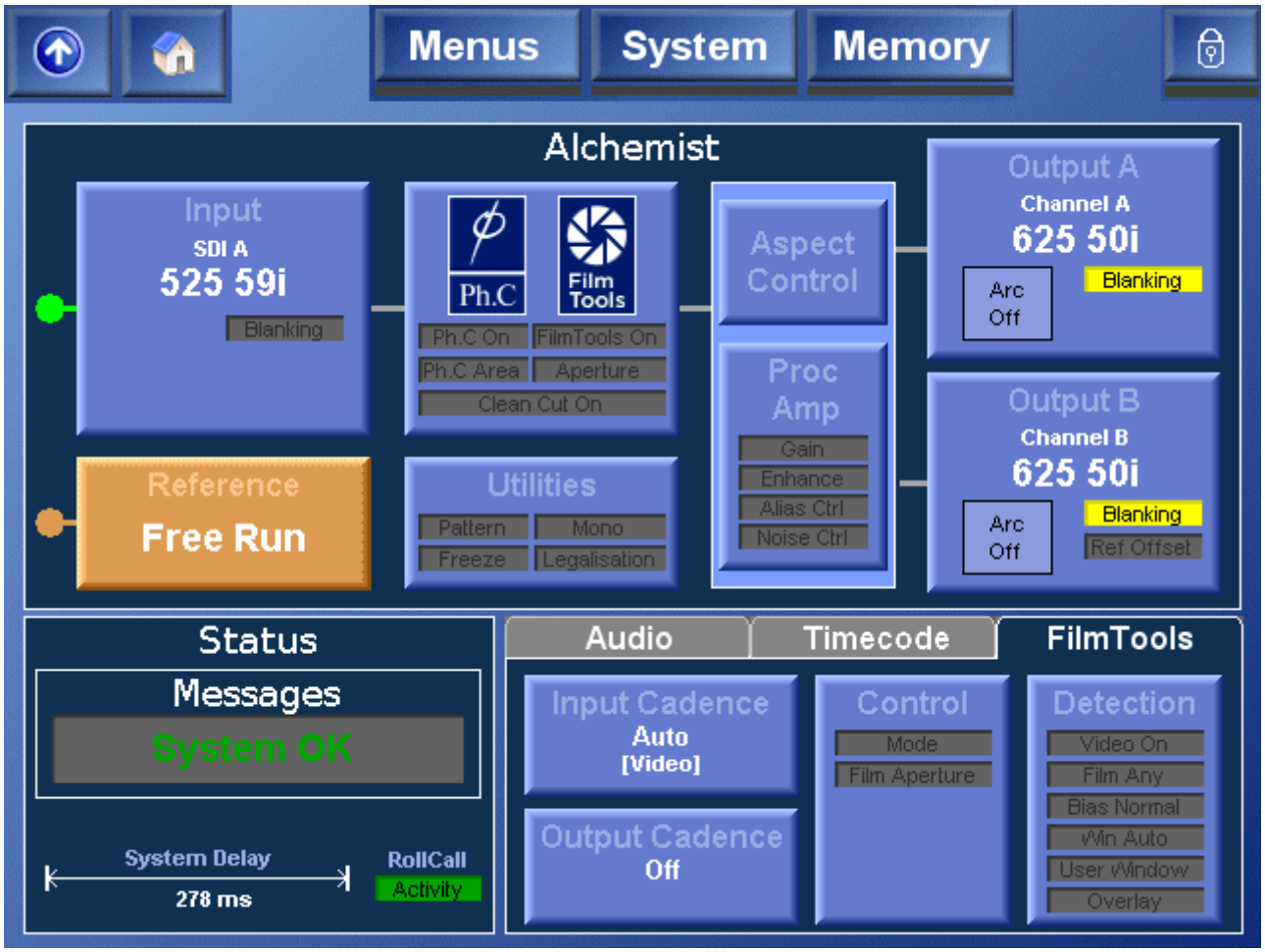
FilmTools has been designed with the challenges of real program material in mind:

- Accurate and agile detection of film originated 2:3 or 2:2 sequences
- Detection and clean processing of film originated 2:3 or 2:2 with broken cadence
- Cleanly handles mixed film and video content
- Agile field pairing ensures varispeed and animation at variable frame rates are no problem
- Easily maintain programme length for any conversion type
- Create clean, continuous 2:3 or 2:2 sequences at the output
- Powerful timecode tools give guaranteed program start and eliminate costly rejects
- Powerful, easy to use control interface
- Fully integrated latency compensation – automatic video, audio and timecode alignment

FilmTools Control Interface

The FilmTools option is enabled or disabled from the Conversion menu.

There are 4 principal FilmTools control and setup pages. These can be accessed from the FilmTools Tab on the home screen.

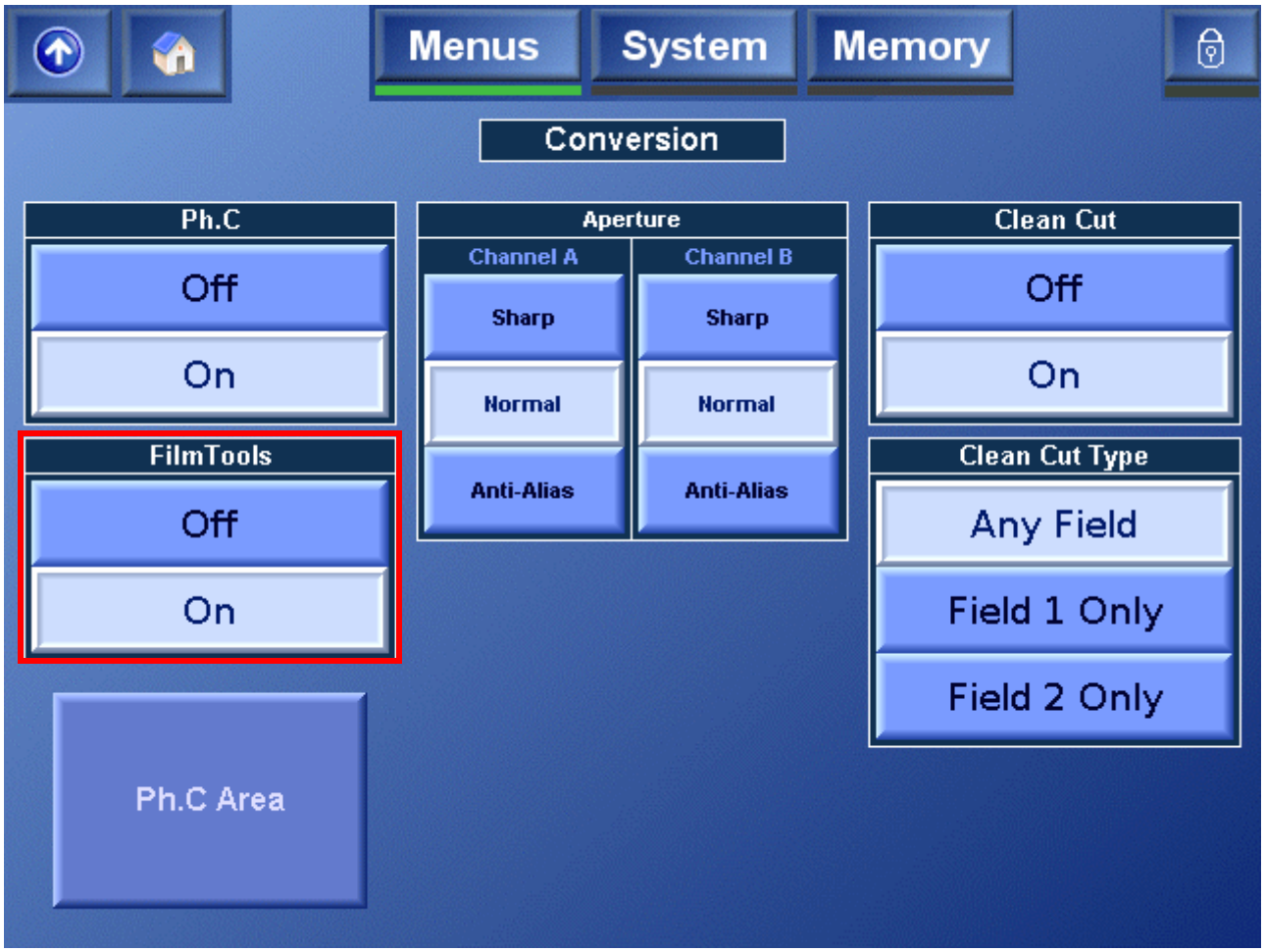


- **Input:** This page allows the user to define a film cadence for the incoming content. A single, continuous and perfect cadence can be defined flawlessly by its relationship to timecode or by aligning an internal free running cadence generator. If the content contains discontinuous or mixed cadence or, if the cadence is unknown prior to conversion, Detect mode performs real time analysis to assign cadence.
- **Control:** This page allows the user setup FilmTools controls. These controls are specific to FilmTools conversions only.
- **Output**: This page allows the user to control the cadence of the converted content. This menu allows the user to select the required cadence including any required relationship with output timecode.
- **Detect**: This page allows the user to control and bias the internal sequence detection algorithm. The sequence detector has been optimized to dynamically identify all cadence types on a field by field (or frame by frame) basis. i.e. 2:2, 2:3, broken 2:3, 1:1 (field by field or frame by frame), varispeed.

For specific details of the FilmTools controls see “FilmTools” on page 79.

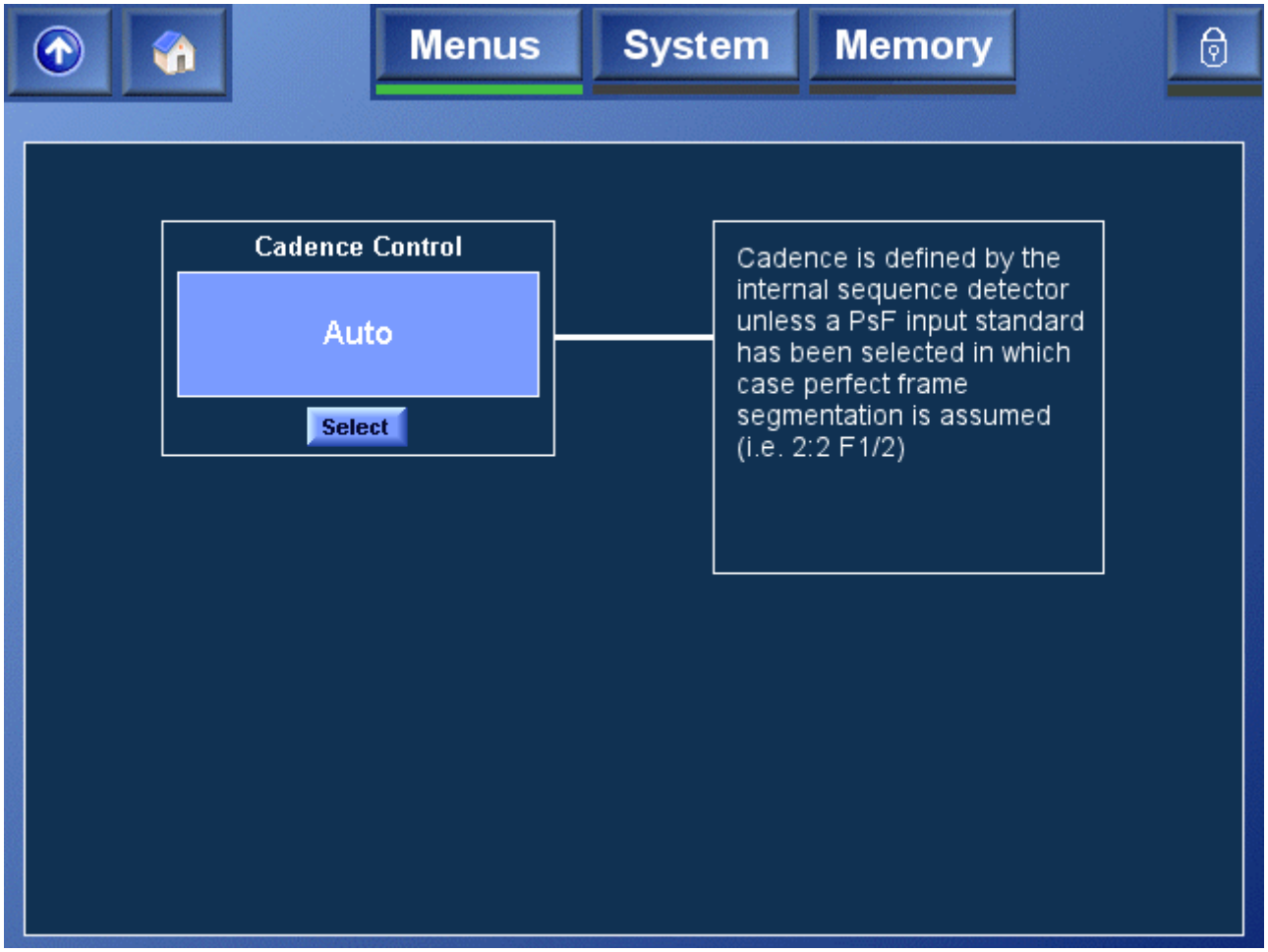
Enabling FilmTools

The FilmTools option is enabled and disabled from the **Conversion** menu.

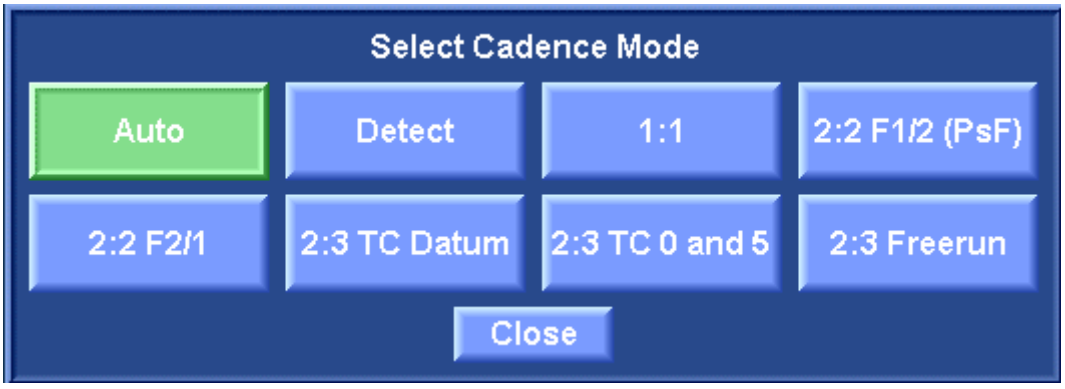


FilmTools Input

The **Input Cadence** menu allows the user to define a film cadence for the incoming content. A single continuous and perfect cadence can be defined flawlessly by its relationship to timecode, or by aligning an internal free-running cadence generator. If the content contains discontinuous or mixed cadence, or if the cadence is unknown before conversion, the Detect mode performs real-time analysis to assign cadence.



To select the Cadence Mode, in the **Cadence Control** section, touch the **Select** button. Then, from the **Select Cadence Mode** dialog, choose the required cadence.



Auto
Cadence is defined by the internal sequence detector unless a PsF input standard has been selected, in which case perfect frame segmentation is assumed (i.e. 2:2 F1/2)

This is the default selection.

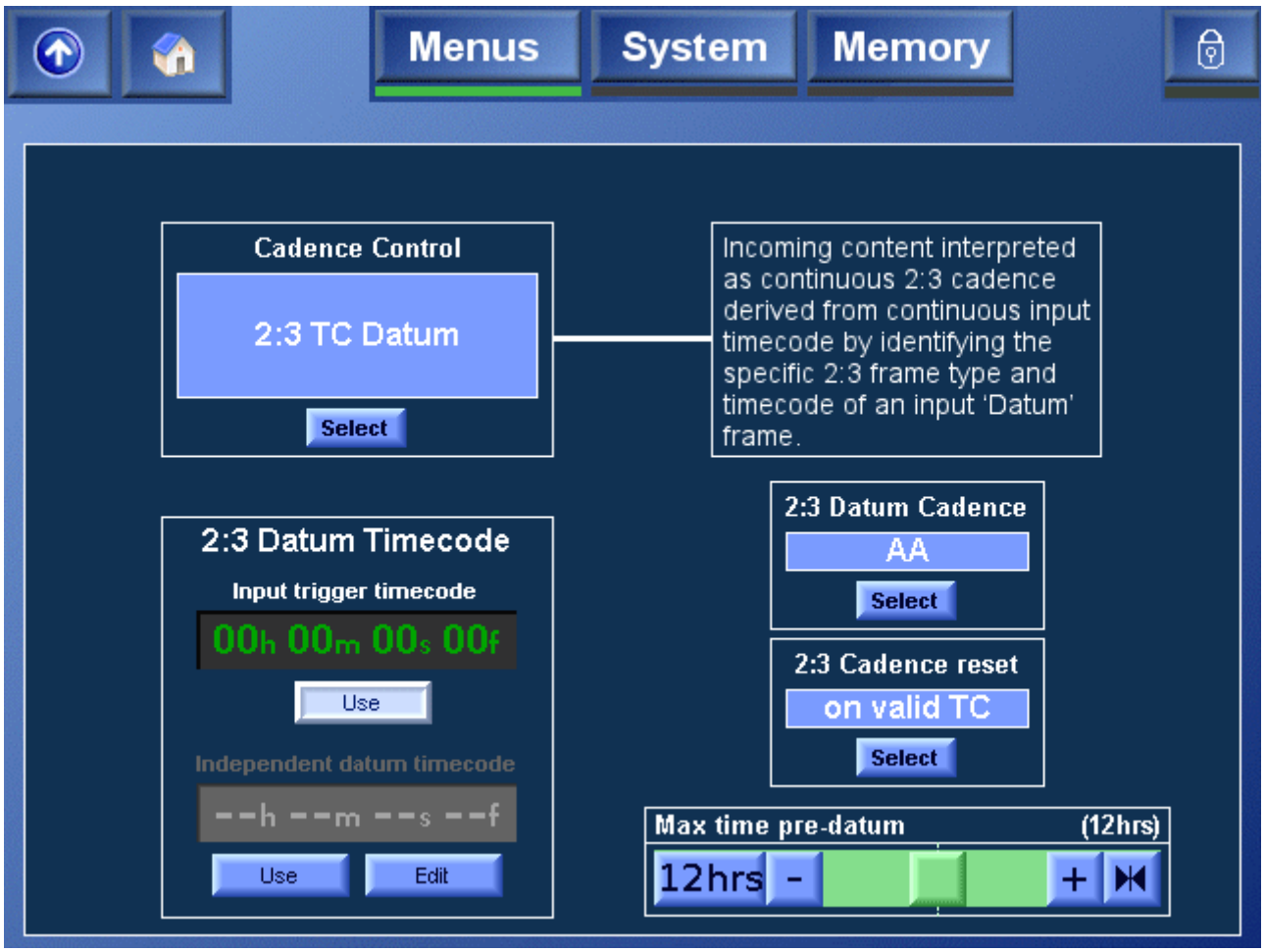
Detect
Cadence is defined by the internal sequence detector (even when PsF inputs are selected).

1:1
Incoming content is interpreted as 1:1 cadence (field by field or frame by frame motion).

2:2 F1/2 (PsF)
All incoming content is interpreted as 2:2 F1/2 (PsF) cadence.

2:2 F2/1
All incoming content is interpreted as 2:2 F2/1 cadence.

2:3 TC Datum
Incoming content is interpreted as continuous 2:3 cadence derived from continuous input timecode by identifying the specific 2:3 frame type and timecode of an input 'Datum' frame.



2:3 Datum Cadence
This control defines the 2:3 cadence of the Datum frame when the input cadence control is 2:3 TC Datum mode. For more information, see “Understanding 2:3 Datum Cadence” on page 156.

2:3 Cadence Reset

On Valid TC (Default)	Input 2:3 cadence will be defined according to the 2:3 Datum Cadence and Timecode controls when stable input timecode has been detected. The input timecode may be greater or less than specified 2:3 Datum Timecode.
At Datum	Input 2:3 cadence will be defined according to the 2:3 Datum Cadence and Timecode controls. The cadence reset occurs when the input timecode is equal to the 2:3 Datum Timecode.

