HARRIS®
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NEO®

MTG-3901 Master Time Generator
CSD-3902 Master Clock Driver

Installation and Operation Manual

Edition D
MTG 3901 MAN

LEITCH®
A brand of Harris Corporation

MTG-3901
Master Time Generator

CSD-3902
Master Clock Driver

Installation and Operation Manual

Edition D
February 2007

Copyright Information

Warranty Information

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Chapter 6: Specifications

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Preface

Manual Information

Purpose

This manual details the features, installation, operation, maintenance, and specifications of the NEO® MTG-3901 Master Time Generator and CSD-3902 Master Clock Driver.

Audience

This manual is written for engineers, technicians, and operators responsible for the installation, setup, maintenance, and operation of the MTG-3901 and CSD-3902 modules.

Revision History

Table P-1. Revision History of Manual

Edition	Date	Revision History
A	June 2004	Initial Release

Table P-1. Revision History of Manual *(Continued)*

Edition	Date	Revision History
B	August 2004	• Various edits and formatting changes • Added MTG-3901-BM illustration
C	December 2005	• Various edits and formatting changes
D	February 2007	• Feature additions • Various edits and formatting changes • Addendum incorporated

Writing Conventions

This manual adheres to the following writing conventions.

Table P-2. Writing Conventions

Term or Convention	Description
Bold	Indicates dialog box, property sheet, field, button, check box, list box, combo box, menu, submenu, window, list, and selection names
Italics	Indicates email addresses, names of books and publications, and first instances of new terms and specialized words that need emphasis
CAPS	Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, DELETE
`Code`	Indicates variables or command-line entries, such as a DOS entry or something you type into a field.
>	Indicates the direction of navigation through a hierarchy of menus and windows.

Table P-2. Writing Conventions

Term or Convention	Description
hyperlink	Indicates a jump to another location within the electronic document or elsewhere
Internet address	Indicates a jump to a Web site or URL
 Note	Indicates important information that helps to avoid and troubleshoot problems

Obtaining Documents

Product support documents can be viewed or downloaded from our Web site at www.broadcast.harris.com/leitch. Alternatively, contact your Customer Service representative to request a document.

Unpacking/Shipping Information

Unpacking a Product

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble-free service.

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original packaging, in the event that you need to return a product for servicing.

Product Servicing

MTG-3901 and CSD-3902 are not designed for field servicing. All upgrades, modifications, or repairs require you to return the product to the Customer Service center.

Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, then send the unit back for servicing.

Keep at least one set of original packaging in the event that a product needs to be returned for service. If the original package is not available, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product's weight.
- The product must be held rigid within the packaging.
- There must be at least 2 in. (5 cm) of space between the product and the container.
- The corners of the product must be protected.

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing.

Restriction on Hazardous Substances (RoHS) Compliance

Directive 2002/95/EC—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive, which took effect on July 1, 2006, and it refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

According to this EU Directive, all products sold in the European Union will be fully RoHS-compliant and “lead-free.” (See our Web site for more information on dates and deadlines for compliance.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive will be marked with a RoHS-compliant emblem, as shown in Figure P-1.

Figure P-1. RoHS Compliance Emblem

Waste from Electrical and Electronic Equipment (WEEE) Compliance

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. As of August 13, 2006, producers or users must recycle electrical and electronic equipment at end of its useful life, and may not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled. (See our Web site for more information on dates and deadlines for compliance.) Contact your local sales representative for information on returning these products for recycling. Equipment that complies with the EU directive will be marked with a WEEE-compliant emblem, as shown in Figure P-2.

Figure P-2. WEEE Compliance Emblem

Safety

Carefully review all safety precautions to avoid injury and prevent damage to this product or any products connected to it. If this product is rack-mountable, it should be mounted in an appropriate rack using the rack-mounting positions and rear support guides provided. It is recommended that each frame be connected to a separate electrical circuit for protection against circuit overloading. If this product relies on forced air cooling, it is recommended that all obstructions to the air flow be removed prior to mounting the frame in the rack.

If this product has a provision for external earth grounding, it is recommended that the frame be grounded to earth via the protective earth ground on the rear panel.

IMPORTANT! Only qualified personnel should perform service procedures.

Safety Terms and Symbols in this Manual

WARNING

Statements identifying conditions or practices that may result in personal injury or loss of life. High voltage is present.

CAUTION

Statements identifying conditions or practices that can result in damage to the equipment or other property.

Chapter 1

Introduction

Overview

The NEO® MTG-3901 Master Timing Generator and CSD-3902 Master Clock Driver are modules designed for NEO 1RU and 3RU rack-mounted frames. The CSD-3902 replaces the CSD-3901 module that includes an enhanced feature set, such as impulse drive output for legacy applications, Digital Audio Reference Signal (DARS) output, as well as Vertical Interval Timecode (VITC) and Absolute Time Reference (ATR) support for black burst video outputs.

The MTG-3901 has a similar feature set to that of the CSD-3902 except that it has four black burst video output instead of four.

The MTG-3901 and CSD-3902 modules are designed to work with another MTG-3901 or CSD-3902 and an ACO-3901 to form a redundant Master Timing Generator/ Master Clock Driver system. With a double-height back module (MTG-3901-BM or CSD-3902-BM) installed, the MTG-3901 and CSD-3902 can be used as a stand-alone time generator modules.

Note

Unless otherwise noted, the term MTG-3901 is used throughout this manual to refer to both the MTG-3901 and the CSD-3902 modules.

See the *FR-3901, FR-3903, and FR-3923 Installation and Operation Manual* for information about NEO frames. The frame manual includes information about these items:

- Fan modules
- Resource modules
- Alarm interconnect modules
- Power supplies
- Genesis adapters
- Servicing instructions

This chapter covers the following topics:

- "Product Description" (below)
- "Front Module" on page 5
- "Back Modules" on page 6
- "CSD-3902-BO Breakout Module" on page 10
- "Block Diagrams" on page 15

Product Description

The MTG-3901 master time generator inputs time information from various reference sources, including Global Positioning System (GPS), and Network Time Protocol (NTP) servers. The module's internal timing engine processes the incoming reference information, makes appropriate conversions to different timebases, and maintains a consistent timebase which is used to drive the module's outputs.

Using a combination of parameters such as leap second information, DST rules, and offset values, the MTG-3901 can be configured to convert incoming International Atomic Time (TAI) to other time bases including UTC and local time. This time is then distributed to the module's outputs as time and date information, timecode, and black burst video reference signals.

Main Features

The MTG-3901 has the following features:

MTG-3901 Input

- Support for video/genlock input from NTSC, PAL-B, PAL-M or Tri-Level Sync format sources
- Support for various timecode formats and timecode user bit formats, including SMPTE/EBU drop frame or non-drop timecode formats
- RS-232 interface (ASCII RS-232 300-9600 baud) supports external time reference sources, such as GPS, DCF, MSF, and France Inter (using supported radio receiver); option to split RS-232 into two serial ports for added functionality
- Internal ASCII 300 baud, Bell 103 modem (on demand) that supports both call out and auto-answering features for internal and external modem operation.
- Detection of embedded information for video inputs
- Support for input Absolute Timing Reference (ATR) input features
- Support for Network Time Protocol (NTP) via an Ethernet connection port

MTG-3901 Output

- Four independently configurable black burst video outputs on the MTG-3901, and one configurable black burst output on the CSD-3902 that support NTSC, PAL-B, PAL-M, and Tri-Level Sync
- Two SMPTE/EBU serial timecode, 600Ω, or Low-Z balanced timecode outputs, each independently configurable for linear (LTC) drop frame or non-drop frame timecode and Vertical Interval Timecode (VITC)
- Support for Digital Audio Reference Signal output (one unbalanced channel)
- Support for impulse drive output
- Time and date information output through the internal modem and RS-232 serial ports (See “MTG-3901 Input Features” above)
- Support for Absolute Timing Reference (ATR) output features

MTG-3901 Processing Features

- Configurable Daylight Saving Time and Leap Second change auto detection for some input sources
- User-definable scheduled call outs to time reference sources, such as GPS receivers
- User-programmable delays for input and output, offsets, timecode offsets, output phasing offsets, and input and output jam syncs
- Display of current local time and date on a menu-driven front panel interface (FR-3901 front control panel LCP-3901-1U)
- Synchronization of control settings between MTG-3901 modules through ACO-3901; backup MTG-3901 is locked to primary MTG-3901 through ATR

MTG-3901 Interface to ACO-3901

In MTG-3901 redundant systems, the module’s inputs and outputs are accessible through the ACO-3901-BM back module. For information about the ACO-3901-BM back module, see your *ACO-3901 Automatic Changeover Unit Installation and Operation Manual*

Compatible GPS Receivers

The MTG-3901 operates with the following GPS receivers:

- GPS-3903/GPS-3902/GPS-3901 for time reference only
- GPS-1600 for time reference and genlock applications
- GPS-5300 for time reference only

Compatible Radio Receivers

The MTG-3901 operates with the Precitel RS-Dataclock (Harris/Leitch version) radio receivers. The Dataclock can input PS, DCF, MSF, France Inter signals, and UTC or NON-UTC time formats from the radio receiver.

Front Module

Figure 1-1 illustrates the front module of the MTG-3901. Front modules are designated by the suffix “-FM.” For example, the front module of the MTG-3901 is the MTG-3901-FM. See page 22 for an explanation of how to install the battery for this module.

There are a series of jumpers on this module that need to be set before operation. See “Setting Jumpers” on page 26 for instructions on setting the jumpers.

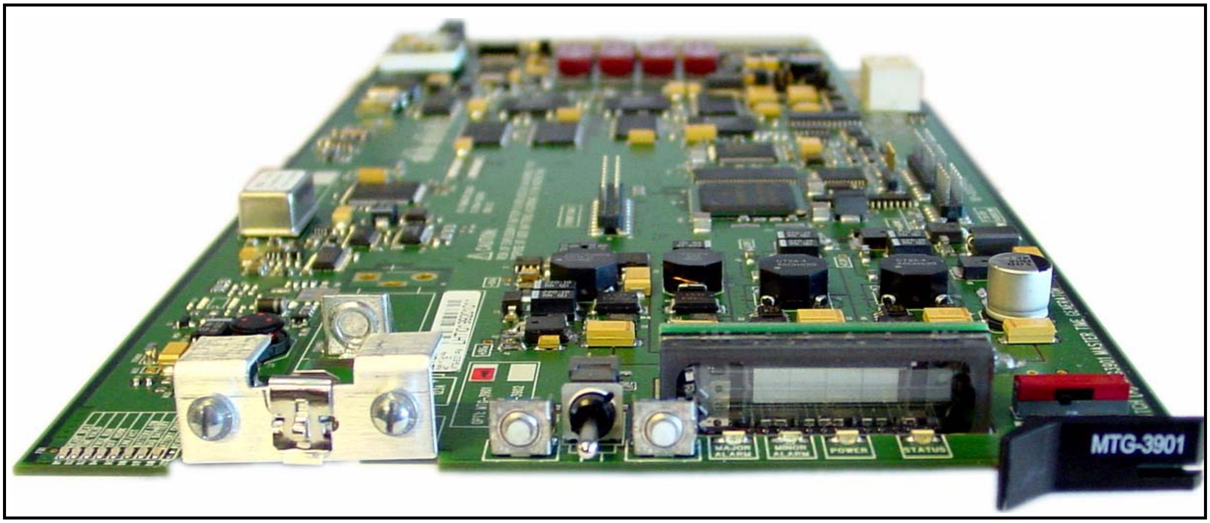

Figure 1-1. MTG-3901-FM Front Module

Back Modules

In the NEO frame, back connector modules are placed directly behind the front modules, facing the rear. Back modules are designated by the suffix "-BM." For example, the back module of the MTG-3901 is the MTG-3901-BM.

The MTG-3901 and CSD-3902 support either the ACO-3901-BM back module or the MTG-3901-BM back module and the CSD-3902-BM back module. The CSD-3902-BM back module connections are the same as those of the MTG-3901-BM back module connection except that the CSD-3902 provides one black burst output instead of four.

For more information on the ACO-3901-BM and the corresponding connections to the MTG-3901, see "MTG-3901/CSD-3902 System Configurations" on page 24 or your *ACO-3901 Automatic Changeover Unit Installation and Operation Manual*.

- The MTG-3901- BM back module connections are shown in Figure 1-2.
- The CSD-3902-BM back module connections are shown in Figure 1-3.
- The ACO-3901-BM back module connections are shown in Figure 1-4.

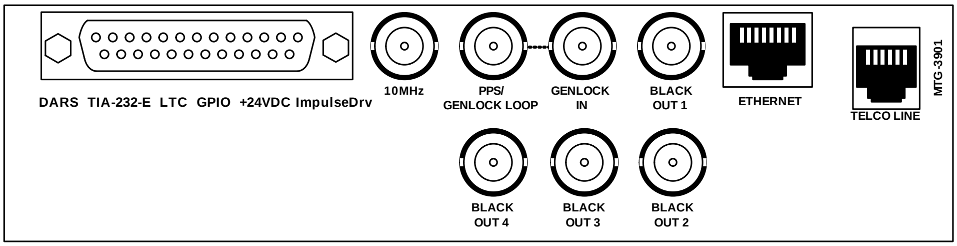

Figure 1-2. MTG-3901-BM Back Module

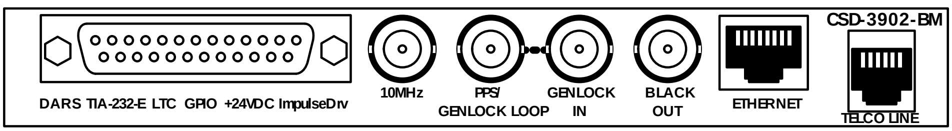

Figure 1-3. CSD-3902-BM Back Module

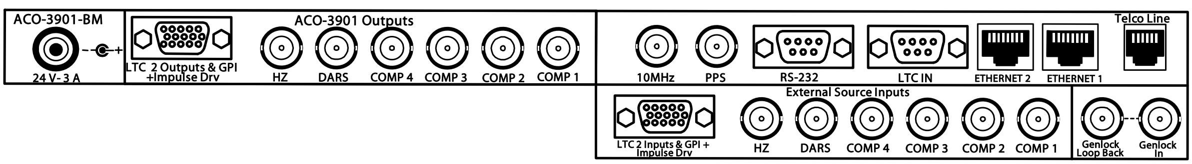

Figure 1-4. ACO-3901-BM Back Module

Back Module Connectors

The following section describes the pinouts for connectors located on the MTG-3901-BM back module. For information about ACO-3901-BM back module connections, see your *ACO-3901 Automatic Changeover Unit Installation and Operation Manual*.

DARS TIA/232-E LTC GPIO +24VDC Impulse Drv

The DB-25 connector provides interface to several inputs/outputs including DARS, LTC, RS-232, +24V DC, and Impulse.

The pin assignments are as follows:

Table 1-1. DB25 Connector Pin Assignments

Pin	Function	Pin	Function
1	DARS	14	LTC in positive
2	Transmitted data (TD)	15	LTC in negative
3	Received data (RD)	16	Ground
4	Request to send (RTS)	17	LTC 1 out positive
5	Clear to send (CTS)	18	LTC 1 out negative
6	DCE ready (DCR)	19	Ground
7	Ground	20	DTE ready (DTR)
8	Received line signal detector (RLSD)	21	TRIG/PPS
9	LTC 2 out positive	22	Ring indicator (RI)
10	LTC 2 out negative	23	Hz out
11	Ground	24	Impulse out even
12	Impulse out odd	25	+24V
13	+24V		

10 Mhz Input (10 Mhz)

This input is used for GPS-1600 and other 10Mhz references.

PPS/Genlock Loop

The function of this BNC connector is jumper selectable. Depending on the jumper settings, the connector can be used for the following purpose:

- To lock to the PPS Input from a GPS-1600 receiver.
- To provide a passive loop-back of an genlock input signal when a genlock looping is used.

For information about the jumper setting for the PPS/Genlock Loop BNC connector, see “Setting Jumpers For PPS Input and Genlock Looping” on page 26.

Genlock Input (GENLOCK IN)

This connector accepts NTSC, PAL-B, PAL-M, or Tri-Level Sync reference signals for genlock. For time information, the MTG-3901 can accept VITC or ATR.

Black Burst Outputs (COMP1 - 4)

These outputs provide an NTSC, PAL-B, PAL-M or Tri-Level Sync color black burst video reference signal, supporting ATR, VITC and/or 10-field (all are applicable to the output video standard).

Note

The CSD-3902-BM back module has only one black burst video output.

Ethernet Interface

The Ethernet interface provides10Base-T connectivity through an RJ-45 connector. The Ethernet interface supports the NTP protocol. See Chapter 5, “Network Time Protocol (NTP) Support” (page 223) for more information.

Telephone Line (TELCO LINE)

The telephone line connector is a standard 6-position, 2-wire modular jack, compatible with RJ11C (CA11 in Canada) type jacks.

The pin assignments are as follows:

Table 1-2. Telephone Line Pin Assignments

Pin	Function
1	N/C
2	TIP_2
3	RING_1
4	TIP_1
5	RING_2
6	N/C

One or two telephone lines are supported, using the ACO-3901-BM jumpers. See your the *ACO-3901 Automatic Changeover Unit Installation and Operation Manual* for more details.

CSD-3902-BO Breakout Module

The CSD-3902-BO breakout module further divides the signals available on the DB-25 connector of the CSD-3902-BM back module into nine function-specific groups and connectors. The breakout module is illustrated in Figure 1-5.

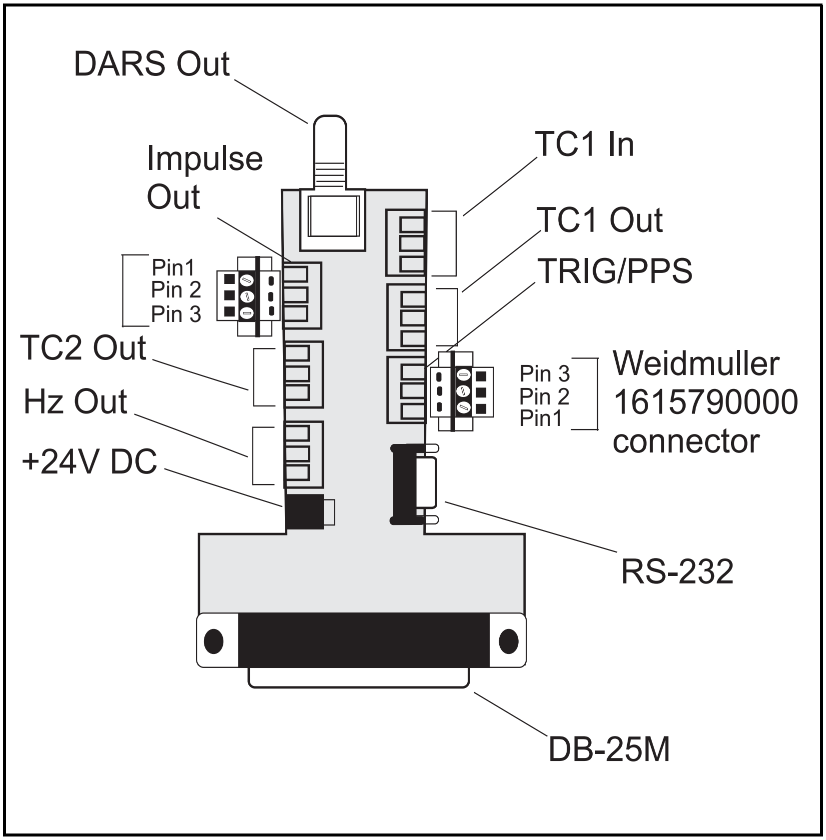

Figure 1-5. CSD-3902-BO Breakout Module

The breakout module may be rigidly fastened to the back module. However, in this configuration, both may be prone to physical damage if enough force is applied (vertically) to the breakout module. You may plug the breakout module into the DB-25 port through a short (less than 12 inch) straight-through cable between the back module and the breakout module. (This cable is not provided). The cable must be capable of handling 24V 1A. For more information about making CSD-3902-BO connections, see "Making MTG-3901/CSD-3902 System Connections" on page 31.

