Falcon VS

(Rev. 2.7 ENG)

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1. INTRODUCTION

1.1 FALCON AUDIO PROCESSOR – VERSIONE AVAILABLE

MODEL	COMMERCIAL DESCRIPTION	NOTES
FALCON 3i	4-Band Digital FM Audio Processor with MPX stereo generator. Analog and digital inputs and outputs and double MPX output. MPX Split. AGC, equalizer and speech detector, final limiter drive and brilliance control. 4 GPIn and 4 GPOut, Rs232 serial port and USB. Remote control software.	Available option RDS Encoder
FALCON VS	5-Band Digital FM Audio Processor, MPX stereo generator, multiband AGC, stereo enhancer, brilliance control, lookahead limiter, expander, and overdrive. Audio changeover, MPX and Analog/Digital I/O, double MPX output. MPX Split. Four GP inputs and four GP outputs. USB and Serial port. Remote control software.	Available Option: LAN Interface RDS Encoder
FALCON XT	5-Band Digital FM-Audio Processor, MPX stereo generator, multiband AGC, superbass, stereo enhancer, overdrive, brilliance control, lookahead limiter, audio changeover, analog, digital and MPX IN/OUT. MPX Split. Ethernet. SNMP agent Web Server, GPS interface. Four GP inputs and four GP outputs. Remote control software.	Available option RDS Encoder

1.2 OPTION AVAILABLE FOR FALCON AUDIO PROCESSOR SERIES

MODEL	COMMERCIAL DESCRIPTION	NOTES
F-RDS	Digital RDS/RBDS encoder. Static service generation: 60 programmable PS messages for Datasets, RadioText, Alternative Frequency (AF), Traffic Program (TP), Traffic Announcement (TA), EON, M/S, DI, CT, PI, PTY, PIN. Two available datasets interchangeable via remote control. UECP SPB490 compliant.	Available for all Falcon models
F_VS-LAN	Optional Ethernet port for LAN-type connections (TCP/IP and UDP) and RS232 connection (ASCII Parser) for Falcon VS only.	For Falcon VS only

1.3 USE OF THIS MANUAL

This manual is for the Falcon VS. Certain features may be altered without prior notice.

1.4 FALCON VS – DEPLIANT AND BROCHURE

Falcon VS

BROADCAST AUDIO PROCESSOR

HIGHLIGHTS

1. 5-Band Digital Audio Processor
2. AES/EBU and analog I/O Over XLR
3. Automatic audio input changeover
4. 2 composite outputs and 2 AUX inputs
5. Stereo Generator with composite Clipper
6. Mpx Power Control - ITU-R BS.412
7. Digital RDS Encoder, 2 Dataset
8. Multiband AGC, Speech Detector, 3-Band EQ, Stereo Enhancer
9. Brilliance Control, Expander and Superbass enhancer
10. Usb, Serial, 4 GPIn-4 GPOut
11. Front headphone output
12. Hardware bypass

MAIN DESCRIPTION

Falcon VS is a Digital Audio Processor, a Stereo Generator and an RDS encoder, all in a single device, specifically designed for the market of broadcast radio FM, Webradio and Satellite.

The Falcon VS audio processor is based on dedicated DSP technology with a 5-band audio processing architecture. The Stereo Generator is fully digital, and can create a perfect Multiplex signal. Falcon VS allows to create your own soundprint, unique and unmistakable.

The features available on the Audio Processor is complete and fully customizable; 5-band compression control, dual-band AGC, a three-band EQ and Brightness control. The parameterized Stereo Enhancer command provide to the radio station sound, the spacing effect and large stereo horizon openings. The Expander control allows you to minimize background and unwanted noise, while the *Overdrive* and *SuperBass* deal to make an important sound at low and medium-low frequencies, creating an impressive sensation of loudness. The phases control of monophonic audio, gives the sound of the human voice a more natural and pleasant listening, while the final limiter drive maximizes the presence of sound. Falcon VS makes the sound of any single broadcaster unique, without creating a sound artificially too colorful.

The soundprint of each channel can be created from one of ten preset audio files already on Falcon VS, from rock to classical, country, talk show, or preset audio while preserving the original sound, enhance caratteriche and unique details. E 'can also recall a preset by the logic state on the port or protocol GPIn ASCII serial / ethernet (on OPT)

The Composite Clipper installed in the Stereo Generator provides the highest level of modulation, while the 'MPX Power Control allow to use the processor in full compliance with the ITU-R BS.412 about a density reduction while maintaining the same level of deviation. In order to calibrate and set up correctly the audio network, a digital tone generator with variable sample frequency and amplitude is available on Analog, Digital and MPX outputs.

The Falcon VS front panel has two large LCD displays, the first LCD shows the whole process input and output from the audio processor, including the amount of intervention on each single compressor band, the limiting introduced by the multiband limiter, the AGC level, input and output levels of audio sources analog, digital and MPX. The second display shows all Falcon VS parameters such as preset on the air, RDS station name, GP In and GP Out status. Again on the front panel there is a headphone output for monitoring the audio process introduced by the Falcon VS. So it’s simple to hear the difference between the original audio and the processed one.

The internal RDS encoder available as an option, provides two DataSet, each with a wide range of services including static programmable PS 60 messages, 16 RadioText messages, Alternative Frequency (AF) to receive the best frequency as a function of 'coverage area, the Traffic Program (TP) / Traffic Announcement (TA) to listen to traffic information and functions such as EON, M/S, DI, CT, PI, PTY, PIN. The switching between the DataSet can occur by serial commands, GPIO or TCP/IP from a radio automation system. The RDS encoder complies with UECP SPB490

The connectivity of Falcon VS is complete and manifold. The rear panel features balanced XLR connectors for the connection of the inputs and outputs in analog and digital AES / EBU. As regards the part MPX are available two outputs individually buffered and independent for the signal MPX+RDS, plus two additional inputs AUX (SCA) with different functionality. An AUX input (SCA) expressly intended use of external RDS encoder, while a second input is able to switch the audio from another processor MPX and create a subnet managed by an automation system. All outputs are equipped with hardware bypass in case of fault of the apparatus.

For remote connections are available an Ethernet TCP/IP (*on option*) a RS232 serial port, a USB port and a connection port GP In and GP Out to optocouplers and open collector representing the operating states and alarms. Falcon VS can be controlled remotely via Windows-based client software or through a common http thanks to the web server (*on option*). Universal power supply 90-264Vac 47-63Hz to operate in any region of the world Falcon VS occupies 1 rack unit 19 "

1.5 COMPARISON TABLE - FALCON AUDIO PROCESSOR

General Features	Falcon 3i	Falcon VS	Falcon XT	Note
Price List / MSRP				
Audio processor band management	4	5	5	
Audio process architecture	24Bit-120Mhz DSP-Based audio process			
Stereo Generator – MPX Encoder	✓	✓	✓	
RDS Encoder	*by option*	*by option*	*by option*	
Input and Output				
Analog XLR In/Out	✓	✓	✓	
Digital AES/EBU XLR In/Out	✓	✓	✓	
2 BNC MPX Out and 2 BNC AUX IN	✓	✓	✓	
Hardware bypass I/O XLR/XLR–BNC/BNC	✓	✓	✓	
MPX Split Mode	✓	✓	✓	
Audio Management				
Band management	4	5	5	
3-Band Equalizer	✓	✓	✓	
Remote preset changer	✓	✓	✓	
Final Limiter Drive	✓	✓	✓	
Test tone generator	✓	✓	✓	
Brilliance control	✓	✓	✓	
Double band AGC (LO/HI)	✓	✓	✓	
AGC control	✓	✓	✓	
AGC *power control*	-	✓	✓	
Audio Fault input changeover	-	✓	✓	
MPX ITU-R BS.412 Control	-	✓	✓	
Stereo Enhancer	-	✓	✓	
Limiter LookAhead mode	-	✓	✓	
Expander *(noise reduction)*	-	✓	✓	
Overdrive *power control*	-	✓	✓	
Super Bass *control*	-	✓	✓	
Super Bass Harmonizer	-	-	✓	
Final Main Band Limiter Drive	-	-	✓	
Final Low Band Limiter drive	-	-	✓	
Preset clock-based manager	-	-	✓	
Remote Control				
GPIO Connector – Type	SubD 15p HD - 4x GP In opto coupled, 4x GP Out Open Collector opto isolated			
USB	1x USB – B Type EMI Filtered			
Serial	2x Rs232 EMI Filtered			
Software Remoter	✓	✓	✓	
Ethernet Port /Web Server	-	*by option*	✓	
Parser ASCII protocol via TCP/IP UDP/IP	-	*by option*	✓	

1 SAFETY WARNINGS / ISTRUZIONI PER LA SICUREZZA

SAFETY WARNINGS

CONSIGNES DE SÉCURITÉ IMPORTANTES

ISTRUZIONI IMPORTANTI PER LA SICUREZZA

WICHTIGE SICHERHEITSHINWEISE

INSTRUCCIONES IMPORTANTES DE SEGURIDAD

(Rel. 2.0)

1.1 FOREWORD

For your own safety and to avoid invalidation of the warranty all text marked with these Warning Symbols should be read carefully.

Information in this manual is subject to change without notice and does not represent a commitment on the part of the vendor.

The manufacturer shall not be liable for any loss or damage whatsoever arising from the use of information or any error contained in this manual, or through any mis-operation or fault in hardware contained in the product.

It is recommended that all maintenance and service on the product should be carried out by the manufacturer or its authorised agents. The manufacturer cannot accept any liability whatsoever for any loss or damage caused by service, maintenance or repair by unauthorised personnel.

2 SAFETY WARNINGS

The installation and servicing instructions in this manual are for use by qualified personnel only.

- **Read All Instructions.** All safety and operating instructions must be read before operating the product. They also must be retained for future reference, as it contains a number of useful hints for determining the best combination of equipment settings for Yr particular application.
- **Heed All Warnings**. All warnings on the product and those listed in the operating instructions must be adhered to.
- **Heat**. This product must be situated away from any heat sources such as radiators or other products (including power amplifiers or transmitters) that produce heat.
- **Power Sources.** This product must be operated from the type of power source indicated on the marking label and in the installation instructions. If you are not sure of the type of power supplied to your facility, consult your local power company. Make sure the AC main voltage corresponds to that indicated in the technical specifications. If a different voltage (ex. 110/115 VAC) is available, open the equipment closure and set the voltage switch on the main supply circuit, located behind the AC socket
- **Power Cord Protection.** Power supply cords must be routed so that they are not likely to be walked on nor pinched by items placed upon or against them. Pay particular attention to the cords at AC wall plugs and convenience receptacles, and at the point where the cord plugs into the product
- **Use only with a cart,** stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- **Lightning**. For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the AC wall outlet and the audio connections. This will prevent damage to the product due to lightning and power line surges
- **Installation**. Configuration and installation should only be carried out by a competent installation engineer
- **Cabling**. Using high quality wires, well protected. Make sure the cable integrity.

This symbol alerts you to the presence of dangerous voltage inside the closure – voltage which may be sufficient to constitute a risk of shock. Do not perform any servicing other than that contained in the operating instructions. Refer all servicing to qualified personnel

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Do not change the voltage setting or replace the mains fuse without first turning the unit off and unplugging the mains cord

Make sure the AC main voltage corresponds to that indicated in the technical specifications. THIS APPARATUS MUST BE EARTHED !

To avoid risk of fire use the correct value fuse, as indicated on the label stuck on the right side of the unit.

This apparatus uses a single pole mains switch and does therefore not separate the unit completely from the mains power. To completely separate from mains power (in the event of danger) unplug mains power cord. As the MAINS plug is the disconnect device, the disconnect device shall remain readily operable.

3 CONSIGNES DE SÉCURITÉ IMPORTANTES

- **Lire ces consignes**
- **Conserver ces consignes**
- **Observer tous les avertissements**
- **Suivre toutes les consignes**
- **Ne pas utiliser cet appareil à proximité de l'eau**
- **Ne pas obstruer les ouvertures de ventilatio**n. Installer en respectant les consignes du fabricant
- **Ne pas installer à proximité d'une source de chaleur** telle qu'un radiateur, une bouche de chaleur, un poêle ou d'autres appareils (dont les amplificateurs) produisant de la chaleur.
- **Ne pas annuler la sécurité de la fiche de terre**, la troisième branche est destinée à la sécurité. Si la fiche fournie ne s'adapte pas à la prise électrique, demander à un électricien de remplacer la prise hors normes.
- **Protéger le cordon d'alimentation** afin que personne ne marche dessus et que rien ne le pince, en particulier aux fiches, aux prises de courant et au point de sortie de l'appareil
- **Utiliser uniquement les accessoires spécifiés par le fabricant**
- **Utiliser uniquement avec un chariot**, un support ou une table spécifié par le fabricant ou vendu avec l'appareil. Si un chariot est utilisé, déplacer l'ensemble chariot–appareil avec précaution afin de ne pas le renverser, ce qui pourrait entraîner des blessures
- **Débrancher l'appareil** pendant les orages ou quand il ne sera pas utilisé pendant longtemps.
- **Confier toute réparation à du personnel qualifié.** Des réparations sont nécessaires si l'appareil est endommagé d'une façon quelconque, par exemple: cordon ou prise d'alimentation endommagé, liquide renversé ou objet tombé à l'intérieur de l'appareil, exposition de l'appareil à la pluie ou à l'humidité, appareil qui ne marche pas normalement ou que l'on a fait tomber.
- **NE PAS exposer cet appareil aux égouttures et aux éclaboussements**. Ne pas poser des objets contenant de l'eau, comme des vases, sur l'appareil

Ce symbole indique la présence d'une tension dangereuse dans l'appareil constituant un risque de choc électrique.

Ce symbole indique que la documentation fournie avec l'appareil contient des instructions d'utilisation et d'entretien importantes.

Avant de modifier le commutateur de changement de tension ou replacer le fusible il faut débrancher l'appareil de la prise électrique. Pendant son usage, l'appareil doit etre branchee à la prise de terre

Utiliser le fusible principal AC avec le valeur qui est indiquée sur l'étiquette collée sur le coffret.

Assurez-vous que la tension principale AC correspond à celle indiquée dans les spécifications techniques.

L'interrupteur d'alimentation interrompt un pôle du réseau d'alimentation excepté le conducteur de terre de protection. En cas de danger, debrancher le cordon d'alimentation. Parce que la prise du réseau de alimentation est utilisée comme dispositif de déconnexion, ce dispositif doit demeuré aisément accessible

4 ISTRUZIONI IMPORTANTI PER LA SICUREZZA

- **Leggere le presenti istruzioni**
- **Conservare queste istruzioni**
- **Osservare tutte le avvertenze**
- **Seguire scrupolosamente tutte le istruzioni**
- **Non usare questo apparecchio in prossimità di acqua**
- **Non ostruire alcuna apertura per il raffreddamento**. Installare l'apparecchio seguendo le istruzioni
- **Non installare l'apparecchio accanto a fonti di calore** quali radiatori, aperture per l'afflusso di aria calda, forni o altri apparecchi (amplificatori inclusi) che generino calore
- **Non rimuovere il terminale di connessione a terra sul cordone di alimentazione**: esso ha lo scopo di tutelare l'incolumità dell'utilizzatore. Se la spina in dotazione non si adatta alla presa di corrente, rivolgersi ad un elettricista per far eseguire le modifiche necessarie.
- **Evitare di calpestare il cavo di alimentazione o di comprimerlo**, specialmente in corrispondenza della spina e del punto di inserzione sull'apparato.
- **Utilizzare solo dispositivi di collegamento e gli accessori specificati dal produttore.**
- **Utilizzare l'apparecchio** solo con un carrello, un sostegno, una staffa o un tavolo di tipo specificato dal produttore o venduto insieme all'apparecchio. Se si utilizza un carrello, fare attenzione negli spostamenti per evitare infortuni causati da ribaltamenti del carrello stesso.
- **Scollegare l'apparecchio dalla presa di corrente** durante i temporali o quando inutilizzato a lungo
- **Per qualsiasi intervento**, rivolgersi a personale di assistenza qualificato. È' necessario intervenire sull'apparecchio ogniqualvolta si verificano danneggiamenti di qualsiasi natura. Ad esempio, la spina o il cavo di alimentazione sono danneggiati, è entrato liquido nell'apparecchio o sono caduti oggetti su di esso, l'apparecchio è stato esposto alla pioggia o all'umidità, non funziona normalmente o è caduto.
- **Non esporre a sgocciolamenti o spruzzi**. Non appoggiare sull'apparecchio oggetti pieni di liquidi, ad esempio vasi da fiori.

Questo simbolo indica la presenza di alta tensione all'interno dell'apparecchio, che comporta rischi di scossa elettrica.

Questo simbolo indica la presenza di istruzioni importanti per l'uso e la manutenzione nella documentazione in dotazione all'apparecchio.

Non sostituire il fusibile o cambiare la tensione di alimentazione senza aver prima scollegato il cordone di alimentazione. L'APPARATO DEVE ESSERE CONNESSO A TERRA.

Sostituire il fusibile generale con uno di identico valore, come indicato sulla etichetta applicata sul mobile dell'apparato

Assicurarsi che la tensione di rete corrisponda a quella per la quale è configurato l'apparecchio

Questo apparato utilizza un interruttore di alimentazione di tipo unipolare e l'isolamento dalla rete elettrica non è pertanto completo. Per ottenere un isolamento totale (ad esempio in caso di pericolo), scollegare il cordone di alimentazione. Inoltre, poichè la spina di alimentazione è utilizzata come dispositivo di sezionamento, essa deve restare facilmente raggiungibile

5 WICHTIGE SICHERHEITSHINWEISE

- **Diese Hinweise LESEN**
- **Diese Hinweise AUFHEBEN**
- **Alle Warnhinweise BEACHTEN**
- **Alle Anweisungen BEFOLGEN**
- **Dieses Gerät NICHT in der Nähe von Wasser verwenden**
- **KEINE Lüftungsöffnungen verdecken**. Gemäß den Anweisungen des Herstellers einbauen
- **Nicht in der Nähe von Wärmequellen**, wie Heizkörpern, Raumheizungen, Herden oder anderen Geräten (einschließlich Verstärkern) installieren, die Wärme erzeugen
- **Die Schutzfunktion des Schukosteckers NICHT umgehen**. Bei Steckern für die USA gibt es polarisierte Stecker, bei denen ein Leiter breiter als der andere ist; US-Stecker mit Erdung verfügen über einen dritten Schutzleiter. Bei diesen Steckerausführungen dient der breitere Leiter bzw. der Schutzleiter Ihrer Sicherheit. Wenn der mitgelieferte Stecker nicht in die Steckdose passt, einen Elektriker mit dem Austauschen der veralteten Steckdose beauftragen
- **VERHINDERN, dass das Netzkabel gequetscht oder darauf getreten wird**, insbesondere im Bereich der Stecker, Netzsteckdosen und an der Austrittsstelle vom Gerät
- N**UR das vom Hersteller angegebene Zubehör** und entsprechende Zusatzgeräte verwenden.
- **NUR in Verbindung** mit einem vom Hersteller angegebenen oder mit dem Gerät verkauften Transportwagen, Stand, Stativ, Träger oder Tisch verwenden. Wenn ein Transportwagen verwendet wird, beim Verschieben der Transportwagen-Geräte- Einheit vorsichtig vorgehen, um Verletzungen durch Umkippen
- **Das Netzkabel dieses Geräts** während Gewittern oder bei längeren Stillstandszeiten aus der Steckdose ABZIEHEN.
- **Alle Reparatur- und Wartungsarbeiten** von qualifiziertem Kundendienstpersonal DURCHFÜHREN LASSEN. Kundendienst ist erforderlich, wenn das Gerät auf irgendwelche Weise beschädigt wurde, z.B. wenn das Netzkabel oder der Netzstecker beschädigt wurden, wenn Flüssigkeiten in das Gerät verschüttet wurden oder Fremdkörper hineinfielen, wenn das Gerät Regen oder Feuchtigkeit ausgesetzt war, nicht normal funktioniert oder fallen gelassen wurde.
- **Dieses Gerät vor Tropf- und Spritzwasser SCHÜTZEN**. KEINE mit Wasser gefüllten Gegenstände wie zum Beispiel Vasen auf das Gerät STELLEN.

Dieses Symbol zeigt an, dass gefährliche Spannungswerte, die ein Stromschlagrisiko darstellen, innerhalb dieses Geräts auftreten.

Dieses Symbol zeigt an, dass das diesem Gerät beiliegende Handbuch wichtige Betriebs- und Wartungsanweisungen enthält.

Vor Änderung der Netzspannung oder Sicherungswechsel Netzkabel trennen.
Das Gerät muss für den Betrieb geerdet werden.

Hauptsicherung nur mit einer gleichwertigen austauschen
(s. entsprechende Etikette).

Vor Einschalten Netzspannungseinstellung am Gerät überprüfen bzw. anpassen.

Inpoliger Netzschalter. In Notfälle oder für Wartungsarbeiten Netzkabel trennen. Der Netzstecker fungiert auch als Trennelement muss deshalb zugänglich bleiben

6 INSTRUCCIONES IMPORTANTES DE SEGURIDAD

- **LEA estas instrucciones**
- **CONSERVE estas instrucciones**
- **PRESTE ATENCION a todas las advertencias.**
- **SIGA todas las instrucciones**
- **NO utilice este aparato cerca del agua**
- **NO obstruya ninguna de las aberturas de ventilación.**Instálese según lo indicado en las instrucciones del fabricante
- **No instale el aparato cerca de fuentes de calor** tales como radiadores, registros de calefacción, estufas u otros aparatos (incluyendo amplificadores) que produzcan calor
- **NO anule la función de seguridad del enchufe polarizado** o con clavija de puesta a tierra. Un enchufe polarizado tiene dos patas, una más ancha que la otra. Un enchufe con puesta a tierra tiene dos patas y una tercera clavija con puesta a tierra. La pata más ancha o la tercera clavija se proporciona para su seguridad. Si el toma corriente no es del tipo apropiado para el enchufe, consulte a un electricista para que sustituya el toma corriente de estilo anticuado
- **PROTEJA el cable eléctrico** para evitar que personas lo pisen o estrujen, particularmente en sus enchufes, en los toma corrientes y en el punto en el cual sale del aparato
- **UTILICE únicamente los accesorios especificados por el fabricante**
- **UTILICESE únicamente** con un carro, pedestal, escuadra o mesa del tipo especificado por el fabricante o vendido con el aparato. Si se usa un carro, el mismo debe moverse con sumo cuidado para evitar que se vuelque con el aparato
- **DESENCHUFE el aparato** durante las tormentas eléctricas, o si no va a ser utilizado por un lapso prolongado.
- **TODA reparación** debe ser llevada a cabo por técnicos calificados. El aparato requiere reparación si ha sufrido cualquier tipo de daño, incluyendo los daños al cordón o enchufe eléctrico, si se derrama líquido sobre el aparato o si caen objetos en su interior, si ha sido expuesto a la lluvia o la humedad, si no funciona de modo normal, o si se ha caído.
- **NO exponga** este aparato a chorros o salpicaduras de líquidos. NO coloque objetos llenos con líquido, tales como floreros, sobre el aparato.

Este símbolo indica que la unidad contiene niveles de voltaje peligrosos que representan un riesgo de choques eléctricos.

Este símbolo indica que la literatura que acompaña a esta unidad contiene instrucciones importantes de funcionamiento y mantenimiento.

Antes de cambiar la alimentacion de voltaje o de cambiar el fusible, desconecte el cable de alimentacion. Para reducir el riesgo de descargas electricas, esta unidad debe ser conectada a tierra.

Remplaze el fusible con lo mismo, que corresponde a lo indicado en el panel del equipo.

Antes de encender, controlar que la linea de alimentacion de voltaje corresponda a la indicada

El interruptor de alimentación es unipolar. En el caso de peligro, desconecte el cable de alimentación. Porque la clavija de conexion a red sirve por la desconection de la unidad, la

clavija debe ser ubicada en proximidad de la unidad

7 UNPACKING AND INSPECTION

Your equipment was packed carefully at the factory in a container designed to protect the unit during shipment. Nevertheless, we recommend making a careful inspection of the shipping carton and the contents for any signs of physical damage.

Damage & Claims

If damage is evident, do not discard the container or packing material. Contact your carrier immediately to file a claim for damages. Customarily, the carrier requires you, the consignee, to make all damage claims. It will be helpful to retain the shipping documents and the waybill number.

Save all packing materials! If You should ever have to ship the unti (e.g. for servicing), it is best to ship it in the original carton with its packing materials because both the carton and packing material have been carefully designed to protect the unit.

Under normal conditions no user maintenance or calibration are required. Internal links and preset controls may be set to configure the unit during installation. **Any service work required should be carried out by qualified service personnel only.**
We are able to offer further product support through our worldwide network of approved dealers and service agents.

To help us provide the most efficient service please would you keep a record of the unit serial number, and date and place of purchase to be quoted in any communication regarding this product.

The actual equipment Serial Number is indicated on the silver label stuck on the rear panel of the equipment closure.

Tools And Equipment Needed

Only standard technician's tools are required to install this equipment.

8 FIRST INSTALLATION RECOMMENDATIONS

8.1 POWER SUPPLY CABLE

A power supply cable of approx. 2 mt length is supplied with the device, which has a moulded IEC plug attached – this is a legal requirement.
The type of plug for the power supply depends on the country in which it is delivered.

If for any reason, you need to use this appliance with a different plug, you should use the following wiring guidelines in replacing the existing plug with the new one:

Earth	Green, or green and yellow
Neutral (N)	Blue
Live (L)	Brown

Supply cables should be laid in such a manner that one does not step or walk on them. They should not be squashed by any objects.

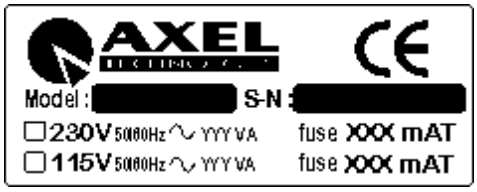
THIS EQUIPMENT MUST BE EARTHED.

The chassis is always connected to mains earth to ensure your safety: check your mains wiring and earthing before switching on.

8.2 AC MAINS VOLTAGE SETTING (230 V / 115 V)

BE SURE THAT THE UNIT IS SET TO THE CORRECT MAINS/LINE VOLTAGE FOR YOUR COUNTRY BEFORE PLUGGING IT INTO THE WALL OUTLET !

The actual Mains voltage is indicated on the label stuck on the equipment closure. Should the type of power at the operation location not be known, please contact your dealer or electricity company.



If, for some reason, the unit is to be operated at a mains input voltage which is different to that as supplied, you need to switch the voltage selector on the right side of the unit. You also need to replace the AC main fuse, according to information provided on the external label or on the Technical Specifications table at the end of this user manual.

CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, ALWAYS DISCONNECT THE AC MAINS CABLE BEFORE ALTERING THE CHANGE-OVER SWITCH. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

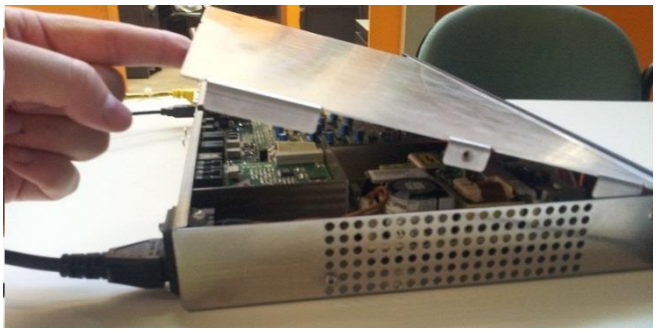
8.3 FUSE REPLACEMENT

The power supply socket has an integral fuse drawer containing the AC power fuse and a spare, both of the same value.

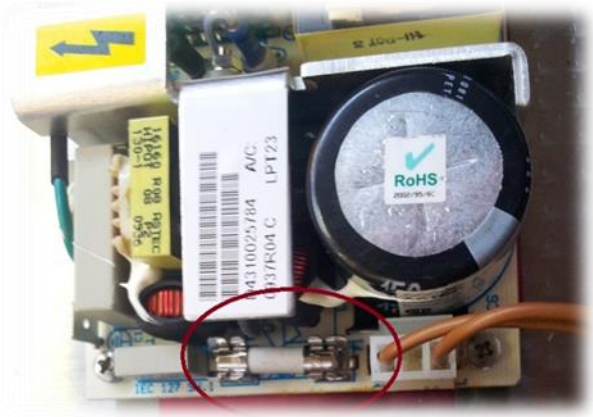
BEFORE REPLACING THE POWER FUSE, MAKE SURE YOU HAVE THE RIGHT TYPE OF FUSE FOR THE VOLTAGE TO BE PROTECTED.
USING WRONG FUSE TYPE WILL RESULT IN INSUFFICIENT PROTECTION.

Make sure that the power is switched off and the power cable is disconnected from the equipment.

a. Open the upper iron cover using a screwdriver.



b. Replace the fuse located at the internal position – Power supply Type-1



c. Replace the fuse located at the internal position – Power supply Type-2

Perform the set-up under static control conditions. Static charges are likely to completely destroy one or more of the CMOS semiconductors employed in the unit. Static damage will not be covered under warranty.

Basic damage prevention consists of minimizing generation, discharging any accumulated static charge on your body and preventing that discharge from being sent to or through any electronic component.

Uninsulated dangerous voltage are inside the enclosure, voltage that may be sufficient to constitute a risk of shock.
Always disconnect to AC Mains before removing the top cover

8.4 PROTECTION AGAINST LIGHTNING

When the upper iron cover is removed, a plastic transparent cover helps the user safety, to avoid from flashlight coming from the switching power supply. After the power cord has been disconnected some parts of the power supply remain electrically loaded for a lot of time.
Axel Technology suggest to don't touch never this parts, and it is not responsible for human flash light or electrical burns.

Should the device be put out of action due to being struck by lightning or excess voltage, disconnect it from the power supply without delay. Do not reconnect until the device has been checked. If in doubt contact the technical support service.

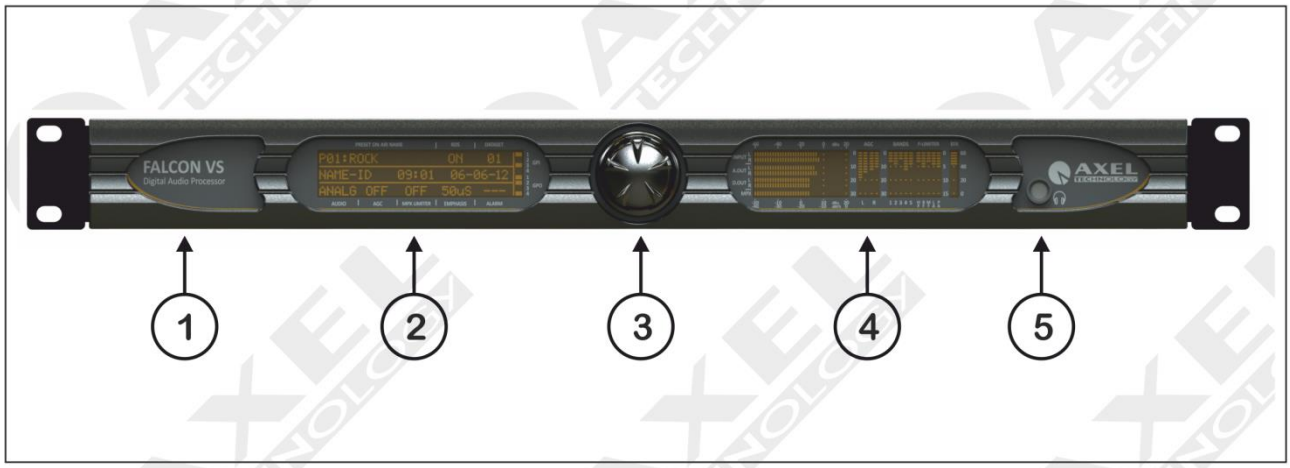
Make sure there is suitable lighting protection to protect the device.
Alternatively you should disconnect all connectors from the device during a storm or when the device is going to be unsupervised or not used for a longer period of time.
These measures will protect against damage by lightning or excess voltage.

8.5 VENTILATION

The equipment will operate as a free-standing unit without requiring any special cooling arrangement.
However, slots and openings in the product are provided for ventilation. They ensure reliable operation of the product, keeping it from overheating. These openings must not be blocked nor covered during operation.
YOU MUST LEAVE AT A MINIMUM ONE RACK UNIT OF EMPTY SPACE ABOVE THE EQUIPMENT TO ENHANCE VENTILATION AND TO GET A LONGER EQUIPMENT LIFE.

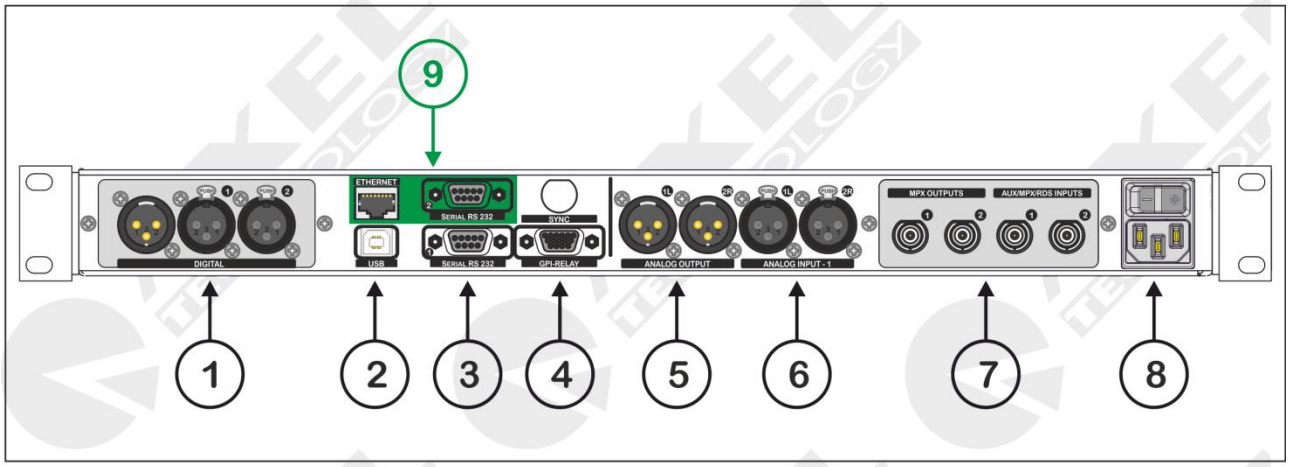
9 FALCON VS – GENERAL DESCRIPTION

9.1 FALCON VS – FRONT PANEL



N°	CONTROL NAME	FUNCTION
1	**DEVICE NAMEPLATE**	Plate stating product name and description.
2	**LCD-1**	Three-line LCD that displays the status and operation mode of the Falcon VS. It displays all the technical parameters for each menu.
3	**JOG-SHUTTLE**	Dial (or JogShuttle) to access the various navigation menus and make changes. Press the JogShuttle to confirm selection. Accessing this menu allows you to configure certain operating parameters for work. All the parameters can also be set via the Axel Universal Software Remoter monitoring, configuration, and control software.
4	**LCD-2**	This LCD displays the statuses and operation mode of the audio processor, double AGC, 5-band compressor, multiband limiter, and the analog, digital, and MPX inputs and outputs featured on the Falcon VS
5	**HEADPHONE SOCKET**	Headphone socket on the front panel, set to 6.3 mm jack, for listening to the Falcon VS audio process. You can listen to the original audio inputted into the processor (bypass) or the audio outputted by the Falcon VS processor. You can also listen to the test tone generated by the internal DSP with variable frequency and intensity. The headphone audio output is parallel to the analog output; changing the Analog Out level also changes the headphone output level.

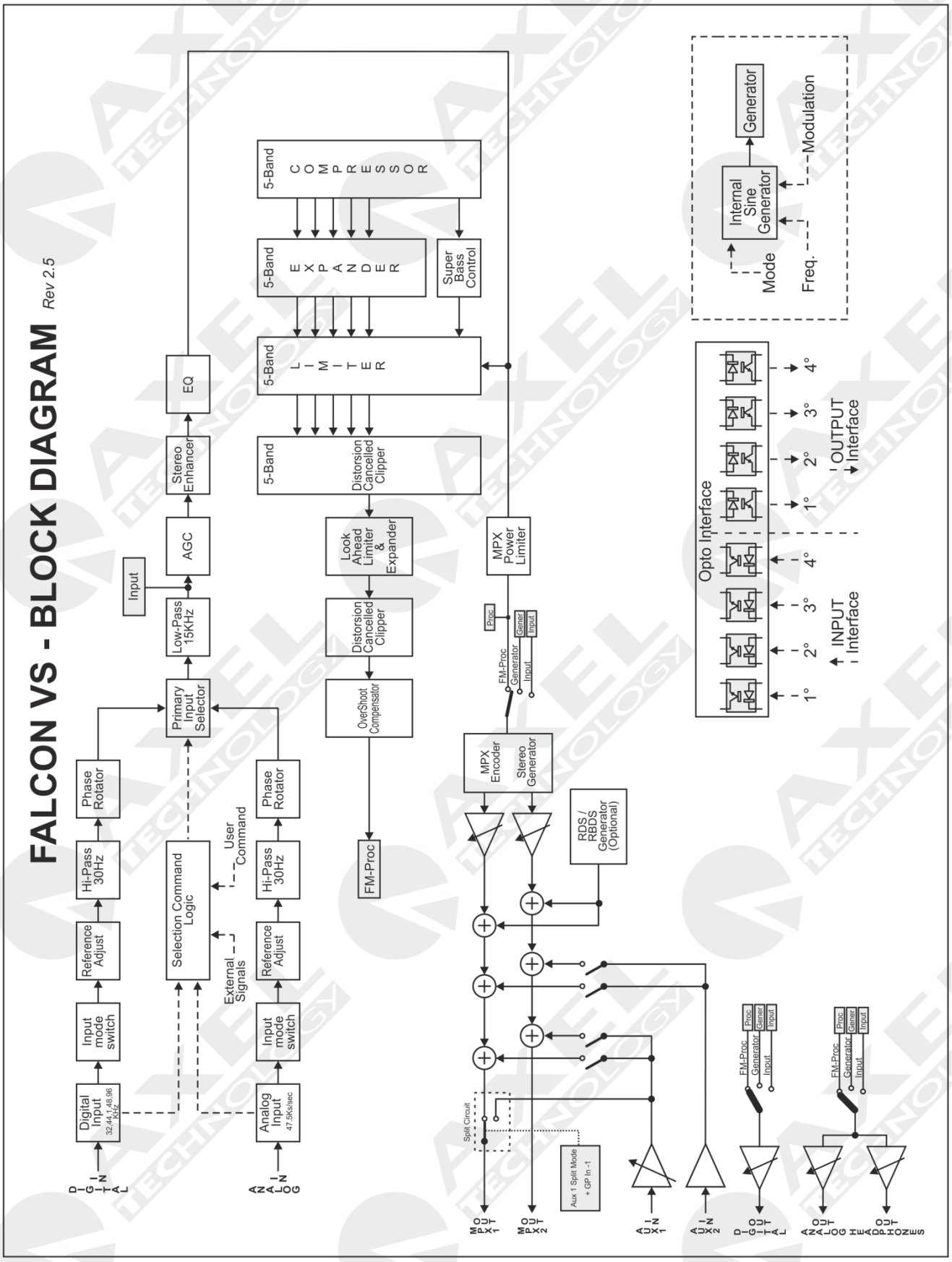
9.2 FALCON VS – REAR PANEL



N°	CONTROL NAME	FUNCTION
1	**"DIGITAL" UNIT**	This section contains the connections for AES / EBU digital inputs and outputs on the balanced XLR connection. Digital Input 1 is marked as **1C** while Input **2D** is the **Sync AES/EBU**. The output is an AES/EBU format male XLR connector.
2	**"USB" PORT**	**USB -B** type data communication port. This port is used to remotely control the device using a standard PC. Before connecting this port, it is necessary to connect the device control software contained in the box; USB drivers are installed at the same time as the software.
3	**SERIAL -1 RS232** **SERIAL PORT 1**	Falcon VS provides by default, one serial port for control of the software via the remote control. Inserting the LAN option (F-LAN), you can install on Falcon VS, in addition to port for Ethernet connection also brings one additional Serial Rs232. The control features are the same as for the USB control port. Using the ***Axel Universal Software Remoter*** control software, you can change the operating parameters, levels, and compression, as well as the audio process/processing. Using ***Axel Universal Target Address Manager*** you can set the machine's individual address in UECP format, set RDS to work in UECP-compatible mode or extended mode, and reset any or all of the RDS service datasets. Again, using the Universal Target Address Manager, you can also enter codes (Plug Activation key) that allow you to upgrade the machine to incorporate other optional features, such as the RDS encoder. The serial port 1 can also be used for **reprogramming the firmware**. The port speed default setting is 38.400 bps.See the relative section in the *Appendix* on how to reprogram the firmware.
4	**"GPIO" PORT**	HD 15-pin female interface on SubD connector. This shows the logic status of the Falcon VS. The GP outputs are Open Collector outputs, while the GP inputs are optocouplers. The status of the GP inputs and GP outputs can be viewed on the front panel, in the right-hand section of the first LCD screen. For information on the Opto Interface port *pinout*, see the Appendix at the end of this manual. For the operation of each GPI and GPO, see the specific section in the next pages of this manual.

5	**ANALOG OUTPUT**	ANALOG audio output of the Falcon VS audio processor. Electronically balanced output on XLR connector (type: stereo / mono)
6	**ANALOG INPUT (ANALOG INPUT –A)**	ANALOG audio input of the Falcon VS audio processor, with electronically balanced XLR connection.
7	**MPX UNIT** **MPX OUTPUTS** **MPX INPUTS**	"**MPX OUTPUTS**" unit: this contains the two output MPX lines. These MPX outputs are buffered and totally independent of each other, and the levels of the MPX output (but not of the individual Audio, Pilot, and RDS carriers) can be set individually via remote control software or directly on the front panel. The level of the subcarrier components cannot be altered on one output only. "**MPX INPUTS**" unit: this section contains two auxiliary broadband inputs (AUX or SCA), which are added directly to the **MPX-OUT -1** and/or the **MPX-OUT -2**. The signal from **AUX-1** can be sent to **MPX-OUT -1** and also to **MPX-OUT -2** at the same time, or just to **MPX-OUT -2**. The same can be done for the signal from **AUX-2**, sending it to **MPX OUT-1** and to **MPX-OUT -2** at the same time as, or just to **MPX-OUT -2**. For more information, see the block diagram of the machine.
8	**POWER SUPPLY UNIT**	The power supply unit features a switch to switch on the device and a power socket. For the change of the fuse, see the relevant chapter. The fuse is located inside the device, near the switching power supply unit. The fuse is of the slow blow type, 230 V a.c. and 2,000 A, equal to 2000 mA
9	**SERIAL -2 RS232** **SERIAL PORT 2**	The Falcon VS features two serial ports for device control via the remote control software.In this case, **Serial-2** is the port selected. The control features are the same as for the USB control port. Using the ***Axel Universal Software Remoter*** control software, you can change the operating parameters, levels, and compression, as well as the audio process/processing. Using ***Axel Universal Target Address Manager*** you can set the machine's individual address in UECP format, set RDS to work in UECP-compatible mode or extended mode, and reset any or all of the RDS service datasets.
10	**PORTA ETHERNET** ***(OPZ)***	Falcon VS mounts (on option to be request) an Ethernet port on RJ45 connector for connecting a LAN/WAN. In addition, this port provides an integrated web server, and Falcon VS can be controlled remotely using a standard web browser. The same port provides an SNMP agent, and an ASCII Parser (see Appendix).

10 BLOCK DIAGRAM OF FALCON VS



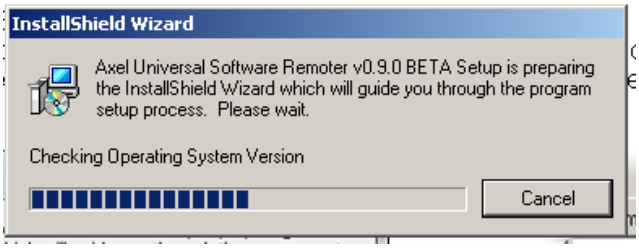
11 INSTALLATION AND USE OF THE FALCON VS CONTROL SW

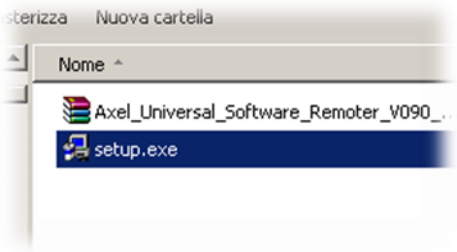
The installation procedure of the Falcon VS control software is described below. The program runs on all Windows platforms, including Windows Xp sp3, Windows Vista and Windows 7 32-bit and Windows 7 64-bit and Windows 8 Pro 64bit. The control software must be installed before connecting the devices to the USB port. To install the program follow the instructions below using the program file from the original CD contained in the package with the device, or the file downloaded from the Axel Technology website.

