grass valley

MAESTRO

Multi-Format Master Control

Automation Interface Protocol Technical Reference Manual
Software Version 2.4.0

www.grassvalley.com

071847209
MARCH 2011

Contacting Grass Valley

International Support Centers	**France 24 x 7**	+800 8080 2020 or +33 1 48 25 20 20	**United States/Canada 24 x 7**	+1 800 547 8949 or +1 530 478 4148
Local Support Centers (available during normal business hours)	**Asia**	**Hong Kong, Taiwan, Korea, Macau:** +852 2531 3058 **Indian Subcontinent:** +91 22 24933476 **Southeast Asia/Malaysia:** +603 7805 3884 **Southeast Asia/Singapore:** +65 6379 1313 **China:** +861 0660 159 450 **Japan:** +81 3 5484 6868		
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Grass Valley Web Site

The www.grassvalley.com web site offers the following:

Online User Documentation — Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes in .pdf format can be downloaded.

FAQ Database — Solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database.

Software Downloads — Download software updates, drivers, and patches.

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END-OF-LIFE PRODUCT RECYCLING NOTICE

Grass Valley's innovation and excellence in product design also extends to the programs we've established to manage the recycling of our products. Grass Valley has developed a comprehensive end-of-life product take back program for recycle or disposal of end-of-life products. Our program meets the requirements of the European Union's WEEE Directive, the United States Environmental Protection Agency, and U.S. state and local agencies.

Grass Valley's end-of-life product take back program assures proper disposal by use of Best Available Technology. This program accepts any Grass Valley branded equipment. Upon request, a Certificate of Recycling or a Certificate of Destruction, depending on the ultimate disposition of the product, can be sent to the requester.

Grass Valley will be responsible for all costs associated with recycling and disposal, including freight. However, you are responsible for the removal of the equipment from your facility and packing the equipment to make it ready for pickup.

For further information on the Grass Valley product take back system please contact Grass Valley at + 800 80 80 20 20 or +33 1 48 25 20 20 from most other countries. In the U.S. and Canada please call 800-547-8949 or 530-478-4148, and ask to be connected to the EH&S Department. Additional information concerning the program can be found at: www.thomsongrassvalley.com/environment

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Contents

Safety Summary

Read and follow the important safety information below, noting especially those instructions related to risk of fire, electric shock or injury to persons. Additional specific warnings not listed here may be found throughout the manual.

WARNING Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Safety Terms and Symbols

Terms in This Manual

Safety-related statements may appear in this manual in the following form:

WARNING Warning statements identify conditions or practices that may result in personal injury or loss of life.

CAUTION Caution statements identify conditions or practices that may result in damage to equipment or other property, or which may cause equipment crucial to your business environment to become temporarily non-operational.

Terms on the Product

The following terms may appear on the product:

DANGER — A personal injury hazard is immediately accessible as you read the marking.

WARNING — A personal injury hazard exists but is not immediately accessible as you read the marking.

CAUTION — A hazard to property, product, and other equipment is present.

Symbols on the Product

The following symbols may appear on the product:

Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

Indicates that user, operator or service technician should refer to product manual(s) for important operating, maintenance, or service instructions.

This is a prompt to note fuse rating when replacing fuse(s). The fuse referenced in the text must be replaced with one having the ratings indicated.

Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.

Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.

Indicates that static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Warnings

The following warning statements identify conditions or practices that can result in personal injury or loss of life:

Dangerous voltage or current may be present — Disconnect power and remove battery (if applicable) before removing protective panels, soldering, or replacing components.

Do not service alone — Do not internally service this product unless another person capable of rendering first aid and resuscitation is present.

Remove jewelry — Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.

Avoid exposed circuitry — Do not touch exposed connections, components or circuitry when power is present.

Use proper power cord — Use only the power cord supplied or specified for this product.

Ground product — Connect the grounding conductor of the power cord to earth ground.

Operate only with covers and enclosure panels in place — Do not operate this product when covers or enclosure panels are removed.

Use correct fuse — Use only the fuse type and rating specified for this product.

Use only in dry environment — Do not operate in wet or damp conditions.

Use only in non-explosive environment — Do not operate this product in an explosive atmosphere.

High leakage current may be present — Earth connection of product is essential before connecting power.

Dual power supplies may be present — Be certain to plug each power supply cord into a separate branch circuit employing a separate service ground. Disconnect both power supply cords prior to servicing.

Double pole neutral fusing — Disconnect mains power prior to servicing.

Use proper lift points — Do not use door latches to lift or move equipment.

Avoid mechanical hazards — Allow all rotating devices to come to a stop before servicing.

Cautions

The following caution statements identify conditions or practices that can result in damage to equipment or other property:

Use correct power source — Do not operate this product from a power source that applies more than the voltage specified for the product.

Use correct voltage setting — If this product lacks auto-ranging power supplies, before applying power ensure that the each power supply is set to match the power source.

Provide proper ventilation — To prevent product overheating, provide equipment ventilation in accordance with installation instructions.

Use anti-static procedures — Static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Do not operate with suspected equipment failure — If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.

Ensure mains disconnect — If mains switch is not provided, the power cord(s) of this equipment provide the means of disconnection. The socket outlet must be installed near the equipment and must be easily accessible. Verify that all mains power is disconnected before installing or removing power supplies and/or options.

Route cable properly — Route power cords and other cables so that they ar not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.

Use correct power supply cords — Power cords for this equipment, if provided, meet all North American electrical codes. Operation of this equipment at voltages exceeding 130 VAC requires power supply cords which comply with NEMA configurations. International power cords, if provided, have the approval of the country of use.

Use correct replacement battery — This product may contain batteries. To reduce the risk of explosion, check polarity and replace only with the same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Troubleshoot only to board level — Circuit boards in this product are densely populated with surface mount technology (SMT) components and application specific integrated circuits (ASICS). As a result, circuit board repair at the component level is very difficult in the field, if not impossible. For warranty compliance, do not troubleshoot systems beyond the board level.

Sicherheit – Überblick

Lesen und befolgen Sie die wichtigen Sicherheitsinformationen dieses Abschnitts. Beachten Sie insbesondere die Anweisungen bezüglich Brand-, Stromschlag- und Verletzungsgefahren. Weitere spezifische, hier nicht aufgeführte Warnungen finden Sie im gesamten Handbuch.

WARNUNG Alle Anweisungen in diesem Handbuch, die das Abnehmen der Geräteabdeckung oder des Gerätegehäuses erfordern, dürfen nur von qualifiziertem Servicepersonal ausgeführt werden. Um die Stromschlaggefahr zu verringern, führen Sie keine Wartungsarbeiten außer den in den Bedienungsanleitungen genannten Arbeiten aus, es sei denn, Sie besitzen die entsprechende Qualifikationen für diese Arbeiten.

Sicherheit – Begriffe und Symbole

In diesem Handbuch verwendete Begriffe

Sicherheitsrelevante Hinweise können in diesem Handbuch in der folgenden Form auftauchen:

WARNUNG Warnungen weisen auf Situationen oder Vorgehensweisen hin, die Verletzungs- oder Lebensgefahr bergen.

VORSICHT Vorsichtshinweise weisen auf Situationen oder Vorgehensweisen hin, die zu Schäden an Ausrüstungskomponenten oder anderen Gegenständen oder zum zeitweisen Ausfall wichtiger Komponenten in der Arbeitsumgebung führen können.

Hinweise am Produkt

Die folgenden Hinweise können sich am Produkt befinden:

GEFAHR — Wenn Sie diesen Begriff lesen, besteht ein unmittelbares Verletzungsrisiko.

WARNUNG — Wenn Sie diesen Begriff lesen, besteht ein mittelbares Verletzungsrisiko.

VORSICHT — Es besteht ein Risiko für Objekte in der Umgebung, den Mixer selbst oder andere Ausrüstungskomponenten.

Symbole am Produkt

Die folgenden Symbole können sich am Produkt befinden:

Weist auf eine gefährliche Hochspannung im Gerätegehäuse hin, die stark genug sein kann, um eine Stromschlaggefahr darzustellen.

Weist darauf hin, dass der Benutzer, Bediener oder Servicetechniker wichtige Bedienungs-, Wartungs- oder Serviceanweisungen in den Produkthandbüchern lesen sollte.

Dies ist eine Aufforderung, beim Wechsel von Sicherungen auf deren Nennwert zu achten. Die im Text angegebene Sicherung muss durch eine Sicherung ersetzt werden, die die angegebenen Nennwerte besitzt.

Weist auf eine Schutzerdungsklemme hin, die mit dem Erdungskontakt verbunden werden muss, bevor weitere Ausrüstungskomponenten angeschlossen werden.

Weist auf eine externe Schutzerdungsklemme hin, die als Ergänzung zu einem internen Erdungskontakt an die Erde angeschlossen werden kann.

Weist darauf hin, dass es statisch empfindliche Komponenten gibt, die durch eine elektrostatische Entladung beschädigt werden können. Verwenden Sie antistatische Prozeduren, Ausrüstung und Oberflächen während der Wartung.

Warnungen

Die folgenden Warnungen weisen auf Bedingungen oder Vorgehensweisen hin, die Verletzungs- oder Lebensgefahr bergen:

Gefährliche Spannungen oder Ströme — Schalten Sie den Strom ab, und entfernen Sie ggf. die Batterie, bevor sie Schutzabdeckungen abnehmen, löten oder Komponenten austauschen.

Servicearbeiten nicht alleine ausführen — Führen Sie interne Servicearbeiten nur aus, wenn eine weitere Person anwesend ist, die erste Hilfe leisten und Wiederbelebungsmaßnahmen einleiten kann.

Schmuck abnehmen — Legen Sie vor Servicearbeiten Schmuck wie Ringe, Uhren und andere metallische Objekte ab.

Keine offen liegenden Leiter berühren — Berühren Sie bei eingeschalteter Stromzufuhr keine offen liegenden Leitungen, Komponenten oder Schaltungen.

Richtiges Netzkabel verwenden — Verwenden Sie nur das mitgelieferte Netzkabel oder ein Netzkabel, das den Spezifikationen für dieses Produkt entspricht.

Gerät erden — Schließen Sie den Erdleiter des Netzkabels an den Erdungskontakt an.

Gerät nur mit angebrachten Abdeckungen und Gehäuseseiten betreiben — Schalten Sie dieses Gerät nicht ein, wenn die Abdeckungen oder Gehäuseseiten entfernt wurden.

Richtige Sicherung verwenden — Verwenden Sie nur Sicherungen, deren Typ und Nennwert den Spezifikationen für dieses Produkt entsprechen.

Gerät nur in trockener Umgebung verwenden — Betreiben Sie das Gerät nicht in nassen oder feuchten Umgebungen.

Gerät nur verwenden, wenn keine Explosionsgefahr besteht — Verwenden Sie dieses Produkt nur in Umgebungen, in denen keinerlei Explosionsgefahr besteht.

Hohe Kriechströme — Das Gerät muss vor dem Einschalten unbedingt geerdet werden.

Doppelte Spannungsversorgung kann vorhanden sein — Schließen Sie die beiden Anschlußkabel an getrennte Stromkreise an. Vor Servicearbeiten sind beide Anschlußkabel vom Netz zu trennen.

Zweipolige, neutrale Sicherung — Schalten Sie den Netzstrom ab, bevor Sie mit den Servicearbeiten beginnen.

Fassen Sie das Gerät beim Transport richtig an — Halten Sie das Gerät beim Transport nicht an Türen oder anderen beweglichen Teilen fest.

Gefahr durch mechanische Teile — Warten Sie, bis der Lüfter vollständig zum Halt gekommen ist, bevor Sie mit den Servicearbeiten beginnen.

Vorsicht

Die folgenden Vorsichtshinweise weisen auf Bedingungen oder Vorgehensweisen hin, die zu Schäden an Ausrüstungskomponenten oder anderen Gegenständen führen können:

Gerät nicht öffnen — Durch das unbefugte Öffnen wird die Garantie ungültig.

Richtige Spannungsquelle verwenden — Betreiben Sie das Gerät nicht an einer Spannungsquelle, die eine höhere Spannung liefert als in den Spezifikationen für dieses Produkt angegeben.

Gerät ausreichend belüften — Um eine Überhitzung des Geräts zu vermeiden, müssen die Ausrüstungskomponenten entsprechend den Installationsanweisungen belüftet werden. Legen Sie kein Papier unter das Gerät. Es könnte die Belüftung behindern. Platzieren Sie das Gerät auf einer ebenen Oberfläche.

Antistatische Vorkehrungen treffen — Es gibt statisch empfindliche Komponenten, die durch eine elektrostatische Entladung beschädigt werden können. Verwenden Sie antistatische Prozeduren, Ausrüstung und Oberflächen während der Wartung.

CF-Karte nicht mit einem PC verwenden — Die CF-Karte ist speziell formatiert. Die auf der CF-Karte gespeicherte Software könnte gelöscht werden.

Gerät nicht bei eventuellem Ausrüstungsfehler betreiben — Wenn Sie einen Produktschaden oder Ausrüstungsfehler vermuten, lassen Sie die Komponente von einem qualifizierten Servicetechniker untersuchen.

Kabel richtig verlegen — Verlegen Sie Netzkabel und andere Kabel so, dass Sie nicht beschädigt werden. Stützen Sie schwere Kabelbündel ordnungsgemäß ab, damit die Anschlüsse nicht beschädigt werden.

Richtige Netzkabel verwenden — Wenn Netzkabel mitgeliefert wurden, erfüllen diese alle nationalen elektrischen Normen. Der Betrieb dieses Geräts mit Spannungen über 130 V AC erfordert Netzkabel, die NEMA-Konfigurationen entsprechen. Wenn internationale Netzkabel mitgeliefert wurden, sind diese für das Verwendungsland zugelassen.

Richtige Ersatzbatterie verwenden — Dieses Gerät enthält eine Batterie. Um die Explosionsgefahr zu verringern, prüfen Sie die Polarität und tauschen die Batterie nur gegen eine Batterie desselben Typs oder eines gleichwertigen, vom Hersteller empfohlenen Typs aus. Entsorgen Sie gebrauchte Batterien entsprechend den Anweisungen des Batterieherstellers.

Das Gerät enthält keine Teile, die vom Benutzer gewartet werden können. Wenden Sie sich bei Problemen bitte an den nächsten Händler.

Consignes de sécurité

Il est recommandé de lire, de bien comprendre et surtout de respecter les informations relatives à la sécurité qui sont exposées ci-après, notamment les consignes destinées à prévenir les risques d'incendie, les décharges électriques et les blessures aux personnes. Les avertissements complémentaires, qui ne sont pas nécessairement repris ci-dessous, mais présents dans toutes les sections du manuel, sont également à prendre en considération.

AVERTISSEMENT **Toutes les instructions présentes dans ce manuel qui concernent l'ouverture des capots ou des logements de cet équipement sont destinées exclusivement à des membres qualifiés du personnel de maintenance. Afin de diminuer les risques de décharges électriques, ne procédez à aucune intervention d'entretien autre que celles contenues dans le manuel de l'utilisateur, à moins que vous ne soyez habilité pour le faire.**

Consignes et symboles de sécurité

Termes utilisés dans ce manuel

Les consignes de sécurité présentées dans ce manuel peuvent apparaître sous les formes suivantes:

AVERTISSEMENT **Les avertissements signalent des conditions ou des pratiques susceptibles d'occasionner des blessures graves, voire même fatales.**

ATTENTION Les mises en garde signalent des conditions ou des pratiques susceptibles d'occasionner un endommagement à l'équipement ou aux installations, ou de rendre l'équipement temporairement non opérationnel, ce qui peut porter préjudice à vos activités.

Signalétique apposée sur le produit

La signalétique suivante peut être apposée sur le produit:

DANGER — risque de danger imminent pour l'utilisateur.

AVERTISSEMENT — Risque de danger non imminent pour l'utilisateur.

MISE EN GARDE — Risque d'endommagement du produit, des installations ou des autres équipements.

Symboles apposés sur le produit

Les symboles suivants peut être apposés sur le produit:

Signale la présence d'une tension élevée et dangereuse dans le boîtier de l'équipement ; cette tension peut être suffisante pour constituer un risque de décharge électrique.

Signale que l'utilisateur, l'opérateur ou le technicien de maintenance doit faire référence au(x) manuel(s) pour prendre connaissance des instructions d'utilisation, de maintenance ou d'entretien.

Il s'agit d'une invite à prendre note du calibre du fusible lors du remplacement de ce dernier. Le fusible auquel il est fait référence dans le texte doit être remplacé par un fusible du même calibre.

Identifie une borne de protection de mise à la masse qui doit être raccordée correctement avant de procéder au raccordement des autres équipements.

Identifie une borne de protection de mise à la masse qui peut être connectée en tant que borne de mise à la masse supplémentaire.

Signale la présence de composants sensibles à l'électricité statique et qui sont susceptibles d'être endommagés par une décharge électrostatique. Utilisez des procédures, des équipements et des surfaces antistatiques durant les interventions d'entretien.

Avertissements

Les avertissements suivants signalent des conditions ou des pratiques susceptibles d'occasionner des blessures graves, voire même fatales:

Présence possible de tensions ou de courants dangereux — Mettez hors tension, débranchez et retirez la pile (le cas échéant) avant de déposer les couvercles de protection, de défaire une soudure ou de remplacer des composants.

Ne procédez pas seul à une intervention d'entretien — Ne réalisez pas une intervention d'entretien interne sur ce produit si une personne n'est pas présente pour fournir les premiers soins en cas d'accident.

Retirez tous vos bijoux — Avant de procéder à une intervention d'entretien, retirez tous vos bijoux, notamment les bagues, la montre ou tout autre objet métallique.

Évitez tout contact avec les circuits exposés — Évitez tout contact avec les connexions, les composants ou les circuits exposés s'ils sont sous tension.

Utilisez le cordon d'alimentation approprié — Utilisez exclusivement le cordon d'alimentation fourni avec ce produit ou spécifié pour ce produit.

Raccordez le produit à la masse — Raccordez le conducteur de masse du cordon d'alimentation à la borne de masse de la prise secteur.

Utilisez le produit lorsque les couvercles et les capots sont en place — N'utilisez pas ce produit si les couvercles et les capots sont déposés.

Utilisez le bon fusible — Utilisez exclusivement un fusible du type et du calibre spécifiés pour ce produit.

Utilisez ce produit exclusivement dans un environnement sec — N'utilisez pas ce produit dans un environnement humide.

Utilisez ce produit exclusivement dans un environnement non explosible — N'utilisez pas ce produit dans un environnement dont l'atmosphère est explosible.

Présence possible de courants de fuite — Un raccordement à la masse est indispensable avant la mise sous tension.

Deux alimentations peuvent être présentes dans l'équipement — Assurez vous que chaque cordon d'alimentation est raccordé à des circuits de terre séparés. Débranchez les deux cordons d'alimentation avant toute intervention.

Fusion neutre bipolaire — Débranchez l'alimentation principale avant de procéder à une intervention d'entretien.

Utilisez les points de levage appropriés — Ne pas utiliser les verrous de la porte pour lever ou déplacer l'équipement.

Évitez les dangers mécaniques — Laissez le ventilateur s'arrêter avant de procéder à une intervention d'entretien.

Mises en garde

Les mises en garde suivantes signalent les conditions et les pratiques susceptibles d'occasionner des endommagements à l'équipement et aux installations:

N'ouvrez pas l'appareil — Toute ouverture prohibée de l'appareil aura pour effet d'annuler la garantie.

Utilisez la source d'alimentation adéquate — Ne branchez pas ce produit à une source d'alimentation qui utilise une tension supérieure à la tension nominale spécifiée pour ce produit.

Assurez une ventilation adéquate — Pour éviter toute surchauffe du produit, assurez une ventilation de l'équipement conformément aux instructions d'installation. Ne déposez aucun document sous l'appareil — ils peuvent gêner la ventilation. Placez l'appareil sur une surface plane.

Utilisez des procédures antistatiques - Les composants sensibles à l'électricité statique présents dans l'équipement sont susceptibles d'être endommagés par une décharge électrostatique. Utilisez des procédures, des équipements et des surfaces antistatiques durant les interventions d'entretien.

N'utilisez pas la carte CF avec un PC — La carte CF a été spécialement formatée. Le logiciel enregistré sur la carte CF risque d'être effacé.

N'utilisez pas l'équipement si un dysfonctionnement est suspecté — Si vous suspectez un dysfonctionnement du produit, faites inspecter celui-ci par un membre qualifié du personnel d'entretien.

Acheminez les câbles correctement — Acheminez les câbles d'alimentation et les autres câbles de manière à ce qu'ils ne risquent pas d'être endommagés. Supportez correctement les enroulements de câbles afin de ne pas endommager les connecteurs.

Utilisez les cordons d'alimentation adéquats — Les cordons d'alimentation de cet équipement, s'ils sont fournis, satisfont aux exigences de toutes les réglementations régionales. L'utilisation de cet équipement à des tensions dépassant les 130 V en c.a. requiert des cordons d'alimentation qui satisfont aux exigences des configurations NEMA. Les cordons internationaux, s'ils sont fournis, ont reçu l'approbation du pays dans lequel l'équipement est utilisé.

Utilisez une pile de remplacement adéquate — Ce produit renferme une pile. Pour réduire le risque d'explosion, vérifiez la polarité et ne remplacez la pile que par une pile du même type, recommandée par le fabricant. Mettez les piles usagées au rebut conformément aux instructions du fabricant des piles.

Cette unité ne contient aucune partie qui peut faire l'objet d'un entretien par l'utilisateur. Si un problème survient, veuillez contacter votre distributeur local.

Regulatory Notices

Certifications and Compliances

FCC Emission Control

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by Grass Valley Group can affect emission compliance and could void the user's authority to operate this equipment.

Canadian EMC Notice of Compliance

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'emet pas de bruits radioélectriques dépassant les limites applicables aux appareils numeriques de la classe A préscrites dans le Règlement sur le brouillage radioélectrique édicte par le ministère des Communications du Canada.

EN55022 Class A Warning

For products that comply with Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Canadian Certified Power Cords

Canadian approval includes the products and power cords appropriate for use in the North America power network. All other power cords supplied are approved for the country of use.

Canadian Certified AC Adapter

Canadian approval includes the AC adapters appropriate for use in the North America power network. All other AC adapters supplied are approved for the country of use.

Laser Compliance

Laser Safety Requirements

The device used in this product is a Class 1 certified laser product. Operating this product outside specifications or altering from its original design may result in hazardous radiation exposure, and may be considered an act of modifying or new manufacturing of a laser product under U.S. regulations contained in 21CFR Chapter1, subchapter J or CENELEC regulations in HD 482 S1. People performing such an act are required by law to recertify and reidentify this product in accordance with provisions of 21CFR subchapter J for distribution within the U.S.A., and in accordance with CENELEC HD 482 S1 for distribution within countries using the IEC 825 standard.

Laser Safety

Laser safety in the United States is regulated by the Center for Devices and Radiological Health (CDRH). The laser safety regulations are published in the "Laser Product Performance Standard," Code of Federal Regulation (CFR), Title 21, Subchapter J.

The international Electrotechnical Commission (IEC) Standard 825, "Radiation of Laser Products, Equipment Classification, Requirements and User's Guide," governs laser products outside the United States. Europe and member nations of the European Free trade Association fall under the jurisdiction of the Comite European de Normalization Electrotechnique (CENELEC).

For the CDRH: The radiant power is detected trough a 7 mm aperture at a distance of 200 mm from the source focused through a lens with a focal length of 100 mm.

For IEC compliance: The radiant power is detected trough a 7 mm aperture at a distance of 100 mm from the source focused through a lens with a focal length of 100 mm.

FCC Emission Limits

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may no cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation. This device has been tested and found to comply with FCC Part 15 Class B limits for a digital device when tested with a representative laser-based fiber optical system that complies with ANSI X3T11 Fiber Channel Standard.

Certification

Category	Standard	Designed/tested for compliance with:
Safety	UL1950	Safety of Information Technology Equipment, including Electrical Business Equipment (Second edition, 1993).
	IEC 950	Safety of Information Technology Equipment, including Electrical Business Equipment (Second edition, 1991).
	CAN/CSA C22.2, No. 950-93	Safety of Information Technology Equipment, including Electrical Business Equipment.
	EN60950	Safety of Information Technology Equipment, including Electrical Business Equipment.

Section 1

Introduction

The Maestro automation command set is an extended version of the Saturn command set, which in turn was derived from the M-2100 protocol. An automation system designed to operate with Saturn or Master-21 should operate with Maestro with minimal changes.

This document includes all Saturn commands, Maestro applicability to Saturn commands, and new Maestro commands. The Master-21 command set is defined in Grass Valley document number TP3504-00.

These protocols are based upon standards described in SMPTE documents EG29-1993, RP113-1992, RP138-1992, RP139-1992, RP163-1992, and RP172-1993; and on the ESbus standard as defined in EBU document Tech 3245-E.

The features described in this document are applicable to software release Maestro 1.0 and later.

