SNELL & WILCOX

MEMPHIS
with
MOLE™ and Ph.C
(also covers the MPEG Mastering unit)

Operator's Manual

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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

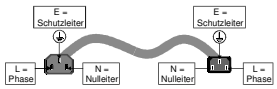
Die angeführten Service-/Reparatur-Anweisungen sind ausschließlich von qualifiziertem Service-Personal auszuführen. Um das Risiko eines lektroschocks zu reduzieren, führen Sie ausschließlich die im Benutzerhandbuch eschriebenen Anweisungen aus, es sei denn, Sie haben die entsprechende Qualifikation.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

ATTENZIONE
RISCHIO DI SHOCK ELETTRICO NON CERCARE DI SMONTARE L'UNITA PER QUALSIASI TIPO DI INTERVENTO RIVOLGERSI AL PERSONALE QUALIFICATO

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

FORSIGTIG
RISIKO FOR ELEKTRISK STØD DÆKPLADER MÅ IKKE FJERNES INGEN BRUGER SERVICERBARE DELE SERVICE MÅ KUN UDFØRES AF FAGLÆRTE PERSONER

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

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

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

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

Strömkontakter i länder utanför USA

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

GRÖN/GUL ledning ansluten till E (Skyddsjordad ledare)

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

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

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

VAROITUS
SÄHKÖISKUN VAARA ÄLÄ AVAA LAITTEEN KANSIA EI SISÄLLÄ KÄYTTÄJÄLLE HUOLLETTAVIA OSIA HUOLTO AINOASTAAN AMMATTILAISEN SUORITTAMANA

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

G

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

Οδηγίες επισκευής, όπου παρέχονται, αναφέρονται αποκλειστικά και μόνο σε εξειδικευμένο προσωπικό. Για να μειωθεί ο κίνδυνος ηλεκτροπληξίας, μην εκτελείτε επισκευές πέρα από 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 ψείωση της συσκευής και τη σωστή σύνδεση των συνδέσμων τροφοδοσίας.
- Ο εξοπλισμός πρέπει να τροφοδοτείται από ένα σύστημα τροφοδοσίας που να εξασφαλίζει ΠΡΟΣΤΑΤΕΥΤΙΚΗ ΓΕΙΩΣΗ ⏚ και να έχει καθορισμένες θέσεις ουδέτερου και φάσης.
- Ο εξοπλισμός που τροφοδοτεί τη συσκευή θα πρέπει να βρίσκεται κοντά στη συσκευή και να είναι εύκολα προσβάσιμος.

Σύνδεση τροφοδοσίας σε χώρες εκτός των ΗΠΑ

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

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

ΜΠΛΕ καλώδιο συνδέεται στο N
(Ουδέτερο Αγωγό)

ΚΑΦΕ καλώδιο συνδέεται στο L (Αγωγό Φάσης)

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

Products employing Lithium batteries

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

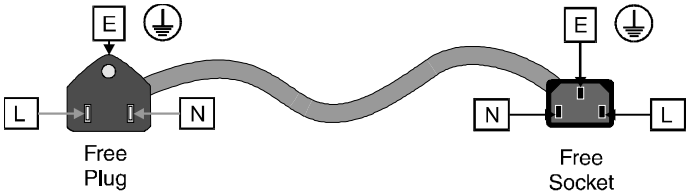
Power cable supplied for the USA

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

GREEN lead connected to E (Protective Earth Conductor)

BLACK lead connected to L (Live Conductor)

WHITE lead connected to N (Neutral Conductor)



For products with more than one power supply inlet

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

Rack Mounting the Enclosure

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

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

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

Safety Standard

MEMPHIS conforms to the following standard:

EN60950: 2000
Safety of Information Technology Equipment.

EMC Standards

This unit conforms to the following standards:

BS EN 55103-1 : 1997
Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1. Emission

BS EN 55103-2 : 1997
Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2. Immunity

Federal Communications Commission Rules Part 15, Class A :1998

EMC Environment

The product(s) described in this manual conform to the EMC requirements for, and are intended for use in,
either
The commercial and light industrial environment (including, for example, theatres) E2
or
The controlled EMC environment (for example purpose-built broadcasting or recording studios), and the rural outdoor environment (far away from railways, transmitters, overhead power lines, etc.) E4

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

EMC Performance Information

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

EMC Performance of Cables and Connectors

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

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

COAXIAL CABLES
Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 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.

About this Manual

This manual contains information for the Installation of the MEMPHIS unit, and is intended for use by trained engineering staff.
Update/revision sheets should replace existing pages when supplied by the agent or Snell & Wilcox Ltd.
Note that the date at the bottom of the page is the release date of the current revision.

This manual covers the following product:

- MEMPHIS

Packing List

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

Any shortages or damage should be reported to the supplier immediately.

Enclosures:

- MEMPHIS unit
- Power cable
- Installation Manual
- Operation Manual

Software Version Amendments

Notes about Versions fitted ..... none

Manufacturer's Notices

Use of this product in any manner that complies with the MPEG-2 standard for encoding video information for packaged media is expressly prohibited without a license under applicable patents in the MPEG-2 patent portfolio, which license is available from: MPEG LA, 250 Steele Street, Suite 300, Denver, Colorado 80206.

Important Notice

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

Table of Contents

SECTION

Product Support Procedure

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

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

Basic Information

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

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

Basic Application

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

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

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

Basic Tests

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

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

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

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

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

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

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

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

Product Support Request Form

Name: *		
Company:		
Address Details: *		
Post/ZIP Code:		
Country: *		
Telephone: *		
Fax:		
Email: *		
Local S&W Center: *		
Product Name: *		
Product Type: *	Switchers (i.e. Magic DaVE, Switchpack, Kahuna)	
	File & Data Transfer Products (i.e. RollCall, Memphis & Asteroid)	
	Video Products (i.e. Modular, Kudos Plus and Alchemist)	
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:**	e-mail	
	Phone	

- **Item is required.**

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

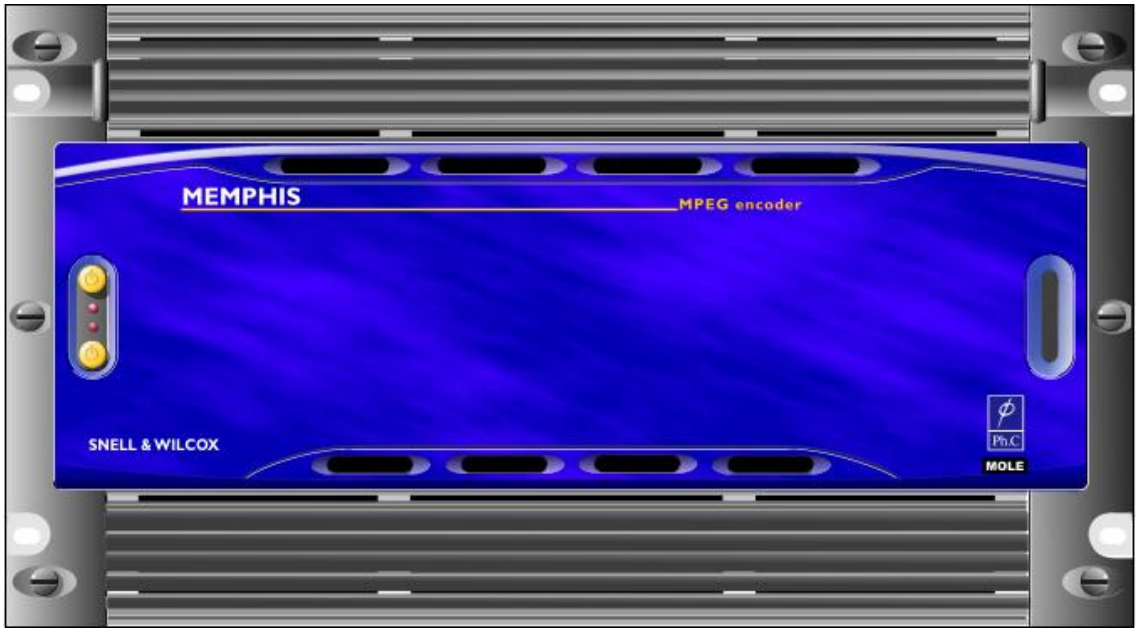
Manual Revision Record

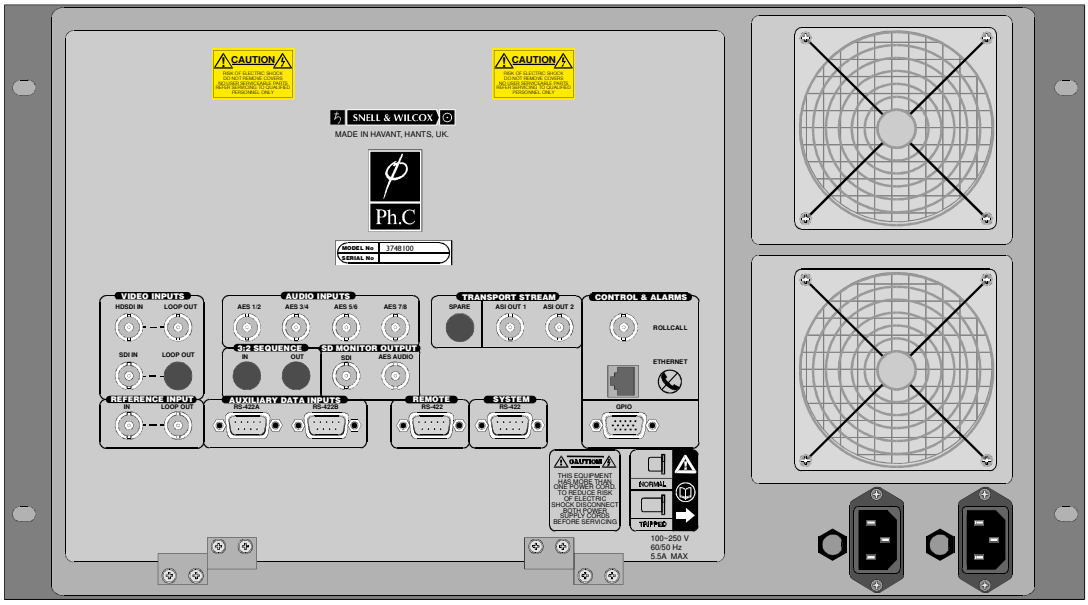
Date	Version No.	Issue No.	Change	Comments
010905	1	1	MPEG Mastering Unit renamed MEMPHIS	First Issue released
31-Mar-06	1	2	Table of reference signals added	New issue released
07-Jun-06	1	3	Reference table P3.4 corrected 16 kilobyte changed P4.27	New issue released
24-Jul-06	1	4	Reference table changed P3.4, rear panel corrected with blanks	New issue released
21-May-07	1	5	For Version 6.0 of the firmware	New issue released

Description

MEMPHIS is a high-end MPEG-2 mastering engine. The unit genuinely supports both standard definition (SD) and high definition video. In SD, it produces multi-standard 4:2:2 and 4:2:0 video encoding (according to MP@ML and 4:2:2-Profile@ML). The unit has both SD SDI and HD SDI video inputs. In HD, it produces multi-standard 4:2:2 and 4:2:0 video encoding (according to MP@HL and 422P@HL). The unit produces a single-program Transport Stream (SPTS) on two Asynchronous Serial Interface (ASI) outputs. Frame-accurate genlocked input synchronization is featured as standard. Although the unit does not perform any audio compression internally, it supports both uncompressed PCM Audio and externally pre-compressed audio (MPEG-1 Layer II, Dolby Digital AC-3, Dolby E, etc.). All streams can be input via up to four unbalanced digital audio inputs (IEC-958) or on embedded audio. In the case of embedded audio, up to four stereo pairs are supported in total.
Standardized as SMPTE 319M and 327M, MOLE™ Technology enables a MOLE™ MPEG-2 decoder (such as the Snell & Wilcox IQMDMO) to pass the encoding decisions from the original encoding to any subsequent encoder through the SDI signal. Video decoded from MPEG-2 with MOLE™ can then be manipulated in the same manner as ordinary 10-bit SDI video, allowing edits, wipes, crossfades and digital effects to be performed. It is then possible to re-encode with the MOLE™-compliant MEMPHIS using the original coding decisions with no loss of quality. It also enables transcoding to be more transparent and flexible enough to handle any constant or variable bit-rate standard definition input, with 4:2:2 or 4:2:0 video.

MEMPHIS accepts all current standard definition and high definition formats used by DVB, ATSC and ARIB. It uses Snell & Wilcox original MPEG-2 mastering techniques, providing superior encoding efficiency thanks to Phase Correlation (Ph.C) motion estimation and Prefix pre-processing techniques. Its patented rate control technique provides a constant quality mastering mode allowing it to reduce bit-rates while maintaining the quality. Coupled with the Bridge (computer disk storage interface) unit, it offers a powerful ingest solution.

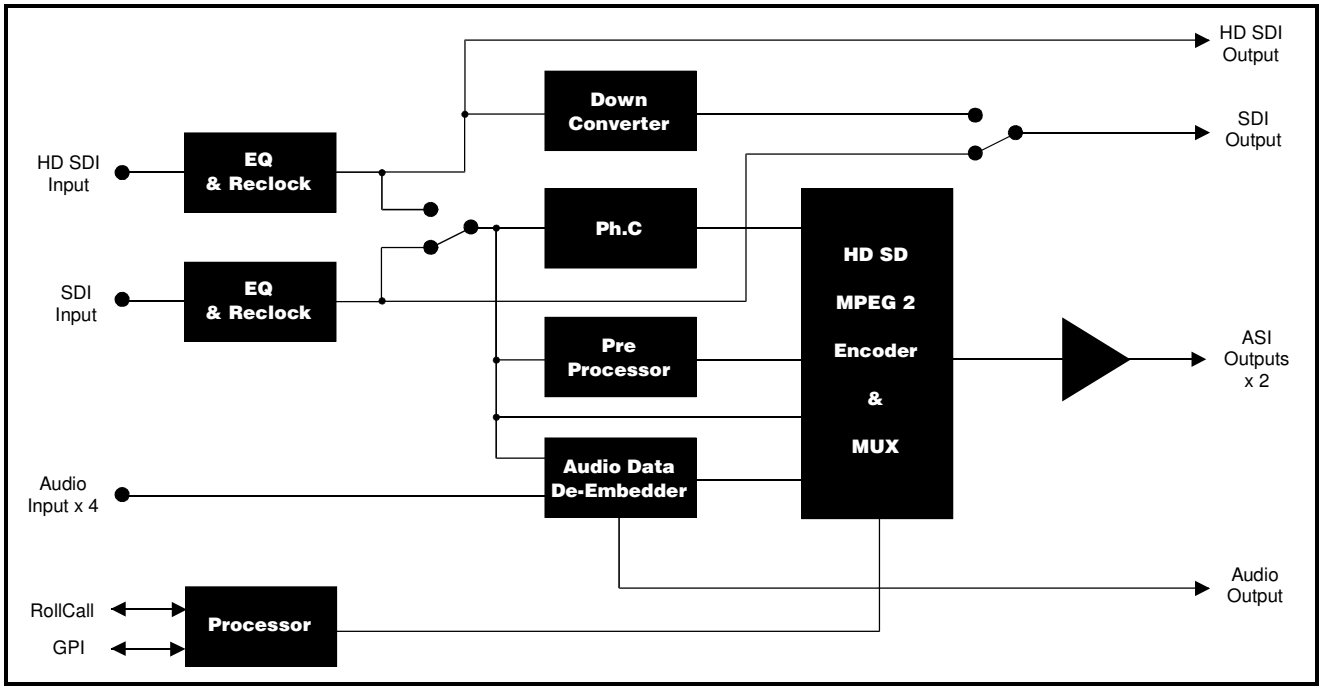




Features

- Mastering quality MPEG-2 encoder
- 100% MOLE™ Technology compliant
- Dual ASI output (to Bridge unit and MPEG decoder)
- Supports most SD and HD formats, including progressive video
- Encodes and multiplexes MPEG-2 MP@ML, 4:2:2P@ML, MP@HL, 422P@HL
- Second generation Prefix pre-processor with quadruple linear filter, recursive filter and wavelet spatial filter
- Constant/Variable (CBR/VBR) encoding
- Constant quality mode: Digibeta/HD-D5, DV/HD-CAM, DVD, DTV, Browse qualities
- Video bit-rates from 1Mbps to 50 Mbps in SD, from 5Mbps to 175Mbps in HD
- Advanced Clean-Cut shot-change detection algorithm with 3:2 pulldown detection
- Up to 4 Unbalanced AES Audio inputs and 4 embedded audio inputs
- 4 audio PES services with up to 4 stereo audio pairs in total
- Support for PCM uncompressed and compressed audio
- Programmable audio delay
- SDI input with SMPTE 319M compliant MOLE™ data support
- HD-SDI input with active loop-through
- SDI video output and 1 unbalanced AES audio output for confidence monitoring of the inputs (the HD video input is downconverted for monitoring)
- RollCall control system compatible, using RS-422, 75 Ohm BNC (ArcNet), or Ethernet.

Block Diagram



Specifications

Features

Signal inputs

Serial Digital Video ..... SDI to ITU-R Rec.656/Rec.601(SMPTE259M) with MOLE™ (SMPTE319M)

High Definition Serial Digital Video ..... HD-SDI to SMPTE292

AES/EBU Serial x 4 ..... Unbalanced AES/EBU Serial Digital Audio Outputs –IEC-958

Analog Reference ..... SD (Black and Burst composite) and HD (Tri-Sync) are both supported, at standard levels.

Auxiliary Data RS-422 x 2... Not used in the current release.

3:2 Sequence ..... Indicates repeated field

Signal outputs

ASI 1 and 2 ..... ASI (270 Mbit/s) single-program transport stream (SPTS) via BNC connector, to CENELEC 50083-9.

SD Monitor SDI ..... SDI to ITU-R Rec.656/Rec.601(SMPTE259M)

SD Monitor AES audio ..... Unbalanced AES/EBU Serial Digital Audio Outputs –IEC-958

Control signals

RollCall ArcNet/RS422/Ethernet

Ethernet ..... 10/100 Mbit RJ45

GPIO ..... 9-way SUB D carrying: 2 x IN, 2 x OUT, 2 x IN-OUT Not implemented in the current release.

System ..... RS-422 RollCall

Remote ..... RS-422 Sony protocol

Additional Controls via RollCall™ Remote Control System

Logging ..... On/Off

Memories ..... 1..8

Specifications

Compressed Video ..... MPEG-2 only. 4:2:2 Profile@ML, MP@ML, MP@HL, 422P@HL

Serial Input Return Loss ..... Better than -15 dB to 1GHz

Video Standards ..... SD:To ITU-R Rec.656/Rec.601 (SMPTE259M) with MOLE™ (SMPTE319M) – HD: To SMPTE292M

Signal Output Level ..... 800 mV ±10%

Output Return Loss ..... Better than -15 dB to 270 MHz

Output Jitter ..... < 0.2UI

Installation

Note: For full installation details please consult the MEMPHIS installation manual

UNPACKING MEMPHIS

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

MEMPHIS unit
2 Power cables
1 Operating Manual
1 Installation Manual

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

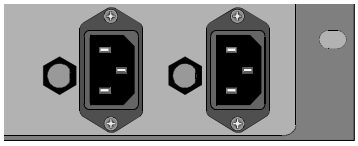
MEMPHIS *weighs more than 18 kg. Appropriate manual handling precautions should be taken when lifting the unit.*

CONNECTING POWER MEMPHIS

Note: before connecting power to the unit please refer to the safety warnings on page 0.2

Power Inlets

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



The rated current for the unit is 5 .5A at 100 V and 2 A at 250 V.

Standby Switches

The standby switches are located on the left-hand side of the front panel.

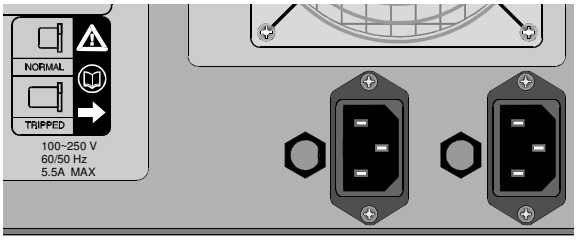
MEMPHIS can support dual power supplies for redundancy. However this is an option, therefore a second PSU may not be fitted

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

Supply Voltage

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

Circuit Breakers



MEMPHIS has a circuit breaker on each mains input.
In the event of a fault a plunger will pop out and protrude from the rear of the breaker. To reset remove power from the unit, press the plunger back in and then restore power to the unit.

Warning! If the breaker continually trips disconnect the unit and consult your dealer or service agent.

Environment

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

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

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

Warning!

MEMPHIS weighs more than 18 kg. Appropriate manual handling precautions should be taken when lifting the unit.

Warning!

Under no circumstances should the grip handles be used to lift MEMPHIS.

When rack mounting the equipment support other than the rack mount ears must be provided.

Remote Control

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

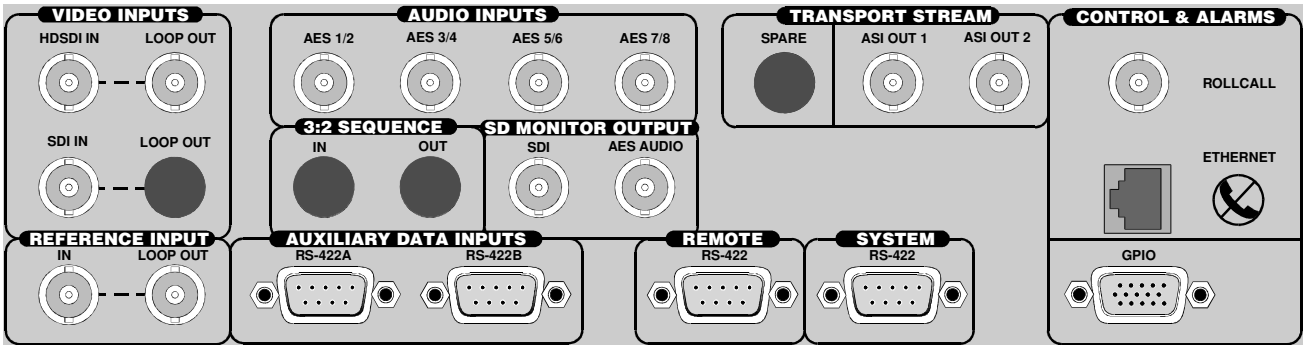
The RollCall system should be connected using 75 Ohm "T" pieces in a similar manner to an "Ethernet" system. Both extremities of the system must be terminated in 75 Ohms.

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

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

For details of the menu system see Section 4 page 4.15 of the Operator's manual, and for details of the RollCall system consult the Modular System Operation manual.

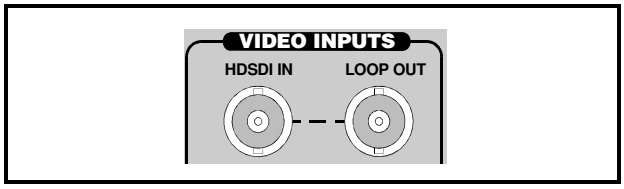
CONNECTIONS



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

VIDEO INPUTS

HDSDI IN (Option)

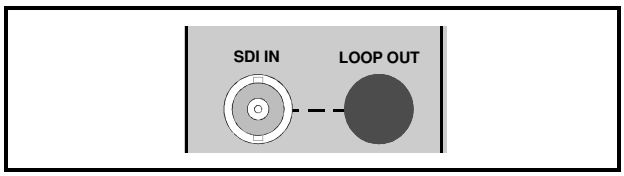


This is the SMPTE 292 serial digital input to the unit made via a BNC connector, which is terminated at 75 Ohms within the unit.

LOOP OUT

This is the SMPTE 292 serial digital output from the unit made via BNC connector. Re-clocked copy of the HD-SDI input. Requires 75 Ohm termination at the receiving equipment's input.

SDI IN

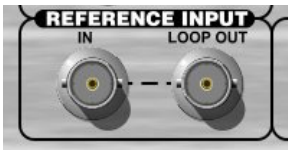


This is the SMPTE 259 serial digital input to the unit made via BNC connector, which is terminated at 75 Ohms within the unit.

LOOP OUT

This is the SMPTE 259 serial digital output from the unit made via BNC connector. Re-clocked copy of the SDI input. Requires 75 Ohm termination at the receiving equipment's input.

REFERENCE INPUT



IN

This is a 75-Ohm impedance input which accepts both SD "black-and-burst" composite video sync and HD "tri-sync" video sync signals, both at standard levels. It is recommended that this input is not used unless the source connected to the SDI or HD-SDI video input (see above) fails to provide a perfectly stable and reliable signal. This means it is only worth using the reference input if a reference sync source is available which is more stable and reliable than the SDI or HD-SDI video source. Furthermore, if the reference input is used then it is recommended that audio is connected to MEMPHIS via the AES/EBU BNC inputs (see below) rather than as embedded audio on the video input. This is because if the SDI or HD-SDI video source is not dependable then it should not be relied on to carry audio.

LOOP OUT

This is a passive loop-through connection for the reference input.
Note that if a reference signal is connected to the IN connector and the loop-through facility is not used the LOOP-OUT BNC socket must be fitted with a 75 Ohm terminator.

Allowable Reference Signal/Operating Standard Combinations

Operating Standard	SD Reference Signal		Tri-sync HD Reference Signal							
	525i	625i	1125(1080)/30i	1125(1080)/29i	1125(1080)/25i	1125(1080)/23sF	1125(1080)/24sF	750(720)/60P	750(720)/59P	750(720)/50P
525(480)/29i	OK			OK						
625(576)/25i		OK			OK					
1125(1080)/30i			OK							
1125(1080)/29i				OK						
1125(1080)/25i					OK					
1125(1080)/23sF						OK				
1125(1080)/24sF							OK			
750(720)/60P								OK		
750(720)/59P									OK	
750(720)/50P										OK

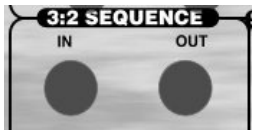
Note that only 'OK' combinations are allowed.

AUDIO INPUTS

These are the four Unbalanced AES/EBU serial digital audio inputs to the unit via BNC connectors. Each of these inputs is terminated at 75 Ohms within the unit.

3:2 SEQUENCE

This function is not utilized on this product.



SD MONITOR OUTPUT

SDI

This provides an ITU Rec.656/601 Monitor confidence output of the selected source with down-converted output from HD-SDI input when HD used.

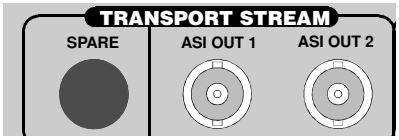
AES AUDIO

This is unbalanced an AES/EBU serial digital audio output from the unit via a BNC connector. Requires 75 Ohm termination at the receiving equipment's input.

TRANSPORT STREAM

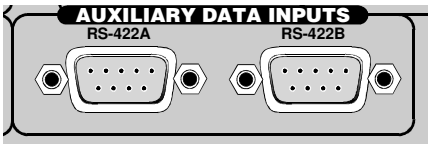
ASI OUT 1 and 2

There are two independent ASI outputs from the unit via these BNC connectors. Each output requires 75 Ohm termination at the receiving equipment's input.



AUXILIARY DATA INPUTS

These connectors have no function in the current release and connections should not be made to them.

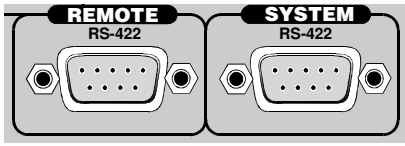


REMOTE

This 9 pin `D' connector on the rear panel allows the unit to be connected to the RollCall 485 network communications system.
Note that RS485 interconnections should be pin to pin and only be used for Snell & Wilcox RollNet applications.

This would normally be connected to an edit controller running the standard Sony VTR protocol.

This connector may also be used as a RS422 port.

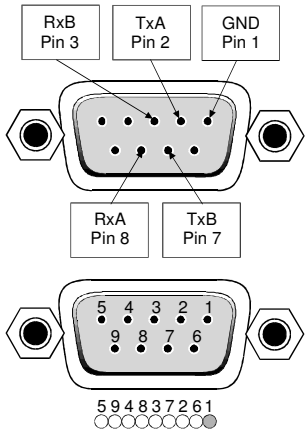


RS-422 Port

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

Where MEMP = MEMPHIS

Physical Interface - RollCall RS422



N.B. Connector is a socket, viewed from mating face. Equivalently, this is a plug, viewed from the rear, cable face.

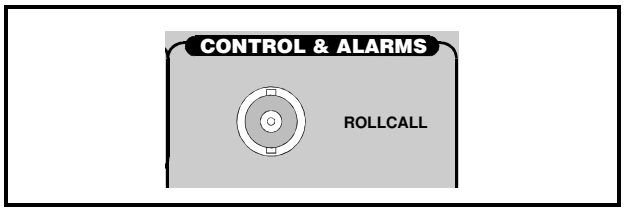
For reference, the A signal is at 0V at line idle, and the B signal at 5V.

SYSTEM

This is used for the RS422 RollCall connection.

CONTROL & ALARMS

ROLLCALL

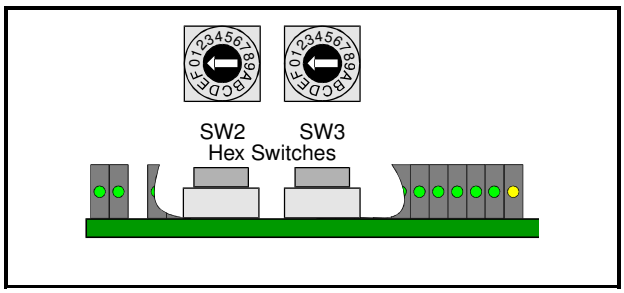


The unit can be controlled via RollCall using the BNC connector or the REMOTE RS-422 9-way D-type connector.

The RollCall BNC system should be connected using 75 Ohm "T" pieces in a similar manner to an "Ethernet" system. Both extremities of the system must be terminated in 75 Ohms.

Hex Switches (located behind the LED's)

A unique address for each unit on the RollCall system must be set by two Hex switches (SW2, SW3) on the printed circuit board fitted in the uppermost slot. The addresses 00 and FF are reserved and must not be used.



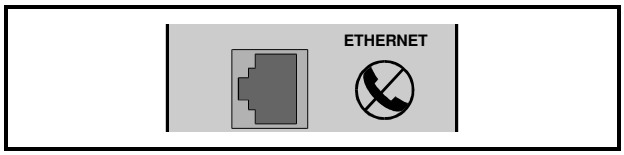
SW2 sets the most significant nibble and SW3 the least significant. Both switches face upwards on the PCB rather than forwards, which means that the board needs withdrawing part-way out of the box for access.

Please refer to the Installation Manual Section 1 page 3 for instructions of how to open the front panel.

Notes: *In a RollCall™ segment, all units must have different unit address codes. For more information see RollCall™ section.*

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

Ethernet

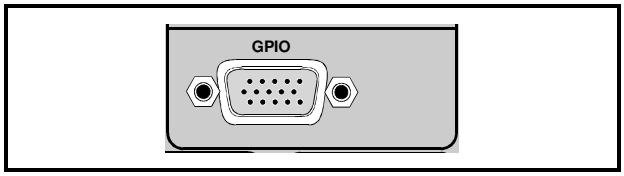


This RJ45 connector socket allows the unit to be connected to a LAN.

Warning Crossover CAT 5 Ethernet cable must be used for this connection.

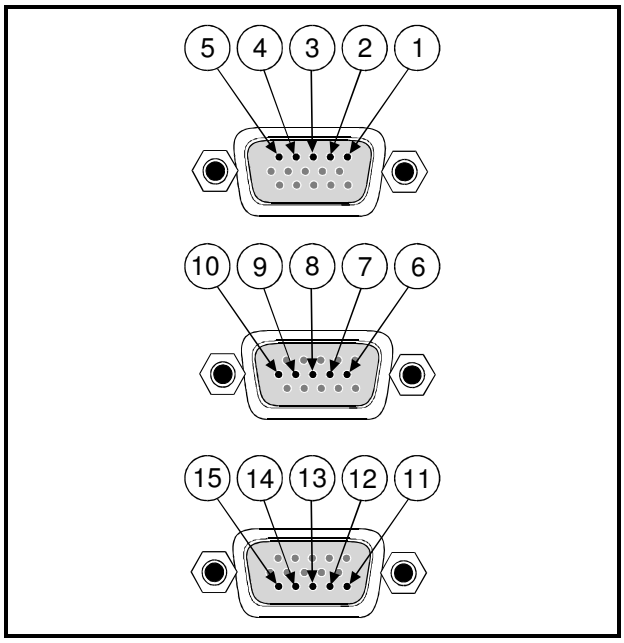
Warning This connector is not intended for direct connection to a telecommunications network.

GPIO



The General Purpose Interface is accessed via a 15 way 3-row D type female connector. In the table GPI refers to inputs and GPO refers to outputs.

There are 2 GPI inputs, 2 GPO outputs and 3 GPIO bi-directional ports.
Each one is a pair of semiconductor relay contacts, labelled + and -.



Pin	Function
	Inputs
1	GPI 0 Signal +
6	GPI 0 Signal -
2	GPI 1 Signal +
7	GPI 1 Signal -
3	GPI 2 Signal +
	Bi-directional (Inputs/Outputs)
8	GPIO 2 Signal -
4	GPIO 3 Signal +
9	GPIO 3 Signal -
5	GPIO 4 Signal +
10	GPIO 4 Signal -
	Outputs
11	GPO 0 Signal -
12	GPO 0 Signal +
13	GPO 1 Signal -
14	GPO 1 Signal +
15	**Ground**

The output (GPO) characteristics are as follows:

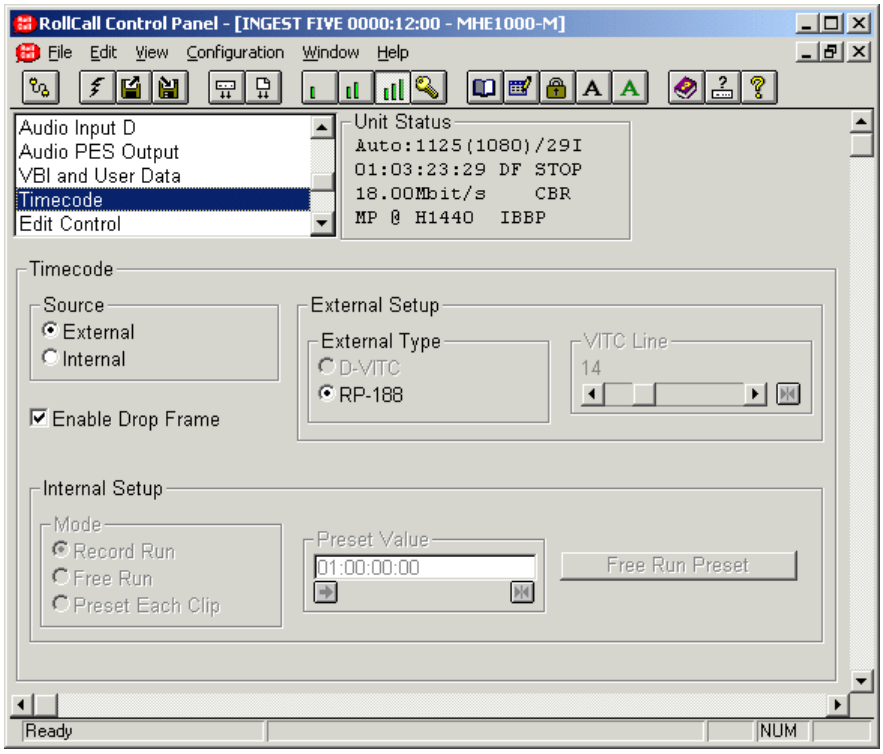
Operating Voltage Range	0 to ±60 V (DC/AC peak)
Maximum Load current	1.0 A (AC/DC)
Maximum On-State Resistance @ Tamb =+25°C	500 mOhm
Minimum Off-State Resistance @Tamb =+25°C,V=±48V	100 MOhm

4 Unit Control Menus (on remote PC via RollCall)

MEMPHIS is controlled using a PC via the RollCall protocol over either a point-to-point 10/100-base-T Ethernet connection or an “ArcNet” connection. See the "Installation Guide" document for connection details.

To access the RollCall control menus, run the "RollCall Control Panel” software on the PC. Then select "File", then "New". A list of RollCall units will be displayed: wait for the RollCall unit name (the default is "MEMPHIS") to appear on the list (if this has not happened within 1 minute, something is wrong: consult the "Installation Guide" document). Select the RollCall unit name with the mouse, then select the "OK" button: the RollCall menus will then be transferred and displayed on the PC, ready for use.

The menus are divided into a number of separate menu screens. An example menu screen is shown below. The title bar at the top shows a RollCall unit name of “INGEST FIVE”, a RollCall address of 0000:12:00 and a RollCall product type of “MHE1000-M”.



To select a different menu screen, use the scrollable list of menu screens (scrolled down as far as “Audio Input D” in the above example) which appears in the top left corner of every menu screen. The name of the selected menu screen (“Timecode” in the above example) is highlighted. It is strongly recommended that when setting up for each new application, the user works through this list from top to bottom.

To the right of the list of menu screens, every menu screen shows the same “Unit Status” window. This is intended to keep the user informed with the most important status information about MEMPHIS, irrespective of which menu screen is currently in use. The window contains of 4 lines of text (following a convention common to all RollCall-compliant products). Their functions are as follows.

- The 1st line of “Unit Status” text always displays the input video standard. Because the size of the “Unit Status” window is fixed for all RollCall-compliant products, input video standards ending in “SF” are sometimes truncated so that they end in “S”.
    - If the input video standard is being detected automatically and an input video signal is present, as shown in the example menu screen above, the displayed input video standard will be preceded by the word “Auto”.
    - If the input video standard is being detected automatically but an input video signal is not present, “Auto: None” will be displayed instead of an input video standard.
    - If the standard is not being detected automatically, the displayed input video standard will be followed by “OK” (normal operation) or “LOST” (missing video input signal) or “ERR”. The latter indicates that the input video is not of the manually selected standard.

- The 2nd line of “Unit Status” text displays either:
  - the Genlock input status (this is displayed only when there is a problem with the Genlock input signal as described in Section 4.1.2.1), or
  - the MPEG-2 video timecode (followed by the letters “DF” if it is drop-frame timecode) together with MEMPHIS current clip-capture edit control status (displayed as “REC” whilst recording a clip, or as “STOP” whilst not recording), as shown in the example menu screen above.

- The 3rd line of “Unit Status” text displays either:
  - the status of audio PES stream 1 (see section 4.7.7 for details of audio status), or
  - the status of audio PES stream 3, or
  - MEMPHIS current MPEG-2 video bit rate, including an indication of whether this bit rate is constant (“CBR”) or variable (“VBR”), as shown in the example menu screen below.

