Innovation in the
Multi-Screen World

Operator's Manual

Alchemist Ph.C-HD

Motion Compensated Conversion Platform

Information and Notices

About this Manual

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

Software Version

Software version: 7.1.0

Copyright and Disclaimer

Important Notice

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

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For further details of our Regional Customer Support Offices, please visit the Snell website and navigate to Support/Customer Support Contacts.

http://www.snellgroup.com/support/customer-support/customer-support/

Customers with a support contract should call their personalized number, which can be found in their contract, and be ready to provide their contract number and details.

Safety Information

Explanation of Safety Symbols

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.

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

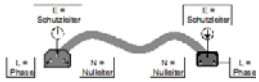
Die angeführten Service-/Reparatur-Anweisungen sind ausschließlich von qualifiziertem Service-Personal auszuführen. Um das Risiko eines lektroschocks zu reduzieren, führen Sie ausschließlich die im Benutzerhandbuch eschriebenen Anweisungen aus, es sei denn, Sie haben die entsprechende Qualifikation.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

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.

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 PROTECCIONES
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.

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.

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 hankontakten, avyttra denna kontakt omedelbart på ett säkert sätt. Färgkoden för ledningen är följande:

GRÖN/GUL ledning ansluten till E (Skyddsjordad ledare)

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

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

Turvamerkkien selitys (FI)

Tämä merkki tarkoittaa, että laitteen mukana toimitettu kirjallinen materiaali sisältää tärkeitä tietoja. Lue käyttöohje.

Tämä merkki ilmoittaa, että laitteen sisällä on vaarallisen voimakas jännite. Sisäpuolella ei ole mitään osia, joita käyttäjä voisi itse huoltaa. Huollon saa suorittaa vain alan ammattilainen.

Turvaohjeita

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

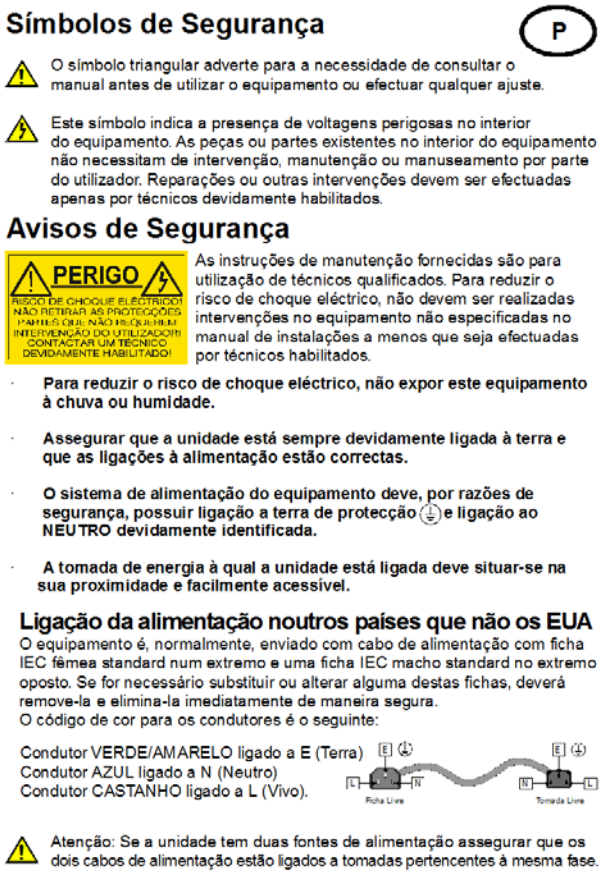
- **Sähköiskujen välttämiseksi suojaa laite sateelta ja kosteudelta.**
- **Varmistu, että laite on asianmukaisesti maadoitettu ja että sähkökytkennät on tehty oikein.**
- **Laitteelle tehoa syöttävässä järjestelmässä tulee olla SUOJAMAALIITÄNTÄ ⏚ ja nollaliitännän on oltava luotettavasti tunnistettavissa.**
- **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

PERIGO
RISCO DE CHOQUE ELÉCTRICO! NÃO RETIRAR AS PROTECÇÕES PARTES QUE NÃO REQUEREM INTERVENÇÃO DO UTILIZADOR! CONTACTAR UM TÉCNICO DEVIDAMENTE HABILITADO!

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.

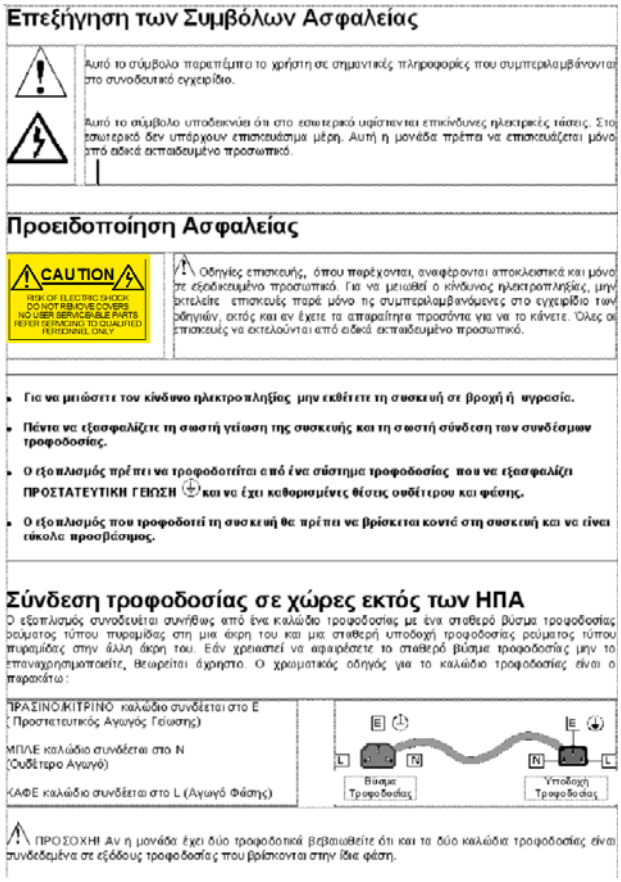
- **Para reduzir o risco de choque eléctrico, não expor este equipamento à chuva ou humidade.**
- **Assegurar que a unidade está sempre devidamente ligada à terra e que as ligações à alimentação estão correctas.**
- **O sistema de alimentação do equipamento deve, por razões de segurança, possuir ligação 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 συνοδεύεται συνήθως από ένα καλώδιο τροφοδοσίας με ένα σταθερό βύσμα τροφοδοσίας ρεύματος τύπου πυραμίδας στη μια άκρη του και μια σταθερή υποδοχή τροφοδοσίας ρεύματος τύπου πυραμίδας στην άλλη άκρη του. Εάν χρειαστεί να 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.

Mains Power Supplies

This equipment has two 3-pin IEC power sockets, one for the main power supply unit and one for the redundant power supply unit.

The power supply is auto switching for input voltages in the ranges of 100 V to 240 V nominal. No voltage adjustment procedure is required.

- To reduce the risk of electric shock, plug each power supply into separate branch circuits employing separate service grounds.
- Before performing any servicing or maintenance, disconnect and isolate the unit from the mains input and from any product outputs.
- Do not operate this unit without an earth connection.

Power Cord Supplied

The equipment is shipped with a power cord with a standard molded IEC female plug on one end and a standard mains 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/YELLOW lead connected to E (Protective Earth Conductor)
- BROWN lead connected to L (Live Conductor)
- BLUE lead connected to N (Neutral Conductor)

Handling Instructions

Caution! Do not attempt to lift the unit using the handles attached to the front panel.

Safety Standards

This equipment conforms to the following standards:

EN60950-1: 2006 + A11

Safety of Information Technology Equipment
Including Electrical Business Equipment.

UL1419 (2nd Edition)

Standard for Safety – Professional Video and Audio equipment.

EMC Standards

This equipment 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.

FCC / CFR 47:Part 15, Class A

Federal Communications Commission Rules Part 15, Subpart B, Class A.

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.

EMC Performance of Cables and Connectors

Snell 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.

Contents

1. Introduction

1.1 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.

1.1.1 Front Panel View

1.1.2 Rear Panel View

1.2 Features

- Compact 3RU size: practical for portable applications as well as mobiles, studio installation and rental.
- All in one box: easy installation and low engineering risk.
- User Interface: intuitive color touch screen.
- Top performance: ultimate in video conversion performance using Ph.C.
- Dual redundancy: dual PSUs 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.
- Timecode: seamlessly timecode handling while performing a frame-rate conversion.

1.3 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 3Gbit/s HD - SDI SMPTE 424/425 Level A - mapping structure 1 (SMPTE 424/425) Level B - SMPTE 372M Dual link payload on a 3Gbit/s serial digital interface Dual link 1.5Gbit/s SMPTE 372
Reference	2 x loop-through HDTV Trisync/SD Bisync (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 (Output A) with embedded audio (4 Groups) Output Standards: 1.5 Gbit/s HD-SDI SMPTE292M/SMPTE299M 270M Mbit/s SD-SDI SMPTE259M 3Gbit/s HD - SDI SMPTE 424/425 Level A - mapping structure 1 (SMPTE 424/425) Level B - SMPTE 372M Dual link payload on a 3Gbit/s serial digital interface Dual link 1.5Gbit/s SMPTE 372
Serial digital secondary (Output B)	2 x 75 Ohm SD/HD Serial Digital (Output B) with embedded audio (4 Groups) Output Standards: 1.5 Gbit/s HD-SDI SMPTE292M/SMPTE299M 270M Mbit/s SD-SDI 3Gbit/s HD - SDI SMPTE 424/425 Level A - mapping structure 1 (SMPTE 424/425) Level B - SMPTE 372M Dual link payload on a 3Gbit/s serial digital interface Dual link 1.5Gbit/s SMPTE 372
Audio AES	8 channels unbalanced AES-3 via BNC connectors (75 Ohm)

Control Functions	
Input select	Input A, Input B
Input blanking	Left, Right, Top Bottom
Input loss	Input, Freeze, Black
Input standard	Auto
– SD	525, 625
– SD/HD	525, 625, 720 50p, 720 59p, 1080 50i, 1080 59i, 1080 50p, 1080 59p
– SD/HD with FilmTools	525 29PsF, 525 59i, 625 23/24/25PsF, 625 47/48i, 625 50i, 720 50p, 720 59/60p, 1080 23/24/25PsF, 1080 29/30PsF, 1080 47/48i, 1080 50i, 1080 59/60i
Output Standard	Auto
– Primary SD	525, 625
– Primary SD & HD	525, 625, 720 50p, 720 59p, 1080 50i, 1080 59i, 1080 50p, 1080 59p
– Secondary SD/HD with FilmTools	525 29PsF, 525 59i, 625 23/24/25PsF, 625 47/48i, 625 50i, 720 50p, 720 59/60p, 1080 23/24/25PsF, 1080 29/30PsF, 1080 47/48i, 1080 50i, 1080 59/60i
	Colorimetry
Output Standard	Auto
– Secondary SD	525, 625
– Secondary SD & HD	525, 625, 720 50p, 720 59p, 1080 50i, 1080 59i, 1080 50p, 1080 59p
– Secondary SD/HD with FilmTools	525 29PsF, 525 59i, 625 23/24/25PsF, 625 47/48i, 625 50i, 720 50p, 720 59/60p, 1080 23/24/25PsF, 1080 29/30PsF, 1080 47/48i, 1080 50i, 1080 59/60i
	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
Enhancement	Horizontal and vertical
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
Metadata	2 x input RS485
	2 x output RS485

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	SD, HD, 3Gbit/s Standard Conversion SD, HD, 3Gbit/s Standards, Up, Down & Cross Conversion
Ph.C area	5 user-definable keys with overlays to define active and inactive areas
Aspect ratio conversion	Manual, Forced or Auto (Format) mode. Preset Input and Output ARC Settings 4:3, 16:9, 14:9LB, 16:9LB, 4:3PB, Anamorphic, No Change User (Pan, Size, Asp, Tilt) Forced or Auto (Format) SMPTE 2016, (AFD) Authoring
CleanCut™	On/Off F1/F2/Any
VANC passing	VANC data passed when in pass-through or ARC mode
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 Embedded output pairs can be switched off as well as muted.
Pair Audio Delay	Audio delay for each pair can be adjusted independently

Timecode Functions (Option)

Input Timecode Setup

SD Source

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

HD Source

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

Output Timecode Setup

Output A

Frame Count Max	Auto, 24, 25, 30
Drop Frame Mode	59.94 output rates only DF/NDF

Output B

Frame Count Max	Auto, 24, 25, 30
Drop Frame Mode	59.94 output rates only DF/NDF

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

HD Activate

Embedded VITC	Enables insertion of embedded 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	00h00m00s00f to 23h59s59m29f Presets 01h00s00m00f, 10h00s00m00f
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 set-up time
EE Window	EE mode continuity window
Mode	Synchro Auto, Snychro Prerun, Synchro Manual, E-E, E-E Regen, Freerun, Trigger Load

FilmTools Functions (Option)

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
Video to Film Blur	User adjustable video to film blur control

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 (Option)

Processing

Dolby®E - 1 Channel	1 Dolby®E transcoder / authoring path • 1 x Dolby®D/E decoder • 1 X Dolby®E encoder
Dolby®E - 2 Channel	2 Dolby®E transcoder / authoring paths • 2 x Dolby®D/E decoder • 2 x Dolby®E encoder

Controls (per Dolby®E Channel)

Decoder Source	Selectable at pair level EMB [1:8] inputs AES [1:8] inputs ENC1 output ENC2 output
Encoder Source	Selectable at channel level AES [1:8] inputs EMB [1:8] inputs DEC1 [1:4] + AUX DEC2 [1:4:] + AUX Test tones

Decoder input alignment	Dolby e is co-timed, advanced or delayed by one frame.
Map AES monitor	Enables automatic assignment of decoded dolby E audio (co-timed with video)
Metadata programs	1–8 programs available (depending on program configuration)
Metadata memories	In addition to global memories 8 metadata memories are available
Metadata snapshot	Enables decoder metadata to be stored and modified
PCM processing	Route, delay, and gain
BLITS generator	Line up tone system for use with 5.1 surround formats
Encode output alignment	Dolby E is co-timed, advanced or delayed by one frame

Controls (Output)

AES [1:8] outputs selectable at channel level

AES [1:8] inputs
EMB [1:8] inputs
DEC1 [1:4] + AUX
DEC2 [1:4] + AUX
ENC1
ENC2
Test tones

EMB A [1:8] outputs selectable
at channel level

AES [1:8] inputs
EMB [1:8] inputs
DEC1 [1:4] + AUX
DEC2 [1:4] + AUX
ENC1
ENC2
Test tones

EMB B [1:8] outputs selectable
at channel level

AES [1:8] inputs
EMB [1:8] inputs
DEC1 [1:4] + AUX
DEC2 [1:4] + AUX
ENC1
ENC2
Test tones

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
Communications	
RollCall	Connection to a RollCall network via BNC connector, RS422, Ethernet.
SNMP	Ethernet
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)

2. Installation

Refer to “Safety Information” on page 4 before installing and connecting power to the unit.

2.1 Unpacking the Unit

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

- ALCHEMIST Ph.C-HD unit
- Two power cables
- Operator’s Manual CD

Unpack the box carefully and check for any shortages or shipping damage. Report any shortages or shipping damage to Snell immediately.

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

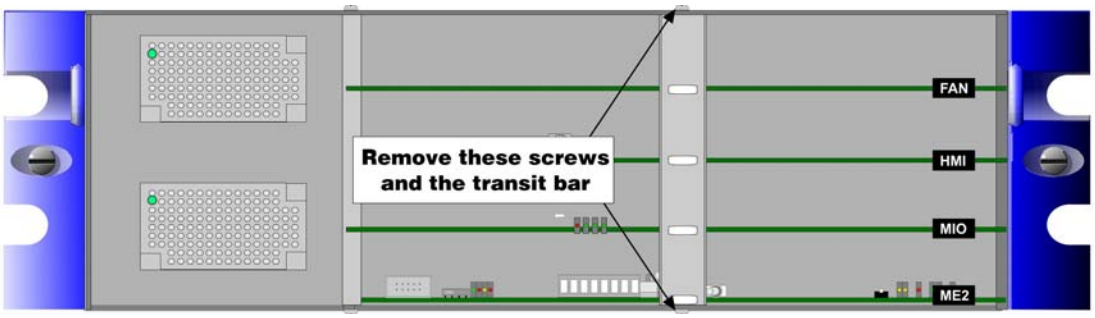
The Alchemist Ph.C-HD unit weighs more than 18 kg. Appropriate manual handling precautions should be taken when lifting the unit.

Do not attempt to lift the unit using the handles attached to the front panel.

2.2 Removing the Transit Bar

Remove the transit bar before installing the unit into an enclosure.

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



The transit bar must be in place before transporting the Alchemist Ph.C-HD. 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.

2.3 Connecting Power to the Alchemist Ph.C-HD

Note: Before connecting power to the unit, see “Safety Information” on page 4.

2.3.1 Power Inlets and Power Supply Switches

Power connectors and 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.

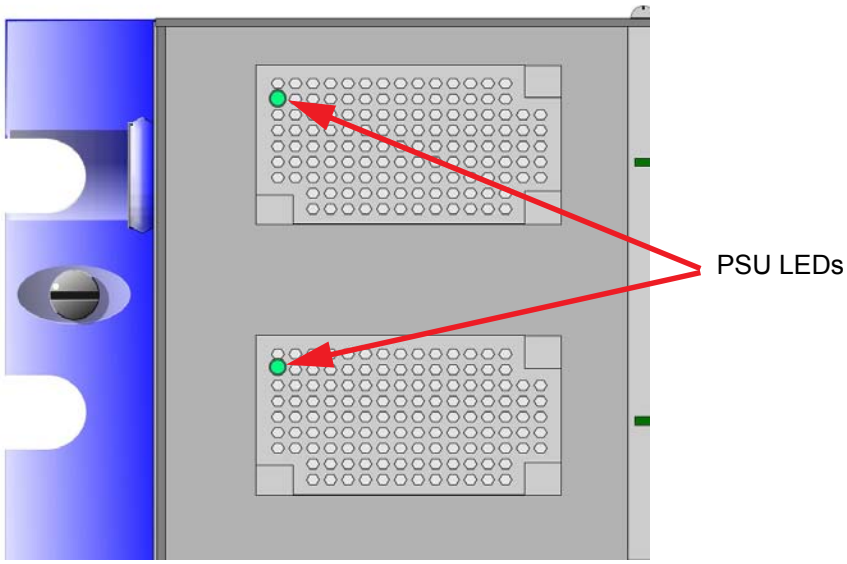
The rated current for each power supply is 7 - 3 A 100 V 240 V 50/60 Hz.

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.

2.3.2 Power Supply LEDs

When illuminated, the green LEDs indicate that the power supplies are operational.



2.3.3 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.

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

2.3.4 Supply Voltage

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

2.4 Environment

Although 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.

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 (detailed above). The fixing “ears” behind the panel will be revealed and the unit can be mounted in the rack.

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.

2.5 Handling Precautions

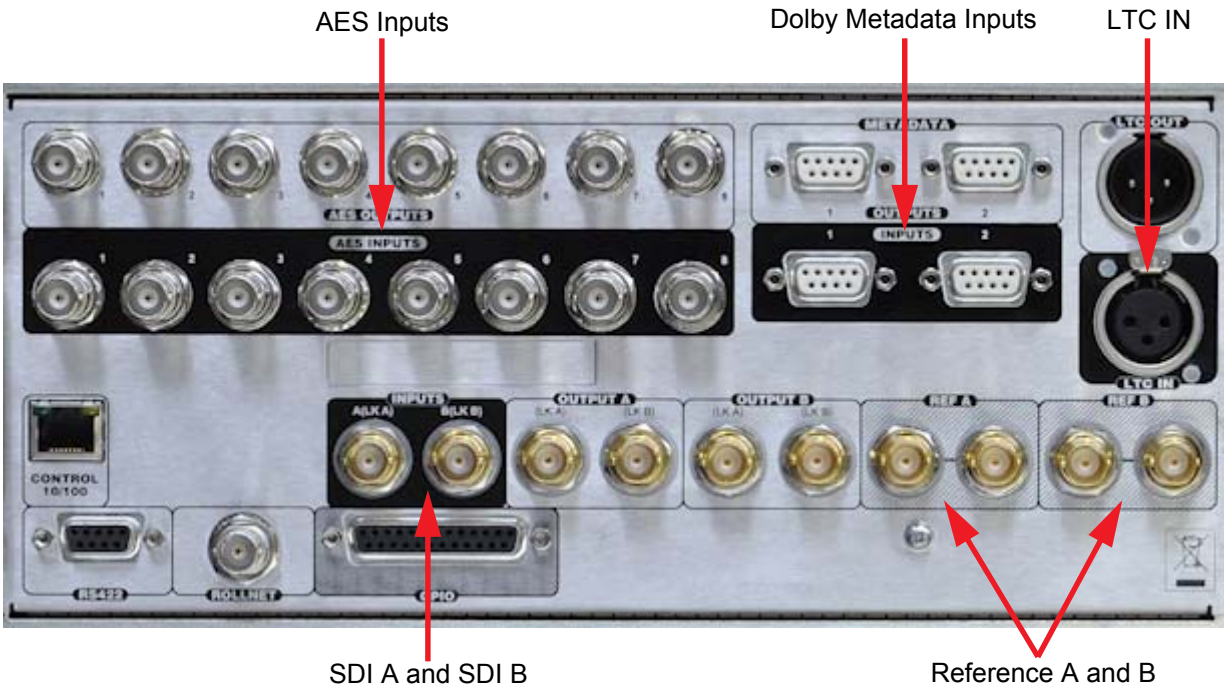
Touchscreen and TFT-LCD:

- 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, 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.

3. Connections

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

3.1 Inputs



3.1.1 SDI A, SDI B

Two SDI inputs via BNC connectors for 75 Ohms.

3.1.2 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.

3.1.3 AES Inputs

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

3.1.4 LTC IN

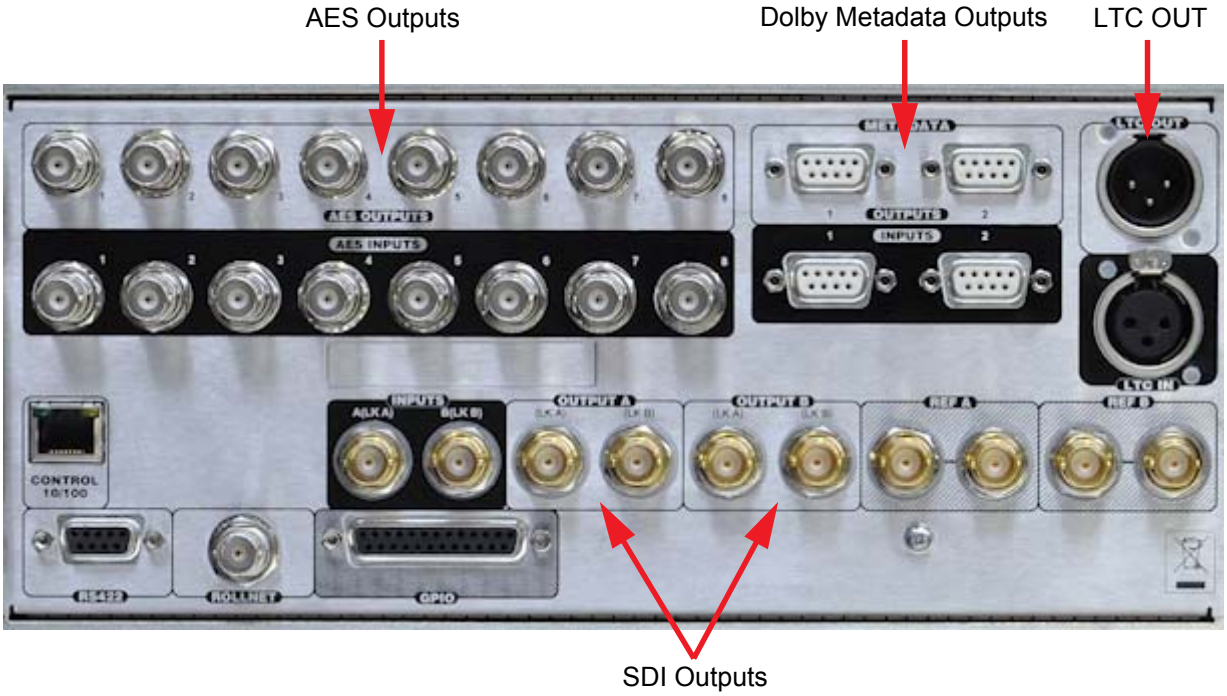
A standard Longitudinal Time Code signal may be connected to this XLR connector.

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

3.1.5 Dolby Metadata Inputs

Dolby Metadata input is via two D-type connectors.

3.2 Outputs



3.2.1 Output A & Output B

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

3.2.2 AES Outputs

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

3.2.3 LTC Out

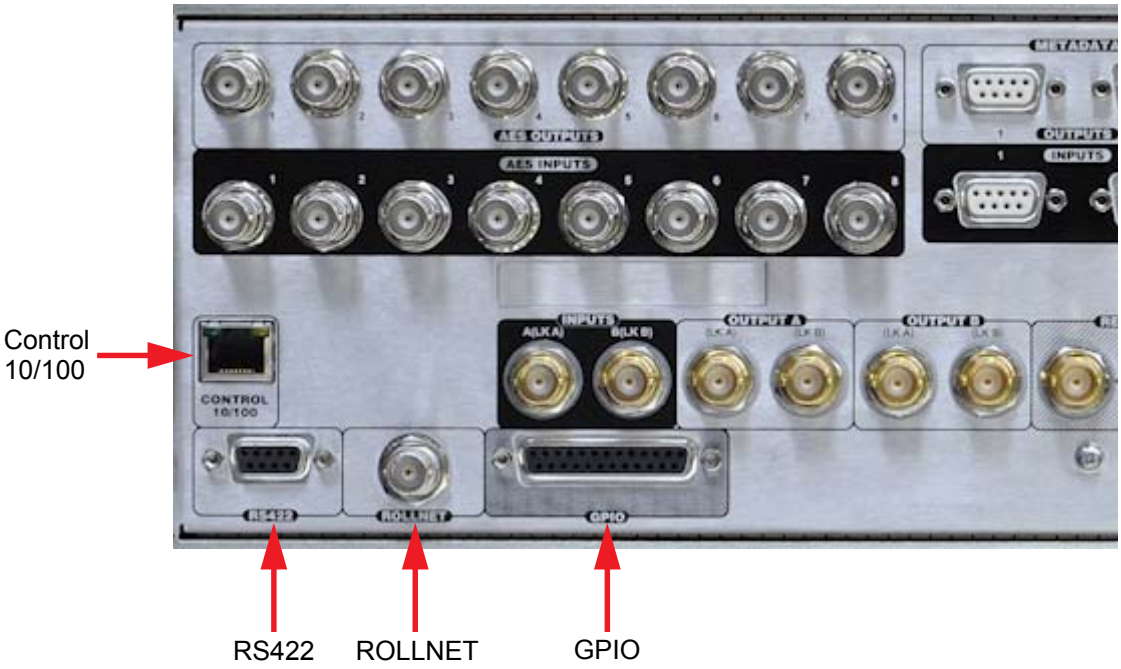
This XLR connector provides a standard Longitudinal Time Code signal.

This output requires a mating female XLR connector.

3.2.4 Dolby Metadata Inputs

Dolby Metadata is output via two D-type connectors.

3.3 Communication



3.3.1 ROLLNET

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).

3.3.2 RS422

The unit can be controlled via RollCall using the D-Type connector.

Pin	Function	Direction
1	Ground	
6	Tx signal common	
2	Transmit A	A Ph.C → Remote
7	Transmit B	A Ph.C → Remote
3	Receive B	A Ph.C ← Remote
8	Receive A	A Ph.C ← Remote
4	Rx signal common	
9	Ground	
5	Spare	

3.3.3 Control 10/100

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

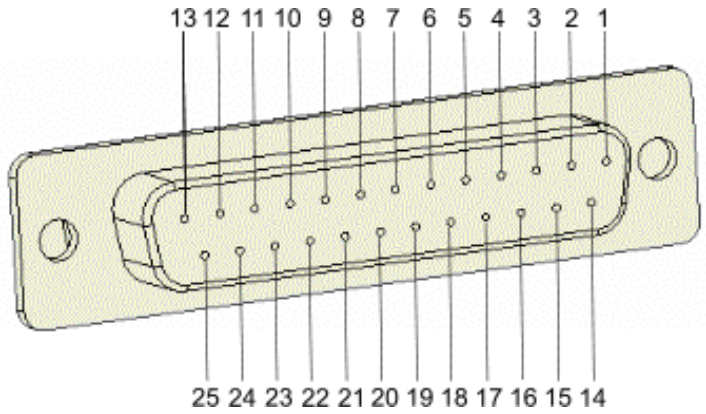
This connector is not intended for direct connection to a telecommunications network.

3.3.4 GPI

The General Purpose Interfaces (GPIs) 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

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



The output (GPO) characteristics are as follows:

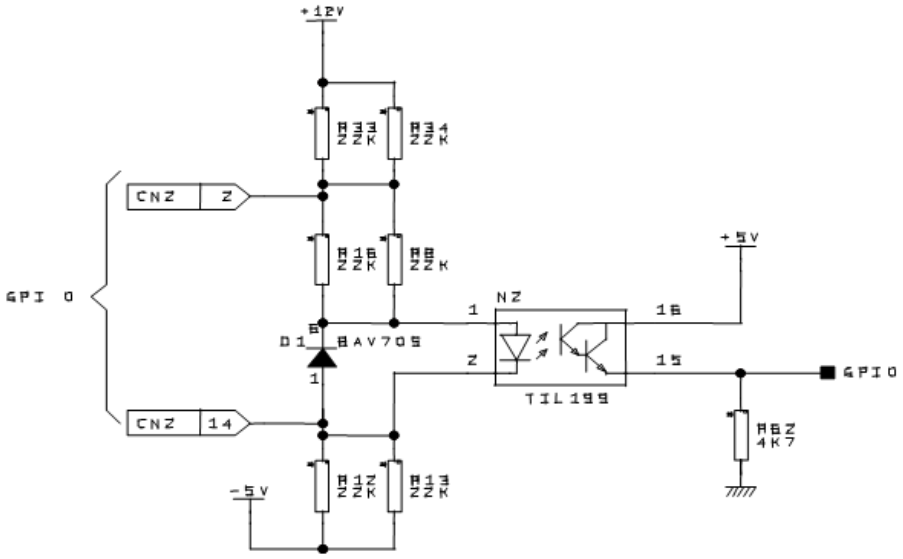
Operating Voltage Range	0 to ±60 V
(DC/AC peak)	
Maximum Load current	1.0 A (AC/DC)
Maximum On-State Resistance @ Tamb =+25°C	500 mOhm
Minimum Off-State Resistance	
@Tamb =+25°C,V=±48V	100 MOhm

3.3.6 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 below.

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



3.4 Headphones

On the front panel is a 1/4” headphone jack socket. The headphones can be used to monitor decoded PCM.

4. Operation Using the Touch Screen

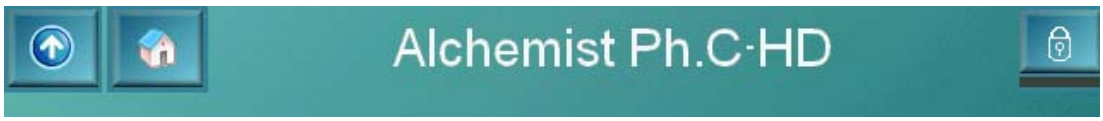
4.1 Overview

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.

4.2 Main Toolbar Selections



- 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.

4.3 Warnings and Notifications

If there is a problem with a function, the color of the item on the Home screen will change from a blue background to a red background.

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 an orange background.

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

4.4 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.

Touch **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.

4.5 Timeout

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

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

4.6 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.

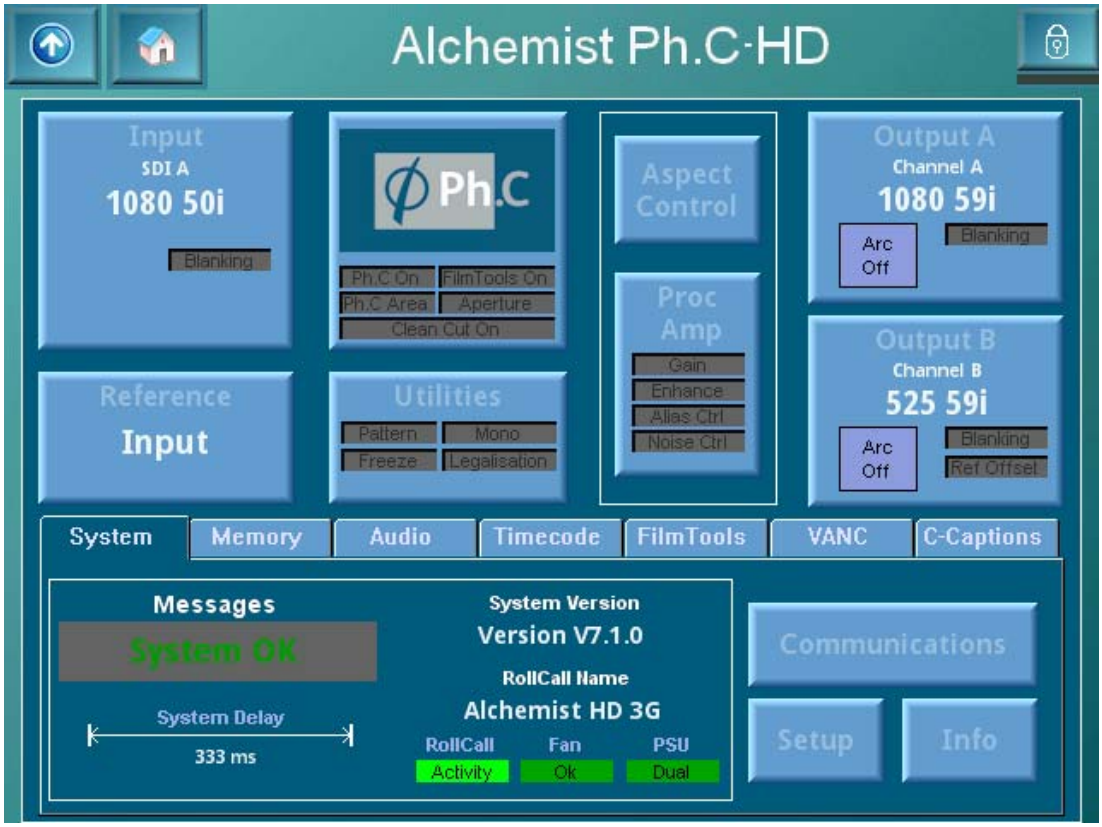
When the direct Value Entry function is activated, a numerical keypad will be displayed. Values may be entered by touching the numbers on the keypad. This value will be shown in a box at the top right of the keypad area.

- **OK** enters the value and removes the keypad from the screen.
- **Cancel** removes the keypad from the screen without accepting the value.
- **Del** clears the last number entered.

4.7 Selecting Specific Functions

The Alchemist Ph.C-HD functions are grouped into seven main areas:

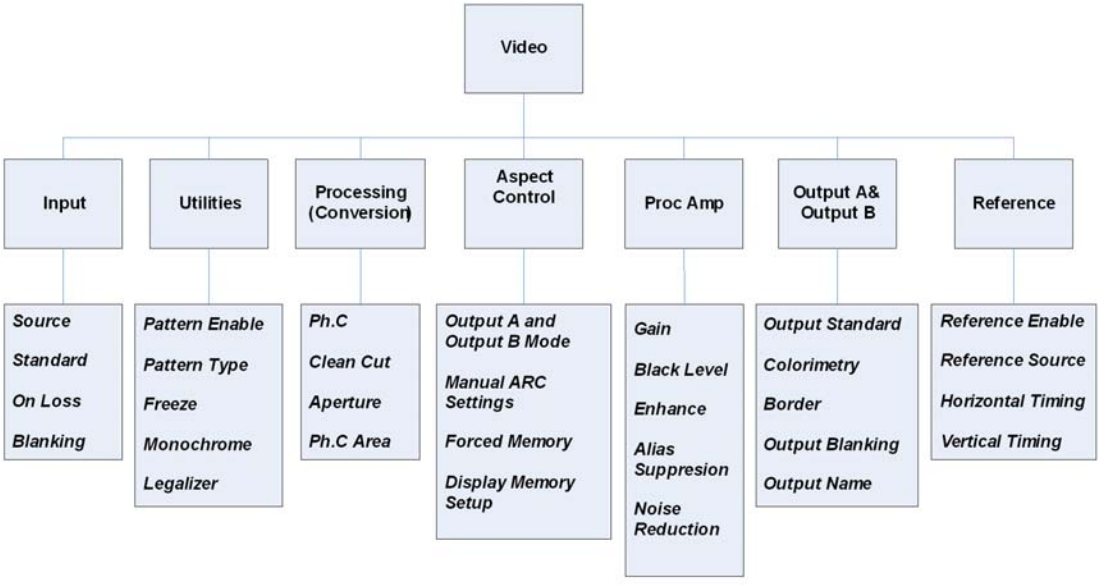
- **Video Menus:** The Video Menus are used to configure and control the unit's video functions. For more information, see page 35.
- **Audio Menus:** The Audio Menus are used to configure and control the unit's audio and Dolby E functions. For more information, see page 62.
- **Status Display:** The 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, see page 106.
- **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, see page 105.
- **Memory:** The Memory screen is used to store system configurations so that they can be recalled later. For more information, see page 122.
- **Timecode Tab:** The Timecode tab provides access to the menus used to configure and control the unit's timecode functions. For more information, see page 80.
- **FilmTools Tab:** The FilmTools tab provides access to the menus used to configure and control the unit's film conversion functions. For more information, see page 88.
- **VANC Tab:** The VANC tab provides access the menus used to control vertical ancillary blanking. For more information, see page 99.



4.8 Video Menus

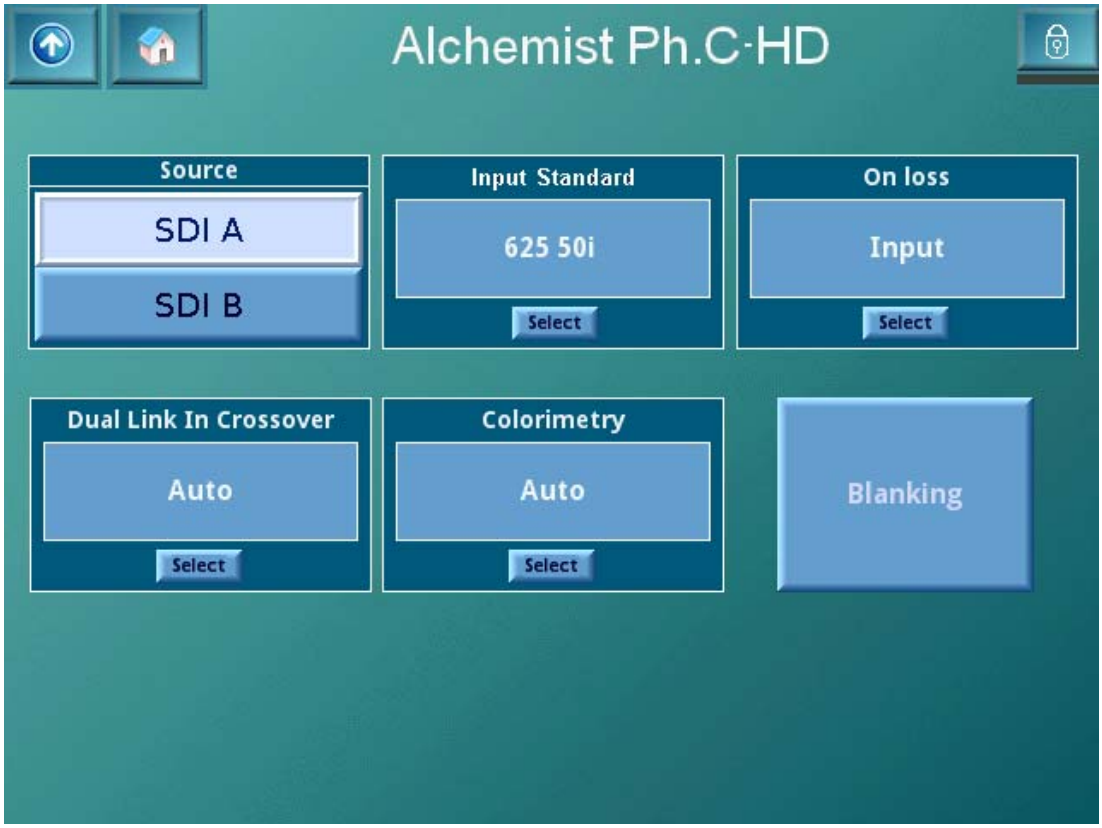
This section describes the Alchemist Ph.C-HD video functions, which include the following configuration settings and controls:

- **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 36.
- **Conversion:** Use these settings to enable or disable the Ph.C and CleanCut 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 39.
- **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 43.
- **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 51.
- **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 54.
- **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 58.
- **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 monochrome image, and configure gamut legalization. See “Utilities” on page 59.



4.8.1 Input

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



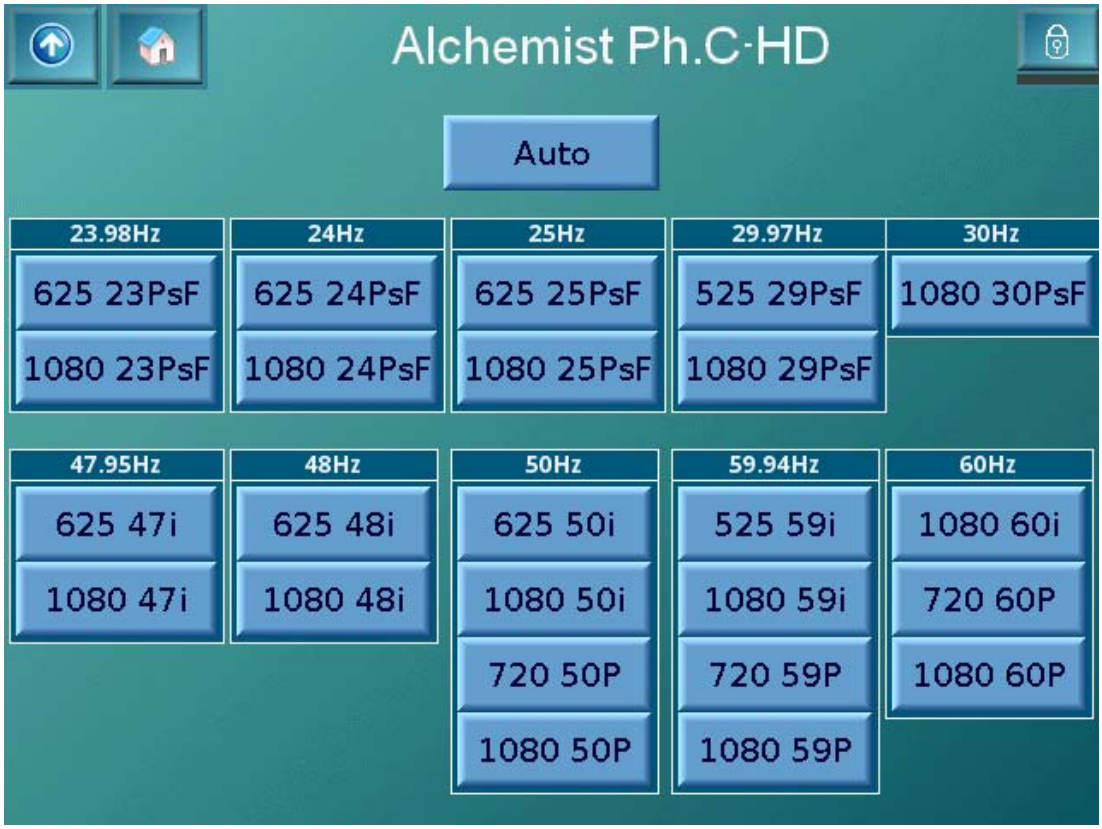
4.8.1.1 Source

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

4.8.1.2 Standard

To view the input standard, touch **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 grayed-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.

4.8.1.3 On Loss

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

4.8.1.4 Dual Link Crossover

- **Auto (default):** Using the SPMTE352 payload identification present in Dual Link the Alchemist will automatically correct when the input links are crossed over. If the payload is not present, no action is taken.
- **OFF:** Input link A and B are NOT crossed over.
- **ON:** Input links A and B are crossed over.

When the crossover feature is in effect (via **Auto** or **ON**) a crossover symbol will be present within the Input section of the home screen.

4.8.1.5 Colorimetry

The **Colorimetry** 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.

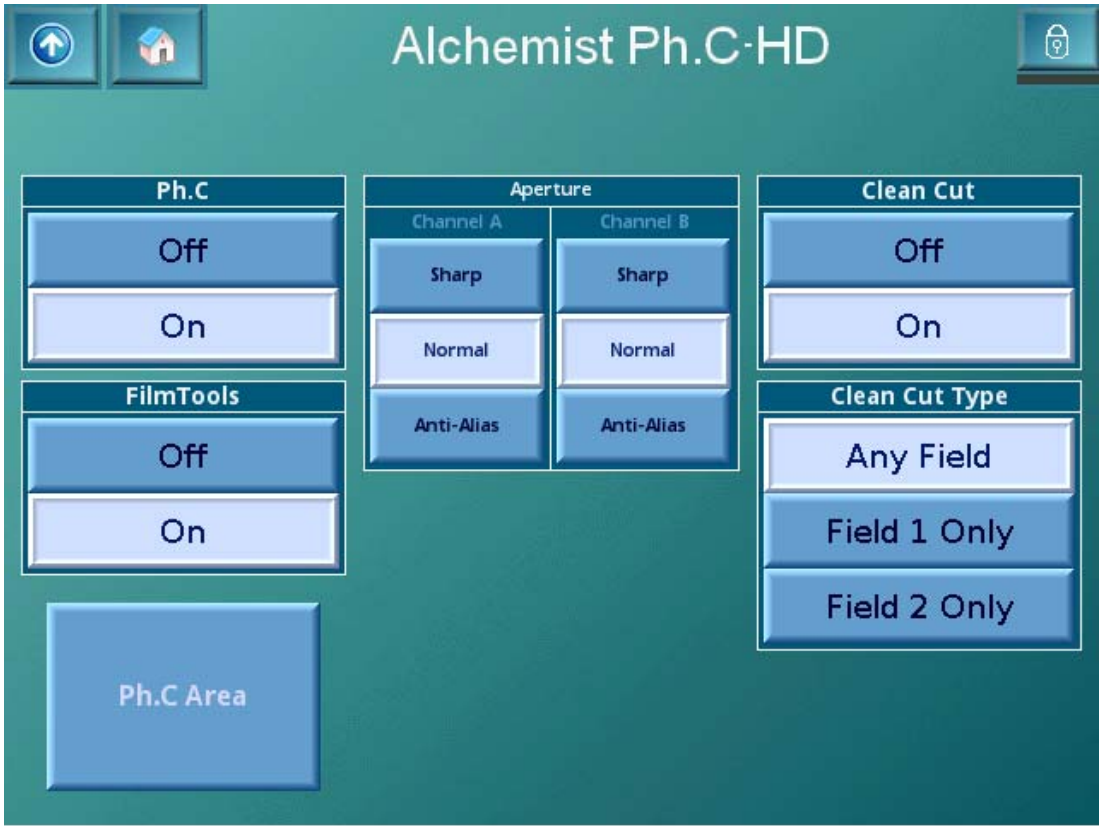
4.8.1.6 Blanking

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.

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.

4.8.2 Conversion

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



4.8.2.1 Ph.C (Phase Correlation)

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

4.8.2.2 FilmTools

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

For more information about FilmTools, see “FilmTools” on page 87 and “Appendix D: FilmTools” on page 145.

4.8.2.3 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 52.

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.

4.8.2.4 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 should a false cut be 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.

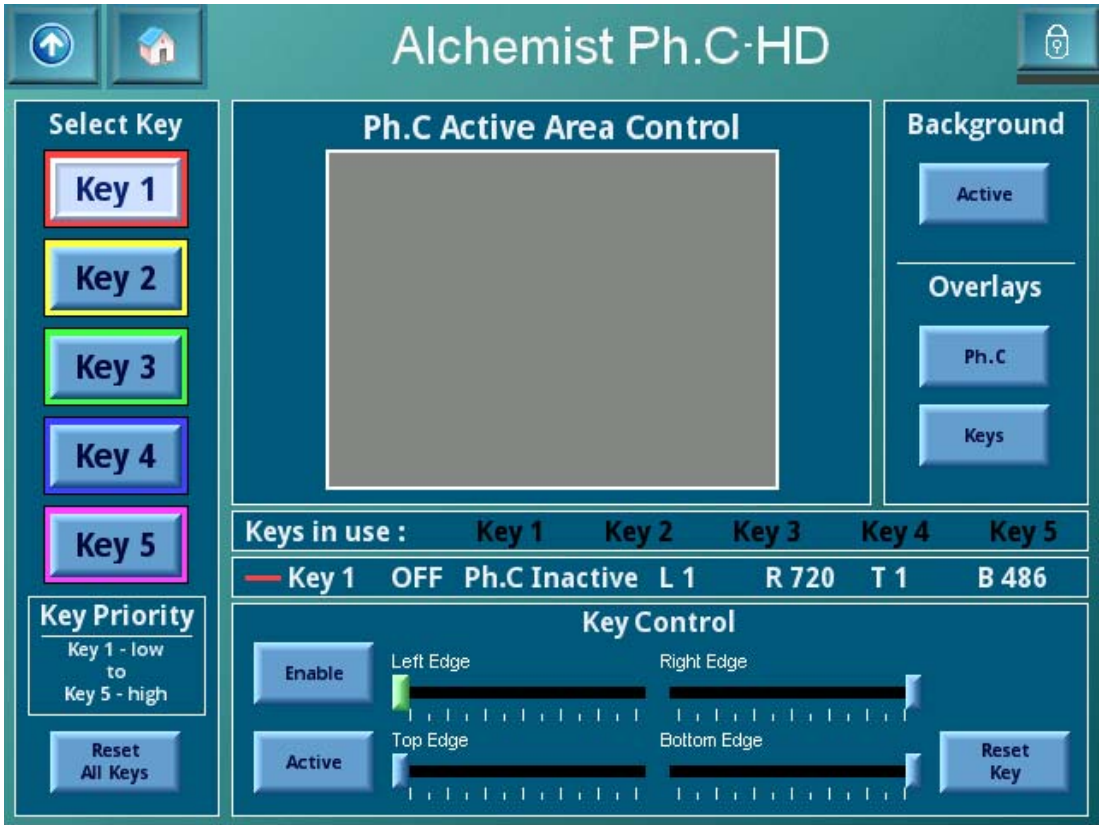
Primary (A)	Secondary (B)	Frame Synchronization
i	i	✓
i	P	✓
P	i	x
P	P	x

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

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

4.8.2.5 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.

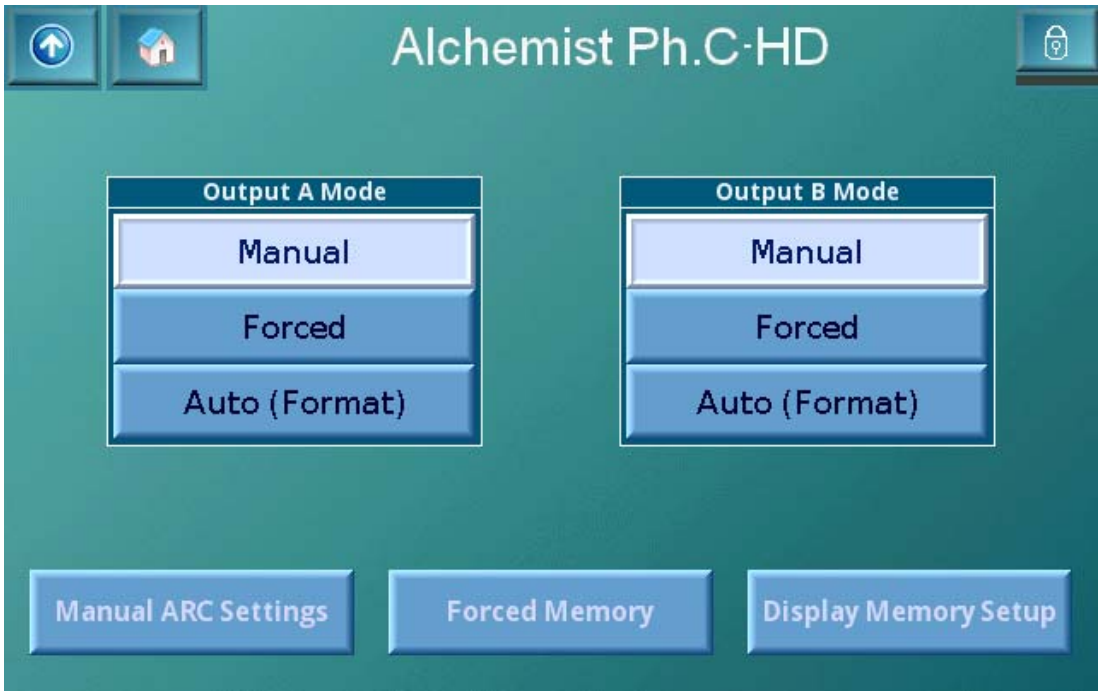
Colored overlay after adjustment to convert the source shown on the right.

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*	This line displays the following information about the currently selected key:
(Where n is the 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.

4.8.3 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.

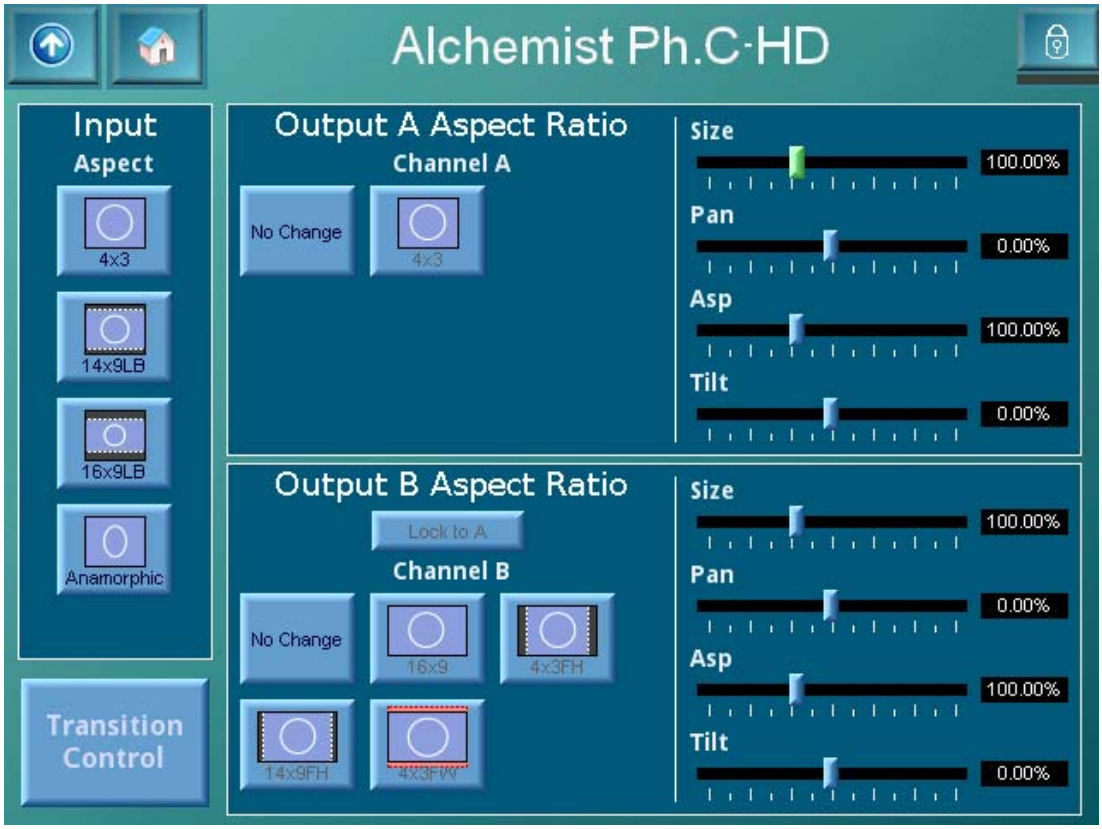


For both Output A and Output B, the Aspect Ratio Conversion mode is selected from the following modes.

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.

4.8.3.1 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

4.8.3.2 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.

4.8.3.3 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: 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.

4.8.3.4 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.