Legacy Command Caveats

1. The order of the **Saturn Input table** is ascending category/number combinations. For example, if the categories are defined (in order) as VTR, AUX and TEST, the Saturn Input table will be ordered as VTR 1, VTR 2, VTR 3 (etc.), then AUX 1, AUX 2, AUX 3 (etc.), TEST 1, TEST 2 TEST 3 (etc.). Invoking autoXptSelectionShow at the shell prompt of the Saturn video processor will list sources and their associated source numbers.

2. Mixer & Keyer - The method for selecting and manipulating sources on the Mix and Key buses is as follows:

   Mixer: Use the TAKE_XPT command to bring the desired source into the Mixer. Then use the PST_OVER or the PGM_OVER to select the source on the PST or PGM bus. **Alternatively, use the SET_MIX command for full mixer control.**

   Keyer: Use the TAKE_XPT command to bring the desired source into the Keyer. Then use the SEL_1KEY or the SEL_2KEY to select the source on the PST or PGM bus. SEL_1KEY selects KEY 1, SEL_2KEY selects

KEY 2. **Alternatively, use the SET_KEY command for full keyer control.**

3. VID_1KEY and VID_2KEY change the settings on Keyer 1 and Keyer 2 respectively. Note that neither of these commands provide complete control of the Saturn keyers. **The SET_KEY command allows complete manipulation of the keyers.**

4. The RATIO command sets the same ratio for both mixers. The READ RATIO command returns the ratio setting for Mixer 1.

5. Audio gain reads (MAL_PST, MAL_PGM, etc.) will occasionally return a value one less than the value from a pre ceding SET command. This is due to the command being rounded down to assure a minimum gain setting occurs.

6. SET_MIX command controls all audio levels on the specified mixer. It reports status only on the first audio level. The SET_AUDIO command allows complete manipulation/reporting of audio parameters.

7. READ PROLL reports 9.9 seconds for preroll times greater than 9.9 seconds.

8. The time value passed in PROLL is two bytes, the first byte being the seconds (0-9), the second byte being tenths (0-9).

9. READ CLK reports the time known by the video processor board. This is set by time manager, which gets its source from the VM board or the file server. Automation can not currently change the time.

10. System service BEGIN/END keywords are supported.

11. UPDATE command - Issuing an UPDATE of commands that normally use an argument to report status (TAKE_XPT, SET_KEY, SET_MIX) will result in a generated status message when the state of any of their respective arguments change.

    For additional information concerning the UPDATE command, see the *Use of UPDATE*setting.

12. The MUTE command clears all UPDATE commands.

13. The 6 character “R Message Block” timeout specified in RP113-1992 is not currently supported.

14. Group Select specified in RP113-1992 is not currently supported.

Transport Medium Characteristics

Serial

The ESbus standard as defined in EBU document Tech 3245-E states, “standard transmission rate on the interface bus is 38.4 kbit/s”. The supported transmission rates in Maestro for the serial interface will be 38.4 kbit/s and 115.2 kbit/s and will be configurable through the Maestro Configuration Editor.

Furthermore, Maestro will conform with the ESbus standard as defined in EBU document Tech 3245-E which states, “The complete serial data word consists of one start bit (SPACE), eight data bits (ONE BYTE), a parity bit (EVEN), and one stop bit (MARK). The least significant bit is transmitted first.

Determinacy

Execution of received commands as a result of internal processing shall be frames latent from the frame in which a command is received at the automation module boundary. This latency only specifies when the command will be executed. Determinacy of command completion is not guaranteed where execution involves an indeterminate external element (Router Control System, Network, etc.). Where possible, the determinacy of command executions will be specified.

Automation Input Set

The Configuration Editor shall allow the user to specify an Automation Input Set for a specific channel based upon that channel’s available inputs. This is necessary to allow the user to specify the available sources (typically all that are available to the channel) and the order of those sources for automation. The Automation Input Set shall be independent of the Channel Input Set with respect to ordering so that Category/Entry changes to the Channel Input Set do not reorder the Automation Input Set causing an unexpected inconsistency between Maestro and the Automation system. It is the responsibility of the Configuration Editor to validate the Automation Input Set with respect to the Channel Input Set.

Control Panel Background Button Assignment

In systems to be controlled by an automation computer, three of the control panel background buttons must be dedicated to the automation function. This assignment is made during system configuration using the Background Button table. (For more information about the Background Button table, refer to the Software Configuration section of the Installation and Service manual.)

During automation control, one of the three buttons will be selected on PGM for each defined Video/Audio group, one will be selected on PST for each defined Video/Audio group, and since these buses can't be disturbed when assigning/selecting a new source, a third button must be available at all times. Automation activity is thus constrained to the three defined buttons. Otherwise, the automation system may eventually replace many, if not all, sources that the user has manually assigned. If such replaced sources were needed later, the operator would have to re-assign them before they could be used.

It should be noted that if an unused "Automation" associated button is not available on the hardware control panel (for example, none are defined in the Background Button table), then a source request from automation will fail and a message indicating "ESChannelCmds::ESCMaestroAssign() - No available background buttons for groups..." will be printed to the console on the affected channel.

General ES Support

The following ES functionality is not currently supported:

- Cycle Updates
- Group Selects

Emergency Alert System Caveat

There is a potential for conflict if both the automation system and the EAS event triggers want to control the same resources. To address conflicts, Maestro will restrict certain automation operations for any keyer(s) /audio over(s) specified in the Background Buttons table as having a fixed assignment. The automation restriction will be that the following automation commands will not allow the source to be specified and/or changed on keyer(s)/audio over(s) with fixed assignments:

- SET_KEY
- MAESTRO_KEYER_SOURCE_REQUEST
- TAKE_XPT
- VID_PSET
- AUD_PSET
- AUD_BPSET
- SET_MIX
- MAESTRO_AUDIO_MIXER_SOURCE_REQUEST

If the automation command has the option to specify a NOOP for the source argument then that source argument must be set to a NULL in order to process other arguments. All other automation commands not specifically mentioned in the list above will be allowed on fixed assignments.

Note If EAS Messaging is configured then Keyer 8 and Audio Over 4 will be EAS Fixed Assignments and cannot be controlled by Automation commands.

Section 2

Saturn Command Summaries

The following are summaries of the automation commands as implemented for the Saturn Master Control switcher.

Note A summary of Maestro commands is in preparation. In the meantime, please refer to the Maestro command reference in *Section 5-Definition of Extended Maestro Commands*.

Alphabetical command summary

Command	C/R/U	Hex	Arguments
ALL_STOP	C/-/-	0x76	
AUD_BPSET	C/R/U	0xC1	audio_source ign
AUD_PSET	C/R/U	0x58	audio_source ign
CLK	C/R/-	0x90	time_value
FTBLK	C/R/U	0x78	
LRS_PGM	C/R/U	0xA3	audio_mode
LRS_PST	C/R/U	0xA1	audio_mode
MAL_PGM	C/R/U	0xA7	audio_level
MAL_PST	C/R/U	0xA4	audio_level
PGM_OVER	C/R/U	0x5B	over_selection
PROLL	C/R/U	0x91	seconds
PST_OVER	C/R/U	0x5A	over_selection
RATIO	C/R/U	0xAA	audio_level
RECALL_REG	*C/R/U*	0xE4	*register_bits register_number*
REM_MODE	C/R/U	0x61	off_on_null
RFTB	C/-/-	0x79	
SAP0_PGM	C/R/U	0xAD	audio_level
SAP0_PST	C/R/U	0xAB	audio_level
SAP1_PGM	C/R/U	0xAE	audio_level
SAP1_PST	C/R/U	0xAC	audio_level
SEL_1KEY	C/R/U	0x50	key_src
SEL_2KEY	C/R/U	0x51	key_src
SET_AUDIO	*C/R/U*	0xE2	*src_bus channel_bits ratio balance gain mode ch_rev phase_inv*
SET_KEY	*C/R/U*	0xE0	*keyer video_src key_mix_bus key_type invert_mod key_shadow matte_mod key_timing key_clip key_gain matte_hue matte_sat matte_lum*
SET_MIX	*C/R/U*	0xE1	*mixer src key_mix_bus audio_ratio ign*
SWAP_PGM	C/-/-	0xC3	backup_bits
SWAP_PST	C/-/-	0xC2	backup_bits
TAKE_XPT	C/R/U	0x7F	bus video_source audio_source ign ign
TRAN_PRESET	*C/R/U*	0xE3	*board_bits type rate rate_SS:FF delay_SS:FF black_SS:FF*
TX_STAT	-/R/U	0x45	trans_status
TX_TRIG	C/-/-	0x44	trigger_bits
VID_1KEY	C/R/U	0x4A	key_type key_mod ign matte_mod
VID_2KEY	C/R/U	0x4E	key_type key_mod ign matte_mod
VID_BPSET	C/R/U	0xC0	video_source ign
VID_MODE	C/R/U	0x4C	transition
VID_PSET	C/R/U	0x48	video_source ign
VID_RATE	C/-/-	0x4D	trans_rate
VID_RATE	-/R/U	0x4D	trans_rate
VID_SYNC	-/R/-	0x49	sync_bits

`C' = Used as a Command
`R' = Used as a READ command
`U' = Can be used with UPDATE command
`-' = not applicable as a command or a Read command, as indicated
`*' = required argument to a READ command message

Numerical command summary

Hex	Command	C/R/U	Arguments
0x44	TX_TRIG	C/-/-	trigger_bits
0x45	TX_STAT	-/R/U	trans_status
0x48	VID_PSET	C/R/U	video_source ign
0x49	VID_SYNC	-/R/-	sync_bits
0x4A	VID_1KEY	C/R/U	key_type key_mod ign matte_mod
0x4C	VID_MODE	C/R/U	transition
0x4D	VID_RATE	C/-/-	trans_rate
0x4D	VID_RATE	-/R/U	trans_rate
0x4E	VID_2KEY	C/R/U	key_type key_mod ign matte_mod
0x50	SEL_1KEY	C/R/U	key_src
0x51	SEL_2KEY	C/R/U	key_src
0x58	AUD_PSET	C/R/U	audio_source ign
0x5A	PST_OVER	C/R/U	over_selection
0x5B	PGM_OVER	C/R/U	over_selection
0x61	REM_MODE	C/R/U	off_on_null
0x76	ALL_STOP	C/-/-	
0x78	FTBLK	C/R/U	
0x79	RFTB	C/-/-	
0x7F	TAKE_XPT	C/R/U	bus video_source audio_source ign ign
0x90	CLK	C/R/-	time_value
0x91	PROLL	C/R/U	seconds
0xA1	LRS_PST	C/R/U	audio_mode
0xA3	LRS_PGM	C/R/U	audio_mode
0xA4	MAL_PST	C/R/U	audio_level
0xA7	MAL_PGM	C/R/U	audio_level
0xAA	RATIO	C/R/U	audio_level
0xAB	SAP0_PST	C/R/U	audio_level
0xAC	SAP1_PST	C/R/U	audio_level
0xAD	SAP0_PGM	C/R/U	audio_level
0xAE	SAP1_PGM	C/R/U	audio_level
0xC0	VID_BPSET	C/R/U	video_source ign
0xC1	AUD_BPSET	C/R/U	audio_source ign
0xC2	SWAP_PST	C/-/-	backup_bits
0xC3	SWAP_PGM	C/-/-	backup_bits
0xE1	*SET_MIX*	*C/R/U*	*mixer src key_mix_bus audio_ratio ign*
0xE0	*SET_KEY*	*C/R/U*	*keyer video_src key_mix_bus key_type invert_mod key_shadow matte_mod key_timing key_clip key_gain matte_hue matte_sat matte_lum*
0xE2	*SET_AUDIO*	*C/R/U*	*src_bus channel_bits ratio balance gain mode ch_rev phase_inv*
0xE3	*TRAN_PRESET*	*C/R/U*	*board_bits type rate rate_SS:FF delay_SS:FF black_SS:FF*
0xE4	*RECALL_REG*	*C/R/U*	*register_bits register_number*

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`U' = Can be used with UPDATE command
`-' = not applicable as a command or a Read command, as indicated
`*' = required argument to a READ command message

Alphabetical command cross reference

Command	C/R/U	Hex	Explanation
ALL_STOP	C/-/-	0x76	Cut to new video
AUD_BPSET	C/R/U	0xC1	Backup audio PST bus take
AUD_PSET	C/R/U	0x58	Audio PST bus take
CLK	C/R/-	0x90	Clock time
FTBLK	C/R/U	0x78	Fade to black
LRS_PGM	C/R/U	0xA3	PGM audio mode
LRS_PST	C/R/U	0xA1	PST audio mode
MAL_PGM	C/R/U	0xA7	PGM main audio level
MAL_PST	C/R/U	0xA4	PST main audio level
PGM_OVER	C/R/U	0x5B	PGM over take
PROLL	C/R/U	0x91	Preroll time
PST_OVER	C/R/U	0x5A	PST over take
RATIO	C/R/U	0xAA	Over to main ratio
RECALL_REG	*C/R/U*	0xE4	*Recall configured independent transition*
REM_MODE	C/R/U	0x61	Remote switch
RFTB	C/-/-	0x79	Return from fade to black
SAP0_PGM	C/R/U	0xAD	SAP0 PGM level
SAP0_PST	C/R/U	0xAB	SAP0 PST level
SAP1_PGM	C/R/U	0xAE	SAP1 PGM level
SAP1_PST	C/R/U	0xAC	SAP1 PST level
SEL_1KEY	C/R/U	0x50	Key 1 bus take
SEL_2KEY	C/R/U	0x51	Key 2 bus take
SET_AUDIO	*C/R/U*	0xE2	*Channel related audio parameters*
SET_KEY	*C/R/U*	0xE0	*Keyer related parameters*
SET_MIX	*C/R/U*	0xE1	*Mixer related parameters*
SWAP_PGM	C/-/-	0xC3	Swap primary and backup PGM inputs
SWAP_PST	C/-/-	0xC2	Swap primary and backup PST inputs
TAKE_XPT	C/R/U	0x7F	Bus take
TRAN_PRESET	*C/R/U*	0xE3	*Distributed transition parameters*
TX_STAT	-/R/U	0x45	Transition status
TX_TRIG	C/-/-	0x44	Transition trigger
VID_1KEY	C/R/U	0x4A	Key 1 source and parameters
VID_2KEY	C/R/U	0x4E	Key 2 source and parameters
VID_BPSET	C/R/U	0xC0	Backup video PST bus take
VID_MODE	C/R/U	0x4C	Transition type select
VID_PSET	C/R/U	0x48	Video PST bus take
VID_RATE	C/R/U	0x4D	Transition rate select
VID_SYNC	-/R/-	0x49	Video sync status

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`U' = Can be used with UPDATE command
`-' = not applicable as a command or a Read command, as indicated
`*' = required argument to a READ command message

Numerical command cross reference

Hex	Command	C/R/U	Explanation
0x44	TX_TRIG	C/-/-	Transition trigger
0x45	TX_STAT	-/R/U	Transition status
0x48	VID_PSET	C/R/U	Video PST bus take
0x49	VID_SYNC	-/R/-	Video sync status
0x4A	VID_1KEY	C/R/U	Key 1 source and parameters
0x4C	VID_MODE	C/R/U	Transition type select
0x4D	VID_RATE	C/R/U	Transition rate select
0x4E	VID_2KEY	C/R/U	Key 2 source and parameters
0x50	SEL_1KEY	C/R/U	Key 1 bus take
0x51	SEL_2KEY	C/R/U	Key 2 bus take
0x58	AUD_PSET	C/R/U	Audio PST bus take
0x5A	PST_OVER	C/R/U	PST over take
0x5B	PGM_OVER	C/R/U	PGM over take
0x61	REM_MODE	C/R/U	Remote switch
0x76	ALL_STOP	C/-/-	Cut to new video
0x78	FTBLK	C/R/U	Fade to black
0x79	RFTB	C/-/-	Return from fade to black
0x7F	TAKE_XPT	C/R/U	Bus take
0x90	CLK	C/R/-	Clock time
0x91	PROLL	C/R/U	Preroll time
0xA1	LRS_PST	C/R/U	PST audio mode
0xA3	LRS_PGM	C/R/U	PGM audio mode
0xA4	MAL_PST	C/R/U	PST main audio level
0xA7	MAL_PGM	C/R/U	PGM main audio level
0xAA	RATIO	C/R/U	Over to main ratio
0xAB	SAP0_PST	C/R/U	SAP0 PST level
0xAC	SAP1_PST	C/R/U	SAP1 PST level
0xAD	SAP0_PGM	C/R/U	SAP0 PGM level
0xAE	SAP1_PGM	C/R/U	SAP1 PGM level
0xC0	VID_BPSET	C/R/U	Backup video PST bus take
0xC1	AUD_BPSET	C/R/U	Backup audio PST bus take
0xC2	SWAP_PST	C/-/-	Swap primary and backup PST inputs
0xC3	SWAP_PGM	C/-/-	Swap primary and backup PGM inputs
0xE1	*SET_MIX*	*C/R/U*	*Mixer related parameters*
0xE0	*SET_KEY*	*C/R/U*	*Keyer related parameters*
0xE2	*SET_AUDIO*	*C/R/U*	*Channel related audio parameters*
0xE3	*TRAN_PRESET*	*C/R/U*	*Distributed transition parameters*
0xE4	*RECALL_REG*	*C/R/U*	*Recall configured independent transition*

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`U' = Can be used with UPDATE command
`-' = not applicable as a command or a Read command, as indicated
`*' = required argument to a READ command message

Section 3

Saturn Argument Summary

The following is a summary of the automation command arguments as implemented for the Saturn Master Control switcher.

Italicized items are extensions to the original GVG Master-21 command set, defined in Grass Valley document number TP3504-00.

Notes

1. All arguments are one byte unless indicated otherwise.
2. NOP = No Operation.
3. A summary of Maestro arguments is in preparation. In the meantime, please refer to the Maestro command reference in .

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off_on_null:	0,2,3	0 = No Change	IF_NULL
		2 = Off	IF_OFF
		3 = On	IF_ON
trigger_bits:		B7 = Trigger Enable	VX_TRIG
		B6 = Inhibit Preroll	NO_PROL
		B5 - B0 = reserved	
trans_status:	2-5	2 = Quiescent	TS_Q
		3 = Prerolling	TS_PROL
		4 = Transitioning	TS_TRAN
		5 = In Black	TS_BLK
video_source:	0,1-255	0 = video source NOP	IF_NULL
		1-255 = Maps to the order of the Saturn input table. See commentary below for discussion of Saturn Input table.	
audio_source:	0,1-255	0 = audio source NOP	IF_NULL
		1-255 = Maps to the order of the Saturn input table.	
ign:	0-255	Value ignored by Saturn. Included to maintain compatibility with Master-21 protocol.	
bus:	0,1-8	0 = Bus NOP	IF_NULL
		1 = PGM	D_PGM
		2 = PST	D_PST
		3 = Backup PGM	D_BPGM
		4 = Backup PST	D_BPST
		5 = Mixer 1	*D_MIX1*
		6 = Mixer 2	*D_MIX2*
		7 = Keyer 1	*D_KEY1*
		8 = Keyer 2	*D_KEY2*
mixer:	*5,6*	*5 = Mixer 1*	*D_MIX1*
		6 = Mixer 2	*D_MIX2*
keyer:	*7,8*	*7 = Keyer 1*	*D_KEY1*
		8 = Keyer 2	*D_KEY2*
transition:	0,1-8	0 = Transition Type NOP	IF_NULL
		1 = Cut	XTAKE
		2 = Mix	XMIX
		3 - 5 = reserved	
		6 = Fade-Fade	XVFADE
		7 = Cut-Fade	XCFADE
		8 = Fade-Cut	XFADEC

trans_rate:	0,1-3	0 = Transition Rate NOP	IF_NULL
		1 = Slow	RATES
		2 = Medium	RATEM
		3 = Fast	RATEF
audio_mode:	0,1-4	0 = Audio Mode NOP	IF_NULL
		1 = Mono L + R	AMONO
		2 = Mono L	ALFT
		3 = Mono R	ARGHT
		4 = Stereo	AST

over_selection:

B7 = Must be set for over selection to occur for commands
B6 - B4 = reserved
B3 = Over 3 (not used by Saturn)
B2 = Over 2 (not used by Saturn)
B1 = Over 1 (Saturn Mix 2 In/Next)
B0 = Over 0 (Saturn Mix 1 In/Next)

key_src:

B7 = Must be set for key selection and PST key enable in commands.
Indicates key is on PST for replies.
B6 = Must be set for key selection and PGM key enable in commands.
Indicates key is on PGM for replies.
B5 = Indicates key is to be removed from both PST and PGM in commands.
Don't care for replies.
B4 = Key 4 (not used by Saturn)
B3 = Key 3 (not used by Saturn)
B2 = Key 2 (not used by Saturn)
B1 = Key 1 (not used by Saturn)
B0 = Key 0 (Saturn Key 1/Key 2 In/Next)

key_mix_bus:

B7 = Must be set for key/mix selection and PST key/mix enable in commands.
Indicates key/mix is on PST for replies.
B6 = Must be set for key/mix selection and PGM key/mix enable in commands.
Indicates key/mix is on PGM for replies.
B5 = Indicates key is to be removed from busses indicated by B7 & B6.
Don't care for replies.
B4 - B0 = reserved

key_type:	0,3,5,6	0 = Key Type NOP	IF_NULL
		3 = Self Key	K_SELF
		5 = External Key	K_EXT
		6 = Chroma Key	(not used by Saturn)
key_mod:	0,1,2,8	0 = Key Modifier NOP	IF_NULL
		1 = Normal	KSNORM
		2 = Shadow	KSSHAD
		8 = Border	(not used by Saturn)
key_hold:	0,2,3	0 = Key Hold NOP	IF_NULL
		2 = Key Hold Off	IF_OFF
		3 = Key Hold On	IF_ON
matte_mod:	0,2-3	0 = Key Matte NOP	IF_NULL

		2 = Matte Off	IF_OFF
		3 = Matte On	IF_ON
key_shadow:	0-3	Key Shadow Depth	
invert_mod:	0,2,3	0 = Key Invert NOP	IF_NULL
		2 = Invert Off	IF_OFF
		3 = Invert On	IF_ON
sync_bits:	B7 = PST & Internal Black in sync		
		B6 = PST & KEY in sync	
		B5 = PGM & PST in sync	
		B4 = PGM & KEY in sync	
		B3 = PGM video present	
		B2 = PST video present	
		B1 = reserved	
		B0 = reserved	
time_value:	0-23	HH = BCD Hours	
	0-59	MM = BCD Minutes	
	0-59	SS = BCD Seconds	
	0-29	FF = BCD Frames	
secs:	0-9	BCD 0..9 (one byte)	
tenths:	0-9	BCD 0..9 (one byte)	
seconds:	0-9,0-9	secs:tenths (two bytes)	
seconds_tenths:	0-9	B7-B4 = BCD seconds	
	0-9	B3-B0 = BCD tenths of seconds	
audio_level:	0-99	(base 10) percent of full-scale	
backup_bits:		B7 = Set for command to execute. Don't care replies.	
		B6-B2 = reserved	
		B1 = swap backup and primary video	
		B0 = swap backup and primary audio	
key_timing:	*0,1-255*	*0 = Key Timing NOP*	*IF_NULL*
		1-255 = key timing (128 = default)	
key_clip:	*0,1-255*	*0 = Key Clip NOP*	*IF_NULL*
		1-255 = key clip	

key_gate: *0,1-255 0 = Key Gate NOP IF_NULL*
1-255 = key gate

key_gain: *0,1-255 0 = Key Gain NOP IF_NULL*
1-255 = key gain

matte_hue: *0,1-255 0 = Matte Hue NOP IF_NULL*
1-255 = matte hue

matte_sat: *0,1-255 0 = Matte Saturation NOP IF_NULL*
1-255 = matte saturation

matte_lum: *0,1-255 0 = Matte Luminance NOP IF_NULL*
1-255 = matte luminance

audio_gain: *0,1-255 0 = Audio Gain NOP IF_NULL*
1-255 = audio gain

audio_bal:0,1-2550 = Audio Balance NOP IF_NULL
1-255 = audio balance

audio_ratio: *0,1-255 0 = Audio Ratio NOP IF_NULL*
1-255 = audio ratio

register_bits: *00,10 (hex, one byte)*
00 = Valid on query only--verify existence of transition table specified in register_num ber
(If bit 4 is set in the reply, then the table exists in the customer's configuration set.)
10 = (Bit 4 set--all other bits reserved) Recall transition configuration table.

register_number: 00, 01-63,64,65 (hex one byte)
00 = Specifies default transition parameters.
01-63 = Specifies configuration transition table numbers 1-99.
64 = Valid on reply only--reports that transition parameters have been set by TRAN_PRESET.
65 = Valid on reply only--reports that transition parameters have been manually set.

src_bus: *0,1,2,5,6*
0 = Bus NOP
1 = Program bus
2 = Preset bus
5 = Mixer 1
6 = Mixer 2

channel_bits: *00-07 (hex, one byte)*
bit 7-bit3 = reserved
bit 2 = Mode 1-CH5/6 Stereo, Mode 2-CH5 Mono, Mode 3-CH4 Mono
bit 1 = Mode 1,2-CH3/4 Stereo, Mode 3-CH3 Mono
bit 0 = All Modes-CH1/2 Stereo

ratio: *00,01-FD,FE-FF (hex, one byte)*
00 - Audio ratio NOP
01-FD = Audio ratio linearly corresponding to -18.0 dB through +18.0 dB.
Mixer ratios change in 0.375 (3/8) dB steps.
FE-FF = Audio ratio corresponding to +INF dB.

balance: *00,01-FF (hex, one byte)*
00 = Audio balance NOP
01-FF = Audio balance linearly corresponding to 10.0 dB Left through 10.0 dB Right.
Balance changes in 0.375 (3/8) dB steps.

gain: *00,01-FF (hex, one byte)*
00 = Audio gain NOP
01-FF = Audio gain linearly corresponding to -24.0 dB through +24.0 dB.
Gain changes in 0.375 (3/8) dB steps.

mode: *0,1-4*
0 = Audio mode NOP
1 = MONO L+R
2 = MONO L
3 = MONO R
4 = STEREO

ch_rev: *0,2,3*
0 = Channel reverse NOP
2 = Channel reverse OFF
3 = Channel reverse ON

phase_inv: *0,2,3*
0 = Phase invert NOP
2 = Phase invert OFF
3 = Phase invert ON

board_bits: *00-0F (hex, one byte)*
bit7-bit4 = reserved
bit 3 = Audio 5/6 board (Mode 2-CH5 Mono, Mode 1-CH5/6 Stereo)
bit 2 = Audio 3/4 board (Mode 3-CH3 & CH4 Mono, Mode 1,2-CH3/4 Stereo)
bit 1 = Audio 1/2 board (All Modes-CH1/2 Stereo)
bit 0 = Video board

type: *0,1-4*
0 = Transition type NOP
1 = Cross-fade
2 = Fade-cut
3 = Cut-fade
4 = Fade-fade

rate: *0,1-5* *0 = Transition rate NOP*
1 = Slow
2 = Medium
3 = Fast
4 = Cut
5 = Custom (used with <rate_SS:FF> argument to specify transition rate)

rate_SS:FF: *<seconds><frames>*

delay_SS:FF: *<seconds><frames>*

black_SS:FF: *<seconds><frames>*

seconds: *FF,00-09 (hex, one byte)*
FF = argument NOP, causes Saturn to ignore the contents of the <seconds><frames> pair
00-09 = Seconds representing 0:00-9:00

frames: *00-1D (hex, one byte)*
00-1D = Frames representing 0:00-0:29

Section 4

Definition of Supported Saturn Commands

The existing Saturn Automation commands, their parameters and functionality, are defined as follows for Maestro. It should be noted that in order to ensure backwards compatibility with Saturn, no changes, redefinition, or use of unused parameters will be made to the existing Saturn Automation commands for use by Maestro. Instead, Maestro Applicability will be stated for each Saturn command. For Maestro specific commands, refer to *Section 5-Definition of Extended Maestro Commands*.