Timecode Input (TC IN)

This input connector inputs timecode into the CSD-3902. The timecode input impedance is jumper selectable on the CSD-3902 front module. See "Setting Impedance for Timecode Inputs" on page 30 for more information.

Table 1-3. TC IN Pin Layouts

Pin	Description
1	Ground
2	TC in negative
3	TC in positive

Timecode Outputs (TC1 OUT and TC2 OUT)

These connectors are used to output timecode from the CSD-3902. The timecode output impedance is jumper selectable on the CSD-3902 front module. See "Setting Impedance for Timecode Outputs" on page 29 for more information.

Some devices (such as the Harris/Leitch DAC-5000 series of digital analog clocks) bridge high-impedance inputs. Therefore, a large number of clocks may be connected in parallel to this output. For the purposes of fault isolation, however, it is recommended that some form of distribution, such an audio distribution amplifiers, be used when connecting more than 20 clocks to the system.

Table 1-4. TC OUT Pin Layouts

Pin	Description
1	Ground
2	TC out negative
3	TC out positive

TRIG/PPS

The TRIG/PPS signal provides one of two distinct functions (the actual function is determined using **TrigPpsSel** controls):

- It may provide a trigger signal to manually set the time. The trigger occurs at the instant when the TRIG_PPS signal connects to the ground signal.
- It may provide a pulse-per-second (PPS) signal from the GPS-5300 or GPS-3903/GPS-3902/GPS-3901 receivers.

Table 1-5. TRIG/PPS Pin Layouts

Pin	Description
1	Ground
2	Not connected
3	TRIG/PPS

TIA/EIA-574 (RS-232)

This 9-pin male connector is a standard serial interface connector compliant with TIA/EIA-574. The signalling on this connector is compatible with RS-232 levels.

The pin layout when using the RS-232 as one serial port is as shown in Table 1-6:

Table 1-6. TIA/EIA-574 Pin Layouts

Pin	Description
1	Received line signal detector (RLSD)
2	Received data (RD)
3	Transmitted data (TD)

Table 1-6. TIA/EIA-574 Pin Layouts*(Continued)*

4	DTE ready (DTR)
5	Signal common (ground)
6	DCE ready (DCR)
7	Request to send (RTS)
8	Clear to send (CTS)
9	Ring indicator (RI)

When using dual serial option, the pin layout is as shown in Table 1-7:

Table 1-7. TIA/EIA-574 (Dual Serial Option) Pin Layouts

Primary Port	
Pin	**Description**
Pin 1	Received line signal detector (RLSD)
Pin 2	Received data (RD)
Pin 3	Transmitted data (TD)
Pin 4	DTE ready (DTR)
Pin 5	Signal common (ground)
Pin 8	Clear to send (CTS)
Pin 9	Ring indicator (RI)
Secondary Port	
Pin	**Description**
Pin 5	Signal common (ground)
Pin 6	Received data (RD)
Pin 7	Transmitted data (TD)

DARS Output

This BNC connector provides an unbalanced DARS output. (The connector is just a conduit: the module generates the signal.)

IMPULSE OUT

This connector provides output to drive impulse clocks.

Table 1-8. IMPULSE OUT Pin Layouts

Pin	Description
1	Ground
2	Impulse out even
3	Impulse out odd

Hz Output

This output connector provides you with a 5V TTL square-wave signal at the programmed frequency. The **HzOut** parameter sets the frequency of the square wave. For more information about setting the **HzOut** parameter, see "Setting Hz Out Control" on page 113.

Table 1-9. Hz Output Pin Layouts

Pin	Description
1	Ground
2	Not connected
3	Hz out

+24V DC 1A Barrel Connector

Using this connector, you can supply an external +24V DC source of power to the CSD-3902. This forms a redundant power supply and is also used whenever frame power is not available.

Block Diagrams

Figure 1-6 on page 16 is a functional block diagram of the MTG-3901. The block diagram for the CSD-3902 is the same as Figure 1-6 except that there is only one black burst output instead of four. Figure 1-7 on page 17 is a redundant MTG system level block diagram. Figure 1-8 on page 18 is a signal flow diagram of the ACO-3901 module.

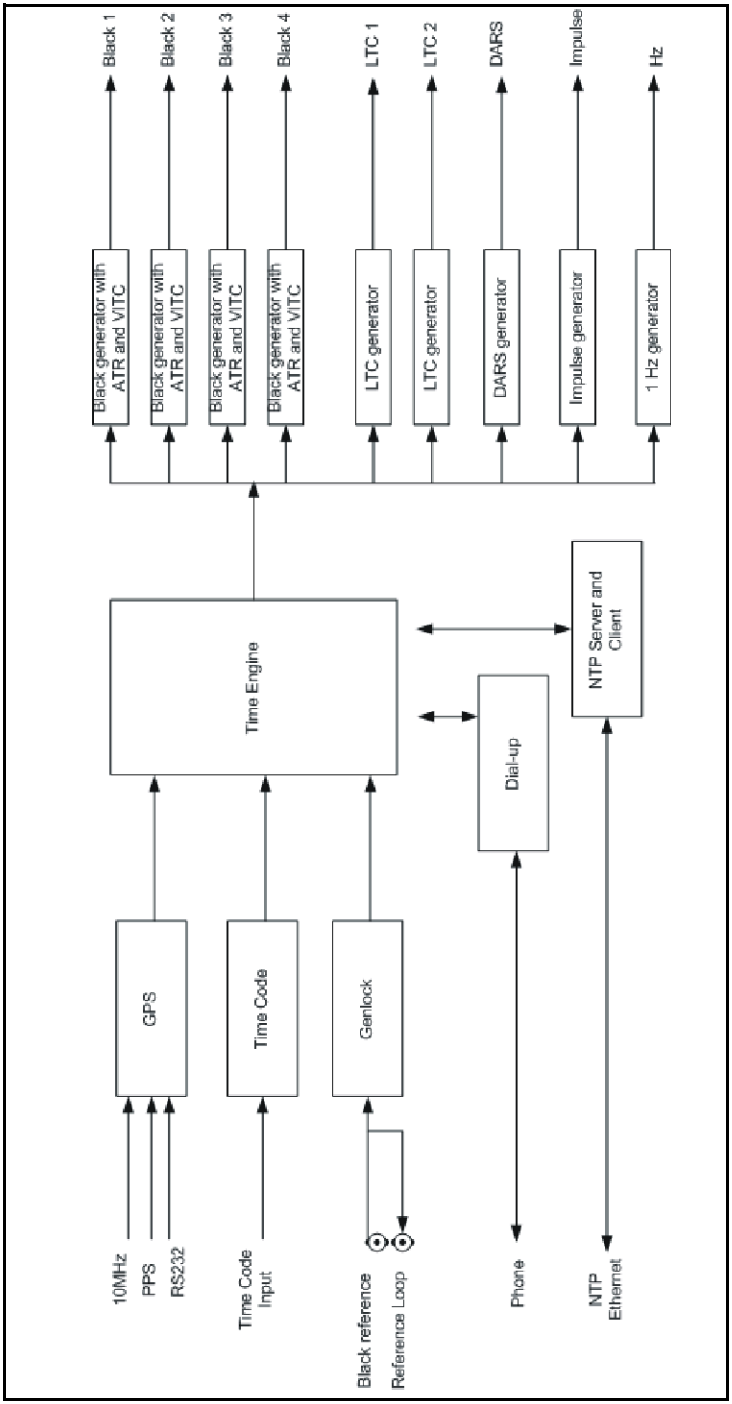

Figure 1-6. MTG-3901 Block Diagram

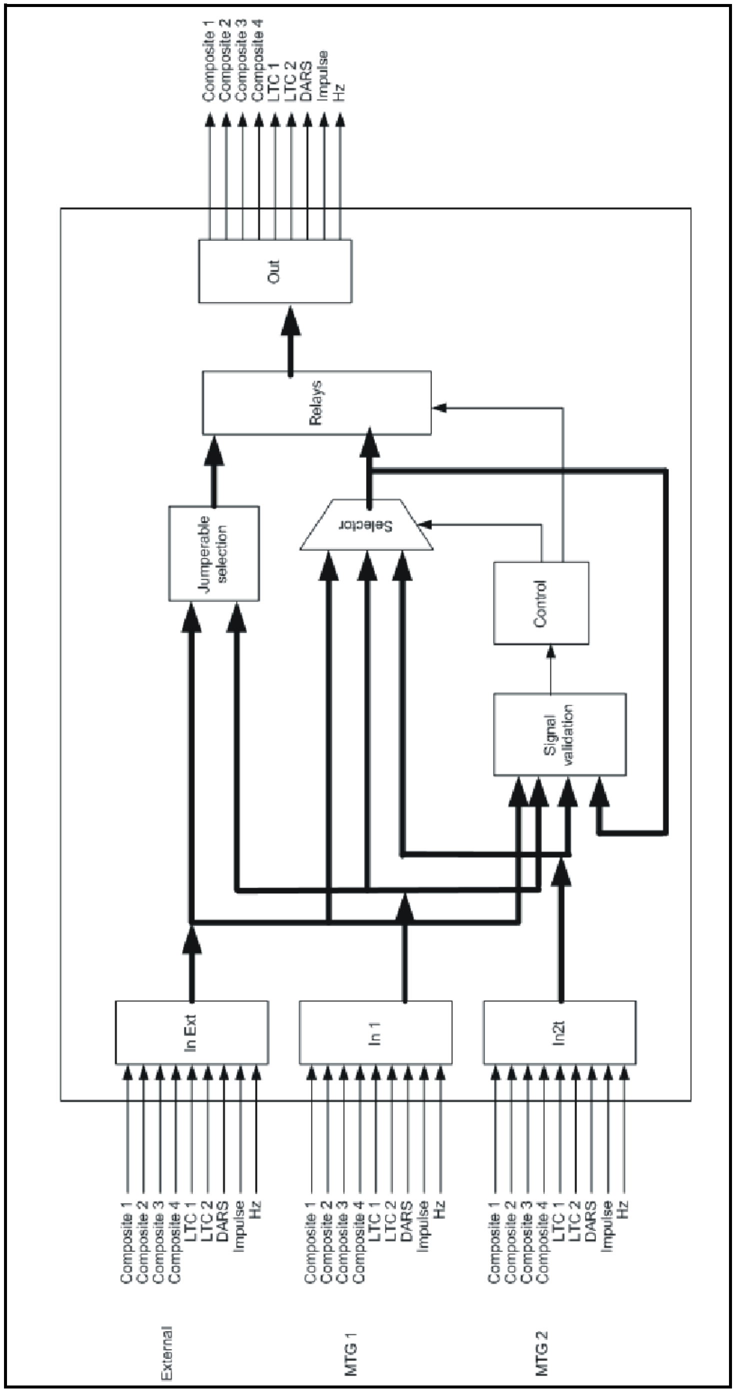

Figure 1-7. Redundant MTG System Level Block Diagram

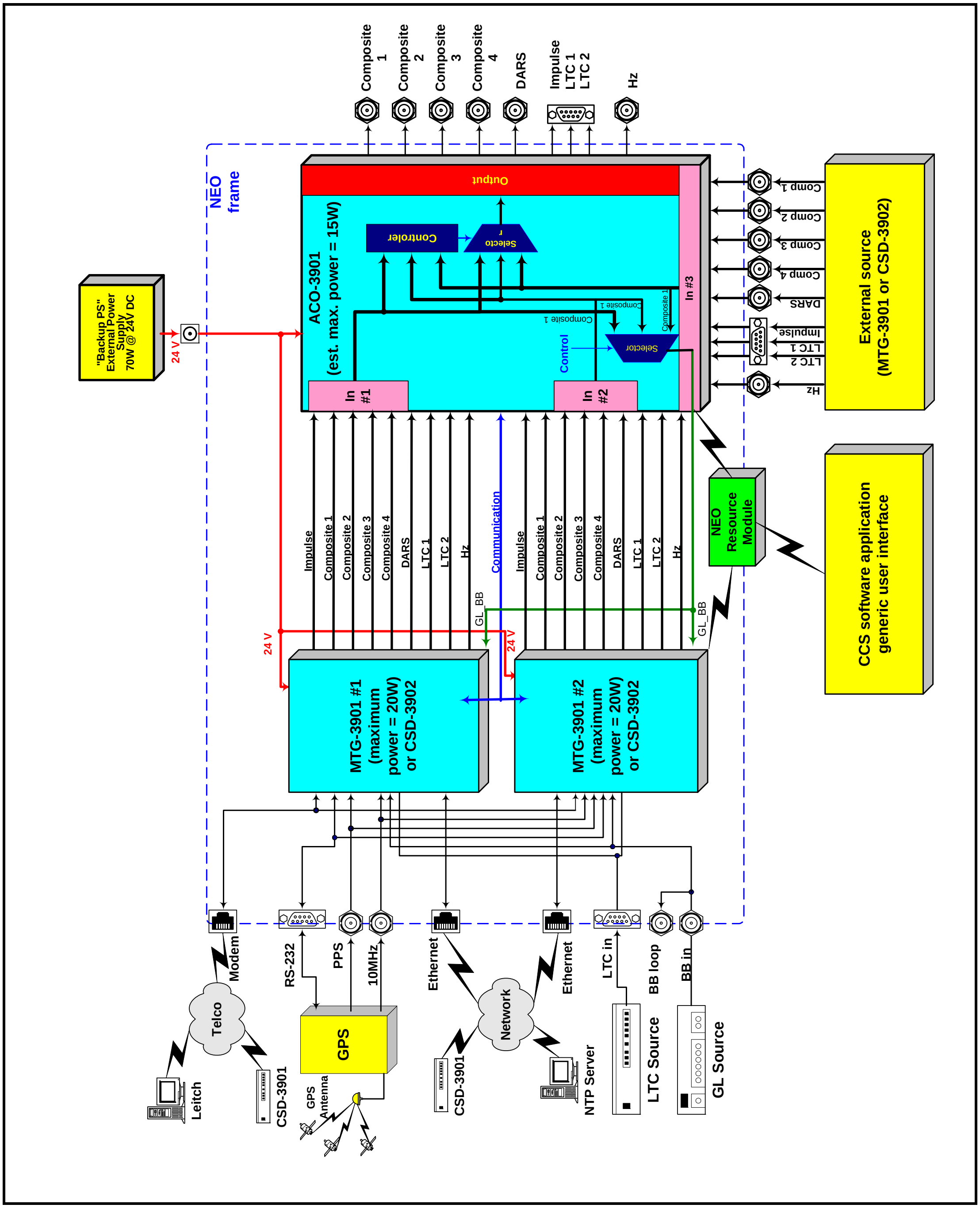

Figure 1-8. ACO-3901 Signal Flow Diagram

Chapter 2

Installation and System Connections

Overview

This chapter describes how to set the module's jumpers and connect your MTG-3901or CSD-3902 systems to devices such as GPS receivers and external modems. It includes information on the following topics:

- "Checking the Packing List" on page 21
- "Battery Installation and Disposal" on page 22
- "Installing MTG-3901 and CSD-3902 Modules" on page 24
- "Removing MTG-3901 and CSD-3902 Modules" on page 24
- "Setting Jumpers" on page 26
- "Connecting MTG-3901/CSD-3902 Systems to GPS-3903 Receivers" on page 35
- "Connecting MTG-3901/CSD-3902 Systems to GPS-1600 Receivers" on page 40
- "Connecting MTG-3901/CSD-3902 Systems to GPS-5300 Receivers" on page 44
- "Connecting MTG-3901/CSD-3902 Systems to External Modems" on page 50
- "Connecting Other Devices to MTG-3901 and CSD-3902 Systems" on page 54
- "Upgrading MTG-3901/CSD-3902 Firmware" on page 57

- "Correcting a Failed Upgrading Procedure" on page 61

Caution

Before installation, please read the NEO *Safety and Compliance Manual.* This document contains important information about the safe installation and operation of NEO products

Note

Except where noted, the term "MTG-3901" will be used in this manual to refer to both the MTG-3901 and CSD-3902 modules.

Checking the Packing List

Depending on the system you have, the module package includes these items:

- **MTG-3901/CSD-3902-SYS-*X***
  - Two MTG-3901-FM or CSD-3902-FM front modules
  - One ACO-3901-FM front module
  - One ACO-3901-BM back module
  - Two 3V Energizer 2014 lithium batteries (or equivalent)
  - One *MTG-3901 and CSD-3902 Installation and Operation Manual* per order
  - One *MTG-3901/CSD-3902 Initial Startup Guide* per order
  - One *ACO-3901 Automatic Changeover Unit Installation and Operation Manual* per order
- **MTG-3901/CSD-3902**
  - One MTG-3901/CSD-3902-FM front module
  - One MTG-3902/CSD-3902-BM back module
  - One MTG-3901/CSD-3902-BO break out module
  - One *MTG-3901 and CSD-3902 Installation and Operation Manual* per order
  - One *MTG-3901/CSD-3902 Initial Startup Guide* per order

Battery Installation and Disposal

Installing the Battery

Each MTG-3901 is shipped from the factory with one Energizer 2014 lithium battery (or equivalent). Follow these steps to install the battery:

1. Remove the two screws from the battery clip located at the board front edge (see Figure 2-1). The clip will fall off when the screws have reached the ends of their threads.
2. Insert the battery, with the positive (+) end facing toward the rear of the board.
3. Reattach the battery clip.

Caution

DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. DISPOSE OF USED BATTERIES ACCORDING TO THE MANUFACTURER’S INSTRUCTIONS.

4. Fully tighten each clip screw. (The battery will not be connected unless the clip is completely attached.)

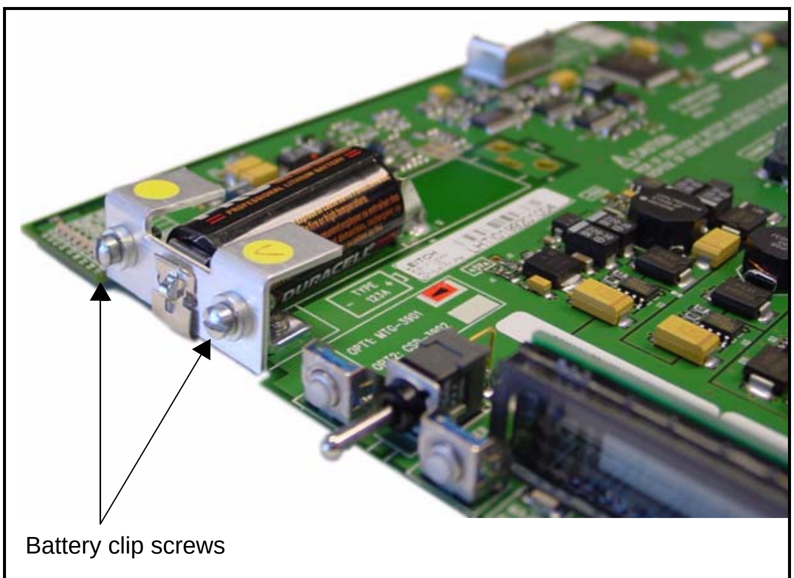

Figure 2-1. Battery Placement

Replace the battery after every eight hours of battery use, every 12 months, or when the “BATTERY LOW” warning LED lights up, whichever occurs first.

Caution

Never attempt to remove a battery from its holder without first removing the battery clip. Pulling the battery out with the battery clip firmly attached will cause damage to the battery and may pose a safety hazard.

Disposing of the Battery

A depleted battery may be safely disposed of in normal waste. Contact your local government for disposal or recycling practices in your area.

Caution

Never dispose of battery in fire, as it could explode. Remove the worn-out battery from equipment immediately and dispose of promptly. Do not attempt to recharge the battery.

Installing MTG-3901 and CSD-3902 Modules

This module requires no specialized installation procedures. For general information about installing NEO modules, see your *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*.

Note

Before installing your MTG-3901 module, there are jumpers that you must configure. See “Setting Jumpers” on page 26.

Removing MTG-3901 and CSD-3902 Modules

This module requires no specialized removal procedures. For general information about removing NEO modules, see your *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*.