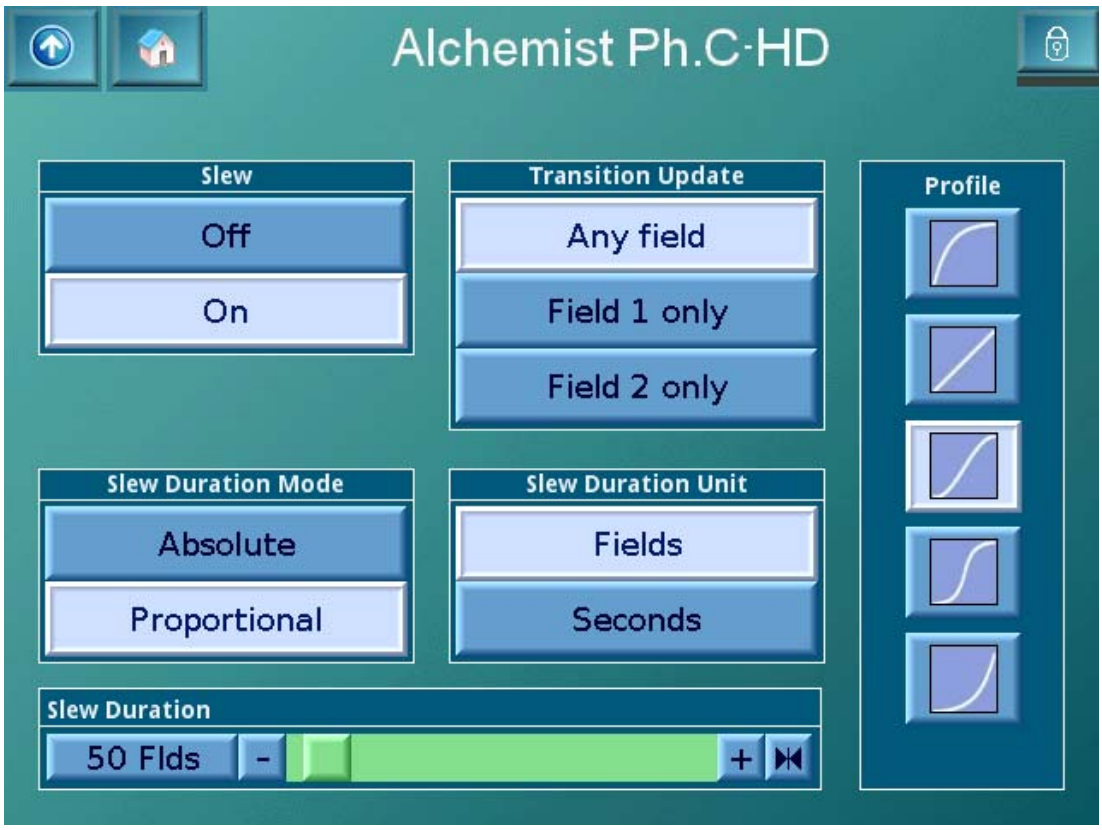
To adjust these controls, move the slider bars as required.

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: 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.

4.8.3.5 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.

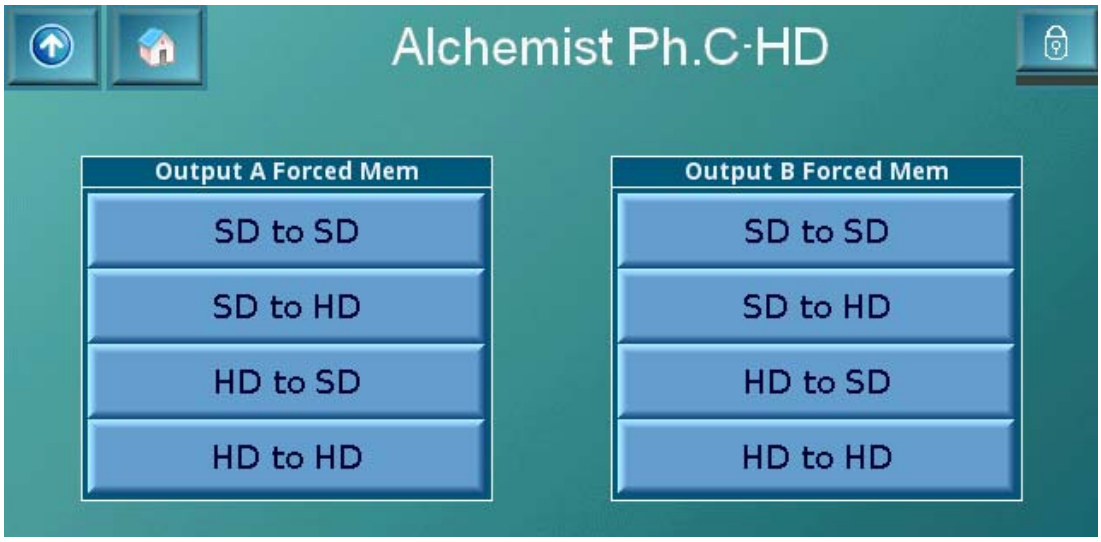
The actual duration of the transition between different aspect ratios also depends on the Slew Duration Mode control.

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.

4.8.3.6 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.

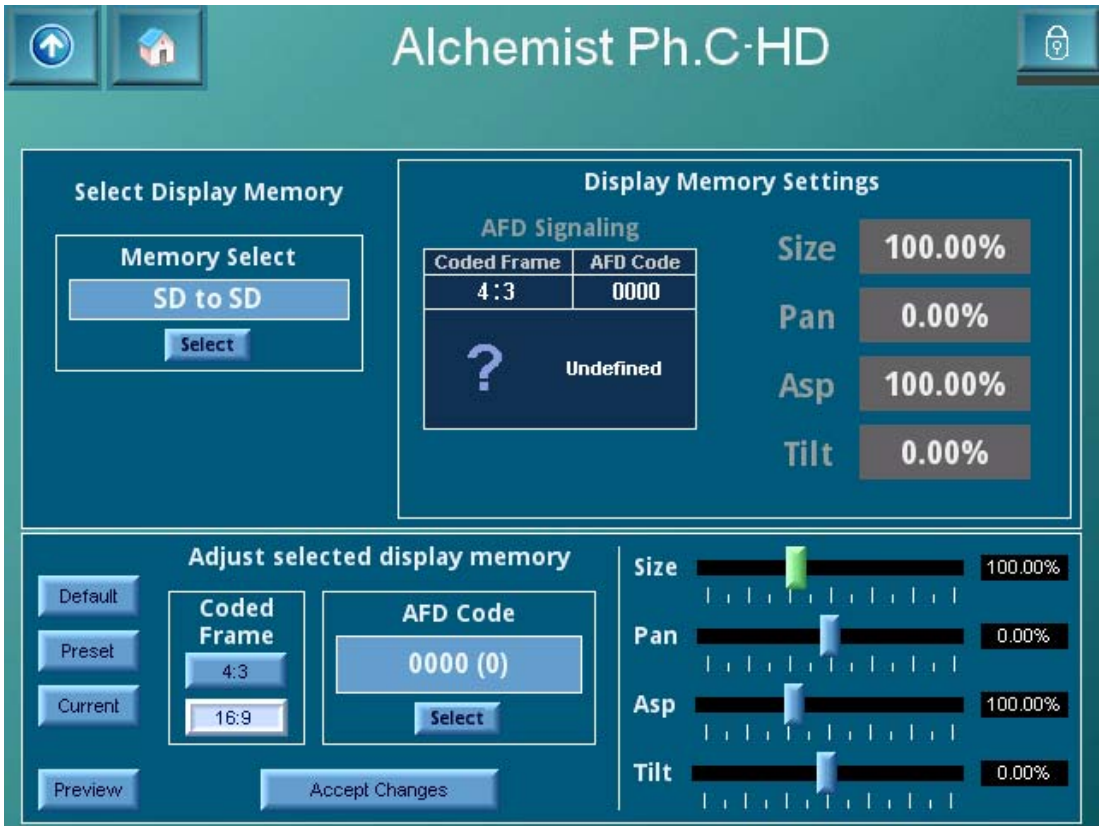


4.8.3.7 Display Memory Setup

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.

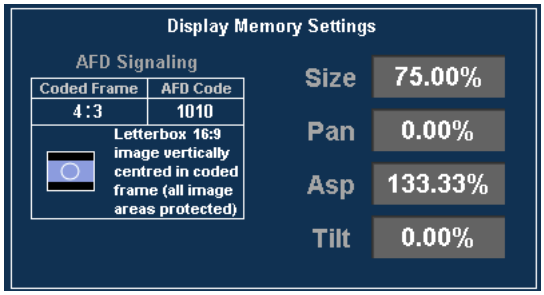


Select Display Memory

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

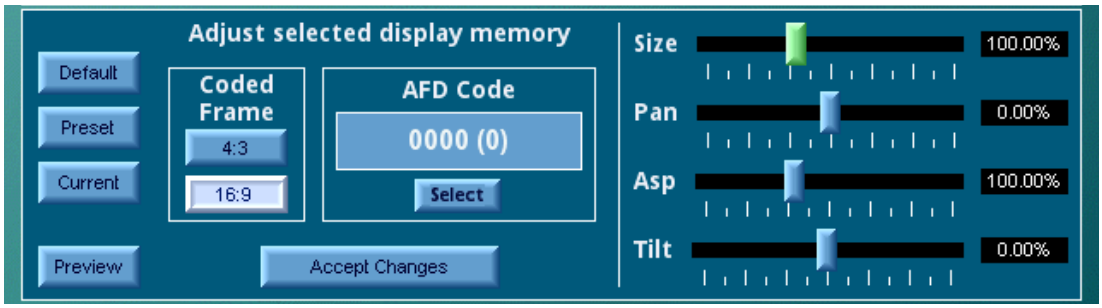
Display Memory Settings

The current display memory settings are displayed in this section.



Adjust Selected Memory Display

This section allows the display memory settings to be configured.

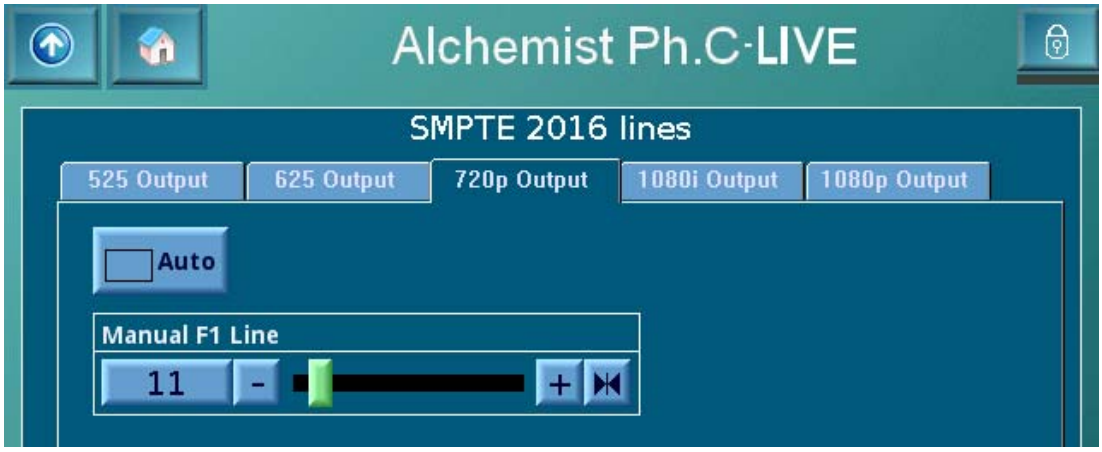


Default	Recalls the default settings for the selected memory.
Preset	Resets the Size, Pan, Asp, and Tilt settings to their preset values. **Size:** 100% **Pan:** 0.00% **Asp:** 100% **Tilt:** 0.00%
Current	Recalls the current settings stored in the selected memory.
Preview	Allows the user to preview 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.

4.8.3.8 Changing SMPTE 2016 Output Line

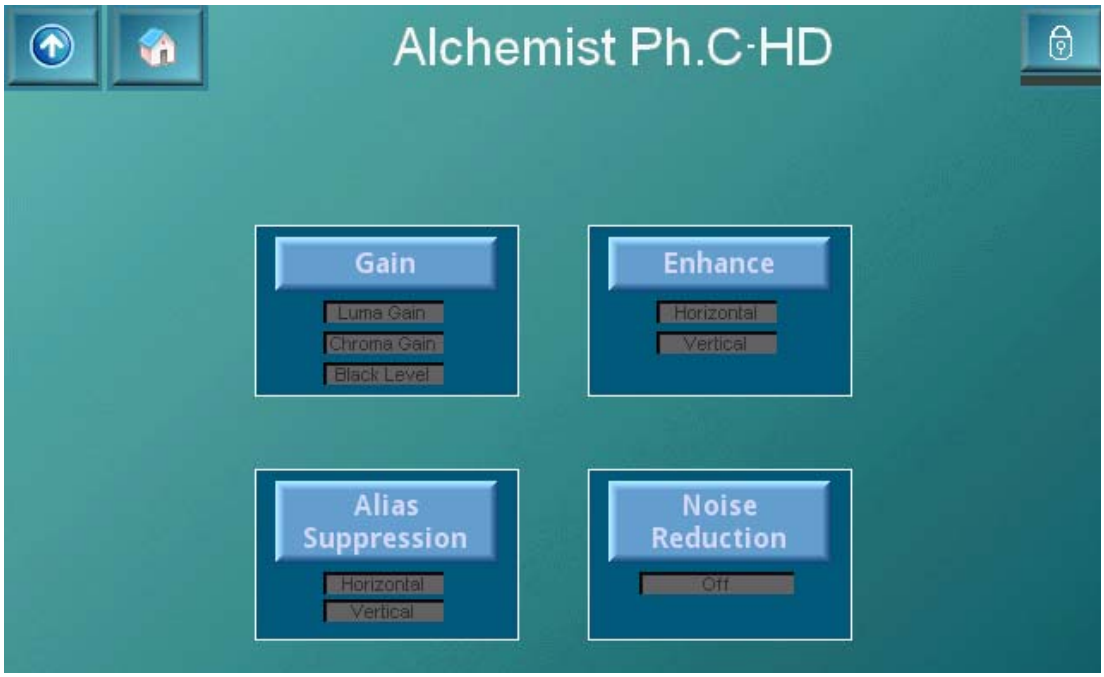
This function allows the output line for SMPTE 2016 to be changed. To do this:

1. From the **Setup** screen, touch **SMPTE 2016 lines**.
2. Choose the tab for the required output standard.
3. Deselect the **Auto** box and select the required output line.



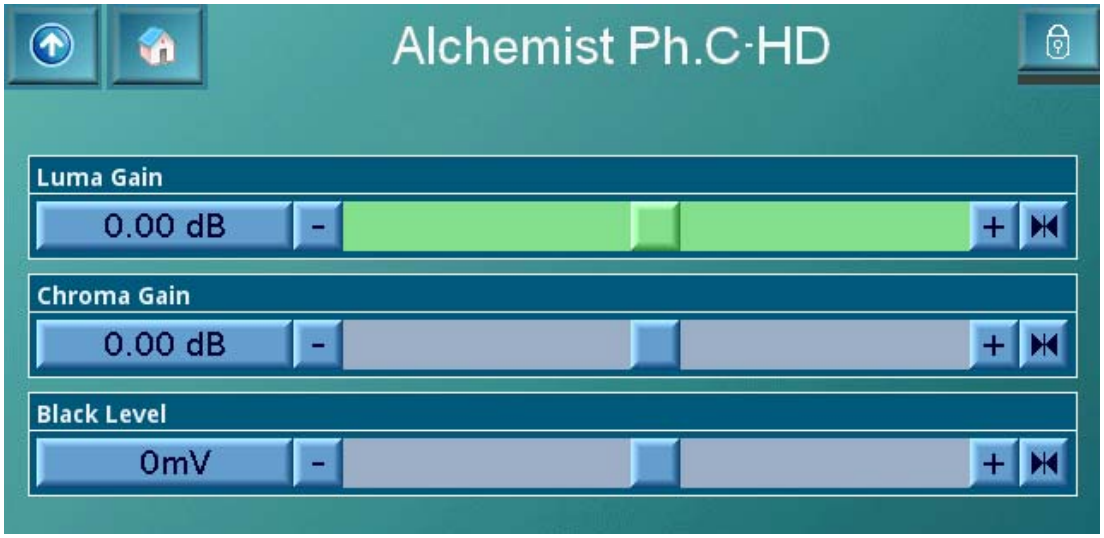
4.8.4 Proc Amp

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



4.8.4.1 Gain

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



4.8.4.2 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.

4.8.4.3 Alias Suppression

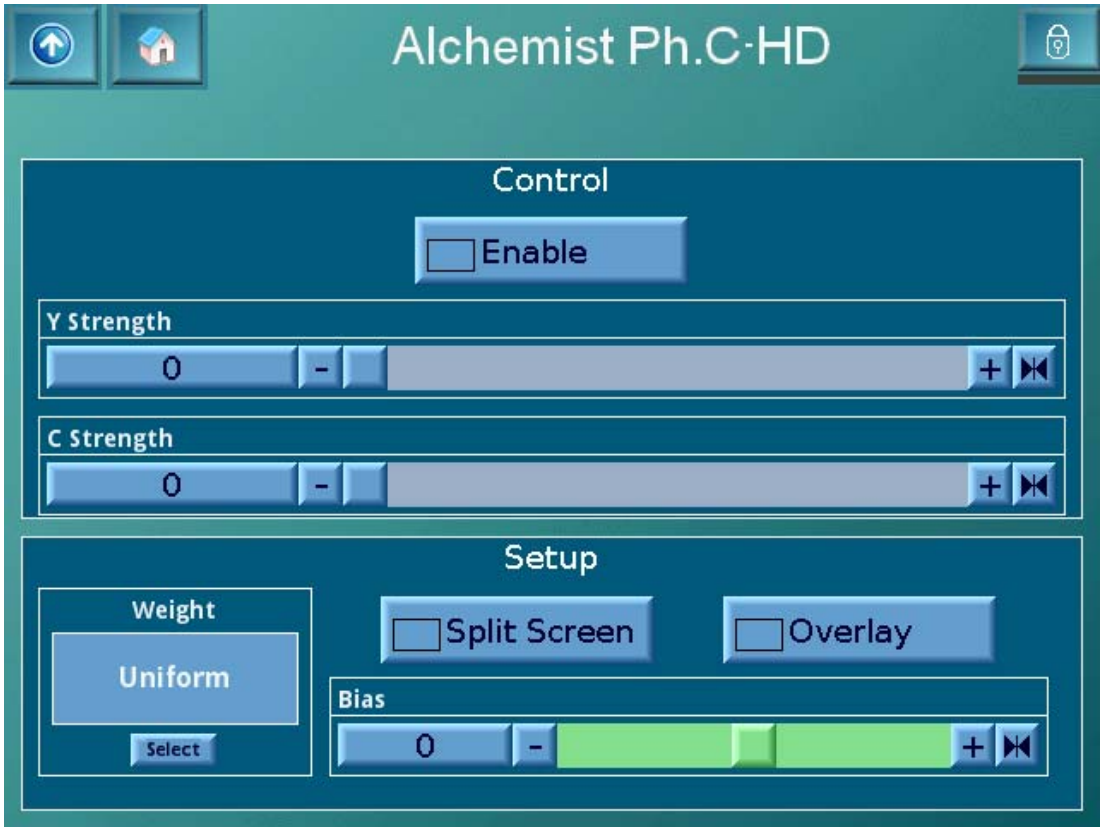
When **Alias Suppression** is selected, the screen shown below is displayed.

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.

4.8.4.4 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 123.



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.

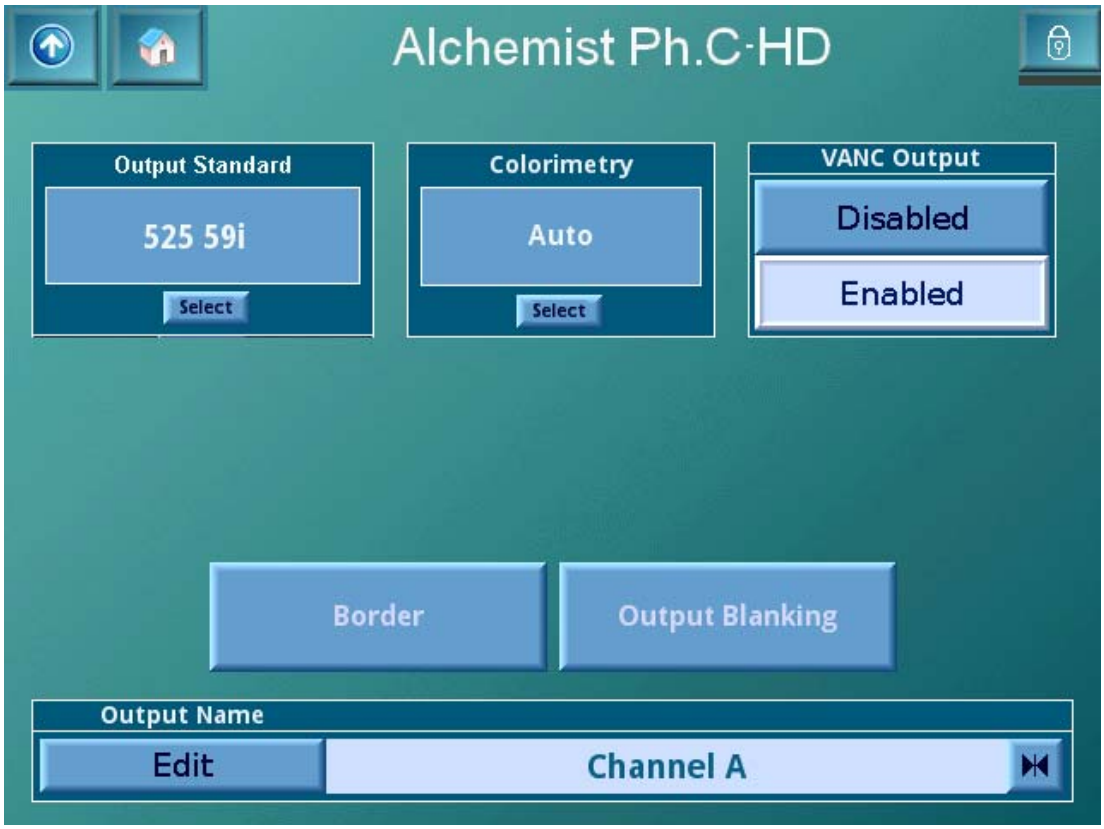
When the overlay is enabled, colored regions indicate areas of the image where spatial processing is being used, and monochrome regions indicate where temporal processing is being used.

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.

4.8.5 Output A and Output B

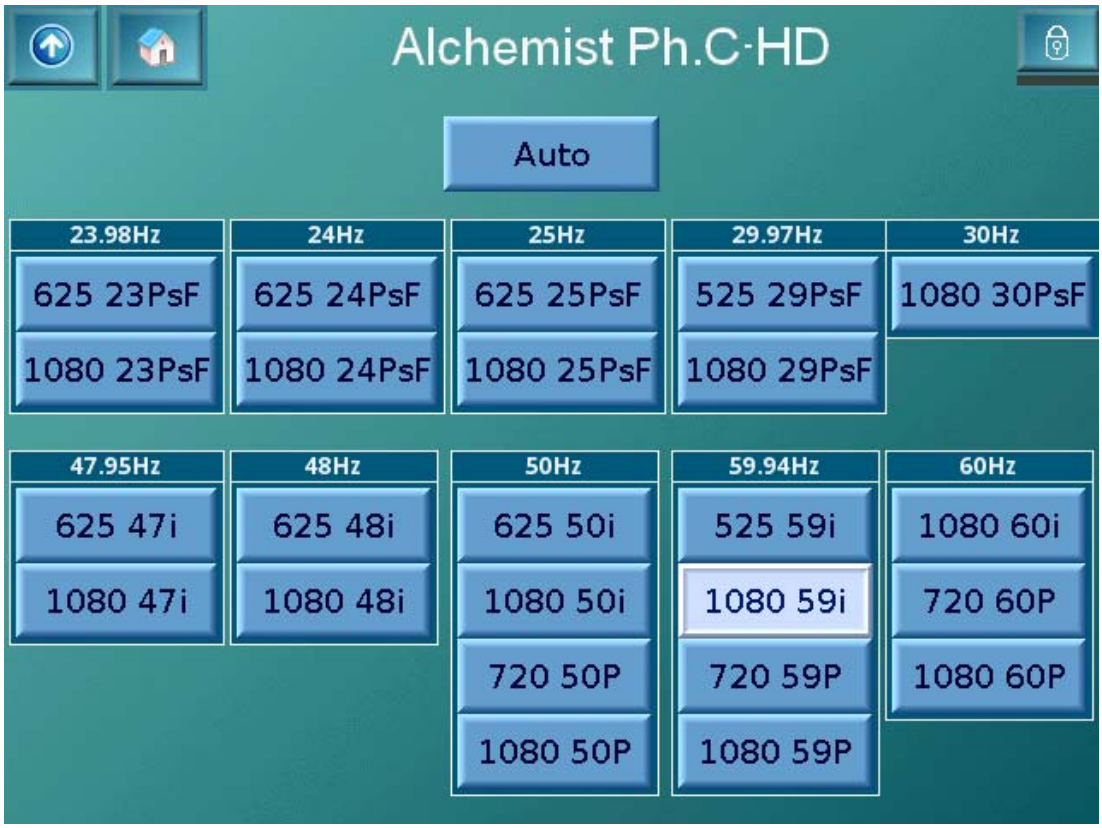
When the Output A item is selected, the screen shown below is displayed. This screen allows various options to be selected for the output signal.



4.8.5.1 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 1080 59i is selected as the Output A standard, only 525 59i, 1080 59i, 1080 59P and 720 59P may be selected as the Output B standard.

4.8.5.2 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.

4.8.5.3 VANC Output

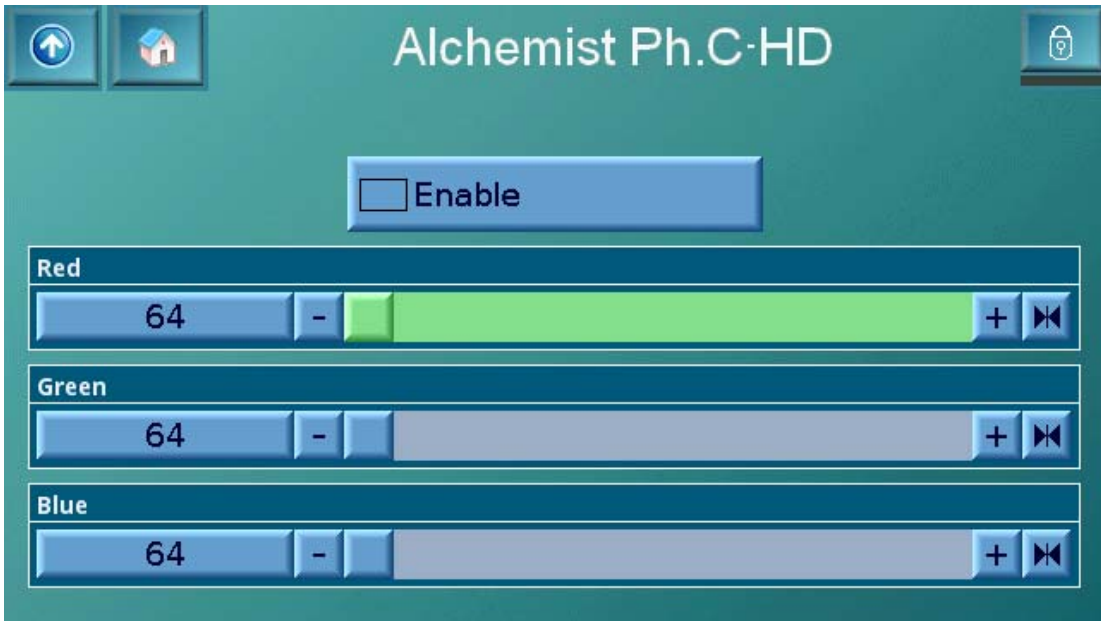
VANC output can be enabled and disabled independently for output A and output B.

4.8.5.4 1080P Outputs

- **Level A:** 3Gbit/s SMPTE424/425, Level A Mapping structure (SMPTE274 1920x1080 4:2:2 10 bit)
- **Level B:** 3Gbit/s SMPTE424/425, Level B SMPTE 372 Dual Link payload (SMPTE274 1920x1080 4:2:2 10bit)
- **Dual Link:** Dual Link 1.5Gbit/s SMPTE372 (SMPTE274 1920x1080 4:2:2 10bit)

4.8.5.5 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.

4.8.5.6 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.

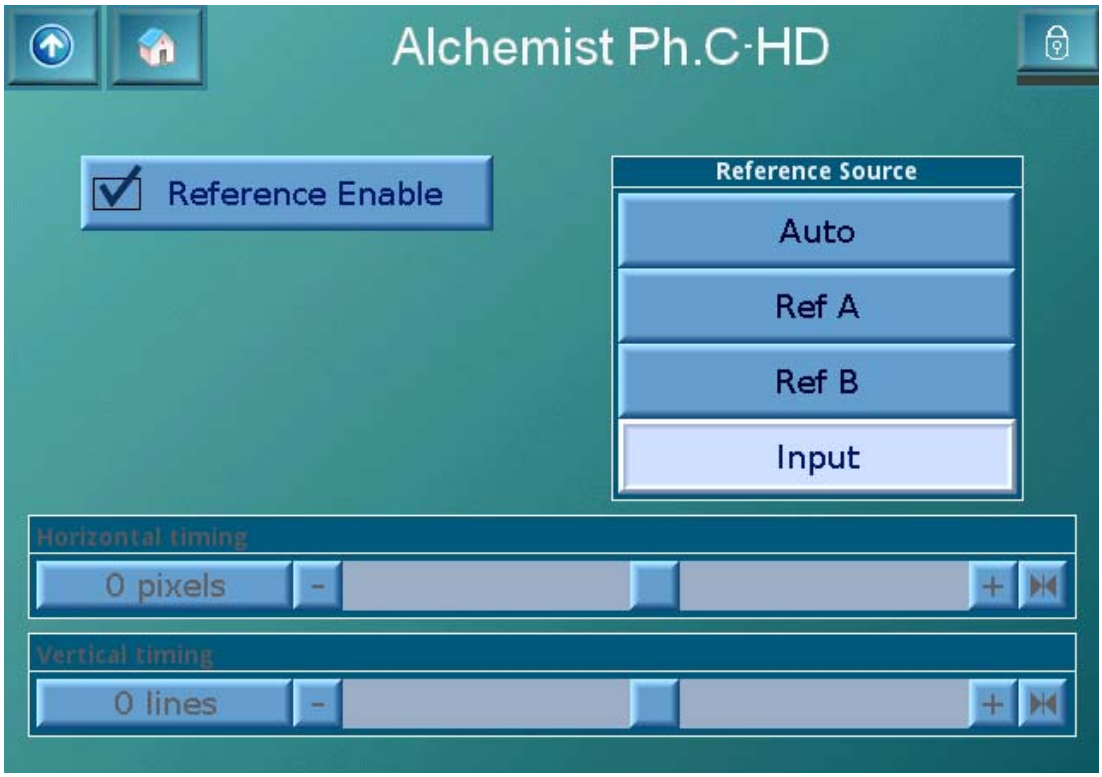
4.8.5.7 Output Name

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.

4.8.6 Reference

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



4.8.6.1 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.

4.8.6.2 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.

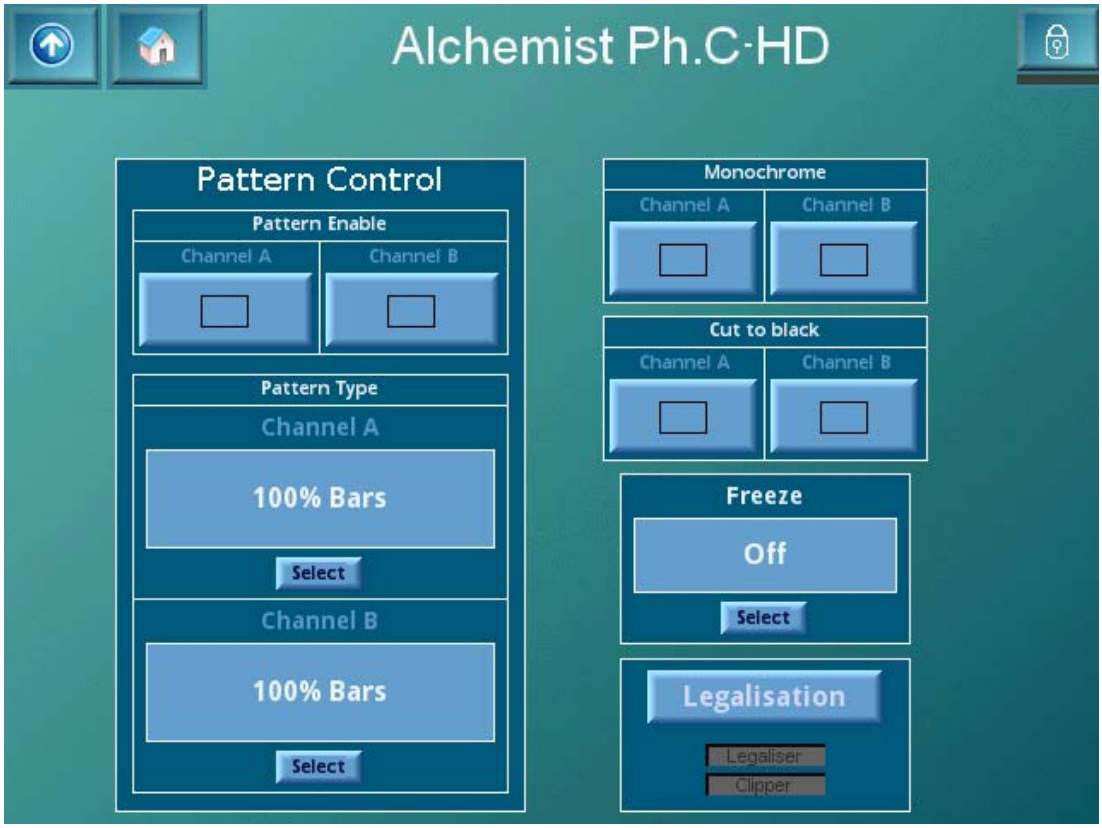
Ref A Forces the unit to operate from the external reference A input.

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.

4.8.7 Utilities

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



4.8.7.1 Pattern Enable (Channel A and B)

When checked, the output will become the pattern chosen by the **Pattern Type** function.

4.8.7.2 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

4.8.7.3 Freeze

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

4.8.7.4 Monochrome

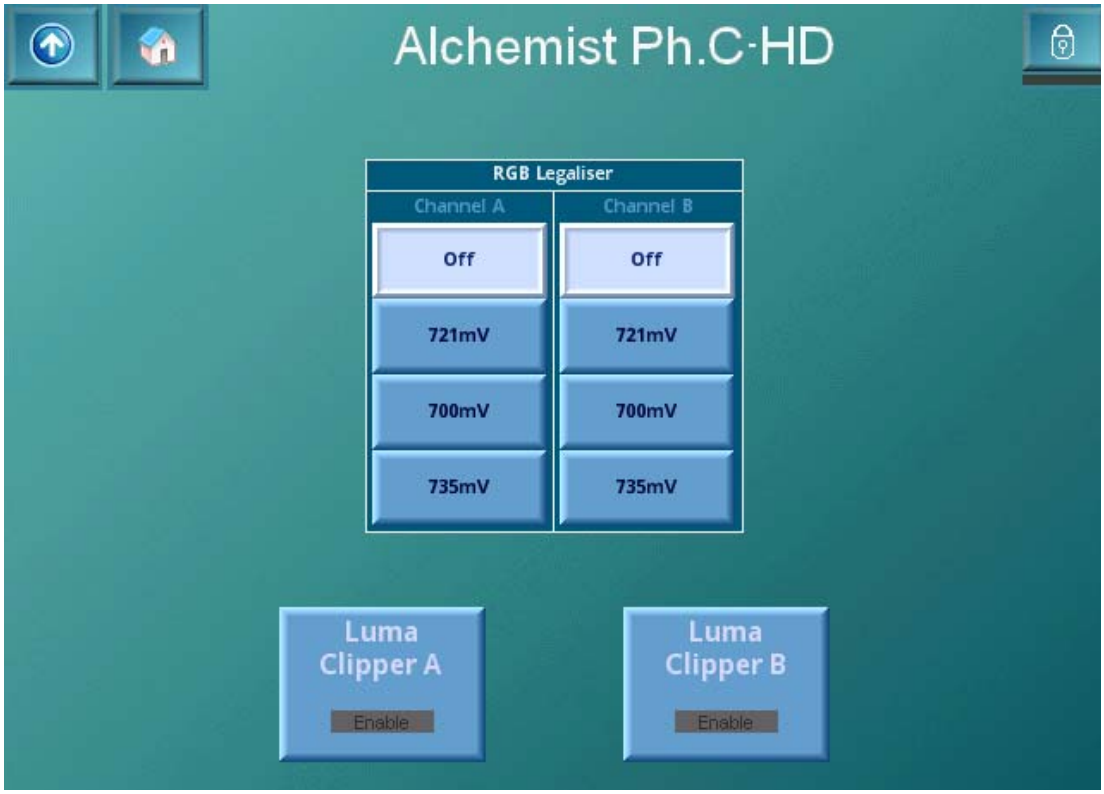
When checked, the selected output will become a monochrome picture.

4.8.7.5 Cut to black

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

4.8.7.6 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.

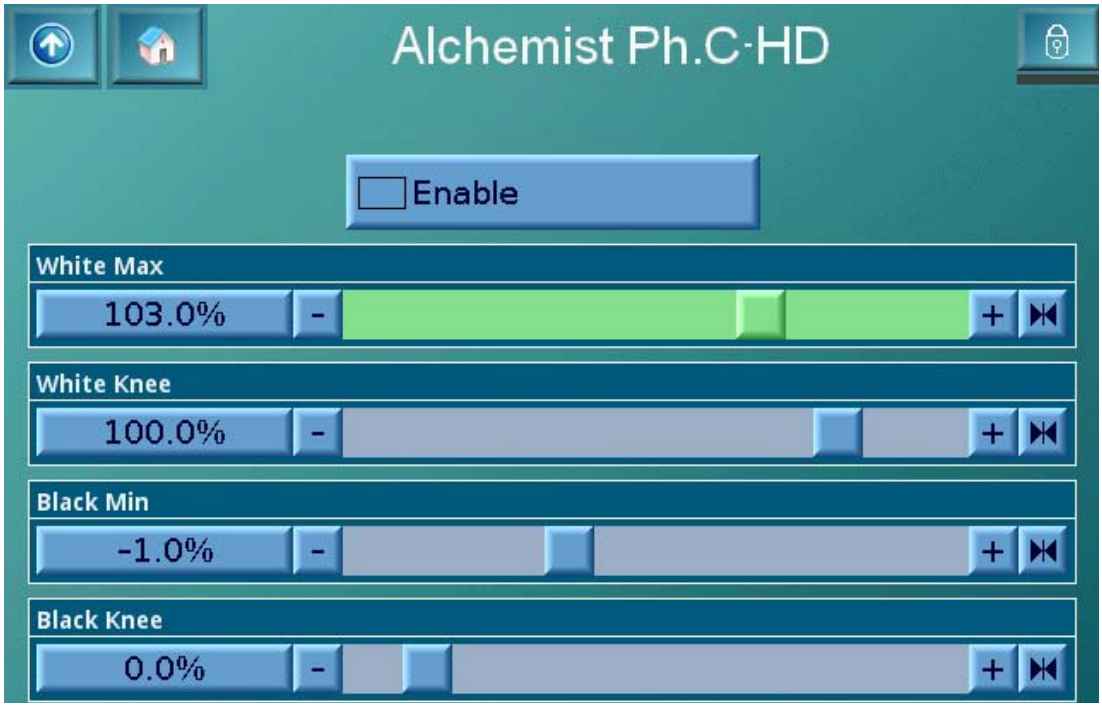
Note: The 735mV selection should be used in conjunction with the luma clipper (set at presets) to generate images that adhere to EBU R103-200 specification.

For more information about legalisation, see “Appendix C: RGB Legalizer and Luma Clipper” on page 142.

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.

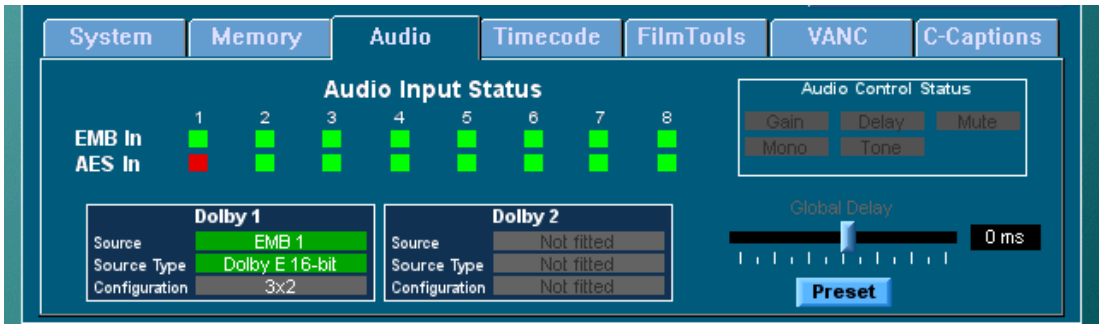
To achieve a hard white clip set the **White Max** and **White Knee** to the same value. Similarly to achieve a hard black clip set the **Black Min** and the **Black knee** to the same value.

For more information about the luma clipper, see “Appendix C: RGB Legalizer and Luma Clipper” on page 142.

4.9 Audio Menus

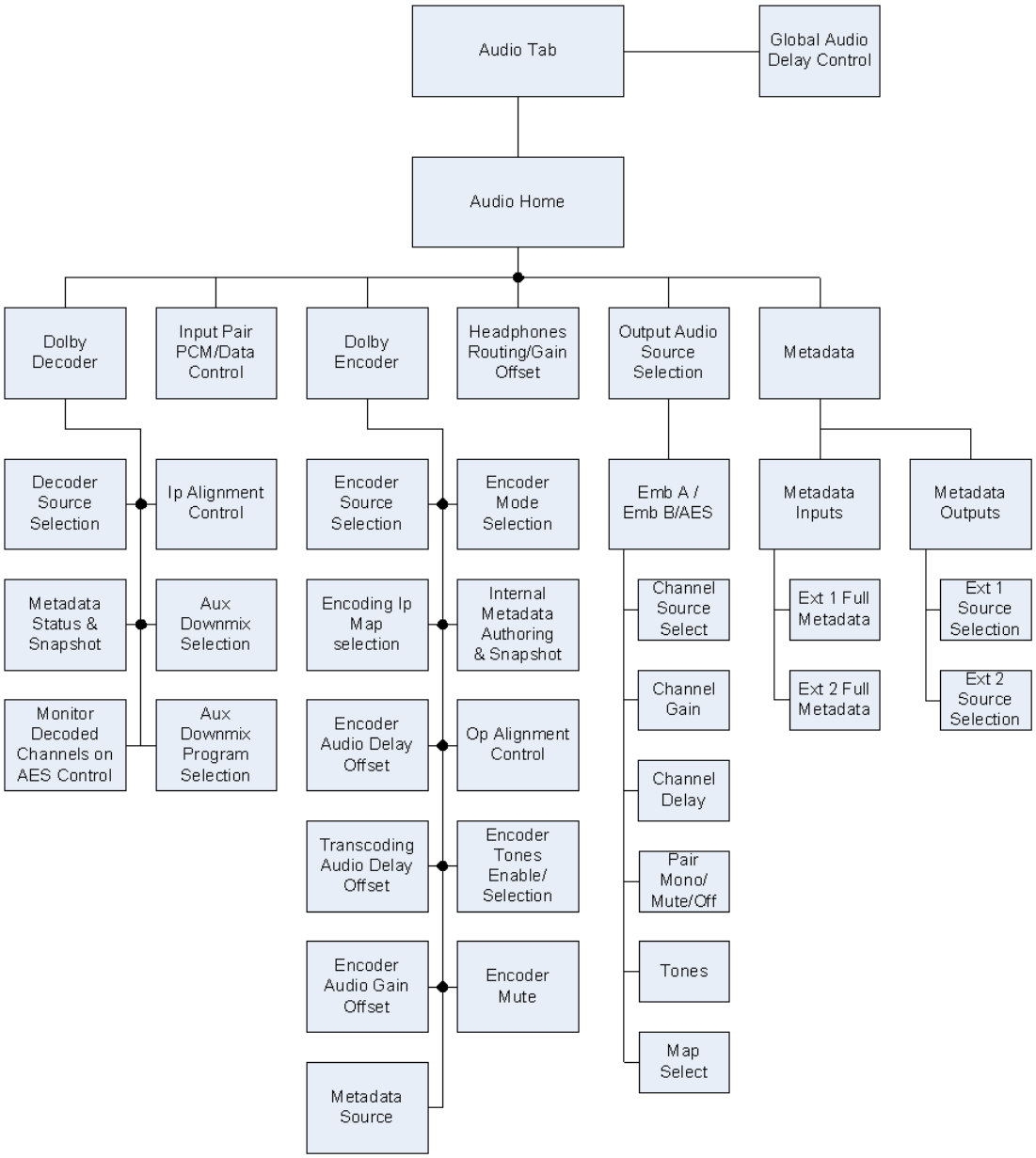
This section describes the Alchemist Ph.C-HD audio functions, which include the following configuration settings and controls:

- **Audio Display Tab:** The Audio display tab shows audio input / output status/ Dolby source and types and the Dolby program configuration. See “Audio Display Tab” on page 64.
- **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 66.
- **Dolby Decoder:** The Dolby Decoder menu allows the Alchemist’s Dolby decoding functions to be configured. See “Dolby Decoder” on page 68.
- **Dolby Encoder:** The Dolby Encoder menu allows the Alchemist’s Dolby encoding functions to be configured. See “Dolby Encoder” on page 70.
- **Audio Output:** The Audio Output menus allow you to configure the unit’s Audio Output settings. See “Audio Output” on page 73.



For additional information about the Alchemist Ph.C-HD’s audio processing and Dolby E functions, see “Appendix E: Dolby E Authoring” on page 172.

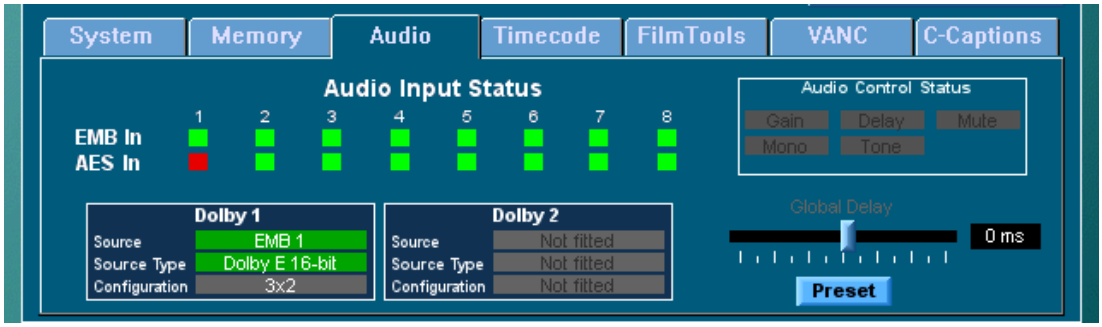
4.9.1 Audio Menu Hierarchy



For additional information about the Alchemist Ph.C-HD's audio processing and Dolby E functions, see "Appendix E: Dolby E Authoring" on page 172.

4.9.2 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 Status

These 'out of preset' status indicators warn the user when the individual audio controls are adjusted from their preset values.

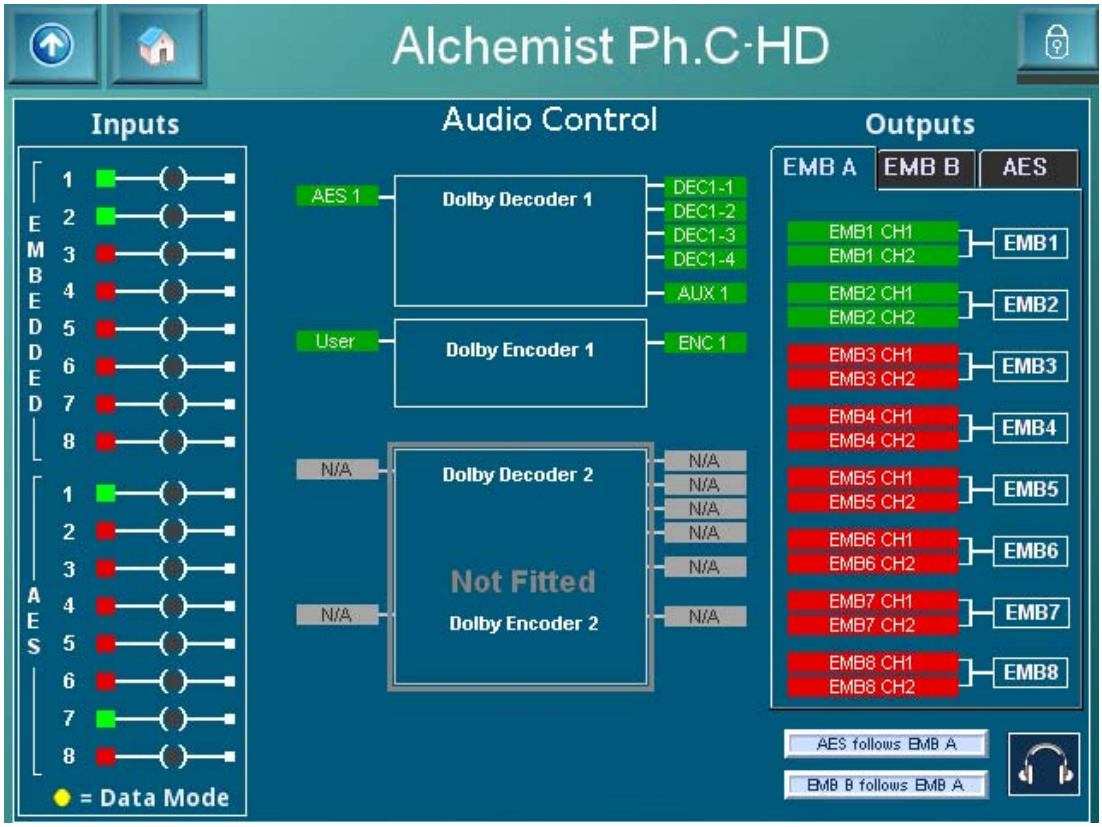
Global Delay Use the slider to adjust the global audio delay. The offset value is displayed in milliseconds.

Note: The delay is applied to all audio channels. Individual channel delays will be added/subtracted from this delay.

4.9.3 Audio Control

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

The top level audio control menu presents a combination of general audio and Dolby configuration. Each Dolby channel consists of a dedicated Dolby®E encoder and decoder module. The availability of the control interface depends on the hardware installed.



Inputs PCM/DATA

Touch the toggle switch to enable Data mode.

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

Note: When the Dolby card is NOT installed inputs which have not been routed to the output will remain grayed out.

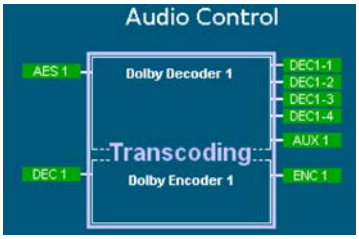
Dolby Decoder 1 / Dolby Decoder 2

Touch the **Dolby Decoder 1 / Dolby Decoder 2** area on the screen to access the Dolby Decoder setup page.

Dolby Encoder 1 / Dolby Encoder 2

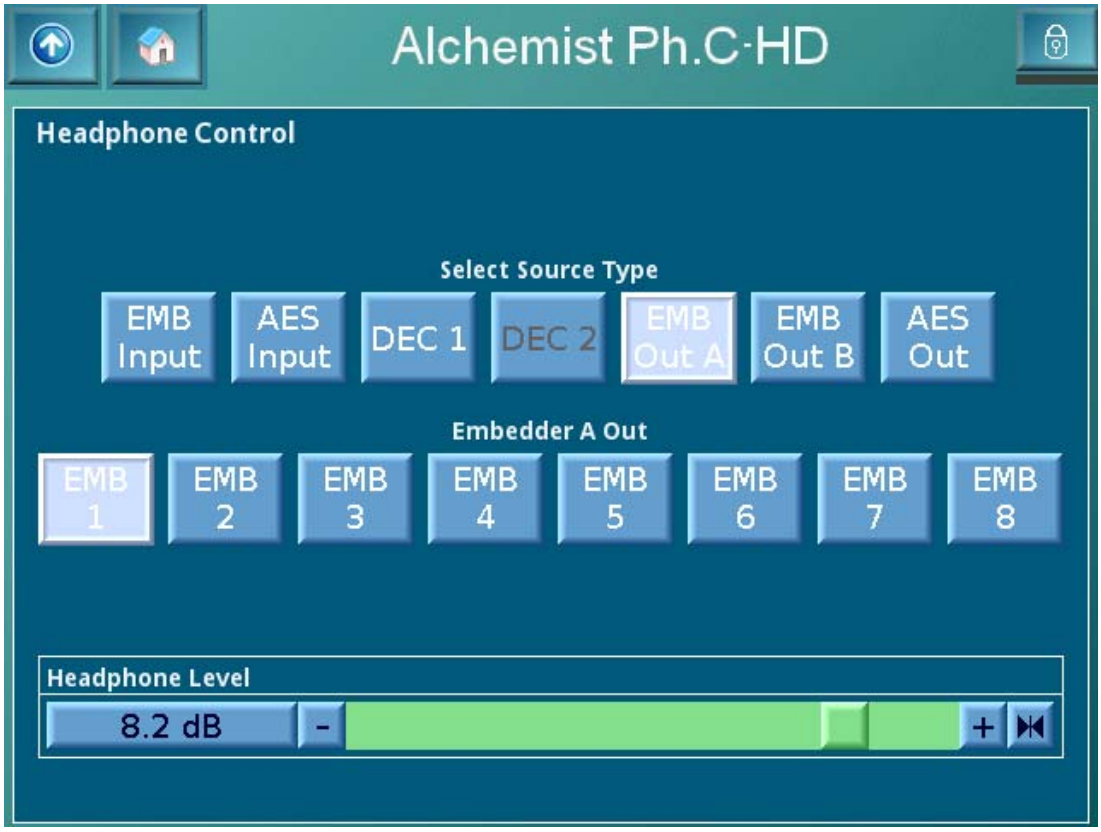
Touch **Dolby Encoder** area on the screen to access the Dolby encoder setup page.

*Note: When in transcode mode, a **Transcoding** indicator is shown at the Audio control level.*



Outputs **EMB A /** **EMB B /** **AES**	Touch each of the audio output tabs to access the individual output setup pages. EMB B and AES can be configured to follow routing selections made on EMB A.
Metadata	Touch the Metadata area to access the External Metadata configuration. *Note: This menu item is only present if 1080P option is installed (RIO2X rear assembly).*
Headphones	Touch the **Headphones** button to access the Headphone Control page.

4.9.3.1 Headphone Control

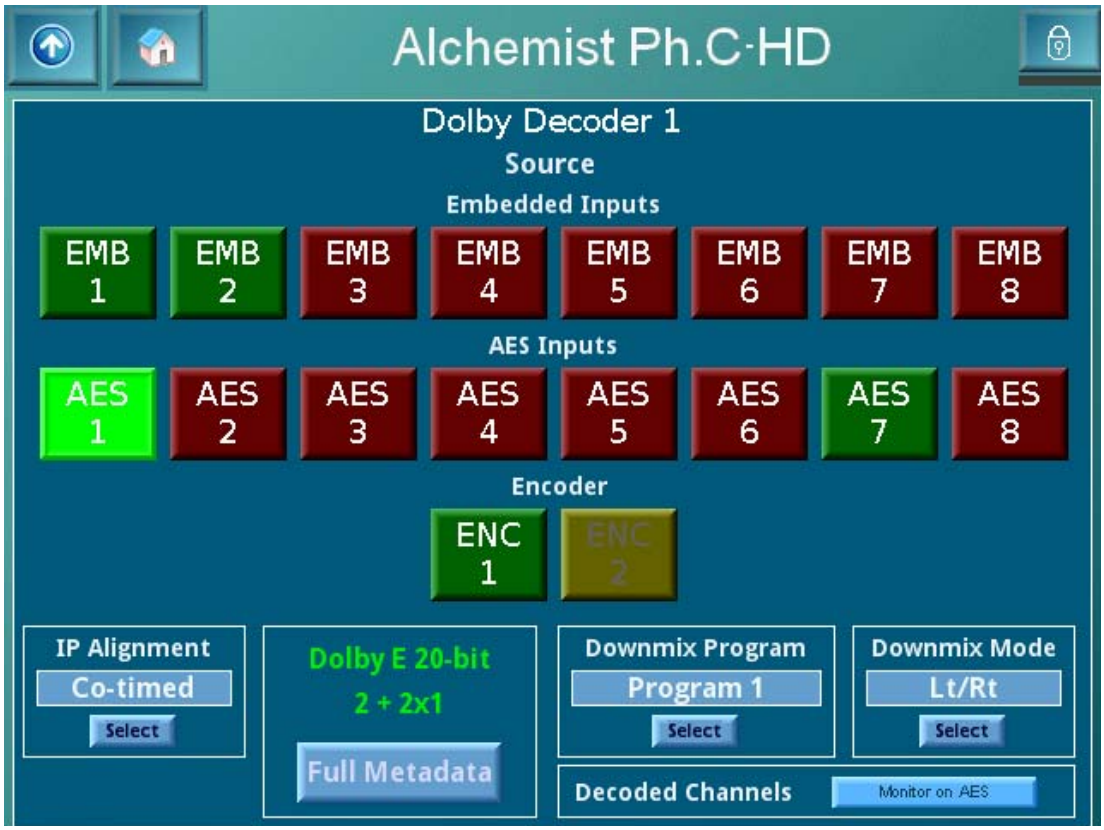


A variety of headphone sources may be selected from embedded/AES inputs, decoded outputs and embedded/AES outputs.

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

Note: Audio outputs are not colored.

4.9.4 Dolby Decoder



Source Embedded/AES input pairs and Encoder outputs may be routed to each decoder.

- Green indicates that a valid input signal is present.
- Red indicates that no input signal is present.
- Yellow (only present on ENC buttons) is a warning indication that:
  - The decoder is currently passing PCM not Dolby®E.
  - In Dolby E authoring mode, the encoder does not have the required audio channels to generate the selected program configuration.