Note "Use applicable with UPDATE:" refers to commands supported for automatic updating.

Note The "Maestro Applicability" statements in this section are preliminary and subject to change without notice.

All stop (cut to new video)

Hex definition	Mnemonic
76	ALL_STOP

Command format:

ALL_STOP

Query format:

Illegal

Reply format:

None

Use applicable with UPDATE:

No

Argument definitions:

None

Maestro applicability:

Not presently supported

AUD_BPSET (Audio backup preset bus Take)

Hex definition	Mnemonic
C1	AUD_BPSET

Command format:

AUD_BPSET <audio source> <ign>

Query format:

READ AUD_BPSET

Reply format:

IFRE AUD_BPSET <audio source> <ign>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio source**> = 0, 1-255

0 = audio source NOP IF_NULL

1-255 = Maps to the order of the Saturn input table.

<**ign**> = 0-255

Value ignored by Saturn.

Maestro applicability:

Not Supported – Backup sources are not currently a requirement of Maestro

AUD_PSET (Audio preset bus Take)

Hex definition	Mnemonic
58	AUD_PSET

Command format:

AUD_PSET <audio source> <ign>

Query format:

READ AUD_PSET

Reply format:

IFRE AUD_PSET <audio source> <ign>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio source**> = 0, 1-255

0 = audio source NOP IF_NULL

1-255 = Maps to the order of the Saturn input table.

<**ign**> = 0-255

Value ignored by Saturn.

Maestro applicability:

As stated

CEXT (0x3F) Common Extension

The Extension Set command UPDATE (0x07) is used to specify Saturn commands for automatic updates. E.g.:

STX | LEN | 3F | 07 | 01 | 58 | 78 | 02 |

This would active UPDATE for AUD_PSET and REM_MODE. The RBGN/REND is necessary since this example selects more than one command for updates.

The MUTE command would switch off all responses (Legacy or Maestro).

(0x3F) Common Extension

The Extension Set command UPDATE (0x07) is enhanced to specify Maestro commands. Extension (0xFF) precedes each Maestro command (I/F name). E.g.:

STX | LEN | 3F | 07 | 01 | FF | 40 | FF | 41 | 02 |

This would activate UPDATE for MAESTRO_TRANSITION_TYPE and MAESTRO_TRANSITION_RATE

The MUTE command would switch off all responses (Legacy or Maestro).

CLK (Clock time)

Hex definition	Mnemonic
90	CLK

Command format:

CLK <time value>

Query format:

READ CLK

Reply format:

IFRE CLK <time value>

Use applicable with UPDATE:

No

Argument definitions:

<time value>

0-23HH = BCD Hours
0-59MM = BCD Minutes
0-59SS = BCD Seconds
0-29FF = BCD Frames

Maestro applicability:

The CLK command format is not supported in Maestro as Maestro Time is set by the timecode input only. The CLK query/reply format functions in Maestro as stated.

FTBLK (Fade to black)

Hex definition	Mnemonic
78	FTBLK

Command format:

FTBLK

Query format:

READ FTBLK

Reply format:

IFRE FTBLK <off_on_null>

Use applicable with UPDATE:

Yes

Argument definitions:

<off_on_null>

0 = No change	IF_NULL
2 = Off	IF_OFF
3 = On	IF_ON

Maestro applicability:

As stated

LRS_PGM (Left/right/stereo PGM audio mode)

Hex definition	Mnemonic
A3	LRS_PGM

Command format:

LRS_PGM <audio mode>

Query format:

READ LRS_PGM

Reply format:

IFRE LRS_PGM <audio mode>

Use applicable with UPDATE:

Yes

Argument definitions:

<audio mode> = 0, 1-4

0 = Audio Mode NOP	IF_NULL
1 = Mono L + R	AMONO
2 = Mono L	ALFT
3 = Mono R	ARGHT
4 = Stereo	AST

Maestro applicability:

Applies only to:

- Audio Group 1
- Only if Audio Group 1 is configured as a Stereo Audio Group type.

LRS_PST (Left/right/stereo PST audio mode)

Hex definition	Mnemonic
A1	LRS_PST

Command format:

LRS_PST <audio mode>

Query format:

READ LRS_PST

Reply format:

IFRE LRS_PST <audio mode>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio mode**> = 0, 1-4

0 = Audio Mode NOP	IF_NULL
1 = Mono L + R	AMONO
2 = Mono L	ALFT
3 = Mono R	ARGHT
4 = Stereo	AST

Maestro applicability:

Applies only to:

- Audio Group 1
- Only if Audio Group 1 is configured as a Stereo Audio Group type.

MAL_PGM (PGM main audio level)

Hex definition	Mnemonic
A7	MAL_PGM

Command format:

MAL_PGM <audio level>

Query format:

READ MAL_PGM

Reply format:

IFRE MAL_PGM <audio level>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio level**> = 0-99 (base 10) percent of full-scale

Maestro applicability:

Applies only to:

- Audio Group 1
- Only if the Audio Group 1 type supports audio level adjustment.

MAL_PST (PST main audio level)

Hex definition	Mnemonic
A4	MAL_PST

Command format:

MAL_PST <audio level>

Query format:

READ MAL_PST

Reply format:

IFRE MAL_PST <audio level>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio level**> = 0-99 (base 10) percent of full-scale

Maestro applicability:

Applies only to:

- Audio Group 1
- Only if the Audio Group 1 type supports audio level adjustment

PGM_OVER (Program bus over take)

Hex definition	Mnemonic
5B	PGM_OVER

Command format:

PGM_OVER <over selection>

Query format:

READ PGM_OVER

Reply format:

IFRE PGM_OVER <over selection>

Use applicable with UPDATE:

Yes

Argument definitions:

<over selection>

B7 = Must be set for over selection to occur for commands
B6 - B4 = reserved
B3 = Over 3 (not used by Saturn)
B2 = Over 2 (not used by Saturn)
B1 = Over 1 Saturn Mix 2 In/Next
B0 = Over 0 Saturn Mix 1 In/Next

Maestro applicability:

Command Selects/Unselects the specified <over selection> on **all** Audio Groups that support Overs (e.g.: Dolby Passthrough does not support Overs).

Query: Reports whether the specified <over selection> is selected on **any** Audio Groups.

PROLL (Preroll time)

Hex definition	Mnemonic
91	PROLL

Command format:

PROLL <seconds>

Query format:

READ PROLL

Reply format:

IFRE PROLL <seconds>

Use applicable with UPDATE:

Yes

Argument definitions:

<**seconds**> = 0-9, 0-9 secs:tenths (two bytes)

Maestro applicability:

As stated.

PST_OVER (Preset bus over take)

Hex definition	Mnemonic
5A	PST_OVER

Command format:

PST_OVER <over selection>

Query format:

READ PST_OVER

Reply format:

IFRE PST_OVER <over selection>

Use applicable with UPDATE:

Yes

Argument definitions:

<over selection>

B7 = Must be set for over selection to occur for commands
B6 - B4 = reserved
B3 = Over 3 (not used by Saturn)
B2 = Over 2 (not used by Saturn)
B1 = Over 1 Saturn Mix 2 In/Next
B0 = Over 0 Saturn Mix 1 In/Next

Maestro applicability:

Command: Selects/Unselects the specified <over selection> on **all** Audio Groups that support Overs (e.g.: Dolby Passthrough does not support Overs).

Query: Reports whether the specified <over selection> is selected on **any** Audio Groups.

Ratio (audio mixer to main ratio)

Hex definition	Mnemonic
AA	RATIO

Command format:

RATIO <audio level>

Query format:

READ RATIO

Reply format:

IFRE RATIO <audio level>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio level**> = 0-99 (base 10) percent of full-scale

Maestro applicability:

Applies only to Over 1.

Command: The specified <audio level> is applied to **all** Audio Groups that support ratio on both Program and Preview.

Query: Reports the <audio level> associated with Audio Group 1.

RECALL_REG (Recall configured independent transition)

This command allows Saturn's distributed transition parameters to be preset using the customer's predefined configura tion sets.

Hex definition	Mnemonic
E4	RECALL_REG

Command format:

RECALL_REG <register bits> <register number>

Query format:

READ RECALL_REG <register bits> <register number>

Reply format:

IFRE RECALL_REG <register bits> <register number>

Note: The response will contain a reply for each board requested in the <board bits> argument of the query, wrapped within a begin-end construct.

Use applicable with UPDATE:

Yes

Argument definitions:

<**register_bits**> = 00, 10 (hex, one byte)

00 = Valid on query only--verify existence of transition table specified in <register_number>. (If bit 4 is set in the reply, then the table exists in the customer's configuration set.)

10 = (Bit 4 set--all other bits reserved) Recall transition configuration table.

<**register_number**> = 00, 01-63, 64, 65 (hex, one byte)

Specifies the configuration transition table number, or reports on the current table on a reply.

00 = Specifies default transition parameters.

01-63 = Specifies configuration transition table numbers 1-99.

64 = Valid on reply only--reports that transition parameters have been set by TRAN_PRESET.

65 = Valid on reply only--reports that transition parameters have been manually set.

Examples

Request validation on existence of transition configuration table #25:

STX 04 READ E4 00 19 <checksum>

REPLY: STX 04 IFRE E4 10 19 <checksum>

REPLY: STX 04 IFRE E4 00 19 <checksum>

Set up transition parameters by recalling transition table #25:

STX 03 E4 10 19 <checksum>

Request the current transition table setting:

STX 04 READ E4 10 00 <checksum>

REPLY: STX 04 IFRE E4 10 19 <checksum> (if #25 is active)

REPLY: STX 04 IFRE E4 10 65 <checksum> (if operator intervened)

Maestro applicability:

<**register bits**> = 00, 0x10 (hex, one byte)

0x00 = Valid on query only. Verify existence of the Transition Association Table number specified in <register number>. (If bit 4 is set in the reply, then the Association exists in the customer's configuration set.)

0x10 = (Bit 4 set--all other bits reserved) Recall the specified Transition Association.

<**register number**> = 0x00-0x03, 0x04-0x63, 0x64, 0x65 (hex, one byte)

Specifies the configuration Transition Association Table number, or reports on the current table on a reply.

0x00-0x03 = Fixed values where:

0x00 = Cross-Fade	MAESTRO_TRANSITION_TYPE_CROSS_FADE
0x01 = Fade-Cut	MAESTRO_TRANSITION_TYPE_FADE_CUT
0x02 = Cut-Fade	MAESTRO_TRANSITION_TYPE_CUT_FADE
0x03 = Fade-Fade	MAESTRO_TRANSITION_TYPE_FADE_FADE

0x04-0x63 = Specifies configuration Transition Association numbers 4-99.

0x64 = Valid on reply only. Reports that transition parameters have been set by TRAN_PRESET (only if a Custom Transition is processed, refer to Maestro Applicability of TRAN_PRESET) or MAESTRO_TRANSITION_TYPE_CUSTOM.

0x65 = Valid on reply only. Reports that transition parameters have been manually set.

REM_MODE (Remote switch mode)

Hex definition	Mnemonic
61	REM_MODE

Command format:

REM_MODE <off on null>

Query format:

READ REM_MODE

Reply format:

IFRE REM_MODE <off on null>

Use applicable with UPDATE:

Yes

Argument definitions:

<off on null> = 0, 2, 3

0 = No Change	IF_NULL
2 = Off	IF_OFF
3 = On	IF_ON

Maestro applicability:

As stated

RTFB (Return from fade to black)

Hex definition	Mnemonic
79	RTFB

Command format:

RTFB

Query format:

Illegal

Reply format:

None

Use applicable with UPDATE:

No

Argument definitions:

None

Maestro applicability:

As stated

SAP0_PGM (SAP 0 program level)

Hex definition	Mnemonic
AD	SAP0_PGM

Command format:

SAP0_PGM <audio level>

Query format:

READ SAP0_PGM

Reply format:

IFRE SAP0_PGM <audio level>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio level**> = 0-99 (base 10) percent of full-scale

Maestro applicability:

Applies only to:

- Audio Group 2
- Only if Audio Group 2 is a Mono Audio Group type

SAP0_PST (SAP 0 preset level)

Hex definition	Mnemonic
AB	SAP0_PST

Command format:

SAP0_PST <audio level>

Query format:

READ SAP0_PST

Reply format:

IFRE SAP0_PST <audio level>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio level**> = 0-99 (base 10) percent of full-scale

Maestro applicability:

Applies only to:

- Audio Group 2
- Only if Audio Group 2 is a Mono Audio Group type

SAP1_PGM (SAP 1 program level)

Hex definition	Mnemonic
AE	SAP1_PGM

Command format:

SAP1_PGM <audio level>

Query format:

READ SAP1_PGM

Reply format:

IFRE SAP1_PGM <audio level>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio level**> = 0-99 (base 10) percent of full-scale

Maestro applicability:

Applies only to:

- Audio Group 3
- Only if Audio Group 3 is a Mono Audio Group type

SAP1_PST (SAP 1 preset level)

Hex definition	Mnemonic
AC	SAP1_PST

Command format:

SAP1_PST <audio level>

Query format:

READ SAP1_PST

Reply format:

IFRE SAP1_PST <audio level>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audio level**> = 0-99 (base 10) percent of full-scale

Maestro applicability:

Applies only to:

- Audio Group 3
- Only if Audio Group 3 is a Mono Audio Group type

SEL_1KEY (Select key 1 bus source)

Hex definition	Mnemonic
50	SEL_1KEY

Command format:

SEL_1KEY <key src>

Query format:

READ SEL_1KEY

Reply format:

IFRE SEL_1KEY <key src>

Use applicable with UPDATE:

Yes

Argument definitions:

<key src>

B7 = Must be set for key selection and PST key enable in commands. Indicates key is on PST for replies.

B6 = Must be set for key selection and PGM key enable in commands. Indicates key is on PGM for replies.

B5 = Indicates key is to be removed from both PST and PGM in commands. Don't care for replies.

B4 = Key 4 (not used by Saturn)

B3 = Key 3 (not used by Saturn)

B2 = Key 2 (not used by Saturn)

B1 = Key 1 (not used by Saturn)

B0 = Key 0 Saturn Key 1/Key 2 In/Next

Maestro applicability:

As stated

SEL_2KEY (Select key 2 bus source)

Hex definition	Mnemonic
51	SEL_2KEY

Command format:

SEL_2KEY <key src>

Query format:

READ SEL_2KEY

Reply format:

IFRE SEL_2KEY <key src>

Use applicable with UPDATE:

Yes

Argument definitions:

<key src>

B7 = Must be set for key selection and PST key enable in commands. Indicates key is on PST for replies.

B6 = Must be set for key selection and PGM key enable in commands. Indicates key is on PGM for replies.

B5 = Indicates key is to be removed from both PST and PGM in commands. Don't care for replies.

B4 = Key 4 (not used by Saturn)

B3 = Key 3 (not used by Saturn)

B2 = Key 2 (not used by Saturn)

B1 = Key 1 (not used by Saturn)

B0 = Key 0 (Saturn Key 1/Key 2 In/Next)

Maestro applicability:

As stated

SET_AUDIO (Set channel related audio parameters)

This command allows all of Saturn's audio parameters to be preset directly.

Hex definition	Mnemonic
E2	SET_AUDIO

Command format:

SET_AUDIO <src bus> <channel bits> <ratio> <bal> <gain> <mode> <ch rev> <phase inv>

Query format:

READ SET_AUDIO <src bus> <channel bits>

Reply format:

IFRE SET_AUDIO <src bus> <channel bits> <ratio> <bal> <gain> <mode> <ch rev> <phase inv>

Note: the response will contain a reply for each channel requested in the <channel bits> argument of the query, wrapped within a begin-end construct.

Note: If src bus is D_MIX1 or D_MIX2, the stereo mode returned is the Program Stereo Mode.

Use applicable with UPDATE:

Yes

Argument definitions:

<**src bus**> = 1, 2, 5, 6.

Specifies the source bus affected by the command.

1 = Program bus
2 = Preset bus
5 = Mixer 1
6 = Mixer 2

<**channel bits**> = 00-07 (hex, one byte).

Specifies the audio channels affected by the command.

bit 7-bit3 = reserved
bit 2 = Mode 1-CH5/6 Stereo, Mode 2-CH5 Mono, Mode 3-CH4 Mono
bit 1 = Mode 1,2-CH3/4 Stereo, Mode 3-CH3 Mono
bit 0 = All Modes-CH1/2 Stereo

<**ratio**> = 00, 01-FD, FE-FF (hex, one byte)

When <src bus> = Mixer 1 or Mixer 2, specifies the audio ratio or reports the current ratio on a reply.

00 =Audio ratio NOP

01-FD = Audio ratio linearly corresponding to -18.0 dB through +18.0 dB. Mixer ratios change in 0.375 (3/8) dB steps.

FE-FF = Audio ratio corresponding to +INF dB.

<**bal**> = 00, 01-FF (hex, one byte)

On a stereo channel, specifies the audio balance or reports the current balance on a reply.

00 =Audio balance NOP

01-FF = Audio balance linearly corresponding to 10.0 dB Left through 10.0 dB Right. Balance changes in 0.375 (3/8) dB steps.

<**gain**> = 00, 01-FF (hex, one byte)

Specifies the audio gain or reports the current audio gain on a reply.

00 =Audio gain NOP

01-FF = Audio gain linearly corresponding to -24.0 dB through +24.0 dB. Gain changes in 0.375 (3/8) dB steps.

<**mode**> = 0, 1-4

On a stereo channel, specifies the audio mode or reports the current audio mode on a reply.

0 = Audio mode NOP

1 = MONO L+R

2 = MONO L

3 = MONO R

4 = STEREO

<**ch rev**> = 0, 2, 3

On a stereo channel, specifies channel reverse or reports the current state of channel reverse on a reply.

0 = Channel reverse NOP

2 = Channel reverse OFF

3 = Channel reverse ON

<**phase inv**> = 0, 2, 3

On a stereo channel, specifies phase invert or reports the current state of channel reverse on a reply.

0 = Phase invert NOP

2 = Phase invert OFF

3 = Phase invert ON

Maestro applicability:

<**channel bits**> = 00-07 (hex, one byte).

Specifies the Audio Groups affected by the command.

bit 7-bit3 = reserved
bit 2 = Audio Group 3
bit 1 = Audio Group 2
bit 0 = Audio Group 1

<**ratio**> = 00-FF (hex, one byte)

When <src bus> = Mixer 1 or Mixer 2, specifies the audio ratio to be applied on all audio channels, or reports the current ratio of CH1/2 on a reply . Saturn audio ratio is -18.0 dB through 18.0 dB in 0.375 (3/8) dB steps where FE-FF is +INF dB. The Maestro range is from 0 dB to 24.0dB in .1dB increments and +INF. The Range supported by this command is from 0 dB to18.0dB in .1dB increments and +INF. Maestro does not support negative (-) dB values.

00 = Audio Ratio NOP IF_NULL
01-7F = Audio ratio set to 0 db.
80-FD = Audio ratio scaled to 0.1 dB through 18.0 dB in 0.1dB increments rounded to the lower whole 0.1 dB step.
FE-FF = Audio ratio set to +INF

<**bal**> = 00, 01-FF (hex, one byte)

On a stereo channel, specifies the audio balance or reports the current balance on a reply.

00 = Audio balance NOP
01-FF = Audio balance linearly corresponding to 10.0 dB Left through 10.0 dB Right. Balance changes in 0.375 (3/8) dB steps (Saturn compatibility) but will be applied as the lower whole 0.1 dB step in Maestro.

<**gain**> = 00, 01-FF (hex, one byte)

Specifies the audio gain or reports the current audio gain on a reply.

00 = Audio gain NOP
01-FF = Audio gain linearly corresponding to -24.0 dB through +24.0 dB. Gain changes in 0.375 (3/8) dB steps (Saturn compatibility) but will be applied as the lower whole 0.1 dB step in Maestro.

<**mode**> <**ch rev**>

Stereo Mode and Channel Reverse are not independent parameters in Maestro. In situations where there is a conflict between the requested Stereo Mode and the requested and/or current Channel Reverse mode, the requested Stereo Mode takes precedence over Channel Reverse. Basically, the only way to turn Channel Reverse ON is to request NOP for the Stereo Mode parameter. The following table indicates the interaction between Stereo Mode and Channel Reverse:

Decision Table for <mode> vs. <ch rev> parameters (SET_AUDIO)

<mode>	<ch rev>	<mode> Result	<ch rev> Result
NOP	NOP	NOP	NOP
NOP	OFF	NOP	OFF
NOP	ON	NOP	ON
MONO L+R	NOP	MONO L+R	OFF
MONO L	NOP	MONO L	OFF
MONO R	NOP	MONO R	OFF
STEREO	NOP	STEREO	OFF
MONO L+R	OFF	MONO L+R	OFF
MONO L	OFF	MONO L	OFF
MONO R	OFF	MONO R	OFF
STEREO	OFF	STEREO	OFF
MONO L+R	ON	MONO L+R	OFF
MONO L	ON	MONO L	OFF
MONO R	ON	MONO R	OFF
STEREO	ON	STEREO	OFF

SET_KEY (Set keyer related parameters)

Hex definition	Mnemonic
E0	SET_KEY

Command format:

SET_KEY <keyer> <video src> <key mix bus> <key type> <invert mod> <key shadow> <matte mode> <key timing> <key clip> <key gain> <matte hue> <matte sat> <matte lum>

Query format:

READ SET_KEY <keyer>

Reply format:

IFRE SET_KEY <keyer> <video src> <key mix bus> <key type> <invert mod> <key shadow> <matte mode> <key timing> <key clip> <key gain> <matte hue> <matte sat> <matte lum>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 7, 8

7 = Keyer 1 D_KEY1

8 = Keyer 2 D_KEY2

<**video src**> = 0, 0x01-0xFF

0 = video source NOP IF_NULL

0x01-0xFF = Input source numbers 1 through 255 (list sources with autoXptSelectionShow pROBE command)

0xFF = 255 is used to select the Direct Input

<**key mix bus**>:

B7 = Must be set for key/mix selection and PST key/mix enable in commands. Indicates key/mix is on PST for replies.