MTG-3901/CSD-3902 System Configurations

To ensure that you make the proper jumper settings and system connections, it is important for you to identify the type of MTG-3901/ CSD-3902 system you have. Throughout this chapter, “MTG-3901/ CSD-3902-SYS-*x*” and “CSD-3902 stand-alone system” are used to refer to the following system configurations:

- **MTG-3901/CSD-3902-SYS-*x*** Consists of any supported NEO frame with the following modules installed:
  - Two MTG-3901/CSD-3902-FM front modules
  - One ACO-3901-FM front module
  - One ACO-3901-BM back module

  If you have only one MTG-3901 installed in your NEO frame (stand-alone system), use the connection information that is provided for CSD-3902 stand-alone systems.
- **CSD-3902 stand-alone system** Consists of any supported NEO frame with the following modules installed:
  - One CSD-3902-FM front module

- One CSD-3902-BM back module
- One CSD-3902-BO breakout module

Note

For information on the cables that you need to connect your MTG-3901/CSD-3902 systems to devices, see “Making MTG-3901/CSD-3902 System Connections” on page 31.

Setting Jumpers

On the MTG-3901/CSD-3902 front modules there are several jumpers that you need to set before you operate the unit for the first time. See Figure 2-2 for the location of these jumpers.

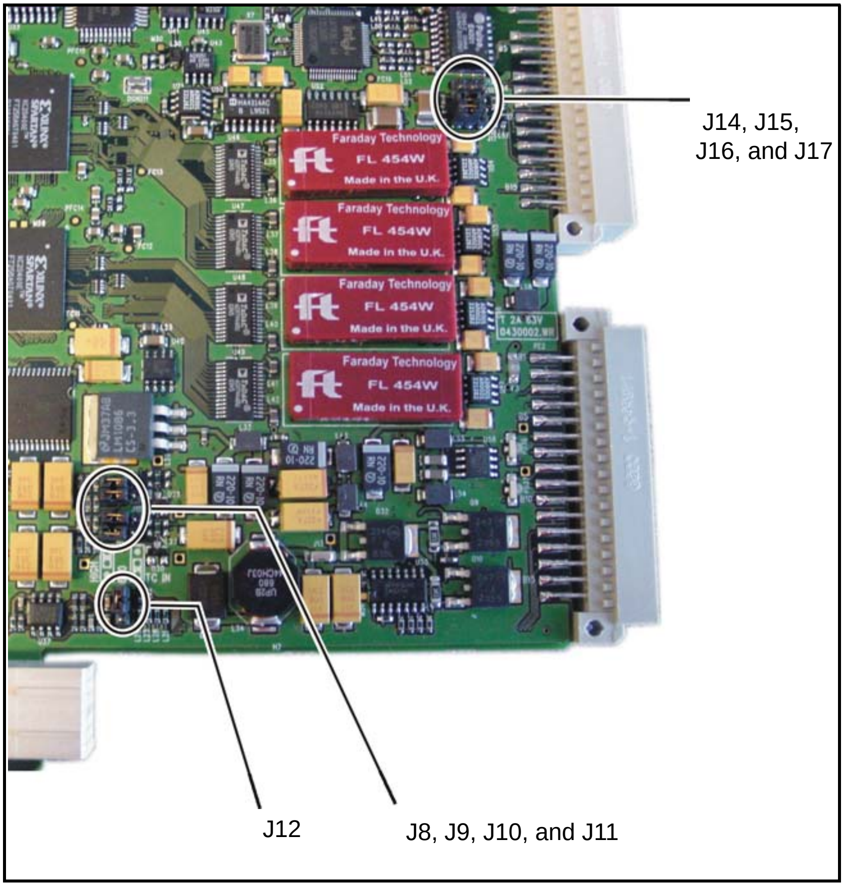

Figure 2-2. MTG-3901/CSD-3902 Jumper Locations

Setting Jumpers For PPS Input and Genlock Looping

On MTG-3901/CSD-3902 modules, there are jumpers to configure the system to input PPS signals at the **PPS/Genlock Loop** connection.

Setting Jumpers for PPS Input Mode

Depending on the type of system you have, configure your module for PPS input in one of the following ways:

- For MTG-3901/CSD-3902-SYS-*x* systems, locate jumpers pins **J14** through **J17** on your MTG-3901 front module (see Figure 2-2 on page 26 for the location of these jumpers) and set jumpers on jumper pins **J16** and **J17** as illustrated in Figure 2-3.

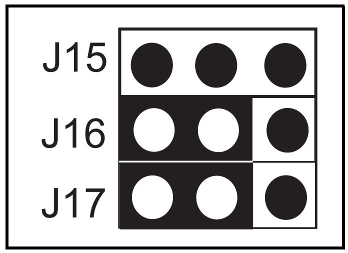

Figure 2-3. MTG-3901/CSD-3902-SYS-*x* PPS Jumper Setting

When set for PPS input, a 75Ω external terminator should be placed on the **GENLOCK Loop Back** connector on the ACO-3901-BM back module.

OR

- For CSD-3902 stand-alone systems, locate jumpers pins **J14** through **J17** on your CSD-3902 front module (see Figure 2-2 on page 26 for the location of these jumpers) and set jumpers on jumper pins **J15**, **J16**, and **J17** as illustrated in Figure 2-4.

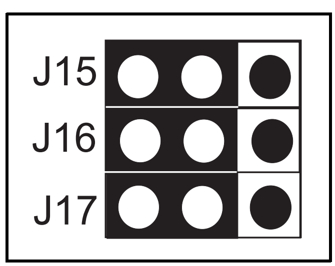

Figure 2-4. CSD-3902 Stand-alone System PPS Input Jumper Settings

When set for PPS input, the PPS connector is internally terminated with a 50Ω impedance, and the **GENLOCK IN** connector is internally terminated with a 75Ω impedance. The **PPS/GENLOCK LOOP** signal is routed to the PPS logic.

Setting Jumpers for BBIL (Blackburst Internal Loop) Mode on a CSD-3902 Stand-Alone System

When used as a stand-alone system, your CSD-3902 module can be configured for **BBIL** (Blackburst Internal Loop) mode as indicated on the silk-screen on the PCB. When BBIL mode is used, the **PPS/ GENLOCK** connector can be used as a passive loop-back of the genlock input signal.

To configure your CSD-3902 stand-alone system for BBIL mode, locate jumpers pins **J14** through **J17** on your CSD-3902 front module (see Figure 2-2 on page 26 for the location of these jumpers) and then set jumpers on jumper pins **J15**, **J16**, and **J17** as illustrated in Figure 2-3.

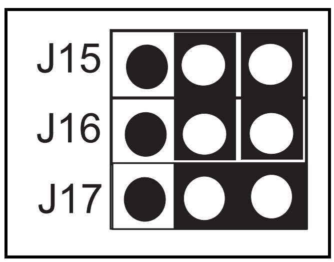

Figure 2-5. CSD-3902 Stand-Alone System BBIL Mode Jumper Settings

When set to BBIL mode, the **PPS/GENLOCK LOOP** connector is electrically connected to the **GENLOCK IN** connector. The input video reference signal may be looped through the module and must be terminated externally, as the signal is not terminated on the board. The unit is shipped with jumpers set for PPS input mode.

Setting Impedance for Timecode Outputs

You can set the impedance of the Timecode Output 1 using jumpers **J8** and **J9**, and Timecode Output 2 using jumpers **J10** and **J11** as indicated on the silk-screen on the product circuit board. The two possible jumper settings are **LOW** for a low-impedance output, and **600** for a 600Ω output impedance. The unit is shipped with the **LOW** jumper setting. See Figure 2-2 on page 26 for the location of these jumpers.

Setting Jumpers For Low Impedance Timecode Output

To set the timecode impedance to **LOW**, set the jumpers as illustrated in Figure 2-6.

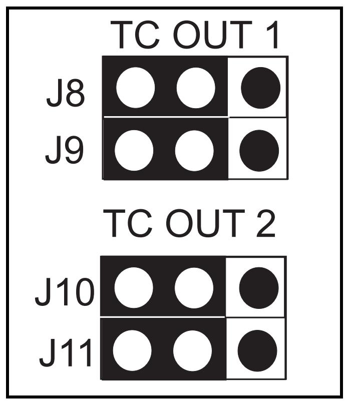

Figure 2-6. TC Out Low Impedance Jumper Setting

Setting Jumpers For 600Ω Timecode Output

To set the output timecode impedance to **600**, set the jumpers as illustrated in Figure 2-7.

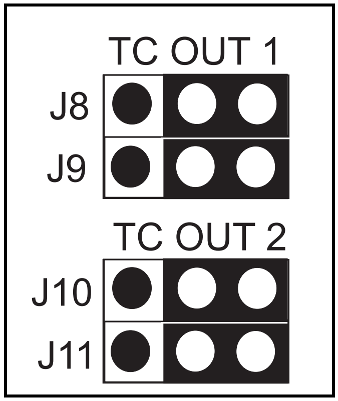

Figure 2-7. TC Out 600Ω Impedance Jumper Setting

Setting Impedance for Timecode Inputs

You can set the impedance of the timecode input using jumper **J12**, as indicated on the silk-screen on the product circuit board. The two possible jumper settings are **HIGH** for a high-impedance input, and **600** for a 600Ω input impedance. The unit is shipped with the **HIGH** jumper setting. See Figure 2-2 on page 26 for the location of these jumpers.

To set the input timecode impedance to **HIGH** or **600**, set the jumper on jumper pin 12 as illustrated in Figure 2-8.

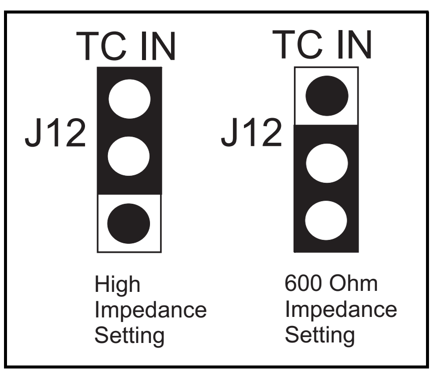

Figure 2-8. TC In Impedance Jumper Settings

Making MTG-3901/CSD-3902 System Connections

The following sections describe how to connect your MTG-3901/ CSD-3902 system to devices, such as GPS receivers and external modems.

This section includes information on the following system connections:

- "Connecting MTG-3901/CSD-3902 Systems to GPS-3903 Receivers" on page 35
- "Connecting MTG-3901/CSD-3902 Systems to GPS-1600 Receivers" on page 40
- "Connecting MTG-3901/CSD-3902 Systems to GPS-5300 Receivers" on page 44
- "Connecting MTG-3901/CSD-3902 Systems to External Modems" on page 50
- "Connecting Other Devices to MTG-3901 and CSD-3902 Systems" on page 54

Mounting a GPS Antenna

To mount a GPS antenna outside, follow this procedure:

1. Attach a short length of ¾-inch/19mm standard plumbing pipe (not supplied in the MTG-3901 kit) to an outside surface or wall where it will not be disturbed.

   Note

   The thread on the end of the pipe must be 3/4 inch NPT to properly screw into the bottom of the antenna. It is not necessary to mount the GPS antenna in a sheltered or protected area, as it is a completely sealed and well constructed unit. However, it should be located where it is unobstructed by surrounding buildings.

2. Thread one end of the 75 ft/22.86 m RG-59 cable through the pipe.
3. Attach the female F-type connector on the RG-59 cable to the male connection under the antenna dome.
4. Thread the remainder of the RG-59 cable through an exterior wall and into the building.

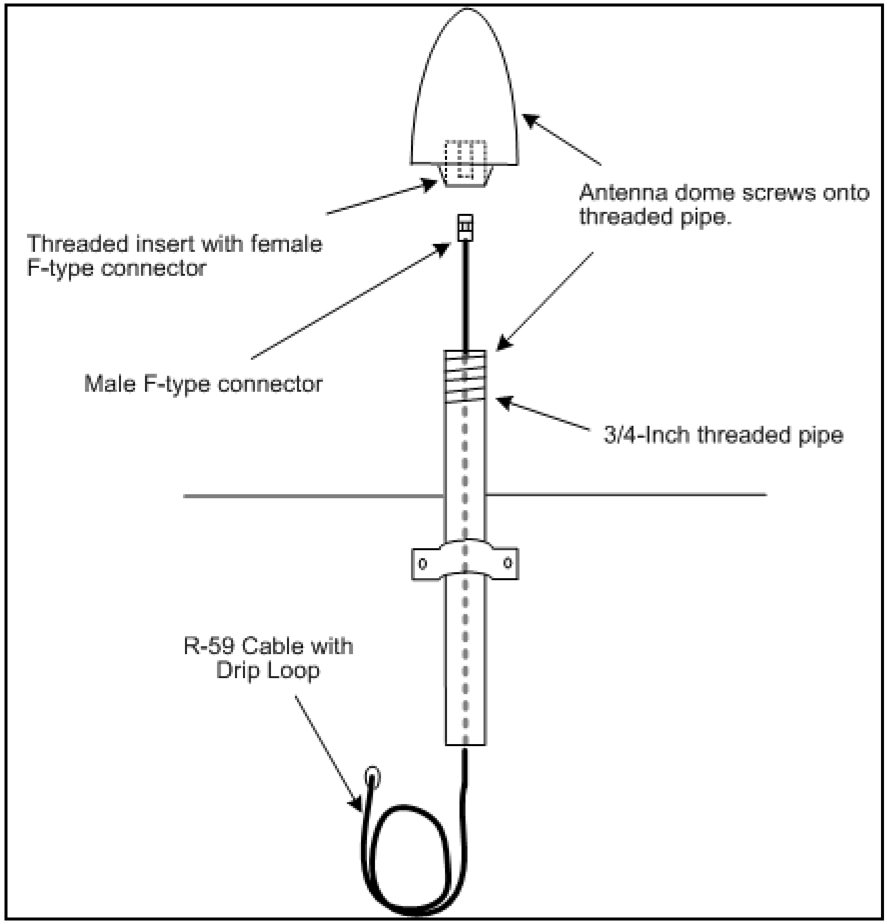

Figure 2-9. Typical Outdoor Installation of a GPS Antenna

Note

To ensure the safety of your personnel and the protection of your equipment from lightning strikes, it is recommended that you attach an approved ground wire to the R-59 cable. Follow the provisions of your local electrical code.

Connecting a GPS Antenna to the Receiver

After the antenna has been installed and connected, the other end of the RG-59 cable must be connected to the 8 in./20 cm Type-F adapter cable. The other end of the adapter cable is then plugged into the **Ant** port of the GPS receiver.

Note

The GPS-3903 and GPS-3902 receiver and antenna systems are not backwards compatible. This means that you cannot use an antenna that came with the GPS-3902 receiver with the GPS-3903 receiver and vice versa.

Connecting MTG-3901/CSD-3902 Systems to GPS-3903 Receivers

This section describes how to connect your MTG-3901/CSD-3902 system to a GPS-3903, GPS-3902, or GPS-3901 receiver.

Note

Unless otherwise noted, the term GPS-3903 receiver is used in the manual to refer to GPS-3903, GPS-3902, and GPS-3901 receivers.

Connecting an MTG-3901/CSD-3902-SYS-*x* System to a GPS-3903 Receiver

To connect your MTG-3901/CSD-3902-SYS-*x* system to a GPS-3903 receiver, you may need to create a custom cable. See **Step 2** on page 36 for details.

Follow these steps to connect your MTG-3901/CSD-3902-SYS-*x* system to a GPS-3903 receiver. Figure 2-11 on page 37 illustrates the required connections.

1. Ensure the GPS antenna is mounted outside the building and connected to the receiver (See page 32).

2. If your MTG-3901/CSD-3902-SYS-*x* system did not come with a CAB-MTG-GPS3901 cable or a CAB-MTG-GPS-39-Y cable, you can create a custom cable to connect your MTG-3901/ CSD-3902-SYS-*x* system to a GPS-3903 receiver.

   To do this, create a cable that has a 9-pin male connector at one end, and on the other end, a 9-pin male and a 9-pin female connector. Figure 2-10 illustrates the pin assignments for the connectors.

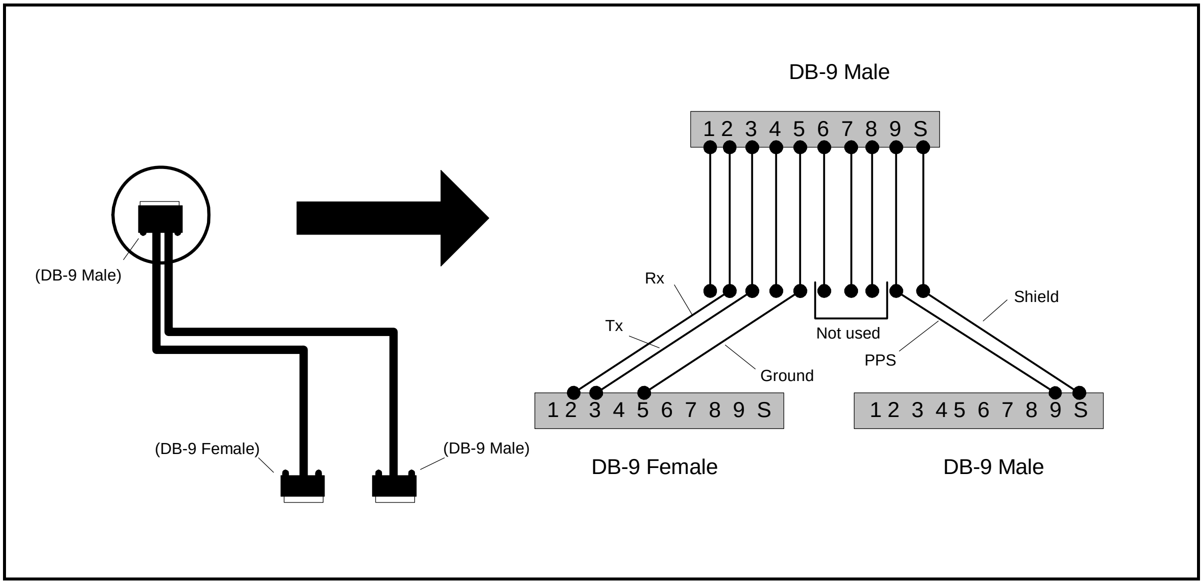

Figure 2-10. GPS-3903 cable pin assignments

3. Attach the cable's 9-pin male connector to **Port 2** on the GPS-3903 receiver.

4. Attach the cable’s 9-pin female and 9-pin male connectors to the **RS-232** and the **LTC IN** connectors (respectively) on the ACO-3901-BM back module.

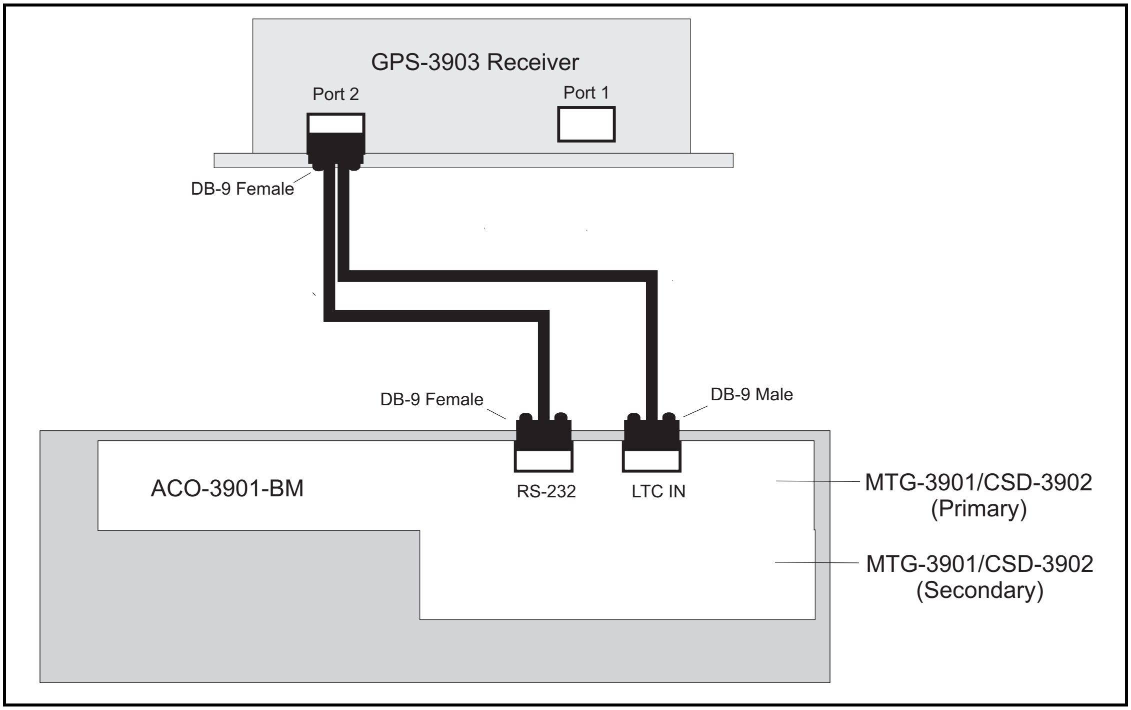

Figure 2-11. MTG-3901/CSD-3902-SYS-*x to* GPS-3903 Connections

5. Allow the GPS antenna and receiver 15 minutes to lock on to an orbiting satellite signal. Actual time to lock depends on weather conditions, solar conditions, antenna orientation, and satellite health.