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

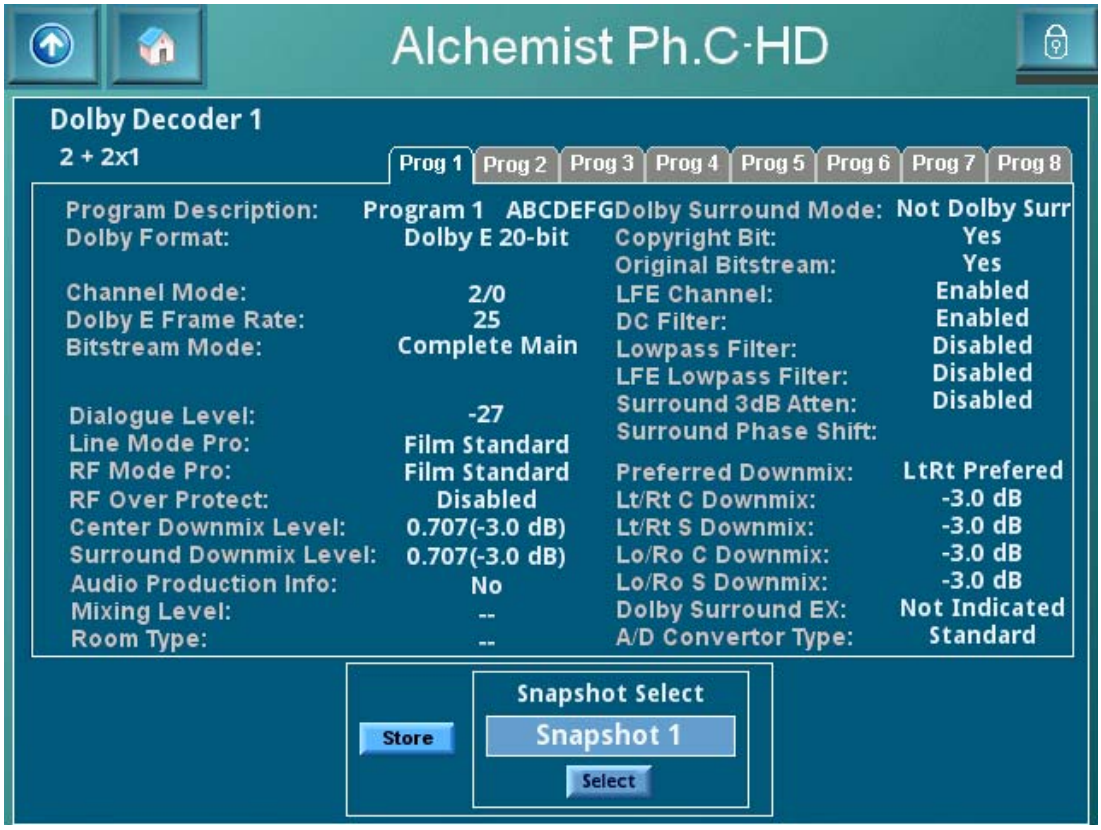
- **Advanced** by one input frame.
- **Co-timed** with the video signal.
- **Delayed** by one input frame.

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

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

Decoder Metadata This indicates the current Dolby Format, Program Configuration and bit depth.

To view all the Metadata touch **Full Metadata.**



Decoded metadata associated to each valid program may be viewed using the tabs.

Note: Alchemist only presents the programs that are available for the current Dolby program configuration.

Eight Metadata Snapshots are available to store decoded Metadata and/or Authored Metadata. Each Snapshot can store metadata from one program and may be applied to either Dolby Encoder.

Touch **Select** to change the current Snapshot configuration. To capture the current Decoder metadata, select the desired program and touch **Store**.

Decoded Channels

Monitor AES

The monitor function enables a predefined method of operation in which decoded audio pairs are automatically assigned to AES outputs, thus maintaining program configuration. This control overrides any other mapping to the relevant 4 AES outputs.

Decoder 1 **"Monitor on AES"** decodes to AES outputs 1 to 4.

Decoder 2 **"Monitor on AES"** decodes to AES outputs 5 to 8.

Note: This monitoring feature bypasses internal routing/gain/delay. See "Appendix E: Audio Block Diagram" on page 185.

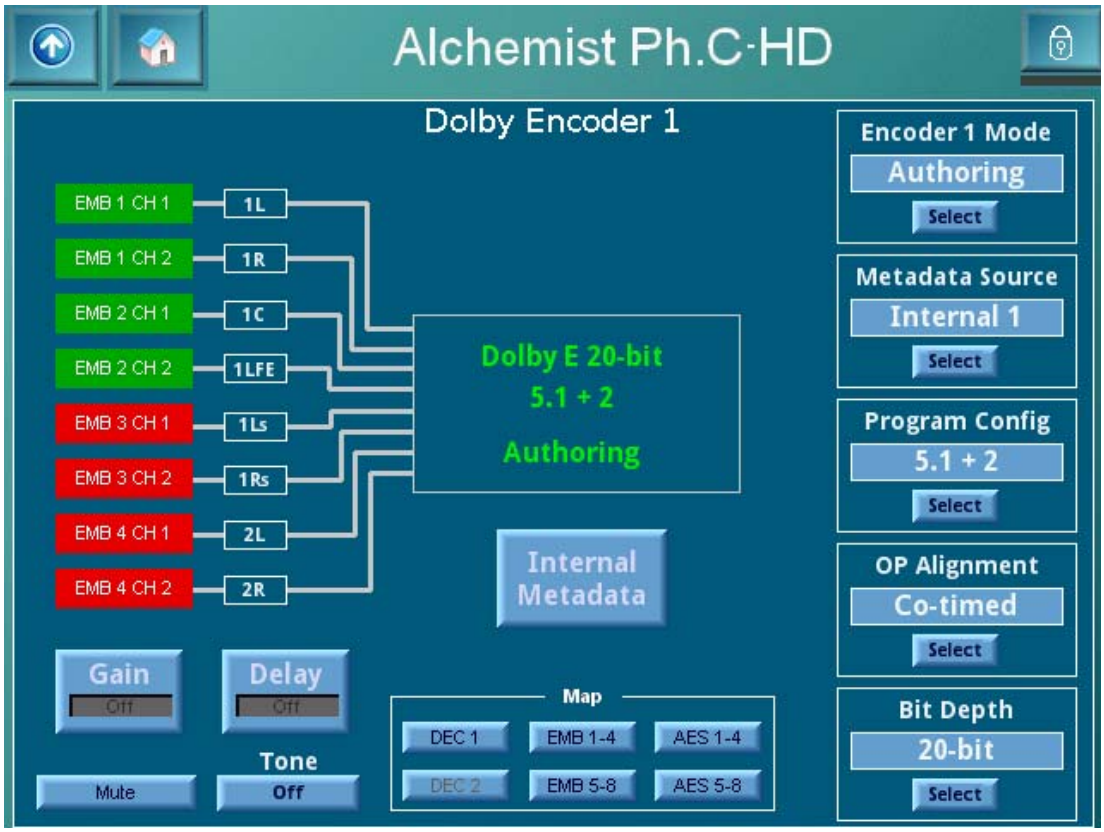
Downmix Mode

This allows the user to specify the downmix mode available from the 5th Auxiliary output of the Dolby decoder.

Downmix Program Selection

This allows the users to specify which program the Downmix is generated from.

4.9.5 Dolby Encoder



Encoder Inputs

Touch the channel source selection menu item to assign inputs to the encoder.

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

Note: The Dolby channel label dynamically updates when a different program configuration is selected on the encoder.

Encoder Map Mode

Touch the **Map** buttons to quickly configure a pre-defined mapping to the encoder. These behave like a memory recall operation.

Gain

Touch **Gain** to adjust the audio gain.

The Gain controls allow gain to be applied to the individual channel inputs to the encoder. The amount of gain applied to each channel is displayed in dB.

The **Track** feature facilitates audio gain tracking across multiple channels within the same Dolby program.

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

Note: The selected channel will return to its default value. Other channels configured to track this channel will maintain their relative level.

If a program configuration is selected which doesn't contain 8 channels the redundant channels will be grayed out.

Delay

Touch **Delay** to adjust the audio delay.

This allows a delay offset to be applied to the individual channel inputs to the encoder and/or to the audio path when in Transcoding mode. The value displayed reflects the offset applied on this control.

Note: The total audio delay will be displayed on the output Audio Channel Control page.

OP Alignment

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

4. **Advanced** by one output frame.
5. **Co-timed** with the video signal.
6. **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.

Bit Depth

Touch **Bit Depth** to specify 20 bit or 16 bit encoding. The default is 20 bit.

Note: This control is grayed out when in Transcode mode.

Program Config

Touch **Program Config** to specify the desired encoding program configuration. The default is 5.1+2.

Note: This control is grayed out when in Transcode mode.

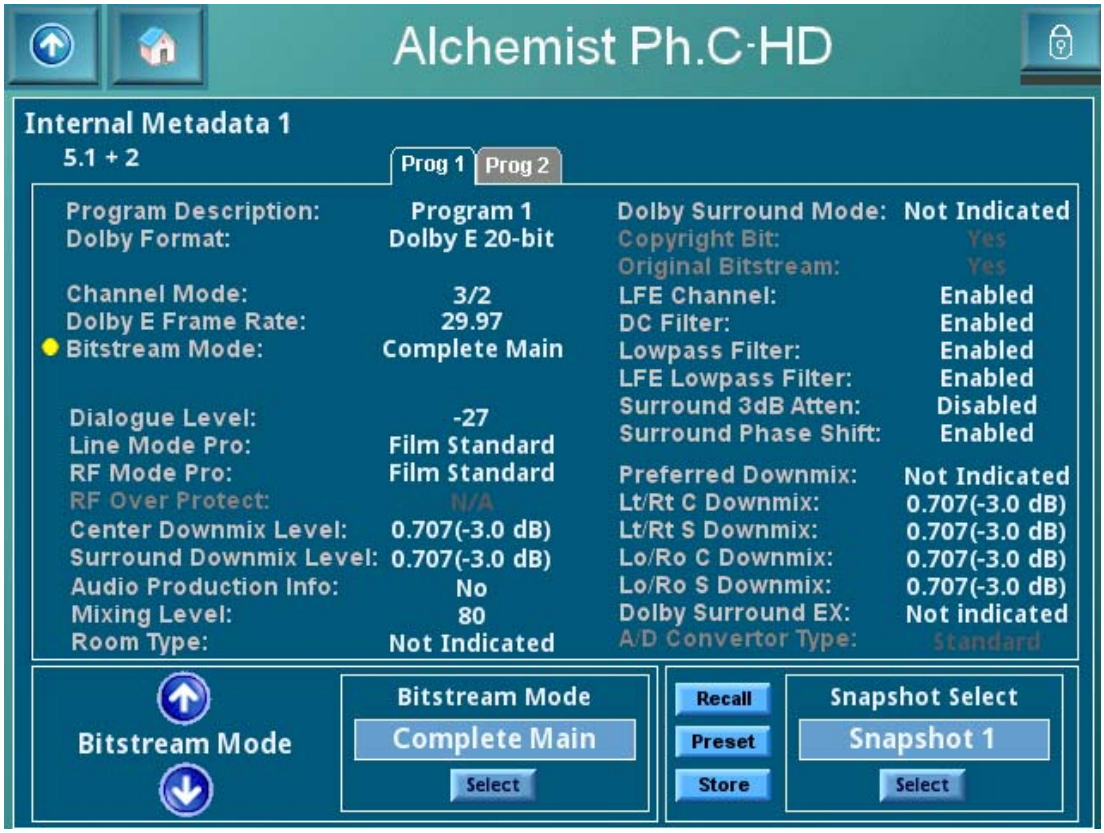
Metadata Source

Touch **Metadata Source** to specify the desired source of metadata to the encoder.

Note: This control is only available if the 1080P option is installed and Encoder Mode is set to Author. (In Transcode mode the metadata is sourced directly from the decoder).

Metadata Authoring

Touch **Metadata Authoring** to view all the metadata.



This page indicates the current Encoder Metadata configuration. Encoded metadata associated to each valid program can be viewed using the tabs.

Use the **up/down** arrows to select individual metadata parameters.

To change the current setting for the selected parameter, touch the **Select** button.

The current selection within the full metadata table is indicated by the yellow marker.

Eight Metadata Snapshots are available to store decoded Metadata and/or Authored Metadata. Each Snapshot can store metadata from one program and may be applied to either Dolby Encoder. The Snapshot may be renamed. See “Metadata Workflow” on page 182.

Touch **Select** to change the current Snapshot configuration. To capture the current encoder metadata, select the desired program and touch **Store**.

To load a previously saved Snapshot into the currently selected Program touch **Recall**.

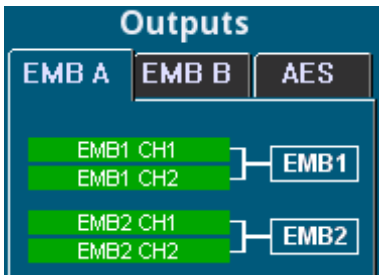
To preset all the metadata parameters for the current program touch **Preset**.

Mute	When selected, all encoder input channels will be muted.
Tone	The current **Tone Type** is indicated on the button. Touch the **Tone** button to enable and change the **Tone Type**. As well as the standard PCM tones a BLITS test tone is also available. The BLITS type is can be configured within the system menu. See “System Setup” on page 78. *Note: This Loop configuration applies to both encoders.*

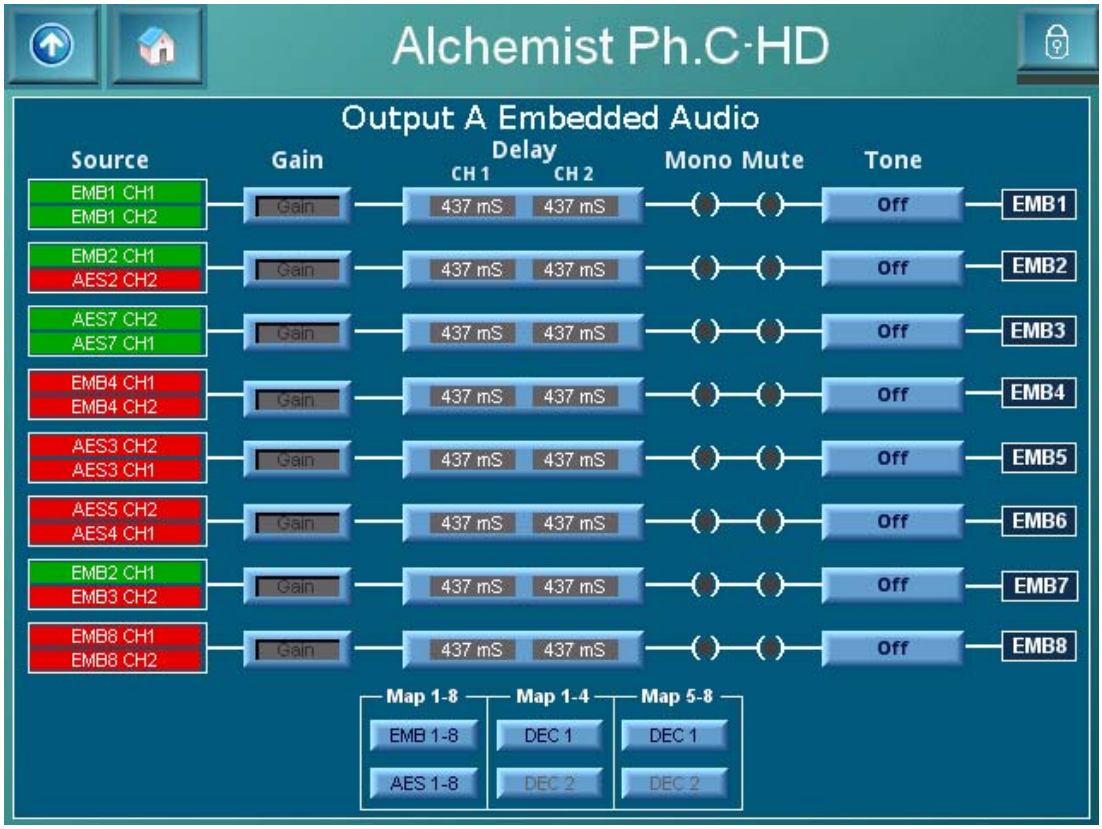
4.9.6 Audio Output

These menus allow you to configure the unit's Audio Output settings.

Outputs
EMB A
EMB B
AES



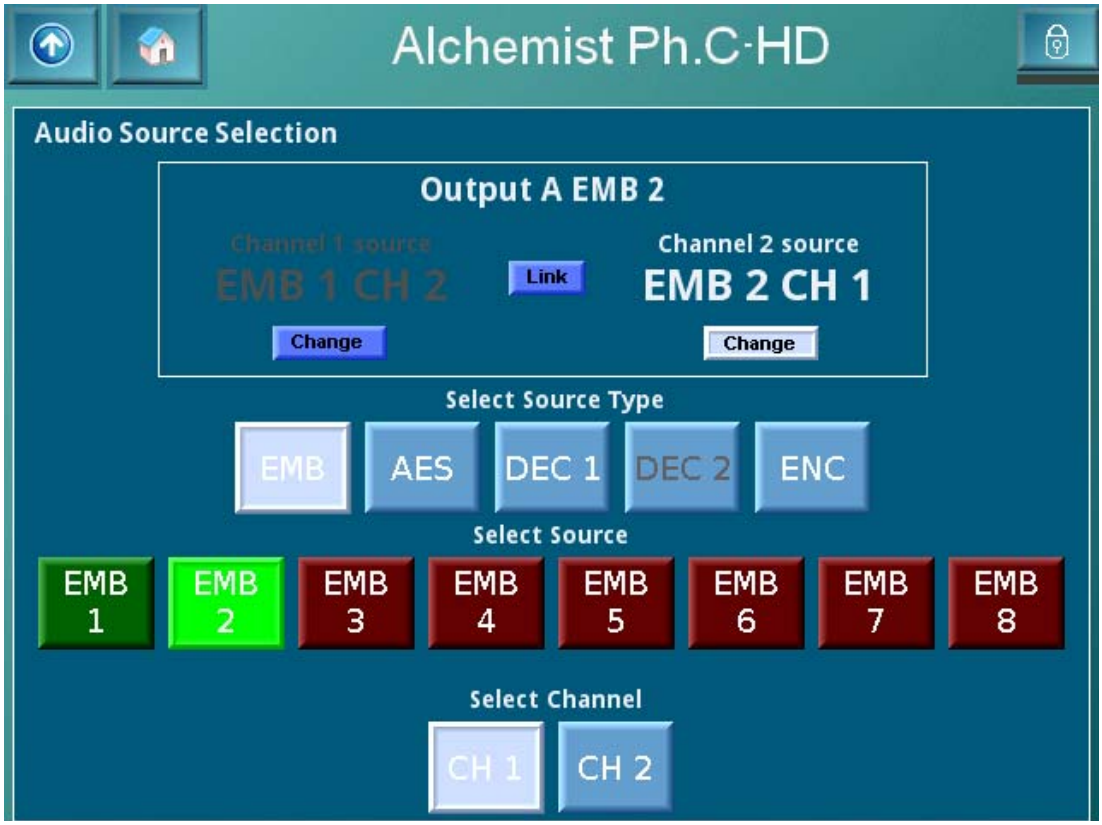
Touch each of the audio output tabs to access the individual output setup pages.



Source Selection

Touch the source selection menu item to assign a source to the output audio pair.

- Green indicates that a valid input signal is present.
- Red indicates that no input signal is present.
- Yellow (only present on ENC buttons) is a warning indication that the encoder is currently passing PCM not Dolby®E.



Link To assign an audio pair, select the **Link** button.

Change To assign individual audio channels, select the **Change** button for the relevant channel.

Source type and source selection can then be made.

When **Link** is enabled the two channels may be swapped using the **Swap** button.

- Green indicates that a valid input signal is present.
- Red indicates that no input signal is present.
- Yellow (only present on ENC buttons) is a warning indication that:
- The encoder is currently passing PCM not Dolby®E.

In Dolby E authoring mode, the encoder does not have the required audio channels to generate the selected program configuration.

Gain (PCM) Touch the **Gain** button to setup the gain for each channel. Yellow indicates the gain is currently set out of preset.

Gain may be applied to the individual channels of the PCM output pair. The amount of gain applied to each channel is displayed in dBs.

The **Track** feature facilitates audio gain tracking across both channels within the same Dolby program.

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

Delay (PCM) Touch the **Delay** button to set up the delay for each channel.

The total delay* for each channel of the output pair is displayed.

If either channel has been adjusted out of preset the delay indicator will be illuminated yellow.

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

* The total delay is the sum of:

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

The values of the system delay vary according to the conversion being made and are listed in “Appendix H: Latency Tables” on page 208.

Note: This PCM control will be grayed out when an encoder output is selected.

Mono (PCM) Touch the **Mono** toggle button to take the average of the left and right channels and apply that average to both.

Note: This PCM control cannot be enabled when an encoder output is selected.

Mute (PCM) When selected both channels will be muted.

Note: This PCM control cannot be enabled when an encoder output is selected.

Tone (PCM) The current **Tone Type** selection is indicated on the **Tone** button

Touch the **Tone** button to select a **Tone Type**.

Note: This PCM control will be grayed out when an encoder output is selected.

Map 1–8 The map functions enable a predefined routing configuration.

EMB 1-8 assigns all 8 embedded inputs to each of its respective audio outputs for the selected audio output (i.e. EMB A, EMB B or AES)

AES 1-8 assigns all 8 AES inputs to each of its respective audio outputs for the selected audio output.

Map 1–4 **DEC 1** assigns the 4 decoded outputs from decoder 1 to audio outputs 1–4 for the selected audio output.

DEC 2 assigns the 4 decoded outputs from decoder 2 to audio outputs 1–4 for the selected audio output.

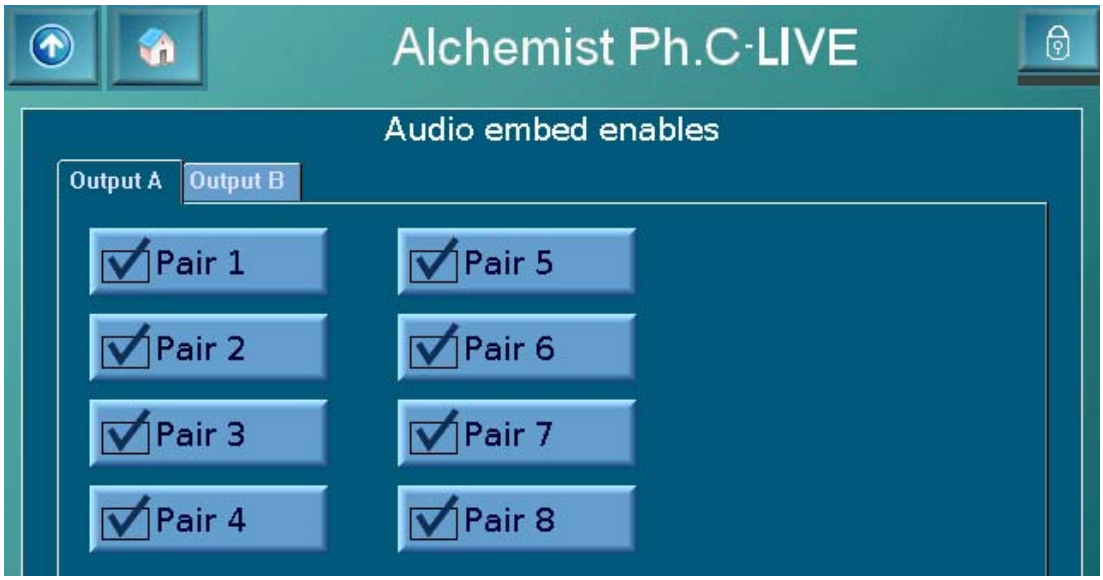
Map 5–8 **DEC 1** assigns the 4 decoded outputs from decoder 1 to audio outputs 5–8 for the selected audio output.

DEC 2 assigns the 4 decoded outputs from decoder 2 to audio outputs 5–8 for the selected audio output.

4.9.6.1 Disabling Embedded Audio outputs

To disable/turn off embedded audio output pairs:

1. From the **Home** screen, touch the **System** tab.
2. Select **Setup** > **Audio Embed**.
3. Choose the required output tab (only applies to units with a secondary output). Use the check boxes to enable/disable output pairs.

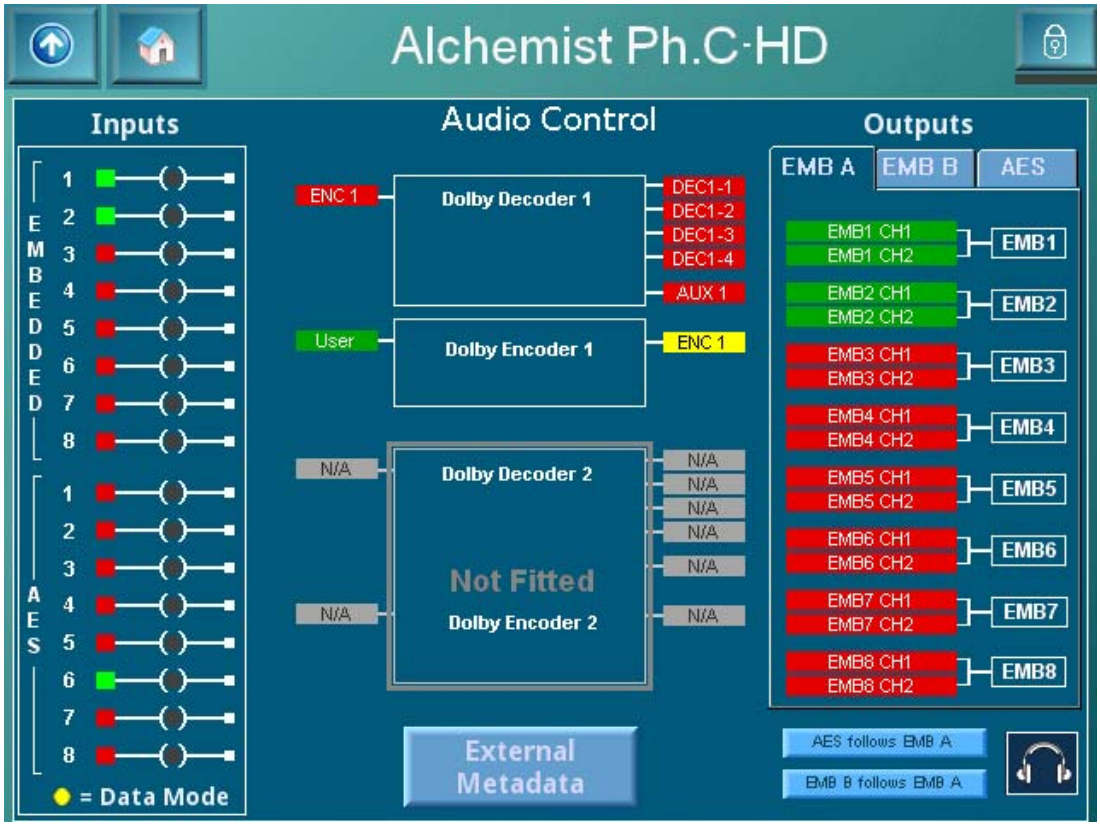


Note: This PCM control cannot be enabled when an encoder output is selected.

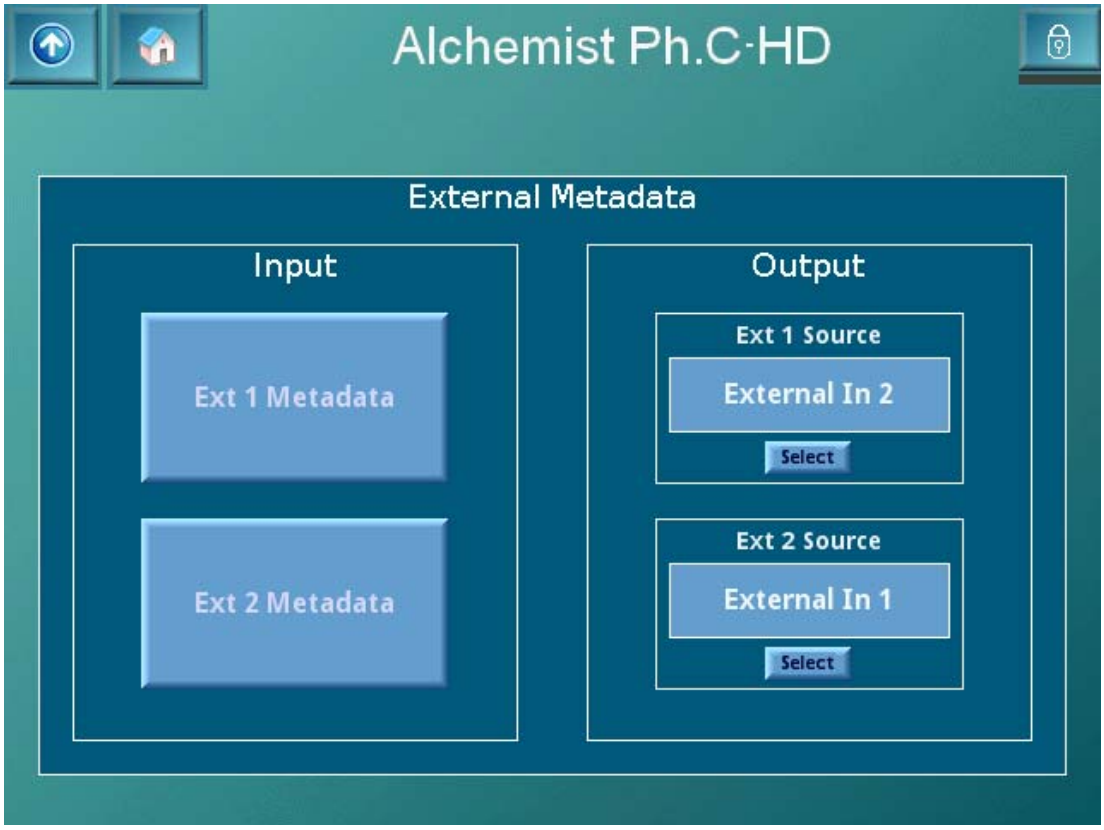
4.9.7 External Metadata

External Dolby Metadata can be ingested into the Alchemist and output from the Alchemist using the 4 dedicated 9-way D-types on the rear on the unit (2 x Input RS485, 2 x Output RS485).

Note: These connections are only present if the unit is enabled with the 1080P option.



Touch **External Metadata** to access the External Metadata page.

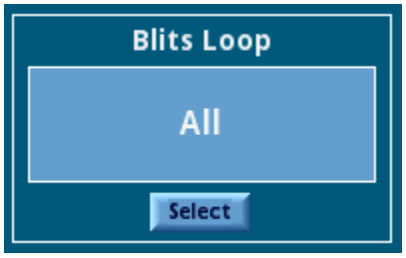


The External Metadata page consists of an **Input** and an **Output** pane.

Input	Touch **Ext 1 / 2 Metadata** to view the metadata present on the external metadata inputs.
Output	Touch **Ext 1 / 2 Source** to configure the metadata source for each output.

4.9.8 System Setup

BLITS Loop



Select the **System** tab followed by the **Config** button to see the current BLITS Loop selection.

Touch the **Select** button to select all phases on the BLITS tone or a specific phase.

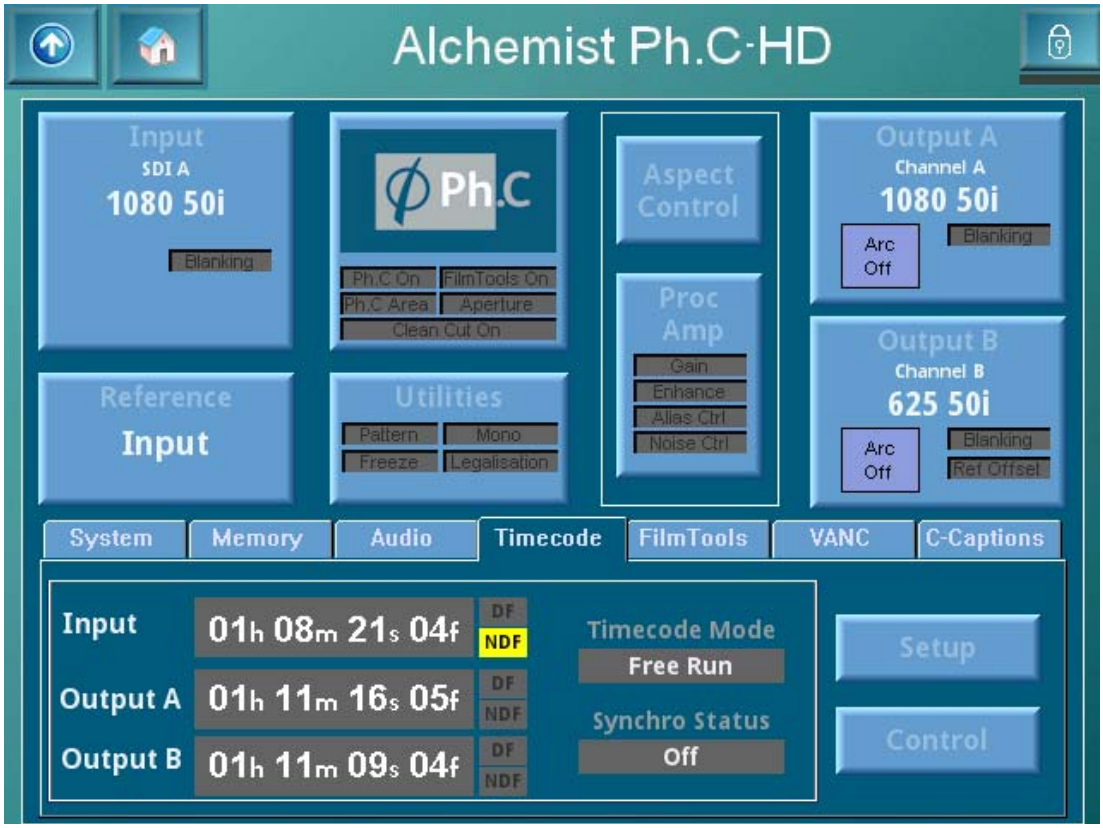
See “BLITS Test Generator” on page 189.

4.10 Timecode

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 Tab” on page 80.
- **Timecode I/O:** Use these settings to setup input timecode sources and output timecodes. See “Timecode Setup” on page 81.
- **Timecode Control:** Use these settings to specify timecode input triggers, output loads, prerun times and the timecode mode. See “Timecode Control” on page 83.

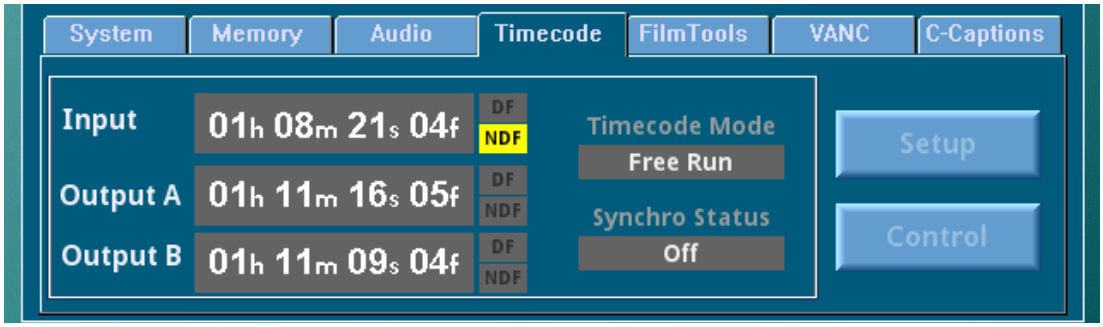
Note: The Alchemist Ph.C Timecode functions are optional. If the Timecode option has not been purchased, these functions are not available.



For additional information about timecodes, see “Appendix B: Timecode” on page 126.

4.10.1 Timecode Display Tab

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.

Syncro Status This field displays the current status of timecode synchronization. For example:

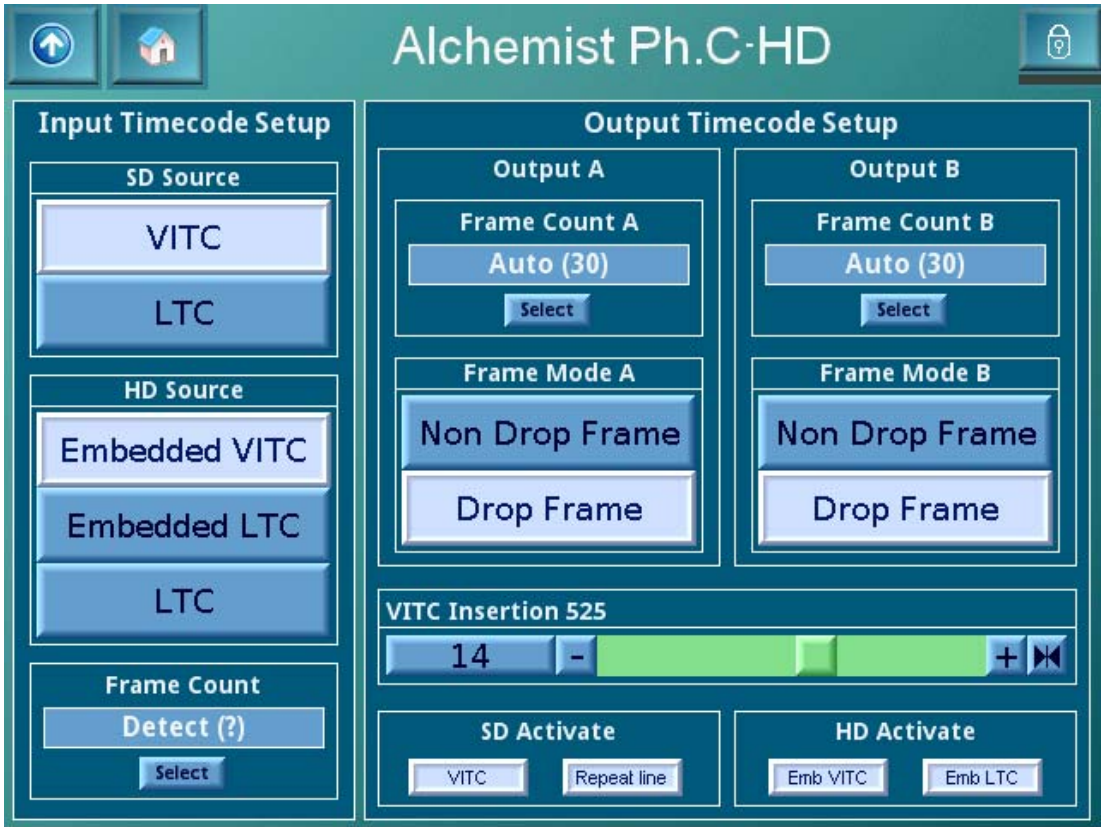
- **Prerun** indicates that the timecode is in the prerun phase preceding a synchro start event.
- **Success** indicates that the synchro start event has occurred successfully.

Setup Touch the **Setup** button to access the Timecode Setup menu.

Control Touch the **Control** button to access the Timecode control menu.

4.10.2 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.



4.10.2.1 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.

4.10.2.2 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

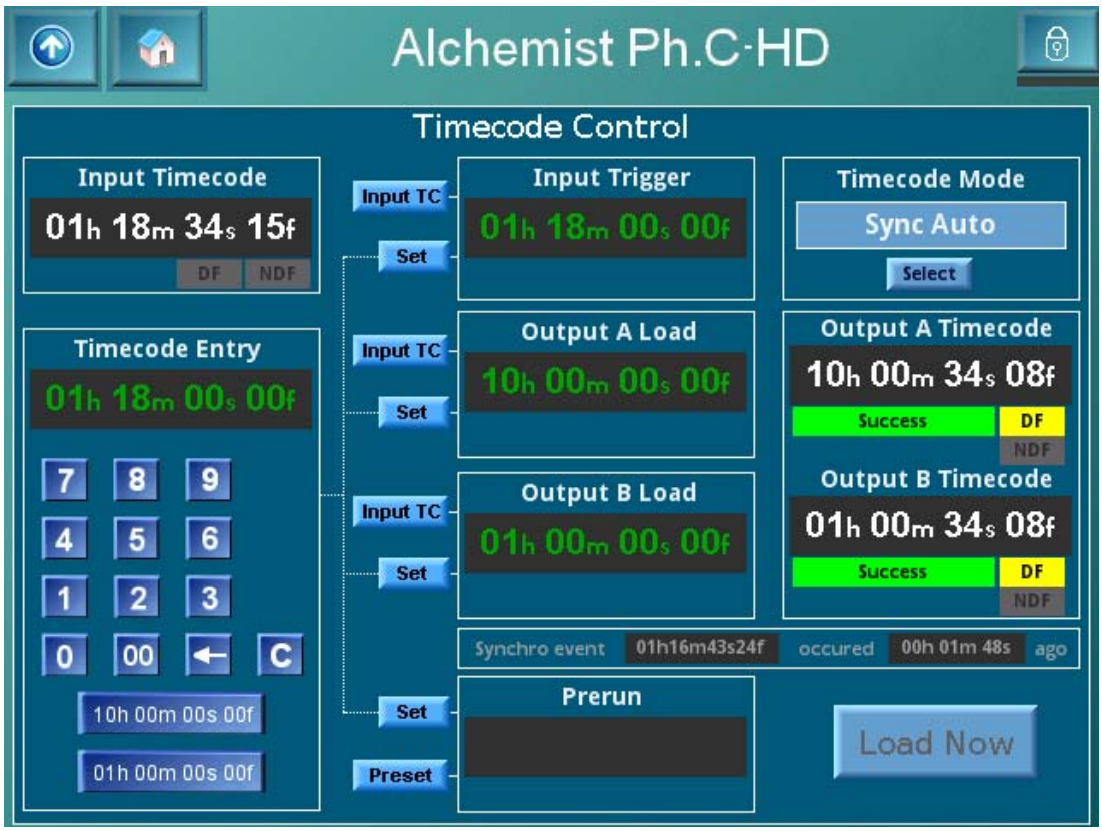
Note that the LTC via XLR is always enabled.

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.

4.10.3 Timecode Control

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



4.10.3.1 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.

4.10.3.2 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.

4.10.3.3 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 timecode to the input timecode value.

4.10.3.4 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.

4.10.3.5 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.

4.10.3.6 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.

4.10.3.7 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.

4.10.3.8 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.

4.10.3.9 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 126.

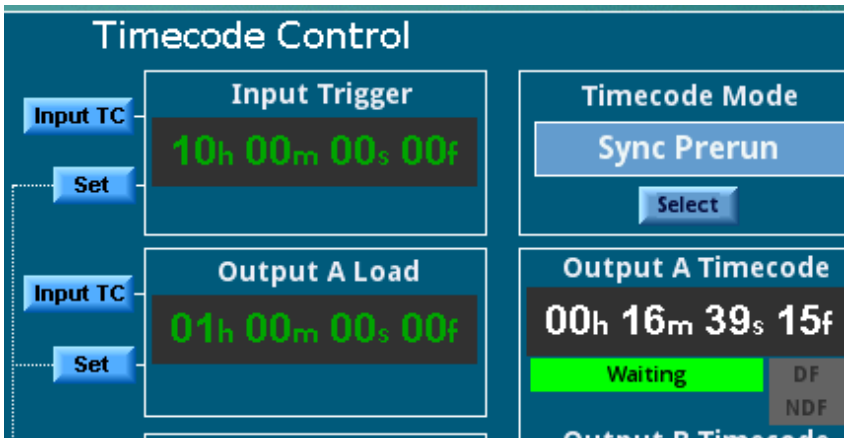
The available timecode modes are:

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

4.10.4 Timecode Control Warnings

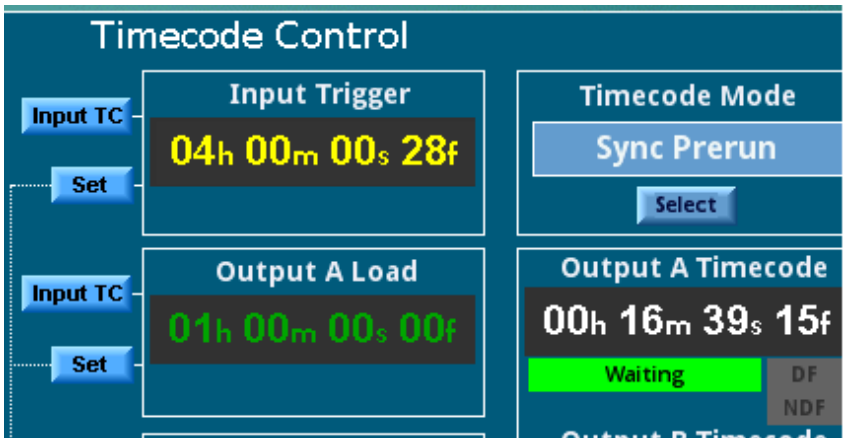
The timecode displays for the Input Trigger, Output Loads, and Prerun change color to indicate valid or invalid values.

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.

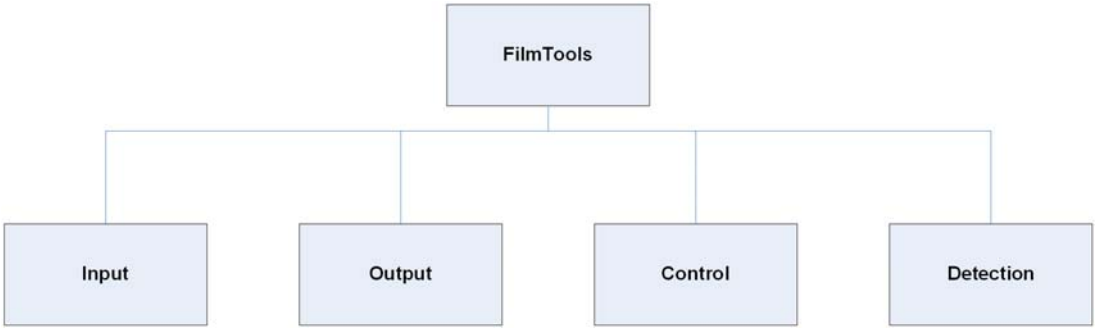
4.11 FilmTools

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 89.
- **Output Cadence:** Use this menu to control the cadence of the converted content. See “FilmTools Output” on page 92.
- **Control:** Use this menu to specify user-specified FilmTools control options. See “FilmTools Control” on page 95.
- **Detection:** Use this menu to control the bias and internal detection algorithm. See “FilmTools Detection” on page 96.

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

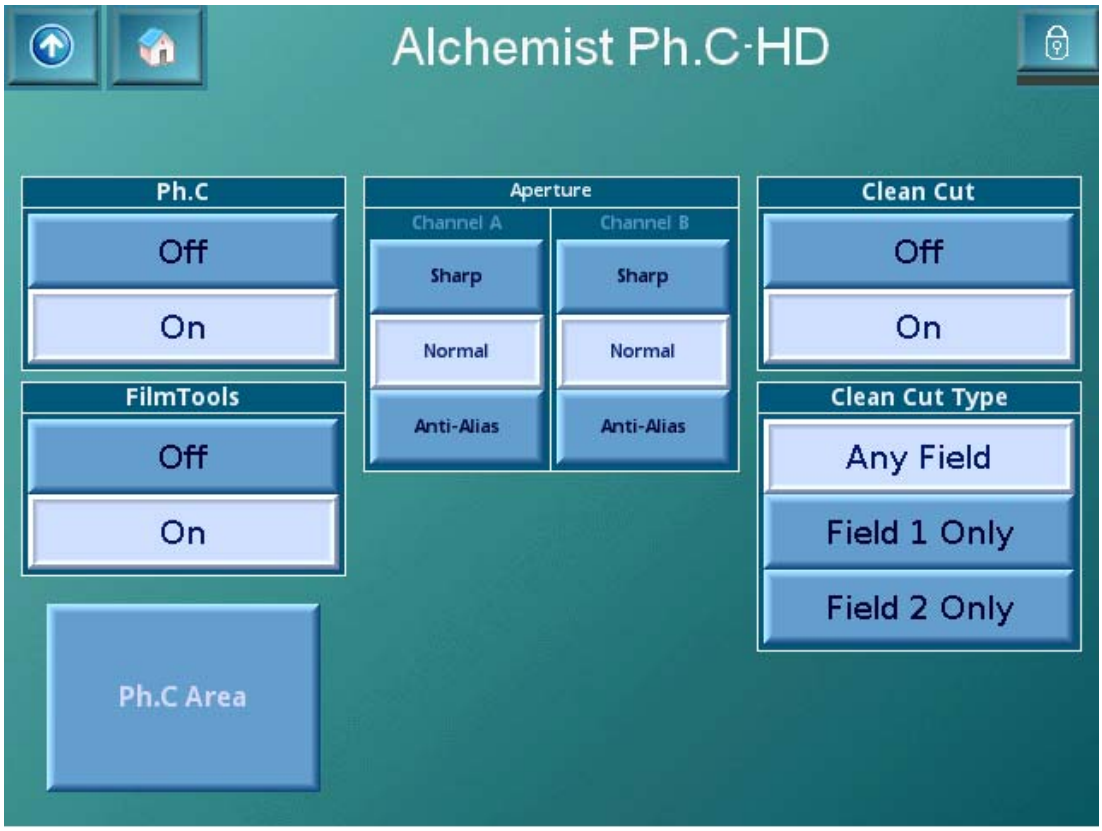
For more information, see “Appendix D: FilmTools” on page 145.



FilmTools must be enabled in the **Conversion** menu.

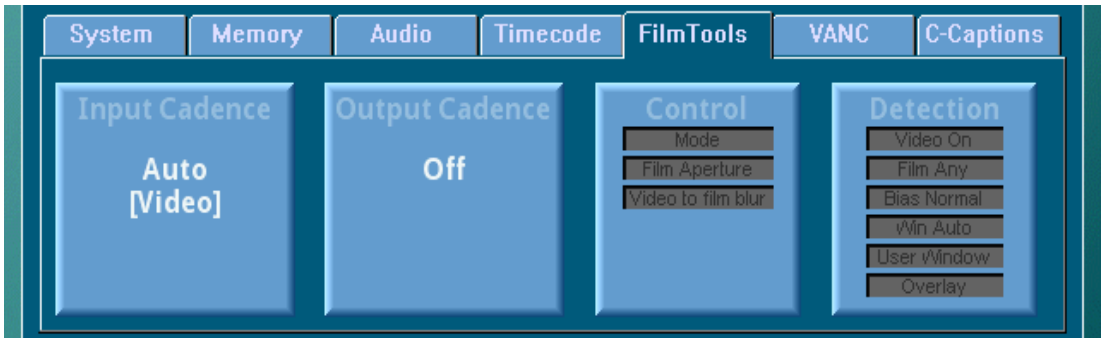
4.11.1 Enabling FilmTools

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



4.11.2 FimTools Display Tab

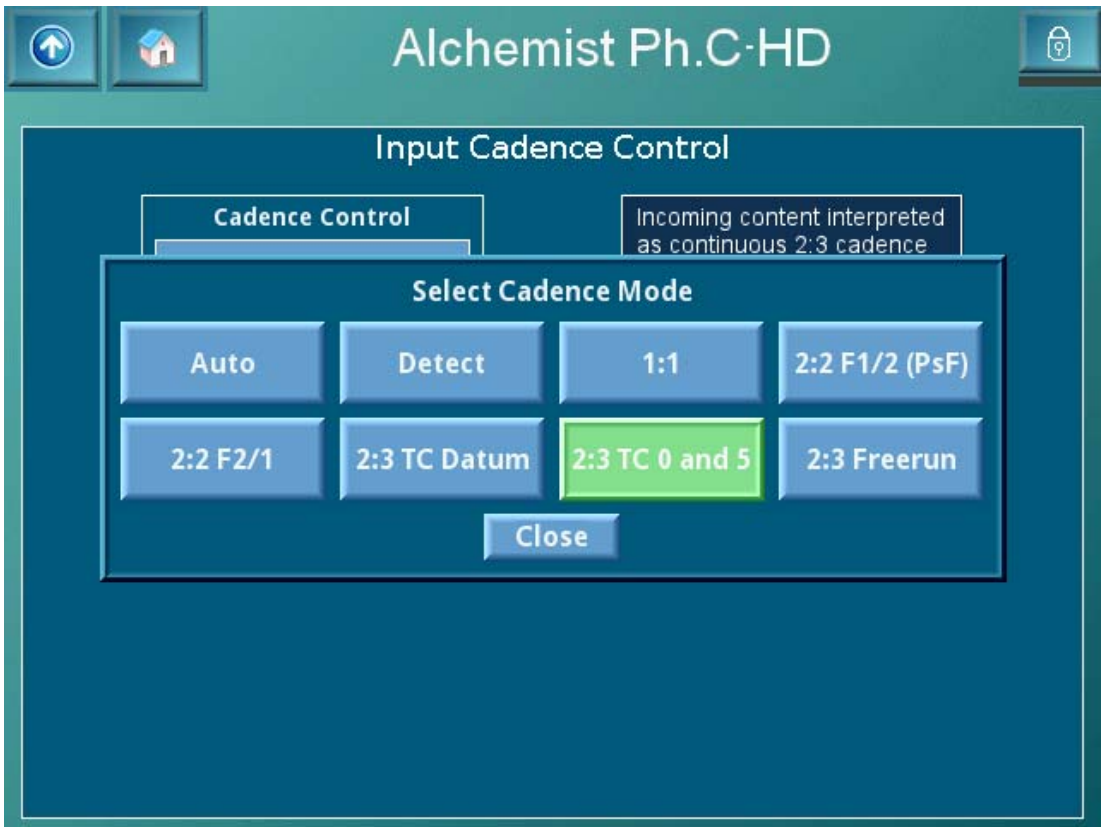
The **FilmTools** display tab on the Home screen displays the FilmTools controls.



4.11.3 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.



4.11.3.1 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.

4.11.3.2 Detect

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

4.11.3.3 1:1

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

4.11.3.4 2:2 F1/2 (PsF)

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

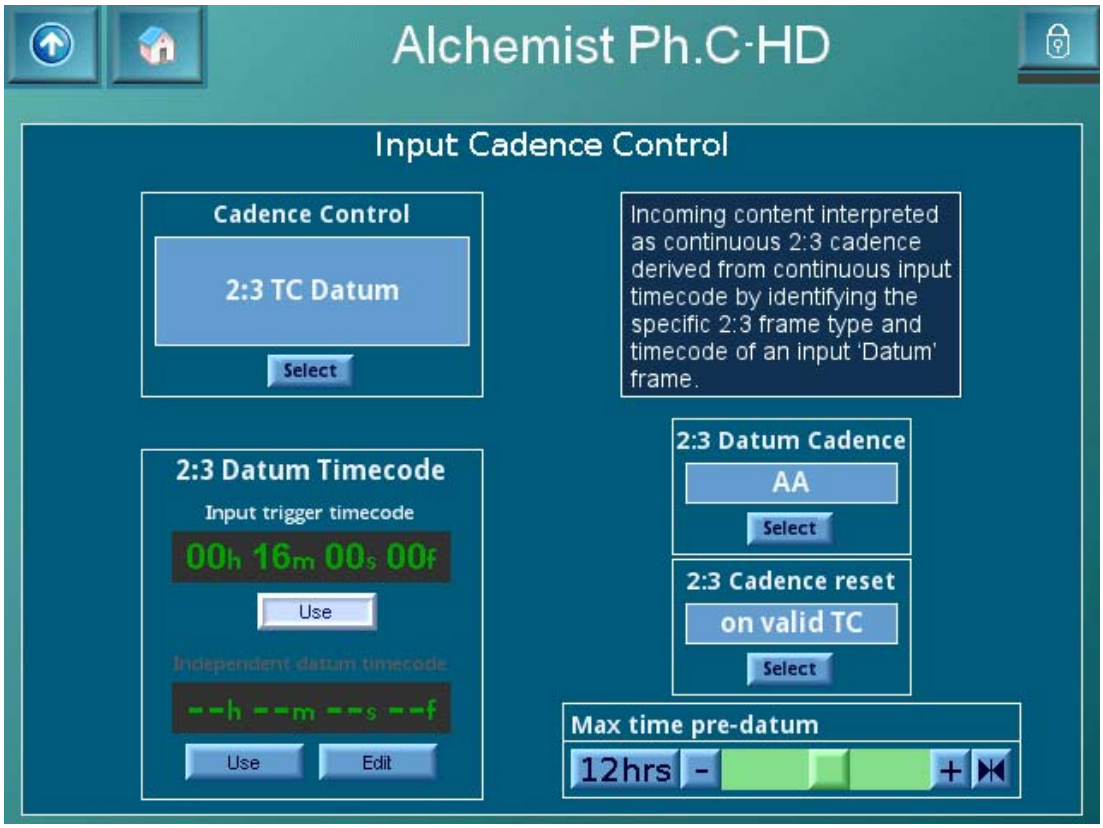
4.11.3.5 2:2 F2/1

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

4.11.3.6 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, see “Appendix D: FilmTools” on page 145.



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 166.

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

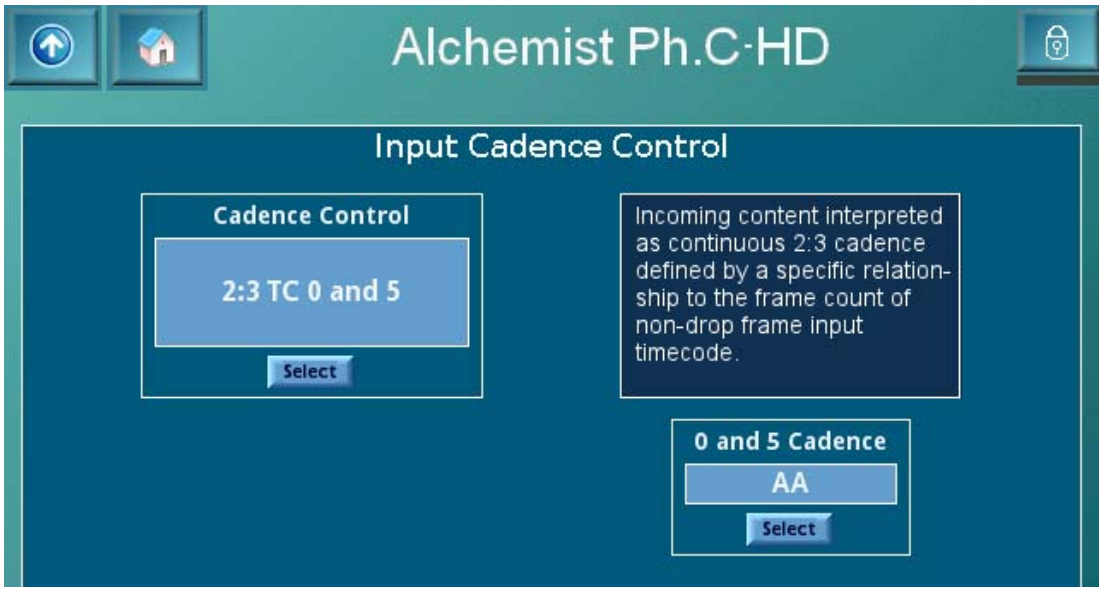
Input Timecode Trigger (Default)	(Default) The 2:3 Datum Timecode is automatically set to match the timecode “Input Trigger” value.
Independent Cadence Trigger	The 2:3 Datum Timecode can be set to any required frame.