B6 = Must be set for key/mix selection and PGM key/mix enable in commands. Indicates key/mix is on PGM for replies.

B5 = Indicates key is to be removed from busses indicated by B7 & B6. Don't care for replies.

B4 - B0 = reserved

<**key type**> = 0, 3, 5, 6

0 = Key Type NOP IF_NULL

3 = Self Key K_SELF

5 = External Key K_EXT

6 = Chroma Key (not used by Saturn)

<**invert mod**> = 0, 2, 3

0 = Key Invert NOP IF_NULL

2 = Invert Off IF_OFF

3 = Invert On IF_ON

<**key shadow**> = 0-3 Key Shadow Depth

<**matte mod**> = 0, 2-3

0 = Key Matte NOP IF_NULL

2 = Matte Off IF_OFF

3 = Matte On IF_ON

<**key timing**> = 0, 1-255

0 = Key Timing NOP IF_NULL

1-255 = key timing (128 = default)

<**key timing**> = 0, 1-255

0 = Key Timing NOP IF_NULL

1-255 = key timing (128 = default)

<**key clip**> = 0, 1-255

0 = Key Clip NOP IF_NULL

1-255 = key clip

<**key gain**> = 0, 1-255

0 = Key Gain NOP IF_NULL

1-255 = key gain

<**matte hue**> = 0, 1-255

0 = Matte Hue NOP IF_NULL

1-255 = matte hue

<**matte sat**> = 0, 1-255

0 = Matte Saturation NOP IF_NULL

1-255 = matte saturation

<**matte lum**> = 0, 1-255

0 = Matte Luminance NOP IF_NULL

1-255 = matte luminance

Maestro applicability:

<key timing> is not supported in Maestro. <key shadow>, <matte hue>, <matte sat>, and <matte lum> are not presently supported.

The Saturn protocol query described above can only accommodate sources numbered from 1 to 255. If a Maestro command was used to set a video/audio source (which could be from 1 to 65535), the Saturn query will return a value of zero.

SET_MIX (Set mixer related parameters)

Since the SET_AUDIO command allows modification of Saturn audio parameters on a per channel basis, the <au dio_bal> argument of SET_MIX will be ignored. This parameter was never implemented and is not consistent with manual balance control, as it would affect all channels.

Hex definition	Mnemonic
E1	SET_MIX

Command format:

SET_MIX <mixer> <audio src> <key mix bus> <audio ratio> <**unused**>

Query format:

READ SET_MIX <mixer>

Reply format:

IFRE SET_MIX <mixer> <audio src> <key mix bus> <audio ratio> <**unused**>

Use applicable with UPDATE:

Yes

Argument definitions:

<**mixer**> = 5, 6

Specifies the mixer affected by the command.

5 = Mixer 1 D_MIX1
6 = Mixer 2 D_MIX2

<**audio src**> = 00, 01-FF (hex, one byte)

Specifies the audio source to assign to the mixer, or report the current assignment on a reply.

00 = Audio source NOP IF_NULL

01-FF = Input source numbers 1 through 255 (list sources with *autoXptSelectionShow* pROBE command).

<**key mix bus**> = 00, 40, 60, 70, 80, A0, C0 (hex, one byte)

Controls mix selection or reports on mix selection on a reply.

B7 = Must be set for key/mix selection and PST key/mix enable in commands. Indicates key/mix is on PST for replies.

B6 = Must be set for key/mix selection and PGM key/mix enable in commands. Indicates key/mix is on PGM for replies.

B5 = Indicates key is to be removed from busses indicated by B7 & B6. Don't care for replies.

B4-B0 = Reserved

<**audio ratio**> = 00, 01-FD, FE-FF (hex, one byte)

Specifies the audio ratio to *on all audio channels*, or reports the current ratio of *CH1/2* on a reply.

00 = Audio Ratio NOP IF_NULL

01-FD= Audio ratio linearly corresponding to -18.0 dB through 18.0 dB. Mixer ratios change in 0.365 (3/8) dB

steps.
FE-FF= Audio ratio corresponding to +INF dB

<***unused***> *= 00-FF (hex, one byte). Don't care about value.*

Maestro applicability:

<**audio ratio**> = 00-FF (hex, one byte)

Specifies the audio ratio to be applied on all audio channels, or reports the current ratio of CH1/2 on a reply. Saturn audio ratio is -18.0 dB through 18.0 dB in 0.375 (3/8) dB steps where FE-FF is +INF dB. The Maestro range is from 0 dB to 24.0dB in .1dB increments and +INF. The Range supported by this command is from 0 dB to 18.0dB in .1dB increments and +INF. Maestro does not support negative (-) dB values.

00 = Audio Ratio NOP IF_NULL
01-7F = Audio ratio set to 0 dB
80-FD = Audio ratio scaled to 0.1 dB through 18.0 dB in 0.1dB increments rounded to the lower whole 0.1 dB step.
FE-FF = Audio ratio set to +INF.

<**key mix bus**> = 00, 40, 60, 70, 80, A0, C0 (hex, one byte)

Commands: Enables/Disables the specified mixer on **all** Audio Groups.

Query: Indicates whether the specified mixer is enabled on **any** Audio Group.

The Saturn protocol query described above can only accommodate sources numbered from 1 to 255. If a Maestro command was used to set a video/audio source (which could be from 1 to 65535), the Saturn query will return a value of zero.

SWAP_PGM (Swap primary and backup program inputs)

Hex definition	Mnemonic
C3	SWAP_PGM

Command format:

SWAP_PGM <backup bits>

Query format:

Illegal

Reply format:

None

Use applicable with UPDATE:

No

Argument definitions:

<backup bits>

B7 = Set for command to execute. Don't care replies.
B6-B2 = reserved
B1 = swap backup and primary video
B0 = swap backup and primary audio

Maestro applicability:

Not Supported – Backup sources are not currently a requirement of Maestro

SWAP_PST (Swap primary and backup preset inputs)

Hex definition	Mnemonic
C2	SWAP_PST

Command format:

SWAP_PST <backup bits>

Query format:

Illegal

Reply format:

None

Use applicable with UPDATE:

No

Argument definitions:

<backup bits>

B7 = Set for command to execute. Don't care replies.
B6-B2 = reserved
B1 = swap backup and primary video
B0 = swap backup and primary audio

Maestro applicability:

Not Supported – Backup sources are not currently a requirement of Maestro

TAKE_XPT (Take crosspoint to a bus)

Hex definition	Mnemonic
7F	TAKE_XPT

Command format:

TAKE_XPT <bus> <video source> <audio source> <ign> <ign>

Query format:

READ TAKE_XPT <bus>

Reply format:

IFRE TAKE_XPT <bus> <video source> <audio source> <ign> <ign>

Use applicable with UPDATE:

Yes

Argument definitions:

<**bus**> = 0, 1-8

0 = Bus NOP	IF_NULL
1 = PGM	D_PGM
2 = PST	D_PST
3 = Backup PGM	D_BPGM
4 = Backup PST	D_BPST
5 = Mixer 1	D_MIX1
6 = Mixer 2	D_MIX2
7 = Keyer 1	D_KEY1
8 = Keyer 2	D_KEY2

<**video source**> = 0, 1-255

0 = video source NOP	IF_NULL

1-255 = Maps to the order of the Saturn input table.
See "Comments" below for discussion of Saturn Input table.

<**audio source**> = 0, 1-255

0 = audio source NOP	IF_NULL

1-255 = Maps to the order of the Saturn input table.

<**ign**> = 0-255

Value ignored by Saturn.

Maestro applicability:

As stated. <video source> contains the source associated with the Video level. <audio source> contains the source associated with all Audio Groups.

TRAN_PRESET (Preset distributed transition parameters)

This command allows all of Saturn's distributed transition parameters to be preset directly.

Hex definition	Mnemonic
E3	TRAN_PRESET

Command format:

TRAN_PRESET <board bits> <type> <rate> <rate SS:FF> <delay SS:FF> <black SS:FF>

Query format:

READ TRAN_PRESET <board bits>

Reply format:

IFRE TRAN_PRESET <board bits> <type> <rate> <rate SS:FF> <delay SS:FF> <black SS:FF>

Note: The response will contain a reply for each board requested in the <board bits> argument of the query, wrapped within a begin-end construct.

Use applicable with UPDATE:

Yes

Argument definitions:

<**board bits**> = 00-0F(hex, one byte)

Specifies the Saturn board affected by the command.

bit 7 - bit 4 = reserved
bit 3 = Audio 5/6 board (Mode 2-CH5 Mono, Mode 1-CH5/6 Stereo)
bit 2 = Audio 3/4 board (Mode 3-CH3 & CH4 Mono, Mode 1,2-CH3/4 Stereo)
bit 1 = Audio 1/2 board (All Modes-CH1/2 Stereo)
bit 0 = Video board

<**type**> = 0, 1-4

Specifies the transition type, or reports the current transition type on a reply.

0 = Transition type NOP
1 = Cross-fade
2 = Fade-cut
3 = Cut-fade
4 = Fade-fade

<**rate**> = 0, 1-5

Specifies the transition rate, or reports the current transition rate on a reply.

0 = Transition rate NOP
1 = Slow
2 = Medium
3 = Fast
4 = Cut

5 = Custom (used with <rate_SS:FF> argument to specify transition rate)

<**rate SS:FF**> = <seconds> <frames>

Specifies the transition rate when <rate> = 5, or reports the current transition rate on a reply. See "<seconds>" and "<frames>" below.

<**delay SS:FF**> = <seconds> <frames>

Specifies the take delay, or reports the current take delay on a reply. See "<seconds>" and "<frames>" below.

<**black SS:FF**> = <seconds> <frames>

Specifies the black duration, or reports the current black duration on a reply. See "<seconds>" and "<frames>" below.

<**seconds**> = FF, 00-09 (hex, one byte)

FF = argument NOP, causes Saturn to ignore the contents of the <seconds> <frames> pair.

00-09 = Seconds representing 0:00 through 9:00.

<**frames**> = 00-1D (hex, one byte). Frames representing 0:00 through 0:29.

Examples

Set all boards to Fade-fade, Slow, without disturbing the current Take delay or black duration:

STX 0A E3 0F 04 01 FF 00 FF 00 FF 00 <checksum>

Set up a custom transition rate of 9:29 on all boards, without disturbing the current type, Take delay or black duration:

STX 0A E3 0F 00 05 09 1D FF 00 FF 00 <checksum>

Set up a 1:00 Fade-cut transition, with a black duration of 0:14, on all boards. This produces and event which fades to black in 0:08, remains in black for 0:22, then cuts to the new source:

STX 0A E3 0F 02 05 01 00 00 00 00 0E <checksum>

Set up a medium rate mixed transition, with Fade-fade on video, and Cross-fade on audio:

STX 0A E3 01 04 02 FF 00 FF 00 FF 00 <checksum>
STX 0A E3 06 01 02 FF 00 FF 00 FF 00 <checksum>

Set up an audio seque, where all boards are set up to do a Cross-fade, 1:00 in duration, but audio "leads" video by 0:15 (audio from both sources would be mixed in equally before the video would begin mixing. The total time to complete the transition is 1:00 + 0:15 = 1:15):

STX 0A E3 01 01 05 01 00 00 0F 00 00 <checksum>
STX 0A E3 06 01 05 01 00 00 00 00 00 <checksum>

Request the current transition settings on the Saturn video board:

STX 03 READ E3 01 <checksum>
REPLY: STX 0B IFRE E3 01 04 04 00 00 00 00 00 00 00 <checksum>
(video board is set to Fade-fade, at Cut rate, 0:00 actual rate)

Request the current transition settings on all boards (only two boards exist in the system):

STX 03 READ E3 0F <checksum>
REPLY: STX 19 RGBN
IFRE E3 01 04 04 00 00 00 00 00 00 00 (Video: Fade-fade, Cut, 0:00 all else)
IFRE E3 02 03 03 00 0F 00 00 00 00 00 (Audio 1/2: Cut-fade, Fast, 0:15 rate)
REND <checksum>

Maestro applicability:

Argument definitions:

<**board bits**> = 00-0F (hex, one byte)

Specifies the Maestro groups affected by the command.

bit 7 - bit 2 = Reserved

bit 1 = All audio groups

bit 0 = Video

Reply format:

The response will contain a reply for the Video Group and/or All Audio Groups requested in the <board bits> argument of the query, wrapped within a begin-end construct.

Notes:

If the Transition Duration is 0 then <**type**> in the reply will be “4 = Fade-Fade“ since the system cannot resolve this case.

TX_STAT (query transition status)

Hex definition	Mnemonic
45	TX_STAT

Command format:

Illegal

Query format:

READ TX_STAT

Reply format:

IFRE TX_STAT <trans status>

Use applicable with UPDATE:

Yes

Argument definitions:

<trans status> = 2-5

2 = Quiescent	TS_Q
3 = Prerolling	TS_PROL
4 = Transitioning	TS_TRAN
5 = In Black	TS_BLK

Maestro applicability:

TRANSITION_STATE_IDLE	TS_Q
TRANSITION_STATE_PENDING	TS_TRAN
TRANSITION_STATE_PREROLL	TS_PROL
TRANSITION_STATE_DELAY	TS_TRAN
TRANSITION_STATE_FROM_OLD	TS_TRAN
TRANSITION_STATE_BLACK_SILENT	TS_BLK or TS_SILENT
TRANSITION_STATE_TO_NEW	TS_TRAN
TRANSITION_STATE_COMPLETE	TS_Q

TX_TRIG (Transition trigger)

Hex definition	Mnemonic
44	TX_TRIG

Command format:

TX_TRIG <trigger bits>

Query format:

Illegal

Reply format:

None

Use applicable with UPDATE:

No

Argument definitions:

<trigger bits>

B7 = Trigger Enable	VX_TRIG
B6 = Inhibit Preroll	NO_PROL
B5 - B0 = reserved	

Maestro applicability:

As stated

VID_1KEY (Set Key 1 source and parameters)

Hex definition	Mnemonic
4A	VID_1KEY

Command format:

VID_1KEY <key type> <key mod> <ign> <matte mod>

Query format:

READ VID_1KEY

Reply format:

IFRE VID_1KEY <key type> <key mod> <ign> <matte mod>

Use applicable with UPDATE:

Yes

Argument definitions:

<**key type**> = 0, 3, 5, 6

0 = Key Type NOP	IF_NULL
3 = Self Key	K_SELF
5 = External Key	K_EXT
6 = Chroma Key (not used by Saturn)	

<**key mod**> = 0, 1, 2, 8

0 = Key Modifier NOP	IF_NULL
1 = Normal	KSNORM
2 = Shadow	KSSHAD
8 = Border (not used by Saturn)	

<**ign**> = 0-255

Value ignored by Saturn.

<**matte mod**> = 0, 2-3

0 = Key Matte NOP	IF_NULL
2 = Matte Off	IF_OFF
3 = Matte On	IF_ON

Maestro applicability:

<key mod> 2 (Shadow) not presently supported.

VID_2KEY (Set Key 2 source and parameters)

Hex definition	Mnemonic
4E	VID_2KEY

Command format:

VID_2KEY <key type> <key mod> <key shadow> <matte mod> <invert mod> <ign> <cksum>

Query format:

READ VID_2KEY

Reply format:

IFRE VID_2KEY <key type> <key mod> <key shadow> <matte mod> <invert mod> <ign> <cksum>

Use applicable with UPDATE:

Yes

Argument definitions:

<**key type**> = 0, 3, 5, 6

0 = Key Type NOP	IF_NULL
3 = Self Key	K_SELF
5 = External Key	K_EXT
6 = Chroma Key (not used by Saturn)	

<**key mod**> = 0, 1, 2, 8

0 = Key Modifier NOP	IF_NULL
1 = Normal	KSNORM
2 = Shadow	KSSHAD
8 = Border (not used by Saturn)	

<**key shadow**> = 0-3 Key Shadow Depth

<**matte mod**> = 0, 2-3

0 = Key Matte NOP	IF_NULL
2 = Matte Off	IF_OFF
3 = Matte On	IF_ON

<**invert mod**> = 0, 2, 3

0 = Key Invert NOP	IF_NULL
2 = Invert Off	IF_OFF
3 = Invert On	IF_ON

<**ign**> = 0-255

Value ignored by Saturn.

Maestro applicability:

As stated

VID_BPSET (Backup video preset bus Take)

Hex definition	Mnemonic
C0	VID_BPSET

Command format:

VID_BPSET <video source> <ign>

Query format:

READ VID_BPSET

Reply format:

IFRE VID_BPSET <video source> <ign>

Use applicable with UPDATE:

Yes

Argument definitions:

<**video source**> = 0, 1-255

0 = video source NOP IF_NULL

1-255 = Maps to the order of the Saturn input table.

See "Comments" below for discussion of Saturn Input table.

<**ign**> = 0-255

Value ignored by Saturn.

Maestro applicability:

Not Supported – Backup sources are not currently a requirement of Maestro

VID_MODE (Transition mode select)

Hex definition	Mnemonic
4C	VID_MODE

Command format:

VID_MODE <transition>

Query format:

READ VID_MODE

Reply format:

IFRE VID_MODE <transition>

Use applicable with UPDATE:

Yes (NOTE: A "Cut" to Saturn is a rate change, NOT a mode change. Therefore, the UPDATE response to setting the VID_MODE to XTAKE will be a VID_RATE response with the <seconds> bytes indicating the duration of the "Cut" as configured in the Saturn Master Control Description table of the Configuration Editor.)

Argument definitions:

<**transition**> = 0, 1-8

0 = Transition Type NOP	IF_NULL
1 = Cut	XTAKE
2 = Mix	XMIX
3 - 5 = reserved	
6 = Fade-Fade	XVFADE
7 = Cut-Fade	XCFADE
8 = Fade-Cut	XFADEC

Maestro applicability:

As stated

VID_PSET (Video preset bus Take)

Hex definition	Mnemonic
48	VID_PSET

Command format:

VID_PSET <video source> <ign>

Query format:

READ VID_PSET

Reply format:

IFRE VID_PSET <video source> <ign>

Use applicable with UPDATE: Yes

Argument definitions:

<**video source**> = 0, 1-255

0 = video source NOP IF_NULL

1-255 = Maps to the order of the Saturn input table.

See Item on page for discussion of Saturn Input table.

<**ign**> = 0-255

Value ignored by Saturn.

Maestro applicability:

As stated

VID_RATE (Transition rate (command))

Hex definition	Mnemonic
4D	VID_RATE

Command format:

VID_RATE <trans rate>

Query format:

READ VID_RATE

Reply format:

IFRE VID_RATE <trans rate> <value SS.TT>

Use applicable with UPDATE: No

Argument definitions:

<**trans rate**> = 0, 1-3

0 = Transition Rate NOP	IF_NULL
1 = Slow	RATES
2 = Medium	RATEM
3 = Fast	RATEF

<**value SS.TT**> = <seconds> <tenths of seconds>

Specifies the transition duration in seconds and tenths of seconds.

<seconds> = 00-09 (hex, one byte)

00-09 = Seconds representing 0:00 through 9:00

<tenths of seconds> = 00-09 (hex, one byte)

00-09 = Tenths of seconds representing 0.0 through 0.9

Maestro applicability:

As stated

VID_RATE (Transition rate [query])

Hex definition	Mnemonic
4D	VID_RATE

Command format:

Illegal

Query format:

READ VID_RATE

Reply format:

IFRE VID_RATE <trans rate> <seconds>

Use applicable with UPDATE: Yes (NOTE: A "Cut" to Saturn is a rate change, NOT a mode change. Therefore, the UPDATE response to setting the VID_MODE to XTAKE will be a VID_RATE response with the <seconds> bytes indicating the duration of the "Cut" as configured in the Saturn Master Control Description table of the Configuration Editor.)

Argument definitions:

<**trans rate**> = 0, 1-3

0 = Transition Rate NOP	IF_NULL
1 = Slow	RATES
2 = Medium	RATEM
3 = Fast	RATEF

<**seconds**> = 0-9, 0-9 secs:tenths (two bytes)

Maestro applicability:

As stated

VID_SYNC (Video sync status)

Hex definition	Mnemonic
49	VID_SYNC

Command format:

Illegal

Query format:

READ VID_SYNC

Reply format:

IFRE VID_SYNC <sync bits>

Use applicable with UPDATE: No

Argument definitions:

<sync bits>

B7 = PST & Internal Black in sync
B6 = PST & KEY in sync
B5 = PGM & PST in sync
B4 = PGM & KEY in sync
B3 = PGM video present
B2 = PST video present
B1 = reserved
B0 = reserved

Maestro applicability:

As stated

Section 5

Definition of Extended Maestro Commands

Introduction

The Maestro Automation Extensions to the Saturn ES serial protocol will be accessed through the Virtual Machine Type-Specific Subset Extension Keyword (0xFF, Mnemonic: ESMC_MAESTRO_EXT) capability of the ES protocol. The extended Maestro Automation commands, their parameters and functionality, are defined as follows.

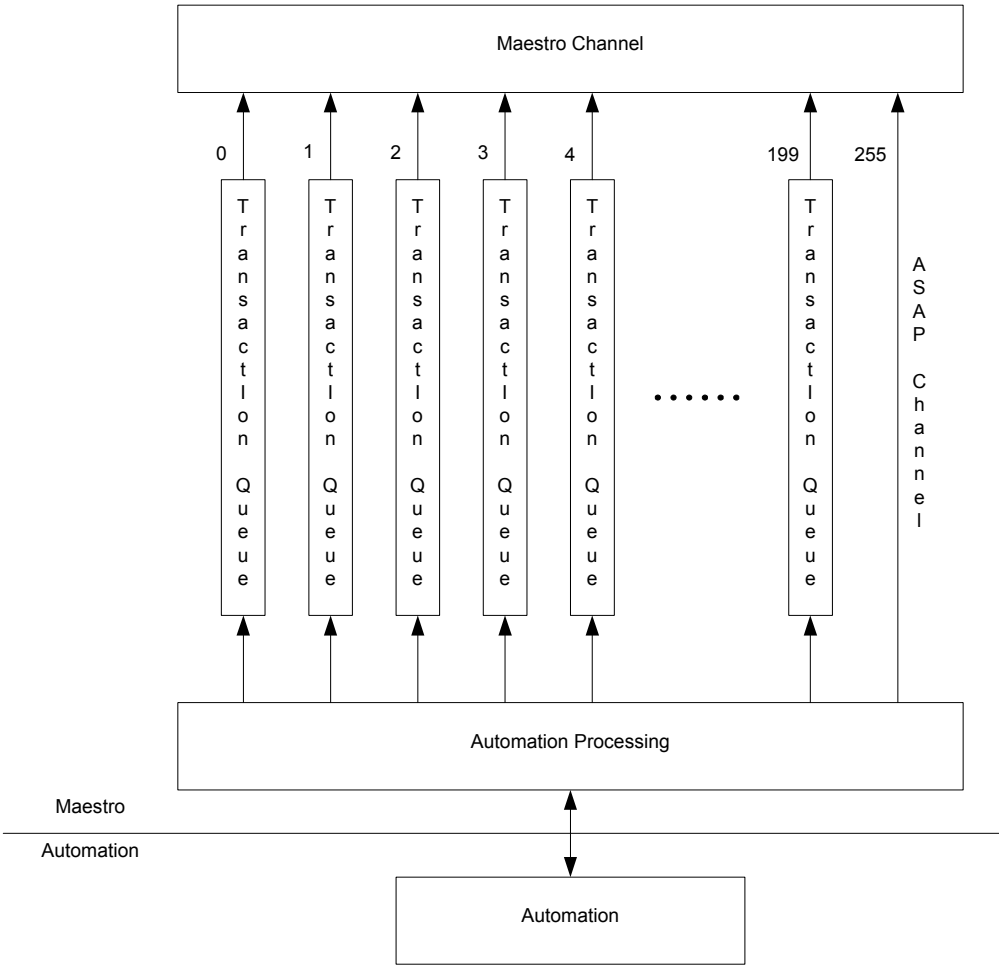
All Maestro Extended commands are preceded by the transaction queue in which it is to be placed. Refer to **Sequential Transaction Queues Theory of Operation.**

CAUTION Using a mix of new Maestro commands (as described in this section) and Saturn legacy commands (as described in the previous section) is not encouraged. Certain combinations of Maestro/Saturn commands are not compatible and may cause unpredictable results. For example, since a Maestro command can set a video/audio source from 1 to 65535, but a subsequent Saturn protocol query can only accommodate sources numbered from 1 to 255, the Saturn query will return a value of zero.

Sequential Transaction Queues Theory of Operation

In order to provide the means for execution of Maestro specific automation commands in a successive manner, the following is implemented. It is desired that an automation system have the ability to specify that a group of commands be executed in a successive manner and only after the previously issued command in the sequence has completed.

Figure 1.