For information on configuring your MTG-3901 module for GPS operation, see “Applying Settings for GPS Receiver Operation” on page 141.

Connecting a CSD-3902 Stand-Alone System to a GPS-3903 Receiver

To connect your stand-alone CSD-3902 to a GPS-3903 receiver, you will need the following:

- One CSD-3902-BO breakout module
- One CAB-CSD-GPS3901 cable (with attached Weidmuller 1615790000 female 3-pin connector)
- One DB-25 cable (12 inches/30 cm in length)

Follow these steps to connect your stand-alone CSD-3902 to a GPS-3903 receiver. Figure 2-12 on page 39 illustrates the required connections.

1. Ensure the GPS antenna is mounted outside the building and connected to the receiver.
2. Use a short (12 inches/30 cm in length) DB-25 cable to connect the 25-pin female connector of the CSD-3902-BO breakout module to the 25-pin male connector of the CSD-3902-BM back module.

   The breakout module may be rigidly fastened to the back module, however this type of connection is **not** recommended. In this configuration, both may be prone to physical damage if enough force is applied (vertically) to the breakout module.
3. Attach the 9-pin male RS-232 connector of the CAB-CSD-GPS3901 cable to **Port 2** on the GPS-3903 receiver.
4. Attach the 9-pin female RS-232 of the CAB-CSD-GPS3901 cable to the 9-pin male **RS-232** connector on the CSD-3902-BO breakout module.

5. Attach the CAB-CSD-GPS3901 cable's Weidmuller 3-pin female connector to the 3-pin male connector labeled **TRIG/PPS** on the CSD-3902 breakout module.

   When making this connection, ensure that the screw heads on the Weidmuller 3-pin female connector are facing up.

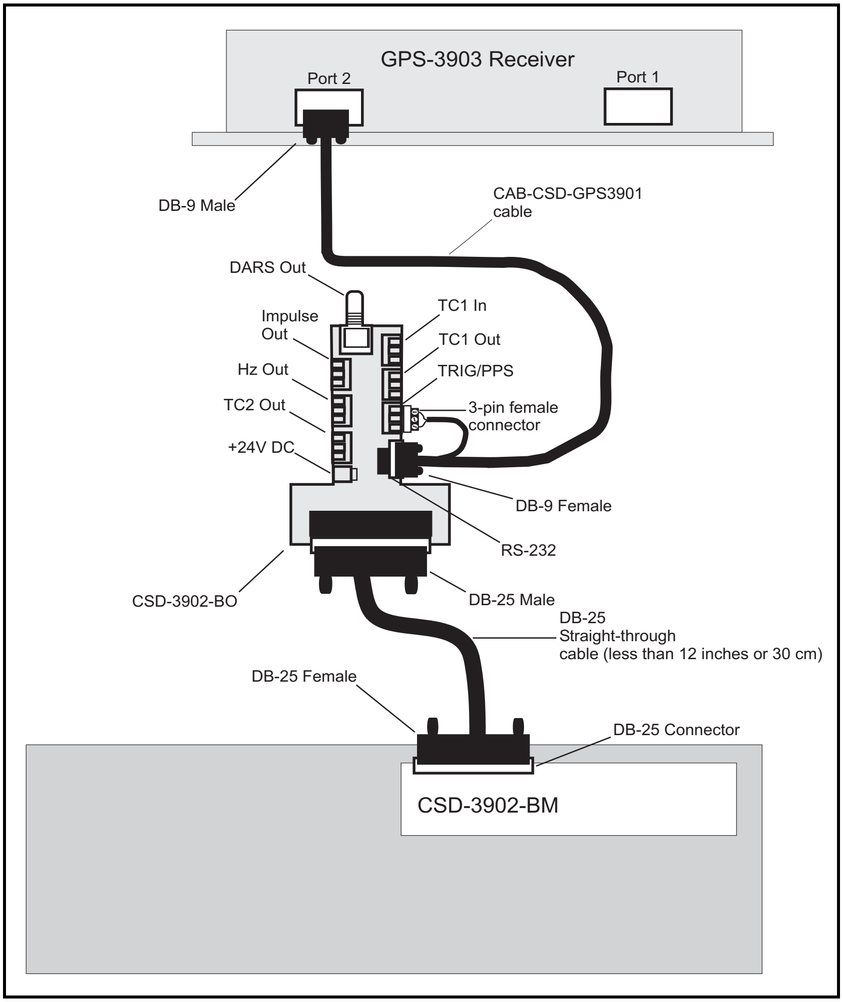

Figure 2-12. CSD-3902 Stand-alone System to GPS-3903 Receiver Connections

For information on configuring your CSD-3902 module for GPS operation, see "Applying Settings for GPS Receiver Operation" on page 141.

Connecting MTG-3901/CSD-3902 Systems to GPS-1600 Receivers

This section describes how to connect your MTG-3901/CSD-3902 system to a GPS-1600 receiver.

This section includes information and illustrations on the following topics:

- "Connecting an MTG-3901/CSD-3902-SYS-x System to a GPS-1600 Receiver" on page 40
- "Connecting a CSD-3902 Stand-alone System to a GPS-1600 Receiver" on page 42

Connecting an MTG-3901/CSD-3902-SYS-*x* System to a GPS-1600 Receiver

To connect your MTG-3901/CSD-3902-SYS-*x* system to a GPS-1600 receiver, you will need the following:

- One standard 9-pin male to 9-pin female RS-232 serial cable
- Two standard BNC cables

Follow these steps to connect your MTG-3901/CSD-3902-SYS-*x* system to a GPS-3903 receiver. Figure 2-13 on page 41 illustrates the required connections.

1. Using a standard BNC cable, connect the **1 PPS OUTPUT** BNC connector on the GPS-1600 receiver to the **PPS** BNC connector on the ACO-3901-BM back module.
2. Using a standard BNC cable, connect the **10 MHz OUTPUT** BNC connector on the GPS-1600 receiver to the **10MHz** BNC connector on the ACO-3901-BM back module.
3. Attach the 9-pin male connector on the RS-232 serial cable to the 9-pin female **RS-232** connector on the back of the GPS-1600 receiver.

4. Attach the 9-pin female connector on the RS-232 serial cable to the 9-pin male **RS-232** connector on the ACO-3901-BM back module.

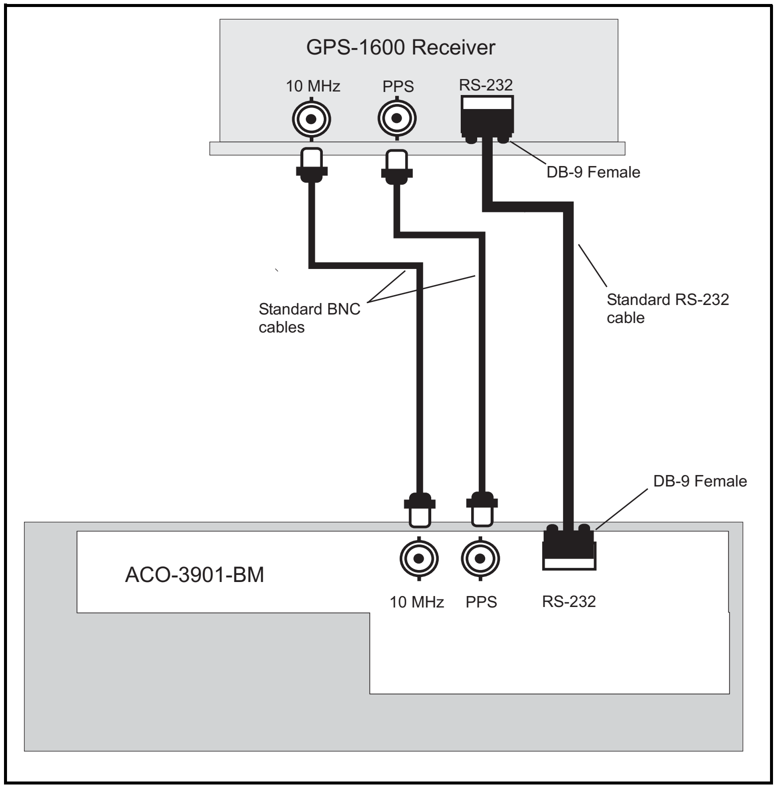

Figure 2-13. MTG-3901/CSD-3902-SYS-*x* to GPS-1600 Connections

For information on configuring your MTG-3901 module for GPS operation, see “Applying Settings for GPS Receiver Operation” on page 141.

Connecting a CSD-3902 Stand-alone System to a GPS-1600 Receiver

To connect your stand-alone CSD-3902 to a GPS-1600 receiver, you will need the following:

- One CSD-3902-BO breakout module
- One standard 9-pin male to 9-pin female RS-232 serial cable
- One DB-25 cable (12 inches/30 cm in length)
- Two standard BNC cables

Follow these steps to connect your stand-alone CSD-3902 to a GPS-1600 receiver. Figure 2-14 on page 43 illustrates the required connections.

1. Using a standard BNC cable, connect the **1 PPS OUTPUT** BNC connector on the GPS-1600 receiver to the **PPS** BNC connector on the CSD-3902 back module.
2. Using a standard BNC cable, connect the **10 MHz OUTPUT** BNC connector on the GPS-1600 receiver to the **10MHz** BNC connector on the CSD-3902 back module.
3. Use a short (12 inches or 30 cm in length) DB-25 cable to connect the 25-pin female connector of the CSD-3902-BO breakout module to the 25-pin male connector of the CSD-3902-BM back module.

   The breakout module may be rigidly fastened to the back module, however this type of connection is **not recommended**. In this configuration, both may be prone to physical damage if enough force is applied (vertically) to the breakout module.
4. Attach the 9-pin male connector on the RS-232 serial cable to the 9-pin female **RS-232** connector on the back of the GPS-1600 receiver.

5. Attach the 9-pin female connector on the RS-232 serial cable to the 9-pin male **RS-232** connector on the CSD-3902-BO breakout module.

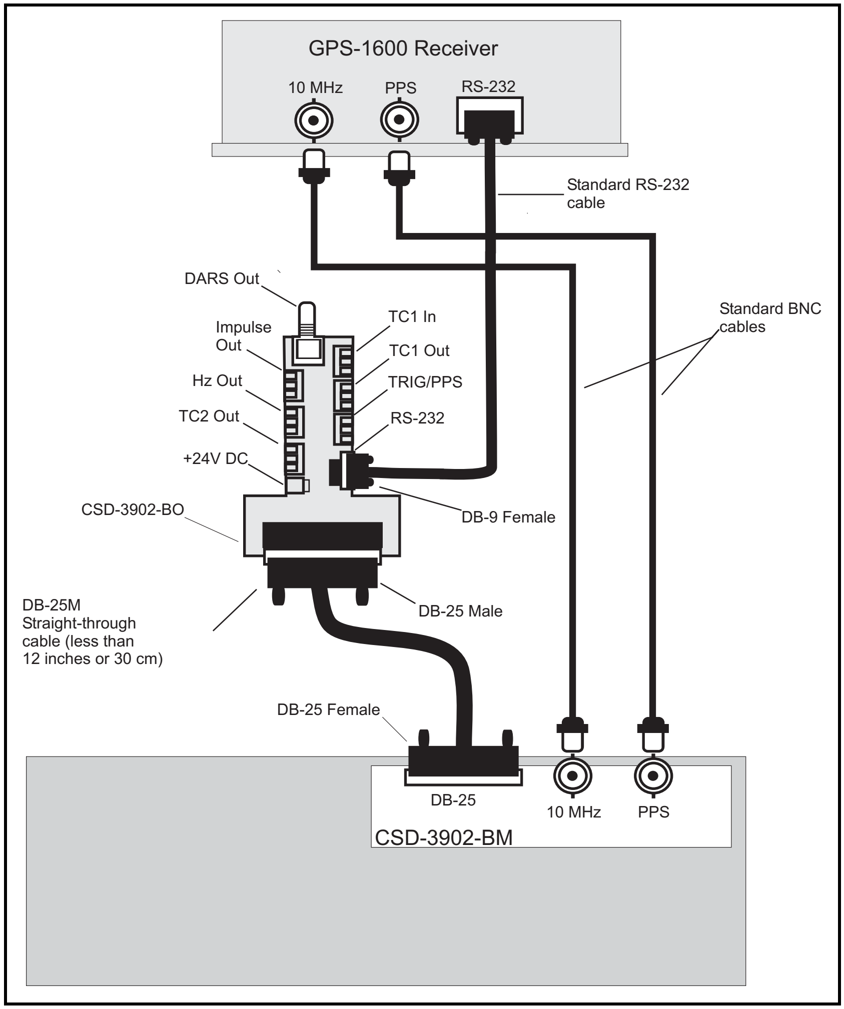

Figure 2-14. CSD-3902 Stand-alone system to GPS-1600 Receiver Connections

For information on configuring your CSD-3902 module for GPS operation, see “Applying Settings for GPS Receiver Operation” on page 141.

Connecting MTG-3901/CSD-3902 Systems to GPS-5300 Receivers

This section describes how to connect your MTG-3901/CSD-3902 system to a GPS-5300 receiver.

This section includes information and illustrations on the following topics:

- "Connecting an MTG-3901/CSD-3902-SYS-x System to a GPS-5300 Receiver" on page 44
- "Connecting a CSD-3902 Stand-Alone System to a GPS-5300 Receiver" on page 47

Connecting an MTG-3901/CSD-3902-SYS-*x* System to a GPS-5300 Receiver

To connect your MTG-3901/CSD-3902-SYS-*x* system, to a GPS-5300 receiver, you will need to create a custom cable. See **Step 2** on page 45 for details.

Follow these steps to connect your MTG-3901/CSD-3902-SYS-*x* system to a GPS-5300 receiver. Figure 2-16 on page 46 illustrates the required connections.

1. Ensure the GPS-5300 is mounted outside of the building and connected to the receiver.

2. Create a cable that has a 25-pin male connector at one end, and on the other end, a 9-pin male and a 9-pin female connector. Figure 2-15 illustrates the pin assignments for the connectors.

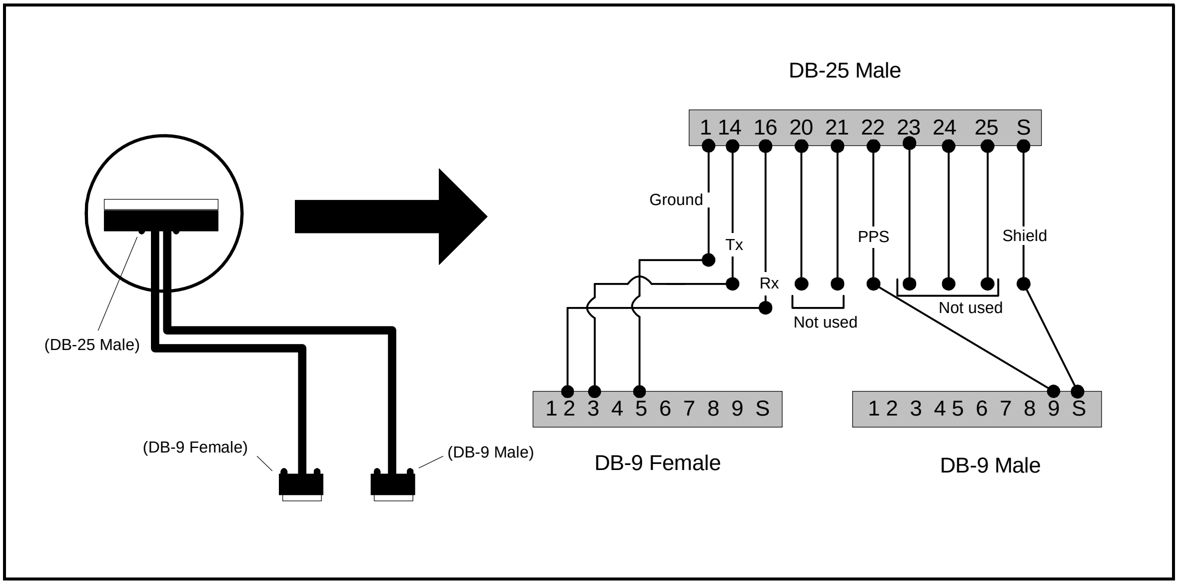

Figure 2-15. GPS-5300 cable pin assignments

3. Attach the new cable’s 25-pin male connector to the DB-25 connection on the GPS-5300 receiver.

4. Attach the cable's 9-pin female and 9-pin male connectors to the **RS-232** and **LTC IN** connectors (respectively) on the ACO-3901-BM back module.

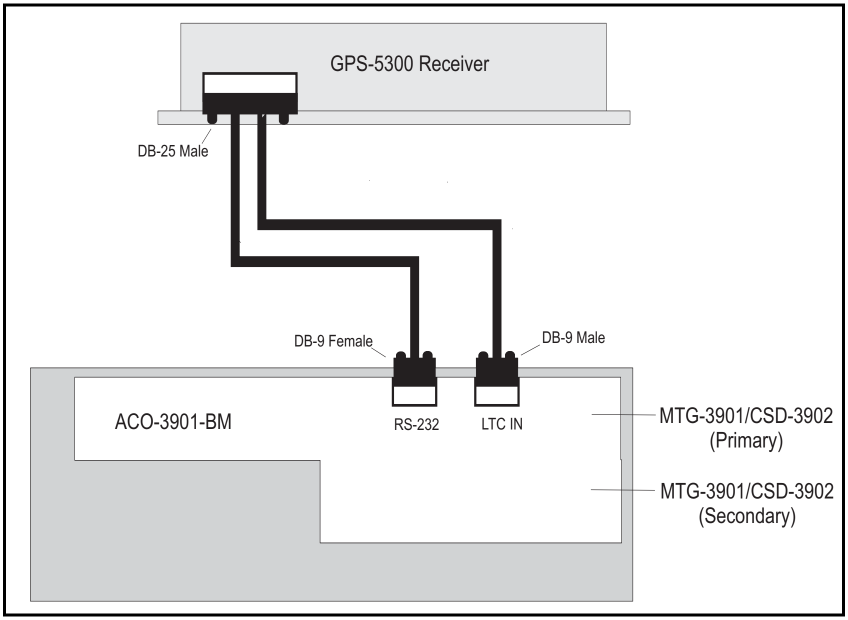

Figure 2-16. MTG-3901/CSD-3902-SYS-*x to* GPS-5300 Connections

5. Attach the 24 volt connector of the AC adapter to the casing of the 25-pin female connector on the GPS cable from the GPS-5300.

Caution

Do not reverse steps **5** and **6**. Failure to perform these steps in the stated order may result in equipment damage.

6. Insert the AC adapter plug into a power outlet.
7. Allow the GPS-5300 15 minutes to lock on to an orbiting satellite signal. Actual time to lock depends on weather conditions, solar conditions, antenna orientation, and satellite health.