2:3 Datum Timecode

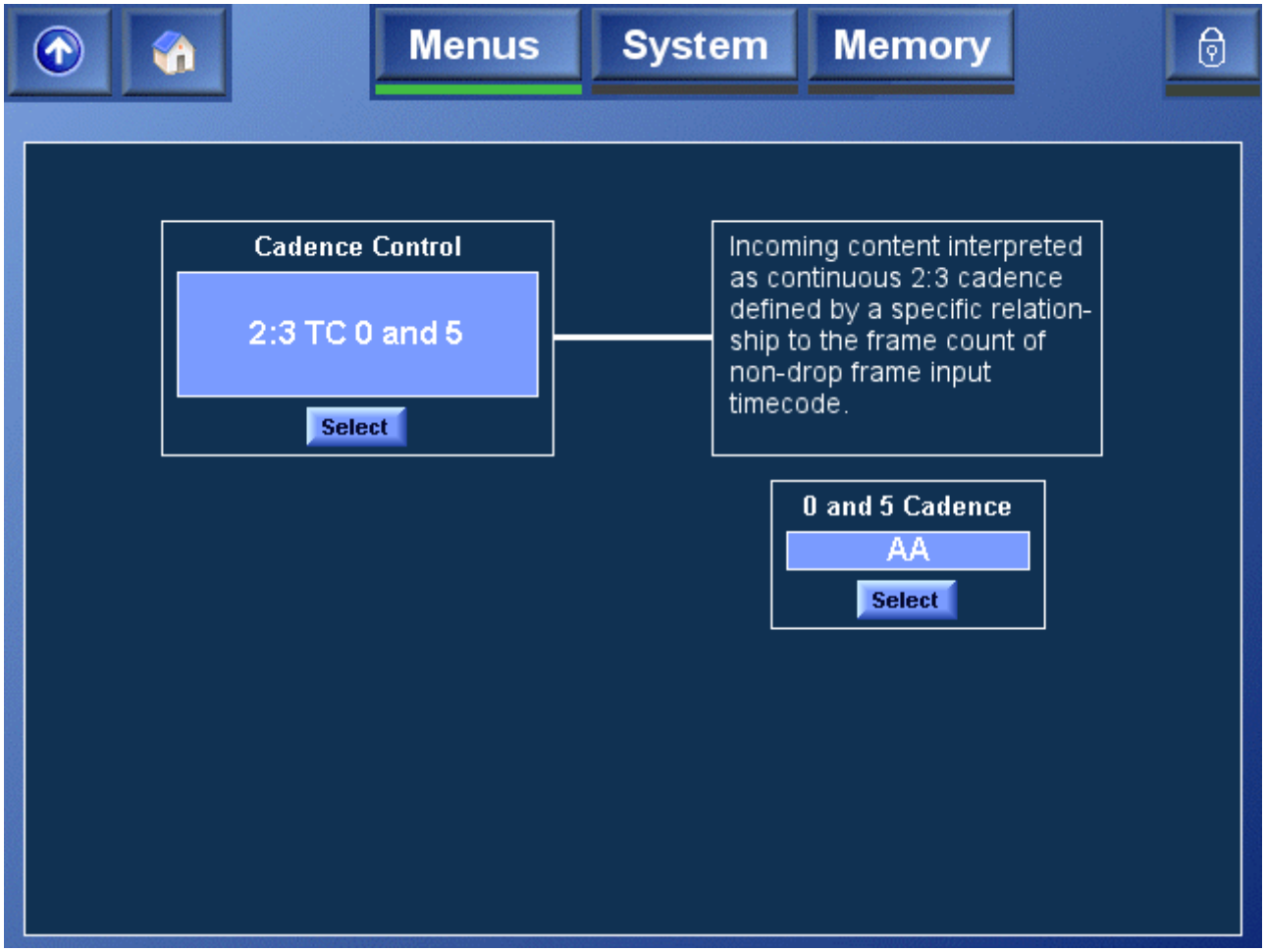
Input Timecode Trigger (Default)	(Default) The 2:3 Datum Timecode is automatically set to match the timecode “Input Trigger” value.
Independent Cadence Trigger	The 2:3 Datum Timecode can be set to any required frame.

Max Time Pre-Datum

0 – 23 hours (Default 12 hours)	Defines the start of the Cadence Window. Only applicable when 2:3 Cadence Reset is set to “On Valid TC”. For more information, “Understanding Datum TC Conversion” on page 154.

2:3 TC 0 and 5

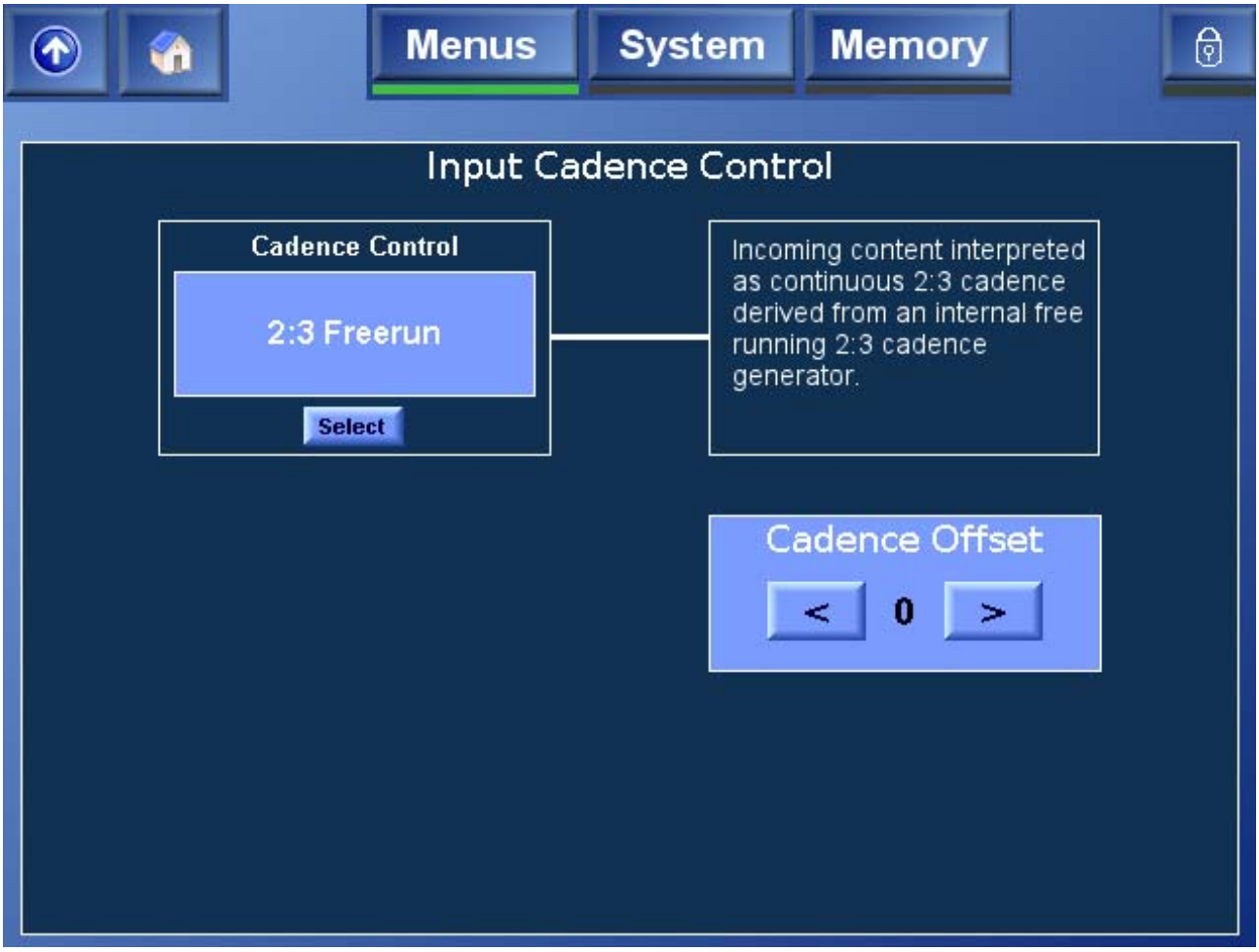
Incoming content is interpreted as continuous 2:3 cadence defined by a specific relationship to the frame count of non-drop frame input timecode.



0 and 5 Cadence

This control defines the phase of the relationship between frame count and input timecode. When frame count values of 0 and 5 are present, the 2:3 cadence is interpreted as the selected frame type.

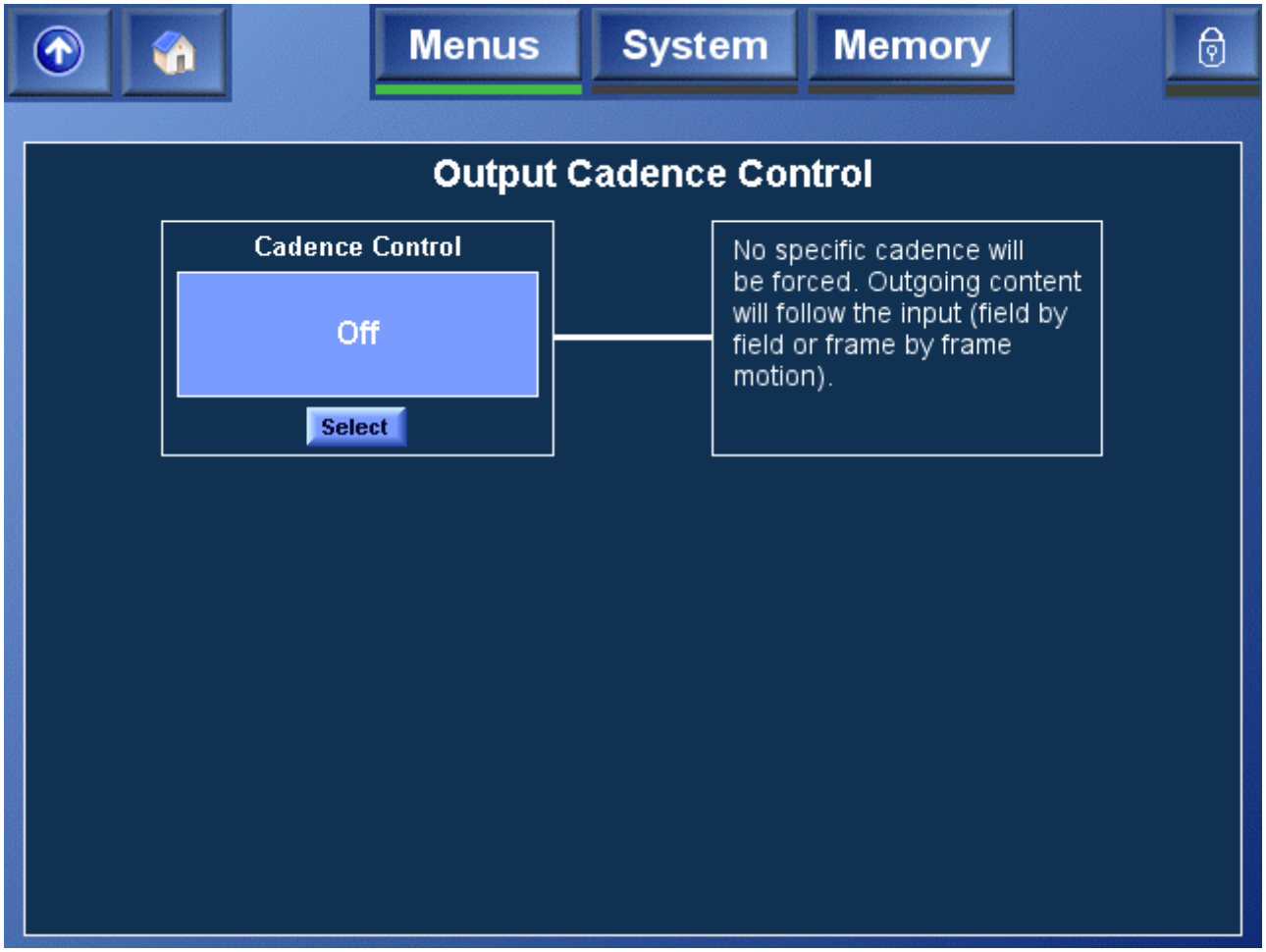
2:3 Freerun
Incoming content is interpreted as continuous 2:3 cadence derived from an internal free-running 2:3 cadence generator.



Cadence Offset
This control enables the cadence of the free-running 2:3 cadence generator to be offset.

FilmTools Output

The FilmTools Output Cadence Control menu enables the user to control the cadence of the converted content. This menu allows the user to select the required cadence including any required relationship with the output timecode.



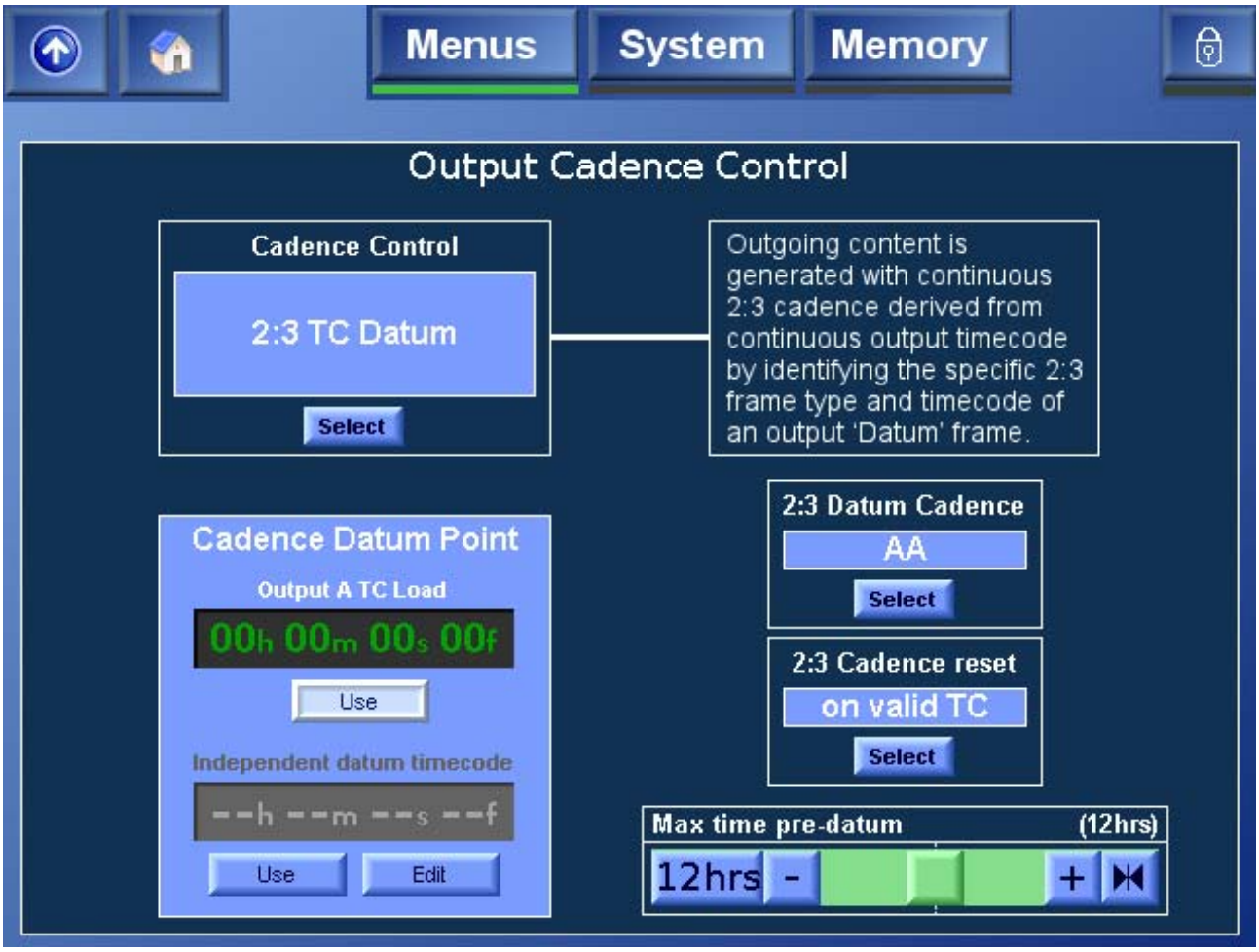
Off
No specific cadence will be forced. Outgoing content will follow the Input (field by field or frame by frame motion).

2:2 F1/2 (PsF)
Outgoing content is generated with 2:2 F1/2 (PsF) cadence.

2:2 F2/1
Outgoing content is generated with 2:2 F2/1 cadence.

2:3 TC Datum

Outgoing content is generated with continuous 2:3 cadence derived from continuous output timecode by identifying the specific 2:3 frame type and timecode of an output 'Datum' frame.



2:3 Datum Cadence

This control defines the 2:3 cadence of the Datum frame when the input cadence control is 2:3 TC Datum mode.

2:3 Cadence Reset

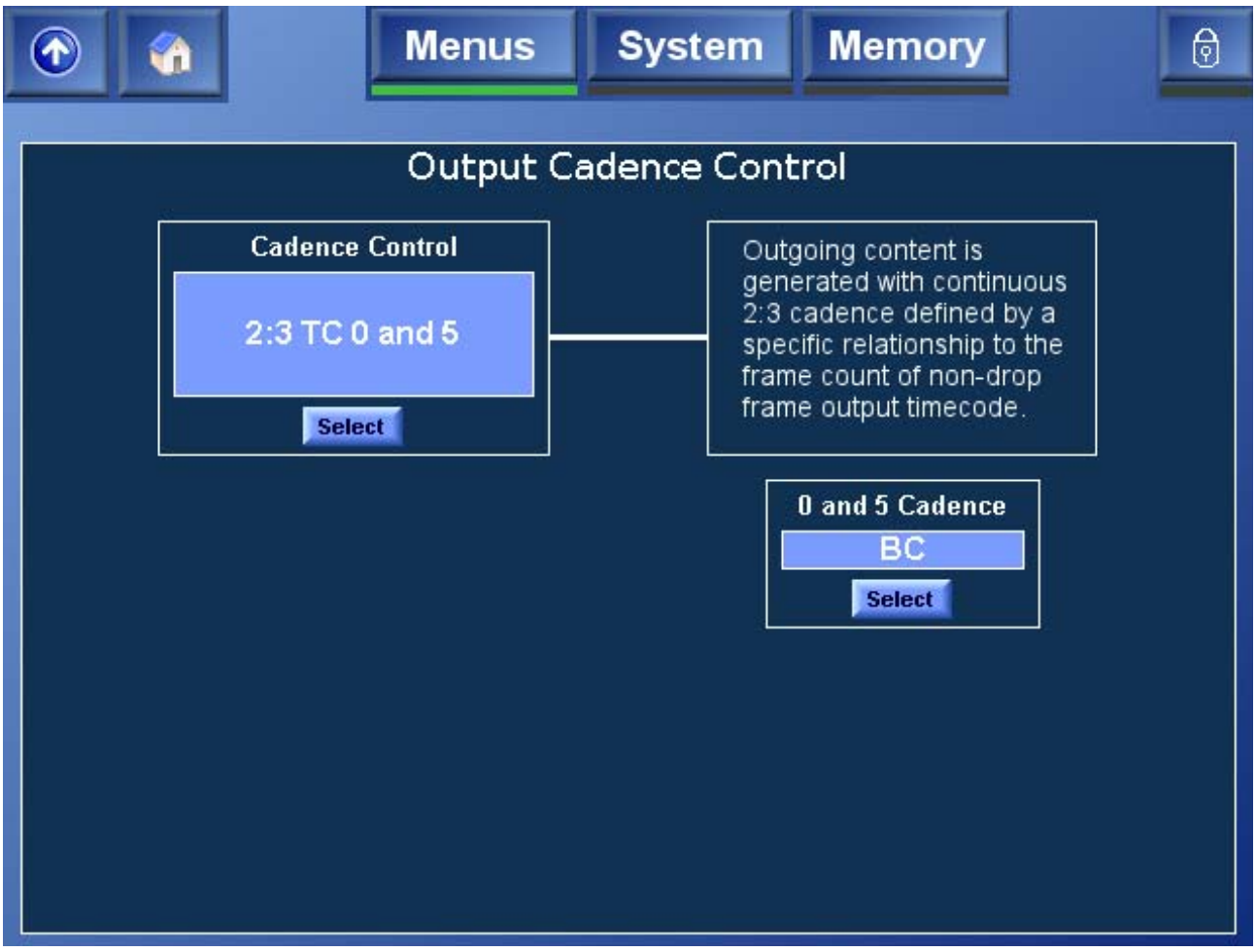
On Valid TC (Default)	Output 2:3 cadence will be defined according to the 2:3 Datum Cadence and Timecode controls when stable output timecode has been detected. The output timecode may be greater or less than specified 2:3 Datum Timecode.
At Datum	Output 2:3 cadence will be defined according to the 2:3 Datum Cadence and Timecode controls. The cadence reset occurs when output timecode is equal to the 2:3 Datum Timecode

2:3 Datum Timecode

Output Load A Timecode (Default)	The 2:3 Datum Timecode is automatically set to match the "Output A Load" timecode.
Independent Cadence Trigger	The 2:3 Datum Timecode can be set to any required frame.

Max time pre-datum
This control defines the start of the Cadence Window. It is only applicable when 2:3 Cadence Reset is set to "on valid TC". The default value is 12 hours.