255 Transaction Queues (0-199 are available for use by automation, 200-254 are reserved for internal use) will be created that will allow an automation vendor to specify which queue a command message will be placed. Providing multiple queues allows an automation system to set up multiple unrelated command sequences that will then be executed in parallel to minimize the latency. All command messages within a queue will be executed in a successive manner. In addition to the Sequential Transaction Queues (0-254), an ASAP channel (with an identifier of 255) will exist that will provide a channel for the execution of ALL existing Saturn Automa-

tion commands and can be specified as the Transaction Queue in the Maestro Automation commands to facilitate immediate execution of commands with no regard for execution of other command messages. **Transaction Queues (200-254) are reserved for internal use (e.g. break down and convert Legacy Commands such as Set Key, Set Mix etc. into Transaction Queues so that they are processed correctly).** Any command messages using Transactions Queues 200-254 will not be executed and an error message will be generated.

Transaction Queues will be processed on a field basis. First, system events will be processed to remove and report any completed or failed commands from the queues. Then, the subsequent command in any pending queues will be executed.

If a command in a Transaction Queue fails and no TransactionQueueBegin command has been received for that queue, all subsequent commands pending in that Transaction Queue will not be executed and will be reported as failed.

If a command in a Transaction Queue fails and a TransactionQueueBegin command has been received for that queue, all subsequent commands pending in that Transaction Queue and any additional commands received utilizing that transition queue will not be executed and will be reported as failed until a TransactionQueueEnd command is encountered for that Transaction Queue. It is recommended that TransactionQueueBegin and TransactionQueueEnd commands be used by automation vendors to demarcate a set of commands comprising a transaction as this prevents the situation where: 1) a sequence of commands are in the process of being communicated to be placed into a TransactionQueue, 2) A command in the Transaction Queue fails, 3) All remaining pending commands in that queue are marked as failed and removed from the transaction queue, and 4) Subsequent commands in the transaction are received and acted upon as though they are a new transaction. If one were to use TransactionQueueBegin and TransactionQueueEnd in this situation, if a failure occurred after a TransactionQueueBegin had been encountered, all subsequent commands either pending in the queue or received via the communication channel would be marked as failed and not executed until a TransactionQueueEnd command for that Transaction Queue was encountered. It is recommended that unrelated or independent commands be placed in separate transaction queues to prevent deletion of unrelated commands in the event of failure.

Packet Format Summary

Legacy

Legacy Command Packet:

<STX> <LEN> <CMD> <DATA> < CHKSUM>

Legacy Query Packet:

<STX> <LEN> <READ> <CMD> <DATA> <CHKSUM>

Legacy Query Reply Packet:

<STX> <LEN> <IFRE> <CMD> <DATA> <CHKSUM>

Maestro

<**TransactionQueue> <Command ID>** All Maestro Extended commands are preceded by the Transaction Queue (1 hex byte) in which it is to be placed and the Command ID (2 hex bytes, MSB first).

<PREAMBLE> is used to indicate the following:

<0xFF> <TRANSACTION QUEUE> <COMMAND ID>

Maestro Extension Command Packet:

<STX> <LEN> <PREAMBLE> <CMD> <DATA> <CHKSUM>

Maestro Extension Query Packet:

<STX> <LEN> <READ> <PREAMBLE> <CMD> <DATA> <CHKSUM>

Maestro Extension Query Reply Packet:

<STX> <LEN> <IFRE> <PREAMBLE> <CMD> <DATA> <CHKSUM>

Extended Maestro Commands Summary

Audio Mixer

MAESTRO_AUDIO_MIXER_CHANNEL_DEFAULT_MAPPING> <audioMixer>

MAESTRO_AUDIO_MIXER_CHANNEL_MAPPING> <audioMixer> <(Input) groupMask> <(Output) groupMask>

MAESTRO_AUDIO_MIXER_CHANNEL_UNMAPPING> <audioMixer> <(Output) groupMask>

MAESTRO_AUDIO_MIXER_SELECT <audioMixer> <groupMask> <select> <destInputBus>

MAESTRO_AUDIO_MIXER_SOURCE_REQUEST <audioMixer> <source> <groupMask>

MAESTRO_AUDIO_MIXER_RATIO <audioMixer> <destInputBus> <groupMask> <audioMixerRatio>

Note: Video in <groupMask> is ignored for audio only commands.

Background

MAESTRO_BACKGROUND_AUDIO_BALANCE <destInputBus><groupMask> <audioBalance>

MAESTRO_BACKGROUND_AUDIO_CHANNEL_DEFAULT_MAPPING <destInputBus>

MAESTRO_BACKGROUND_AUDIO_CHANNEL_MAPPING> <destInputBus> <source> <(Input)groupMask> <(Output) groupMask>

MAESTRO_BACKGROUND_AUDIO_CHANNEL_UNMAPPING> <destInputBus> <(Output) groupMask>

MAESTRO_BACKGROUND_AUDIO_GAIN <destInputBus><groupMask> <audioGain>

MAESTRO_BACKGROUND_SELECT <source> <destInputBus> <groupMask>

MAESTRO_BACKGROUND_STEREO_MODE <destInputBus> <groupMask> <stereoMode>

Note: Video in <groupMask> is ignored for audio only commands.

Channel

MAESTRO_DISABLE_AUTOMATION

DVE

MAESTRO_DVEFFECT <effectID> <effectAction> <audioMode>

MAESTRO_DVEFFECT_SELECT> <select>

MAESTRO_DVEFFECT_STATE

Keyer

MAESTRO_KEYER_CLIP < keyer> <clip>

MAESTRO_KEYER_FILL_MODE <keyer> <keyFillMode>

MAESTRO_KEYER_GAIN <keyer> <keyerGain>

MAESTRO_KEYER_HOLE_CUT_MODE <keyer> <keyHoleCutMode>

MAESTRO_KEYER_INVERT_MODE <keyer> <keyInvertMode>

MAESTRO_KEYER_SELECT <keyer> <select> <destInputBus>

MAESTRO_KEYER_SHADOW_MODE <keyer> <keyShadowMode>

MAESTRO_KEYER_SOURCE_REQUEST <keyer> <fillSource> <cutSource>

Transaction Queue

MAESTRO_TRANSACTION_BEGIN

MAESTRO_TRANSACTION_END

MAESTRO_TRANSACTION_QUEUE_STATUS

MAESTRO_TRANSACTION_QUEUE_PURGE

MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND _ID <aec>

MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND _ID_SET <offOn>

Transition

MAESTRO_MASTER_FADE_BLACK <fadeState>

MAESTRO_TAKE <requestedTransitionTimecode>

MAESTRO_TAKE_BLACK <toFrom> <requestedTransitionTimecode>

MAESTRO_PREROLL_TAKE <requestedTransitionTimecode>

MAESTRO_TRANSITION_NEXT <transitionNextBitsCommand>

MAESTRO_TRANSITION_RATE <transitionRate><transitionRate SS:FF><blackDuration SS:FF>

MAESTRO_TRANSITION_STATE

MAESTRO_TRANSITION_TYPE <transitionType>

MAESTRO_TRANSITION_TYPE_CUSTOM <videoTransitionType> <videoTransitionFromOldDelay SS:FF> <videoTransitionFromOld SS:FF> <videoTransitionblack SS:FF> <reserved 2 Bytes> <videoTransitionToNew SS:FF> <audioTransitionType> <audioTransitionFromOldDelay SS:FF> <audioTransitionFromOld SS:FF> <audioTransitionSilent SS:FF> <audioTransitionToNewDelay SS:FF> <audioTransitionToNew SS:FF>

MAESTRO_WIPE_SELECT> <select>

MAESTRO_WIPE_STATE>

MAESTRO_WIPE_TYPE <wipeType>

MAESTRO CERR (0x29) EXEC CODES

29 CERR (ERROR)

CERR indicates that the command string was not processed. EXEC CODES 0x10 and 0x20 are additions for Maestro.

Format: <ERROR>

<EXEC CODE> 8-bits:

00 - Parse error

01 - Cannot do by design

02 - Insufficiently equipped

03 - Buffer overflow

04 - Invalid keyword

05 - Invalid keyword argument

10 - Transaction Queue Full

20 - Internal Processing Error

FF - PROTECT (not used by Maestro, used by Jupiter)

<BYTE COUNT> 8-bits, not including the byte count

<OFFENDING STRING> Truncated not to exceed an overall ERROR message length of 256 bytes.

Note: "20 – Internal Processing Errors" includes failures such as an error returned from a vxWorks commands (e.g. msgQSend). Logging will include more details of the exact error encountered. These types of errors should rarely occur.

MAESTRO CEXT (0x3F) Common Extension

When using the Common Extension command UPDATE (0x07), Extended Maestro Commands are specified within the UPDATE command by indicating the Extension Command (0xFF) followed by the desired Extended Maestro Command. For example:

02	STX
08	Byte count
3F	Common Message Extension
07	UPDATE
01	**RBGN**
FF	Extension
40	MAESTRO_TRANSITION_TYPE
FF	Extension
41	MAESTRO_TRANSITION_RATE
02	**REND**
CS	Checksum

This would activate UPDATE for MAESTRO_TRANSITION_TYPE and MAESTRO_TRANSITION_RATE. The RBGN/REND is necessary since this example selects more than one command for updates.

The MUTE command would switch off all responses (Legacy and/or Maestro).

MAESTRO_AUDIO_MIXER_CHANNEL_DEFAULT_MAPPING

Hex definition	Mnemonic
0x24	MAESTRO_AUDIO_MIXER_CHANNEL_DEFAULT_MAPPING

Command format:

<PREAMBLE><MAESTRO_AUDIO_MIXER_CHANNEL_DEFAULT_MAPPING><audioMixer>

Query format: N/A

Reply format: N/A

Use applicable with UPDATE:

No. Mapping UPDATES are all controlled by the Maestro Audio Mixer Channel Mapping command. See that command for details.

Argument definitions:

<audioMixer> = 1-4

1 = Audio Mixer 1	AUDIO_MIXER1
2 = Audio Mixer 2	AUDIO_MIXER2
3 = Audio Mixer 3	AUDIO_MIXER3
4 = Audio Mixer 4	AUDIO_MIXER4

Notes:

Since there are not independent Audio Mixer inputs for Pgm and Pst, Audio Mixer Channel Mapping on Pgm and Pst is NOT independent of the other. Therefore, Audio Mixer Channel Mapping changes **always** affect BOTH Pgm and Pst buses. This is consistent with other Audio Mixer parameters such as Stereo Mode, Gain, and Balance.

MAESTRO_AUDIO_MIXER_CHANNEL_MAPPING

Hex definition	Mnemonic
0x22	MAESTRO_AUDIO_MIXER_CHANNEL_MAPPING

Command format:

<PREAMBLE><MAESTRO_AUDIO_MIXER_CHANNEL_MAPPING><audioMixer> <(Input) groupMask> <(Output) groupMask>

Query format:

READ<PREAMBLE><MAESTRO_AUDIO_MIXER_CHANNEL_MAPPING> <audioMixer> <(Output)groupMask>

Note: A query with all groupMask bytes set to 0xFF returns mapping information for all Output Groups.

Reply format:

IFRE<PREAMBLE><MAESTRO_AUDIO_MIXER_CHANNEL_MAPPING><audioMixer> <(Input)groupMask> <(Output)groupMask>

Use applicable with UPDATE:

YES

Note: Updates for the related Audio Mixer channel mapping commands are all controlled by setting this UPDATE to YES/NO. I.e., if UPDATE is set to YES then updates can/will result from updates to any of the following events:

MAESTRO_AUDIO_MIXER_CHANNEL_MAPPING
MAESTRO_AUDIO_MIXER_CHANNEL_UNMAPPING
MAESTRO_AUDIO_MIXER_CHANNEL_DEFAULT_MAPPING

Argument definitions:

<audioMixer> = 1-4

1 = Audio Mixer 1	AUDIO_MIXER1
2 = Audio Mixer 2	AUDIO_MIXER2
3 = Audio Mixer 3	AUDIO_MIXER3
4 = Audio Mixer 4	AUDIO_MIXER4

<(input/output) groupMask> = 4 bytes (Most Significant Bit first)

Bit 0 = VIDEO VIDEOGROUP

1 = Audio Group 1	AUDIOGROUP1
2 = Audio Group 2	AUDIOGROUP2
…	
15 = Audio Group 15	AUDIOGROUP15
16 = Audio Group 16	AUDIOGROUP16

Notes:

Since there are not independent Audio Mixer inputs for Pgm and Pst, Audio Mixer Channel Mapping on Pgm and Pst is NOT independent of the other. Therefore, Audio Mixer Channel Mapping changes **always** affect BOTH Pgm and Pst buses. This is consistent with other Audio Mixer parameters such as Stereo Mode, Gain, and Balance.

Mapping is one to one or one to many. Only a single group can be specified in the input groupMask.

MAESTRO_AUDIO_MIXER_CHANNEL_UNMAPPING

Hex definition	Mnemonic
0x23	MAESTRO_AUDIO_MIXER_CHANNEL_UNMAPPING

Command format:

<PREAMBLE><MAESTRO_AUDIO_MIXER_CHANNEL_UNMAPPING><audioMixer> <(Output) groupMask>

Query format: N/A

Reply format: N/A

Use applicable with UPDATE:

No. Mapping UPDATES are all controlled by the Maestro Audio Mixer Channel Mapping command. See that command for details.

Argument definitions:

<audioMixer> = 1-4

1 = Audio Mixer 1	AUDIO_MIXER1
2 = Audio Mixer 2	AUDIO_MIXER2
3 = Audio Mixer 3	AUDIO_MIXER3
4 = Audio Mixer 4	AUDIO_MIXER4

<(output) groupMask> = 4 bytes (Most Significant Bit first)

Bit 0 = VIDEO		VIDEOGROUP
	1 = Audio Group 1	AUDIOGROUP1
	2 = Audio Group 2	AUDIOGROUP2
	…	
	15 = Audio Group 15	AUDIOGROUP15
	16 = Audio Group 16	AUDIOGROUP16

Notes:

Since there are not independent Audio Mixer inputs for Pgm and Pst, Audio Mixer Channel Mapping on Pgm and Pst is NOT independent of the other. Therefore, Audio Mixer Channel Mapping changes **always** affect BOTH Pgm and Pst buses. This is consistent with other Audio Mixer parameters such as Stereo Mode, Gain, and Balance.

MAESTRO_AUDIO_MIXER_SELECT

Hex definition	Mnemonic
0x20	MAESTRO_AUDIO_MIXER_SELECT

Command format:

<PREAMBLE> MAESTRO_AUDIO_MIXER_SELECT <audioMixer> <groupMask> <select> <destInputBus>

Query format:

READ <PREAMBLE> MAESTRO_AUDIO_MIXER_SELECT <audioMixer> <4 bytes ignored> <destInputBus>

Reply format:

IFRE <PREAMBLE> MAESTRO_AUDIO_MIXER_SELECT <audioMixer> <groupMask> <select> <destInputBus>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audioMixer**> = 1-4

1 = Audio Mixer 1	AUDIO_MIXER_01
2 = Audio Mixer 2	AUDIO_MIXER_02
3 = Audio Mixer 3	AUDIO_MIXER_03
4 = Audio Mixer 4	AUDIO_MIXER_04

<**groupMask**> = 4 bytes (Most Significant Bit first)

Bit 0 = VIDEO	VIDEOGROUP
1 = Audio Group 1	AUDIOGROUP1
2 = Audio Group 2	AUDIOGROUP2
…	
15 = Audio Group 15	AUDIOGROUP15
16 = Audio Group 16	AUDIOGROUP16

<**select**> = 0-1

0 = Unselect	MAESTRO_UNSELECT
1 = Select	MAESTRO_SELECT

<**destInputBus**> =

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM

MAESTRO_AUDIO_MIXER_SOURCE_REQUEST (Take Crosspoint to a Mixer)

Hex definition	Mnemonic
60	MAESTRO_AUDIO_MIXER_SOURCE_REQUEST

Command format:

<PREAMBLE> MAESTRO_AUDIO_MIXER_SOURCE_REQUEST <audioMixer><source><groupMask>

Command notes:

If a Mixer is is selected on Program or Preset, attempting to assign a different source will not be allowed and will fail.

Query format:

READ <PREAMBLE> MAESTRO_AUDIO_MIXER_SOURCE_REQUEST <audioMixer>

Reply format:

IFRE <PREAMBLE> MAESTRO_AUDIO_MIXER_SOURCE_REQUEST <audioMixer><source><groupMask>

Use applicable with UPDATE:

Yes

Argument definitions:

<**audioMixe**r> = 1-4

1 = Audio Mixer 1	AUDIO_MIXER_01
2 = Audio Mixer 2	AUDIO_MIXER_02
3 = Audio Mixer 3	AUDIO_MIXER_03
4 = Audio Mixer 4	AUDIO_MIXER_04

<**source**> = (2 bytes, MSB first) automation input 1-65535 or 0 to Unassign source

<**groupMask**> = 4 bytes (Most Significant Bit first)

Bit	0 = VIDEO	VIDEOGROUP
	1 = Audio Group 1	AUDIOGROUP1
	2 = Audio Group 2	AUDIOGROUP2
	...	
	15 = Audio Group 15	AUDIOGROUP15
	16 = Audio Group 16	AUDIOGROUP16

MAESTRO_AUDIO_MIXER_RATIO

Hex definition	Mnemonic
0x21	MAESTRO_AUDIO_MIXER_RATIO

Command format:

<PREAMBLE> MAESTRO_AUDIO_MIXER_RATIO <AudioMixer> <destInputBus> <groupMask> <audioMixerRatio>

Query format:

READ <PREAMBLE> MAESTRO_AUDIO_MIXER_RATIO <AudioMixer> <destInputBus> <groupMask>

Reply format:

IFRE <PREAMBLE> MAESTRO_AUDIO_MIXER_RATIO <AudioMixer> <destInputBus> <groupMask> <audioMixerRatio>

Use applicable with UPDATE:

Yes

Argument definitions:

<**destInputBus**> = 0-1

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM

<**AudioMixer**> = 1-4

1= Audio Mixer 1	AUDIO_MIXER1
2= Audio Mixer 2	AUDIO_MIXER2
3= Audio Mixer 3	AUDIO_MIXER3
4 = Audio Mixer 4	AUDIO_MIXER4

<**groupMask**> = 4 bytes (Most Significant Bit first)

Bit 0 = VIDEO	VIDEOGROUP
1 = Audio Group 1	AUDIOGROUP1
2 = Audio Group 2	AUDIOGROUP2
…	
15 = Audio Group 15	AUDIOGROUP15
16 = Audio Group 16	AUDIOGROUP16

<**audioMixerRatio**> = 0x00-0xF0 or 0xFF for +INF(1 hex byte). The range is from 0-0xF0 which corresponds to 0 dB to 24.0dB in .1dB increments. 0xFF corresponds to +INF.

MAESTRO_BACKGROUND_AUDIO_BALANCE

Hex definition	Mnemonic
0x12	MAESTRO_ BACKGROUND_AUDIO_BALANCE

Command format:

<PREAMBLE> MAESTRO_BACKGROUND_AUDIO_BALANCE <destInputBus> <groupMask> <audioBalance>

Query format:

READ <PREAMBLE> MAESTRO_BACKGROUND_AUDIO_BALANCE <destInputBus> <groupMask>

Reply format:

IFRE <PREAMBLE> MAESTRO_BACKGROUND_AUDIO_BALANCE <destInputBus> <groupMask> <audioBalance>

Use applicable with UPDATE:

Yes

Argument definitions:

<**destInputBus**> = 0-2

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM
2 = Auxiliary	IB_AUXILIARY

<**groupMask**> = 4 bytes (Most Significant Bit first)

Bit 0 =	VIDEO	VIDEOGROUP
	1 = Audio Group 1	AUDIOGROUP1
	2 = Audio Group 2	AUDIOGROUP2
	…	
	15 = Audio Group 15	AUDIOGROUP15
	16 = Audio Group 16	AUDIOGROUP16

<**audioBalance**> = 0-0xF0 (1 hex byte). The range is from 0-0xF0 which corresponds to 12 dB Left to 12 dB Right in 0.1 dB increments.

MAESTRO_BACKGROUND_AUDIO_CHANNEL_DEFAULT_MAPPING

Hex definition	Mnemonic
0x16	MAESTRO_ BACKGROUND_AUDIO_CHANNEL_DEFAULT_MAPPING

Command format:

<PREAMBLE><MAESTRO_BACKGROUND_AUDIO_CHANNEL_DEFAULT_MAPPING> <destInputBus>

Query format: N/A

Reply format: N/A

Use applicable with UPDATE:

No. Mapping UPDATES are all controlled by the Maestro Background Audio Channel Mapping command. See that command for details.

Argument definitions:

<destInputBus> = 0-2

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM
2 = Auxiliary	IB_AUXILIARY

MAESTRO_BACKGROUND_AUDIO_CHANNEL_MAPPING

Hex definition	Mnemonic
0x14	MAESTRO_ BACKGROUND_AUDIO_CHANNEL_MAPPING

Command format:

<PREAMBLE><MAESTRO_BACKGROUND_AUDIO_CHANNEL_MAPPING> <destInputBus> <source> <(Input)groupMask> <(Output) groupMask>

Query format:

READ<PREAMBLE><MAESTRO_BACKGROUND_AUDIO_CHANNEL_MAPPING> <destInputBus><(Output)groupMask>

Note: A query with all groupMask bytes set to 0xFF returns mapping information for all Output Groups.

Reply format:

IFRE<PREAMBLE><MAESTRO_BACKGROUND_AUDIO_CHANNEL_MAPPING> <destInputBus><source> <(Input)groupMask> <(Output)groupMask>

Use applicable with UPDATE:

Yes

Note: Updates for the related Background Audio channel mapping commands are all controlled by setting this UPDATE to YES/NO. I.e., if UPDATE is set to YES then updates can/will result from updates to any of the following events:

MAESTRO_BACKGROUND_AUDIO_CHANNEL_MAPPING
MAESTRO_BACKGROUND_AUDIO_CHANNEL_UNMAPPING
MAESTRO_BACKGROUND_AUDIO_CHANNEL_DEFAULT_MAPPING

Argument definitions:

<destInputBus> = 0-2

0 = Preset IB_PRESET
1 = Program
IB_PROGRAM
2 = Auxiliary
IB_AUXILIARY

<source> = (2 bytes, MSB first) automation input 1-65535

<(input/output) groupMask> = 4 bytes (Most Significant Bit first)

Bit 0 = VIDEO VIDEO-GROUP

1 = Audio Group 1
AUDIOGROUP1

2 = Audio Group 2
AUDIOGROUP2

…

15 = Audio Group 15
AUDIOGROUP15

16 = Audio Group 16
AUDIOGROUP16

Notes:

Mapping is one to one or one to many. Only a single group can be specified in the input groupMask.

The VIDEO group cannot be mapped.

Command will Assign, Select and Map as necessary.

MAESTRO_BACKGROUND_AUDIO_CHANNEL_UNMAPPING

Hex definition	Mnemonic
0x15	MAESTRO_ BACKGROUND_AUDIO_CHANNEL_UNMAPPING

Command format:

<PREAMBLE><MAESTRO_BACKGROUND_AUDIO_CHANNEL_UNMAPPING> <destInputBus> <(Output) groupMask>

Query format: N/A

Reply format: N/A

Use applicable with UPDATE:

No. Mapping UPDATES are all controlled by the Maestro Background Audio Channel Mapping command. See that command for details.

Argument definitions:

<destInputBus> = 0-2

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM
2 = Auxiliary	IB_AUXILIARY

<(Output) groupMask> = 4 bytes (Most Significant Bit first)

Bit 0 = VIDEO	VIDEOGROUP
1 = Audio Group 1	AUDIOGROUP1
2 = Audio Group 2	AUDIOGROUP2
…	
15 = Audio Group 15	AUDIOGROUP15
16 = Audio Group 16	AUDIOGROUP16

MAESTRO_BACKGROUND_AUDIO_GAIN

Hex definition	Mnemonic
0x11	MAESTRO_BACKGROUND_AUDIO_GAIN

Command format:

<PREAMBLE> MAESTRO_BACKGROUND_AUDIO_GAIN <destInputBus> <groupMask > <audioGain>

Query format:

READ <PREAMBLE> MAESTRO_BACKGROUND_AUDIO_GAIN <destInputBus> <groupMask>

Reply format:

IFRE <PREAMBLE> MAESTRO_BACKGROUND_AUDIO_GAIN <destInputBus> <groupMask> <audioGain>

Use applicable with UPDATE:

Yes

Argument definitions:

<**destInputBus**> = 0-2

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM
2 = Auxiliary	IB_AUXILIARY

<**groupMask**> = 4 bytes (Most Significant Bit first)

Bit 0 = VIDEO	VIDEOGROUP
1 = Audio Group 1	AUDIOGROUP1
2 = Audio Group 2	AUDIOGROUP2
…	
15 = Audio Group 15	AUDIOGROUP15
16 = Audio Group 16	AUDIOGROUP16

<audioGain> = 0-0x1FE (2 hex bytes, MSB first). The range is from 0-0x1FE which corresponds to -24 dB to +24 dB in 0.1 dB increments.