Installation procedure:

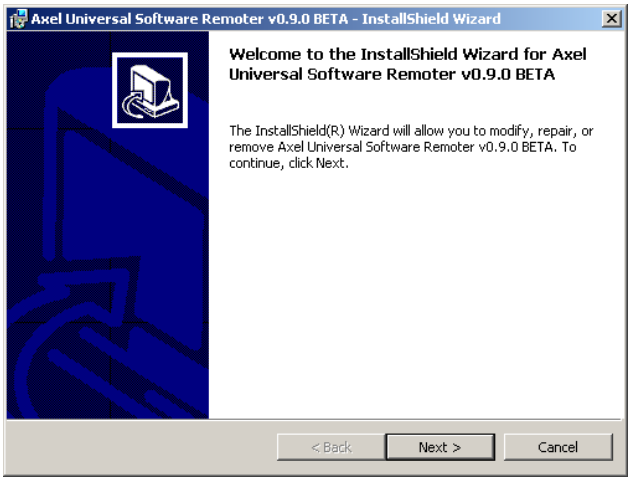
1. Insert the CD in the player
2. Run SETUP.EXE

a. We recommend you copy the program from the CD onto the hard disk of the PC you are using and run the program from the hard disk. Once the run command has been entered, the following InstallShield Wizard page will appear

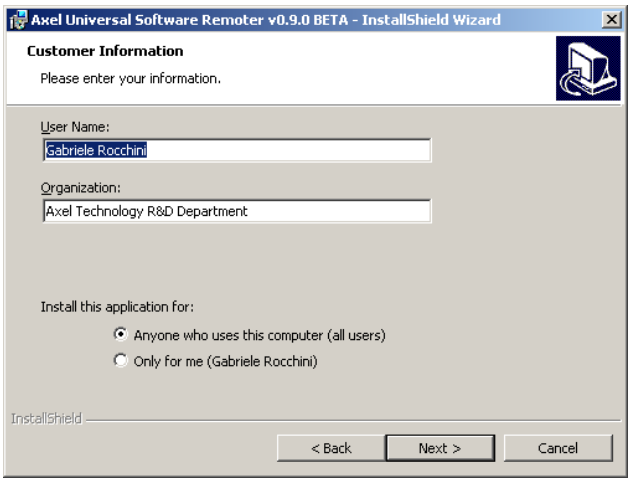




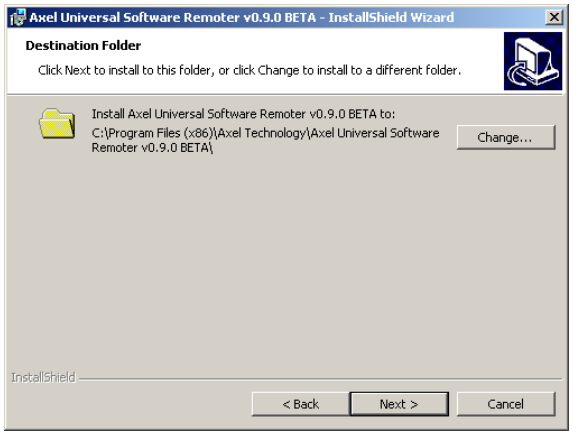
3. The following page will be displayed; click NEXT

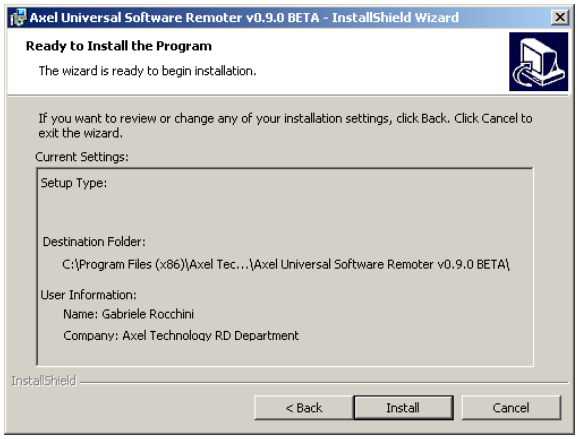


4. Enter user information:

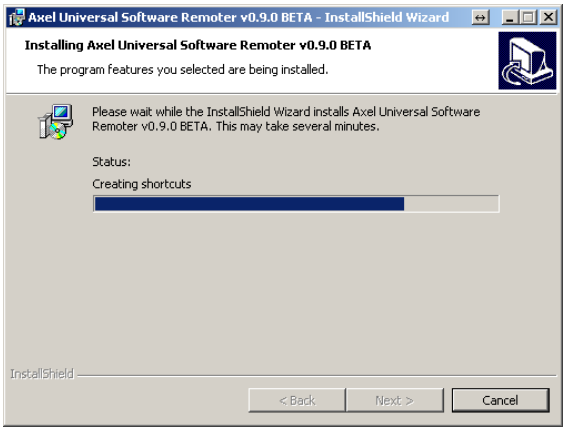


5. Select a destination folder or leave folder unchanged, click NEXT and then INSTALL

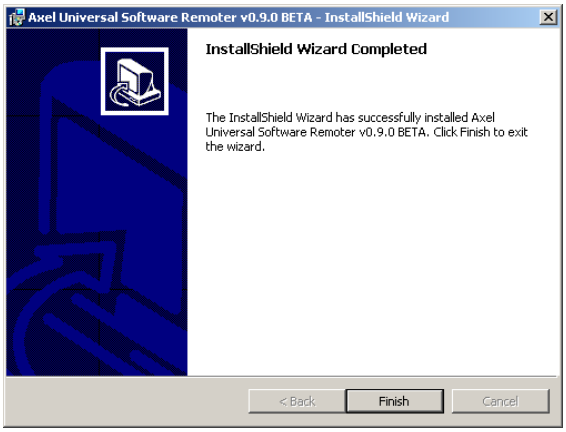




6. The software will start installing the program on the PC; during installation a request for confirmation to install the USB drivers for the connection to the Falcon VS device will appear.



7. At the end of the installation this page will appear; click Finish and two new icons will be created on the desktop:

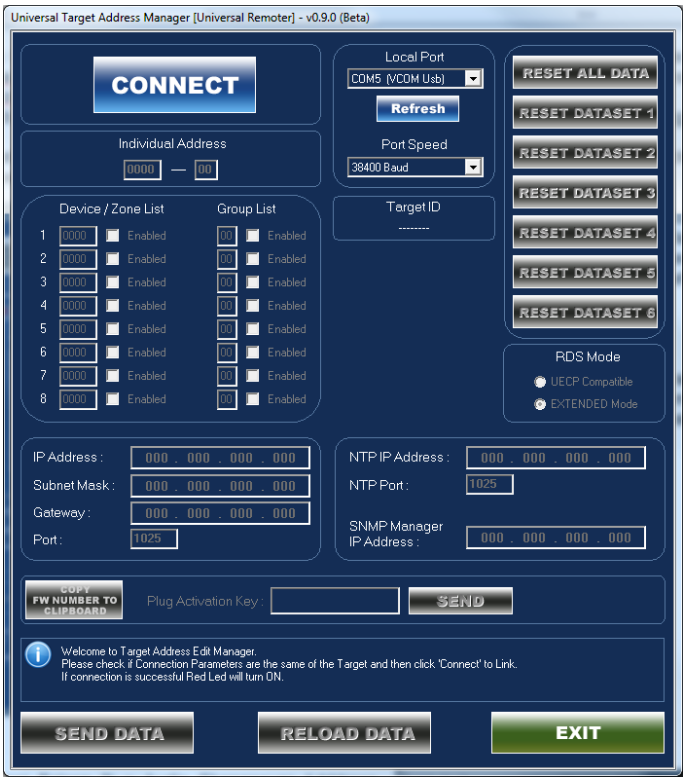


a. *Axel Universal Software Remoter v2.0 (or other)*
b. *Axel Universal Target Address Manager v2.0 (or other)*

8. You can now use the programs to manage the Falcon VS devices. The following sections explain how to connect the device and outline the potential offered by the product.

12 USE OF THE UNIVERSAL TARGET ADDRES MANAGER

The Falcon VS Target Address Manager software is used to assign to Falcon VS an Individual Address via UECP protocol, to reset one or all of the RDS service datasets, to set either the RDS mode if it is perfectly compliant with the UECP standard, or to set the extended mode.
A plug activation key can also be entered in order to upgrade the machine or add new features.
This can be achieved using either the PC's Serial port or the USB port. The following screen will appear when you open the program:



***Universal Target Address* Manager** is still disconnected from the Falcon VS device. When you press the **CONNECT** button, a connection is established between the PC and the Falcon VS. The default values of the COM port are:

38,400bps 8-N-1

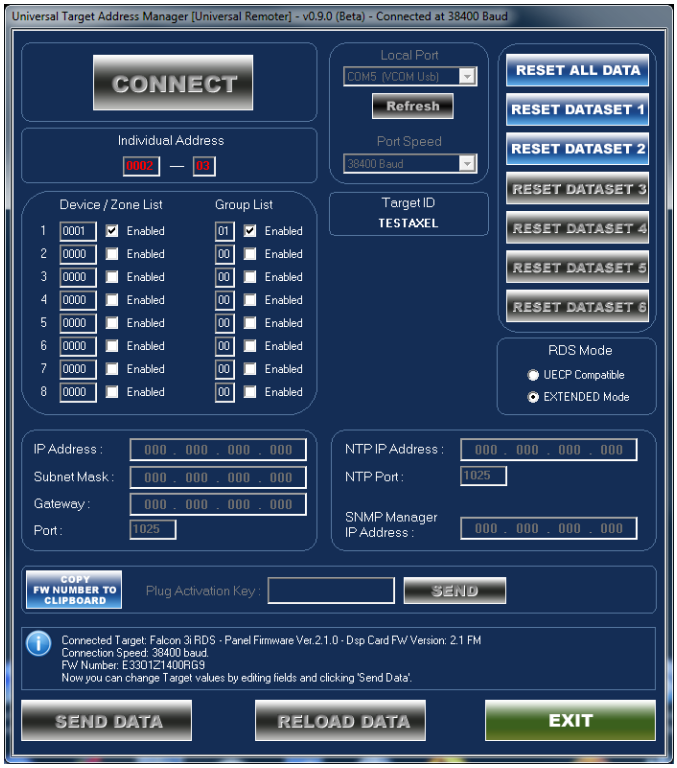
If a USB port is assigned, simply select the relevant port assigned by the operating system from the list (in this case VCOM USB Port). Port COM 5 has been assigned.

Once the Falcon VS and ***Universal Target Address Manager*** are connected, the machine settings are displayed. To change these values, position the cursor in the relevant fields and enter the port data, then click ***SEND DATA*** to send the changes to the Falcon VS device.

To check whether the changes have been applied, click ***RELOAD DATA***, which refreshes the program and then reads the port values again.

Information concerning the device connected is available in the bottom section of the software display, above the command keys. This includes data such as "***Connected Target***", which shows the device model to which it is connected (a Falcon VS in the picture), and the ***firmware release installed*** (r.2.1)

The ***firmware code*** is also included, i.e. the unique ID code of the hardware and firmware installed on the device. This number could be required for an upgrade of the device or in the case of specific requirements or customisations.



13 USE OF UNIVERSAL REMOTER SOFTWARE

The Universal Remoter is powerful control/monitoring software which can be used for the entire series of audio processors, including:

- **Falcon 3i**
- **Falcon VS**
- **Falcon XT**

This single software package can be used to can control three different types of audio processors, stereo encoders, and RDS generators. There are two software operation modes: "Single Target Mode" and "Network Mode", as outlined below.

Universal Remoter start window

13.1 "SINGLE TARGET MODE" OR "NETWORK MODE"?

"Single Target Mode" means the "**local**" connection, therefore two-way data communication will be established between a Falcon device and a monitoring and control PC. This connection can be via RS232 serial port, USB A - B connection or via LAN using the Ethernet port (if featured on the device).

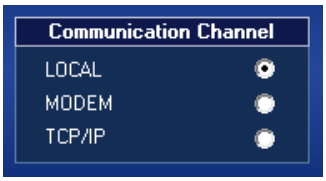
"Network Mode", meanwhile, means a "**distant**" connection, without a return data channel. A connection of this kind is generally established in cases of audio processors installed on remote transmission sites or in locations without a return data channel. This connection is usually common with audio transfers via satellite, where configuration data can be sent in one-way mode (uplinking to the transmitter site). Of course, you will not know if the command has been successfully received or whether it has been executed correctly by the audio processor. That is why a redundancy check is added, which allows the same command to be sent several times, so that it can be received and executed.

13.2 "SINGLE TARGET MODE" CONNECTION

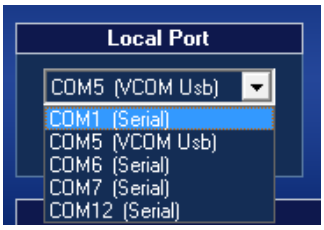
Pressing Single Target Mode establishes a direct, two-way communication link with the Falcon device. To select which communication channel to use and set the relative parameters, click "Connection Settings".

The Single Target Mode is the easiest and most immediate way to connect the Falcon processor to the Host PC. It requires a two-way communication channel between the Host PC and the Falcon encoder.
This channel may be a LOCAL, MODEM or TCP/IP channel. It is useful for real-time monitoring of the current Falcon status (sound levels, RDS, etc.).

11



For a **USB** connection, once you have installed the driver supplied with the device (as stated in the section titled "Control Software Installation"), a port (USB VCOM) will appear in the list as a COM port ("COM5" in the case shown beside). This port allows you to make a USB connection between the control PC and the Falcon device.



Meanwhile, every time a connection to the Falcon is made via the **serial** port, you will need to select **'LOCAL RS 232'** in the communication channel (LINK MODE) configuration windows. The "Link Mode" will automatically be set to 'two-way'. You will need to set the parameters associated with the PC serial port to use and the relative speed.

LOCAL PORT	Selects the PC serial port to use for the connection (from 1 to 255).
SERIAL SPEED	Sets the maximum transmission rate for the PC port selected. The default set ting on the Falcon is the maximum value (38400 Baud)

The communication transmission speed set in the PC control software MUST MATCH the relative transmission rate set for the serial port on the Falcon to which it is connected. For example, if Serial Port 1 on the Falcon has a transmission rate of 4800 Baud, the same speed must also be set for the PC serial port used in the connection. The port speed for Serial Port -1 is usually 38,400 bps.

Enter a comment/string of mnemonic characters in the "**User Note**" field (for example: *TELECOM TOWER - Radio One*). Click OK to confirm, or ESC to exit without saving.

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13.3 DIRECT UPLINK TO VIA MODEM

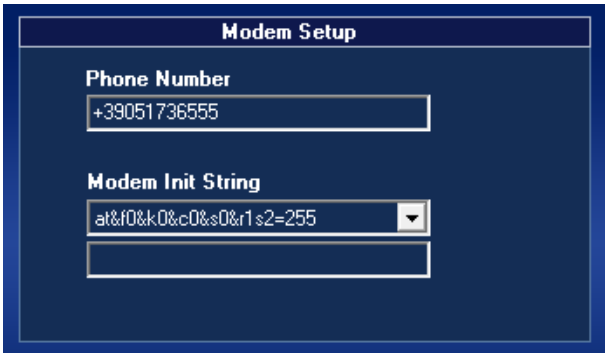
Every time the connection to the Falcon is made using two dial-up modems, select **'MODEM'** in the Communication Channel configuration windows. The default link mode is 'two-way'.

Please see the APPENDIX to this manual for the physical connection between the modem and the Falcon at the remote end (Serial Port 1 of the Falcon must be used for this).

Using the Universal Remoter software, set the serial port used for the modem connection and the connection speed thereof (usually 38,400 baud for POTS/PSTN modems and 9600 Baud for GSM modems). You must also enter a modem initialisation string.

SERIAL PORT	Select the PC serial port to use for the connection (from 1 to 255). In the case of a USB modem, check which 'virtual' serial port is selected by default by the PC.
SERIAL PORT SPEED	Sets the maximum transmission rate for the PC port selected. The default setting on the Universal Remoter is the maximum value (38400 Baud).

The communication transmission speed set in the PC control software MUST MATCH the relative transmission rate set for the modem connected.



Modem Init. String	Enter the AT initialisation string here. The Universal Remoter offers two preset strings. The shorter of the two *(at&f&k0&c0&r1s2=255*) is usually appropriate for internal PCI modems, while the longer one *(at&f0&k0&c0&s0&r1s2=255*) is usually appropriate for external modems.
Phone Number	Enter the phone number to dial here (including country code, area code, etc.)

Click OK to confirm, or ESC to exit without saving.

13.4 CONNECTION TO A DIAL-UP MODEM

Whenever remote monitoring is required via a dial-up modem, connect the modem to Serial Port 1 on the back of the unit. Check the configuration of Port 1 carefully, its speed must be set to:

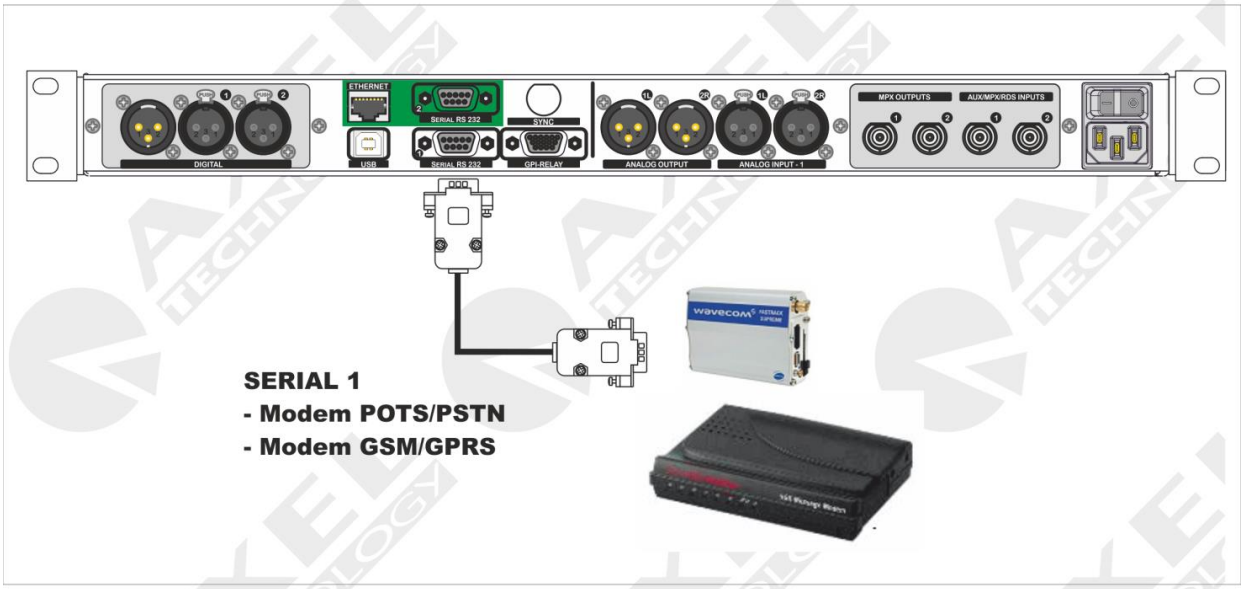
- 38400 Baud for dial-up POTS modems
- 9600 Baud for GSM modems.

A 'crossover' **CABLE** (**NULLMODEM**) is required for the modem connection. The following table shows the wiring diagram for the cable in both cases, whether the modem features 9-pin or 25-pin female SubD connectors.

Remember also that:

- With a 25-pin plug, connect pins 6 and 8.
- With a 9-pin plug, connect pins 1 and 6.

	Falcon end (Male SubD9)	Modem end (M Subd 9p)	Modem end (M Subd 25p)
Pin	2	3	2
Pin	3	2	3
Pin	4	6 and 1	6 and 8
Pin	5	5	7



The receiving modem (the one connected to the Falcon serial port) must have at least the following settings (modem commands are given in brackets and refer to the most common modem models):

- IGNORE CD (the standard command is &C0)
- IGNORE RTS (&R1)
- IGNORE DTR (&D0)
- Disable TX Flow Control (&H0)
- Disable RX Flow Control (&I0)
- Disable Data Compression (&K0)

Registers S0 and S2 must also be set as follows:

- **S0=2**
- **S2=255**

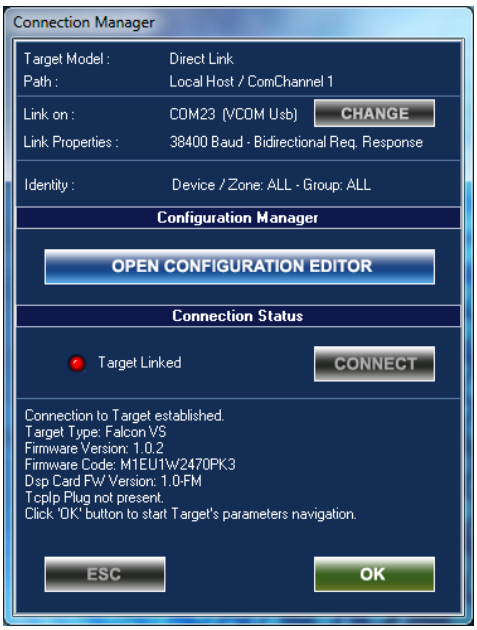
The S0 register is the number of rings before Automatic Answering is activated. It sets the number of rings required before the modem answers a call automatically. Range: 0-255 rings. Setting this register to zero disables automatic answering mode. S0 = n, where n is the number of rings. ***We recommend you set S0 at 2.***

The S2 register (Escape Code Character) specifies the ASCII value of the character used in the escape code. (The escape code is the escape character entered three times in a row.) When the modem status is 'connected' and the modem receives the escape code, it enters the command status. Normally, setting the S2 registry at 128 or more disables the escape code character. ***We recommend you set S2 at 255.***

You will have to **load the settings into the modem memory**, so that they are immediately loaded when the modem starts up. Please refer to the modem user manual for more information.

13.5 DIRECT LINK CONNECTION

Once you have set the connection parameters, you can connect to the Falcon device. Clicking "Connect to Single Target" opens a second panel, the "Connection Manager" panel (the photo shows how the Falcon is not yet connected to the control PC).



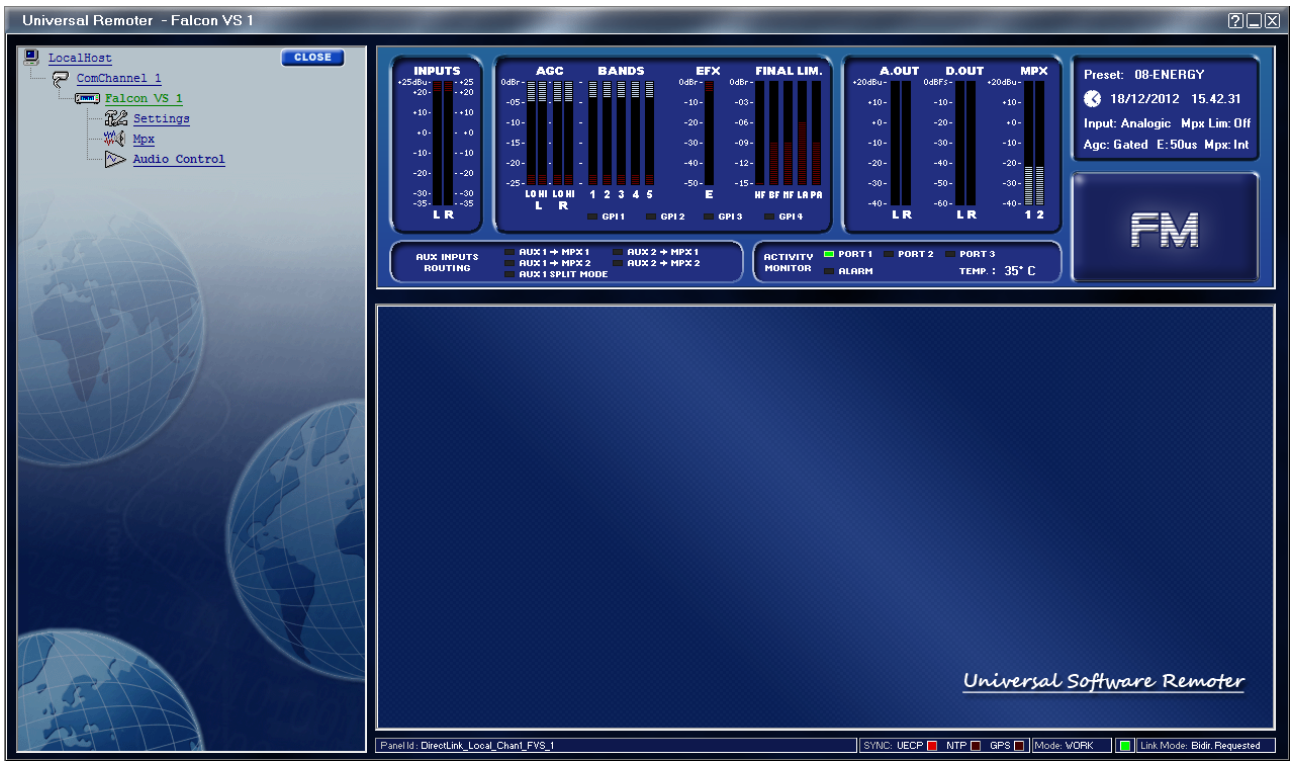
In the top section of the "Connection Manager" software display, there is a summary of the connection modes; clicking on the "Change" key allows you to change the connection setting again, if necessary.

Once the "Connect" button is pressed, a connection between the PC and Falcon device is established.

Once the connection is established, "Connection Status" is written in red and the "Target Linked" label is displayed, while the bottom section contains the Target Type, the firmware version, the firmware code (individual ID code of the motherboard) and other information related to the Falcon device to which it is connected.

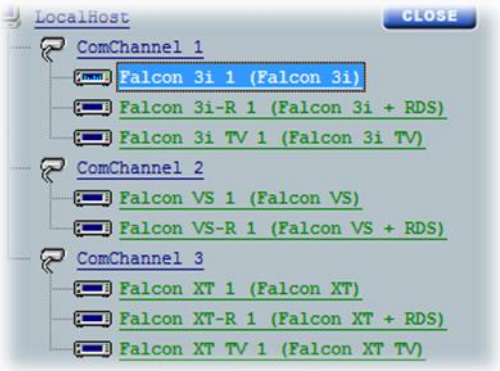
14 FALCON VS CONTROL VIA SOFTWARE

Universal Remoter allows you to control the Falcon VS device via a one-way or two-way connection; the screen that appears after installing and accessing the software is shown below:



14.1 TYPE OF FALCON AUDIO PROCESSOR CONNECTED

On the left-hand side of the screen, you can see the kind of Falcon device connected and the options linked to it. More specifically, for the **Falcon VS**, you can select a version with audio processor and MPX encoder only, which can be displayed as the **Falcon VS**.



The RDS encoder can also be applied optionally, in which case the words '**Falcon VS-R'** appear in the specifications at the side, indicating the presence of the RDS Radio Data System encoder.

For the Falcon series devices, as well as the various options available in the "*Introduction*" section, there are also versions not specifically intended for the FM/Web market. Using the Universal Remoter software, you can also request and use the audio processors for the TV part. For the television part, there are **Falcon 3i** and **Falcon XT** devices currently under production, which are known as **Falcon 3i TV** and **Falcon XT TV.**

More specifically, a second difference, clearly highlighted by Universal Remoter, is the presence or absence of the RDS signal encoding status box. If the letters 'FM' appear in the middle section, immediately to the right, this means that solely a Falcon Audio Processor and MPX encoder are in use, i.e. no RDS encoder.

If the letters 'RDS' appear with the words "RDS encoding in progress", it means there is an RDS encoder installed in the device.

The front panel displays the relative section, i.e. "RDS MODULE SETUP"

14.2 "SETTINGS" SECTION

The SETTINGS section contains some general work parameters for the Falcon VS.

14.2.1 Target Settings:

Using this box you can set the mnemonic name of the device to which you are connected (in the ID Label section). The "Name" section contains the name of the machine and is non-editable, while the "FW NUM" is the individual ID code of the firmware installed on the Falcon VS device. This number may be required when the implementation of an option within the machine is requested (e.g. an RDS encoder).

However, to prevent direct access to the machine via the front encoder dial, you can set a password in the section titled "Keyboard Lock". To set the password, enter an alphanumeric combination of up to 8 characters in the box and then press LOCK. Once this is done, the front panel can no longer be controlled directly via the front encoder dial.

	WARNING: There is no backdoor mechanism to release this lock feature and the staff of Axel Technology cannot provide assistance in the event of lost/forgotten passwords. If this happens, the device must be brought back for reformatting.

To restore normal encoder dial operation, enter the password chosen during the lock stage in the 'Password' field and then press UNLOCK.

14.2.2 The Falcon VS internal clock:

The **clock** installed inside the unit is powered by a *SuperCAP* (**capacitor**) instead of a conventional battery. The capacitor keeps the clock running and protects the system memory against loss of stored programs in the event of power cuts, with an autonomy of approximately one week (depending on environmental conditions).

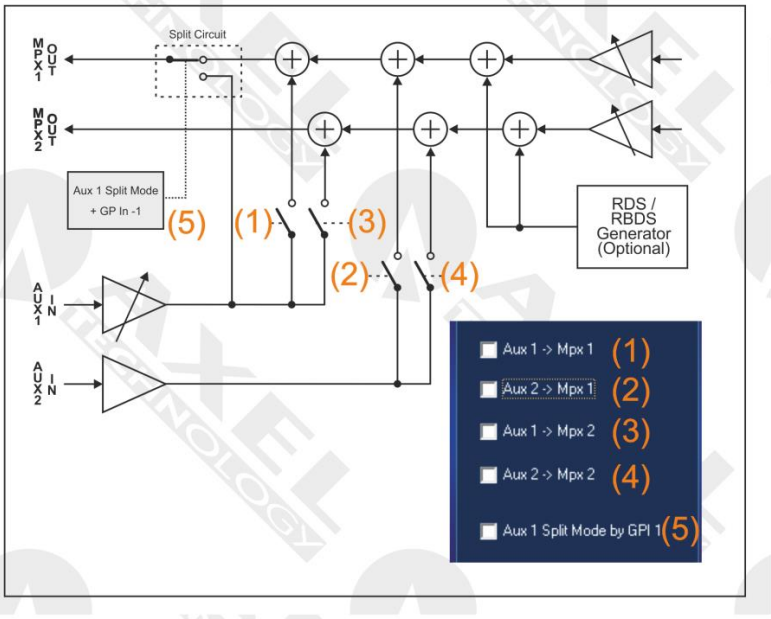
Full charge requires at least 30 minutes of standard operation. The RDS parameters and settings are stored in a non-volatile memory (to maintain data integrity in the event of long periods of disuse).

The clock tolerance is approximately 1 second per day (strictly linked to environmental conditions). Should the SuperCap discharge completely, the clock will stop and will **need to be resynchronized** with the PC clock using the Synchronize Clock function.

The Scheduler for the RDS services stops when the internal clock stops.

14.2.3 Aux Settings - SCA inputs

The Falcon VS can have two composite MPX outputs connected at the rear of the device (shown as MPX-1 and MPX-2), as well as two broadband auxiliary inputs mixed with the former. The photo below helps understand how the multiplex auxiliary signals are "mixed":



As you can see from the numbering shown, by flagging one of the functions from 1 to 4, the signal from the AUX (SCA) input towards one or both of the two MPX outputs is added on. A typical case of use of adding onto the signal MPX generated internally is the use of an external RDS encoder:

To be able to use the said external RDS encoder, connect a coaxial cable from it to one of the two AUX inputs on the front panel. **Simply by convention** the AUX-2 is considered the external RDS input, therefore, after making the various hardware connections, tick the checkbox for AUX 2 -> MPX 1.

It is also possible to apply (**solely to AUX-1**) a positive or negative gain, ranging from a minimum of -20.0 dB to a maximum of +12.0 dB, with 0.1 dB steps. This could be useful when the signal applied to 'AUX-1 is not the same as or of a similar level to that generated by the Falcon VS processor during Network or Split mode (Split Circuit) operation.

14.2.4 Split Circuit:

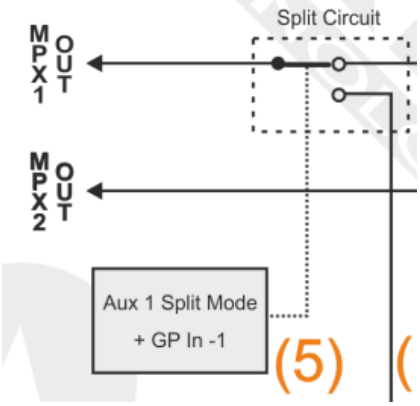
The "**Aux 1 Split Mode by GPI 1**" (also known as MPX Splitting or Split Circuit) allows you to alter the Falcon VS **MPX-1** output by assigning it either an external MPX signal applied via the AUX-1 **or** the MPX signal generated internally. This feature is particularly useful when a broadcaster needs to create regional or local sub-networks of the main network at any given time of the day.

	A typical application case is when the type of advertising broadcast is changed over different geographical areas, or a radio news programme is transmitted over different geographic regions with different regionally-specific content.

Switching the two MPX lines between External and Internal is activated via an impulse at Input Port 1 of the GPIN port.

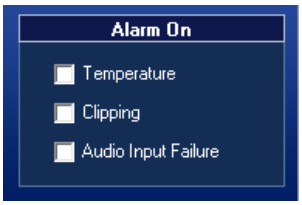
Aux 1 Split Mode by GPI 1	GP Port In	OUTPUT
Enabled	Active	Internal MPX
	Not active	Copy of the Aux 1* signal

By default, the Falcon VS is **NOT** configured in "Split" mode when supplied to the customer, therefore the position of the switch is as shown in the figure on the right, i.e. with the MPX generated internally.



14.2.5 Audio Preset Manager and Alarm:

This section has two sections, called “On Air Audio Preset Change”, which show the preset channel currently broadcasting (whether this is the factory setting or a customised one), while the ”External Preset Change” section shows which preset channel is broadcast when an external command is received. The external command which "switches" the preset channel broadcasting is inputted at **GPIn-2.**
Whenever this **GPIn -2** is closed, the Preset Audio channel is switched over. To render this function unavailable, select **Disable**.



The "Alarm On" section shows which conditions are recognised as alarms for the Falcon VS device. When Temperature is selected, the relative temperature alarm GP-O is closed, while Audio Input Failure means lack of audio input at the input selected in the Input Setup (Audio Control - Inputs - Input Setup), which can be set to either Analog or Digital. The lack of audio closes **GPOut -2** on the rear port and triggers the alarm in the Alarm software. A signal light appears on the front panel of the Falcon VS device at **GPOut -2.** If Clipping is selected, an alarm is generated in the event of continuous Clipping, which also reaches the Clipping Hardware.

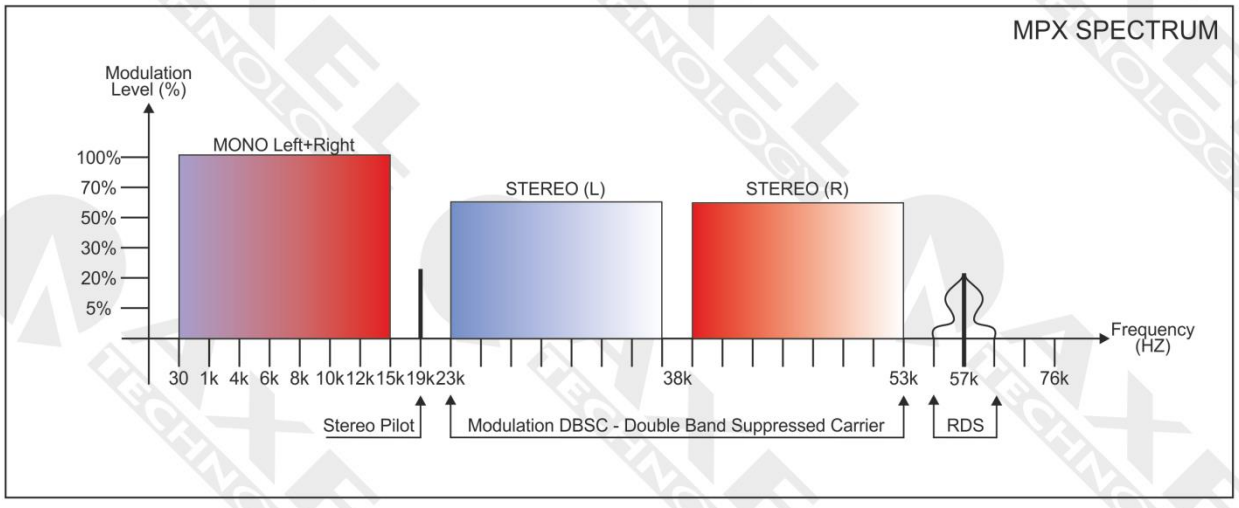
In the event of an Audio Input Failure, a signal light appears on the front panel of the Falcon VS at the GPOut -2.

15 THE MPX GENERATOR

Let’s assume that the MPX signal is composed of three main **components**:

- **audio signal (L and R channels)**
- **pilot tone (19 kHz)**
- **RDS signal (57 kHz)**

The stereo encoding process modulates (double-sideband suppressed-carrier) the LH-RH or stereo difference signal into a 38kHz subcarrier. Its sidebands will extend by +/ - 15kHz. At the upper end this will amount to 53 kHz. A digital filter ensures that all the content above 53 kHz is suppressed. This accuracy with which the spectrum is controlled contributes to the sound level, since it ensures no excess energy is transmitted.

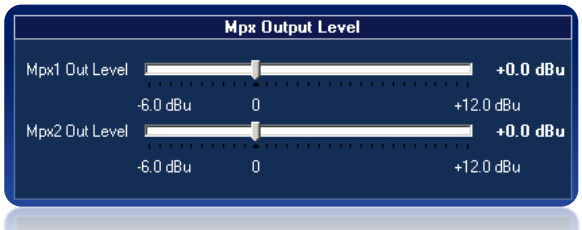


Note that the composite clipper does not degrade the RDS signal as it is applied before the 19kHz pilot is added to the multiplex signal (if the pilot was present at the composite clipping stage, the third harmonic of the pilot generated by the clipping process would fall on exactly 57kHz, thereby downgrading the RDS.) **Each component of the MPX signal is generated digitally and, therefore, available at the highest quality.**

15.1 MPX SECTION

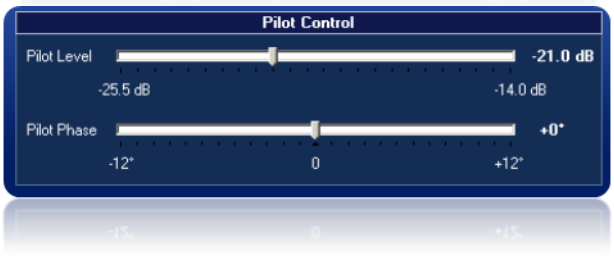
The MPX section contains controls for the two multiplex outputs (MPX OUT-1 and MPX OUT-2)

15.1.1 MPX Output Level



This section contains two individual controls for the two composite outputs. This way, the equipment that requires different power levels can be handled individually, so that they can be adjusted as needed. Level adjustable from -6.0 dBu to +12.0 dBu in 0.1 dBu-steps.

15.1.2 Pilot Control



Pilot Level: the default setting is -20 dB with respect to the overall composite MPX stereo signal. Use the horizontal bar to change this level within a range of -14.0 dB to - 25.5 dB in 0.1 dB-steps. The Stereo Pilot signal can be disabled using the relative controls on the MPX Output Mode units.
Pilot phase: this can be adjusted within a range of - 12.0 to + 12.0 degrees (Deg) in 1- degree steps. The phase selection function is used to adjust the phase relationship between the pilot and the 19 kHz/38 kHz modulator. This can be used to correct incoherence between different transmitters.

15.1.3 Output Source Selection

This selector switch allows you to set which audio signals to send to the MPX Stereo Generator unit. The audio signals can be sent directly to the sound processor input, in which case the audio processor is bypassed. In this position, the pre-emphasis is also removed.

In the "Processed" position, audio material (processed according to the parameters set in the "Audio" section) is sent to the Audio Processor instead of the MPX Stereo Generator. This is generally the standard operation position.

If "Internal Generator" is selected for the MPX Stereo Generator, the audio signals are sent to the internal tone generator, as shown in Audio Control -> Menu -> Internal Generator. There are various sinusoidal frequencies and various operation levels. This generator is extremely useful during an audio chain alignment stage.

15.1.4 MPX Clipper

This value can be settable at between 95% and 105%, the MPX Clipper stage operates within the pre-pilot region stage and is performed on the L + R and L-R signals, before the pilot signal is entered. This design ensures that the clipping is only performed on the composite signal, never on the Stereo Pilot signal.

The MPX Clipper stage can also be set to OFF via the same menu. When disabled, the MPX Composite Clipper circuit is totally disconnected and not operational.

	Whenever “aggressive” modulation is needed, i.e. a powerful increase in the sound density, at the expense of sound 'definition', the cut point must be set at less than 100%, while any time more “protected” modulation is required, the cut point must be set at over 100%

The Falcon VS clipping stage is based on the principle of maintaining a fixed clipping level and if it is increasing, it means a positive gain must be applied to the modulated signal. If, instead, the clipping level is decreasing, a negative gain must be applied to the modulated signal. The gain applied will be calculated according to the following formula:

Gain = 100% - "Clipping parameter" value point

Important: after setting the clipping parameter to 97%, the gain will be 100% - 97% = 3%, resulting in a density increase of 3%. The final modulation level is always kept at 100%.

Conversely, if the clipping point is set at 104%, the gain applied will be 100% - 104% = - 4%, therefore a negative gain. Without the clipping stage activated, the modulation peaks may surpass the 100% limit by as much as 3 or 5 kHz.

We therefore strongly recommend that you set the clipping level at 100%, which will avoid modulation distortions and fully preserve the quality of the sound processed.

The clipping range (MPX Clipper) is designed so that, even when set at 95% (i.e. the maximum of the positive gain), the Pilot Protection factor (19 kHz) is always kept above 60 dB.

15.1.5 MPX Output Mode

OPERATIVE MODES	
STEREO	This is the device’s nominal operating or "stereo" mode, which includes all the components within the MPX spectrum, as shown in the upper photo. It also includes the RDS data carrier, if featured.
MONO	The MONO mode physically "switches off" the Stereo Pilot carrier at 19kHz. This way, the receivers cannot decode the multiplex audio signal in "Stereo" mode. The RDS data carrier can still be modulated.

TEST MODES	
L+R	The MPX MAIN spectrum part and the Stereo Pilot are transmitted at 19kHz
L-R	The MPX SUB spectrum part and the Stereo Pilot are transmitted at 19kHz
PILOT	Solely the Stereo Pilot carrier is transmitted at 19kHz
NO PILOT	The entire MPX spectrum (Main and Sub) are transmitted at 19kHz but not the Stereo Pilot carrier

15.2 MPX POWER LIMITER CONTROL (ITU-R BS.412)

The aim of standard **ITU-R BS.412** is to reduce the density of the modulated signal while maintaining the same peak deviation level, so as to keep co-channel interference as low as possible.

Standard ITU-R BS.412 stipulates:

"It is assumed that the maximum peak deviation of ± 75 kHz is never exceeded. It is also assumed that the power of the complete multiplex signal (including pilot tone and additional signals) over each 60-second interval is no greater than the power of a multiplex signal containing a single sinusoidal signal which causes a peak deviation of ± 19 kHz. "

Essentially, the standard envisages the instalment of a sound treatment with a peak ratio of 12dB peak.

WARNING!

The default setting for MPX POWER CONTROL is 'off'.

Many European countries are applying ITU-R 412. However, if the use of MPX POWER CONTROL is not required by law in your country, make sure the control is switched off, as it could cause a loss of output volume.

For example, with ITU BS-412 switched on and set at 0.0 dB, there is a volume loss of approximately 5-8 dB as against the same level with ITU BS-412 switched on.

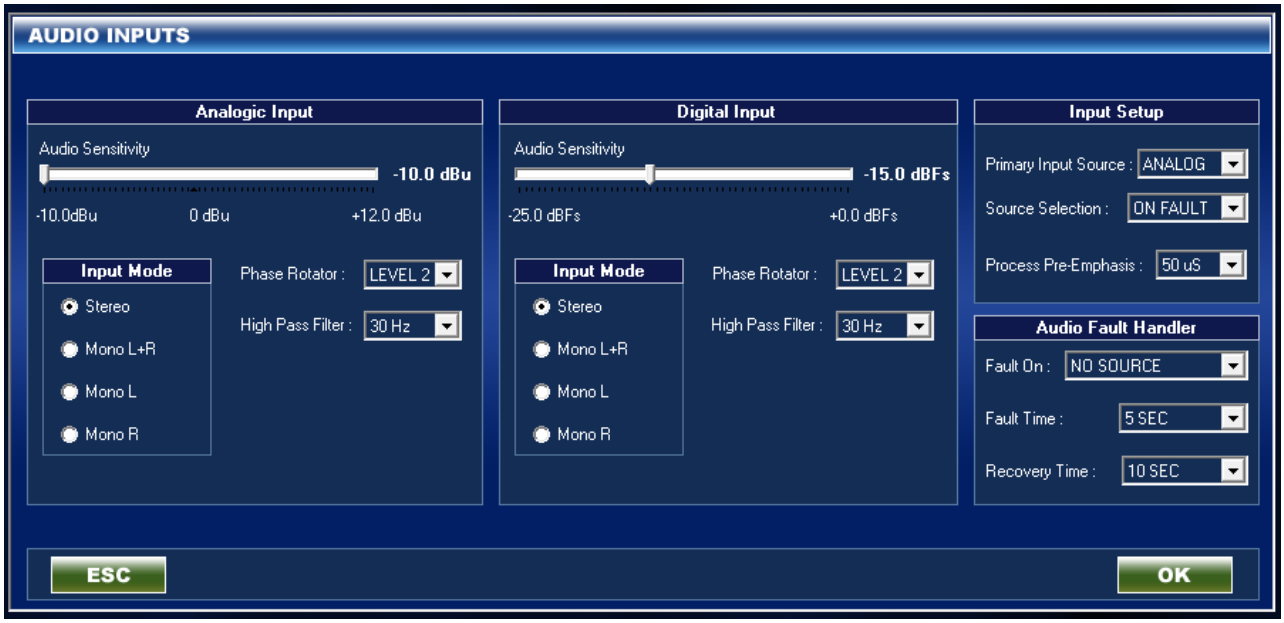
To activate MPX POWER CONTROL, turn the MPX power control to ON. The power threshold can then be increased from 0 to + 12 dB in 0.1 dB-steps. The output power calculation takes into account the pilot injection values, the external RDS signal, and any SCA signals.