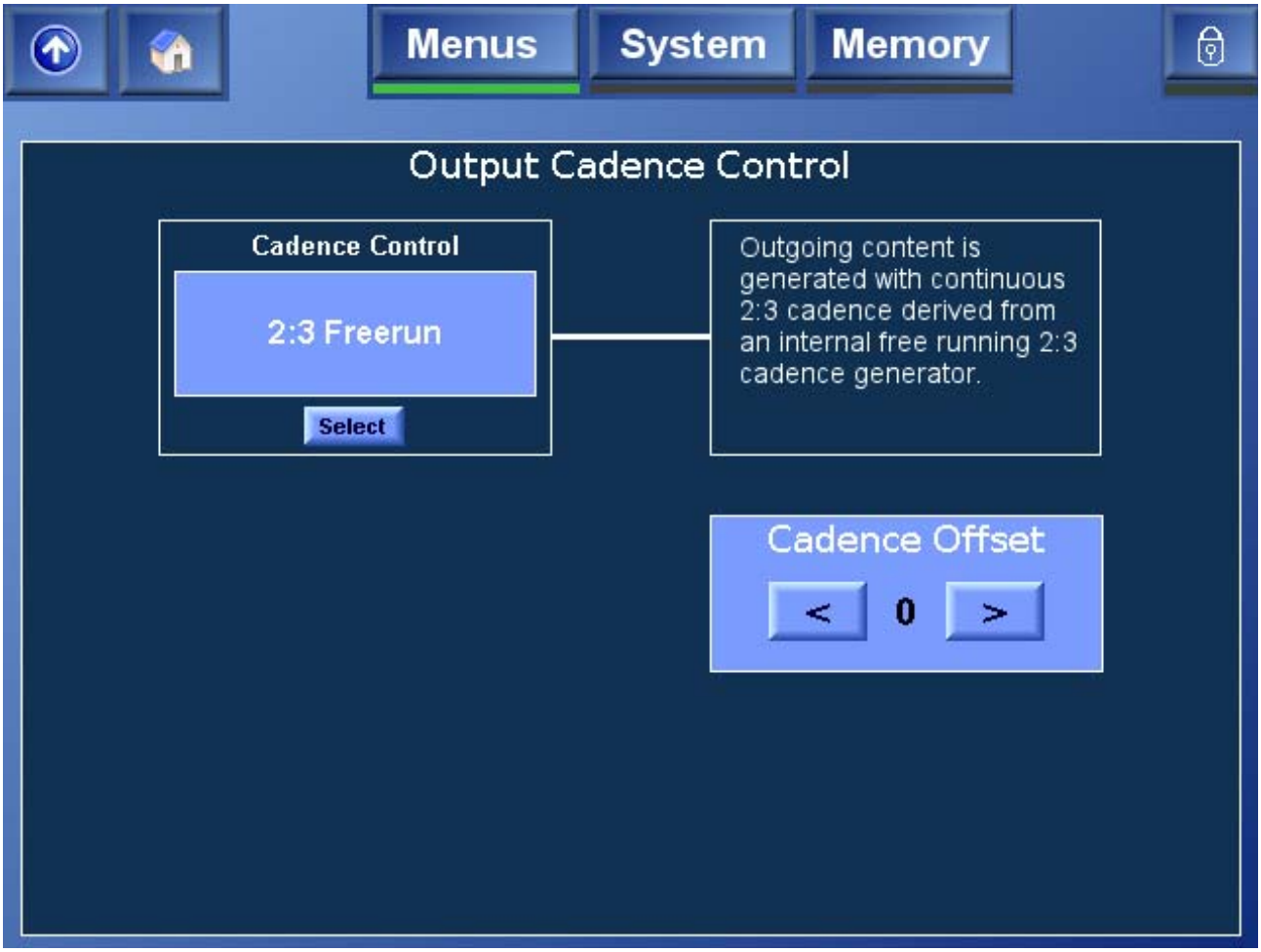
2:3 TC 0 and 5
Outgoing content is generated with continuous 2:3 cadence defined by a specific relationship to the frame count of non-drop frame output timecode.



0 and 5 Cadence
This control defines the phase of the relationship between frame count and output timecode. When frame count values of 0 and 5 are present, the 2:3 cadence is interpreted as the selected frame type.

2:3 Freerun

Outgoing content is generated with continuous 2:3 cadence derived from an internal free-running 2:3 cadence generator.



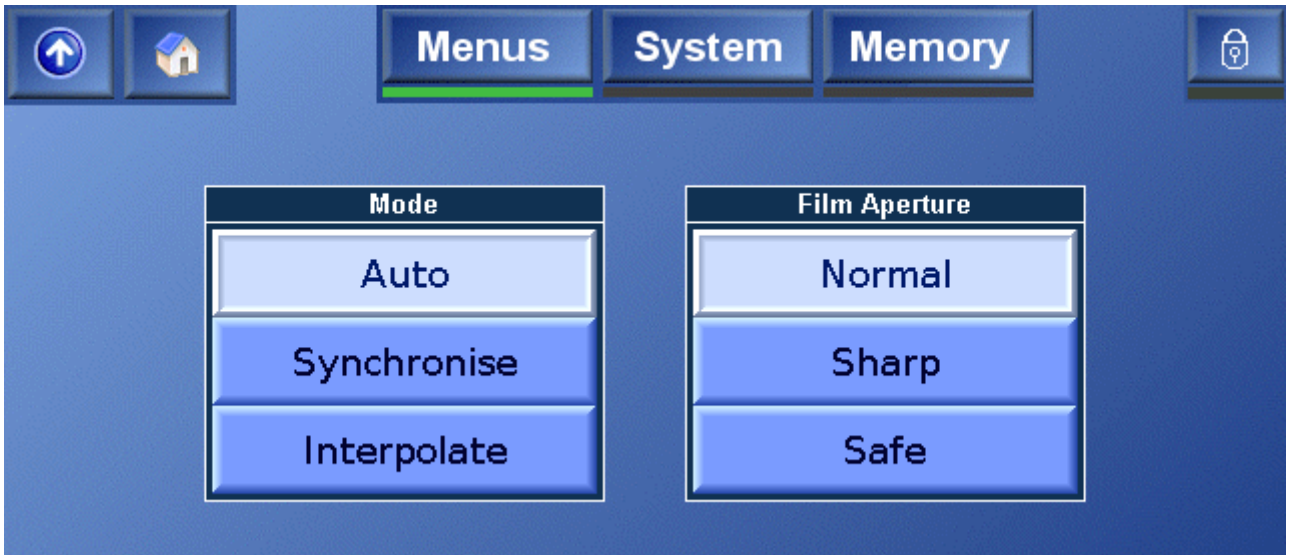
Cadence Offset

This control enables the cadence of the free-running 2:3 cadence generator to be offset.

For more information, see “Understanding 2:3 Datum Cadence” on page 156.

FilmTools Control

The FilmTools Control menu enables the FilmTools Mode and Film Aperture settings to be specified.



Mode

Auto (Default)	Selects between synchronized or interpolated conversion as appropriate depending on the input and output formats specified. See “Conversion Tables” on page 151. Interpolation gives the smoothest motion profile. Synchronize disables temporal interpolation and maintains clean frames. Note synchronize mode can cause field/frame drops or repeats depending on the input and output frequencies selected.
Synchronize	Forces the conversion by synchronization.
Interpolation	Forces the conversion by interpolation.

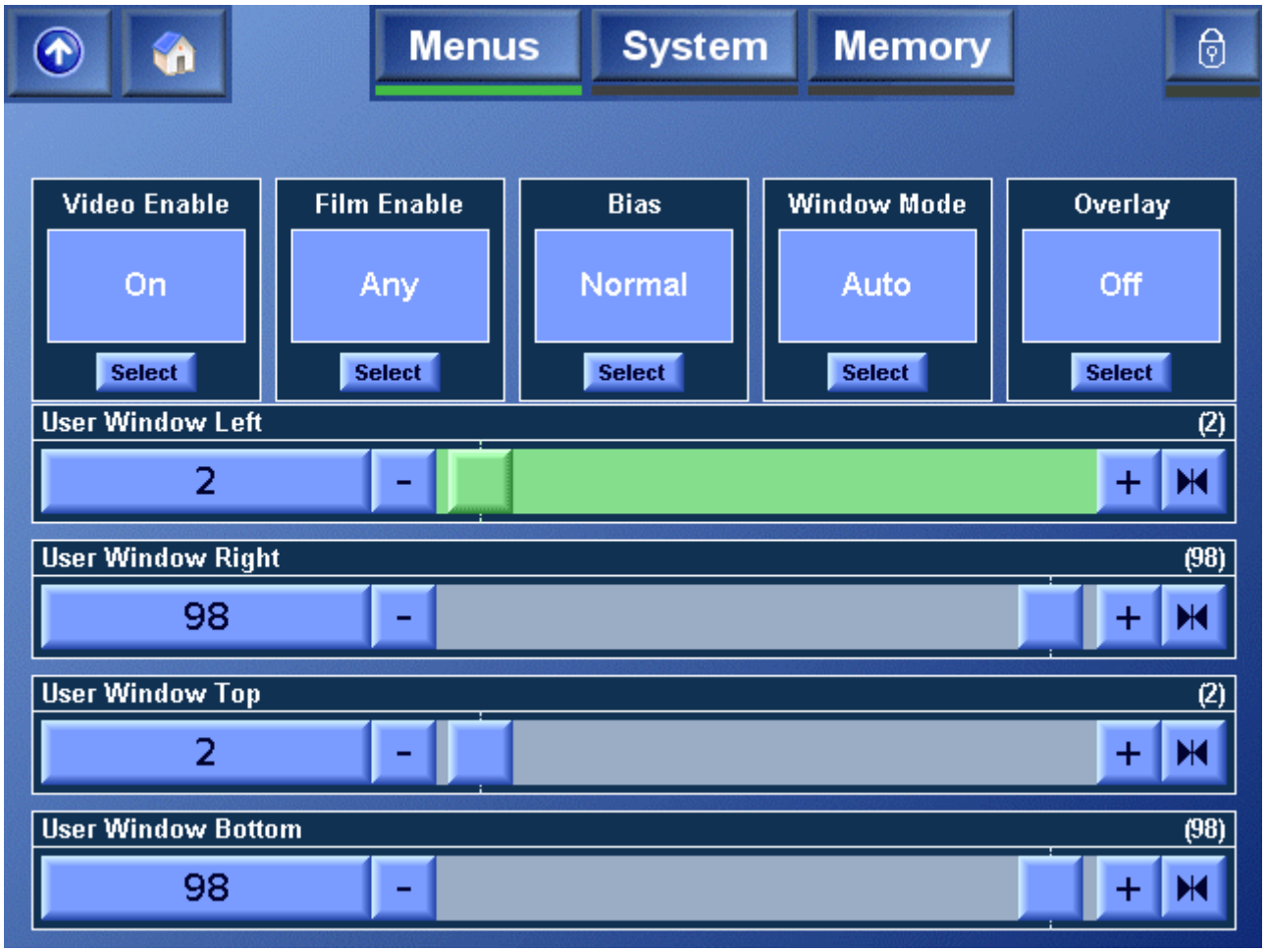
Film Aperture

Normal (Default)	This aperture maximizes the vertical resolution from the incoming film material. This is the optimum aperture for most applications.
Sharp	This aperture maintains maximum possible vertical resolution with the result that it is less tolerant to film sequence detection errors
Safe	This aperture is film safe. It is the most tolerant to film sequence detection errors. Note this mode is useful in applications where the film content contains mixed cadence regions.

FilmTools Detection

The FilmTools **Detection** menu controls the internal sequence detection algorithm.

The Alchemist utilizes a complex integrated detection algorithm to identify content type and cadence information. This algorithm has been optimized so that the maximum possible range of material can be converted in a single pass. In some rare cases it may be desirable to bias the algorithm using the following controls.



Video Enable

On (default)	Allows the sequence detector to positively identify content as 1:1 (video).
Off	The sequence detector will never identify content as video.

Film Enable

Any	(Default) Allows the sequence detector to identify film of any cadence. This maybe 2:2, 2:3, discontinuous 2:3, orphan fields, varispeed or animation.
2:2	Forces the sequence detection to identify film content as 2:2 cadence only. Content maybe F1/2 or F2/1.
2:3	Forces the sequence detection to identify film content as 2:3 cadence only. The 2:3 cadence may be discontinuous.
Animation	Optimized sequence detection algorithm specifically for animation.
Off	The sequence detector will not identify content as film.

Bias

Normal (Default)	This is the optimum setting for most applications. The detection algorithms have been optimized to give the most accurate results for the greatest possible range of material.
Video 2, Video 1, Film 1, Film 2	In some rare cases in may be desirable to bias the sequence detector such that it is more likely to detect video or more likely to detect film. Video 2 biases more strongly towards video than Video 1. Similarly Film 2 biases more strongly towards film than Film 1.

Window Control

This control allows the sequence and cut detection to be restricted to specific areas of the image. A typical detection application would be to avoid sequence detection errors caused by artifacts near the images edges. A typical cut detection application would be to prevent the detection of cuts occurring within a specific region of the image.

Auto (Default)	The sequence/cut detection region will be set to default values.
Track Input Blanking	The sequence/cut detection region will track with the settings for input blanking.
User	The user may manually define a specific sequence/cut detection region.

Window Overlay

The overlay permits adjustment of the active sequence/cut detection region.

Off (Darken)	The sequence/cut detection region overlay is disabled.
Darken	The active sequence/cut detection region is shown with reduced luminance.
Greyed	The active sequence/cut detection region is shown in mono

User Window

Left 0%-100% (Default 1%)	Defines the left edge of the detection region as a percentage of the picture width.
Right 0%-100% (Default 99%)	Defines the right edge of the detection region as a percentage of the picture width.
Top 0%-100% (Default 1%)	Defines the top edge of the detection region as a percentage of the picture height.
Bottom 0%-100% (Default 99%)	Defines the bottom edge of the detection region as a percentage of the picture height.

Operational Examples

This section provides examples of common FilmTools conversions.

Note:

Before performing any FilmTools conversion, it is recommended that the Alchemist is referenced to the input or an external reference source.

See "Genlock & FilmTools" on page 156.

Operational Example 1

This example describes how to perform a FilmTools conversion from 625 23.98PsF to 525 59.94i 2:3 (2:3 Insertion).

1. In the **Conversion** menu, turn FilmTools **On**.
2. In the **Input** menu, select **625 23PsF** Input standard.
3. In the **Output** menu, select **525 59i** Output standard.
4. In the FilmTools **Input** menu, set the **Input Cadence** control to **Auto**.
5. In the FilmTools **Output** menu, set the **Output Cadence** control to **2:3 Freerun**.

Operational Example 2

This example describes how to perform a FilmTools conversion from 1080 59.94i 2:3 (with video inserts) to 1080 23.98 PsF. Video inserts will be converted to film.

1. In the **Conversion** menu, turn FilmTools **On**.
2. In the **Input** menu, select **1080 59i** Input standard.
3. In the **Output** menu, select **1080 23PsF** Output standard.
4. In the FilmTools **Input** menu, set the FilmTools **Input Cadence** control to **Auto**.
5. In the FilmTools **Detection** menu, set Film Enable to **On**.
6. In the FilmTools **Output** menu, set output Cadence to **2:2 F1/2 (PsF)**.

Operational Example 3

This example describes how to perform a FilmTools conversion from 1080 59.94i 2:3 (with video inserts) to 1080 47i . The film elements will be processed as in example 2, and the video elements will remain as video.

1. In the **Conversion** menu, turn FilmTools **On**.
2. In the **Input** menu, select **1080 59i** Input standard.
3. In the **Output** menu, select **1080 47i** Output standard.
4. In the FilmTools **Input** menu, set the FilmTools **Input Cadence** control to **Auto**.
5. In the FilmTools **Detection** menu, set Film Enable to **On**.
6. In the FilmTools **Output** menu, set output Cadence to **Off**.

Operational Example 4

This example describes how to perform a FilmTools conversion from 1080 23.98PsF to 525 59.94i 2:3 — the source is a feature film with continuous cadence and timecode split across two tapes.

Tape 1 10:00:00:00 > 10:59:59:29

Tape 2 11:00:00:00 > 11:30:00:00

Output cadence should start at hour 10:00:00:00 with a start phase of AA.

Setup:

1. In the **Conversion** menu, turn FilmTools **On**.
2. In the **Input** menu, select **1080 23PsF** Input standard.
3. In the **Output** menu, select **525 59i** Output standard.
4. In the FilmTools **Input** menu, set the **Input Cadence** control to **2:2 F1/2**.
5. In the FilmTools **Output** menu, set output cadence control to **2:3 TC Datum**.
6. Set Output 2:3 Datum Cadence to **AA**.
7. Set 2:3 Cadence Reset to **At Datum**
8. Set an independent cadence datum cadence of 10:00:00:00

Both tapes can be converted without any further setup.

See “Understanding 2:3 Datum Cadence” on page 156.

Operational Example 5

This example describes how to perform a FilmTools conversion from 1080 25PsF to 1080 24PsF. The PsF material contains some moderate motion speeds and it is desirable to maintain a smooth motion profile in the output. This conversion is desirable in applications where it is deemed unacceptable to perform a 4% speed adjustment during playout. Typical examples would include applications where the audio is critical (e.g. Operas) or when it is crucial to maintain the exact program length (e.g. adverts).

Setup:

1. In the **Conversion** menu, turn FilmTools **On**.
2. In the **Input** menu, select **1080 25PsF** Input standard.
3. In the **Output** menu, select **1080 24PsF** Output standard.
4. In the FilmTools **Input** menu, set the **Input Cadence** control to **Auto**.
5. In the FilmTools **Output** menu, set the **Output Cadence** control to **2:2 F1/F2 (PsF)**.
6. In the FilmTools **Detection** menu, set the film mode to **Auto**.

Conversion Tables

The FilmTools suite comprises a number of different temporal conversion techniques. Each technique has been optimized for a specific application. The Alchemist Ph.C – HD will select the most appropriate technique depending on the input/output standard combination selected.

These tables indicate which conversion technique the alchemist will adopt depending on the various standard combinations.

KEY	
S	Synchronisation
S_R	Synchronisation with 2:3 repair
I_S	Interpolation or Synchronisation
M	Motion Compensated Interpolation
P	Pulldown (2:3) Insertion
P_M	Pulldown (2:3) Insertion via Motion Compensated Interpolation
D	DEFT/DEFTplus (2:3 pulldown removal)

			FILM OUTPUT						
	Native		23	23	24	24	25	29	30
		Transport	47 2:2	59 2:3	48 2:2	60 2:3	50 2:2	59 2:2	60 2:2
FILM INPUT	23	47 2:2	S	P	I_S	I_S	I_S	I_S	I_S
	23	59 2:3	D	S_R	I_S	I_S	I_S	I_S	I_S
	24	48 2:2	I_S	I_S	S	P	I_S	I_S	I_S
	24	60 2:3	I_S	I_S	D	S_R	I_S	I_S	I_S
	25	50 2:2	I_S	I_S	I_S	I_S	S	I_S	I_S
	29	59 2:2	I_S	I_S	I_S	I_S	I_S	S	I_S
	30	60 2:2	I_S	I_S	I_S	I_S	I_S	I_S	S

			VIDEO OUTPUT				
	Native		47	48	50	59	60
		Transport					
FILM INPUT	23	47 2:2	S	I_S	I_S	I_S	I_S
	23	59 2:3	D	I_S	I_S	S	I_S
	24	48 2:2	I_S	S	I_S	I_S	I_S
	24	60 2:3	I_S	D	I_S	I_S	S
	25	50 2:2	I_S	I_S	S	I_S	I_S
	29	59 2:2	I_S	I_S	I_S	S	I_S
	30	60 2:2	I_S	I_S	I_S	I_S	S

Note: *All film to video conversions maintain the input temporal sampling frequency*

		VIDEO OUTPUT				
	Native	47	48	50	59	60
VIDEO INPUT	47	S	M	M	M	M
	48	M	S	M	M	M
	50	M	M	S	M	M
	59	M	M	M	S	M
	60	M	M	M	M	S

		FILM OUTPUT						
	Native	23	23	24	24	25	29	30
		47 2:2	59 2:3	48 2:2	60 2:3	50 2:2	59 2:2	60 2:2
VIDEO INPUT	47	S	P	M	P	M	M	M
	48	M	P	S	P	M	M	M
	50	M	P_M	M	P_M	S	M	M
	59	M	P_M	M	P_M	M	S	M
	60	M	P_M	M	P_M	M	M	S

Understanding Datum TC Conversion

2:3 TC Datum with 'On Valid TC'

FilmTools allows both input and output 2:3 cadence phase to be locked to timecode. **2:3 TC Datum** mode allows the user to configure a datum timecode with a specified 2:3 phase. When **On Valid TC** is selected, upon receipt of valid timecode the Alchemist will perform the required Datum calculations ensuring the cadence will be locked to the specified Datum timecode. The cadence window defines a 24 hour period of time used to define the behavior of the Datum calculations.

If the timecode was post Datum the Alchemist will extrapolate forwards in time. If the timecode was pre-datum the Alchemist will extrapolate backwards in time. The **Max Time Pre-datum** defines at what timecode the Datum calculations switch from extrapolating forwards to extrapolating backwards.

If incorrectly configured the user may not get the desired cadence. For most cases the default value of 12 hours for Max Time Pre-datum will give the desired cadence.