2:3 Max time pre-datum

0–23 hours (Default 12 hours)	(Default) The 2:3 Datum Timecode is automatically set to match the timecode “Input Trigger” value.

4.11.3.7 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



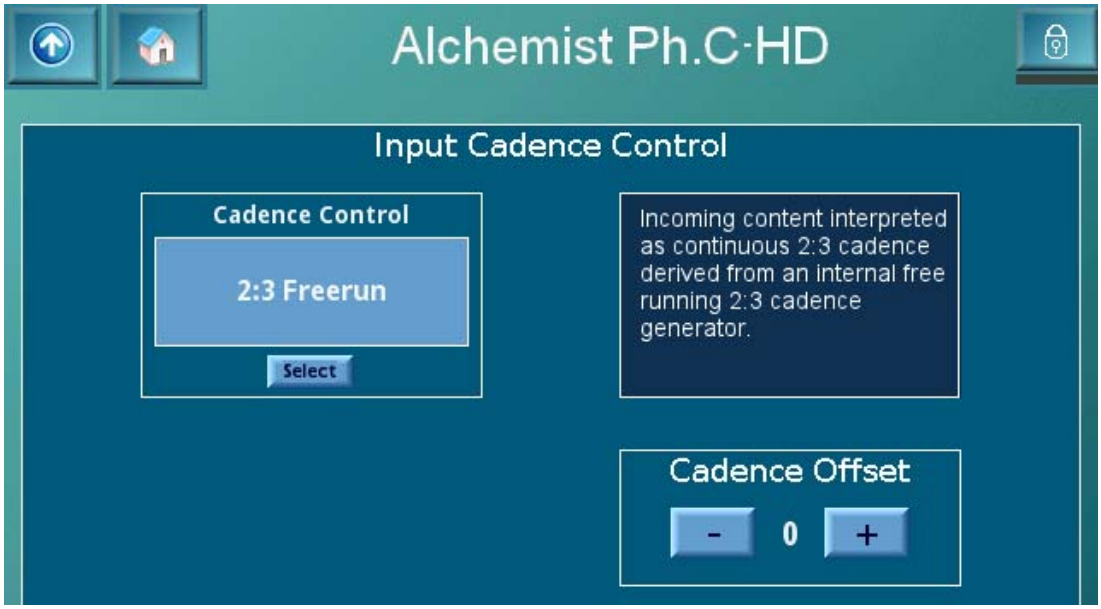
0 and 5 Cadence

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 166.

4.11.3.8 2:3 Freerun

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

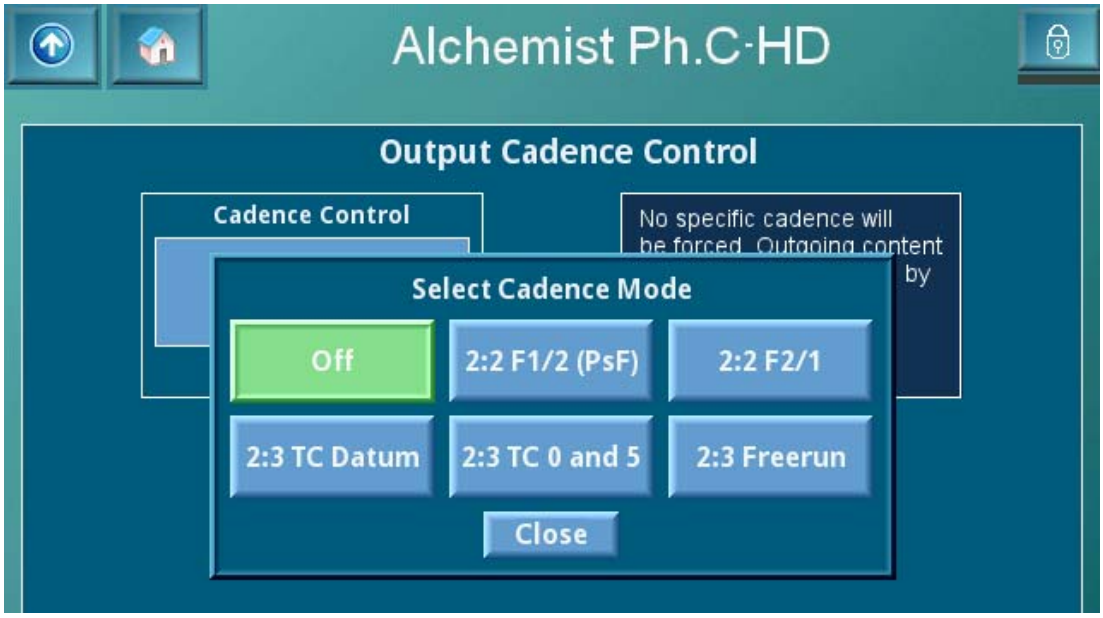


Cadence Offset

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

4.11.4 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.



4.11.4.1 Off

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

4.11.4.2 2:2 F1/2 (PsF)

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

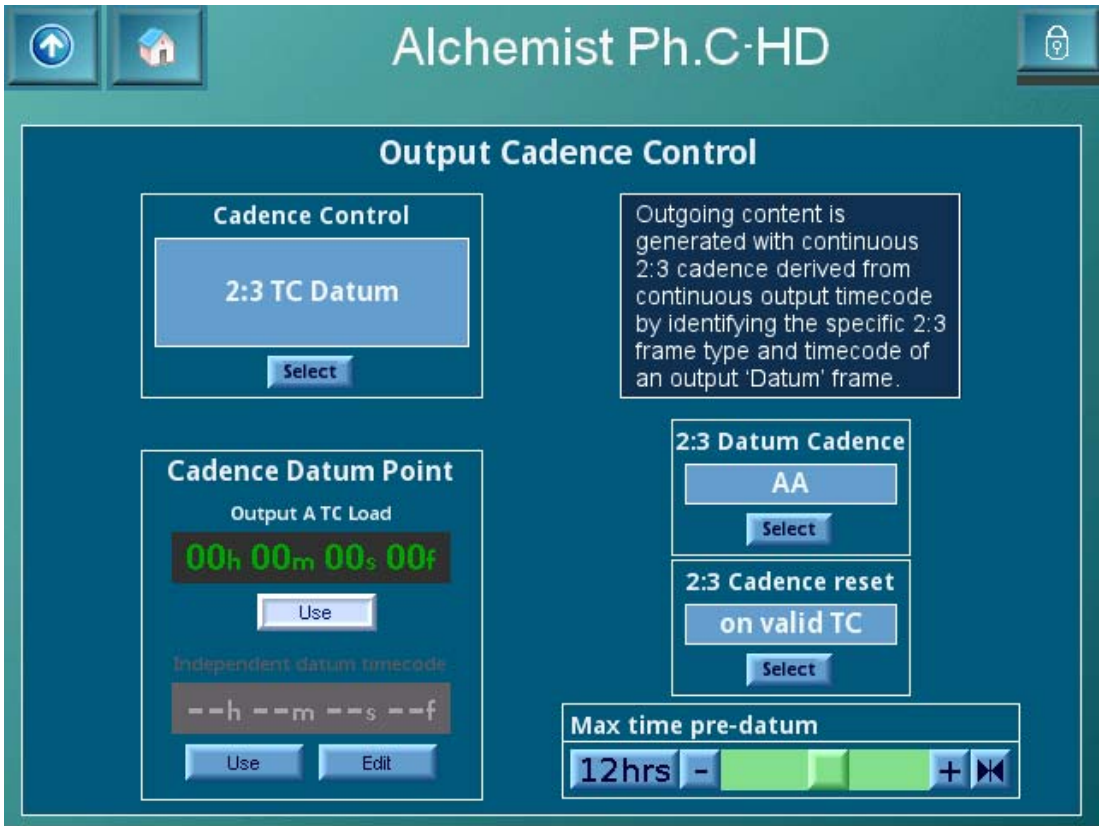
4.11.4.3 2:2 F2/1

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

4.11.4.4 2:3 TC Datum

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

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

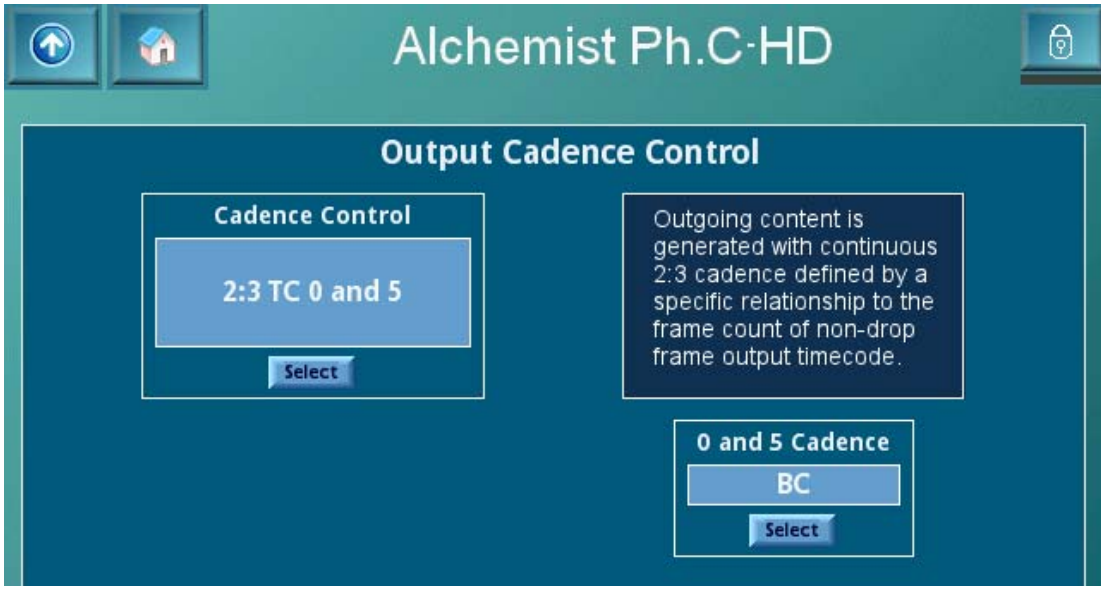
Output Load A Timecode (Default)	The 2:3 Datum Timecode is automatically set to match the “Output A Load” timecode.
Independent Cadence Trigger	The 2:3 Datum Timecode can be set to any required frame.

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.

4.11.4.5 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.

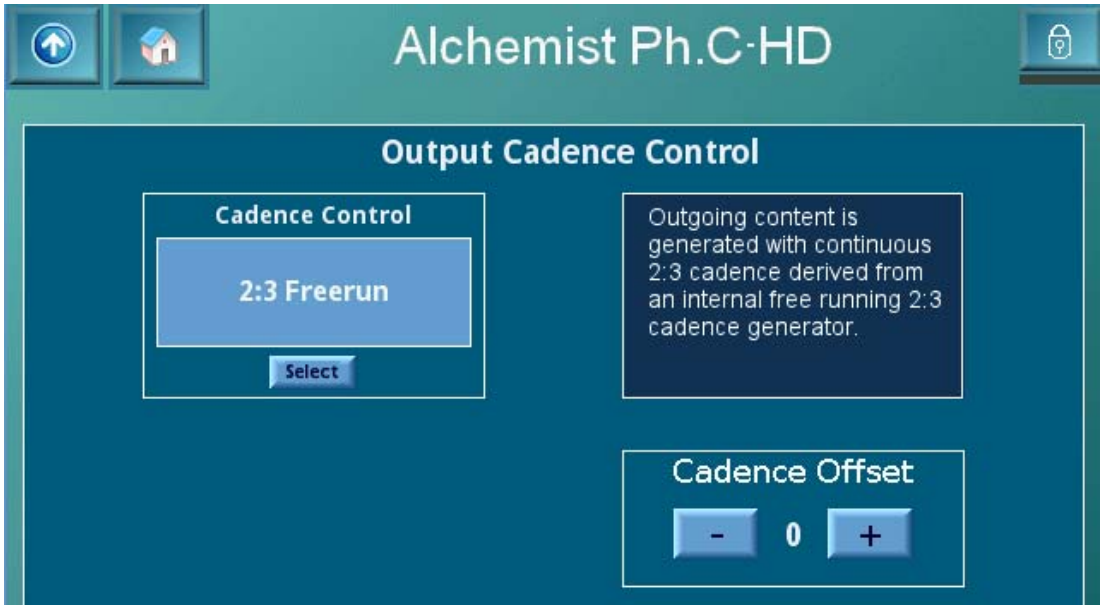


0 and 5 Cadence

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.

4.11.4.6 2:3 Freerun

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

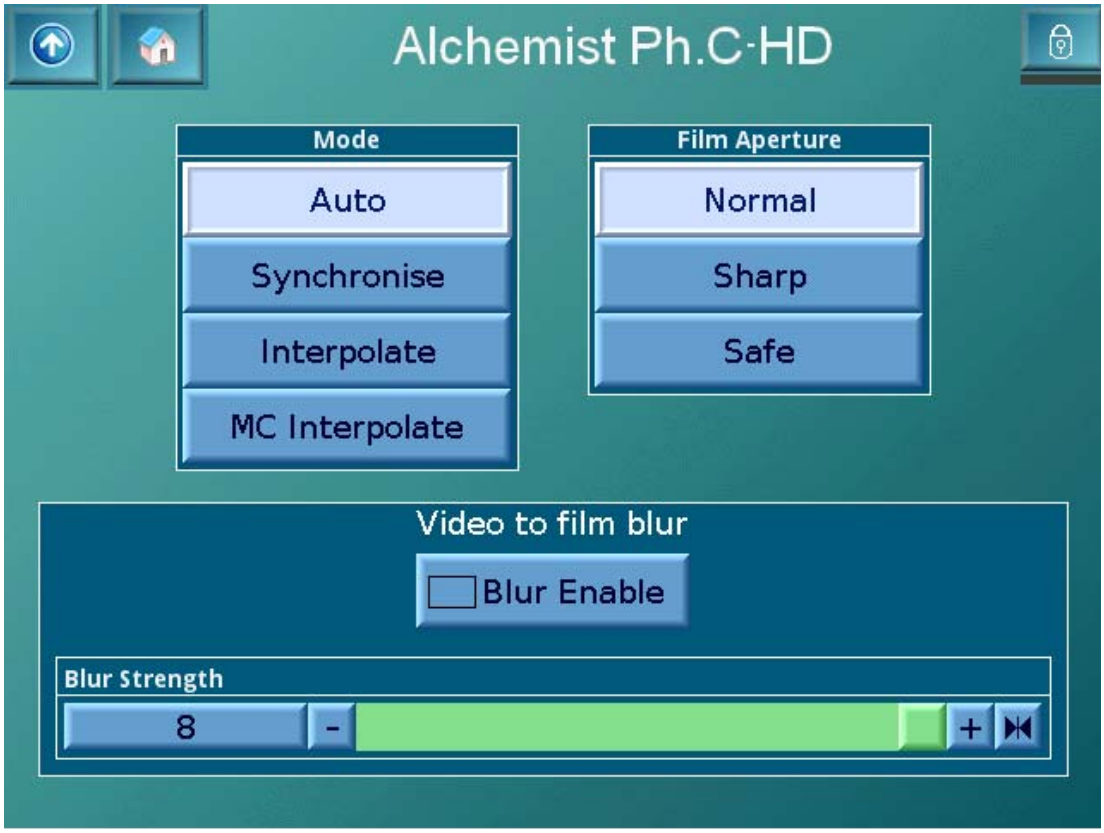


Cadence Offset

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

4.11.5 FilmTools Control

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



4.11.5.1 Mode

Auto (Default)	Selects between synchronized, interpolated (linear) and MC interpolated (motion compensated interpolation) conversion as appropriate depending on the input and output formats specified. See “Conversion Tables” on page 162. 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.
Interpolate	Forces the conversion by linear interpolation.
MC Interpolate	Forces the conversion by motion compensated interpolation.

4.11.5.2 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

4.11.5.3 Video to film blur

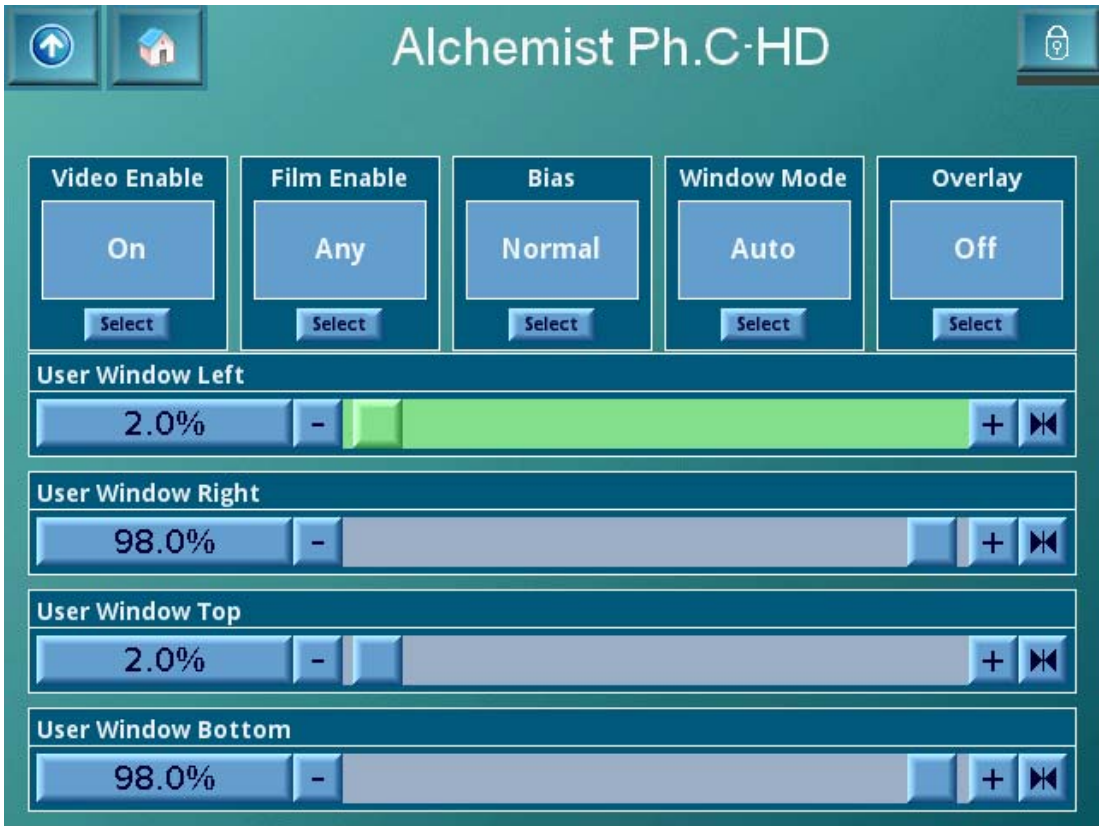
Video to film blur allows any video-to-film conversion to have controlled blur added in areas of movement. Using Ph.C, this process ensures that the amount of blur is proportional to the speed and direction of the motion so that fast moving objects will be blurred more than the slower ones. This mimics the blur usually associated with production on 35mm film.

Blur Enable	Select this option to enable film blur.
Blur Strength	Use the slider bar to adjust the blur strength from 0 (min) to 8 (max).

4.11.6 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.



4.11.6.1 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.

4.11.6.2 Film Enable

Any	(Default) Allows the sequence detector to identify film of any cadence. This may be 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 may be 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.

4.11.6.3 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.

4.11.6.4 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.

4.11.6.5 Window Overlay

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

4.11.6.6 User Window

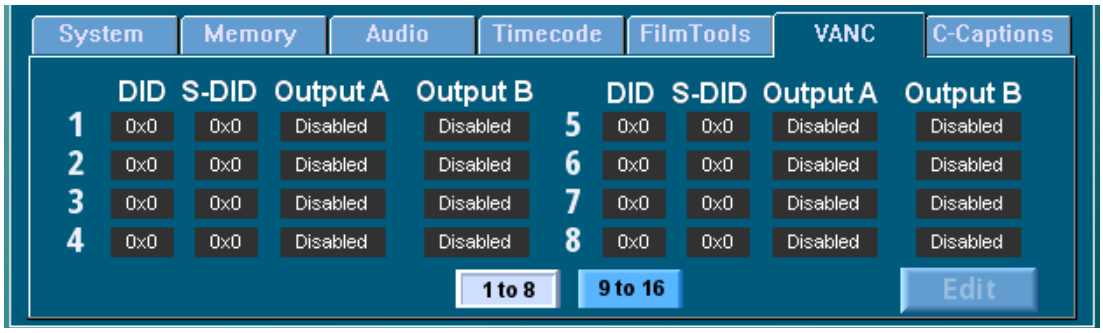
Left **0–100%** **(Default 1%)**	Defines the left edge of the detection region as a percentage of the picture width.

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.

4.12 VANC

This section describes the control interface of the Alchemist Ph.C-HD vertical ancillary bypass mode.

4.12.1 VANC Display Tab



1 to 8

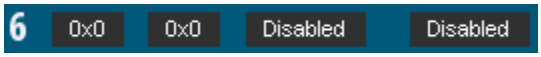
9 to 16

These toggle buttons allow the user to select whether status information for packets **1 to 8** or **9 to 16** is viewed.

Edit

Touch **Edit** to access the VANC configuration page.

Status Disabled



Disabled indicates the VANC bypass feature for the specified data packet is currently disabled.

Status Green (OK)

Green indicates a packet with the specified identification value has been successfully detected and inserted into the specified output line. All packets will be transparently bypassed from input to output.

Status Yellow (Warning)

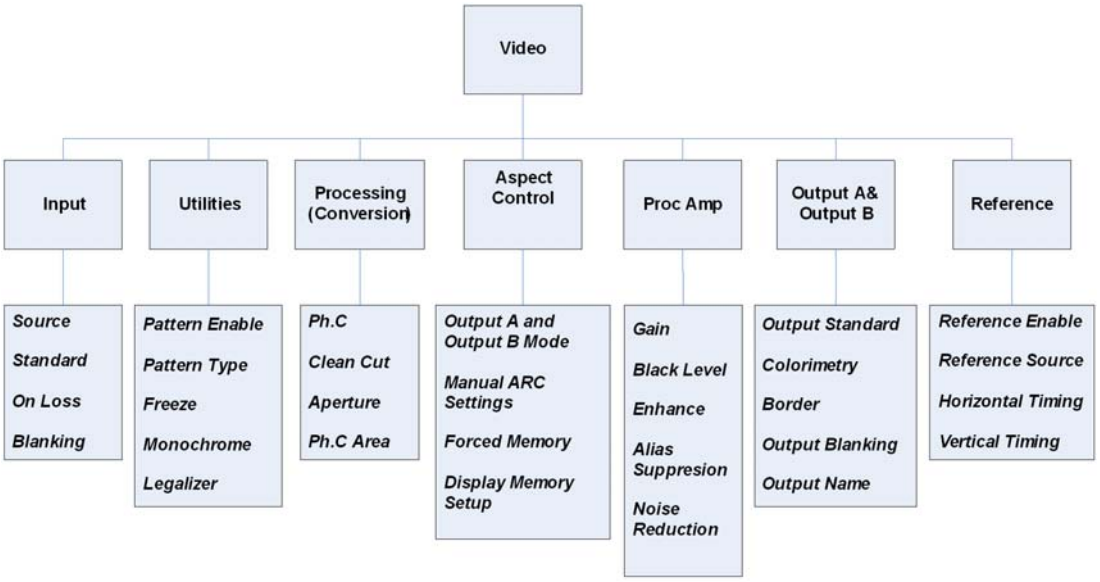
Yellow indicates a packet with the specified identification value has been successfully detected and inserted into the specified output line, however due to the combination of input / output standards selected VANC packets might be dropped or repeated.

Note: Packets are dropped/repeated in sympathy with video fields/frames.

Status Red (Error)

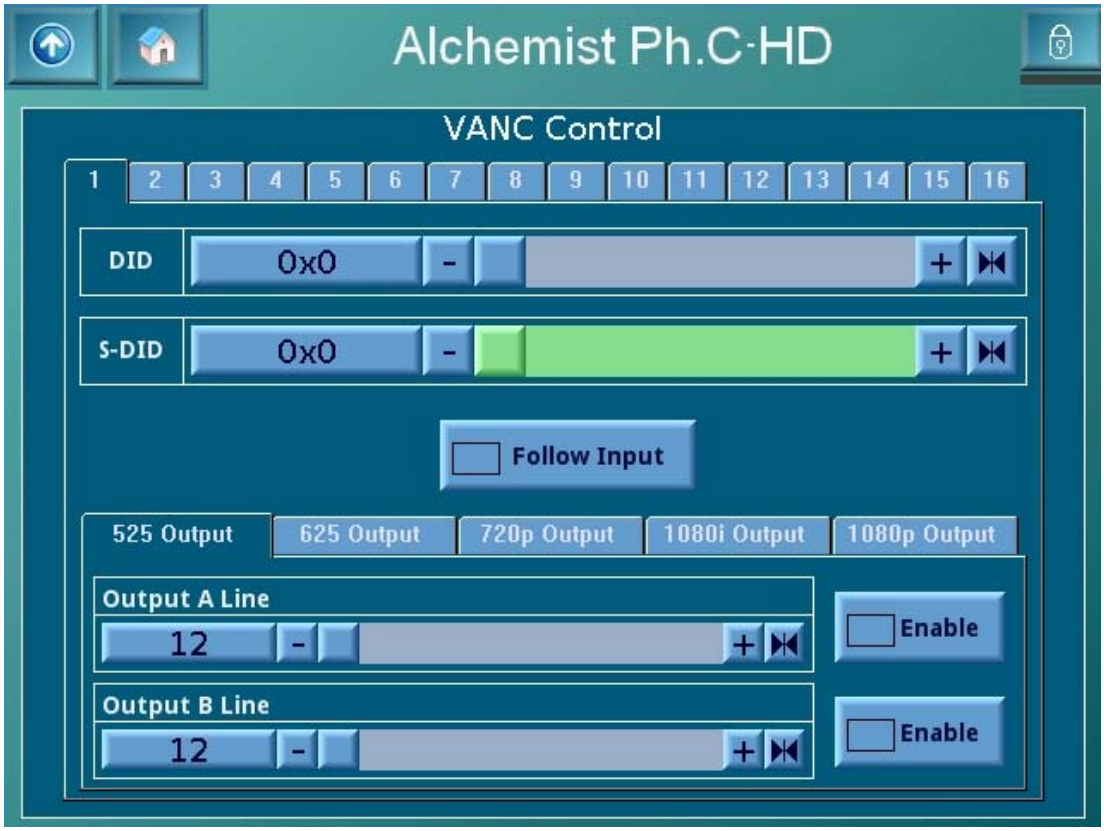
Red indicates the user specified identification value has not been detected and therefore will not be inserted.

4.12.2 VANC Menu Hierarchy



4.12.3 VANC Control

The VANC control page offers configuration for each of the 16 data packets. Individual packets may be selected using the tabs. In addition to these controls VANC must be enabled on the output page before data can be successfully bypassed.



Packet Selection	Select the desired packet using the tabs.
DID	Touch the slider to set the **DID** hex value. Alternatively touch the numeric value and a hex keypad is available to enter the desired identification value.

SDID	Touch the slider to set the **S-DID** hex value. Alternatively touch the numeric value and a hex keypad is available to enter the desired identification value.
Follow Input	Touch **Follow Input** to insert the data on the same line as it was extracted on. This feature is only applicable when the input and output image formats are the same e.g. 1080i to 1080i. In this mode the Alchemist will track data packets, even if the input packets are present on different lines in different fields (assuming they are within the valid range). This is the only mode the Alchemist will effectively insert data into different line positions in different fields. If selected when IO formats are different Alchemist will default to insert on the line number specified in the user interface. Default is the minimum line specified in the available range.
Output Selection	Select the desired output format configuration using the tabs. This allows the user to configure independently the five different output formats (525, 625, 720P, 1080i, 1080P).
Output A Line	Touch the slider to set the Output A insertion line number. Alternatively touch the numeric value and a decimal keypad is available to enter the desired line number.
Output A Enable	Touch Enable to activate packet insertion on Output A.
Output B Line	Touch the slider to set the Output B insertion line number. Alternatively touch the numeric value and a decimal keypad is available to enter the desired line number.
Output B Enable	Touch Enable to activate packet insertion on Output B.

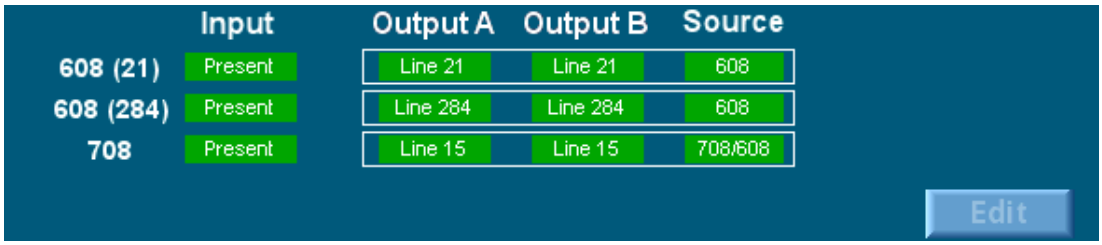
Note: VANC must be enabled on the output page before data can be successfully bypassed. See “VANC Output” on page 55.

4.13 Closed Captions

This section describes the control interface of the Alchemist Ph.C-HD Closed Captions mode.

4.13.1 C-Captions Display Tab

The C-Captions (Closed Captions) display tab on the Home screen illustrates at a glance the current 608/708 input status and output configuration.



Input

The **Input** column displays the input caption status.

608 (21)
608 (284)
708

Present — Green (Present) indicates that a valid 608/708 signal is present.

Missing — Red (Missing) indicates the input 608/708 caption is missing.

Not Valid — Grey (Not Valid) indicates that the 608 caption data is not valid for the current input standard selected.

Error — Red (Error) indicates that the input 708 caption is invalid. Invalid conditions include a sequence count mis-match, checksum error or some other error in the packet.

Output A/B

The **Output A/B** column informs the user whether each output caption (608/708) is currently being successfully passed (in the current mode of operation).

608 (21)
608 (284)
708

Line 21 — The caption is being successfully passed and is currently inserted into the specified output line.

Note that 608 can only be inserted onto lines 21 and 284.

Missing — The caption is NOT currently being passed. The input caption is missing and therefore cannot be inserted.

Source

The **Source** column indicates the source of each output caption type (608/708).

608 (21)
608 (284)

Missing — The specified 608 source caption is NOT present.

608 — 608 output caption is sourced from the 608 input.

708 CB — 608 output caption is sourced from 708 CB (compatibility bytes).

708

708/608 — 708 output captions are sourced from both the 608 and 708 input. The compatibility bytes are sourced from the 608 and the Native 708 is source from the 708 input.

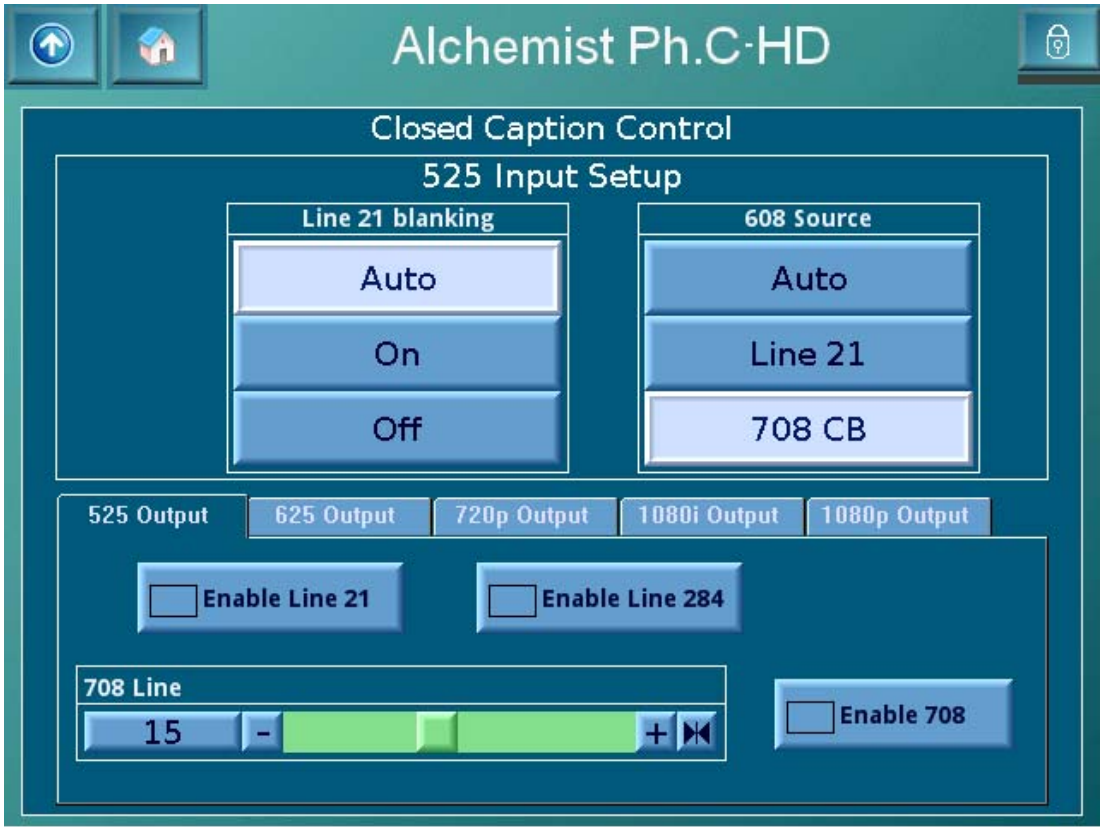
708 — All 708 output captions (Native and compatibility bytes) are sourced from the 708 input.

Edit

Touch **Edit** to access the Closed Captions configuration page.

4.13.2 Closed Caption Control

The Closed Caption control page offers configuration for CEA608 and CEA708 passing functionality. In addition to these controls the Closed Captions must be enabled on the output page before captions can be successfully passed.



525 Input Setup

This allows line 21/284 to be blanked once the 608 caption data has been extracted. This prevents the caption data creeping into the image processing apertures.

Note: Only applicable to 525 59i inputs.

Line 21 Blanking

Auto: If 608 is detected the Alchemist will extract the caption data and then blank line 21/284.

On: Forces line 21/284 to be blanked even when a caption is not present.

Off: Line 21/284 will never be blanked.

525 Input Setup

Use this to control of the source of the outgoing 608 captions.

Note: Only applicable to 525 59i inputs.

608 Source

Auto: The Alchemist will automatically detect the presence of line 21 or 708 compatibility bytes. If both are both present Line 21 takes priority.

Line 21: Forces the 608 source to Line 21/284.

708 CB: Forces the 608 source to 708 CB.

Format tabs

Select the desired output format configuration using the tabs.

This allows the user to configure independently the five different output formats (525, 625,720P, 1080i, 1080P).

Enable Line 21	Touch **Enable Line 21** to enable/disable the insertion of 525 608 Line 21 output captions. Note: Only present on 525 tab
Enable Line 284	Touch **Enable Line 284** to enable/disable the insertion of 525 608 Line 284 output captions. Note: Only present on 525 tab
Enable 708	Touch **Enable Line 284** to enable/disable the insertion of 525 608 Line 284 output captions. Note: Only present on 525 tab
Enable 708	Touch **Enable 708** to enable/disable the insertion of 708 captions.
708 Line	Touch the slider to select the 708 output insertion line number. Alternatively touch the numeric value and a decimal keypad is available to enter the desired line number.

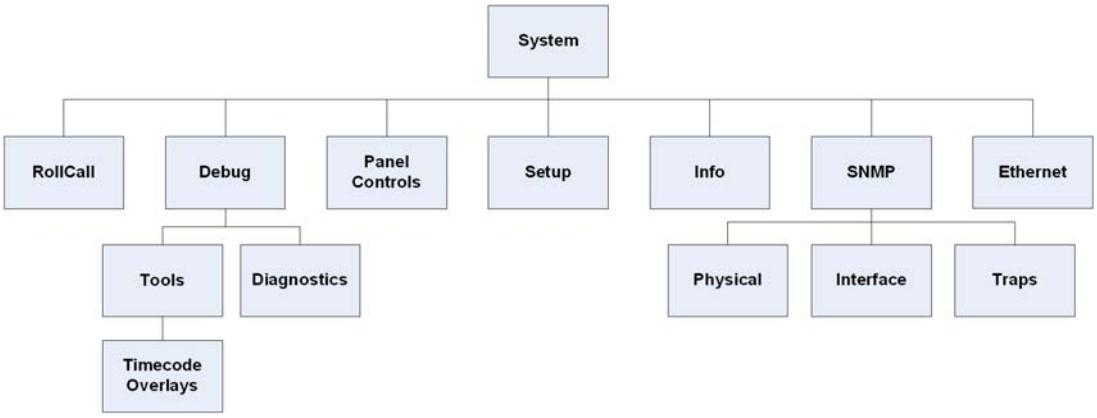
4.13.3 Closed Captions Output Enabled/Disabled

C-Captions Output	Closed Captions Output can be enabled/disabled independently for output A and output B.

4.14 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 108.
- **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 113.
- **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 118.
- **Setup:** Use these settings to enable or disable shaped horizontal blanking, active line length type, and analog blanking. See "Debug" on page 119.
- **Info:** The system information screen displays version information about the Alchemist Ph.C. See "Debug" on page 119.
- **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 "Panel Controls" on page 118.
- **SNMP:** Use these setting to configure the Alchemist's SNMP settings. See "Appendix F: SNMP" on page 193.



4.14.1 System Tab

The Alchemist's system configuration functions are accessed from the System page

4.14.1.1 Messages

The Messages area on the System tab can display 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.

In addition, the current total system delay is displayed as well as the status indicators for:

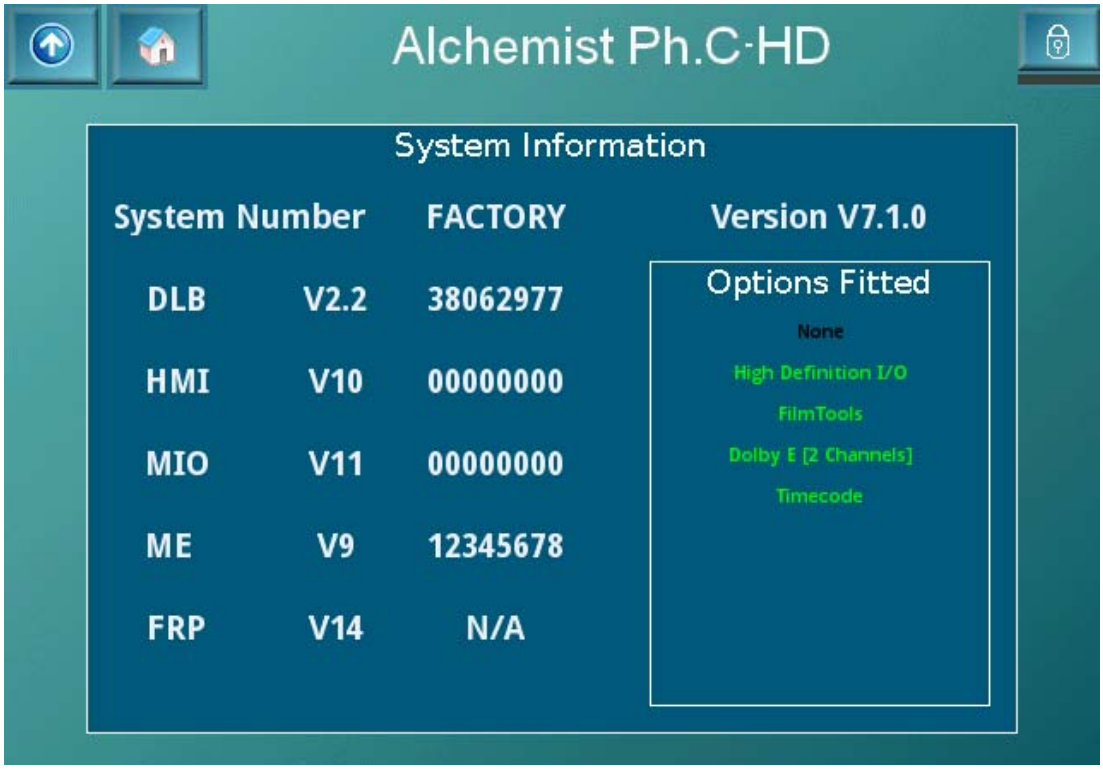
- RollCall
- Fan operation
- PSU

4.14.2 Info

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

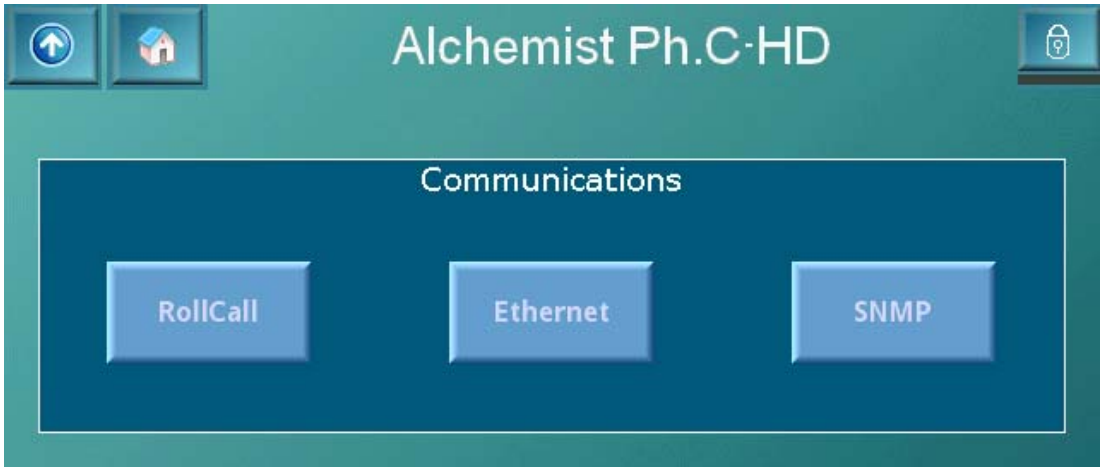
The System Information Screen displays information about the Alchemist Ph.C HD's software and hardware versions. This information is required when contacting Snell support.

System Information screen for unit with High Definition, Dolby E, FilmTools, and Timecode options:



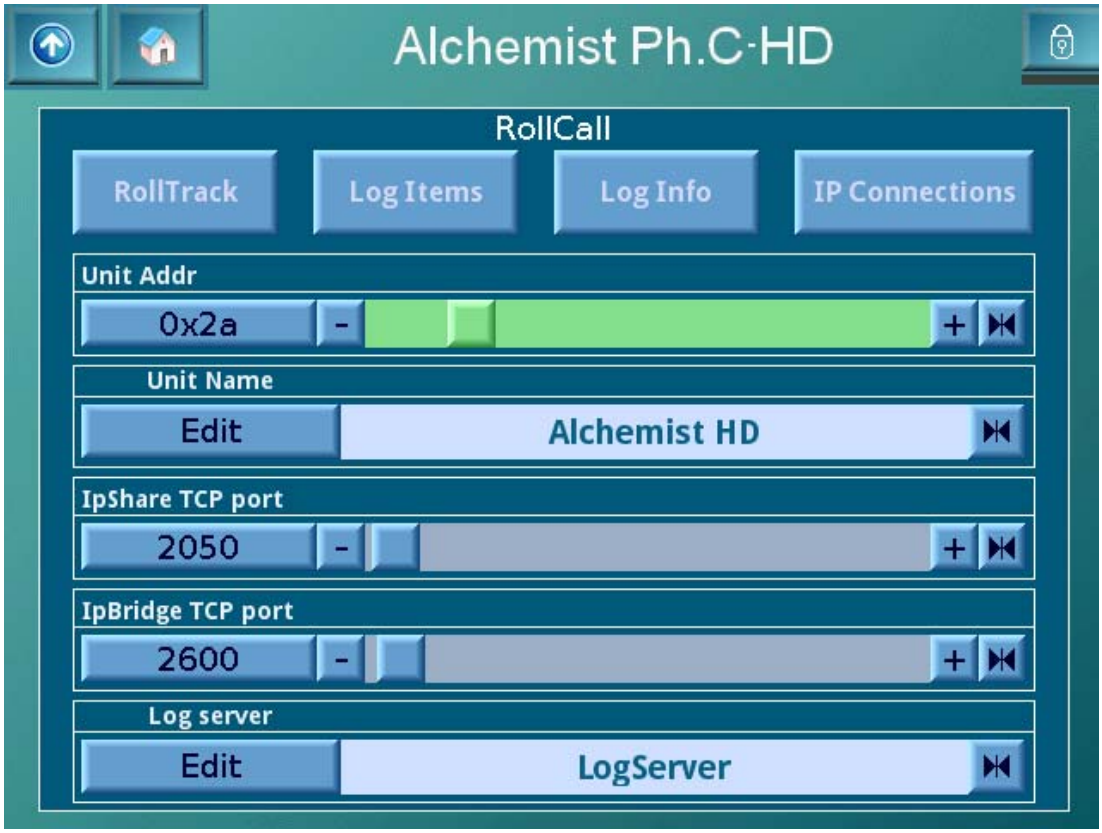
4.14.3 Communications

The Communications menu provides access to the Alchemist's RollCall, Ethernet and SNMP menus.



4.14.4 RollCall

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



4.14.4.1 Unit Addr

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

To change the address, 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**.

4.14.4.2 Unit Name

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

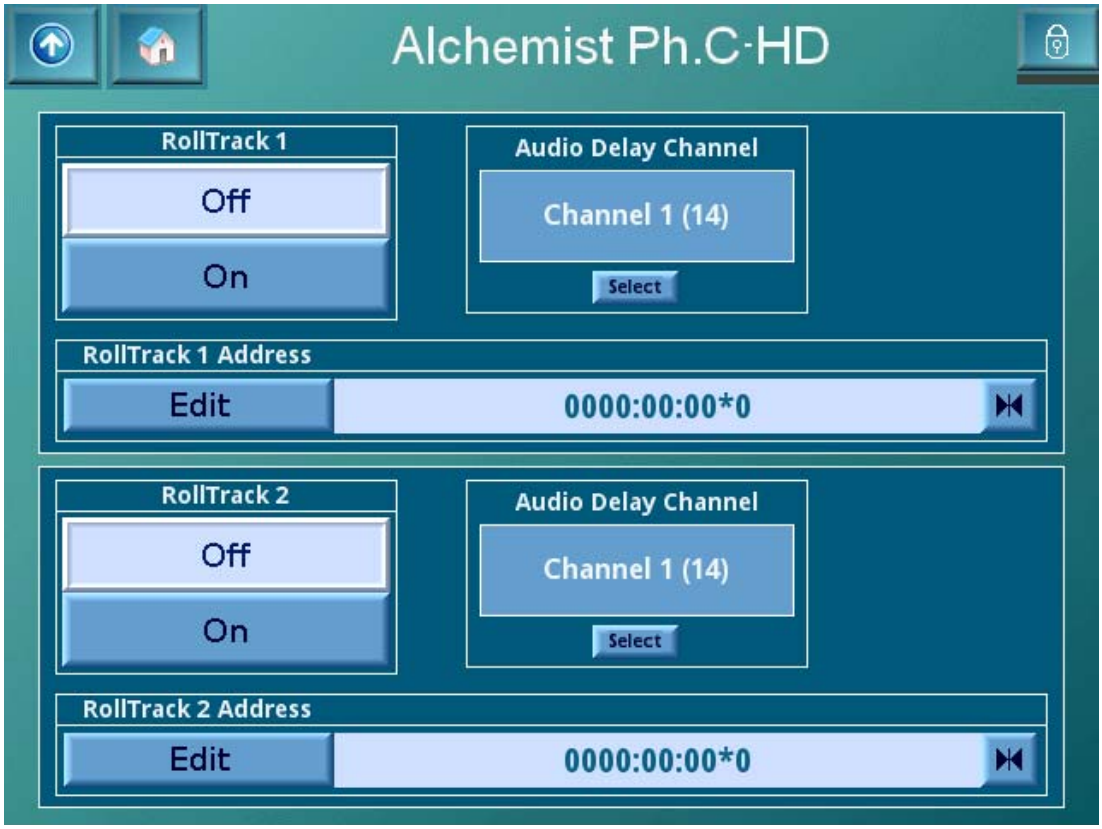
To change the name select the **Edit** item and use the keyboard to edit the text. Select OK to enable the new name.

4.14.4.3 Log Server

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

4.14.4.4 RollTrack

When **RollTrack** 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 I: RollTrack Audio Delay Tracking” on page 218.

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

Up to 2 audio delays may be selected as a destination. Selecting either of the two Address edit buttons produces an address editing keyboard.

The string characteristics of a RollCall address are:

0000:00:00*0	The first set of digits identifies the network address, in hexadecimal. This is usually 0000.
0000:**00**:00*0	The second set of digits identifies the enclosure address, in hexadecimal.
0000:00:**00***0	The third set of digits identifies the slot address of the delay module, in hexadecimal.
0000:00:00***0**	The last set of digits identifies the unit ID, in decimal.

A more detailed description of these items is given in “Appendix I: RollTrack Audio Delay Tracking” on page 218.

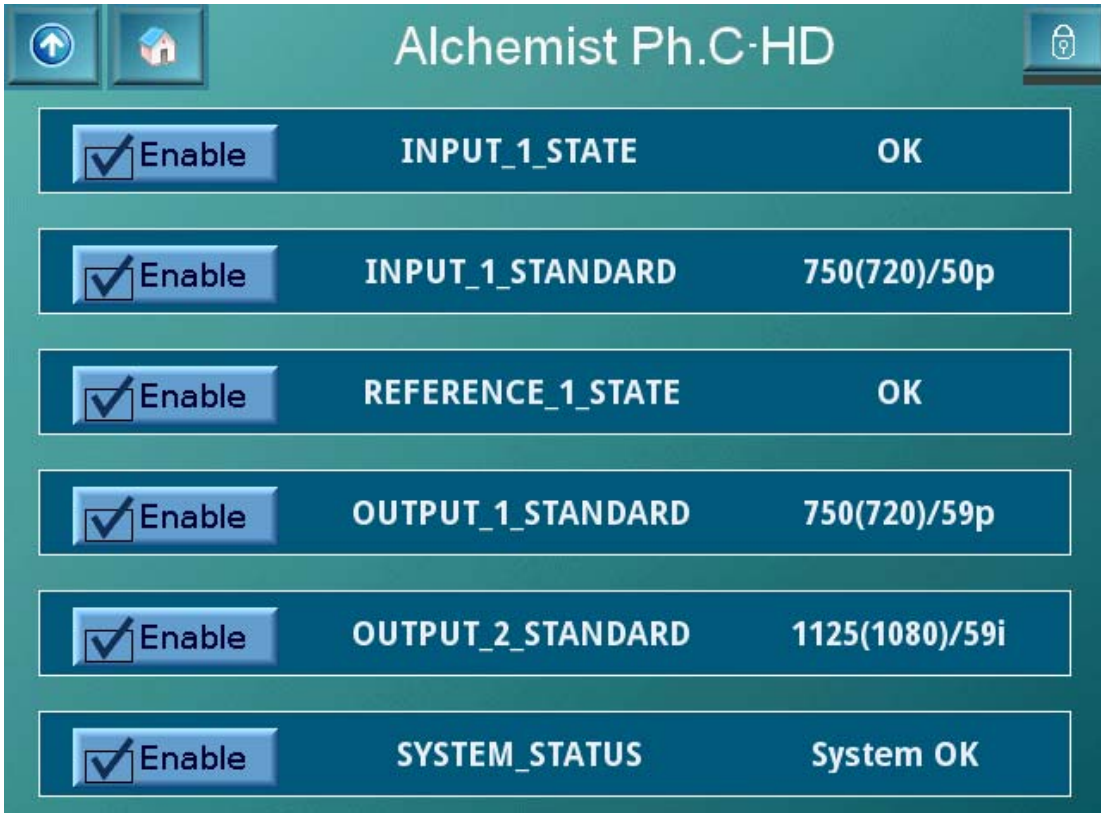
In a typical set-up, the network address will be 0000, the enclosure and slot address would match those of the destination module, and the unit ID should be set to the RollCall ID of the destination unit.

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

RollTrack 1/ RollTrack 2 On / Off	Enables or disables the corresponding RollTrack.
Audio Delay Channel	Specifies the channel number, which can be 14, 15, 16, or 17.
RollTrack 1 Address/ RollTrack 2 Address	Touch **Edit** to change the RollTrack Address as described previously. The preset value is 0000:00:00*0.

4.14.4.5 Log Items

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



This screen shows a list of items that can be made available for logging. The current state of each item is also displayed.

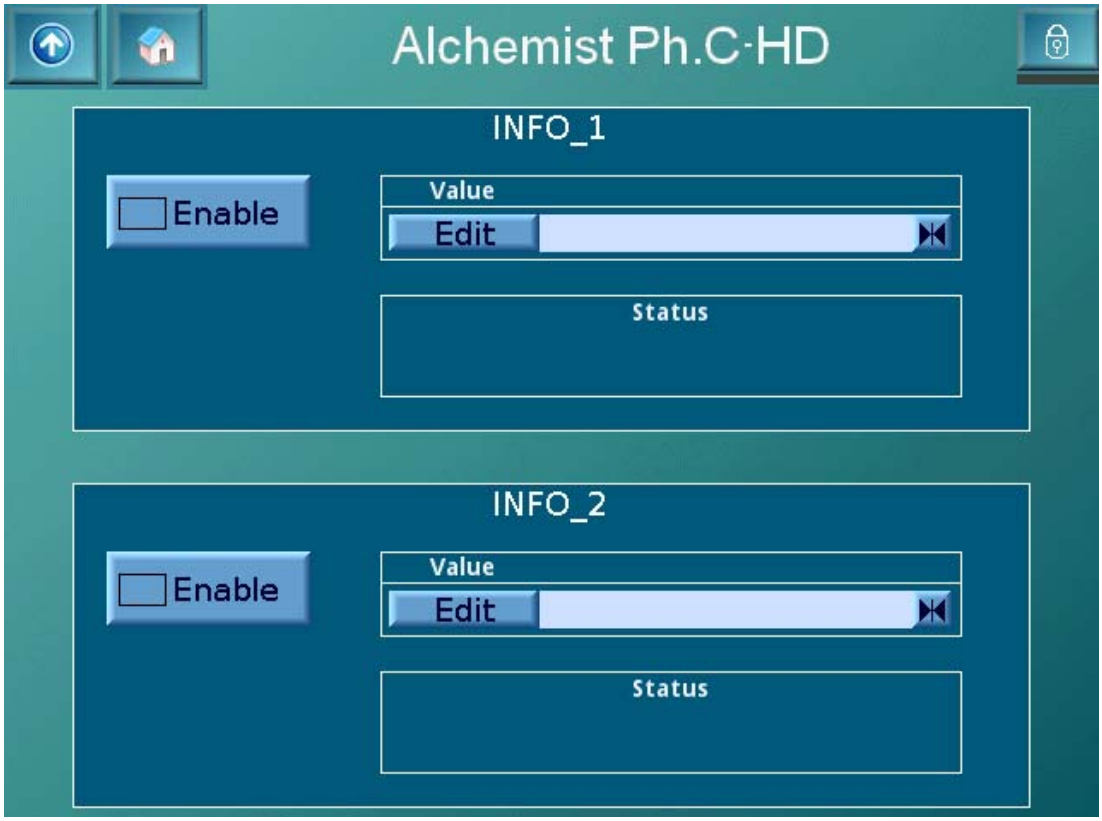
Check the relevant box to enable logging.

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.

4.14.4.6 Log Info

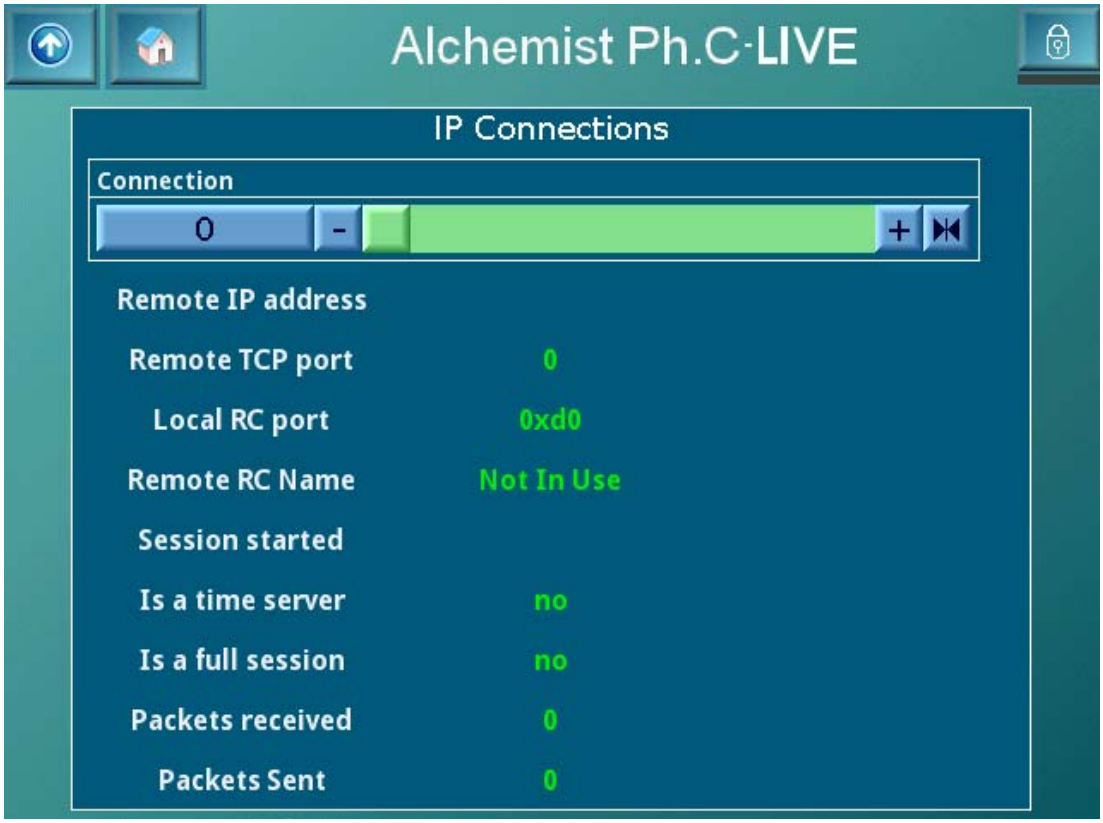
When **Log Info** is selected, the screen shown below is displayed.