16 AUDIO CONTROL

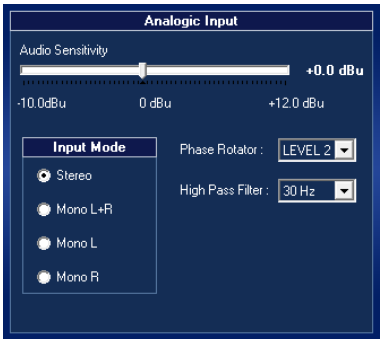
This section of the manual specifies the operating mode of the audio control parameters. The section also explains the following functions and features: **Input**, **Output**, Sampling Tone Generator (**Signal Generator**), Automatic Gain Control (**AGC** or **Pre-Process**), **Audio Processing** and Preset Manager

16.1 AUDIO INPUTS

This section contains all the working parameters for the Falcon VS analog and digital inputs. In addition to these controls, you can set parameters such as pre-emphasis and the main audio input (Input Setup).



16.1.1 Analog Input

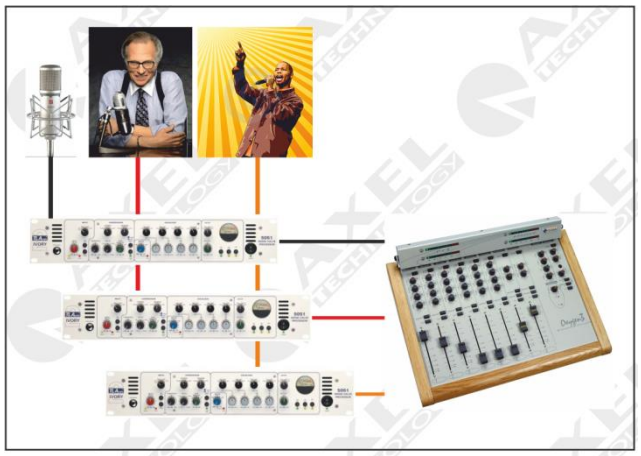


The balanced analog audio sensitivity ranges from -10dBu to +10 dBu, with 0.1dBu-steps. The section on Input Mode features the operating modes for the audio processor inputting stage: the functional operating (or nominal operating) conditions are either Stereo or Mono L + R, while the Mono L and Mono R functions are considered to be the test or configuration mode.

In the input stage, a HPF (high pass filter) is available with two cutting modes: 5 Hz or 30Hz. Generally speaking, for transmitters dating back to prior to the introduction of DDS (therefore in all the transmitters still based on PLL digital frequency synthesis), it is advisable to set the HPF at 30Hz, as in some cases subsonic frequencies, or frequencies below this value, could influence the behaviour of the transmitter exciter.

16.1.2 Phase rotator input

In the input stage, the processor generates a phase rotation via a 'phase rotator' circuit. This optimisation is achieved by means of a dedicated filter which acts on the input signal waveform to avert unwanted effects, as in the case where material with a highly vocal content is inputted directly into the audio processor.



The waveform of a standard speech signal (as in the case of signals generated by microphones) is asymmetrical, while that of a standard musical signal is symmetrical.

The sound of an asymmetrical clipped speech signal is much less pleasant and agreeable than that of a symmetrical clipped signal. That is why the Phase Rotator ensures that the signal phase is converted from an asymmetrical waveform to a symmetrical waveform, thereby significantly improving standard spoken audio material and, therefore, eliminating any type of distortion during the clipping stage.

However, it is advisable to pre-process vocal material (speech), i.e. in the same way as it is captured by studio microphones, with dedicated VOCAL processors positioned between the microphone and the mixer for the signal on air (see figure).

At this point, after due consideration of the type of equipment present at the station, you will be able to decide whether the Phase Rotator needs to remain on, or if it is more useful to have it turned off.

If, however, there is no microphone processor installed between the microphone and the mixer, and the spoken material is transmitted directly to the processor inputs, then it is useful to keep the Phase Rotator switched on and apply the effect thereof.

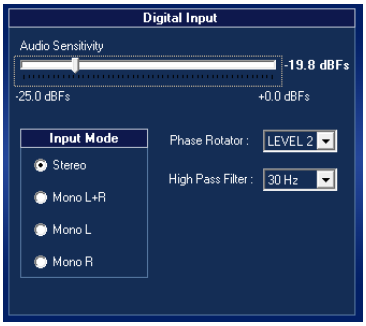
There are three Phase Rotator levels available. Each of them has a different effect on spoken audio material. Without going into the matter too deeply or providing long and cumbersome mathematical explanations, we recommend you test the different phase rotation levels and choose the one most suitable for the material that the processor will be modifying according to the table below. The Phase Rotator default setting is Level-2

Phase Rotator Level	Mode	Use
OFF	Off	If there are already dedicated audio processors present for audio signals from microphones or for spoken audio material.
Level-1	Female voice	If the audio material processed is predominantly female.
Level-2	General Purpose	This is the default setting. Suitable for general audio processor use, i.e. with music, mixed with speech, or for background music with the presenters' voices over it (whether male or female), or spoken material inputted into the audio processor.
Level-3	Male voice	If the audio material processed is predominantly male.

In addition to the **Phase Rotator** control, the Falcon VS (and all the processors in the Falcon series in general) are equipped with a voice detection stage (**Speech Detector)**, which can recognise vocal components within the audio material inputted into the audio processor and automatically adjust the processing parameters in order to obtain the best result. Please see the section on the **Speech Detector**. All the factory settings have the Speech Detector activated.

16.1.3 Digital Input

The balanced digital audio sensitivity ranges from -25dBFs to 0 dBFs, with 0.1dBFs-steps. The section on Input Mode features the operating modes for the audio processor inputting stage: the functional operating (or nominal operating) conditions are either Stereo or Mono L + R, while the Mono L and Mono R functions are considered to be the test or configuration mode. In the input stage, a HPF (high pass filter) is available with two cutting modes: 5 Hz or 30Hz. Generally speaking, for transmitters dating back to prior to the introduction of DDS (therefore in all the transmitters still based on PLL digital frequency synthesis), it is advisable to set the HPF at 30Hz, as in some cases subsonic frequencies, or frequencies below this value, could influence the behaviour of the transmitter exciter.



16.1.4 Input Setup and Audio Fault Handler

This part of the software is used to set the audio processor input audio source: the options available are Analog or Digital. This control is closely linked to the **Audio Fault Handler.** The Falcon VS is equipped with an audio fault changeover device which, in the event that an input is no longer available, switches to the second available input after a set wait time. Generally speaking, this feature intervenes in the event of faults and when the **Source Selection** is set to **On Fault**.

Otherwise, if the **Source Selection** remains on Manual, the input can only be changed manually, not automatically.

The Source Selection options are shown below:

• **MANUAL**: manual operation i.e. without automatic changes.

• **ON FAULT**: Automatic operation, as per the Audio Fault Handler

• **EXT. CMD 1:** audio input changed manually but controlled by GP-1
• **EXT. CMD 2:** audio input changed manually but controlled by GP-2
• **EXT. CMD 3:** audio input changed manually but controlled by GP-3
• **EXT. CMD 4:** audio input changed manually but controlled by GP-4

	Example: the main audio input of the Falcon VS processor is analog, but there is silence at the Analog input for over 5 seconds (**Audio Fault Handler Fault Time**) . The Falcon VS automatically changes its input from Analog to Digital.

The Audio Fault Handler displays the reason why the Falcon VS audio input has to be switched from one of the following options:
• NO SOURCE: no signal at the analog or digital input
• LOW LEVEL SOURCE: audio present at input but below-25dB.
• UNBALANCED SOURCE: audio present at input, but difference between L-R and R-L is over 9dB.

Fault Time is the time delay between loss of audio signal and switching being triggered. Essentially, it is the time that lapses between the detection of a lack of audio and the system switching to the secondary source.

The **Recovery Time**, on the other hand, is the exact opposite; when the main audio source time returns, the recovery time is the time which must lapse before the source is considered valid again and therefore can be inputted into the audio processor again.

	It is important to select both Fault Times and the Recovery Times which are appropriate for the radio station where the Falcon VS is in use; a Fault Time too close to 2-5s could cause continuous switching between audio sources and a Recovery Time too close to 2-5s could cause validation of an audio signal which is not actually valid.

16.1.5 What are pre-emphasis and de-emphasis and what are they for?

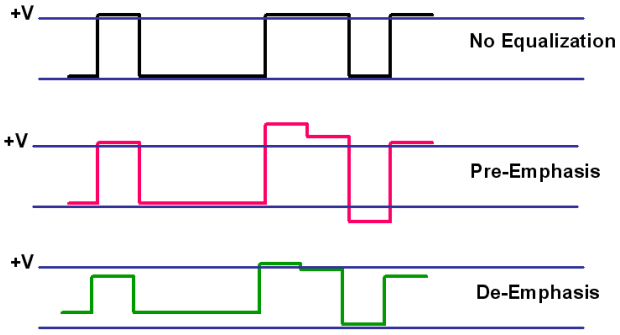
In an FM system, noise has a random spectral distribution of a triangular type, with the result that noise occurs mainly at high frequencies within the bandwidth. This may be offset, to a limited extent, by increasing the high frequencies prior to transmission and reducing those quantities of high frequencies during reception. Consequently, reducing the high frequencies in the receiver also reduces the high frequency noise. These processes of enhancement prior to transmission and subsequent reduction of certain frequencies are known as pre-emphasis and de-emphasis.
The amount of pre-emphasis and de-emphasis needed is determined by the time constant of an RC filter circuit. In most parts of the world the time constant of **50µs** is used.
In North America and South Korea the time constant of **75µs** is used. This applies to both MONO transmissions and STEREO transmissions. In stereo signals, pre-emphasis is applied to the left-hand and right-hand channels prior to MPX multiplexing.

The amount of pre-emphasis that can be applied is nevertheless limited by the fact that many forms of contemporary music contain more high-frequency energy than the musical styles that were fashionable at the time FM broadcasting was introduced, i.e. around the late 1950's. As a result, pre-emphasis cannot be used too much nowadays as it would cause an excessive shift of the FM carrier. The more modern FM broadcasting systems tend to use a variable pre-emphasis system which depends on the program and the audio material inputted into the audio processor.

In electronic audio signal processing, pre-emphasis refers to a process system designed to increase certain frequencies (usually the high frequencies) within a given bandwidth frequency with respect to the levels of other frequencies (usually the low frequencies). All this is done to improve the S/N (signal/noise) ratio, and consequently minimise the negative effects of phenomena, such as attenuation, distortion, or saturation, during processes or parts introduced after those already in the system. This whole system is called "emphasis"

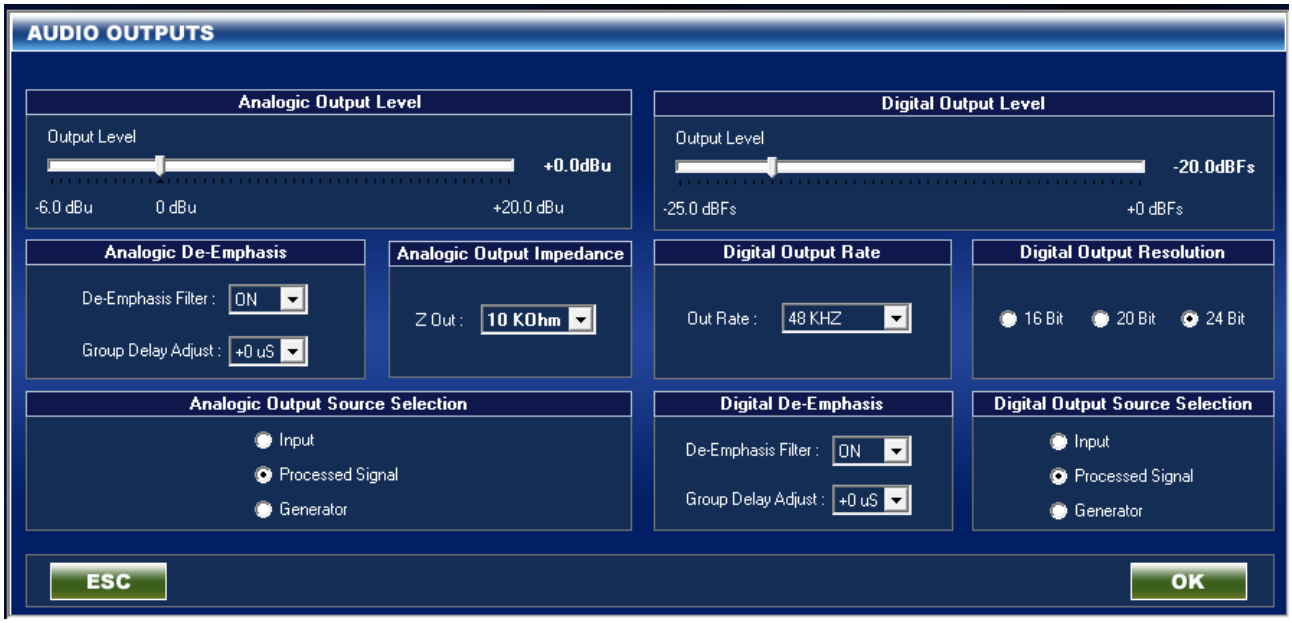
The frequency tripping curve is determined by special time constants and the cut frequency can be calculated using mathematical formulas. The reverse process, applied to FM receivers, is called **de-emphasis**.

One example which clearly illustrates the effects of pre-emphasis is the RIAA equalization curve on 33 rpm and 45 rpm vinyl records.

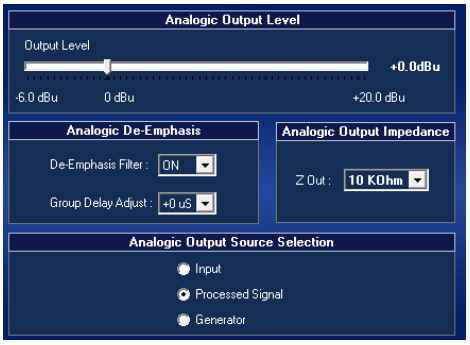


16.2 AUDIO OUTPUTS

This section contains all the working parameters for the Falcon VS analog output and digital output.



16.2.1 Analog Output



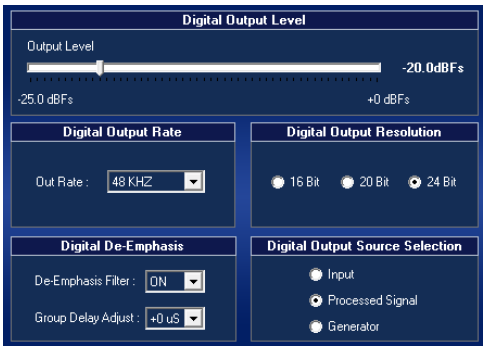
OUTPUT LEVEL: the analogue output level of the Falcon VS. The values settable range from -6.0 dBu to +20.0 dBu in 0.1dBu-steps

ANALOG DE-EMPHASIS: the ability to filter the analog output to remove the emphasis effect. It is also possible to adjust the group delay within the range of 0 to +3 mS (Group Delay Adjust) if the transmitter experiences emphasis decoding problems.

ANALOG OUTPUT IMPEDANCE: this option lets you select the output impedance for the Falcon VS. The values allowed are 600Ω or 10kΩ.

ANALOG OUTPUT SOURCE SELECTION: with this Falcon VS function you can decide which signal to place at the Falcon VS analog output. Audio signals can be routed with the following options: Input (actually a bypass) - Signal processed - Generator. The generator allows you to set the audio generated by the internal signal generator at the output. To set the parameters, see "Signal Processor".

16.2.2 Digital Output



OUTPUT LEVEL: the analogue output level of the Falcon VS. The values can be set from -25.0 dBFs to + 0 dBFs.

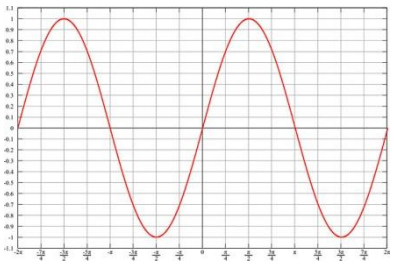
DIGITAL DE-EMPHASIS: the ability to filter the digital audio output to remove the emphasis effect. It is also possible to adjust the group delay within the range of 0 to +3 mS (Group Delay Adjust) if the transmitter experiences emphasis decoding problems.

DIGITAL OUTPUT RATE: the sampling frequency of the digital output signal. The values can be set at: 32 kHz, 44.1 kHz, 48kHz, 64kHz, 88.2 kHz, 96 kHz and **INP.SYNC**, which sets the frequency value depending on the sampling frequency of the input signal. Everything is done automatically.

DIGITAL OUTPUT RESOLUTION: this control sets the resolution of the digital output signal.

DIGITAL OUTPUT SOURCE SELECTION: with this Falcon VS function you can decide which signal to place at the Falcon VS analog output. Audio signals can be routed with the following options: Input (actually a bypass) - Signal processed - Generator. The generator allows you to set the audio generated by the internal signal generator at the output. To set the parameters, see "Signal Processor".

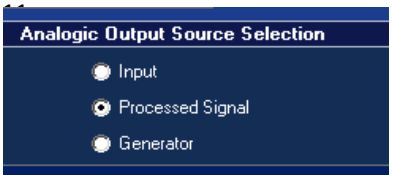
16.3 SIGNAL GENERATOR

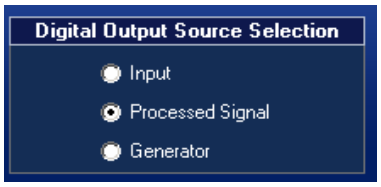


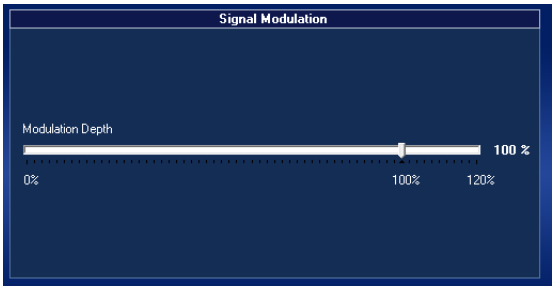
One special feature of the Falcon VS is the internal generator which produces sinusoidal signals in audio waveform. This feature is very important when it is necessary to generate test signals and calibrate studio transmitter link (STL) networks or the input and output phases of other equipment. The Falcon VS internal generator offers maximum accuracy.

The signal generator can be applied to the following outputs:

- Analog Output,
- Digital Output
- MPX Setup







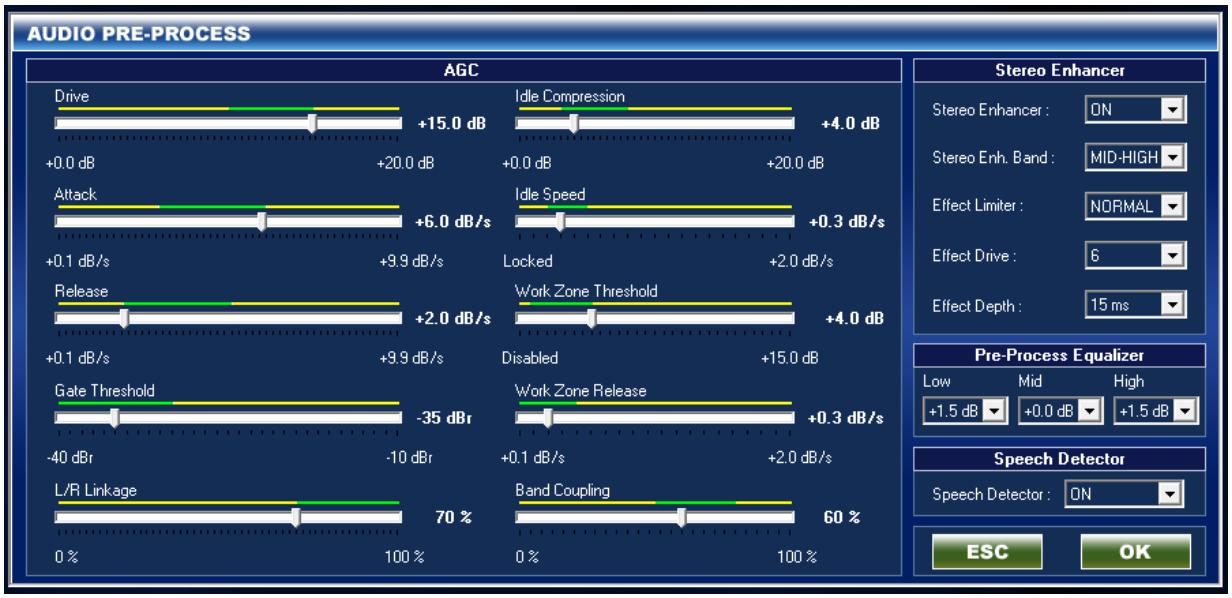
The Tone level can be selected from a range of 0% to 120% of the total modulation.

The output configuration or Flow Control can be selected so as to remove the main or secondary section of the composite outputs for measurement or alignment of the transmission chain.

The frequency of the sinusoidal wave to generate is determined by the signal frequency, with values ranging from 30 Hz to 15 KHz.

16.4 AUDIO PRE-PROCESS – THE AGC CONTROL

The two parts which are key to creating your own ***Sound*** footprint for the station can be found in the **Audio Pre-Process** and **Audio Process** sections. The Input section also plays a key role in the audio processing chain, since discrepancies between the input/output impedances or incorrect input sensitivity can generate audio disturbances or distortions. The Falcon VS allows you to set the "sound" of the MPX signal, the analog signal, and the digital signal in a single operation. This way, each station can create its own sound footprint, both technically and artistically.



16.4.1 AGC: Automatic Gain Control.

Automatic Gain Control (AGC) is one of the most important features of the processor, which offsets changes in the input level, while maintaining the internal signal at a standardised level of 0 dBr. All the AGC parameters are customizable and can be edited as required. Like all processors in the Falcon Audio Processor series and unlike many wideband audio processors, the Falcon VS features two AGC features, which work alone on two separate bandwidths. This feature, however, is typical in expensive, top-of-the-range audio processors. Using DSP-based technology, we can now offer a product with high-level features and performance at a very competitive price. The AGC cut frequencies are listed below.

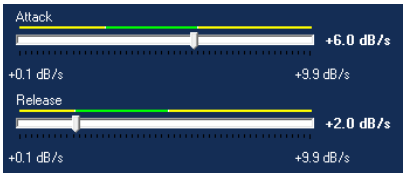
Type:	Cross Frequency	Slope
ACG -1	5 - 30Hz – 200 Hz	12dB/oct
ACG -2	200Hz 15kHz	12dB/oct

16.4.2 Drive

With this control, you can apply a variable gain ranging from 0.0 dB to 20.0 dB to the input signal of any unit. The work area inside the yellow end sections is the "Safe Mode" work area, which is the area where you are advised to stay in order to prevent unwanted sound effects introduced by the audio processor.

16.4.3 Attack and Release

The AGC speed value is expressed in dB/seconds. i.e. the number of dB amplified or attenuated in a second. The Falcon VS allows you to set two different working speeds for the main AGC function:
the Attack speed and the Release speed, with the former generally set significantly higher than the latter.



High AGC speed settings obviously allow the quick offsetting of considerable differences in the input signal level, which, however, can lead to unpleasant "pumping" effects on the material applied to the audio processor input. We recommend you use average speeds of about 2 or 3 dB/sec and work mainly on the audio sources connected to the processor, to obtain a more uniform sound level.

16.4.4 Gate Threshold

The *Gate Threshold* parameter shows the threshold at which the AGC system remains idle, without either amplifying or reducing the signal at its input. When there is no signal applied to the input, the 'AGC GATED' status is displayed on

the screen. This condition is also displayed in the software. In the event of a change in the signal, the AGC function always waits for a set time of 0.5 seconds before acting.

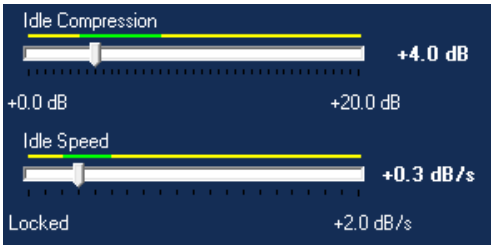
16.4.5 L/R Linkage

This control determines the percentage by which the left-hand and right-hand channels are connected together. A 0% setting means the LR channel is completely decoupled and the processing architecture is of a dual mono kind. 100% linkage means that the input audio content is stereo balanced.

The lower the linkage percentage, the greater the stereo image, resulting in a particularly "large" sound (*Fat* or *Phat*, in jargon)

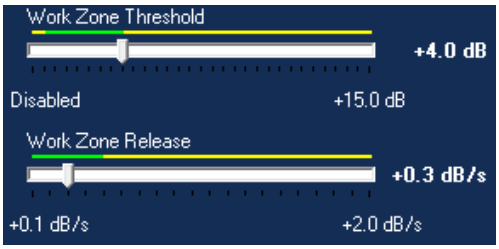
Let's have a look at a practical example: with a 90% value and a right-hand channel input level about -6dB lower than the left channel, if you wait a few minutes you will notice that the analog, digital, and composite outputs have, respectively, the left-hand channel and the right-hand channel virtually aligned.

16.4.6 Idle Compression and Idle Speed



These two controls are fundamental in AGC work, as they show the value at which the AGC must not do anything when there is no audio in the AGC; idling, therefore, is when the AGC is inactive. The Idle Speed, meanwhile, is the speed at which the level of AGC work is locked. Allowable values are from Locked, i.e. with no activity, up to a maximum of +2.0 dB/second.

16.4.7 Work Zone Threshold& Work Zone Release



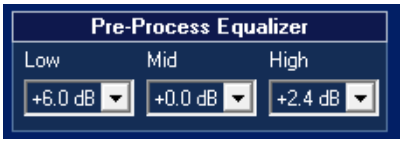
These two controls act when, after "X" seconds, the AGC has stabilized and reached its working point (i.e. the Work Zone). This gating control, which is separate from the gate threshold, makes sure that the AGC is not active when it has reached its work values. The values can be set at from Disable to 15dB and any value other than Disable prevents the AGC operating excessively when the audio waveform has already reached the average peak value. The higher this value is (6.0dB - 15.0dB), the less the original signal will be affected by the AGC work, and therefore will be 'cleaner'

If, on the other hand, the command is Disabled, the AGC can intervene intensely, which results in considerable level changes and the original audio signal sounding more "pumped up."

16.4.8 Band Coupling

The Band Coupling control allows you to reduce the effects of the multiband process by attempting to pair up, to a certain extent, the AGC work bandwidths. You may want this effect in order to limit the of re-equalization effect of the multiband AGC and the limiters. The recommended reference value is 50% - 60%.

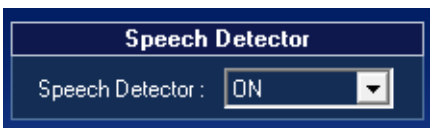
16.4.9 Pre-Process Equalizer



The Pre-Process Equalizer is a Falcon VS feature that allows you to introduce an equalizer with free curves that can be customised to suit your own taste, and fit it in before the multiband processor unit.

The effect introduced by this feature is extremely clear as regards the vocal frequency spectrum, or specific presets with low compression levels. Where presets with high compression levels are concerned, the multiband unit located after the pre-equalizer tends to cancel out the effects.

16.4.10 Speech Detector

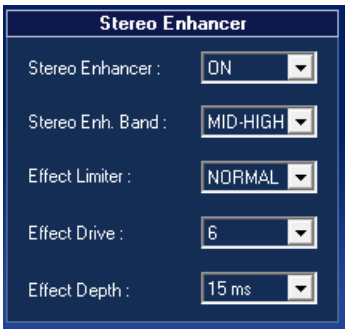


The speech detector function is a key operating parameter for the audio processor.
It allows you to detect when spoken material is applied to the audio processor input. Speech recognition is essential to be able to switch off audio processes where voices inputted may change significantly in terms of timbre, colour and footprint. We recommend you always leave this control on.

16.4.11 Stereo Enhancer

Using the Stereo Enhancer you can increase the spatial image of stereo sound. Listeners will notice greater loudness, brilliance, and clarity of sound, as well as a more dynamic effect and greater depth of the sound. The accuracy of the integrated DSP in the Falcon VS prevents the introduction of harmonic distortion and an unnatural sound source footprint.

To enhance the stereo effect of an audio recording of a radio or television broadcast, the Falcon VS has a built-in Stereo Enhancer that creates an effect similar to a broad separation of the left-hand and right-hand channels. This effect is obtained by adding a part of the other channel to each channel, but in antiphase. BY modifying the L-R and L+R ratio in this way, a sound with a greater stereophonic impact is obtained, creating an extremely strong psycho-acoustic effect, in particular on the audio details.



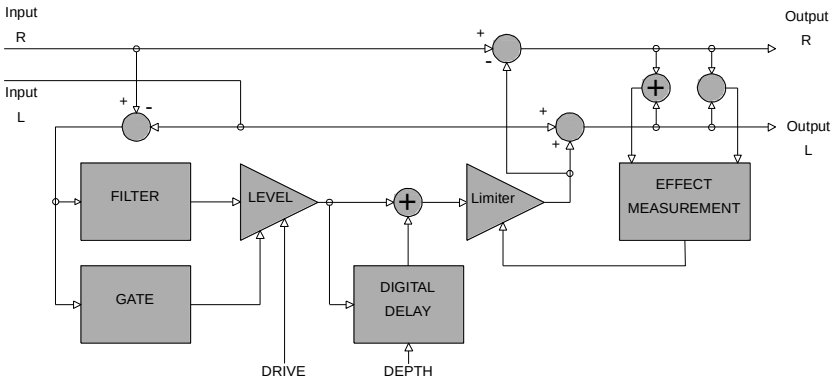
Stereo Enhancer: The ON and OFF functions are used to enable/disable the Falcon VS Stereo Enhancer.

Stereo Enh. Band: This is the frequency range within which the Stereo Enhancer process is applied. Available options include: MID-HIGH or WIDE.

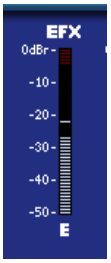
Effect Limiter: This feature introduces a stereo limiter to the stereo enhancer process, with operation settable at three levels: LOW - NORMAL - HIGH

Effect Drive: This parameter can be used to set the level of the effect at the audio processor output once the Stereo Enhancer has processed the audio material. The possible values range from 1 to 10.

Effect Depth: The depth control can be used to control the Digital Delay introduced in the L-R and L+R ratio (see diagram).



Digital Stereo Enhancer



The intervention level is shown by the Stereo Enhancer histogram "E" in the top section of the Universal Remoter Software under the **EFX** label.

WARNING! The Stereo Enhancer process requires any amount of time except 0! The amount calculated by the Falcon VS processor (and consequently the ability to appreciate the process added by the Stereo Enhancer) is about 10-20s depending on the audio material inputted into the processor. No change will be noticeable immediately after switching on the Stereo Enhancer, however, its full potential will noticeable after 20 seconds. The effect is much easy to appreciate when you switch the Stereo Enhancer from ON to OFF.

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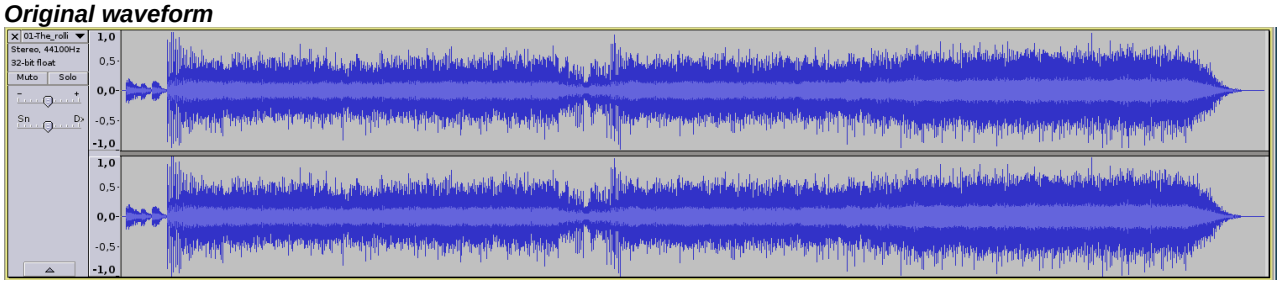
16.5 AUDIO PROCESS

Most audio processors use a combination of internal compressors, limiters, and clippers that attempt to reduce the dynamics, by reducing the modulation peaks and increasing the average ratio in each stage of the audio signal processing. A cascade arrangement of the compressor, limiter, and clipper produces the best results. The first stage of the process generally runs slowly and then the audio transformation generally speeds up progressively during the various subsequent stages, becoming increasingly aggressive as the audio moves along the DSP processor chain. In conjunction with this, the final stage of the chain contains the peak clipper and a look-ahead limiter, which sets the final level of the peak on various levels.

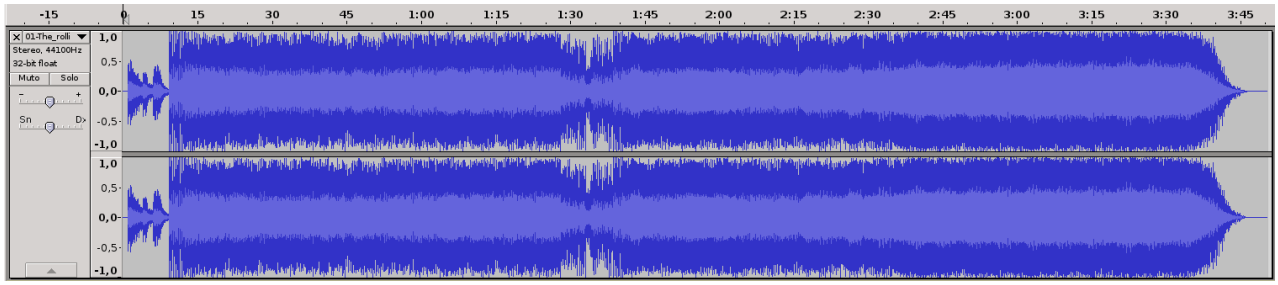
The examples below help to explain some of the audio processes generally used in the Falcon VS audio sound processor. The images below show first the compression of the input dynamics, then the limiting, and lastly the peak clipping.

Original waveform



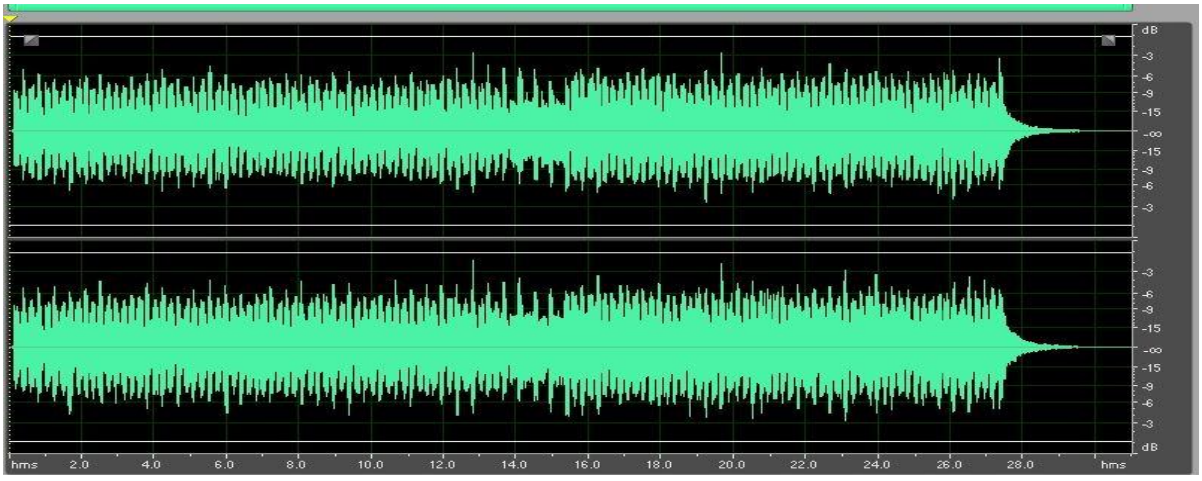
Compression:

Compression of the dynamics reduces the dynamic range of the audio waveform very slowly, in the same way as a trained operator would edit the gain. Compression is generally performed on the audio signal (RMS) and the compression ratio is usually settable. Gated compression can be set, i.e. closed/still/non-operational, so as to reduce the noise during the moments of silence, or when there is no audio signal applied to the audio processor input.

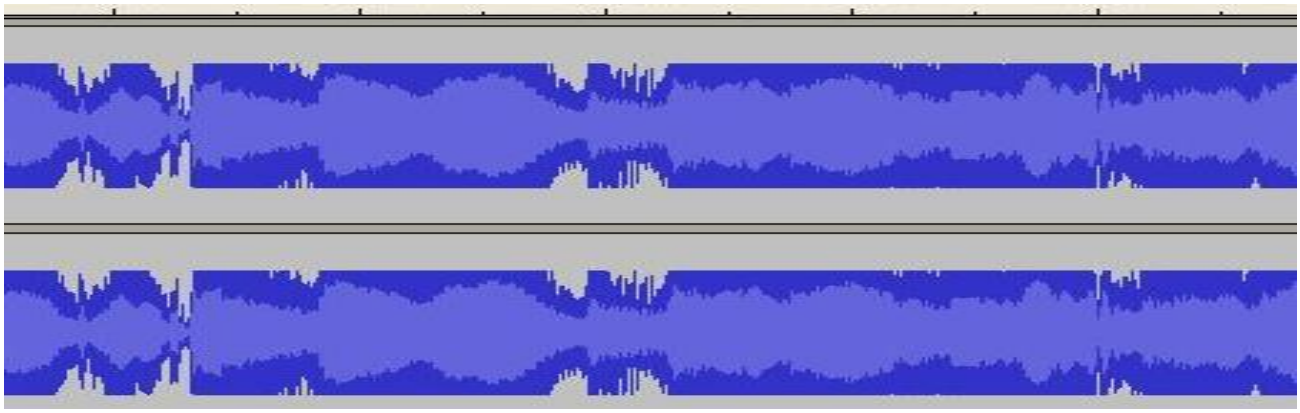


Limiting:

Limiting is a faster form of compression that uses faster time and constant compression ratios (higher than normal) to produce a denser sound, while the peaks are controlled according to the total peak level of the audio waveform. Too high a limiting value could lead to a wall of sound which is unpleasant to the human ear.



Clipping:
Clipping the audio waveform has no effect on an acoustics level as long as it is done with moderation. Over-clipping produces a distorted waveform, which sounds like a tear, a laceration of the sound. Clipping can also be a good way of controlling the high frequency peaks, as long as it is used in association with a distortion control filter.



Lookahead limiter
This is often is used instead of a real clipper, but a lookahead limiter actually examines the input audio waveform and prepares a gain control signal before the audio material inputted into the audio processor. All this is made possible by the use of a delay line which processes the signal and, after analysing and processing it, outputs it again. This way, a very slight sense of a delay is introduced, but the distortion caused by the overshoot is kept to a minimum. In actual fact, a lookahead limiter behaves in the same way as a soft clipper. We recommend the use of this function to preserve the quality of sound applied to the audio processor.

16.6 QUALITY OF THE AUDIO MATERIAL IN FALCON VS INPUT

The Falcon VS can significantly improve the quality of ON-AIR transmission. However, the device can only ever improve on the audio material that is inputted. The best performance is achieved when the Falcon VS is powered with clean, correct audio. After the various multiband audio and sound re-equalization processes, if the quality of the audio material is poor, then the audio outputted by the audio processor cannot be of higher quality than the material inputted into the Falcon VS processor. Here at Axel Technology, we strongly recommend the use of linear audio sources, not compressed forms such as CDs or WAV. If you have to use compressed audio, we advise you to use data compression levels above 256kbps, although the various linear formats are still preferable.

Compressed audio formats use masking frequencies and data reduction techniques to reduce the bit-rate. Using the Falcon VS re-equalization function, the frequency masking characteristics of the bit reduction process could be edited and consequently, after the use of Falcon VS, distortion that was previously imperceptible in the data compression process could become particularly obvious. We recommend you use the audio processor carefully, run all the tests before the final airing, and put considerable time into defining your footprint. This is the only way of ensuring audio visibility within the FM bandwidth range, helping the station to stand out from the rest.

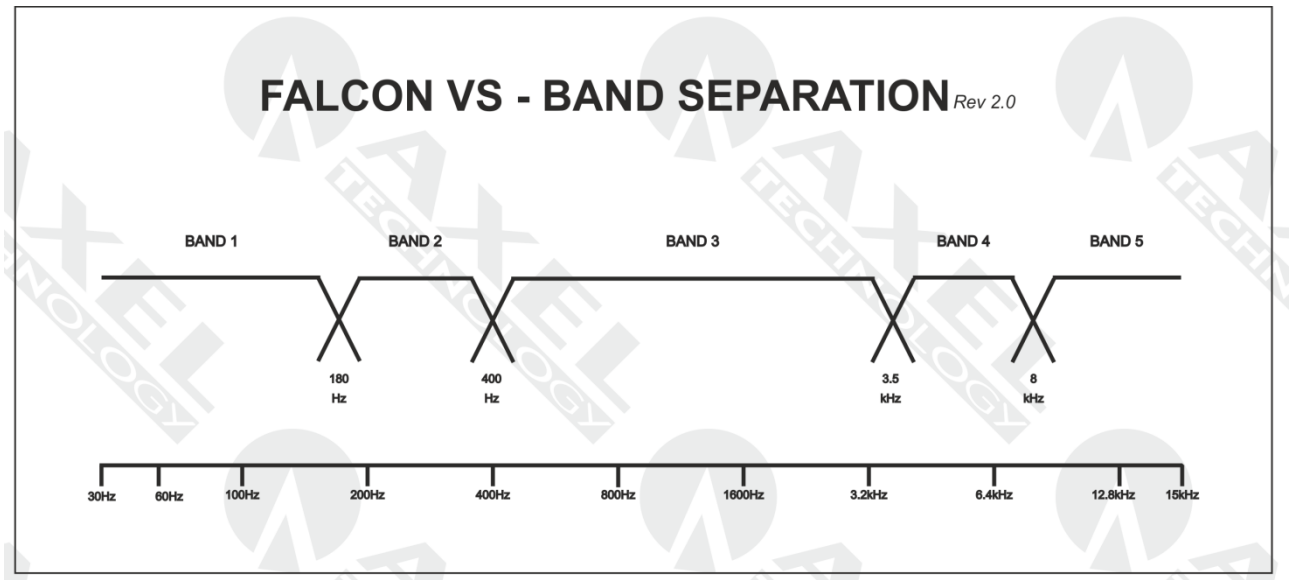
16.7 MULTIBAND CONTROL AND MULTIBAND PROCESS /1

In the Multiband control page, you can define the amount of compression to apply to each bandwidth, ranging from a minimum of - 6.0 dB to a maximum of + 6.0 dB. Using this control, you can set the threshold at which the compressor must react.

A Threshold setting of 0dB (extreme high) means that the compressor only works when the level of that bandwidth reaches of 0dB. Conversely, a setting of -9.0dB (extreme low) means that the compressor starts to work when the audio level within that bandwidth reaches at least -9.0dB. Clearly, with a setting of around 0 dB, the compressor tends to work very little and therefore maintains the original quality of the audio material inputted into the processor. Values closer to -9dB, meanwhile, tend to keep the compressor working constantly and therefore, as the dynamics are reduced, the audio inputted into the audio processor will generally be processed (with values between-6.0dB and +6.0 dB).

16.8 FALCON VS CROSS OVER FREQUENCY

In the below figure the Falcon VS band cross over frequency. All the filtering has been made via digital DSP filtering and the slope is 12dB/oct



16.9 MULTIBAND CONTROL AND MULTIBAND PROCESS /2

The Multiband Process section contains four parameters: Coupling, MultiBand Process, Final Limiter Drive, and Final Limiter Bass Drive, with Brilliance Control, Limiter LookAhead Mode, Expander, Overdrive, Super Bass Mode and Super Bass Harmonizer

*16.9.1 **Multiband Process**:*

This control shows process behaviour of the Falcon VS. Various controls are grouped together under a few simple use conditions. The controls grouped together in these four functions are conventional preset controls for a multiband compressor, i.e. Attack, Release, and Threshold Gate. The action and compression modes are: **PROTECTIVE - NORMAL - AGGRESSIVE - EXTREME** .

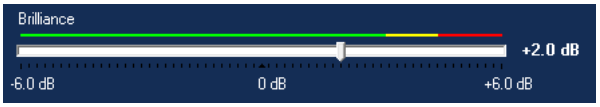
PROTECTIVE is a limited type of compression, which tends to maintain a natural sound. In the NORMAL mode, the compression parameters applied to the audio sent to the processor are slightly emphasized and the compression ratio is increased, while a balance is maintained between the audio details of the material inputted and the compression applied. The conditions for **AGGRESSIVE** and **EXTREME**, meanwhile, are different, as strong compression ratios are entered for the AGGRESSIVE mode and even stronger ones are used for the EXTREME mode, creating a typically 'pumped up' sound. Generally speaking, the Multiband Process Aggressive and Extreme modes are designed to emphasize audio material that already has little musical detail. This could be continuous musical content, such as heavy metal or hard rock, or particularly complex audio material.