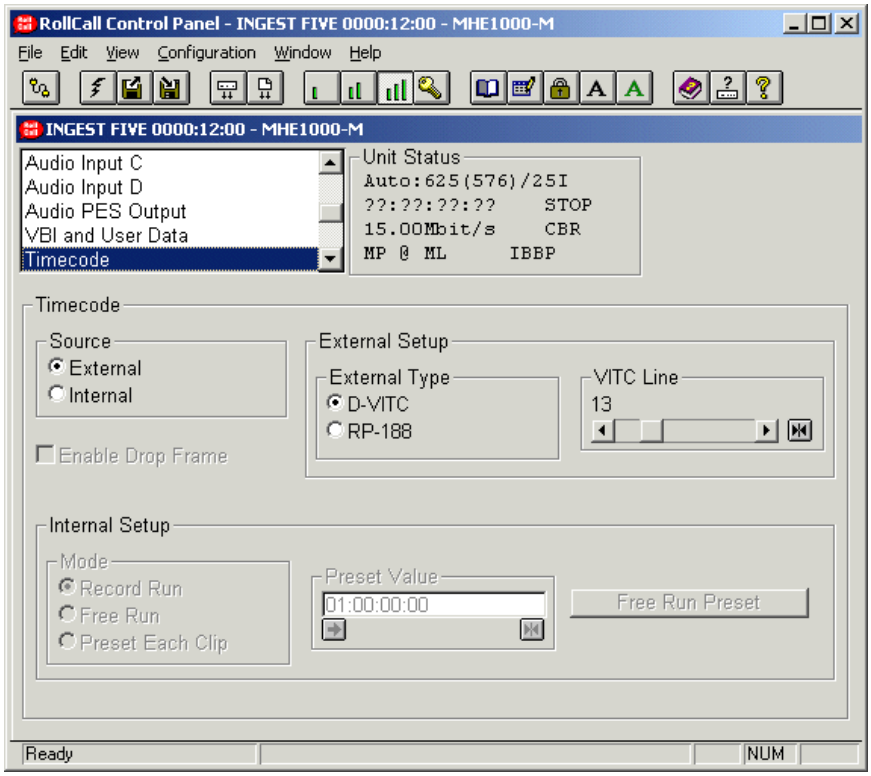
  These 3 alternatives can be displayed in turn, alternating once every 2 seconds. See Section 4.7.7.1 for details of how to obtain this alternating status display.

- The 4th line of “Unit Status” text displays either:
  - the status of audio PES stream 2, or
  - the status of audio PES stream 4, or
  - MEMPHIS current MPEG-2 video coding profile, level and GOP type, as shown in the example menu screen below.

  These 3 alternatives can be displayed in turn, alternating once every 2 seconds. See Section 4.7.7.1 for details of how to obtain this alternating status display.

Note that if MEMPHIS is powered up with no valid video input signal then the 3rd and 4th lines of the “Unit Status” window will remain blank until a valid video input signal is connected.

Remember also that ??:??:??:?? will always be displayed as the timecode value in the Unit Status window if the current external timecode is invalid, as shown in the example menu screen below.



On each menu screen, the menu items themselves are below the menu list and “Unit Status” information. The example menu screen above shows the “Timecode” menu items.

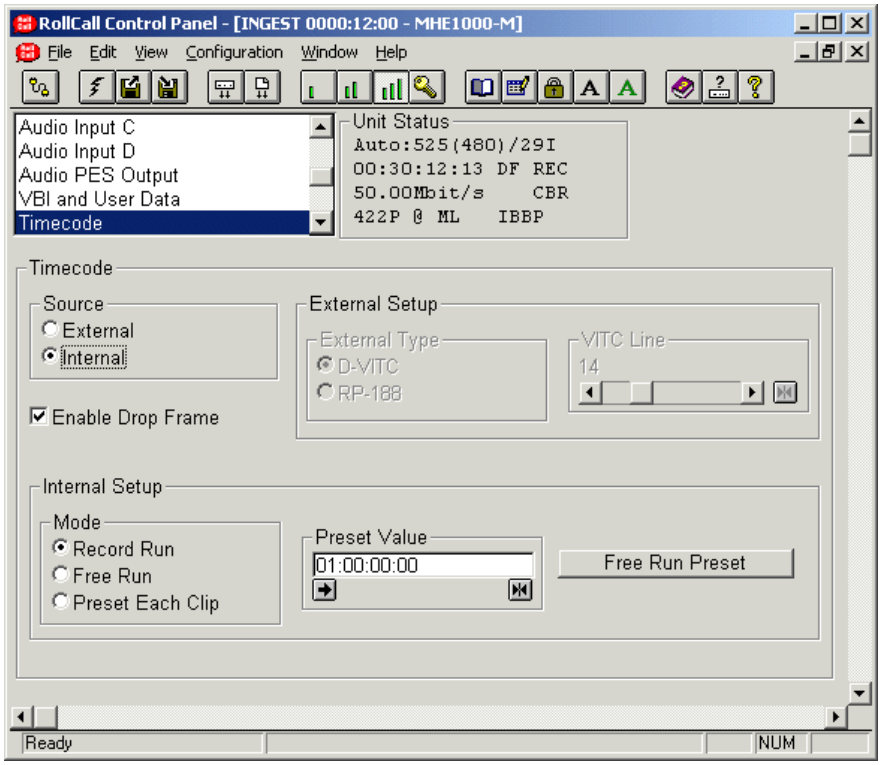
Menu items offering a number of options have a round “radio button” for each option: the “Source” control in the example menu screen above.

Other menu items take the form of boxes in which the user must type values after clicking on each box: the “Preset Value” control in the example menu screen below.

Menu items which are on/off controls use a square “check box”: the “Enable Drop Frame” control in the example menu screen below. When such a box contains either a cross or a tick, the menu item is “on” unless the menu item is also “grayed out”. When such a box contains neither a cross nor a tick, the menu item is “off” unless the menu item is also “grayed out”.

If a menu item is “grayed out” then it is not currently available due to the settings of other menu options, and all the options it offers are switched “off”. In the example menu screen above, “Enable Drop Frame” (located just below “Source”) is “grayed out” because the input video standard does not allow Drop Frame timecode.

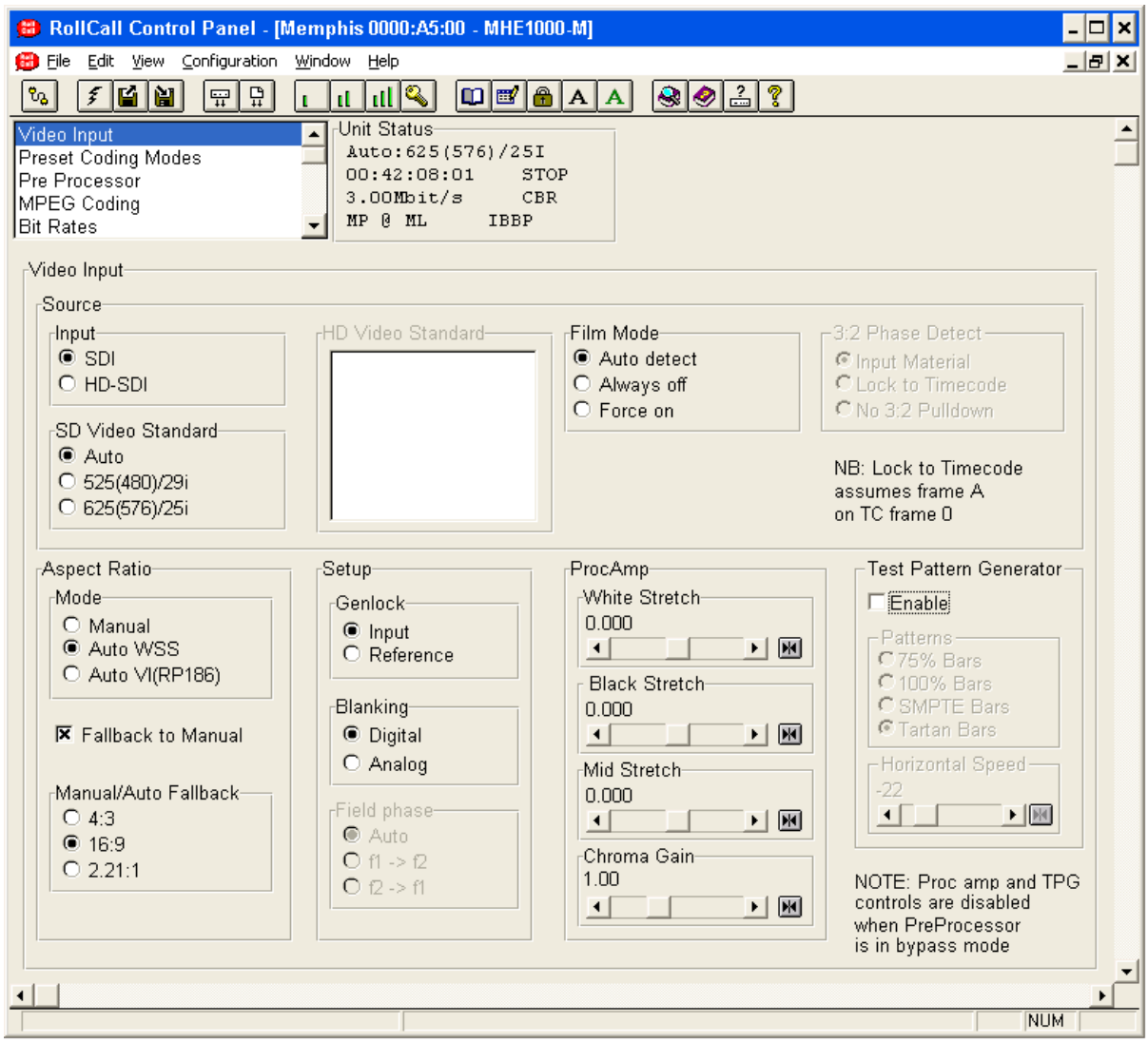
In the example menu screen below, “External Type” is “grayed out” because “Source” is set to “Internal”. Because “External Type” is “grayed out” in the example menu screen below, the fact that it also appears to be set to “D-VITC” does not mean that D-VITC is selected. It just means that if “Source” were changed to “External”, D-VITC would then be selected.



Many of the menu items are accompanied by either one or two “push-buttons”. The push-button means “click here to enter the value” (as a mouse-based alternative to pressing the “Enter” key). The push-button means “click here to return the menu item to its factory default value”. In the example menu screen above, the “Preset Value” menu item has both these “push-buttons” just below the box containing the value.

4.1 VIDEO INPUT MENU SCREEN

This menu screen controls the input video stage of the unit. It affects both the picture quality and the compatibility of the compressed MPEG-2 video stream. It is divided into a number of areas, detailed below.



4.1.1 SOURCE

This area is divided into a number of menus, detailed below.

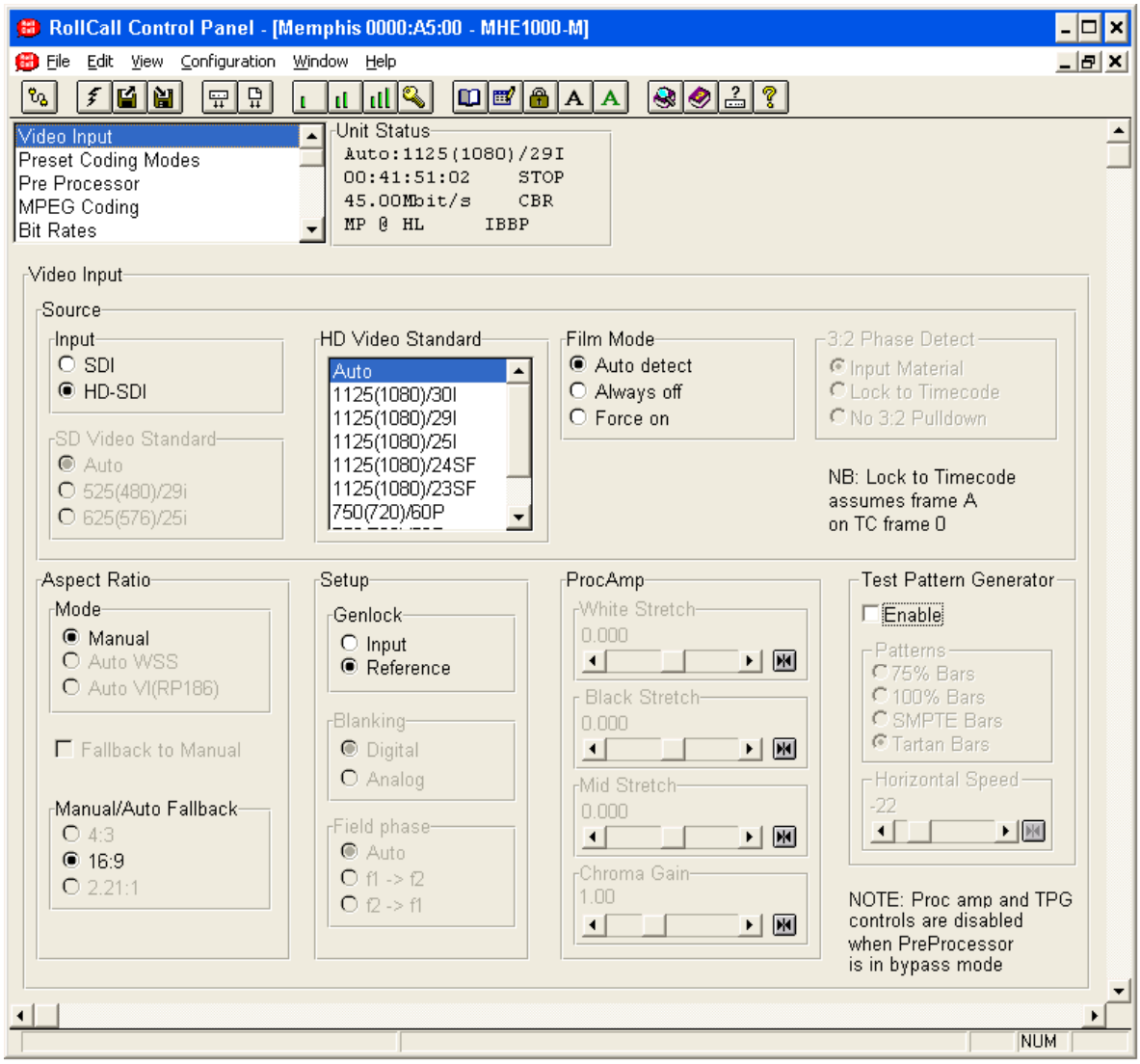
4.1.1.1 INPUT

This field controls the nature of the input signal corresponding to the input on the back of the unit. There are 2 menu options, as follows.

SDI - This option selects the SDI input. All the functions of the unit then work in SD (Standard Definition). The video input menu screen then looks as shown in the example above.

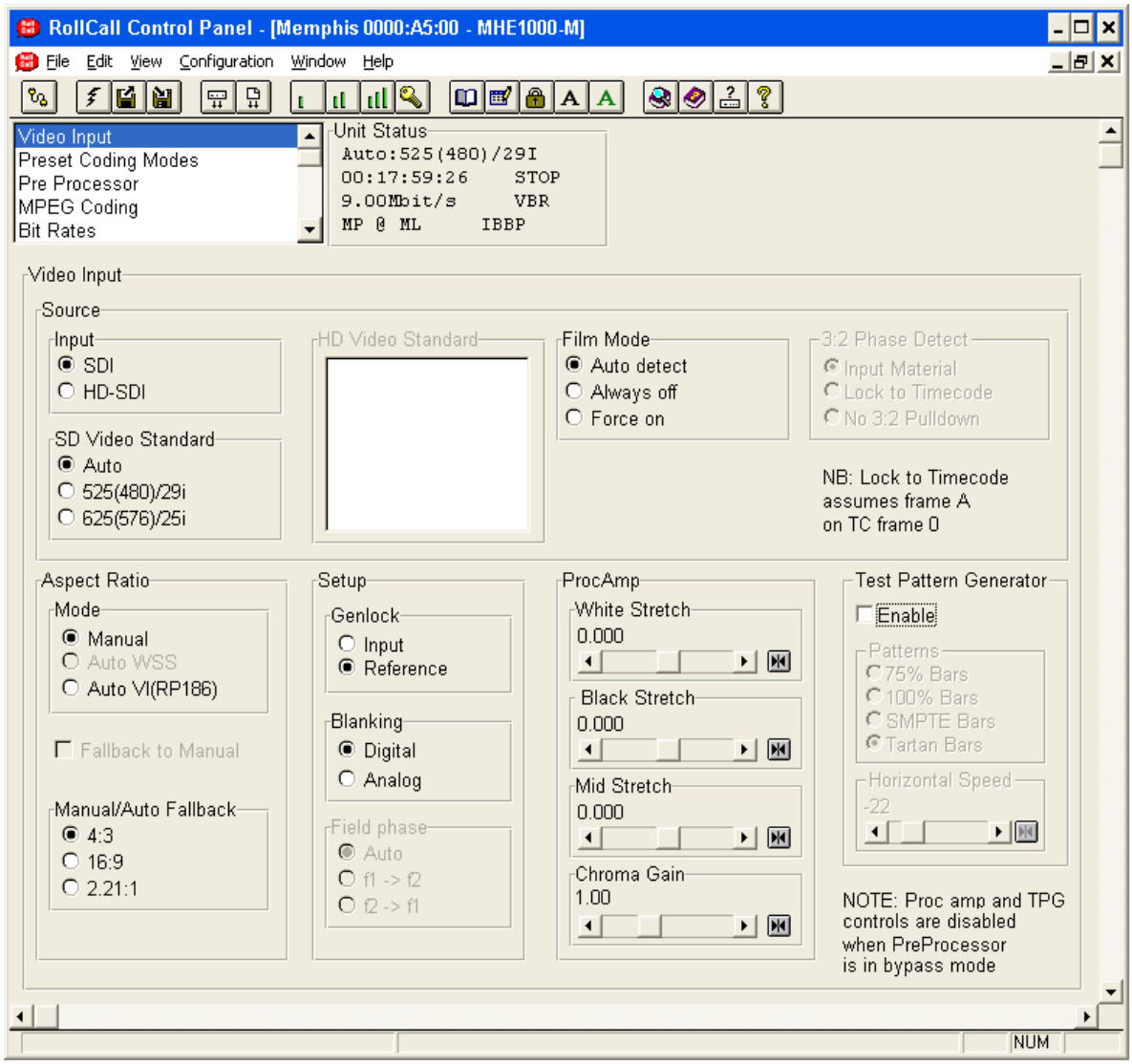
HD-SDI - This option selects the HD-SDI input. All the functions of the unit then work in HD (High Definition). The video input menu screen then looks as shown in the example below.

Note that if the unit has been purchased without the "HD" option, only the "SDI" option will be available: the "HD-SDI" option will be "grayed out".



4.1.1.2 SD VIDEO STANDARD

When the INPUT is set to SDI, this selects the SD standard in the same way as for HD VIDEO STANDARD on the next page.



4.1.1.3 HD VIDEO STANDARD

When the INPUT is set to HD-SDI, this window selects the HD standard, which has the following parameters.

Auto - This option is the default. It automatically detects the input format and displays it in the "Unit Status" window near the top of every menu screen.

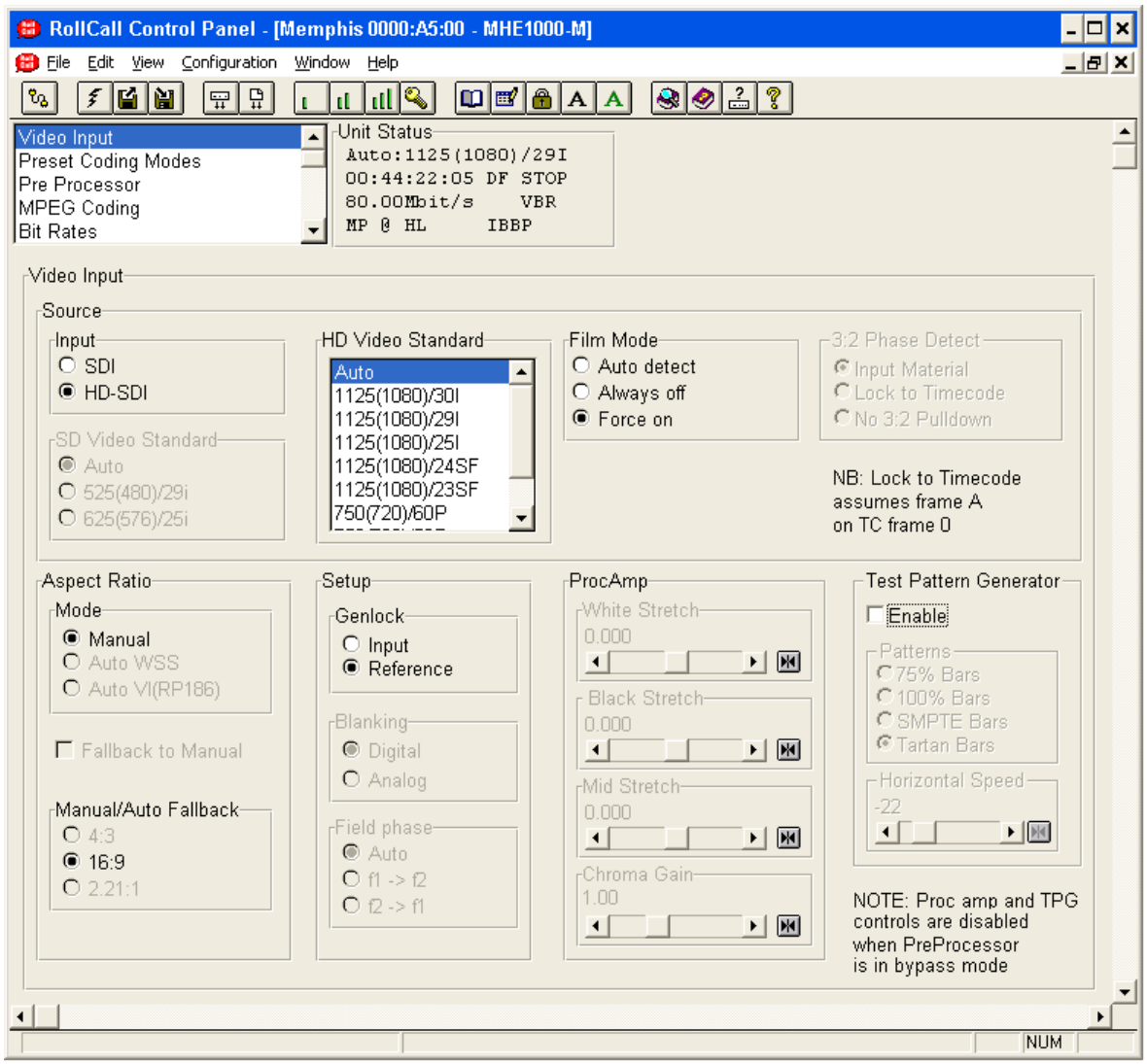
bbbb (vvvv) / nn f This list displays the options for the video input format. The meanings of the fields within the format are as follows.

bbbb This numeric field represents the vertical picture size including blanking.

vvvv This numeric field represents the vertical resolution (excluding blanking).

nn This numeric field represents the integer part of the frame rate. Because **nn** is the integer part, 59.94 becomes "59" and so forth.

f This non-numeric field represents the structure of the video format:
I means interlaced,
P means progressive, and
S or **SF** means segmented frame.



Note that although 23.976 and 24.000 frames/second (segmented frame or "sf") input HD video are both supported, this support is an option which must be purchased. This option covers both 23.976 and 24.000 frames/second. Only if it has been purchased will these frame rates appear on the list under “HD Video Standard” in the “Video Input” menu. The example menu screen above shows this case. See Section 4.15.7 for details of how to tell which MEMPHIS options have been purchased.

Note also that very few external edit controllers support 23.976 or 24.000 frames/second operation (the DNF Controls “2-MCE” supports both and is recommended). However, the "Automatic Control" menu on the "Edit Control" menu page (described later on in this document) can be used at all frame rates.

4.1.1.4 FILM MODE (INCLUDING 3:2 PULL-DOWN ENABLE)

Film mode is the use of progressive MPEG-2 picture coding. This mode must only be used when the incoming picture material is progressive (this is possible even for interlaced input video formats: “interlaced” simply equates to “segmented frame” in such a case). The benefit of this mode is that it increases compression efficiency. This increase in efficiency is very significant for 3:2 pull-down material, but smaller for other material.

The film mode menu has 3 alternative options: “Auto Detect”, “Always Off” and “Force On”.

AUTO DETECT – film mode is detected automatically. Detection of 3:2 pull-down is enabled (see section 4.1.1.5). This automatic detection of film mode is not infallible. It should not therefore be assumed that this mode is suitable for all picture material.

> **WARNING!** Picture material which is incorrectly identified by the “AUTO DETECT” setting may look obviously “wrong” (for example: it may have abnormal interlacing artifacts), or have reduced MPEG-2 picture quality, when the resulting MPEG-2 is decoded.

ALWAYS OFF – film mode and 3:2 pull-down are both disabled. This mode is suitable for all video (interlaced) picture material, and for any film (progressive) or mixed (interlaced and progressive) picture material which is incorrectly identified by the “AUTO DETECT” setting. If the “ALWAYS OFF” setting is used for film (progressive) material, a slight reduction on MPEG-2 picture quality may result, but the pictures will not look obviously “wrong” when the resulting MPEG-2 steam (or captured file) is decoded.

FORCE ON – film mode is permanently “on”. Detection of 3:2 pull-down is enabled (see section 4.1.1.5). This mode is suitable for all 2:2 and 3:2 progressive (film) picture material. It is critical that “FORCE ON” mode is only selected for input material which is definitely and exclusively progressive.

> **WARNING!** ”Film Mode: Force on” mode should never be used for any interlaced video picture material as it would prevent interlaced MPEG-2 video coding modes from being used. This would result in a considerable reduction in MPEG-2 picture quality. It may also result in the picture looking obviously “wrong” (including abnormal interlacing artifacts).

Note that “FORCE ON” can be selected for 25 frame-per-second material which is input using a “25i” input video standard. In such a case the input video standard will effectively be “25sf” (but will be displayed as “25i”) and the resulting MPEG-2 video stream will be “pure progressive”: all the flags will indicate frame-based coding rather than field-based. Again, it is critical that “FORCE ON” is only selected for input material which is definitely and exclusively progressive: any interlaced picture material which is incorrectly set to “FORCE ON” will have reduced MPEG-2 picture quality, and may also look obviously “wrong” (including abnormal interlacing artifacts).

If the picture material is known to be film (progressive) throughout then “FORCE ON” mode is recommended. However, remember that when film (progressive) picture material is standards-converted to another frame rate, the resulting pictures may have “video” rather than “film” timing.

If in doubt, select “ALWAYS OFF”. Although this may result in a slight reduction on MPEG-2 picture quality, the pictures will not look obviously “wrong” when the resulting MPEG-2 steam (or captured file) is decoded.

4.1.1.5 3:2 PULL-DOWN PHASE DETECT

When “FILM MODE” (see preceding section) is “on”, if the input video frame rate is 29.970 or 30.000 or 59.940 or 60.000 frames/second then it is legal to convey 3:2 pull-down in the MPEG-2 video stream. Each repeated field is replaced by a 1-bit flag on the video stream. This gives a large increase in coding efficiency. However, 3:2 pull-down must not be flagged in this way unless the input material actually has 3:2 pull-down, because this would result in non-repeated fields being replaced by repeated ones when the MPEG-2 clip is decoded. The effect of this is very noticeable.

The current firmware version provides 3:2 pull-down detection at frame rates of 29.970 and 30.000 frames/second only. Detection of 3:2 pull-down is therefore not currently provided at frame rates of 59.940 or 60.000 frames/second.

If “FILM MODE” is set to “ALWAYS OFF” or the input video frame rate is neither 29.970 nor 30.000 frames/second then this menu will be "grayed out" and 3:2 pull-down detection will be disabled. If the input video frame rate is either 29.970 or 30.000 frames/second and if “FILM MODE” is set to “AUTO DETECT” then this menu will be "grayed out" but 3:2 pull-down phase detection will always be set to “INPUT MATERIAL” (see below). In all other cases, there are 3 alternative options: “Input Material”, “Lock to Timecode” and “No 3:2 Pulldown”.

INPUT MATERIAL – In this mode the 3:2 pull-down sequence is detected automatically from the input picture material. Note that some input picture material (such as an entirely black picture or a static title, both common at the start of a film) makes this detection difficult. In such cases the 3:2 phase may initially be incorrect, but will change to the correct phase once normal moving pictures are input. Note also that if the input material contains video-domain edits in 3:2 pull-down material, the automatic 3:2 phase detection may not always change phase immediately at each edit. If incorrectly-detected 3:2 pull-down phase causes the resulting MPEG-2 clip to be unacceptable then there are two possible alternatives. If the input video material is known to have perfectly regular 3:2 pull-down then “LOCK TO TIMECODE” mode is always strongly recommended (see below). Otherwise it is recommended that “FILM MODE” should be set to “ALWAYS OFF” to disable 3:2 pull-down detection altogether (see section 4.1.1.4).

LOCK TO TIMECODE – In this mode the 3:2 pull-down sequence is assumed to be perfectly regular and to be in phase with the input timecode. Specifically, the video frame which has a timecode value with a “frames” count of zero is always assumed to be “frame A” of the 3:2 pull-down sequence. If the input video material is known to meet these requirements (as most telecine machine output should) then this mode is recommended as it will always work correctly, even in the worst-case scenario where the start of the video material is an entirely black picture or a static title.

NO 3:2 PULLDOWN – In this mode any input 3:2 pull-down sequence will be ignored and the input video will be treated as 2:2 progressive. The input video standard will effectively be treated as “29sf” or “30sf” (but will be displayed as “29i” or “30i”) and the resulting MPEG-2 video stream will be “pure progressive”: all the flags will indicate frame-based coding rather than field-based.

4.1.1.6 ASPECT RATIO

This menu allows the user to choose the correct aspect ratio for the material (to be carried in the “aspect_ratio_information” field within the MPEG-2 video output stream): 2.21:1, 16:9 or 4:3.

For HD material, the aspect ratio is assumed to be 16:9. For SD material, aspect ratios of 4:3 and 16:9 can be detected automatically using either “Video Index” (SMPTE specification RP196) or “Wide-Screen Signaling” (ETSI specification EN 300 294) if either of these is present in the SDI video input signal. However, “Wide-Screen Signaling” (also known as “line 23 WSS”) is only supported for 625(576)/25I input video.

MODE – this should be set to “Auto WSS” if “Wide-Screen Signaling” is present, to “Auto VI” if “Video Index” is present, or to “Manual” if neither is present. Options which are not available (due to the current input video standard) will be “grayed out” so that they cannot be selected. For example, “Auto WSS” will be “grayed out” unless the input video is 625(576)/25I.

MANUAL/AUTO FALLBACK – should be set to the aspect ratio value which the user believes to be correct, if “MODE” is set to “Manual” or “Fallback to Manual” (see below) is switched on.

FALLBACK TO MANUAL – if “MODE” is set to “Auto WSS” or “Auto VI” and the selected (WSS or VI) data is absent from the video input (even temporarily), the aspect ratio will remain at its most recent value UNLESS “fallback to manual” is switched on, in which case the aspect ratio will change to the “Manual/Auto Fallback” value selected by the user.

If in doubt, find out the correct aspect ratio for the material. Then set “MODE” to “Manual” and select the required aspect ratio value under “Manual/Auto Fallback”.

4.1.2 SETUP

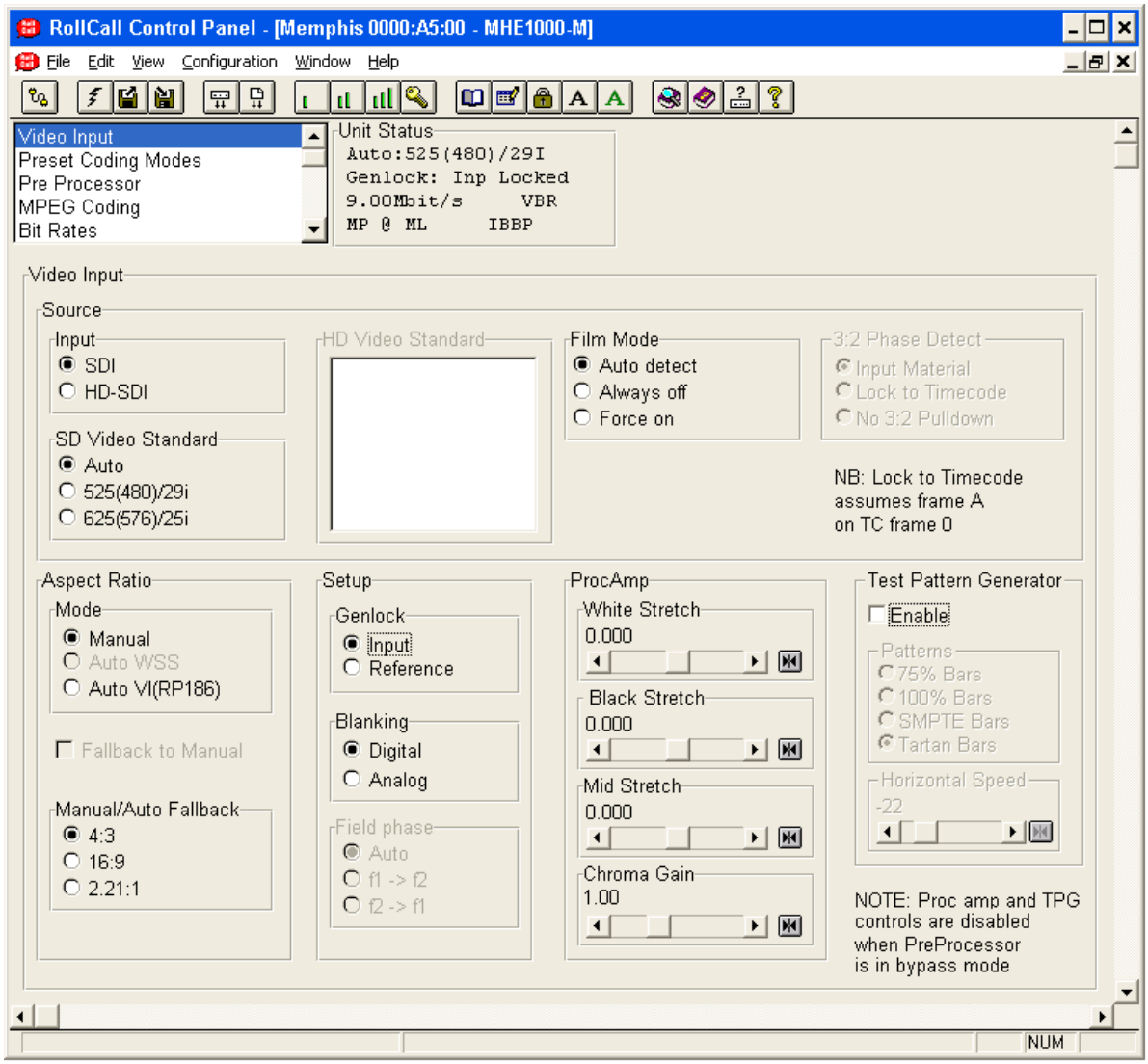
4.1.2.1 GENLOCK

This is the source of input video timing. There are two options:

Input – The SDI or HD-SDI video input (whichever is selected – see above) is used as the video timing source. This is the default setting. If in doubt, use this setting.

Reference – The “Reference Input” connector is used as the video timing source. This connector can accept both SD composite “black-and-burst” and HD “tri-sync”. However, the use of SD composite “black-and-burst” is only supported when the video input itself is also SD.

The “Reference Input” connector is only intended to be used when there is a “studio sync” available which is more dependable than the SDI or HD-SDI video input. For example, if the video source is an analogue VTR which is being converted to SDI, drop-outs on the analogue tape may cause loss of SDI sync. Since loss of input video sync would cause interruptions in the MPEG-2 video stream, a dependable external reference sync signal should be used in such a situation.



If there is a problem with the genlock source, the second line of the “Unit Status” window will display one of the following messages in place of the time code and the REC/STOP status.

Inp Locked – The genlock source is set to “Input” and the SDI/HD-SDI input has just become valid. This message (which is shown in the example menu screen above) will disappear after a few seconds, to be replaced by the timecode and the REC/STOP status of MEMPHIS.

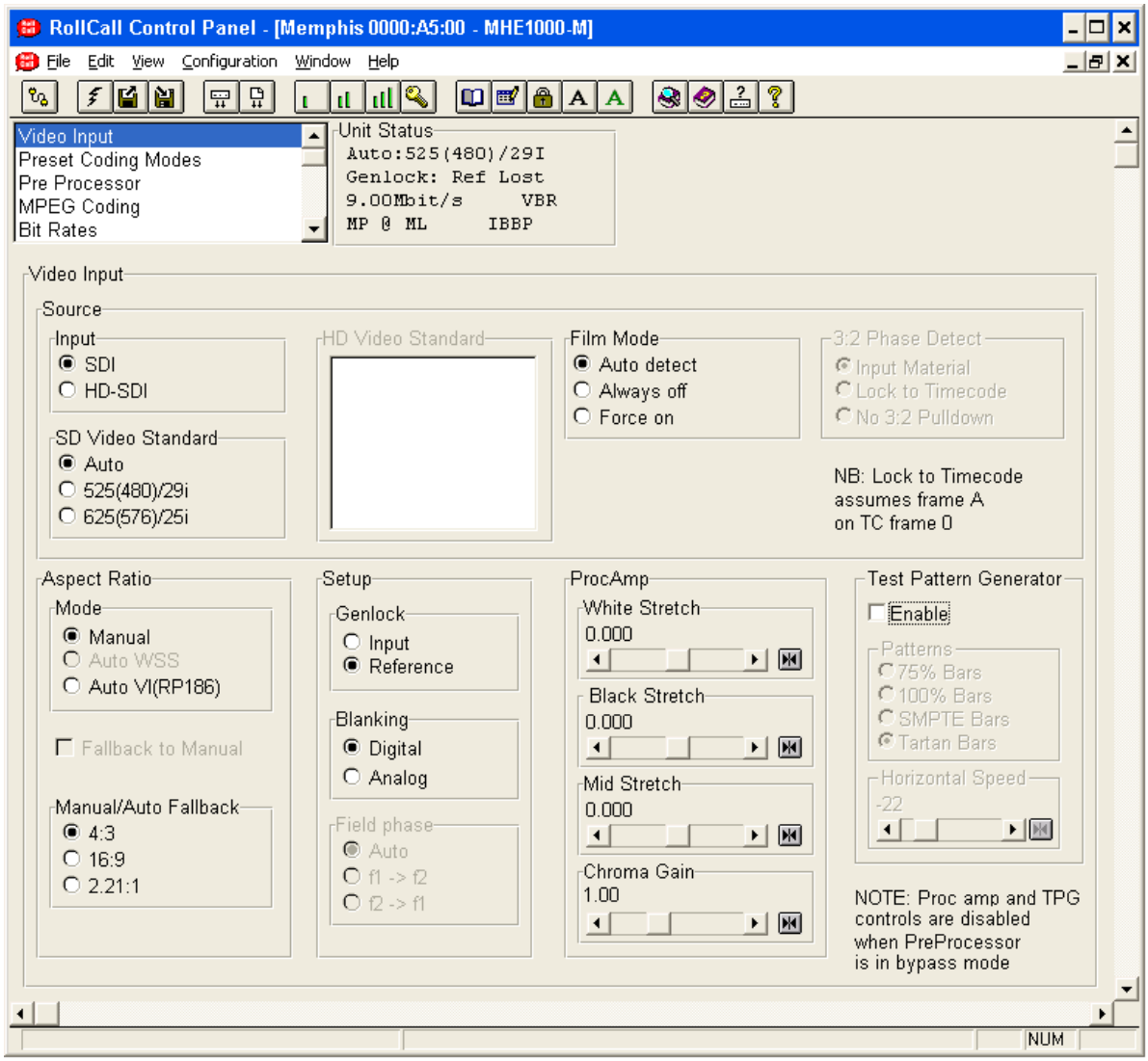
Inp Failed – The genlock source is set to “Input” and the SDI/HD-SDI input is either unconnected or is receiving the wrong video standard. The latter condition can only occur if “HD/SD Video Standard” is not set to “Auto”.