For information on configuring your MTG-3901 module for GPS operation, see "Applying Settings for GPS Receiver Operation" on page 141.

Connecting a CSD-3902 Stand-Alone System to a GPS-5300 Receiver

To connect a stand-alone CSD-3902 to a GPS-5300 receiver, you will need the following:

- One CSD-3902-BO breakout module
- One CAB-CSD-GPS3901 cable (with attached Weidmuller 1615790000 female 3-pin connector)
- One CAB-CSD-GPS53A adapter
- One DB-25 cable (12 inches or 30 cm in length)

1. Use a short (less than 12 inches/30 cm in length) DB-25 cable to connect the 25-pin female connector of the CSD-3902-BO breakout module to the 25-pin male connector of the CSD-3902-BM back module.

   The breakout module may be rigidly fastened to the back module, however this type of connection is **not** recommended. In this configuration, both may be prone to physical damage if enough force is applied (vertically) to the breakout module.

2. Attach the 25-pin male connector of the CAB-CSD-GPS53A adapter to the DB-25 connector on the GPS-5300 receiver.
3. Attach the 9-pin female connector of the CAB-CSD-GPS53A adapter to the 9-pin male connector of the CAB-CSD-GPS3901 cable.
4. Attach the 9-pin female connector of the CAB-CSD-GPS3901 cable to the **RS-232** connector on the CSD-3902 breakout module.

5. Attach the CAB-CSD-GPS3901 cable's Weidmuller 3-pin female connector to the 3-pin male connector labeled **TRIG/PPS** on the CSD-3902 breakout module.

   When making this connection, ensure that the screw heads on the Weidmuller 3-pin female connector are facing up.

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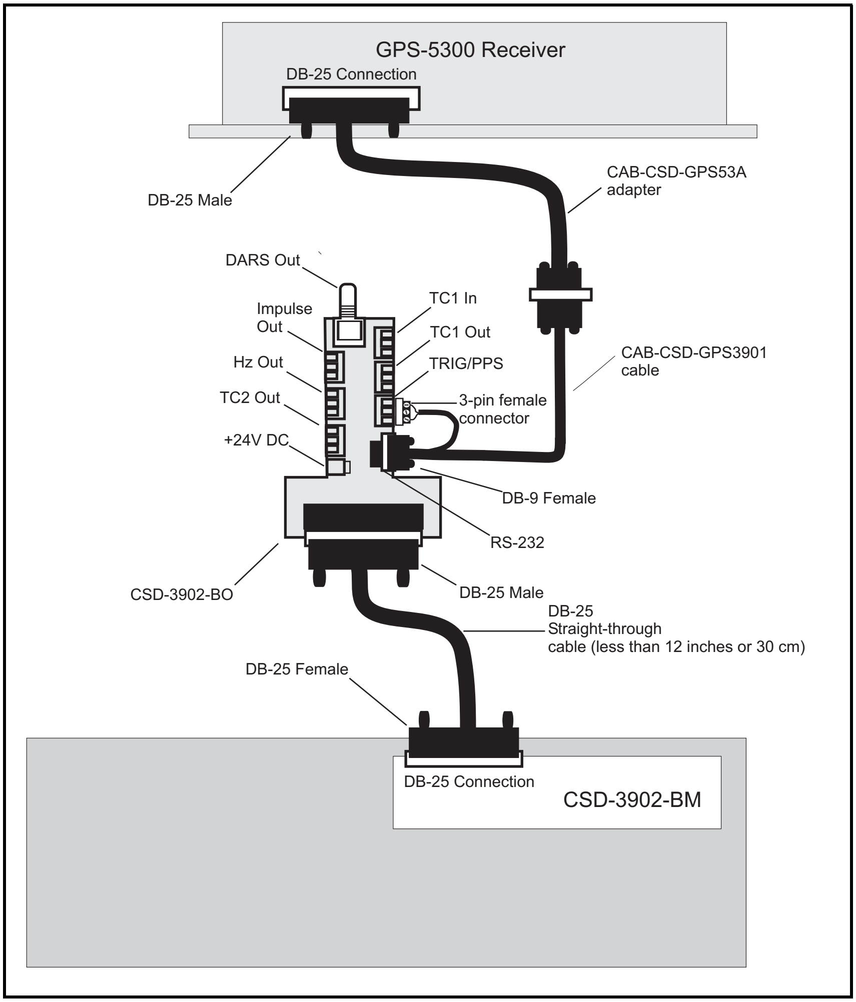

Figure 2-17. CSD-3902 Stand-alone System to GPS-5300 Connections

6. Attach the 24 volt connector of the AC adapter to the casing of the 25-pin female connector on the GPS cable from the GPS-5300.

7. Insert the AC adapter plug into a power outlet.
8. Allow the GPS-5300 15 minutes to lock on to an orbiting satellite signal. Actual time to lock depends on weather conditions, solar conditions, antenna orientation, and satellite health.

For information on configuring your CSD-3902 module for GPS operation, see “Applying Settings for GPS Receiver Operation” on page 141.

Connecting MTG-3901/CSD-3902 Systems to External Modems

This section explains how to connect your MTG-3901 and CSD-3902 systems to operate with an internal or external modem.

It includes information on the following topics:

- “Connecting your MTG-3901/CSD-3902-SYS-x to an External Modem” on page 50
- “Connecting your CSD-3902 Stand-alone System to an External Modem” on page 52

Using the MTG-3901/CSD-3902 Internal Modem

To use the MTG-3901/CSD-3902 internal modem with your system do one of the following:

- If you are using the internal modem for your MTG-3901/ CSD-3902-SYS-*x* system, connect an analog telephone line to the telephone jack (labelled **TELCO LINE**) on the ACO-3901-BM.

  OR

- If you are using the internal modem for your stand-alone CSD-3902, connect an analog telephone line to the telephone jack (labelled **TELCO LINE**) on the CSD-3902-BM.

Note

Your MTG-3901/CSD-3902 module’s internal modem is not certified for use in all regions. If you are experiencing problems with this modem, use an external modem instead.

For information on configuring your MTG-3901 module for modem operation, see “Applying Settings for Internal and External Modem Operation” on page 150.

Connecting your MTG-3901/CSD-3902-SYS-x to an External Modem

Depending on the type of connector your external modem has, you will need one standard 9-pin male to 9-pin female RS-232 serial cable or one standard DB-25 male to DB-9 female cable to connect the modem to your MTG-3901/CSD-3902-SYS-*x* system:

Follow these steps to connect your MTG-3901/CSD-3902-SYS-*x* system to an external modem. Figure 2-18 illustrates the required connections with external modems that have a DB-25 connector.

1. If the external modem has a DB-25 connector, do the following:
   a. Attach the DB-25 cable’s 25-pin male connector to the 25-pin female connector on the modem.
   b. Attach the cable’s 9-pin female connector to the **RS-232** connector on the ACO-3901-BM back module.
2. If the external modem has a DB-9 connector, do the following:
   a. Attach the 9-pin male connector of the RS-232 cable to the 9-pin female connector on the external modem.
   b. Attach the cable’s 9-pin female connector to the **RS-232** connector on the ACO-3901-BM back module.
3. Connect an analog telephone line to the external modem.

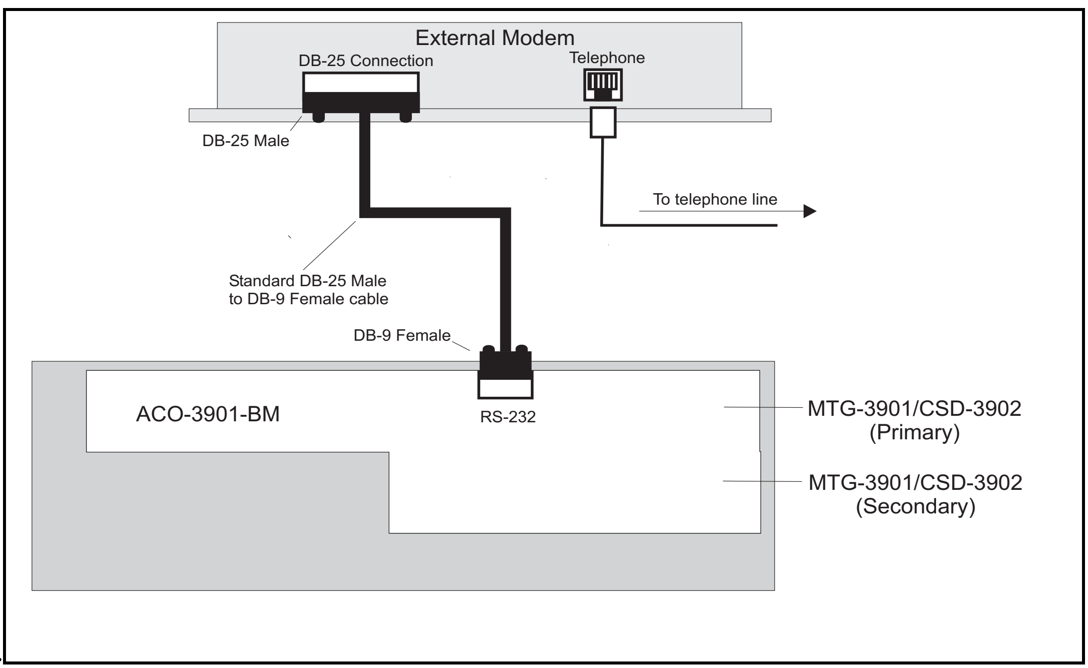

Figure 2-18. Connecting to External Modems that have a DB-25 Connector

If your external modem has a 9-pin RS-232 connector instead of a DB-25-pin connector, use a standard RS-232 serial cable to connect the modem to your ACO-3901-BM back module.

For information on configuring your MTG-3901 module for modem operation, see “Applying Settings for Internal and External Modem Operation” on page 150.

Connecting your CSD-3902 Stand-alone System to an External Modem

Depending on the type of connector your external modem has, you will need one of the following to connect the modem to your stand-alone CSD-3902:

- One CSD-3902 breakout module
- One DB-25 cable (12 inches or 30 cm in length)
- One standard 9-pin male to 9-pin female RS-232 serial cable or one standard DB-25 male to DB-9 female cable

Follow these steps to connect your stand-alone CSD-3902 to an external modem. Figure 2-19 on page 53 illustrates the required connections with external modems that have a DB-25 connector.

1. Use a short (12 inches/30 cm in length) DB-25 cable to connect the 25-pin female connector of the CSD-3902-BO breakout module to the 25-pin male connector of the CSD-3902-BM back module.

   The breakout module may be rigidly fastened to the back module, however this type of connection is not recommended. In this configuration, both may be prone to physical damage if enough force is applied (vertically) to the breakout module.

2. If the external modem has a DB-25 connector, do the following:
   a. Attach the DB-25 cable’s 25-pin male connector to the 25-pin female connector on the modem.
   b. Attach the cable’s 9-pin female connector to the **RS-232** connector on the CSD-3902-BO breakout module.

3. If the external modem has a DB-9 connector, do the following:
   a. Attach the 9-pin male connector of the RS-232 cable to the 9-pin female connector on the external modem.
   b. Attach the cable’s 9-pin female connector to the **RS-232** connector on the CSD-3902-BO breakout module.

4. Connect an analog telephone line to the external modem.

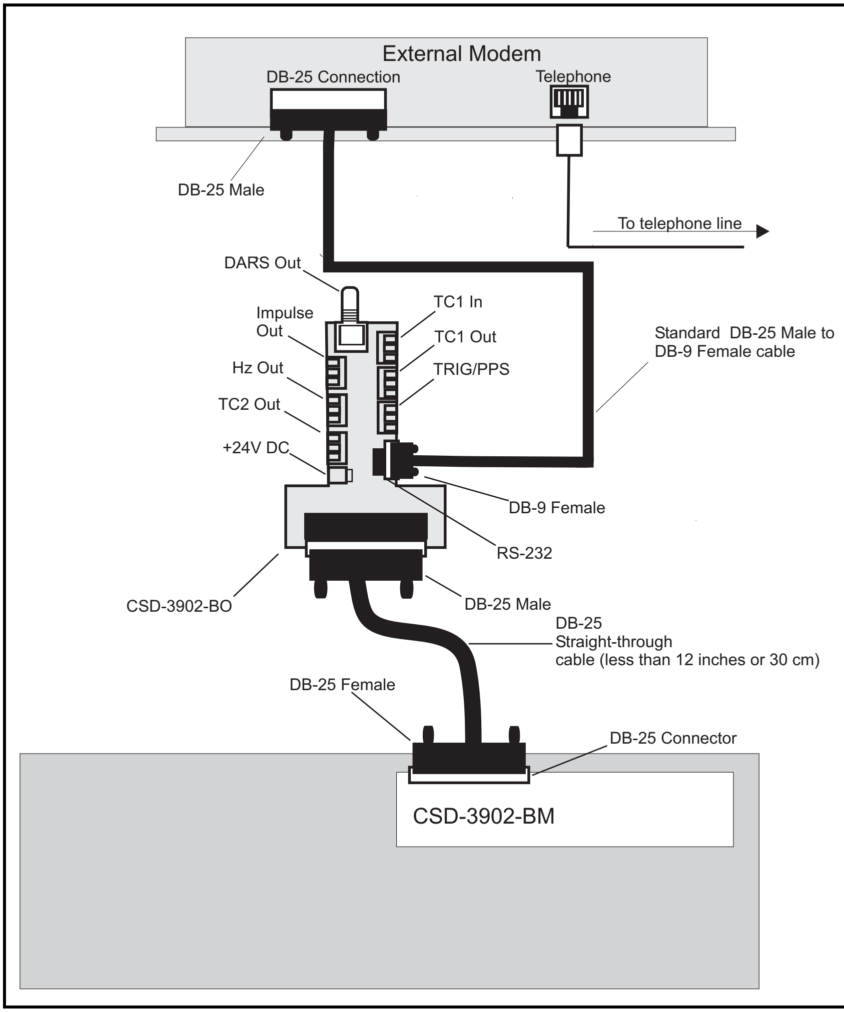

Figure 2-19. Connecting a CSD-3902 Stand-alone System to External an Modem that has a DB-25 Connector

For information on configuring your CSD-3902 module for modem operation, see "Applying Settings for Internal and External Modem Operation" on page 150.

Connecting Other Devices to MTG-3901 and CSD-3902 Systems

This section describes how to connect your MTG-3901/CSD-3902 systems to devices other than GPS receivers or modems. It cover the following topics:

- "Attaching Your MTG-3901/CSD-3902 System to a Precitel Radio Receiver" on page 54.
- "Connecting Your MTG-3901System to a TCC-1302 Unit" on page 55.
- "Connecting Your MTG-3901System to a PC" on page 55.
- "Connecting Two MTG-3901/CSD-3902 Systems Together" on page 56.

Attaching Your MTG-3901/CSD-3902 System to a Precitel Radio Receiver

To connect an MTG-3901 unit to a Precitel radio receiver, you will need a standard 9-pin male to 9-pin female RS-232 serial straight-through cable.

To make the connection, follow these steps:

1. Ensure the Precitel radio receiver antenna is mounted outside of the building and connected to the receiver.
2. Connect the 9-pin male connector on the RS-232 cable to the 9-pin female connector at the back of the Precitel radio receiver.
3. Connect the cables's 9-pin female connector **RS-232** connector on the ACO-3901-BM back module.

   If you are connecting a stand-alone CSD-3902 to a radio receiver, attach the cable's 9-pin female connector to the **RS-232** connector on the CSD-3902-BO breakout module.
4. Plug in the Precitel radio receiver. (The power should be on and the signal LED should be blinking.)
5. Wait several minutes for the Precitel radio receiver to lock to the incoming signal.

When the radio receiver has locked on to the incoming signal, the signal LED will blink on and off, with the LED flashing on every second.

Connecting Your MTG-3901System to a TCC-1302 Unit

To connect your MTG-3901 system to a TCC-1302 unit, you need one CAB-CSD-TCC1302. For information about MTG-3901 cabling, see “Appendix E: Cables”.

To make this connection, follow these steps:

1. Ensure the frame in which the TCC-1302 unit is installed is turned off.
2. Connect the 25-pin male CAB-CSD-TCC1302 cable connector to the 25-pin female connector on the TCC-1302 unit.
3. Connect the 9-pin female CAB-CSD-TCC1302 cable connector to the **RS-232** connector on the ACO-3901-BM back module.

   If you are connecting a stand-alone CSD-3902 to a TCC-1302 unit, attach the cable’s 9-pin female connector to the **RS-232** connector on the CSD-3902-BO breakout module.
4. Power up the frame in which the TCC-1302 unit is installed.

Connecting Your MTG-3901System to a PC

To connect your MTG-3901 system to a PC, you need one standard 9-pin female to 9-pin female RS-232 serial null modem cable.

To make this connection, follow these steps:

1. Ensure the PC is turned off.
2. Connect the cables’s 9-pin female connector to **RS-232** connector on the ACO-3901-BM back module.

   If you are connecting a stand-alone CSD-3902 to a PC, attach the cable’s 9-pin female connector to the **RS-232** connector on the CSD-3902-BO breakout module.
3. Connect the cable’s other 9-pin female connector to the PC’s RS-232 port.
4. Turn on the PC.

Connecting Two MTG-3901/CSD-3902 Systems Together

To connect two MTG-3901 units together, you will need a regular female 9-pin-to-9-pin RS-232 null modem cable.

Follow these steps to make the connection:

1. Ensure the units are turned off.
2. Connect one 9-pin female connector on the null modem cable to the **RS-232** connector on the ACO-3901 back module.

   If you are connecting the system to a stand-alone CSD-3902, attach the cable's 9-pin female connector to the **RS-232** connector on the CSD-3902-BO breakout module.
3. Connect the cable's other 9-pin female connector to the **RS-232** connector on the other system's ACO-3901-BM back module.

   If you are connecting the system to a stand-alone CSD-3902, attach the cable's other 9-pin female connector to the **RS-232** connector on the CSD-3902-BO breakout module.
4. Turn on both units.

Upgrading MTG-3901/CSD-3902 Firmware

Firmware upgrading is a routine procedure that you must perform to install newer versions of software on NEO modules. CCS Pilot, Co-Pilot, or Navigator software applications are required for this procedure. When performing the upgrading procedure, check the appropriate readme file to confirm which files are needed. Use care to ensure that you upload the correct files to the intended module.

If for some reason the upgrade fails, the module may not respond to controls and will appear to be non-functional. In that event, follow the procedures described in "Correcting a Failed Upgrading Procedure" on page 61.

Upgrading Procedure

Follow these steps to upgrade the firmware:

1. Download the most recent appropriate upgrade package from the our Web site.
2. If the affected module has not been discovered, perform the **Discovery** operation, as described in your CCS software application manual or online help. (If you cannot discover the device, see "Discovering Devices Using the Drag-and-Drop Method" on page 59.)

3. From the **Tools** menu, select **Software Upgrade**.

   The **Software Upgrade** window opens or is brought to the foreground.