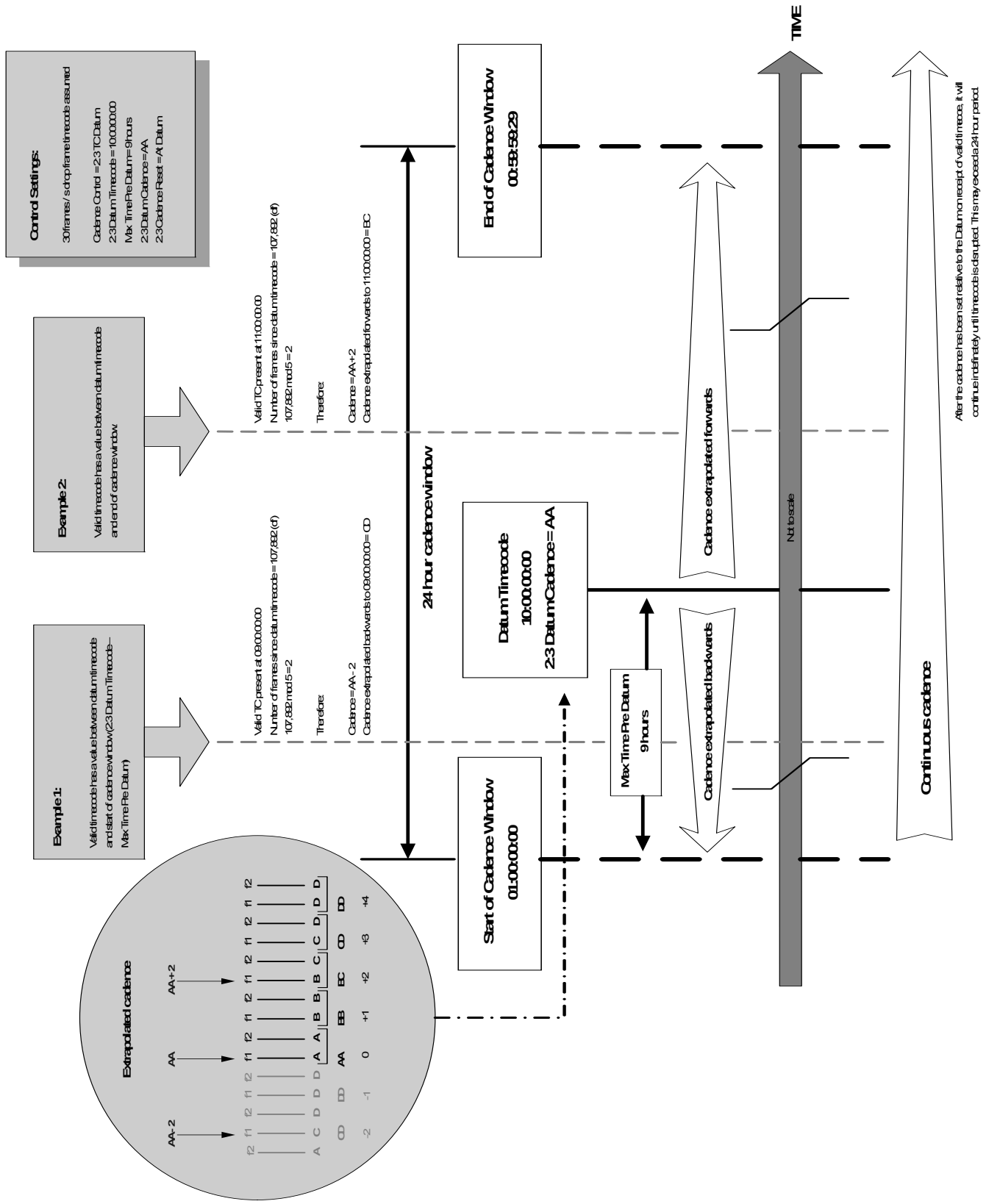
Example: (Figure 1)
As shown in Figure 1 the Max Time Pre-datum is set to 9 hours. This gives a start of cadence window of 01:00:00:00 and a corresponding end of cadence window of 00:59:59:29 (24 hours later). The Datum timecode is set to 10:00:00:00. For any timecode after the 01:00:00:00 but before 10:00:00:00 the cadence will be extrapolated backwards. For any timecode after 10:00:00:00 but before 01:00:00:00 the cadence will be extrapolated forwards.

If the Max Time Pre-datum had been set to 1 hour, it would mean any timecode before 09:00:00:00 would be extrapolated forwards. Had the user wanted to lock input cadence to the datum of 10:00:00:00 but started the tape rolling at 08:00:00:00 they would have wanted the calculation to be extrapolated backwards. With the current settings the resultant cadence wouldn't have been phase locked and continuous up to the datum.

2:3 TC Datum with 'At Datum'

If the user simply wanted to lock input or output 2:3 cadence phase to timecode without the Alchemist performing the Datum calculations upon detection of valid timecode the 2:3 Cadence Reset should be set to **At Datum**. In this mode the Alchemist will reset the cadence to the specified phase when timecode is equal to the specified 2:3 Datum Timecode.

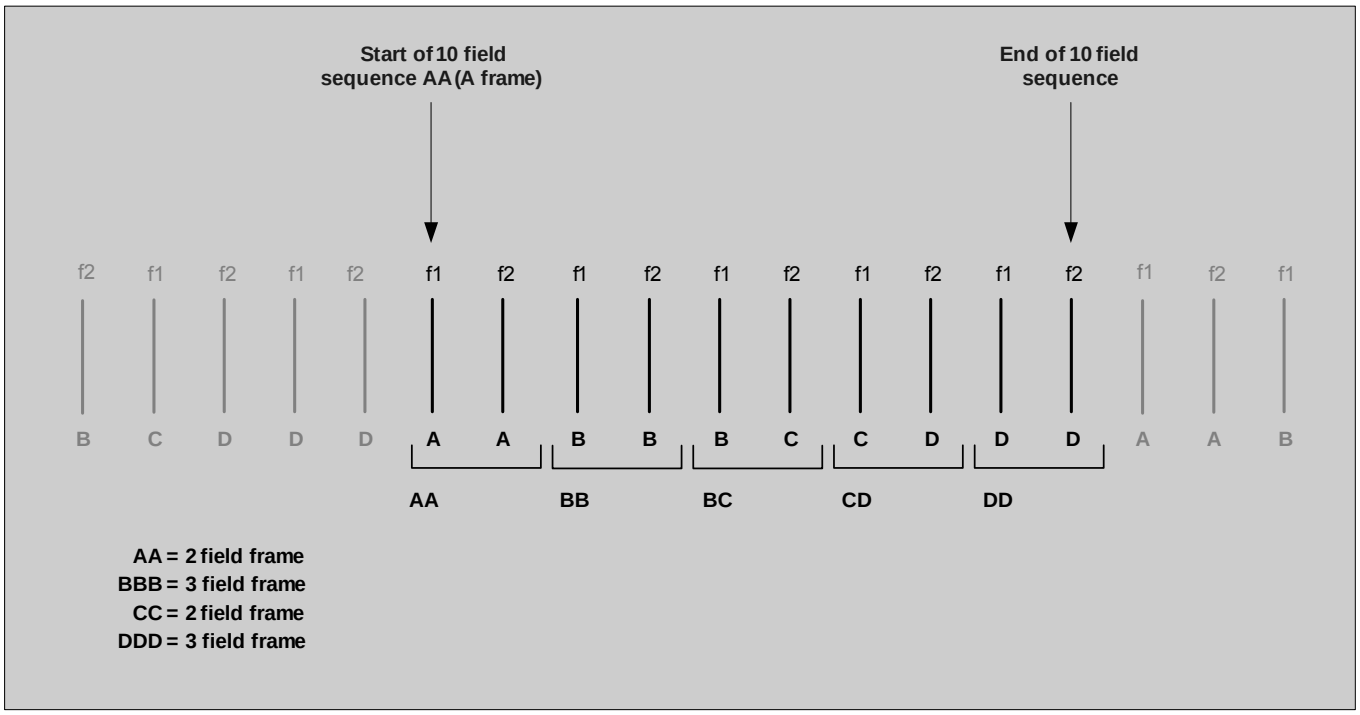
Figure 1


Control Settings:
30frames/sdropframetimecodeassumed
Cadence Control = 23 TC Datum
23 Datum Timecode = 10:00:00:00
Max Time Pre Datum = 9 hours
23 Datum Cadence = AA
23 Cadence Reset = A1 Datum
Example 2:
Valid timecode has a value between datum timecode and end of cadence window
Example 1:
Valid timecode has a value between datum timecode and start of cadence window (23 Datum Timecode – Max Time Pre Datum)
Valid TC present at 11:00:00:00
Number of frames since datum timecode = 107,892 (df)
107,892 mod 5 = 2
Therefore:
Cadence = AA + 2
Cadence extrapolated forwards to 11:00:00:00 = BC
Valid TC present at 09:00:00:00
Number of frames since datum timecode = 107,892 (df)
107,892 mod 5 = 2
Therefore:
Cadence = AA - 2
Cadence extrapolated backwards to 09:00:00:00 = CD
24 hour cadence window
End of Cadence Window
00:59:59:29
Start of Cadence Window
01:00:00:00
Datum Timecode
10:00:00:00
23 Datum Cadence = AA
Max Time Pre Datum
9 hours
Cadence extrapolated forwards
Cadence extrapolated backwards
Not to scale
TIME
Continuous cadence
After the cadence has been set relative to the Datum on receipt of valid timecode, it will continue indefinately until timecode is disrupted. This may exceed a 24 hour period.
Extrapolated cadence
AA-2
AA
AA+2
-2
-1
0
+1
+2
+3
+4

Understanding 2:3 Datum Cadence

Understanding the 5 frame types of a 2:3 sequence AA, BB, BC, CD, DD

Figure 2



The 5 frame types describe each of the 5 phase within a 10 field 2:3 sequence. 4 sequential source film frames are shown in bold in figure 2 - A, B, C, D. Each phase is identified by describing the first and second field of the video frame using the A, B, C, D reference.

For example

Phase 2 is described as “BB”. In this instance both the first and second fields are derived from source frame B.

Phase 4 however is derived from source frames C and D. In this case the label would read “CD”.

Genlock & FilmTools

It is recommended practice to reference the Alchemist when performing any FilmTools conversion.

It is important to reference the Alchemist as this prevents the frame synchronizer from performing additional frame drops or repeats. These extra drops or repeats may introduce an irregular motion profile or in some cases cause a discontinuous cadence.

This can be achieved by:

- Setting the reference menu item to **Input**.
- Setting the reference menu item to **External** and applying an external reference. The source should share the same externally applied reference.

Questions & Answers

Q1. *Why would I want to set up a sequence detection region?*
A1. Pictures edges may contain artifacts unrelated to the image content which if not excluded from the sequence detection could impede or prevent correct sequence detection. Alternatively, some complex material may contain images with different cadences present. This feature allows the user to lock onto the favored cadence.

Q2. *Why would I want to use "On Valid Timecode" mode of operation?*
A2. The feature is very useful in applications where content has been spanned across multiple tapes. Each tape must contain constant cadence and timecode following on from the previous tape.

Q3. *Can I leave the Alchemist in Detect mode all the time?*
A3. Yes you can. However, in some rare circumstances material may not contain a clear motion signature.

Q4. *Why does the latency of the Alchemist increase when FilmTools is enabled?*
A4. In order to perform high quality sequence detection and process sequence changes correctly from the first field of the new sequence the Alchemist requires a longer period of analysis.

Q5. *Can the user set up independent cadences on output A and output B?*
A5. This is not possible – the output cadence defined applies to both Output A and B.

Q6. *What happens if I have some 720P 50/59/60 material with a 2:2 cadence and I set the input cadence alignment to 2:2 F1/2 (PsF)?*
A6. The Alchemist will use the field marker present in the timecode due to the absence of an F sync in these standards. If there is no input timecode the 2:2 sequence will free run.

Q7. *Why do I need the video blur control?*
A7. Video blur is used to create a more naturalistic film originated look on video to film conversions.

Q8. *Can I use embedded audio when I select a SlowPAL output format (625 23.98PsF and 625 24PsF)?*
A8. Yes the embedded audio will be present but it will be 48KHz. In addition all AES outputs will also be 48KHz.

Q9. *Can I use embedded audio when I select a SlowPAL input format (625 23.98PsF and 625 24PsF)?*
A9. Yes the system will accept embedded audio from a SlowPAL source however it must be 48KHz. If Slow audio in is required we recommend the use of AES.

Q10. *When might I need to bias the sequence detector?*
A10. The Bias control is useful when converting material that does not contain a clear motion signature. This can occur for many reasons, such as:

- Severely intercut film, varispeed or video
- Film containing overlaid or transparent video effects/graphics
- Excessively enhanced or compressed clips
- Film originated source with field (video) based noise

Q11. *Is it possible to force F1 or F2 cuts whilst simultaneously forcing an output cadence?*
A11. No, forced cuts and forced output cadence are mutually exclusive. A forced 2:3 output for example would by definition contain sequence changes on both a F1 and a F2. With FilmTools enabled the output cadence must be set to OFF if forced cuts are required.

FilmTools Glossary

2:2 F1/F2	A film frame being transported as 2:2 (PsF) is placed into two consecutive video fields. F1/F2 denotes that the film frame is carried in a field one and the following field two. This is commonly referred to “normal dominance” or “perfect cadence”. See PsF.
2:2 F2/F1	A film frame being transported as 2:2 (PsF) is placed into two consecutive video fields. F2/F1 denotes that the film frame is carried in a field two and the following field one. This is commonly referred to “reverse dominance” or “reverse cadence”. See PsF.
2:3 Datum Timecode	Term used to assist in defining a FilmTools conversion on the Alchemist Ph.C - HD. The 2:3 Datum Timecode identifies a specific frame for which the user can specify an associated phase of 2:3 cadence (see 2:3 Datum Cadence).
2:3 Pulldown	A telecine uses a technique called 2:3 pulldown (sometimes also called 3:2 pulldown) to convert Film from 23.98Hz to 59.94Hz videotape. For every 4 frames of film there are 5 frames of 59.94 video. The telecine alternately places 1 film frame across 2 fields, the next across 3, the next across 2 and so on.
Aliasing	An artifact associated with sampled signals. This undesirable effect is caused by sampling frequencies being too low to faithfully reproduce the frequencies present in the original signal.
Animation	Any content with a frame rate of 12Hz or below where the cadence may have no regular pattern.
Aperture	The characteristic frequency response of a filter which describes the effects on a signal being processed by that filter.
Cadence	The pattern of video fields that create a net frame rate lower than the video frame rate that carries them.
Cadence Window	The cadence window defines a 24 hour period of time used to define the behavior of the 2:3 Timecode Datum calculations. The window definition and input timecode will define whether the 2:3 Datum Cadence is extrapolated backwards or forwards from the 2:3 Datum Timecode. This concept is only applicable to the 2:3 Datum Cadence feature.
Clean frames	Output fields or frames are derived directly from a single input frame with no interpolation.
Content Type	Content can fall into a variety of types based on its properties. In the FilmTools context type categories include 2:2, 2:3, varispeed, animation and video.

DEFT	Historically DEFT represents a motion artifact free conversion from NTSC film originated video material to PAL. The post production trend is to shoot material on film (24Hz) and then perform a telecine transfer to videotape (59.94/2:3). A DEFT conversion process takes this 2:3 material, detects the sequence and eliminates the redundant field in a 3 field frame, and can therefore produce PAL images at a frame rate of 23.98Hz. This video is recorded on a specially modified PAL VTR. The 23.98 to 25Hz frame shift is achieved by replaying the material back on a standard VTR. In more recent times this process has been applied to the HD domain as well i.e. 1080 59.94i 2:3 to 1080 23.98PsF.
DEFTplus	The content targeted at the DEFT conversions evolved over time. Material soon contained both film and video elements cut together throughout a program. This content required a 2 pass conversion. One through a DEFT, and the other through an Alchemist. The results would then be edited together to provide the optimum conversion. DEFTplus offers optimal handling of the video content as well as the film originated content by switching seamlessly from a DEFT conversion to a video conversion on a shot by shot basis. Source video movement at 59.94Hz can be converted to movement at 47.95HZ using Ph.C Motion Compensation. Alternatively the video elements can by converted to 24Hz (Video to film) to maintain a consistent frame based appearance
Discontinuous 2:3 Sequence	It is common for the editing process to be performed post telecine. When editing is performed to 2:3 there is a potential for disruptions in the 2:3 sequence. These can be 3 field sequences adjacent to other 3 field sequences, and 2 field sequences adjacent to other 2 field sequences. Also there are cases where we have single fields present that are not part of any sequence (Orphan fields). These disruptions caused by editing create a “broken 2:3 sequence”.
Field Dominance	Defines whether a field 1 or field 2 represents the first field of a progressive frame. See also 2:2 F1/F2 & 2:2 F2/F1
Film	Any content with a net frame rate of 30Hz or below.
Input Trigger	Term used when defining a timecode conversion. The input trigger is the value of the input timecode that defines when an output timecode event occurs.
Interpolation	The process of deriving new samples from a two or more source samples.
Interpolation (Spatial)	The process of deriving new samples from a two or more source samples associated with the same point in time but different points in space. In the context of video, by using different lines and pixels from the same field or frame.
Interpolation (Temporal)	The process of deriving new samples from a two or more source samples associated with the same point in space but different points in time. In the context of video, by using pixels from the subsequent fields or frames.

Mixed Cadence	Content that contains two or more different cadences occurring concurrently in different regions of the image. Typical examples include film content with overlaid interlaced captions or film content derived from two different sources (with different cadences).
Mixed Content	Generic term used to define content which could contain mixed cadence or content that changes type or cadence over time. See Content Type
Mixed Media	See Mixed Content.
Orphan Field	See Discontinuous 2:3 Sequence.
P-Film	This process offers all the advantages of DEFTplus for 50Hz mixed media sources.
PsF	A Progressive Segmented Frame (PsF) format splits a progressive image into two sequential fields. It is identical to 2:2 in terms of motion profile.
Sequence Detection	This is the act of finding film frame boundaries. For “perfect” PsF or 2:3 sequences, this will produce a regular pattern of frames. For “non-perfect” sequences the pattern will not be regular and might have discontinuities at edit points for example.
Synchronize	Temporal conversion without the use of interpolation. If input and output field or frame rates are not identical then field or frame drops or repeats must occur.
Varispeed	Refers to film originated material which has been played off speed. For example, speed up could be performed by dropping the third field in a three field frame.
Video	Any content with motion portrayal at a frequency greater than 30 Hz.
Video-to-Film	Video-to-Film processing is the conversion of video (interlaced / field based formats) to frame based formats (e.g. 2:2 / PsF.
Video Blur	Technique used during the Video-to-Film process to modify temporal processing to create a more naturalistic film originated look.

Appendix E: Dolby E

Overview

The Dolby E option enables the Alchemist Ph.C – HD to seamlessly handle Dolby E with ease while performing any type of up, down, cross and standards conversion. It provides an integrated transcoding and decoding solution for up to two streams of Dolby E audio.

Multi channel audio has been with us for many years and with the advent of HD Direct to Home (DTH) services it is increasingly used for major live sporting events and concerts, as well as drama, documentary and features. Dolby E provides content owners and distributors with a solution to manage these multiple channels. However, as Dolby E must be correctly referenced and aligned to the video, this poses a problem when standards converting, as the Dolby E must be transcoded to the new video reference and correctly aligned with the new frame rate. The Dolby E option for the Alchemist Ph.C – HD provides a complete integrated solution to solve this problem for broadcasters and post production.

Key Features:

- Eliminates the need for external boxes and infrastructure
- Dolby E processing available in all conversion modes
  - Frame rate standards conversion as well as up, down and cross conversion modes
  - Transcode
  - Decode
- Dolby E guard band alignment
- Fully integrated latency compensation
  - Automatic audio and video alignment
  - Lip-sync maintained
- Range of features to accommodate all potential user applications
- Unique Map modes to route decoded Dolby E to AES and embedded outputs
- Powerful, easy to use, control interface
- Dolby D - Decode

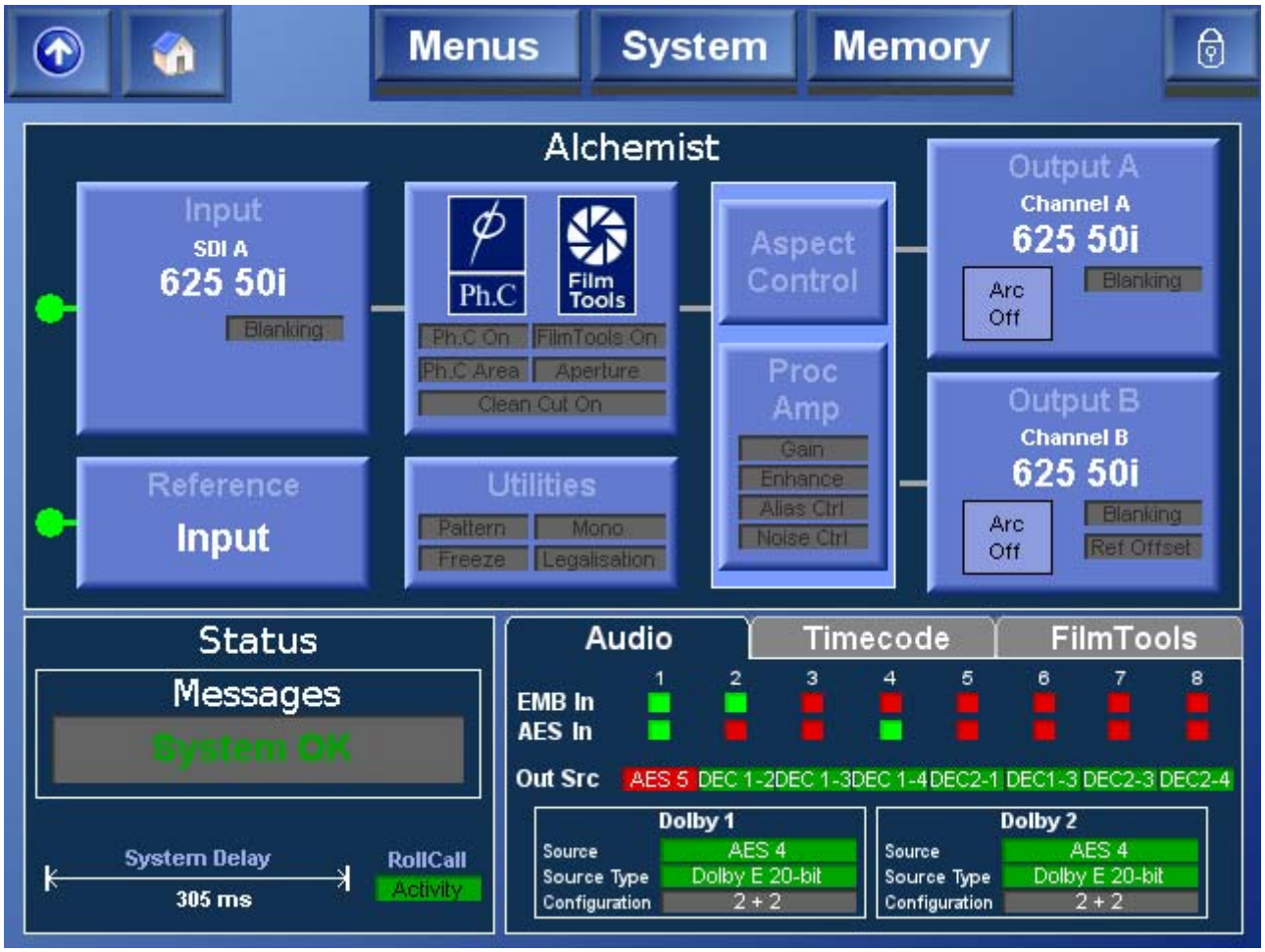
Dolby® E Control Interface

This section describes the control interface of the Alchemist Ph.C – HD's Dolby E functions. Dolby E processing is inextricably linked to general audio processing and as such, the Alchemist's general audio setup functions are also described in this section.