Ref Locked – The genlock source is set to “Reference” and the Reference input has just become valid. This message will disappear after a few seconds, to be replaced by the timecode and the REC/STOP status.

Ref Lost – The genlock source is set to “Reference” and the Reference input is either unconnected or is receiving the wrong type of signal. The Reference input only accepts SD composite sync signals and HD tri-sync signals. This message is shown in the example menu screen below.

Ref Failed – The genlock source is set to “Reference” and the Reference input is receiving the wrong video standard. The Reference input will only accept sync signals with the same video timing as the SDI/HD-SDI video input is receiving.

Conflict – The genlock source is set to “Reference” and the Reference input is SD “black-and-burst” but the video input itself is HD. This particular combination (SD Reference and HD video input) is not supported.



4.1.2.2 FIELD PHASE

This menu item should not be used and is “grayed out” in Version 5.2 firmware upwards. For all earlier versions of firmware, this menu item should always be set to “AUTO”.

However, the issue still arises of how MEMPHIS treats input video when the material is 2:2 progressive. The response to progressive and true-interlaced-video material is set by the "Film Mode" menu item (see above). Specifically, "Film Mode" must be set to either “Auto Detect” or “Force On” for the input video to be treated as 2:2 material. Whenever input video material is detected as being 2:2 progressive, MEMPHIS assumes that the material's 2:2 frames and the input video frames are in sync so that each input video frame contains one whole 2:2 progressive frame. This is called “normal field dominance”.

For some input video material, the material's 2:2 frames and the input video frames are out of sync so that each field within each input video frame belongs to a different 2:2 progressive frame. This is called “reversed field dominance”. There is also input video material containing edits which result in the field dominance alternating between “normal” and “reversed”. This is called “mixed field dominance”.

For all input video material which contains any 2:2 progressive sequences with “reversed” or “mixed” field dominance, it is strongly recommended that "Film Mode" (see above) should always be set to "Always off" so that the material is treated as interlaced rather than as 2:2 progressive. The resulting reduction in video compression efficiency will be very small. If this recommendation is not followed then the resulting MPEG-2 video is likely to show abnormal interlacing artifacts.

4.1.2.3 BLANKING

When working in SD, this setting allows the user to choose how much of the horizontal blanking will be included in the MPEG-2 encoded picture. When working in HD, this option is not available (and is “grayed out”).

Digital - This uses a horizontal line length of 720, i.e. the entire active line length for SDI digital video.

Analog - This uses a horizontal line length of 704. The area selected is the central part of the line. This corresponds to the entire active line for analog SD video.

The "digital" option (i.e. an encoded picture width of 720) is the one recommended by SMPTE and DVB, whereas "analog" (i.e. an encoded picture width of 704) is used for ATSC broadcasts of SD material.

Of these two options, “analog” gives slightly more efficient video compression because it reduces the size of the picture being compressed. Normally, the input video has no picture information outside the “analog” area. However, if in doubt, select “digital” because this removes any risk that the picture will be cropped in any way.

Note that the “Horizontal Resolution” setting on the “MPEG Coding” menu screen (see Section 4.4.1.3) can override the “Blanking” menu setting. This is because the widths of the set of industry-standard horizontally sub-sampled MPEG-2 picture sizes are fractions of either 720 or 704, but not both. For example, for SD video the “half resolution” MPEG-2 picture width is always 352 (half of 704), never 360 (half of 720).

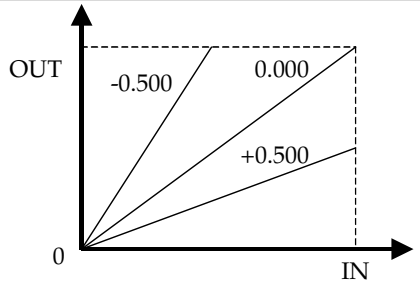
4.1.3 PROCAMP

The PROcessing AMPlifier adjusts the luma, chroma and black levels at the video input stage, before pre-processing and MPEG-2 compression. This is by far the best place to make such adjustments. However, they are intended only for use on source video material which is outside the bounds of acceptability for the target application.

When the “Pre Processor” menu screen (described below) is set to “Bypass All”, these menu controls are “grayed out” as shown in the example menu screen in section 4.1.1.3 above.

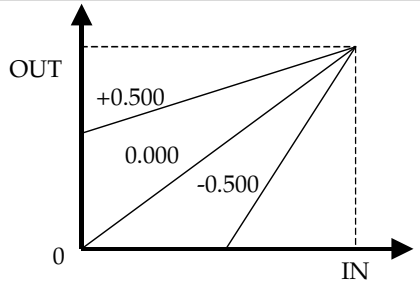
4.1.3.1 White Stretch

This setting adjusts the luminance level. It adjusts the “white” end of the luminance range, between +0.500 (maximum “white stretch”) and –0.500 (maximum “white crush”). For “transparent” results, use the default value of 0.000. If in doubt, use this default.



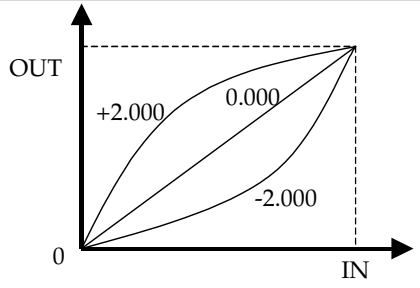
4.1.3.2 Black Stretch

This setting adjusts the luminance level. It adjusts the “black” end of the luminance range, between +0.500 (maximum “black stretch”) and –0.500 (maximum “black crush”). For “transparent” results, use the default of 0.000. If in doubt, use this default.



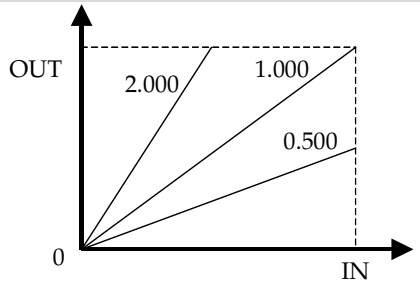
4.1.3.3 Mid Stretch

This setting adjusts the luminance range, specifically the gamma. It adjusts the middle of the luminance range, between +2.000 (maximum “mid stretch”) and –2.000 (maximum “mid crush”). At values other than 0.000, the resulting luminance response is a curve. For “transparent” or “linear” results, use the default of 0.000. If in doubt, use this default.



4.1.3.4 Chroma Gain

This setting adjusts the chrominance level, as a decimal multiple (between 0.50 and 2.00) of the input level. For “transparent” results, use the default of 1.00. If in doubt, use this default.



4.1.4 TEST PATTERN GENERATOR

These controls allow a range of video test patterns to be selected in place of the actual input video source. If the input video source is disconnected or switched off, test patterns can still be selected: the video standard will then default to the most recently used one.

When the “Pre Processor” menu screen (described below) is set to “Bypass All”, these menu controls are “grayed out” as shown in the example menu screen in section 4.1.1.3 above.

4.1.4.1 Enable

When this check-box is checked, the current video test pattern is selected in place of the actual input video source. When this check-box is not checked, the input video source is selected and the other controls (see below) are “grayed out”.

If in doubt, un-check this check box to disable the test patterns.

4.1.4.2 Patterns

This control selects one of the following test patterns:

- 75% Bars,
- 100% Bars,
- SMPTE Bars,
- Tartan Bars.

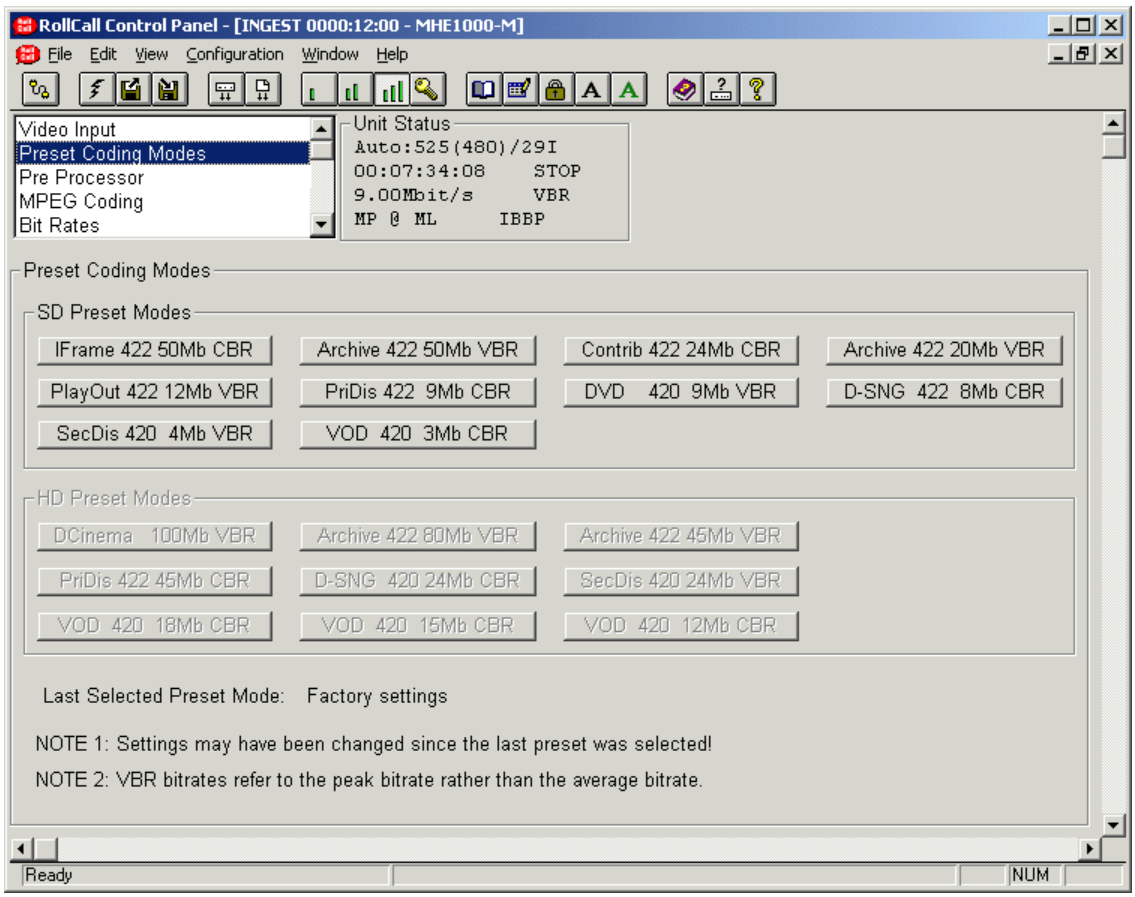
The percentage figure within some pattern names refers to the chroma level used, as a percentage of the maximum chroma saturation which is legal for video.

4.1.4.3 Horizontal Speed

This control allows the test pattern to have continuous horizontal motion. The range of allowed values is -32 to 32. The value is the horizontal movement is pixels per frame. A value of exactly zero therefore produces no horizontal motion. A negative value produces motion to the left. A positive value produces motion to the right.

4.2 PRESET CODING MODES MENU SCREEN

This menu screen controls the MPEG-2 encoding using sophisticated presets for a number of applications. It affects both the picture quality and the compatibility of the compressed MPEG-2 video stream. Selecting each preset over-rides all of the menu items settings on the “Pre Processor”, “MPEG Coding” and “Bit Rates” menu screens. It is therefore strongly recommended that when setting up any new application, the user selects one of these presets as the starting-point, before adjusting any parameters using the “Pre Processor”, “MPEG Coding” or “Bit Rates” menu screens.



Each preset is selected by clicking on one of the labeled buttons on this menu screen. Note that the “Unit Status” window and the other menu screens may not change immediately: it can take several seconds for each preset to take effect.

The buttons for the preset coding modes are labeled as follows:

xxx sss bbb mmm

The meanings of these fields are as follows.

xxx – Name of the preset (these indicate the intended application)
sss – Video sampling mode, either 4:2:2 or 4:2:0, in the MPEG-2 video stream
bbb – Bit-rate in Megabits/second (hence the suffix “Mb”)

mmm – Video encoding mode, either variable bit-rate (VBR) or constant bit-rate (CBR)

Note that the lower-bit-rate preset coding modes, particularly the “VOD” ones, have been optimized using sports material shot on 1125(1080)/29I video (rather than film). In MPEG-2 encoding terms, such material is relatively demanding. These preset coding modes should therefore be suitable for unpredictable and/or demanding video material. If the material is less demanding then the “linear” pre-processor filter “cutoff” settings (see Section 4.3.3) may be increased (from their preset coding mode values) without significantly increasing the visibility of MPEG-2 encoding artifacts.

The SD and HD preset modes available are detailed below.

WARNING! Selecting a preset coding mode (even the same one as was last selected) will temporarily interrupt the validity of output video, audio and all other data in the output Transport Stream.

4.2.1 SD PRESET MODES

When working in SD, this menu offers the set of presets shown in the example menu screen above. Each is ideal as a starting point for a particular application, before fine adjustments. It is recommended that when setting up any new application, the user selects one of these presets as the starting-point, before adjusting MPEG-2 coding parameters and bit rates.

The following SD presets are available:

I-frame 422 50Mb CBR
I-frame-only 4:2:2 coding at the maximum legal bit rate.

Archive 422 50Mb VBR
Near-transparent 4:2:2 long-GOP coding at variable bit-rate, using the maximum legal bit-rate as the peak value.

Contrib 422 24Mb CBR
4:2:2 contribution link and high-end mastering and archiving applications in constant bit-rate.

Archive 422 20Mb VBR
4:2:2 high-end mastering and archive ingest applications in constant quality mode. Allows the user to minimize storage needs while maintaining the highest quality.

Playout 422 12Mb VBR
4:2:2 transmission for master files over a telecom link (i.e. file contribution).

PriDis 422 9Mb CBR
4:2:2 primary distribution link over a telecom link.

DVD 420 9Mb VBR
Ingest for 4:2:0 DVD mastering.

D-SNG 422 8Mb CBR
4:2:2 digital satellite news gathering applications.

SecDis 420 4Mb VBR
Secondary 4:2:0 distribution link for telecom links.

VOD 420 3Mb CBR
4:2:0 mastering for Video On Demand and other “new media” applications.

4.2.2 HD PRESET MODES

When working in HD, this menu offers the set of presets shown in the example menu screen below. Each is ideal as a starting point for a particular application, before fine adjustments. It is recommended that when setting up any new application, the user selects one of these presets as the starting-point, before adjusting MPEG-2 coding parameters and bit rates.

The following HD presets are available:

DCinema 422 100Mb VBR
4:2:2 D-Cinema and other high-end mastering and archiving applications in constant quality mode. This preset will be “grayed out” if the “80Mbit Coding” option is not fitted.

Archive 422 80Mb VBR
4:2:2 high-end mastering and archive ingest applications in constant quality mode. Allows the user to minimize storage needs while maintaining the highest quality.

Archive 422 45Mb VBR
4:2:2 ingest for DTV, for example over an ATM link.

PriDis 422 45Mb CBR
4:2:2 primary distribution link for DTV, for example over an ATM link.

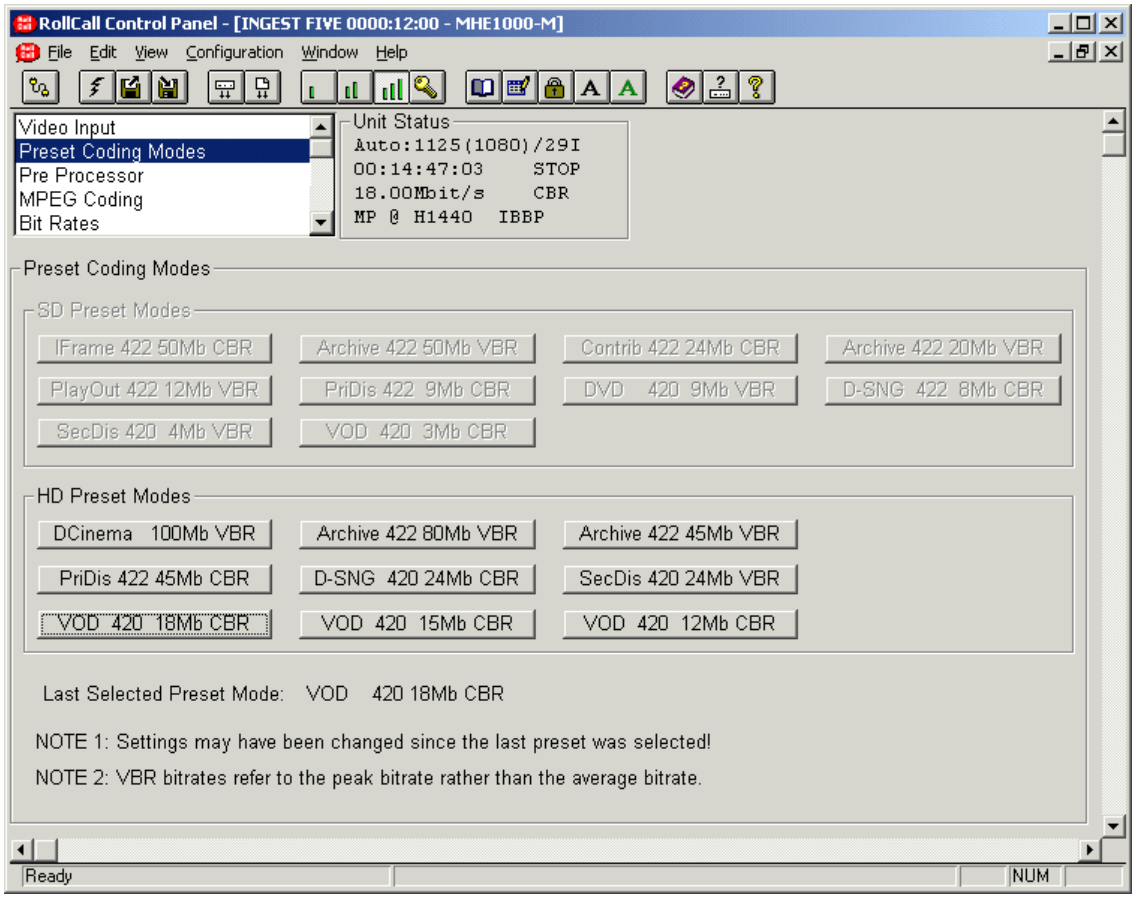
D-SNG 420 24Mb CBR
4:2:0 digital satellite news gathering applications.

SecDis 420 24Mb VBR
4:2:0 secondary distribution link for DTV over ATM.

VOD 420 18Mb CBR
4:2:0 Video On Demand and other “new media” applications: higher bandwidth.

VOD 420 15Mb CBR
4:2:0 Video On Demand and other “new media” applications: medium bandwidth.

VOD 420 12Mb CBR
4:2:0 Video On Demand and other “new media” applications: lower bandwidth.



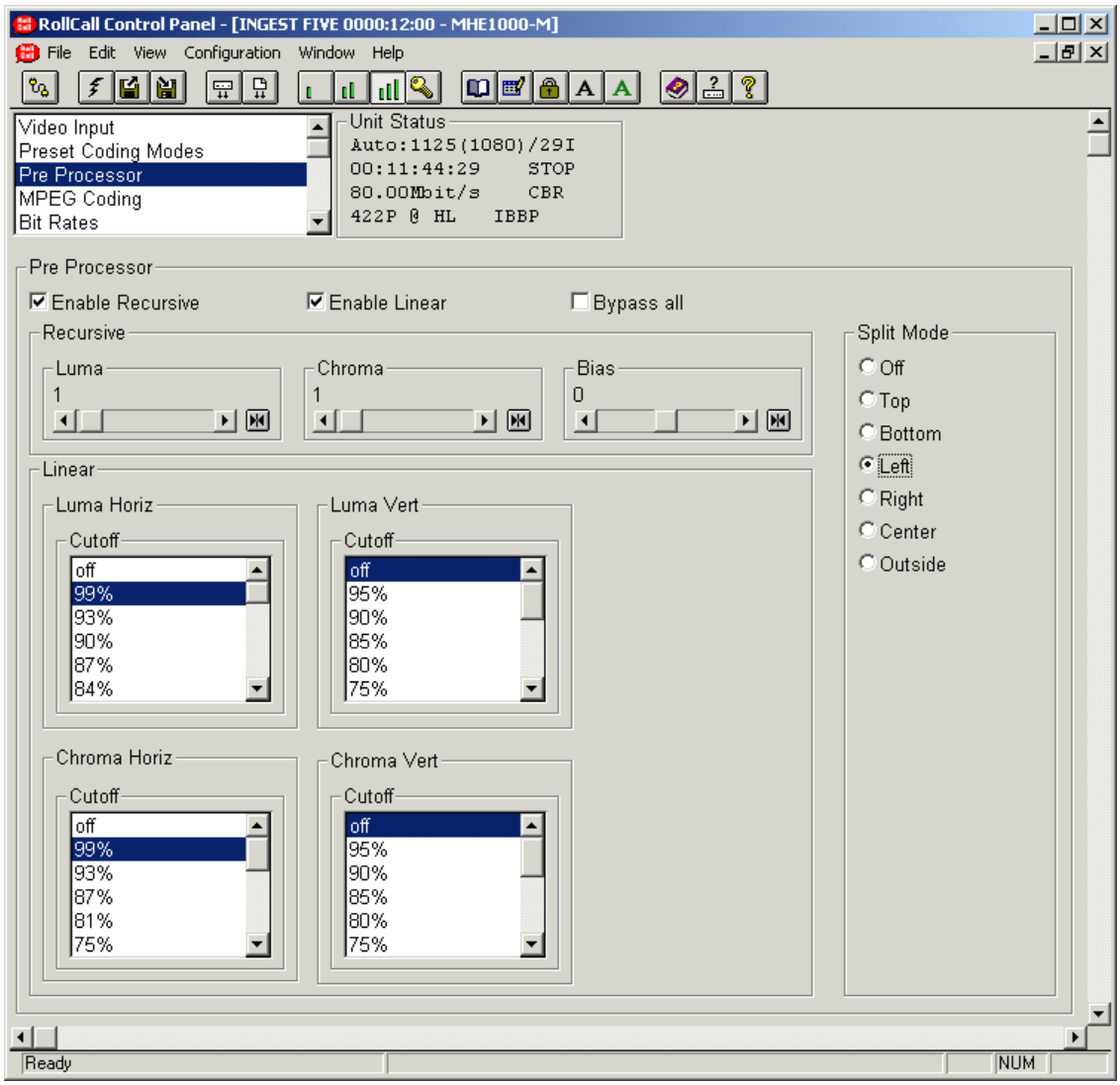
4.2.2.1 Last Selected Preset Mode

This information field is a reminder of which of the above presets was selected most recently. However, this information does not imply that all current settings are consistent with that preset: individual settings may have been changed since the most recent preset was selected.

If no preset coding mode has been selected since the most recent “reset all settings to factory defaults” operation (see Section 4.15.2) then “Factory settings” will be shown here rather than the name of a Preset Coding Mode. The first example menu screen of Section 4.2 shows this condition.

4.3 PRE PROCESSOR MENU SCREEN

This menu screen configures the video pre-processing filters. It affects the picture quality of the compressed MPEG-2 video stream. It is recommended that when setting up any new application, the "Preset Coding Modes" menu screen (see Section 4.2 above) is used before this one rather than afterwards, because each preset over-rides all the pre-processor settings.



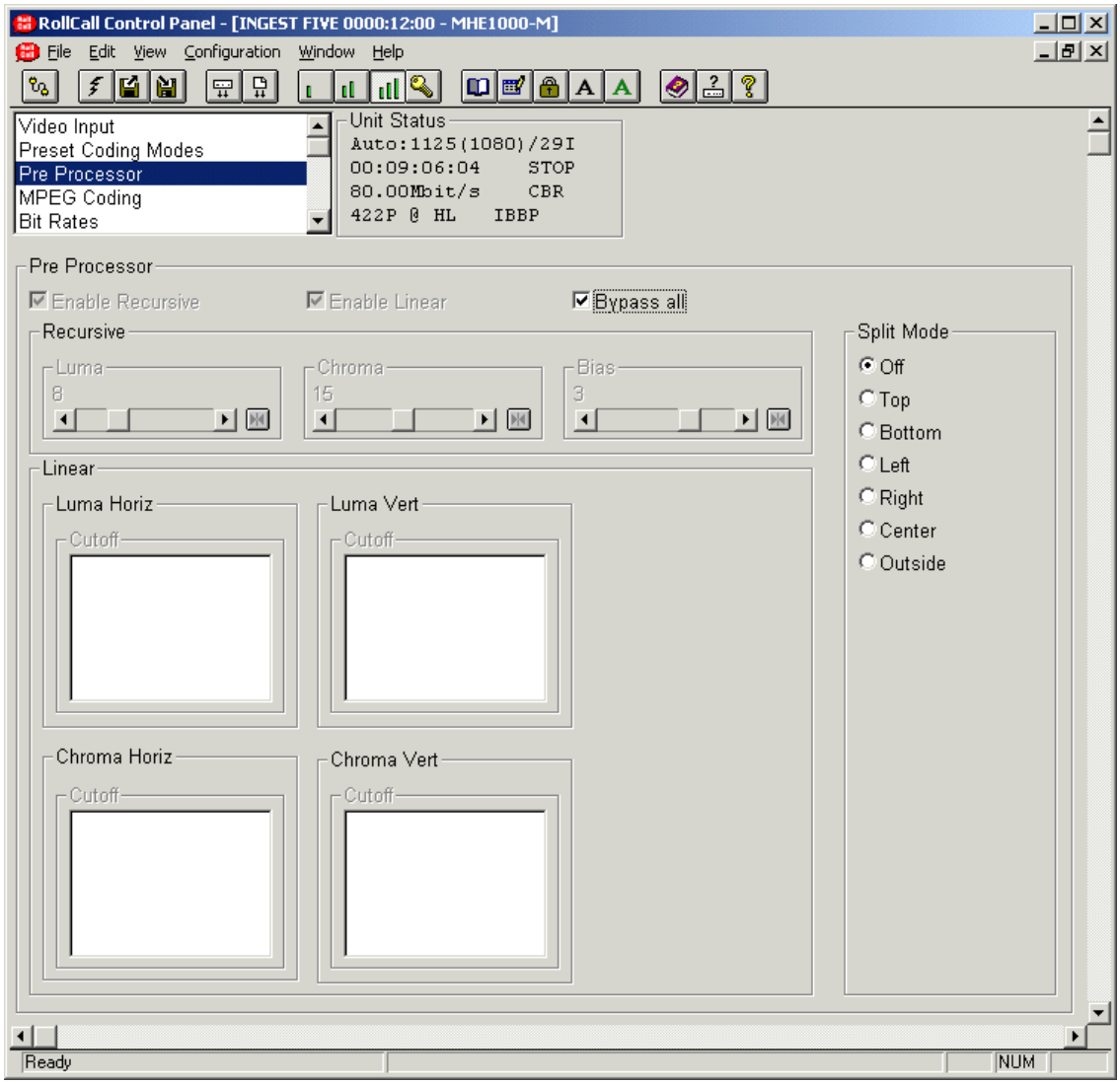
The pre-processor menu screen has the following top-level settings:

Enable Recursive: Checking this option switches on the recursive filter. It can be very useful to be able to turn off the recursive filters during pre-processor set-up so that the effects of the recursive and linear filters can be seen separately.

Enable Linear: Checking this option switches on the linear filters. It can be very useful to be able to turn off the linear filters during pre-processor set-up so that the effects of the linear and recursive filters can be seen separately.

Bypass all: Checking this option switches off all the filters, as shown in the example menu screen below. The Recursive and Linear filter switches are then “grayed out” but their settings are “kept in reserve” so that they can be re-applied by switching “bypass all” off. The “Bypass all” mode may be useful as a reference against which to check the effect of the filters, and may be worth trying for "near-lossless" operation at high video bit-rates.

Each filter can be set up independently, as described below. If the unit has been purchased without the “pre-processor” option, “bypass” will be permanently selected on this menu: the whole menu will be “grayed out” as shown in the example menu screen below.



4.3.1 SPLIT MODE

When adjusting the recursive and linear filter settings, a “live” MPEG-2 decoder is usually used together with a suitable monitor. However, it can still be difficult to see the exact amount of effect they are having on the resulting picture. In order to assist in this process, this menu allows the recursive and linear filters to be applied over just half of the picture: the other half effectively has both the recursive and linear filters bypassed. This mode of operation is called “Split Mode”: the picture is split into a filtered part and a non-filtered part.

The “Split Mode” can be used in combination with the “Enable Recursive” and “Enable Linear” menu controls described above, as shown in the table below.

Split Mode:	Enable Recursive:	Enable Linear:	Result:
Off	Off	Off	No filters applied over any part of the picture.
On *	Off	Off	No filters applied over any part of the picture.
Off	Off	On	Linear filters applied over the whole picture.
On *	Off	On	Linear filters applied over half of the picture.
Off	On	Off	Recursive filters applied over the whole picture.
On *	On	Off	Recursive filters applied over half of the picture.
Off	On	On	Linear and recursive filters both applied over the whole picture.
On *	On	On	Linear and recursive filters applied over same half of the picture.

* For “Split Mode”, “On” means any option other than “Off”.

Because different picture material can make the split boundary position difficult to see, there are 7 different options for the split mode itself, rather than just “Off” and “On”. These options are as follows.

Off – This is the default setting, in which “Split Mode” is off. The filters are applied over the whole picture. It is critical that this option is selected before “going live” with MEMPHIS, unless the “Split Mode” is being specifically demonstrated. To help ensure this, “Split Mode” will automatically be set to “off” when MEMPHIS goes into “Rec” (stream capture) mode. See Section 4.11 for other information about “Rec” mode.

Top – “Split Mode” is on. The filters are applied over the top half of the picture only. The split boundary is a horizontal line half-way down the picture.

Bottom – “Split Mode” is on. The filters are applied over the bottom half of the picture only. The split boundary is a horizontal line half-way down the picture.

Left – “Split Mode” is on. The filters are applied over the left half of the picture only. The split boundary is a vertical line half-way across the picture.

Right – “Split Mode” is on. The filters are applied over the right half of the picture only. The split boundary is a vertical line half-way across the picture.

Center – “Split Mode” is on. The filters are applied only inside a central rectangular area of the picture. The split boundary is a rectangle centered on the picture center.

Outside – “Split Mode” is on. The filters are applied only outside a central rectangular area of the picture. The split boundary is a rectangle centered on the picture center.

4.3.2 RECURSIVE

Recursive filters reduce noise by temporally averaging successive pictures. Noise can be reduced in stationary areas of the picture without loss of horizontal or vertical detail. A complex noise-floor measurement algorithm is used to automatically adjust the filter threshold to a level just above the noise floor. This ensures optimum noise reduction across a wide range of material.

Remember that the higher the picture noise level, the higher the video bit-rate required to minimize the visibility of MPEG-2 compression artifacts. This is because as far as MPEG-2 compression is concerned, noise is high-frequency detail which is different on every picture. Noise can therefore consume a large number of MPEG-2 bits on its own, leaving less MPEG-2 bits for the picture material “underneath the noise”. It is therefore recommended that the lower the target video bit-rate, the larger the amount of recursive noise reduction should be.

The menu has 3 controls for the recursive filters, as follows.

Luma

This slide bar adjusts the maximum amount of recursive luminance noise reduction, on a scale from 0 to 31 (31 provides the strongest filtering). This control works by limiting the maximum amount of noise reduction which can be applied to any pixel. In other words, it adjusts the strength of the luminance noise reduction on those areas of the picture which contain the most noise. Note that the actual amount of noise reduction is adjusted automatically on a pixel-by-pixel basis, subject to this maximum.

Using this control, the user can put a limit on how noticeable the effects of the recursive filter are. For “transparent” results, it is best not to exceed a setting of 2.

Chroma

This slide bar adjusts the maximum amount of recursive chrominance noise reduction, on a scale from 0 to 31 (31 provides the strongest filtering). This control works by limiting the maximum amount of noise reduction which can be applied to any pixel. In other words, it adjusts the strength of the chrominance noise reduction on those areas of the picture which contain the most noise. Note that the actual amount of noise reduction applied by the recursive filter is adjusted automatically on a pixel-by-pixel basis, subject to this maximum.

Using this control, the user can put a limit on how noticeable the effects of the recursive filter are. For “transparent” results, it is best not to exceed a setting of 2.

Bias

This slide bar allows adjustment of the absolute (rather than maximum) amount of noise reduction from the recursive filter. In other words, it adjusts the strength of the noise reduction everywhere in the picture, rather than just in those areas which contain the most noise. Even after this adjustment, the noise reduction is still subject to the maximum luminance and chrominance limits set in the “Luma” and “Chroma” menus above.

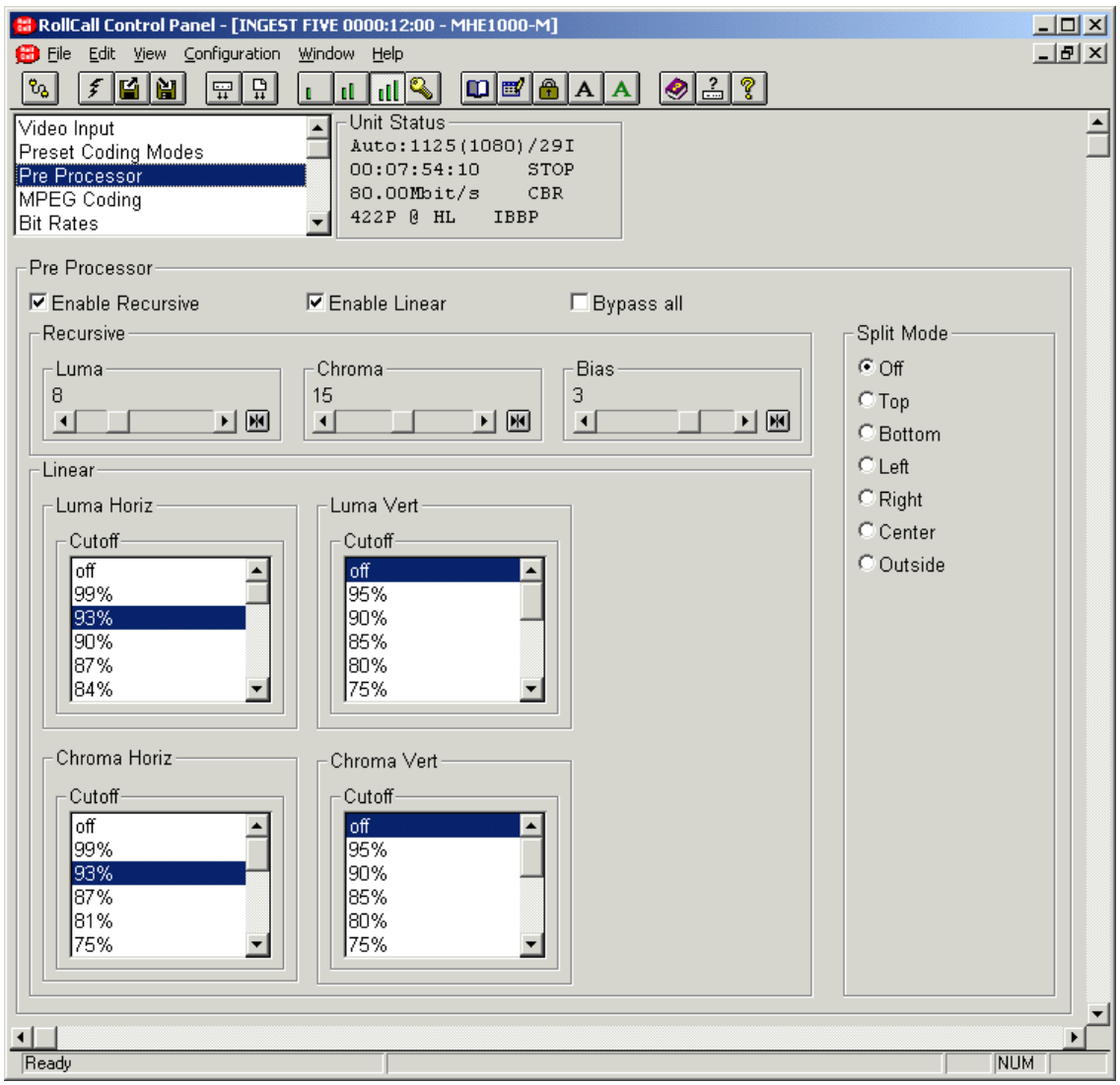
The level set using this slide bar is added to the picture noise-floor automatically measured by the pre-processor. The resulting "biased" noise level is then used as the level of noise to be removed by the filter. This “biased” noise level automatically controls the recursive filter.

The default bias value is zero. Increasing the bias (subject to a maximum value of +7) has the effect of raising the noise threshold and therefore giving more noise reduction. Decreasing the bias (subject to a minimum value of –7) has the effect of reducing the noise threshold and therefore giving less noise reduction.