16.9.2 Coupling (Band Coupling)

The bandwidth coupling control can limit the ability of the bandwidths to work too independently, thereby destroying the spectral balance of the original audio material inputted in the processor. The options available are **LOW – MID – HIGH**, where Low means a low coupling between the bandwidths, so that they can work as independent as possible, while HIGH tends to make the bandwidths work together as much as possible. MID mode offers a good compromise to enable greater re-equalization for a more coherent tonal balance.

16.9.3 Brilliance Control

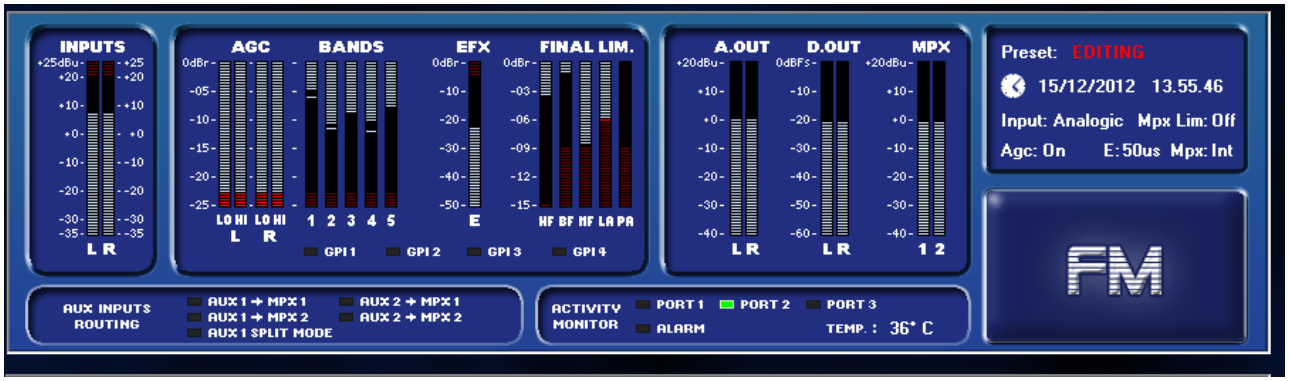
The Brilliance Control adjusts the brilliance of the sound, by amplifying or reducing its brightness. The control can be set within a range of -6.0dB to +6.0dB.



ATTENZIONE: a high level of Brilliance may affect the pre emphasys!

16.9.4 Final Limiter Drive

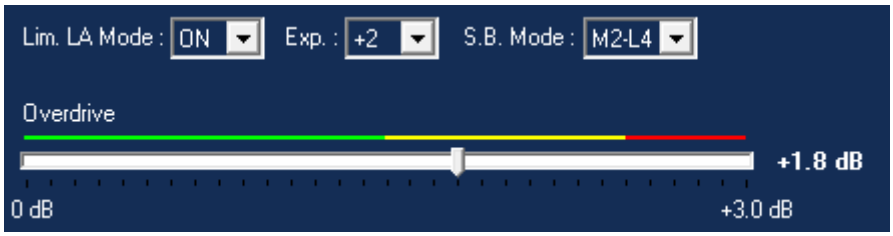
The Final Limiter Drive is the last stage before the MPX stereo encoder, right between the Final Expander and the Power Limiter. This control allows you to increase or decrease the substance of the audio material delivered to the MPX encoder. The term MAIN refers to the fact that it operates on the 350Hz to 15kHz frequency range.
Warning: as already mentioned, it is a very important and powerful command, and so overuse of the Final Limiter Main Drive tends to overwork the "HF", i.e. the Main Final Limiter.



16.9.5 The Lookahead Limiter

The Lookahead Limiter is a predictive limiter that works on the final stage of the audio processor. Predictive means the processor's ability to know what and how much audio material will be inputted into the processor for processing and outputting and then exactly the desired level of signal. While it is impossible to predict the future, it is possible to add a small delay (an increase about 6-8ms in the overall delay) in the audio process stage, in order to change the level and the waveform outputted by the processor in the event of strong variations in the input signal.

LA Lim. Mode: this is the ON and OFF switch to enable and disable the LookAhead process function.



The total delay in the audio process chain with the Lookahead Limiter set to **OFF** is approx. 4ms, while with the Lookahead Limiter set to **ON,** the total delay in the audio process chain (or group delay) increases to a total of approx. 14 ms. The above values are approximate, and depend very much on the audio material inputted into the audio processor; however, in any case, they are calibrated so that no type of delay is noticeable when listening with headphones.

16.9.6 Overdrive

This the amount of signal to apply to the Lookahead module input.

16.9.7 SuperBass

The SuperBass parameter acts directly on the compression of low frequencies below 100 Hz. The maximum compression available is 15 dB. Operation of this control is very simple, but it is very powerful because it can influence the sound of low frequencies considerably. This SuperBass works on the principle that if you cannot increase a parameter as it has already reached the highest clipping levels, then to be able to bring it out further, it is advisable to reduce other parameters in order to emphasise and increase the higher bandwidth selected and, in that case, the low frequencies.

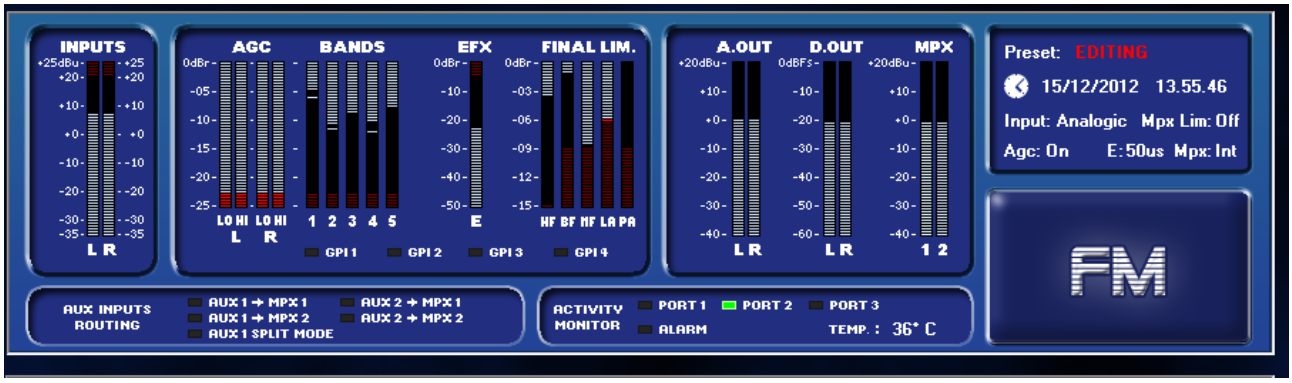
Following this principle and reducing the frequencies between 150 Hz and 300 Hz at the same time, the Superbass frequencies tend to emerge. Very high Superbass levels can cause strong compressor movements in Bandwidth 1. This is absolutely normal, unless the limiter does not reach the **red** area. This condition indicates the need to limit use of this control because the processor is not operating in the linear region.

16.9.8 Expander

The multiband expander is used to reduce the background noise on vocal audio signals or a microphone, or to reduce unwanted effects caused by the introduction of strong compressions. The allowed and available values range from **OFF** to +5. To ensure the adjustments are performed properly, we recommend you listen to the voices without music, or keep the background music low. Levels above 3 tend to clean the voice, however, they also tend to decrease the brilliance of the sound under certain operating conditions. This command uses the same expansion process as the Lookahead Limiter and therefore it does not add any delay. To be able to use the expander control, the Lookahead Limiter must be in the **ON** position.

16.9.9 Final Limiter Section

In the upper part of the control software you can see the Final Limiter with its indications and level of work. Specifically, the five histograms represent the following functions:



HF: High Frequency Limiter is the stage that occurs on the amount of emphasis applied to the original signal. If this control is set too high, or works in the red area indicates that the preset you are using was created evil, and there is an excess of compression or working on high frequencies.

BF: Final Bass Limiter, this limiter works on Bass, If this control is set too high, or works in the red area indicates that the preset you are using was created evil, and there is an excess of compression or work on the frequencies high.

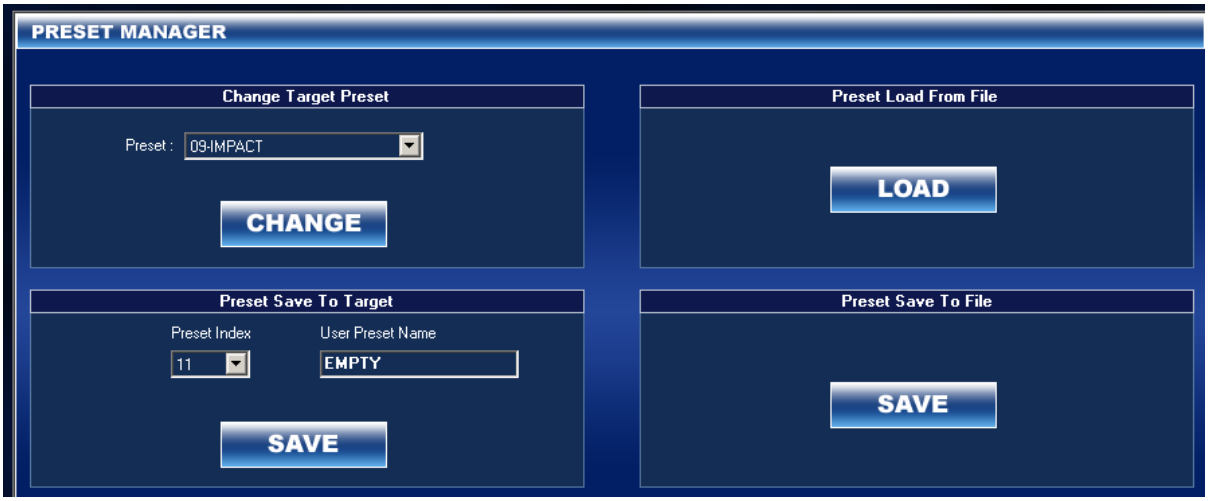
MF: Main Frequency Limiter, this whole band limiter intervenes between 350Hz and 15kHz. The action of this control can be strongly influenced by the Final Limiter Drive control on the third Falcon and Falcon VS, while on Falcon XT control is called Main Final Limiter Drive. If this control is set too high, or works in the red area indicates that the preset you are using was created evil, and there is an excess of compression or working on high frequencies**.**

LA: Look Ahead Limiter Limiter intervention. If this control is set too high, or works in the red area indicates that the preset you are using was created evil, and there is an excess of compression or working on high frequencies**.**

PA: Power Attenuator, when the Power Control ITU-R BS.412 is activated, this control indicates to what intervenes the Power Control. If this control is set too high, or works in the red area indicates that the preset you are using was created evil, and there is an excess of compression or working in the high frequency.

16.10 PRESET MANAGER

The Audio Control -> Preset Manager section contains a number of very important features for loading, saving, and exporting presets to and from the PC or factory presets with user customizations.



The Preset Manager comprises four sections:

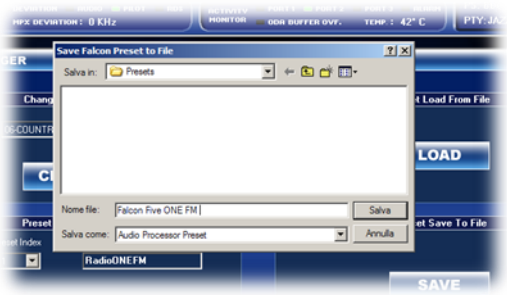
- **Change target Preset**
- **Preset save to Target**
- **Preset Load from file**
- **Preset save to file**

In the Change Target preset, you can load one of the ten presets by clicking on Change. Select a preset from the dropdown menu and click on **CHANGE**. This way, the Audio Process parameters will be changed to take into account the new setting. The input and output level values and the AGC (Pre-Process) parameter values are not changed. Selecting a preset is the first step in the initial configuration of an audio processor. The name of the preset specifies the purpose for which it was designed. For instance, the preset 06-COUNTRY is the best preset to start with when setting the audio transmitted for a country music programme. When the Change button is pressed, the preset is loaded immediately, with the result that the difference between the audio presets can be heard immediately.
11
Using the Save to a Target preset, you can save the customised settings in the internal memory of the Falcon VS audio processor. The Preset Index ranges from 11 to 20 and a mnemonic name can also be set for the preset. Press SAVE: the preset name and its settings are now saved in the internal memory of the Falcon VS.

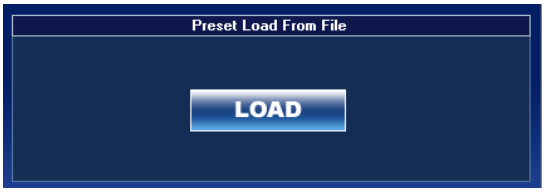
To recall a preset, go back to the Change Target Preset option and select the preset from the index in the dropdown menu. The maximum number of characters allowed for this type of field is 12. Please note that the names for Presets 01 through to 10 cannot be changed as they are default factory settings. The maximum number of presets that can be saved on the machine is 20.

The Preset Save to a File section lets you save all the preset data in a separate storage area from the Falcon VS. When you press SAVE, the window to save the file appears.

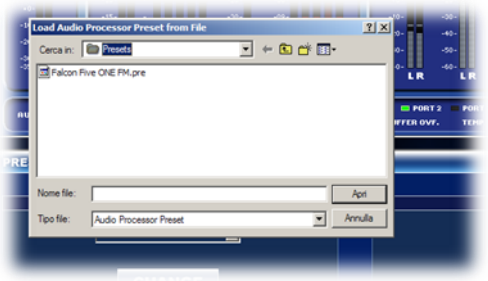
After keying in the default file name (FM.PRE named 'ONE' in the example), press SAVE. There is no need to add the extension '.PRE' as it will be added automatically by the system.



The last part of the PRESET MANAGER section is the Load Preset from File function. This feature allows you to reload the parameters previously exported from the Falcon VS. When you click on LOAD, a dialog box appears.



Select the preset that you want to recall and click on Open.



17 RDS / RBDS GENERATOR - GENERAL SETUP

The Radio Data System (RDS), which was introduced worldwide in 1992, is the European Union standard for sending small amounts of digital information via the conventional FM radio transmission system. The RDS system allows stations to transmit various kinds of information, including their identifier. RDS has been standard in Europe since the nineties. With RDS, data is sent at 1187.5 bits per second and includes program information, the title/author of the song on the air, and traffic messages (TMC).

The RDS controls linked to phase and levels can be accessed via the front panel, while any other configuration concerning texts, RDS data, etc., can be set up using the PC control software or via UECP.

The Falcon VS RDS encoder features two different programming modes.

The first is fully compliant with the most recent UECP.

The second (Extended) features a wider range of options, which have been customized to render the Falcon VS RDS encoder more versatile and appropriate to most users' needs. In this case, some controls are not UECP-compliant.

When using the Universal Remoter software, data configuration can be performed in text/ASCII format (using the Configuration Editor) or via the standard pages of the Remoter.

The current status of the RDS services on air can be constantly monitored via the small blue screen in the right-hand corner in the centre of the Falcon VS - Universal Remoter screen.

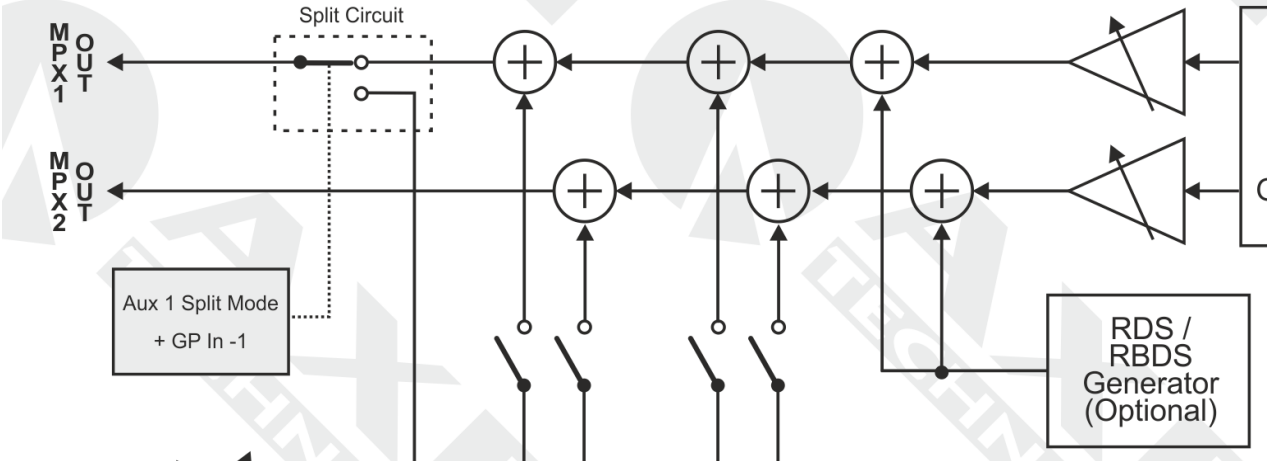
The descriptions given on the following pages refer to the Falcon VScon with the RDS option installed.

If you cannot see the Radio Data System settings and want to install the RDS option, contact the Axel Technology sales department.

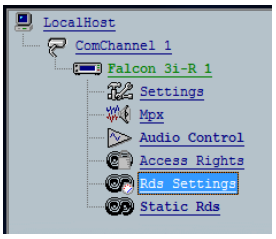
Axel Technology has been a member of the RDS Forum since 1998

Unless otherwise stated otherwise, all the information contained in this section applies to both generations of the system (i.e. RDS and RBDS). RBDS operations can be obtained on the Falcon VS by installing the RBDS-version Universal Remoter Control Software.

17.1 RDS GENERATOR – RDS ENCODER BLOCK DIAGRAM

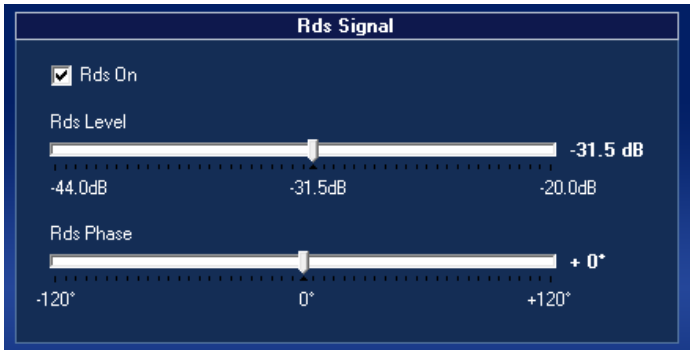


17.1.1 ON/OFF, RDS PHASE AND LEVEL



Open the 'RDS SETTINGS' windows from the main tree menu. In the relative panel, select the '**RDS on**' option to enable RDS generation. The RDS carrier can also be turned on or off via the front panel.

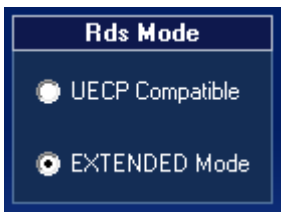
The RDS Level cursor sets the RDS generation level within a range of - 44.0 and - 20.0 dB, where 0 dBm is a deviation of 75 kHz.



The table below shows the relationship between the level and the signal deviation. The default value is -31.5dB, i.e. a deviation of D = 2.0 KHz.

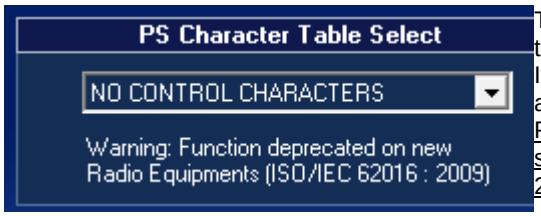
-37.5 dB	D=1.0 KHz
-31.5 dB	D=2.0 KHz
-28.0 dB	D=3.0 KHz
-25.5 dB	D=4.0 KHz
-23.5 dB	D=5.0 KHz
-21.9 dB	D=6.0 KHz

17.1.2 UECP OR NON-UECP COMPATIBLE PROGRAMMING MODES



The Extended/non-UECP mode incorporates a full set of 'customised' features/controls, which represent the extra value offered by the Falcon VS. The Extended mode will be outlined in the following pages, as it also includes the UECP-compliant mode.

17.2.1 CHARACTER TABLES (FOR RT, PS, PTYN SERVICES)



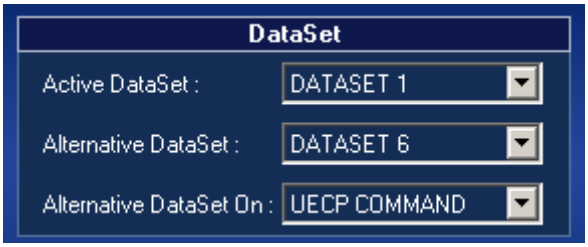
The Falcon VS allows you to select the character table used in all text services, such as PS, RT, PTYN.
It also allows you to add control characters, as envisaged by EBU and ISO standards.
Please note that this feature has been disabled and automatically succeeded by the new Radio Equipment standard ISO / IEC 62016: 2009

Nevertheless, the character tables available are user-settable:

EBU LATIN-BASED REPERTOIRE
EBU COMMON CORE
ISO PUBLICATION 646

TAKE CAREFUL NOTE OF THE SET OF CHARACTERS IN USE. SOME CHEAP RECEIVERS MAY NOT DISPLAY ALL THE CHARACTER SETS PROPERLY.

17.2.2 ACTIVE DATASET AND ALTERNATIVES DATASET



The dataset contains all the RDS data, such as PS messages, Radio Text, PI Code, etc.
The Falcon VS contains two datasets, which can be retrieved either via software, using the Universal Remoter, or via UECP command, or with a GPIn contact.

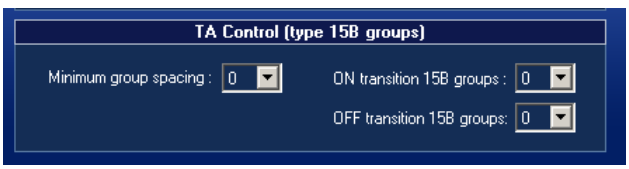
The Active Dataset box displays the dataset to transmit and allows you to edit it, while the Alternative Dataset box allows you to enter which dataset to air from a choice of Dataset 1 or Dataset 2. To recall the dataset, select it in the Alternative DataSet On box:

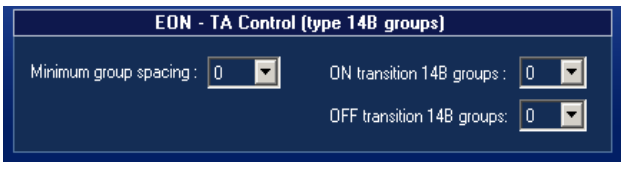
The Alternative Dataset can be simply recalled with a UECP command (see the first item in the menu) or by applying a positive control (active high) or negative control (active low) to Inputs 1-2-3-4 of the GPIO interface. This selection can be made in the Alternative Dataset On section. This is the easiest way to switch between two sets of data: the current dataset (active data) and an alternative dataset.
The selection can also be made via "CHANGEOVER" i.e., if the audio input backup should switch from one source to another because the primary source is no longer valid, the dataset on the air changes.

An Alternative Dataset application case
At a given time of day, or even several times a day, a switch is made from regional to national transmitting. This switch involves a PI CODE changeover, wherein the system switches from a regional variant of the same programme, changing the PS, the AF, and the Radio Text.

An Alternative DataSet via Changeover application case.
In a transmission station, the audio program is received via satellite. Backup reception also takes place later on, also via satellite but on a different channel. When the audio material of the main satellite is no longer valid, the Audio changeover function switches input. When this occurs, the dataset on the air is also changed, and different PS or Radio Text messages might be transmitted with result that the technicians, on seeing that these values had changed, would understand that something had happened at the transmission site.

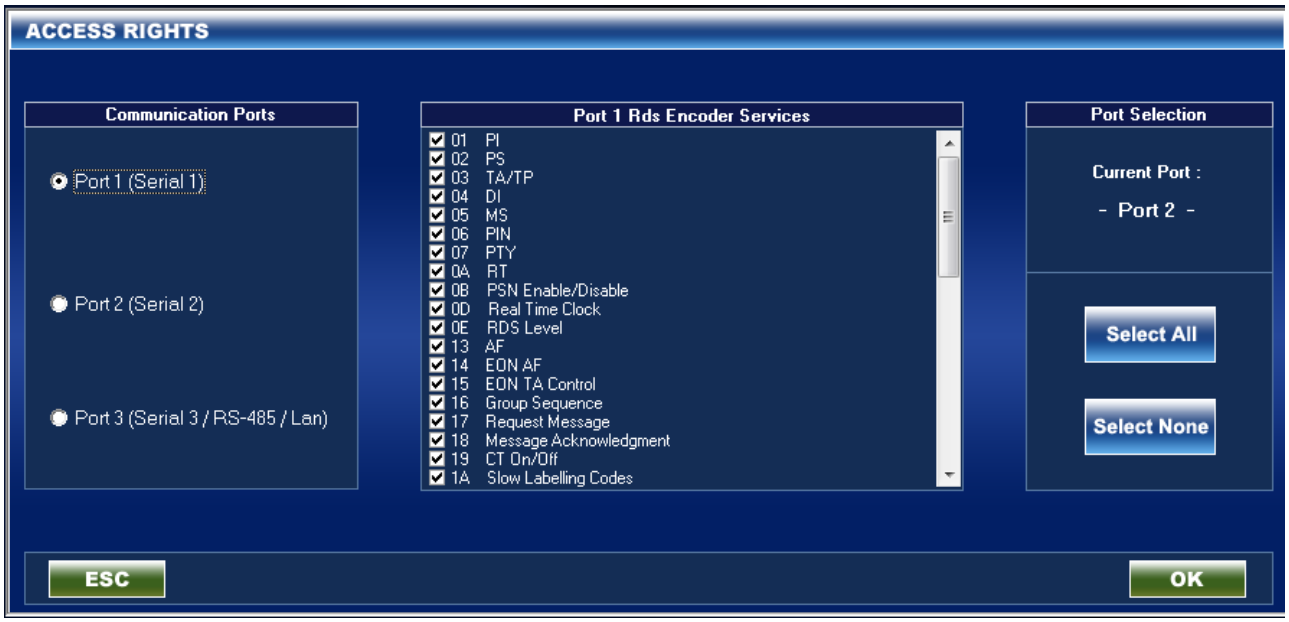
17.2.3 TA CONTROL (TYPE 15B GROUPS) EON - TA Control





TA Control (type 15B groups) and EON - TA Control (type 14B Groups) are UECP Protocol commands that are used to improve TA switching in the Main Network and in EON networks.

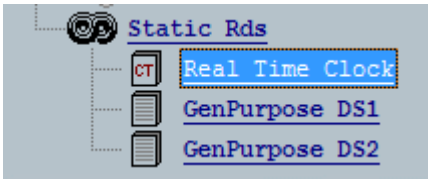
17.3 FALCON VS ACCESS RIGHTS



In the RDS version, the Falcon VS offers users the chance to filter the services managed by the different communication ports. The Falcon VS has both a Serial Com port and a USB port available. The USB port is identified as Port 2, while the and as RS232 port is Port 1. For each port, if you select the associated service, you can assign each port different access rights.
This feature is vital if large organisations, networks, and broadcasters assign the various technicians to the functions in a different way. One department handles the MPX Stereo Generation while a second department, which is separate from the first, deals with the RDS service.
By assigning the two ports different access rights, only one service can be accessed at a time, without the risk of interfering with the work of other departments.

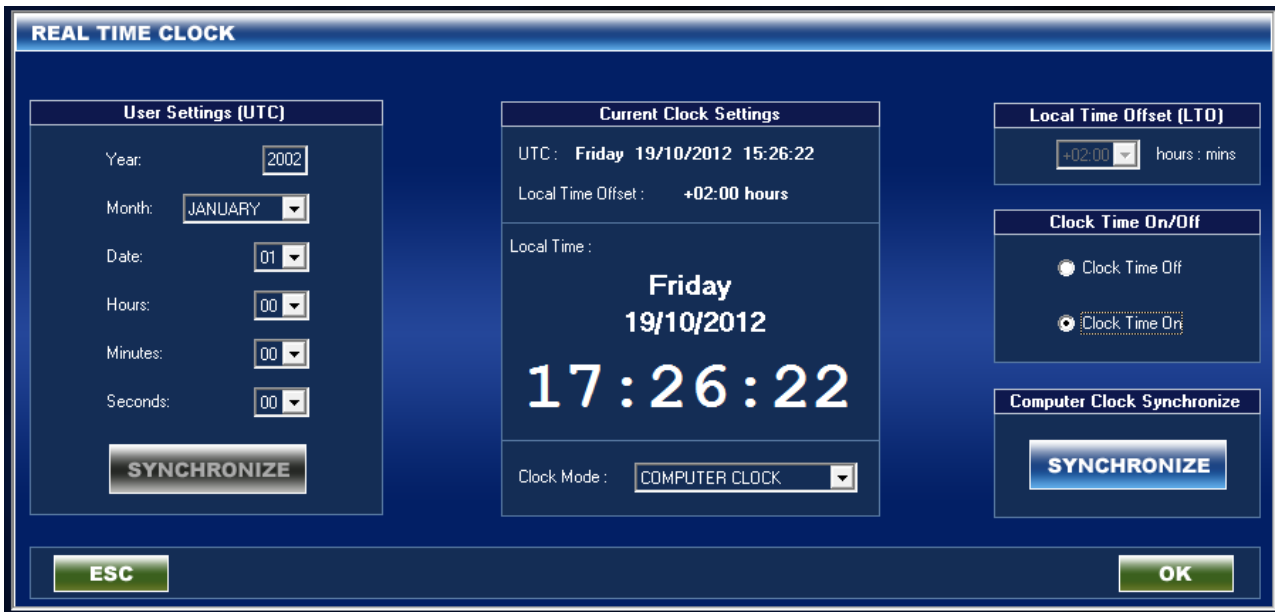
17.4 STATIC RDS SETTING IN FALCON VS

The Static RDS section contains a tree menu and three submenus consisting of the Real Time Clock, GenPurpose DS1, and GenPurpose DS2. These menus contain all the data relating to the PS, Radio Text, Time, etc messages.



17.5 INTERNAL CLOCK SYNCHRONIZATION AND "CT" SERVICE ENABLING

The Falcon VS has an internal clock and internal calendar, which are used as a reference for scheduling the PS, RT, and PTY/PIN services, or the CT (Clock Time) service.



The Real Time Clock panel allows you to adjust the time and date in current Falcon VS models. If enabled (see CT on /off button), this RDS feature allows each receiver to automatically set its own internal clock. The current time and date on the PC used are displayed continuously in the middle of the panel. Two different time references can be selected for the Falcon VS: the PC clock or the time set by the user. The selection is made via the dialogue box located beneath the clock display.

COMPUTER CLOCK: this synchronizes the Falcon VS internal clock with the PC clock.

USER SETTINGS: this allows the user to set a specific time and date via the User Settings box on the left-hand side of the panel (see figure below). **NOTE:** *in accordance with the relevant CCIR Recommendations, time codes and transmission dates shall use Universal Coordinated Time (UTC) and Modified Julian Day (MJD). However, the listener will not use this information directly and the conversion into local time and date will be processed within the receiver circuits.*
A coded local time difference, expressed in multiples of half hours, can be applied to the user's time and date codes (see **Local Time Offset** options).

Click on '**Synchronize'** to refresh the Target time using the selected time reference. Check the current PC time before refreshing the Falcon VS clock.
The CT information is included in Group 4A. The group is controlled automatically by the Falcon VS and is not accessible to the user. For more information on Time Sync in the Falcon VS, see Appendix A.

Whenever a UECP command containing the refreshed time is received, the Falcon VS displays the words 'SYNC:UECP' in green at the bottom of the screen, as shown in the photo.

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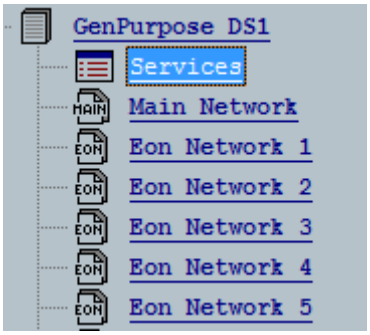
18 DATASET 1 CONFIGURATION

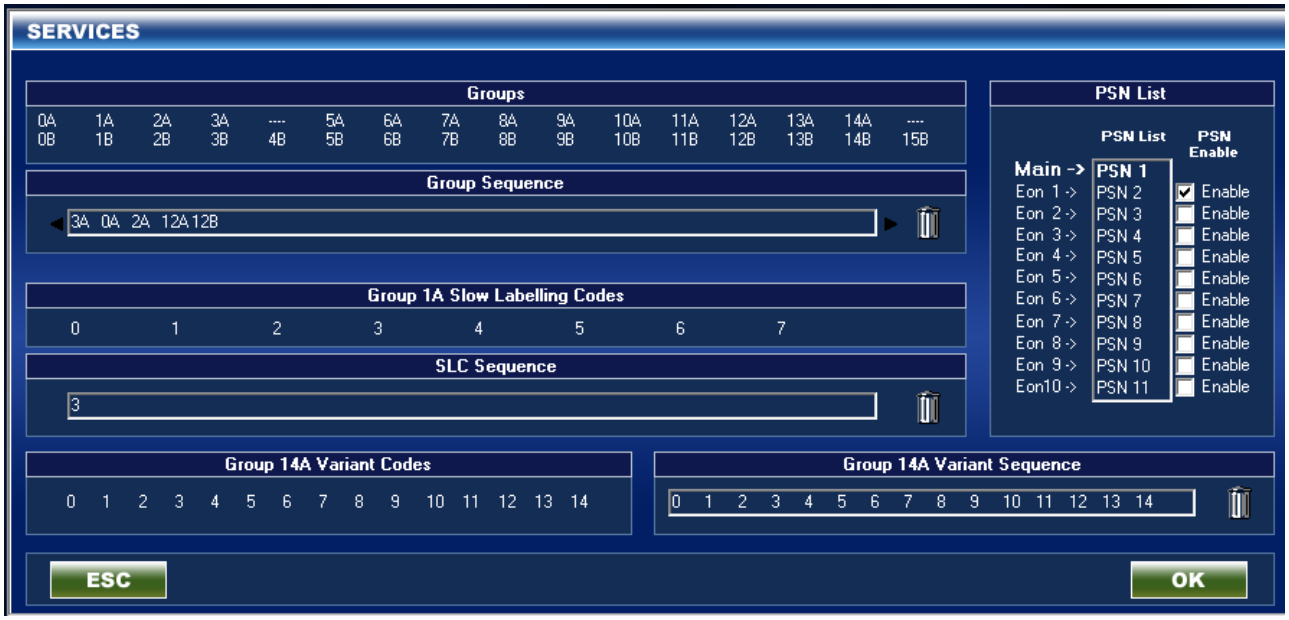
18.1 INTRODUCTION TO DATASET1

The DataSet 1 multifunction menu includes all the settings related to the Main network (which is transmitting the dataset) and up to 10 EON (Enhanced Other Networks). There is also another page (**Services**) for enabling/configuring the RDS services supported in the dataset.



18.2 RDS GROUP CONFIGURATION ('SERVICE' PANEL)

As with the UECP protocol, the Services panel allows you to enable individual RDS services/features (e.g. PIN, RT, etc.) and enter the Group Sequence included in the RDS signal.

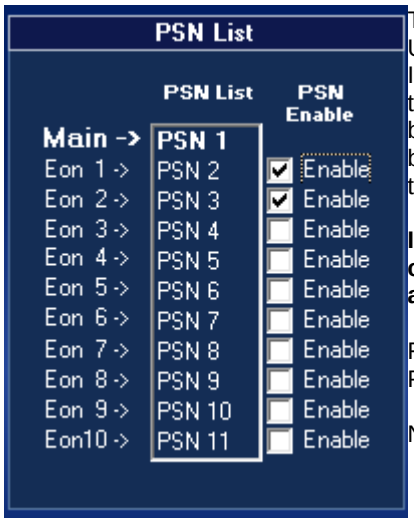


The Falcon VS accepts all the groups listed and reaches a maximum of 64 elements. The only groups not included are 4A (automatically generated) and 15A (not supported). This feature corresponds to ODA management, which allows the use of any group for linking the information. The DYNAMIC services, such as TMC, IH, EWS, RadioTextPlus, TDC, and ODA, are not supported by the Falcon VS RDS

When any group is specified, the Falcon VS which generates **default Group 0A**, which includes all the basic RDS services (**PS, OF, M/S, TP, TA, PTY, AF**). Group 4A (which includes clock information) is controlled automatically by the Falcon VS, i.e. it is not user-settable.

If you wish to provide additional services to those in Group 0A, you will need to transmit a Group sequence. This sequence can be generated manually with DragAndDrop, by dragging the corresponding group number from "Groups" and dropping it in the "Group Sequence".

18.3 EON/PSN SERVICES IN DATASET 1



The PSN (Programme Service Number) List is used as a reference for the entire UECP index.
It allows you to associate the various PSN items (i.e. RDS configurations) with the main networks and the EON, so that the same UECP command (e.g. TA) can be transmitted to each encoder at the same time, regardless of which network it belongs to, thereby activating the TA on the main network and the EON-TA on the connected network.

In order to change the PSN assignment in the PSN list, simply click on the chosen PSN and drag it to the desired position. Next, enable the individual assignments by checking the Enable boxes.

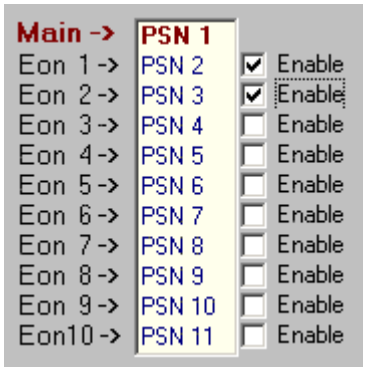
For example, to assign PSN 5 to EON 2 (instead of the default PSN 3), drag PSN5 to the current PSN 3 position. Then enable EON 2.

NB: You can only change the PSN List on an inactive dataset.

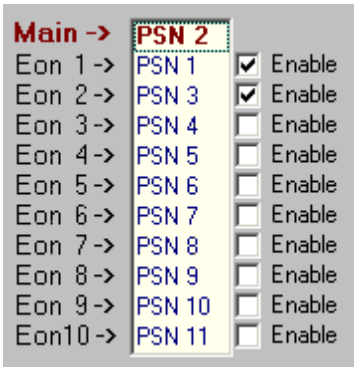
EXAMPLE

In the case of three RDS encoders broadcasting three stations (Radio 1, Radio 2 and Radio 3) and the same TA-UECP command transmitted to each encoder at the same time, the PSN lists on the three encoders are as follows:

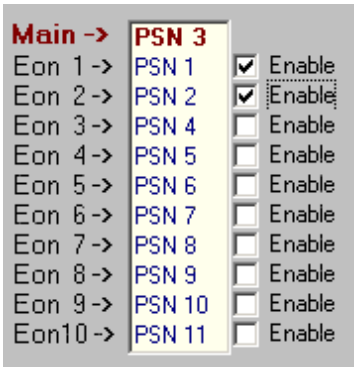
RADIO 1



RADIO 2



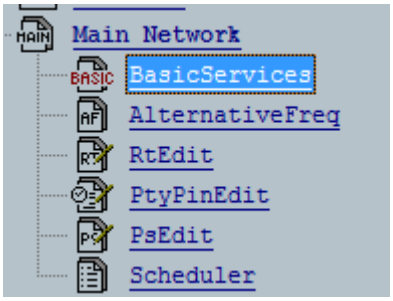
RADIO 3



The **EON Fast Switch** option (Group 14B) will be selected in the event of transmission of a high number of groups (both Main and EON), in order to change the TA flag status of a programme service with cross-references more quickly.

Some of the earlier RDS EON consumer receivers need up to four 14B Groups of the correct type for reliable operation. Therefore, if manual group mode has been selected, we recommend you transmit the highest possible number of 14B groups in 8 types, in order to ensure TA switching is detected in poor reception conditions.

18.4 PI (PROGRAMME IDENTIFIER) CODE

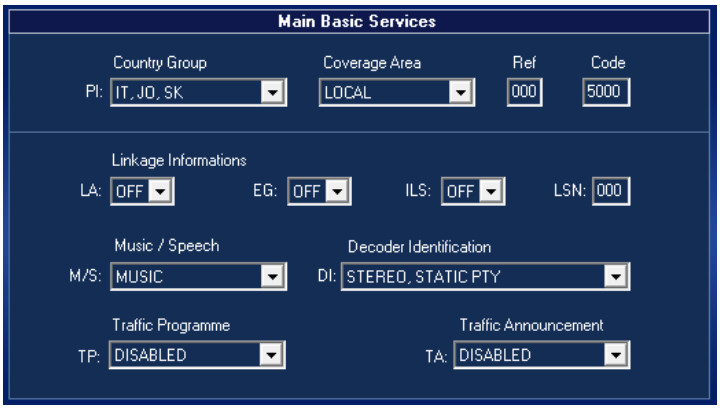


The Main Network Panel contains all the settings relating to the RDS signal currently being transmitted.

A double click on the Main Network icon will open a subtree containing the following panels: Basic Services, Alternative Frequencies, RT (Radio Text) Edit, PinPtyEdit, PsnEdit, Scheduler.

Access the Basic Services page.

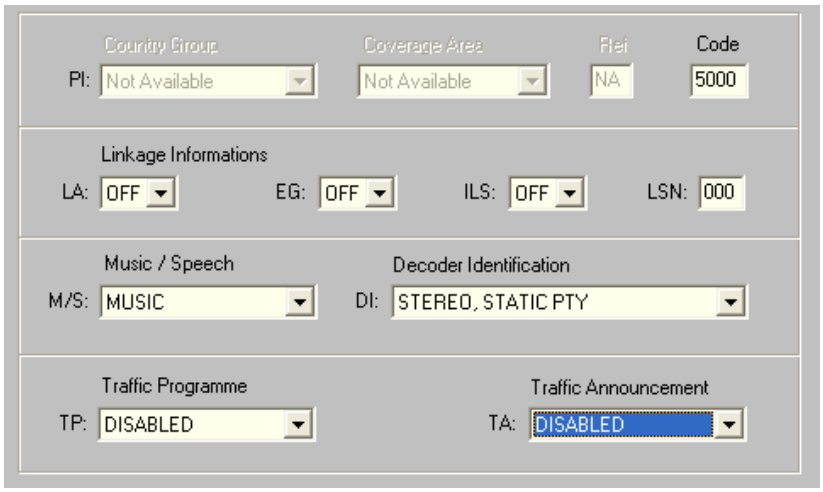
18.4.1 PROGRAM IDENTIFIER CODE IN RDS MODE



PI (PROGRAMME IDENTIFIER) CODE - this contains four hexadecimal numbers (see 'Code' box).
The first is the country of transmission and is assigned automatically by the Remoter software by clicking on the country acronyms (see Country Group). The second hexadecimal number is the coverage profile (i.e., national, local, etc.). Click on the appropriate item in the Coverage Area window and the application assigns the relative hexadecimal number. The 'Ref' window contains a number within a range of 1 to 255 (normally assigned by radio regulatory authorities).

If the complete hexadecimal code is already known, enter it in the 'Code' box.

18.4.2 PROGRAM IDENTIFIER CODE IN RBDS MODE



PI (PROGRAMME IDENTIFIER) CODE - this contains four hexadecimal numbers (see 'Code' box). **The hexadecimal code must be entered in the 'Code'** 01 **field - it will be transmitted 'as is'.**

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18.5 DI (DECODER IDENTIFIER)

DI (**DECODER IDENTIFIER**): This dropdown menu allows you to select the modulation type (Stereo, Mono, etc.). The stereo modulation is assigned to **STEREO, STATIC PTY,** while the mono is assigned to **MONO, STATIC PTY**.
Click OK to confirm, or ESC to exit without saving.

18.6 LINKAGE INFORMATION (LA, EG, ILS, LSN)

This can be accessed via the 'Basic Services' panel.

Linkage information provides a means with which various programme services (each featuring its own PI code) can be processed by a receiver as a single service within the same times of a common programme.
During these times, each programme service maintains its own unique identity, i.e. the programme service must keep its own PI code and the AF (Alternate Frequency) list or lists assigned to it, but it can change the features of the program, such as PS, PTY, RT, TP and TA, in order to reflect the common programme;
With LA=1, a service which includes codes TP=1 or TP=0/TA=1 does not have to be linked to another service which includes codes TP=0/TA=0.
The linkage information is transmitted in the four data elements below:

1) LA – Linkage Actuator (1-bit)
2) EG – Extended Generic (1-bit)
3) ILS – International Linkage Setting (1- bit)
4) LSN –Linkage Setting Number (12-bit)

18.7 TP, TA, MS SETTINGS AND RELATIVE REMOTE MANAGEMENT

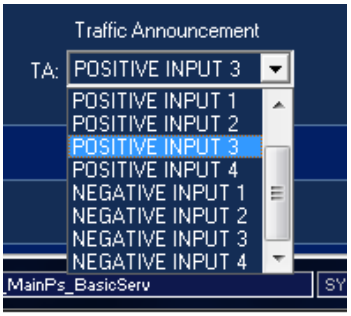
Open the 'Basic Services' page in the Main Network (see section above).

TP - Traffic Program can be flagged to enable traffic announcements to be included during the programme tuned into. The TP element most only be flagged for programs which switch dynamically to TA identification during traffic announcements. It can be set to Enabled or Disabled.

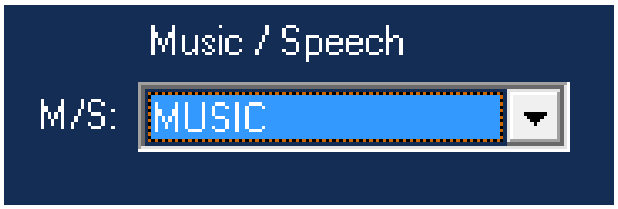
TA - The **Traffic Announcement** element is an on/off signal designed to signal when there is a Traffic Announcement on the air. To enable it, see the section below.