MAESTRO_BACKGROUND_SELECT

Hex definition	Mnemonic
0x10	MAESTRO_BACKGROUND_SELECT

Command format:

<PREAMBLE> MAESTRO_BACKGROUND_SELECT <source> <destInputBus> <groupMask>

Query format:

READ <PREAMBLE> MAESTRO_BACKGROUND_SELECT <destInputBus> <groupMask>

Reply format:

IFRE <PREAMBLE> MAESTRO_BACKGROUND_SELECT <source> <destInputBus> <groupMask>

Use applicable with UPDATE:

Yes

Argument definitions:

<**source**> = (2 bytes, MSB first) automation input 1-65535

<**destInputBus**> = 0-2

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM
2 = Auxiliary	IB_AUXILIARY

<**groupMask**> = 4 bytes (Most Significant Bit first)

Bit	0 = VIDEO	VIDEOGROUP
	1 = Audio Group 1	AUDIOGROUP1
	2 = Audio Group 2	AUDIOGROUP2
	…	
	15 = Audio Group 15	AUDIOGROUP15
	16 = Audio Group 16	AUDIOGROUP16

Note: Unless one desires a breakaway, the <groupMask> must always be set to “FF FF FF FF” (i.e., all four hex bytes set to 0xFF).

MAESTRO_BACKGROUND_STEREO_MODE

Hex definition	Mnemonic
0x13	MAESTRO_ BACKGROUND_STEREO_MODE

Command format:

<PREAMBLE> MAESTRO_BACKGROUND_STEREO_MODE <destInputBus> <groupMask> <stereoMode>

Query format:

READ <PREAMBLE> MAESTRO_BACKGROUND_STEREO_MODE <destInputBus> <groupMask>

Reply format:

IFRE <PREAMBLE> MAESTRO_BACKGROUND_STEREO_MODE <destInputBus> <groupMask> <stereoMode>

Use applicable with UPDATE:

Yes

Argument definitions:

<**destInputBus**> = 0-2

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM
2 = Auxiliary	IB_AUXILIARY

<**groupMask**> = 4 bytes (Most Significant Bit first)

Bit 0 = VIDEO	VIDEOGROUP
1 = Audio Group 1	AUDIOGROUP1
2 = Audio Group 2	AUDIOGROUP2
…	
15 = Audio Group 15	AUDIOGROUP15
16 = Audio Group 16	AUDIOGROUP16

<**stereoMode**> = 0-4

0 = Stereo	STEREO_MODE_STEREO
1 = Stereo Reversed	STEREO_MODE_STEREO_REVERSE
2 = Mono Left	STEREO_MODE_MONO_L
3 = Mono Right	STEREO_MODE_MONO_R
4 = Mono Left Right	STEREO_MODE_MONO_LR

MAESTRO_DISABLE_AUTOMATION

Hex definition	Mnemonic
0x50	MAESTRO_DISABLE_AUTOMATION

Command format:

<PREAMBLE> MAESTRO_DISABLE_AUTOMATION

Query format:

READ <PREAMBLE> MAESTRO_DISABLE_AUTOMATION

Reply format:

IFRE <PREAMBLE> MAESTRO_DISABLE_AUTOMATION <offOn>

Use applicable with UPDATE:

Yes

Argument definitions:

<**offOn**> = 0-1(Reply format only)

0 = Off MAESTRO_IF_OFF
1 = On MAESTRO_IF_ON

Usage notes:

An automation system can *disable* automation control, but it cannot *enable* automation control. This is to prevent an automation system from overriding manual intervention by the operator.

MAESTRO_DVEFFECT

Note Automation interface does not validate the DVE audio mode parameter against the available configured audio modes for the specified DVE Effect

Hex definition	Mnemonic
0x71	MAESTRO_DVEFFECT

Command format:

<PREAMBLE> MAESTRO_DVEFFECT <effectID> <effectAction> <audioMode>

Query format:

READ <PREAMBLE> MAESTRO_DVEFFECT

Reply format:

IFRE <PREAMBLE> MAESTRO_DVEFFECT <effectID> <effectAction> <audioMode>

Use applicable with UPDATE:

Yes

Command Usage Notes:

1. On all commands, a valid <audiomode> greater than 0 must be specified with the exception of the following commands:

   MAESTRO_DVE_EFFECT_EXIT_PGM
   MAESTRO_DVE_EFFECT_EXIT_AUX
   MAESTRO_DVE_EFFECT_EXIT_PST

   On the above 3 commands, an <audioMode> of 0 (Effect NOP) should be used.

2. If a DVE is not active (i.e. DVE is not on program) then one must only send the following <effectAction> argument values:

1 = Enter PGM	MAESTRO_DVE_EFFECT_ENTER_PGM
3 = Enter AUX	MAESTRO_DVE_EFFECT_ENTER_AUX
5 = Enter PST	MAESTRO_DVE_EFFECT_ENTER_PST

3. If a DVE is active (i.e. DVE is on program) then one must only send the following <effectAction> argument values:

2 = Exit PGM	MAESTRO_DVE_EFFECT_EXIT_PGM
4 = Exit AUX	MAESTRO_DVE_EFFECT_EXIT_AUX
6 = Exit PST	MAESTRO_DVE_EFFECT_EXIT_PST

7 = Transition AUX PST	MAESTRO_DVE_EFFECT_TRANS_AUX_PST
8 = Audio Only	MAESTRO_DVE_EFFECT_AUDIO_ONLY
9 = Swap PGM AUX	MAESTRO_DVE_EFFECT_SWAP_PGM_AUX
10 = Rotate PST PGM AUX	MAESTRO_DVE_EFFECT_ROTATE_PST_PGM_AUX
11 = Rotate AUX PGM PST	MAESTRO_DVE_EFFECT_ROTATE_AUX_PGM_PST

4. The <effectID> argument is ignored with the exception of the following <effectAction> argument values:

1 = Enter PGM	MAESTRO_DVE_EFFECT_ENTER_PGM
3 = Enter AUX	MAESTRO_DVE_EFFECT_ENTER_AUX
5 = Enter PST	MAESTRO_DVE_EFFECT_ENTER_PST

The <effectID> argument cannot be 0 (effect NOP) for the above <effectAction> parameter values.

Argument definitions:

<**effectID**> = 0, 1-255

0 = effect NOP	IF_NULL
1-255 = Maps to the order of the DVE Set table.	

<**effectAction**> = 1-11

1 = Enter PGM	MAESTRO_DVE_EFFECT_ENTER_PGM
2 = Exit PGM	MAESTRO_DVE_EFFECT_EXIT_PGM
3 = Enter AUX	MAESTRO_DVE_EFFECT_ENTER_AUX
4 = Exit AUX	MAESTRO_DVE_EFFECT_EXIT_AUX
5 = Enter PST	MAESTRO_DVE_EFFECT_ENTER_PST
6 = Exit PST	MAESTRO_DVE_EFFECT_EXIT_PST
7 = Transition AUX PST	MAESTRO_DVE_EFFECT_TRANS_AUX_PST
8 = Audio Only	MAESTRO_DVE_EFFECT_AUDIO_ONLY
9 = Swap PGM AUX	MAESTRO_DVE_EFFECT_SWAP_PGM_AUX
10 = Rotate PST PGM AUX	MAESTRO_DVE_EFFECT_ROTATE_PST_PGM_AUX
11 = Rotate AUX PGM PST	MAESTRO_DVE_EFFECT_ROTATE_AUX_PGM_PST

<**audioMode**> = 0, 1-5

0 = audioMode NOP	IF_NULL
1 = PGM Off AUX On	MAESTRO_DVE_AUDIO_MODE_PGM_OFF_AUX_ON
2 = PGM On AUX Off	MAESTRO_DVE_AUDIO_MODE_PGM_ON_AUX_OFF
3 = PGM On AUX On	MAESTRO_DVE_AUDIO_MODE_PGM_ON_AUX_ON
4 = PGM Over AUX	MAESTRO_DVE_AUDIO_MODE_PGM_OVER_AUX
5 = AUX Over PGM	MAESTRO_DVE_AUDIO_MODE_AUX_OVER_PGM

MAESTRO_DVEFFECT_SELECT

Hex definition	Mnemonic
0x70	MAESTRO_ DVEFFECT_SELECT

Command format:

<PREAMBLE> MAESTRO_DVEFFECT_SELECT> <select>

Query format:

READ <PREAMBLE> MAESTRO_DVEFFECT_SELECT

Reply format:

IFRE <PREAMBLE> MAESTRO_DVEFFECT_SELECT <select>

Use applicable with UPDATE:

Yes

Argument definitions:

<select> = 0-1

0 = Unselect	MAESTRO_UNSELECT
1 = Select	MAESTRO_SELECT

MAESTRO_DVEFFECT_STATE

Hex definition	Mnemonic
0x72	MAESTRO_DVEFFECT_STATE

Command format:

N/A

Query format:

READ <PREAMBLE> MAESTRO_DVEFFECT_STATE

Reply format:

IFRE <PREAMBLE> MAESTRO_DVEFFECT_STATE <dvEffectState>

Use applicable with UPDATE:

Yes

Argument definitions:

<**dvEffectState**> = 0-10

0 = Idle	DVE_STATE_IDLE
1 = Enter Pending	DVE_STATE_ENTER_PENDING
2 = Enter In Progress	DVE_STATE_ENTER_IN_PROGRESS
3 = Enter Complete	DVE_STATE_ENTER_COMPLETE
4 = Active	DVE_STATE_ACTIVE
5 = Exit Pending	DVE_STATE_EXIT_PENDING
6 = Exit In Progress	DVE_STATE_EXIT_IN_PROGRESS
7 = Exit Complete	DVE_STATE_EXIT_COMPLETE
8 = No Motion Pending	DVE_STATE_NO_MOTION_PENDING
9 = No Motion In Progress	DVE_STATE_NO_MOTION_IN_PROGRESS
10 = No Motion Complete	DVE_STATE_NO_MOTION_COMPLETE

MAESTRO_KEYER_CLIP

Hex definition	Mnemonic
0x31	MAESTRO_KEYER_CLIP

Command format:

<PREAMBLE> MAESTRO_KEYER_CLIP <keyer> <clip>

Query format:

READ <PREAMBLE> MAESTRO_KEYER_CLIP <keyer>

Reply format:

IFRE <PREAMBLE> MAESTRO_KEYER_CLIP <keyer> <clip>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 1-8

1= Keyer 1	MAESTRO_KEY_01
2= Keyer 2	MAESTRO_KEY_02
3= Keyer 3	MAESTRO_KEY_03
4= Keyer 4	MAESTRO_KEY_04
5= Keyer 5	MAESTRO_KEY_05
6= Keyer 6	MAESTRO_KEY_06
7= Keyer 7	MAESTRO_KEY_07
8= Keyer 8	MAESTRO_KEY_08

<**clip**> = 0-0x03E8 (2 hex bytes, MSB first). The range is from 0.0% to 100% in 0.1 increments. 0 to 0x03E8 corresponds to 0.0% to 100.0%.

MAESTRO_KEYER_FILL_MODE

Hex definition	Mnemonic
0x35	MAESTRO_KEYER_FILL_MODE

Command format:

<PREAMBLE> MAESTRO_KEYER_FILL_MODE <keyer> <keyFillMode>

Query format:

READ <PREAMBLE> MAESTRO_KEYER_FILL_MODE <keyer>

Reply format:

IFRE <PREAMBLE> MAESTRO_KEYER_FILL_MODE <keyer> <keyFillMode>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 1-8

1= Keyer 1	MAESTRO_KEY_01
2= Keyer 2	MAESTRO_KEY_02
3= Keyer 3	MAESTRO_KEY_03
4= Keyer 4	MAESTRO_KEY_04
5= Keyer 5	MAESTRO_KEY_05
6= Keyer 6	MAESTRO_KEY_06
7= Keyer 7	MAESTRO_KEY_07
8= Keyer 8	MAESTRO_KEY_08

<**keyFillMode** > = 0-1

0 = Video	KEY_FILL_VIDEO
1 = Matte	KEY_FILL_MATTE

MAESTRO_KEYER_GAIN

Hex definition	Mnemonic
0x32	MAESTRO_KEYER_GAIN

Command format:

<PREAMBLE> MAESTRO_KEYER_GAIN <keyer> <keyerGain>

Query format:

READ <PREAMBLE> MAESTRO_KEYER_GAIN <keyer>

Reply format:

IFRE <PREAMBLE> MAESTRO_KEYER_GAIN <keyer> <gain>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 1-8

1= Keyer 1	MAESTRO_KEY_01
2= Keyer 2	MAESTRO_KEY_02
3= Keyer 3	MAESTRO_KEY_03
4= Keyer 4	MAESTRO_KEY_04
5= Keyer 5	MAESTRO_KEY_05
6= Keyer 6	MAESTRO_KEY_06
7= Keyer 7	MAESTRO_KEY_07
8= Keyer 8	MAESTRO_KEY_08

<**keyerGain** > = 0-0x0257 (2 hex bytes, MSB first). The range is from 0.0 dB to -59.9 dB. 0 to 0x0257 corresponds to 0.0 dB to -59.9 dB.

MAESTRO_KEYER_HOLE_CUT_MODE

Hex definition	Mnemonic
0x33	MAESTRO_KEYER_HOLE_CUT_MODE

Command format:

<PREAMBLE> MAESTRO_KEYER_HOLE_CUT_MODE <keyer> <keyHoleCutMode>

Query format:

READ <PREAMBLE> MAESTRO_KEYER_HOLE_CUT_MODE <keyer>

Reply format:

IFRE <PREAMBLE> MAESTRO_KEYER_HOLE_CUT_MODE <keyer> <keyHoleCutMode>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 1-8

1= Keyer 1	MAESTRO_KEY_01
2= Keyer 2	MAESTRO_KEY_02
3= Keyer 3	MAESTRO_KEY_03
4= Keyer 4	MAESTRO_KEY_04
5= Keyer 5	MAESTRO_KEY_05
6= Keyer 6	MAESTRO_KEY_06
7= Keyer 7	MAESTRO_KEY_07
8= Keyer 8	MAESTRO_KEY_08

<**keyHoleCutMode** > = 0-1

0 = Cut Self Key	KEY_HOLE_CUT_SELF_KEY
1 = Cut External Key	KEY_HOLE_CUT_EXT_KEY

MAESTRO_KEYER_INVERT_MODE

Hex definition	Mnemonic
0x36	MAESTRO_KEYER_INVERT_MODE

Command format:

<PREAMBLE> MAESTRO_KEYER_INVERT_MODE <keyer> <keyInvertMode>

Query format:

READ <PREAMBLE> MAESTRO_KEYER_INVERT_MODE <keyer>

Reply format:

IFRE <PREAMBLE> MAESTRO_KEYER_INVERT_MODE <keyer> <keyInvertMode>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 1-8

1= Keyer 1	MAESTRO_KEY_01
2= Keyer 2	MAESTRO_KEY_02
3= Keyer 3	MAESTRO_KEY_03
4= Keyer 4	MAESTRO_KEY_04
5= Keyer 5	MAESTRO_KEY_05
6= Keyer 6	MAESTRO_KEY_06
7= Keyer 7	MAESTRO_KEY_07
8= Keyer 8	MAESTRO_KEY_08

<**keyInvertMode** > = 0-1

0 = Invert Off	MAESTRO_IF_OFF
1 = Invert On	MAESTRO_IF_ON

MAESTRO_KEYER_SELECT

Hex definition	**Mnemonic**
0x30	MAESTRO_ KEYER_SELECT

Command format:

<PREAMBLE> MAESTRO_KEYER_SELECT <keyer> <select> <destInputBus>

Query format:

READ <PREAMBLE> MAESTRO_KEYER_SELECT <keyer> <destInputBus>

Reply format:

IFRE <PREAMBLE> MAESTRO_KEYER_SELECT <keyer> <select> <destInputBus>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 1-8

1= Keyer 1	MAESTRO_KEY_01
2= Keyer 2	MAESTRO_KEY_02
3= Keyer 3	MAESTRO_KEY_03
4= Keyer 4	MAESTRO_KEY_04
5= Keyer 5	MAESTRO_KEY_05
6= Keyer 6	MAESTRO_KEY_06
7= Keyer 7	MAESTRO_KEY_07
8= Keyer 8	MAESTRO_KEY_08

<**select**> = 0-1

0 = Unselect	MAESTRO_UNSELECT
1 = Select	MAESTRO_SELECT

<**destInputBus** > = 0-2

0 = Preset	IB_PRESET
1 = Program	IB_PROGRAM
2 = Auxiliary	IB_AUXILIARY

MAESTRO_KEYER_SHADOW_MODE

Hex definition	**Mnemonic**
0x34	MAESTRO_KEYER_SHADOW_MODE

Command format:

<PREAMBLE> MAESTRO_KEYER_SHADOW_MODE<keyer> <keyShadowMode>

Query format:

READ <PREAMBLE> MAESTRO_KEYER_SHADOW_MODE <keyer>

Reply format:

IFRE <PREAMBLE> MAESTRO_KEYER_SHADOW_MODE <keyer> <keyShadowMode>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 1-8

1= Keyer 1	MAESTRO_KEY_01
2= Keyer 2	MAESTRO_KEY_02
3= Keyer 3	MAESTRO_KEY_03
4= Keyer 4	MAESTRO_KEY_04
5= Keyer 5	MAESTRO_KEY_05
6= Keyer 6	MAESTRO_KEY_06
7= Keyer 7	MAESTRO_KEY_07
8= Keyer 8	MAESTRO_KEY_08

<**keyShadowMode** > = 0

0 = Shadow None	KEY_SHADOW_NONE

MAESTRO_KEYER_SOURCE_REQUEST (Take Crosspoint to a Keyer)

Hex definition	Mnemonic
61	MAESTRO_ KEYER_SOURCE_REQUEST

Command format:

<PREAMBLE> MAESTRO_KEYER_SOURCE_REQUEST <keyer> <fillSource> <cutSource>

Command notes:

If there is an associated cut specified in the table, it will be automatically routed. If a <cutSource> is specified then it will override any associated cut specified in the table. If a Keyer is selected on Program or Preset, attempting to assign a source to that keyer will not be allowed and will fail.

Query format:

READ <PREAMBLE> MAESTRO_KEYER_SOURCE_REQUEST <keyer>

Reply format:

IFRE <PREAMBLE> MAESTRO_KEYER_SOURCE_REQUEST <keyer> <fillSource> <cutSource>

Use applicable with UPDATE:

Yes

Argument definitions:

<**keyer**> = 1-8 decimal

1= Keyer 1	MAESTRO_KEY_01
2= Keyer 2	MAESTRO_KEY_02
3= Keyer 3	MAESTRO_KEY_03
4= Keyer 4	MAESTRO_KEY_04
5= Keyer 5	MAESTRO_KEY_05
6= Keyer 6	MAESTRO_KEY_06
7= Keyer 7	MAESTRO_KEY_07
8= Keyer 8	MAESTRO_KEY_08

<**fillSource**> = (2 bytes, MSB first)

NOP	=	Utilize the current source
1-65534	=	Automation Input
65535 (0xFFFF)	=	Unassign source

<**cutSource** > = (2 bytes, MSB first)

NOP	=	See *Command Notes* above
1-65534	=	Automation Input
65535 (0xFFFF)	=	Unassign source

MAESTRO_MASTER_FADE_BLACK

Hex definition	Mnemonic
0x45	MAESTRO_MASTER_FADE_BLACK

Command format:

<PREAMBLE> MAESTRO_MASTER _FADE_BLACK<fadeState>

Query format:

READ <PREAMBLE> MAESTRO_MASTER _FADE_BLACK

Reply format:

IFRE <PREAMBLE> MAESTRO_MASTER _FADE_BLACK<videoState> <audioState>

Use applicable with UPDATE:

Yes

Argument definitions:

<**fadeState**> = 0,1

0 = Fade from Black and not Silent
MAESTRO_IF_OFF

1 = Fade to Black and Silent
MAESTRO_IF_ON

<**videoState**> = 0,1

0 = not Black
1 = Black

<**audioState**> = 0,1

0 = not Silent
1 = Silent

MAESTRO_TAKE

Hex definition	**Mnemonic**
0x43	MAESTRO_TAKE

Command format:

<PREAMBLE> MAESTRO_TAKE <requestedTransitionTimecode>

Query format:

N/A

Reply format:

Use applicable with UPDATE:

No

Argument definitions:

<**requestedTransitionTimecode**> (four BCD bytes or set all four bytes to FF for immediate Transition) =

0-23	HH	= packed BCD Hours
0-59	MM	= packed BCD Minutes
0-59	SS	= packed BCD Seconds
0-29	FF	= packed BCD Frames

Usage notes:

The requested Transition Time Code can be up to 12 hours in the future. A requested Time Code that is 12 hours or more in the future will result in an immediate Transition.

MAESTRO_TAKE_BLACK

Hex definition	Mnemonic
0x44	MAESTRO_TAKE_BLACK

Command format:

<PREAMBLE> MAESTRO_TAKE_BLACK <toFrom> <requestedTransitionTimecode>

Query format:

N/A

Reply format:

See MAESTRO_TRANSITION_STATE

Use applicable with UPDATE:

No

Argument definitions:

<**toFrom**> =

1 = Take to Black MAESTRO_TO
2 = Take from Black MAESTRO_FROM

<**requestedTransitionTimecode**> (four BCD bytes or set all four bytes to FF for immediate Transition) =

0-23	HH	= packed BCD Hours
0-59	MM	= packed BCD Minutes
0-59	SS	= packed BCD Seconds
0-29	FF	= packed BCD Frames

Usage notes:

The requested Transition Time Code can be up to 12 hours in the future. A requested Time Code that is 12 hours or more in the future will result in an immediate Transition.

MAESTRO_PREROLL_TAKE

Hex definition	Mnemonic
0x49	MAESTRO_PREROLL_TAKE

Command format:

<PREAMBLE> MAESTRO_PREROLL_TAKE <requestedTransitionTimecode>

Query format:

N/A

Reply format:

Use applicable with UPDATE:No

Argument definitions:

<requestedTransitionTimecode> (four BCD bytes or set all four bytes to FF for immediate Transition) =

0-23	HH	= packed BCD Hours
0-59	MM	= packed BCD Minutes
0-59	SS	= packed BCD Seconds
0-29	FF	= packed BCD Frames

Note The requested Transition Time Code can be up to 12 hours in the future. A requested Time Code that is 12 hours or more in the future will result in an immediate Transition.

MAESTRO_PREROLL_DURATION

Hex definition	Mnemonic
0x4B	MAESTRO_PREROLL_DURATION

Command format:

<PREAMBLE> MAESTRO_PREROLL_DURATION <prerollDuration>

Query format:

READ<PREAMBLE>MAESTRO_PREROLL_DURATION

Reply format:

IFRE <PREAMBLE>MAESTRO_PREROLL_DURATION <prerollDuration >

Use applicable with UPDATE:

Yes

Argument definitions:

<prerollDuration> (unsigned two bytes) = seconds:frames

Notes

For a 30 frame video standard, the valid range for Pre Roll time is from 0 seconds and 0 frames (0:00) to 9 seconds and 29 frames (9:29). For a 25 frame video standard, the valid range for Pre Roll time is from 0 seconds and 0 frames (0:00) to 9 seconds and 24 frames (9:24). If there is a Pre Roll time entered in the GPIO Definition Table, then an entry of a Pre Roll time outside the valid range will result in the Pre Roll Duration defaulting back to the Pre Roll time from the GPIO definition table. If there is not a Pre Roll time entered in the GPIO Definition Table, then an entry of a Pre Roll time outside the valid range will result in an error message being reported (that is, the command will not be executed).

MAESTRO_TRANSACTION_BEGIN

Hex definition	Mnemonic
0x01	MAESTRO_TRANSACTION_BEGIN

Command format:

<PREAMBLE>[1] MAESTRO_TRANSACTION_BEGIN

Query format:

N/A

Reply format:

N/A

Use applicable with UPDATE:

No

Argument definitions:

N/A

[1] <PREAMBLE> is described on page 100.