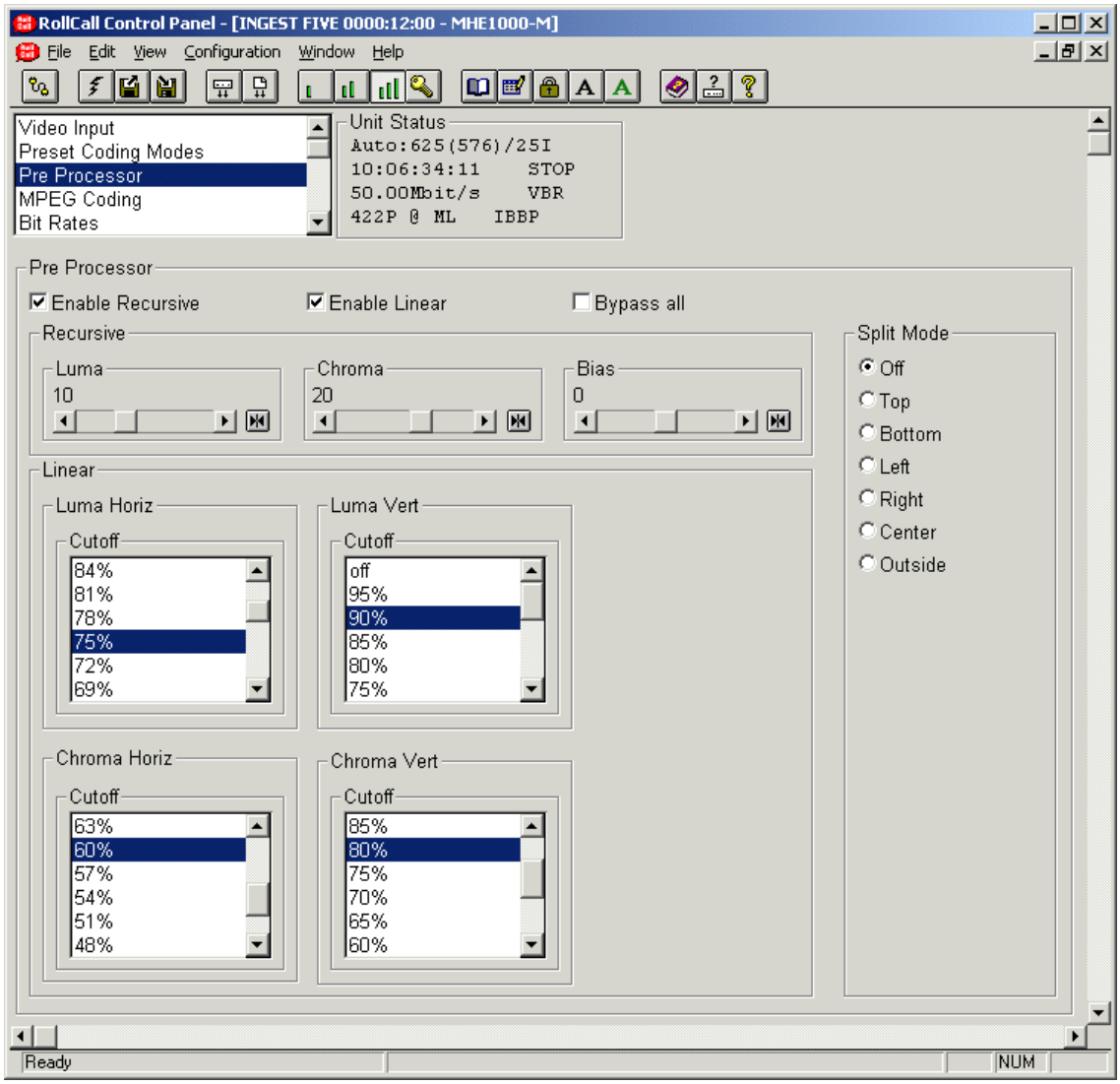
The best “Luma”, “Chroma” and “Bias” settings to use for the recursive filters depend on the type and amount of picture noise, but also on how much noise reduction is acceptable before the resulting picture is judged to be “over-processed” by the relevant target audience. There is therefore no single ideal setting which will suit all cases. However, some practical examples may assist in understanding how the recursive filter controls can be applied in different situations.

The example menu screen at the very start of Section 4.3 (see above) is for an HD video source which contains a small amount of noise. The “Luma” and “Chroma” are both set to 1 (the minimum amount) and the “Bias” to 0 (the default). This is typical of the preprocessor settings for the Preset Coding Modes (see earlier section): a subtle but worthwhile reduction in noise, without risking visible side effects. The examples below of much stronger noise reduction may also be instructive.

In the example menu screen below, the pre-processor filters have been set for a particular example of “noisy” HD film material. The source is an HD-D5 tape of a film with considerable high-resolution texture but also with very strong (film grain) noise. The recursive filter Bias has been turned up from its default setting of 0 (more suited to video) to +3 to force it to give more grain reduction. The Luma and Chroma settings have each been turned up as high as possible without causing obvious blurring of moving surface textures.



In the example menu below, the pre-processor filters have been set for an extreme example of “noisy” SD video material. The source is a VHS tape with very little bandwidth but a great deal of noise. The default recursive filter Bias setting of 0 is well suited to video material. The Luma and Chroma settings have each been turned up as high as possible without significantly worsening the VHS blurring of surface textures.



Note that in both the above example menu screens, the MPEG-2 coding mode and bit-rate have been set to higher quality settings than the final “target” ones for each application. This has been done just for pre-processor set-up, so that the effects of pre-processing can be seen in relative isolation from the effects of compression. Once the preprocessor settings have been adjusted, the MPEG-2 coding mode and bit-rate are set to their target values and the resulting picture quality checked again. This technique can be useful when trying to judge the effects of changes to the preprocessor settings, including those of the “Linear” filters described below.

4.3.3 LINEAR

A suite of linear filters allows fine control over the horizontal and vertical bandwidth of the picture's luminance and chrominance components. Brick-wall low-pass filters provide good band-limiting facilities so that picture bandwidth can be controlled to suit the target MPEG-2 video bit-rate.

The "LINEAR" menu controls the settings of the linear filters. Chrominance and luminance are each filtered vertically and horizontally, hence four filters:

Luma Horiz – Luminance horizontal filter

Luma Vert – Luminance vertical filter

Chroma Horiz – Chrominance horizontal filter

Chroma Vert – Chrominance vertical filter

Each of these 4 filters is adjusted using its own independent "Cutoff" control. This adjusts the cutoff frequency of the filter. The units used are percentages of the inherent frequency limit imposed by the digital sample rate of the input video (be this SD or HD).

For best results, start with the presets offered in the "Preset Coding Modes" menu screen (see Section 4.2). These set the filters to suit the application (archive, VOD, etc). Filter settings can then be fine-tuned manually if required. The best setting to use for the linear filters depends on the bandwidth of the source picture material, but also on how much "softening" is acceptable before the resulting picture is judged to be "over-processed" by the relevant target audience. In some cases, a certain amount of "softening" may be desirable to achieve a previously established "look" (whether personal taste or "house style") or even to suit a particular type of display device. There is therefore no single ideal setting to suit all possible cases. However, some practical examples may assist in understanding how the linear filter controls can be applied in different situations. The example menu screens above show the linear filter settings which have been used in particular situations (see the descriptions above) alongside the recursive filter settings.

The linear filters are completely separate from the "Horizontal Resolution" sub-sampling filters controlled using the "MPEG CODING" menu screen (described in Section 4.4.1.3). The input video passes through the pre-processing filters, then through the "Horizontal Resolution" sub-sampling filters, then into MPEG-2 compression. Setting the horizontal luminance or chrominance cutoff value higher than the value (shown in the table below) corresponding to the "Horizontal Resolution" menu settings will therefore have negligible effect.

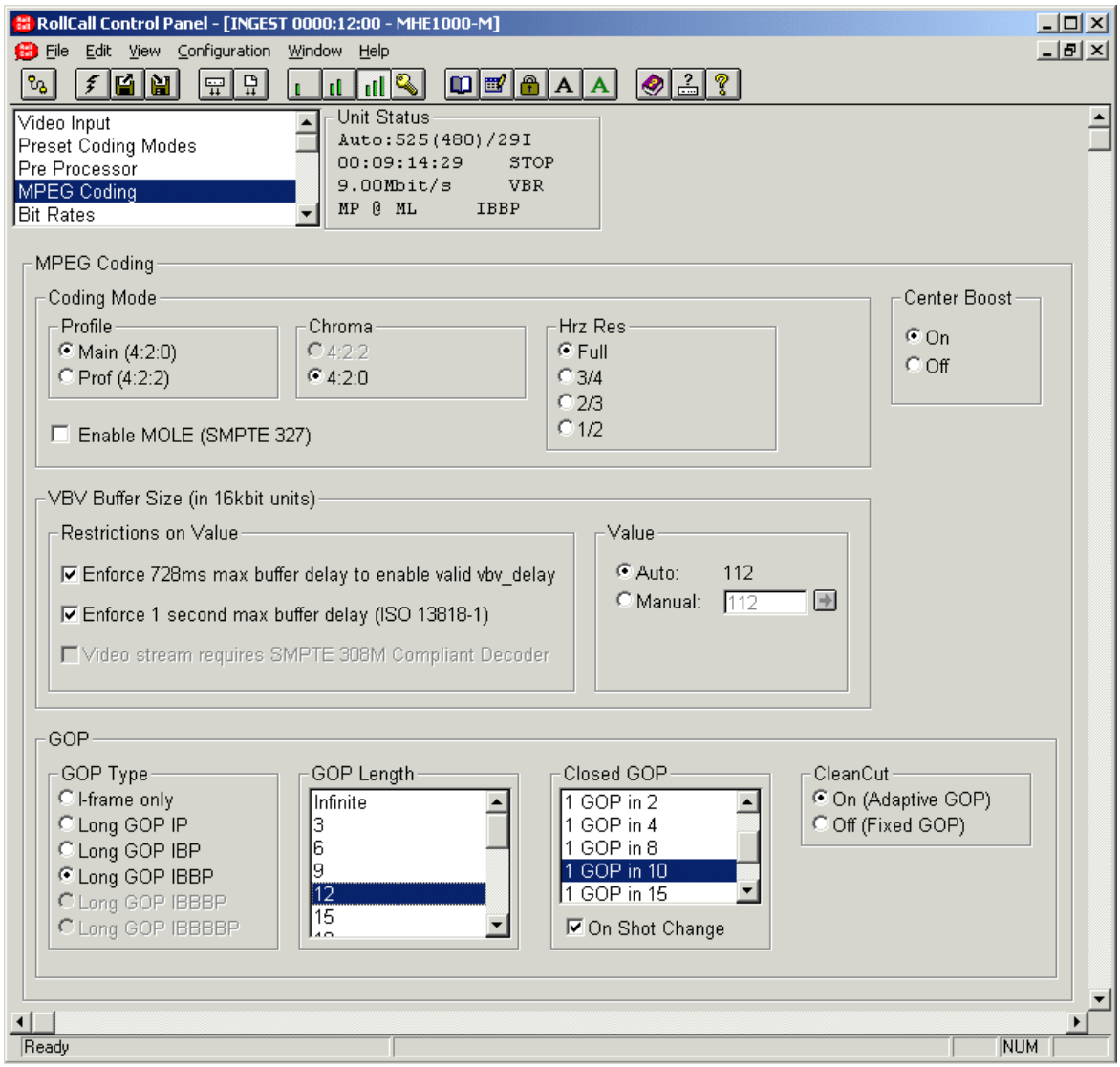
Horizontal Resolution Setting:	Corresponding Linear Cutoff Value:
Full	100%
3 / 4	75%
2 / 3	67%
1 / 2	50%

Both the linear filters and the "Horizontal Resolution" sub-sampling filters reduce the bandwidth of the input video before it is compressed, so both should be used together for best results. To see examples of this, select each of the lower-bit-rate Preset Coding Modes (see Section 4.2) and look at the resulting settings for the "Horizontal Resolution" and the "Linear" filter bandwidth. The lower the video bit-rate, the smaller will be the values of all these menu items, reducing the input video bandwidth.

Remember that "softer" pictures are less demanding of high MPEG-2 bit-rates. In other words, reducing the bandwidth of the input video (before it is compressed) reduces the visibility of MPEG-2 compression artifacts. It does this by simply reducing the amount of MPEG-2 compression required to achieve the target bit-rate. This can be used to compensate for the fact that reducing the video bit-rate increases the visibility of MPEG-2 compression artifacts. However, the situation is complicated by the fact that the visibility of these artifacts also depends very strongly on the nature of the input video picture material. For example, sports material is far more demanding of higher bit-rates than relatively static "talking heads". The optimal menu settings therefore depend on the nature of the input video picture material as well as the target bit-rate.

4.4 MPEG CODING MENU SCREEN

This section configures the video encoding. It affects both the picture quality and the compatibility of the compressed MPEG-2 video stream. It is recommended that when setting up any new application, the "Preset Coding Modes" menu screen (see Section 4.2 above) is used before this one rather than afterwards, because each preset over-rides all the MPEG coding settings.



4.4.1.1 Profile

The MPEG-2 “profile” is defined by the MPEG-2 video specification (ISO specification 13818-2). The following 2 options are available:

Main (4:2:0) – Main Profile (often abbreviated to MP) only allows 4:2:0 video sampling. In this case, the MPEG CODING menu screen looks as shown in the example above.

Prof (4:2:2) – Professional Profile (also known as “4:2:2 Profile”) allows both 4:2:0 and 4:2:2 video sampling. In this case, the “CODING MODE” menu looks as shown in the example below.

Note that the MPEG-2 coding “level” (as distinct from the “profile”) is set automatically depending on the horizontal resolution. The horizontal resolution menu is described below.

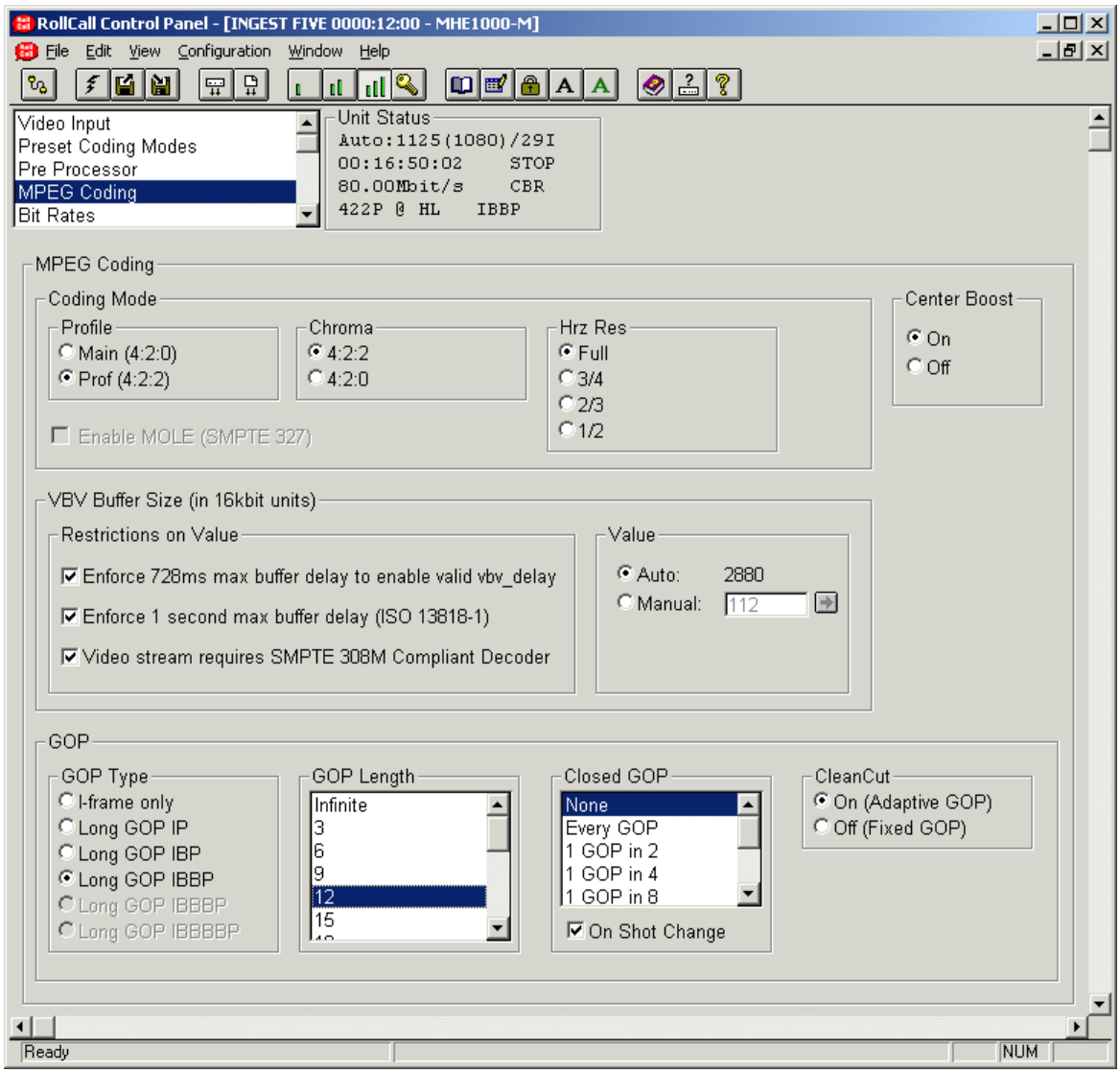
WARNING! Changing the Profile setting may temporarily interrupt all video, audio and VBI streams within the output Transport Stream.

4.4.1.2 Chroma

This menu selects the video chroma sampling mode for the MPEG-2 video stream: this is actually a separate MPEG-2 stream parameter from the stream “profile” (see above) although the two are related. If the “profile” is set to “Main (4:2:0)” then this menu is “grayed out” and the video chroma sampling mode in the MPEG-2 video stream will always be 4:2:0. If the “profile” is set to “Prof (4:2:2)” then there are two video chroma sampling mode options for the MPEG-2 video stream: 4:2:0 and 4:2:2.

It is usual to set the chroma sampling to 4:2:2 if the “profile” is set to “Prof (4:2:2)”. Many MPEG-2 decoders do not support 4:2:2 Profile. Some that do support 4:2:2 Profile only do so in 4:2:2 chroma sampling mode.

WARNING! Changing the Chroma setting may temporarily interrupt all video, audio and VBI streams within the output Transport Stream.



4.4.1.3 Hrz Res (Horizontal Resolution)

MPEG-2 video can use a number of sub-sampled horizontal resolutions. The following 4 options are available:

Full – Full horizontal resolution.

3/4 – Three-quarter horizontal resolution by sub-sampling the input video picture.

- For SD input video, the MPEG-2 picture will have either 528 or 544 pixels per line, depending on whether "analogue" or "digital" horizontal blanking is selected (see Section 4.1.2.3).
- For HD input video with 1920 pixels per line, the MPEG-2 picture will have 1440 pixels per line.
- For HD input video with 1280 pixels per line, the MPEG-2 picture will have 960 pixels per line.

2/3 – Two-third horizontal resolution by sub-sampling the input video picture.

- For SD input video, the MPEG-2 picture will have 480 pixels per line.
- For HD input video with 1920 pixels per line, the MPEG-2 picture will have 1280 pixels per line.
- For HD input video with 1280 pixels per line, the MPEG-2 picture will have 864 pixels per line.

1/2 – Half horizontal resolution by sub-sampling the input video picture.

- For SD input video, the MPEG-2 picture will have 352 pixels per line.
- For HD input video with 1920 pixels per line, the MPEG-2 picture will have 960 pixels per line.
- For HD input video with 1280 pixels per line, the MPEG-2 picture will have 640 pixels per line.

Full horizontal resolution is recommended for maximum quality at medium and high bit rates. The purpose of the sub-sampled modes is to give better quality MPEG-2 encoding at low bit rates. As the bit-rate decreases, reducing the horizontal resolution of the MPEG-2 picture is the most effective way to reduce the bandwidth of the input video before it is compressed. This reduces the visibility of MPEG-2 compression artifacts by simply reducing the amount of MPEG-2 compression required to achieve the target bit-rate.

The "Horizontal Resolution" menu settings control sub-sampling filters which are completely separate from the linear filters controlled using the "PRE PROCESSOR" menu screen (described in Section 4.3.3). The input video passes through the pre-processing filters, then through the "Horizontal Resolution" sub-sampling filters, then into MPEG-2 compression. Both sets of filters reduce the bandwidth of the input video before it is compressed, so both should be used together for best results. To see examples of this, select each of the lower-bit-rate Preset Coding Modes (see Section 4.2) and look at the resulting settings for the "Horizontal Resolution" and the "Linear" filter bandwidth. The lower the video bit-rate, the smaller will be the values of all these menu items, reducing the input video bandwidth.

Remember that reducing the bandwidth of the input video (before it is compressed) reduces the visibility of MPEG-2 compression artifacts. This can be used to compensate for the fact that reducing the video bit-rate increases the visibility of MPEG-2 compression artifacts. However, the situation is complicated by the fact that the visibility of these artifacts also depends very strongly on the nature of the input video picture material. For example, sports material is far more demanding of higher bit-rates than relatively static "talking heads". The optimal menu settings therefore depend on the nature of the input video picture material as well as the target bit-rate.

Note that for SD video-DVD authoring, only "Full" and "1/2" horizontal resolutions are generally considered to be DVD-compatible for 4:3 aspect ratio material, and only "Full" horizontal resolution is generally considered to be DVD-compatible for 16:9 aspect ratio material.

4.4.2 Enable MOLE™

This control enables MOLE™ metadata according to SMPTE 319 and SMPTE 327. This feature minimizes real-time re-coding loss when the video input is actually decoded MPEG-2. It requires a MOLE™-compliant MPEG-2 decoder to be used as the source of uncompressed video for MEMPHIS. However, any MPEG-2 decoder can be used to decode the output Transport Stream from MEMPHIS, even when "MOLE™" is enabled.

The "MOLE™" function is only available for SD input video standards. For HD video input video standards, it is "grayed out" as in the example menu screen above.

4.4.3 Center Boost

When the “Center Boost” option is switched “on”, MEMPHIS uses higher coding quality for the central area of the picture than for the edges. This will usually improve the overall quality of the pictures at low bit rates. The lower the video bit-rate, the stronger the boost applied: this adjustment always happens automatically. At high bit rates, the boost applied is small. At very high bit-rates, the boost applied is zero.

When the “Center Boost” option is switched “off”, the boost applied is zero (regardless of the video bit rate).

For certain picture material (mainly “artificial” material such as some animation and particular synthetic moving test patterns) the MPEG-2 video may look better with “Center Boost” switched “off”. However for “natural” picture material (such as sports and “live action” drama and film) the MPEG-2 video will almost always look better with “Center Boost” switched “on”.

It is recommended that this setting be left “on” (the default setting) as the overall picture quality improvement will usually outweigh the reduction in quality at the edges. It may however be switched “off” if required, for example to allow the picture quality “with” and “without” the “Center Boost” to be compared.

4.4.4 VBV Buffer Size

The MPEG-2 video stream output by this unit must be compatible with the smallest video decoder buffer size within any of the MPEG-2 decoders which will be used with it (both “live” and via captured clips). This buffer size is called the “VBV buffer size” in MPEG-2. The larger this buffer is, the greater the maximum encoded picture quality can be.

To help ensure video stream compatibility, there are 3 specific compatibility options.

Enforce 728ms max buffer delay to enable valid vbv_delay – when this is switched “on”, the VBV buffer size will be decreased at very low bit rates so that the buffer delay never exceeds 728ms (the maximum valid delay value which can be represented by vbv_delay) and the vbv_delay field in the video stream will convey valid values. If this compatibility option is switched “off” then vbv_delay will be set to 65535: this is a reserved value meaning “invalid”. In applications which use Transport Streams (or PES Streams) rather than Elementary Streams, vbv_delay is not important (because the PES layer timestamps are available) so this option may be switched “off”. If in doubt, switch this option “on”.

Enforce 1 second max buffer delay (ISO 13818-1) – when this is switched “on”, the VBV buffer size will be decreased at very low bit rates so that the buffer delay never exceeds 1000ms (the maximum delay value allowed by the MPEG-2 specification). This option should only ever be switched “off” in applications where all the “target” MPEG-2 decoders are known to be able to tolerate a longer delay than the MPEG-2 specification allows. If in doubt, switch this option “on”.

Video Stream requires SMPTE 308M Compliant Decoder – when this is switched “on”, the VBV buffer size will be allowed to use the large value specified by SMPTE 308M, the document which defines 4:2:2 Profile HD MPEG-2. This option is “grayed out” unless the coding mode is 4:2:2 Profile HD MPEG-2. When this option is not “grayed out” it should normally be switched “on”. This option should only be switched “off” if the “target” MPEG-2 decoders are known to be non-compliant with SMPTE 308M. If in doubt, switch this option “on”.

Note that the first of these 3 compatibility options is more restrictive than the second. Therefore, if the first is switched “on” then the second is automatically switched “on”. Similarly, if the second is switched “off” then the first is automatically switched “off”.

In addition to the above compatibility options, this menu also allows the actual value of the VBV buffer size to be set, using the 2 alternative options below.

Auto – when this is selected, the smallest applicable standard buffer size is used, to ensure maximum compatibility. This value will be the smallest of the MPEG-2 standard, ATSC and DVB values that apply to the current input video standard. When this option is selected, the “Manual” value will be “grayed out” so that it cannot be applied.

Manual – the user can enter a value here, in 16kilobit units. Here 1 kilobit means 1024 bits.

The “Auto” value for the VBV buffer size depends on whether the video being encoded is SD or HD, and also on the current MPEG-2 coding mode. The relevant “Auto” value is always displayed on this menu screen, even if “Manual” mode has been selected, and can therefore be used as a guide. In “Manual” mode, the “Manual” value can be set above the “Auto” value, unless the “Manual” value exceeds the limit set by the compatibility options (see previous page). However, if the “Manual” value exceeds the “Auto” value then it is less likely that MPEG-2 decoders or servers will accept the resulting stream.

Note that certain non-compliant MPEG-2 decoders and servers are restricted to 10-bit values for the VBV Buffer Size and will not therefore accept the stream unless the VBV Buffer Size is 1023 or less. This would obviously require the use of “Manual” mode if the “Auto” value is greater than 1023.

Some playout server/decoders require a relatively small VBV Buffer Size. This requirement gives a short video decoding latency so that the decoded picture responds quickly to a “play now” command. To meet this requirement, the “VBV buffer” size can be set to a smaller value than the default.

If in doubt, select “Auto”.

4.4.5 GOP

This section adjusts the GOP (Group of Picture) structure of the MPEG video Elementary Stream.

4.4.5.1 GOP Type

This menu controls the GOP structure. It offers the following options:

I-frame only – the GOP is only made of I-frames (also known as “anchor frames”). Note that this mode is not compatible with the I-frame-only D-10 format (also referred to as “IMX”).

Long GOP xxx – the GOP can contain more than 1 picture and may take several forms: IP (no B picture), IBP (only one successive B picture), IBBP (two successive B pictures), and so forth. The maximum supported number of successive B pictures depends on the input video standard: it is 4 for progressive video at 50.000, 59.940 and 60.000 frames/second, and 2 for all other video standards.

If the unit has been purchased without the “long GOP” option, “I-frame only” will be the only available option on this menu: the others will be “grayed out”.

4.4.5.2 GOP Length

This setting adjusts the length of the GOP, measured (in display picture order) from the start of an I-picture to a point just before the next I-picture. The longer the GOP, the higher the video compression efficiency. However, the efficiency gain is relatively small. Also, the longer the GOP, the longer the start-up time for MPEG-2 decoders (which must see an I-frame to start decoding) and the fewer closed-GOP random-access points the captured clip file will be able to have (for post-ingest editing). Closed GOPs are covered in the next section, below.

The following GOP length values are available:

1, 2, 3,…, 16 – length of GOP in pictures, when GOP type is Long GOP IP.

2, 4, 6,…, 32 – length of GOP in pictures, when GOP type is Long GOP IBP.

3, 6, 9,…, 48 – length of GOP in pictures, when GOP type is Long GOP IBBP.

4, 8, 12,…, 64 – length of GOP in pictures, when GOP type is Long GOP IBBBP.

5, 10, 15,…, 80 – length of GOP in pictures, when GOP type is Long GOP IBBBBP.

Many MPEG-2 applications have guidelines that suggest using approximately 2 GOPs per second. Therefore, if in doubt, use the following GOP length values:

- 12 for input video standards of 23.976 or 24.000 frames/second,
- 12 for input video standards of 25 frames/second,
- 15 for input video standards of 29.970 or 30.000 frames/second,
- 24 for input video standards of 50 frames/second,
- 30 for input video standards of 59.940 or 60.000 frames/second.

Note that when the “GOP Type” is set to “I-frame only”, the GOP length defaults to 1 and will be “grayed out” so it cannot be changed.

4.4.5.3 Closed GOP

Closing a GOP allows random access to individual GOPs within an ingested file (e.g. for post-ingest editing or for DVD “chapter point” insertion) by providing self-contained scenes with no reference to frames outside that particular scene.

In display picture order terms, the algorithm works in the following way: when a shot starts, the next reference picture is converted into an I-picture, and the first B pictures (before the first reference picture) only contain motion vectors which point to the first I-picture. Also, the last picture before the shot change is converted into a P picture. The overall result is that no motion vectors cross the shot change boundary.

In addition to closed GOPs on shot changes (which are always recommended), the user can select closed GOPs at regular intervals. Although these decrease the compression efficiency slightly, they allow random access throughout the ingested file. This can be useful in DVD authoring, and in post-ingest editing applications. Remember that the number of pictures per closed GOP depends on the number of GOPs per regular closed GOP and on the number of pictures per GOP. For details of the latter see Section 4.4.5.2 above.

There are a number of options for regular closed GOPs:

> **None** – no regular closed GOPs, although the option to close GOPs at shot changes is still available (see “On Shot Change” below).
>
> **Every GOP –** Every GOP is closed.
>
> **1 in 2, 1 in 4, …, 1 in 20 –** One GOP is closed every 2 GOPs, 4 GOPs ... up to 20 GOPs, in addition to any GOPs closed at shot changes.

The user can also select whether or not closed GOPs are inserted at shot changes using this option:

On Shot Change – this is a separate control from those above which apply to regular closed GOPs.

If closed GOPs cause compatibility problems with non-compliant MPEG-2 decoders or servers, or if compression efficiency is more important than either random access or editability, “On Shot Change” should be switched off and “Closed GOP” should be set to “None”. Otherwise, “On Shot Change” should always be switched on. If in doubt, switch it on.

Note that when the “GOP Type” is set to “I-frame only”, all GOPs are closed, so the whole “Closed GOP” menu will be “grayed out” so that it cannot be changed, as shown in the menu screen example above.

4.4.5.4 CleanCut

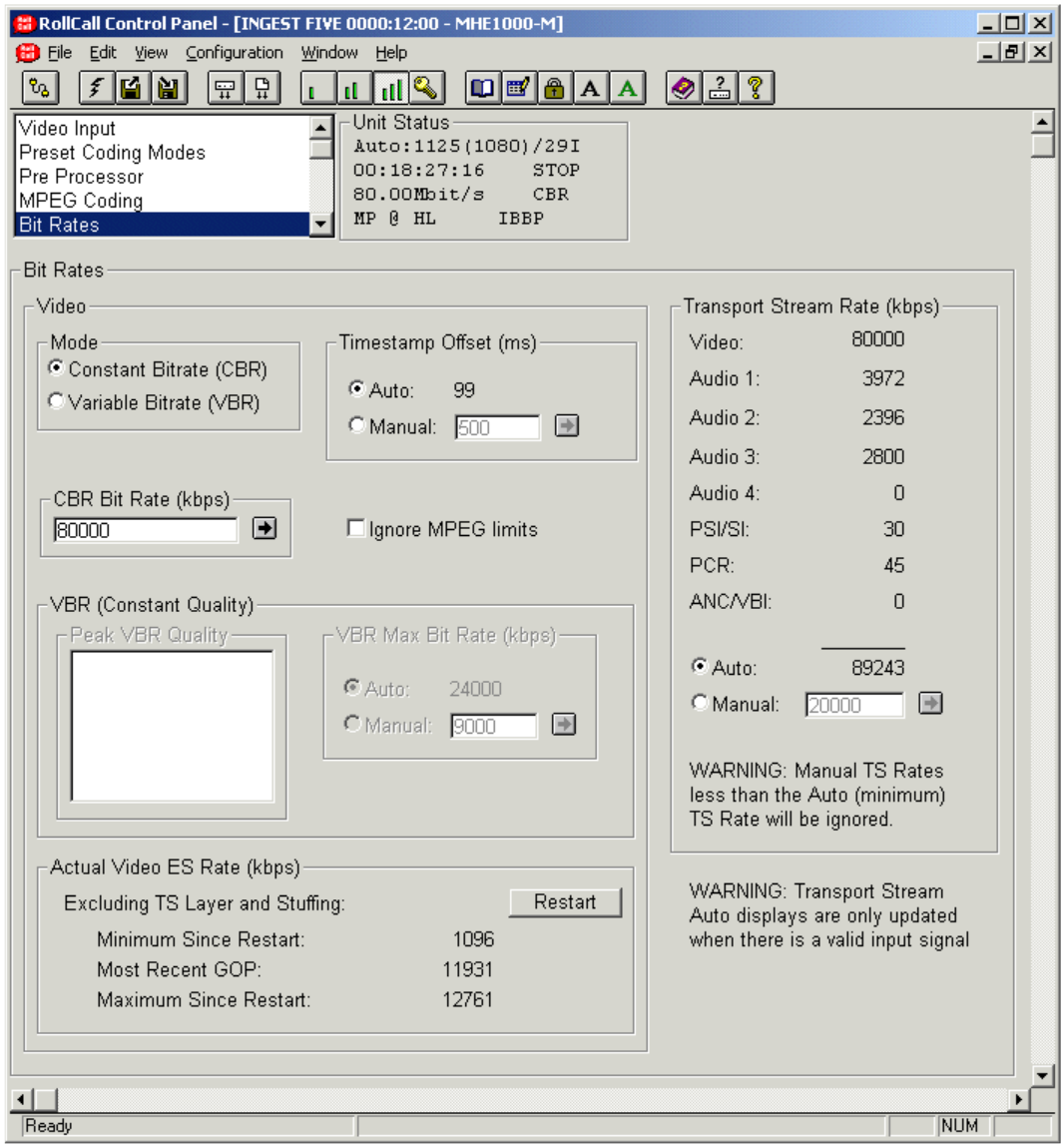
In order to optimize the MPEG-2 video encoding quality, the CleanCut shot detection system may be used to drive the GOP structure (see above).

On (Adaptive GOP) – enables adaptive variable GOP structure. If in doubt, select this option.

Off (Fixed GOP) – only a regular GOP structure is used. Select this option only if adaptive GOPs cause compatibility problems: certain MPEG-2 disk-based servers (and a very small number of non-compliant MPEG-2 decoders) do not support adaptive GOPs.

4.5 BIT-RATES MENU SCREEN

This menu screen allows the adjustment of the various bit-rates. It affects both the video picture quality and the compatibility of the output MPEG-2 Transport Stream. It is recommended that when setting up any new application, the "Preset Coding Modes" menu screen (see Section 4.2 above) is used before this one rather than afterwards, because each preset over-rides all the video bit-rate settings.



4.5.1 VIDEO

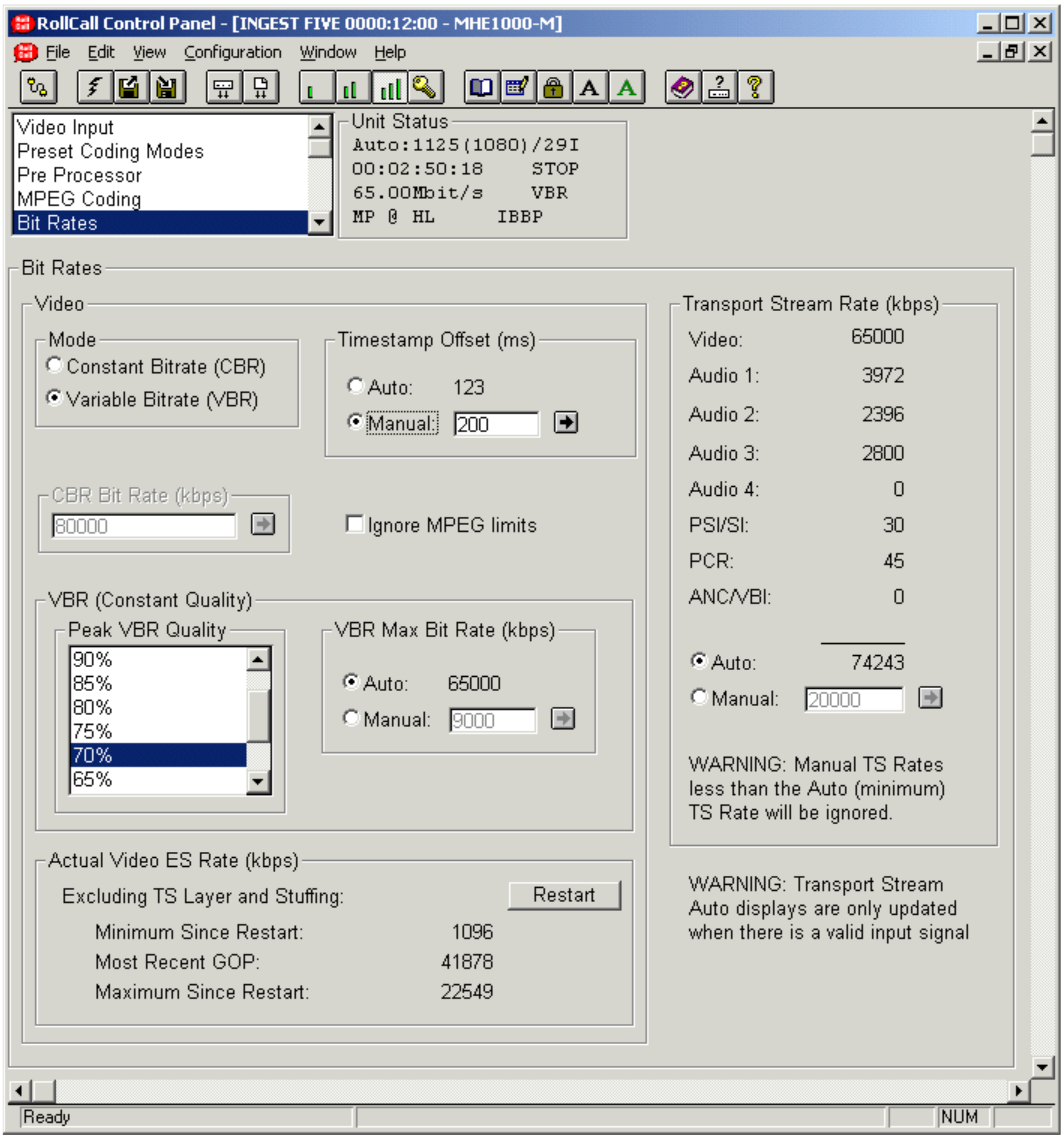
This section controls the bit-rate management of the compressed video.

4.5.1.1 Mode

The bit-rate of the video can be managed in two ways:

Constant Bit-rate – also referred as "CBR"; the bit-rate remains constant over time, using Elementary Stream stuffing (zero bytes) in the video stream when necessary. In this case, the menu screen looks as shown in the example above.