The TA and **M/S statuses can be**:

- **Fixed** (enabled/disabled)
- Associated with the relative **UECP** command
- Associated with the statuses of one of the four inputs on the GPIO port



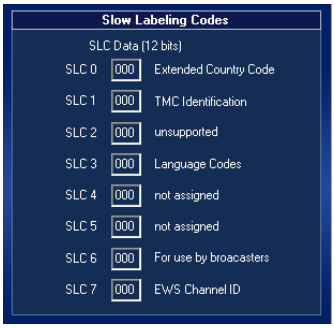
M/S - Music/Speech is a double status signal which can signal whether music or speech is being transmitted. The signal will allow receivers to be equipped with two separate volume controls, one for music and one for speech, so that the listener can adjust the balance between them to suit their personal listening habits.



See the Appendix of this manual for the GPIO interface pinout.

	The TA, TP and MS services are included in the group of Basic Services packages

18.8 SLOW LABELLING CODES



The Slow Labelling Codes, as they are transmitted via Group 1A, are entered in the Slow Labelling Codes section of the Basic Services page.

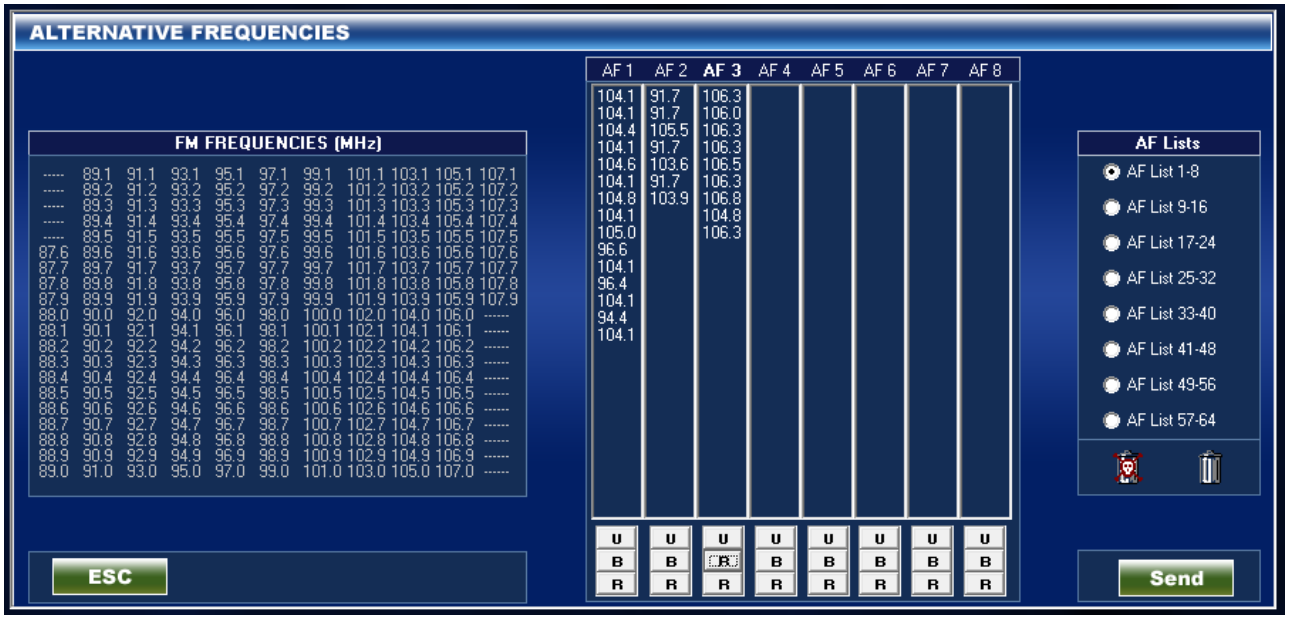
18.9 ALTERNATIVE FREQUENCIES (AF)

The alternative frequencies (AF) list or lists provide information on the various transmitters broadcasting the same program in the same area or in adjacent reception areas. This structure proves particularly useful for car radios and portable radios.

NB: Overall, up to 500 alternative frequencies can be entered in each dataset.

The list of alternative frequencies (AF) can be transmitted via two procedures: Procedure A and Procedure B.
In both cases, the lists must only contain the frequencies of the closest transmitters (or frequencies in overlapping coverage areas).

NB: The receivers can establish which Procedure (A or B) is used by the respective data organization function (coupled frequencies or individual frequencies) through the identifiers available for this purpose.



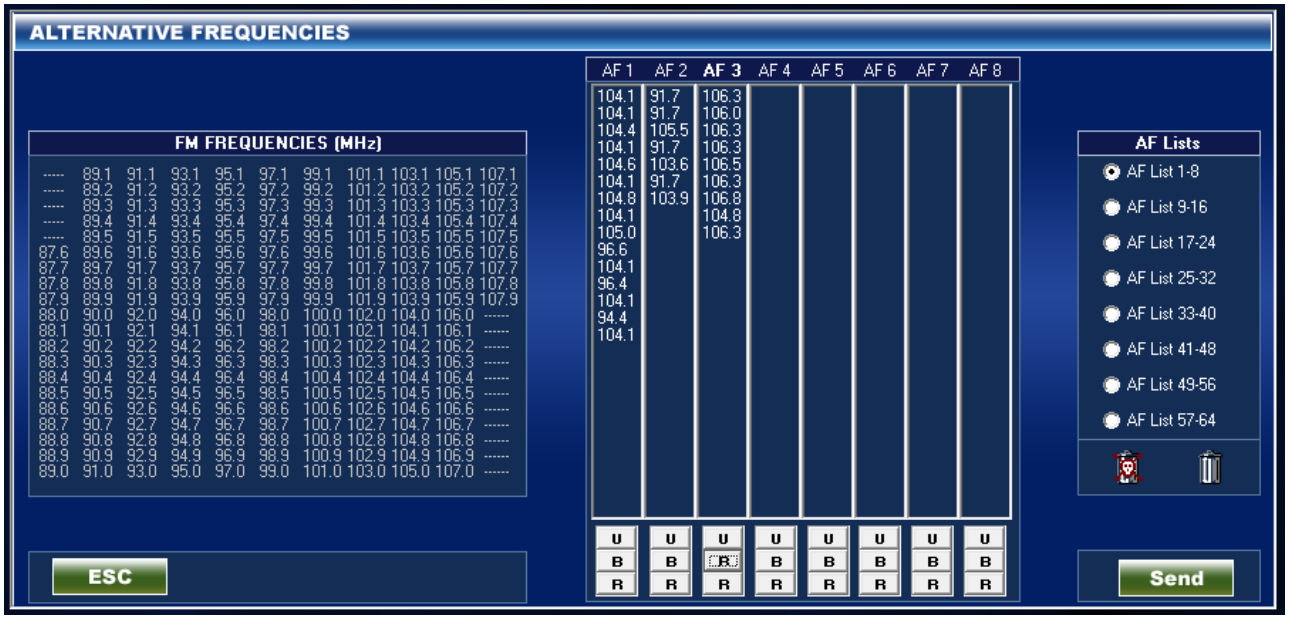
	The Falcon VS allows the user maximum freedom, when using either Procedure A or Procedure B, regarding the creation of the list and, in particular, whether the frequency pairs are listed in descending or ascending order, within Procedure B

	How the receiver behaves may differ from one model to another. The examples given in these pages are provided for illustrative purposes only and show the potential offered by the Falcon VS in AF programming. Please see the Cenelec standard for an in-depth discussion of AF programming.

18.10 AF LIST CONSTRUCTION METHOD

First loading procedure (Drag & Drop) Select the AF from the available frequencies in the left-hand window by left-clicking them, then dragging over to the AF list. Release the left-hand mouse button to drop the frequency in the desired AF list**.**

Second loading procedure (preset AF list) Highlight the AF to load by clicking on them. The selected column will go bright red. Now double-click on the items you want in the main list; these will appear automatically in the highlighted AF list.

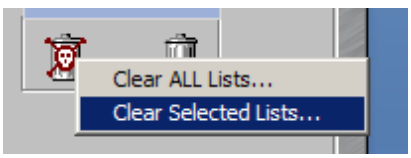


- "U" = prepare AF
- “B” = create AF list with Procedure “B”
- “R” = refresh AF using previous ranking

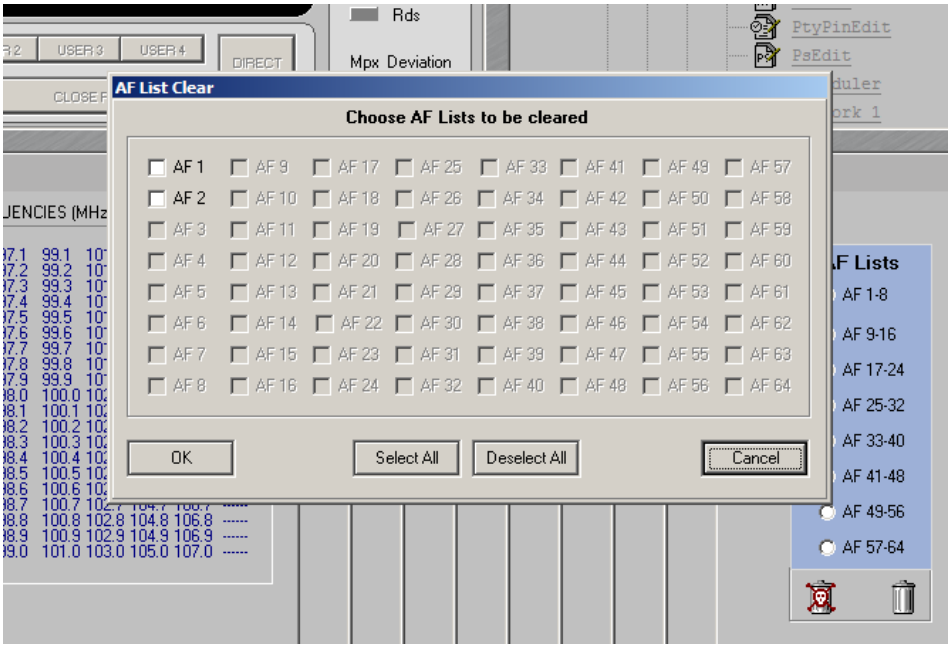
By right-clicking, you can delete ALL the frequencies in the highlighted list or in ALL the lists.

The lists containing at least one entry (i.e. not empty) are shown in blue.

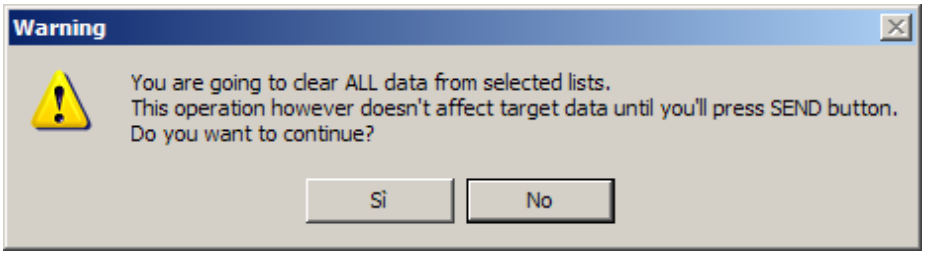
- To delete a frequency from the list, left-click it, then drag it over to the **rubbish bin** (alternatively, click on the 'Delete' button). Right-clicking on the rubbish bin with a skull on it deletes just one AF list.



You can now select the AF list to delete and press OK to delete it.



A warning message is displayed to remind you that you are ONLY deleting in the Database Manager, so if you wish to enter information at this time, press SEND.



18.11 "METHOD A" AND "METHOD B" FOR THE ALTERNATIVE FREQ.

There are two ways of transmitting the AF lists: **Procedure A or Method A** and **Procedure B or Method B.** In both cases, the lists should only include the frequencies for the closest transmitters and repeaters (with overlapping coverage areas).

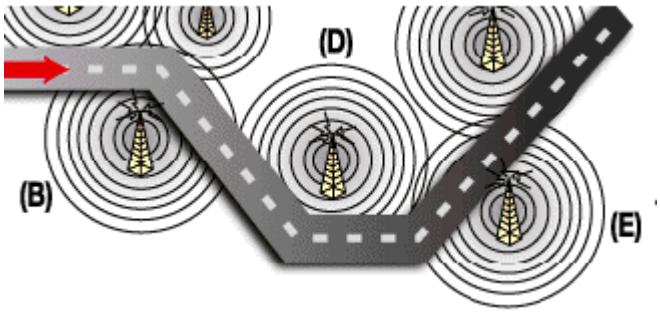
Generally speaking, **Procedure A** is used when the list contains no more than 25 frequencies and **Procedure B** is used when the list is longer (up to a maximum of 24 lists). **Procedure B** is recommended when areas are divided or when several programs are transmitted (Splitting)

NB: use of encoding procedure A or B is not expressly specified by a signal dedicated to the receiver, as the latter is able to identify the procedure used by analyzing the structure of the data transmitted (whether organized in pairs or not).

PROCEDURE A *(METHOD A)*

Compile List AF1 by assigning the tuning frequency (i.e. the frequency that includes the list of alternative frequencies) to the first position and then continue with the alternative frequencies that transmit exactly the same program, strictly in ascending order.

We advise you to register the alternative frequencies (those of adjacent transmitters and receivers with overlapping coverage areas) on each transmitter, making sure the first position is occupied by the frequency that includes the list of alternative frequencies.
0101



For example, in the situation shown in the figure, three transmitters (B, D, E) only intersect in two coverage areas: between B and D and between D and E. The lists below should be loaded onto each transmitter:

Tx B lists (tuning frequency: f Tx B)	**AF1**	**AF2**	Note that the frequency of Transmitter C is not on the list as its coverage area does not overlap with that of Transmitter A.
	f Tx B	f Tx D	
	f Tx D	f Tx B	

Tx D lists (tuning frequency: f Tx D)	**AF1**	**AF2**	**AF3**	Coverage area D partly overlaps the coverage area of both Transmitters B and E and, therefore, we recommend you load the lists for both adjacent transmitters. Make sure you list all the frequencies above the tuning frequency in ascending order.
	f Tx D	f Tx B	f Tx E	
	f Tx B	f Tx D	f Tx D	
	f Tx E			

Tx E lists (tuning frequency: f Tx E)	**AF1**	**AF2**	Note that the frequency of Transmitter B is not on the list as its coverage area does not overlap with that of Transmitter E.
	f Tx E	f Tx D	
	f Tx D	f Tx E	

PROCEDURE B (METHOD B)

As mentioned earlier, Method B is used when there are large numbers of alternative frequencies and/or when the transmitter also has frequencies transmitting different radio programmes at different times of the day (subdivision, local programming, etc.).

In the latter case, the mobile receiver must check whether the AF is transmitting the same content before selecting another frequency.

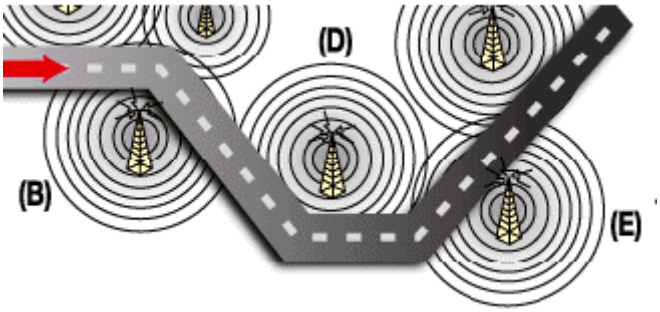
Each list begins with the tuning frequency (for which the list is valid) and up to 12 **frequency pairs** in a row, each containing the tuning frequency and an alternative frequency. If there are more than 12 possible alternative frequencies, the list continues with other lists, following the same method.

The order of the frequencies in each pair follows the rules stated below:

- If the order is ascending, the alternative frequency transmits the same programming as the tuning frequency.

- If the order is descending, the two frequencies are programmed differently.

01



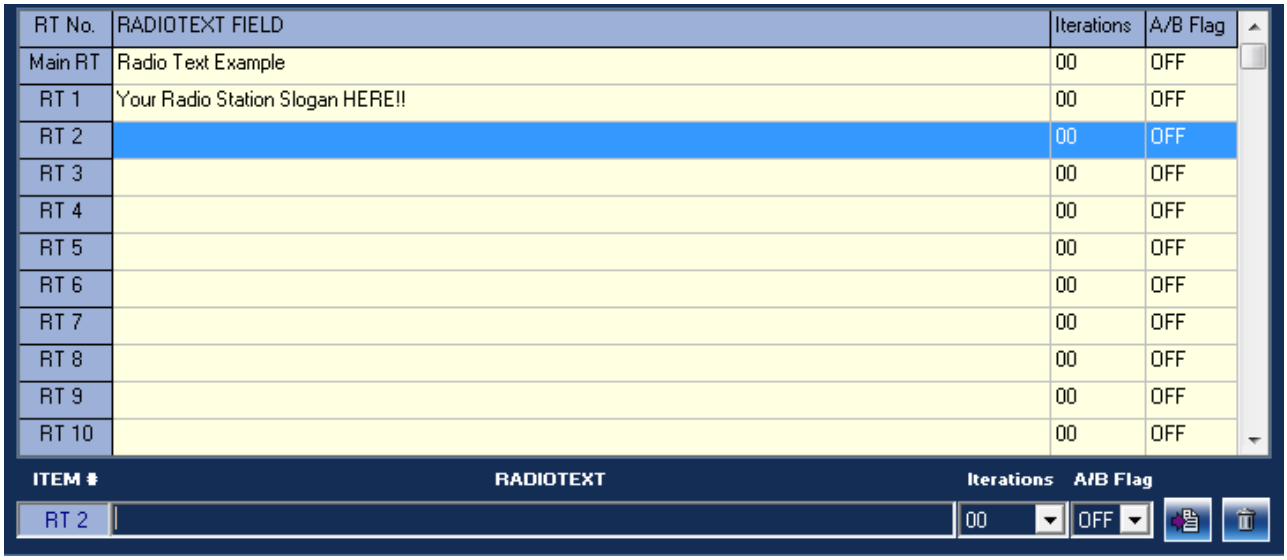
Going back to the example in the section above of Transmitters B, D and E (where Coverage areas D and E do not overlap), two further lists will be assigned to Transmitter B, ranked according to the aforesaid criteria so as to take into account any different programming by certain AF.

	AF1	AF2	
Tx B (tuning frequency: f Tx B	f Tx B	f Tx D	Note that the tuning frequency f Tx B is repeated twice in List 1: in first position, and then coupled with f Tx D. Tx B transmits the same programme as D if Tx B < f Tx D, and different programmes if f Tx B > f Tx D.
	f Tx B	f Tx D	
	f Tx D	f Tx B	

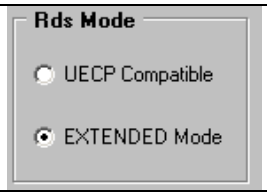
The AF lists for the other transmitters are compiled following the same criteria, alternating frequency pairs. NB: if the same tuning frequency is used by more than one transmitter within the same network, the corresponding AF lists should not be consecutive (e.g. AF 1 and AF 2). The lists for different tuning frequencies must be positioned between them.

18.12 RADIO TEXT PANEL

Once you have selected the Radio Text panel, you can enter up to 16 Radio Text messages, each one with a maximum of 64 characters (including spaces). This refers to the text transmission, mainly aimed at home receivers, which will be equipped with suitable display structures. This feature can also be used to display cyclical messages.



NB: only the MAIN RT field can be programmed according to UECP protocol. The other fields (from RT01 to RT15) are related solely to the **Extended UECP** RDS (customised) programming mode.

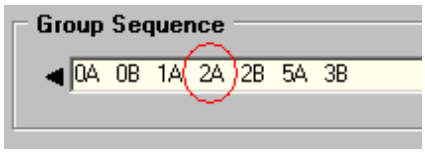


To enter Radio Text messages:

-	select a field (MAIN RT, RT01, RT02, etc.) by clicking in the yellow area: the field selected will be displayed at the bottom of the window.			
-	select and delete the default text displayed (e.g. RADIOTEXT 04)			
-	enter the new Radio Text message (max. 64 characters) in the field at the bottom.			
-	**click on the 'Update' button**		**to refresh the message or click on**	**to delete it.**

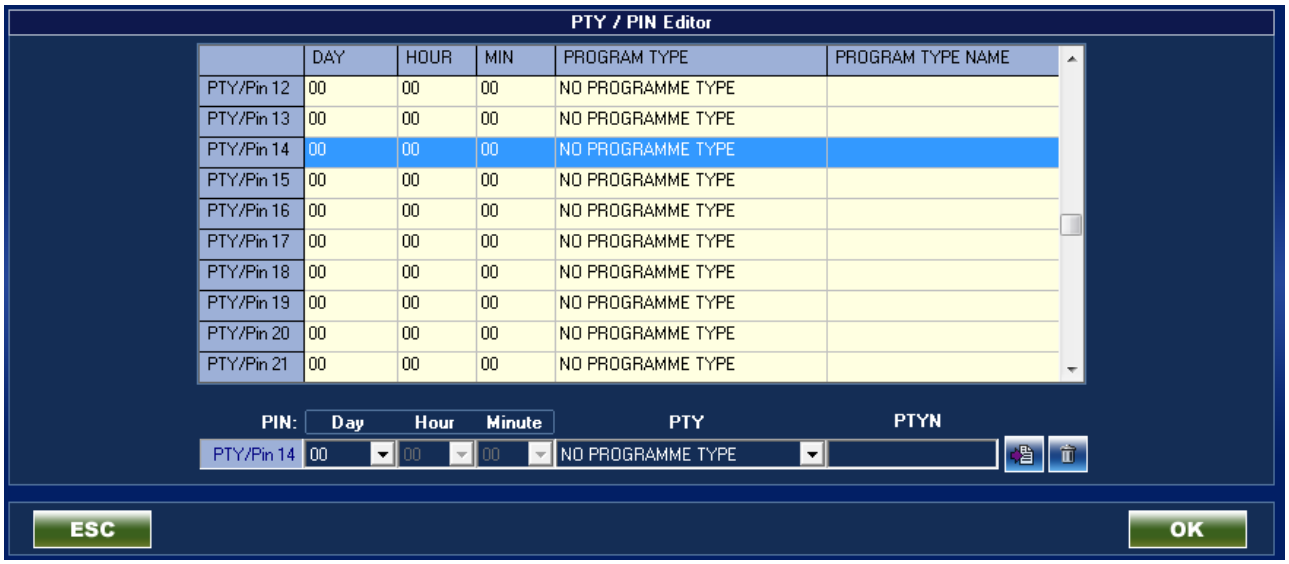
NB: The Main Radio Text Message (also known as RT 00) is transmitted by default.
The SCHEDULER panel schedules several RT sequences.

Please remember to enable the RT group in the Main RDS SERVICE panel. The name of the group for RT is 2A



18.13 PIN – PTY SERVICES

PIN / PTY EDITOR allows you to set up to 32 different PIN / PTY / PTYN items.



- **PIN – Programme Item Number**
  The PIN code will be used to enable the receivers and recorders designated to use this feature to respond to the programme item or items that the user has pre-selected. The time used is the time set in the programme with the day of the month added to avoid confusion.

- **PTY - Programme Type**
  This is an identification number which will be transmitted with each programme item and which specifies the current programme type from a set of 31 type options. This code can be used for tuning searches. What is more, the code will enable receivers and recorders suitable to be preset to respond solely to programme items of the desired type. The last number, i.e. 31, is reserved for alarm identification purposes, the said function being designed to activate an audio signal when a receiver is in receive standby mode

- **PTYN – Programme Type Name**
  The PTYN feature is used to provide further information on the current PTY. The PTYN allows a more specific PTY description to be displayed (max. 8 characters), which the radio station may decide of its own choice (e.g. PTY = 4: Sport and PTYN: Football). The PTYN is not intended to change the default eight PTY characters which will be used during the search or standby modes, only to provide more programme type detail once a programme has been tuned into. If the radio station is satisfied with a default PTY name, there is no need to use further data capacity for the PTYN. The Programme Type Name is not envisaged for use for automatic PTY selection and should not be used to provide information in sequence.

NB: the MAIN PTY can only be programmed in compliance with the Protocol UECP. The other fields (from PTY/PIN01 to PTY/PIN31) are related solely to the **Extended UECP** RDS (customised) programming mode.

To enter the PTY/PIN:

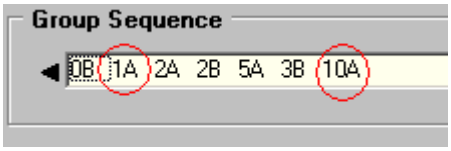
- select a field (MAIN PTY, PTY01, PTY02, etc.) by clicking in the yellow area: the line selected will be displayed at the bottom of the window (e.g. the figure above shows PTY 1 selected).

- select the PIN Date/Time (Day, Hour, Min) and the PTY from the list. Enter another PTYN (max. 8 char.) in the field at the bottom.

- **click on the 'Update' button** **to refresh the data or click on** **to delete it.**

NB: The Main PTY/PIN (also known as PTY 00) is transmitted by default. Using the SCHEDULER panel (see FOLLOWING PAGES) you can schedule several PTY sequences.

Please remember to enable PTY and PTYN groups in the Main RDS SERVICE panel. The group numbers are for PTY 1A and for PTYN 10A

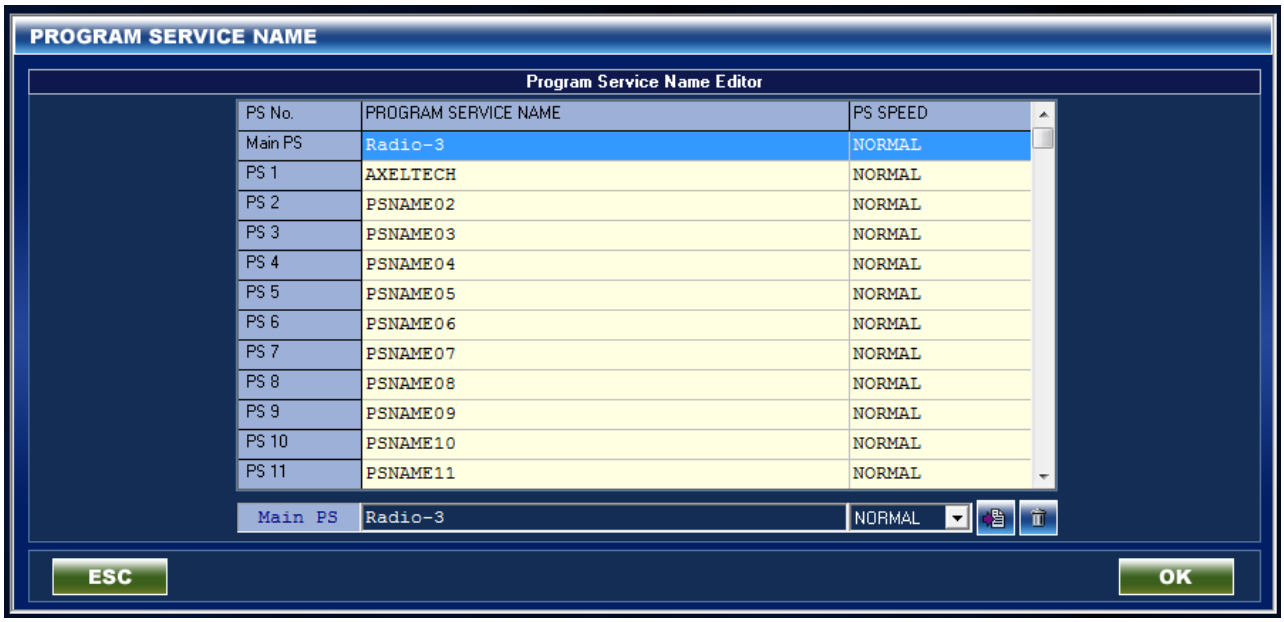


PTY CODE	PROGRAMME TYPE
0	None or indeterminate
1	News
2	Current affairs
3	Information
4	Sport
5	Educational
6	Theatre
7	Culture
8	Science
9	Miscellaneous
10	Pop
11	Rock
12	M.O.R.
13	Light classical
14	Classical
15	Other musical genres
16	Weather

PTY CODE	PROGRAMME TYPE
17	Finance
18	Children’s
19	Social affairs
20	Religious
21	Phone calls
22	Travel
23	Free time
24	Jazz
25	Country
26	National music
27	Golden oldies
28	Folk
29	Documentaries
30	Alarm Test
31	Alarm

18.14 PROGRAMME SERVICE NAME

The Programme Service Name is a text comprising no more than eight alphanumeric characters which is displayed by RDS receivers in order to inform the listener of the programme service transmitted by the station which the receiver is tuned into. One example of a PS name is "Radio 1". The name of the programme service is not designed for use for automatic tuning searches.



NB: the MAIN PSN can only be programmed in compliance with UECP protocol. The other fields (from PS1 to PS59) are related solely to the **Extended UECP** (customised) programming mode.

To enter the PSN items:

- select a field (MAIN PSN, PSN1, PSN2, etc.) by clicking in the yellow area: the field selected will be displayed at the bottom of the window (e.g. the figure above shows PSN 4 selected).
- select and delete the default text displayed (e.g. PSNAME 03) from the field at the bottom.
- enter the new PS name (max. 8 char.)
- **click on the 'Update' button** **to refresh the message or click on** **to delete it.**

NB: the Main PSN (also known as PS 00) is transmitted by default.
Using the SCHEDULER panel, you can schedule several PS sequences.

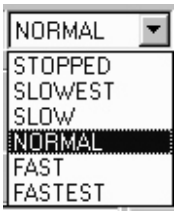
18.15 VARIABLE PS ITEMS - STANDARD OPERATION

The section below outlines some of the standard tools for managing the variable PS items. For advanced PS scheduling/programming, please see the Scheduler panel information (next section).

18.15.1 PS SEQUENCES

In Extended UECP mode, the Falcon VS allows you to easily create and transmit sequences comprising a maximum of 60 PS names. For each PS, you can also set the respective 'display speed' (in relation to the time for which it will be visible on the receiver display unit).

To enter the individual PSN that make up the sequence, please see the previous page.



Each message can be set with a different display speed. The options available are listed in the PSN SPEED pop-up menu (**slowest, slow, normal, fast, and fastest**).

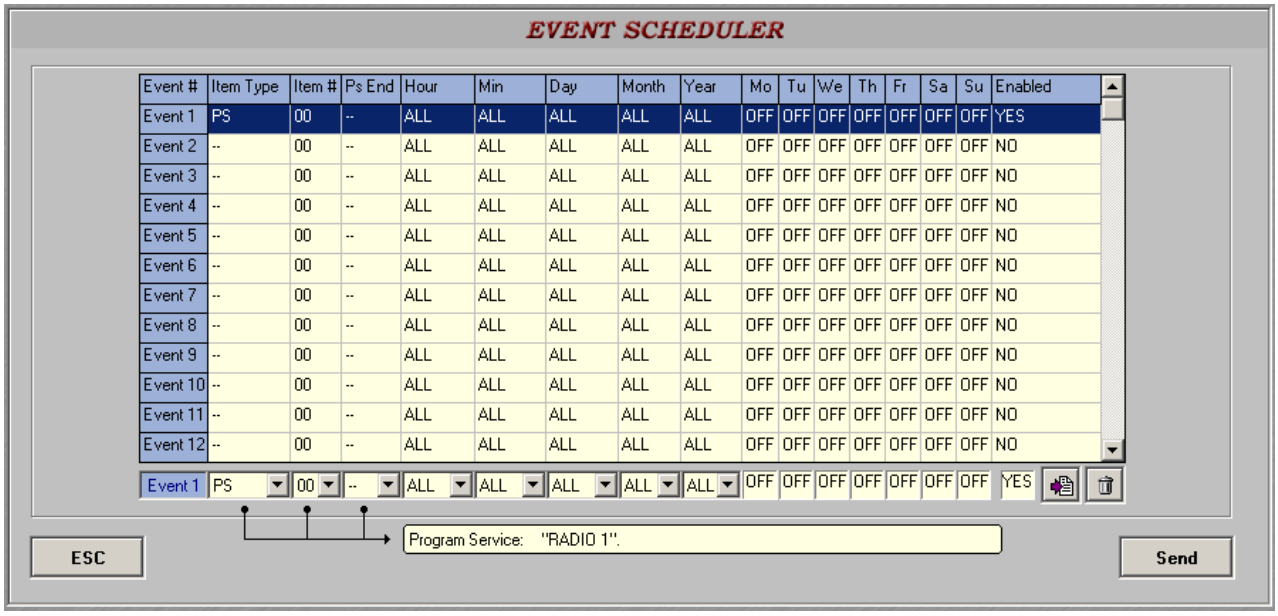
NB: the time needed for a receiver to receive and properly display a message depends on the following factors:

- Number of characters in the message
- Data group repetition rate/total number of groups executed by the RDS signal.
- Reception conditions at the receiver
- Software implementation of the PS feature

As a result of these conditions, you cannot set an exact duration for each PSN (i.e. a set number of seconds). In any case, a ‘normal’ display speed usually refers to a display time of approx. 3 seconds. Please remember that the ‘fast’ and ‘fastest’ speeds are only recommended if a large number of groups are executed by the RDS signal. See also the ‘Warning’ note at the end of this section.

The 'Stopped' option allows you to keep a specific PSN constantly displayed. This feature is very useful when several PS sequences are scheduled via the Scheduler panel (see next section). Please make sure that there is no stopped PSN set in the middle of a PS sequence.

18.16 THE SCHEDULER



Event #	Item Type	Item #	Ps End	Hour	Min	Day	Month	Year	Mo	Tu	We	Th	Fr	Sa	Su	Enabled
Event 1	PS	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 2	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 3	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 4	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 5	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 6	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 7	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 8	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 9	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 10	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 11	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 12	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO
Event 1	PS	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES

The Scheduler allows you to organize round-the-clock RDS transmission on a daily, weekly, or monthly basis.
The Scheduler is used to implement the specific Falcon VS RDS transmission/editing features (PS, PTY/PIN) at specific times and dates.

The programming editing is saved and implemented immediately. The programming activity is activated (i.e. aired) in 1 minute at the most.

The basic unit of the Event Scheduler is the **Event**, which is a RDS feature (PS, PTY/PIN) that can be configured to be launched automatically at a specific date and time or cyclically with a specified frequency.

Events have two kinds of properties that influence their operation mode: operational properties and chronological properties. The operational properties determine the Event operations (i.e. the type of event) and the chronological properties determine the time at which the event is **launched**.

The Scheduler's programming capacity is extremely flexible, allowing you to set the duration of each event, within a range of 1 minute to 365 days a year, increasing the duration in 1-minute steps. Up to 64 events can be saved in the memory of the Falcon VS. The Event Scheduler allows the user to **set four event types (PS, PTY/PIN) to occur simultaneously.**

Let's have a look at some examples.

- You can program a new PS Name to be transmitted during specific intervals (e.g. from 6:00 to 12:00).

- A specific PTY can be programmed to be launched at 2:00 every afternoon.

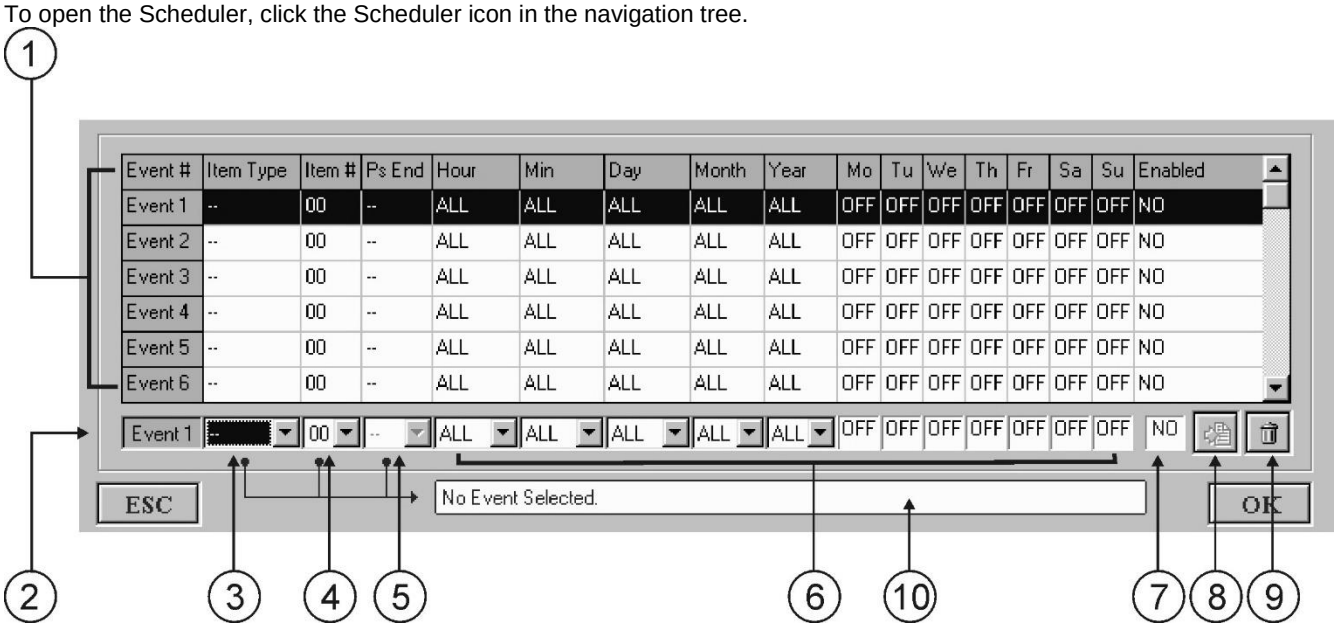
Every minute, the Falcon VS will check for newly scheduled events and activate them. This means that a newly scheduled event can be transmitted within 1 minute. Note that the Falcon VS scans the scheduled events in the Scheduler with a bottom-up approach. This means that **if the timing of two events partly or completely overlaps, the Falcon VS will execute the event with the highest rank (see FOLLOWING pages). THE TIGER SHARK CLOCK MUST THEREFORE BE KEPT ACCURATE TO ENSURE MORE RELIABLE SCHEDULER OPERATION.**

An individual event may be enabled or disabled at any time using the Enable option provided for each event.

NB:
- There is no time format change option (i.e. from 12 to 24 hour clock) available
- There is a Preview bar featured with cross-references, which offers a quick way of finding the item you are scheduling.

This section provides working knowledge of the Scheduler's general features and step-by-step programming instructions. In particular, it describes how to enter items (PS Names, etc.) already created in blank event slots (lines) in the Programming Table.

To open the Scheduler, click the Scheduler icon in the navigation tree.



0101

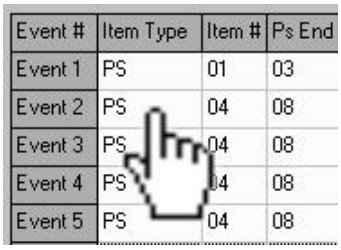
SCHEDULER OVERVIEW

1	**Event lines**	Each event line provides complete information on the type of event and the day, month, date, and year for which it is scheduled.
2	**Edit bar**	The Edit bar allows you to set/edit the properties of the highlighted event (event type, launch time and date, etc.).
3	**Item Type**	Two different RDS features (PS, PTY / PIN) can be scheduled. The Item Type menu allows you to assign a new event to one of these four features.
4	**Item N.**	This shows the specific RT/PS/PTY item scheduled (e.g. PSN 6)
5	**EndPS**	If the Event is a PS sequence, the Item N. field shows the first element of the sequence and the End PS field shows the last element
6	**Calendar**	The Calendar is a set of menus that allows you to set a specific time and date or a specific range for the selected event. Daily scheduling tools are also provided.
7	**Master enable**	This shows the event's master status. If the event is not enabled, it is not taken into account by the Scheduler.
8	**Update button**	Once a new event has been scheduled, the Update button allows you to refresh the Target and Scheduler table (event lines).
9	**Delete button**	This deletes all the properties of the event currently displayed on the Edit bar.
10	**Preview bar**	This contains cross-references to the PTY and PSN Editor, in order to show the content of the item to schedule.

18.16.1 START

Check that the clock shows the right current time.
Highlight the event to be programmed by clicking on the yellow field in the Event lines: the event selected will appear in the Edit bar at the bottom of the panel.

The figure shows Event 2 selected.

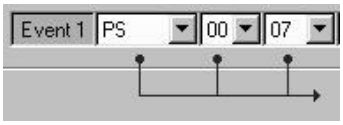


18.16.2 SELECTING AN ITEM TYPE

In this stage, you can select the type of event or events to implement from the list of items available (PS, PTY/PIN).
When you click on the open menu arrow next to the Item Type field, a dropdown menu appears. The Item Type can be selected from this menu.

18.16.3 SELECTING AN ITEM NUMBER

After setting the RDS feature to schedule, the Item Number menu allows you to select a particular PSN, or PTY item (e.g., PSN 4 or RT 7).
The **PS End** menu allows you to select the last item in the **PS sequences.**



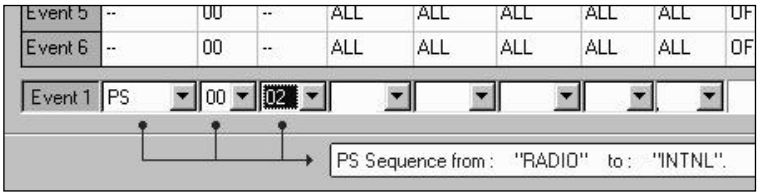
EXAMPLE 1

You wish to schedule the PSN sequence: **RADIO/LONDON/INTNL**.
The **PSN Editor** panel is similar to the figure below:

0000

PSN No.	PROGRAM SERVICE NAME
Main PSN	RADIO
PSN 1	LONDON
PSN 2	INTNL

0000



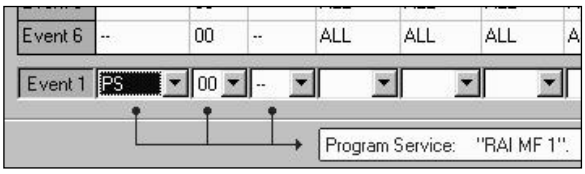
The **Scheduler** panel must be configured as shown in the figure (NB: the MAIN PSN is also called PSN 00).
The Edit bar will display the first and last items in the sequence.

EXAMPLE 2

If you wish to transmit just one PSN (e.g. PSN00), the **PSN Editor** panel (see section 18:14) is similar to the figure shown here on the right.

00000

PSN No.	PROGRAM SERVICE NAME
Main PSN	RAI MF 1
PSN 1	PSNAME01
PSN 2	PSNAME02



The **Scheduler** panel must be configured as shown in the figure (the PS End field is left blank - as it will display the symbol --)

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18.16.4 SETTING THE SCHEDULER TIME AND DATE

The Calendar area allows you to set the date and time at which the Scheduler is required to implement the event(s). When the menu open arrow next to the date fields is selected, the specific Hour/Minutes/Day/Month/Year menu appears. The date or time range can be selected from this menu.

The Falcon VS Scheduler works according to a temporal correspondence mechanism. This means that, at the beginning of each minute (i.e. when the internal clock reaches XX:XX:00), the Falcon VS checks the current time against all the start times of the scheduled events and launches events whose start time corresponds with the current time.

The **TIME** menu includes the following options:

Individual hours	The event is launched any time the hour shown on the clock matches the hour selected.
Time range	The event is launched any time the hour shown on the clock matches the hours included within the chosen range.
ALL	The event is launched regardless of the time on the clock.

The **MIN** menu includes the following options:

Individual minutes	The event is launched at any time the minutes shown on the clock match the minutes selected.
Time range	The event is launched at any time the minutes shown on the clock match the minutes included within the chosen range.
Asterisk (*) + Minutes digit	The asterisk (*) shows that the first digit of the minutes (0,1,2,3,4,5) is not crucial; therefore, the event is launched any time the minutes on the clock match simply the second digit chosen. See Examples 7 and 8 below.
ALL	The event is launched regardless of the minutes on the clock.

EXAMPLE 4

Event #	Item Type	Item #	Ps End	Hour	Min	Day	Month	Year	Mo	Tu	We	Th	Fr	Sa	Su	Enabled
Event 1	PS	00	--	10	34	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 2	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO

E.g., The PSN 00 scheduled in the example above (Event 1) **will only be active from 10:34:00 to 10:34:59 every day**.

EXAMPLE 5

Event #	Item Type	Item #	Ps End	Hour	Min	Day	Month	Year	Mo	Tu	We	Th	Fr	Sa	Su	Enabled
Event 1	PS	00	--	07-12	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 2	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO

The PSN 00 scheduled in the example above (Event 1) **will only be active from 07:00:00 to 12:59:59 every day**.
Since there is no minutes specification (see 'All' selection), the Falcon VS keeps the event active as of the first hour that matches 'the current one (7.00) until the first minute of hour '12 '.

EXAMPLE 6

Event #	Item Type	Item #	Ps End	Hour	Min	Day	Month	Year	Mo	Tu	We	Th	Fr	Sa	Su	Enabled
Event 1	PS	02	--	07-12	10-19	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 2	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO

The PSN 02 scheduled in the example above (Event 1) **will be active as follows**:

From **07:10 to 07:19** From **09:10** to **09:19** From **11:10** to **11:19**

From **08:10** to **08:19** From **10:10** to **10:19** From **12:10** to **12:19**

EXAMPLE 7

Event #	Item Type	Item #	Ps End	Hour	Min	Day	Month	Year	Mo	Tu	We	Th	Fr	Sa	Su	Enabled
Event 1	PS	04	--	13	*7	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 2	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO

The PSN 04 scheduled in the example above (Event 1) **will be active as follows**:

13:07 (i.e. from 13:07:00 to 13:07:59) **13:37** (i.e. from 13:37:00 to 13:37:59)

13:17 (i.e. from 13:17:00 to 13:17:59) **13:47** (i.e. from 13:47:00 to 13:47:59)

13:27 (i.e. from 13:27:00 to 13:27:59) **13:57** (i.e. from 13:57:00 to 13:57:59)

i.e. the asterisk symbol (*) shows that the first digit of the minutes specification (0,1,2,3,4,5) is not crucial, and the event is enabled any time the second digit is '7'.