MAESTRO_TRANSACTION_END

Hex definition	Mnemonic
0x02	MAESTRO_TRANSACTION_END

Command format:

<PREAMBLE> MAESTRO_TRANSACTION_END

Query format:

N/A

Reply format:

N/A

Use applicable with UPDATE:

No

Argument definitions:

N/A

MAESTRO_TRANSACTION_QUEUE_STATUS

Hex definition	Mnemonic
0x03	MAESTRO_TRANSACTION_QUEUE_STATUS

Command format:

N/A

Query format:

READ <PREAMBLE> MAESTRO_TRANSACTION_QUEUE_STATUS

Reply format:

IFRE <PREAMBLE> MAESTRO_TRANSACTION_STATUS <transactionQueueStatus>

Use applicable with UPDATE:

No

Argument definitions:

N/A

<**transactionQueueStatus**> = 1-5

1 = OK
2 = ERROR – Queue Full
3 = ERROR – Automation Defeat Enabled
4 = ERROR – Transaction Failed
5 = ERROR – Invalid Queue

MAESTRO_TRANSACTION_QUEUE_PURGE

Hex definition	Mnemonic
0x04	MAESTRO_TRANSACTION_QUEUE_PURGE

Command format:

<PREAMBLE> MAESTRO_TRANSACTION_QUEUE_PURGE

Query format:

N/A

Reply format:

N/A

Use applicable with UPDATE:

No

Argument definitions:

N/A

MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND _ID

Hex definition	Mnemonic
0x05	MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND_ID

Command format:

N/A

Query format:

N/A

Reply format:

IFRE<PREAMBLE>MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND_ID <aec>

Use applicable with UPDATE:

No

Argument definitions:

<aec> =

0 = OK	AEC_OK
1 = Automation Defeat Enabled	AEC_AUTOMATION_DEFEAT_IS_ENABLED
2 = Invalid Begin/End	AEC_AUTOMATION_INVALID_TRANSACTION_BEGIN_END
3 = Command Failed	AEC_COMMAND_FAILED
4 = Transaction Failed	AEC_TRANSACTION_FAILED
5 = Transaction Queue Full	AEC_TRANSACTION_QUEUE_FULL

Notes:

The activation of this Reply is controlled by MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND_ID_SET

MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND_ID_SET

Hex definition	Mnemonic
0x06	MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND_ID_SET

Command format:

<PREAMBLE> MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND_ID_SET <offOn>

Query format:

READ<PREAMBLE> MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND_ID_SET

Reply format:

IFRE<PREAMBLE>MAESTRO_TRANSACTION_QUEUE_REPLY_COMMAND_ID <offOn>

Use applicable with UPDATE:

No

Argument definitions:

<**offOn**> = 0-1

0 = Off

1 = On

MAESTRO_TRANSITION_NEXT

Hex definition	Mnemonic
0x42	MAESTRO_TRANSITION_NEXT

Command format:

<PREAMBLE> MAESTRO_TRANSITION_NEXT <transitionNextBitsCommand>

Query format:

READ <PREAMBLE> MAESTRO_TRANSITION_NEXT

Reply format:

IFRE <PREAMBLE> MAESTRO_TRANSITION_NEXT <transitionNextBitsReply>

Use applicable with UPDATE:

Yes

Argument definitions:

<**transitionNextBitsCommand**> = (hex, 1 byte)

Bit 7 - Bit 3 = reserved	
Bit 2 = Transition Next Effect	MAESTRO_TRANSITION_NEXT_EFFECT
Bit 1 = Transition Next Downstream	MAESTRO_TRANSITION_DOWNSTREAM_NEXT
Bit 0 = Transition Next Upstream	MAESTRO_TRANSITION_UPSTREAM_NEXT

<**transitionNextBitsReply**> = (hex, 1 byte)

Bit 7 - Bit 4 = reserved	
Bit 3 = Transition Next Preview Transition	MAESTRO_TRANSITION_PVW_TRANS
Bit 2 = Transition Next Effect	MAESTRO_TRANSITION_NEXT_EFFECT
Bit 1 = Transition Next Downstream	MAESTRO_TRANSITION_DOWNSTREAM_NEXT
Bit 0 = Transition Next Upstream	MAESTRO_TRANSITION_UPSTREAM_NEXT

MAESTRO_TRANSITION_RATE

Hex definition	Mnemonic
0x41	MAESTRO_TRANSITION_RATE

Command format:

<PREAMBLE> MAESTRO_TRANSITION_RATE <transitionRate><transitionRate SS:FF><blackDuration SS:FF>

Query format:

READ <PREAMBLE> MAESTRO_TRANSITION_RATE

Reply format:

IFRE <PREAMBLE> MAESTRO_TRANSITION_RATE <transitionRate ><transitionRate SS:FF><blackDuration SS:FF>

Use applicable with UPDATE:

Yes

Argument definitions:

<**transitionRate**> = 0-4

0 = Cut	MAESTRO_TRANSITION_RATE_CUT
1 = Slow	MAESTRO_TRANSITION_RATE_SLOW
2 = Medium	MAESTRO_TRANSITION_RATE_MEDIUM
3 = Fast	MAESTRO_TRANSITION_RATE_FAST
4 = Custom	MAESTRO_TRANSITION_RATE_CUSTOM

<**transitionRate SS:FF**> (2 Hex Bytes)

0x00-0x09, 0xFF	SS	= transition duration seconds (0xFF = NOP)
0x00-0x1D, 0xFF	FF	= transition duration frames (0xFF = NOP)

The <transitionRate SS:FF> parameter is only applicable in the Command Format when <transitionRate> = Custom. The values are ignored otherwise.

The <transitionRate SS:FF> parameter in the Reply Format will always indicate the actual transition duration in seconds and frames for all <transitionRate> types.

<**blackDuration SS:FF**> (2 Hex Bytes)

0x00-0x09, 0xFF	SS	= black duration seconds (0xFF = NOP)
0x00-0x1D, 0xFF	FF	= black duration frames (0xFF = NOP)

The <blackDuration SS:FF> parameter is currently not utilized and the values will be ignored.

The <blackDuration SS:FF> parameter in the Reply Format will always indicate the actual black duration in seconds and frames.

Note The Requested Black Duration cannot exceed the Transition Duration. If a Black Duration exceeds the Transition Duration, then the Black Duration will be set to the Transition Duration.

MAESTRO_TRANSITION_STATE

Hex definition	Mnemonic
0x4F	MAESTRO_TRANSITION_STATE

Command format:

N/A

Query format:

READ <PREAMBLE> MAESTRO_TRANSITION_STATE

Reply format:

IFRE <PREAMBLE> MAESTRO_TRANSITION_STATE <transitionState>

Use applicable with UPDATE:

Yes

Argument definitions:

<transitionState> = 0-7(Reply format only)

0= Idle

1= Pending

2= From Old

3= Black Silent

4= To New

5= Complete

6= Delay

7= Preroll

Note The Delay state was added as a result of the addition of Independent Transitions in Maestro. Since the automation interface <transitionState> enumerations were already published without the Delay state, the interface has been extended by including this state after the previously defined states (6 = Delay). A Preroll state has been added and this also has been added by including this state after the previously defined states (7 = Preroll). As a result, the actual progression of states may not be sequential, depending upon transition definition, and is as follows: Idle, Pending, Preroll, Delay, From Old, Black Silent, To New, Complete.

MAESTRO_TRANSITION_TYPE

Hex definition	Mnemonic
0x40	MAESTRO_TRANSITION_TYPE

Command format:

<PREAMBLE> MAESTRO_TRANSITION_TYPE <transitionType>

Query format:

READ <PREAMBLE> MAESTRO_TRANSITION_TYPE

Reply format:

IFRE <PREAMBLE> MAESTRO_TRANSITION_TYPE <transitionType>

Use applicable with UPDATE:

Yes

Argument definitions:

<**transitionType**> = 0x00-0x03 fixed, 0x04-0x63 user definable, 0x64

0x00 = Cross-Fade	MAESTRO_TRANSITION_TYPE_CROSS_FADE
0x01 = Fade-Cut	MAESTRO_TRANSITION_TYPE_FADE_CUT
0x02 = Cut-Fade	MAESTRO_TRANSITION_TYPE_CUT_FADE
0x03 = Fade-Fade	MAESTRO_TRANSITION_TYPE_FADE_FADE
0x04-0x63 = User Definable	Transition Association Table

0x64 = Valid on reply only. Reports that transition parameters have been set by TRAN_PRESET (only if a Custom Transition is processed, refer to Maestro Applicability of TRAN_PRESET) or MAESTRO_TRANSITION_TYPE_CUSTOM.

Notes:

The first 4 rows in the Transition Association Table are fixed values (i.e., values 0-3 above).

MAESTRO_TRANSITION_TYPE_CUSTOM

Hex definition	Mnemonic
0x4A	MAESTRO_TRANSITION_TYPE_CUSTOM

Command format:

<PREAMBLE> MAESTRO_TRANSITION_TYPE_CUSTOM <videoTransitionType> <videoTransitionFromOldDelay SS:FF> <videoTransitionFromOld SS:FF> <videoTransitionblack SS:FF> <reserved 2 Bytes> <videoTransitionToNew SS:FF> <audioTransitionType> <audioTransitionFromOldDelay SS:FF> <audioTransitionFromOld SS:FF> <audioTransitionSilent SS:FF> <audioTransitionToNewDelay SS:FF> <audioTransitionToNew SS:FF>

Notes: 1) If Cross-Fade is selected and From Old does not equal To New then an error will result. 2) If Cross-Fade is selected and Black Duration is not 0:00 then an error will result.

Query format:

READ <PREAMBLE> MAESTRO_TRANSITION_TYPE_CUSTOM

Reply format:

IFRE <PREAMBLE> MAESTRO_TRANSITION_TYPE_CUSTOM <videoTransitionType> <videoTransitionFromOldDelay SS:FF> <videoTransitionFromOld SS:FF> <videoTransitionblack SS:FF> <reserved 2 Bytes> <videoTransitionToNew SS:FF> <audioTransitionType> <audioTransitionFromOldDelay SS:FF> <audioTransitionFromOld SS:FF> <audioTransitionSilent SS:FF> <audioTransitionToNewDelay SS:FF> <audioTransitionToNew SS:FF>

Use applicable with UPDATE:

Yes

Argument definitions:

Command Arguments: <**videoTransitionType**>, <**audioTransitionType**> = 0x00, 0x03

0x00 = Cross-Fade	MAESTRO_TRANSITION_TYPE_CROSS_FADE
0x03 = Fade-Fade	MAESTRO_TRANSITION_TYPE_FADE_FADE

Reply Arguments: <**videoTransitionType**>, <**audioTransitionType**> = 0x00-0x03 fixed, 0x04-0x63 user definable, 0x64

0x00 = Cross-Fade	MAESTRO_TRANSITION_TYPE_CROSS_FADE
0x01 = Fade-Cut	MAESTRO_TRANSITION_TYPE_FADE_CUT
0x02 = Cut-Fade	MAESTRO_TRANSITION_TYPE_CUT_FADE
0x03 = Fade-Fade	MAESTRO_TRANSITION_TYPE_FADE_FADE

0x04-0x63 = User Definable Transition Association Table

0x64 = Valid on reply only. Reports that transition parameters have been set by TRAN_PRESET (only if a Custom Transition is processed, refer to Maestro Applicability of TRAN_PRESET) or MAESTRO_TRANSITION_TYPE_CUSTOM

<**videoTransitionFromOldDelay SS:FF**>, <**audioTransitionFromOldDelay SS:FF**> = <seconds> <frames>

Specifies the delay, or reports the current delay on a reply, between initiation of a transition and initiation of the From Old video and audio segment of the transition. See "<seconds>" and "<frames>" below.

<**videoTransitionFromOld SS:FF**>, <**audioTransitionFromOld SS:FF**> = <seconds> <frames>

Specifies the From Old duration, or reports the current From Old duration on a reply. See “<seconds>” and

"<frames>" below.

<**videoTransitionblack SS:FF**>, <**audioTransitionSilent SS:FF**> = <seconds> <frames>

Specifies the Black duration, or reports the current Black duration on a reply. See "<seconds>" and "<frames>" below.

<audioTransitionToNewDelay SS:FF>=<seconds><frames>

Specifies the delay, or reports the current delay on a reply, between initiation of a transition and initiation of the To New audio segment of the transition. See "<seconds>" and "<frames>" below.

<**videoTransitionToNew SS:FF**>, <**audioTransitionToNew SS:FF**> = <seconds> <frames>

Specifies the To New duration, or reports the current To New duration on a reply. See "<seconds>" and "<frames>" below.

<**reserved 2 Bytes**>

A two byte parameter reserved for a possible future enhancement. It is suggested that the parameter be set to NOP's (0x00)

<**seconds**> = 00-09 (hex, one byte)

00-09 = Seconds representing 0:00 through 9:00.

<**frames**> = 00-1D (hex, one byte). Frames representing 0:00 through 0:29.

MAESTRO_WIPE_SELECT

Hex definition	Mnemonic
0x46	MAESTRO_ WIPE_SELECT

Command format:

<PREAMBLE> MAESTRO_WIPE_SELECT> <select>

Query format:

READ <PREAMBLE> MAESTRO_WIPE_SELECT

Reply format:

IFRE <PREAMBLE> MAESTRO_WIPE_SELECT <select>

Use applicable with UPDATE:

Yes

Argument definitions:

<select> = 0-1

0 = Unselect	MAESTRO_UNSELECT
1 = Select	MAESTRO_SELECT

MAESTRO_WIPE_STATE

Hex definition	Mnemonic
0x48	MAESTRO_WIPE_STATE

Command format:

N/A

Query format:

READ <PREAMBLE> MAESTRO_WIPE_STATE

Reply format:

IFRE <PREAMBLE> MAESTRO_WIPE_STATE <wipeState>

Use applicable with UPDATE:

Yes

Argument definitions:

<**wipeState**> = 0-3

0 = Idle	WIPE_STATE_IDLE
1 = Pending	WIPE_STATE_PENDING
2 = In Progress	WIPE_STATE_IN_PROGRESS
3 = Complete	WIPE_STATE_COMPLETE

MAESTRO_WIPE_TYPE

Hex definition	Mnemonic
0x47	MAESTRO_WIPE_TYPE

Command format:

<PREAMBLE> MAESTRO_WIPE_TYPE <wipeType>

Query format:

READ <PREAMBLE> MAESTRO_WIPE_TYPE

Reply format:

IFRE <PREAMBLE> MAESTRO_WIPE_TYPE <wipeType>

Use applicable with UPDATE:

Yes

Argument definitions:

<**wipeType**> = 0-19, 0xFF

0 = L2R	MAESTRO_WIPE_TYPE_L2R
1 = R2L	MAESTRO_WIPE_TYPE_R2L
2 = LR2M	MAESTRO_WIPE_TYPE_LR2M
3 = M2LR	MAESTRO_WIPE_TYPE_M2LR
4 = T2B	MAESTRO_WIPE_TYPE_T2B
5 = B2T	MAESTRO_WIPE_TYPE_B2T
6 = TB2M	MAESTRO_WIPE_TYPE_TB2M
7 = M2TB	MAESTRO_WIPE_TYPE_M2TB
8 = ULBOX2LR	MAESTRO_WIPE_TYPE_ULBOX2LR
9 = URBOX2LL	MAESTRO_WIPE_TYPE_URBOX2LL
10 = LLBOX2UR	MAESTRO_WIPE_TYPE_LLBOX2UR
11 = LRBOX2UL	MAESTRO_WIPE_TYPE_LRBOX2UL
12 = MBOX2CORNERS	MAESTRO_WIPE_TYPE_MBOX2CORNERS
13 = CORNERS2MBOX	MAESTRO_WIPE_TYPE_CORNERS2MBOX
14 = PLUS2CORNERS	MAESTRO_WIPE_TYPE_PLUS2CORNERS
15 = CORNERS2PLUS	MAESTRO_WIPE_TYPE_CORNERS2PLUS
16 = ULDIAG2LR	MAESTRO_WIPE_TYPE_ULDIAG2LR
17 = URDIAG2LL	MAESTRO_WIPE_TYPE_URDIAG2LL
18 = LLDIAG2UR	MAESTRO_WIPE_TYPE_LLDIAGUR
19 = LRDIAG2UL	MAESTRO_WIPE_TYPE_LRDIAGUL
0xFF = Undefined	MAESTRO_WIPE_TYPE_UNDEFINED **(Reply format only)**

MAESTRO_CONTENT_FILENAME_ASSOCIATION

(Associate a Content File with an Automation Input Set source)

Hex definition	Mnemonic
0x80	MAESTRO_CONTENT_FILENAME_ASSOCIATION

Command format:

<PREAMBLE> MAESTRO_CONTENT_FILENAME_ASSOCIATION <source> <boxID> <V/A Bitmask> <filename>

Command notes:

1. This command associates a content filename with an entry in the configured Content Definition table for later assignment and use via the Input Set table. This is done through various levels of indirection as the <source> field references an entry in the Automation Input table which references an entry in the Input Set table which may reference an entry in the Content Definition table. If the specified Automation Input <source> does not ultimately reference a Content Definition table entry, the command will have no effect. This command does not reserve any Maestro system resources. Only upon assignment of a source defined in the Input Set via the Automation Input set will Maestro system resources be reserved. Therefore, association of content does not guarantee availability of system resources. Additionally, content associated with a source (Automation Input) is loaded at the time of assignment to a Keyer or Audio Mixer. Therefore, an already assigned source for which the content filename association has changed must be unassigned and reassigned to reload the new content.

2. Filename associations are stored in Non-volatile RAM. If the user clears the non-volatile RAM on the Maestro Frame Processor, all existing filename associations will also be cleared and all sources will revert to the default pathname specified in the configuration. Therefore, it will be necessary to reestablish filename associations after clearing of non-volatile RAM.

3. It needs to be noted that content is loaded at the time of Keyer and Audio Mixer source assignment. This has the following implications:

   a. Content filename association needs to occur prior to source assignment.

   b. If the content filename of an Automation Input changes after it has been assigned to a Keyer or Audio Mixer, that Automation Input must be unassigned and reassigned to get the newly associated content file.

Query format:

READ <PREAMBLE> MAESTRO_CONTENT_FILENAME_ASSOCIATION <source> <boxID> <V/A Bitmask>

Reply format:

IFRE <PREAMBLE> MAESTRO_CONTENT_FILENAME_ASSOCIATION <source> <boxID> <V/A Bitmask> <filename>

Use applicable with UPDATE:

Yes

Argument definitions:

<source> = (2 bytes, MSB first) automation input 1-65535

<boxID> = (1 byte) 0-255, Content Definition table element boxID

0 = NOP (can be used with Stills, Animations, Audio Clips, and Text Crawl content types)

Reference to a CGText element's configured CGBox in the Maestro Configuration Editor - Content Definition table. This parameter is only applicable to CGText content types. This parameter will be ignored for Still, Animation, Audio Clips, and Text Crawl content types.

<V/A bitmask> = (1 byte)

Bit 0 = Video

Bit 1 = Audio

If the V/A bitmask attempts to query or effect a change on an unconfigured element (e.g.: specifying video and audio for a source only configured with video) the unconfigured element of the mask will be ignored and no response generated.

<filename> = (40 bytes, MSB first) Null terminated and filled ASCII representation of filename.

Empty string = remove any existing filename association for the indicated <source> <boxID>. This will revert the association back to the configured pathname. Valid characters include A-Z, a-z, underscore, and period ".". Since the deployed content is converted to an internal format with an internal file extension, filename extensions are ignored as the type of the specified source (as configured in the Content Definition table) will dictate the internal file extension.

MAESTRO_CONTENT_FILENAME_ASSOCIATION_CLEAR_SOURCE

(Revert all Content Files associated with an Automation Input Set source to default/configured filename)

Hex definition	Mnemonic
0x81	MAESTRO_CONTENT_FILENAME_ASSOCIATION_CLEAR_SOURCE

Command format:

<PREAMBLE> MAESTRO_CONTENT_FILENAME_ASSOCIATION_CLEAR_SOURCE <source>

Command notes:

1. This command clears all existing content file associations for the specified automation input source reverting file associations for that source back to configured values..

2. It needs to be noted that content is loaded at the time of Keyer and Audio Mixer source assignment. This has the following implications:

   a. Content filename association needs to occur prior to source assignment.

   b. If the content filename of an Automation Input changes after it has been assigned to a Keyer or Audio Mixer, that Automation Input must be unassigned and reassigned to get the newly associated content file.

Query format:

N/A

Reply format:

IFRE <PREAMBLE> MAESTRO_CONTENT_FILENAME_ASSOCIATION_CLEAR_SOURCE <source>

Use applicable with UPDATE:

Yes

Argument definitions:

<source> = (2 bytes, MSB first) automation input 1-65535

MAESTRO_CONTENT_FILENAME_ASSOCIATION_CLEAR_ALL

(Revert all Content Files to default/configured filename)

Hex definition	Mnemonic
0x82	MAESTRO_CONTENT_FILENAME_ASSOCIATION_CLEAR_ALL

Command format:

<PREAMBLE> MAESTRO_CONTENT_FILENAME_ASSOCIATION_CLEAR_ALL

Command notes:

1. This command clears all existing content file associations back to configured values..

2. It needs to be noted that content is loaded at the time of Keyer and Audio Mixer source assignment. This has the following implications:

   a. Content filename association needs to occur prior to source assignment.

   b. If the content filename of an Automation Input changes after it has been assigned to a Keyer or Audio Mixer, that Automation Input must be unassigned and reassigned to get the newly associated content file.

Query format:

N/A

Reply format:

IFRE <PREAMBLE> MAESTRO_CONTENT_FILENAME_ASSOCIATION_CLEAR_ALL

Use applicable with UPDATE:

Yes

Argument definitions:

None

MAESTRO_CONTENT_PRESENCE

(Query the presence of a content file)

Hex definition	Mnemonic
0x83	MAESTRO_CONTENT_PRESENCE

Command format:

N/A

Command notes:

1. This command reports the presence of content on the local channel stores.
2. Valid characters include A-Z, a-z, underscore, and period ".".
3. Deployed content on the local channel stores will have been converted to an internal format with an internal file extension. The specified <contentType> determines the internal extension and location of the specified root filename. If a filename extension is provided, the extension will be ignored as the <contentType> parameter will determine the internal extension and location of the specified root filename.

Query format:

READ <PREAMBLE> MAESTRO_CONTENT_PRESENCE <contentType> <filename>

Reply format:

IFRE <PREAMBLE> MAESTRO_CONTENT_PRESENCE <contentPresence> <contentType> <filename>

Use applicable with UPDATE:

No

Argument definitions:

<contentPresence> = 0-1

0 = NOT Present

1 = Present

<contentType> = (1 byte)

1 = Text

2 = Audio

3 = Still

4 = Animation

<filename> = (40 bytes, MSB first) Null terminated and filled ASCII representation of filename

Note Querying with an empty filename string will result in the return of an empty filename string and a contentPresence response of "Not Present".

MAESTRO_CONTENT_REPLACE_TEXT_DATA

(Replace the contents of a Channel Branding text data file)

Hex definition	Mnemonic
0x84	MAESTRO_CONTENT_REPLACE_TEXT_DATA

Command format:

<PREAMBLE> MAESTRO_CONTENT_REPLACE_TEXT_DATA <source> <boxID> <text>

Command notes:

1. The length of the ASCII string specified in the <text> parameter is limited to 240 bytes due to the packet size. Any strings less than 240 bytes must be zero filled/padded such that <text> is 240 bytes in length.

2. This command is only applicable to Text Crawls and CG Text elements.

Query format:

READ <PREAMBLE> MAESTRO_CONTENT_REPLACE_TEXT_DATA <source> <boxID>

Reply format:

IFRE <PREAMBLE> MAESTRO_CONTENT_REPLACE_TEXT_DATA <source> <boxID> <text>

Use applicable with UPDATE:

Yes

Argument definitions:

<source> = (2 bytes, MSB first) automation input 1-65535

<boxID> = (1 byte) 0-255, Content Definition table element boxID

0 = NOP (can be used with Stills, Animations, Audio Clips, and Text Crawl content types)

Reference to a CG Text element's configured CGBox in the Maestro Configuration Editor - Content Definition table. This parameter is only applicable to CGText content types. This parameter will be ignored for Text Crawl content types.

<text> = (240 bytes, MSB first) Null filled ASCII text

MAESTRO_TEXT_CRAWL_CONTENT_STATUS

(Query the status of a Crawl on a Keyer)

Hex definition	Mnemonic
0x85	MAESTRO_TEXT_CRAWL_CONTENT_STATUS

Command format:

N/A

Command notes:

The following notes pertain to the <crawlStatus> parameter:

1. Bit 0 indicates whether a crawl is assigned to the specified <keyer>. A keyer that does not have a crawl assigned (Bit 0 = 0) will always indicate Not Playing (Bit 1 = 0) and No Text Buffer Available (Bit 2 = 0).

2. Bit 1 indicates whether the crawl is playing. A crawl that is not playing (Bit 1 = 0) will always indicate that a text buffer is available. This allows immediate replacement of crawl text on a stopped crawl.

3. If a crawl is playing (Bit 1 = 1), Bit 2 will indicate if a text buffer is available (Bit 2 = 1) or not (Bit 2 = 0). The text buffers can be viewed as a double buffer where the crawl plays one buffer while the other can be filled. If the second buffer contains text when the crawl reaches the end of the first, it will switch to rendering the second buffer freeing up the first. If the second buffer does not contain text when the crawl reaches the end of the first, it will continue to loop on the first buffer checking for text in the second buffer each time it reaches the end of the first.

Query format:

READ <PREAMBLE> MAESTRO_TEXT_CRAWL_CONTENT_STATUS <keyer>

Reply format:

IFRE <PREAMBLE> MAESTRO_TEXT_CRAWL_CONTENT_STATUS <keyer> <crawlStatus>

Use applicable with UPDATE:

No

Argument definitions:

<keyer> = 0-7

<crawlStatus> = 1 byte (Most Significant Bit first)

Bit 0 = Crawl is Assigned

Bit 1 = Playing

Bit 2 = Text Buffer Available

Section 6

Examples

Maestro State Progression

Maestro will progress through, and remain in, certain protocol states based upon the current state and received data.