This screen has two user-defined strings which are additional to the Alchemist log fields.

4.14.4.7 IP Connections

When **IP Connections** is selected, the screen shown below is displayed.

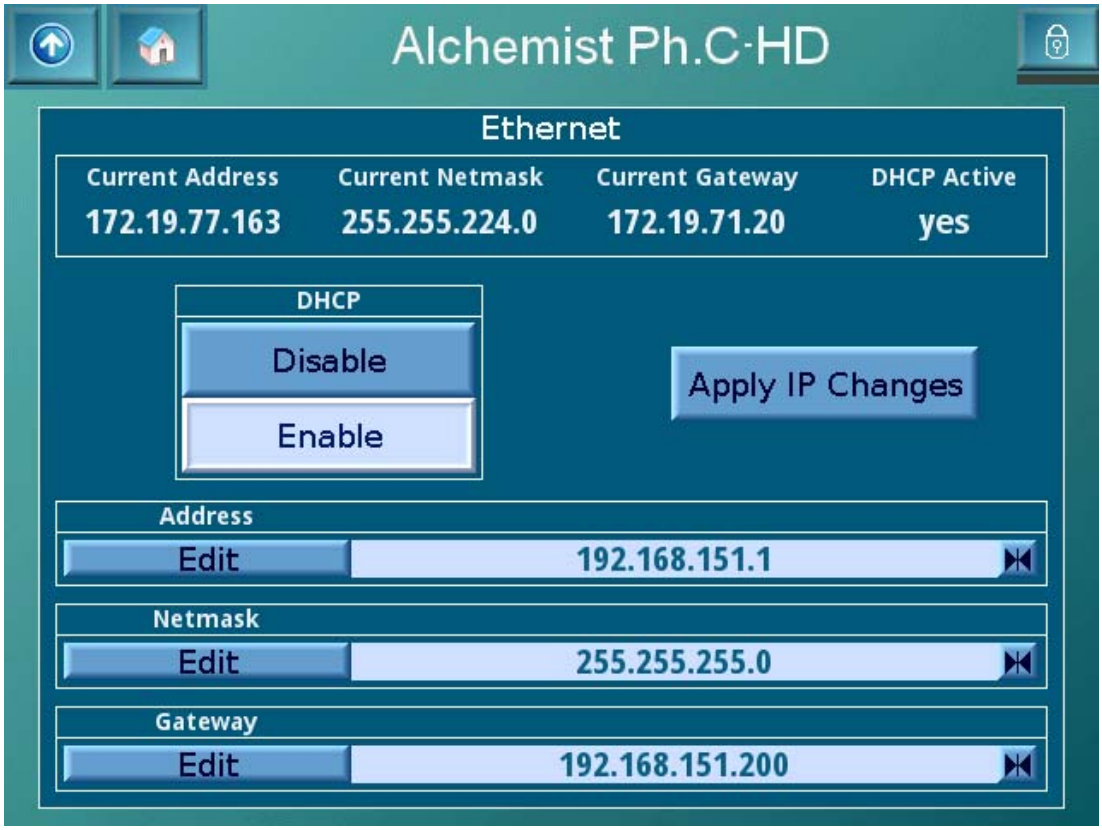


This screen displays information about the unit's IP connections.

4.14.5 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.



DHCP 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. If a DHCP server is not available, the IP address will revert to the default IP address.

Apply IP Changes Allows the user to set up all IP parameters before actually enabling them.

Address The default address can be changed by manually assigning an IP address. To do this, 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**. The factory state for the default IP address is 192.168.151.1.

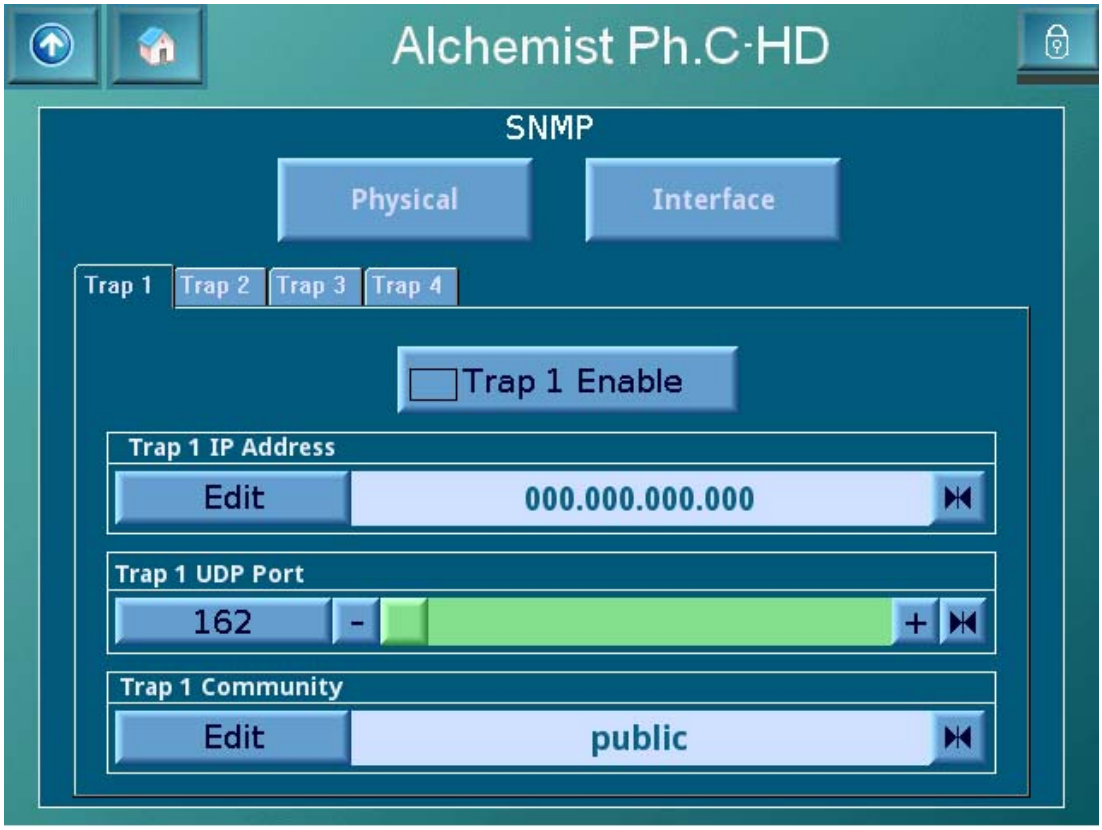
Netmask This allows the Subnet Mask to be entered. The default address is 255.255.255.0.

Gateway This allows the Gateway address to be entered. The default address is 0.0.0.0.

4.14.6 SNMP

On the main **SNMP** page, you can configure and enable up to four SNMP traps.

Note: For more information about the Alchemist's SNMP functions, see "Appendix F: SNMP" on page 193.

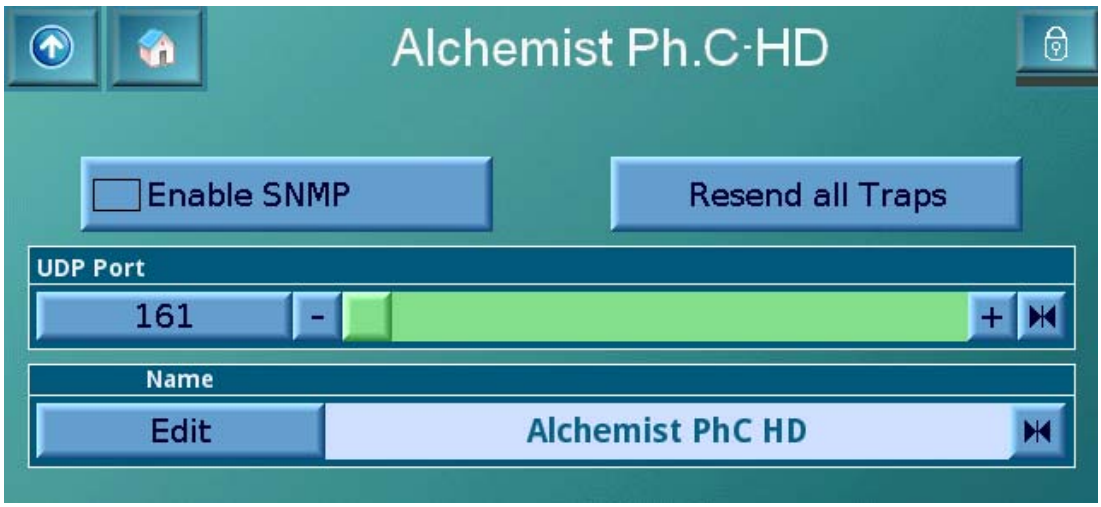


Each SNMP trap is configured on its own tab. For each trap, specify the following information:

Trap Enable	Enable Trap 1 destination.
Trap IP Address	Configures the IP address to which traps (notifications) are sent. This address should correspond to the IP address of the SNMP Manager.
Trap UDP Port	Configures the destination UDP port for traps. The manager should be configured to "listen" for traps on this port. The SNMP default is 162 but other port numbers may be used.
Trap Community	Configures the trap community string.

4.14.6.1 SNMP > Physical

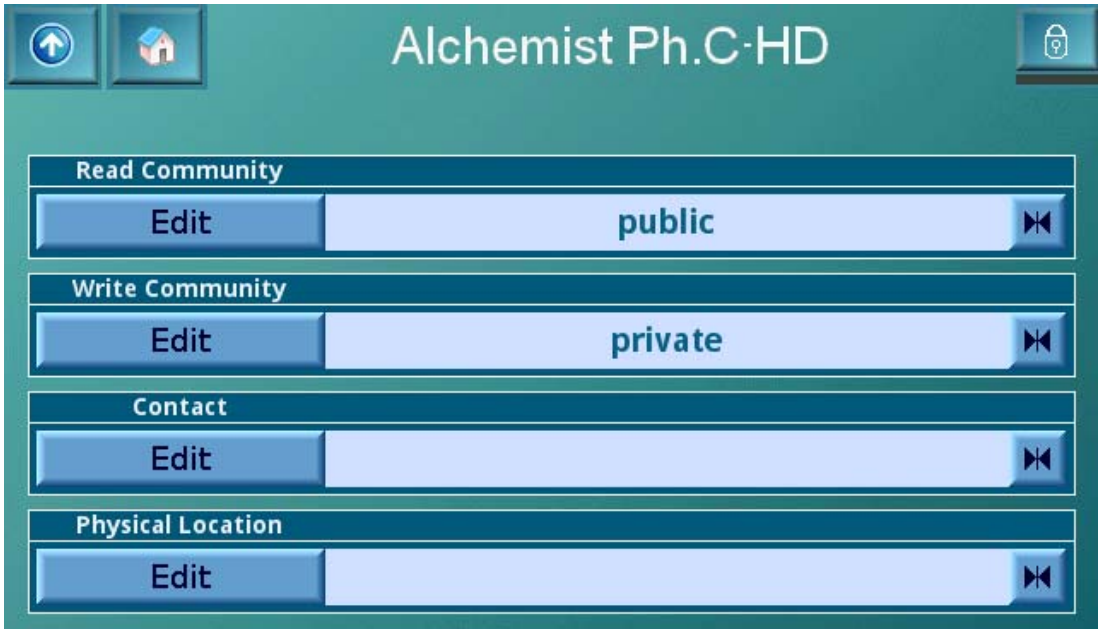
The settings on the **SNMP** > **Physical** page allow the Alchemist's SNMP functions to be enabled or disabled and the UDP Port to be used for SNMP communication to be specified. This page also provides an option to resend all SNMP traps to the SNMP manager.



Enable SNMP	This enables or disables the SNMP agent within the Alchemist. Default is disabled.
Resend All Traps	When pressed the Alchemist will resend all current traps/notifications.
UDP Port	This indicates/configures the UDP port that the Alchemist listens on for SNMP messages from a manager. The SNMP default is 161 but other ports may be used.
Name	Click edit to change unit's physical name, used for SNMP purposes. The default name is "Alchemist PhC HD".

4.14.6.2 SNMP > Interface

The settings on the **SNMP** > **Interface** page configure the Alchemist's SNMP interface.



Read Community	Configures the SNMP read community value. Default is "public".
Write Community	Configures the SNMP write community value. Default is "private".
Contact	Configures the contact email address for Alchemist SNMP agent.
Physical Location	Configures the physical location of the Alchemist

4.14.6.3 Where Can I Find the MIBs?

The MIBs are stored locally on the Alchemist or can be found on the Snell FTP site.

Simply connect the Alchemist to your network, open an internet browser (IE 7 recommended) and enter the current IP address (see system > Ethernet > IP address).

This will show the Alchemist home page. At the top of the home screen select the "SNMP MIBs" logo to extract a zip file containing the required MIBs. Save these locally for use with your chosen SNMP application.

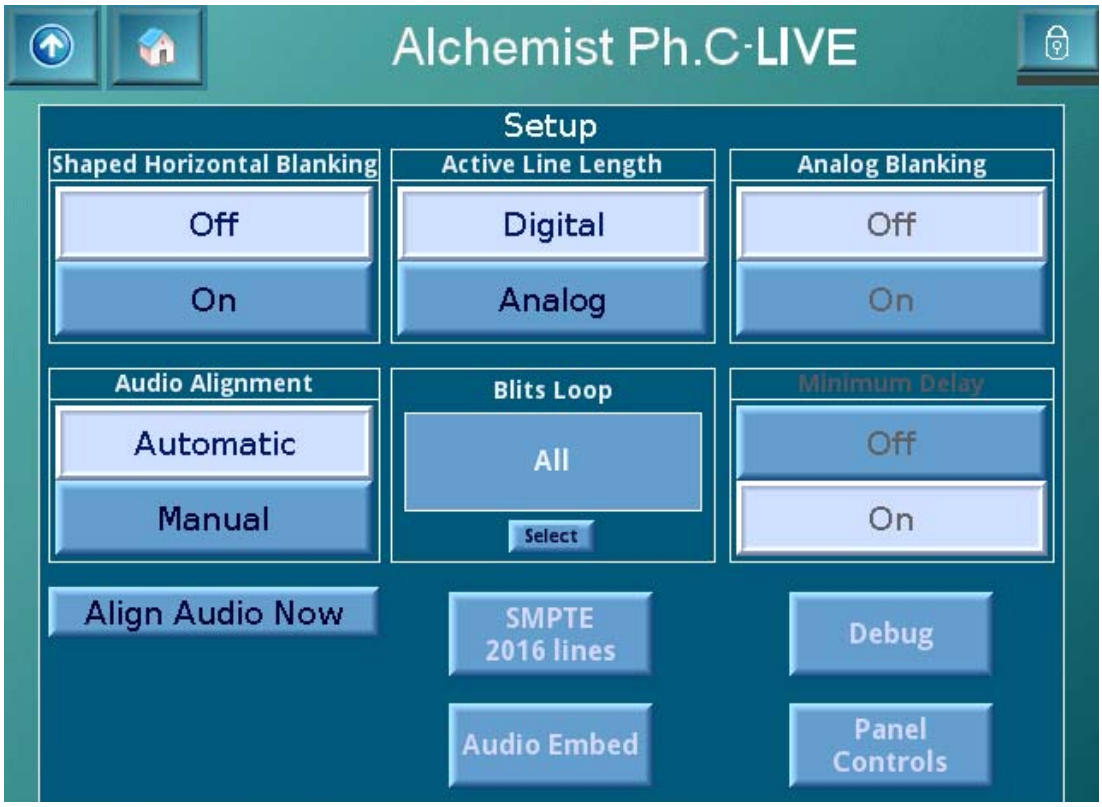
4.14.6.4 Validated SNMP Applications

The Alchemist's SNMP Agent has been validated with the following SNMP applications:

- iReasoning (Pro & Enterprise versions)
- Castle Rock SNMPc Manager
- MGSoft

4.14.7 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

SMPTE 2016 lines, **Audio Embed**, **Panel Controls**, and **Debug** menus are also available.

4.14.7.1 Shaped Horizontal Blanking

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

4.14.7.2 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.

4.14.7.3 Analog Blanking

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

4.14.7.4 Audio Alignment

This allows the user to enable or disable the auto AES re-align feature. When in Automatic mode, 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.

Touch **Align Audio Now** to manually trigger a reset to all AES channels.

4.14.7.5 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.

4.14.7.6 SMPTE 2016 lines

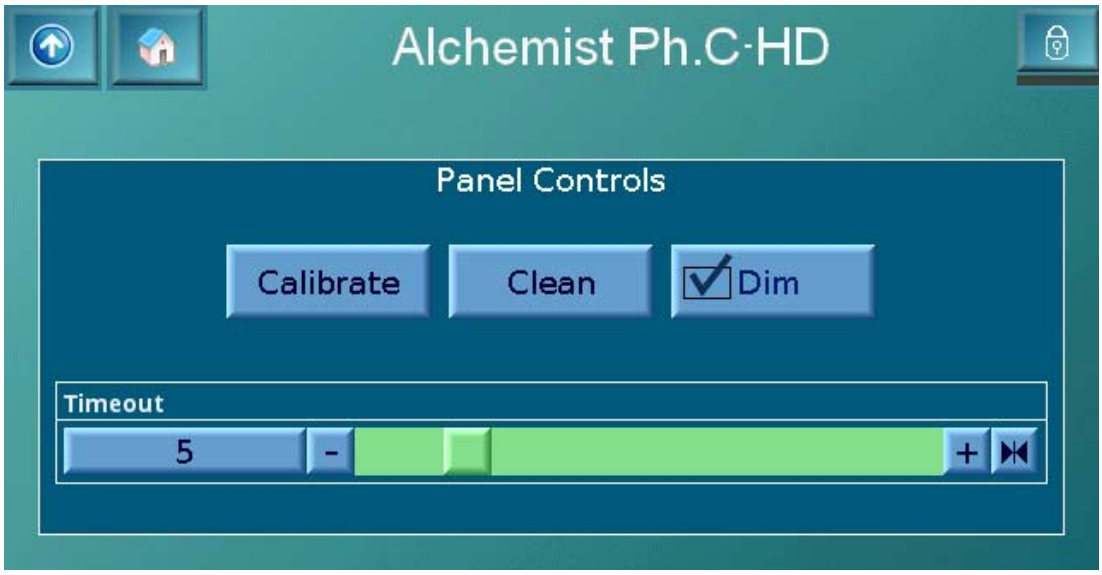
This function allows the output line for SMPTE 2016 to be changed. See page 50.

4.14.7.7 Audio Embed

This function allows the embedded audio outputs to be disabled. See page 76.

4.14.8 Panel Controls

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



4.14.8.1 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.

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

4.14.8.2 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.

4.14.8.3 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 scroll bar or the keypad. By setting the control to less than 1 minute the function will be turned off.

4.14.8.4 Dim

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

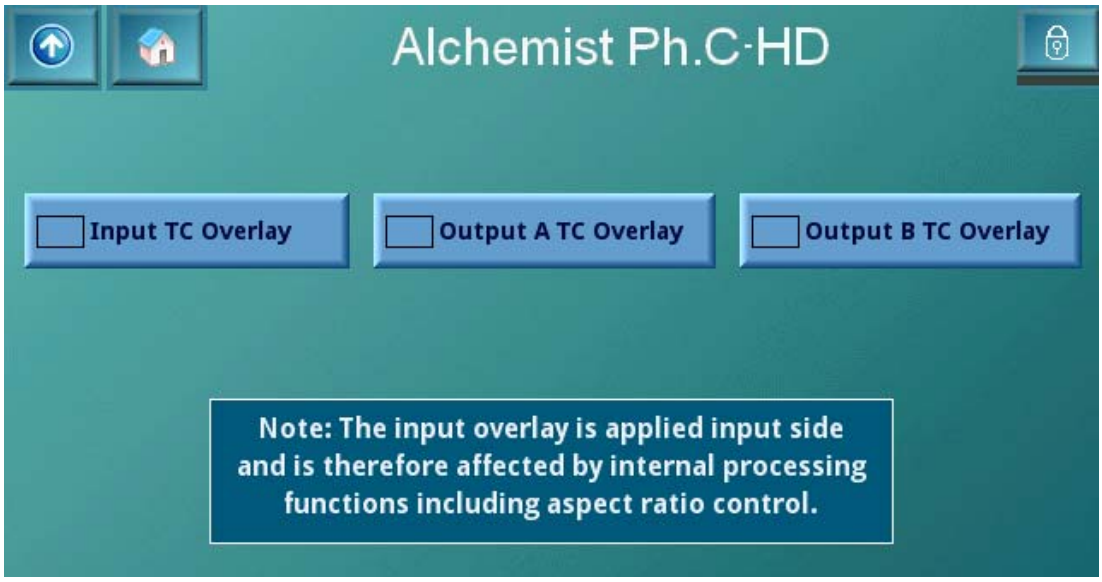
4.14.9 Debug

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.

4.14.10 Tools (Timecode Overlays)

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



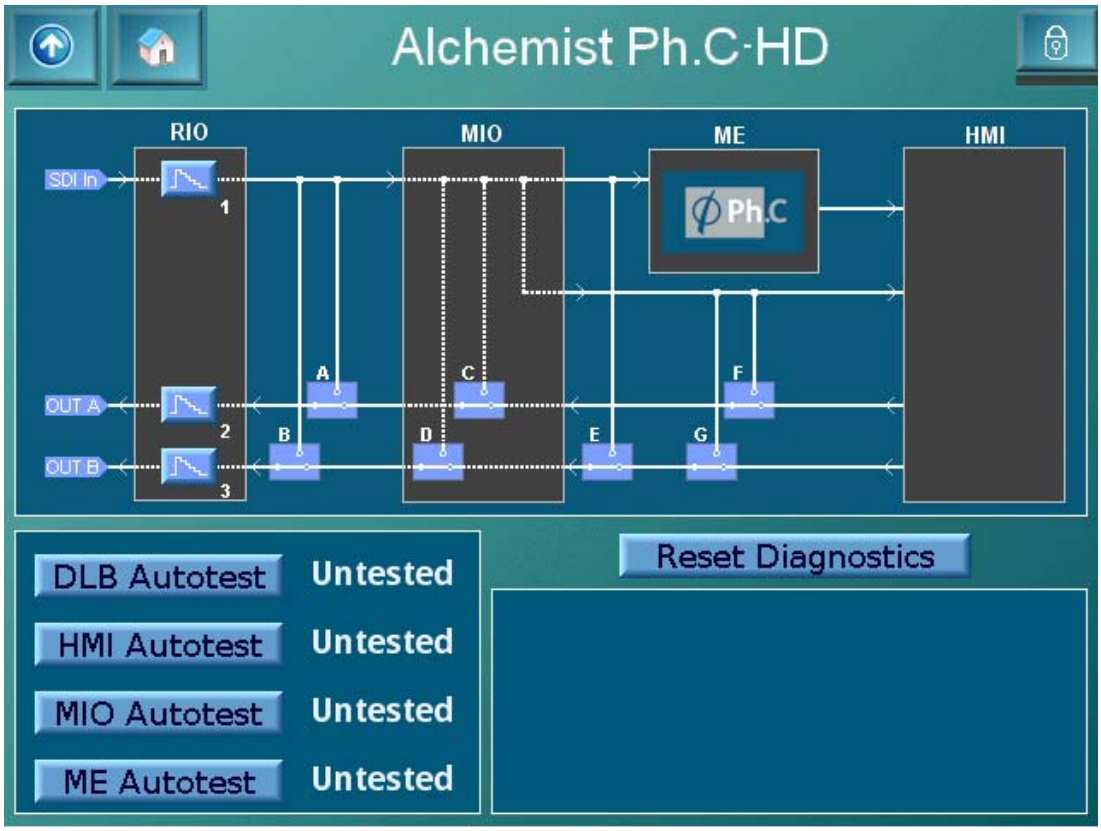
These options allow overlays, displaying any or all of the Input Timecode, Output A Timecode, and Output B Timecode to be displayed on the output.

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.

4.14.11 Diagnostics

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



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

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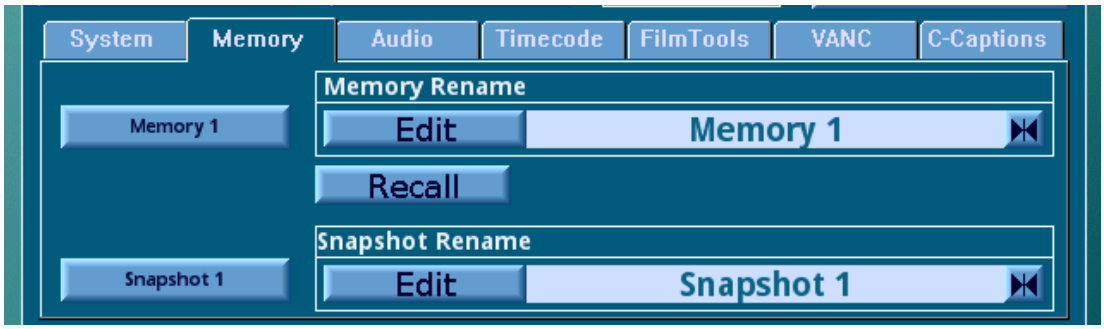
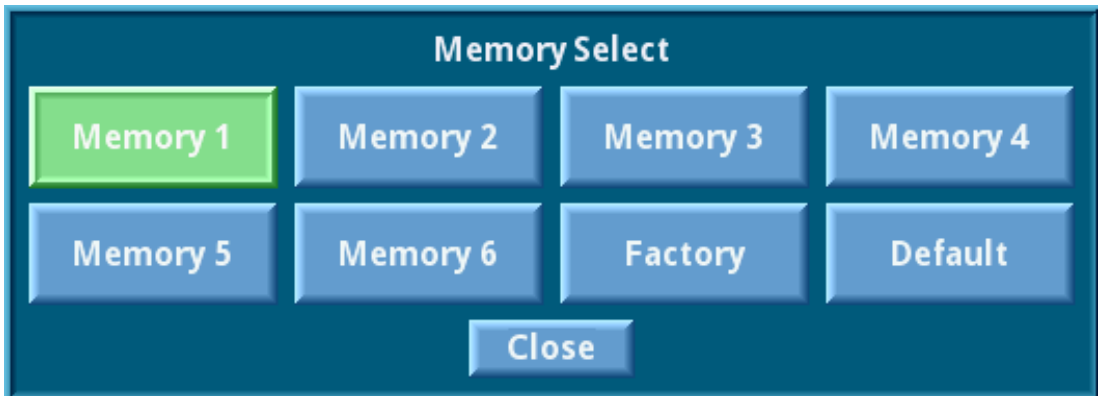
4.14.12 Memory

This function allows a number of particular setups of the unit to be saved and recalled. There are six 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:

1. Select the memory location (color will change to green)
2. Select **Store**.

To Recall a Setup from a Memory Location:

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

Appendix A. Noise Reduction

A.1 Overview

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.

A.2 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.

A.3 Setup

A.3.1 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.

A.3.2 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).

A.3.2.1 Scenario 1 – Too much bias

In the above image it can be seen that 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.

A.3.2.2 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.

A.3.2.3 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

B.1 Overview

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 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 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, and allows the mode and trigger to be set up while monitoring the input.

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

B.2 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.

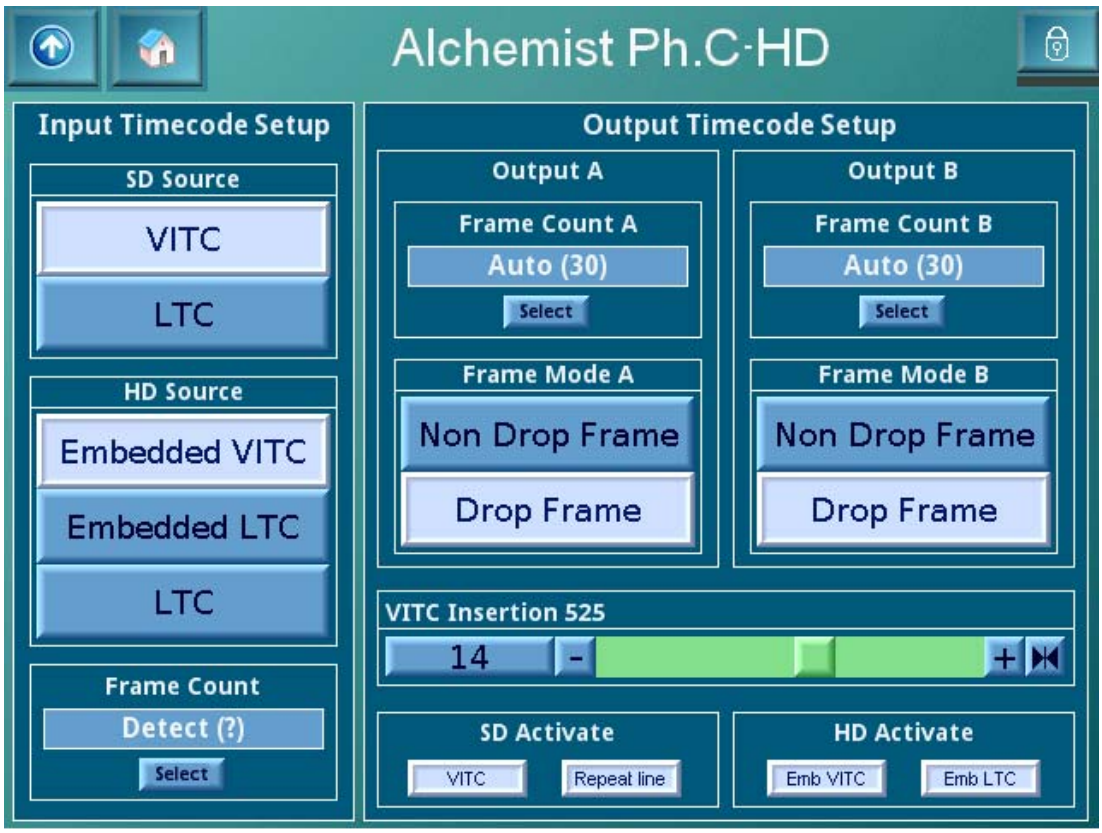
The Alchemist timecode insertion is based upon two timecode concepts. The first of these is the input timecode trigger (Input Trigger) and the second is the output timecode load (Output A/B Load).

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.

B.3 Control Interface

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



B.3.1 Input Timecode Setup

B.3.1.1 SD Source

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).

B.3.1.2 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).

B.3.1.3 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, for example, Slow PAL.

B.3.2 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”).

B.3.2.1 Frame Count Max

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, for example, Slow PAL.

B.3.2.2 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.

B.3.2.3 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).

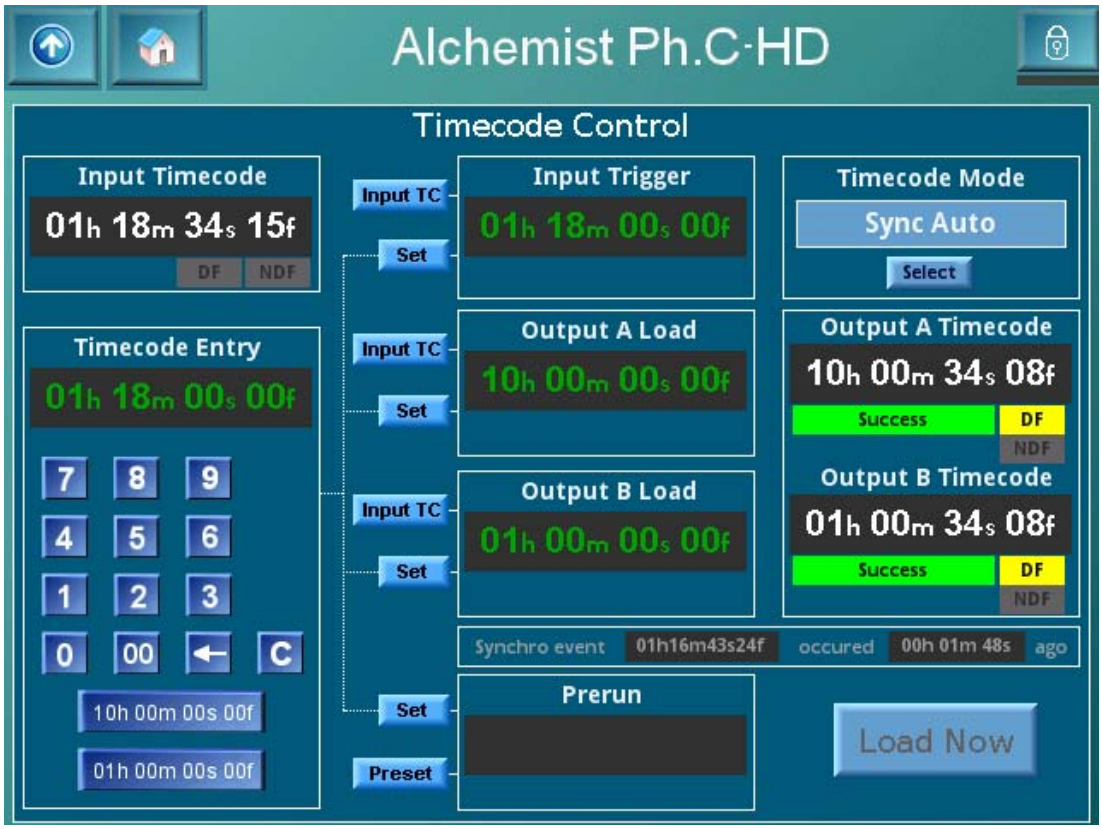
B.3.3 Activate

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

- SD Output: VITC/Repeat
- HD OutpActivateut: HD Emb VITC/HD Emb LTC

Note: LTC via the XLR is always enabled.

B.4 Timecode Control



B.4.1 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.

B.4.2 Timecode Entry

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

B.4.3 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.

B.4.4 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.

B.4.5 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.

B.4.6 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.

B.4.7 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.

B.4.8 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.

B.4.9 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).

B.4.10 Manual Trigger

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

B.5 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

B.5.1 Timecode Modes at a Glance

B.5.1.1 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

B.5.1.2 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

B.5.1.3 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.

B.5.2 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

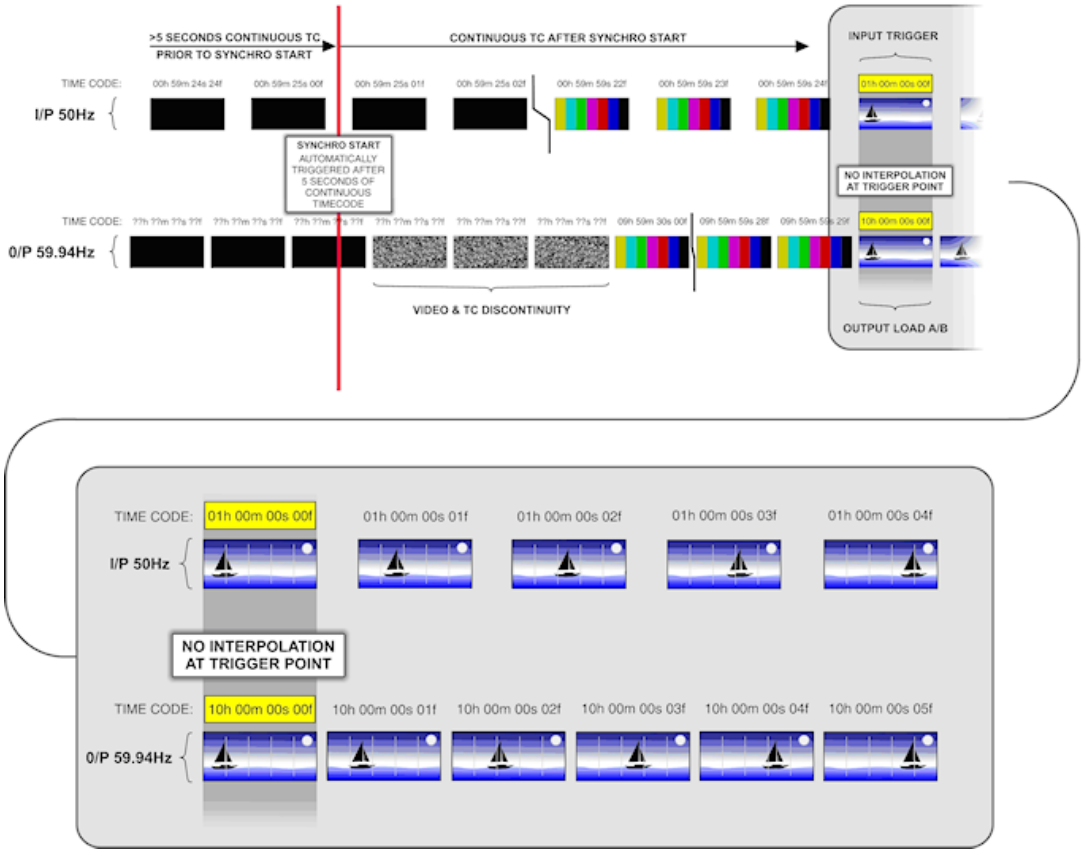
The user must configure an input trigger event, and set a desired output timecode load value. In our example the input trigger is 01h 00m 00s 00f and the output load value is 10h 00m 00s 00f. Once the Alchemist has detected 5 seconds of continuous input timecode it will action the “synchro start” event. 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 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.



B.5.3 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.

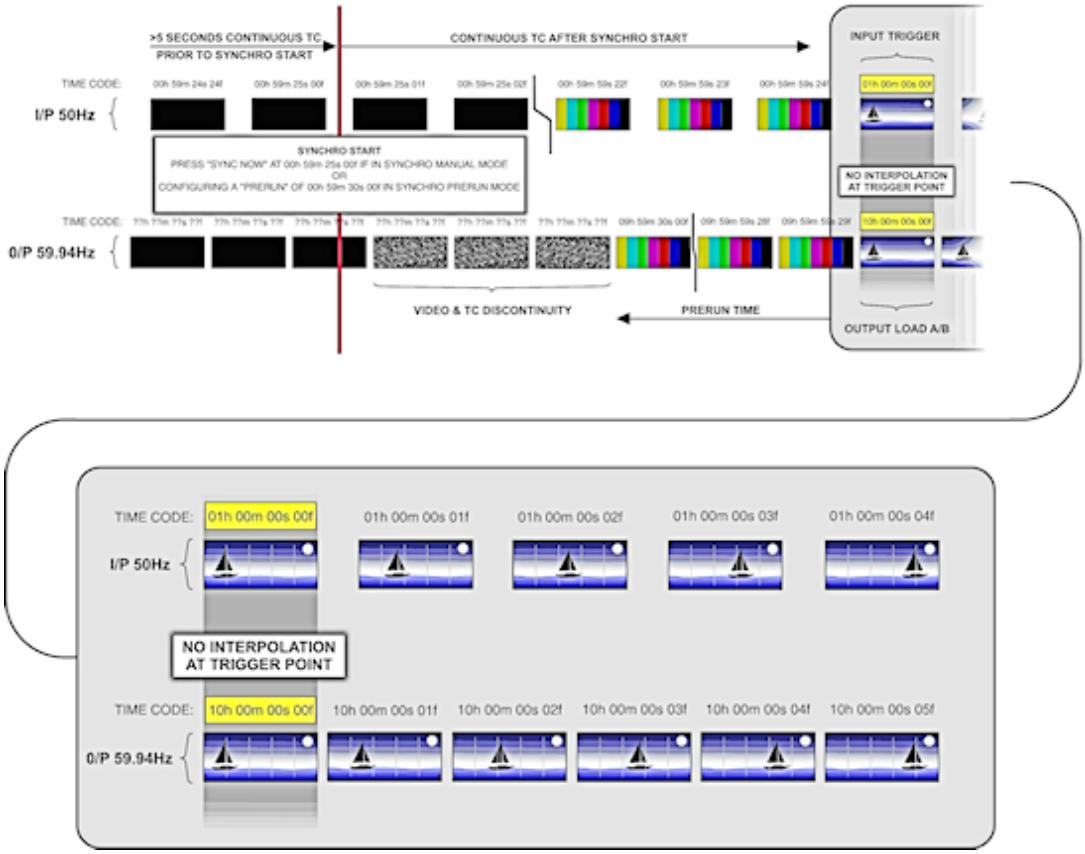
Synchro Start Event = Input Trigger Timecode – Prerun Timecode – 5 seconds

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.

B.5.4 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.



B.5.5 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.

B.5.6 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 is used. 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.

B.5.7 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.

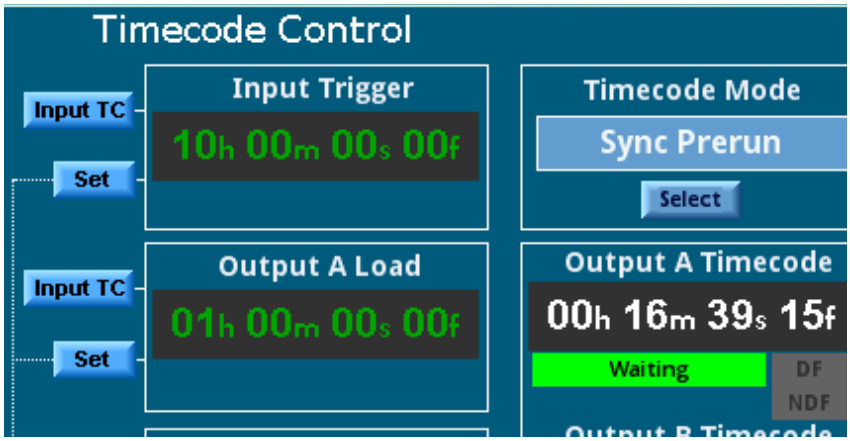
B.5.8 Trigger Load

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.

B.5.9 Timecode Control Warnings

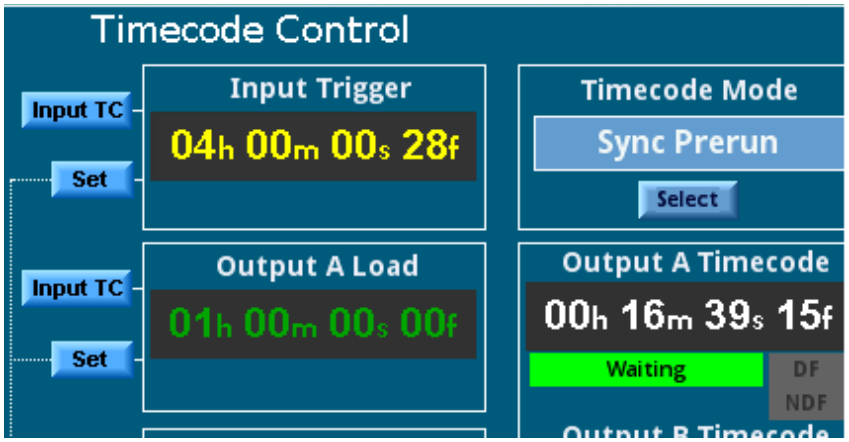
The timecode displays for the Input Trigger, Output Loads, and Prerun change color to indicate valid or invalid values.

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.

B.5.10 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.

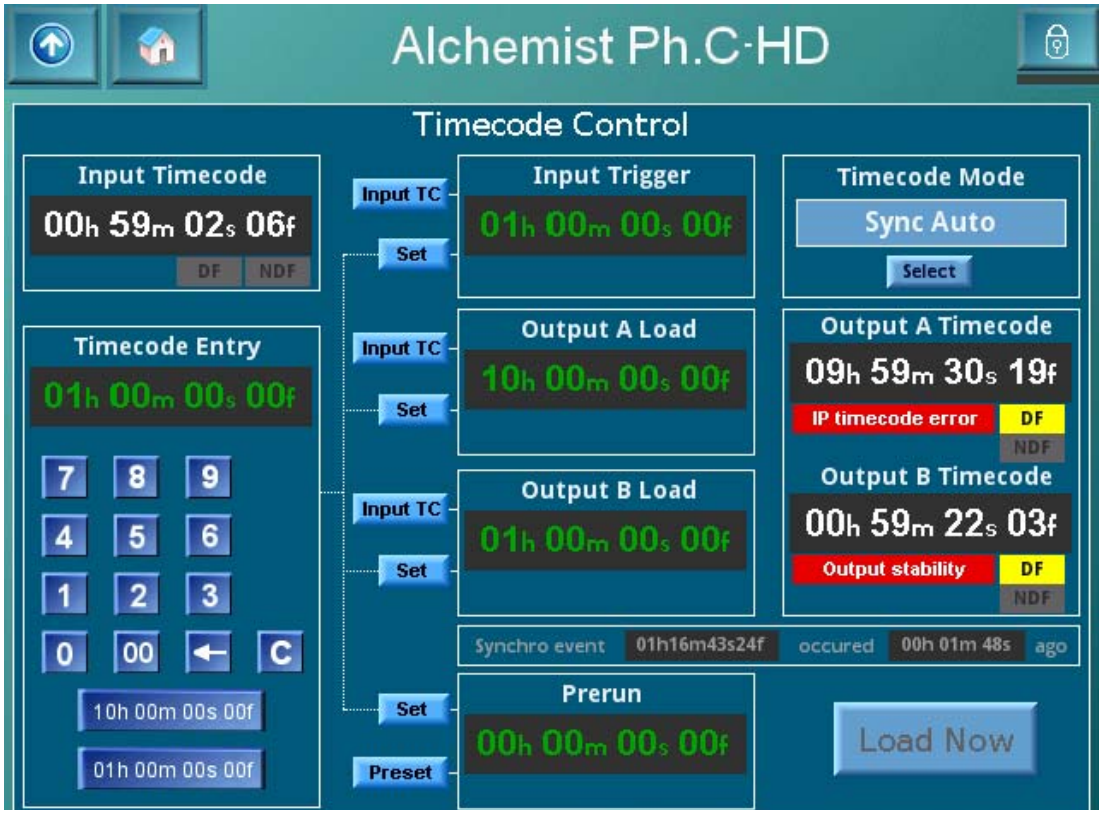
Timecode Control Page:

- 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.

Note: After pressing the play button, waiting approximately 5 seconds before pressing record will eliminate discontinuity as the Alchemist achieves lock.

B.5.10.1 Input Timecode = 00h 59m 02s 06f

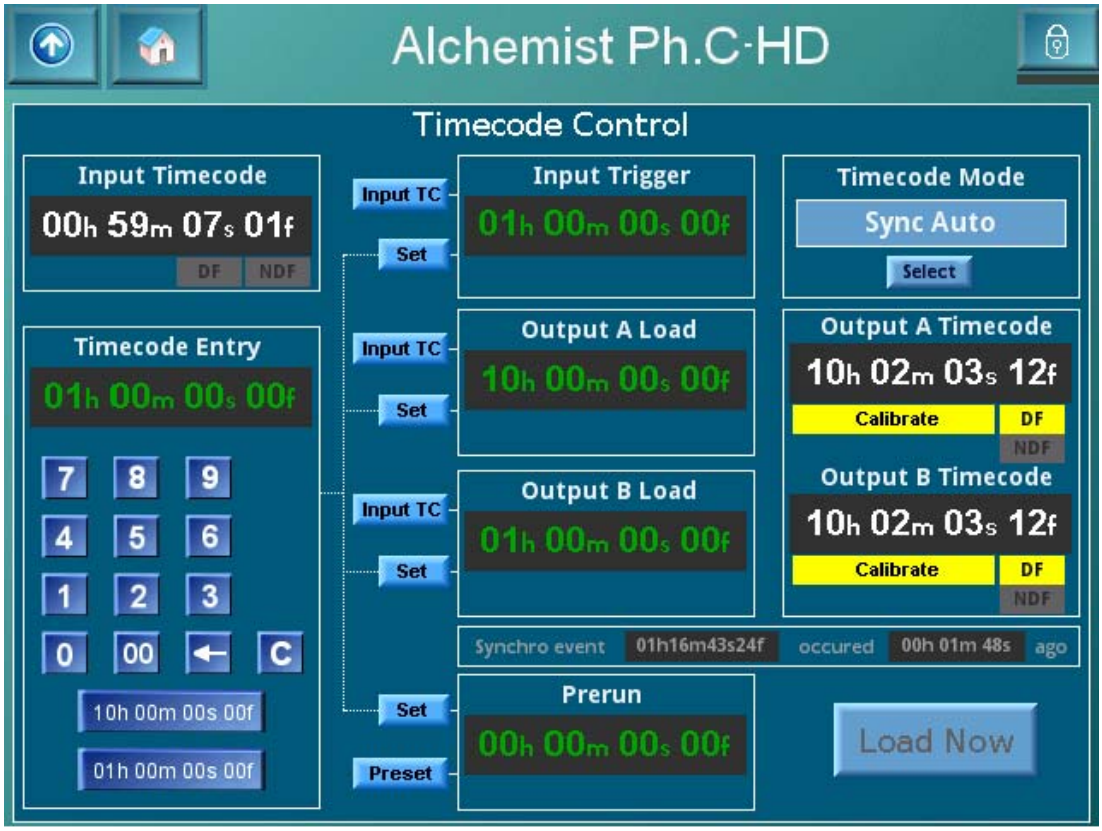


At this point, the timecode configuration has just been adjusted, and the unit is initializing.

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

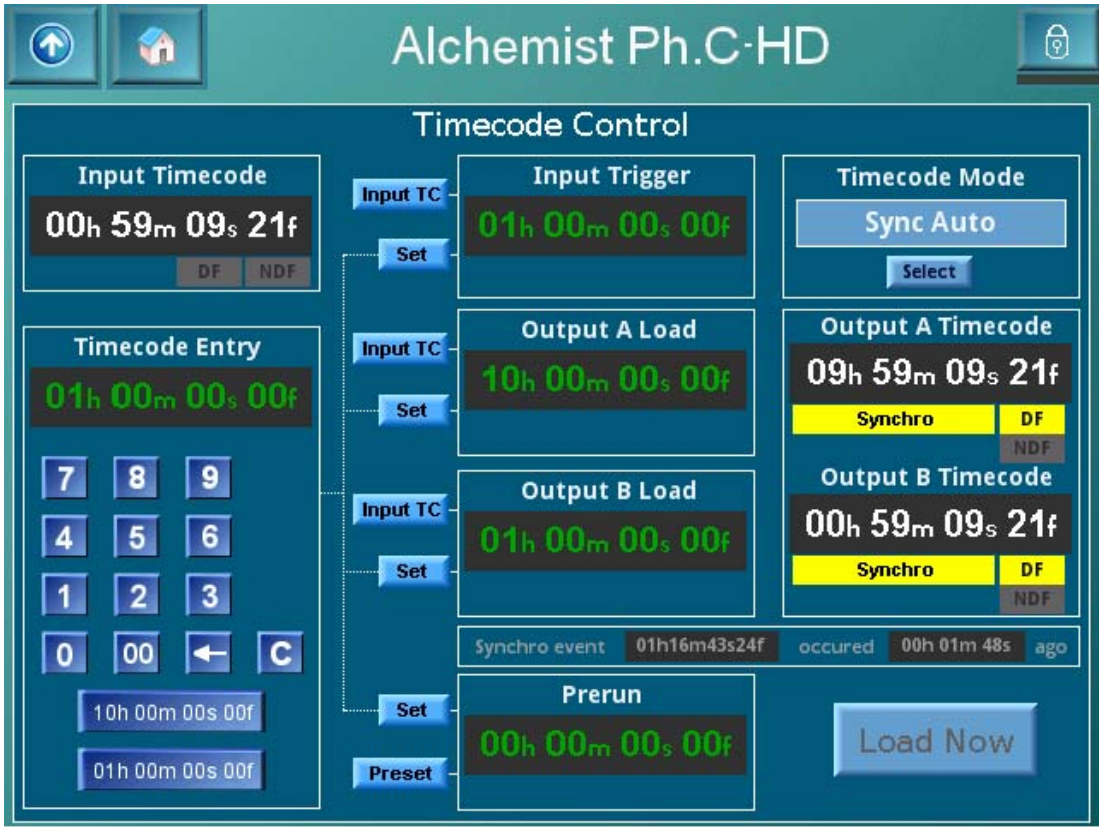
Output B Timecode is displaying an Output stability warning. This condition can be caused by anything that can alter the timecode arithmetic. For example, an I/O standard change, a reference change, or a genlock change.

B.5.10.2 Input Timecode = 00h 59m 07s 01f



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

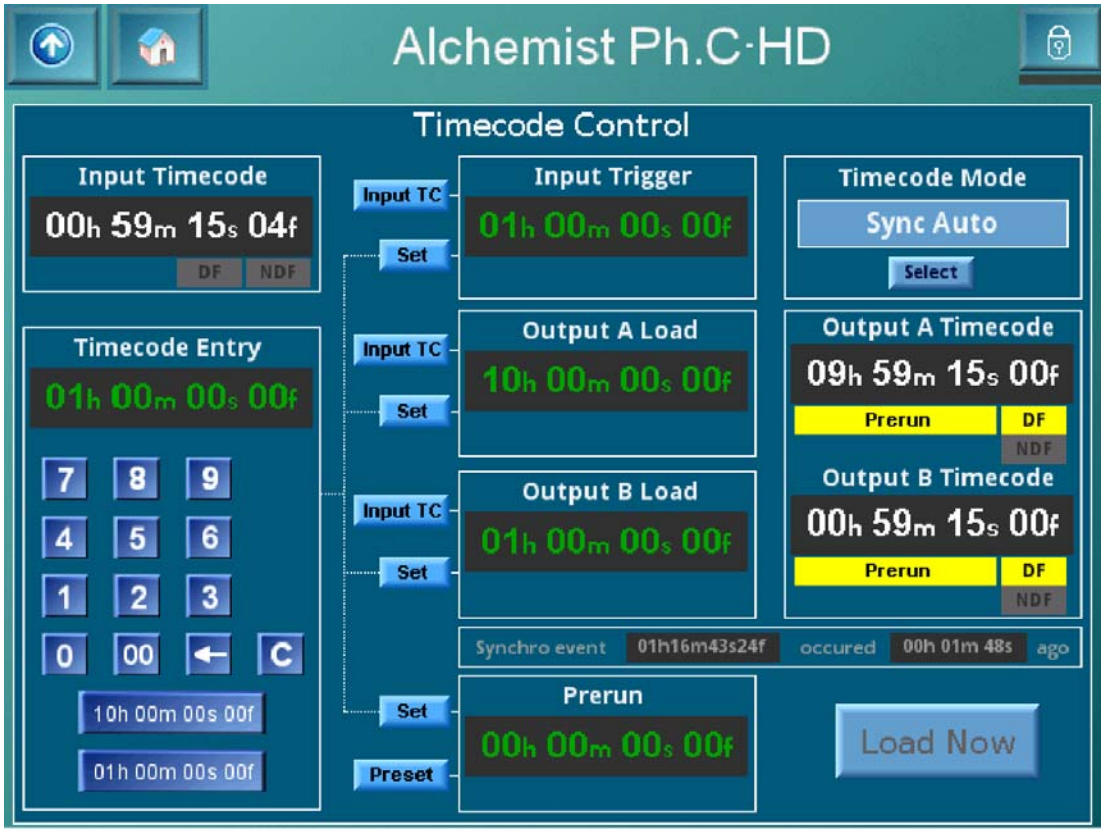
B.5.10.3 Input Timecode = 00h 59m 09s 21f



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.

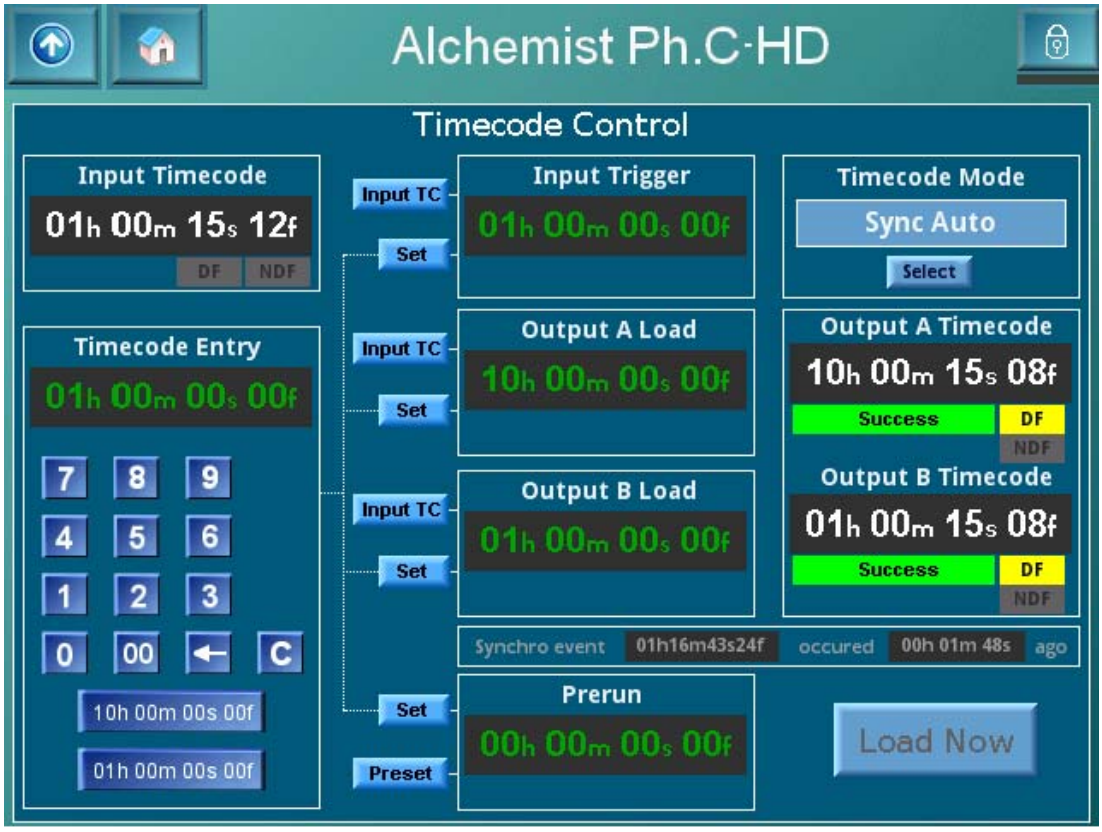
Note: After pressing the play button, waiting approximately 5 seconds before pressing record will eliminate discontinuity as the Alchemist achieves lock.