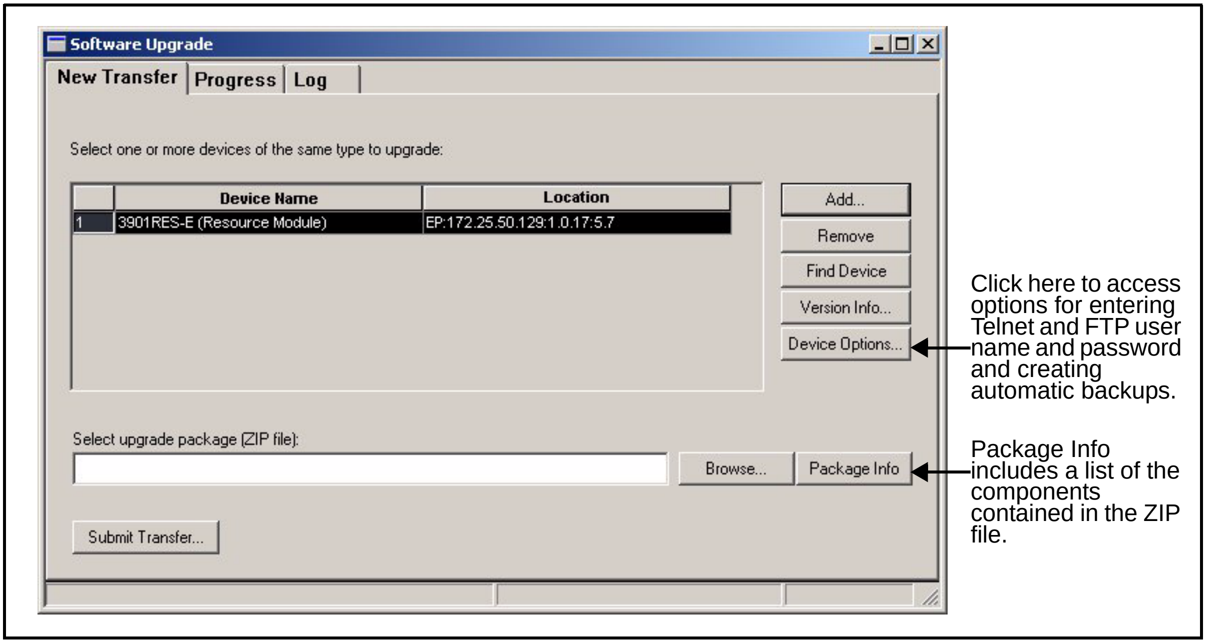

Figure 2-20. Software Upgrade Tool's New Transfer Tab

4. On the **New Transfer** tab, click **Add**.

   The **Device Selection** dialog opens.

5. Select one or more devices, and then click **OK** to close the **Add Device** dialog box.

   You can only add one unit from each IP address. All items in a frame have the same IP address.

   The selected devices appear in the table on the **New Transfer** tab of the **Software Upgrade** window. This table lists devices that are to receive the same upgrade package.

   For each device in this table, you can highlight its position in the Tree View by clicking **Find Device**. You can check the software revision numbers, etc., by clicking **Version Info**, and create an automatic backup by clicking the **Device Options...** button. (Place a check beside **Software Backup** and enter a file name or click **Browse** to choose a new file location.)

6. Press **Browse...** to select the software upgrade package (ZIP file).

   A standard **Windows File Selection** dialog opens.

7. Choose the upgrade ZIP file on a local or network drive.

   The selected file's path name is displayed in the edit box to the left of the **Browse…** button.

The extraction process on the ZIP file is handled as part of the upgrade process. You do not need to extract the files yourself.

8. Press **Submit Transfer...**

   A dialog box opens, requesting confirmation that you want to proceed with the request. If you have multiple devices selected, multiple transfer tasks are submitted—one per device.

   The transfer now progresses. You may close the **Software Upgrade** window, or continue with other tasks. Closing the window does not effect any of the transfer processes that may be running in the background.

   Or you can switch to the **Progress** tab to view the status of the transfers.

Note

If you try to log off or exit the CCS software while a transfer is underway, a notification window will alert you that processes are still active and will ask if you want to terminate these processes.

9. Click on the **Log** tab and look at the **Progress** column to ensure that all files have correctly updated.

   The module is automatically rebooted following an upgrade procedure.

Discovering Devices Using the Drag-and-Drop Method

If you are unable to discover the device (as described in step 2 on page 57), follow these steps to upgrade the firmware using the drag-and-drop method:

1. Download the appropriate most recent upgrade package from the our Web site or from your CD-ROM, and then unzip the upgrade package.

2. If the affected module has not been discovered by your CCS software application, enter the Build mode, and then drag or copy and paste the module's device icon from the catalog folder into the **Network** or **Discovery** folder.
3. Right-click the device icon and then select **Properties**.
4. On the **NRO** or **Device** tab of the **Navigation Properties** box, enter the IP address of the frame that holds the module. (See Figure 2-21.)

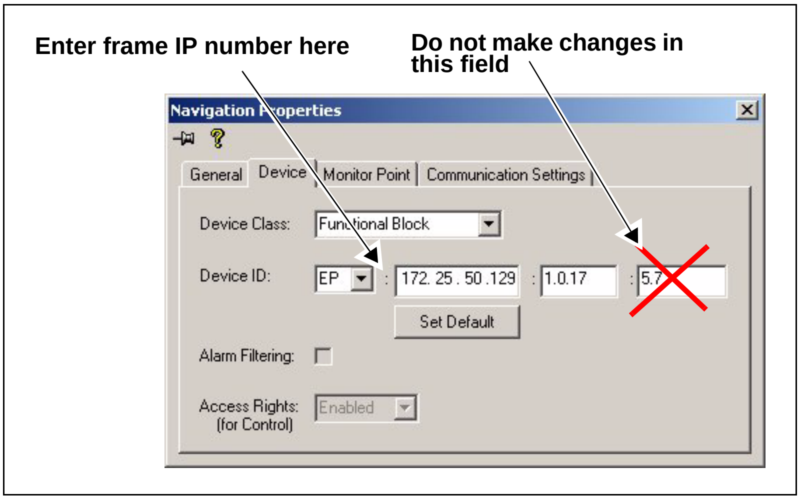

Figure 2-21. Navigation Properties Box

Note

The **Device ID** line will be slightly different than in previous versions. The acronym **EP** will appear—instead of **IP**—in the first **Device ID** field. The frame and slot number now are entered in the third field instead of the last field. And the area in which you should *not* enter any data is now the last field (previously the third field).

5. In the third field, enter the slot number of the module as shown in Figure 2-22, and then close the window.

To enter information into the frame and slot field (the third field in CCS-3.0), follow the convention shown in Figure 2-22 on page 61. The first number in the third field should always be **1.** The second number should always be **0**. The third number is the slot number in the NEO frame (for example, **10**). Resource modules will now appear as **17** or **18** in this third number spot, instead of **101** and **102**, as in earlier versions. In the unlikely event that you cannot discover the frame, the number **0** may be used to represent the frame.

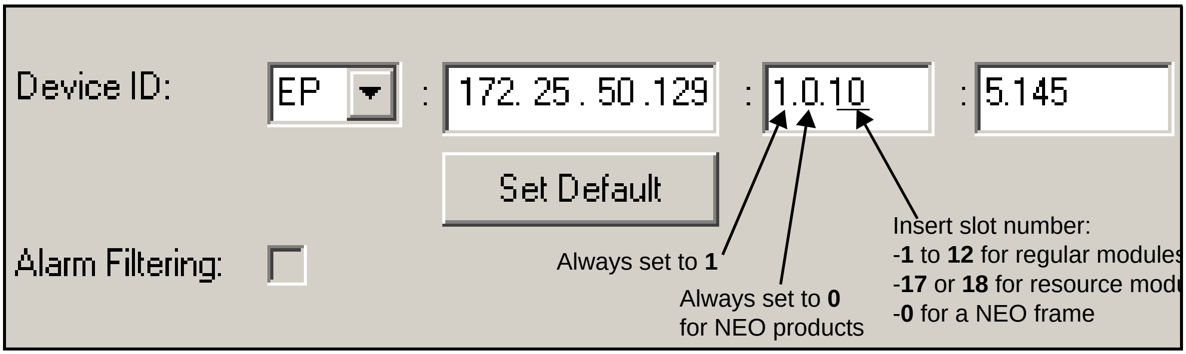

Figure 2-22. Inserting Numbers in the Frame and Slot Field

6. Continue upgrading your device’s firmware, starting with Step 3 on page 58.

Correcting a Failed Upgrading Procedure

Firmware upgrades may fail in the event of network interruptions, power failures, or if too much data is uploaded to the NEO module. Often, uploads of too much data can occur for one of the following reasons:

- The boot file (typically **vxWorks.lzs**) was accidentally uploaded during the fl0 procedure, instead of the boot procedure.
- Files were sent to the wrong NEO module.
- The particular hardware version of the module requires only some (but not all) of the available fl0 files.
- The upgrade .zip file was mistakenly sent to the module.

All of these problems can be corrected by re-installing the firmware while in a fail-safe mode, as described in the following pages. When you are performing this procedure, check the appropriate readme file to confirm which files are needed. Use care to ensure that you upload the correct files to the intended module.

Three general steps are involved in correcting a failed upgrading procedure. These steps are found in the following sections:

1. "Setting the Module to Fail-Safe Loader Mode" (see below)
2. "Upgrading the Firmware in the Boot Folder in Fail-Safe Mode" on page 62
3. "Upgrading the Firmware in the Fl0 Folder and Rebooting the Module" on page 64

Setting the Module to Fail-Safe Loader Mode

Follow these steps to set a NEO module to the fail-safe loader mode:

1. Remove the affected module from the NEO frame.
2. Press the **Nav** switch down while simultaneously pressing both the **Escape** and **Enter** buttons.

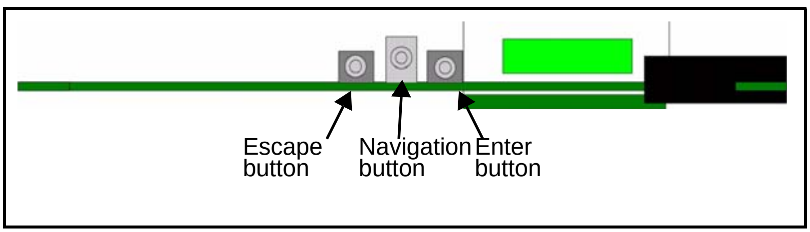

Figure 2-23. Buttons on a Typical Card Edge

3. While still pressing the buttons and the navigation switch, reinsert the module into the frame and hold for approximately three seconds until the display on the module reads **Offline-H** (or **Offline-L**) **Upload Required**.

Upgrading the Firmware in the Boot Folder in Fail-Safe Mode

Ensure that you follow these steps in the exact sequence when upgrading the firmware in fail-safe mode:

1. Download the most recent appropriate upgrade package from the our Web site or from your CD-ROM, and then unzip the upgrade package.

2. If the affected module has not been discovered by your CCS software application, enter Build mode, and then drag or copy and paste the module’s device icon from the catalog folder into the **Network** or **Discovery** folder.

3. Right-click the device icon and then select **Properties**.

On the **Device** tab of the **Navigation Properties** box, enter the IP address of the frame that holds the module. (See Figure 2-24.)

4. On the **Device** tab of the **Navigation Properties** box, enter the IP address of the frame that holds the module. (See Figure 2-24.)

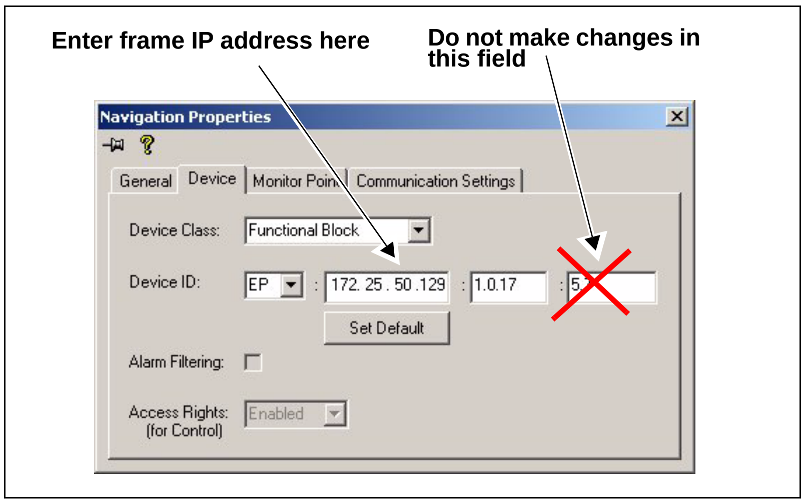

Figure 2-24. Navigation Properties Box

Note

The **Device ID** line will be slightly different than in previous versions. The acronym **EP** will appear—instead of **IP**—in the first **Device ID** field.

The frame and slot number now are entered in the third field instead of the last field.

And the area in which you should *not* enter any data is now the last field (previously the third field).

5. In the third field, enter:

```
1.0.[slotnumber]
```

(Where, for example, 1.0.5 would refer to the module in slot 5 of the frame.)

6. Close the window.
7. Double-click the device icon.

   The **Configuration...** box opens. On the **File Transfer** tab, the **/slotx/boot** (where x is the slot number) directory appears in the **Select the device directory to transfer to:** field.
8. Click **Add,** and in the **Add Upgrade Files** box, browse, select the **boot** folder in the module's upgrade package and then click **OK**.
9. Choose the vxWorks.lzs file and then click **OK**.
10. Click **Perform Transfer** and then click **Yes**.

    This may take several minutes.
11. Wait for the message **File transfer to device succeeded** in the status bar.

See "Upgrading the Firmware in the Fl0 Folder and Rebooting the Module" below to continue the correction procedure.

Upgrading the Firmware in the Fl0 Folder and Rebooting the Module

This procedure is meant to be performed directly after "Upgrading the Firmware in the Boot Folder in Fail-Safe Mode" on page 62.

Follow these steps to reboot the affected NEO module:

1. Click **Reboot Device**, and then click **Yes**.

   Note

   Some NEO modules will reboot automatically. In these cases, the **Reboot** button will be grayed out. During this time, the module's card-edge display will show the word **Rebooting** before the name of the module appears. These modules do not require the **fl0** file.

   After the module has rebooted, a message box advises you to wait until the device has rebooted.
2. Wait 30 seconds.
3. On the **File Transfer** tab, select the **/slotx/fl0** (where x is the slot number) directory in the **Select the device directory to transfer to:** field.
4. Click **Add**, browse and select the **fl0** folder in the module's upgrade package, and then click **OK**.

   Check the readme for the upgrade package to ensure that you are adding the correct files.

5. Select the files shown in the **Add Upgrade Files** box, and then click **OK**.
6. Select and delete unwanted files (for example: **vxWorks.lzs**) in the **Add upgrade files for transfer to device:** field by clicking **Remove**.

Caution

You must delete unwanted files in the **Add upgrade files for transfer to device:** field before transferring the files. Otherwise, the upgrading procedure will fail.

7. Click **Perform Transfer** and then click **Yes**.
8. Wait for the message **File transfer to device succeeded**.

   This may take a moment.
9. Click **Reboot Device** and then click **Yes.**
10. Wait 30 seconds, and then close the **Configuration...** box.

    The module name appears at the card edge.

The upgrade procedure is complete.

Chapter 3

Configuration and Operation

Overview

This chapter includes information on the following topics:

Note

Except where noted, the term MTG-3901 will be used in this manual to refer to both MTG-3901 and CSD-3902 modules.

MTG-3901 Operation Overview

The MTG-3901 receives time information from various time reference sources, including Global Positioning Systems (GPS) and Network Time Protocol (NTP) servers. The module’s internal engine processes the incoming time reference, makes appropriate conversions to different timebases, and maintains a consistent timebase which is used to drive the time outputs. When no input sources are used, the MTG-3901 can be configured to use an internal timing mechanism to drive some of the module’s outputs.

The MTG-3901 can be configured to make periodic call outs to time reference sources. When the module is connected and locked to a time input, it calculates the time difference between the reference source and its internal time, and determines whether or not an update to the module’s internal time is necessary. Using this information, the MTG-3901 updates its output time, and then sends this information to all the applicable outputs.

Figure 3-1 is a simplified illustration of how the MTG-3901/CSD-3902 inputs, processes, and outputs time, date, and time base information.

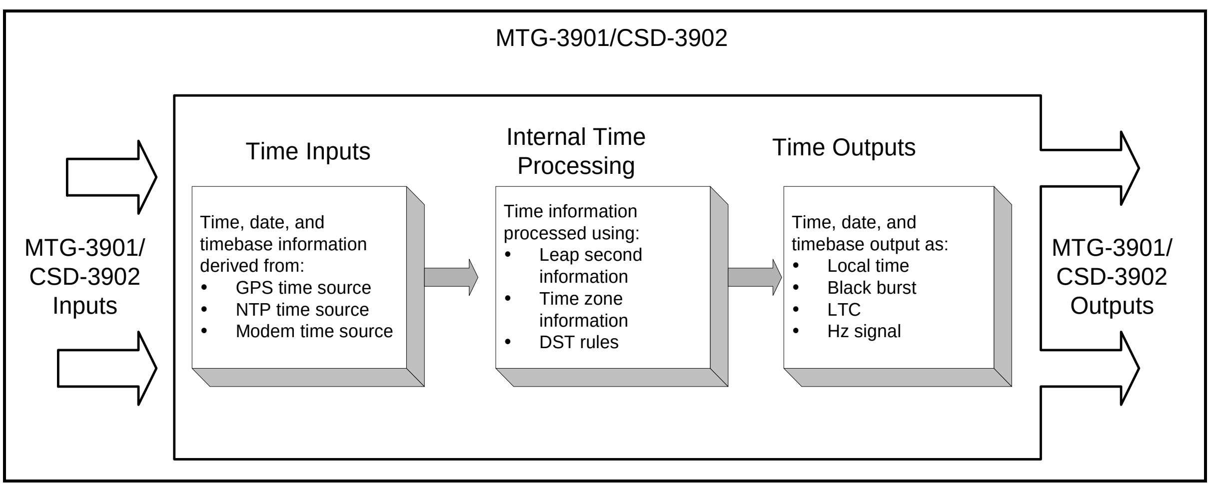

Figure 3-1. MTG-3901/CSD-3902 Inputs and Outputs

MTG-3901/CSD-3902-SYS-*X* systems offer simultaneous configuration of the primary and secondary MTG-3901 modules. When the MTG-3901/CSD-3902-SYS-*X* systems are installed, changes in configuration to the primary MTG-3901 are immediately reflected in the secondary MTG-3901. When the primary and secondary modules are identically configured, there is less chance for a timing discontinuity during switchover. Modules that are identically configured are also easier to set up and maintain.

MTG-3901 Time Inputs

The MTG-3901 accepts two independent types of input: one that provides time and date information and another that provides time base information.

The module can obtain time and date information through one of the following input sources:

- FreeRun (internally generated time)
- LTC
- GPS
- Radio
- Internal or external modem
- Serial (using TCC or CSD mode)
- NTP

The module can obtain time base information through one of the following time base input sources:

- 10M
- Genlock

When the module's time reference source and time base inputs are used, the MTG-3901 provides the following time information combinations:

- GPS + 10M input = **GPS_10M**
- LTC + Genlock input = **LTC_Video**
- FreeRun + 10M input = **10M**
- FreeRun + Genlock input = **Video**

When you configure your MTG-3901, you can specify which combination of time, date, and time base inputs you want to use. For more information about configuring MTG-3901 inputs, see “Applying Input Settings” on page 98.

Additionally, you can configure each reference source input with an input offset parameter. This offset compensates for any time zone differences between the current input and current local time. For more information about applying input offsets, see “Using MTG-3901 Offset Parameters” on page 75.

Using the Software Phase Loop Lock

When no time base is specified, an internal software phase loop lock (PLL) can be used to lock the MTG-3901 to the incoming timing information. Only the LTC, Serial input (TCC mode), GPS-1600, and NTP are passed through the internal PLL.

The software PLL updates the module’s time with the input time source time when one of the following events occur:

- The difference between the time/time base relationship is greater than 500 ms.
- The internal PLL locks to the incoming time.

Note

When a radio input is used as the input reference source, it is considered a hybrid, because it combines the inputs that call out and those that do not. The radio input calls out for time and does not go through the software PLL. However, the module checks whether or not there is a 500 ms difference between the time and time base prior to updating the MTG-3901 time.

Modem and Serial (CSD mode) input sources do *not* pass through the software PLL. Instead, when the module uses these two input sources, time is updated when the MTG-3901 calls out to an input time reference source. If your input changes from an PPL-modifies source to one that is *not* PPL-modified, the MTG-3901 automatically updates to the new input time.

Any change in the MTG-3901 time causes a disruption in the output time. For best results, observe the following:

- For inputs going through the software PLL, ensure that the MTG-3901 has achieved PLL lock on the input before using the outputs.
- For inputs that call out for time, ensure that the call out time and frequency is set so that an output time disturbance is minimal.