DATE SCHEDULING

As far as the date is concerned, there are several options to consider when deciding on the event launch frequency.

* Specific days of the week, e.g. MON, WED, and FRI

* Specific date/dates (e.g. 10th March 2001 or 13th April any year)

* Every day/on a selected day of every month, etc.

Selecting the Week option disables the Calendar option.

The **DAY** menu includes the following options:

Individual day	The event is launched any time the date on the clock (day) matches the date selected.
Range of days	The event is launched any time the date on the clock (day) matches any of the days included within the chosen range.
ALL	The event is launched regardless of the day on the clock date.

The **MONTH** menu includes the following options:

Individual month	The event is launched any time the date on the clock (month) matches the date selected.
ALL	The event is launched regardless of the date on the clock (month).

The **YEAR** menu includes the following options:

Individual year	The event is launched any time the date on the clock (year) matches the date selected.
ALL	The event is launched regardless of the date on the clock (year).

Day of the **WEEK** option

The event is launched every selected day of the week (in which case, the Year, Month, and Day menus are automatically disabled).

18.16.5 ENABLING AN EVENT

Once you have set up a new event via the Edit bar, Enable must be checked (**YES**) (see Scheduler figure)

18.16.6 EVENT REFRESH

Once you have keyed in a new event via the Edit bar and enabled it, click on the following button:
UPDATE (REFRESH) to schedule the event (or render it effective). Please note that the Update button is disabled if the event scheduling is incorrect or incomplete.

18.16.7 CLEARING A SCHEDULED EVENT

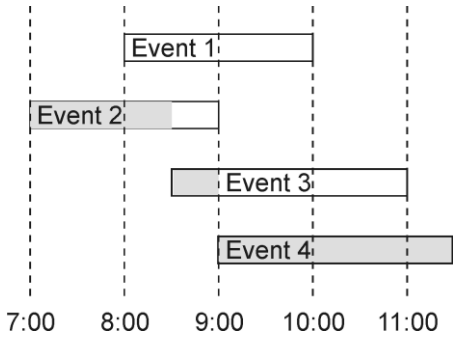
1 Select (click) the event to clear from the Events bar: the event will be displayed in the Edit bar

2 Select the CLEAR button: from the Edit bar

18.16.8 EVENT PRIORITY

When two or more **events** (OF THE SAME TYPE) **overlap**, priority is automatically assigned to the most highly ranked event (e.g.., Event 4 has higher priority than Event 2).

EXAMPLE 1



The figure above shows a possible daily schedule for four Events of the same kind (e.g. four PSN items).
In this case, only Event 4 is transmitted as scheduled (from 9:00 to 11:30); Event 3 is only transmitted from 8:30 to 9:00, Event 2 from 7:00 to 8:30, and **Event 1 is kept inactive, as it is completely 'hidden' by the other events**

We recommend you schedule events with the lowest priority as DEFAULT events

EXAMPLE 8

Event #	Item Type	Item #	Ps End	Hour	Min	Day	Month	Year	Mo	Tu	We	Th	Fr	Sa	Su	Enabled
Event 1	PS	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 2	PS	01	--	07-12	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 3	PS	02	--	10-11	ALL	--	--	--	ON	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 4	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO

Event 1: PSN. 00 (Main PS) is the **default PS** (i.e. It is transmitted whenever no other PS is scheduled)

Event 2: PSN 01 is scheduled every day, from 07.00 am to 12.59 am. It will replace PSN 00 within that time range.

Event 3: PSN 02 is only scheduled for Mondays from 10:00 am to 11:59 am.

11

When an event ends and no other event matches the current time, the Scheduler will keep the last event on air for another 2 or 3 minutes. The default PSN (i.e. PSN 00) is then automatically restored.

18.16.9 OVERALL SCHEDULER EXAMPLES

The following instructions explain how to program the Scheduler in order to perform the timing operations

EXAMPLE 9

Event #	Item Type	Item #	Ps End	Hour	Min	Day	Month	Year	Mo	Tu	We	Th	Fr	Sa	Su	Enabled
Event 1	PS	01	03	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 2	PS	04	08	00-06	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 3	PS	04	08	06-07	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 4	PS	04	08	08-09	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 5	PS	04	08	10-11	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 6	RT	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES

Events 1-5 allow you to program two PS sequences. The PS 1 sequence (from PSN 01 to PSN 03) is the default and is transmitted daily from 12:00:00 to 23:59:59

The PS 2 sequence (comprising PSN 04 through to PSN 08) will be aired every day from 00:00:00 (midnight) through to 11:59:59 am.

Since the time range of 00:00 to 12:00 is not a default setting, you will need to cover this interval by sequencing various Events with the same Start PS + End PS but with different time ranges.

EXAMPLE 10 (Use of PSN Stopped)

Recommended PS scheduling includes a fixed PSN (i.e. 8 characters) for most of the time (90%) and dynamic PS sequences that begin every few minutes (e.g. every 5 minutes).

For scheduling of this kind, the PSN Editor panel should look similar to the figure below. Note that the speed of the last PSN (BBC ONE) is set at 'Stopped' as this is the PSN that must be displayed for a lengthy period.

0000

PSN No.	PROGRAM SERVICE NAME	PSN SPEED
Main PSN	THE	NORMAL
PSN 1	BBC	NORMAL
PSN 2	WORLD	NORMAL
PSN 3	SERVICE	NORMAL
PSN 4	BBC ONE	STOPPED

The Scheduler window will be similar to the figure below:

Event #	Item Type	Item #	Ps End	Hour	Min	Day	Month	Year	Mo	Tu	We	Th	Fr	Sa	Su	Enabled
Event 1	PS	00	04	ALL	*0	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 2	PS	00	04	ALL	*5	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	YES
Event 3	--	00	--	ALL	ALL	ALL	ALL	ALL	OFF	OFF	OFF	OFF	OFF	OFF	OFF	NO

The sequences of PS 00 through to PS 04 will start every 5 minutes, and after the first three items have been displayed once, the last PS (BBC ONE) will remain displayed until a new Event is launched.

18.17 EON NETWORK CONFIGURATION IN DATASET 1

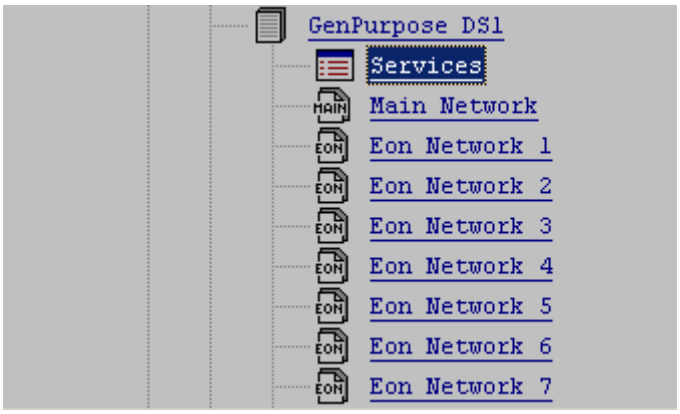
The Enhanced Other Network feature can be used to update the information stored in a receiver concerning other programme services than those received. Alternative frequencies, the PS name, the Traffic Programme, and the Traffic Announcement identification, as well as the Programme Type and Programme Item Number information, can be transmitted for any other service. The relationship with the corresponding programme is established through the relative Program Identification. The linkage information, which consists of four data elements, provides the means with which various programme services can be processed by the receiver as a single service whenever a common programme is maintained. The linkage information also provides a mechanism for signalling a broader set of related services.

The Falcon VS supports the following EON codes:

EON-PI, EON-PS, EON-TP, EON-TA, EON-AF, EON-PIN, EON-PTY.

Linkage Information will also be added.

Up to 10 different EON items can be configured for each dataset:



The EON Basic Services pages and the AF windows are very similar to those associated with the main window. Please see the previous sections for the respective configuration.

As regards the AF, EON services in particular offer an additional programming procedure, called *Mapped Frequency Procedure*. Radio stations can choose the most appropriate method for them.

EON services must be enabled by adding the groups associated with the group sequence on air.

19 ALTERNATIVE DATASET 2 - CONFIGURATION AND RECALL

To configure Dataset 2, carry out the same configuration procedure as for Dataset 1.

19.1 DATASET 'RECALL' MODE

The Dataset can be selected via the current Dataset menu in the RDS SETTINGS page. There are a number of options available.

19.2 SELECTING THE ALTERNATIVE DATASET

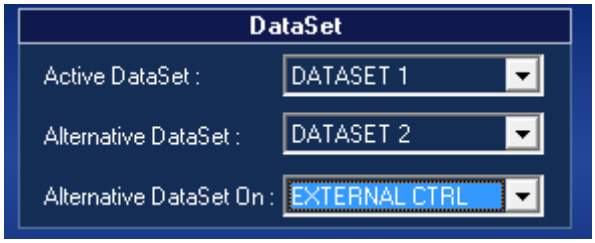
The Alternative Dataset is the dataset used in alternative to the current dataset. The Current Dataset is selected from the **Active DataSet** menu

The Alternative Dataset can be recalled via a UECP command (see the first item in the menu) or a positive control (active high) or negative control (active low) applied to Inputs 1 to 5 of the Opto interface, as envisaged in the menu.

This is the easiest way to change/switch between two datasets, i.e. the current set (Active Dataset) and an Alternative Dataset.

Typical example: switching the dataset during the day to suit the national/regional audio program transmitted.

19.3 DIRECT SELECTION OF DATASET 1 VIA A DIFFERENT DS



As well as selecting the Alternative Dataset as shown above, **the user can instantly recall any dataset using a combination of GPI** interface input activations or a **UECP** command.

To do so, select **EXTERNAL C(on)TR(o)L** (last item in the menu).

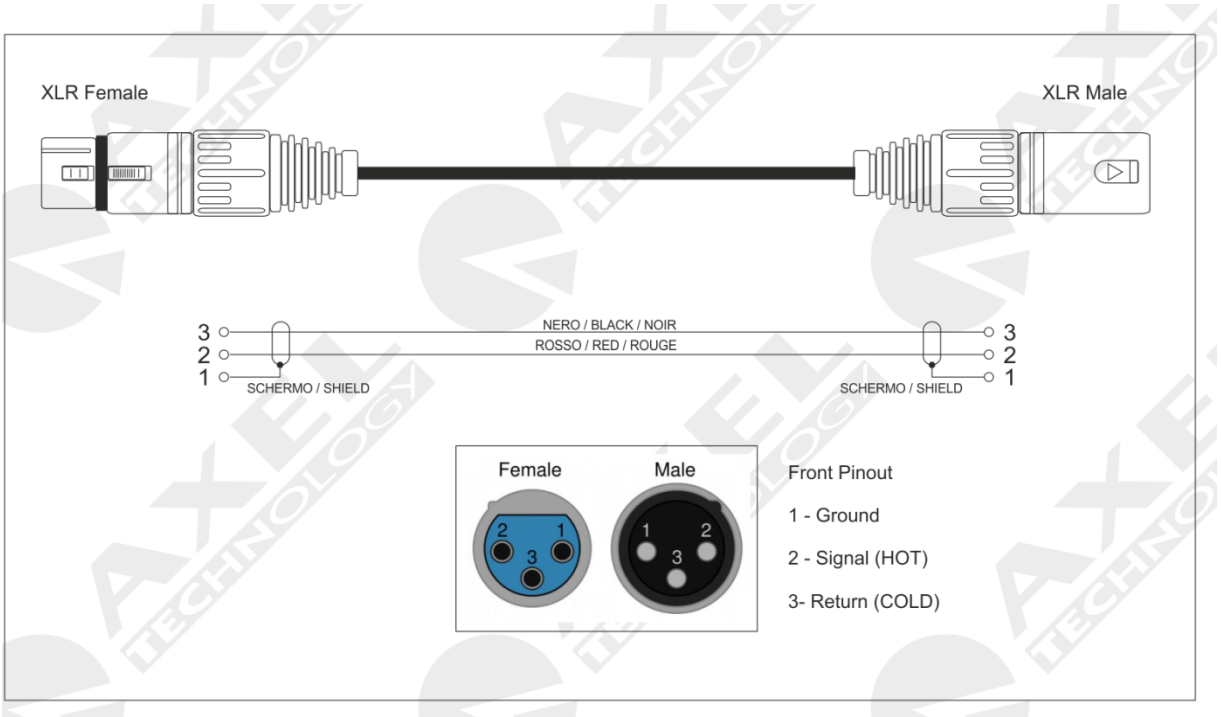
For more details on **GPI, please see the Appendix** to this manual.

20 TECHNICAL APPENDIX

This section provides all the technical explanations, and the connection pinouts to and from the Falcon VS device. Always refer to this technical appendix for connections and connection procedures. In case of differences between the documentation below and the hardware device, please contact Axel Technology at the numbers and e-mail addresses shown at the end of this manual. Our technical and assistance department will be pleased to help you!

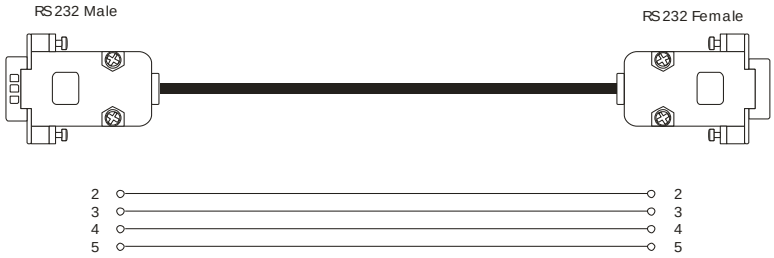
20.1 APPENDIX A - BALANCED AUDIO CONNECTION AND PINOUT

Balanced Audio connection diagram with balanced XLR for **Analogue** audio **input** and **output** (Left+Right) and AES/EBU **digital** audio **input** and **output**.



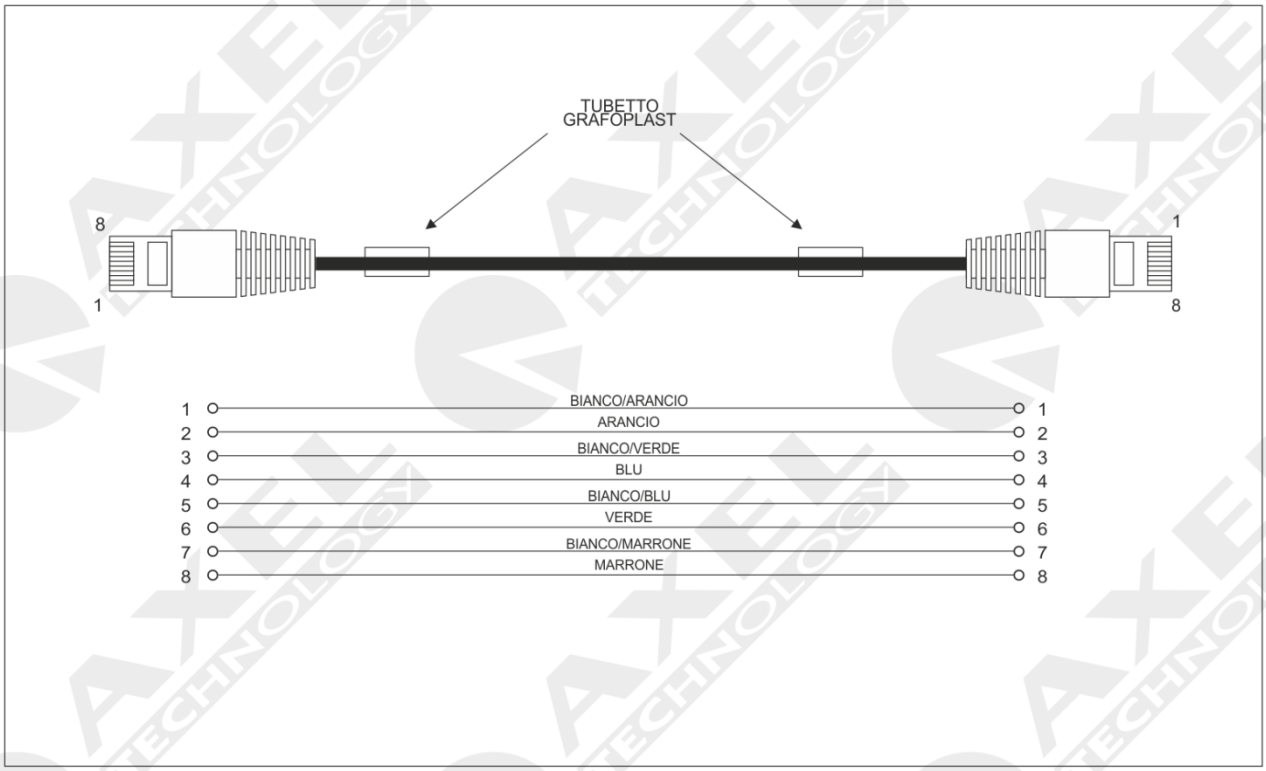
20.2 APPENDIX B - SERIAL CONNECTION E PINOUT

PORT 1		PORT 2,3,4	
2	Tx	2	Tx
3	Rx	3	Rx
4	DTR	4	/
5	GND	5	GND

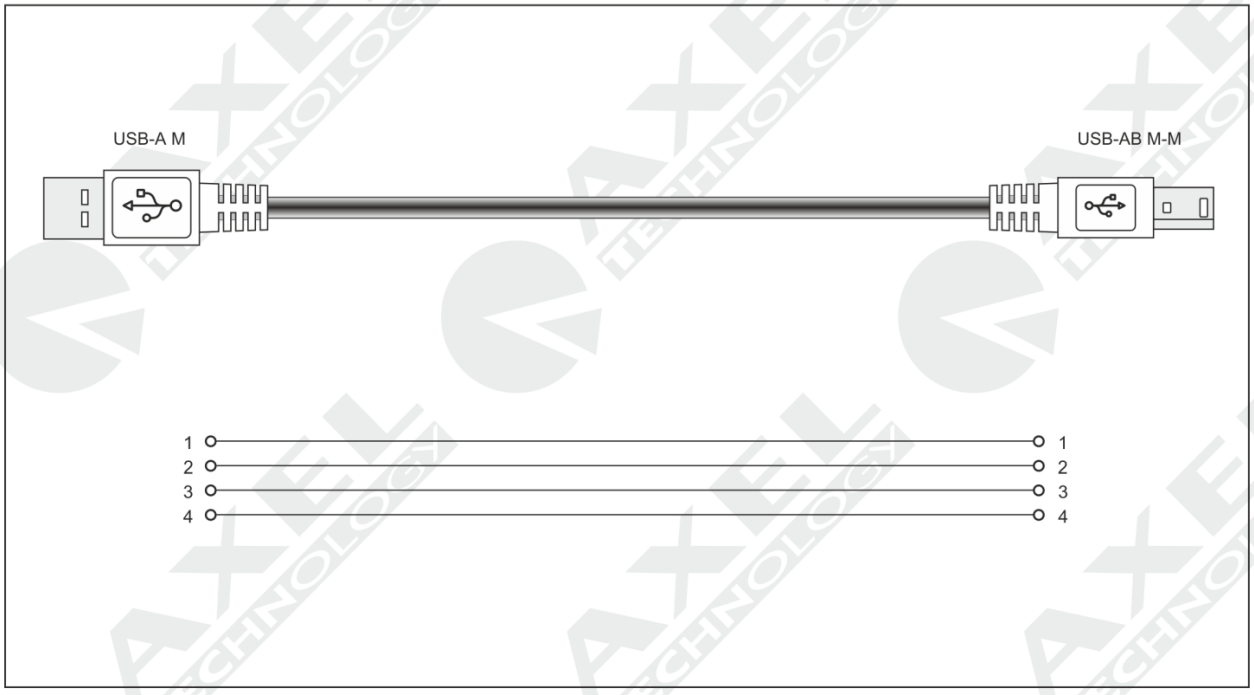


A standard Pin-to-Pin serial cable is required for the PC connection, not a CROSSOVER one. For a correct connection the cable must not be more than 20 m long. Ports 2 and 3 use only the Tx, Rx and GND for the PC connection while port 1 also has the DTR (Data Terminal Ready) for modem connection. The port connection speed must coincide with the speed of the port of the Falcon VS and of the PC's serial port.

20.3 APPENDIX C - ETHERNET/LAN CONNECTIONS



20.4 APPENDIX D - USB A/B CONNECTION



20.5 APPENDIX E - RDS ABILITATION

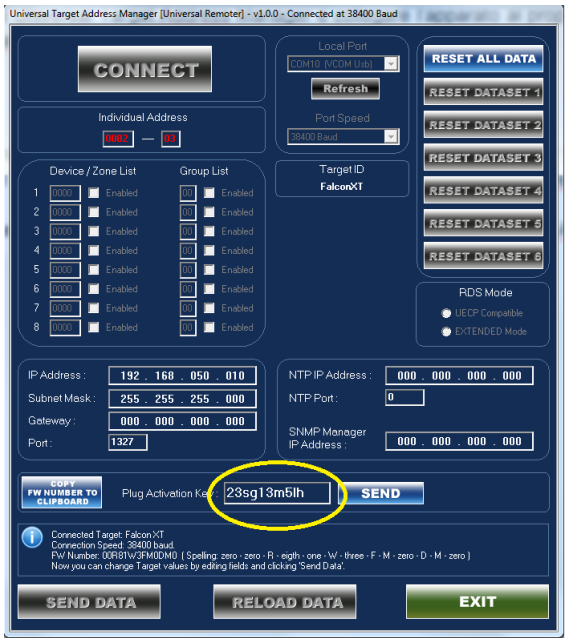
When buying the Falcon VS you may not require, need, or want the RDS (Radio Data System) encoder as a component of the audio processor. If, afterwards, you need to activate this feature, then you will have to obtain a Plug Activation Key. This option can be requested by email from the Axel Technology support service at support@axeltechnology.com. The department will respond by providing a code to enter using the Axel Universal Target Address Manager within the Falcon VS.

1. Open the Axel Universal Target Address Manager and connect the device to your PC.

2. Click COPY FW NUMBER TO CLIPBOARD

3. Email your Firmware Number to Support@axeltechnology.com by simply pasting in the Firmware Number obtained via the Axel Universal Target Address Manager.

4. Once you have received the code via email, enter it in the "Plug Activation Key" field and press SEND, as shown in the figure below, in the yellow ring.



5. Press SEND; the system will respond with a message advising you to turn the power supply of the connected target off then on again to apply the changes.

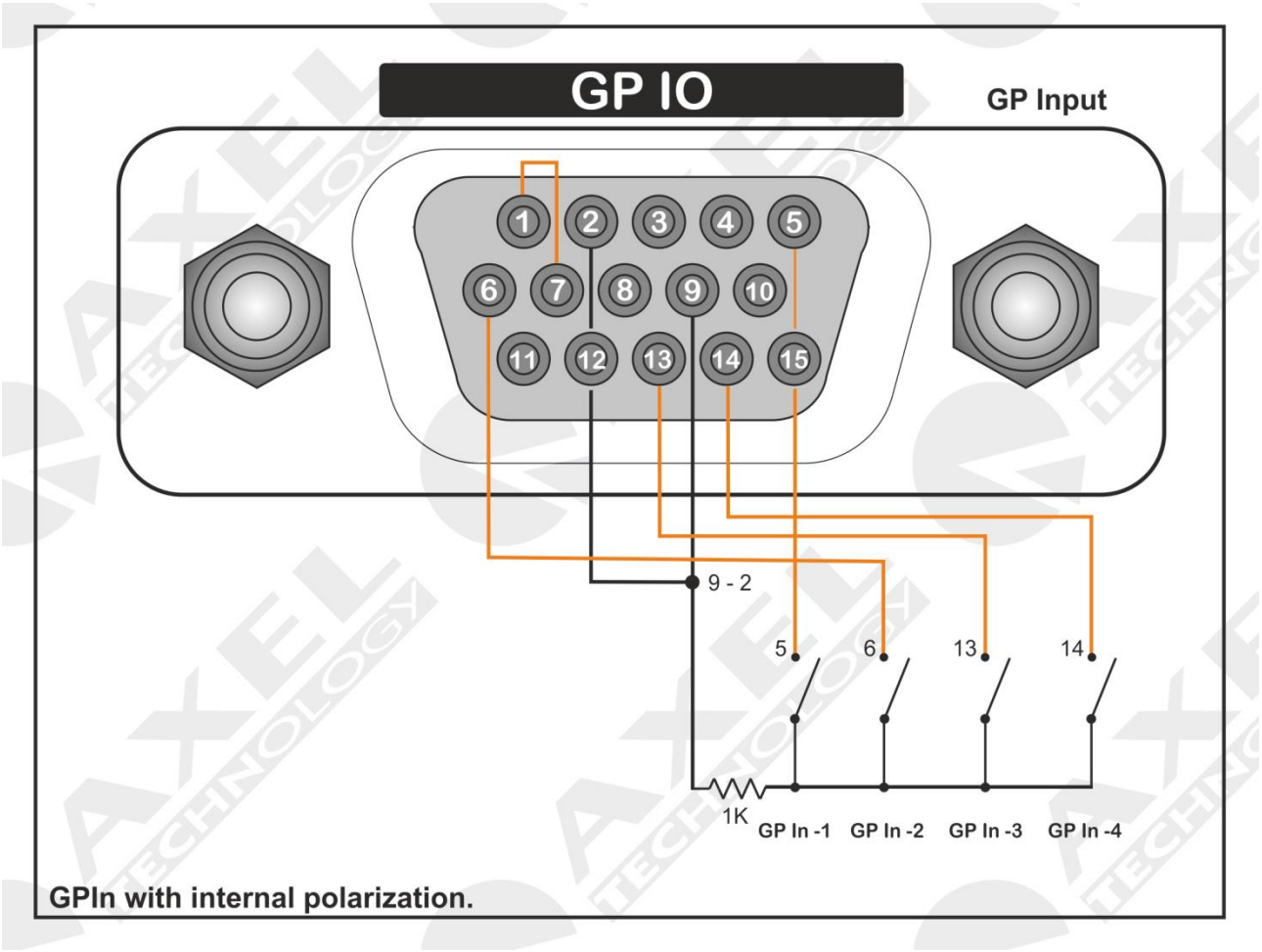
6.You will now be able to use the RDS functions and the RDS MONITOR PAGE will appear as follows:

20.6 APPENDIX F - GPIO PORT

The 15 pin HD SubD **GPIO** connector on the back of the Falcon VS features four General Purpose inputs and four General Purpose binary outputs. The inputs are polarised Opto coupler inputs, while the outputs are Open Collector outputs. They can be used to send commands to the device and to carry out specific functions. The inputs feature polarized photo couplers on each input and a 150 Ohm protection resistor is always installed in series inside. The maximum current that can circulate on each photo coupler is 20mA. The voltage supplied between pin 9 and pin 1 is +5 V dc non-stabilised.

20.6.1 GP In connection via internal activation (Relay)

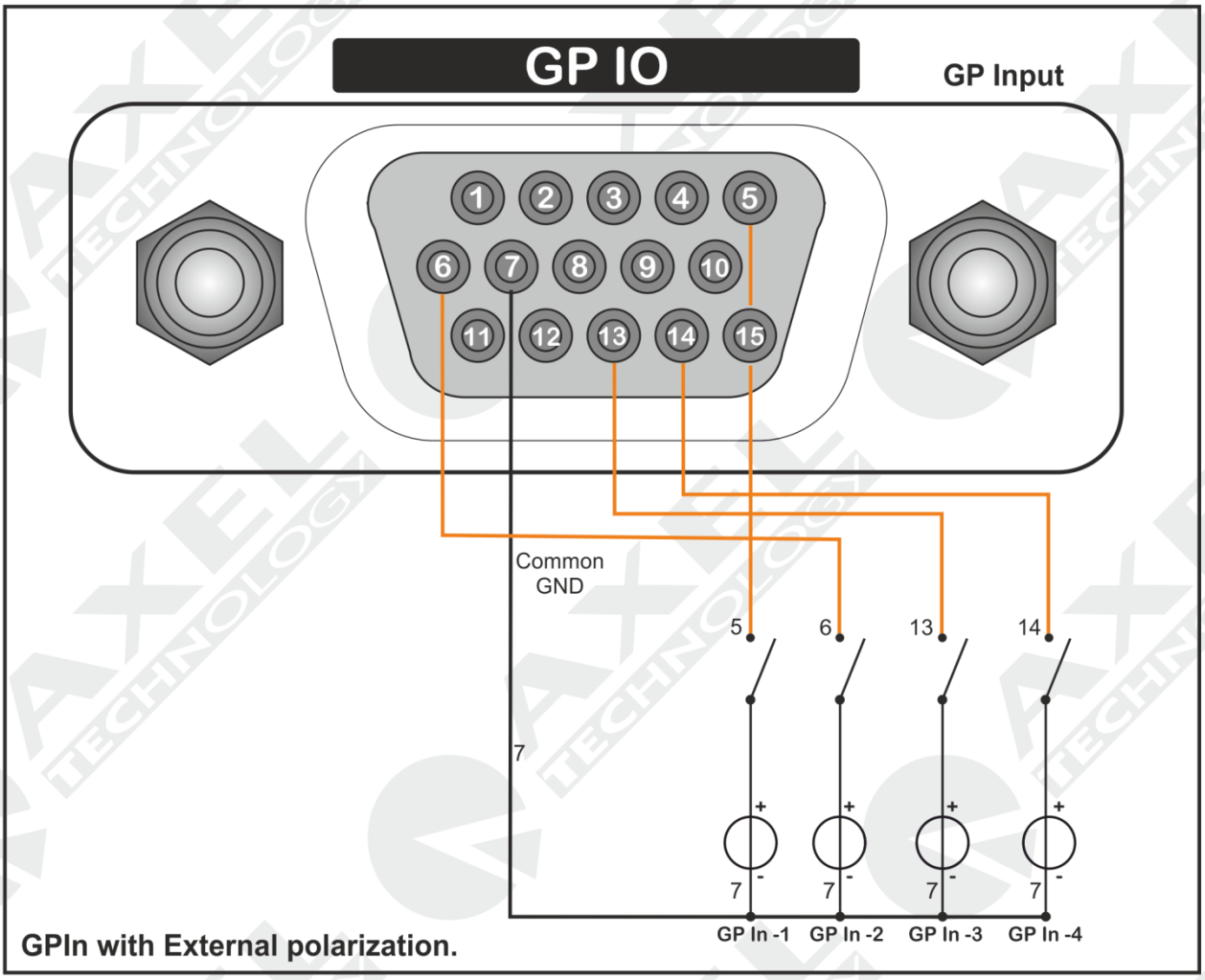
As shown in the diagram below, taking the tension from the Falcon VS's GPIO port it is possible to polarize a photocoupler and use one of the four GP Input available. Taking the +5 V from pin9 and applying it to the anode of an optocoupler and then connecting the common katode (pin7) to the mass represented by pin1 it is possible to reach the function.



GPIn with internal polarization.

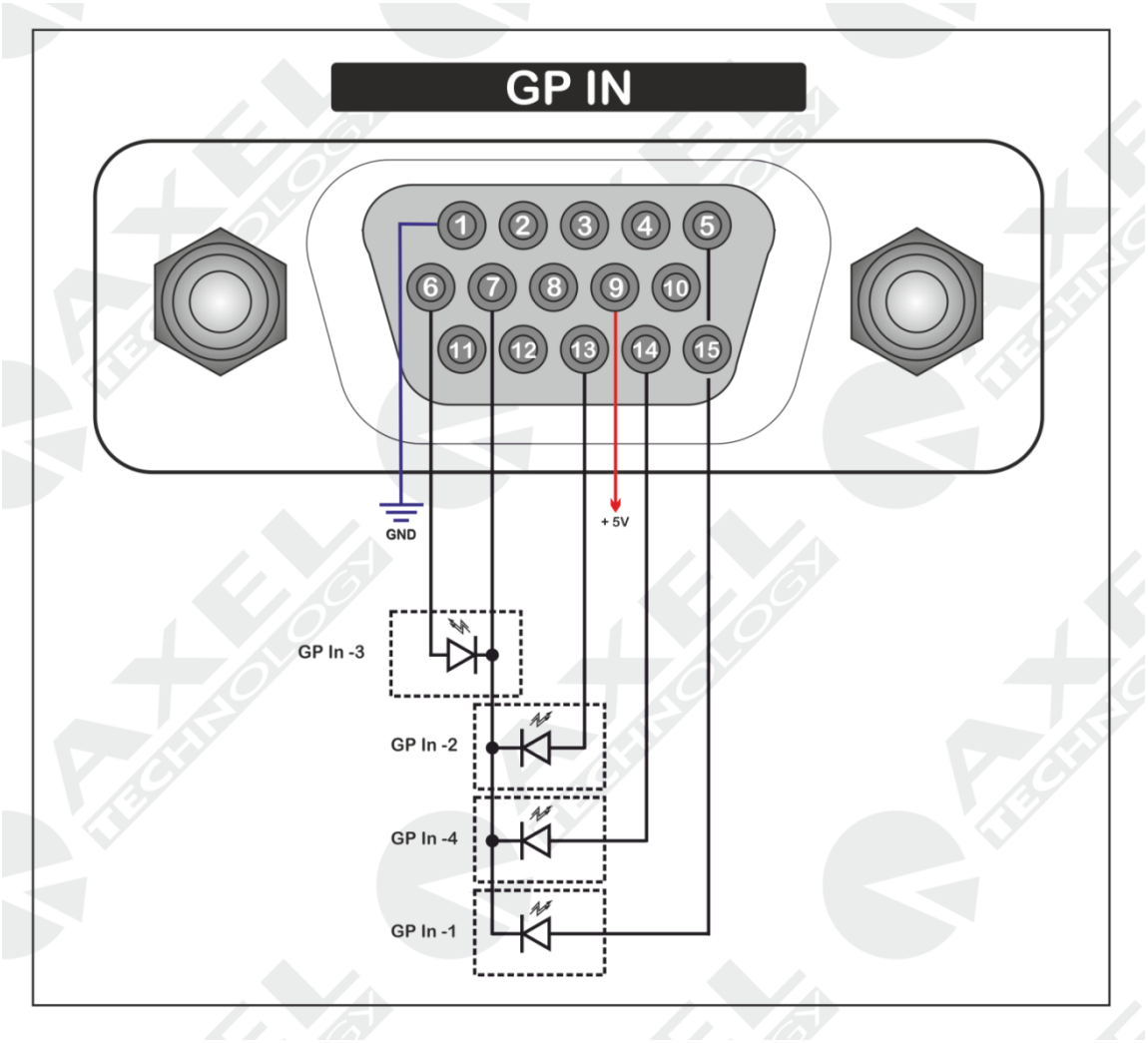
20.6.2 GP In connection via external signal activation (TTL)

As shown in the diagram below, taking the voltage externally from the Falcon VS it is possible to polarize a photo coupler and use one of the four GP Input available.
Caution: in this case the ground of the TTL signals of the generators are common.



20.6.3 GP In correspondancy (Internal view)

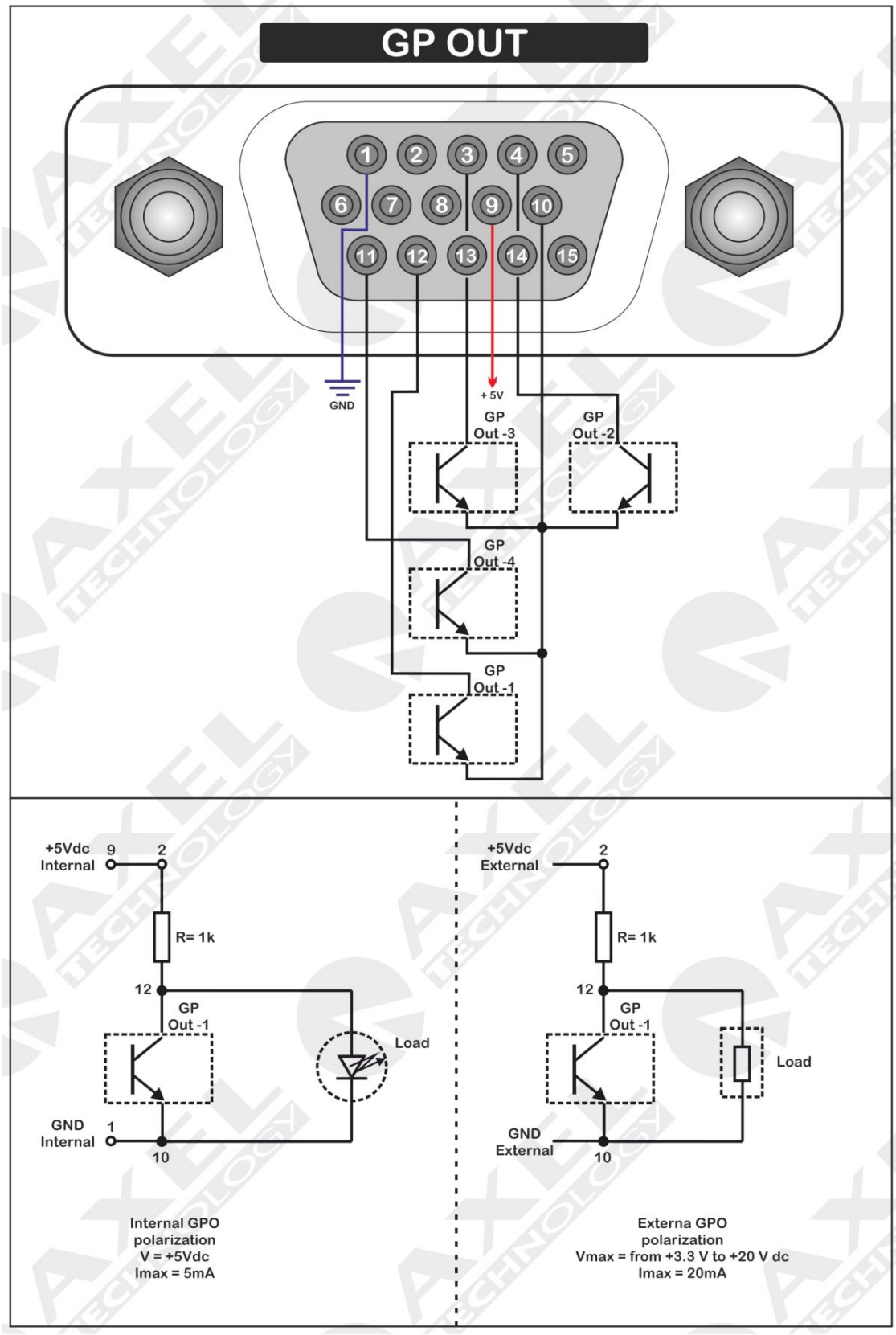
View from the back, ie within the SubD connector 15p HD. Connections correspond to the internal connections of the Falcon VS



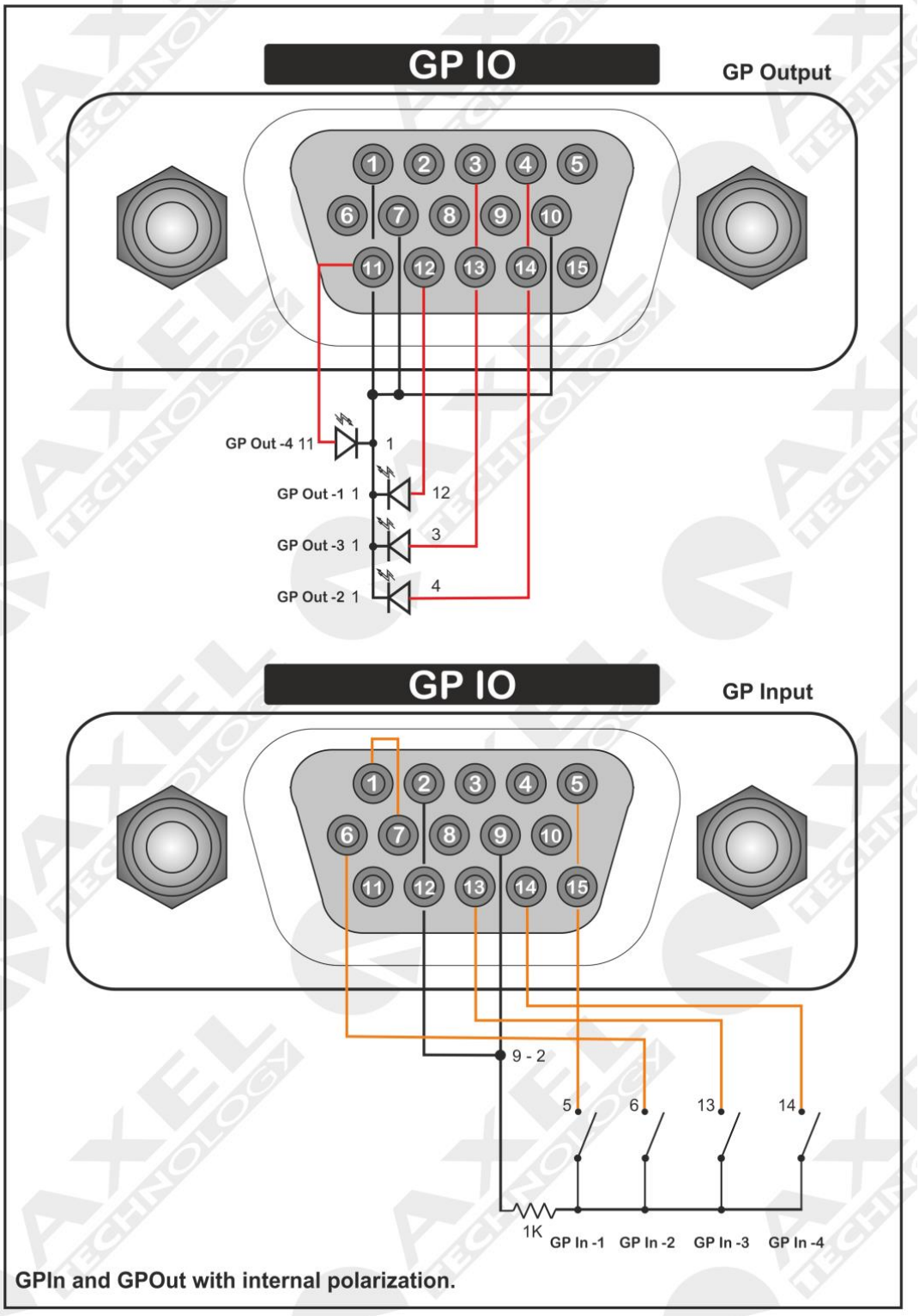
20.6.4 GP In (Optocoupler) correspondence

Optocoupler	Pin SubD 15p HD	Note
GP In -1	Anode5 – Katode7	
GP In -2	Anode13 – Katode7	
GP In -3	Anode6 – Katode7	
GP In -4	Anode14 – Katode7	
PWS	9	PSU +5Vcc
GND	1	GND – Ground