B.5.10.4 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**.

B.5.10.5 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:

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

This set-up requires no further changes for similar jobs, just put the tape in.

B.6 Questions & Answers

Q1. How will timecode be aligned with a 720 50P/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?

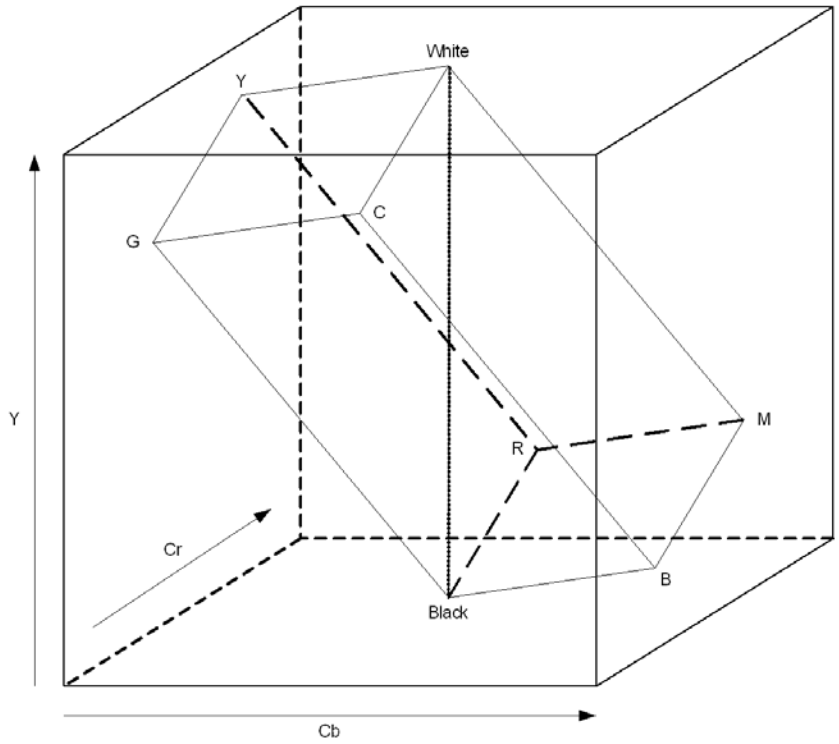
A3. No, the Alchemist will measure the input to derive its frequency and modify its timecode arithmetic accordingly. However, the Alchemist does assume the source is stable. If the source clock is fluctuating this could result in an incorrect timecode conversion.

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.

C.1 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.

C.2 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.

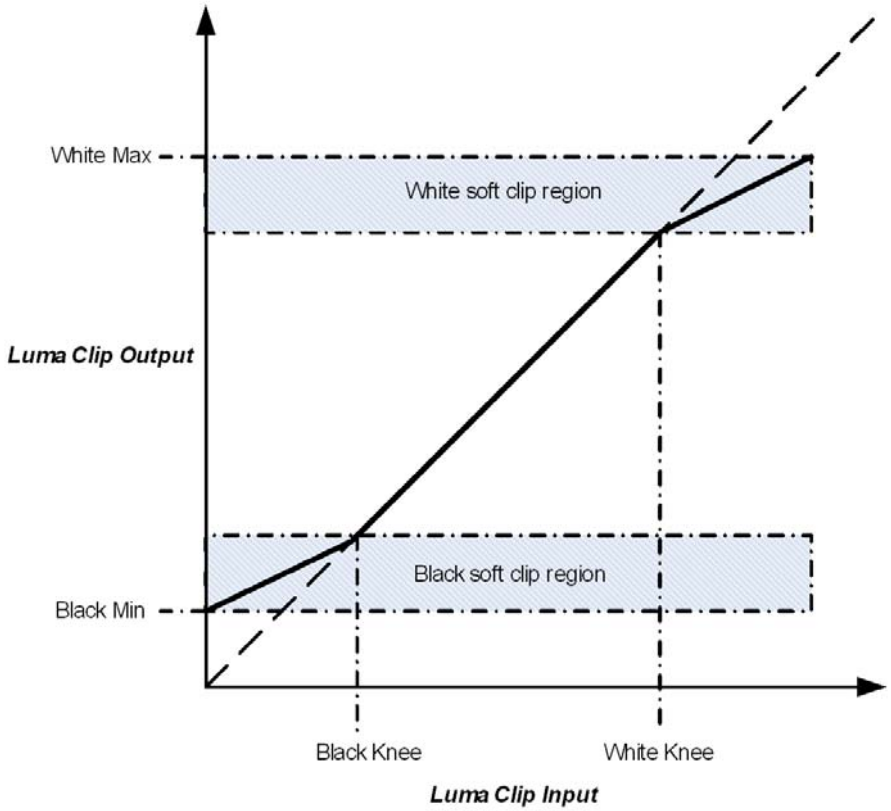
C.3 Luma Clipper Overview

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.

C.4 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

D.1 Overview

FilmTools is 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 Ph.C-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.

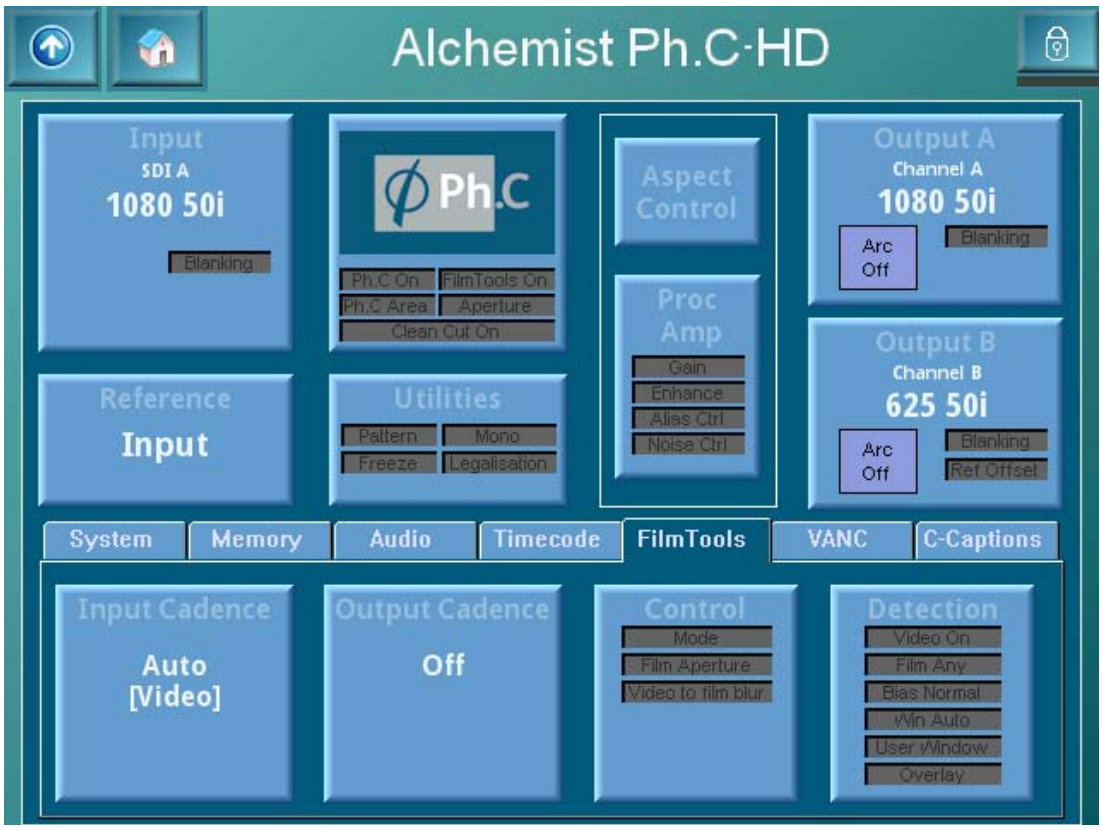
Combining the power of Ph.C, DEFTplus, P-Film and Video-to-Film processing, the FilmTools Option addresses the challenges of converting to, from, and between any of the many frame based material formats.

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
- 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.

D.2 FilmTools Control and Setup

There are four principal FilmTools control and setup pages. These can be accessed from the **FilmTools** tab on the Home screen.

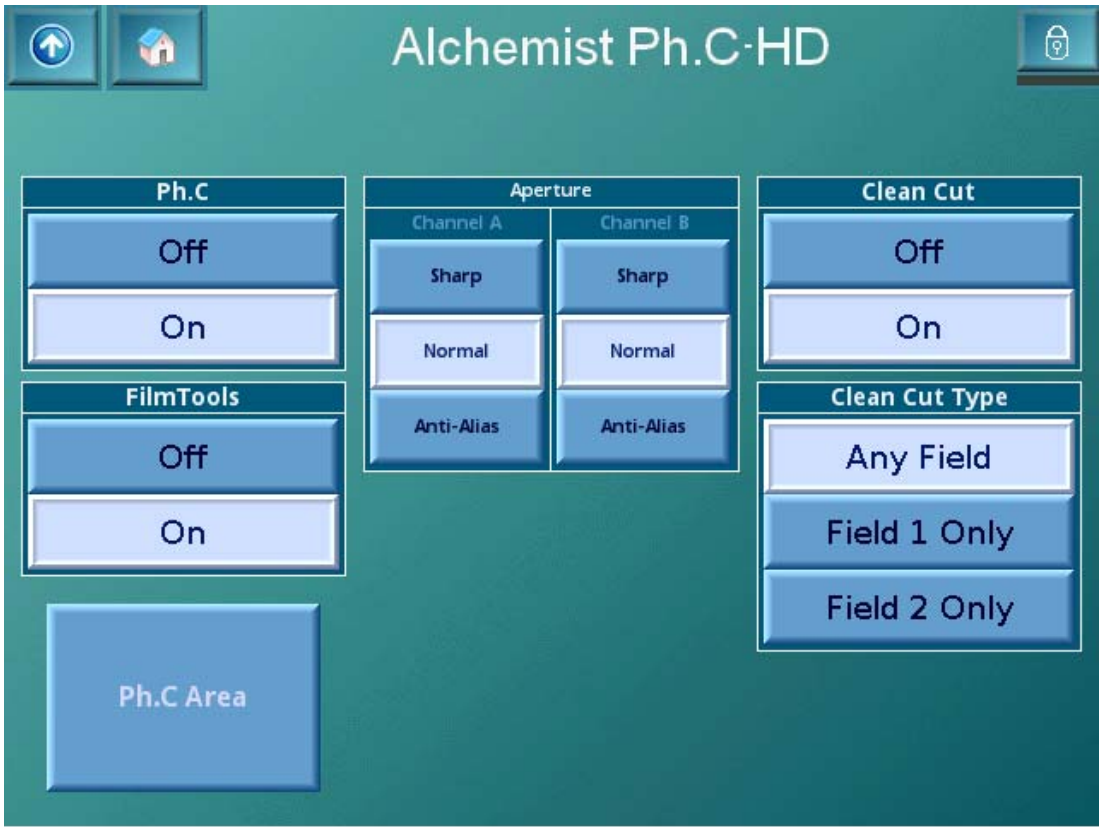


- **Input Cadence:** This page allows the user to define a film cadence for the incoming content. A single, continuous and perfect cadence can be defined flawlessly by its relationship to timecode or by aligning an internal free running cadence generator. If the content contains discontinuous or mixed cadence or, if the cadence is unknown prior to conversion, Detect mode performs real time analysis to assign cadence.
- **Output Cadence:** 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.
- **Control:** This page allows the user setup FilmTools controls. These controls are specific to FilmTools conversions only.
- **Detection**: 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 87.

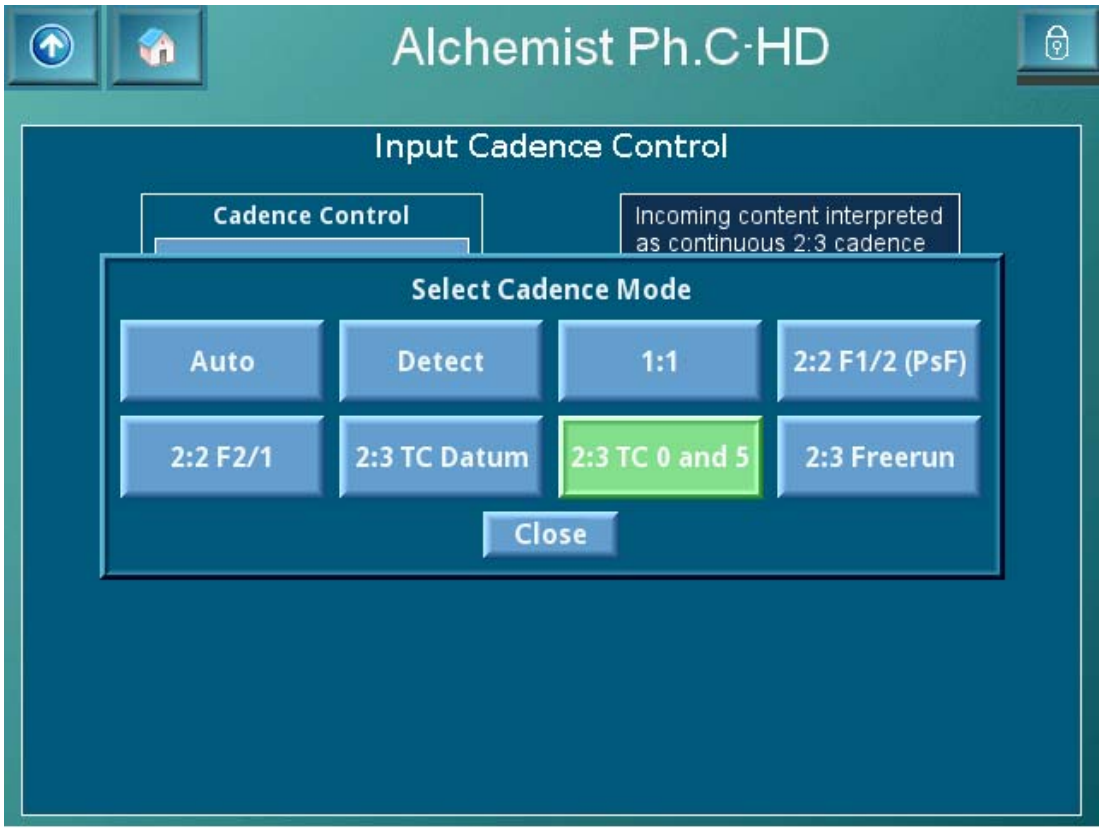
D.2.1 Enabling FilmTools

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



ON	Enables the FilmTools option. This is the default setting.
OFF	Disables the FilmTools Option. Note PsF standards will be grayed out.

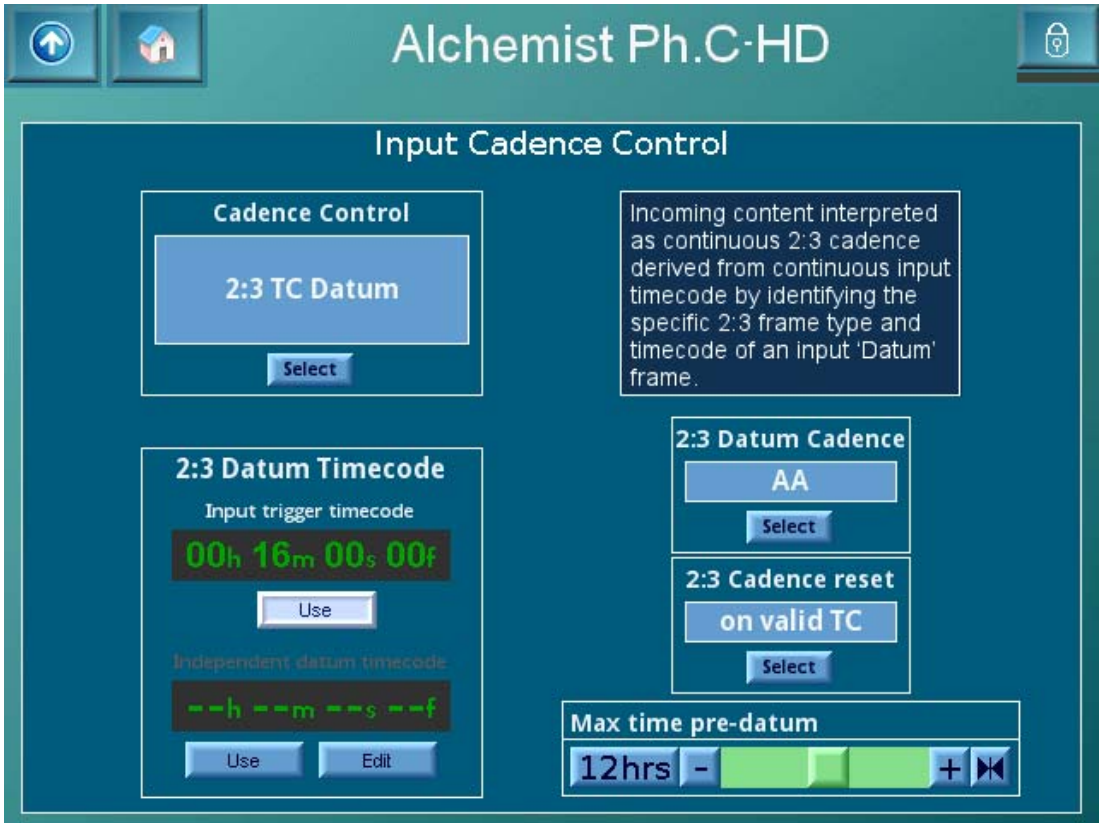
D.2.2 FilmTools Input Setup



D.2.2.1 Input Cadence Alignment Control

Auto (Default)	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)
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/F2 (PsF) cadence.
2:2 F2/1	All incoming content is interpreted as 2:2 F2/F1 (PsF) 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 TC 0&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.
2:3 Freerun	Incoming content is interpreted as continuous 2:3 cadence derived from an internal free running 2:3 cadence generator.

D.2.2.2 2:3 TC Datum



2:3 Datum Cadence

AA (Default) **BB,** **BC,** **CD,** **DD**	This control defines the 2:3 cadence of the Datum frame when the input cadence control is 2:3 TC Datum mode. See “Understanding 2:3 Datum Cadence” on page 166.

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.

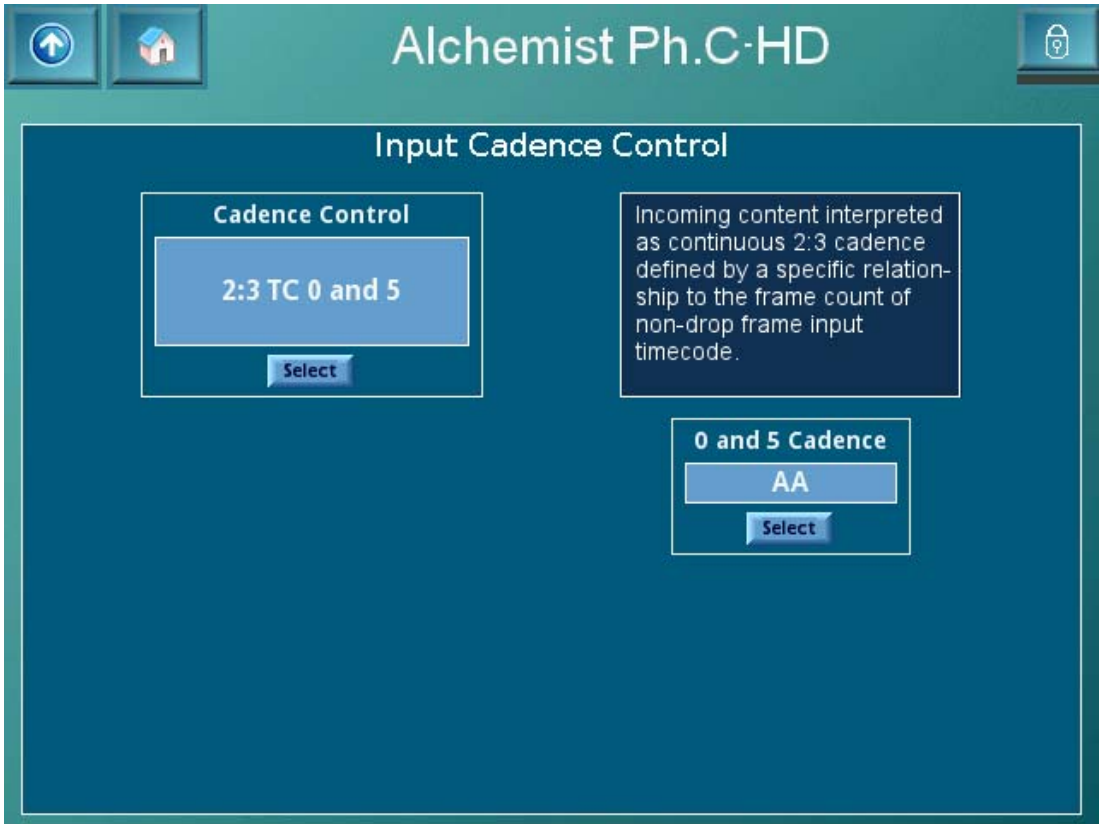
2:3 Datum Timecode

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.

2:3 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”. See “Understanding Datum TC Conversion” on page 164.

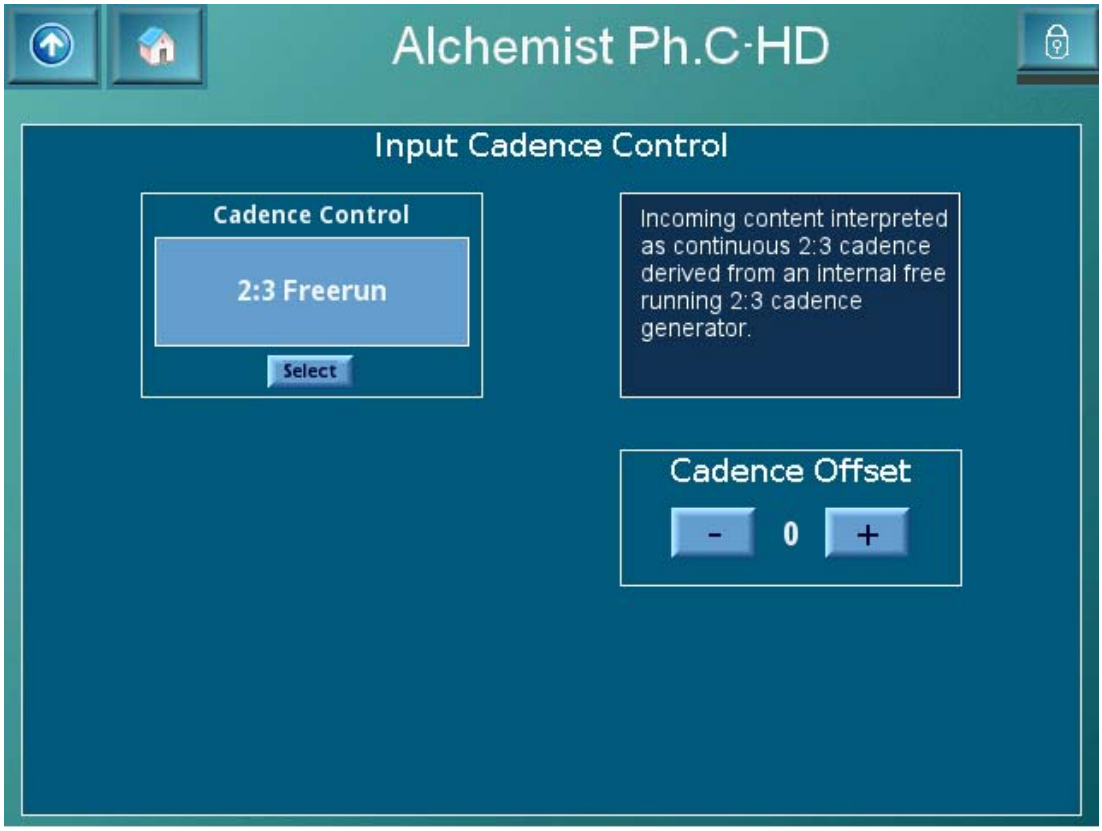
D.2.2.3 2:3 TC 0 & 5



0 & 5 Cadence

AA (Default) **BB,** **BC,** **CD,** **DD**	This control defines the phase of the relationship between frame count and input timecode. When a frame count of 0 & 5 is present the 2:3 phase can be set any one of the five frame types. See “Understanding 2:3 Datum Cadence” on page 166.

D.2.2.4 2:3 Freerun

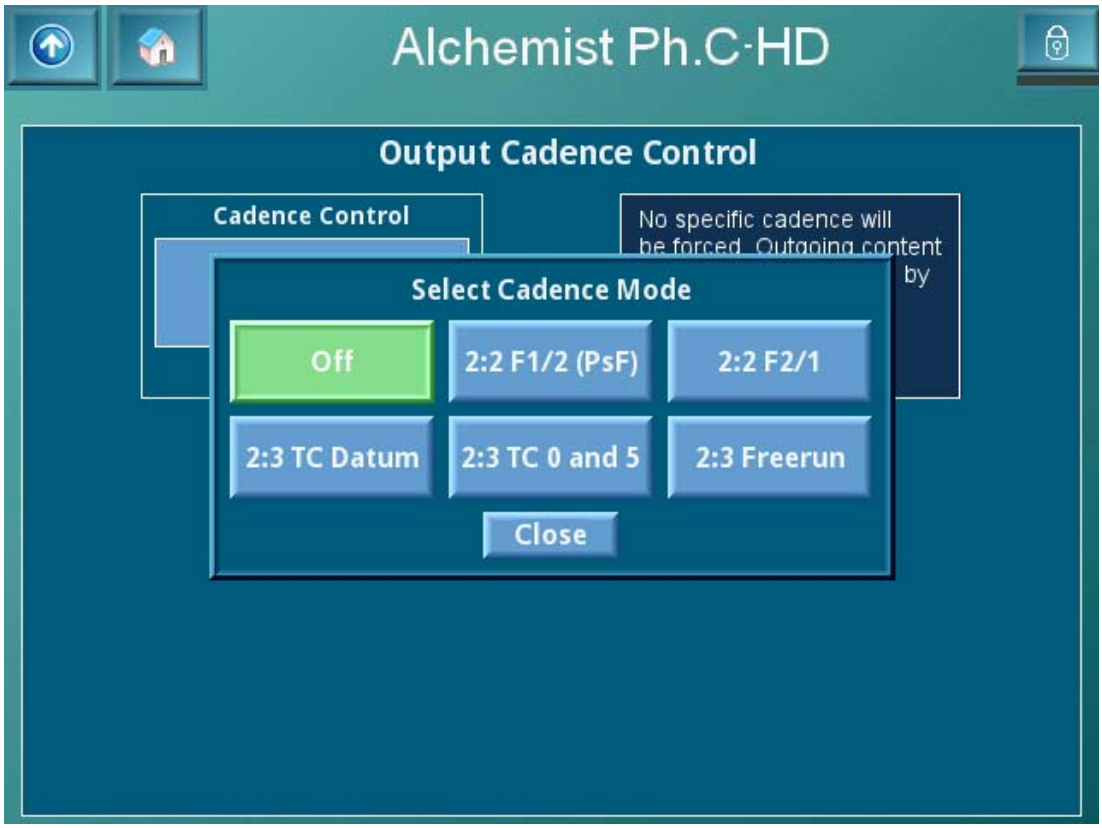


Cadence Offset

- ***/ +*** The cadence of the free running 2:3 generator maybe offset.

See “Understanding Datum TC Conversion” on page 164.

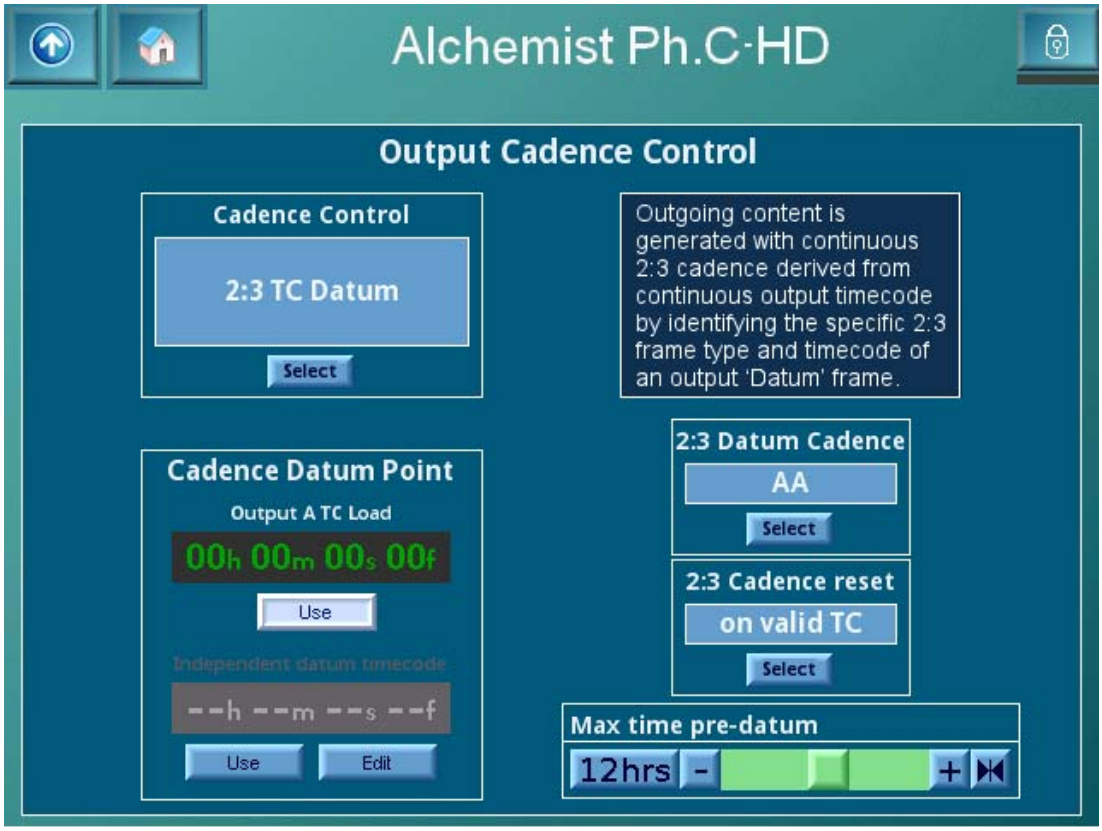
D.2.3 FilmTools Output Setup



D.2.3.1 Output Cadence Alignment Control

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)	All outgoing content is interpreted as 2:2 F1/F2 (PsF) cadence.
2:2 F2/1	All outgoing content is interpreted as 2:2 F2/F1 (PsF) cadence.
2:3 TC Datum	Outgoing 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 TC 0&5	Outgoing content is interpreted as continuous 2:3 cadence defined by a specific relationship to the frame count of non-drop frame input timecode.
2:3 Freerun	Outgoing content is interpreted as continuous 2:3 cadence derived from an internal free running 2:3 cadence generator.

D.2.3.2 2:3 TC Datum



2:3 Datum Cadence

AA (Default) **BB,** **BC,** **CD,** **DD**	This control defines the 2:3 cadence of the Datum frame when the input cadence control is 2:3 TC Datum mode. See “Understanding 2:3 Datum Cadence” on page 166.

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 a 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 the output timecode is equal to the 2:3 Datum Timecode.

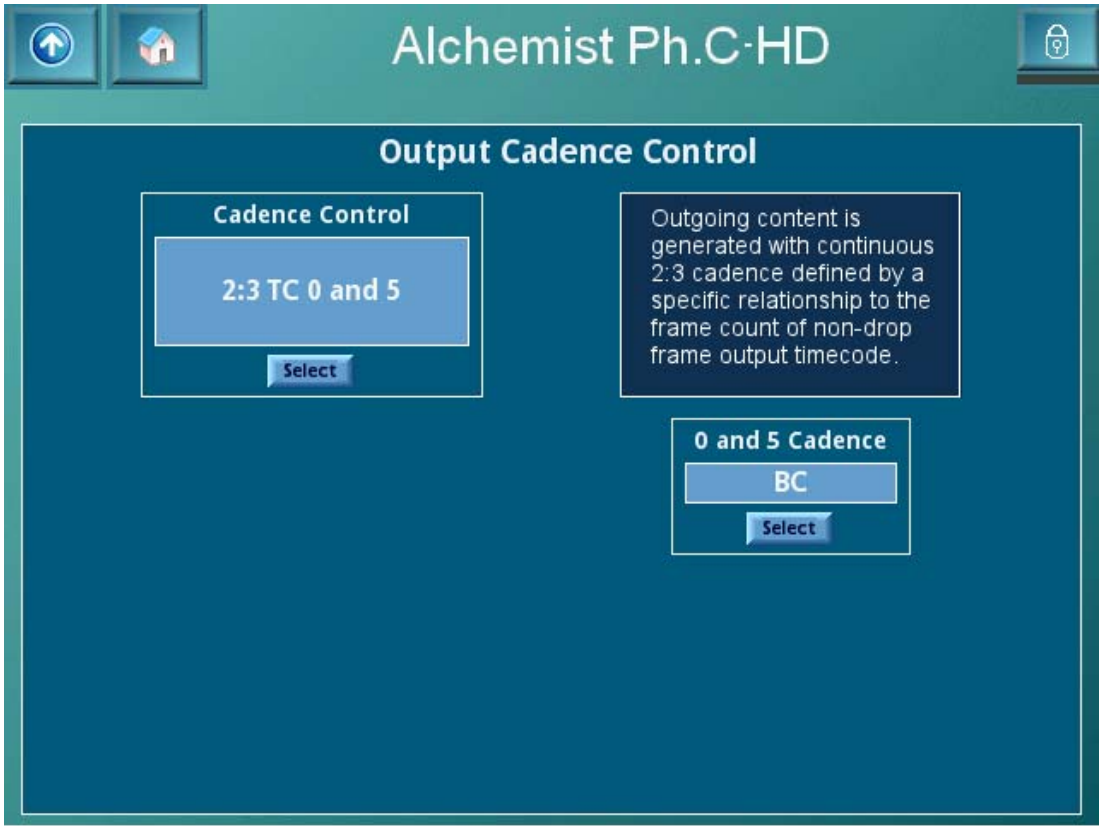
2:3 Datum Timecode

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

2:3 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”. See “Understanding Datum TC Conversion” on page 164.

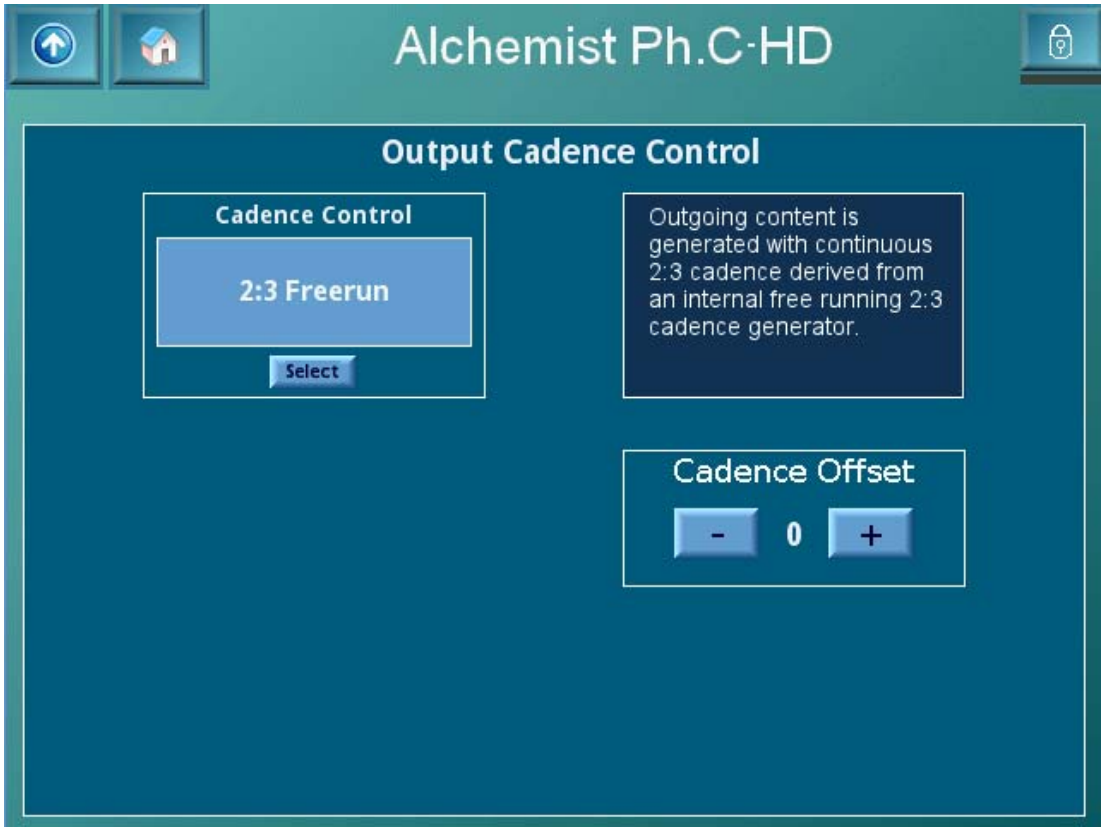
D.2.3.3 2:3 TC 0 & 5



0 & 5 Cadence

AA (Default) **BB,** **BC,** **CD,** **DD**	This control defines the phase of the relationship between frame count and output timecode. When a frame count of 0 & 5 is present the 2:3 phase can be set any one of the five frame types. See “Understanding 2:3 Datum Cadence” on page 166.

D.2.3.4 2:3 Freerun

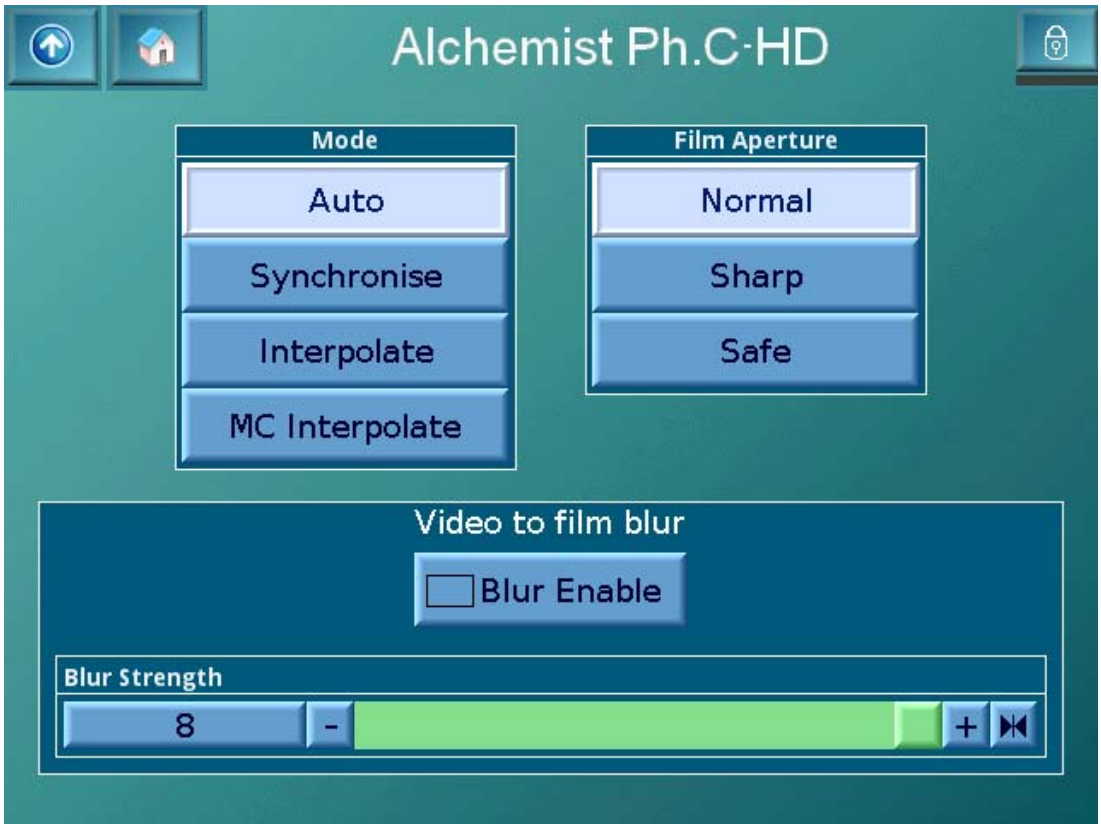


Cadence Offset

- ***/ +*** The cadence of the free running 2:3 generator maybe offset.

See “Understanding 2:3 Datum Cadence” on page 166.

D.2.4 FimTools Control Setup



D.2.4.1 Mode

Auto (Default)	Selects between synchronized, interpolated (linear) and MC interpolated (motion compensated interpolation) conversion as appropriate depending on the input and output formats specified. See “Conversion Tables” on page 162. 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.
Interpolate	Forces the conversion by linear interpolation.
MC Interpolate	Forces the conversion by motion compensated interpolation.

D.2.4.2 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

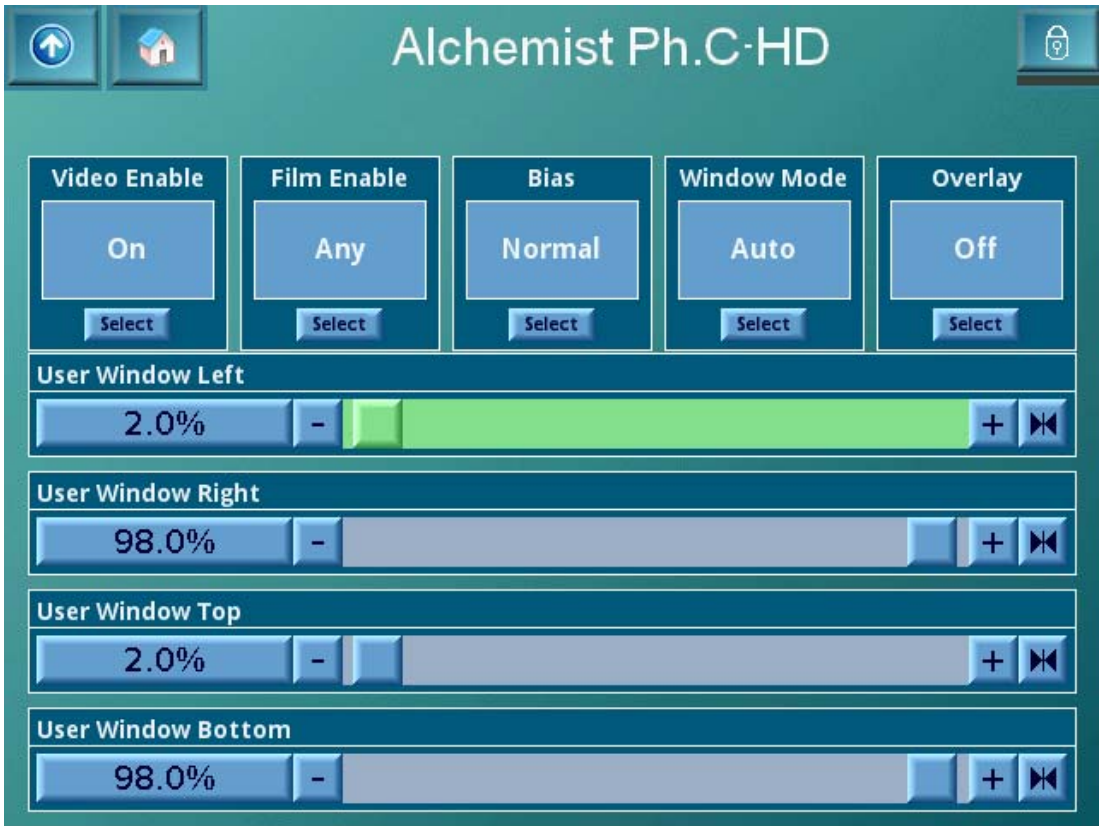
2.4.2.1 Video to film blur

Video to film blur allows any video-to-film conversion to have controlled blur added in areas of movement. Using Ph.C, this process ensures that the amount of blur is proportional to the speed and direction of the motion so that fast moving objects will be blurred more than the slower ones. This mimics the blur usually associated with production on 35mm film.

Blur Enable	Select this option to enable film blur.
Blur Strength	Use the slider bar to adjust the blur strength from 0 (min) to 8 (max).

D.2.5 FilmTools Detection Setup

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.



D.2.5.1 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.

D.2.5.2 Film Enable

Any	(Default) Allows the sequence detector to identify film of any cadence. This may be 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 may be 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.

D.2.5.3 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.

D.2.5.4 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.

D.2.5.5 Window Overlay

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

D.2.5.6 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.

D.3 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 166.

D.3.1 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**.

D.3.2 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)**.

D.3.3 Operational Example 3

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
9. Both tapes can be converted without any further setup. See “Understanding 2:3 Datum Cadence” on page 166.

D.3.4 Operational Example 4

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**.

D.4 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.

With some conversions there is only one technique available, others can be influenced using the film **Mode** control (see FilmTools control).

These tables indicate which conversion technique the Alchemist will adopt depending on the various standard combinations. If only one mode is available the film Mode control has no effect. For conversions which offer the user a choice, the behavior of **Mode** in film **Auto** is indicated in brackets.

			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	ISI_M (I_M)	ISI_M (I_M)	ISI_M (I_M)	ISI_M (I_M)	ISI_M (I_M)
	23	59 2:3	D	S_R	IS (I)	S	IS (I)	S	S
	24	48 2:2	ISI_M (S)	ISI_M (I)	S	P	ISI_M (I_M)	ISI_M (I_M)	ISI_M (I_M)
	24	60 2:3	IS (I)	S	D	S_R	IS (I)	S	S
	25	50 2:2	ISI_M (I_M)	ISI_M (I)	ISI_M (I_M)	ISI_M (I_M)	S	ISI_M (I_M)	ISI_M (I_M)
	29	59 2:2	S	S	ISI_M (I_M)	S	ISI_M (I_M)	S	ISI_M (I_M)
	30	60 2:2	ISI_M (I_M)	S	S	S	ISI_M (I_M)	ISI_M (I_M)	S

			VIDEO OUTPUT				
	Native		47	48	50	59	60
		Transport					
FILM INPUT	23	47 2:2	S	ISI_M (SZ)	ISI_M (S)	ISI_M (S)	ISI_M (S)
	23	59 2:3	D	IS (S)	IS (S)	S	IS (SZ)
	24	48 2:2	ISI_M (S)	S	ISI_M (S)	ISI_M (S)	ISI_M (S)
	24	60 2:3	IS (S)	D	IS (S)	IS (S)	S
	25	50 2:2	ISI_M (S)	ISI_M (S)	S	ISI_M (S)	ISI_M (S)
	29	59 2:2	ISI_M (S)	ISI_M (S)	ISI_M (S)	S	ISI_M (S)
	30	60 2:2	ISI_M (S)	S	ISI_M (S)	ISI_M (S)	S

		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

KEY	
S	Synchronisation
S_R	Synchronisation with 2:3 repair
IS_S	Interpolation (I) or Synchronisation (S)
ISI_M	Interpolation (I), Synchronisation (S) or MC Interpolation (I_M)
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)

D.5 Understanding Datum TC Conversion

D.5.1 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.

D.5.1.1 Example (Figure 1)

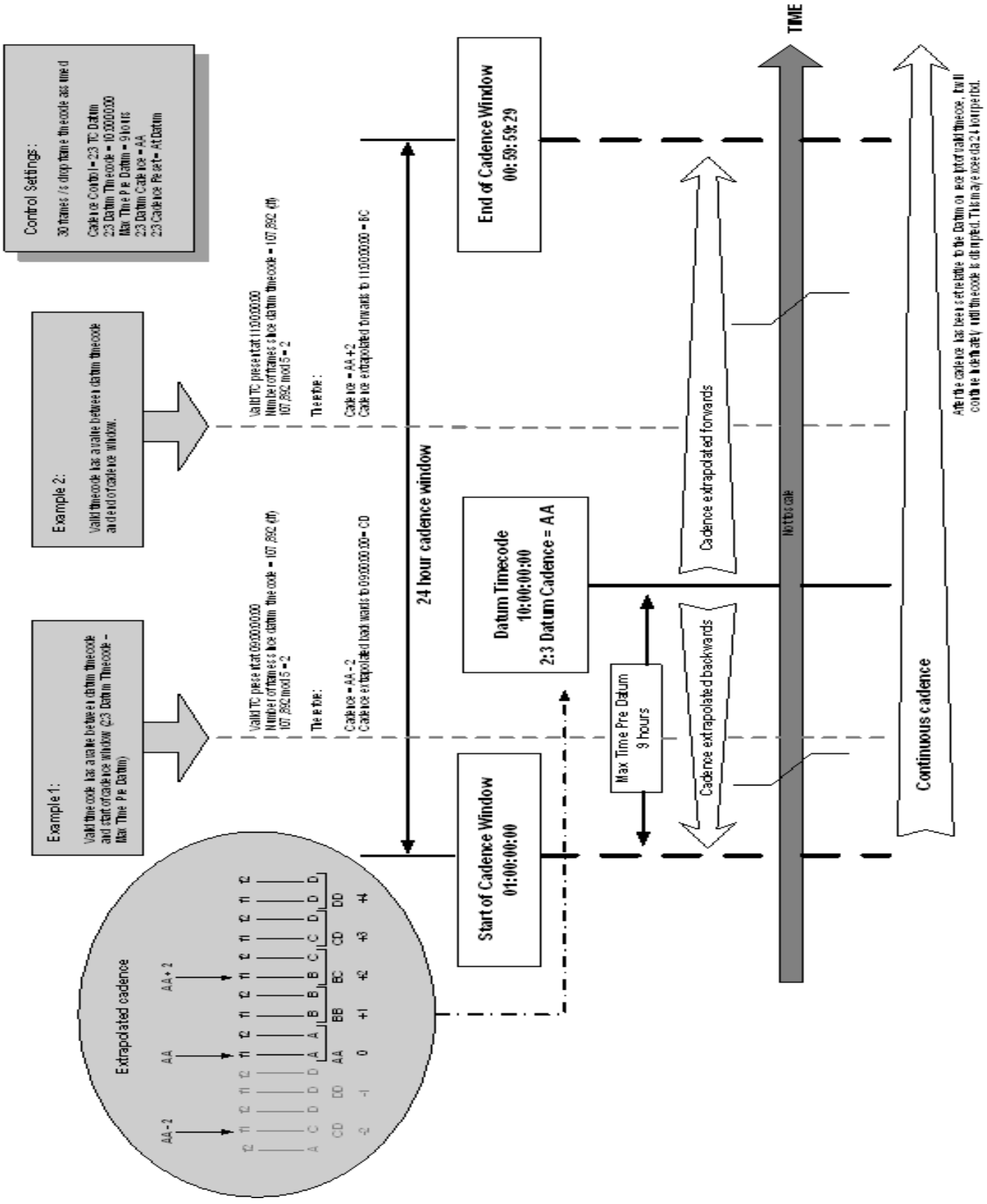
As shown in “Figure 1:” on page 165, the Max Time Pre-datum is set to 9 hours. This gives a start of cadence window of 01:00:00:00 and a corresponding end of cadence window of 00:59:59:29 (24 hours later). The Datum timecode is set to 10:00:00:00. For any timecode after the 01:00:00:00 but before 10:00:00:00 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.

D.5.2 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.

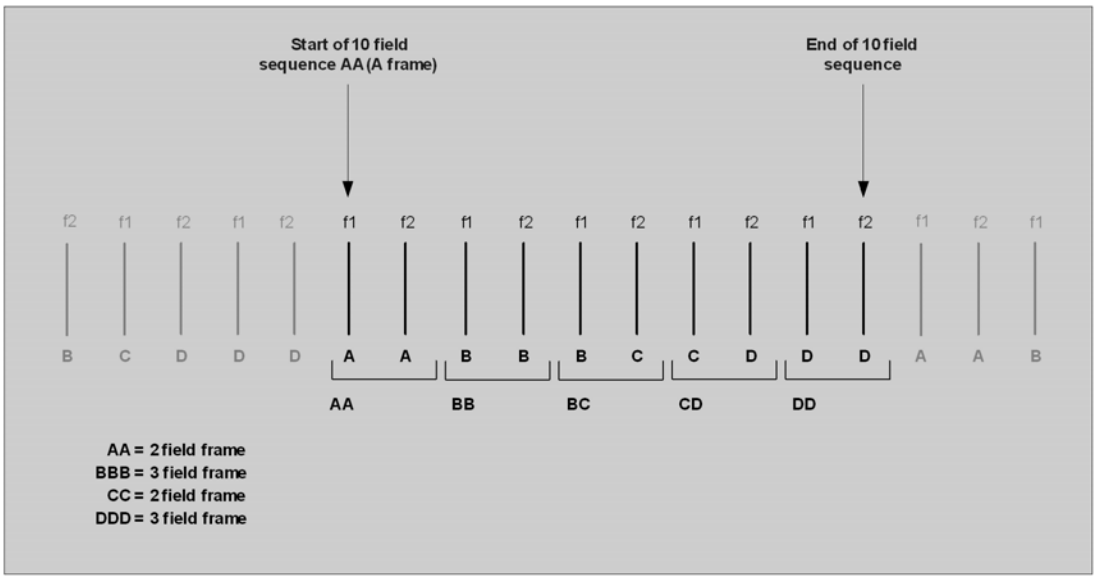
Figure 1:



D.6 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”.

D.7 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.

D.8 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 720 50P/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.

Q12. Can the MC Interpolate mode be used with 59.94 2:3 input cadences?

A12. The MC Interpolate conversion mode is only available for film inputs which have a 2:2 cadence. If there is a requirement to convert from 1080 59i with a 2:3 cadence to 1080 50PsF then it is recommended that this conversion is achieved using a two pass process. The 1080 59i with 2:3 cadence should first be converted to 1080 23.98PsF, followed by a secondary conversion to 1080 25PsF.

Q13. When I perform a low frame rate conversion (such as 1080 23.98 PsF) to a high frame rate (such as 1080 50i) the output of the Alchemist seems to phase between a 2:2 (film) cadence and a 1:1 (video) cadence. Why is this?

A13. This phenomenon occurs as the phase of the input and output video run through. In the example used (1080 23.98PsF > 1080 50i) the cadence moves smoothly between pseudo 2:2 and 1:1 cadence every second. This repetition rate will vary depending on the frame rate conversion undertaken.

Q14. When I perform a low frame conversion (such as 1080 23.98 PsF > 1080 25PsF) I get a different result with V6.0.0. Why is this?

A14. This is because the behavior of Auto mode has been modified with the introduction of MC Interpolate. All 2:2 to 2:2 cadence conversions will use MC Interpolate as default. If the old behavior is desired the Film control should be set to Interpolate.

D.9 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 Authoring

E.1 Overview

The Dolby®E Authoring option for Alchemist Ph.C-HD is capable of providing encoding, transcoding and decoding for up to two Dolby®E audio streams, without impacting on the processing of other PCM audio channels. Set up and control is integrated with the existing user interface through simple, easy to use control screens or RollCall remote control.

The Dolby®E Authoring option offers the ability to encode and author Dolby®E from PCM with full support for the associated metadata.

Metadata can be configured with ease – commonly used metadata sets can be stored in global memories and/or specific metadata memories to assist efficient processing.

To complement this comprehensive Dolby processing, the Alchemist Ph.C-HD includes an integrated multi-channel routing and processing module offering the capability to route, delay and gain all audio inputs and decoded outputs simultaneously. This flexibility continues through to the audio outputs where all audio sources maybe routed independently to the embedder A, embedder B and AES.

For monitoring the newly authored Dolby®E it is possible to route the Dolby®E to the Dolby®E decoder. The decoded PCM may be monitored on the headphones socket or routed to the audio outputs. Decoded metadata is presented per program in a single screen shot allowing fast validation that the metadata was correctly configured during encoding.

E.1.1 Features

- Dolby®E processing integrated with converter; no need to setup and configure external boxes.
- Dolby®E processing available in all conversion modes.
- Frame rate standards conversion as well as up, down and cross conversion modes.
- Transcode, Decode, Encode.
- Easy set up, intuitive GUI minimizes time to perform jobs.
- Lip-sync maintained, guard band protected: no more rejects.
- Full support for metadata authoring.
- Flexible channel routing, gain and delay.
- Ability to independently map audio sources to embedder A, embedder B and AES.
- Headphones socket.
- Integrated BLITS audio tone generator.
- Powerful features to support metadata configuration.
- Dolby®D decode.
- Dolby®E external metadata processing available in all conversion.

E.2 Dolby® E Control Interface

The Alchemist Ph.C's Dolby® E controls are contained within the Audio Menus. See "Audio Menus" on page 62 for information.

E.3 Dolby Metadata

This section provides a brief description of the Dolby Metadata parameters. Detailed explanations can be found on the Dolby Web site www.dolby.com.

In general when authoring Dolby the important parameters are Program Configuration, Dialogue Norm, Line Mode and Preferred Stereo Downmix. Other parameters are normally left in preset.