Variable Bit-rate – this constant-quality mode is also referred as "VBR". The bit-rate varies over time depending on how demanding the video material is at the time. In this case, the menu screen looks as shown in the example below.



4.5.1.2 CBR Bit Rate

When in CBR mode, this field selects the (constant) video bit-rate in kilobits/second (hence the suffix “kbps”). Here one kilobit means 1000 bits. When in VBR mode, this field is “grayed out”.

4.5.1.3 VBR (Constant Quality)

This menu will be “grayed out” if the “MODE” (see above) is set to “CBR” as these parameters only apply in VBR mode.

Peak VBR Quality

For VBR, the actual video bit-rate at any moment is determined by the maximum video bit-rate (see below), the nature of the input video material and the “peak quality” which is expressed as a percentage value. The nature of the input video material depends on its “genre” and origin, but also varies from moment to moment. In other words, how demanding the input video material is to encode as MPEG-2 varies from moment to moment. The more demanding the video material, the higher the bit-rate needed to achieve high MPEG-2 encoding quality.

The “maximum bit-rate” and the “peak quality” control different aspects of VBR video encoding. The VBR maximum bit-rate limits the video bit-rate used when the input video material is at its most demanding. On the other hand, the higher the “peak quality” value, the more the MPEG-2 encoding quality (PAR) will reduce as the input video material changes from its least demanding to its most demanding, and the higher the average video bit-rate will be.

Each “peak quality” setting has a “recommended” maximum video bit-rate. There is also an “auto” mode for the maximum video bit-rate (set using the “VBR Max Bit Rate” menu options described below). In this “auto” mode, the maximum video bit-rate is set equal to the “recommended” value. Then each “peak quality” setting acts as a “constant quality” encoding mode (at its “recommended” maximum video bit-rate). When the “manual” (rather than “auto”) mode for maximum video bit-rate is used, the maximum bit-rate and “peak quality” controls can be adjusted separately, allowing the user to iteratively converge on the ideal encoding mode for their own input video material and application.

For example, if a clip is being ingested for “high quality” archive purposes then the “peak quality” can be thought of as simply controlling average video bit-rate and hence the amount of storage space required for the MPEG-2 archives. The “manual” mode for maximum video bit-rate can be used. The maximum video bit-rate can then be set high enough to encode the most demanding video material with an acceptable MPEG-2 encoding quality. The “peak quality” can be adjusted downwards from 100% to constrain the average video bit-rate.

As a second example, if a clip is being ingested for lower-bit-rate “playout quality” purposes then the “peak quality” can be thought of as controlling variation in MPEG-2 encoding quality (PAR). The “auto” mode for maximum video bit-rates can be used to enable “constant quality” encoding. Then the “peak quality” can be set to a value which gives an acceptable balance between MPEG-2 encoding quality and maximum bit-rate.

VBR Max Bit Rate

When working in VBR mode, this field selects the maximum (or “peak”) video bit-rate in kilobits/second (hence the suffix “kbps”) where 1 kilobit means 1000 bits. When “Auto” is selected, the bit-rate will be set to its recommended value based on the “Peak VBR Quality” setting (see above). When “Manual” is selected, the bit-rate can be overridden by the user. Note that unless CBR mode is selected, the recommended bit-rate value is always displayed (next to the “Auto” option) as a guide.

4.5.1.4 Timestamp Offset

This menu item adjusts the video timestamp offset. This determines the video delay from the input of the compressed video buffer within MEMPHIS to the video output of any attached MPEG-2 video decoder (assuming that the MPEG-2 decoder obeys MPEG-2 timestamps: some older ones ignore them). Two modes are available: “Auto” and “Manual”.

Auto – the timestamp offset value is set automatically to a default value based on the coding mode and video bit-rate selected. This mode is recommended for operation at any fixed video bit-rate, which can be either CBR or VBR: in the VBR case it is the peak video bit-rate which is fixed.

> **WARNING!** In “Auto” timestamp offset mode, any change of video bit-rate will cause a change in the timestamp offset, which will result in a discontinuity in the MPEG-2 video stream. Such a discontinuity is illegal in MPEG-2 and will cause the video from MPEG-2 decoders to “glitch”. Such changes of video bit-rate must therefore be avoided during the “Recording” phase (also known as “Edit On”) of an ingest capture, or whilst “on-air” in live applications.

Manual – the user can enter the timestamp offset value in milliseconds. The default timestamp offset value is always displayed (next to the “Auto” option) as a guide. This mode is recommended when dynamic “on-the-fly” changes of video bit-rate are required, using the steps described below.

> **WARNING!** In “Manual” timestamp offset mode, entering a “Timestamp Offset” value greater than the value displayed next to the “Auto” option will result in illegal MPEG-2 video within the output Transport Stream. This is because such a value requires a larger “VBV buffer” than the one specified within the MPEG-2 video stream itself. See Section 4.4.4 for details of how to increase the size of the “VBV buffer”: this will allow a larger “Timestamp Offset”.

Dynamic “on-the-fly” changes of video bit-rate can be made “seamlessly” (i.e. without any discontinuity in the MPEG-2 video stream) using “manual” timestamp offset mode. However, not all timestamp offset values are legal in MPEG-2 at all video bit-rates (because there is always a maximum timestamp offset which will fit within the MPEG-2 “VBV buffer” size at a given bit rate). The recommended method for setting a “manual” value is therefore as follows:

1. Decide on the highest value for video bit-rate which is to be used in the current application.
2. Set the video bit-rate to that value.
3. Set the timestamp offset to manual mode, with a value equal to the default value (the one displayed next to the “Auto” option).
4. It is now safe to start capturing clips. Also, it is now safe to change the video bit-rate during clip capture: no discontinuities will result in the MPEG-2 video stream as long as the “highest” video bit-rate value (decided in step 1 above) is never exceeded.

For operation at a fixed video bit-rate (either CBR or VBR: in the VBR case it is the peak video bit-rate which is fixed) it is recommended that this menu option should be set to “Auto”. The “VBV Buffer” size (see Section 4.4.4) can then be used to achieve a suitable video timestamp offset. For example, some playout server/decoders require a relatively small maximum video timestamp offset: perhaps 300ms rather than the MPEG-2 specification maximum limit of 1000ms. This requirement gives the server/decoder a short video decoding latency so that the decoded picture responds quickly to a “play now” command. To meet this requirement, the “VBV buffer” size can be set to a smaller value than the default (see Section 4.4.4).

If in doubt, use the “Auto” setting but avoid changing the video bit-rate (specifically the CBR or “VBR maximum” bit-rate) during the “Recording” phase (also known as “Edit On”) of an ingest capture, or whilst “on-air” in “live” applications. Remember that in VBR mode, changing the “Peak VBR Quality” counts as a change of “VBR maximum” video bit-rate if the “VBR Max Bit Rate” is set to “Auto” (see Section 4.5.1.3). However the inherent fluctuations of bit-rate in VBR mode are not changes of “VBR maximum” bit-rate.

4.5.1.5 Ignore MPEG limits

There are defined limits on the video bit-rate.

- For 422 Profile SD, the legal maximum bit-rate is 50 Mbps (as defined in the MPEG-2 specification).
- For Main Profile SD, the legal maximum bit-rate is 15 Mbps (as defined in the MPEG-2 specification).
- For 422 Profile HD, the maximum bit-rate is 175 Mbps (as recommended by SMPTE 308M).
- For Main Profile HD, the legal maximum bit-rate is 80 Mbps (as defined in the MPEG-2 specification).

When the “Ignore MPEG limits” menu item is switched on, the video bit rate can be set to values above these legal limits, up to a maximum of 200 Mbps. It is strongly recommended that this menu item is NEVER switched on unless there is a very strong reason for doing so. This menu item should only be switched on when the user is absolutely sure that no compatibility problems will ensue. For example, most MPEG-2 decoders and servers will not operate correctly above the maximum legal video bit-rate. If in any doubt, leave this menu item switched off.

4.5.1.6 Actual Video ES Rate

This part of the menu screen displays information about the current video bit-rate. This can be very useful when setting up MEMPHIS: it allows the bit-rate saving to be calculated (for the particular video material currently being input) for changes in video-compression-related settings such as the linear filtering, the horizontal sub-sampling mode and the “Center Boost”.

The recent maximum value, the most recent snapshot value and the recent minimum value are all displayed in kilobits/second (kbps). All 3 values are based on the video ES bit-rate over each GOP (Group Of Pictures). All 3 values exclude the Transport Stream packet header layer and also exclude the video stuffing in CBR mode.

Calculation of the recent minimum and maximum values can only be restarted manually, by clicking on the “Restart” button.

Note that the Transport Stream packet header accounts for approximately 1 part in 47 of the video bit-rate in the Transport Stream. The video ES rate will therefore be at least 1 part in 47 lower than the video bit-rate in the Transport Stream. All the video bit-rate controls described above work in terms of the bit-rate in the Transport Stream. So for example, if a video bit rate (in the Transport Stream) of 15000 kbps has been selected, the video ES bit-rate displayed will not exceed 14681 kbps.

4.5.2 TRANSPORT STREAM RATE

This menu configures the Transport Stream output by MEMPHIS.

Note: In the case of Elementary Stream capture the values in this menu are arbitrary. However they must be set to legal values in order for capture to work, and in order for any downstream MPEG-2 decoder (such as a monitoring decoder) to decode the resulting Transport Stream.

4.5.2.1 TS Bit-rate (kbps)

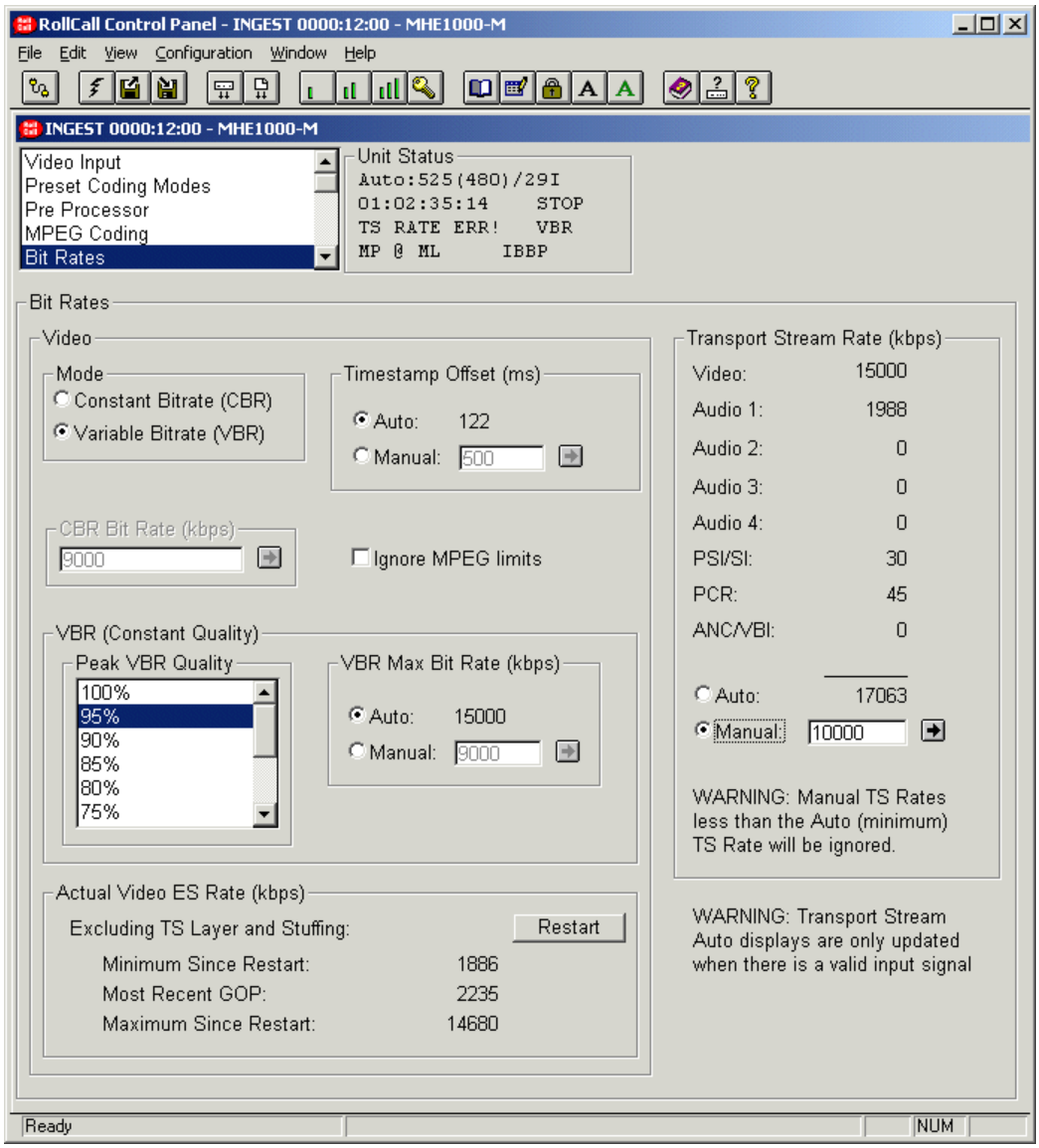
This section covers the Transport Stream (TS) bit-rate. This may be set automatically or manually.

Auto - Select this option to let the on-board multiplexer calculate the bit-rate. The calculation is based on the sum of the Elementary Stream bit-rates, together with the metadata and the worst-case Transport Stream bit-rate overhead on each stream due to its format. This calculated value is always displayed next to the “Auto” option, with the values used in its calculation displayed as a sum above it. This information is always valid even in “Manual” mode, so that it can be used as a guide.

Manual - This option is used to enter the Transport Stream rate in units of kilobits/second (i.e. 1000 bits/second). It is “grayed out“ when Automatic is selected. Note that this rate needs to equal to or greater than the value displayed as a guide next to the “Auto” option. This restriction is enforced automatically by this menu: if the user attempts to change the bit-rate to a value which is too low, the change is ignored and the error message “TS RATE ERR!” is displayed (in place of the video bit rate information) in the “Unit Status” window of every menu screen, as shown in the example menu screen below.

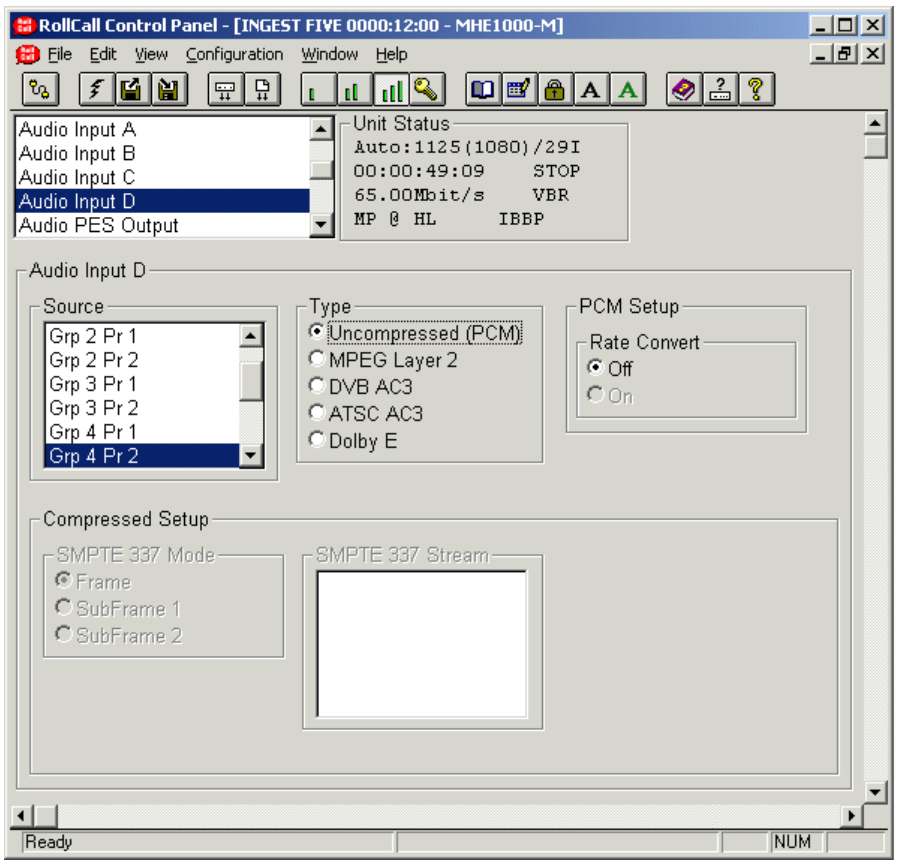
The maximum supported output Transport Stream bit-rate is 208 million bits/second. However, not all MPEG-2 decoders or disk-based servers support Transport Stream bit-rates this high. If in doubt, use the “Auto” setting because this minimizes the Transport Stream bit-rate.

If the “Auto” Transport Stream bit-rate (or the minimum “Manual” bit-rate which the unit will accept) is higher than the user expects, the most likely cause is the additional Transport Stream bit-rate which is automatically added to allow for the formatting overhead (for the MPEG-2 PES and Transport Stream layers) for each audio stream. For low-bit-rate compressed audio, this overhead can be far larger than the actual compressed audio bit-rate. If this causes real problems in a given application, increase the “frames per PES packet” for compressed audio streams, using the “Audio PES Output” menu screen (see Section 4.7.5). It may also be worth trying other compressed audio bit-rates: a higher rate may be less inefficient in the Transport Stream. Note also that the contributions to the Transport Stream bit-rate made by any PCM (uncompressed) or Dolby E audio can be reduced by reducing their word length, for example from 24-bit to 16-bit. However for Dolby E audio, the selected word length must at least equal that of the audio source otherwise the Dolby E payload will be corrupted.



4.6 AUDIO INPUT MENU SCREEN

This menu screen controls the handling of the audio inputs to MEMPHIS. To avoid confusion, it is recommended that when setting up any new application, the user sets up all four "Audio Input" menu screens (A, B, C and D) before the "Audio PES Output" menu screen.



There are four audio input menus, corresponding to the four discrete AES/EBU inputs and the four de-embedded stereo pairs. The four Audio Inputs, each of which is a stereo pair, are labeled A, B, C and D.

Each of these 4 stereo pairs can arrive as either embedded audio (arriving on the SDI or HD-SDI video input) or in AES/EBU format (arriving on its own dedicated rear-panel BNC connector), or can be set to be internally-generated tone or silence. Apart from Dolby E, compressed audio arriving in AES/EBU format must use the SMPTE 337 protocol.

Each of the 4 input stereo pairs (A, B, C and D) can carry either uncompressed (PCM) or compressed audio. MEMPHIS supports Dolby E, MPEG 1 Layer 2, and Dolby AC-3. However, compressed audio must already be compressed when it reaches the input: MEMPHIS contains no audio compression hardware. It is recommended that whenever possible, audio is captured in uncompressed (PCM) format and then compressed using PC-based (or server-based) software after any post-ingest audio trimming and/or mixing which may be required.

In all cases, each audio input signal must have a sampling rate (or “word clock”) of 48 kHz which is sample-rate-locked to the SDI or HD-SDI video input to MEMPHIS. For embedded input audio and for internally-generated tone and silence, this requirement will always be met automatically. For AES/EBU format input audio, this requirement must either be met by the AES/EBU input signal itself, or by using the sample rate converters provided inside MEMPHIS (see Section 4.6.3 below for details). However, these sample rate converters can ONLY be used for uncompressed (PCM) input audio because they are not compatible with compressed audio. This incompatibility can NOT be overcome by changing the “Type” of a compressed audio input to “Uncompressed (PCM)” using the menu described in Section 4.6.2 below.

If any audio input (A, B, C or D) fails to meet the above sample-rate requirement, the audio from that input will be corrupted at intervals which may be as short as a few milliseconds or as long as several days. It is therefore strongly recommended that the specification and settings of audio sources are always checked.

WARNING! Changing the settings on any of the 4 Audio Input menu screens may temporarily interrupt all audio and VBI streams within the output Transport Stream.

4.6.1 Source

The audio source can be either embedded audio (arriving on the SDI or HD-SDI video input) or AES/EBU format (arriving on its own dedicated rear-panel BNC connector). Alternatively, silence (mute) and fixed-frequency tone can be used as audio sources. The options for this menu are therefore as follows.

Grp x Pr y

These options correspond to the embedded audio contained in the selected video input (SDI or HD-SDI). Here "**x**" is the embedded audio group number and "**y**" is the embedded audio pair number. Note that the numbering of groups and pairs is different in SD video compared to HD video.

When embedded audio is being used, the AUDIO INPUT menu screen looks as shown in the example above.

AES BNC 1, 2, 3, 4

These 4 options correspond to the AES/EBU input BNC connectors on the rear panel of MEMPHIS, as follows:

- "AES BNC 1" on the menu refers to the physical BNC connector labeled "AES 1/2".
- "AES BNC 2" on the menu refers to the physical BNC connector labeled "AES 3/4".
- "AES BNC 3" on the menu refers to the physical BNC connector labeled "AES 5/6".
- "AES BNC 4" on the menu refers to the physical BNC connector labeled "AES 7/8".

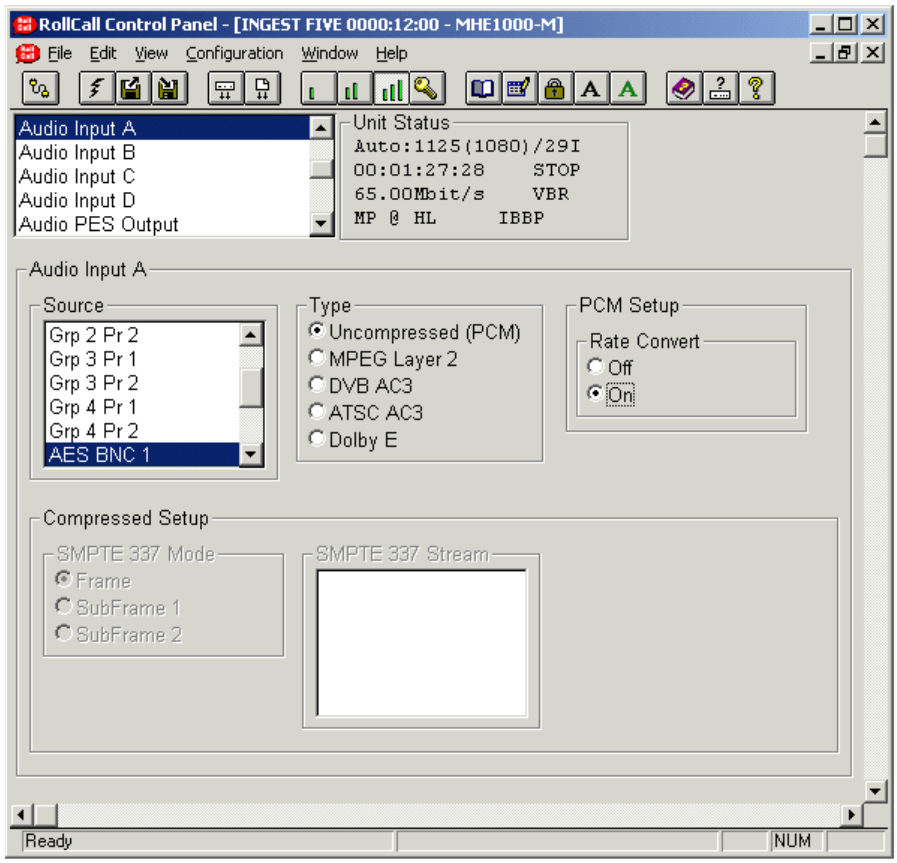
When a BNC is being used, the AUDIO INPUT menu screen looks as shown in the example below.

MUTE

This option provides silence on both mono channels of a PCM (uncompressed) stereo pair. It does not "switch off" the audio stream.

TONE

This option provides a fixed-frequency tone on both mono channels of a PCM (uncompressed) stereo pair.



4.6.2 Type

This menu selects the type of audio present on each audio input. The available alternatives are as follows:

Uncompressed (PCM) Raw uncompressed (i.e. PCM) audio

MPEG Layer 2 Pre-compressed using MPEG-1 layer 2

DVB AC3 Pre-compressed using AC3, with the resulting MPEG-2 Transport Stream in DVB-compliant format

ATSC AC3 Pre-compressed using AC3, with the resulting MPEG-2 Transport Stream in ATSC-compliant format

Dolby E Pre-compressed using Dolby E

Selecting between the above options automatically causes the MPEG SI generator in MEMPHIS to flag the nature of the audio in the Transport Stream. MEMPHIS can not compress audio itself. This menu should be used to specify the type of audio arriving at each of the inputs of MEMPHIS.

Note that if the “Source” of the audio (see previous section) is either “MUTE” or “TONE” then only “Uncompressed (PCM)” can be selected as the “Type”. This is because MEMPHIS contains sources of uncompressed (PCM) silence and tone, but does not contain sources of compressed silence or tone.

4.6.3 PCM Setup: Rate Convert

This menu is only available when the “Input” menu (see above) is set to an AES/EBU BNC input and the “Type” menu (see above) is set to “Uncompressed (PCM)”. When this menu is available, the AUDIO INPUT menu screen looks as shown in the example above.

When uncompressed AES/EBU BNC input audio is used, the sample rate of the incoming audio may not be locked to the video. If it is not, the audio sample rate conversion function (within MEMPHIS) must be used, because audio must be locked to video in MPEG-2. The options are listed below:

On Audio sample rate is converted to 48 kHz, locked to the video.
This setting is only available for uncompressed audio on an AES/EBU BNC input.

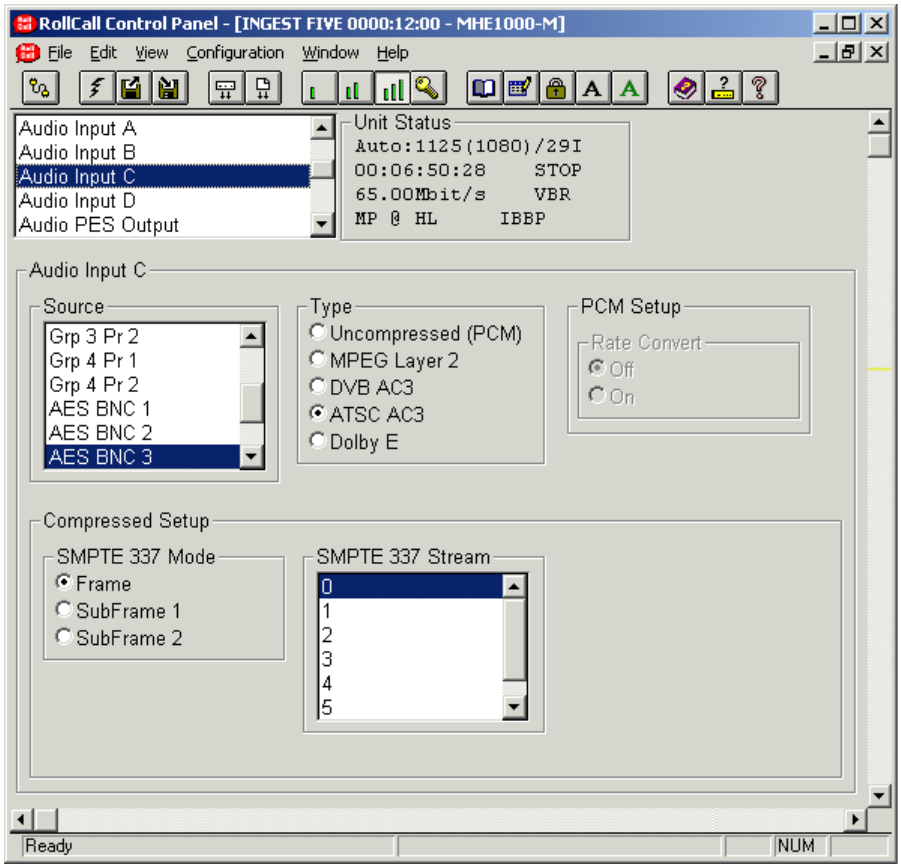
Off No sample rate conversion.
This setting will always be automatically selected for both compressed audio and embedded audio.

If in doubt about whether or not it is locked to the video input, switch on the sample rate conversion when this menu option is available.

When this menu is not available, either the “On” option will be “grayed out” (for embedded audio input or internally-generated tone or silence) or the whole “Rate Convert” menu will be “grayed out” (for compressed audio input)

4.6.4 Compressed Setup

This menu is only available when the “Type” (see previous section) is NOT set to “Uncompressed (PCM)” or “Dolby E”. When this menu is available, the AUDIO INPUT menu screen looks as shown in the example below.



This section of the audio menu must be set manually to match the format of the incoming compressed audio stream which is of interest. Remember that one "stereo pair" can carry multiple compressed audio streams, but each audio input (A, B, C and D) of MEMPHIS can only carry one compressed audio stream.

4.6.4.1 SMPTE 337 Mode

When transporting compressed audio within an AES/EBU stereo pair using SMPTE 337 protocol, 3 different modes are possible:

Frame	Both AES/EBU mono channels is used.
SubFrame 1	Only the left channel of the AES/EBU pair is used
SubFrame 2	Only the right channel of the AES/EBU pair is used

If in doubt, try each setting in turn for a few seconds each, using the “Audio Status” information at the bottom of the “Audio PES Output” menu screen to check whether the value is correct. If the value is incorrect, the “Audio Status” for the relevant PES stream will say “ERROR” rather than the audio type, and the relevant compressed audio will be missing from the Transport Stream output from MEMPHIS.

4.6.4.2 SMPTE 337 Stream

Up to 7 compressed audio streams in SMPTE 337 protocol may be transported within one AES/EBU stereo pair. This menu selects the stream number (between 0 and 6 inclusive) required.

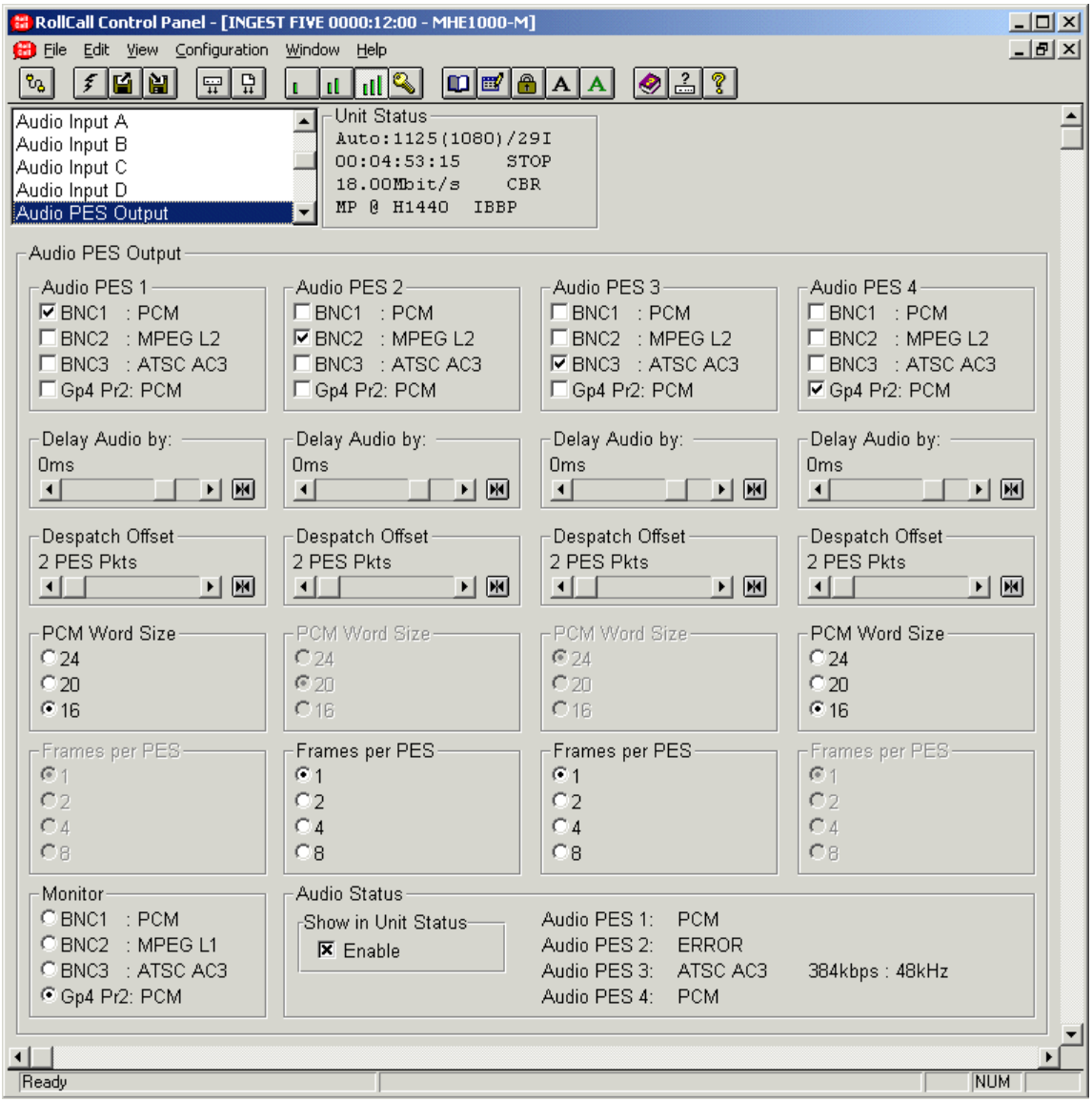
This should be set to match the source of compressed audio. If in doubt, start at 0 and try each in turn for a few seconds each, using the “Audio Status” information at the bottom of the “Audio PES Output” menu screen to check whether the value is correct. If the value is incorrect, the “Audio Status” for the relevant PES stream will say “ERROR” rather than the audio type, and the relevant compressed audio will be missing from the Transport Stream output from MEMPHIS.

4.7 AUDIO PES OUTPUT MENU SCREEN

MEMPHIS supports the output into the MPEG-2 Transport Stream of up to four audio services. These four services are labeled Audio PES 1, 2 3 and 4. The term "PES" refers to the "Packetized Elementary Stream" defined in the MPEG-2 System Specification (13818-1).

Note that under some circumstances, only 3 audio PES services are supported by MEMPHIS (rather than 4). In all such cases Audio PES 4 will be “grayed out”.

This menu screen controls the format and timing with which each Audio PES is output in the Transport Stream. To avoid confusion, it is recommended that when setting up any new application, the user sets up all four "Audio Input" menu screens (A, B, C and D) before this one.



WARNING! Changing the settings on the Audio PES Output menu screen may temporarily interrupt all audio and VBI streams within the output Transport Stream.

An “Ingest Capture” PC running Snell and Wilcox capture software offers both Transport Stream and Elementary Stream capture modes. The choice between these two modes depends on how the captured material will be used. Both modes offer frame-accurate capture as far as video is concerned. However, only Elementary Stream capture offers frame-accurate capture of audio (or near-frame-accurate capture of audio, depending on the audio format), for the reasons explained below. On the other hand, only Transport Stream capture records the stream timestamp information (PCRs, PTSs and DTSs).

Each captured Transport Stream is a single contiguous stream which starts with the first video picture of the clip and ends just before the first video picture after the clip. For MPEG-2, decoders have buffers of different durations for audio and video. This means that audio and video which were co-timed at the inputs to MEMPHIS can never be guaranteed to be co-timed in its MPEG-2 Transport Stream output. This is why frame-accurate (or near-frame-accurate) audio capture cannot be guaranteed when a Transport Stream is being captured.

Each captured video Elementary Stream is a single contiguous stream which starts with the first video picture of the clip and ends at the end of the last video picture within the clip.

Each captured audio Elementary Stream is a single contiguous stream which starts co-timed with (or just after) the start of the first video picture of the clip and ends co-timed with (or just after) the start of the first video picture after the clip. Remember that captured audio can only start or end at exactly the same time as video if the audio format is inherently video-frame-aligned. This is the case only for uncompressed (PCM) and Dolby E audio: these formats divide the audio into units with exactly the same duration as one video frame. The MPEG 1 Layer 2 and Dolby AC-3 audio formats divide the audio into units which do not have the same duration as one video frame, which means that capture of these audio formats can only ever be near-frame-accurate.

It is recommended that Elementary Stream capture is used whenever possible (rather than Transport Stream capture) because only Elementary Stream capture offers frame-accurate (or near-frame-accurate) capture of audio.

In the case of Elementary Stream capture some of the values on this menu screen are arbitrary. However they must be set to legal values in order for capture to work, and in order for any downstream MPEG-2 decoder (such as a monitoring decoder) to decode the resulting Transport Stream.

4.7.1 Audio PES 1…4

The four Audio Inputs (A, B, C and D) must be routed to the four audio services (Audio PES 1, 2, 3 and 4) for the required audio to be output in the Transport Stream. This routing is configured using a 4-by-4 matrix of check-boxes as shown in the example menu screen above.

Within this matrix, each column represents one Audio PES service, as labeled above the column. Each row represents an Audio Input: the top row is Audio Input A, and the bottom row is Audio Input D.

When a box is checked, the relevant Audio Input is routed to the relevant Audio PES service. An example using Audio PES 1: in the first column of 4 check-boxes, checking the top box routes Audio Input A to Audio PES 1. Checking the box below routes the Audio Input B to Audio PES 1, and so on.

In the example menu screen above, audio PES services 1 and 4 are each carrying one stereo pair of 16-bit uncompressed (PCM) audio, audio PES service 2 is carrying compressed MPEG 1 Layer 2 audio, and audio PES service 3 is carrying Dolby AC-3 compressed audio.

In the example menu screen below, audio PES service 1 is carrying two stereo pairs of 16-bit uncompressed (PCM) audio, audio PES service 2 is carrying one stereo pair of 20-bit uncompressed (PCM) audio, audio PES service 3 is carrying a 24-bit Dolby E stream, and audio PES service 4 is switched off.

Basically, each of the 4 audio services can be used for one of 3 purposes, as follows.

- it may be switched off by having no Audio Inputs routed to it,
- it may carry one compressed audio stream by having one Audio Input (which has already been configured to carry compressed audio using its own Audio Input menu screen) routed to it, or
- it may carry between one and four stereo pairs of uncompressed PCM audio by having between one and four Audio Inputs (each of which has already been configured to carry uncompressed audio using its own Audio Input menu screen) routed to it.

All 4 of the audio PES output services do not have to be used if they are not required. In the example menu screen below, “Audio PES 4” is not being used because no boxes are checked in that column. Similarly, all 4 of the audio inputs (A, B, C and D) do not have to be used if they are not required: each row of check boxes can be left unchecked.

Under some circumstances, only 3 audio PES services are supported by MEMPHIS (rather than 4). In all such cases Audio PES 4 will be “grayed out”.

Certain MPEG-2 decoders support only one stereo PCM pair per PES. If in doubt, consult the decoder manuals.