20.6.5 GP Out (Open Collector) correspondence

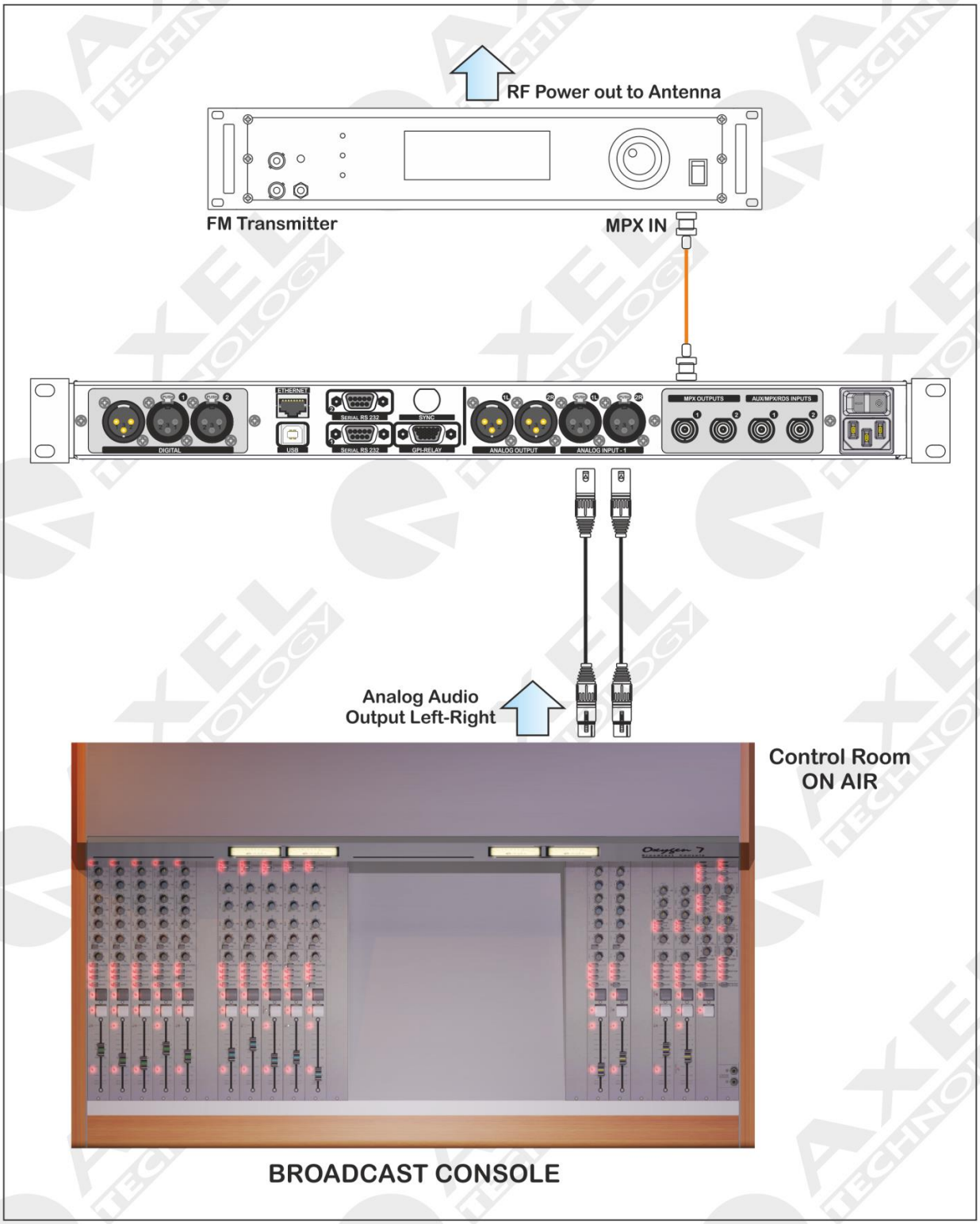


20.6.6 GP In and GP Out Correspondence – Test Board Circuit



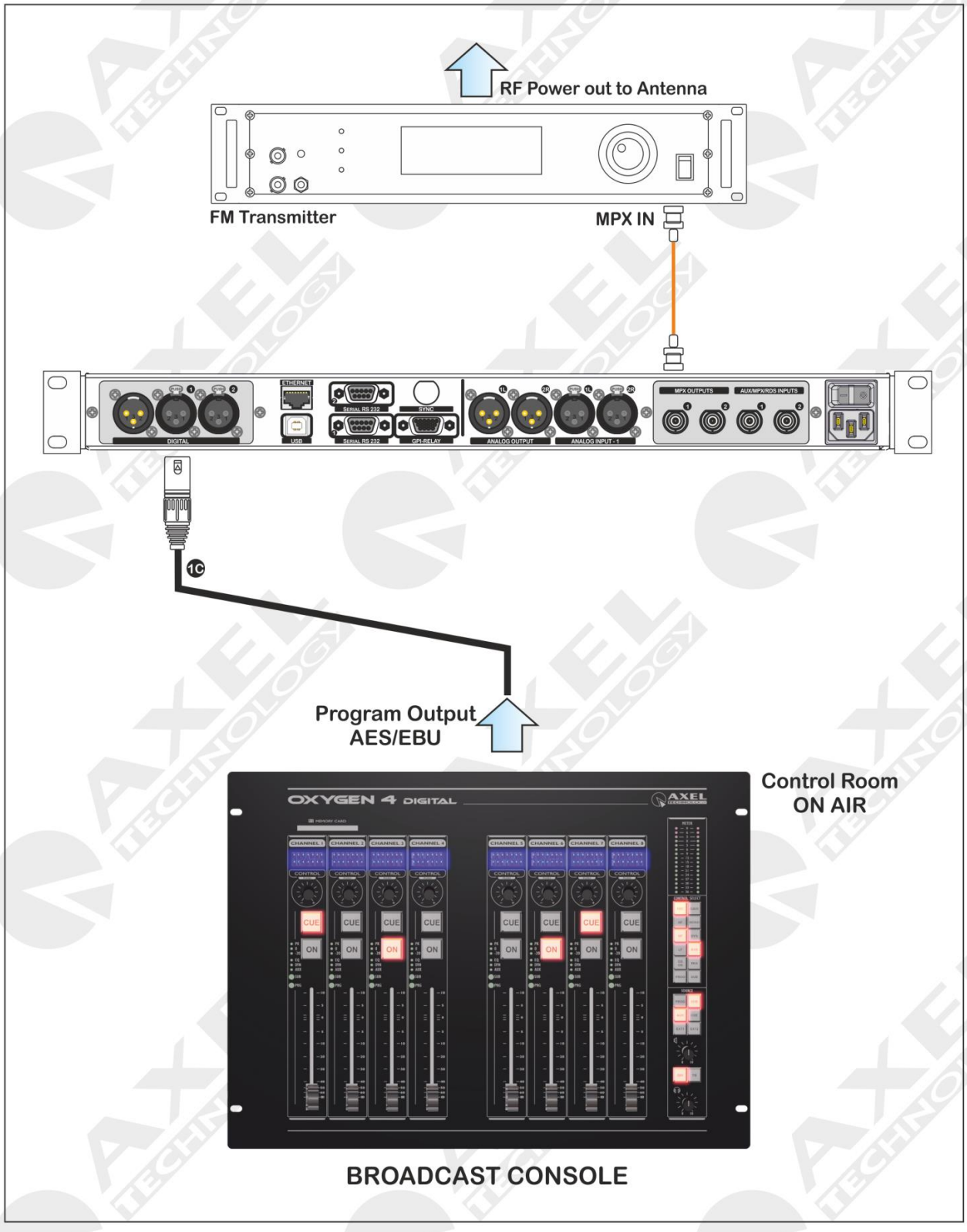
21 APPENDIX G - FALCON VS CONNECTION EXAMPLE

21.1.1 Analog connection



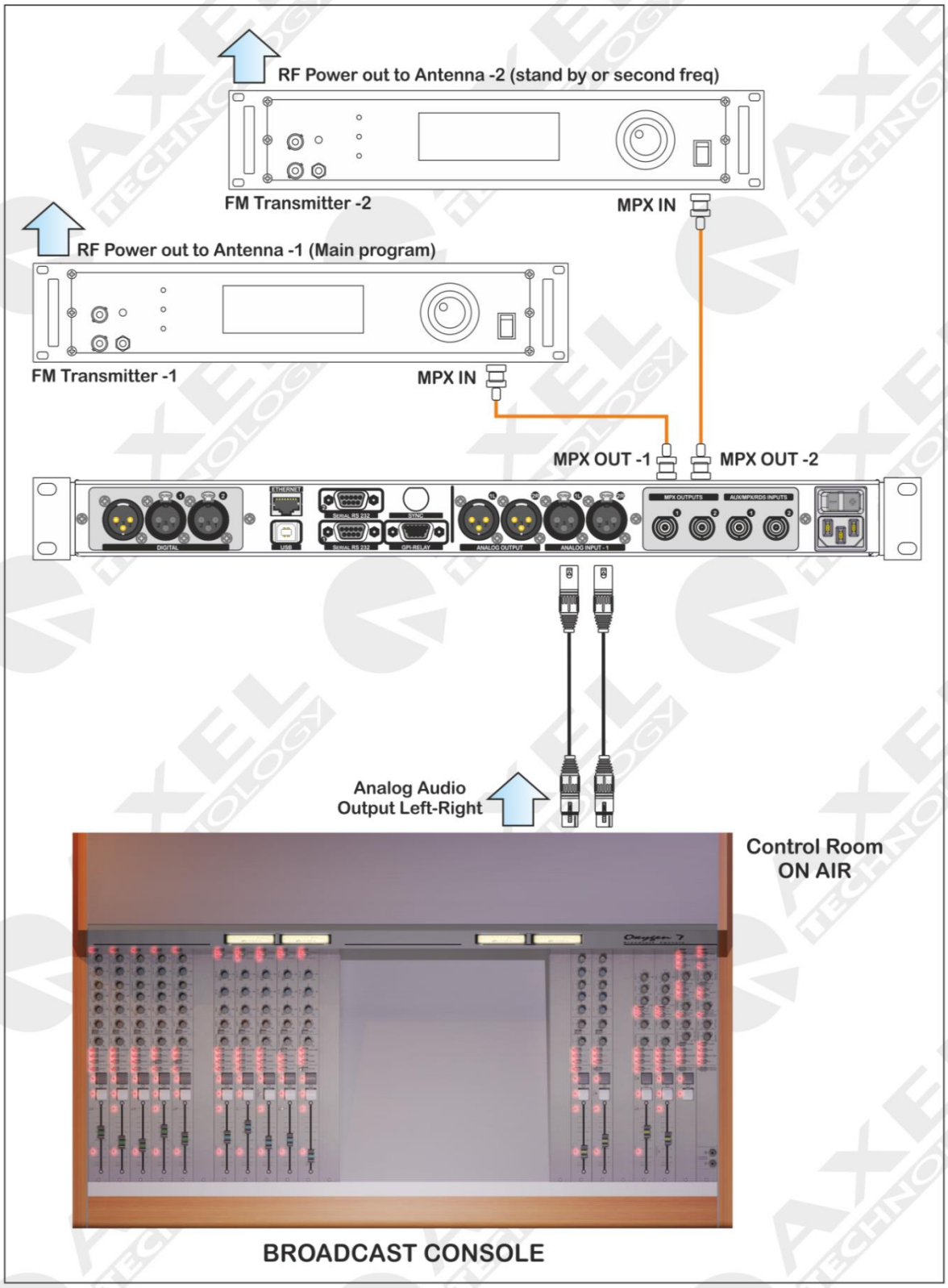
a. Falcon VS connection via analog audio. The main programme output (PGM) is sent to the Falcon VS audio processor via XLR connection. The MPX composite output is sent via BNC connection to the transmitter MPX input. The audio processor output is MPX OUTPUT -1

21.1.2 AES/EBU Digital connection



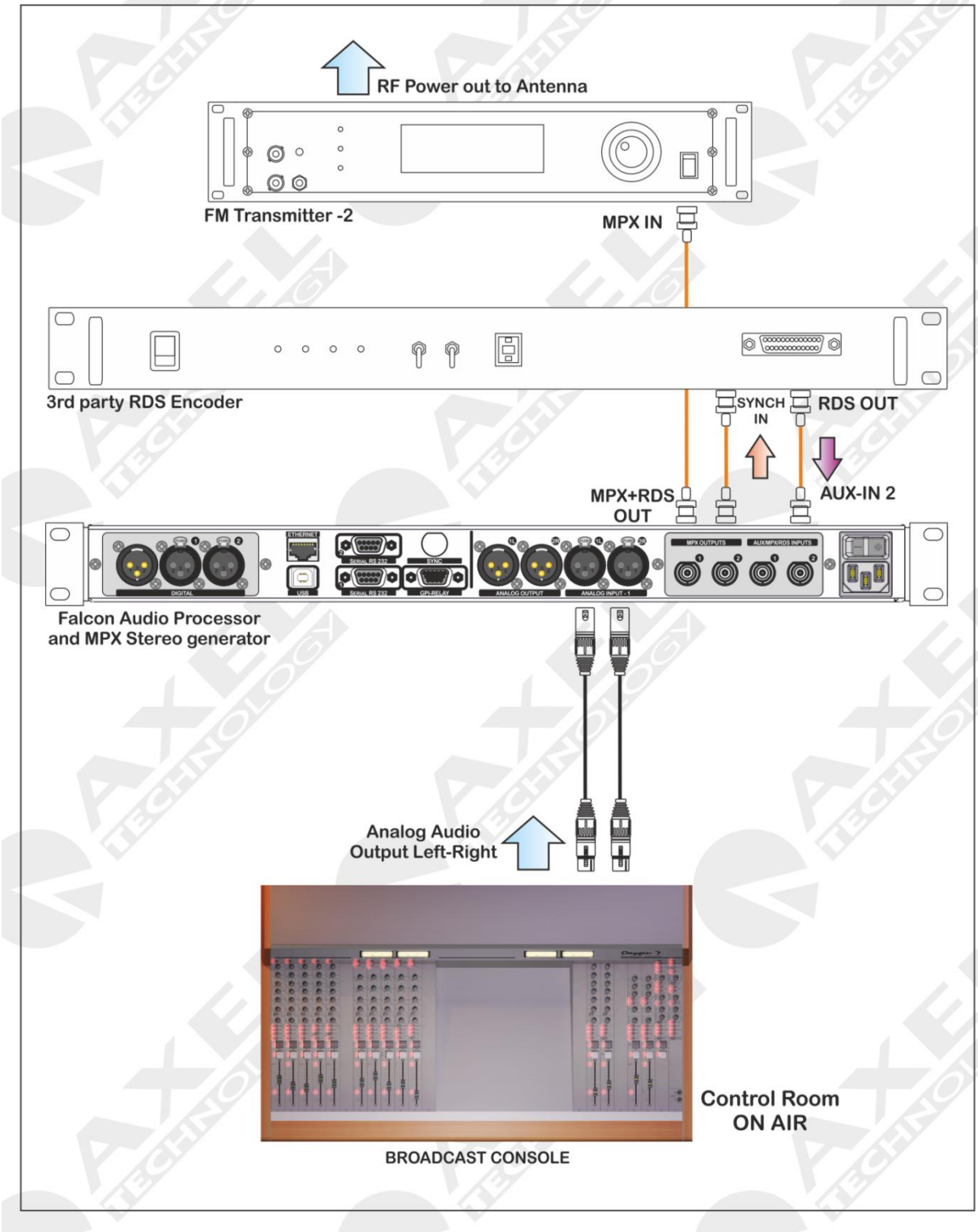
b. Falcon VS connection via AES/EBU digital audio. The main programme output (PGM) is sent to the Falcon VS audio processor via XLR cable. The MPX composite output is sent via BNC connection to the transmitter MPX input. The audio processor output is MPX OUTPUT -1

21.1.3 Analog connection and two transmitters



c. Falcon VS connection with two transmitters, i.e. a programme transmitter and standby transmitter, or two identical programme transmitters broadcasting on different frequencies via analog audio connection. The main program output (PGM) is sent to the Falcon VS audio processor via XLR connection. The MPX composite output is sent via BNC connection to the transmitter MPX input. The audio processor output is MPX OUTPUT -1

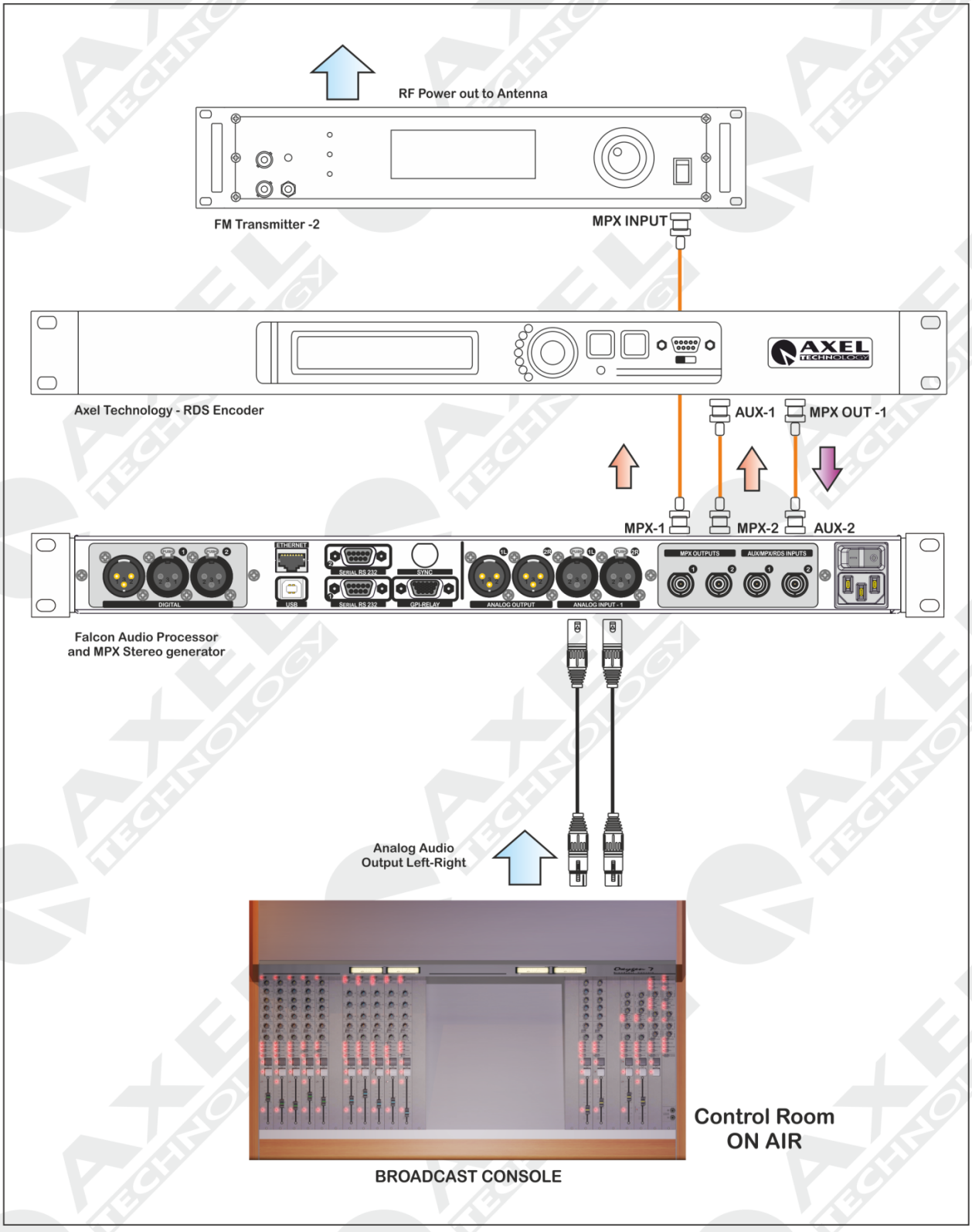
21.1.4 Analog Connection and an RDS Encoder (SideChain)



d. Falcon VS connection to a third party RDS encoder. The RDS encoder output is sent to Input AUX-2 RDS, while to provide the RDS encoder with a Sync signal for the 19kHz pilot tone, the entire programme can be taken out via MPX OUT-2. Take care not to send the same signal as is generated by the RDS encoder to MPX OUT-2; please see the section on AUX SETTINGS – SCA INPUTS.

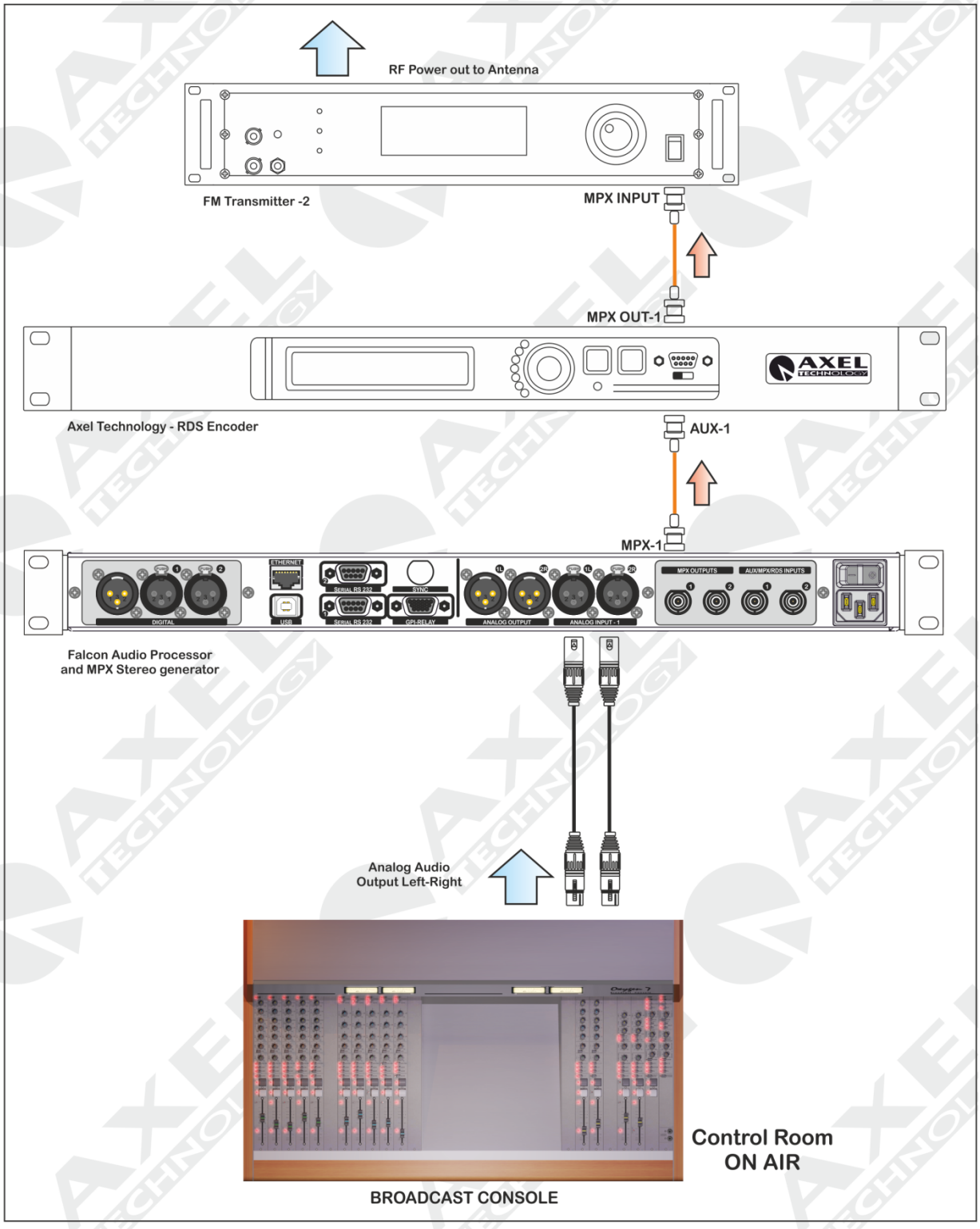
Warning: Falcon VS does not generate Sync Out signals

21.1.5 Analog Connection and an Axel Technology RDS encoder (SideChain)



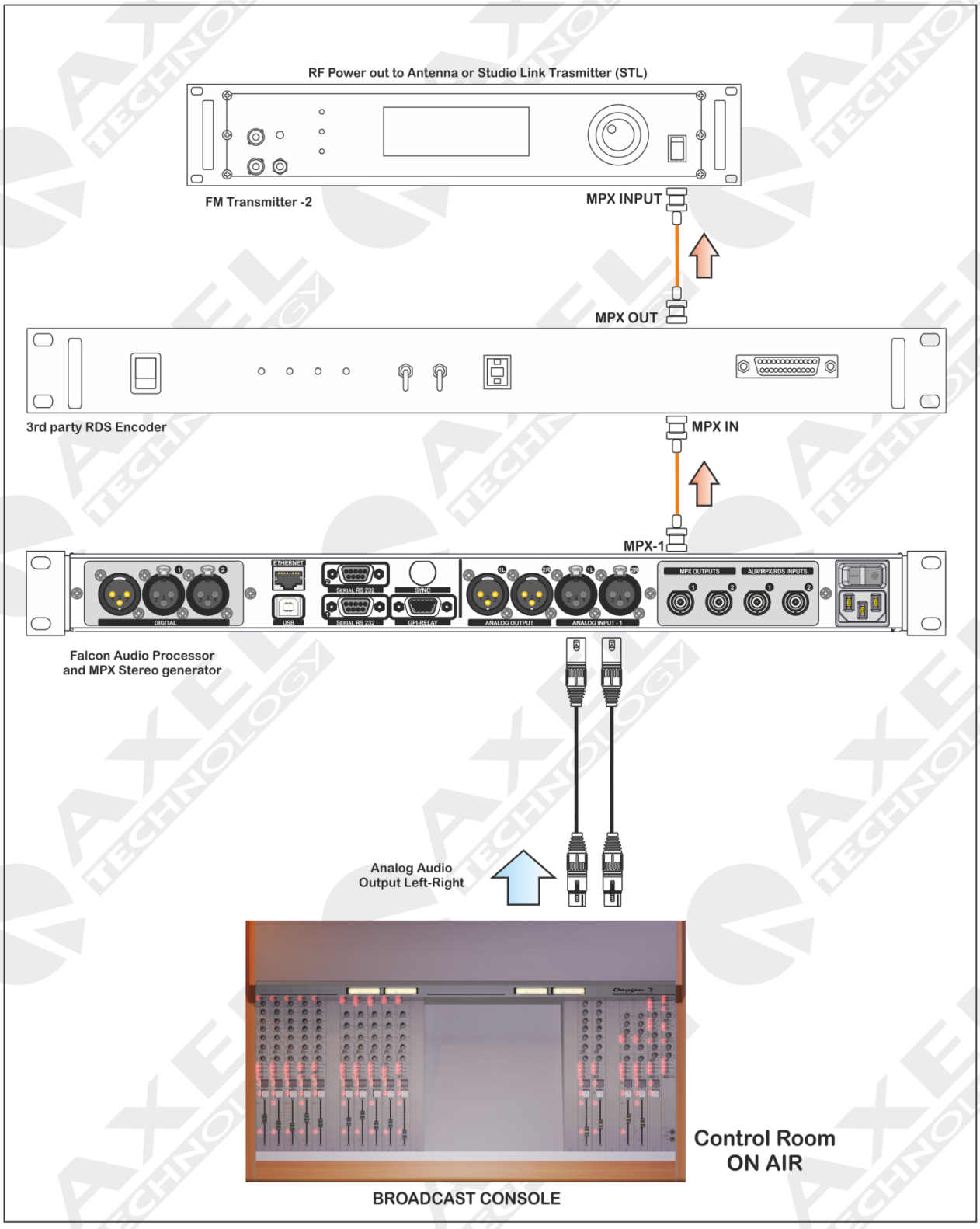
e. Side-Chain connection mode: depending on the availability of a reference Sync signal that can be taken from MPX OUT 2 (use of the stereo generator 19 kHz clock) it is much easier to lock the signal RDS phase at the pilot frequency. This greatly facilitates elimination of any intermodulation components that may exist between the pilot and the RDS signal.

21.1.6 Analog Connection and an Axel Technology RDS encoder (Loop-Through)



f. Loop-through mode, the output of the Falcon Audio Processor is wired directly to the input AUX 1 of the RDS encoder. The output of the RDS encoder will be connected to the normal input composite / MPX transmitter FM exciter. Thus as noted, this configuration is not recommended, because the composite signal / MPX passes through the RDS encoder and the transmission of the program will be interrupted in the event of failure of the RDS encoder, in case you do NOT use of encoders Axel Technology which always include the Hardware Bypass between AUX1 and MPXOUT MPXOUT-1 and-2. RDS subcarrier phase will be locked to MPX stereo FM signal on the outside. (see user guide RDS encoder)

21.1.7 *Analog Connection and a RDS Encoder (Loop-Through)*



g. Loop-through mode, the output of the Falcon Audio Processor is wired directly to the input of the RDS encoder input. The output of the RDS encoder will be connected to the normal input composite / MPX transmitter FM exciter. Thus as noted, this configuration is not recommended, because the composite signal / MPX passes through the RDS encoder and the transmission of the program will be interrupted in the event of failure of the RDS encoder.

22 APPENDIX F – FIRMWARE UPDATE PROCEDURE

The most recent firmware version is installed by the manufacturer on the Falcon VS before it is delivered. Once purchased, the firmware can be updated with the latest version available. The Firmware Upgrade can be carried out using the Windows operating system. The suitable operating systems are: Windows Xp Sp3, Windows Vista and Windows 7 Ultimate 32/64 Bit. Check that Microsoft.net 4 is installed on the operating system; if this is not the case, go to www.microsoft.com for the installation.

To upgrade the processor follow the procedure below:

Following the initialisation of the device (firmware upgrade), all the user's settings and adjustments may be deleted and/or overwritten by the manufacturer's new configuration! Save your current configuration in a document outside the device before upgrading the firmware.

In the firmware upgrade phase remember to install the new version of the associated software for remote control of the PC. There is a direct correspondence between the firmware and software versions. For example the PC software version 3.0 requires installation of the firmware version 3.0 on the unit and vice versa. More precisely, the first two digits must correspond; in so far as possible, the sub-versions (identified by the third digit) are not involved in the firmware/software compatibility.

As a general rule, the *X.Y.Z* software version is executed with the X.Y.*K* firmware version

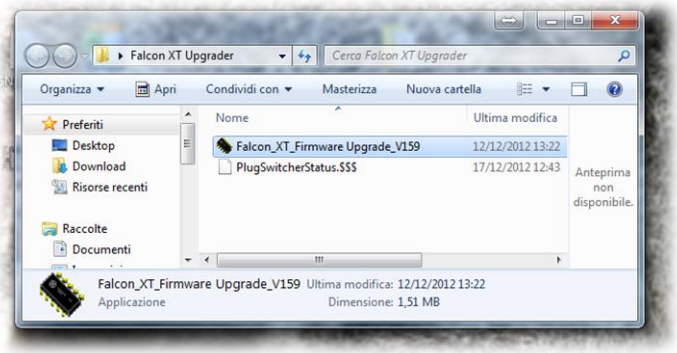
22.1 PREPARING THE DEVICE FOR UPGRADING

To correctly update or upgrade a Falcon VS device, use an Rs232 COM Serial port. If the port is native on the PC's motherboard, the port characteristics do not need to be set; if USB-to-Serial adaptors are used, then - in some cases - it may be necessary to set certain port data, such as speed and stop bits. The software upgrader operates with the following port values:

38,400bps, 8-N-1

Follow each step of these instructions to correctly execute the upgrade:

a. Close all open applications.
b. Access the "Fw UpGrades" folder
c. Double click on the FILE ASSOCIATED with the required upgrade:
d. Launch the program: Upgrader_V2xx.EXE



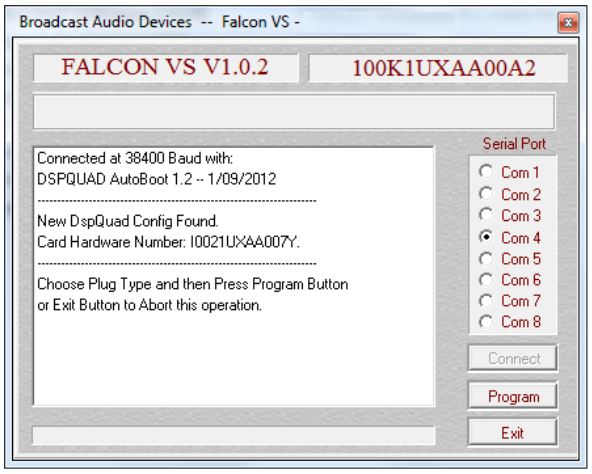
e. Falcon VS_Upgrader_V201.exe

NB: *to check the current version of your Falcon VS, enter the Firmware Version page from the system information menu.*

f. Select the **PC serial port** on the screen and switch off the Falcon Vs

g. Switch on the Falcon VS device and in timing between 1 and 3 second after the switch on push the CONNECT button. To be sure, after the switch ON wait just one second.

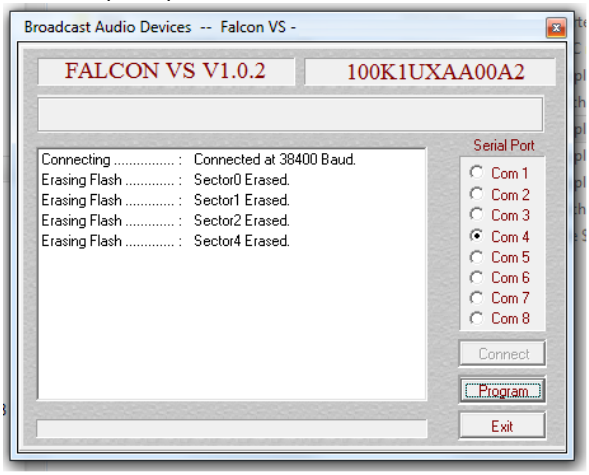
h. **Once the software is connected** to the Falcon VS device, the following page will appear: At the same time the front display of the device **remains completely blank**, showing nothing.



i. Once the Falcon VS is connected to the software, click **PROGRAM**

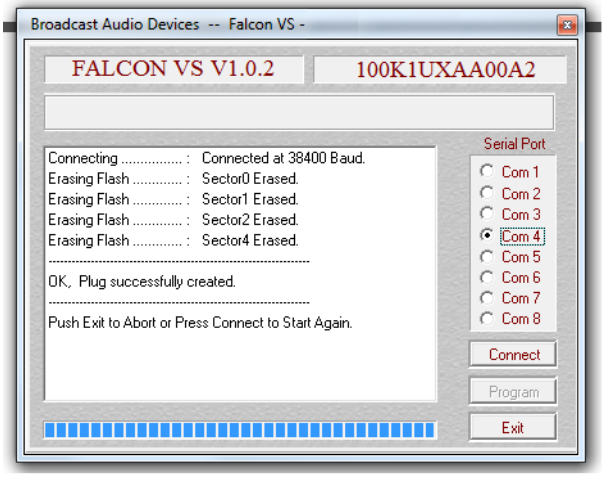
j. The Firmware upgrade will start; at the end, click **EXIT**, then switch the Falcon VS off then on again.

k. Do not stop or switch off or close the upgrade software, as this could impair operation of the device.



l. When it's done press **EXIT**.

m. Then switch OFF and then ON the Falcon VS



Do not stop and do not turn off or close the software update, as this may compromise the operation of the equipment. If error was less than the power or there were no errors at this stage, you may need to send the machine back at Axel Technology for repair.

23 TECHNICAL SPECIFICATION - FALCON VS

GENERAL	*VALUE*
Dimension	434x351x44mm (1 rack unit)
AC Rate	230Vac / 110Vac 50 Hz / 60 Hz 30VA
Type of power supply	Universal switching power supply
Processing architecture	Fully digital, based on DSP 24bit/100Mhz. Signal processing is performed by phase linear filter
Operative Delay	Total processing chain audio 8 mS. With Limiter LookAhed around 18 mS
Weight	≈ 5 Kg
Operating Temperature	-5°C / +50°C
ANALOG INPUT MODULE	
A/D Conversion	24bit Sigma-Delta Conversion (Crystal CS4272)
Connectors:	XLR, female - Electronically balanced
AD Clipping Point	+19.5 dBu
Operative Nominal Level:	From –10.0dBu to +12.0dBu (0.1dBu Step)
Line Impedance	10 kΩ (Electronically balanced selectable) EMI–suppressed
Distortion:	less than 0.01% TDH+NOISE (0.0dBu 1Khz)
AD Dynamic Range:	105 dB RMS (110 dB A weighted)
Input Modes:	Stereo, Mono (Left), Mono (Right), Mono (Left+Right)
DIGITAL INPUT MODULE	
Connectors:	XLR, female – Electronically balanced
Format	AES3/EBU
Sample rates	32 kHz / 44.1 kHz / 48 kHz / 64 kHz / 88.2 kHz / 96 kHz with src and jitter correction
Operative Nominal level:	From 0.0 dBFs to -24dBFs (0.1 dBu step)
Dynamic Range:	117 dB (Typ), 122 dB (Min)
Distortion	less than 0.01% TDH+NOISE (0.0dBu 1 kHz)
Input Modes:	Stereo, Mono (Left), Mono (Right), Mono (Left+Right),
ANALOG OUTPUT MODULE	
D/A Conversion	24 bit Sigma-Delta Conversion (Crystal CS4272)
Connectors	XLR, male - Electronically balanced
Output Level	-6.0dBu to +20.0dBu (0.1dBu Step) – Max (+19dBu)
Impedance Source	10 Ω
Load Impedance	600 Ω or greater
Distortion	Less than 0.01% TDH+NOISE (0.0dBu @ 1 kHz)
DIGITAL OUTPUT MODULE	
Connectors:	XLR, Male – Electronically balanced
Format	AES3/EBU
Sample rates	32 kHz / 44.1 kHz / 48 kHz / 64 kHz / 88.2 kHz / 96 kHz with src and jitter correction
Resolution	16 bit – 20 bit – 24 bit
Operative Nominal level:	From 0.0 dBFs to -25.0 dBFs (0.1 dBu step)
Dynamic Range:	125 dB (Typ), 122 dB (Min)
Distortion	less than 0.01% TDH+NOISE (0.0dBu 1 kHz)
Input Modes:	Stereo, Mono (Left), Mono (Right), Mono (Left+Right)
MPX, RDS and MPX+RDS OUT	
Output Connectors	Two BNC, EMI suppressed. MPX1 and MPX2 are singly managed
Load Impedance	600 Ω or greater
Source impedance	10 kΩ
D/A Conversion	Burr Brown 1738
Maximum Load Capacitance	5nF
External MPX summation	External MPX or RDS injected into Aux1 and/or Aux2 software selectable
Composite output level	- 6.0dBm to +12.0 dBm (0.1 dBm step)

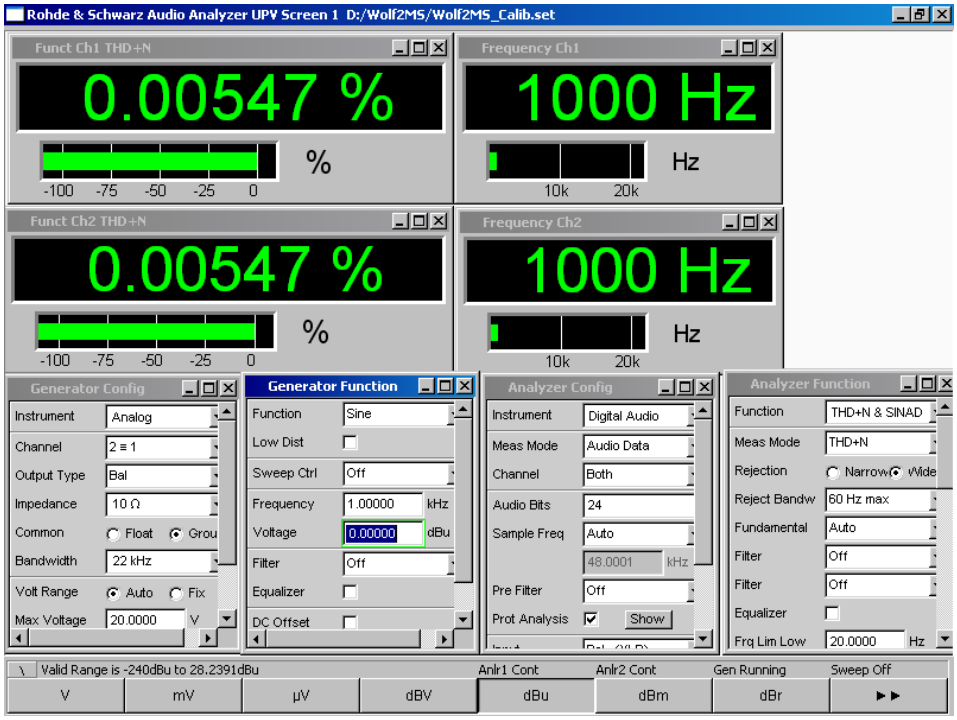
MPX Stereo Generator	
Pilot Frequency	19 KHz +/- 1Hz
Pilot Injection	Adj from –25.5 dB to –14.5 dB (0.1 dB step); 6 to 18% of total deviation
Pilot Stability:	±10 ppm (-10 to +55 °C)
Pilot Phase	Adjustable +/- 12 deg. (1 deg step)
Pilot distortion	0.07 % (typical)
Pilot distortion + Noise	0.002% (on 80 kHz Band)
MPX S/N	> 88 dB (on 100 kHz band)
Composite out THD	0.017 % (typical on the whole band)
Stereo Separation	>70 dB (typical on the whole band)
Linear Crosstalk:	≤ –80 dB, main channel to sub-channel or sub-channel to main channel (referenced to 100% modulation).
Crosstalk Main to Sub / Sub to Main	> 65 dB (minimum)
Composite Clip Drive:	+0.0 to +6.0dB (0.1dB step), software controlled (manually or automatically)
Digital filtering / band	30 Hz to 15 kHz (-0.1 dB), 17 kHz (-70 dB), 19 kHz (-100 dB)
57 kHz (RDS/RBDS) Protection	Better than 51 dB
38KHz suppress.	< - 80dB (typical)
Pre-emphasis	Off, 50uS, 75uS (+-0.1dB)
Freq Response	±0.3 dB (30Hz-15kHz)
Operation	Mono /Stereo
TEST CONDITIONS:	*Signal processing is performed by phase linear filters / all measurements referenced to 100% modulation unless otherwise noted. OUT LEVEL = +12 dBm, LOAD= 600 Ohm, PILOT LEV= -20 dB MODE=STEREO*
AUX1 and AUX2 (SCA IN)	
Connector Type	2x BNC female, EMI suppressed
Pass-through Level	-20.0 dB to + 20.0 dB software adjustable
Frequency response	30 Hz ÷ 80 kHz +/- 0.1 dB
Distortion	< 0.02 %
Input Impedance	> 10 kΩ
SYNCH OUT	*(available as Option)*
Connector Type	*Optional* over BNC, EMI suppressed
Purpose	TTL-level (5Vpp) 19 kHz Pilot Ref. Out for synchronizing external RDS coders.
Sync Out phase error	± 2 degrees (maximum)
RDS Signal Generation	*(available as Option)*
RDS Signal generation	DSP-based , compliant to CENELEC EN 50067
Coding	Differential and bi-phase
Modulation	Amplitude modulation double side band, with suppressed carrier DSBSC
Subcarrier frequency	57 kHz ± 3 Hz
Bandwidth	± 2.5 kHz (- 60 dB) ± 3.0 kHz (- 80 dB)
Linear Distortion	0.01 dB
RDS output level	-20.0 dB to -44.0 dB with 0.1 dB/Step
RDS phase	adj ± 120 deg (referred to MPX pilot). 1 deg step
RDS Programming	
RDS Command formats	fully compliant to UECP Forum document SPB 490 (Version 6.02) plus extended manufacturer ‘s commands list
Static services supported	PS - Programme Service
	PI - Programme Identification
	ECC - Extended Country Codes
	PTY - Programme-type
	PTYN - Programme Type Name
	TP - Traffic-programme
	TA - Traffic-announcement
	MS - Music Speech
	DI - Decoder Identification

	AF - Alternative Frequencies
	PIN - Programme-item number
	EON - Enhanced Other Networks
	CT - Clock-time and date
	RT - Radio Text
	LA - Linkage Actuator
	EG - Extended Generic indicator
	ILS - International Linkage Set indicator
	LSN - Linkage Set Number
	LIC - Language Identification Code
	SLC - Slow Labeling Code
Groups	0A, 0B, 1A, 1B, 2A, 2B, 3A, 3B, 4B, 5A, 5B, 6A, 6B, 7A, 7B, 8A, 8B, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B, 13A, 13B, 14A, 14B, 15B
Data Sets	2, with recall by UECP Command, GPI and software control
AF lists for each Data Set	64, containing up to 25 freq each one
PS animation	Capability to transmit PS in sequences (composed by up to 60 PS) and in scrolling mode (up to 64 chars long text). Scrolling mode user controls: number of repetitions, step size, scrolling speed.
RT messages for each Data Set	16 with A/B flag control (one of which programmable accordingly to UECP)
Scheduler	Manufacturer's specific application, with capability to program up to 64 events (PS, PTY/PIN) to occur at any time with duration from 1 minute to 1 year
REMOTE INTERFACE	
Digital Inputs GPIn	4x GP In opto coupled
Digital Outputs GPOut	4x GP Out Open Collector opto isolated
Serial Interface	2x RS-232 Serial protocol ports EMI filtered
USB	1x Universal Serial Bus port – B type EMI filtered
Ethernet Port and Parser ASCII protocol	Ethernet port by option, over RJ45 connector with web server interface. The Ethernet port allows also one more Rs-232