Users of previous versions of the Alchemist will notice that the audio setup menus have been changed somewhat to simplify audio configuration.

Audio Display Tab (Home Screen)

The Audio display tab on the Home screen illustrates Audio Input / Audio Output status. Dolby Sources and types, and the Dolby program configuration.



EMB In The **EMB In** indicators display the EMB input status.

- Green indicates that a valid embedded input signal is present.
- Red indicates that no embedded input signal is present.

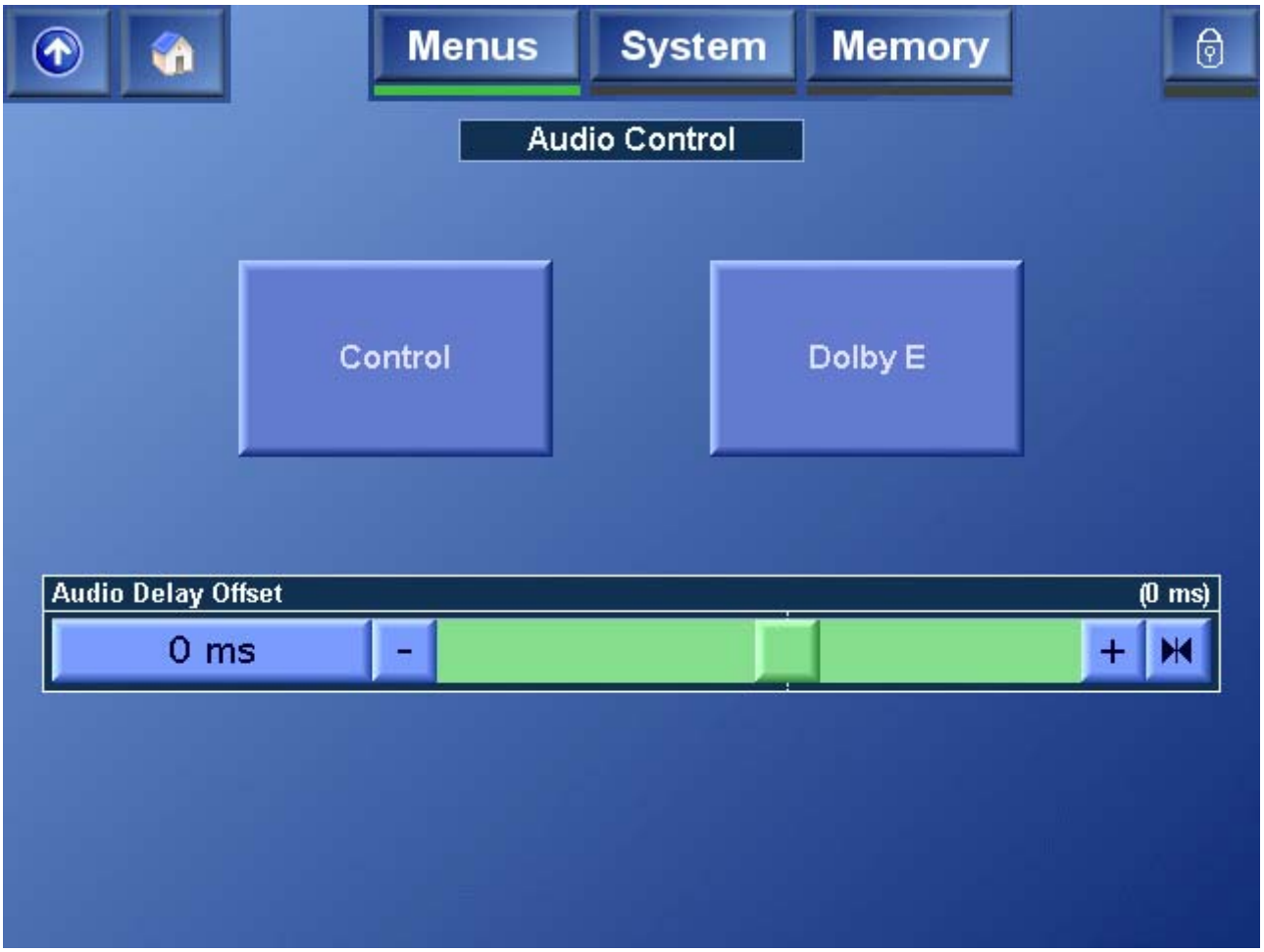
AES In The **AES In** indicators display the AES input status.

- Green indicates that a valid AES input signal is present.
- Red indicates that no AES input signal is present.

Out Src	These indicators display the audio output pair status. • The text for each describes the selected source currently routed to each output. • Green indicates that the selected source is valid. • Red indicates that the selected source is not valid.
Dolby 1 / Dolby 2 Source	This indicates the input source that is routed to the respective Dolby channel decoder. • Green indicates a valid Dolby E or Dolby D signal • Yellow indicates a valid PCM signal • Red indicates that no Dolby E, Dolby D or PCM signal is present.
Dolby 1 / Dolby 2 Source Type	This indicates the bitstream format that is being routed to the respective Dolby channel decoder. • Green indicates a valid Dolby E or Dolby D signal. • Red indicates that there is no valid Dolby E or Dolby D signal. • Yellow indicates a valid PCM signal.
Dolby 1 / Dolby 2 Configuration	This displays the Dolby program configuration being routed to the respective Dolby channel decoder.

Audio Control

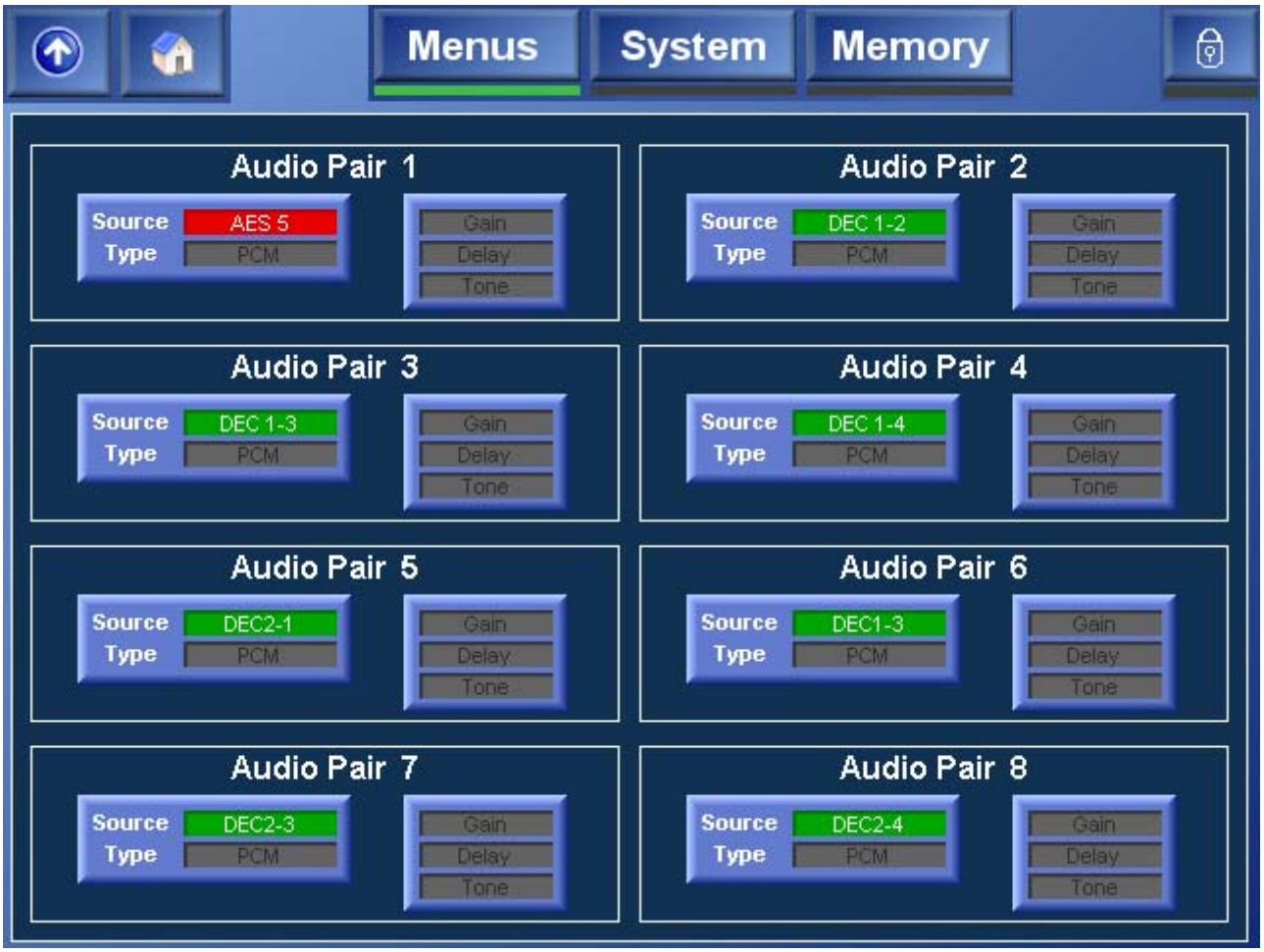
The Audio Control page is accessed by touching anywhere on the audio tab.



Audio Delay Offset	This allows the overall audio delay of the unit to be set. This value will be displayed on the Audio Channel Control screens.
Note:	*Any audio delay added to individual PCM or Dolby channels is added to this delay.*
Control	Touch the **Control** button to access the audio control pages from which the Alchemist's audio setup can be configured.
Dolby E	Touch **Dolby E** to access the Dolby E setup page.

Audio Control (Audio Pair 1 to Audio Pair 8)

This page allows the user to configure each of the audio outputs.



For each of the Alchemist Ph.C – HD's eight audio pairs the following information is shown.

Source This displays the source that has been configured for each of the output audio pairs. If the source is present and valid, it is displayed in green. If the source is absent, or invalid. it is displayed in red.

Type In the absence of Dolby E output, this displays whether the output is AES audio or data.

Gain If the Gain indicator is yellow, the gain on the channel has been changed from the default setting. This indicator applies only to PCM.

Delay If the Delay indicator is yellow, the Delay on the channel has been changed from the default setting. This indicator applies only to PCM / Data signals.

Note that this differs from the global audio delay offset, applied to all channels, that is adjusted on the Audio Control page.

Tone If the Tone indicator is yellow, the output channel is currently producing a tone. This indicator applies only to PCM / Data signals.

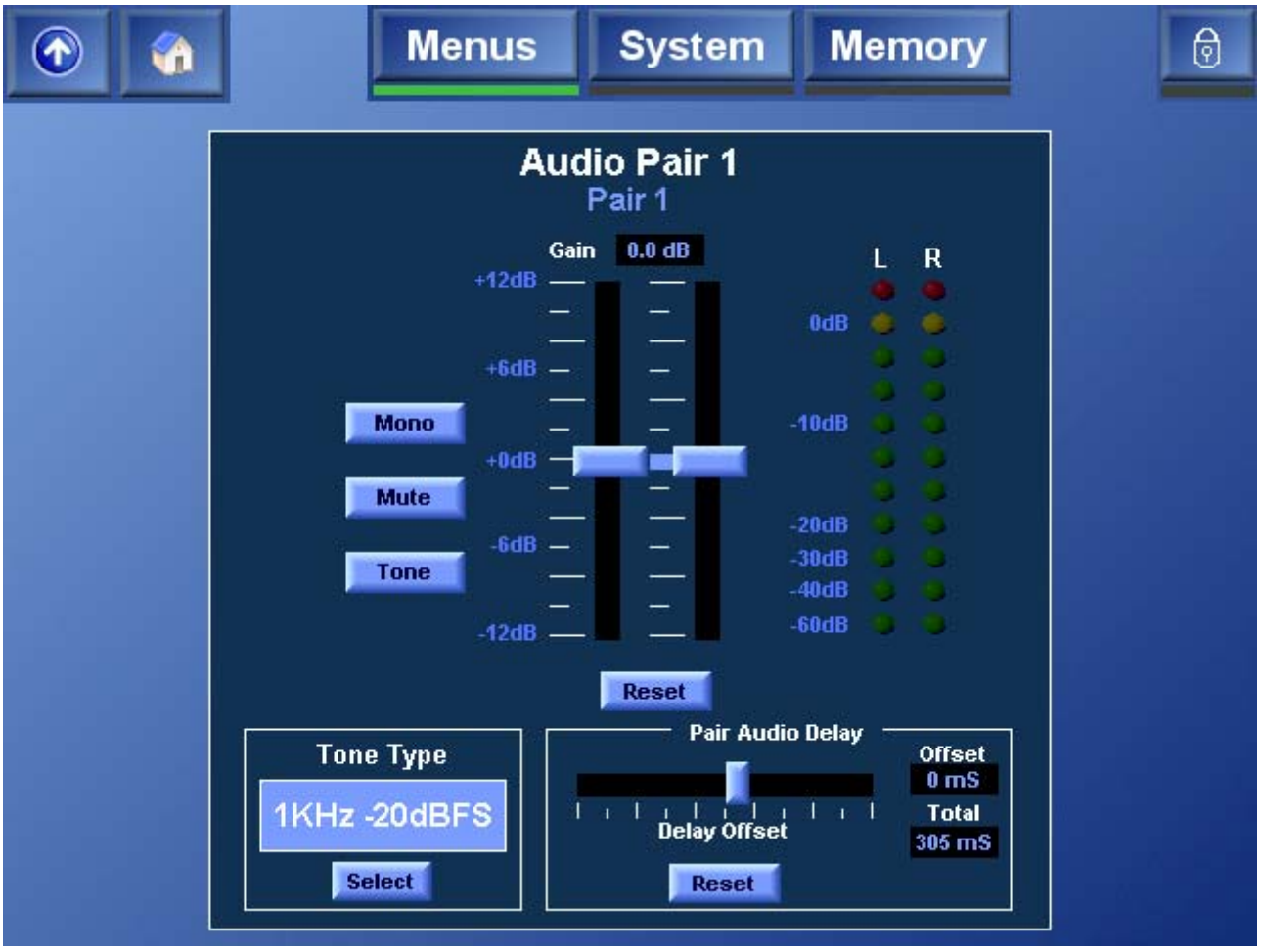
Touch **Source/Type** to specify the input source and type.

Touch **Gain/Delay/Tone** to adjust the channel gain and delay options.

Audio Pair 1 to Audio Pair 8 (PCM/Data Controls)

The settings on the Audio Control pages enable the channel gain, delay, Tone, Mute and Mono options to be adjusted.

These settings are only applicable to PCM audio / Data only. Dolby E tone and gain options are configured from the Dolby E pages.



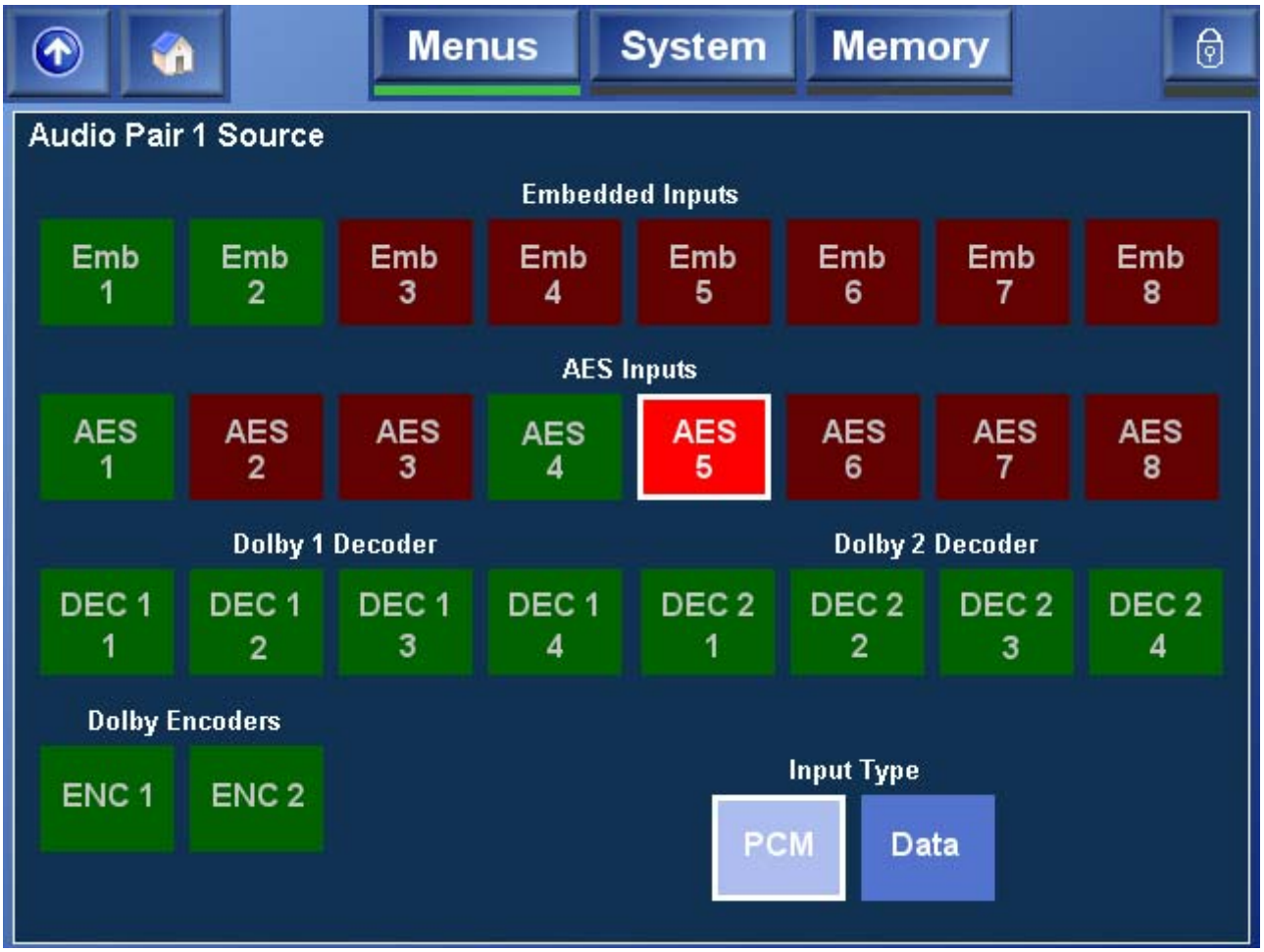
Gain This allows the gain of the left and right channels of the pair to be adjusted. The range of control is ±12 dB.

Touch **Reset** to return the gain control to its preset value of 0 dB.

Mono	Touch the **Mono** button to take an average of the left and right channels and apply that average to both.
Mute	When selected, both channels will be muted.
Tone	Touch tone to generate the tone specified in the **Tone Type** section.
Tone Type	The audio pair may be assigned a fixed frequency tone. To change the tone type, touch **Select** and in the dialog that appears, select the tone type.
Pair Audio Delay **(PCM/Data Audio Only)**	The audio delay for each pair can be adjusted individually. This delay is added to the global audio delay and the unit's internal processing delay. The total delay for the pair is displayed in the Total field. The values of this delay vary according to the conversion being made and are listed in the "Latency Tables" appendix of the Alchemist Ph.C – HD Operator's manual. To change the delay offset for the audio pair, use the slider bar. ***Note:*** *the system latency is dependent on the following user controls - input standard, output standard, FilmTools, Min Delay and Synchro Timecode conversion.* *In Timecode synchro mode, the system delay can change by a maximum of one output standard frame. The modified system delay is displayed on the Home page.*

Audio Pair 1 Source to Audio Pair 8 Source

The settings on these pages enable the input source for any of the eight audio output pairs to be specified.