4.7.2 Delay Audio by:

The delay set by this menu is used to compensate the audio timestamps (in the output Transport Stream) for any difference in delay between the input video and the input audio. For example, the delay introduced by an external audio encoder for compressed audio. The delay is in units of milliseconds, and can be set to any value in the range +100ms to –300ms.

This delay value should be set to match the source of compressed audio. If the value is incorrect, the audio will be out of sync with the video when the MPEG-2 Transport Stream is decoded “live”, and the audio will be out of sync with the video in any clips which are captured.

Even when compressed audio is “pre-compressed” on a video tape, the correct delay value may have to allow for the delay of the audio encoder used when the video tape was originally recorded, rather than being zero.

As a different example case, consider a videotape with 3 stereo pairs of uncompressed audio which are co-timed with the video. If the 3 stereo pairs are to be carried in the MPEG-2 Transport Stream as PCM audio then the “Delay Audio by” setting would be zero. However if the 3 stereo pairs are routed through a “5.1” Dolby AC-3 audio encoder to a BNC input on MEMPHIS, the “Delay Audio by” setting might, for example, have to be -240ms in order for audio/video synchronization to be correct when the Transport Stream (containing the audio in Dolby AC-3 format) has been decoded.

If the audio is being compressed “live” as in the above example, the documentation for the audio compression encoder should give the compression delay (or “latency”) value. The “Delay Audio By” menu should then be set to a negative value equal to this delay. In the above example the Dolby AC-3 audio encoder had a latency of 240ms so that the “Delay Audio by” setting was -240ms

If in doubt, start with the default “Delay Audio by” value of 0. Capture a short clip containing audio events for which the timing relative to video is obvious. Then compare the video and audio timing for the captured clip, taking care if calculating “time since clip start” from video timecodes (beware 3:2 pull-down, non-integer frame rates and drop-frame timecode!). If events in the audio occur early (i.e. closer in time to the start of the captured clip) relative to the video then the delay slider should be moved to the right (to increase the audio delay). If events in the audio occur late (i.e. closer in time to the end of the captured clip) relative to the video then the delay slider should be moved to the left (to decrease the audio delay). Having adjusted the delay, repeat the capture of the same clip to verify that the audio-versus-video timing is now correct. If not, adjust again and repeat the process.

As an alternative (but perhaps more approximate) method, the audio and video in the Transport Stream can be monitored “live” using an external MPEG-2 decoder. Start with the default “Delay Audio by” value of 0. If the audio is not in sync with the video then adjust this delay value, allowing a reasonable time to judge the effect of each adjustment. If the audio is early (i.e. events in the audio occur before the corresponding events in the video) then the delay slider should be moved to the right (to increase the audio delay). If the audio is late (i.e. events in the audio occur after the corresponding events in the video) then the delay slider should be moved to the left (to decrease the audio delay).

Many MPEG-2 decoders ignore MPEG-2 timestamps once they have started successfully decoding a Transport Stream, in which case adjusting the “Delay Audio by” menu setting may appear to have no effect. In such cases, after each adjustment to the delay, uncheck the “Audio PES” 1, 2, 3 or 4 check box (the one for the relevant audio stream), wait at least 5 seconds, then check the check box again. This should cause the decoder to stop its audio decoding and then restart it, taking account of the new delay setting. If this does not work then either reset or power-cycle the decoder after each adjustment to the delay.

Some older non-compliant MPEG-2 decoders simply ignore MPEG-2 timestamps, in which case adjusting the "Delay Audio by" menu setting will have no effect, even after power-cycling the decoder. In such cases, the "despatch offset" (see below) can be used as a crude "brute force" delay adjustment for the audio relative to the video. However, this is not recommended if the resulting Transport Stream (or Elementary Streams) will be used (including after ingest capture) with MPEG-2 decoders which do obey timestamps.

Note that the use of VTR-style video-timing-based capture by MEMPHIS (see Section 4.11) means that capture timing can only be controlled or adjusted in multiples of one video field duration, even for audio capture. This means that as far as capture timing is concerned, MEMPHIS rounds the "Delay Audio by" value for each audio PES stream to the nearest video field duration. However, the "Delay Audio by" value is applied to audio timestamps (within the MPEG-2 Transport Stream) without any rounding.

4.7.3 Despatch Offset

This menu allows the user to adjust audio buffer occupancy for any external MPEG-2 decoder receiving a Transport Stream from MEMPHIS, even if that decoder ignores audio timestamps. MEMPHIS despatches each PES packet of audio into the Transport Stream before it is required by an audio decoder: it is despatched "early". The despatch offset value is the amount by which it is despatched "early", expressed in terms of whole audio PES packets. It should therefore equal the maximum buffer occupancy for an external audio decoder, measured in whole audio PES packets.

This value should normally be left at its default setting, which is 2. If the value is too low, the audio may be out of sync with the video. If the value is too high, an external audio decoder's buffer may overflow, causing audio to stutter or fail completely. If in doubt, use the default value of 2.

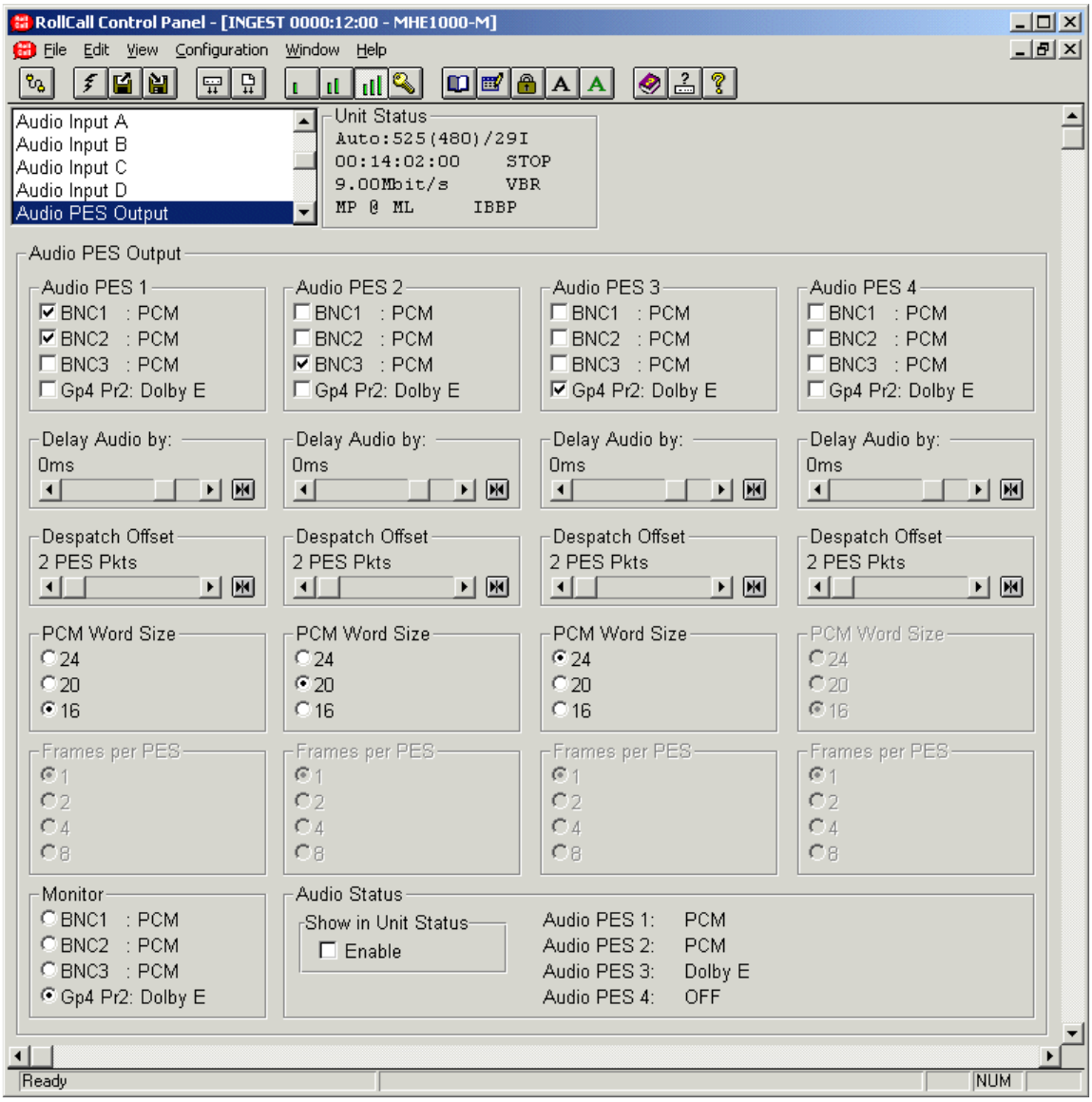
4.7.4 PCM Word size

This section selects the precision (in bits) of each sample of uncompressed (PCM) and Dolby E audio. This precision may be set to 16, 20 or 24 bits. There is no automatic audio word size detection. This menu should be set manually to match the source of the audio. If this menu is set to a shorter word size than that of the incoming audio, the latter is truncated. For PCM audio this will reduce audio quality. For Dolby E audio, truncation corrupts the stream and must always be avoided. If in doubt, a setting of "24 bits" will always be transparent, at the expense of a higher audio bit-rate (and hence a higher total Transport Stream bit-rate, giving larger captured ingest files).

This menu is only available when either "uncompressed (PCM)" or "Dolby E" has already been selected in the relevant AUDIO INPUT menu screen (i.e. the menu screen for audio input A, B, C or D).

Up to four PCM stereo pairs can be assigned to the same audio service, but the word size must be the same for all the stereo pairs within one service, as shown for "Audio PES 1" in the example menu screen below. If different word sizes are required for different PCM pairs, this can be achieved by assigning them to different audio services as shown for "Audio PES 2" in the example menu screen above.

Each Dolby E audio stream requires its own separate audio PES stream, and can therefore have its own individual word size value as shown for "Audio PES 3" in the example menu screen above.



4.7.5 Frames per PES

For compressed audio services, this menu allows the user to specify how many “frames” of compressed audio will be put into each audio PES packet. For Dolby E, one audio “frame” has the same duration of one video frame. For all other compressed audio types, there is no fixed timing relationship between compressed audio “frames” and video frames.

The values allowed in this menu are 1, 2, 4 and 8. The higher the number, the more efficiently they are packed (giving lower bit-rates in the Transport Stream, and hence smaller captured ingest Transport Stream files). This efficiency gain is at the expense of editability of captured ingest Transport Streams. If Elementary Streams are being captured rather than Transport Streams, this makes no difference.

For PCM and Dolby E audio services there is always 1 frame per PES packet, so this menu item will always be “grayed out” for PCM and Dolby E audio services.

If in doubt, select a value of 1.

4.7.6 Monitor

MEMPHIS features one AES monitoring audio output. This setting allows the user to route one of the four audio inputs to the monitoring output. This monitor output works for uncompressed PCM audio (for which it carries one stereo pair) and for compressed audio (for which it carried all the compressed streams that arrived within one stereo pair).

4.7.7 Audio Status

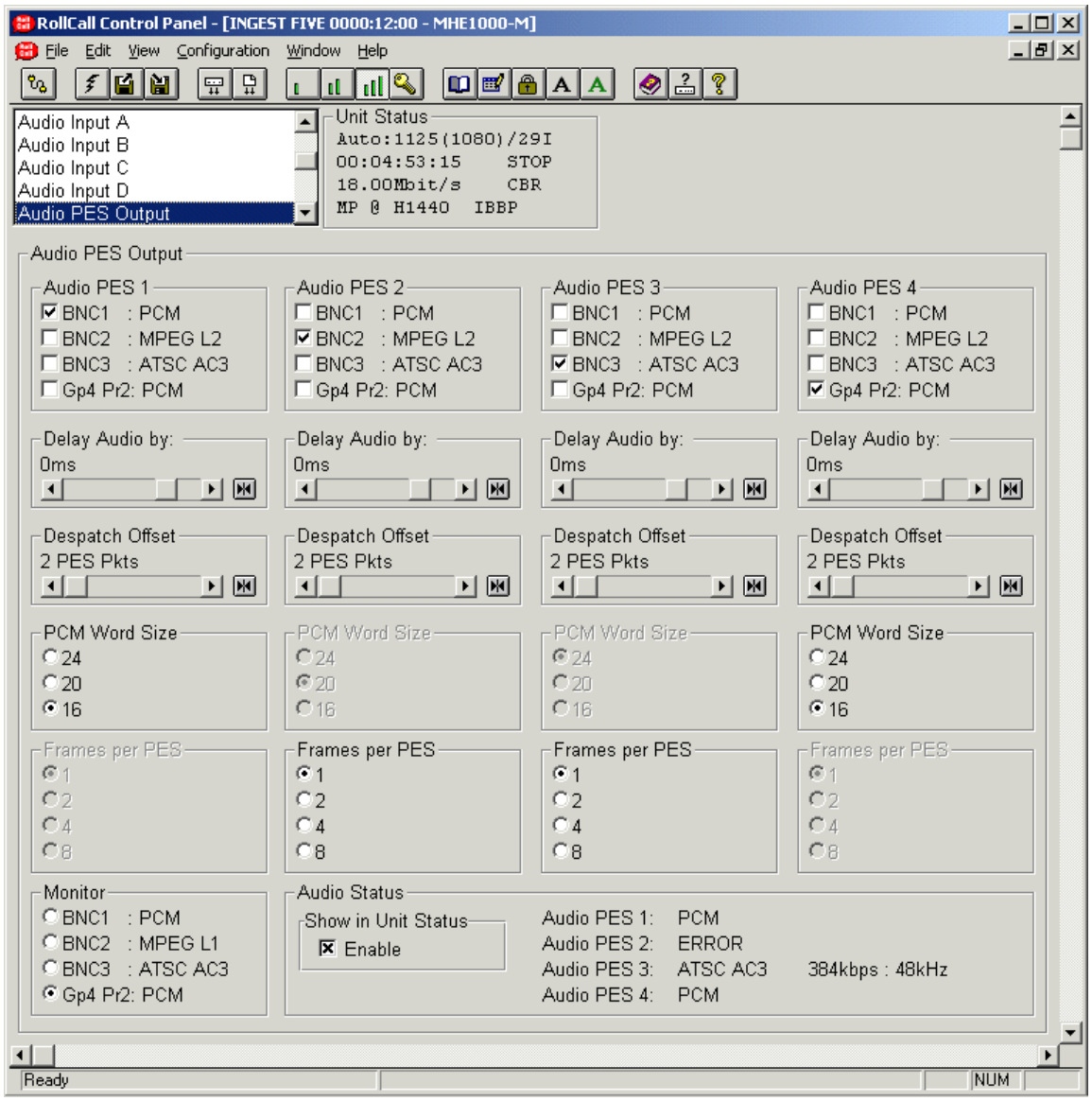
This part of the menu screen displays status information about compressed audio streams, and allows the same audio status information to be displayed in the “Unit Status” window.

For audio PES streams which are turned off, the displayed audio status is simply “OFF”.

For audio PES streams which are carrying PCM or Dolby E audio, the displayed audio status is simply the audio type: “PCM” or “Dolby E”.

For audio PES streams which are carrying other compressed audio types, if the compressed audio stream is missing then the audio status is displayed as “ERROR”. Otherwise the displayed audio status is simply the audio type in truncated form (“DVB AC3” or “ATSC AC3” or “MPEG L2”) followed by the audio Elementary Stream bit rate, followed by the original sample rate of the audio (i.e. the sample rate the original audio had, before it was compressed).

In the example menu screen below, audio PES 2 is set to carry MPEG-1 Layer 2 audio but the relevant compressed stream is missing from the BNC 1 input, resulting in “ERROR” being displayed as the audio status. Audio PES 3 is set to carry Dolby AC-3 which is present on input BNC 3: the audio status shows that the Dolby AC-3 Elementary Stream bit-rate is 384kbps and that the original sample rate for the Dolby AC-3 is 48kHz. Audio PES 1 and audio PES 4 are both set to carry PCM audio.



If a compressed audio stream is missing (so that its audio status is displayed as “ERROR”) then clip capture will exclude that stream. Possible causes of an audio status “ERROR” are as follows.

- The compressed audio “Type” is set incorrectly on the relevant Audio Input menu screen.
- The SMPTE 337 “Mode” parameter is set incorrectly on the relevant Audio Input menu screen.
- The SMPTE 337 “Stream” parameter is set incorrectly on the relevant Audio Input menu screen.
- The source of compressed audio has stopped. For example, if the source is a VTR playing a tape containing video and pre-compressed Dolby AC-3 audio then if the VTR stops, pauses, rewinds or does anything else other than play, the Dolby AC-3 audio stream will stop. On the other hand, if the source is a VTR playing a tape containing video and PCM audio through an external Dolby AC-3 audio encoder then the Dolby AC-3 audio stream will only stop if that audio encoder is either switched off, or in the wrong operating mode.

4.7.7.1 Show in Unit Status

The “Enable” check box is the only control within the “Audio Status” menu. When checked, this causes the audio status information described above to be displayed in the “Unit Status” window at the top right of every menu screen (as well as at the bottom of the “Audio PES Output” menu screen). This is done by alternating the content of the 3rd and 4th lines of text within that window. Because the size of the “Unit Status” window is fixed for all RollCall-compliant products, there is no room to display compressed audio Elementary Stream bit-rates or original sampling rates.

The audio status information will always be displayed at the bottom of the “Audio PES Output” menu screen, irrespective of the “Show in Unit Status” setting.

As an example, consider the example menu screen above. This shows a snapshot in time, in which the 3rd and 4th lines of text within the “Unit Status” window are:

18.00Mbit/s CBR
MP @ H1440 IBBP

However, because the “Enable” check box within “Show in Unit Status” is checked in the above example menu screen, these lines of text would be alternating. Therefore, 2 seconds later the 3rd and 4th lines of text within the “Unit Status” window would be:

Audio PES1 PCM
Audio PES2 ERROR

After another 2 seconds the 3rd and 4th lines of text within the “Unit Status” window would be:

Audio PES3 ATSC AC3
Audio PES4 PCM

After another 2 seconds the 3rd and 4th lines of text within the “Unit Status” window would return to:

18.00Mbit/s CBR
MP @ H1440 IBBP

These 2 text lines would continue to alternate in this way every 2 seconds until the “Enable” check box within “Show in Unit Status” was unchecked. After this, the 3rd and 4th lines of text within the “Unit Status” window would remain at:

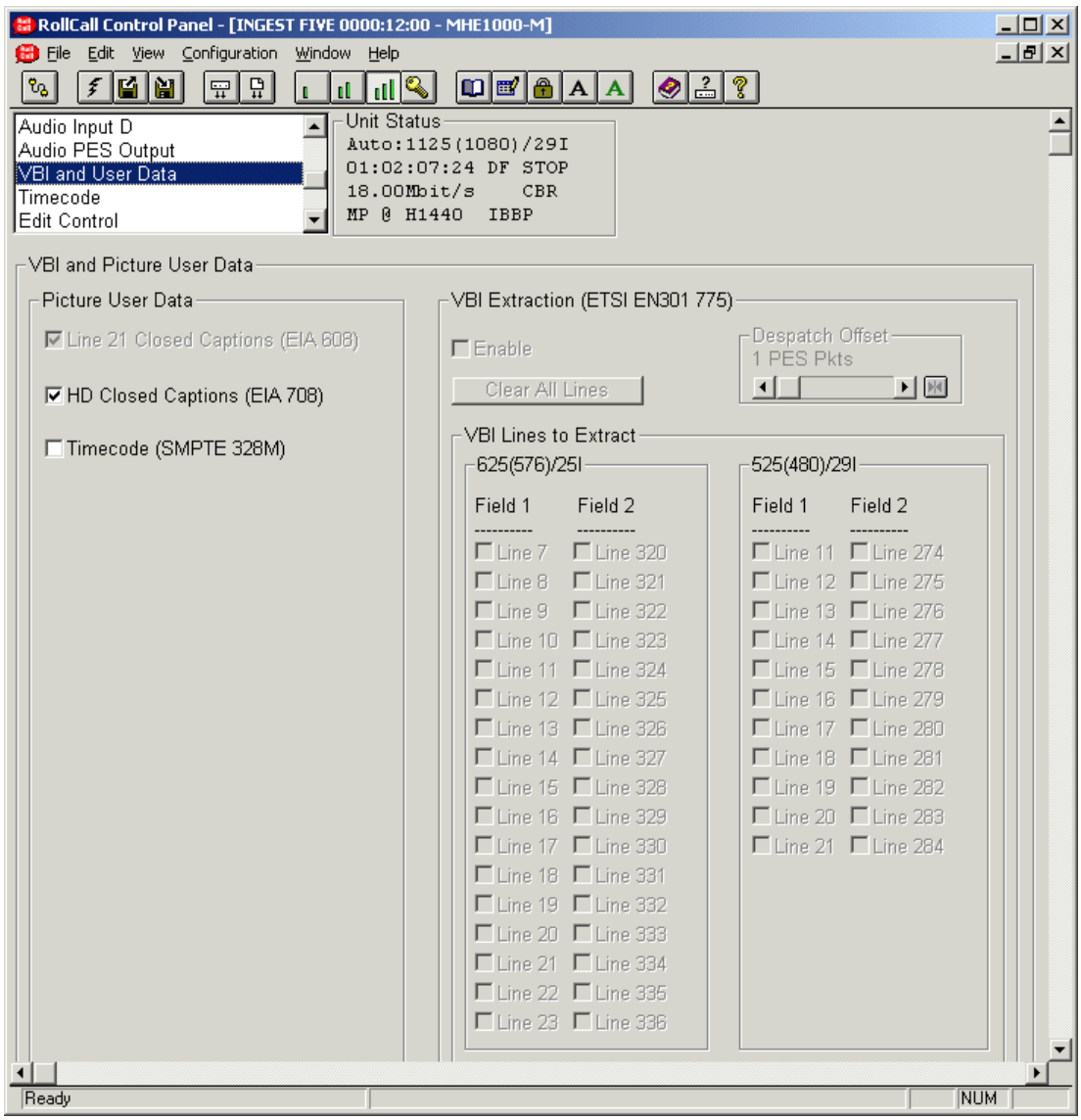
18.00Mbit/s CBR
MP @ H1440 IBBP

Remember that all the information in the “Unit Status” window (including alternating text lines) is displayed at the top right of every menu screen, not just at the top right of the “Audio PES Output” menu screen.

4.8 VBI AND USER DATA

This section controls the output into the MPEG-2 Transport Stream of Picture User Data (which is within the video stream) and a separate PES stream carrying Vertical Blanking Interval (VBI) sample data. The term "PES" refers to the "Packetized Elementary Stream" defined in the MPEG-2 System Specification (13818-1).

This menu screen controls the content of the Picture User Data and the VBI PES stream, and the timing with which the latter is output in the Transport Stream.



4.8.1 Picture User Data

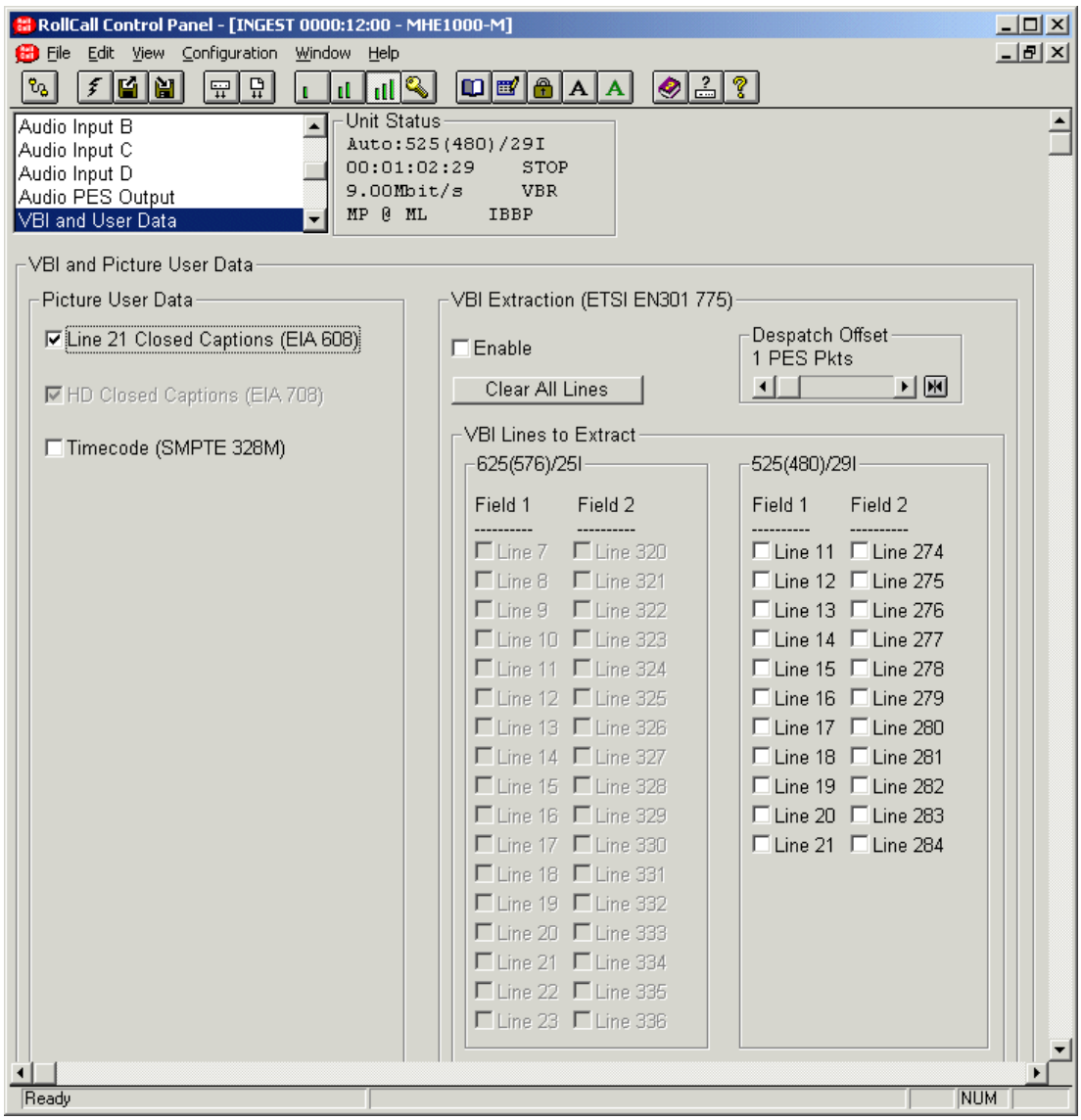
This menu controls the content of the Picture User Data which is within the video stream. The 3 available options are as follows:

Line 21 Closed Captions: As defined by standard EIA608 for 525(480)29I SD video. The example menu screen below shows this option, which will default to “on” for 525(480)/29I input video. This option will be “grayed out” (and always switched off) if the input video standard is not 525(480)/29I: the example menu screen above shows this condition. When this box is checked, closed captions will be extracted from the EIA608-compliant waveforms on line 21 of the SDI input of MEMPHIS, and will be output as an EIA608-compliant Picture User Data stream. Note that MEMPHIS will pad this stream to the EIA608-standard data rate, even if the relevant line 21 waveforms are interrupted or entirely missing.

HD Closed Captions: As defined by standard EIA708-B for HD video. The example menu screen above shows this option switched on. This option will be “grayed out” (and always switched off) if the input video is not HD: the example menu screen below shows this condition. When this box is checked, closed captions will be extracted from HD-SDI input of MEMPHIS, and will be output as EIA708-compliant Picture User Data within the MPEG-2 video stream. The implementation details are as follows.

- MEMPHIS only supports HD Closed Captions which arrive as HD-SDI Ancillary Data "Caption Distribution Packets" which must comply with EIA708-B.
- MEMPHIS only does not supports HD Closed Captions in KLV format.
- Everything other than timecode (and sections reserved by EIA708-B for future use) within each "Caption Distribution Packet" is supported by MEMPHIS.
- MEMPHIS will automatically put any and all "caption service descriptors" from the "Caption Distribution Packets" into the PSI as part of the PMT.
- No HD Closed Caption data size or data-rate limits (other than those inherent in EIA708-B) are imposed by MEMPHIS.
- If the frame rate indicated by the Caption Distribution Packets does not match the frame rate of the HD input video then MEMPHIS will handle the Caption Distribution Packets transparently: what is output into the MPEG-2 Transport Stream will be exactly what was present on the HD video source.
- MEMPHIS will pad the HD Closed Captions stream to the EIA708-standard data rate, even if the relevant ANC packets are interrupted or entirely missing.

Timecode: Standard SMPTE328 allows the timecode of every MPEG-2 picture to be carried in the Picture User Data of each MPEG-2 picture. This is in addition to the standard MPEG-2 timecode carried in every GOP header. Note that this “Timecode” option is not mutually exclusive with either of the two “Closed Caption” options above.



4.8.2 VBI Extraction

This menu controls the content and timing of the output into the MPEG-2 Transport Stream of a separate PES stream carrying Vertical Blanking Interval (VBI) sample data. The format of this stream is defined by ETSI standard EN301 775 (specifically section 4.9, “Data field for monochrome 4:2:2 samples”), except for the following points.

- At MEMPHIS MPEG-2 Transport Stream output, the PES header length (although completely valid) is not set to 46 for the VBI PES stream.
- For MEMPHIS, the number of lines of VBI data in the (single) VBI PES stream is not constrained to small values: it can be up to 34.

The VBI stream carries whole Vertical Blanking lines only: fractions of Vertical Blanking lines are not supported. The stream can carry between 1 and 34 complete Vertical Blanking lines.

Note that VBI sample data in this format can only be used for SD video. If the selected input video is HD, this whole menu will be “grayed out” and the VBI stream will be disabled. Note also that the VBI format used is valid for both 625(576)/25I and 525(480)/29I, because ETSI standard EN301 775 covers both.

An “Ingest Capture” PC running Snell and Wilcox capture software offers both Transport Stream and Elementary Stream capture modes. The choice between these two modes depends on how the captured material will be used. Both modes offer frame-accurate capture as far as video is concerned. However, only Elementary Stream capture offers frame-accurate capture of VBI, for the reasons explained below. On the other hand, only Transport Stream capture records the stream timestamp information (PCRs, PTSs and DTSs).

Each captured Transport Stream is a single contiguous stream which starts with the first video picture of the clip and ends just before the first video picture after the clip. For MPEG-2, decoders have buffers of different durations for video and VBI. This means that video and VBI which were co-timed at the inputs to MEMPHIS can never be guaranteed to be co-timed in its MPEG-2 Transport Stream output. This is why frame-accurate VBI capture cannot be guaranteed when a Transport Stream is being captured.

Each captured video Elementary Stream is a single contiguous stream which starts with the first video picture of the clip and ends at the end of the last video picture within the clip.

Each captured VBI Elementary Stream is a single contiguous stream which starts with the VBI for the first video picture of the clip and ends at the end of the VBI for the last video picture within the clip.

It is recommended that Elementary Stream capture is used whenever possible (rather than Transport Stream capture) because only Elementary Stream capture offers frame-accurate capture of VBI.

4.8.2.1 Enable

The VBI stream is only output into the Transport Stream when this box is checked (and this menu is not “grayed out”).

4.8.2.2 Clear All Lines

This button unchecks all the “VBI Lines to Extract” (see below). It is intended to be used as a shortcut before changing the content of the VBI stream.

4.8.2.3 Despatch Offset

This menu allows the user to adjust VBI buffer occupancy for any external MPEG-2 decoder or server receiving a Transport Stream from MEMPHIS, even if that decoder or server ignores PES timestamps. MEMPHIS dispatches each PES packet of VBI into the Transport Stream before it is required by a decoder: it is dispatched “early”. The dispatch offset value is the amount by which it is dispatched “early”, expressed in terms of whole VBI PES packets. It should therefore equal the maximum buffer occupancy for an external decoder, measured in whole VBI PES packets.

This value should normally be left at its default setting, which is 2. If the value is too low, the VBI may be out of sync with the video. If the value is too high, an external decoder’s VBI buffer may overflow, causing VBI to become intermittent or fail completely.

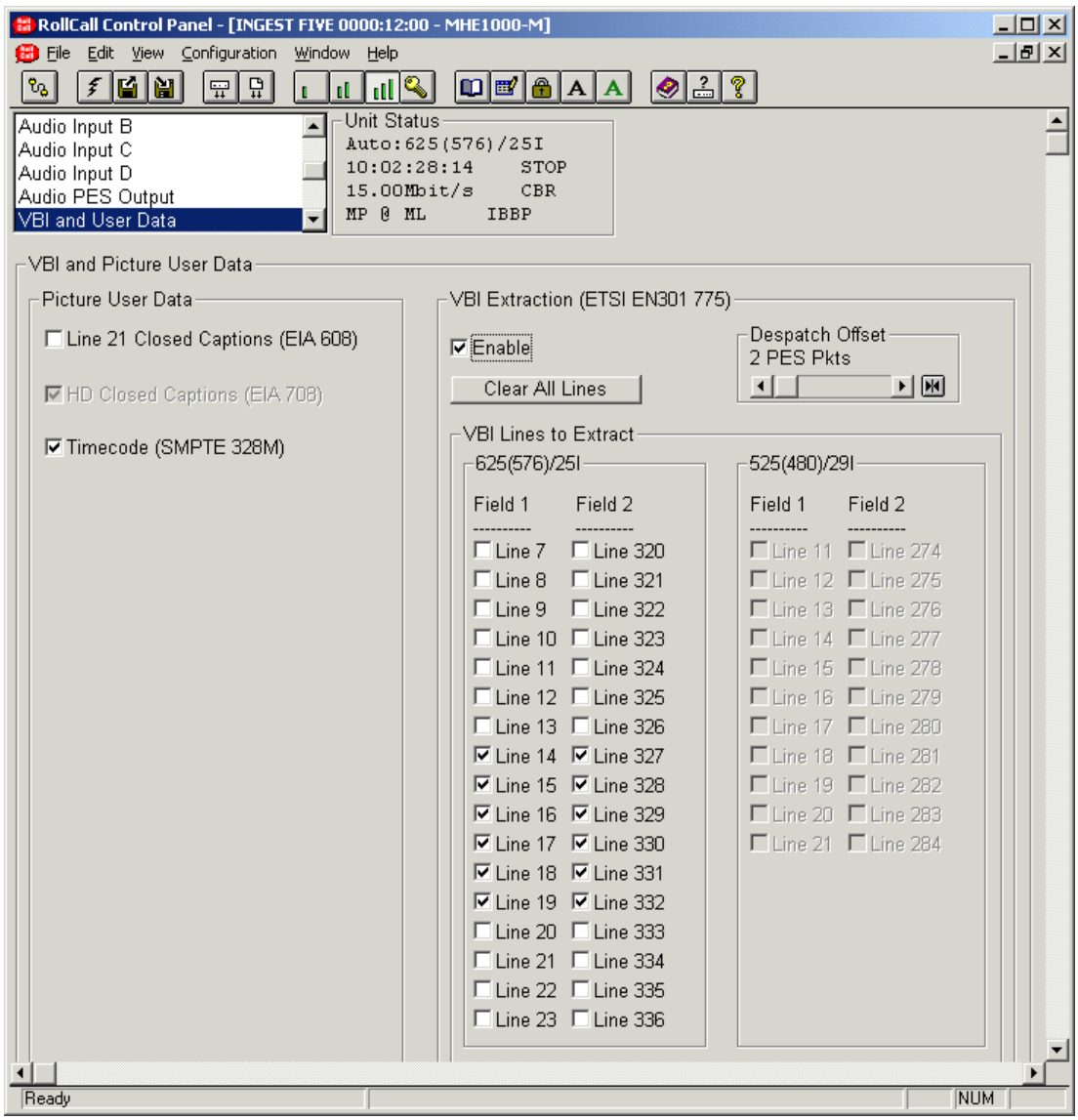
If in doubt, use the default value of 2.

4.8.2.4 VBI Lines to Extract

This menu offers a check box for each legal line within the SD video VBI. The line numbers offered depend on whether the input video standard is 525(480)/29I as shown in an example menu screen above, or 625(576)/25I as shown in the example menu screen below.

The blanking lines within each video field are presented as a column. The corresponding lines of the two fields are therefore presented side by side. This is intended to help when the user wishes to extract the corresponding blanking lines from both fields, as shown in the example menu screen below.

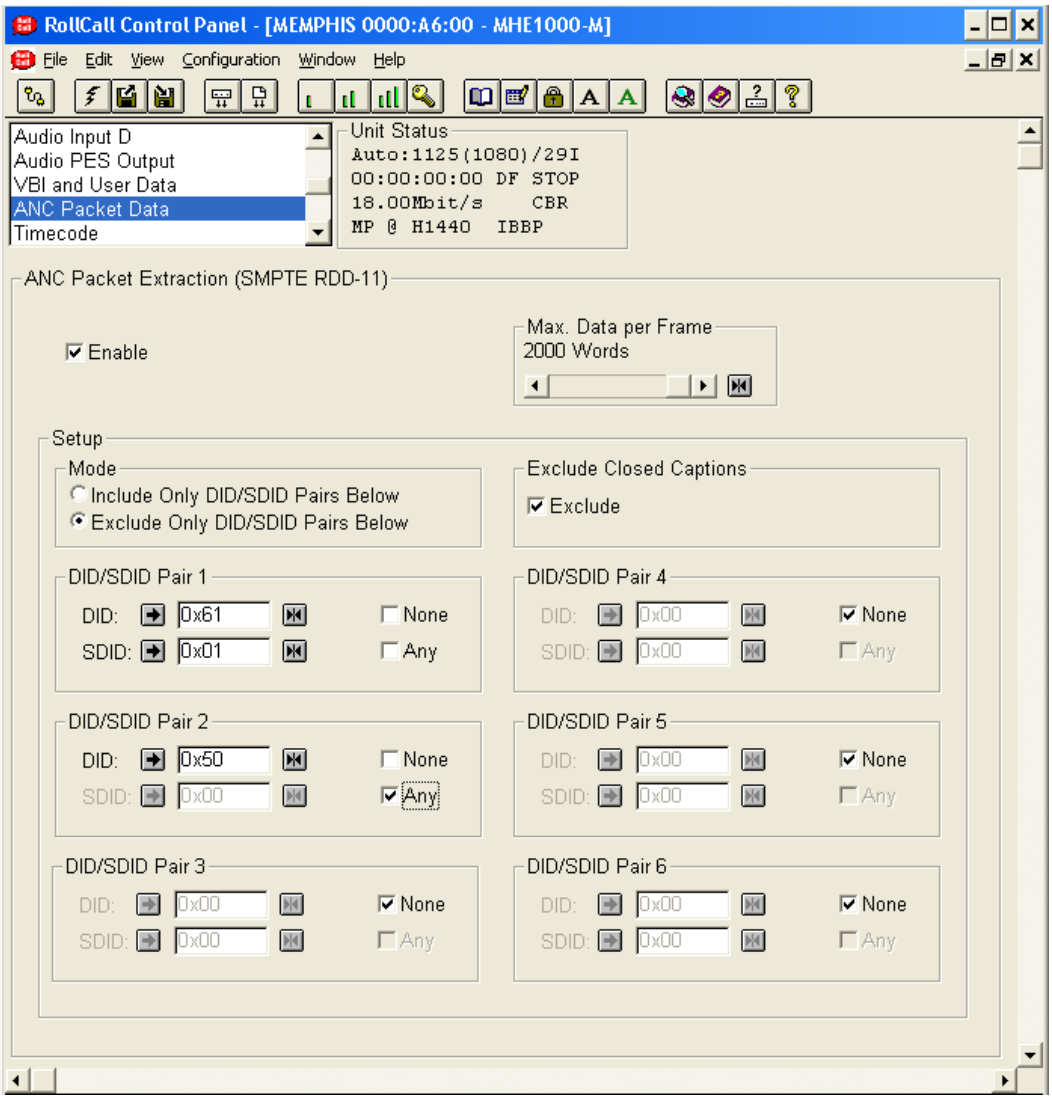
MEMPHIS will automatically calculate the Transport Stream bit-rate for this “VBI” data service, based on the number of lines selected in this menu. The resulting Transport Stream bit-rate will be displayed on the “Bit Rates” menu screen as the “ANC/VBI” bit-rate.