Input Source Switching

If the time, date, or time base reference source is missing from an input source, the MTG-3901 switches to the next lower priority input source. For example, if a backup input source is set using the **BackSrc1** parameter, the module switches to that backup source if the primary source is interrupted. When the time/date reference and the time base reference is recovered from a higher priority input source, the MTG-3901 switches back to that higher priority input source. For information on setting primary and backup input source, see “Applying Input Settings” on page 98.

Internal Time Keeping

In addition to receiving timing information from inputs and maintaining time accuracy for outputs, the module’s internal time keeping engine calculates and maintains several types of time, date, and time base information. The MTG-3901 maintains International Atomic Time (TAI) as its principal time base. Since input times references can have different time bases, including local time and Coordinated Universal Time (UTC), the MTG-3901 must convert the incoming time information into TAI time. Using a combination of parameters such as leap second information, DST rules, and offset values, the module calculates other time bases including UTC and local time. For information about the different types of supported time bases, see “MTG-3901 Supported Time Bases” on page 73.

In ideal situations, the TAI time base should be constant over long periods of time to prevent any discontinuity or break in the LTC and black burst outputs. However, when the module uses inputs that call out for time, date, and time base information, a TAI time base change is inevitable. Therefore, the call out time should be carefully selected to ensure the disruption in the outputs will have minimal impact.

The MTG-3901 can output TAI, UTC, and local time. Because the MTG-3901 needs to convert the incoming time into TAI time, a change in the leap seconds, time zone, or DST settings can cause the TAI time base to break. To maintain a constant TAI time base, the MTG-3901 provides auto-detection of leap seconds and DST changes. The auto-detection mechanism allows the MTG-3901 to ensure that leap second and DST changes will not necessarily cause the TAI time base to change. For more information about DST and leap second auto detection, see "Applying Input DST Auto-Detection" on page 89" and "Step 2 Configuring a Leap Second Change At Local time" on page 93".

In the event of time zone changes, it is assumed that all incoming timing information and all outgoing time information is based on the same time zone information. When the input time information is from another time zone, an input offset control parameter is provided to compensate. Time zone changes will cause the TAI time base to shift. For best results, it is recommended that all time zone settings be set and then remain untouched during the lifetime of the MTG-3901.

MTG-3901 Time Outputs

Once the TAI time base has been established, the MTG-3901 can convert this time information to a corresponding UTC or local time and output it to various devices. These outputs include the following:

- Two Linear Timecode (LTC) outputs
- Four black burst video outputs for MTG-3901 systems or one black burst video output for CSD-3902 systems that can be configured to output Vertical Interval Timecode (VITC).
- One Digital Audio Reference Signal (DARS) output
- One impulse drive outputs

Using parameter options, you can configure the MTG-3901 outputs for ATR output features, phasing offsets, various timecode and timecode user bit formats, and auxiliary output offsets.

When the MTG-3901 uses new timing information to make minute adjustments to its own internal timing engine, the master frequency of the MTG-3901's timing engine is adjusted to compensate for variations from the reference source. The MTG-3901 manages any variation between the internal timebase and continuous output timebase so as to limit disruptions in continuous LTC outputs or black burst video output signals.

MTG-3901 Supported Time Bases

Since the MTG-3901 inputs, processes, and outputs different types of time bases, it is important for you to understand the difference between each time base. This section provides information about the different time bases the MTG-3901 supports.

TAI Time

Temps Atomique International or International Atomic Time (TAI) is a non-leap second compensated "continuous" time. It is the main time base for the MTG-3901 and the time base to which all the outputs are referenced, including black burst outputs and color frame synchronization for the LTC outputs.

UTC Time

Coordinated Universal Time (UTC), formerly known as Greenwich Mean Time GMT, is the sum of TAI time minus an integer number of leap seconds. As of January 1, 2006, the current leap second count is +33 seconds, meaning that UTC time is trailing TAI time by 33 seconds.

The MTG-3901 supports UTC time from modem, GPS, NTP and Linear Timecode (LTC) sources. When the UTC time source is from an LTC input, the timecode format must be SMPTE-309M (with MJD mode), which provides a user bit to indicate whether or not the DST is on. For more information about timecode user bits, see "Setting Timecode Input" on page 104 and "Setting Timecode Format and User Bit Format" on page 128.

Table 3-1 describes the relationship between UTC time and TAI time.

Table 3-1. Relationship Between UTC and TAI Time

UTC Time	Leap Second Offset	TAI Time
January 1, 2006 00:00:00	33	January 1, 2006 00:00:33
July 1, 1990 00:00:00	25	July 1, 1990 00:00:25

GPS Time

GPS receivers maintain either GPS or UTC time. As of January 1, 1999, GPS time is ahead of UTC time by 13 seconds. Therefore, GPS and TAI are related by an integer number of seconds where TAI is ahead of GPS by 19 seconds.

Local Time

Local time is the sum of UTC time plus (or minus) time zone offsets and DST. Local time is the time base seen in the card edge display when viewing the **Time_Disp** and **Date** parameters. Table 3-2 describes the relationship between local time and TAI time.

Table 3-2. Relationship Between Local and TAI Time

Local Time	Daylight Savings Time	Time zone	Leap Second Offset	TAI Time
January 1, 2006 00:00:00	No	EST (UTC - 5 hours)	33	January 1, 2006 05:00:33
July 1, 1990 00:00:00	Yes	EST (UTC - 5 hours)	25	July 1, 1990 04:00:25
January 1, 2006 00:00:00	No	PST (UTC - 8 hours)	33	January 1, 2000 08:00:33
July 1, 1990 00:00:00	Yes	PST (UTC - 8 hours)	25	July 1, 1990 07:00:25

How the MTG-3901 Calculates Time

The MTG-3901 uses a combination of input time sources, different time bases, and user-defined parameter offsets to calculate the various time information that it maintains and outputs. For example, local time can be calculated from an input time source, such as TAI time, by applying offset values that account for time zones differences, leap second changes, and daylight saving time (DST). Further calculations are required to convert the local time to an appropriate LTC output.

This section describes the various offsets that can be used in time base calculations and explains how the MTG-3901 calculates different time bases using these offset values and input time sources. It includes information on the following topics:

- "Using MTG-3901 Offset Parameters" on page 75
- "Calculating Input TAI Time" on page 77
- "Calculating Local Time" on page 77
- "Calculating Output LTC Time" on page 78

Using MTG-3901 Offset Parameters

Depending on the input time source and the type of time base you want to output, there are a number of user-defined offsets that you can apply as parameters to make time base calculations. Offsets are set using a string value that is comprised of a user-defined numeric value between -99999 and +99999, and a time unit. Figure 3-3 lists the different time units:

Table 3-3. Offset Parameter Time Unit Descriptions

Time Unit	Description
S	Seconds
M	Minutes
T	Half hours
H	Hours
D	Days

Table 3-3. Offset Parameter Time Unit Descriptions *(Continued)*

Time Unit	Description
W	Weeks
N	Months
Y	Years

Table 3-4 describes the MTG-3901 offset parameters.

Table 3-4. MTG-3901 Offset Parameters

Offset Name	Parameter Name	Description
Local Offset	LocOfst	This offset updates local time or changes the way local time is calculated from the TAI time. Local time updates can be seen in the time/date on the card-edge display and on all outputs. For more information, See“Applying a Local Offset” on page 96.
Millisecond Offset	msOfst	This offset applies a millisecond to the module’s TAI time. The offset can be used to update local time or to change the way local time is calculated from the TAI time. Local time updates can be seen in the time/date on the card-edge display and on all outputs. For more information, see“Applying a Millisecond Offset” on page 96.
Input Offsets	• TcOfst • GpsOfst • RadOfst • ModOst • SerOfst • ATROfst	Each input source has an input offset parameter that you can apply to the input time and date information. The input offset is commonly used to correct time zone difference between the input source and the MTG-3901 system. For more information, See“Applying an Input Offset” on page 106.
Output Timecode Auxiliary Offset	OTcAux	Use this offset to apply an auxiliary offset value to a downstream device. This offset is applied to the time and date information indicated by the LTC. For more information, See“Applying an Output Timecode Auxiliary Offset” on page 132.
Output Timecode Offset	OTcOSet	Use this offset to apply an offset value to a timecode output. For more information, see “Applying an Output Timecode Offset” on page 130.
ATR (Absolute Time Reference) Offsets	• ATROfst • OATROfst	Use these offsets to apply a programmable offset to a black burst input or output that is transporting ATR information. For more information, see “Applying an Output ATR Offset Delay” on page 122

Calculating Input TAI Time

Since the MTG-3901 uses TAI time as its primary time base, Input TAI time is based directly on the conversion of the primary input reference source time. Depending on whether the incoming time is local time or UTC time, the incoming TAI time is calculated using one of the following formulas:

- **Input TAI Time** = Input Local Time + Input Offset + Auxiliary Offset - Time Zone - DST + Leap Seconds

OR

- **Input TAI Time** = Input UTC Time + Input Offset + Auxiliary Offset + Leap Seconds

Calculating Local Time

Local time is calculated from Input TAI time and any user-definable offsets required to correct the time due to time zone differences. For example, if the input source exists in a different time zone than the MTG-3901, an input offset is required to account for the time zone difference. Local time is seen in the card-edge display when the **Time_Disp** or **Date** parameters are set. Local Time is calculated using the following formula:

Local Time = Input TAI Time - Leap Seconds + Time Zone + DST

When receiving time from an input source that provides local time and a time zone has been set on the MTG-3901, then the incoming time and the time on the MTG-3901 will be the same. However, if the input source provides UTC time, then the incoming time and the time on the MTG-3901 will differ by the time zone difference.

For example:

Input Time	Time Zone	Leap Second Offset	MTG-3901 Time
January 1, 2006 00:00:00 (local time)	EST (UTC - 5 hours)	33 seconds	January 1, 2006 00:00:00 (local time)
January 1, 2000 00:00:00 (UTC time)	EST (UTC - 5 hours)	32 seconds	December 31, 1999 19:00:00 (local time)

Calculating Output LTC Time

Output LTC time is calculated using Local Time and any programmable output offsets that you defined.

Output LTC Time is calculated using the following formula:

Output LTC Time = Local Time + Programmable output offset

Synchronizing Two MTG Modules

With an ACO-3901, two MTG-3901 modules can be synchronized, thereby sharing the same parameter settings. If the primary MTG-3901 module fails, the backup MTG-3901 resumes control.

When a MTG-3901 module powers up, if the ACO-3901 can detect the MTG-3901 module, it will designate it as either a primary or backup unit. This is indicated in the **OperMode** parameter.

- *Standalone* indicates the MTG-3901 has no contact with an ACO-3901. This is the default setting
- *Primary* indicates the MTG-3901 has been designated as the main reference unit by the ACO-3901. Black burst output 1 will be enabled with ATR to lock the Backup unit. Control settings will by synchronized from the primary unit to the backup unit.
- *Backup* indicates the MTG-3901 will be reserved as a backup in the event that the Primary unit fails. All control settings will be disabled except for **EthIPMask**, **EthIPAddr**, **DGatIPAddr** and the Setup menu. The backup unit will be locked to the primary unit and will receive any control setting changes from the primary unit.

Once a primary and backup unit are designated, the primary MTG will begin sending its control settings over to the backup MTG through the ACO-3901.

A complete synchronization of the control settings can take several minutes to complete on power-up. Subsequent updates to the primary MTG's settings will take less time, occurring after the last parameter change is saved (as indicated in "Operation Notes" on page 175).

Configuration Overview

Using your module's card-edge controls, you can configure all of the MTG-3901 control parameters. You can also use CCS software applications such as Pilot or Navigator to configure your MTG-3901. The following sections describe how to configure your MTG-3901 module using the module's Tree View menu. If you are using CCS software to configure your MTG-3901, you can still use the information in this chapter as it provides detailed information about the MTG-3901 features and describes how to set the module's parameters to perform these operation. For more information about using CCS software to configure the MTG-3901, see

Using Card-Edge Controls With Your MTG-3901

If your module is not in Tree View mode, switch to Tree View via the card-edge control settings:

Setup > **Nav Mode** > **Tree View**

The Tree View is one of the three navigation modes available on MTG-3901/CSD-3902 modules. Unlike the other navigation modes, the Tree View is a multi-level list of parameters, arranged in the following main groups:

- Input
- Other
- Output
- Processing
- Setup

For information about using your module's card edge controls, see your *NEO FR-3901, FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*.

A complete list of MTG-3901 parameters arranged in the Tree View can be found in Chapter 4: "Parameters". For information about using the All List to navigate, view, and change parameter settings, see "Cross-Functional Parameter Changes" on page 208.

Using CCS Software With Your MTG-3901

This section is intended to provide a brief overview of how you can use CCS software to configure your MTG-3901. It does not, however, provide detailed information about how to use CCS Navigator or CCS Pilot. For information about using these applications, see your CCS application user guide.

Setting Up Your MTG-3901System For CCS Applications

Before you can use CCS software to configure, operate, and monitor your MTG-3901, your system must be connected to a local network. You can then use the CCS software **Discovery** tool to discover your MTG-3901 system. Discovery is the process by which your CCS software finds and connects to the IP addresses of CCS devices so that you can configure, control, and monitor them.

Figure 3-2 shows the CCS software **Navigation** window that is used to discover CCS devices.

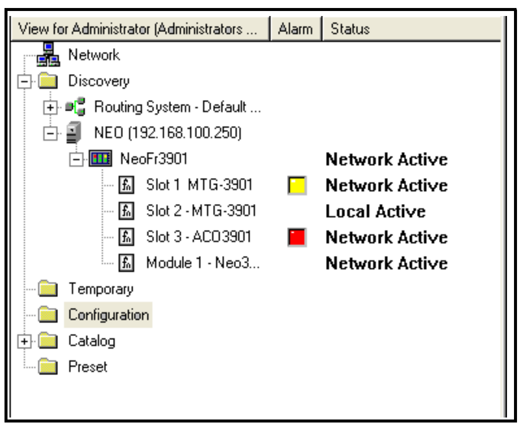

Figure 3-2. Discovering an MTG-3901 System in Navigator

For information about using CCS software to discover your MTG-3901 system, see your CCS software user guide.

Setting MTG-3901 Parameters Using CCS Software

After you've discovered your MTG-3901 system, you can use the CCS software to configure and monitor all of the MTG-3901 module parameters. In the CCS software's **Control** mode, the MTG-3901 parameters are displayed in the same Tree View list as the module's card-edge display. Figure 3-3 displays the CCS software **Control** page.

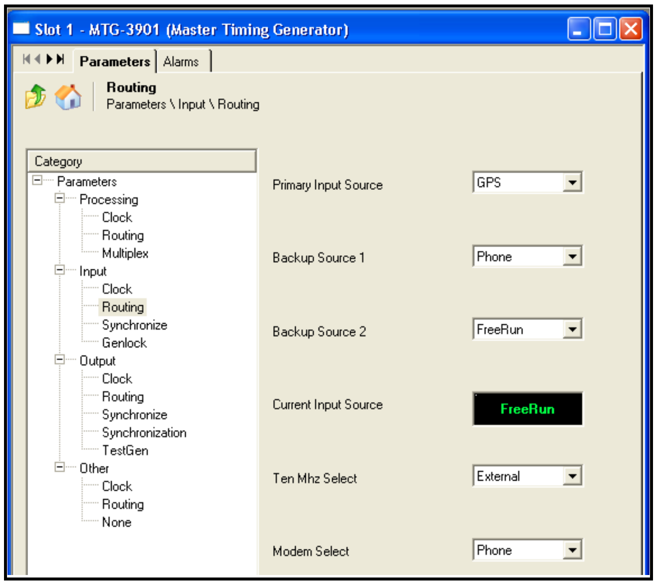

Figure 3-3. CCS Software Control Page

For information about using CCS software to adjust your module's parameters, see your CCS software user guide.

Applying Time and Date Settings

This section describes how to configure the time, date, and seconds related settings on your MTG-3901 module. If includes information on the following topics:

- “Setting the Time and Date” on page 83
- “Setting the Time Zone and Locale” on page 85
- “Applying Input Leap Second Auto-Detection” on page 94
- “Applying a Millisecond Offset” on page 96
- “Applying a Local Offset” on page 96

Setting the Time and Date

You can set the time and date of your module by entering the time and date information manually, or by using an external trigger. The MTG-3901 will resolve all dates to within January 1, 1972 and December 31, 2071.

Note

The time and/or date can be set at any time during the operation of the MTG-3901. However, unless the **CurInSrc** is set to **FreeRun**, **10M**, or **Video** (without VITC or ATR), the time/date will be updated by the active input source and any manual changes to time and date will be lost.

Setting the Time and Date Manually

To set the time and date manually, make the following selections:

Setting Description	Tree View Navigation			
Set the current time.	Processing	Clock	SetTime	HH:MM:SS
Set the current date.			SetDate	YYYY-MM-DD
Initiate the new day and date settings. **Note** You can choose to set the time only using **Time** or the date only using **Date**. DST options (**DSTTime** and **DSTimeDat**) are also available to indicate whether the time and/or date set is already DST-enabled. **Note** When you set this parameter to **Yes**, the module completes the command, and then returns the parameter value to **No**.			SetTimeNow	Time_Date
Check the time and date.			Time_Disp [RO]	Current time

Setting the Time and Date Using an External Trigger

To set the time and date using an external trigger, make the following selections:

Setting Description	Tree View Navigation			
Set the Trig/PPS pin to trigger. **Note** To use the Trig/PPS pin as a trigger, you must properly set the module's jumpers for PPS operation. See "Setting Jumpers" on page 26.	Input	Clock	TrigPpsSel	Trig
Set the time and date using the external trigger. **Note** You can choose to set the time only using **Time** or the date only using **Date**. DST options (**DSTTime** and **DSTimeDat**) are also available to indicate whether the time and/or date set is already DST-enabled.	Processing	Clock	SetTimTrig	Time_Date
Check the new time and date.			Time_Disp [RO]	Current time

Note

When **SetTimTrig** is set, **SetTimNow** is disabled.

For more information about setting the external trigger, see "Setting the Trig/PPS Control" on page 100.

Setting the Time Zone and Locale

The time zone parameter and locale parameter perform similar functions. Therefore, when **SetLoc** is set to a valid locale, **SetTZ** will be disabled. If **DSTMode** is not set to **AutoDST**, then the DST rules that apply to a particular locale will not be in effect. See the next section for details about DST rules.

Caution

The time zone or locale settings should not be changed while the MTG-3901 and CSD-3902 is running with any scheduled events. A change in the **SetTZ** setting will temporarily cause the time to shift as it stabilizes the change. During this shift, an event that is scheduled within the time zone or locale change may be triggered in the process.

To set the time zone or locale, make the following selections:

Setting Description	Tree View Navigation			
Set the time zone that matches your region. **Note** For a list of global time zones, see Chapter 4: "Parameters".	Processing	Clock	SetTZ	(select your time zone)

OR

Setting Description	Tree View Navigation			
Set the locale that matches your region. **Note** For a list of global locales, see Chapter 4: "Parameters".	Processing	Clock	SetLoc	(select your locale)

Using Manual DST Mode

Using the **DSTMode** parameter you have several options for setting up daylight saving times (DST) rules. Table 3-5 describes each **DSTMode** parameter setting.

Table 3-5. DST Parameter Options

DSTMode Parameter Setting	Rule Description
NoDST	No DST rule is applied
AutoDST	DST rules are based on the **SetLoc** parameter setting
InputDST	DST rule is based on the input source, provided that the current input source supports automatic DST detection
ManualDST	DST rules are user-defined. For information on manually defining DST rules, see the next section

Caution

If a DST Off event has occurred and the time has moved back by one hour, then you should either change the time again, toggle the **MnDSTEdgTr** or **MnDSTEn** controls (from **On** to **Off** and then back to **On**), nor change the **DSTMode** or **SetLoc** parameters. To do so may cause the DST Off event to reoccur.

Setting Up Manual DST Rules

The manual DST rule is set using a seven character string that specifies when to enable DST. Since DST cannot be set using an absolute date, the string specifies a relative date such as the first Sunday in April or the last Sunday in October. For example, to enable DST on the first Sunday of April, the string for the **MnDSTOnRul** parameter is **WFD7M04**. Table 3-6 describes each string character.