E.3.1 Audio Production Info

- **No/Yes**: This parameter indicates whether Mix Level and Room Type values are valid.
- **Mix Level**: This parameter can only be adjusted if the 'Audio Production' is set to 'Yes'. The Mix Level describes the peak sound pressure level (SPL) used during the final mixing at the studio, and allows the consumer's amplifier to set its volume such that the SPL in the replay environment matches that of the studio. This control operates in addition to dialog level and is best thought of as the final volume setting on the consumer's equipment.
- **Room Type**: This parameter can only be adjusted if the 'Audio Production' is set to 'Yes'. The Room Type parameter describes the equalization used during the final mixing session at the studio.
- None: No equalization
- Large: X-curve equalization
- Small: Flat equalization

E.3.2 Bitstream Mode

This universal metadata parameter describes the nature of the encoded program material.

- **Complete Main**: From 2 to 6 channels with all content.
- **Music and Effects**: Main source without the dialog channel. Usually associated with a separate Dialog program.
- **Visually Impaired**: 1 channel containing a narrative description of an associated video channel.
- **Hearing Impaired**: 1 channel containing all content processed for increased intelligibility.
- **Dialog**: 1 or 2 channels containing dialog. Usually associated with a separate Music and Effects program.
- **Commentary**: 1 channel with supplementary commentary.
- **Emergency**: 1 channel for emergency messages with priority to mute all other programs.
- **Voice Over**: A single channel to be decoded and mixed with the centre channel.
- **Karaoke**: Left and right channels have music. Centre channel has a guide melody. L's and R's have optional backing vocals.

E.3.3 Center Mix Level

When the encoded audio has three front channels (L, C, R), but the consumer has only two front speakers (left and right), this parameter indicates the nominal downmix level for the Center channel with respect to the Left and Right channels. Decoders use this universal metadata parameter during downmixing in Lo/Ro mode when Extended Bitstream Information parameters are not active.

E.3.4 Channel Mode

The **Channel Mode** displays which channels will exist in the Dolby®D program. Channel mode is expressed as *n/m* (e.g. 3/2), where *n* is the number of front channels and *m* is the number of back channels. Additionally, there may be a *Low Frequency Effects* (LFE) channel added. LFE is sometimes called a subwoofer channel.

E.3.5 Dialogue Norm.

Dialog normalization employs a level shift to enable the average level of dialog to be maintained at a preset level. This aids in matching audio volume between program sources. Use the slider bar to set the Dialog Normalization level.

E.3.6 DC Filter

This parameter indicates whether the DC-blocking 3Hz highpass filter is applied to the main input channels of the program.

E.3.7 LFE Channel

This parameter indicates that the LFE Channel is present in this program.

E.3.8 LFE Filter

This parameter determines whether a 120 Hz eighth-order lowpass filter is applied to the LFE channel input of an encoder prior to encoding. It is ignored if the LFE channel is disabled. This parameter is not sent to the consumer decoder. The filter removes frequencies above 120 Hz that would cause aliasing when decoded. This filter should only be switched off if the audio to be encoded is known to have no signal above 120 Hz.

E.3.9 Lowpass Filter

This parameter determines whether a lowpass filter is applied to the main input channels of a Dolby encoder prior to encoding. This filter removes high frequency signals that are not encoded. At the suitable data rates, this filter operates above 20 kHz. In all cases it prevents aliasing on decoding and is normally switched on. This parameter is not passed to the consumer decoder.

E.3.10 Line Mode

This parameter is also often referred to as Dynamic Range Control or DynRng. Line-level or power-amplified outputs from two-channel set-top decoders, two channel digital televisions, 5.1-channel digital televisions, Dolby Digital A/V surround decoders, and outboard adapters use Line Mode.

E.3.11 LoRo Center Downmix

This parameter indicates the level shift applied to the Center channel when adding to the left and right outputs as a result of downmixing to an Lo/Ro output. When Extended BSI parameters are active, this parameter replaces the Center Mix Level parameter in the universal parameters.

E.3.12 LoRo Surround Downmix

This parameter indicates the level shift applied to the Surround channels when downmixing to an Lo/Ro output. When Extended BSI parameters are active, this parameter replaces the Surround Mix Level parameter in the universal parameters.

E.3.13 LtRt Center Downmix

This parameter indicates the level shift applied to the Center channel when adding to the left and right outputs as a result of downmixing to an Lt/Rt output.

E.3.14 LtRt Surround Downmix

This parameter indicates the nominal downmix level.

E.3.15 Preferred Stereo Downmix

This parameter allows the producer to select either the Lt/Rt or the Lo/Ro downmix in a consumer decoder that has stereo outputs. The options are:

- Not Indicated.
- LtRt Preferred: The Lt/Rt downmix is prologic encoded so that the output contains centre and surround information that can be decoded by a prologic decoder.
- LoRo Preferred: The Lo/Ro downmix adds the Left and Right Surround channels discretely to the Left and Right speaker channels, respectively. This preserves the stereo separation for stereo-only monitoring and produces a mono-compatible signal.

E.3.16 Program Description

Each Dolby®E program may be given a name or description using this field. Descriptions may be up to 19 characters in length.

E.3.17 RF Mode

RF mode is designed for products (such as set-top boxes) that generate a downmixed signal for connection to the RF/antenna input of a television set; however, it is also useful in situations where heavy dynamic range control is required—for example, when small PC speakers are used for DVD playback. In RF mode, high- and low-level compression scaling is not allowed. When RF mode is active, that compression profile is always fully applied.

E.3.18 Surr 3dB Attenuator

This option determines whether the encoder attenuates the surround channel(s) by 3 dB before encoding. It balances the signal levels between theatrical mixing rooms (dubbing stages) and consumer mixing rooms (DVD or TV studios). Consumer mixing rooms calibrate all five main channels are at the same sound pressure level, whereas theatrical mixing rooms calibrate the surround channels 3 dB lower than the front channels.

E.3.19 Surround Ex Mode

The Dolby Surround EX™ mode indicates whether or not the program has been encoded in Dolby Surround EX. This information is not used by the Dolby decoder, but may be used by other portions of the audio reproduction equipment.

E.3.20 Surround Mix Level

When the encoded audio has one or more Surround channels, but the consumer does not have surround speakers, this parameter indicates the nominal downmix level for the Surround channel(s) with respect to the Left and Right front channels. Decoders use this universal metadata parameter during downmixing in Lo/Ro mode when Extended BSI parameters are not active.

E.3.21 Surround Mode

This universal metadata parameter indicates to a Dolby Digital decoding product that also contains a Dolby Pro Logic decoder (for example a 5.1-channel amplifier), whether or not the two-channel encoded bitstream contains a Dolby Surround (Lt/Rt) program that requires Pro Logic decoding. Decoders can use this flag to automatically switch on Pro Logic decoding as required.

- Not indicated: Dolby Surround not indicated
- Not Dolby Surround: Not Dolby Surround encoded
- Dolby Surround: Dolby Surround encoded

E.3.22 Surround Phase Shift

Can be decoded with Dolby Pro Logic to L, C, R, S, if desired. However, for some phase-critical material (such as music) this phase shift is audible when listening in a 5.1-channel format.

E.4 Operational Examples

E.4.1 Operational Example 1

Dolby® E conversion from 1080 50i to 1080 59.94i

Dolby®E Program Config 5.1+2 embedded on Emb 1

Dolby®E 5.1+2 required on all audio outputs pair 1

- Simple Transcode required
- Audio channel configuration remains the same
- No new Metadata needs to be authored
- Fixed channel mapping from decoder to encoder required

Audio Setup

1. Select **Audio** Tab.
2. Touch **Audio Control**.
3. Select **Dolby Encoder 1** page and set Encoder 1 mode to **Transcode**.
4. Select **Dolby Decoder 1** page and set Source to **Emb 1**.
5. Return to the **Audio Control** page.
6. Lock audio outputs together by selecting **AES follows EMB A** and **EMB B follows EMB A**.
7. Select output pair 1 to **Enc 1**.

E.4.2 Operational Example 2

Dolby® E Author to 1080 59.94i

Multi channel PCM presented on AES 1-4

Dolby®E 5.1+2 required on output Emb A

Metadata should be set to Dolby Default values

- Audio channel configuration remains the same
- Metadata needs to be authored, but simply set to Dolby recommended defaults.
- Fixed channel mapping from AES to encoder required.

Audio Setup

1. Select **Audio** Tab.
2. Touch **Audio Control**.
3. Select **Dolby Encoder 1** page and set encode mode to **Author**.
4. Touch map **AES 1-4** button for single step routing configuration.
5. Select a **Bit Depth** of **20 bit**.
6. Select program configuration to **5.1+2**.
7. Return to **Audio control** page.
8. Touch **Preset** to ensure Dolby default values are used.
9. Select **Audio Control** page and **Emb A** tab.
10. Select Emb A pair 1 to **Enc 1.**

E.4.3 Operational Example 3

Dolby® E conversion from 1080 59.94i to 1080 50i

Dolby®E 5.1 presented on Emb 1

Stereo mix presented on AES 1 (to be encoded onto Program 2)

Dolby®E 5.1+2 required on Emb A

Prog 1 metadata should be passed through from the decoder

Prog 2 metadata should be authored with Dolby Default values

Mixture of decoded and authored metadata required

Author mode required

Audio Setup

1. Select **Audio** Tab.
2. Touch **Audio Control**.
3. Select **Dolby Encoder 1** page and set encode mode to **Author**.
4. Select **Dolby Decoder 1** page and set Source to **Emb 1**.
5. Select **Full Metdata**.

6. Play a segment of source where Dolby®E is present, confirm decoded metadata parameters have updated and then snapshot the decoded Metadata into **Snapshot 1**.
7. Go back to **Audio Control** page and select **Dolby Encoder 1** page.
8. Set **Bit Depth** to **20 bit**.
9. Return to the **Audio Control** page.
10. Select program configuration to **5.1+2.** Touch **Preset** to ensure Dolby default values are used.
11. Manually route decoder 1 outputs to encoder input channels 1 – 6.
12. Manually route AES 1 channels to encoder input channels 7 and 8.
13. Select **Metadata Authoring**, followed by **Prog 1** tab.
14. Recall Snapshot 1 (this will load settings for Prog 1 only)
15. Select **Prog 2** tab and modify metadata as required.
16. Return to the **Audio Control Page** and select the **Emb A** tab and Route **Enc 1** to **Emb 1**.

E.4.4 Operational Example 4

Dolby® E Author to 1080 59.94i

8 channels of PCM presented on AES 1-4

Channels 1&2 have been incorrectly swapped upstream

Dolby®E 8x1 required on Emb A

Metadata needs to be specifically set according to customer delivery spec

User wants to verify the encoder is set up correctly whilst performing the conversion

Author mode required

Manual configuration of Metadata

Monitor newly encoded Dolby®E using one of the decoders

Audio Setup

1. Select **Audio** Tab.
2. Touch **Audio Control**.
3. Select **Dolby Encoder 1** page and set encode mode to **Author**.
4. Set **Bit Depth** to **20 bit**.
5. Select program configuration to **8X1**.
6. Return to the **Audio Control** page.
7. Touch map **AES 1-4** button for single step routing configuration, manually re-route AES 1 Ch1 to encoder input 2 and AES 1 Ch 2 to encoder input 1.
8. Select **Dolby Encoder 1**.
9. Select **Metadata Authoring** and configure all 8 programs (if the metadata for each program is the same use the Snapshot tool).
10. Select **Dolby Decoder 1** page and set the source to **Enc 1**.
11. Return to the **Audio Control** page and select **Emb A** tab and Route **Enc 1** to **Emb 1**.

Decoded metadata may now be monitored and validated during authoring process.

E.5 Dolby Metadata and Memories

There are 6 user global memories plus 8 metadata program Snapshots available.

Global memories store the Alchemist's current configuration, including Dolby configuration and associated metadata for each program present with the current Dolby configuration.

Metadata Snapshots allow the user to store and recall specific program metadata configurations (this doesn't include Program Configuration and Bit Depth). These can be saved from the decoder or the encoder as required. For Snapshot behavior see **Using Metadata Snapshots** on page 183

Snapshots will be erased if a **Factory** memory recall is performed.

E.6 Metadata Parameter ‘Default’

The Program Configuration defines the quantity of programs present (as shown below).

Program Config	No. of Programs
5.1 + 2	2
5.1 + 2x1	3
4 + 4	2
4 + 2x2	3
4 + 2 + 2x1	4
4 + 4x1	5
4x2	4
3x2 + 2x1	5
2x2 + 4x1	6
2 + 6x1	7
8x1	8
5.1	1
4 + 2	2
4 + 2x1	3
3x2	3
2x2 + 2x1	4
2 + 4x1	5
6x1	6
4	1
2 + 2	2
2 + 2x1	3
4x1	4
7.1	1
7.1 screen	1

For each program there are metadata default values (based on the associated Program Configuration). These default values are the default values recommended by Dolby.If required the user may modify these defaults independently of each program. Any modification made will be retained until either:

- The user makes subsequent modifications
- The metadata **Preset** is selected
- Global **Default** or **Factory** memories are recalled

E.7 Which Metadata Parameters Are User Configurable?

Parameters which are not user-configurable are grayed out in the table below. In some cases the CAT559 will force a defined behavior and in other cases there is an implicit dependency.

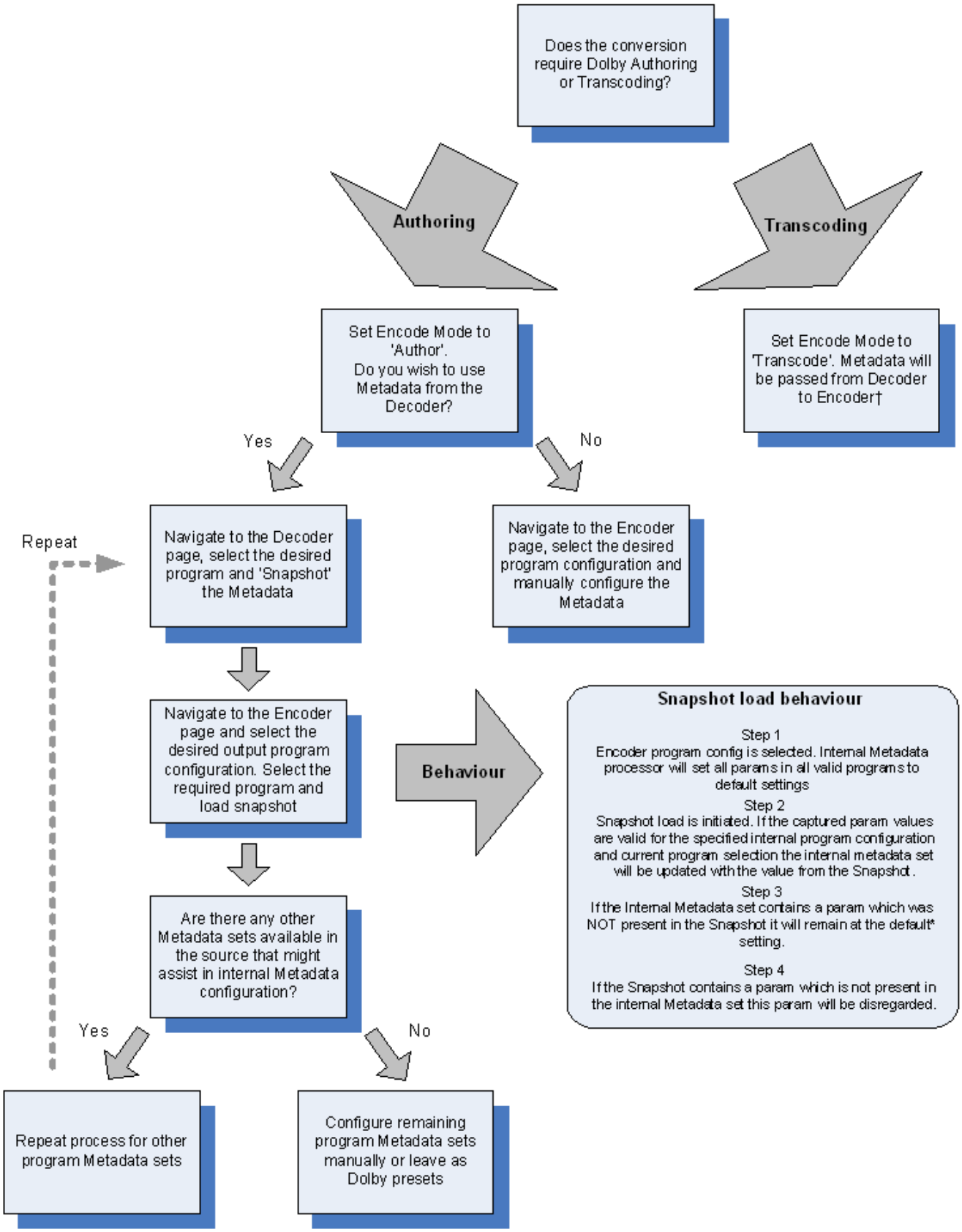
E.7.1 Dolby®E

Bit Depth	Yes
Program Configuration	Yes
Dolby Frame Rate	No (defined by selected video output)

E.7.2 Dolby®D (AC3)

Channel mode	No (defined by program configuration)
Dialogue Level	Yes
LFE Channel	Yes
Bitstream Mode	Yes
Line Mode Pro	Yes
Program Description	Yes
RF Mode Pro	Yes
RF Overmodulation Prot	No (forced 'Enabled')
Center Downmix Level	No (follows Lo/Ro Center)
Surround Downmix Level	No (follows Lo/Ro Surround)
Dolby Surround Mode	Not Indicated
Audio Production	Yes
Mixing Level	Yes (when 'Audio Production' is set 'Yes')
Room Type	Yes (when 'Audio Production' is set 'Yes')
Copyright Bit	No (forced 'Yes')
Original Bitstream	No (forced 'Yes')
DC Filter	Yes
Lowpass Filter	Yes
LFE Lowpass Filter	Yes
Surround 3dB Attenuation	Yes
Surround Phase Shift	Yes
Preferred Stereo Downmix	Yes
Lt/Rt Center Downmix Level	Yes
Lt/Rt Surround Downmix Level	Yes
Lo/Ro Center Downmix Level	Yes
Lo/Ro Surround Downmix Level	Yes
Surround EX Mode	Yes
A/D Convertor Type	No (forced 'Standard')
Datarate	No (forced '384kbs')
Headphone Mode	No (forced 'Not Indicated')

E.8 Metadata Workflow



† The output frame rate Metadata parameter will be modified in accordance with the output standard selection.

* Default settings can be either system preset values (as specified by Dolby) OR user defined 'default' values. (Users can modify the system preset values for each program configuration – these settings will be stored during a power cycle).

E.8.1 Using Metadata Snapshots

For demonstration purposes let's assume the Decoder has a 5.1 input and the Metadata has been captured using the Snapshot feature.

Example: 5.1 metadata snapshot

Channel mode	(3/2)
Dialogue Level	-27
LFE Channel	Enabled
Bitstream Mode	Complete Main (CM)
Line Mode Pro	Film Standard
Program Description	
RF Mode Pro	Film Standard
RF Overmodulation Prot	Enabled
Center Downmix Level	0.5
Surround Downmix Level	0.595
Dolby Surround Mode	Not Indicated
Audio Production	Yes
Mixing Level	90
Room Type	Large
Copyright Bit	Yes
Original Bitstream	Yes
DC Filter	Enabled
Lowpass Filter	Enabled
LFE Lowpass Filter	Enabled/Disabled
Surround 3dB Attenuation	Disabled
Surround Phase Shift	Enabled
Preferred Stereo Downmix	Not Indicated
Lt/Rt Center Downmix Level	0.5
Lt/Rt Surround Downmix Level	0.595
Lo/Ro Center Downmix Level	0.5
Lo/Ro Surround Downmix Level	0.595
Surround EX Mode	Not Indicated
A/D Convertor Type	Standard
Datarate	384kbs
Headphone Mode	Not Indicated

The user has specified a 20bit, 8x1 program configuration and has selected program 1 for configuration.

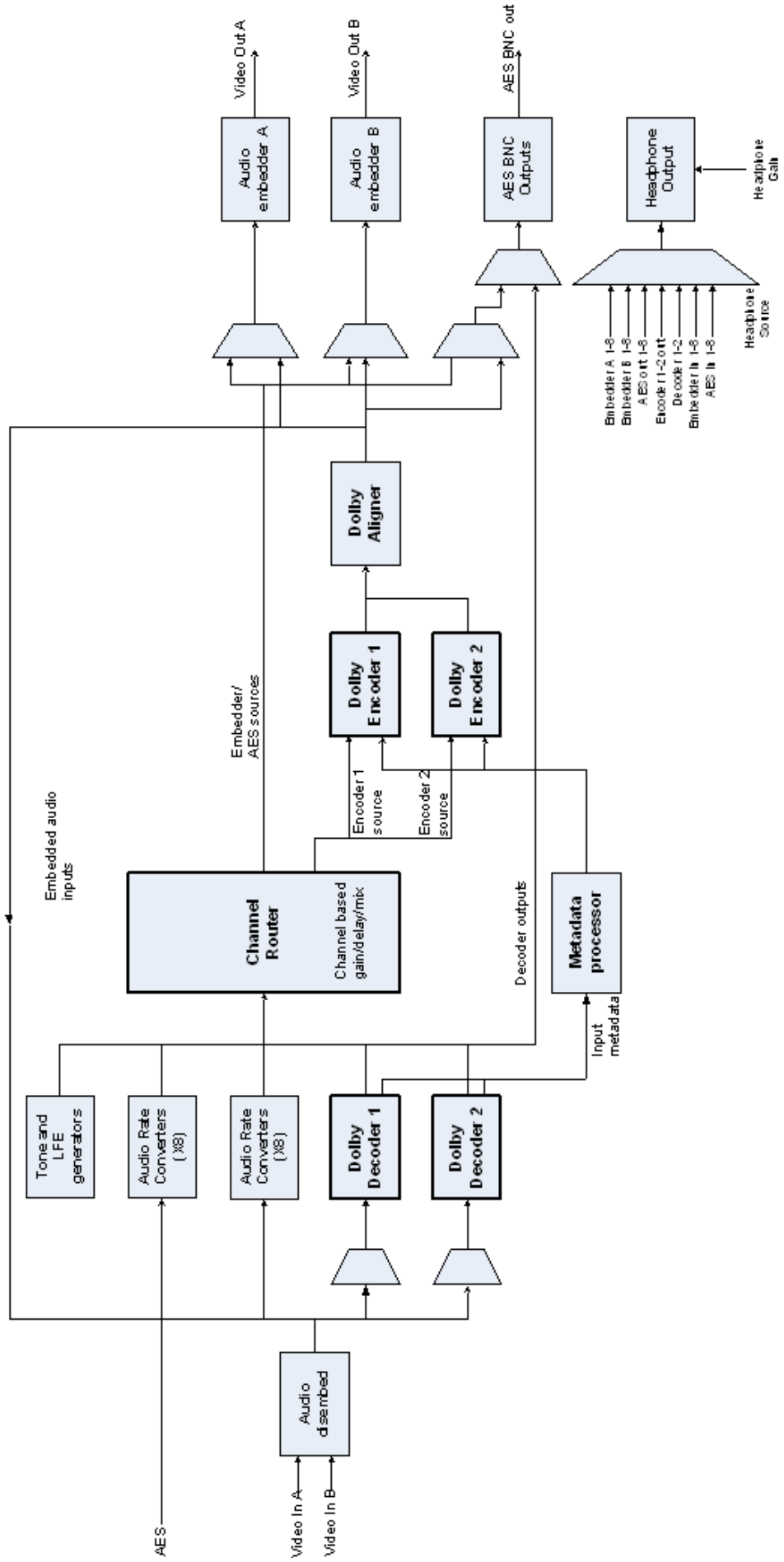
As described in the Metadata Workflow section the internal metadata set (all 8 programs) will be set to default values.

The user now loads the Snapshot.

The table below indicates the contents of the Snapshot, the 8x1 program configuration default values (for program 1) , the value of the Metadata parameters post Snapshot load and whether the internal default value has been updated by the Snapshot. If a parameter wasn't updated there is an explanation as to why it wasn't appropriate to do so.

Metadata Parameter	Captured Snapshot	Post Snapshot Load	Parameter updated by Snapshot?
Channel mode	(3/2)	(1/0)	(1/0)
Dialogue Level	-32	-27	-32
LFE Channel	Enabled	Disabled	Disabled
Bitstream Mode	Complete Main (CM)	Complete Main (CM)	Complete Main (CM)
Line Mode Pro	Film Standard	Film Standard	Film Standard
Program Description	Test		Test
RF Mode Pro	Film Standard	Film Standard	Film Standard
RF Overmodulation Prot	Enabled	Enabled	Enabled
Center Downmix Level	0.5	0.707	0.707
Surround Downmix Level	0.595	0.707	0.707
Dolby Surround Mode	Not Indicated	Not Indicated	Not Indicated
Audio Production	Yes	No	Yes
Mixing Level	90	80	90
Room Type	Large	Not Indicated	Large
Copyright Bit	Yes	Yes	Yes
Original Bitstream	Yes	Yes	Yes
DC Filter	Enabled	Enabled	Enabled
Lowpass Filter	Enabled	Enabled	Enabled
LFE Lowpass Filter	Enabled	Enabled	Enabled
Surround 3dB Attenuation	Disabled	Disabled	Disabled
Surround Phase Shift	Enabled	Disabled	Enabled
Preferred Stereo Downmix	Not Indicated	Not Indicated	Not Indicated
Lt/Rt Center Downmix Level	0.5	0.707	0.707
Lt/Rt Surround Downmix Level	0.595	0.707	0.707
Lo/Ro Center Downmix Level	0.5	0.707	0.707
Lo/Ro Surround Downmix Level	0.595	0.707	0.707
Surround EX Mode	Not Indicated	Not Indicated	Not Indicated
A/D Convertor Type	Standard	Standard	Standard
Datarate	384kbs	384kbs	384kbs
Headphone Mode	Not Indicated	Not Indicated	Not Indicated

E.9 Audio Block Diagram



E.10 Configuring Dolby®E Alignment

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

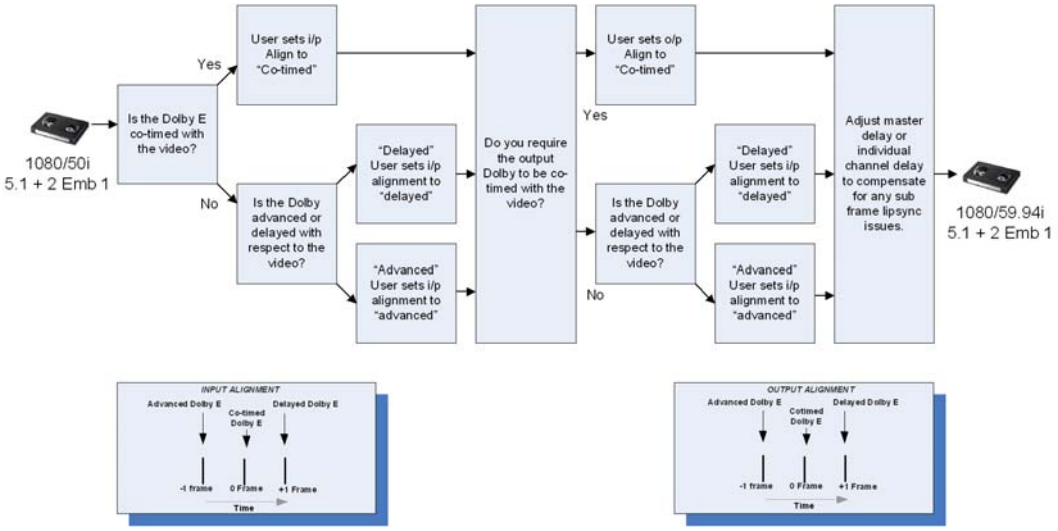
Dolby®E configuration controls have been designed with system integration in mind. IP/OP Alignment controls may be used to compensate for equipment up/downstream which respects Dolby frames. Global/master delay and individual audio pair delay may be used in addition to the alignment controls to allow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

To configure Dolby®E alignment:

Determine whether the input Dolby®E is co-timed, advanced, or delayed with respect to the video and adjust the **IP Alignment** control accordingly.

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.

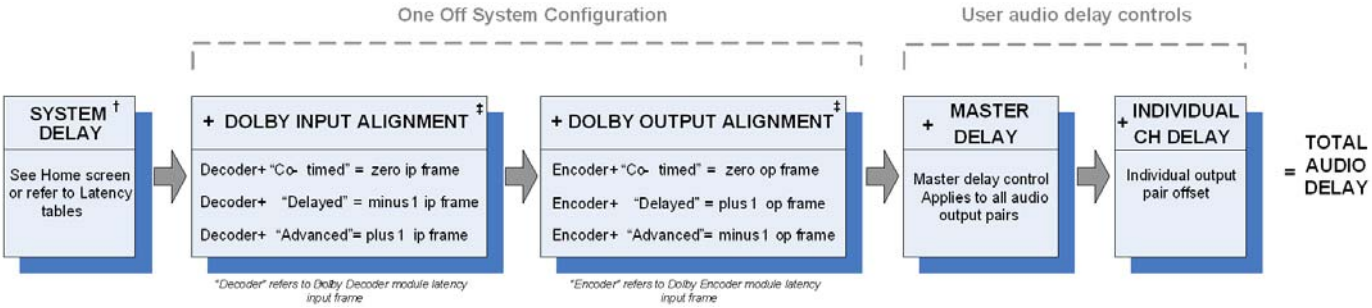
Correct any sub-frame lip-sync issues by adjusting either the master audio delay (if all channels require the same adjustment) or the individual channel delay (if channels require different levels of adjustment).



E.11 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.



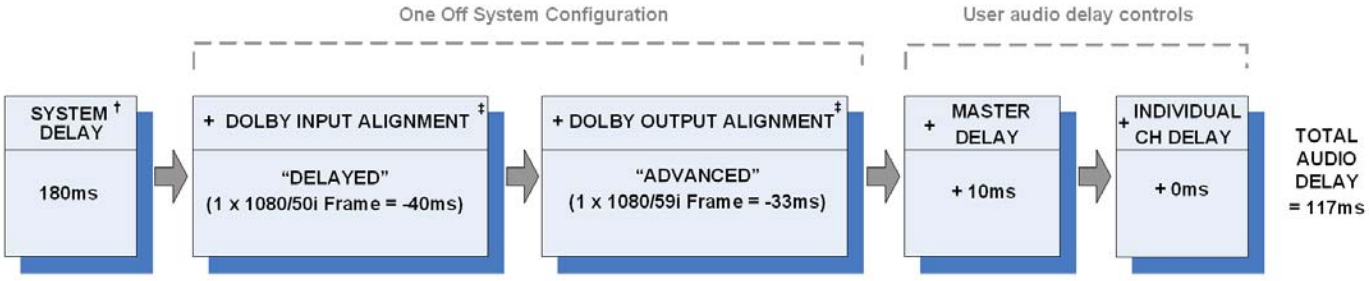
The current System Delay is shown on the Audio tab of the Alchemist Ph.C – HD Home screen; the system delays for all of the Alchemist Ph.C-HD's conversions are also listed in the "Latency Tables" appendix of the Operator's manual.

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.

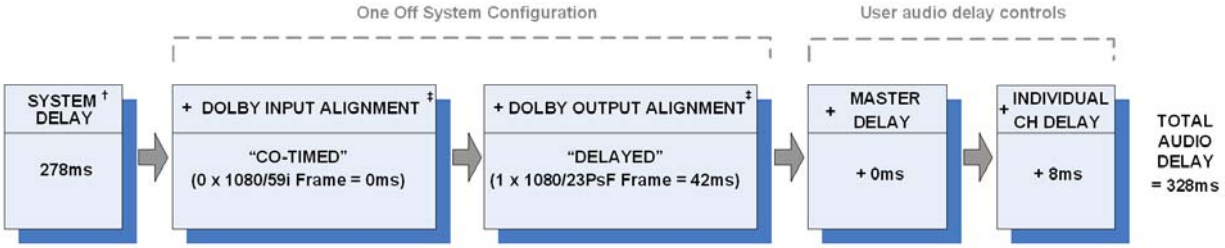
Example 1: 1080/50i to 1080/59i conversion (FilmTools "OFF – Min Delay "ON"), Dolby®E Input is 1 frame delayed with respect to the video, Dolby®E Output should be advanced with respect to the video, and a lip-sync error of +10ms is present.



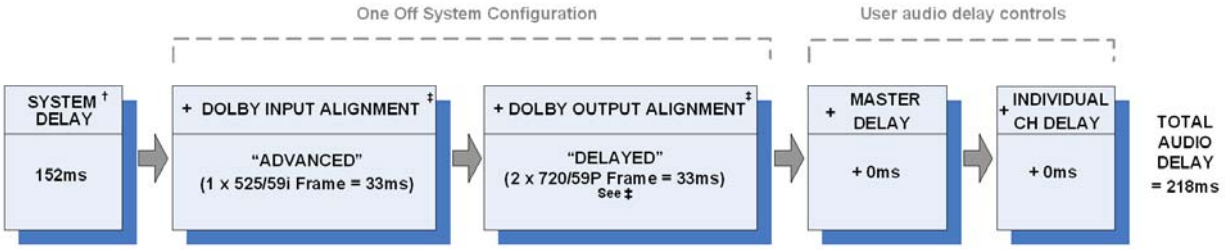
† There are five user controls which contribute to the System Delay value - input standard, output standard, FilmTools (on/off), Min Delay (on/off), Synchro TC Conversion.

‡ 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 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.



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.

E.12 BLITS Test Generator

BLITS is a set of tones designed for television multi track audio line up. BLITS tone has three distinct sections as shown in the diagram below.

The first section **(Phase 1)** is made up from short tones at -18dBFS to identify each channel.

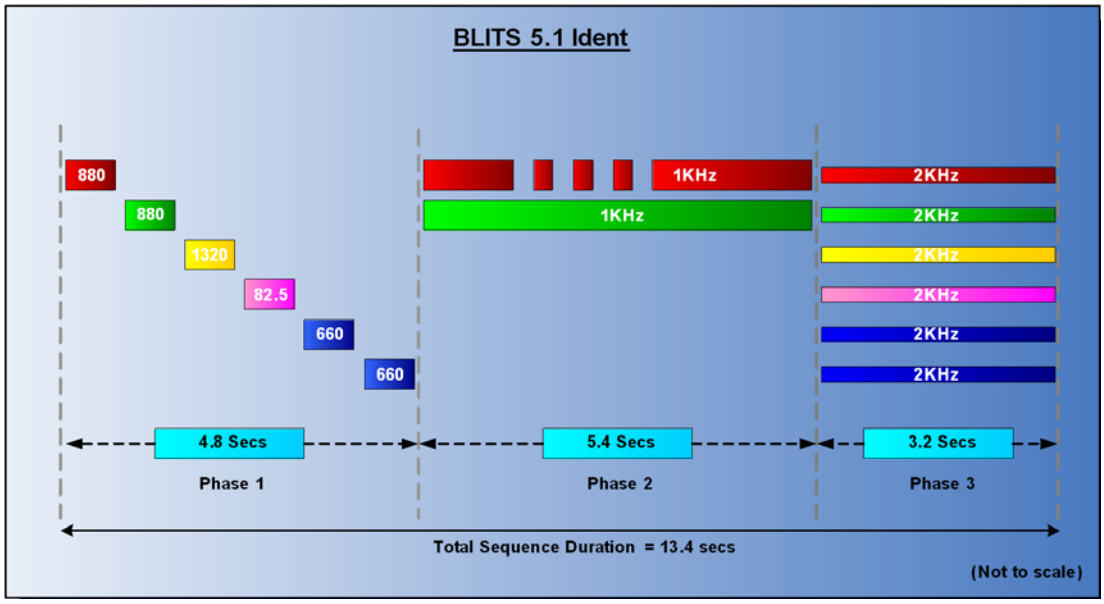
- Left and right- 880Hz
- Centre- 1320Hz
- LFE- 82.5Hz
- Left and right Surround
- - 660Hz

This channel identification section aids interpretation on a visual display and the spatial sequence around the speakers also becomes recognizable very quickly.

The second section **(Phase 2)** identifies front left and right channels only using 1KHz at -18dBFS tone. The left channel is interrupted four times whilst the right channel is constant. This pattern of interrupts was selected to provide a 'familiar' signal to operators and avoids confusion with the GLITS tone after stereo down mix.

The last section **(Phase 3)** has a 2KHz tone at -24dBFS on all six channels. This provides a phase check capability and when summed to stereo using default down-mix values should produce tones approximately -18dBFS on each channel.

When the BLITS test tone is enabled the user can define whether they would like Phase 1, Phase 2, Phase 3 or All phases in sequence. This is configured with the system setup.



E.13 Questions & Answers

Q1. Can I encode PCM to Dolby®E?

A1. Yes, simply set the Encode Mode to "Author" and begin authoring Dolby®E. Metadata can be set to Dolby recommended defaults or may be tailored to individual applications.

Q2. Is it possible to re-order the channel configuration of the Dolby®E program i.e. 2+5.1 to 5.1+2?

A2. Yes, the Alchemist offers comprehensive channel level routing, gain and delay controls.

Q3. Is it possible to have different Audio sources embedded on the same channel of Emb A, Emb B and AES?

A3. Yes. Assuming the audio output lock has been disabled, the user may configure Emb A, Emb B and AES completely independently.

Q4. What happens if the Dolby®E frame rate is different to the input video frame rate?

A4. 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.

Q5. What happens if I give the Alchemist Dolby®E which is out of the guard band?

A5. The Alchemist will automatically re-align and output Dolby compliant data.

Q6. What happens if my program switches from Dolby®E to PCM?

A6. 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.

Q7. Can the Alchemist act as a Dolby®E test generator?

A7. Yes, tones may be generated in either "Author" mode or "Transcode" mode. In Author mode the user is responsible for configuring the Dolby program. In Transcode mode the Dolby configuration is dictated by the decoder (program config and Metadata are passed through). BLITS and 1KHz/4KHz -18dBFS/-20dBFS tones are available. Where a LFE channel is present a 100Hz tone will be generated.

Q8. Why can you not use gain when performing a Dolby Transcode?

A8. 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. It is of course possible to adjust the gain if you enter "Author" mode. In this mode the user is responsible for ensuring content and Metadata are correct.

Q9. Can I use Dolby®E when I select a SlowPAL output format (625 23.98PsF and 625 24PsF)?

A*9. Yes the Dolby®E will be present on both the embedded and AES but it will be 48KHz.*

Q10. Can I use Dolby®E when I select a SlowPAL input format (625 23.98PsF and 625 24PsF)?

A10. 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.

Q11. How will Dolby®E be aligned with a 720 50/59P video output?

A11. 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.

Q12. Can I fix Dolby®E lip-sync problems?

A12. Yes, positive or negative delay may be added via the global delay and/or the individual channel delay controls.

Q13. Can I accommodate the frame latency of the encoder before the Alchemist?

A13. 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.

Q14. Will the AES decoded outputs be aligned with Embedded Dolby®E bitstream?

A14. 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.

Q15. How is the Dolby®E bitstream aligned if my primary and secondary outputs have different genlock offsets?

A15. The Dolby®E will remain aligned to the specified genlock offsets in both outputs. Note that the AES outputs will be aligned to the primary video output (A), and therefore may be offset relative to the secondary.

Q16. Does the Alchemist decode Dolby®D?

A16. The Alchemist will automatically detect the presence of Dolby®D and allow it to be decoded to PCM.

Q17. Is it possible to decode Dolby®D and Encode it as Dolby®E?

A17. Yes this is technically possible, however Dolby®D is an emissive standard which is only intended to be decoded by the consumer. Multiple decode/encode cycles will impair the audio quality.

Q18. Is it possible to ingest Metadata which has been Authored externally to the Alchemist?

A18. Yes Metadata authored on external units (such as the DP570/571) can be directly encoded into the Alchemist's output Dolby®E bitstream.

Q19. If Metadata is ingested through the external metadata connections does the Alchemist validate the metadata prior to encoding?

A19. No, external metadata bypasses the internal metadata processor and is encoded directly into the output Dolby®E bitstream (unless the Snapshot feature is used).

E.14 Glossary

Authoring	Describes the act of encoding PCM to Dolby®E and creating the associated metadata.
BLITS	Black and Lane Ident Tone System.
Decoding	Decoding describes the act of decoding Dolby®D/E to PCM.
Dolby®D	Dolby®D (sometimes referred to as AC-3) is a multichannel audio compression standard developed to bring theatre quality sound into the home.
Dolby®E	A professional audio data-stream designed to carry up to 8 channels of audio, metadata and timecode on stereo PCM systems.
Downmixing	Downmixing is a function of Dolby®Digital that allows a multichannel program to be reproduced over fewer speaker channels than the numbers for which the program is optimally intended.
Encoding	Encoding describes the act of encoding PCM to Dolby®E.
GLITS	Graham's Line up Ident Tone System.
Guard Band	The guard band refers to the number of audio sample locations that do not contain Dolby®E data. The guard band is intended to be aligned with the editing and switching areas so that edits and switches may occur without the loss or corruption of Dolby®E data.
Metadata	Inserted during program creation or mastering and is carried through transmission in a broadcast application or directly onto a consumer format. Metadata provides capability for content producers to deliver the highest quality audio to consumers in a range of listening environments. It also provides choices that allow the consumer to adjust their settings to best suit their listening environment.
Metadata Snapshot	A mechanism to store and recall metadata parameters contained in a single program.
Transcode/ Transcoding	Dolby®E Transcoding is the act of converting Dolby®E from one frame rate to another.

Appendix F. SNMP

F.1 Overview

SNMP (Simple Network Management Protocol) is a protocol within the TCP/IP suite and, because of the popularity of TCP/IP, SNMP has become the de facto standard for managing data networks.

SNMP is a simple request / response protocol that communicates information values between two types of software entities:

- SNMP Managers (also called SNMP Applications or NMS – Network Management Systems)
- SNMP Agents (also called Elements, Devices or Units)

The information available from an SNMP agent is defined by sets of files called Management Information Base or MIB.

Features:

- Receives SNMPV1 & SNMPV2
- Generates SNMPV2 Notifications (rather than SNMPV1 Trap)

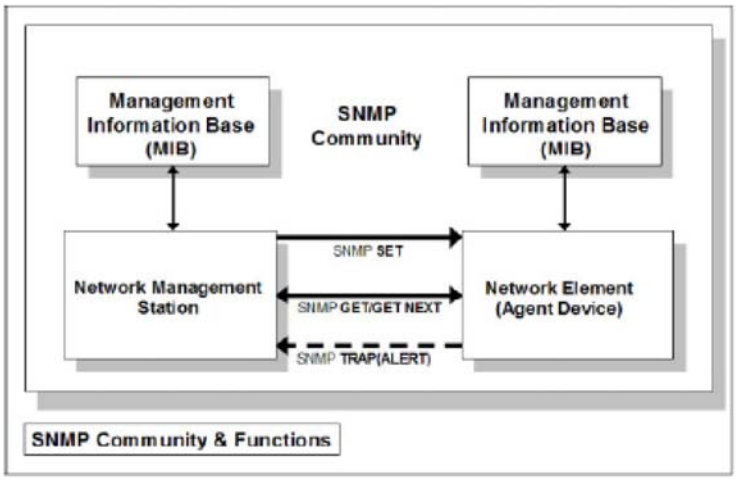
F.2 How SNMP Works

In principle there are two basic commands that an SNMP Manager application uses to manage an SNMP Agent:

- GET (Parameter) – Returns a Value
- SET (Parameter) – Sets a Value

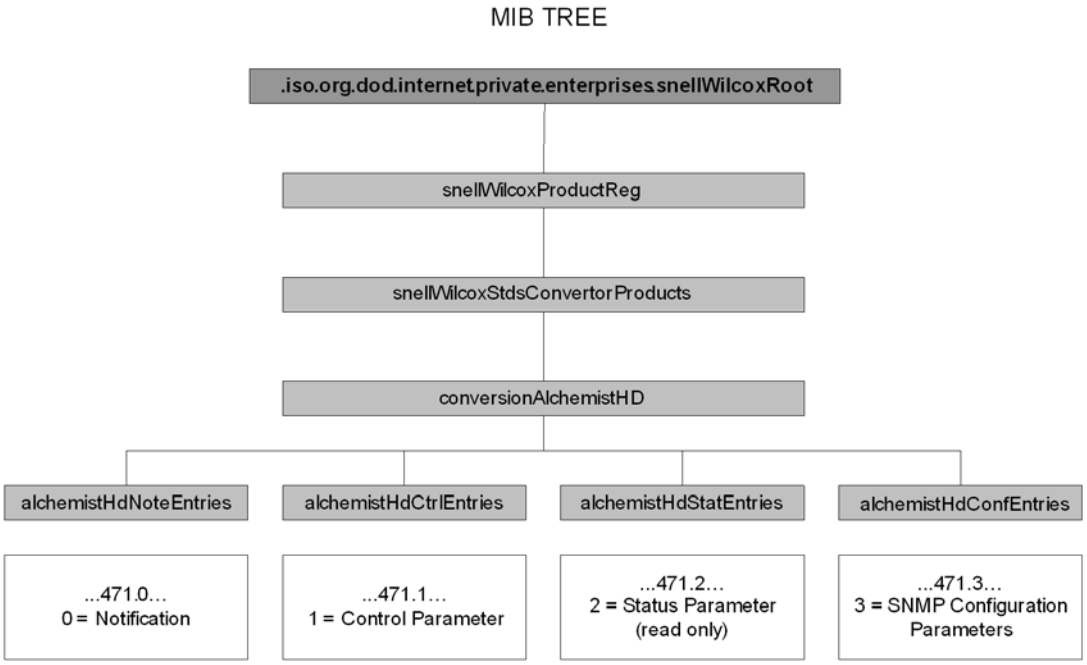
The parameter that is passed to the agent is called an OID (object Identifier). This is a unique reference to the information that is required. Every single piece of information that can be returned from an SNMP agent will have its own unique OID. The complete set of OIDs is organized in a hierarchical or tree structure to form a MIB (management information base).

There is a third command type called a Trap or Notification. Traps work differently to polling in that they are not initiated by the SNMP Manager application. Traps are unsolicited messages broadcast by the agent to its trap destination list (a list of IP addresses that represent the SNMP Manager applications monitoring that agent). Traps are usually only generated when a specific event occurs, usually alerts.



F.3 MIB Hierarchy

The MIB tree structure is shown below. Note the four SNMP groups available to the Manager.



F.4 Accessing a Control Value

To **Get** a value the SNMP manager looks up a value in the MIB file. In this example we are going to configure the input of the Alchemist.

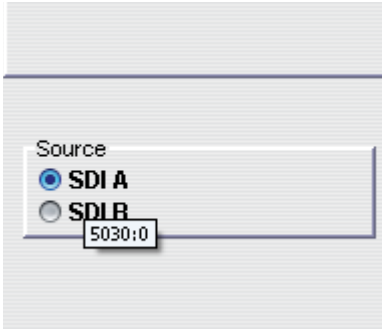
Textual OID name in the MIB:

```
.iso.org.dod.internet.private.enterprises.snellWilcoxRoot.snellWil
coxProductReg.snellWilcoxStdsConvertorProducts.conversionAlchemist
Hd.alchemistHdCtrlEntries.source
```

Numeric OID on the wire:

```
.1.3.6.1.4.1.7995.1.4.471.1.5030.0
```

In this example the command number is '5030'. This can be found in the Rollcall Control Panel or Applet. To determine the RollCall Command number, on the Display tab of the RollCall Preferences window, ensure that the Show Command Numbers option is selected. Then, hover the cursor over the relevant control to reveal the command number.



The final trailing '.0' indicates an instance of this object. The agent responds with the value 0 (SDI A) or 1 (SDI B).

- With a **Get** command, the manager sends the parameter OID, and then receives back the OID and its value.
- With a **Set** command the manager sends the OID plus the value and gets back the OID plus the value.

Note that notification entries cannot be accessed via Get or Set.

F.5 SNMP Notification/Trap

The available notifications are listed within alchemistHdNoteEntries. In this example the manager receives a notification relating to the input status.

Numeric OID on the wire:

```
.1.3.6.1.4.1.7995.1.4.471.0.6665
```

Textual OID name in the MIB:

```
.iso.org.dod.internet.private.enterprises.snellWilcoxRoot.snellWil
coxProductReg.snellWilcoxStdsConvertorProducts.conversionAlchemist
Hd.alchemistHdNoteEntries.input
```

In this case the notification packet actually contains the logInpLossStat parameter

Numeric OID on the wire:

```
.1.3.6.1.4.1.7995.1.4.471.2.5964
```

Textual OID name in the MIB:

```
.iso.org.dod.internet.private.enterprises.snellWilcoxRoot.snellWil
coxProductReg.snellWilcoxStdsConvertorProducts.conversionAlchemist
Hd.alchemistHdStatEntries. LogInpLossStat
```

As and when the input changes the trap receiver will indicate an input state of ‘lost’ or ‘ok’.

F.6 SNMP Community Values

In its simplest terms, a community can be considered as a password. SNMP Devices have two types of community, Read and Write. Every SNMP Agent needs to be configured with these values.

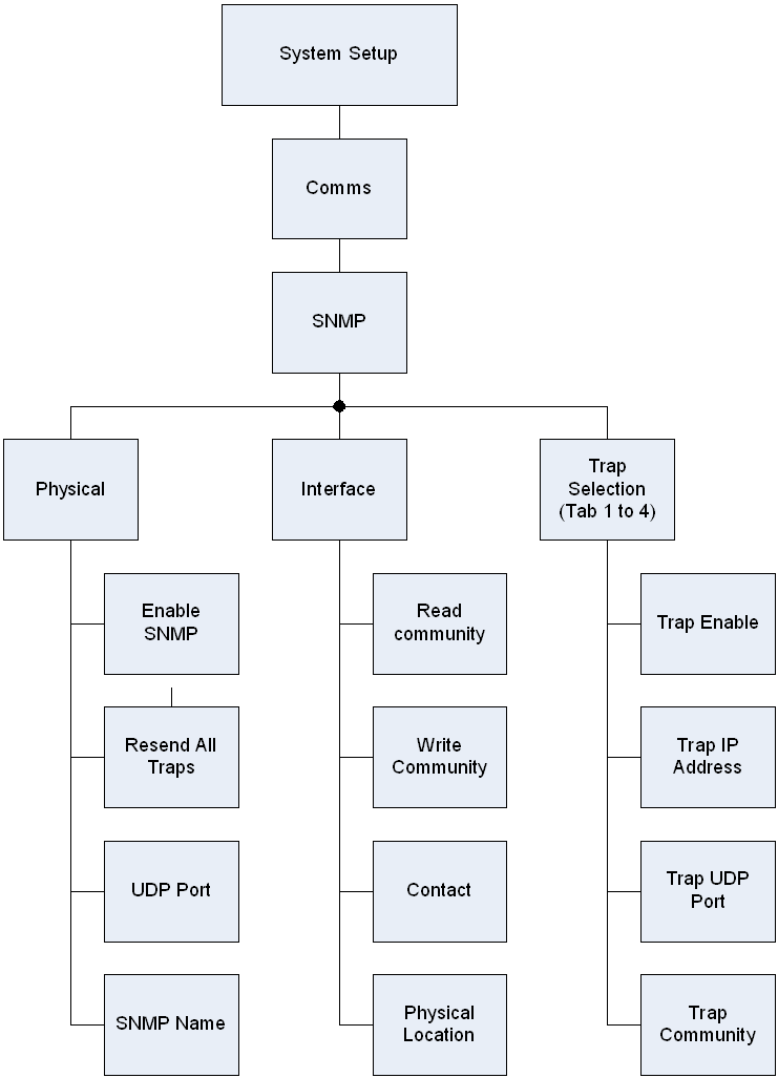
The community provides a very rudimentary level of security. If a GET request is received from an SNMP Manager and the Read community value in the GET message matches the read community value set in the agent, the agent will respond with the value requested.

An identical process is carried out when an agent receives a SET command, however the Write community value must match in this instance.

By default most SNMP Agents have a read community value of ‘public’ and a write community value of ‘private’.

In many systems these values are never changed, leaving the potential for unauthorized access to a device.

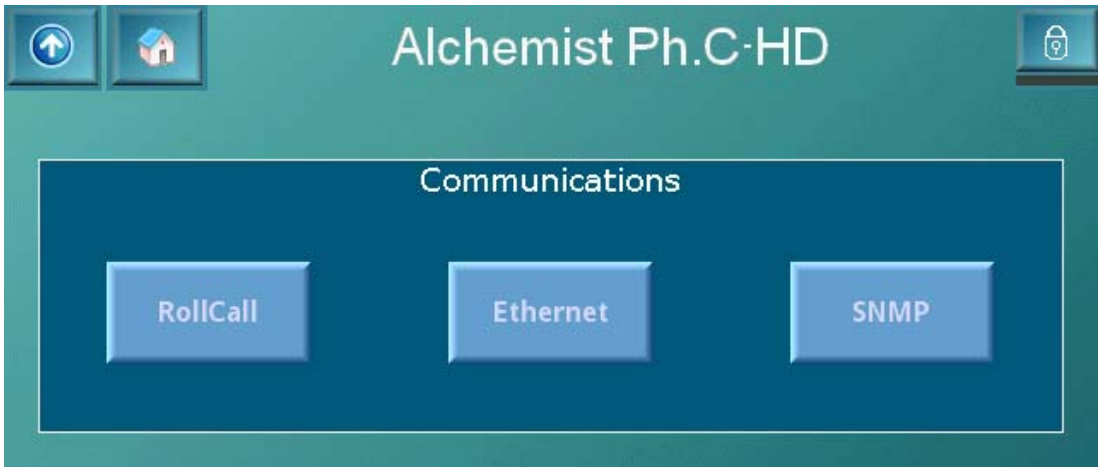
F.7 SNMP Menu Hierarchy



F.8 SNMP Control Interface

This section describes the control interface of the Alchemist Ph.C-HD's SNMP Agent.

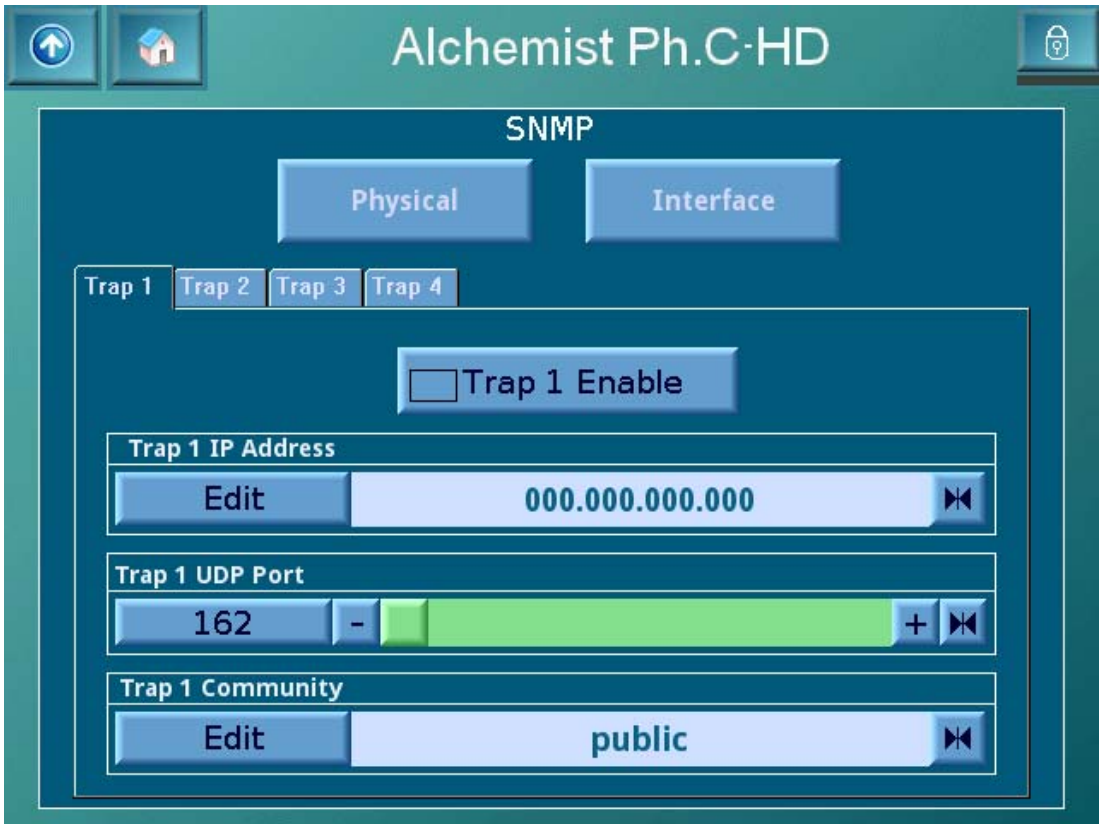
The SNMP Agent that operates within the Alchemist may be accessed via the Communications menu.



Touch **SNMP** to access the SNMP configuration pages.