IDLE state: A BRK character is required to proceed to the ACTIVE state and from the ACTIVE state one can proceed to either the POLL or SELECT state.

In order to proceed to the POLL state, use BRK followed by the poll address:

Automation:	BRK 82 81	*proceed to POLL state*
Maestro:	04	*ACK - Maestro remains in ACTIVE state*

In order to proceed to the SELECT state, use BRK followed by the select address:

Automation:	BRK 82 80 <data>	*proceed to SELECT state*
Maestro:	04	*ACK - Maestro remains in SELECT state*

ACTIVE state: Maestro will remain in the ACTIVE state after reception of a BRK character or after successful POLL processing.

In order to proceed to the POLL state, use the poll address:

Automation:	82 81	*proceed to POLL state*
Maestro:	04	*ACK - Maestro remains in ACTIVE state*

In order to proceed to the SELECT state, use the select address:

Automation:	82 80 <data>	*proceed to SELECT state*
Maestro:	04	*ACK - Maestro remains in SELECT state*

SELECT state: Maestro will remain in the SELECT state after entry into the SELECT state and after successful SELECT state processing.

In order to remain in SELECT state, SELECT state processing must be successful:

Automation:	<data>	*SELECT state message*
Maestro:	04	*ACK - Maestro remains in SELECT state*

Power On or Reset

After a power on or reset of Maestro, Maestro will first respond to polling with a RST (07h) to indicate that a reboot cycle has occurred:

Maestro:	*Power On or Reset*	
Automation:	BRK 82 81	*poll Maestro*
Maestro:		*booting - no response*
Automation:	BRK 82 81	*poll Maestro*
Maestro:		*booting - no response*
Automation:	BRK 82 81	*poll Maestro*
Maestro:	07	*RST*
Automation:	82 81	*poll Maestro*
Maestro:	04	*ACK - remains in ACTIVE state*

Interrupted Communications

If communications between the automation system and Maestro is interrupted (disconnected cable, system reboot, etc.) it is suggested that after a timeout period determined by the automation vendor, the automation system attempt to reestablish communications from the IDLE state:

Automation:	82 81		*poll Maestro from ACTIVE state*
Maestro:	04		*ACK - remains in ACTIVE state*
Automation:	82 81		*poll Maestro from ACTIVE state*
Maestro:			*no response*
Automation:	82 81	Vendor	*poll Maestro from ACTIVE state*
Maestro:		Timeout	*no response*
Automation:	82 81		*poll Maestro from ACTIVE state*
Maestro:			*no response*
Automation:	BRK 82 81		*poll Maestro from IDLE state*
Maestro:			*no response*
Automation:	BRK 82 81		*poll Maestro from IDLE state*
Maestro:	04		*ACK - remains in ACTIVE state*
			NOTE: RST (07h) if due to reboot cycle
Automation:	82 81		*poll Maestro from ACTIVE state*
Maestro:	04		*ACK - remains in ACTIVE state*

Polling Options

Following are a couple of options for polling Maestro.

When Maestro is in the SELECT state, it is not necessary for automation to use BRKs, the POLL address, or the SELECT address before issuing commands. Maestro can be directly commanded or queried. This is the preferable way of polling Maestro. Since this application of the ESBus protocol is not a multi-drop environment, once automation is communicating with Maestro and Maestro is SELECTed, it will only be communicating with Maestro.

Automation:	BRK 82 81	*poll Maestro from IDLE state*
Maestro:	04	*ACK - remains in ACTIVE state*
Automation:	82 80 02 02 22 61 7B	*SELECT and query REM_MODE*
Maestro:	04	*ACK - remains in SELECT state*
Automation:	09	*TEN (select address NOT required)*
Maestro:	05	*NAK - nothing to send (YET!)*
Automation:	02 02 22 45 97	*query TX_STAT (select address NOT required)*
Maestro:	04	*ACK - Maestro remains in SELECT state*
Automation:	09	*TEN*
Maestro:	02 03 23 61 03 76	*REM_MODE On*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	02 03 23 45 02 93	*TX_STAT = quiescent*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK - nothing to send*
Automation:	09	*TEN*
Maestro:	05	*NAK - nothing to send*

. . .

In the case where UPDATE is used for REM_MODE, the above reduces to:

Automation:	BRK 82 81	*poll Maestro from IDLE state*
Maestro:	04	*ACK - remains in ACTIVE state*
Automation:	82 80 02 03 3F 07 61 56	*register for REM_MODE auto-updates*
	3F - Common Message Extension	
	07 - UPDATE	
	61 - REM_MODE	
Maestro:	04	*ACK - remains in SELECT state*
Automation:	02 02 22 45 97	*query TX_STAT*
Maestro:	04	*ACK*
Automation	09	*TEN*
Maestro:	02 03 23 45 02 93	*TX_STAT = quiescent*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK*

. . .

Manual intervention - Auto Defeat pressed on Maestro

Automation:	09	*TEN*
Maestro:	02 03 23 61 02 77	*REM_MODE = Off*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK*

. . .

Another method for polling Maestro, less preferable due to the overhead of ESBus state machine processing, is to poll from the POLL state and act upon Maestro responses. If automation was being used in a multi-drop environment, this is the polling/command method that would be required. This requires selection of Maestro before every command, TEN, etc., and requires numerous passes through the IDLE state. It should be noted that reception of a BRK character forces Maestro to abort any transmissions that may be in progress and may affect throughput due to the need to resend.

Automation:	BRK 82 81	*poll Maestro from IDLE state*
Maestro:	04	*ACK - remains in ACTIVE state*
Automation:	82 80 02 02 22 61 7B	*SELECT and query REM_MODE*
Maestro:	04	*ACK - remains in SELECT state*
Automation:	BRK 82 81	*poll Maestro from IDLE state*
Maestro:	04	*ACK - remain in ACTIVE state*
Automation:	82 80 02 02 22 45 97	*SELECT and query TX_STAT*
Maestro:	04	*ACK - remains in SELECT state*
Automation:	BRK 82 81	*poll Maestro from IDLE state*
Maestro:	08	*SVC - Maestro has a message to send*
Automation:	82 80 09	*SELECT and TEN*
Maestro:	02 03 23 61 03 76	*REM_MODE = On*
Automation:	04	*ACK response*
Automation:	BRK 82 81	*poll Maestro from IDLE state*
Maestro:	08	*SVC - Maestro has a message to send*
Automation:	82 80 09	*SELECT and TEN*
Maestro:	02 03 23 45 02 93	*TX_STAT = quiescent*
Automation:	04	*ACK response*
Automation:	BRK 82 81	*poll Maestro from IDLE state*
Maestro:	04	*ACK - remains in ACTIVE state*
Automation:	82 81	*poll from ACTIVE state*
Maestro:	04	*ACK - remains in ACTIVE state*

. . .

RBGN/REND

It is possible for automation to send multiple commands to Maestro within the same packet using the Begin/End (RBGN/REND) construct. For example:

BRK	BREAK
82	SELECT address MSB
80	SELECT address LSB
02	STX
06	Byte count
3F	Common Message Extension
07	UPDATE
01	**RBGN**
61	REM_MODE
7F	TAKE_XPT
02	**REND**
D1	Checksum

BRK	BREAK
82	SELECT address MSB
80	SELECT address LSB
02	STX
0A	Byte count
01	**RBGN**
22	Query
7F	TAKE_XPT
01	PGM
22	Query
7F	TAKE_XPT
02	PST
22	Query
61	REM_MODE
02	**REND**
2B	Checksum

Use of UPDATE

Use of the UPDATE command by automation provides a convenient way for the automation system to be aware of changes as they occur on Maestro without the overhead on either system of constant command queries. Once a command has been registered, Maestro will automatically queue a message to be sent to automation for that command when any of its parameters change. The automation system will be made aware of these queued messages by receiving a SVC (08h) response to a poll.

The following commands are supported for automatic updating:

AUD_BPSET,
AUD_PSET,
FTBLK,
LRS_PGM,
LRS_PST,
MAL_PGM,
MAL_PST,
PGM_OVER,
PST_OVER,
PROLL,
RATIO,
RECALL_REG,
REM_MODE,
SAP0_PGM,
SAP0_PST,
SAP1_PGM,
SAP1_PST,
SEL_1KEY,
SEL_2KEY,
SET_AUDIO,
SET_KEY,
SET_MIX,
TAKE_XPT,
TRAN_PRESET,
TX_STAT,
VID_1KEY,
VID_2KEY,
VID_BPSET,
VID_MODE,
VID_PSET,
VID_RATE,
MAESTRO_AUDIO_MIXER_CHANNEL_MAPPING
MAESTRO_AUDIO_MIXER_SELECT,
MAESTRO_AUDIO_MIXER_RATIO,
MAESTRO_AUDIO_MIXER_SOURCE_REQUEST,
MAESTRO_BACKGROUND_SELECT,
MAESTRO_BACKGROUND_AUDIO_GAIN,
MAESTRO_BACKGROUND_AUDIO_BALANCE,
MAESTRO_BACKGROUND_AUDIO_CHANNEL_MAPPING
MAESTRO_BACKGROUND_STEREO_MODE,
MAESTRO_DISABLE_AUTOMATION,

MAESTRO_DVEFFECT
MAESTRO_DVEFFECT_SELECT
MAESTRO_DVEFFECT_STATE
MAESTRO_KEYER_SELECT,
MAESTRO_KEYER_CLIP,
MAESTRO_KEYER_GAIN,
MAESTRO_KEYER_HOLE_CUT_MODE,
MAESTRO_KEYER_FILL_MODE,
MAESTRO_KEYER_INVERT_MODE,
MAESTRO_KEYER_SOURCE_REQUEST,
MAESTRO_MASTER_FADE_BLACK,
MAESTRO_TRANSITION_NEXT,
MAESTRO_TRANSITION_RATE,
MAESTRO_TRANSITION_STATE,
MAESTRO_TRANSITION_TYPE,
MAESTRO_TRANSITION_TYPE_CUSTOM,
MAESTRO_WIPE_SELECT,
MAESTRO_WIPE_STATE, and
MAESTRO_WIPE_TYPE.

Issuing an UPDATE of commands that normally use an argument to report status (TAKE_XPT, SET_KEY, SET_MIX, etc.) will result in a generated status message when the state of any of their respective arguments change.

The MUTE command clears all UPDATE commands.

Some previous examples have already used the UPDATE command. Following is a more comprehensive example of how it might be used:

Automation:	BRK 82 81	*poll Maestro from IDLE state*
Maestro:	04	*ACK - remains in ACTIVE state*
Automation:	82 80 02 08 3F 07 01 7F 45 4C 4D 02 52	*register for auto-updates*
	3F - Common Message Extension	
	07 - UPDATE	
	01 - RBGN	
	7F - TAKE_XPT	
	45 - TX_STAT	
	4C - VID_MODE	
	4D - VID_RATE	
	02 - REND	
Maestro:	04	*ACK - remains in SELECT state*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	02 02 22 61 7B	*query REM_MODE*
Maestro:	04	*ACK*
Automation:	02 03 22 7F 01 5B	*query TAKE_XPT PGM*

Maestro:	04	*ACK*
Automation:	02 03 22 7F 02 5A	*query TAKE_XPT PST*
Maestro:	04	*ACK*
Automation:	09	*TEN*
Maestro:	02 02 23 61 03 76	*REM_MODE = On*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	02 07 23 7F 01 02 02 00 00 50	*TAKE_XPT PGM = 02,02*
Automation:	04	*ACK*
Automation:	09	*TEN*
Maestro:	02 07 23 7F 02 03 03 00 00 4D	*TAKE_XPT PST = 03,03*
Automation:	04	*ACK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	02 06 7F 02 04 04 00 00 71	*set TAKE_XPT PST to 04,04*
Maestro:	04	*ACK*
Automation:	02 02 4C 02 B0	*set VID_MODE to Mix*
Maestro:	04	*ACK*
Automation:	02 02 4D 02 AF	*set VID_RATE to Medium*
Maestro:	04	*ACK*
Automation:	09	*TEN*
Maestro:	02 03 23 4C 02 8C	*auto-update VID_MODE = Mix*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	02 03 23 4D 02 01 00 88	*auto-update VID_RATE = Medium (1:00)*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	09	*TEN*
Maestro:	02 07 23 7F 02 04 04 00 00 4B	*auto-update TAKE_XPT PST = 04,04*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	02 02 44 80 3A	*TX_TRIG (preroll enabled)*
Maestro:	04	*ACK*
. . .		
Automation:	09	*TEN*
Maestro:	02 03 23 45 03 80	*TX_STAT = prerolling*

Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	09	*TEN*
Maestro:	02 03 23 45 04 8F	*TX_STAT = transitioning*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	09	*TEN*
Maestro:	02 03 23 45 02 91	*TX_STAT = quiescent*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	09	*TEN*
Maestro:	02 07 23 7F 01 04 04 00 00 5C	*TAKE_XPT PGM = 04,04*
Automation:	04	*ACK*
. . .		
Automation:	09	*TEN*
Maestro:	02 07 23 7F 02 02 02 00 00 4F	*TAKE_XPT PST = 02,02*
Automation:	04	*ACK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	02 02 4C 01 B1	*set VID_MODE to Cut*
Maestro:	04	*ACK*
. . .		
Automation:	09	*TEN*
Maestro:	02 05 23 4D 03 00 00 88	*auto-update VID_RATE = Fast (0:00 => Cut)*
Automation:	04	*ACK response*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	02 02 44 C0 3A	*TX_TRIG (inhibit preroll)*
Maestro:	04	*ACK*
. . .		
Automation:	09	*TEN*
Maestro:	02 03 23 45 02 91	*TX_STAT = quiescent*
Automation:	04	*ACK response*

NOTE: In this case, a TX_STAT indicating a status of “transitioning” was never received by automation. However, the

mere fact that a TX_STAT containing "quiescent" was received via auto-update indicates that the transition state has changed and that the TX_TRIG is now complete. In the case of very short duration transitions, all transition states will not necessarily be reported due to other system tasks of higher priority delaying auto-update message formation until after the state has again changed. But, it is guaranteed that at least one auto-update TX_STAT will be reported for every TX_TRIG to indicate a change of transition status. If only one auto-update TX_STAT is reported, it will indicate "quiescent" meaning TX_TRIG complete.

Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	09	*TEN*
Maestro:	02 07 23 7F 01 02 02 00 00 50	*auto-update TAKE_XPT PGM = 02,02*
Automation:	04	*ACK*
. . .		
Automation:	09	*TEN*
Maestro:	02 07 23 7F 02 04 04 00 00 4B	*auto-update TAKE_XPT PST = 04,04*
Automation:	04	*ACK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		

Maestro Command Examples

MAESTRO_KEYER_SOURCE_REQUEST
Request Fill Source 0x42, Cut Source NOP to Keyer 5
Use Transaction Queue 1 with a Command ID of 1
02 0A FF 01 00 01 61 05 00 42 00 00 CS

MAESTRO_KEYER_SOURCE_REQUEST (query)
Use Transaction Queue 1 with a Command ID of 2
02 07 22 FF 01 00 02 61 05 00
Response: 02 0B 23 FF FF 00 01 61 05 00 42 00 00 CS

MAESTRO_KEYER_SELECT
Select Keyer 5 on PST
Use Transaction Queue 1 with a Command ID of 3
02 08 FF 01 00 03 30 05 01 00 CS

MAESTRO_KEYER_SELECT (query)
Use Transaction Queue 1 with a Command ID of 4
02 08 22 FF 01 00 04 30 05 00 CS
Response: 02 09 23 FF FF 00 01 30 05 01 00 CS

MAESTRO_TRANSITION_NEXT
Select Downstream Next Transition Type
Use Transaction Queue 1 with a Command ID of 5
02 06 FF 01 00 05 42 02 CS

MAESTRO_TRANSITION_NEXT(query)
Use Transaction Queue 1 with a Command ID of 6
02 06 22 FF 01 00 06 42 00
Response: 02 07 23 FF FF 00 01 42 02 CS

MAESTRO_TAKE
Initiate a Take to occur immediately (no requested transition time)
Use Transaction Queue 1 with a Command ID of 7
02 09 FF 01 00 07 43 FF FF FF FF CS

Maestro Command Sequence Example

CS = Checksum

All values in hexadecimal e.g. 42 is 0x42

Automation:	02 0A FF 01 00 01 61 05 00 42 00 00 CS	Keyer Source Request Transaction Queue 01 Command ID 00 01 Keyer 05 Fill Source 0x42 Cut Source NOP
Maestro:	04	*ACK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
. . .		
Automation:	02 07 22 FF 01 00 02 61 05 CS	Keyer Source Query Command ID 00 02
Maestro:	04	*ACK*
Automation:	09	*TEN*
Maestro:	02 0B 23 FF FF 00 02 61 05 00 42 00 00 CS	Response to Query[1]
Automation:	04	*ACK*
. . .		
Automation:	02 08 FF 01 00 03 30 05 01 00 CS	Select Keyer Keyer 05 on PST
Maestro:	04	*ACK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	02 08 22 FF 01 00 04 30 05 00 CS	Select Keyer Query Command ID 00 04
. . .		
Maestro:	04	*ACK*
Automation:	09	*TEN*
Maestro:	02 09 23 FF FF 00 04 30 05 01 00 CS	Response to Query[2]
Automation:	04	*ACK*
. . .		
Automation:	02 06 FF 01 00 05 42 02 CS	Transition Next Downsteam Next Type Command ID 00 05
Maestro:	04	*ACK*

[1.] The Command ID [~~is~~] was set to "00 01" in releases prior to v1.5. Starting with v1.5, the Command ID field is set to match what was received in the prior Automation Command; in this example, "00 02."

[2.] See Note 1. In this example, the Command ID is "00 04."

Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	02 06 22 FF 01 00 06 42 CS	Next Query Command ID 00 06
. . .		
Maestro:	04	*ACK*
Automation:	09	*TEN*
Maestro:	02 07 23 FF FF 42 02 CS	Response to Query[1]
Automation:	04	*ACK*
. . .		
Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	02 09 FF 01 00 07 43 FF FF FF FF CS	Take (Immediate) Command ID 00 07
Maestro:	04	*ACK*
Automation:	09	*TEN*
Maestro:	05	*NAK*
Automation:	09	*TEN*
Maestro:	05	*NAK*

[1] See Note 1 on previous page. In this example, the Command ID is "00 06."

Typical Pitfalls

Source selection latency and subsequent modifications to that source

A common error among automation vendors is to assume instantaneous and sequential completion by Maestro of all automation commands. As a result, a command which selects a bus source will be immediately followed by commands to modify that new bus source. One example of this would be to issue a TAKE_XPT and immediately, or even within the same BEGIN-END construct, issue a command such as LRS-PST to modify the new source. In this case, where the automation system attempts to modify the source selected in TAKE_XPT without first verifying its presence on the desired bus, it is likely that the specified modifications will be applied to the current source and not the source specified in the TAKE_XPT command. A worse situation would be the immediate issuance of a TX_TRIG after a TAKE_XPT potentially resulting in the wrong source "On Air". One reason for this is due to the fact that Maestro may be relying upon an external router to perform source switching and will only apply modifications to the selected source upon switch confirmation. Another example is an automation system issuing a TX_TRIG and then immediately following it with commands modifying the PST bus. Unless the automation system has verified that the transition is complete via TX_STAT messages, modifications may unexpectedly appear on the PGM bus. If the automation vendor uses a query approach to determine if TX_TRIG is complete, as opposed to the superior automatic update solution, they must resolve the problem of an immediate "quiescent" TX_STAT reply meaning the transition hasn't started or the transition is complete (especially difficult in the case of Cut). In the past, some attempts have been made to estimate the latency between receiving a source selection command and when that source is available for modification. Due to the fact that every installation may be unique in its configuration and external hardware setup, the following statements are made to supersede all previous estimates:

> **The latency of command execution at every installation is potentially unique due to such influences as hardware and software configuration, dependencies upon external hardware (possibly 3rd party), system load, etc. Due to this uniqueness, it is imperative that the automation vendor NOT assume a fixed period of time between a command being issued and its completion. The ideal solution to this problem is to use Maestro automatic updates of relevant commands. Another, less than ideal, solution is to query relevant commands to determine when an issued command has completed (must deal with aforementioned "quiescent" TX_STAT pitfall).**

In conclusion, commands do not complete instantaneously and may not even complete sequentially in a multi-threaded real-time environment such as Maestro.

Incorrect association of reply with query

Another common error when interfacing with Maestro is the incorrect association of a response from Maestro with the wrong query. An example of this, and its result, is shown below:

Automation:	BRK 82 80 02 06 7f 02 01 01 00 00 77		*Set TAKE_XPT PST -> 01*
Maestro:	04		*ACK*
Automation:	02 02 A1 04 59		*Set LRS_PST -> Stereo*
Maestro:	04		*ACK*
Automation:	02 02 4C 01 B1		*Set VID_MODE -> Cut*
Maestro:	04		*ACK*
Automation:	02 03 91 01 06 65		*Set PROLL -> 1.6 seconds*
Maestro:	04		*ACK*
Automation:	02 0E E0 07 09 80 05 00 00 02 00 00 00 00 00 00 7B		*Set SET_MIX -> . . .*
Maestro:	04		*ACK*
Automation:	02 02 44 80 3A		*TX_TRIG (with preroll)*
Maestro:	04		*ACK*
Automation:	02 02 22 45 97	(a)	*Query TX_STAT*

Maestro:	04	(b)	*ACK*
Automation:	09	(c)	*TEN*
Maestro:	05	(d)	*NAK - problem begins here*
Automation:	02 02 22 45 97	(e)	*Query TX_STAT*
Maestro:	04		*ACK*
Automation:	09		*TEN*
Maestro:	02 03 23 45 03 92	(f)	*TX_STAT = quiescent*
Automation:	04		*ACK*
Automation:	02 02 22 45 97	(g)	*Query TX_STAT*
Maestro:	04		*ACK*
Automation:	09		*TEN*
Maestro:	02 03 23 45 03 92	(h)	*TX_STAT = quiescent*
Automation:	04		*ACK*
Automation:	02 06 7F 02 01 01 00 00 77	(i)	*Set TAKE_XPT PST -> 01*
Maestro:	04		*ACK*
Automation:	02 02 A1 04 59		*Set LRS_PST -> Stereo*
Maestro:	04		*ACK*
Automation:	02 02 4C 01 B1		*Set VID_MODE -> Cut*
Maestro:	04		*ACK*
Automation:	02 03 91 01 06 65		*Set PROLL -> 1.6 seconds*
Maestro:	04		*ACK*
Automation:	02 02 44 80 3A	(j)	*TX_TRIG (with preroll)*
Maestro:	04		*ACK*
Automation:	02 02 22 45 97	(k)	*Query TX_STAT*
Maestro:	04		*ACK*
Automation:	09		*TEN*
Maestro:	02 03 23 45 02 93	(l)	*TX_STAT = quiescent*
Automation:	04	(m)	*ACK*
Automation:	02 06 7f 02 02 02 00 00 75	(n)	*Set TAKE_XPT PST -> 02*
Maestro:	04		*ACK*

The result of the above example was that source 02 (n) was transitioned to air rather than the expected source 01 (i) for the following reason: Automation queried Maestro for TX_STAT at (a) which Maestro ACKnowledged receiving the request at (b). When automation sent TEN (c), Maestro responded with NAK (d) indicating it had nothing to send (YET!). Automation again queried Maestro for TX_STAT (e) which Maestro ACKnowledged. When automation sent TEN, Maestro responded (f) with quiescent. However, Maestro's response (f) was the response to the query at (a), NOT the query at (e). In this case, automation was incorrectly handling a NAK response to a TEN resulting in all subsequent responses to be out of sync with the queries by 1 command. Therefore, when automation later queries Maestro for TX_STAT (k) after the TX_TRIG (j), the TX_STAT response (l) is actually queued from, and associated with, the TX_STAT query (g). Automation then immediately (and incorrectly) acted upon the quiescent TX_STAT and proceeded to change the PST source (n) before the transition was complete resulting in the wrong source 02 on air. It is important to keep in mind that if Maestro acknowledges a query, a response will be queued and returned to the automation system. A NAK in response to a TEN when there are pending requests does NOT mean “Nothing to send”, but rather “Nothing to send YET”. It is also important to remember that any pending requests for transition status (TX_STAT) should be read from Maestro buffers prior to issuing a TX_TRIG to prevent processing of pre-transition status post-trigger.

Appendix A

Latest Edition Manual Changes

Changes

The following changes have been made to the manual since the last published version:

- Expanded the Maestro Automation Interface and Protocol to support the Pre Roll Take feature.
  - MAESTRO_PREROLL_TAKE
  - MAESTRO_PREROLL_DURATION
  - The Saturn Command PROL is now supported.