RollCall Control Panel - [INGEST FIVE 0000:12:00 - MHE1000-M]
File Edit View Configuration Window Help
Audio Input B
Audio Input C
Audio Input D
Audio PES Output
VBI and User Data
Unit Status
Auto:625(576)/25I
10:02:28:14 STOP
15.00Mbit/s CBR
MP @ ML IBBP
VBI and Picture User Data
Picture User Data
Line 21 Closed Captions (EIA 608)
HD Closed Captions (EIA 708)
Timecode (SMPTE 328M)
VBI Extraction (ETSI EN301 775)
Enable
Clear All Lines
Despatch Offset
2 PES Pkts
VBI Lines to Extract
625(576)/25I
Field 1 Field 2
Line 7 Line 320
Line 8 Line 321
Line 9 Line 322
Line 10 Line 323
Line 11 Line 324
Line 12 Line 325
Line 13 Line 326
Line 14 Line 327
Line 15 Line 328
Line 16 Line 329
Line 17 Line 330
Line 18 Line 331
Line 19 Line 332
Line 20 Line 333
Line 21 Line 334
Line 22 Line 335
Line 23 Line 336
525(480)/29I
Field 1 Field 2
Line 11 Line 274
Line 12 Line 275
Line 13 Line 276
Line 14 Line 277
Line 15 Line 278
Line 16 Line 279
Line 17 Line 280
Line 18 Line 281
Line 19 Line 282
Line 20 Line 283
Line 21 Line 284
Ready
NUM

4.9 ANC PACKET DATA MENU SCREEN

MEMPHIS supports a single data PES service containing Ancillary Data packets from the vertical blanking area of the HD-SDI video input. The term "PES" refers to the "Packetized Elementary Stream" defined in the MPEG-2 System Specification (13818-1). The abbreviation “ANC” is often used to mean “Ancillary Data packets”. In this manual and on the menu screens, the abbreviation “ANC” is used in connection with the PES service containing Ancillary Data packet data.

The format of this PES service complies with the SMPTE/Harris RDD-11 specification. Currently MEMPHIS supports this data service for Ancillary Data packets carried in the luminance sample words of the vertical blanking period of HD input video (these are often referred to as “VANC packets”). However, MEMPHIS does not currently support this data service for SD input video, or for Ancillary Data packets from the horizontal blanking period of HD input video (these are often referred to as “HANC packets”), or for Ancillary Data packets carried in chrominance sample words of HD input video.



4.9.1 Enable

When this check-box is checked, the data PES service is inserted into the MPEG-2 Transport Stream output by MEMPHIS. When this check-box is not checked, the data PES service will be absent from the MPEG-2 Transport Stream output by MEMPHIS and the other controls (see below) are “grayed out”.

Currently MEMPHIS supports this data service for HD input video but not for SD input video. Therefore when the selected MEMPHIS video input is SD, this enable control will be “grayed out”.

4.9.2 Max. Data per Frame

This control limits the data rate of the data service by placing a limit on the number of 10-bit words which will be extracted from Ancillary Data packets during each video frame. The range of legal values is from 0 to 2000.

MEMPHIS will automatically calculate the Transport Stream bit-rate for this “ANC” data service, based on the value this control is set to. The resulting Transport Stream bit-rate will be displayed on the “Bit Rates” menu screen as the “ANC/VBI” bit-rate.

If in doubt, set this control to the highest available value. This will maximize the number of extracted Ancillary Data packets, which in turn will maximize the chances of extracting all available packets.

4.9.3 Setup

These controls determine which Ancillary Data packets will be extracted from the vertical blanking area of the HD-SDI video input. Remember that MEMPHIS currently supports Ancillary Data packets carried in HD-SDI luminance sample words, but not Ancillary Data packets carried in HD-SDI chrominance sample words.

Every Ancillary Data packet has a Data ID (DID) and an optional Secondary Data ID (SDID) which identify what type of data the packet contains. MEMPHIS can either include or exclude each individual Ancillary Data packet from the data PES service. This inclusion or exclusion is done using each the DID and SDID of each packet.

4.9.3.1 Mode

This control determines whether Ancillary Data packets with the DID and SDID values specified by the user should be included or excluded from the data PES service. The example menu screen above shows “Exclude...” mode. The example menu screen below shows “Include...” mode.

If in doubt, set this control to “Exclude...” to maximize the number of extracted Ancillary Data packets, which in turn will maximize the chances of extracting all available packets.

4.9.3.2 Exclude Closed Captions

If the “Mode” control (see above) is set to “Exclude...” then Ancillary Data packets containing HD Closed Captions can optionally be excluded using this control, rather than having to manually enter the relevant DID and SDID values.

If the “Mode” control (see above) is set to “Include...” then this control is “grayed out” as shown in the example menu screen below.

Normally HD Closed Captions should be conveyed via the Picture User Data within the video Elementary Stream, rather than as part of a separate data PES service. It is therefore recommended that this control should normally be set to “Exclude Closed Captions”.

4.9.3.3 DID/SDID Pair 1 to 6

These controls set 6 DID values with their associated optional SDID values. Each DID may be set to a specific 8-bit hexadecimal value manually, or may alternatively be set to “None” using a check-box. Similarly each SDID may be set to a specific 8-bit hexadecimal value manually, or alternatively may be set to “Any” using a check-box. All manually-entered DID and SDID values are treated as being in hexadecimal and are displayed using the standard prefix “0x” to indicate that they are in hexadecimal.

If an SDID is set to “Any” then the SDID value is ignored: only the associated DID value is used to decide whether each packet should be included or excluded. In such a case, the numerical SDID value is “grayed out” as shown in the example menu screen above (under “DID/SDID Pair 2”).

If a DID is set to “None” then that DID value is not used to decide whether each packet should be included or excluded. In such a case the numerical DID value and the associated SDID value are both “grayed out” as shown in the example menu screen above (under “DID/SDID Pair 3”).

If the “Mode” control (see above) is set to “Include...” then each Ancillary Data packet matching any of the 6 DID and SDID value pairs will be included in the data PES service, subject to the limit set by “Max. Data per Frame” (see above).

If the “Mode” control (see above) is set to “Exclude...” then Ancillary Data packets matching any of the 6 DID and SDID value pairs will be excluded from the data PES service but all other Ancillary Data packets will be included in the data PES service, subject to the limit set by “Max. Data per Frame” (see above).

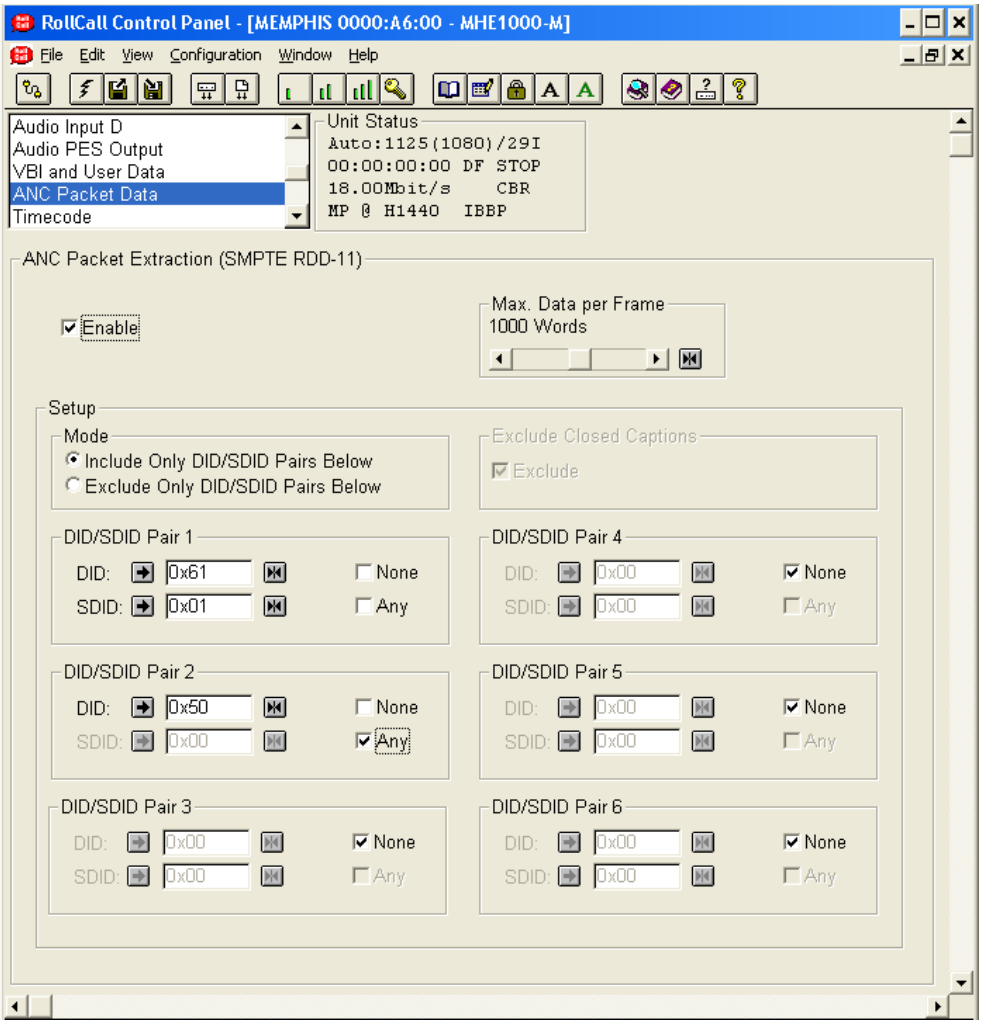
If all 6 DID values are set to “None” and the “Mode” (see above) is set to “Include...” then all Ancillary Data packets will be excluded because “include none” means the same as “exclude all”. However if all 6 DID values are set to “None” and the “Mode” (see above) is set to “Exclude...” then all Ancillary Data packets will be included (subject to the “Max. Data per Frame” limit which is described above) because “exclude none” means the same as “include all”.

In the example menu screen above, all Ancillary Data packets will be included in the data PES service unless they satisfy one of these 3 conditions:

- they contain HD Closed Captions,
- they have a DID of 61 hexadecimal and an SDID of 01 hexadecimal,
- they have a DID of 50 hexadecimal and any SDID value.

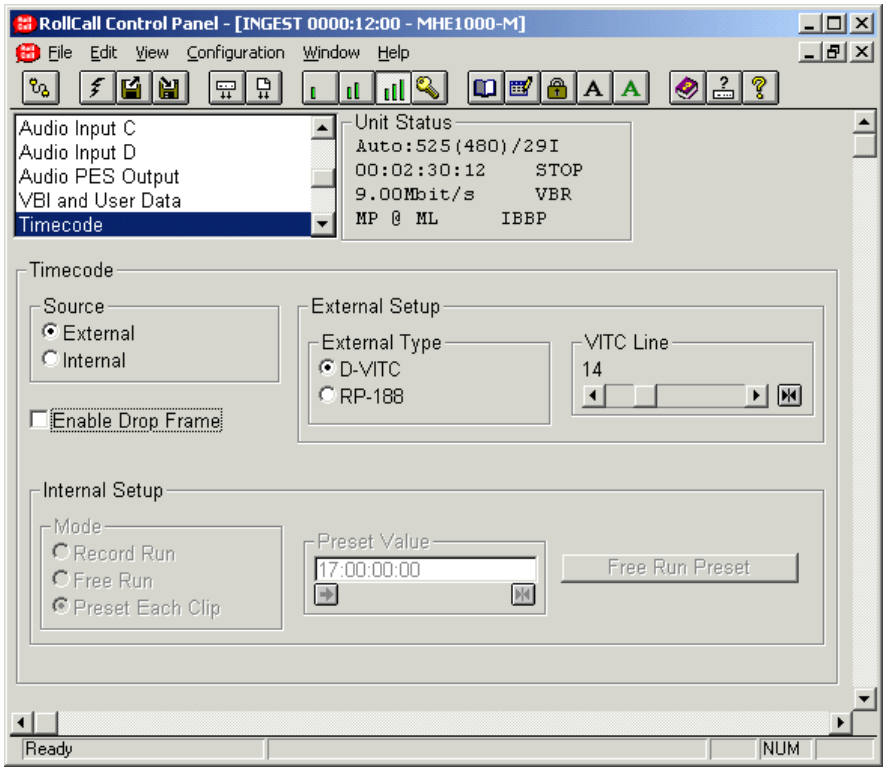
In the example menu screen below, Ancillary Data packets will be included in the data PES service if they have a DID of 61 hexadecimal and an SDID of 01 hexadecimal, or if they have a DID of 50 hexadecimal.

If in doubt, set all the DID values to “None” and the “Mode” control (see above) to “Exclude...” to maximize the number of extracted Ancillary Data packets, which in turn will maximize the chances of extracting all available packets.



4.10 TIMECODE MENU SCREEN

MEMPHIS supports several modes for video timecode, as described below. This timecode is inserted into the MPEG-2 video stream output by the unit.



4.10.1 Source

The timecode may be either generated internally or externally, as selected by this menu item.

4.10.2 External Setup

These menus select the format for timecode when its “source” is “external”, as shown in the example menu screen above. If the “source” is set to “internal” then this menu will be “grayed out”.

Remember that ??:??:??:?? will always be displayed as the timecode value in the Unit Status window if the current external timecode is invalid.

4.10.2.1 External Type

Two different types of external timecode are supported:

D-VITC – The timecode is extracted from the Vertical Interval Timecode on the SDI input. In this case, the timecode is extracted from the line number selected in the “VITC line” section.

RP-188 - The timecode is embedded in the SDI or HD-SDI input video in SMPTE RP-188 format.

When the input video standard is HD, the “D-VITC” option will be “grayed out” so that it cannot be selected. This is because D-VITC is only supported for SD video.

Note that the external time code value is always read every field. However, the timecode value displayed in the “Unit Status” area of the menu screen will only update approximately once per second.

Remember also that ??:??:??:?? will always be displayed as the timecode value in the Unit Status window if the current external timecode is invalid. If this happens and the external timecode source is definitely active (beware VTRs in “standby” mode!) then either the selected “type” of external timecode is incorrect, or (if “D-VITC” is selected) the selected “VITC line” (see below) is incorrect. If in doubt, try each “type” and/or “VITC line” value in turn for at least 2 seconds each.

4.10.2.2 VITC line

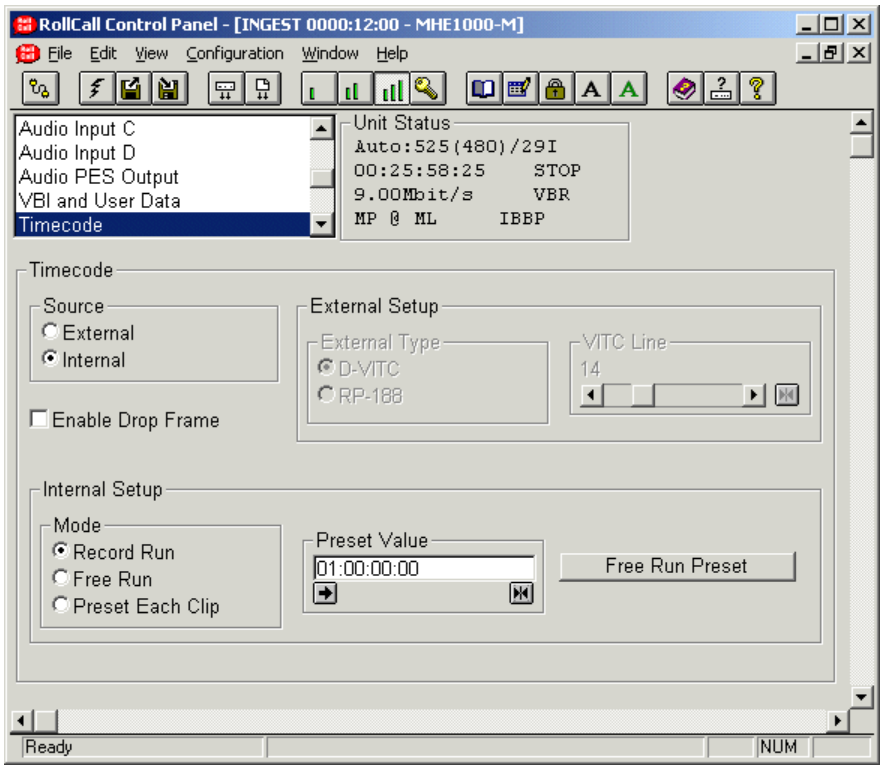
This menu is only available when the timecode “source” is “external” and the “type” is “D-VITC”. It selects the horizontal line number within the picture where D-VITC waveform is located.

Remember that ??:??:??:?? will always be displayed as the timecode value in the Unit Status window if the current external timecode is invalid. If this happens and the external timecode source is definitely active (beware VTRs in “standby” mode!) then the selected “VITC line” (see below) is incorrect. If in doubt, try each “VITC line” value in turn for at least 2 seconds each.

4.10.3 Internal Setup

When no external timecode source is available, or when the required timecode (for the clip to be captured) must be different from any available external value, timecode can be generated internally as shown in the example menu screen below.

If the “source” (see above) is set to “external” then this menu will be “grayed out”.



4.10.3.1 Mode

This setting selects how the timecode is generated internally.

Record Run – The timecode is set by an external remote control (such an a VTR edit controller) over the RS-422 port labeled “remote” on the rear panel of MEMPHIS. This is the best mode when using an external edit controller, if no suitable external time code source is available.

Free Run – The timecode runs forever. Its value is only constrained by the “Free Run Preset” menu button described below. In this mode, the timecode value at the start of each captured clip will be unpredictable.

Preset Each Clip – At the start of each ingest clip, the timecode starts with the value given by the Preset Value field (see Preset Value below). This is the best mode to use when the clip timecode is critical but no suitable external time code source (or edit controller) is available.

4.10.3.2 Preset Value

This field is used to preset the timecode used by the “Preset Each Clip” mode (see above), and by the “Free Run Preset” menu button (see below).

4.10.3.3 Free Run Preset

This button is only available when the “mode” is set to "Free Run". It loads the internal timer to the “Preset Value” (see above). This allows the user some control over the value of free-running timecode, although this control is not intended to be frame-accurate when performed manually.

4.10.3.4 Enable Drop Frame

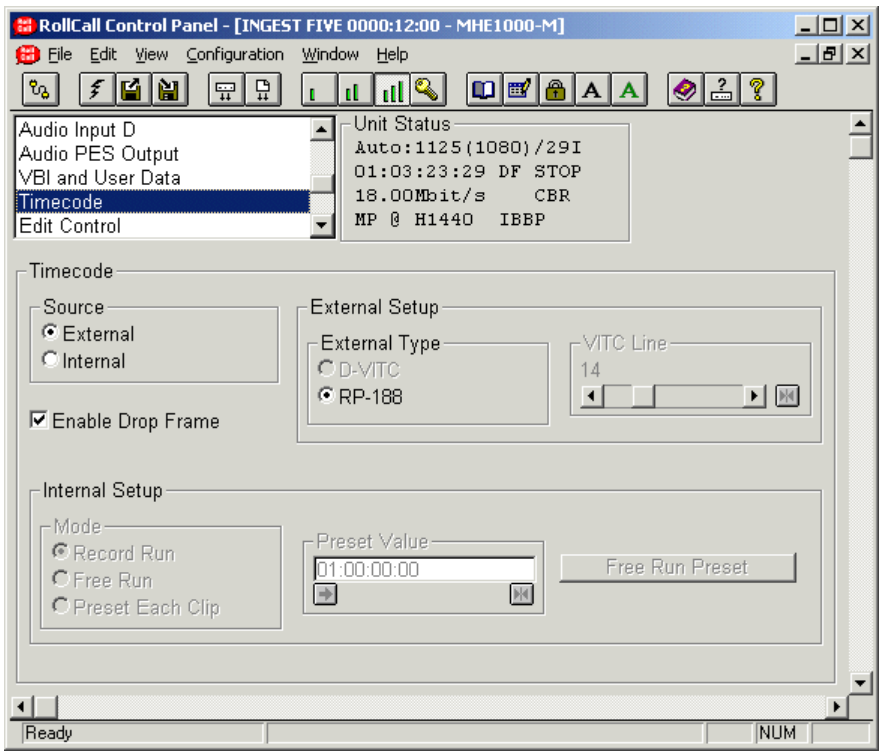
The selected external or internal timecode will not be treated as being drop-frame unless this menu option is checked.

When this menu option is checked, external timecode will only be treated as being drop-frame if the “drop-frame” flag (within the timecode itself) is set. It is therefore strongly recommended that if external timecode is being used, this menu option should always be checked when it is not “grayed out”.

For internal timecode, this menu option simply selects whether or not the timecode is drop-frame. It should therefore only be checked when drop-frame internal timecode is specifically required.

If the input video frame rate does not allow drop-frame timecode then this menu option will be “grayed out”. Otherwise, the default setting is “on” (checked).

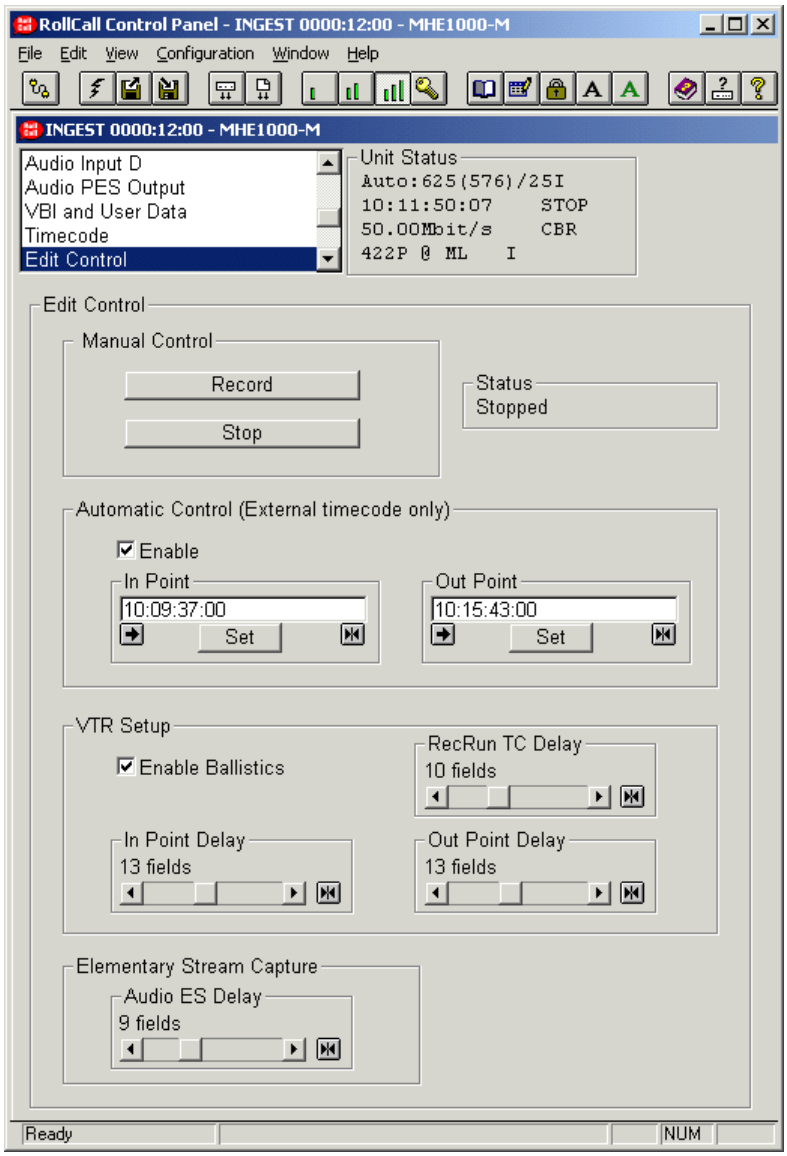
When the selected external or internal timecode is recognized as being drop-frame, the timecode value in the “Unit Status” window will be followed by the letters “DF” as shown in the example menu screen below (the letters “DF” are between the timecode value 00:12:18:08 and the edit control status string “STOP”). When the selected external or internal timecode is not recognized as being drop-frame, the timecode value in the “Unit Status” window will NOT be followed by the letters “DF”, as shown in the example menu screen above.



4.11 EDIT CONTROL MENU SCREEN

This section controls clip capture. MEMPHIS supports the capture of MPEG-2 clips onto an optional “Ingest Capture” PC, using VTR-style remote control.

For this purpose, MEMPHIS and the “Ingest Capture” PC are treated as a single “record-VTR” device. Whilst this is in the VTR “recording” state (displayed in the “Unit Status” window as “REC” and also known “Edit On”), a clip is being captured on the hard disk store within the “Ingest Capture” PC. In the “not recording” state (displayed in the “Unit Status” window as “STOP” and also known as “Edit Off”), no clip is being captured but MEMPHIS still outputs the MPEG-2 Transport Stream which can be decoded “live” by MPEG-2 decoders receiving the Transport Stream. The use of the term “STOP” does not imply that any part of the output MPEG-2 Transport Stream from MEMPHIS is frozen in any way when “not recording”.



MEMPHIS has direct access to the uncompressed video, and hence to video-frame-accurate timing for capture control. On the other hand, the “Ingest Capture” PC receives compressed MPEG-2 (via an ASI link) which has no regularly video timing. Therefore, VTR-style control is performed via MEMPHIS (and its RollCall menus), even though it is the “Ingest Capture” PC which provides the actual file storage. Note that the use of VTR-style video-timing-based capture by MEMPHIS means that capture timing can only be controlled or adjusted in multiples of one video field duration, even for audio capture.

An “Ingest Capture” PC running Snell and Wilcox “Mosalina” software offers both Transport Stream and Elementary Stream capture modes. The choice between these two modes depends on how the captured material will be used. Both modes offer frame-accurate capture as far as video is concerned. However, only Elementary Stream capture offers frame-accurate capture of audio (or near-frame-accurate capture of audio, depending on the audio format) and frame-accurate capture of VBI, for the reasons explained below.

On the other hand, only Transport Stream capture records the stream timestamp information (PCRs, PTSs and DTSs).

Each captured Transport Stream is a single contiguous stream which starts with the first video picture of the clip and ends just before the first video picture after the clip. For MPEG-2, decoders have buffers of different durations for audio, video and VBI. This means that audio, video and VBI which were co-timed at the inputs to MEMPHIS can never be guaranteed to be co-timed in its MPEG-2 Transport Stream output. This is why neither frame-accurate (or near-frame-accurate) audio capture nor frame-accurate VBI capture can be guaranteed when a Transport Stream is being captured.

Each captured video Elementary Stream is a single contiguous stream which starts with the first video picture of the clip and ends at the end of the last video picture within the clip.

Each captured audio Elementary Stream is a single contiguous stream which starts co-timed with (or just after) the start of the first video picture of the clip and ends co-timed with (or just after) the start of the first video picture after the clip. Remember that captured audio can only start or end at exactly the same time as video if the audio format is inherently video-frame-aligned. This is the case only for uncompressed (PCM) and Dolby E audio: these formats divide the audio into units with exactly the same duration as one video frame. The MPEG 1 Layer 2 and Dolby AC-3 audio formats divide the audio into units which do not have the same duration as one video frame, which means that capture of these audio formats can only ever be near-frame-accurate.

Each captured VBI Elementary Stream is a single contiguous stream which starts with the VBI for the first video picture of the clip and ends at the end of the VBI for the last video picture within the clip.

It is recommended that Elementary Stream capture is used whenever possible (rather than Transport Stream capture) because only Elementary Stream capture offers frame-accurate (or near-frame-accurate) capture of audio and frame-accurate capture of VBI.

4.11.1 Manual Control

This menu has two push-button controls.

Record – this puts the unit in the “Recording” state (also known as “Edit On”) immediately. If the unit is already in the “Recording” state, it forces an immediate shot change. When controlled manually, this is not intended to provide frame-accurate capture.

Stop – this puts the unit in the “Stopped” state (i.e. “not recording”, also known as “Edit Off”) immediately. If the unit is already in the “Stopped” state, it has no effect. When controlled manually, this is not intended to provide frame-accurate capture.

4.11.2 Automatic Control

This section configures frame-accurate capture of one clip at a time, without having to use an external real-time Edit Controller. Note that MEMPHIS does support the use of an external Edit Controller: it supports “Edit on” (i.e. “start recording”) and “Edit off” (i.e. “stop recording”) commands via a VTR-style 9-way serial port. However, it is often convenient to be able to operate without such an Edit Controller.

In “Automatic Control” mode, “Edit on” (i.e. “start recording”) and “Edit off” (i.e. “stop recording”) happen automatically at user-defined timecode values. In order for this to work, MEMPHIS must be set to use external timecode from the same “play VTR” device which is providing the uncompressed SDI or HD-SDI video. Note however that MEMPHIS does not control this “play VTR” device, which may therefore have to be controlled manually.

If the “Source” is not set to “External” (on the Timecode menu screen), the whole “Automatic Control” menu will be “grayed out”. The reason for this is that automatic control is only meaningful using external timecode.

Similarly, if external timecode is not valid (indicated by “??:??:??:??” being displayed as the timecode value in the Unit Status window), the whole “Automatic Control” menu will be “grayed out”. The reason for this is to prevent the entry of "In” and "Out” point values which are illegal for drop-frame timecode whilst the drop-frame flag (which is part of the timecode value) is invalid. Note that this “graying out” may happen when an external timecode source device goes into standby mode. An example of such a device is a “play VTR” which does not "freeze" timecode when it goes into standby mode. This should not be a problem: when such a device comes out of standby mode (for example, when a “play VTR” has been in standby mode but then starts to play), the whole “Automatic Control” menu will come out of the “grayed out” state with the most recent settings intact.

To minimize inconvenience in such a case, it is recommended that the output mode of a “play VTR” should be set to “TAPE” rather than “E-to-E”. For the same reason, it is recommended that the “Still” and “Standby” times of a “play VTR” should be set to values longer than likely pauses in operation (perhaps a few minutes).

The 3 items on the “Automatic Control” menu are as follows.

Enable – this must be switched on before the “play VTR” device is commanded to “play”, but should be switched “off” when the “play VTR” device is being “rewound” or “fast forwarded” to avoid accidental triggering.

In Point – this must be set by the user before the “play VTR” device is commanded to “play” the pre-roll. This menu item has its own “Set” button. If this is pressed and the current timecode is valid, the current timecode value (displayed in the Unit Status window) will be set as the “In Point”.

Out Point – this must be set by the user before the “play VTR” device is commanded to “play” the pre-roll. This menu item has its own “Set” button. If this is pressed and the current timecode is valid, the current timecode value (displayed in the Unit Status window) will be set as the “Out Point”.

The “workflow” for each clip is as follows.

1. Switch “enable” off in the menu to avoid accidental triggering.
2. Jog and shuttle the “play VTR” device to decide the “In Point” and the “Out Point”.
3. Enter the “In Point” and the “Out Point” timecode values in the menu.
4. “Rewind” the “play VTR” device to a pre-roll point before the “In Point”. The amount of pre-roll used must be at least that required by the “play VTR” device. For a tape-based device, at least 5 seconds is recommended. For a disk-based device, at least 1 second is recommended.
5. Switch “enable” on in the menu.
6. “Play” the “play VTR” device.
7. Wait for the clip to play through to the “Out Point” or beyond.
8. “Stop” the “play VTR” device.

The above steps can be performed manually, or (when the entire clip ingest process is controlled via a Media Asset Management or other automated system) using “Roll IP” commands.

Note that under certain circumstances, the “In” and “Out” point timecode values will both be drop-frame. The circumstances under which this is true are as follows:

- the “Enable Drop Frame” menu option must be checked on the “TIMECODE” menu screen,
- and the video frame rate must be suitable for drop-frame (i.e. fractional),
- and the timecode must either be external with the “drop-frame” flag (within the timecode itself) set, or be internal timecode.

When the timecode is recognized as being drop-frame, the timecode value in the “Unit Status” window will be followed by the letters “DF” (see section 4.10.3.4 above). When the timecode is not recognized as being drop-frame, the timecode value in the “Unit Status” window will NOT be followed by the letters “DF”.

4.11.3 VTR Setup

This section configures VTR-style remote control of MEMPHIS. It allows the capture timing to be adjusted to work with a variety of external edit controllers. The default values within this menu work for all video standards when using “Automatic Control” capture (see above) rather than an external edit controller. However, different external edit controllers may require different settings, and these settings may be different for different video standards. The default values within this menu work for all video standards apart from fast progressive ones (50p, 59p and 60p) when tested with one specific edit controller: the DNF Controls “2-MCE”. The parameter values which have been tested successfully with this specific edit controller are as follows:

Parameter	Value for 50p, 59p and 60p	Value for all other frame rates
RecRun Timecode Delay	7 fields	10 fields (default value)
In Point Delay	11 fields	13 fields (default value)
Out Point Delay	11 fields	13 fields (default value)
Audio ES Delay	7 fields	9 fields (default value)

For fast progressive input video standards, the RollCall edit control GUI can set IN and OUT points to any individual 59P or 50P frame. However, many edit controllers (including the DNF Controls “2-MCE”) only display 29i or 25i timecode. This means that the frame number displayed by such an edit controller is half the actual 59P or 50P frame number, and the frame number displayed only counts up by 1 every two 59P or 50P frames. Therefore, such edit controllers can only set IN and OUT points to 59P or 50P timecode frame numbers which are even. Furthermore, the RecRun timecode is only accurate to +/-1 59P or 60P or 50P timecode frame when certain edit controllers (including the DNF one) are used for 59P or 60P or 50P input video standards.

4.11.3.1 VTR Ballistics

When this is set to "on", MEMPHIS emulates the ballistics of a Sony DVW-75 Digital Betacam VTR. When it is set to "off", no ballistics are emulated (so that the timecode jumps straight to the destination, as on a disk-based video recorder).

4.11.3.2 "In Point" delay

This is the delay, in video fields, between receiving an "Edit On" command (during "pre-roll" play) and the 1st frame (called the "in point") within the clip. This value is only used when an external edit controller is controlling clip capture. Note that for progressive input video standards, one progressive frame equals one “field” on this menu.

This delay should be adjusted only if the “in point” of captured MPEG-2 video is not the expected video frame. The use of a video source with an on-screen timecode overlay is recommended for adjusting this delay.

4.11.3.3 "Out Point" delay

This is the delay, in video fields, between receiving an "Edit Off" command (during recording) and the 1st frame (called the "out point") after the end of the clip. Again, this value is only used when an external edit controller is controlling clip capture. Note that for progressive input video standards, one progressive frame equals one “field” on this menu.

This delay should be adjusted only if the “out point” of captured MPEG-2 video is not the expected video frame. The use of a video source with an on-screen timecode overlay is recommended for adjusting this delay.

4.11.3.4 RecRun Timecode Delay

This is the delay, in video fields, between receiving a timecode value from an edit controller and that timecode value being applied at the video input of MEMPHIS. This value is only used when the timecode "source" is set to "Internal" and the Internal timecode "mode" is set to "Record Run" (these are settings on the Timecode menu screen). Note that for progressive input video standards, one progressive frame equals one "field" on this menu.

This delay should be adjusted only if the timecode of captured MPEG-2 video does not correspond to that of the video source. The use of a video source with an on-screen timecode overlay is recommended for adjusting this delay.

4.11.3.5 Elementary Stream Capture: Audio ES Delay

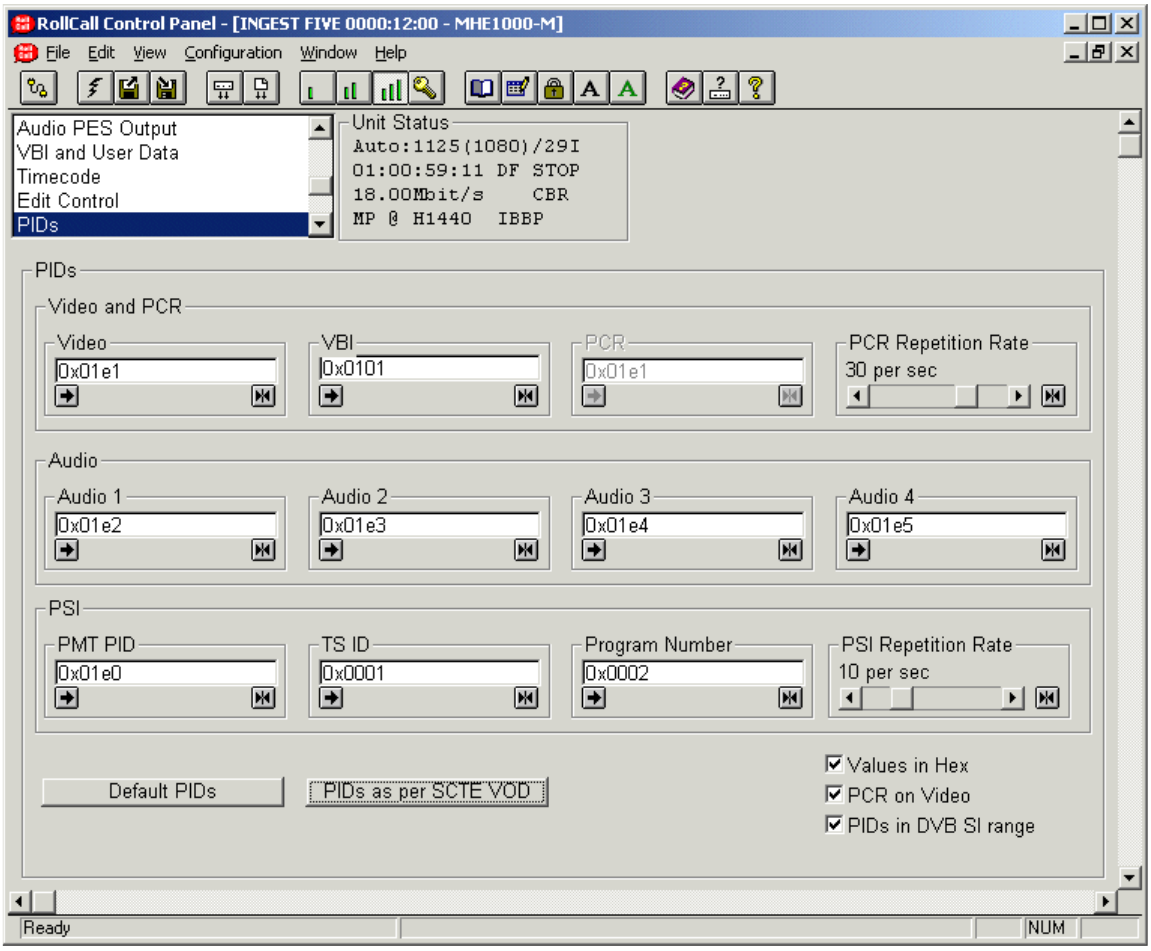
This is the delay, in video fields, between receiving an "Edit On" command (during "pre-roll" play) and the start of captured audio Elementary Streams within the clip. It does not affect audio timing within captured Transport Streams, or the audio timing of a “live” MPEG-2 decoder monitoring the Transport Stream output of MEMPHIS. Note that for progressive input video standards, one progressive frame equals one “field” on this menu.