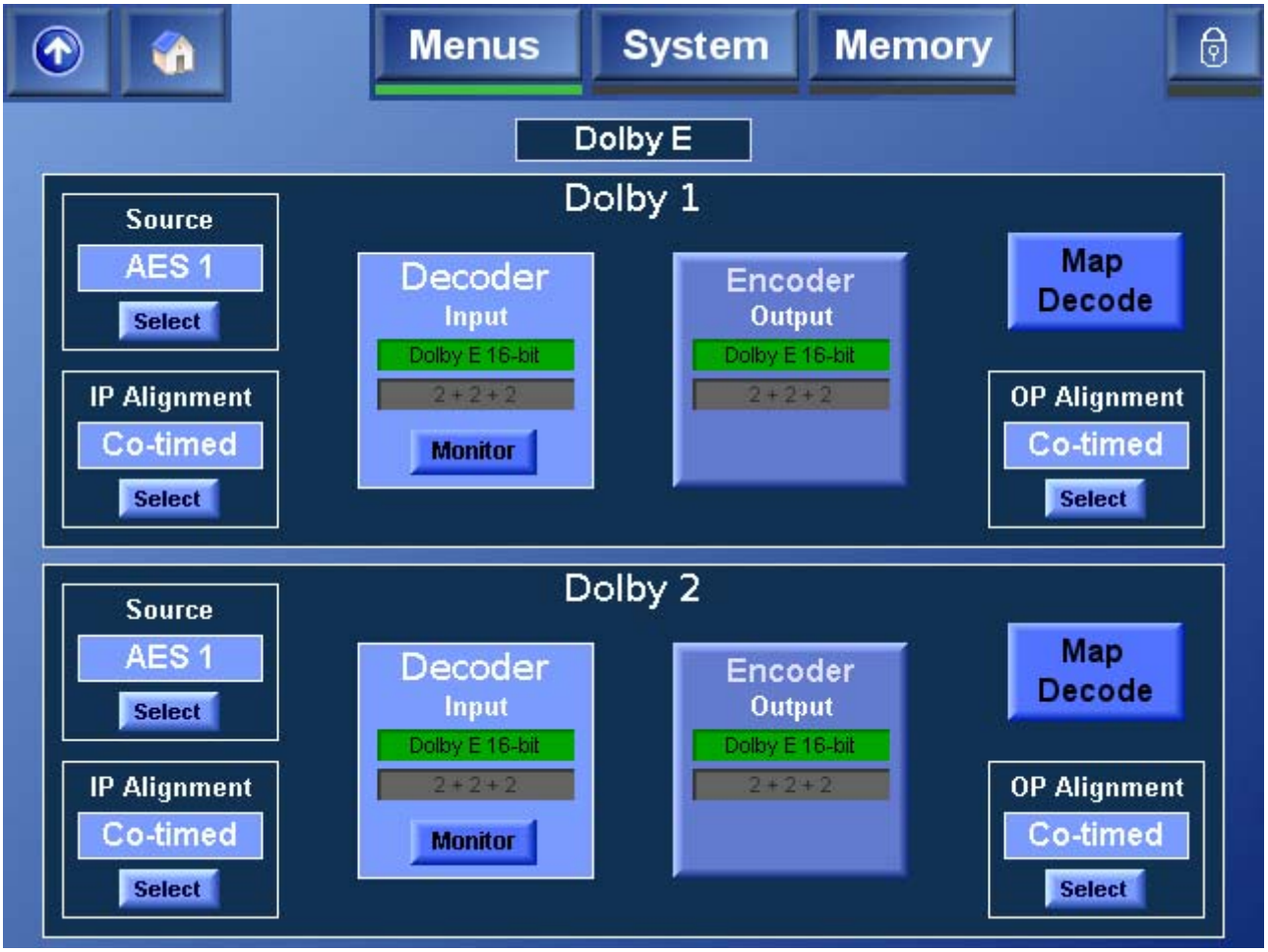


Inputs that have a valid source present are displayed in green. Inputs that do not a have a valid source present are displayed in red. When selected as the input for the selected audio pair, the source is illuminated.

To select the audio type, touch PCM or Data. These options are not available if a Dolby source has been specified.

Dolby E

The Dolby E menu enables the Dolby E channels to be configured. Each channel consists of a dedicated Dolby E encoder and decoder module. The Dolby E page is divided in two. The top half of the page contains the controls for Dolby channel 1 and the bottom half of the page contains the controls for Dolby channel 2.



Source

This displays the input on which the Dolby E input stream is present. It can be present on either AES pairs 1 to 8, or on Embedded pairs 1 to 8.

To specify a different input source, touch **Select**.

IP Alignment

This displays the Dolby E input alignment, which can be:

- **Advanced** by one input frame.
- **Co-timed** with the video signal.
- **Delayed** by one input frame.

To change the input alignment, touch **Select**.

The input alignment needs to be selected based upon what devices are upstream from the Alchemist.

Decoder Input

This displays the input to the Dolby decoder channel, the Dolby E/D program configuration and associated bit depth.

Monitor

The Monitor function enables a predefined method of operation in which decoded audio pairs are automatically assigned to specific AES outputs, thus maintaining program configuration. No change is made to the embedded output mapping, and the mapped AES outputs will not be subjected to any audio gain or delay processing.

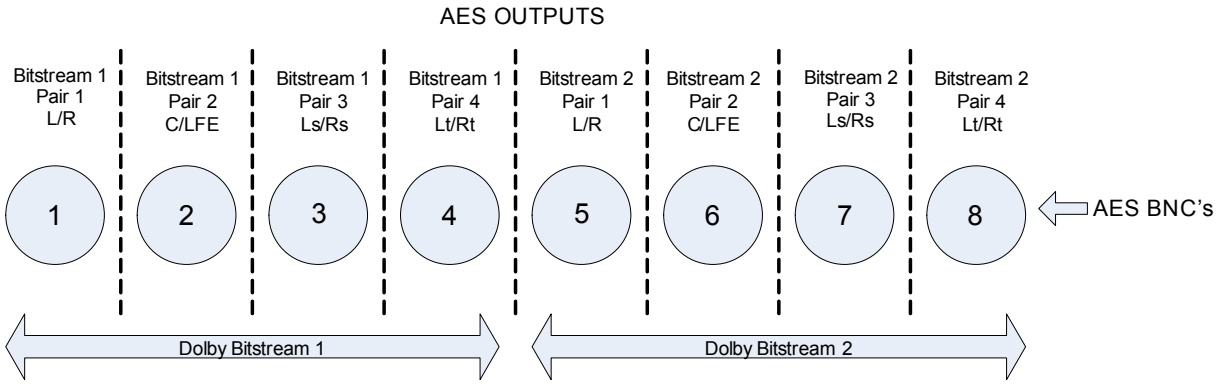
This control overrides any other mapping to the relevant 4 AES outputs.

In this mode:

- Dolby E Bitstream 1 will always be decoded to AES outputs 1 to 4.
- Dolby E Bitstream 2 will always be decoded to AES outputs 5 to 8.

Both outputs will adopt the same structure and configuration as the Dolby E.

For example, if Dolby E Bitstream 1 and 2 both have a 5.1 + 2 program configuration, the output on the AES BNC outputs would be structured as shown in the diagram below.



Encoder Output

This displays the output from the Dolby encoder channel, the Dolby E program configuration and associated bit depth.

Touch this control to access the **Encoder** options page, on which a tone for the Dolby channel can be configured and applied, a mute can be applied to the channel, and the channel delay offset can be specified. See page 172 for more information.

Map Decode

The Map Decode function enables a predefined mode of operation in which decoded audio pairs will be automatically assigned to specific embedded and AES channels, thus maintaining program configuration.

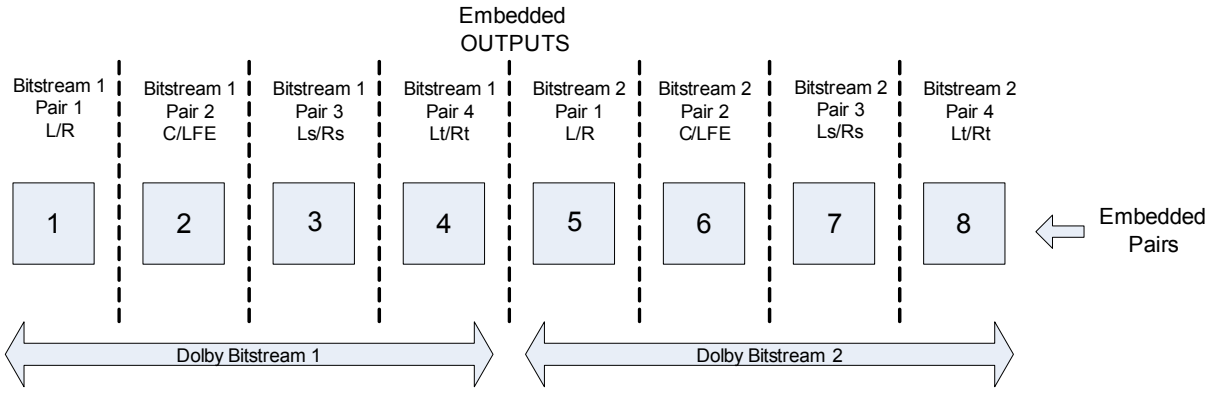
This mapping for the embedded outputs will override any other mapping to these 4 embedded outputs. The AES mappings can be overridden by the Decoder Monitor function.

In this mode:

- Dolby E Bitstream 1 will always be decoded and embedded on channels 1 to 4.
- Dolby E Bitstream 2 will always be decoded and embedded on channels 5 to 8.

Both outputs will adopt the same structure and configuration as the Dolby E.

For example, if Dolby E Bitstream 1 and 2 both have a 5.1 + 2 program configuration, the output embedded within the SDI will be structured as follows.



OP Alignment

This displays the Dolby E output alignment, which can be:

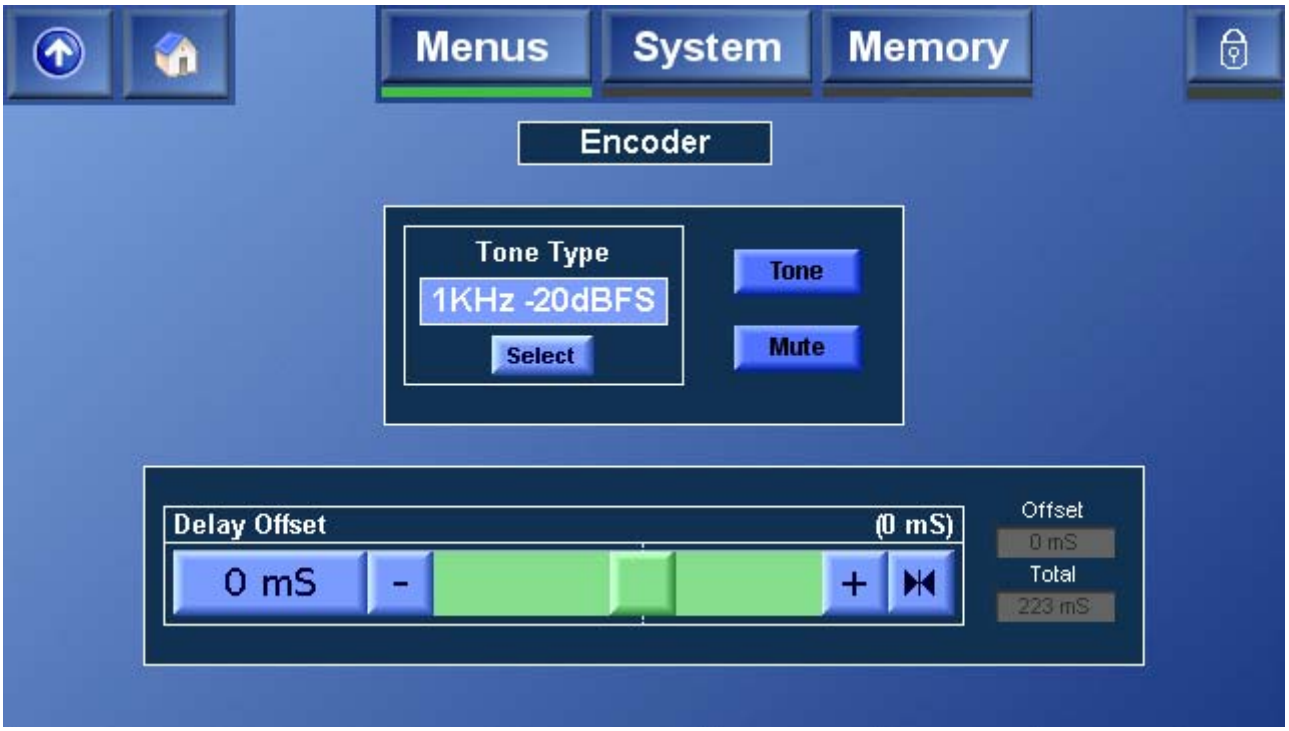
- **Advanced** by one output frame.
- **Co-timed** with the video signal.
- **Delayed** by one output frame.

To change the output alignment, touch **Select**.

The output alignment needs to be selected based upon what devices are downstream from the Alchemist.

Encoder

The settings on the **Encoder** page allow tone, mute and delay offset to be applied to the Dolby encoder output.



Tone Type

The Dolby encoder may be assigned a fixed frequency tone. To change the tone type, touch **Select** and in the dialog that appears, select the tone type.

Note: *Program configuration and Metadata follow the input to the decoder. Any program configuration which utilizes a .1 / LFE channel will contain a 100Hz test tone when the **Tone** is activated.*

Tone

Touch **Tone** to generate the tone specified in the **Tone Type** section.

Mute

Touch **Mute** to apply a mute to the Dolby encoder output.

Delay Offset

The audio delay for each Dolby encoder channel can be adjusted individually. The total delay for the pair is displayed in the Total field and is the sum of:

System Delay + Dolby Input Alignment + Dolby Output Alignment + Master (Global) Delay + Individual Channel Delay (configured here).

The values of the system delay vary according to the conversion being made and are listed in the “Latency Tables” appendix of the Alchemist Ph.C – HD Operator’s manual.

To change the delay offset for the audio pair, use the slider bar.

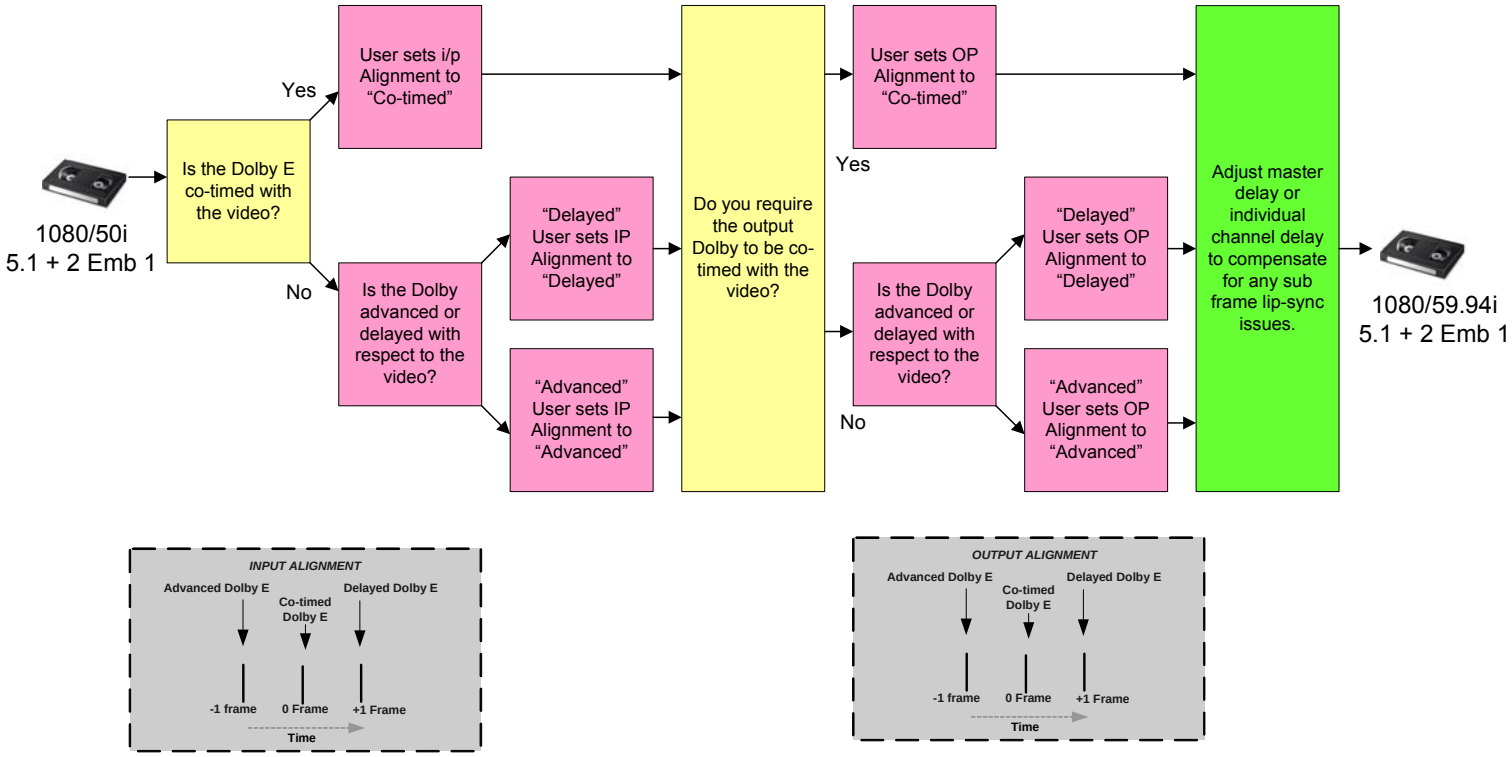
Configuring Dolby E Alignment

This decision chart illustrates the steps that are required to configure Dolby E alignment.

Dolby E configuration controls have been designed with system integration in mind. IP/OP Alignment controls may be used to compensate for equipment up/ downstream which respects Dolby frames. Global/master delay and individual audio pair delay may be used in addition to the alignment controls to allow sub frame lip-sync adjustments to be made.

To configure Dolby E alignment:

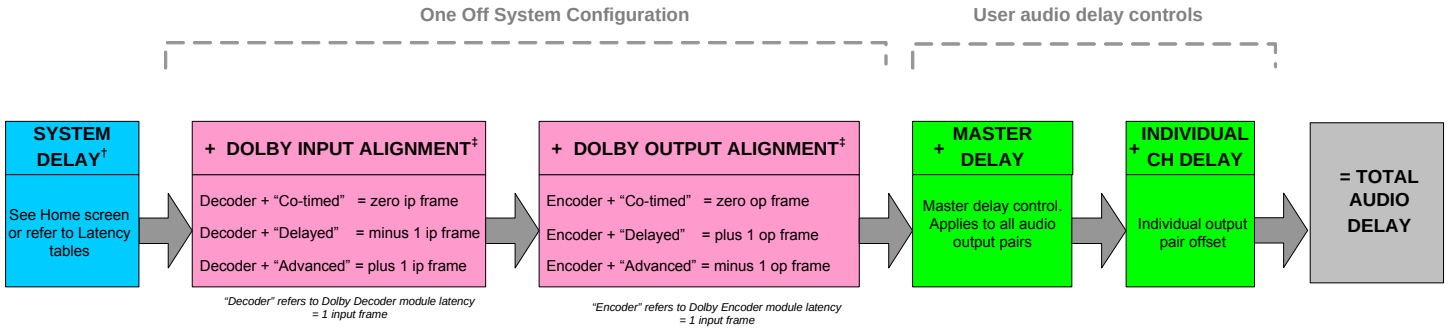
1. Determine whether the input Dolby E is co-timed, advanced, or delayed with respect to the video and adjust the **IP Alignment** control accordingly.
2. Determine whether the output Dolby E needs to be co-timed, advanced, or delayed with respect to the video and adjust the **OP Alignment** control accordingly.
3. Correct any sub-frame lip-sync issues by adjusting either the master audio delay (if all channels require the same adjustment) or the individual channel delay (if channels require different levels of adjustment).