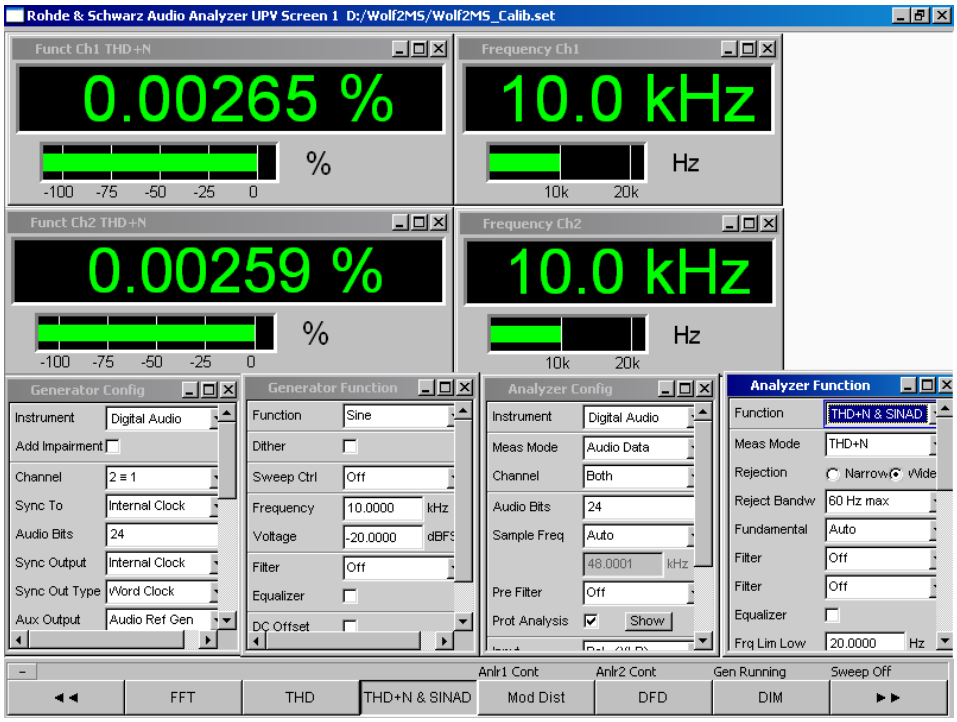
24 TEST ON LABORATORY

Test Report done in laboratory using UPV – R&S and Texas Instruments device

24.1.1 Analog Input to Digital Output THD+N



24.1.2 Digital Input to Digital Output THD+N



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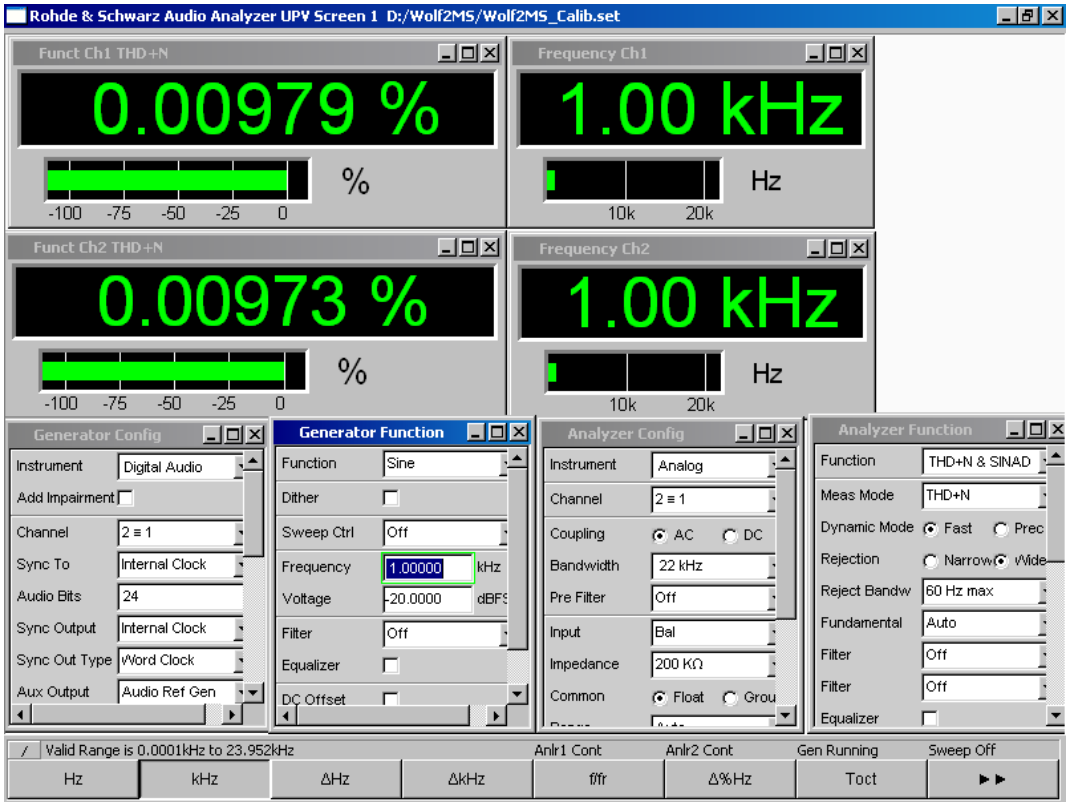
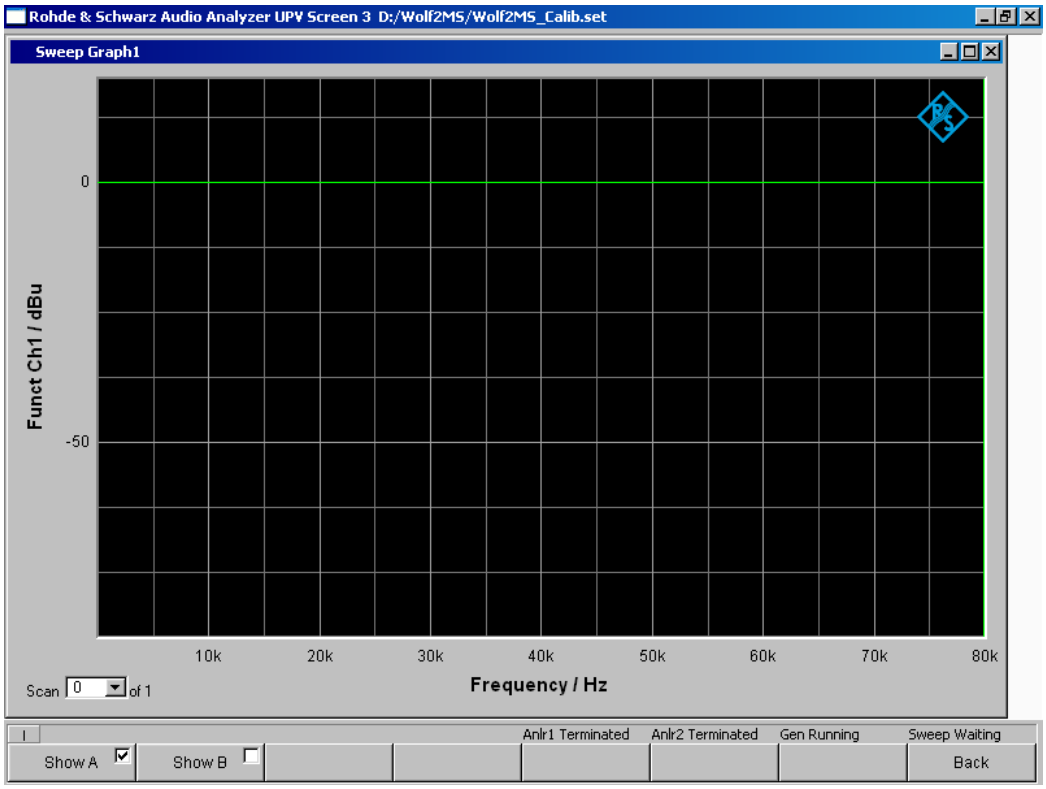
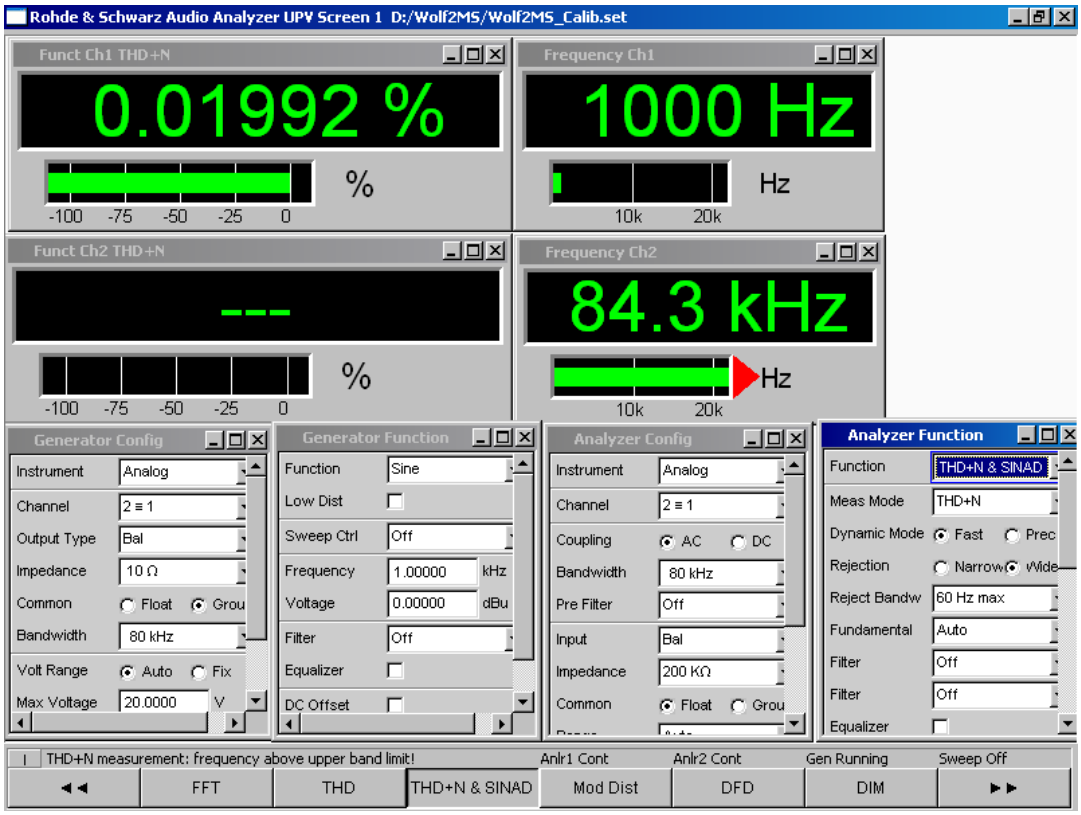
25.1.1 Digital Input to analog Output THD+N



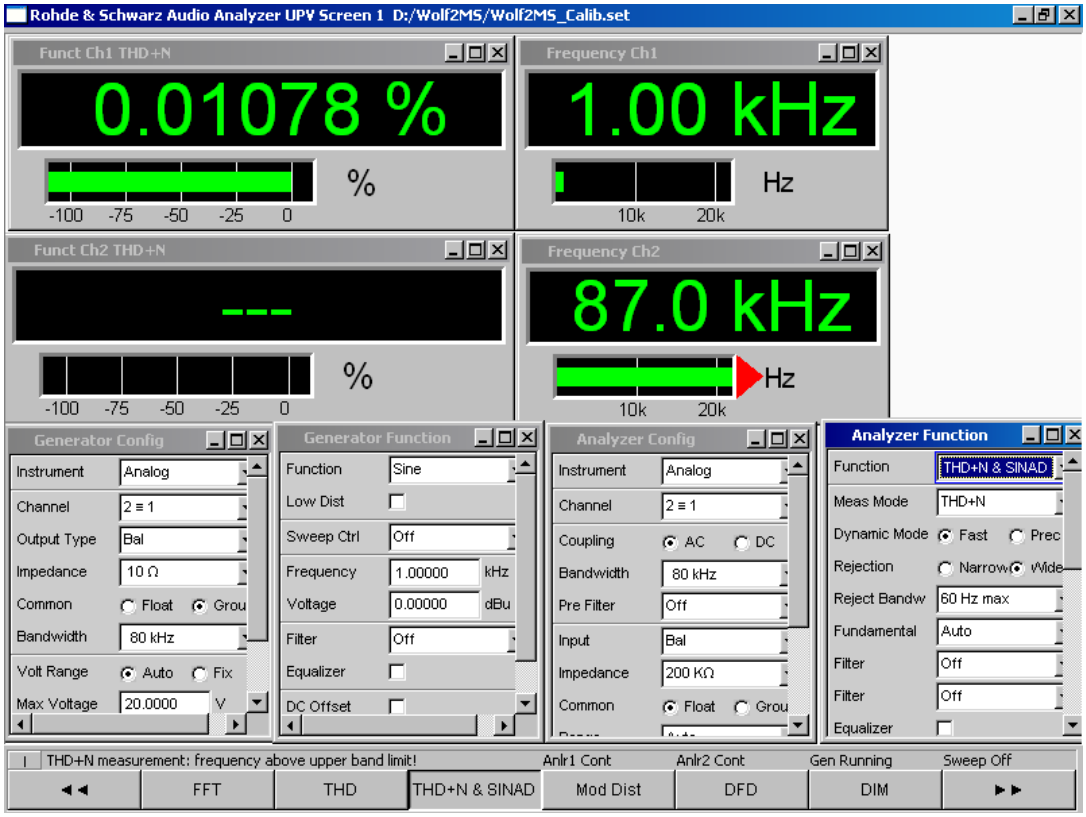
25.1.2 AUX1-MPX1 Linearity



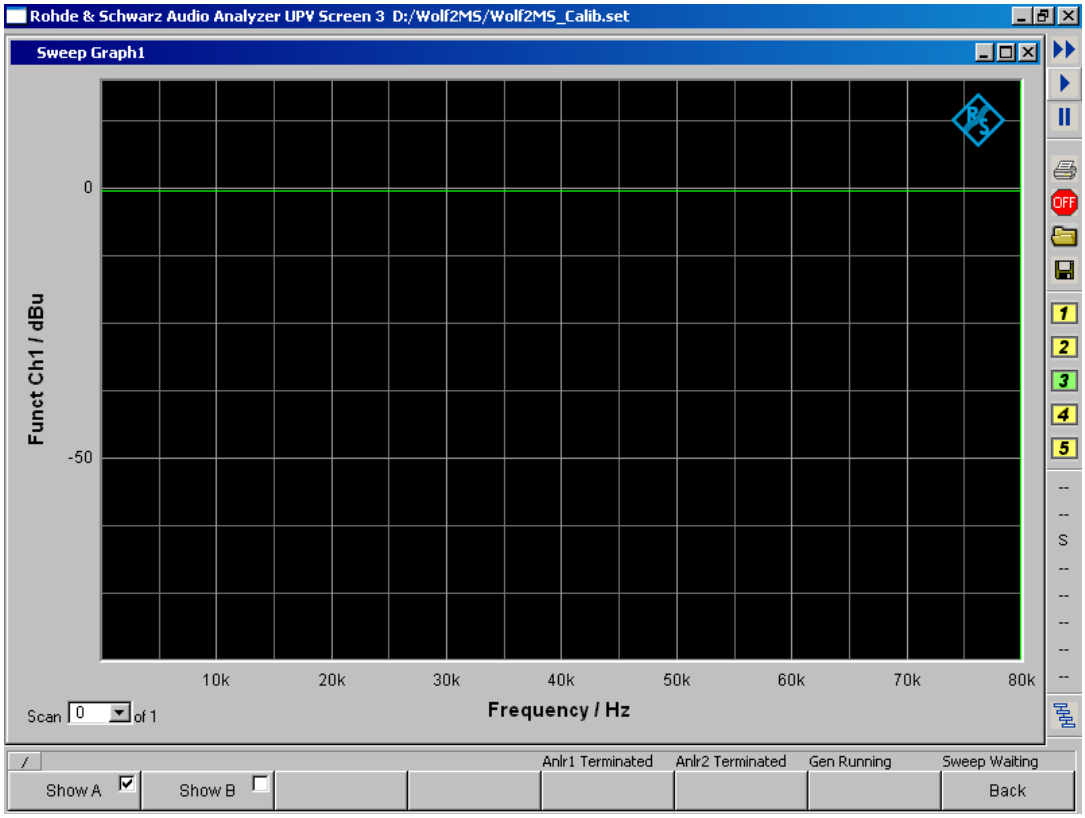
25.1.3 AUX1-MPX1 THD+N



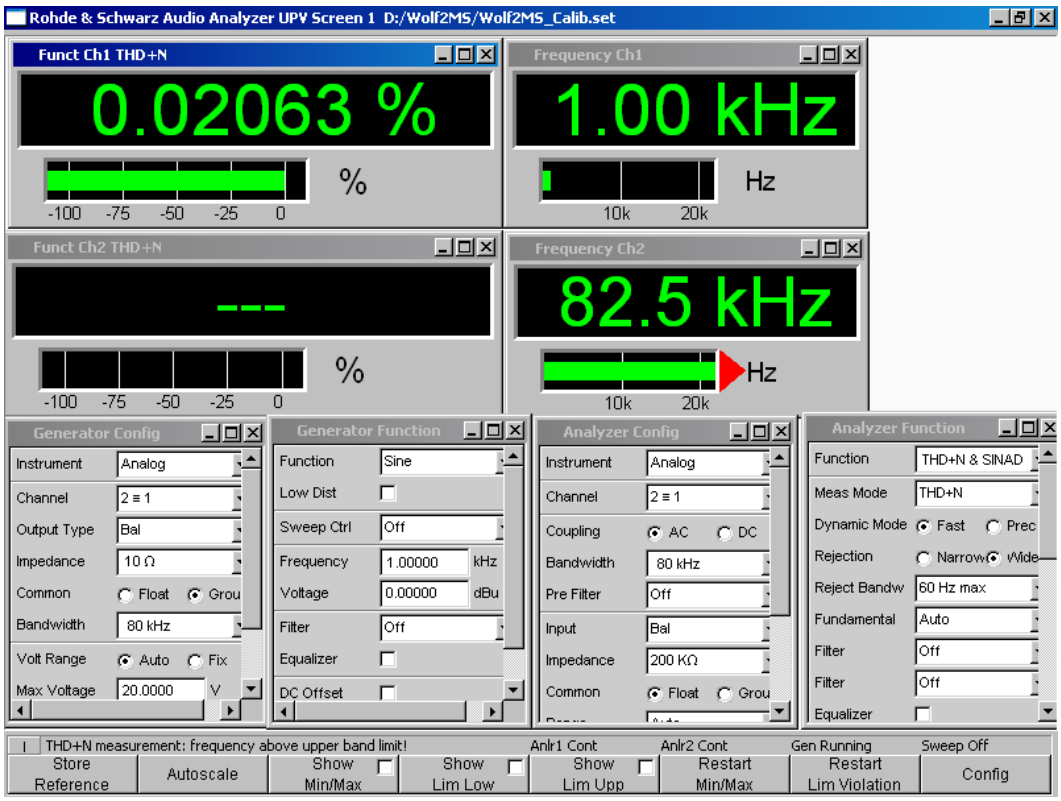
25.1.4 AUX2-MPX1 THD+N



25.1.5 AUX2-MPX1 Linearity



25.1.6 AUX1-MPX2 THD+N



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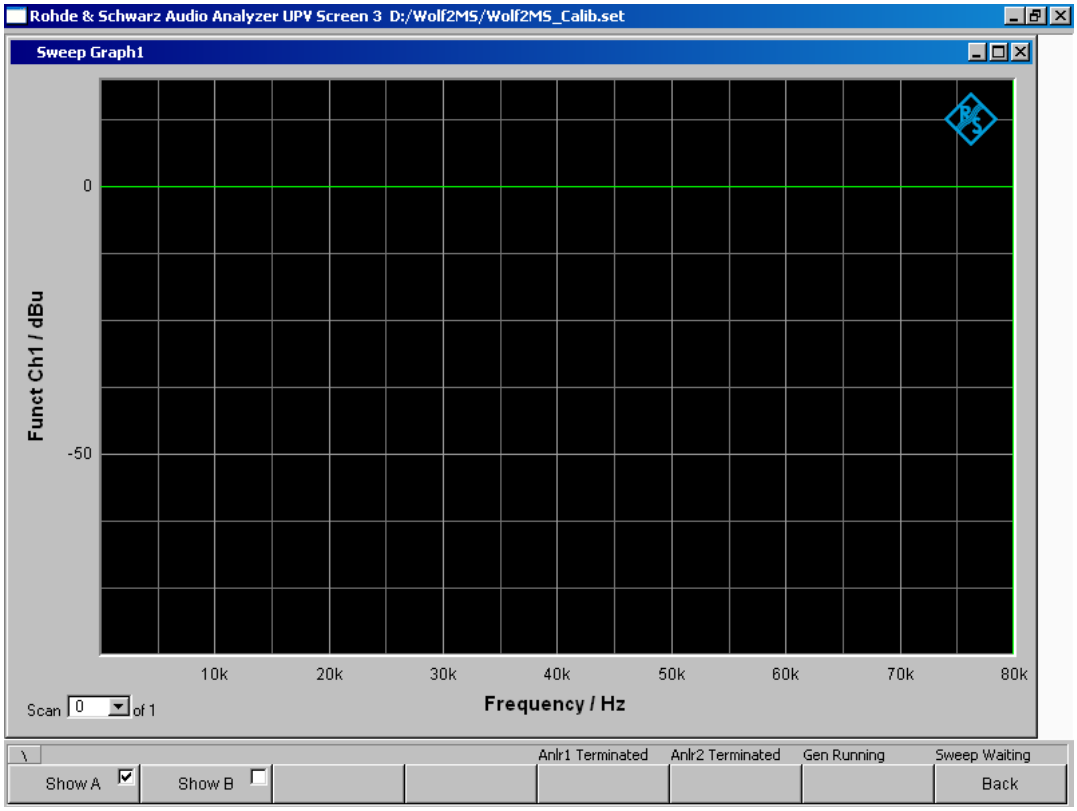
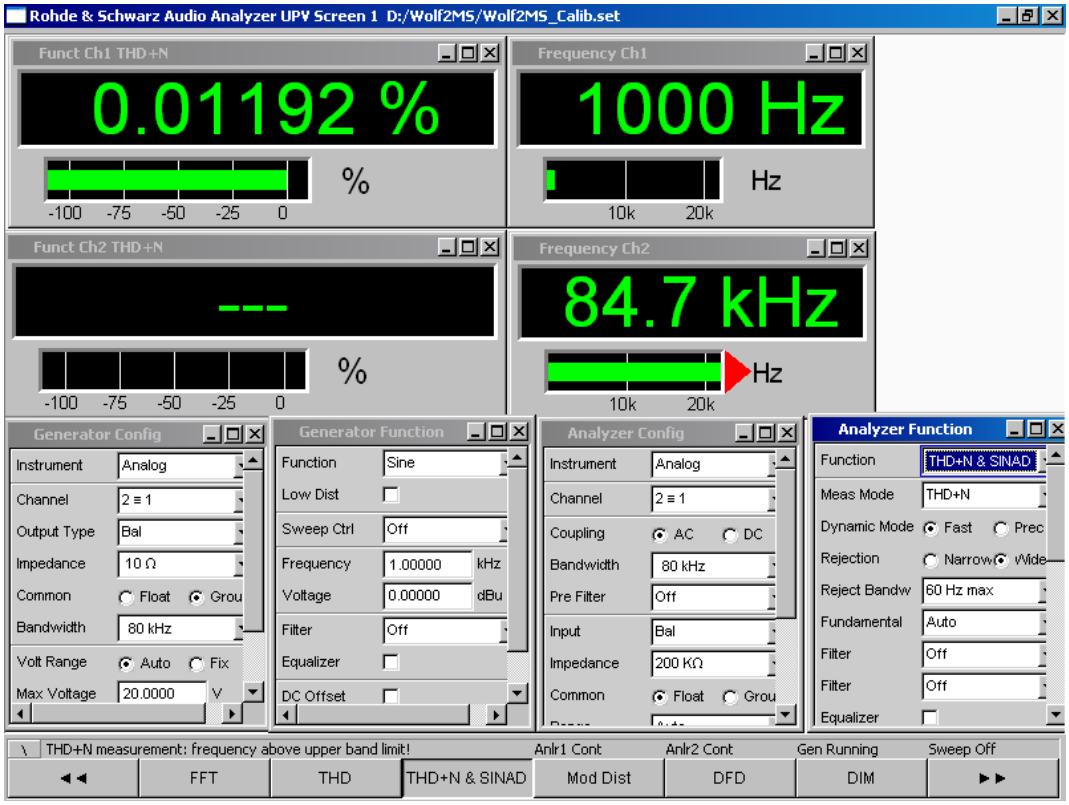
25.1.7 AUX1-MPX2 Linearity



25.1.8 AUX2-MPX2 THD+N



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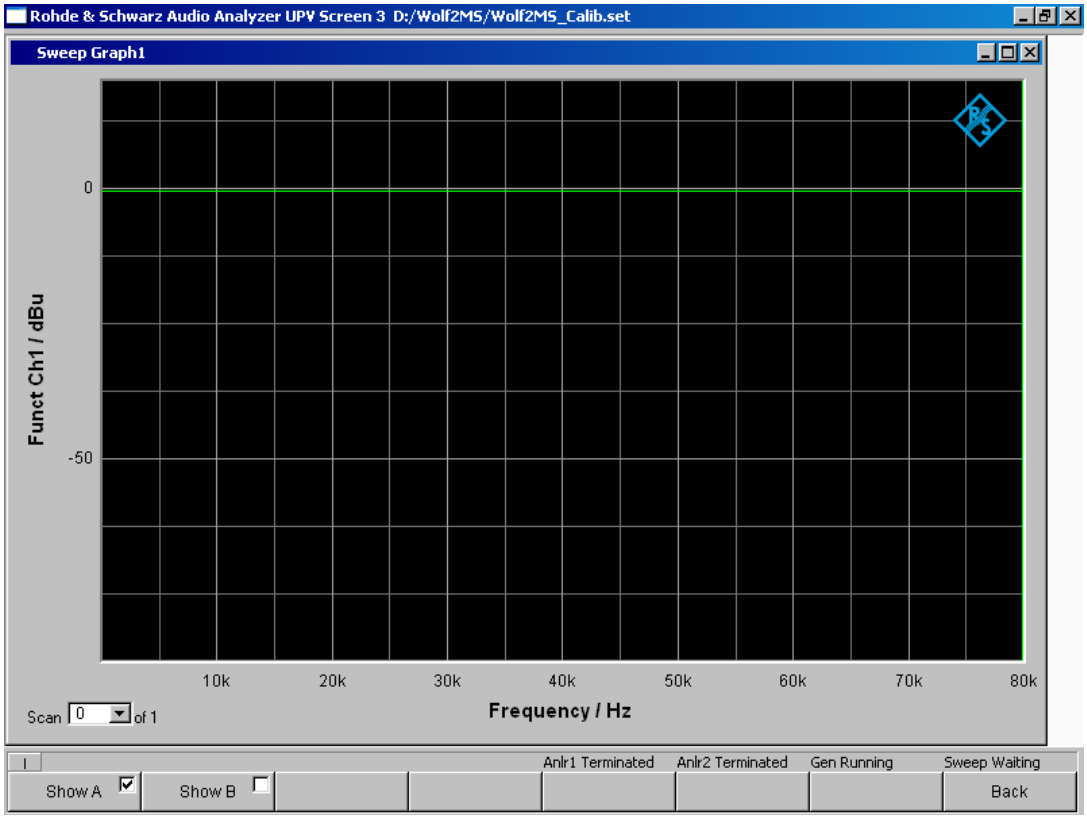
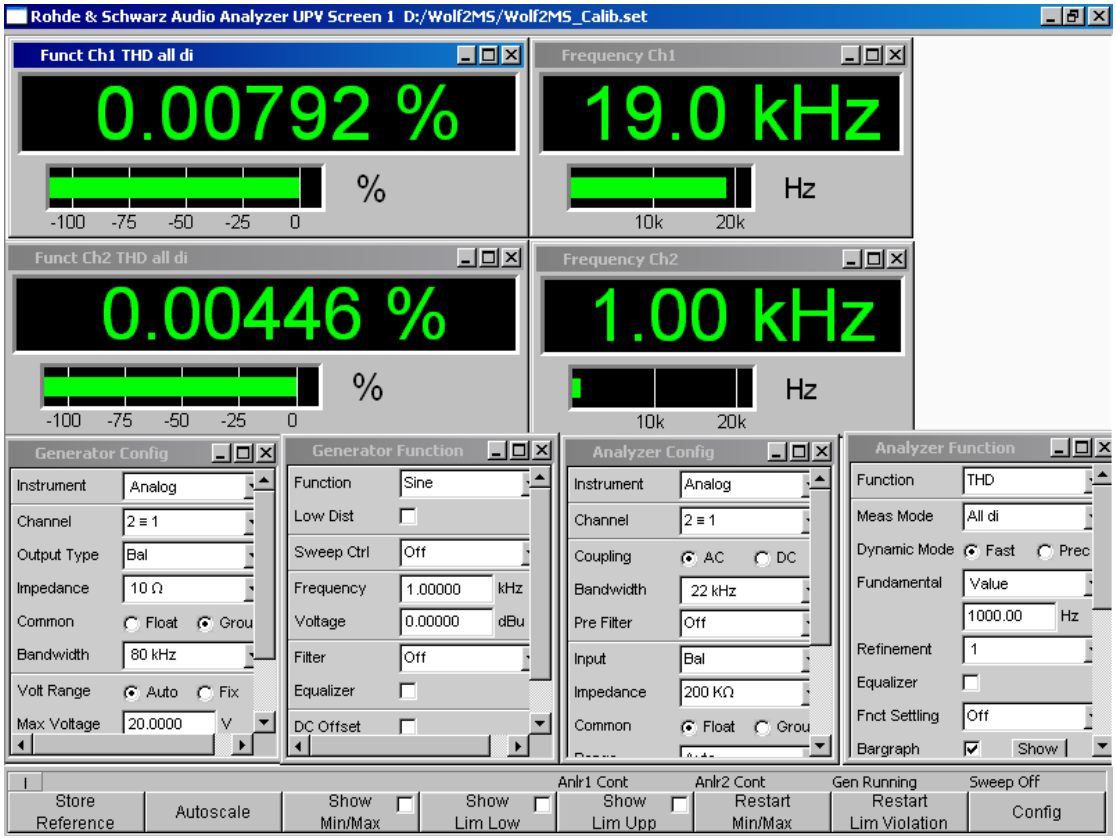
25.1.9 AUX2-MPX2 Linearity



25.1.10 MPX1 Pilot THD



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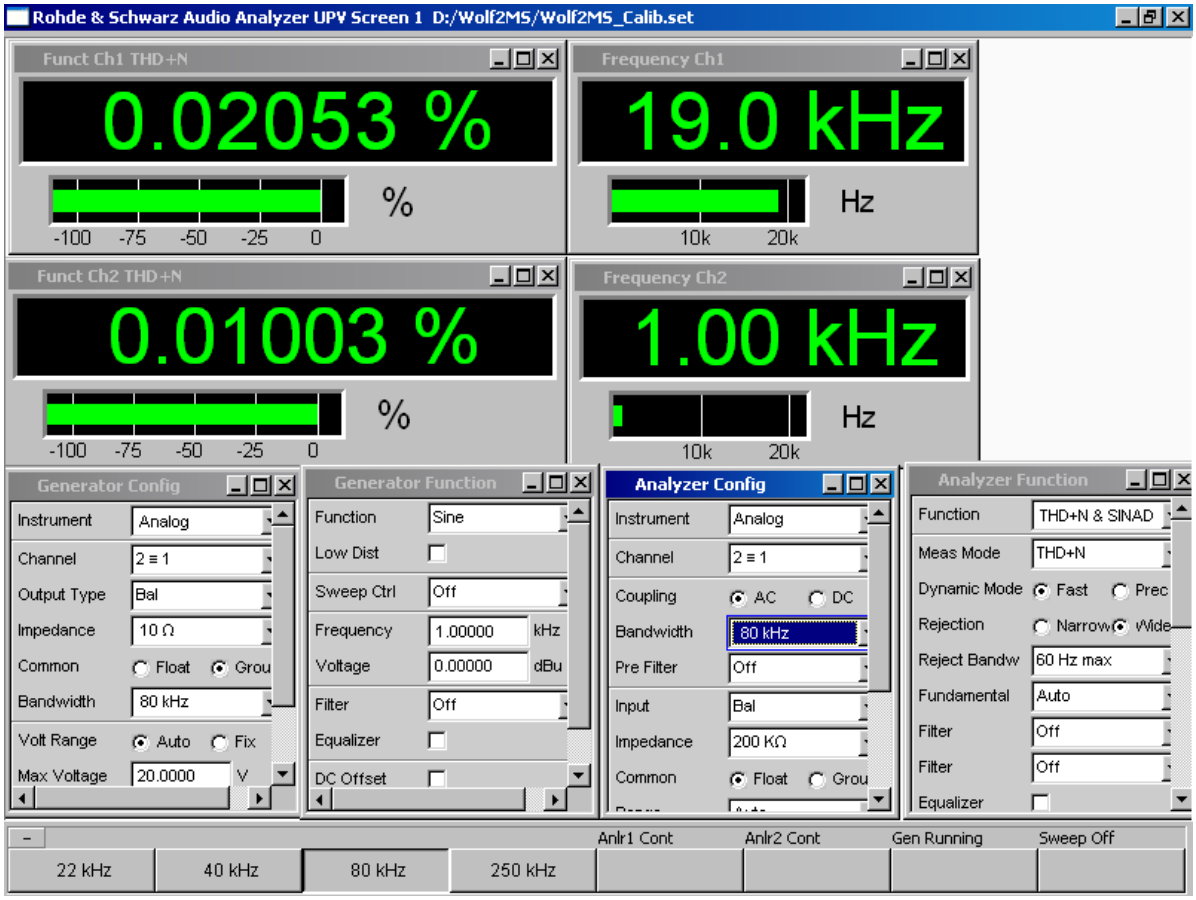
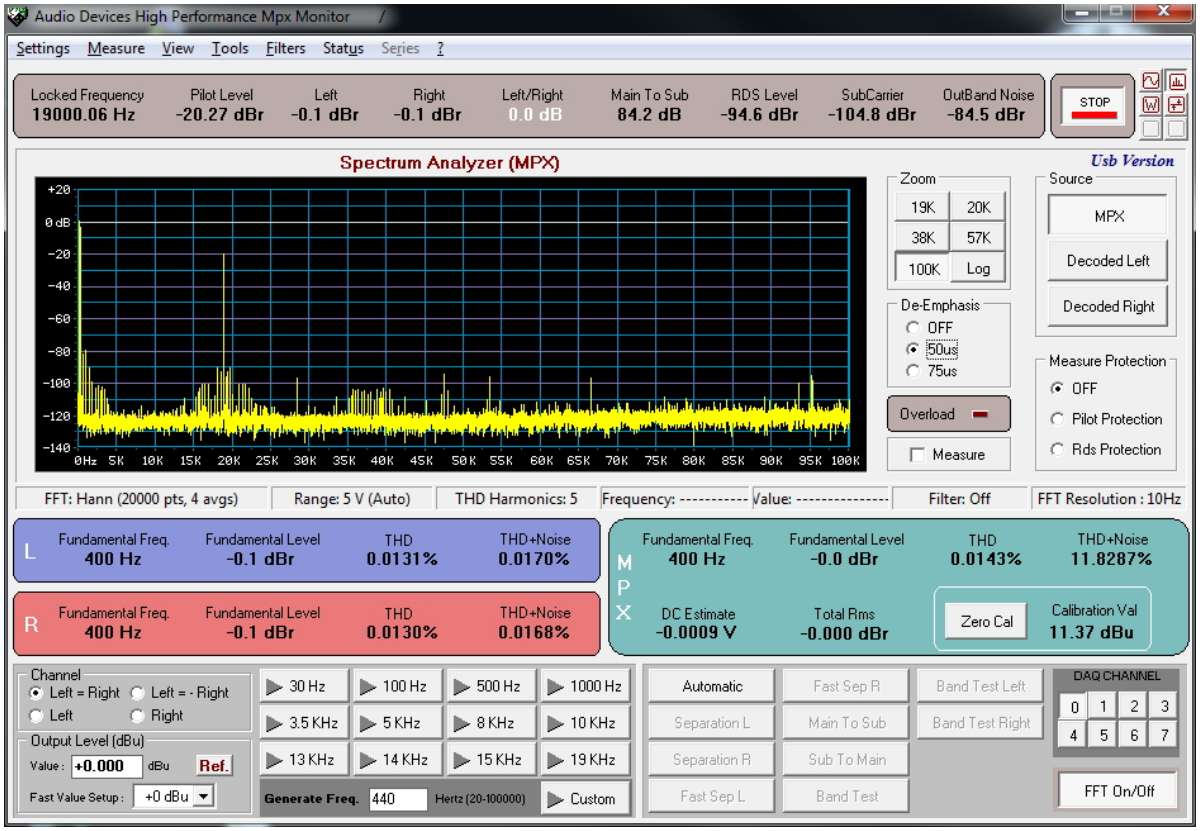
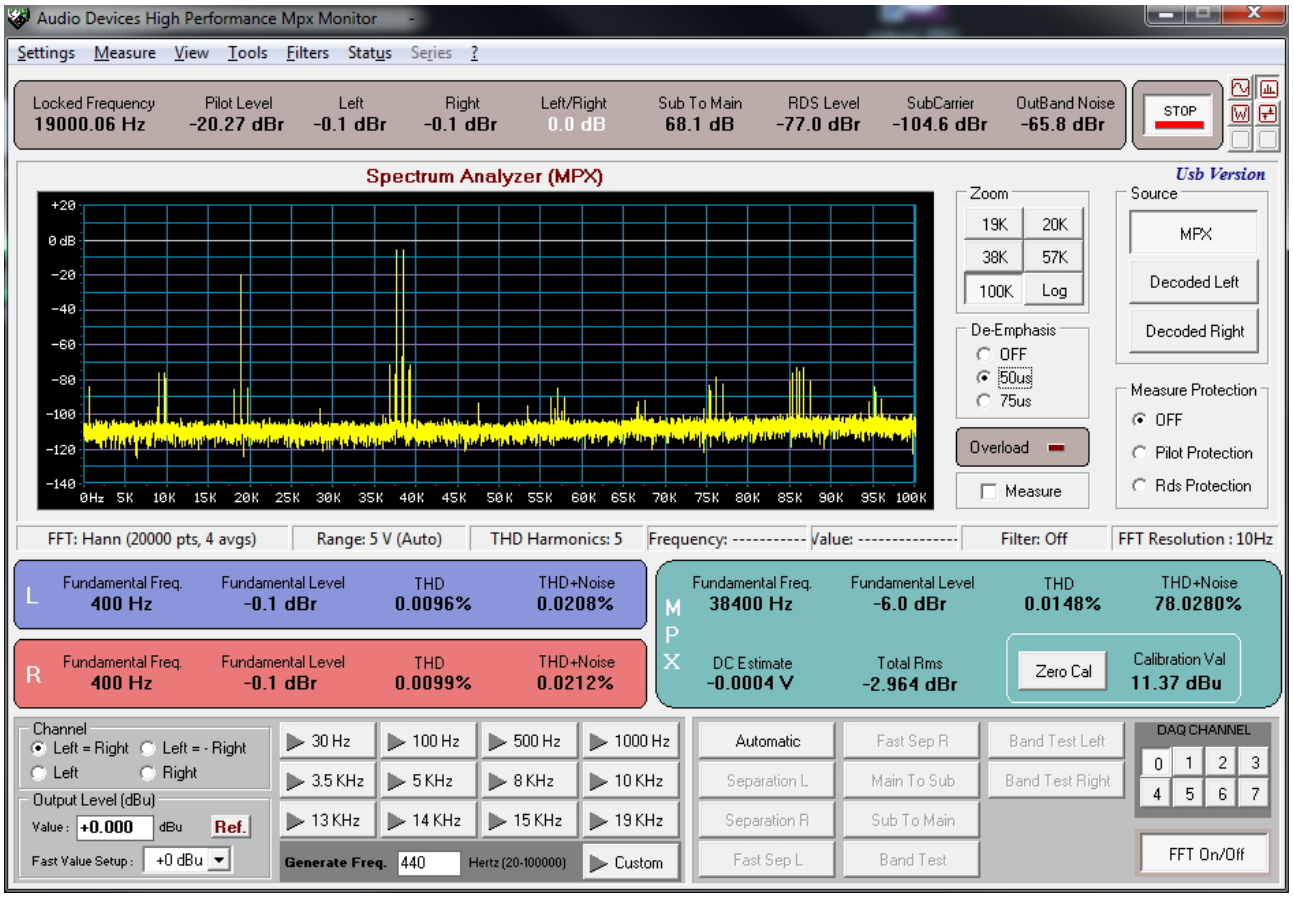
25.1.11 MPX1 Pilot THD+N



25.1.12 MPX1 THD+N, Main to Sub, Pilot frequency



25.1.13 MPX1 Sub to Main



26 WEEE Directive – Informativa RAEE

11In line with EU Directive 2012/19/UE for waste electrical and electronic equipment (WEEE), this electrical product must not be disposed of as unsorted municipal waste. Please dispose of this product by returning it to the point of sale or to your local municipal collection point for recycling.

In Übereinstimmung mit der Richtlinie 2012/19/UE des Europäischen Parlaments und des Rates über Elektro- und Elektronik-Altgeräte (WEEE) darf dieses Elektrogerät nicht im normalen Hausmüll oder dem Gelben Sack entsorgt werden. Wenn Sie dieses Produkt entsorgen möchten, bringen Sie es bitte zur Verkaufsstelle zurück oder zum Recycling-Sammelpunkt Ihrer Gemeinde.

Conformément à la Directive 2012/19/UE sur les déchets d'équipements électriques et électroniques (DEEE), ce produit électrique ne doit en aucun cas être mis au rebut sous forme de déchet municipal non trié. Veuillez vous débarrasser de ce produit en le renvoyant à son point de vente ou au point de ramassage local dans votre municipalité, à des fins de recyclage.

In navolging van richtlijn 2012/19/UE van het Europees Parlement en de Raad betreffende afgedankte elektrische en elektronische apparatuur (AEEA) mag dit elektrische product niet als ongescheiden huisvuil worden weggedaan. Breng dit product terug naar de plaats van aankoop of naar het gemeentelijke afvalinzamelingspunt voor recycling.

In ottemperanza alla Direttiva UE 2012/19/UE sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE), questo prodotto elettrico non deve essere smaltito come rifiuto municipale misto. Si prega di smaltire il prodotto riportandolo al punto vendita o al punto di raccolta municipale locale per un opportuno riciclaggio.

De conformidad con la Directiva 2012/19/UE de la UE sobre residuos de aparatos eléctricos y electrónicos (RAEE), este producto eléctrico no puede desecharse con el resto de residuos no clasificados. Deshágase de este producto devolviéndolo al punto de venta o a un punto de recogida municipal para su reciclaje.

I henhold til EU-direktiv 2012/19/UE om affald af elektrisk og elektronisk udstyr (WEEE) må dette udstyr ikke bortskaffes som usorteret husholdningsaffald. Bortskaf dette produkt ved at returnere det til salgsstedet eller til det lokale indsamlingssted, så det kan genbruges.

I linje med EU-direktiv 2012/19/UE om avfall som utgörs av eller innehåller elektriska eller elektroniska produkter (WEEE) får denna elektriska produkt inte bortskaffas som osorterat kommunalt avfall. Bortskaffa den i stället genom att lämna in den på försäljningsstället eller din lokala återvinningsstation.

EU:n sähkö- ja elektroniikkalaiteromudirektiivin (2012/19/UE) mukaisesti tätä elektroniikkalaitetta ei saa laittaa lajittelemattoman yhdyskuntajätteen sekaan. Hävitä laite palauttamalla se ostopaikkaan tai viemällä se elektroniikkaromun keräyspisteeseen.

De acordo com a Directiva Europeia 2012/19/UE sobre resíduos sólidos de equipamento eléctrico e electrónico (WEEE), este produto eléctrico não pode ser deitado fora juntamente com o lixo municipal indiferenciado. Por favor, no final da vida útil deste produto, devolva-o ao estabelecimento de aquisição, ou entregueo no local de recolha apropriado para reciclagem designado pelo seu município.

V souladu se smrnicí EU. 2012/19/UE o odpadních elektrických a elektronických zaYízeních (OEEZ) se tento elektrický výrobek nesmí likvidovat jako netYídný komunální odpad. PYi likvidaci tento výrobek vrat'te prodejci nebo ho odevzdejte k recyklaci do komunálního sbrného zaYízení.

Vastavalt EL direktiivile 2012/19/UE, mis käsitleb elektri- ja elektroonikaseadmete jäätmeid (WEEE), ei või antud toodet visata majapidamisjäätmete hulka. Palun tagastage antud toode taaskasutamise eesmärgil müügipunkti või kohaliku piirkonna jäätmekogumise punkti.

V súlade so smernicou 2012/19/UE o odpade z elekrických a elektronických zariadení (OEEZ) sa toto elektrické zariadenie nesmie odstranovat' ako netriedený komunálny odpad. Výrobok odstránte jeho vrátením v mieste nákupu alebo odovzdaním v miestnom zbernom zariadení na recyklovanie.

27 GUARANTEE

The product is covered by a one-year ex-works manufacturer's guarantee. Do not open the device. The guarantee will not be valid if the guarantee seals are broken. The manufacturer cannot be held liable for damages of any type deriving from or relating to incorrect use of the product.

DECLARATION OF CONFORMITY

Manufacturer: AXEL TECHNOLOGY S.r.l.
Company title: VIA C. DI SABBIUNO 6/F - 40011 ANZOLA EMILIA - BOLOGNA ITALY

DECLARES UNDER ITS OWN RESPONSIBILITY THAT THE FOLLOWING EQUIPMENT

MODEL: **FALCON VS**
DESCRIPTION:**Digital FM-Audio Processor 5-Band with MPX stereo generator, stereo enhancer, brilliance control, limiter lookahead, overdrive and audio changeover.**

IS COMPLIANT

To the requirements and all characteristics enacted from Community Directive:

1. **2014/30/UE "EMC" Electromagnetic Compatibility**
2. **2014/35/UE "LDV" Low Voltage Directive**
3. **2011/65/UE "on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2)"**

and following Harmonized Standards:

- √ **EN 55103-1:2009** Electromagnetic compatibility. Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Emissions.
- √ **EN 55103-2:2009** Electromagnetic compatibility. Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Immunity.
- √ **EN 60065:2016** Audio, video and similar electronic apparatus. Safety requirements.
- √ **EN 61000-6-1:2007** Electromagnetic compatibility. Generic standards. Immunity for residential, commercial and light-industrial environments.
- √ **EN 61000-6-3:2007+A1:2011** Electromagnetic compatibility. Generic standards. Emission standard for residential, commercial and light-industrial environments.
- √ **EN 60950-1:2006+A2:2013** Information technology equipment. Safety. General requirements.
- √ **EN 55024:2010** Information technology equipment. Immunity characteristics. Limits and methods of measurement.
- √ **EN 50581:2012** - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.
- √ **EN 55032:2015** - Electromagnetic compatibility of multimedia equipment. Emission Requirements.
- √ **EN 55024:2010+A1:2015** - Information technology equipment. Immunity characteristics. Limits and methods of measurement.

Remark: The present product must be installed as showed in the installation manual provided together with the equipment and used at the sole scope for wich it has been manufactured.

Anzola Emilia (BO) Italy, 06/07/2016

C.E.O.
Giuseppe Vaccari