This delay should be adjusted only if the audio-to-video synchronization of captured Elementary Streams is unacceptable. The use of a source with known audio-to-video timing (such as a test tone starting at a known timecode value) is recommended for adjusting this delay value.

4.12 PIDs MENU SCREEN

This section affects compatibility of the MPEG-2 Transport Stream output by MEMPHIS. The Packet Identifier (PID) is defined by the MPEG-2 System specification (ISO specification 13818-1). Each Elementary Stream (such as video) within the Transport Stream is referenced in the Program Specific Information (PSI) tables. Each Elementary Stream generated by MEMPHIS is allocated a PID using this menu screen.

Note: In the case of Elementary Stream capture the PID values given on this menu screen are arbitrary. However they must be set to unique values in order for capture to work, and in order for any downstream MPEG-2 decoder (such as a monitoring decoder) to decode the resulting Transport Stream.



4.12.1 Values in Hex

Causes the numbers to be displayed in hexadecimal form when checked, as shown in the example menu screen above. The numbers are displayed in decimal otherwise, as shown in the example menu screen below.

4.12.2 PCR on Video

When switched on, automatically allocates the PCR the same PID value as the video, as shown in the example menu screen above.

When "PCR on Video" is unchecked, the “PCR” field (see below) contains the PID of the Elementary Stream which contains the Program Clock Reference (PCR), as shown in the example menu screen below. The PID for the PCR must be different from all other PIDs in this case.

Certain disk-based MPEG-2 video servers require the PCR to be on the video PID. One example of this is the SCTE specification for VOD. When the “PIDs as per SCTE VOD” button (at the bottom of this menu screen) is pressed, this option will be switched on. If in doubt, switch this option on.

4.12.3 PIDs in DVB SI range

When this menu option is switched on, this menu screen will accept PID values which are reserved for SI in the DVB system. This may result in compatibility problems for the resulting Transport Stream. When this menu option is switched off, this menu screen will not accept these reserved PID values. If in doubt, switch this option off.

4.12.4 Video and PCR, Audio

These sections contain the PIDs for the relevant Packetized Elementary Stream (PES). Each must be unique. Even if fewer than 4 audio services are in use, all 4 must be assigned a PID on this menu: this ensures that all 4 are always ready to be enabled using the “Audio PES output” menu screen described earlier on in this document.

Certain disk-based MPEG-2 video servers require certain PID values to be used. One example of this is the SCTE specification for VOD. When the “PIDs as per SCTE VOD” button (at the bottom of this menu screen) is pressed, the correct PID values will be selected.

If in doubt, leave the PIDs at their default values. To restore a default value, click on the “>|<” symbol below the bottom right-hand end of the value “box” on the menu.

4.12.4.1 PCR Repetition Rate

This field is used to enter the repetition rate of the Program Clock Reference (PCR) within the Transport Stream. The value is in repetitions per second. The default value is 30. Note that this value may be changed to suit a particular type of MPEG-2 decoders or servers. In most cases, no change is required. If in doubt, use the default value.

4.12.5 PSI

The Program Specific Information (PSI) table is common to all DVB, ATSC and ARIB Transport Stream. The following section sets parameters contained in the PSI table:

4.12.5.1 PMT PID

This field contains the PID for the Program Map Table (PMT). It must be unique. If in doubt, leave the PID at its default value. To restore the default value, click on the “>|<” symbol below the bottom right-hand end of the value “box” on the menu.

4.12.5.2 TS ID

This field contains the Identification number (ID) for the Transport Stream. If in doubt, set this to 1.

4.12.5.3 Program Number

This field contains the identification number for the program (which includes the video, audio and data) for the Transport Stream. If in doubt, set this to 2.

4.12.5.4 PSI Repetition Rate

This field is used to enter the repetition rate of the Program System Information (PSI) table within the Transport Stream. The value is in repetitions per second. The default value is 10. Note that this value may be changed to suit a particular type of MPEG-2 decoders or servers. In most cases, no change is required. If in doubt, use the default value.

4.12.5.5 Program Number

This field contains the Program Number for the program. If in doubt, set this to 2.

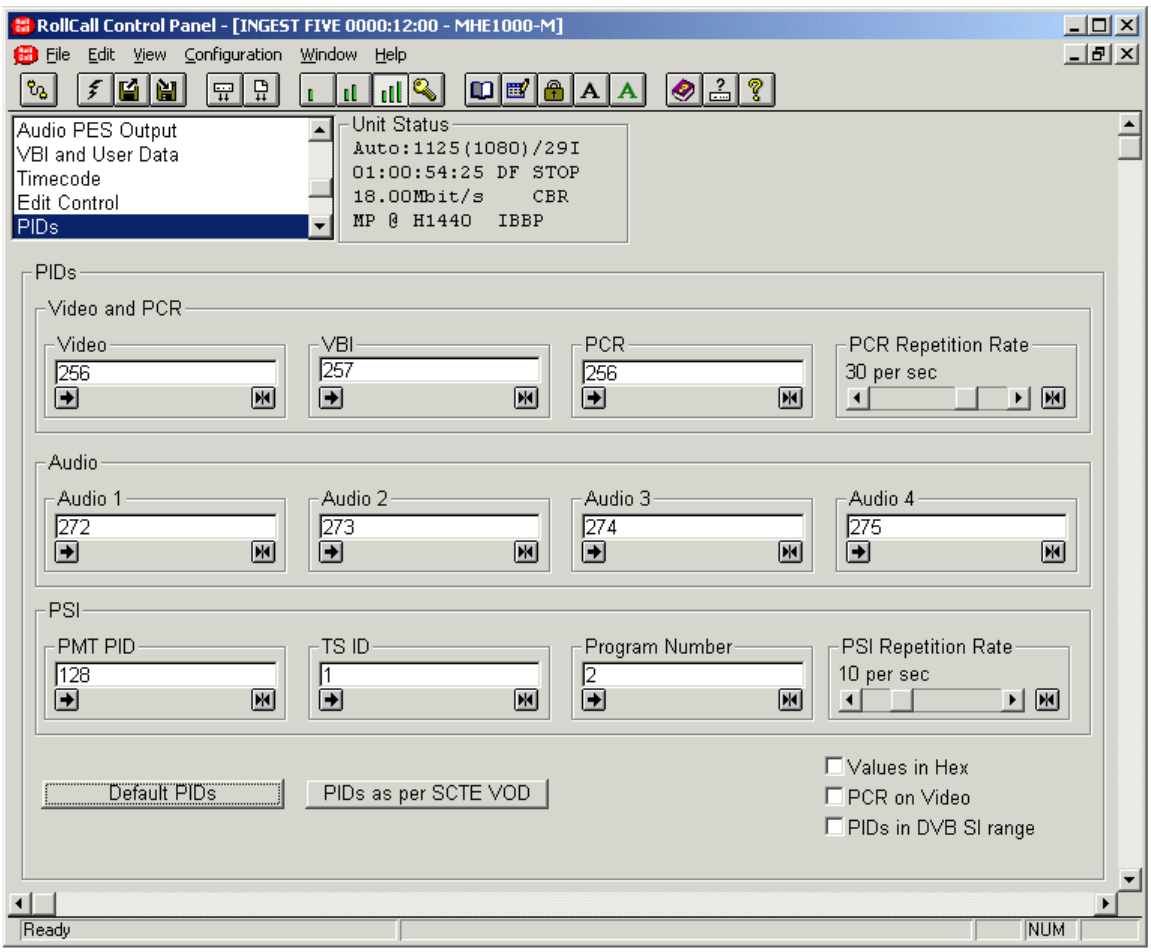
4.12.5.6 Default PIDs

When this menu button is pressed, all the PID values on this menu screen are returned to their default values.

4.12.5.7 PIDs as per SCTE VOD

When this menu button is pressed, all the PID values on this menu screen are set to the values required by the SCTE VOD specification.

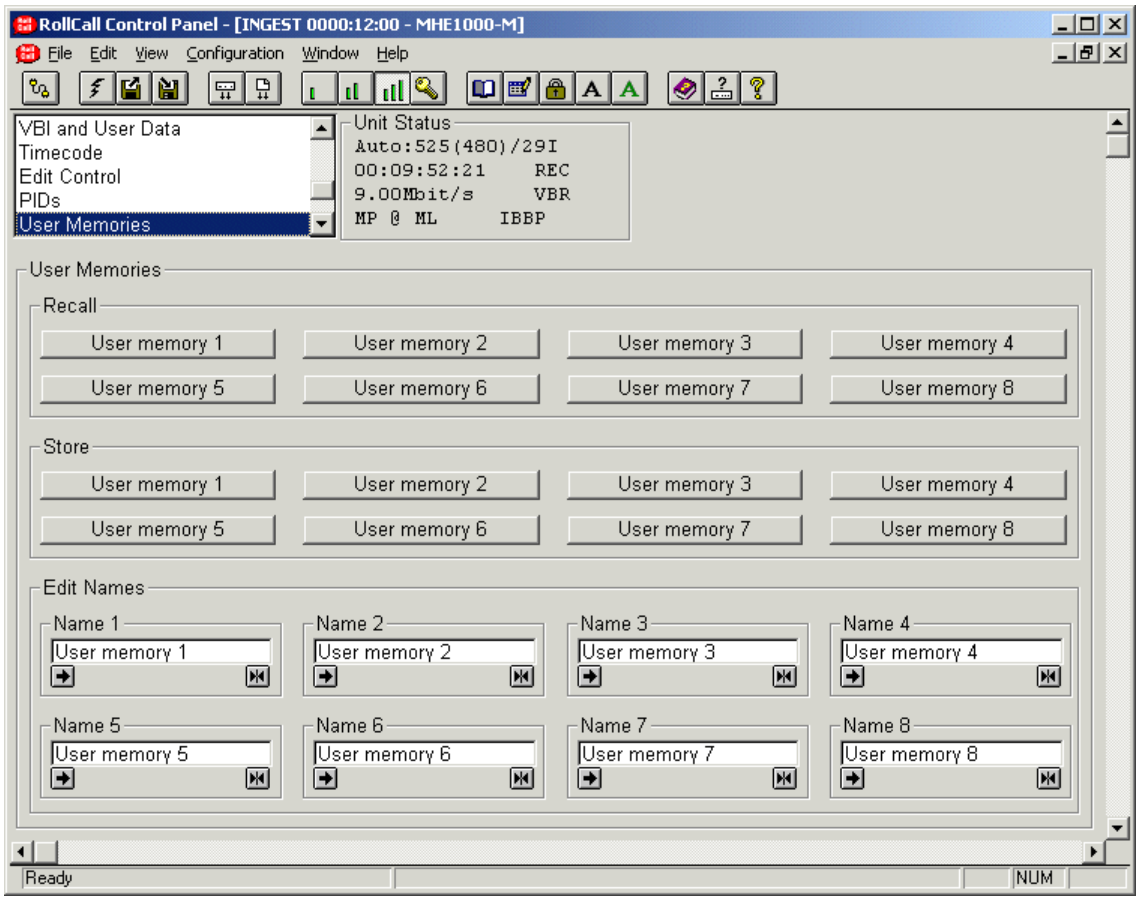
Also, when this button is pressed, an extra PCR is added immediately before the start of each video PES packet as required by the SCTE VOD specification. When the “Default PIDs” button is pressed these extra PCRs are switched off.


RollCall Control Panel - [INGEST FIVE 0000:12:00 - MHE1000-M]
File Edit View Configuration Window Help
Audio PES Output
VBI and User Data
Timecode
Edit Control
PIDs
Unit Status
Auto:1125(1080)/29I
01:00:54:25 DF STOP
18.00Mbit/s CBR
MP @ H1440 IBBP
PIDs
Video and PCR
Video
256
VBI
257
PCR
256
PCR Repetition Rate
30 per sec
Audio
Audio 1
272
Audio 2
273
Audio 3
274
Audio 4
275
PSI
PMT PID
128
TS ID
1
Program Number
2
PSI Repetition Rate
10 per sec
Default PIDs
PIDs as per SCTE VOD
Values in Hex
PCR on Video
PIDs in DVB SI range
Ready
NUM

4.13 USER MEMORIES MENU SCREEN

This section allows the complete configuration of the unit to be stored or retrieved using one of 8 configuration memories. These “User Memories” are within MEMPHIS itself, not within the controlling PC. To save all the current mastering unit settings onto the controlling PC (or onto any local or network disk drive attached to it), use the “SaveSet” function within the RollCall PC software. To do this, run the "RollCall Control Panel” software on the controlling PC. Then select "File", then "Save Setup" and use the resulting dialog box to specify the path and file name. To re-load a “SaveSet”, select "File", then "Recall Setup" and use the resulting dialog box to specify the path and file name.

WARNING! The “SaveSet” function does NOT save the contents of any User Memories, despite the fact that it saves any user-assigned names for all the User Memories. To save their contents, each User Memory in turn must be recalled and then immediately saved as a “SaveSet”. This will result in one “SaveSet” per User Memory.



4.13.1 Recall

This field contains one button for each of the 8 locally stored user memory locations. Pressing one of these buttons causes all of the control parameters of MEMPHIS to be recalled from the selected memory.

WARNING! Recalling a user memory (even the same one as was last recalled) will temporarily interrupt the output of valid video, audio and VBI streams in the output Transport Stream.

WARNING! Loading from one of the configuration memories will cause all of the current parameter settings to be lost. No warning is given when this happens. If you wish to return to the current state the settings must first be saved in another of the configuration memories (using “Store”).

4.13.2 Store

This field contains one button for each of the 8 locally stored user memory locations. Pressing one of these buttons causes the current state of all the control parameters of the module to be saved to the selected configuration memory.

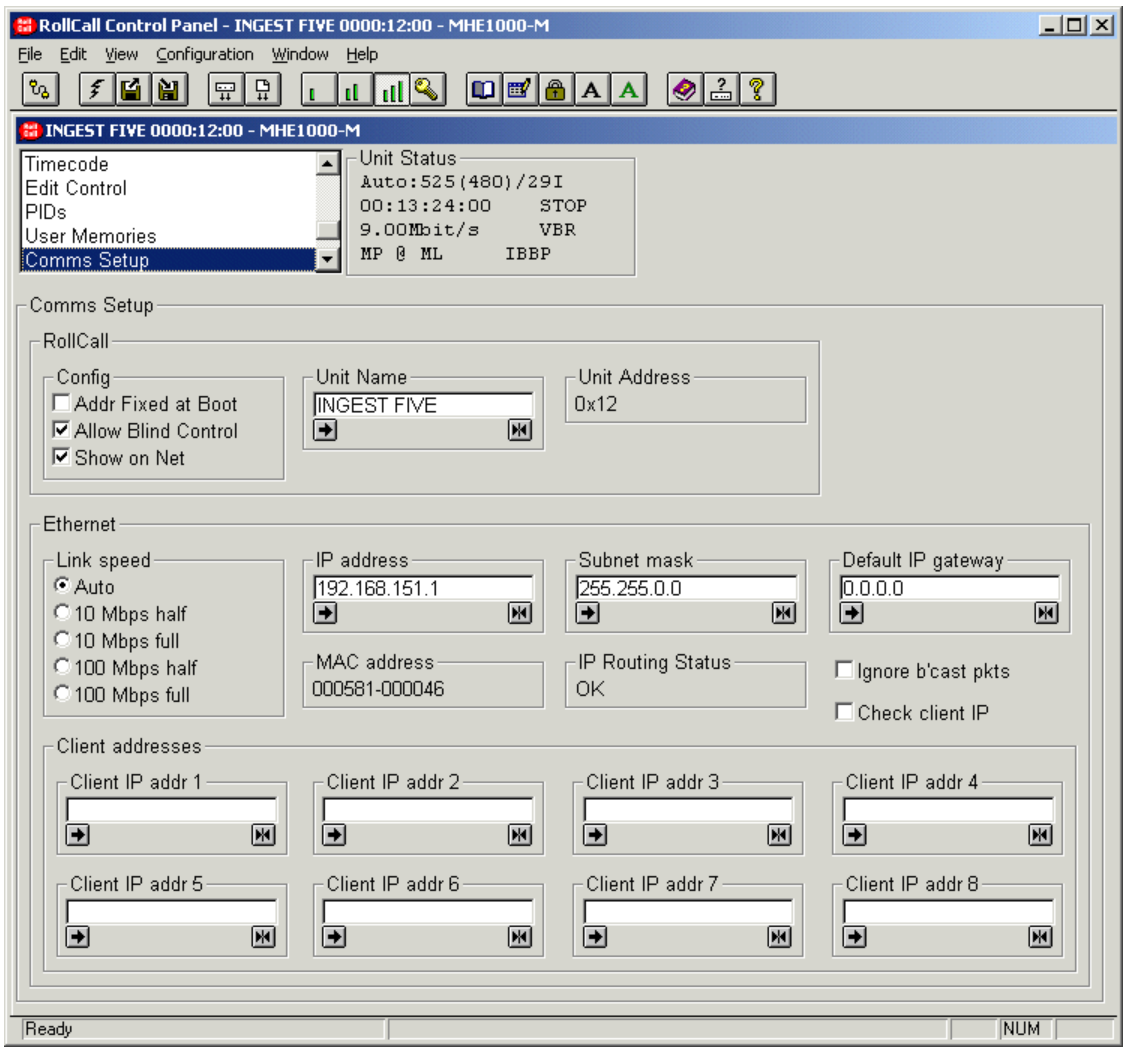
WARNING! Performing a “store” operation to one of the user memory locations will cause all of the previous settings within that user memory location to be lost. No warning is given when this happens. It is recommended that each user memory location is given a meaningful name (see “Edit Names” below) just after it is first used, so that available (previously unused) user memory locations are easy to identify.

4.13.3 Edit Names

This allows the naming of the eight memory locations. To change a name, type the new name in the text area and select (which means “click here to enter the value”). Selecting (which means “click here to return the menu item to its factory default value”) returns to the default name.

4.14 COMMS SETUP MENU SCREEN

This menu screen configures remote control of MEMPHIS. To access this menu screen, the controlling PC must be set to a RollCall "User Level" of at least "Supervisor". To set this within the "RollCall Control Panel" software, select "Configuration", then "User Level", then "Supervisor".



4.14.1 RollCall

RollCall is the Snell & Wilcox control and monitoring system. This protocol allows the user to remotely control MEMPHIS and other Snell & Wilcox products.

4.14.1.1 Config

There are 3 separate controls here.

Addr Fixed at Boot

This field controls how the unit determines its RollCall network address. When checked, the unit reads the hex switches on the VCM card[1] at power-up only, and will ignore any changes to the switch setting while the unit is running. If the field is not checked, the unit will change network address dynamically in response to changes in the switch settings.

Allow Blind Control

If checked, the unit will allow Blind Control (i.e. control by a client controller without the establishment of a RollCall session). If not, Blind Control will be disabled.

Show on Net

Checking this field will cause the Unit to broadcast “I_AM” packets, making the Unit visible on the RollCall network.

[1] *VCM card…* For details please refer to page 1.8 of the Installation Manual

4.14.1.2 Unit Name

This field is used to give a name to the unit visible on the RollCall network. The default is “INGEST”. In the example menu screen above, it has been changed manually to “INGEST FIVE” using this menu field.

4.14.1.3 Unit Address

This field displays the RollCall Unit Address in hexadecimal value. It cannot be used to set the address: that is done using rotary hex switches on the VCM card[1].

4.14.2 Ethernet

MEMPHIS can be controlled via RollCall over TCP/IP and an Ethernet link. The section below allows the user to setup this Roll-IP connection.

4.14.2.1 Link speed

This is the Ethernet bit-rate. The options are as follows:

Auto – automatically senses the mode used for the Ethernet port.

10 Mbps half/full – manually sets the mode used to 10 Base T half duplex or full duplex mode respectively.

100 Mbps half/full – manually sets the mode used to 100 Base T half duplex or full duplex mode respectively.

4.14.2.2 IP address

This field sets the MEMPHIS unit’s own IP address (which defaults to the “reserved” address 192.168.151.1). This IP address must always match the one set on the controlling PC. The IP address cannot be dynamically assigned. It is therefore recommended that the IP address should not be changed, and that a point-to-point Ethernet link is always used between MEMPHIS and the controlling PC.

If the IP address has to be changed, always write down the value it is being changed to, because RollCall communications will be lost temporarily. Within the “Commtrol" software on the controlling PC, select "File", then "Configure Comms", then the "IP address" can be changed to match the value which you just wrote down.

4.14.2.3 Subnet mask

This field sets the unit’s subnet mask for IP routing. It defaults to 255.255.0.0 and it is recommended that this value, like the IP address, is not changed.

When transmitting packets, the subnet mask and the unit’s own IP address are used to determine if the destination is on the same IP subnet as the unit. If so, the packet is sent directly to the destination. If not, the packet is sent to the default IP gateway (see below) for forwarding on to its ultimate destination.

Note that the unit’s own IP address, the default IP gateway address and the subnet mask must all be consistent, i.e. the default IP gateway must be on the same subnet as the unit.

4.14.2.4 Default IP Gateway

This field sets the default IP gateway for IP routing, if IP routing is required. This menu item defaults to the “invalid” address 0.0.0.0 which is used to indicate that IP routing is not required. See description above under “Subnet Mask”.

4.14.2.5 Mac Address

This field displays the MAC address of the Ethernet chipset present in MEMPHIS. It cannot be used to set the address: that is done during manufacture of MEMPHIS.

4.14.2.6 Ignore b’cast pkts

When this control is checked, the unit ignores all broadcast packets received over the Ethernet link.

The purpose of this control is to allow the traffic loading/overhead of the unit to be minimized. One example of this is the undesirable case of being connected to a very busy office LAN.

This control should only be checked by users who are familiar with IP networking and understand the implications of disabling broadcast packets. In particular, checking this control will prevent ARP requests (which are broadcast packets) from being serviced by the unit. This will prevent client controllers from connecting to the unit unless they have a static ARP mapping or there is an ARP proxy on the network.

4.14.2.7 Check client IP

When this control is checked, the unit will only accept connections from a defined set of client IP addresses (see below). Other clients attempting to connect to the unit will be rejected.

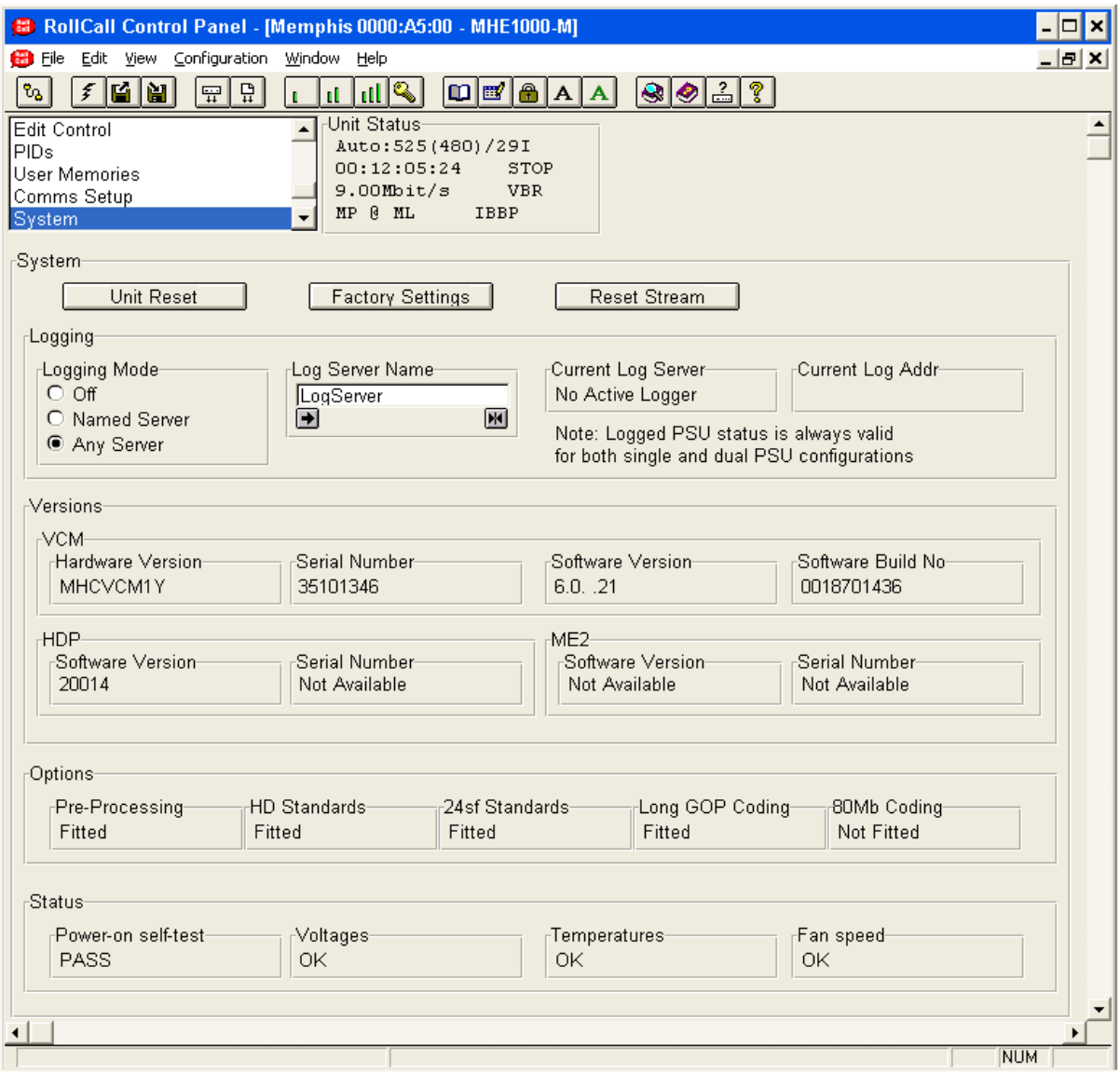
This simple feature offers some measure of security, but it is important to note that a knowledgeable attacker would easily be able to defeat this protection by IP address spoofing.

4.14.2.8 Client IP addresses 1..8

These fields can be used to define a set of up to 8 client IP addresses that the unit will accept as legal. These IP addresses take effect only if “Check client IP” (see above) is checked.

4.15 SYSTEM MENU SCREEN

This menu screen configures the RollCall logging system, and allows the user to inspect the MEMPHIS unit's status and the options fitted to it. To access this menu screen, the controlling PC must be set to a RollCall "User Level" of at least "Supervisor". To set this within the "RollCall Control Panel" software, select "Configuration", then "User Level", then "Supervisor".



4.15.1 Unit Reset

This button causes a full hardware reset of MEMPHIS. This will interrupt the validity of the Transport Stream output, causing a “glitch” on all downstream MPEG-2 decoders. It must therefore be avoided during the “Recording” phase (also known as “Edit On”) of an ingest capture, or whilst “on-air” in “live” applications.

4.15.2 Factory Settings

This button causes all menus (but not the configuration memory contents) to be restored to their factory default values. It may interrupt the validity of the Transport Stream output, causing a “glitch” on all downstream MPEG-2 decoders. It must therefore be avoided during the “Recording” phase (also known as “Edit On”) of an ingest capture, or whilst “on-air” in “live” applications.

Note that the “Unit Status” window and the other menu screens may not change immediately: it can take several seconds for “Factory Settings” to take effect.

WARNING! Recalling factory settings may temporarily interrupt all video, audio and VBI streams within the output Transport Stream.

4.15.3 Reset Stream

This button causes the Transport Stream output to be reset. This may be required if a change of coding mode (or parameter) causes a downstream MPEG-2 decoder to crash or display a “broken” picture. It will interrupt the validity of the Transport Stream output, causing a “glitch” on all downstream MPEG-2 decoders. It must therefore be avoided during the “Recording” phase (also known as “Edit On”) of an ingest capture, or whilst “on-air” in “live” applications.

4.15.4 Both PSUs fitted

RollCall logging of the PSU status is always valid for both single and dual PSU configurations from Version 5.2 firmware upwards. For previous firmware versions, RollCall logging of the PSU status was only valid for dual PSU configurations.

The “Both PSUs fitted” check-box (used in previous firmware versions to enable RollCall logging of the PSU status) is therefore no longer needed and has been removed from this menu screen from Version 5.2 firmware upwards.

4.15.5 Logging

This section sets up the RollCall error logging mechanism. It allows the user to automatically report warnings and errors to a RollCall logging server present on the same network.

4.15.5.1 Logging Mode

MEMPHIS may log warnings and errors in different ways as listed below:

Off – no logging.

Named Server – only one logging server is used as indicated in the Log Server Name window.

Any Server – all logging servers are used.

4.15.5.2 Log Server Name

This field allows the user to enter the name of a RollCall logging server to log to.

4.15.5.3 Current Log Server

This field displays the name of the RollCall log server which the unit is currently sending logging messages to. This is particularly useful when the “logging mode” is set to "Any server".

4.15.5.4 Current Log Address

This field displays the address of RollCall log server which the unit is currently sending logging messages to. This is particularly useful when the “logging mode” is set to "Any server".

4.15.6 Versions

This section summarizes the current configuration of MEMPHIS from the factory point of view. This information is essential to pass on to the relevant Snell and Wilcox support personnel when sending an enquiry.

Note that the actual version numbers displayed may not exactly match those in the example menu screen above. This is simply because this manual is not updated every time there is a new firmware release.

Note also that one or more items within this menu may be displayed as “Not Available”. This can happen due to certain combinations of board firmware versions, and does not itself indicate a fault.

4.15.7 Options

This section lists the additional purchased options which are fitted to an individual MEMPHIS unit. There are 5 such options. The example menu screen above is for a MEMPHIS unit which has 4 of the 5 options fitted. The individual options are as follows:

HD Standards – when fitted, allows the user to work with high definition formats. SD formats are always supported by default.

Pre-Processing – when fitted, includes the “HD Prefix” pre-processor.

Long GOP Coding – when fitted, supports all GOP modes other than I-frame encoding. I-frame encoding is always supported by default.

24sf Standards – when fitted, enables operation at 24.000 and 23.976 video frames per second.

80Mbit Coding – when fitted, allows the video bit rate to be set to values above 80Mbit/sec. This option is new in version 5.2 firmware. It will automatically be treated as being “fitted” for all systems upgraded from previous firmware versions.

4.15.8 Status

This section lists the “health-check” status information for the MEMPHIS unit.

4.15.8.1 Power-on self-test

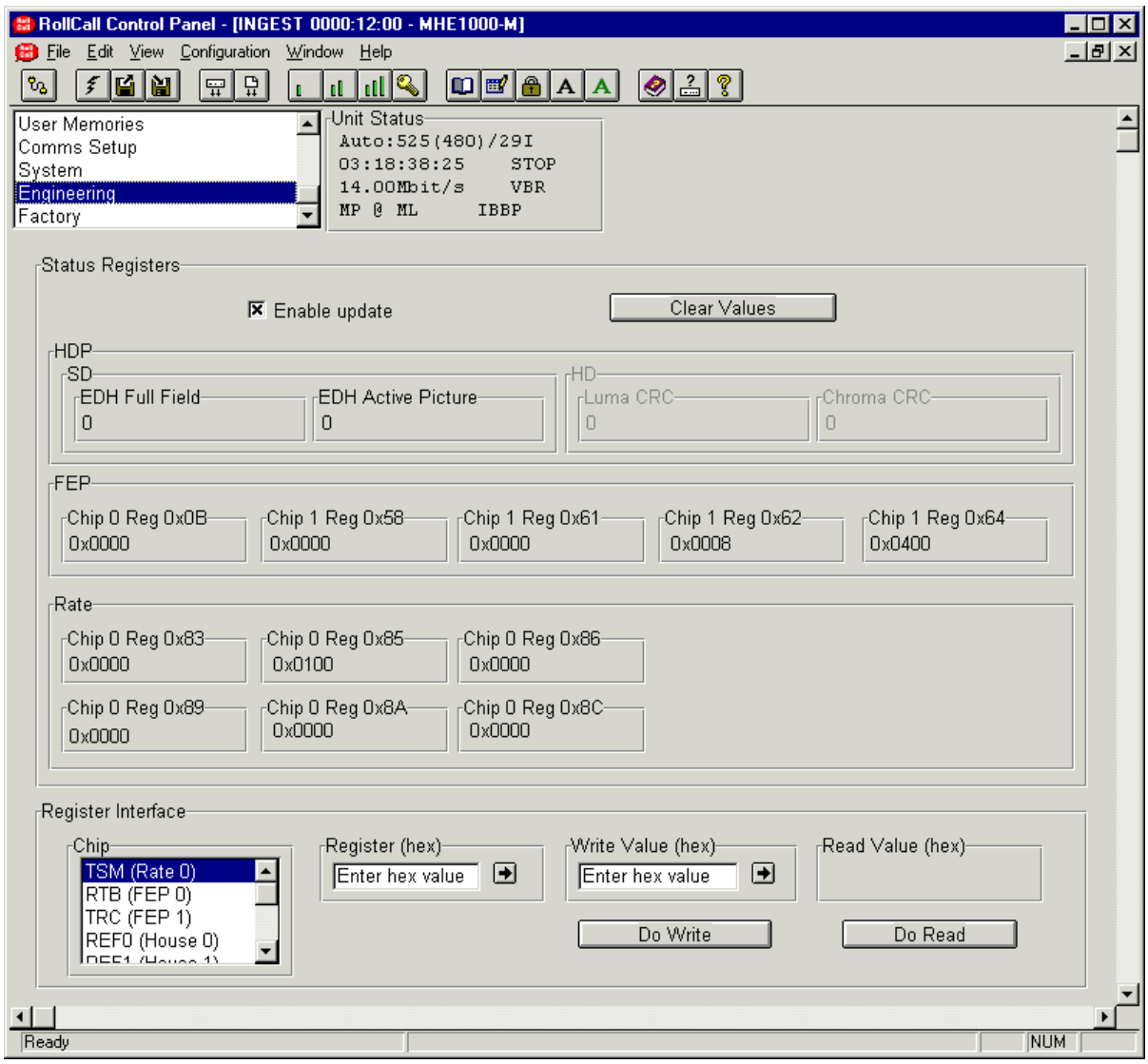
Displays PASS when the unit has booted, unless there is a malfunction.

4.15.8.2 Voltages, Temperatures, Fan speed

Displays OK unless there is a malfunction (or the ambient temperature is too high).

4.16 ENGINEERING MENU SCREEN

This menu screen provides information about the status of MEMPHIS. To access this menu screen, the controlling PC must be set to a RollCall "User Level" of at least "Supervisor". To set this within the "RollCall Control Panel" software, select "Configuration", then "User Level", then "Supervisor".



4.16.1 Status Registers

This menu gives access to status information which is essential to pass on to the relevant Snell and Wilcox support personnel when sending an enquiry.

There are two overall controls which apply to all the status information.

Enable update – This box should be checked to turn the status information “on”.

Clear Values – Clicking on this button clears all pre-existing status information. After this, status information will always accumulate (so that nothing is missed, even if other menu screens are selected) until this button is clicked again or MEMPHIS is reset or powered off. Note that initialization and changes of operating mode (encompassing all the RollCall controls, including the input video standard) may cause status information to change. This button should then be used to clear the status, prior to running MEMPHIS in one particular mode. Status information will then accumulate about any problems which then occur, but this information may be invalidated by any further change of operating mode. It is intended that this status information be inspected at the end of a period of unattended operation in one particular operating mode.

It is recommended that when sending an enquiry to the relevant Snell and Wilcox support personnel, “screen grabs” are taken of the Engineering menu screen (usually by pressing “Alt” and “Print Screen” together on the controlling PC) after the “Enable update” check-box has been checked. Pairs of Engineering menu “screen

grabs" are recommended: after each Engineering menu "screen grab", use the "Clear Values" button and then take a second "screen grab" within a few seconds. It is also recommended to take a pair of Engineering menu "screen grabs" a few seconds after the required operating parameters have first been set up (which may have been done manually, by recall of User Memory, by selection of a Preset Coding Mode, or by default). Other menu screens can be captured (a single "screen grab" of each should be sufficient unless there is relevant status information which is changing). Each "screen grab" should be converted into GIF, JPEG or ZIP format (and clearly named or labeled to indicate the circumstances and the order in which they were taken) before being emailed to the relevant Snell and Wilcox support personnel.

The actual status information is grouped under the following 3 sub-headings.

4.16.1.1 HDP

Any error status information which is available on the video input is displayed here. If information is not available (for instance if the input video carries no EDH) the relevant fields will either be "grayed out" or display "n/a" (meaning "not applicable"). Any errors on the input video may cause errors in the MPEG-2 video bitstream. This menu allows the user to see whether such errors are due to the signal at the video input of MEMPHIS, if such problems are suspected. The use of either EDH or CRC from the source device (for the input video signal) is strongly recommended.

4.16.1.2 FEP

This menu is intended for use by trained Snell and Wilcox personnel. However, it is worth remembering that loss of synchronisation at the video input to MEMPHIS may result in errors in the MPEG-2 video bitstream. Such loss of synchronization will normally also cause changes to the displayed "Register 0x58" and "Register 0x61" status values. This menu therefore allows the user to check for loss-of-synchronization events after clip ingest, if such problems are suspected.

4.16.1.3 Rate

This menu is intended for use only by trained Snell and Wilcox personnel.

4.16.2 Register Interface

This menu should not be used during normal operation. It is intended for use only by trained Snell and Wilcox personnel.

OPERATION FROM AN ACTIVE CONTROL PANEL

MEMPHIS may be operated with an active control panel via the RollCall network.

However we do not advise using this mode considering the complexity of the menus.

This mode is therefore not supported by Snell & Wilcox