Calculating Dolby E Audio Delay Transcoding

When dealing with Dolby E, the total audio delay can be calculated as follows:

Total Audio Delay = System Delay + Dolby IP Alignment + Dolby OP Alignment + Master Delay + Channel Delay



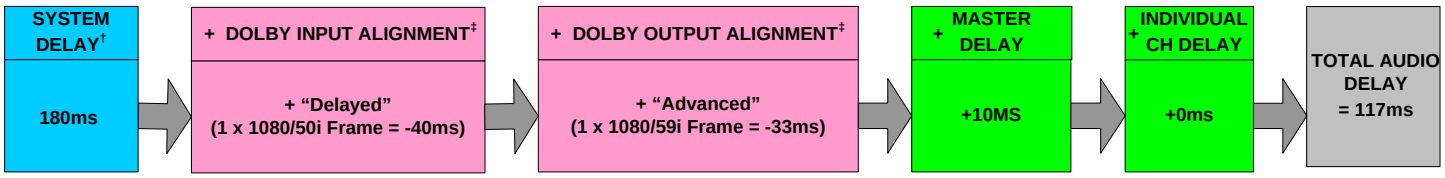
The current System Delay is shown on the Audio tab of the Alchemist Ph.C – HD Home screen; the system delays for all of the Alchemist Ph.C – HD's conversions are also listed in the "Latency Tables" appendix of the Operator's manual.

The Dolby Input Alignment and Dolby Output Alignment controls are dependant on any other devices that are upstream and downstream of the Alchemist Ph.C – HD. These adjustments will normally only be made once, when the Alchemist is first configured, or when upstream or downstream devices are changed.

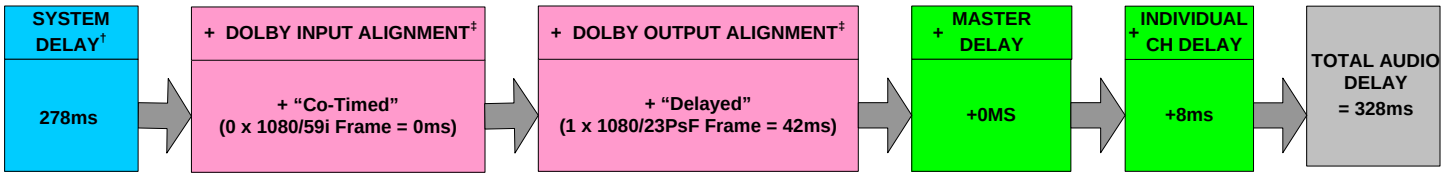
Finally, the master and individual channel delay controls are added to the other delay sources. These are normally used to compensate for lip-sync issues and are more frequently adjusted than the other delay sources.

The following three examples illustrate how audio delay would be calculated.

Example 1: 1080/50i to 1080/59i conversion (FilmTools "OFF – Min Delay "ON"), Dolby E Input is 1 frame delayed with respect to the video, Dolby E Output should be advanced with respect to the video, and a lip-sync error of +10ms is present.



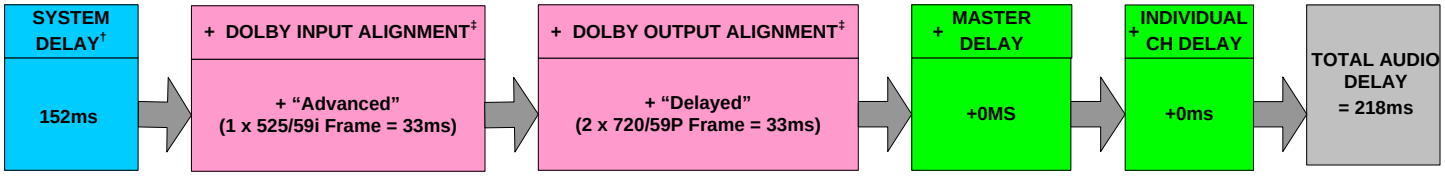
Example 2: 1080/59i 2:3 to 1080/23PsF conversion, FilmTools "ON", Dolby E Input is co-timed with respect to the video, Dolby E Output should be delayed with respect to the video, a lip-sync error of +8ms is present on pair 1 only.



† There are five user controls which contribute to the System Delay value - input standard, output standard, FilmTools (on/off), Min Delay (on/off), Synchro TC Conversion

‡ Note: With the high rate 720P standards (such as 720 50/59/60P) one Dolby frame actually equals two high rate 720P frames. E.g. One 720/50P Dolby Frame = 40ms

Example 3: 525/59i to 720/59P conversion, Dolby E Input is advanced with respect to the video, Dolby E Input should be delayed with respect to the video, no lip-sync error.



† There are five user controls which contribute to the System Delay value - input standard, output standard, FilmTools (on/off), Min Delay (on/off), Synchro TC Conversion

‡ Note: With the high rate 720P standards (such as 720 50/59/60P) one Dolby frame actually equals two high rate 720P frames. E.g. One 720/50P Dolby Frame = 40ms

Questions & Answers

Q1. *What happens if the Dolby E frame rate is different to the input video frame rate?*
A1. The Alchemist will decode the Dolby E (whatever the frame rate is) and re-encode it to make a Dolby compliant bitstream at the specified output frame rate. All embedded audio (PCM/Data or Dolby E) must be 48KHz and clock synchronous with the video. This feature could be used to repair a program which had previously been converted in data mode.

Q2. *What happens if I give the Alchemist Dolby E which is out of the guard band?*
A2. The Alchemist will automatically re-align and output Dolby compliant data.

Q3. *Can I encode PCM to Dolby E?*
A3. Not on the initial release, but the infrastructure is in place to support this feature.

Q4. *Can I author my own metadata?*
A4. It is anticipated this part of the work flow will occur as part of an encoding process. The transcoding Dolby E mode of operation will transparently pass all metadata and modify the frame rate metadata parameter where appropriate.

Q5. *What happens if my program switches from Dolby E to PCM?*
A5. The Alchemist will automatically detect the loss of Dolby E and indicate the presence of PCM. The PCM will be routed through the same path to the output without user intervention.

Q6. *Can the Alchemist act as a Dolby E test generator?*
A6. Yes, a tone may be applied to each Dolby encoder. The usual 1KHz/4KHz -18dBFS/-20dBFS selections are available. The decoder must have a valid Dolby E bitstream present and the tone program config and metadata will be passed through from the input. Where a LFE channel is present a 100Hz tone will be generated.

Q7. *Why can you not use gain with Dolby E?*
A7. Dolby E content has been mastered with care, and the associated Metadata reflects the way this Dolby E has been created. Altering the gain of the audio within the Dolby E bit-stream may render the Metadata inaccurate.

Q8. *Can I use Dolby E when I select a SlowPAL output format (625 23.98PsF and 625 24PsF)?*
A8. Yes the Dolby E will be present on both the embedded and AES but it will be 48KHz.

Q9. *Can I use Dolby E when I select a SlowPAL input format (625 23.98PsF and 625 24PsF)?*
A9. Yes the system will accept either AES or Embedded if the source is 48KHz. If Slow audio is required we recommend the use of AES.

Q10. *How will Dolby E be aligned with a 720p 50/59 video output??*
A10. The Dolby E will be aligned correctly to alternate 720P frames. If a specific alignment is desired, the Alchemist should be provided with an interlaced reference source, OR the 720P output should be allocated to the secondary output, and an interlaced format should be selected on the primary – in this case, the Dolby E will be aligned with the interlaced frame structure.

Q11. *Can I fix Dolby E lip-sync problems?*
A11. Yes, positive or negative delay may be included via the global/master delay and/or the individual output pair delay.

Q12. *Can I accommodate the frame latency of the encoder before the Alchemist?*
A12. Yes, this can be accommodated easily, through the use of the IP Alignment control. This control allows the user to specify whether the incoming Dolby E is Co-timed/Delayed or advanced by 1 frame with respect to the video. Note that

there is also an Output Alignment control to aid integration with downstream equipment.

Q13. *Will the AES decoded outputs be aligned with Embedded Dolby E bitstream?*
A13. Yes they will, although AES outputs will always be aligned with Output A, i.e. if Output B genlock offset is adjusted the timing will be different to A and the AES outputs. In addition if the “Monitor” AES feature is enabled, the AES timing will be advanced on the Embedded channels as this feature is intended to monitor the input decoded PCM.

Q14. *How is the Dolby E bitstream aligned if my primary and secondary outputs have different genlock offsets?*
A14. The Dolby E will be correctly aligned in both outputs, irrespective of the genlock offset. Note that the AES outputs will be aligned to the primary video output (A), and therefore may be offset relative to the secondary. See also Q13 & Q10.

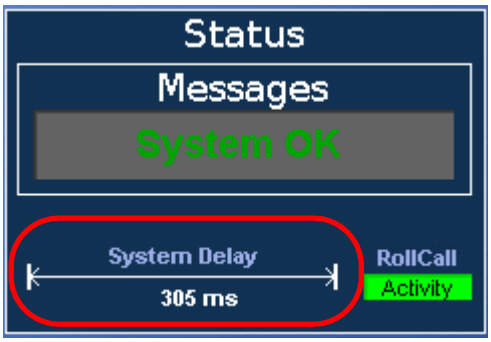
Q15. *Does the Alchemist process Dolby D?*
A15. The Alchemist will automatically detect the presence of Dolby D and allow it to be decoded.

Q16. *Is it possible to change the order of the Dolby E program. i.e. 5.1 + 2 to 2 + 5.1?*
A16. Not on the initial release, but the infrastructure is in place to support this feature. The feature would be included when authoring/encoding is available.

Q17. *Is it possible to have Dolby channel 1 embedded in output pair 1 on output A and Dolby channel 2 embedded in output pair 1 on output B?*
A17. Not on the initial release, but the infrastructure is in place to support this feature. Currently both output A and B carry the same embedded data

Appendix F: Latency Tables

The System Delay (Video Delay) of the Alchemist is shown on the Status display of the Home screem



The value of this delay is varies according to the following factors:

1. The conversion mode selected (input and output standard)
2. Whether FilmTools is enabled and installed
3. If FilmTools is not installed and enabled, whether the Minimum Delay control is enabled
4. Whether the Timecode option is installed and set to a Synchro mode of operation.

The Latency tables define a value for all combinations of points 1-3. A "Synchro" timecode conversion may increase the numbers quoted by up to a maximum of one output frame. The change in processing delay associated to the synchro timecode conversion will change any time a "synchro start" event occurs. It is not possible to predict in advance the change that will be applied. However, it will be reflected in the System Delay which is shown on the status display of the Home screen. The total system delay will automatically be applied to all audio processing channels. There are other audio controls which may affect the total audio delay applied to an audio signal. See page 174.

The two tables in this appendix show the latency through the unit as affected by these factors.

- **Column one:** displays the input standard.
- **Column two:** displays the output standard.
- **Column three:** displays the total system delay (in milliseconds) for the corresponding conversion, assuming that the unit is referenced to the input and no offset has been specified. This value is shown as the System Delay in the Status display on the Home screen.
- **Column four:** displays the range of delay that may occur if the unit is running with an offset or is in Freerun mode.

Table 1 displays the delay when the FilmTools option is not installed, or is disabled, and the Minimum Delay control on the Setup menu is set to **Yes**. See page 180.

Table 2 displays the delay when the FilmTools option is enabled, or when the Minimum Delay control on the Setup menu is set to **No**. See page 183.

Table 1: FilmTools not installed or disabled and Minimum Delay set to Yes

Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
1080 60i/30PsF	1080 60i/30PsF	168	135 to 168
	1080 59i/29PsF	168	135 to 168
	1080 50i/25PsF	160	160
	720 60P	152	135 to 152
	720 59P	168	135 to 168
	525 59i/29PsF	173	140 to 173
	625 50i/25PsF	160	160
	720 50P	160	160
1080 59i/29PsF	1080 60i/30PsF	168	135 to 168
	1080 59i/29PsF	168	135 to 168
	1080 50i/25PsF	160	160
	720 60P	168	135 to 168
	720 59P	152	135 to 152
	525 59i/29PsF	173	140 to 173
	625 50i/25PsF	160	160
	720 50P	160	160
1080 50i/25PsF	1080 60i/30PsF	180	180
	1080 59i/29PsF	180	180
	1080 50i/25PsF	205	165 to 205
	720 60P	180	180
	720 59P	180	180
	525 59i/29PsF	180	180
	625 50i/25PsF	205	165 to 205
	720 50P	180	160 to 180

Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
720 60P	1080 60i/30PsF	152	135 to 152
	1080 59i/29PsF	168	135 to 168
	1080 50i/25PsF	160	160
	720 60P	152	135 to 152
	720 59P	168	135 to 168
	525 59i/29PsF	173	140 to 173
	625 50i/25PsF	160	160
	720 50P	160	160
720 59P	1080 60i/30PsF	168	135 to 168
	1080 59i/29PsF	152	135 to 152
	1080 50i/25PsF	160	160
	720 60P	168	135 to 168
	720 59P	152	135 to 152
	525 59i/29PsF	157	140 to 157
	625 50i/25PsF	160	160
	720 50P	160	160
720 50P	1080 60i/30PsF	180	180
	1080 59i/29PsF	180	180
	1080 50i/25PsF	185	165 to 185
	720 60P	180	180
	720 59P	180	180
	525 59i/29PsF	180	180
	625 50i/25PsF	185	165 to 185
	720 50P	180	160 to 180

Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
625 50i/25PsF	1080 60i/30PsF	180	180
	1080 59i/29PsF	180	180
	1080 50i/25PsF	205	165 to 205
	720 60P	180	180
	720 59P	180	180
	525 59i/29PsF	180	180
	625 50i/25PsF	205	165 to 205
	720 50P	185	165 to 185
525 59i/29PsF	1080 60i/30PsF	168	135 to 168
	1080 59i/29PsF	168	135 to 168
	1080 50i/25PsF	160	160
	720 60P	168	135 to 168
	720 59P	152	135 to 152
	525 59i/29PsF	140	140 to 173
	625 50i/25PsF	160	160
	720 50P	160	160

Table 2: FilmTools enabled or Minimum Delay set to Off

Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
1080 60i/30PsF	1080 60i/30PsF	253	220 to 253
	1080 59i/29PsF	253	220 to 253
	1080 50i/25PsF	278	245 to 278
	720 60P	253	220 to 253
	720 59P	253	220 to 253
	525 59i/29PsF	253	220 to 253
	625 50i/25PsF	278	245 to 278
	1080 48i/24PsF	278	245 to 278
	1080 47i/23PsF	278	245 to 278
	625 48i/24PsF	278	245 to 278
	625 47i/23PsF	278	245 to 278
	720 50P	273	240 to 273
1080 59i/29PsF	1080 60i/30PsF	253	220 to 253
	1080 59i/29PsF	253	220 to 253
	1080 50i/25PsF	278	245 to 278
	720 60P	253	220 to 253
	720 59P	253	220 to 253
	525 59i/29PsF	253	220 to 253
	625 50i/25PsF	278	245 to 278
	1080 48i/24PsF	278	245 to 278
	1080 47i/23PsF	278	245 to 278
	625 48i/24PsF	278	245 to 278
	625 47i/23PsF	278	245 to 278
	720 50P	273	240 to 273

Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
1080 50i/25PsF	1080 60i/30PsF	317	280 to 317
	1080 59i/29PsF	317	280 to 317
	1080 50i/25PsF	305	265 to 305
	720 60P	317	280 to 317
	720 59P	317	280 to 317
	525 59i/29PsF	317	280 to 317
	625 50i/25PsF	305	265 to 305
	1080 48i/24PsF	325	285 to 325
	1080 47i/23PsF	325	285 to 325
	625 48i/24PsF	325	285 to 325
	625 47i/23PsF	325	285 to 325
	720 50P	300	260 to 300
1080 48i/24PsF	1080 60i/30PsF	328	290 to 328
	1080 59i/29PsF	328	290 to 328
	1080 50i/25PsF	336	295 to 336
	720 60P	328	290 to 328
	720 59P	328	290 to 328
	525 59i/29PsF	328	290 to 328
	625 50i/25PsF	336	295 to 336
	1080 48i/24PsF	317	275 to 317
	1080 47i/23PsF	317	275 to 317
	625 48i/24PsF	317	275 to 317
	625 47i/23PsF	317	275 to 317
	720 50P	336	295 to 336

Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
1080 47i/23PsF	1080 60i/30PsF	328	290 to 328
	1080 59i/29PsF	328	290 to 328
	1080 50i/25PsF	336	295 to 336
	720 60P	328	290 to 328
	720 59P	328	290 to 328
	525 59i/29PsF	333	295 to 333
	625 50i/25PsF	336	295 to 336
	1080 48i/24PsF	317	275 to 317
	1080 47i/23PsF	317	275 to 317
	625 48i/24PsF	317	275 to 317
	625 47i/23PsF	317	275 to 317
	720 50P	336	295 to 336
720 60P	1080 60i/30PsF	253	220 to 253
	1080 59i/29PsF	253	220 to 253
	1080 50i/25PsF	278	245 to 278
	720 60P	253	220 to 253
	720 59P	253	220 to 253
	525 59i/29PsF	253	220 to 253
	625 50i/25PsF	278	245 to 278
	1080 48i/24PsF	278	245 to 278
	1080 47i/23PsF	278	245 to 278
	625 48i/24PsF	278	245 to 278
	625 47i/23PsF	278	245 to 278
	720 50P	273	240 to 273

Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
720 59P	1080 60i/30PsF	253	220 to 253
	1080 59i/29PsF	253	220 to 253
	1080 50i/25PsF	278	245 to 278
	720 60P	253	220 to 253
	720 59P	253	220 to 253
	525 59i/29PsF	253	220 to 253
	625 50i/25PsF	278	245 to 278
	1080 48i/24PsF	278	245 to 278
	1080 47i/23PsF	278	245 to 278
	625 48i/24PsF	278	245 to 278
	625 47i/23PsF	278	245 to 278
	720 50P	273	240 to 273
720 50P	1080 60i/30PsF	317	280 to 317
	1080 59i/29PsF	317	280 to 317
	1080 50i/25PsF	305	265 to 305
	720 60P	317	280 to 317
	720 59P	317	280 to 317
	525 59i/29PsF	317	280 to 317
	625 50i/25PsF	305	265 to 305
	1080 48i/24PsF	325	285 to 325
	1080 47i/23PsF	325	285 to 325
	625 48i/24PsF	325	285 to 325
	625 47i/23PsF	325	285 to 325
	720 50P	300	260 to 300

Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
625 50i/25PsF	1080 60i/30PsF	317	280 to 317
	1080 59i/29PsF	317	280 to 317
	1080 50i/25PsF	305	265 to 305
	720 60P	317	280 to 317
	720 59P	317	280 to 317
	525 59i/29PsF	317	280 to 317
	625 50i/25PsF	305	265 to 305
	1080 48i/24PsF	325	285 to 325
	1080 47i/23PsF	325	285 to 325
	625 48i/24PsF	325	285 to 325
	625 47i/23PsF	325	285 to 325
	720 50P	305	265 to 305
625 48i/24PsF	1080 60i/30PsF	328	290 to 328
	1080 59i/29PsF	328	290 to 328
	1080 50i/25PsF	336	295 to 336
	720 60P	328	290 to 328
	720 59P	328	290 to 328
	525 59i/29PsF	333	295 to 333
	625 50i/25PsF	336	295 to 336
	1080 48i/24PsF	317	275 to 317
	1080 47i/23PsF	317	275 to 317
	625 48i/24PsF	317	275 to 317
	625 47i/23PsF	317	275 to 317
	720 50P	336	295 to 336

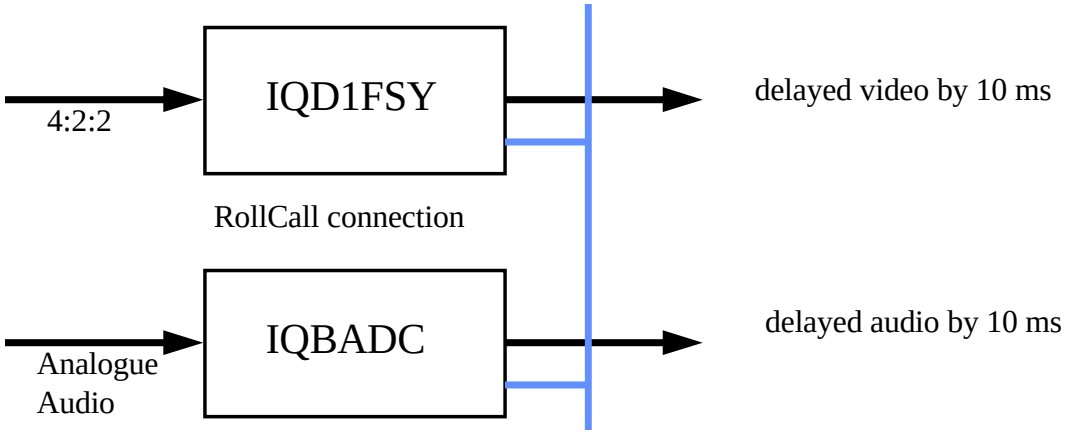
Input	**Output**	**Delay (ms)** Referenced to input with zero offset	**Delay (ms)** Referenced with offset or freerun
625 47i/23PsF	1080 60i/30PsF	328	290 to 328
	1080 59i/29PsF	328	290 to 328
	1080 50i/25PsF	336	295 to 336
	720 60P	328	290 to 328
	720 59P	328	290 to 328
	525 59i/29PsF	333	295 to 333
	625 50i/25PsF	336	295 to 336
	1080 48i/24PsF	317	275 to 317
	1080 47i/23PsF	317	275 to 317
	625 48i/24PsF	317	275 to 317
	625 47i/23PsF	317	275 to 317
	720 50P	336	295 to 336
525 59i/29PsF	1080 60i/30PsF	253	220 to 253
	1080 59i/29PsF	253	220 to 253
	1080 50i/25PsF	278	245 to 278
	720 60P	253	220 to 253
	720 59P	253	220 to 253
	525 59i/29PsF	253	220 to 253
	625 50i/25PsF	278	245 to 278
	1080 48i/24PsF	278	245 to 278
	1080 47i/23PsF	278	245 to 278
	625 48i/24PsF	278	245 to 278
	625 47i/23PsF	278	245 to 278
	720 50P	278	245 to 278

Appendix G: RollTrack Audio Delay Tracking

RollTrack is a feature of RollCall™ (Snell & Wilcox's proprietary remote control system), that allows devices to communicate across the RollCall network with no direct user intervention.