F.8.0.1 SNMP Page

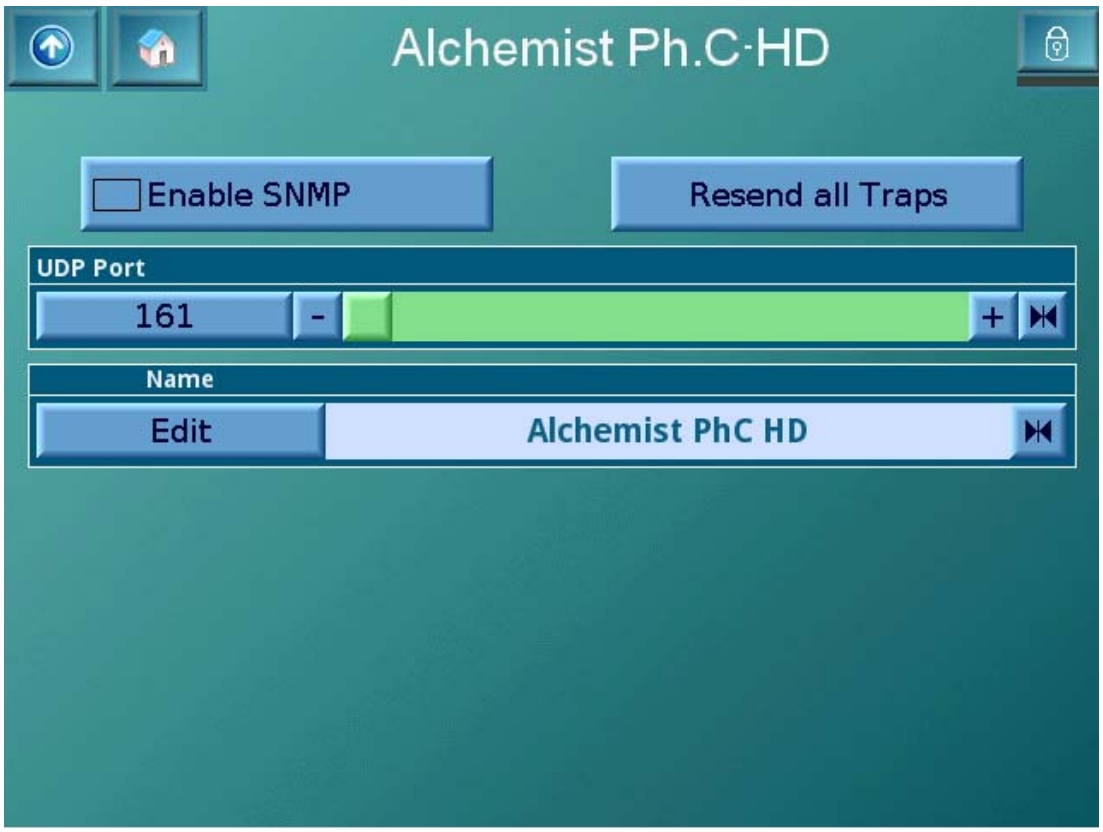
On the main **SNMP** page, you can configure and enable up to four SNMP traps. Each SNMP trap is configured on its own tab. For each trap, specify the following information:



Trap Enable	Enable Trap 1 destination.
Trap IP Address	Configures the IP address to which traps (notifications) are sent. This address should correspond to the IP address of the SNMP Manager.
Trap UDP Port	Configures the destination UDP port for traps. The manager should be configured to 'listen' for traps on this port. The SNMP default is 162 but other port numbers may be used.
Trap Community	Configures the trap community string.

F.8.0.2 SNMP > Physical

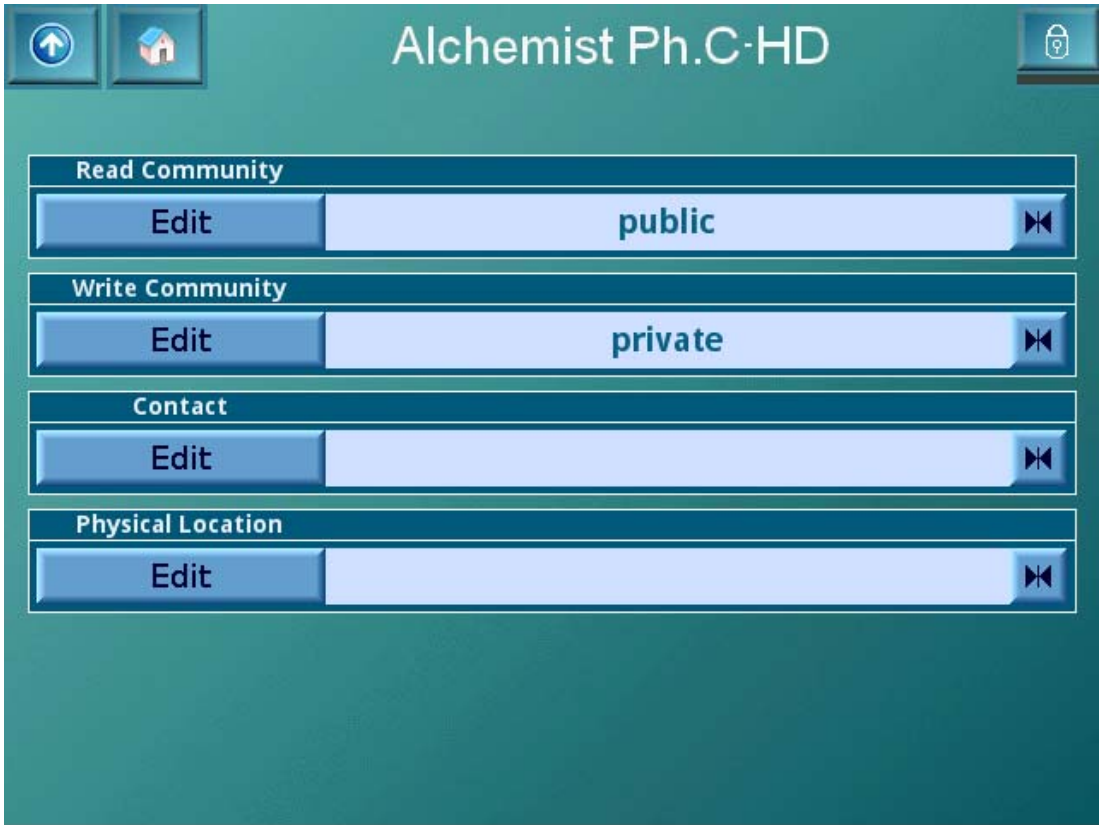
The settings on the **SNMP > Physical** page allow the Alchemist's SNMP functions to be enabled or disabled and the UDP Port to be used for SNMP communication to be specified. This page also provides an option to resend all SNMP traps to the SNMP manager:



Enable SNMP	This enables or disables the SNMP agent within the Alchemist. Default is disabled.
Resend All Traps	When pressed the Alchemist will resend all current traps/notifications.
UDP Port	This indicates/configures the UDP port that the Alchemist listens on for SNMP messages from a manager. The SNMP default is 161 but other ports may be used.
Name	Click edit to change unit's physical name, used for SNMP purposes. The default name is *Alchemist PhC HD.*

F.8.0.3 SNMP > Interface

The settings on the **SNMP > Interface** page configure the Alchemist's SNMP interface.



Read Community	Configures the SNMP read community value. Default is 'public'.
Write Community	Configures the SNMP write community value. Default is 'private'.
Contact email	Configures the contact email address for Alchemist SNMP agent.
Physical Location	Configures the physical location of the Alchemist

F.8.0.4 Where Can I Find the MIBs?

The MIBs are stored locally on the Alchemist or can be found on the Snell FTP site.

Simply connect the Alchemist to your network, open an internet browser (IE 7 recommended) and enter the current IP address (see system > Ethernet > IP address).

This will show the Alchemist home page. At the top of the home screen select the 'SNMP MIBs' logo to extract a zip file containing the required MIBs. Save these locally for use with your chosen SNMP application.

F.8.0.5 Validated SNMP Applications

The Alchemist's SNMP Agent has been explicitly validated with the following SNMP applications:

- iReasoning (Pro & Enterprise versions)
- Castle Rock SNMPc Manager
- MGSoft

Appendix G. Closed Caption CEA608/708

G.1 Overview

Closed captioning is a term describing several systems developed to display text on a television or video screen to provide additional or interpretive information to viewers who wish to access it.

Closed captions typically display a transcription of the audio portion of a program as it occurs (either verbatim or in edited form), sometimes including non-speech elements.

The term "closed" in closed captioning indicates that not all viewers see the captions, only those who choose to decode or activate them. This distinguishes from "open captions" (sometimes called "burned-in" or "hardcoded" captions), which are visible to all viewers.

Most of the world does not distinguish captions from subtitles however these terms do have different meanings. “Subtitles” assume the viewer can hear but cannot understand the language or accent, or speech is not entirely clear, so they only transcribe dialogue and some on screen text. “Captions” aim to describe to the deaf and hard of hearing all significant audio content. This includes spoken dialogue and non-speech information such as the identity of the speakers and occasionally their manner of speaking together with music or sound effects using words or symbols.

This Closed Caption CEA608/708 option provides the ability to transcode CEA608 captions to/from CEA708 compatibility bytes (708 CB) and pass native CEA708 to CEA708 whilst performing a standards conversion, cross conversion, up/down conversion.

G.1.1 Features

- Transcode CEA608 to/from CEA708 compatibility bytes
- Passing of native CEA708 to/from CEA708
- Seamless caption conversions in all conversion modes
- Supports CEA708 data and service information packets
- Automatic detection of input captions
- Caption data delayed/co-timed with video
- Easy to set up, intuitive GUI
- Independent configuration for Output A and Output B

G.1.2 What is CEA608?

CEA608 was developed in the 1970s for carrying 960bps captioning data and services in the VBI (Vertical Blanking Interval) of NTSC video, an analogue composite video format. In latter day digital component version of NTSC, this analogue waveform is digitally encoded and embedded in Line 21 of the Video (Line 284 for Field 2).

G.1.3 What is CEA708?

CEA708 is a migration of the closed caption concepts used in CEA608 to the HDTV environment. This Digital Television Closed Captioning (DTVCC) is allocated 9600bps and is transported as a logical data channel in the DTV bit stream. This allows for the simultaneous transmission of captions in multiple languages and caption windows can consist of text in a variety of colours, size and other attributes.

SMPTE 334-1 outlines a means of transporting the 708 caption as a VANC packet (DID=61 SDID=01). The payload of this ancillary packet contains a Caption Distribution Packet (CDP) and is outlined in SMPTE 334-2.

The CDP payload can consist of CEA608 transported as compatibility bytes (transcoded CEA608 / 708 CB), native CEA708 or both.

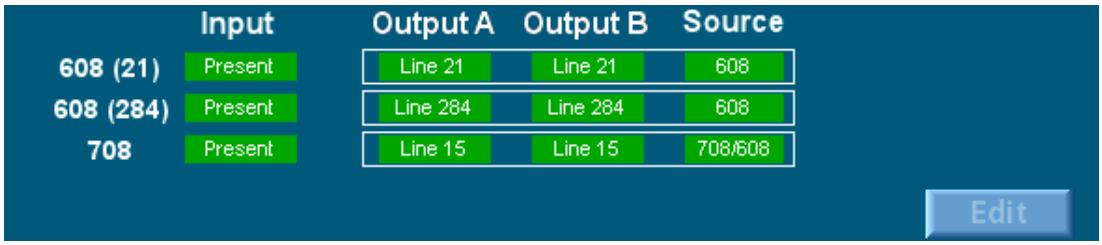
As DTV standards cover many different frame rates, the amount of caption data per field/frame varies dependant on the transmission video standard. Lower frame rates such as 24/25Hz will carry twice the information as the higher frames rates such 50/59.94Hz. This is to maintain the constant 9600bps.

G.2 CEA608/708 Control Interface

This section describes the control interface of the Alchemist Ph.C-HD Closed Caption modes.

G.2.1 C-Captions Display Tab

The C-Captions (Closed Captions) display tab on the Home screen illustrates at a glance the current 608/708 input status and output configuration.



Input

The **Input** column displays the input caption status.

608 (21)
608 (284)
708

Present — Green (Present) indicates that a valid 608/708 signal is present.

Missing — Red (Missing) indicates the input 608/708 caption is missing.

Not Valid — Grey (Not Valid) indicates that the 608 caption data is not valid for the current input standard selected.

Error — Red (Error) indicates that the input 708 caption is invalid. Invalid conditions include a sequence count mis-match, checksum error or some other error in the packet.

Output A/B

The **Output A/B** column informs the user whether each output caption (608/708) is currently being successfully passed (in the current mode of operation).

608 (21)
608 (284)
708

Line 21 — The caption is being successfully passed and is currently inserted into the specified output line.

Note that 608 can only be inserted onto lines 21 and 284.

Missing — The caption is NOT currently being passed. The input caption is missing and therefore cannot be inserted.

Source

The **Source** column indicates the source of each output caption type (608/708).

608 (21)
608 (284)

Missing — The specified 608 source caption is NOT present.

608 — 608 output caption is sourced from the 608 input.

708 CB — 608 output caption is sourced from 708 CB (compatibility bytes).

708

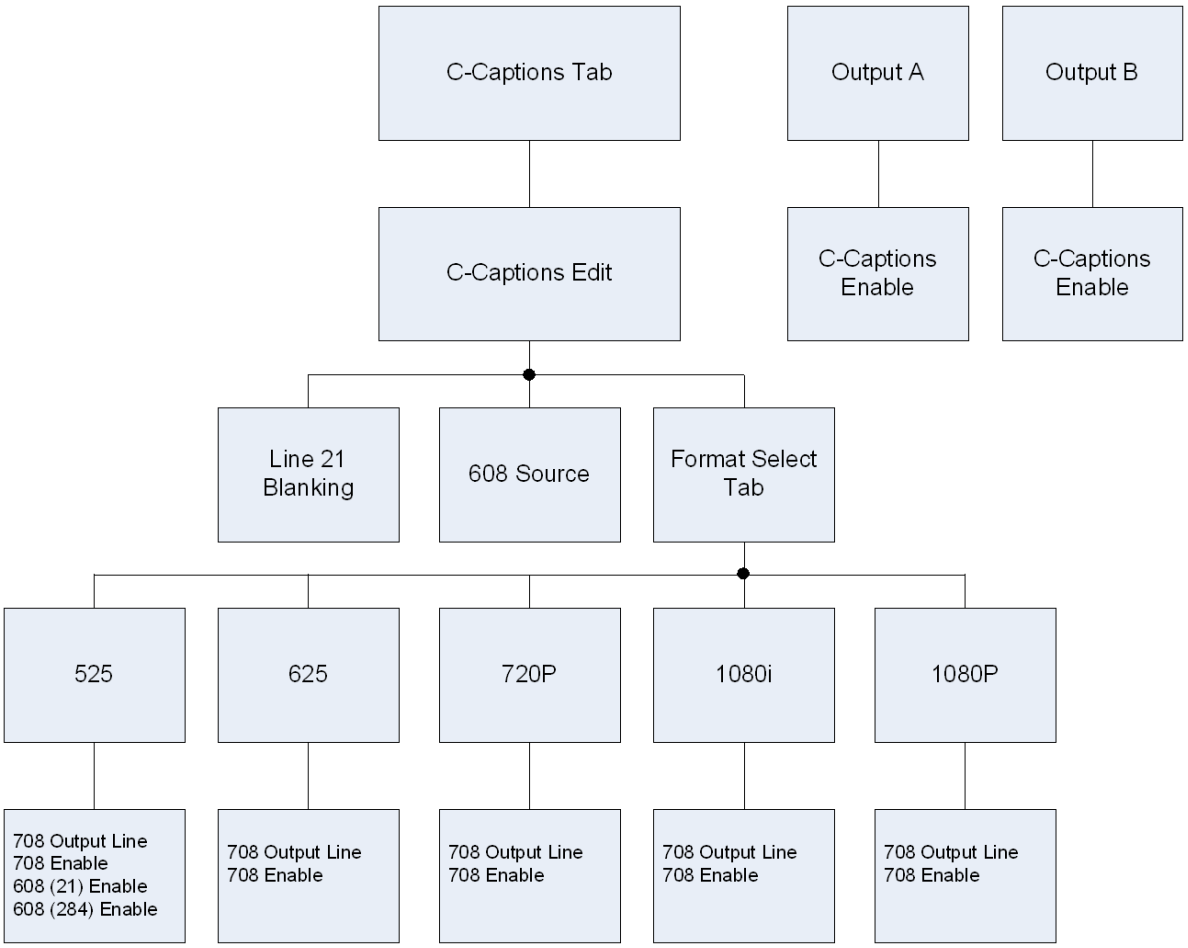
708/608 — 708 output captions are sourced from both the 608 and 708 input. The compatibility bytes are sourced from the 608 and the Native 708 is source from the 708 input.

708 — All 708 output captions (Native and compatibility bytes) are sourced from the 708 input.

Edit

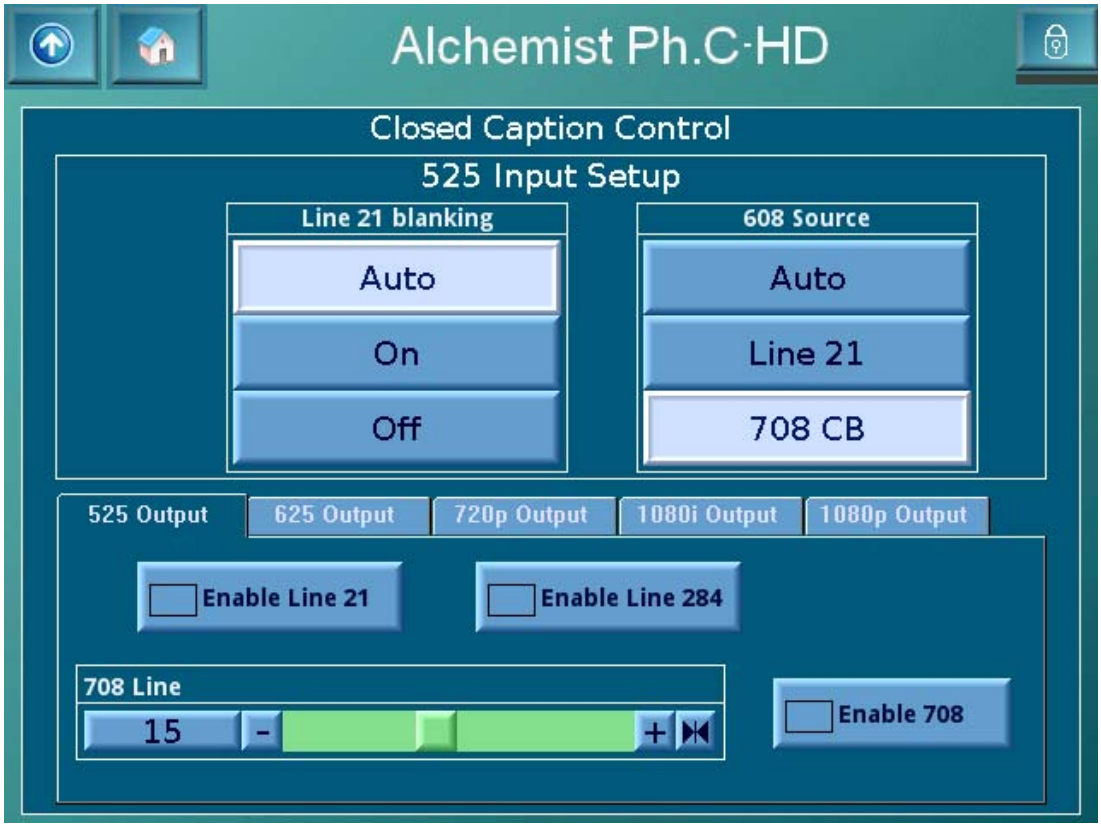
Touch **Edit** to access the Closed Captions configuration page.

G.2.2 Closed Caption Menu Hierarchy



G.2.3 Closed Caption Control

The Closed Caption control page offers configuration for CEA608 and CEA708 passing functionality. In addition to these controls the Closed Captions must be enabled on the output page before captions can be successfully passed.



525 Input Setup	This allows line 21/284 to be blanked once the 608 caption data has been extracted. This prevents the caption data creeping into the image processing apertures. *Note: Only applicable to 525 59i inputs.*
Line 21 Blanking	**Auto:** If 608 is detected the Alchemist will extract the caption data and then blank line 21/284. **On:** Forces line 21/284 to be blanked even when a caption is not present. **Off**: Line 21/284 will never be blanked.
525 Input Setup	Use this to control of the source of the outgoing 608 captions. *Note: Only applicable to 525 59i inputs.*
608 Source	**Auto:** The Alchemist will automatically detect the presence of line 21 or 708 compatibility bytes. If both are both present Line 21 takes priority. **Line 21:** Forces the 608 source to Line 21/284. **708 CB:** Forces the 608 source to 708 CB.
Format tabs	Select the desired output format configuration using the tabs. This allows the user to configure independently the five different output formats (525, 625,720P, 1080i, 1080P).

Enable Line 21	Touch **Enable Line 21** to enable/disable the insertion of 525 608 Line 21 output captions. Note: Only present on 525 tab
Enable Line 284	Touch **Enable Line 284** to enable/disable the insertion of 525 608 Line 284 output captions. Note: Only present on 525 tab
Enable 708	Touch **Enable Line 284** to enable/disable the insertion of 525 608 Line 284 output captions. Note: Only present on 525 tab
Enable 708	Touch **Enable 708** to enable/disable the insertion of 708 captions.
708 Line	Touch the slider to select the 708 output insertion line number. Alternatively touch the numeric value and a decimal keypad is available to enter the desired line number.

G.2.4 Closed Captions Output Enabled/Disabled

C-Captions Output	Closed Captions Output can be enabled/disabled independently for output A and output B.

G.3 Questions & Answers

Q1. Can VANC bypass packets, SMPTE 2016 packets and 708 packets be inserted on the same output line?

A1. Yes. Priority is SMPTE 2016, VANC, 708.

Q2. Can 708 data be present in all standards?

A2. Yes it can, although it is more commonly used in HD standards.

Q3. Is it possible to extract 608 Line 21 caption data and then insert it on Line 284 at the output?

A3. No. Line 21 captions will always be inserted on Line 21, 284 caption data will be inserted on Line 284.

Q4. Can 525 contain both 608 (21/284) and 708?

A4. Yes it can, although 608 is more commonly used for 525.

Q5. What happens if only 708 CB or only native 708 are present at the input?

A5. When enabled the Alchemist will always output both 708 CB and native 708 headers/footers. If only one type is present, the other will be padded with null packets.

Q6. Why does the Alchemist report the output captions are “missing” when the monitoring equipment claims captions are present at the output of the Alchemist?

A6. This can occur if the user has enabled the Alchemist’s output caption data whilst the source data is “missing”. The Alchemist reports ”missing” as it is not successfully inserting the specified input captions at the specified output. In this condition the Alchemist will however output 608/708 packet containing null data, hence why the monitoring equipment advertises the presence of a caption signal.

Appendix H. Latency Tables

H.1 Overview

The delay for each of the Alchemist's audio pairs can be configured individually. This delay is added to the master audio delay and the unit's internal processing delay. The values of this delay vary according to the conversion being made and:

- Whether the FilmTools option is installed and enabled.
- If FilmTools is not installed or enabled, whether the **Minimum Delay** control in the **Setup** menu is enabled.

H.2 Tables Explained

The three 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 minimum delay that may occur if the unit is running with an offset or is in Freerun mode.
- Column five displays the maximum 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 209.

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 211.

Table 3 displays the delays when the FilmTools option is not installed, or disabled, and Minimum Delay control is set to **On**. See page 216.

Table 1: FilmTools not installed or disabled and Minimum Delay set to OFF

Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
1080 60i/30PsF	1080 60i/30PsF	250	217	250
1080 60i/30PsF	1080 59i/29PsF	250	217	250
1080 60i/30PsF	1080 50i/25PsF	248	248	248
1080 60i/30PsF	720/1080 60P	234	217	234
1080 60i/30PsF	720/1080 59P	250	217	250
1080 60i/30PsF	525 59i/29PsF	250	217	250
1080 60i/30PsF	625 50i/25PsF	235	235	235
1080 60i/30PsF	720/1080 50P	252	252	252
1080 59i/29PsF	1080 60i/30PsF	250	217	250
1080 59i/29PsF	1080 59i/29PsF	250	217	250
1080 59i/29PsF	1080 50i/25PsF	248	248	248
1080 59i/29PsF	720/1080 60P	250	217	250
1080 59i/29PsF	720/1080 59P	234	217	234
1080 59i/29PsF	525 59i/29PsF	250	217	250
1080 59i/29PsF	625 50i/25PsF	236	236	236
1080 59i/29PsF	720/1080 50P	252	252	252
1080 50i/25PsF	1080 60i/30PsF	281	281	281
1080 50i/25PsF	1080 59i/29PsF	281	281	281
1080 50i/25PsF	1080 50i/25PsF	300	260	300
1080 50i/25PsF	720/1080 60P	284	284	284
1080 50i/25PsF	720/1080 59P	284	284	284
1080 50i/25PsF	525 59i/29PsF	266	266	266
1080 50i/25PsF	625 50i/25PsF	300	260	300
1080 50i/25PsF	720/1080 50P	280	260	280
720/1080 60P	1080 60i/30PsF	234	217	234
720/1080 60P	1080 59i/29PsF	250	217	250
720/1080 60P	1080 50i/25PsF	248	248	248
720/1080 60P	720/1080 60P	234	217	234
720/1080 60P	720/1080 59P	250	217	250
720/1080 60P	525 59i/29PsF	250	217	250
720/1080 60P	625 50i/25PsF	235	235	235
720/1080 60P	720/1080 50P	252	252	252

Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
720/1080 59P	1080 60i/30PsF	250	217	250
720/1080 59P	1080 59i/29PsF	234	217	234
720/1080 59P	1080 50i/25PsF	248	248	248
720/1080 59P	720/1080 60P	250	217	250
720/1080 59P	720/1080 59P	234	217	234
720/1080 59P	525 59i/29PsF	234	217	234
720/1080 59P	625 50i/25PsF	236	236	236
720/1080 59P	720/1080 50P	252	252	252
525 59i/29PsF	1080 60i/30PsF	251	218	251
525 59i/29PsF	1080 59i/29PsF	251	218	251
525 59i/29PsF	1080 50i/25PsF	248	248	248
525 59i/29PsF	720/1080 60P	251	218	251
525 59i/29PsF	720/1080 59P	235	218	235
525 59i/29PsF	525 59i/29PsF	251	218	251
525 59i/29PsF	625 50i/25PsF	236	236	236
525 59i/29PsF	720/1080 50P	252	252	252
625 50i/25PsF	1080 60i/30PsF	281	281	281
625 50i/25PsF	1080 59i/29PsF	281	281	281
625 50i/25PsF	1080 50i/25PsF	301	261	301
625 50i/25PsF	720/1080 60P	284	284	284
625 50i/25PsF	720/1080 59P	284	284	284
625 50i/25PsF	525 59i/29PsF	266	266	266
625 50i/25PsF	625 50i/25PsF	301	261	301
625 50i/25PsF	720/1080 50P	281	261	281
720/1080 50P	1080 60i/30PsF	281	281	281
720/1080 50P	1080 59i/29PsF	281	281	281
720/1080 50P	1080 50i/25PsF	280	260	280
720/1080 50P	720/1080 60P	284	284	284
720/1080 50P	720/1080 59P	284	284	284
720/1080 50P	525 59i/29PsF	266	266	266
720/1080 50P	625 50i/25PsF	280	260	280
720/1080 50P	720/1080 50P	280	260	280

Table 2: FilmTools enabled or Minimum Delay set to OFF

Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
1080 60i/30PsF	1080 60i/30PsF	234	217	250
1080 60i/30PsF	1080 59i/29PsF	234	217	250
1080 60i/30PsF	1080 50i/25PsF	265	248	281
1080 60i/30PsF	720/1080 60P	234	217	250
1080 60i/30PsF	720/1080 59P	234	217	250
1080 60i/30PsF	525 59i/29PsF	234	217	250
1080 60i/30PsF	625 50i/25PsF	252	235	268
1080 60i/30PsF	1080 48i/24PsF	268	251	284
1080 60i/30PsF	1080 47i/23PsF	268	251	284
1080 60i/30PsF	625 48i/24PsF	255	238	271
1080 60i/30PsF	625 47i/23PsF	255	238	271
1080 60i/30PsF	720/1080 50P	269	252	285
1080 59i/29PsF	1080 60i/30PsF	234	217	250
1080 59i/29PsF	1080 59i/29PsF	234	217	250
1080 59i/29PsF	1080 50i/25PsF	265	248	281
1080 59i/29PsF	720/1080 60P	234	217	250
1080 59i/29PsF	720/1080 59P	234	217	250
1080 59i/29PsF	525 59i/29PsF	234	217	250
1080 59i/29PsF	625 50i/25PsF	253	236	269
1080 59i/29PsF	1080 48i/24PsF	268	251	284
1080 59i/29PsF	1080 47i/23PsF	268	251	284
1080 59i/29PsF	625 48i/24PsF	255	238	271
1080 59i/29PsF	625 47i/23PsF	255	238	271
1080 59i/29PsF	720/1080 50P	269	252	285
1080 50i/25PsF	1080 60i/30PsF	299	281	318
1080 50i/25PsF	1080 59i/29PsF	299	281	318
1080 50i/25PsF	1080 50i/25PsF	280	260	300
1080 50i/25PsF	720/1080 60P	302	284	321
1080 50i/25PsF	720/1080 59P	302	284	321
1080 50i/25PsF	525 59i/29PsF	284	266	303
1080 50i/25PsF	625 50i/25PsF	280	260	300
1080 50i/25PsF	1080 48i/24PsF	307	287	327

Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
1080 50i/25PsF	1080 47i/23PsF	307	287	327
1080 50i/25PsF	625 48i/24PsF	294	274	314
1080 50i/25PsF	625 47i/23PsF	294	274	314
1080 50i/25PsF	720/1080 50P	280	260	300
720/1080 60P	1080 60i/30PsF	234	217	250
720/1080 60P	1080 59i/29PsF	234	217	250
720/1080 60P	1080 50i/25PsF	265	248	281
720/1080 60P	720/1080 60P	234	217	250
720/1080 60P	720/1080 59P	234	217	250
720/1080 60P	525 59i/29PsF	234	217	250
720/1080 60P	625 50i/25PsF	252	235	268
720/1080 60P	1080 48i/24PsF	268	251	284
720/1080 60P	1080 47i/23PsF	268	251	284
720/1080 60P	625 48i/24PsF	254	237	270
720/1080 60P	625 47i/23PsF	255	238	271
720/1080 60P	720/1080 50P	269	252	285
720/1080 59P	1080 60i/30PsF	234	217	250
720/1080 59P	1080 59i/29PsF	234	217	250
720/1080 59P	1080 50i/25PsF	265	248	281
720/1080 59P	720/1080 60P	234	217	250
720/1080 59P	720/1080 59P	234	217	250
720/1080 59P	525 59i/29PsF	234	217	250
720/1080 59P	625 50i/25PsF	253	236	269
720/1080 59P	1080 48i/24PsF	268	251	284
720/1080 59P	1080 47i/23PsF	268	251	284
720/1080 59P	625 48i/24PsF	255	238	271
720/1080 59P	625 47i/23PsF	255	238	271
720/1080 59P	720/1080 50P	269	252	285
525 59i/29PsF	1080 60i/30PsF	235	218	251
525 59i/29PsF	1080 59i/29PsF	235	218	251
525 59i/29PsF	1080 50i/25PsF	265	248	281
525 59i/29PsF	720/1080 60P	235	218	251
525 59i/29PsF	720/1080 59P	235	218	251

Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
525 59i/29PsF	525 59i/29PsF	235	218	251
525 59i/29PsF	625 50i/25PsF	253	236	269
525 59i/29PsF	1080 48i/24PsF	268	251	284
525 59i/29PsF	1080 47i/23PsF	268	251	284
525 59i/29PsF	625 48i/24PsF	255	238	271
525 59i/29PsF	625 47i/23PsF	255	238	271
525 59i/29PsF	720/1080 50P	269	252	285
625 50i/25PsF	1080 60i/30PsF	299	281	318
625 50i/25PsF	1080 59i/29PsF	299	281	318
625 50i/25PsF	1080 50i/25PsF	281	261	301
625 50i/25PsF	720/1080 60P	302	284	321
625 50i/25PsF	720/1080 59P	302	284	321
625 50i/25PsF	525 59i/29PsF	284	266	303
625 50i/25PsF	625 50i/25PsF	281	261	301
625 50i/25PsF	1080 48i/24PsF	308	288	328
625 50i/25PsF	1080 47i/23PsF	308	288	328
625 50i/25PsF	625 48i/24PsF	295	275	315
625 50i/25PsF	625 47i/23PsF	295	275	315
625 50i/25PsF	720/1080 50P	281	261	301
1080 48i/24PsF	1080 60i/30PsF	310	291	329
1080 48i/24PsF	1080 59i/29PsF	310	291	329
1080 48i/24PsF	1080 50i/25PsF	316	296	337
1080 48i/24PsF	720/1080 60P	314	295	333
1080 48i/24PsF	720/1080 59P	314	295	333
1080 48i/24PsF	525 59i/29PsF	296	277	315
1080 48i/24PsF	625 50i/25PsF	303	283	324
1080 48i/24PsF	1080 48i/24PsF	292	271	313
1080 48i/24PsF	1080 47i/23PsF	292	271	313
1080 48i/24PsF	625 48i/24PsF	292	271	313
1080 48i/24PsF	625 47i/23PsF	292	271	313
1080 48i/24PsF	720/1080 50P	319	299	340
1080 47i/23PsF	1080 60i/30PsF	311	292	330
1080 47i/23PsF	1080 59i/29PsF	311	292	330

Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
1080 47i/23PsF	1080 50i/25PsF	316	296	337
1080 47i/23PsF	720/1080 60P	314	295	333
1080 47i/23PsF	720/1080 59P	314	295	333
1080 47i/23PsF	525 59i/29PsF	296	277	315
1080 47i/23PsF	625 50i/25PsF	303	283	324
1080 47i/23PsF	1080 48i/24PsF	292	271	313
1080 47i/23PsF	1080 47i/23PsF	292	271	313
1080 47i/23PsF	625 48i/24PsF	292	271	313
1080 47i/23PsF	625 47i/23PsF	292	271	313
1080 47i/23PsF	720/1080 50P	320	300	341
625 48i/24PsF	1080 60i/30PsF	311	292	330
625 48i/24PsF	1080 59i/29PsF	311	292	330
625 48i/24PsF	1080 50i/25PsF	316	296	337
625 48i/24PsF	720/1080 60P	314	295	333
625 48i/24PsF	720/1080 59P	314	295	333
625 48i/24PsF	525 59i/29PsF	296	277	315
625 48i/24PsF	625 50i/25PsF	303	283	324
625 48i/24PsF	1080 48i/24PsF	293	272	314
625 48i/24PsF	1080 47i/23PsF	293	272	314
625 48i/24PsF	625 48i/24PsF	293	272	314
625 48i/24PsF	625 47i/23PsF	293	272	314
625 48i/24PsF	720/1080 50P	320	300	341
625 47i/23PsF	1080 60i/30PsF	311	292	330
625 47i/23PsF	1080 59i/29PsF	311	292	330
625 47i/23PsF	1080 50i/25PsF	316	296	337
625 47i/23PsF	720/1080 60P	314	295	333
625 47i/23PsF	720/1080 59P	314	295	333
625 47i/23PsF	525 59i/29PsF	296	277	315
625 47i/23PsF	625 50i/25PsF	304	284	325
625 47i/23PsF	1080 48i/24PsF	293	272	314
625 47i/23PsF	1080 47i/23PsF	293	272	314
625 47i/23PsF	625 48i/24PsF	293	272	314
625 47i/23PsF	625 47i/23PsF	293	272	314

Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
625 47i/23PsF	720/1080 50P	320	300	341
720/1080 50P	1080 60i/30PsF	299	281	318
720/1080 50P	1080 59i/29PsF	299	281	318
720/1080 50P	1080 50i/25PsF	280	260	300
720/1080 50P	720/1080 60P	302	284	321
720/1080 50P	720/1080 59P	302	284	321
720/1080 50P	525 59i/29PsF	284	266	303
720/1080 50P	625 50i/25PsF	280	260	300
720/1080 50P	1080 48i/24PsF	307	287	327
720/1080 50P	1080 47i/23PsF	307	287	327
720/1080 50P	625 48i/24PsF	294	274	314
720/1080 50P	625 47i/23PsF	294	274	314
720/1080 50P	720/1080 50P	280	260	300

Table 3: FilmTools not installed or disabled and Minimum Delay set to On

Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
1080 60i/30PsF	1080 60i/30PsF	167	134	167
1080 60i/30PsF	1080 59i/29PsF	167	134	167
1080 60i/30PsF	1080 50i/25PsF	165	165	165
1080 60i/30PsF	720/1080 60P	151	134	151
1080 60i/30PsF	720/1080 59P	167	134	167
1080 60i/30PsF	525 59i/29PsF	167	134	167
1080 60i/30PsF	625 50i/25PsF	152	152	152
1080 60i/30PsF	720/1080 50P	169	169	169
1080 59i/29PsF	1080 60i/30PsF	167	134	167
1080 59i/29PsF	1080 59i/29PsF	167	134	167
1080 59i/29PsF	1080 50i/25PsF	165	165	165
1080 59i/29PsF	720/1080 60P	167	134	167
1080 59i/29PsF	720/1080 59P	151	134	151
1080 59i/29PsF	525 59i/29PsF	167	134	167
1080 59i/29PsF	625 50i/25PsF	152	152	152
1080 59i/29PsF	720/1080 50P	169	169	169
1080 50i/25PsF	1080 60i/30PsF	181	181	181
1080 50i/25PsF	1080 59i/29PsF	181	181	181
1080 50i/25PsF	1080 50i/25PsF	200	160	200
1080 50i/25PsF	720/1080 60P	184	184	184
1080 50i/25PsF	720/1080 59P	184	184	184
1080 50i/25PsF	525 59i/29PsF	166	166	166
1080 50i/25PsF	625 50i/25PsF	200	160	200
1080 50i/25PsF	720/1080 50P	180	160	180
720/1080 60P	1080 60i/30PsF	151	134	151
720/1080 60P	1080 59i/29PsF	167	134	167
720/1080 60P	1080 50i/25PsF	165	165	165
720/1080 60P	720/1080 60P	151	134	151
720/1080 60P	720/1080 59P	167	134	167
720/1080 60P	525 59i/29PsF	167	134	167
720/1080 60P	625 50i/25PsF	152	152	152
720/1080 60P	720/1080 50P	168	168	168

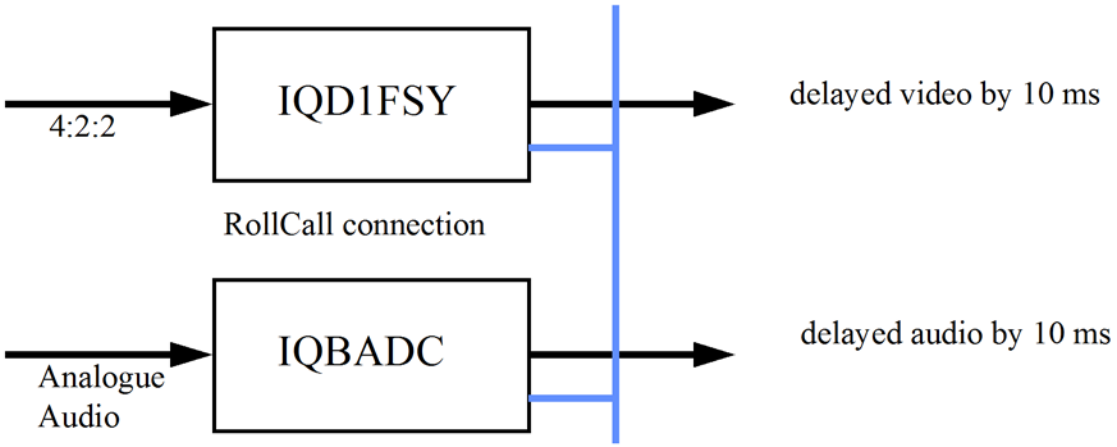
Input	Output	Delay (ms) Referenced to input with zero offset	Min Delay (ms) Referenced with offset or freerun	Max Delay (ms) Referenced with offset or freerun
720/1080 59P	1080 60i/30PsF	167	134	167
720/1080 59P	1080 59i/29PsF	151	134	151
720/1080 59P	1080 50i/25PsF	165	165	165
720/1080 59P	720/1080 60P	167	134	167
720/1080 59P	720/1080 59P	151	134	151
720/1080 59P	525 59i/29PsF	151	134	151
720/1080 59P	625 50i/25PsF	152	152	152
720/1080 59P	720/1080 50P	169	169	169
525 59i/29PsF	1080 60i/30PsF	167	134	167
525 59i/29PsF	1080 59i/29PsF	167	134	167
525 59i/29PsF	1080 50i/25PsF	165	165	165
525 59i/29PsF	720/1080 60P	167	134	167
525 59i/29PsF	720/1080 59P	151	134	151
525 59i/29PsF	525 59i/29PsF	167	134	167
525 59i/29PsF	625 50i/25PsF	153	153	153
525 59i/29PsF	720/1080 50P	169	169	169
625 50i/25PsF	1080 60i/30PsF	181	181	181
625 50i/25PsF	1080 59i/29PsF	181	181	181
625 50i/25PsF	1080 50i/25PsF	201	161	201
625 50i/25PsF	720/1080 60P	184	184	184
625 50i/25PsF	720/1080 59P	184	184	184
625 50i/25PsF	525 59i/29PsF	166	166	166
625 50i/25PsF	625 50i/25PsF	201	161	201
625 50i/25PsF	720/1080 50P	181	161	181
720/1080 50P	1080 60i/30PsF	181	181	181
720/1080 50P	1080 59i/29PsF	181	181	181
720/1080 50P	1080 50i/25PsF	180	160	180
720/1080 50P	720/1080 60P	184	184	184
720/1080 50P	720/1080 59P	184	184	184
720/1080 50P	525 59i/29PsF	166	166	166
720/1080 50P	625 50i/25PsF	180	160	180
720/1080 50P	720/1080 50P	180	160	180

Appendix I. RollTrack Audio Delay Tracking

RollTrack is a feature of RollCall™ (Snell's proprietary remote control system), that allows devices to communicate across the RollCall network with no direct user intervention.

RollTrack Audio Delay Tracking enables 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.



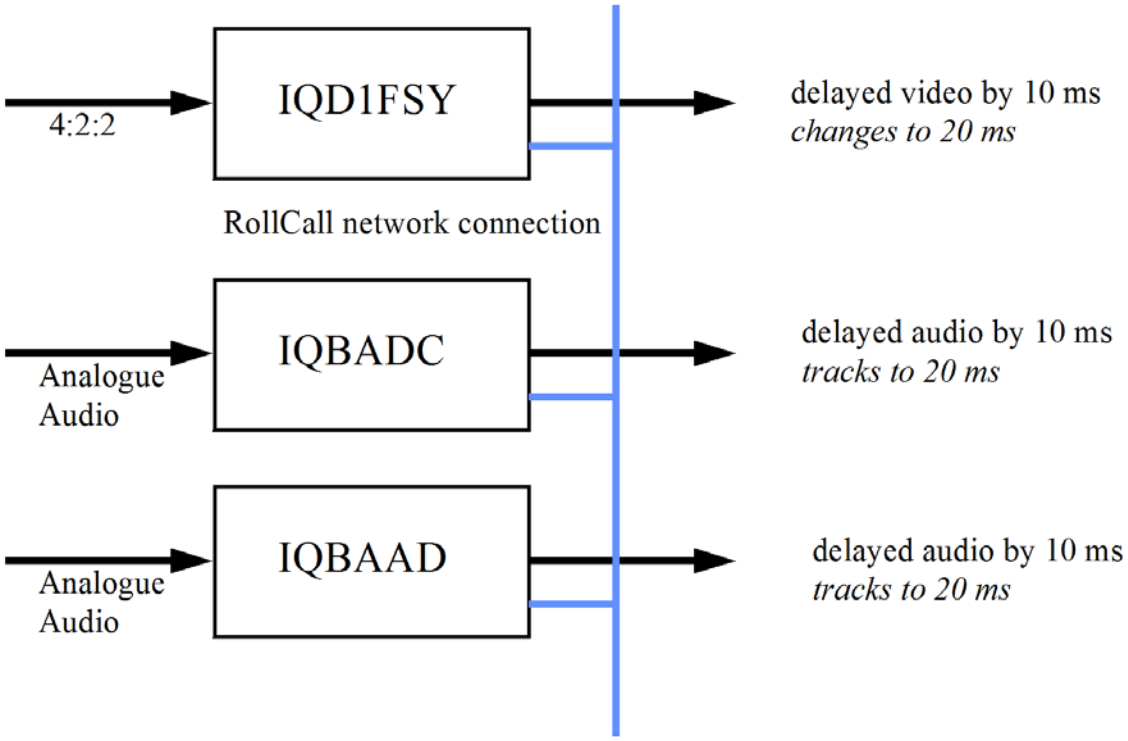
The next level of configuration is where there are multiple Frame Synchronizers (for example) each connected through RollCall to their own tracking Audio Delay. (It is worth stating that the synchronizers and audio delays do not have to be in the same enclosure; the addressing scheme, discussed later, 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:

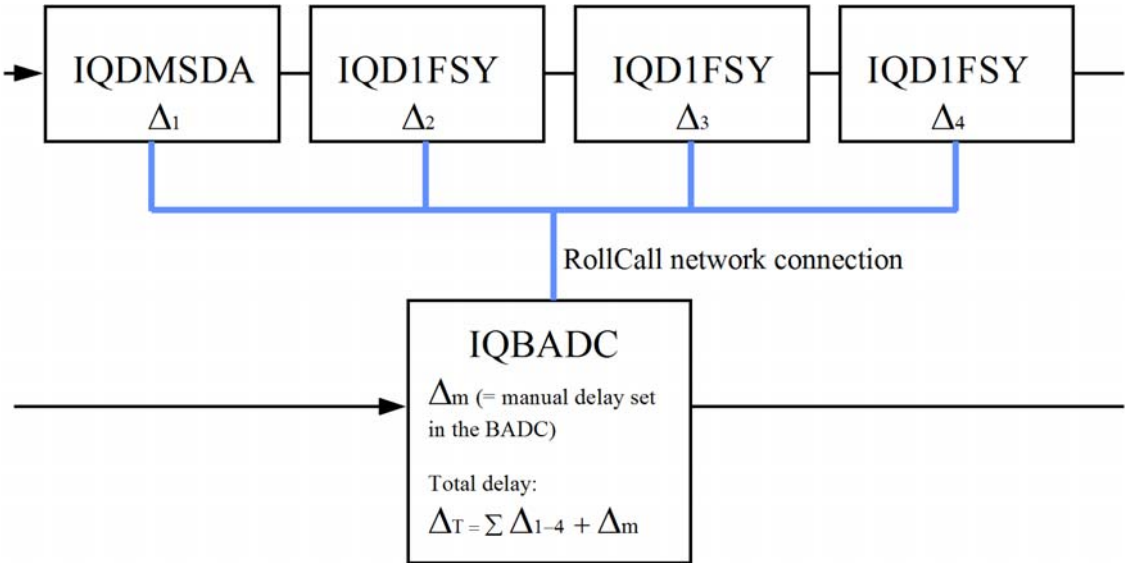
Module	ID
IQBADC	52
IQBDAC	52
IQBAAD	53
IQBDAD	54
IQBSYN	89
IQBADCD	107

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.



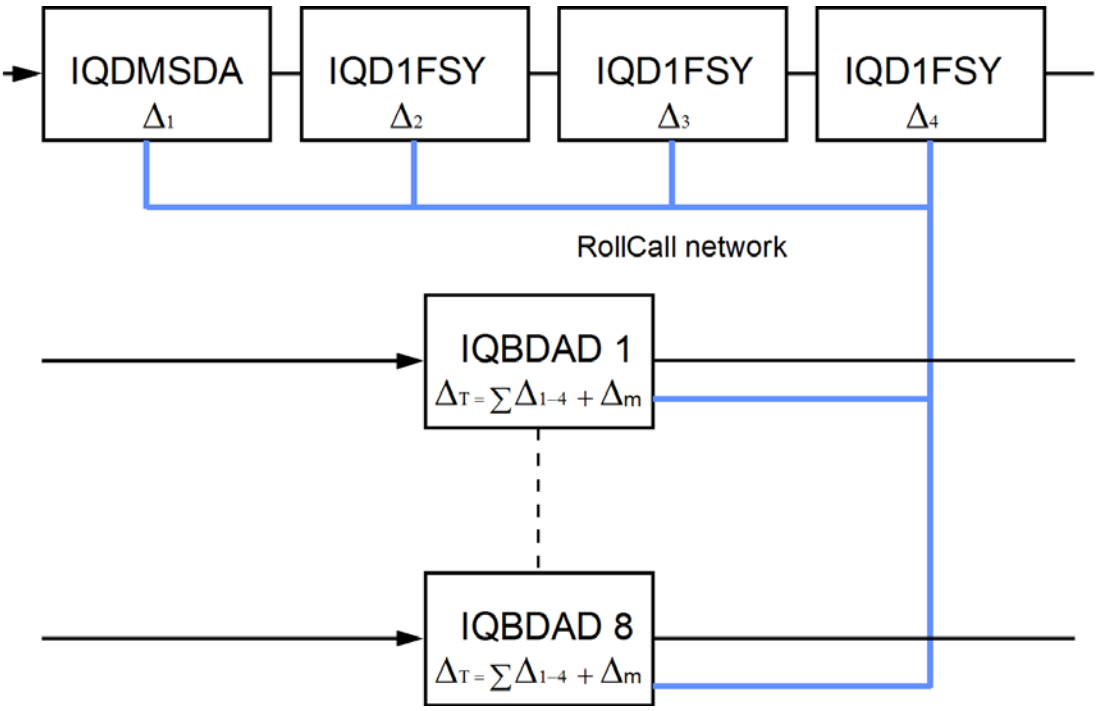
From one to eight audio delay products can be connected via RollCall to a single frame synchronizer, for example. If the synchronizer delay changes, then however many audio delays are connected will track the delay. The audio delays can also have a manual delay which will be added to the RollTrack delay.

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, for example, an IQD1FSY to an IQBDAD by:

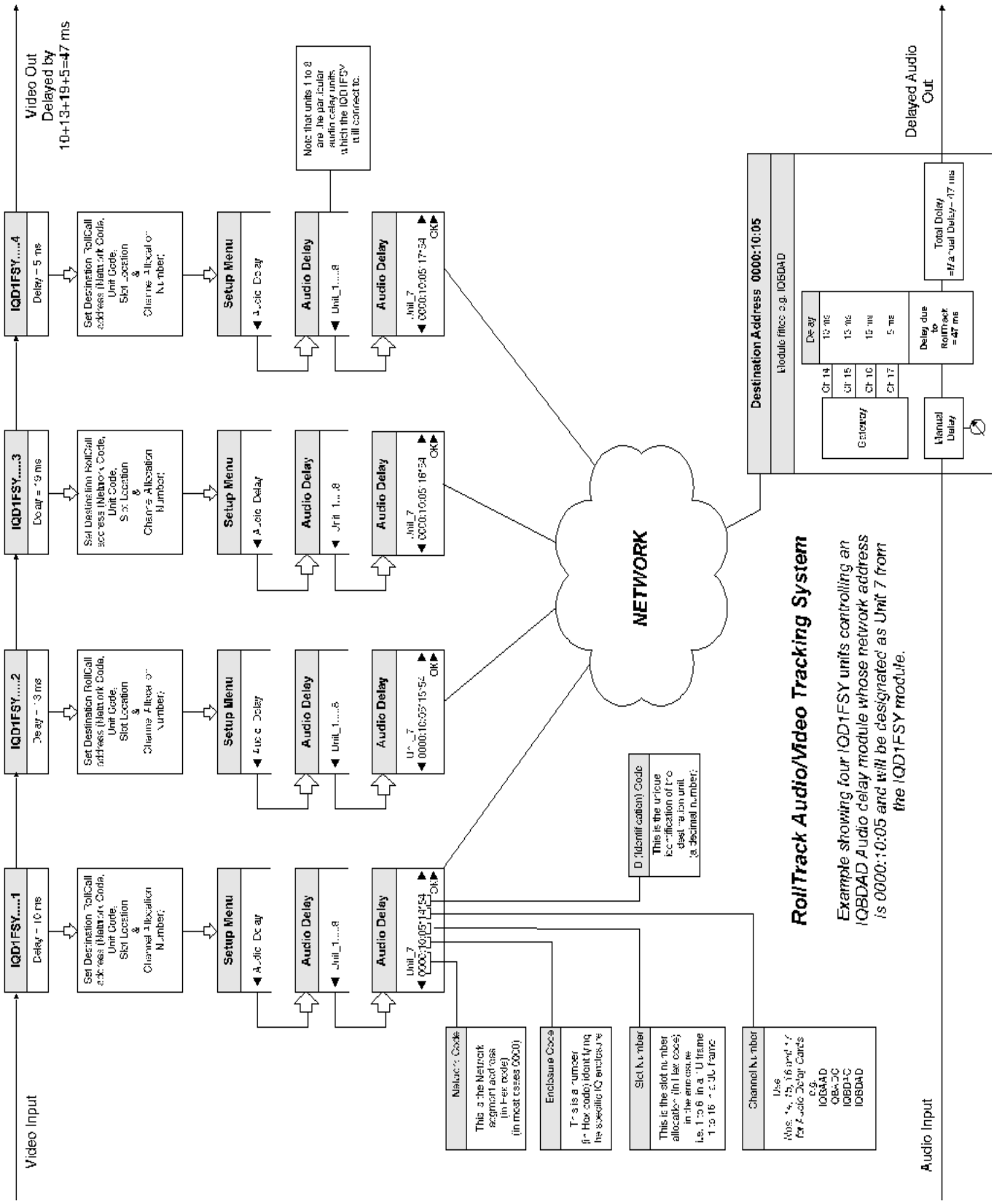
- selecting the *Setup...* Menu of the IQD1FSY
- then selecting the *Audio_Delay...* Menu
- then choosing from *Unit_1* to *Unit_8*
- then entering the unique network address of the IQBDAD in the form *nnnn:xx:yy*z*d*
- where *nnnn* = network address and in most cases will be 0000(hex)
- *xx* = IQ enclosure address (hex)
- *yy* = slot address of the IQBDAD (hex)
- *z* = the connection (or channel) number (decimal) - see table below.

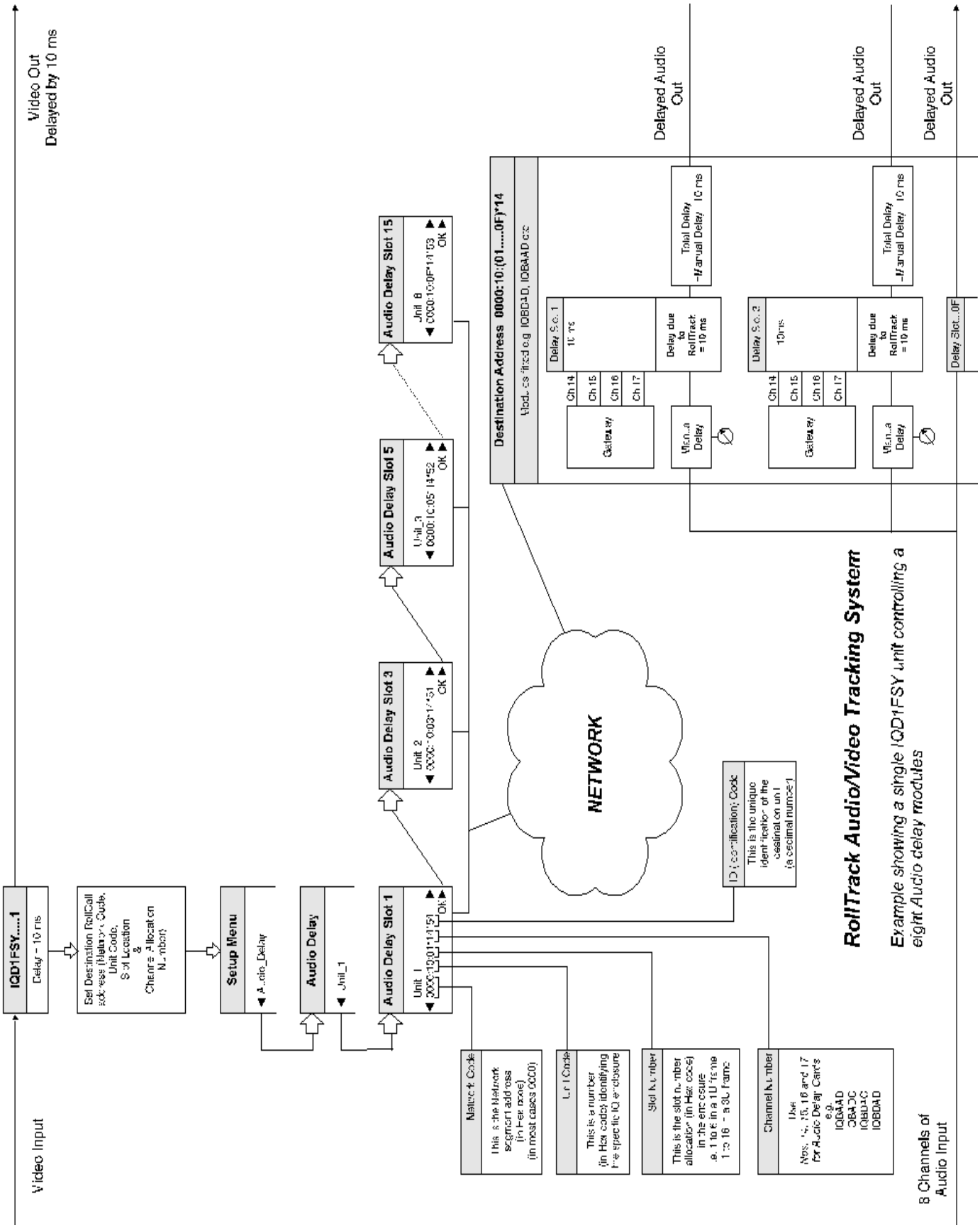
  d = the unique identification of the destination unit (decimal) The ID entered must match the receiving units own ID or else the command will be ignored. If the ID value is set to 00, the receiving unit does not perform an ID match and will always accept the incoming command then selecting the *Delay...* 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.





Appendix J. Product Support Procedure

If you experience any technical or operational difficulties with a Snell 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.

J.1 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.

J.2 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 Snell equipment is currently being used.

J.3 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 Snell 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 Snell products have an internal test pattern/tone generator. Please activate this to assist you with your problem analysis.

In addition, please do not forget to provide us with contact information, including names, telephone & fax numbers, e-mail addresses, and business address. A form is provided for this information on the next page. Alternatively, an online form is available on the Snell Web site at: http://www.snellgroup.com

J.4 Product Support Request Form

***** Indicates required information.

Name:*	
Company:*	
Address:*	
Postal/Zip Code:	
Country:*	
Telephone:*	
Fax:	
Email*	
Local Snell 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 Ltd. Southleigh Park House Eastleigh Road Havant Hants PO9 2PE United Kingdom	+44 (0) 118 921 4214 (tel) +44 (0) 118 921 4268 fax) Web: http://www.snellgroup.com/support