RollTrack Audio Delay Tracking enables Snell & Wilcox RollCall™ compatible audio delay products to track delay introduced by RollCall™ compatible video processing products.

The simplest configuration is a single video unit and a single audio delay in a RollCall™ system. The audio delay will have the same delay as through the video path. If the delay changes the audio delay will track.



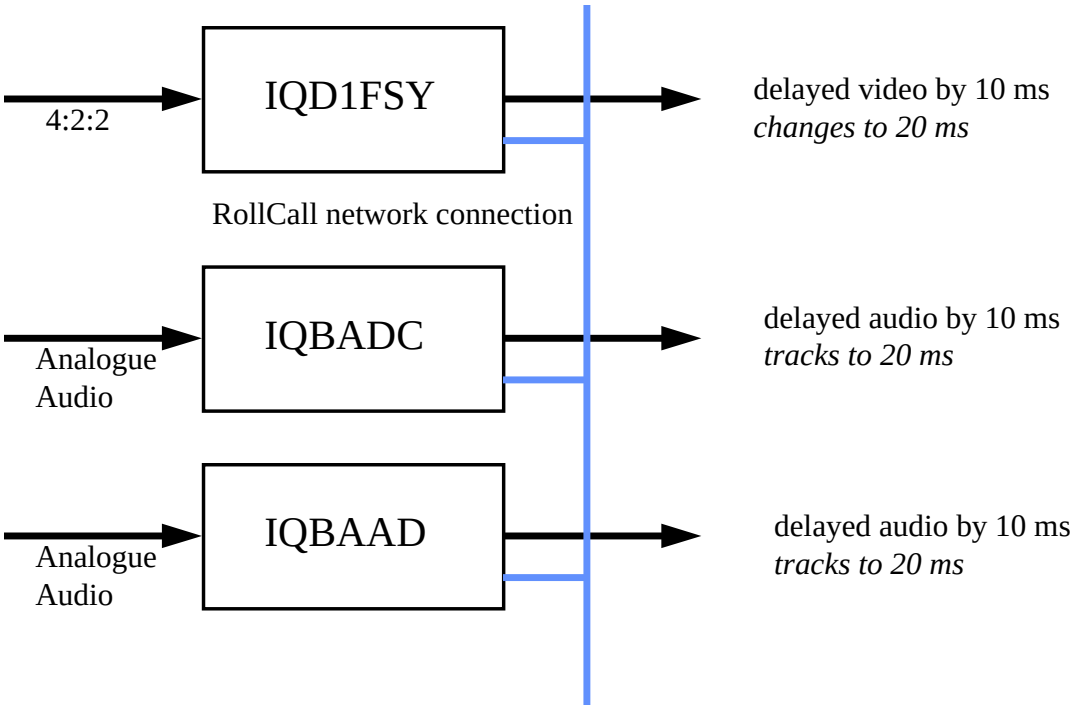
The next level of configuration is where there are multiple Frame Synchronizers (for example) each connected through RollCall™ to their own tracking Audio Delay. (It is worth stating that the synchronizers and audio delays do not have to be in the same enclosure; the addressing scheme, discussed later, allows for the units to be positioned anywhere in the RollCall™ domain.)

The maximum number of video units and audio delays in a RollCall™ system is set by the maximum limit of the number of modules in a RollCall™ network and is currently 3840 on a single network without bridges.

The unique identification of the destination unit (a decimal number) for various modules is as follows:

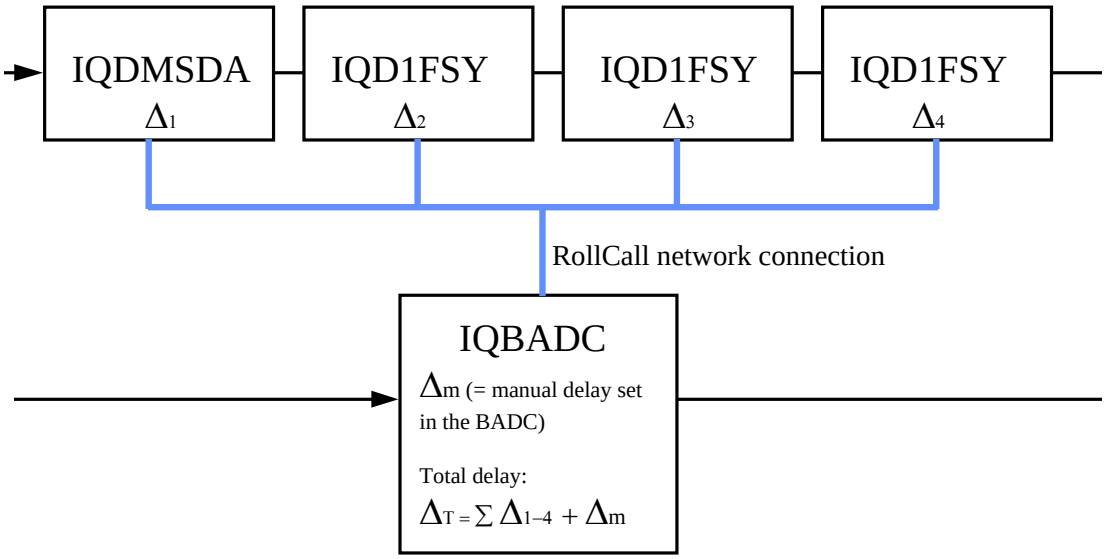
Module	ID
IQBADC	51
IQBDAC	52
IQBAAD	53
IQBDAD	54
IQBSYN	89
IQBADCD	107

The next level of complexity is *a vertical delay cluster* where a video unit can have up to eight audio delays tracking - of the same or different types.



From one to eight audio delay products can be connected via RollCall™ to a single frame synchronizer, for example. If the synchronizer delay changes, then however many audio delays are connected will track the delay. The audio delays can also have a manual delay which will be added to the RollTrack delay.

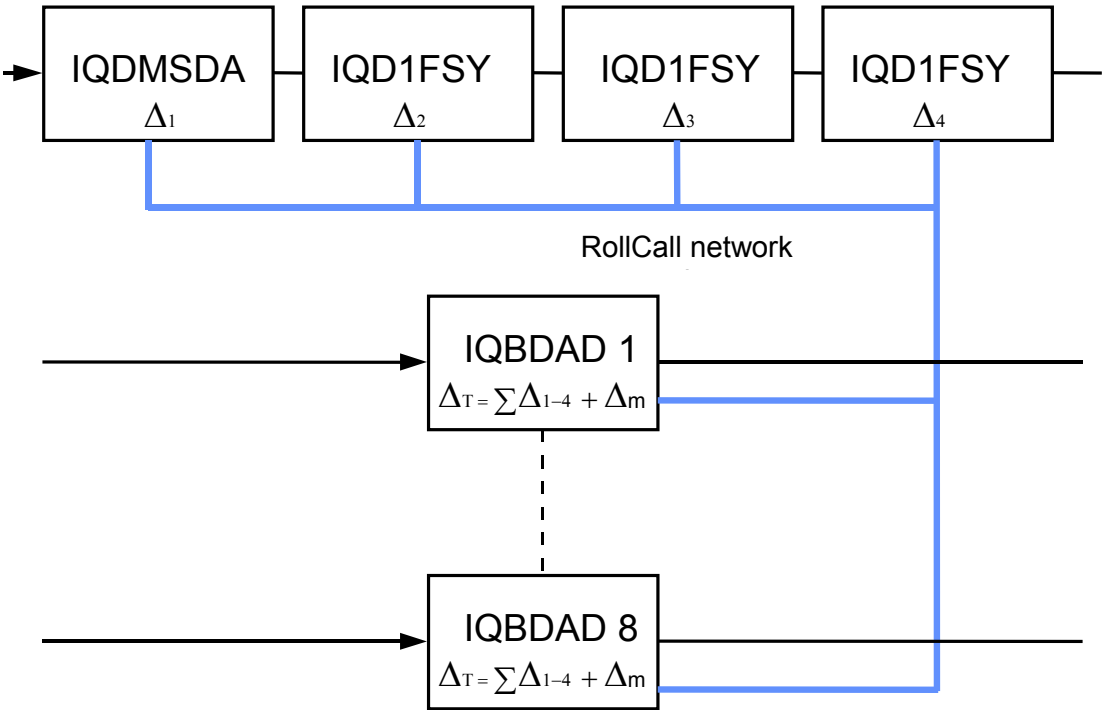
The next level of complexity is *a horizontal delay cluster* where an audio delay can track up to four video units.



The total delay time through the audio delay is then the sum of the individual delays introduced by the video units plus the manual delay of the audio unit. The manual delay can be set to compensate for any fixed propagation delay in the video path or may be set to zero.

The next level of complexity is a *matrix delay cluster* where each audio delay (up to eight) can track up to four video units. This configuration is in effect a four by eight matrix of video units and audio delay units. The total delay time through the

audio delay units is then the sum of the individual delays introduced by the video units plus the manual delay of the audio unit.



As any of the delay times change in the video path so will the audio delay time track this delay.

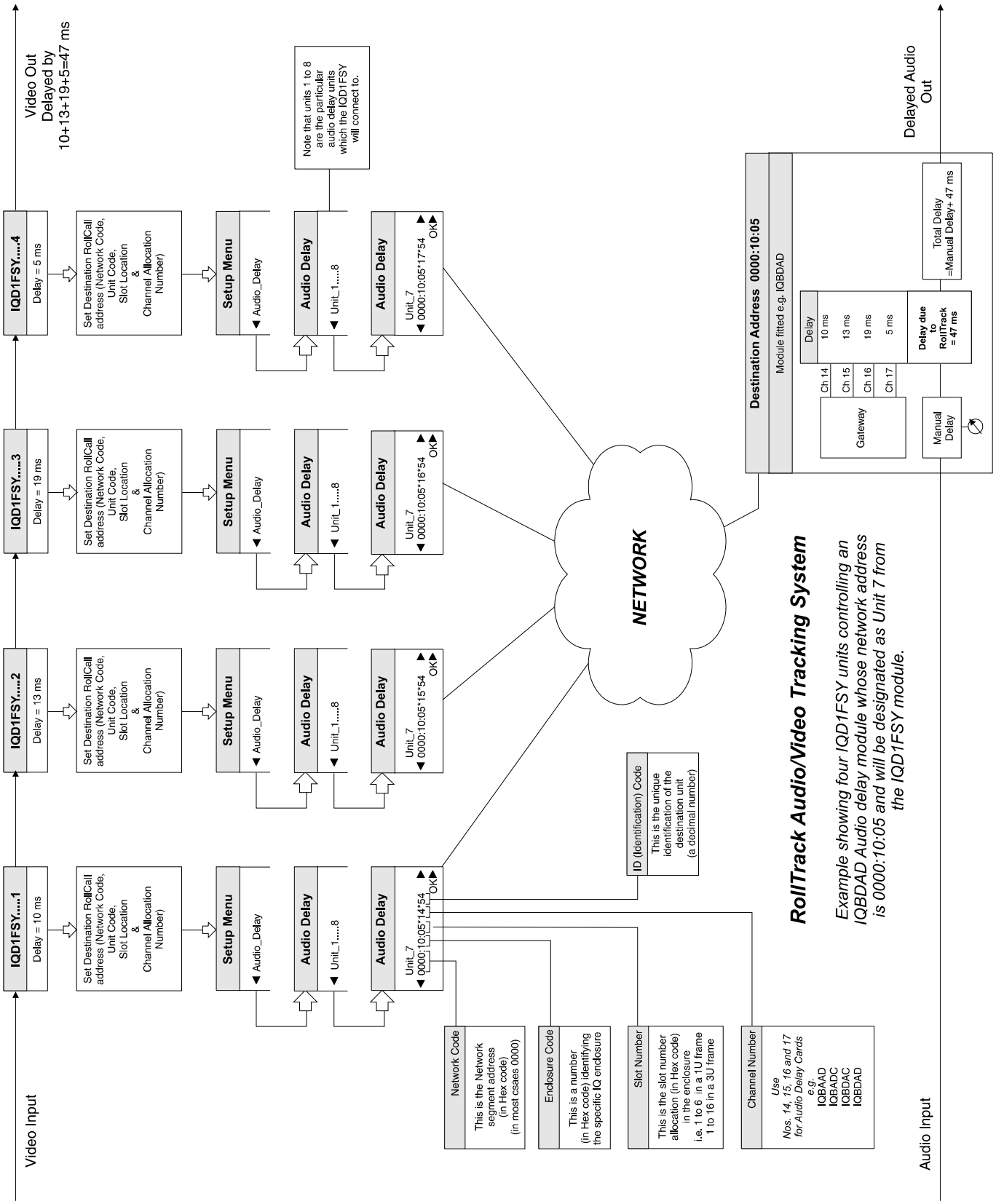
A virtual connection is made between from, say, an IQD1FSY to an IQBDAD by:

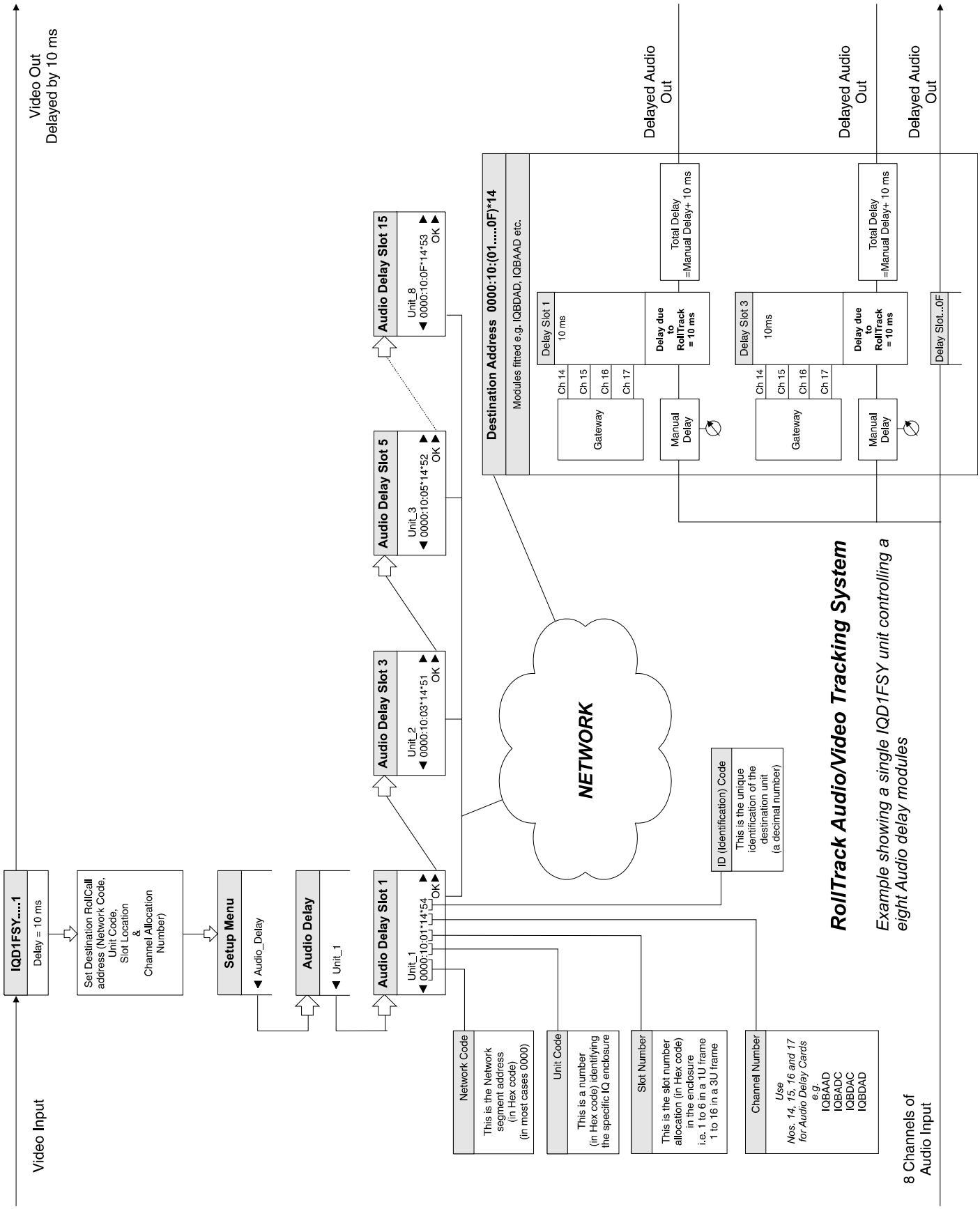
- selecting the *Setup...* Menu of the IQD1FSY
- then selecting the *Audio_Delay...* Menu
- then choosing from *Unit_1* to *Unit_8*
- then entering the unique network address of the IQBDAD in the form *nnnn:xx:yy*z*d*
- where *nnnn* = network address and in most cases will be 0000(hex);
- *xx* = IQ enclosure address (hex);
- *yy* = slot address of the IQBDAD (hex)
- *z* = the connection (or channel) number (decimal) - see table below.

  d = the unique identification of the destination unit (decimal) The ID entered must match the receiving units own ID or else the command will be ignored. If the ID value is set to 00, the receiving unit does not perform an ID match and will always accept the incoming command then selecting the *Delay...* Menu of the IQBDAD then selecting *RollTrack*
  Example of Network Addresses with Channel Numbers and ID Numbers

	D1FSY 1	**D1FSY 2**	**D1FSY 3**	**D1FSY 4**
Audio delay 1	0000:10:01*14*54	0000:10:01*15*54	0000:10:01*16*54	0000:10:01*17*54
Audio delay 2	0000:10:03*14*54	0000:10:03*15*54	0000:10:03*16*54	0000:10:03*17*54
Audio delay 3	0000:10:05*14*54	0000:10:05*15*54	0000:10:05*16*54	0000:10:05*17*54
Audio delay 4	0000:10:07*14*54	0000:10:07*15*54	0000:10:07*16*54	0000:10:07*17*54
Audio delay 5	0000:10:09*14*54	0000:10:09*15*54	0000:10:09*16*54	0000:10:09*17*54
Audio delay 6	0000:10:0B*14*54	0000:10:0B*15*54	0000:10:0B*16*54	0000:10:0B*17*54
Audio delay 7	0000:10:0D*14*54	0000:10:0D*15*54	0000:10:0D*16*54	0000:10:0D*17*54
Audio delay 8	0000:10:0F*14*54	0000:10:0F*15*54	0000:10:0F*16*54	0000:10:0F*17*54

The most complex system would be an array of matrix delay clusters




Video Out
Delayed by 10 ms
IQD1FSY....1
Delay = 10 ms
Set Destination RollCall address (Network Code, Unit Code, Slot Location & Channel Allocation Number)
Setup Menu
Audio_Delay
Audio Delay
Unit_1
Audio Delay Slot 1
Unit_1
0000:10:01*14*54
OK
Audio Delay Slot 3
Unit_2
0000:10:03*14*51
OK
Audio Delay Slot 5
Unit_3
0000:10:05*14*52
OK
Audio Delay Slot 15
Unit_8
0000:10:0F*14*53
OK
NETWORK
Destination Address 0000:10:(01.....0F)*14
Modules fitted e.g. IQBDAD, IQBAAD etc.
Delay Slot 1
10 ms
Ch 14
Ch 15
Ch 16
Ch 17
Gateway
Delay due to RollTrack = 10 ms
Manual Delay
Total Delay =Manual Delay+ 10 ms
Delay Slot 3
10ms
Delay Slot...0F
Delayed Audio Out
Delayed Audio Out
Delayed Audio Out
ID (Identification) Code
This is the unique identification of the destination unit (a decimal number)
Network Code
This is the Network segment address (in Hex code) (in most cases 0000)
Unit Code
This is a number (in Hex code) identifying the specific IQ enclosure
Slot Number
This is the slot number allocation (in Hex code) in the enclosure i.e. 1 to 6 in a 1U frame 1 to 16 in a 3U frame
Channel Number
Use Nos. 14, 15, 16 and 17 for Audio Delay Cards e.g. IQBAAD IQBADC IQBDAC IQBDAD
RollTrack Audio/Video Tracking System
Example showing a single IQD1FSY unit controlling a eight Audio delay modules
Video Input
8 Channels of Audio Input

Manual Revision Record

Date	Version	Issue	Change	Comments
120107	1	1		First issue
101007	1	2	For software version 1.1	New issue
090108	1	3	For software version 1.1.3	New issue
050608	1	4	For software version 2.0	New issue
200808	1	5	For software version 2.1	New issue
220109	2	1	New manual template. Manual updated for software V3.0 (FilmTools).	New version and issue
250309	2	2	Manual updated for software V4.0 (Dolby E)	New issue