Table 3-6. Example String For Manual DST Rule

String Characters	Value Descriptions for WFD7M04
WF	**WF** specifies the first week of the month where: • **W**- Represents week (There are no other options). • **F**- Represents first, as in the first week of the month. You can choose between the following options to specify the other weeks of the month: •**2** represents the second, **3** represents the third, **4** represents the fourth, and **L** represents the last week of the month.
D7	**D7** specifies day seven of the week (Sunday) where: • D- Represents day (There are no other options). • 7- Represents the seventh day of the week, Sunday. You can choose between the following options to specify the other days of the week: •1 represents Monday, **2** represents Tuesday, **3** represents Wednesday, **4** represents Thursday, **5** represents Friday, and **6** represents Saturday.
M04	**M04** specifies the fourth month of the year (April) where: • **M**- Represents month. • **04**- Represents the fourth month of the year. You can specify all the other 12 months of the year by using **01** (January) through to **12** (December).

To manually set up DST enable and disable rules, follow these steps:

1. To set a manual DST rule to enable DST at a specified relative date, use your module's card-edge controls to make the following selections:

Setting Description	Tree View Navigation			
Set the DSTMode.	Processing	Clock	DSTMode	ManualDST
Set the time you want the DST enabled.			MnDSTOnTim	HH:MM:SS
Set the manual DST rule. See Table 3-6 on page 87 for a description of string character values. **Note** The example parameter provided here enables DST on the first Sunday of April.			MnDSTOnRul	WFD7M04
Set the trigger to enable DST on the date specified by the manual DST rule.			MnDSTEdgTr	On

The DST parameter will indicate whether the local time has DST on or off.

2. To set a manual DST rule to disable DST at a specified relative date, make the following selections:

Setting Description	Tree View Navigation			
Set the DSTMode.	Processing	Clock	DSTMode	ManualDST
Set the time you want the DST disabled.			MnDSTOffTim	HH:MM:SS
Set the manual DST rule. See Table 3-6 on page 87 for a description of string character values. **Note** The example parameter provided here disables DST on the last Sunday of October.			MnDSTOffRul	WLD7M10
Set the trigger to disable DST on the date specified by the manual DST rule. See,"Cross-Functional Parameter Changes" on page 208 for cross-functional parameter changes.			MnDSTEdgTr	On

The DST parameter will indicate whether the local time has DST on or off.

Immediately Enabling DST

As an alternative to manually defining DST enable and disable rules, you can immediately enable or disable the DST using the **MnDSTEn** parameter.

Note

To use the **MnDSTEn** parameter, the **MnDSTEdgTr** parameter must be set to **Off**.

To immediately enable DST, make the following selections:

Setting Description	Tree View Navigation			
Set the DSTMode.	Processing	Clock	DSTMode	ManualDST
Enable DST.			MnDSTEn	On

The DST parameter will indicate whether the local time has DST on or off.

Applying Input DST Auto-Detection

If you are using an LTC, radio, modem, or serial input source, you can configure your MTG-3901 to automatically detect a DST change in the input source. Instead of manually programming the DST rules, this option allows you to detect a DST change from the input source and to apply it to the MTG-3901. To configure your MTG-3901 to automatically detect DST changes at the input source, two parameters must be set: the input DST control and the input DST auto-detection control. These controls are described below.

Setting Input DST Control

When the input DST parameter is set to **On**, the MTG-3901 determines whether or not the input source is DST-enabled. This control can be set using the following parameters:

- For timecode inputs (LTC or VITC), use **TcDSTOn**.
- For radio inputs, use **RadDSTOn**.
- For modem inputs, use **ModDSTOn**.

- For serial inputs, use **SerDSTOn**.

When this parameter is set to **On** and the input DST auto-detection control detects that the input source is already DST corrected, it will not apply a one hour offset.

Setting Input DST Auto-detection Control

When the input auto-DST parameter is set **On**, any plus or minus change detected by the module is interpreted as a DST change, depending on these scenarios:

- If the input DST control is set **On** and the MTG-3901 detects a negative one hour change, the module interprets the changes as the DST being disabled. The input DST control is then set to **Off**.
- If the input DST control is set **Off** and the MTG-3901 detects a positive one hour change, the module interprets the change as the DST being enabled. The input DST control is then set to **On**.

In any other instance, the ±1 hour change will not be considered a DST change and no change will be applied to the input DST control. Therefore, the input DST control acts as a feedback control (which you can also update) for the MTG-3901.

This control can be set using the following parameters:

- For timecode inputs (LTC or VITC), use **TcAutoDST**.
- For radio inputs, use **RadAutoDST**.
- For modem inputs, use **ModAutoDST**.
- For serial inputs, use **SerAutoDST**.

DST Operational Considerations

The following DST operational considerations apply when a timecode input source is used:

- If an LTC input source is used, and the input is disrupted, then the MTG-3901 may not be able to detect the ±1 hour change properly. This may occur if the LTC source cannot offset the time by ±1 hour without performing a hard jam sync.
- When decoding LTC input in SMPTE-309M formats, the DST auto-detection only looks at a ±1 hour change in the local time and not a change in the time zone. If you are using the time zone setting

to handle DST On/Off events, then you should turn the **TcRdTZ** parameter **On** instead of using the DST auto-detection. However, using the **TcRdTZ** parameter will not update the DST parameter.

- When changing the **TcDSTOn** parameter by enabling or disabling it, a manual input jam sync is required before the module applies the parameter change. For information about manual input jam syncs, see “Using the IpTimeErr Parameter” on page 112.

Configuring Leap Second Changes

Leap seconds changes are defined in CCIR Rec. 460-4 to occur at four periods in a year, at the end of the following dates at UTC midnight: December 31, March 31, June 30, and September 30. Leap second changes can either be positive (when a leap second is gained), or negative (when a leap second is lost).

In most cases, your MTG-3901 system can be set up to automatically detect leap second changes from the input time source (see “Step 2 Configuring a Leap Second Change At Local time” on page 93). You can also manually configure your MTG-3901 for upcoming leap second changes. Configuring the MTG-3901 for manual leap second changes is a two-step process. You must do the following:

1. Configure the MTG-3901 to make the leap second change on the appropriate date according to UTC time using the **MnLpSeTDat** parameter. These leap second changes will be applied at the end of the designated date at UTC midnight (see “Step 1 Configuring a Leap Second Change At UTC Time” on page 92).
2. Configure the MTG-3901 to schedule the leap second change at the appropriate local time using the **LpSecsTim**. Using this parameter ensures that outputs, such as LTC, receive leap second changes at local times instead of UTC time (see “Step 2 Configuring a Leap Second Change At Local time” on page 93).

Leap second changes must be programmed 30 seconds before UTC midnight on the date of the change. If a leap second change is programmed after UTC midnight, the MTG-3901 will make the change when the date occurs the following year.

The MTG-3901 currently maintains a list of historic leap seconds since January 1, 1972 until the latest leap second change on January 1, 2006.

Step 1 Configuring a Leap Second Change At UTC Time

To manually configure the MTG-3901 to make leap second changes to its UTC time, make the following selections:

Setting Description	Tree View Navigation			
Set the date of the leap second change.	Processing	Clock	MnLpSeTDat	(Select one) • Dec_31 • Jun_30 • Mar_31 • Sep_30
Set the value for the leap second change. **Note** Entering -**1** results in a negative leap second change. In this case, the time would read: **23:59:58**, **00:00:00**, **0:00:01**. Entering +**1**results in a positive leap second change. In this case, the time would read: **23:59:59**, **23:59:60**, **00:00:00**.			MnLpSeDelt	(Enter a value between -1 and+1 s)
Enable the leap second trigger. **Note** This parameter stays **On** until the leap second change date has passed, and then is automatically set to **Off**.			MnLpSeDlyE	On

Step 2 Configuring a Leap Second Change At Local time

Leap second changes occur at UTC midnight, which may not be the most appropriate time to update the local time with change. The **LpSecsTim** parameter can be used to set the most appropriate local time to implement the leap second change. When a leap second change is detected (at UTC midnight), the **LpSecs** parameter is updated and the **LpSecsTim** parameter is read to determine the next available local time the leap seconds is to be applied to the LTC and TCC outputs. The **LpSecsChng [RO]** parameter is set **On**, the leap seconds change is applied at the **LpSecsTim**.

Note

If an LTC output discontinuity occurs when the **LpSecsChng [RO]** parameter is **On**, but before the **LpSecTim** passes, the leap second is automatically applied during the LTC discontinuity. The **LpSecsChng [RO]** parameter is then set to **Off**.

To set a the local time for the leap second change and to determine if a UTC leap second change has occurred (as configured in the previous section), make the following selections:

Setting Description	Tree View Navigation			
Set the local time when you want the leap second change applied.	Processing	Clock	LpSecsTim	HH:MM:SS
Determine if a leap second change has occurred in UTC time.			LpSecsChng [RO]	(displays On or Off)

Note

The **LpSecsTim** parameter is also used by the auto leap second detection parameter.

Applying Input Leap Second Auto-Detection

If you are using an LTC, radio, modem, or serial input source, you can configure your MTG-3901 to automatically detect a leap second change in the input source. Instead of manually programming leap second rules, you can set a leap second detection parameter that detects leap second change in the input source. When a leap second change is detected around one of the four designated periods when a leap second change is valid (either December 31, March 31, June 30, or September 30), the MTG-3901 interprets the change as a leap second change, and updates the leap second count in the MTG-3901 accordingly.

To configure your MTG-3901 to automatically detect leap second changes at the input source, use one of the following parameters:

- For timecode inputs (LTC or VITC), use **TcAutoLS**.
- For radio inputs, use **RadAutoLS**.
- For modem inputs, use **ModAutoLS**.
- For serial inputs, use **SerAutoLS**.

Because these input sources pass in local time, the actual leap second change may not occur at UTC midnight of the appropriate leap second change dates. As a result, the MTG-3901 maintains a time window where any ±1 second change may be properly interpreted as a valid leap second change. The time window starts from 10 seconds prior to UTC midnight on the day that a leap second change can occur, to 3 days and 99 minutes after this UTC midnight period. When a leap second change is detected, the **LpSecs** parameter is updated and the **LpSecsTim** parameter is read to determine the next available local time the leap seconds is to be applied to the LTC and TCC outputs. The **LpSecsChng [RO]** parameter is set **On**, the leap seconds change is applied at the **LpSecsTim**, then set to **Off**.

To configure the MTG-3901 to automatically detect leap seconds in the input source and to schedule this leap second change at a specific local time, follow these steps:

1. To configure the MTG-3901 to automatically detect leap second changes in an input source, make the following selection:

Setting Description	Tree View Navigation			
Set the leap second auto-detection control for the specified input source. **Note** The parameter used here is for leap second auto-detection in a timecode source input.	Input	Clock	TcAutoLS	On

2. To set a the local time for the leap second change and to determine if a UTC leap second change has occurred, make the following selections:

Setting Description	Tree View Navigation			
Set the local time when you want the leap second change applied.	Processing	Clock	LpSecsTim	HH:MM:SS
Determine if a leap second change has occurred in UTC time.			LpSecsChng [RO]	(displays On or Off)

Leap Second Auto-Detection Operational Considerations

- If an LTC input source is used, and the input is disrupted, then the MTG-3901 may not be able to detect the ±1 second change properly. This may occur if the source cannot offset the time by ±1 second without performing an input jam sync. For information about performing an input jam sync, see “Setting an Input Jam Sync” on page 107.
- For inputs that call out for time, if the call out causes an LTC output discontinuity, the leap second will be immediately applied to the LTC outputs and the **LpSecsChng** parameter turned **Off**.

Applying a Millisecond Offset

You can use the millisecond offset to update local time or to change the way local time is calculated from the TAI time. Millisecond offsets are applied cumulatively to the current local time. The millisecond offset stays in effect until a new time is entered into the system through the card-edge controls, user interface, or from an available input source.

To set a millisecond offset, make the following selections:

Setting Description	Tree View Navigation			
Set the DSTMode.	Processing	Clock	msOfst	(Enter a millisecond value between +999 and -999)
Apply the millisecond offset now. **Note** When you set this parameter to **Yes**, the module completes the command then returns the parameter value to **No**			msOfstNow	Yes

Applying a Local Offset

Using the local offset parameter, you can change the way in which local time is calculated from TAI time. For information about how local time is calculated from TAI time, see "How the MTG-3901 Calculates Time" on page 75.

The local offset is set using a string that is comprised of numeric values between -99999 to +99999 and a time unit. For descriptions of parameter time units, see Table 3-3 on page 75. Local offsets can be applied at any time with any input source and are cumulative. The local offset stays in effect until a new time is entered into the system through the card-edge controls, user interface, or from an available input source.

You can apply an immediate local offset to the time, or you can use the offset delay controls to schedule a specific time when you want the offset applied.

Applying an Immediate Local Offset

To apply an immediate local offset, make the following selections:

Setting Description	Tree View Navigation			
Set the local offset value. **Note** The offset value string consists of a value between -99999 and +99999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.	Processing	Clock	LocOfst	(enter a value)
Apply the local offset now. **Note** When you set this parameter to **Yes**, the module complete the command then returns the parameter value to **No**.			LocOfstNow	Yes

Applying a Local Offset Delay

To apply a local offset at a specified time, make the following selections:

Setting Description	Tree View Navigation			
Set the local offset value. **Note** The offset value string consists of a value between -99999 and +99999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.	Processing	Clock	LocOfst	(enter a value)
Set the time when you want the local offset to be applied.			LocOfstTim	HH:MM:SS.
Set the date when you want the local offset to be applied.			LocOfstDat	YYYY:MM:DD
Enable the local offset delay. **Note** After the offset is applied, this parameter returns to **Off**. **Note** When **LocOfsDlyE** is set to **On**, the **LocOfstNow** parameter is disabled.			LocOfsDlyE	On

Applying Input Settings

This section describes how to configure various MTG-3901 input settings. It includes the information on the following topics:

- "Setting Input Sources" on page 98
- "Setting the Trig/PPS Control" on page 100
- "Setting the Video Input Signal" on page 102
- "Setting Timecode Input" on page 104
- "Applying an Input Offset" on page 106
- "Setting an Input Jam Sync" on page 107

Setting Input Sources

You can configure the MTG-3901 to accept time information from more than one input source. When an input source fails, such as the primary input (highest priority source), the MTG-3901 can switch over and use the time information from a backup source (next priority source). Table 3-7 describes the input source options:

Table 3-7. MTG-3901 Input Sources

Parameter Name	Details
InputSrc (highest priority source)	Used to set the primary input time source. In most cases, the most stable and accurate source is designated as the primary source.
BackSrc1	Used to set the first backup time source. When the primary source fails, the MTG-3902 uses this time source as the input source.
BackSrc2	Used to set the second backup time source. When the primary source and the first back source fails, the MTG-3902 uses this time source as the input source.
Uses factory default for Inputsrc (**FreeRun**)	When all other input sources fail, or when no backup sources are set, the MTG-3901 uses the internal time source (**FreeRun)** as the input source.

If GPS, radio, modem, serial, and NTP input sources are configured as backup sources, they still call out and process time/date information. However, this time/date information will not be used to update the local time. In the case of the **Phone** input parameter (internal modem source), the **off-hook** LED will be enabled when the modem is calling out for time. See "LED Indicator Overview" on page 219 for the location of the off-hook LED.

Note

In the case of a primary source failure, if after the source switch the first backup source does not initiate an immediate call out to update time information, the time update occurs at the next scheduled backup source call out.

Setting Your Input Sources

To set up your module's input time sources, make the following selections:

Setting Description	Tree View Navigation			
Set the primary input source.	Input	Routing	InputSrc	(Select a source)
Set the first backup input source.			BackSrc1	(Select a source)
Set the second backup input source.			BackSrc2	(Select a source)
Display the current (primary) input source.			CurlpSrc [RO]	(Primary source)

For a complete list of input source parameter options, see page 189.

Locking the MTG-3901 to a Input Source

Using the **IpTimeLock** and **IpFreqLock [RO]** parameters, you can determine whether or not the MTG-3901 is locked to the input time source and to its corresponding time base signal.

When **IpTimeLock** parameter is **On**, it indicates that the MTG-3901 is obtaining valid time information from the current input source. **IpFreqLock [RO]** then provides information about the time lock. Table 3-8 describes the **IpFreqLock [RO]** parameter option details:

Table 3-8. IpFreqLock Parameter Details

IpFreqLock [RO] Display	Description
None	The MTG-3901 is currently running in Free-run mode.
DataNoLock	The time information received by the MTG-3901 is going through the software PLL but has not locked to the incoming time.
DataLock	The time information received by the MTG-3901 is going through the software PLL and has locked to the incoming time.
PPS	The MTG-3901 is properly receiving PPS information from the GPS receiver.
InputVideo	The MTG-3901 is locked to the incoming video.
TenMhz	The MTG-3901 is locked to the incoming 10Mhz input.
TenMhzPPS **Note** This parameter is valid for the GPS-1600 receiver only.	The MTG-3901 is locked to the incoming 10Mhz input and is receiving PPS information from the GPS-1600 receiver.

Setting the Trig/PPS Control

The **TrigPpsSel** parameter allows you to designate a cable pin to either receive PPS information from the GPS receiver or to set the time and date using the cable pin as an external trigger. In most cases, Pin 9 of the supplied cabling is used to carry the PPS signal or the trigger signal. See Appendix C for cabling information.

Setting the TrigPPsSel Parameter to PPS

When the **TrigPpsSel** parameter is set to **PPS**, the MTG-3901 can lock to the incoming GPS timing information through a designated pin. In most cases, Pin 9 of the supplied cabling is used to transport the PPS signal. To use this setting, you must make the proper jumper settings on your module and use the appropriate cable connections.

For an MTG3901/CSD-3902-SYS-*x* system, see “Setting Jumpers For PPS Input and Genlock Looping” on page 26 and “Connecting an MTG-3901/CSD-3902-SYS-x System to a GPS-3903 Receiver” on page 35.

For a stand-alone CSD-3902 system, “Setting Jumpers For PPS Input and Genlock Looping” on page 26 and “Connecting a CSD-3902 Stand-Alone System to a GPS-3903 Receiver” on page 38

To set the **TrigPpsSel** parameter to **PPS**, make the following selection:

Setting Description	Tree View Navigation			
Enable the PPS.	Input	Clock	TrigPpsSel	PPS

Setting the TrigPPsSel Parameter to Trig

If you set the **TrigPpsSel** to **Trig**, you can use the **SetTimTrig** parameter to determine when a particular time and/or date will take effect. When the TRIG/PPS signal connects to the GND signal, and the **SetTimTrig** is set, the time and/or date indicated in the Time and Date set controls will be applied to the MTG-3901. See “Setting the Time and Date” on page 83 for more information about using the trigger.

To set the **TrigPpsSel** parameter to **Trig**, make the following selection:

Setting Description	Tree View Navigation			
Enable the trigger.	Input	Clock	TrigPpsSel	Trig

Setting the Video Input Signal

The MTG-3901 can take in a composite video input and lock the local time to the incoming video source. In this scenario, when the **CurIpSrc** parameter is set to **Video**, the MTG-3901 takes the current TAI time base and synchronizes it to the video using Absolute Time Reference (ATR).

Note

If the input video signal does not meet appropriate specifications, it might cause breaks in the TAI time base and therefore disrupt output signals.

When using composite video as the primary input source, the MTG-3901 switches over to the hardware Phase Lock Loop (PLL) to lock to the signal. When the MTG-3901is locked to the video signal, it receives periodic time updates from each color field 0 (even field).

To use a video input as a primary input source and to set corresponding parameters, follow these steps:

1. To set up a video source as your primary input source, make the following selections:

Setting Description	Tree View Navigation			
Set the primary input source.	Input	Routing	InputSrc	Video
Determine which video standard is detected. For a list of detectable video standards, see page 188. **Note** **NoSignal** indicates that no video signal is present.		Genlock	VidStdDet [RO]	(Detected standard)
Select to which video signal to lock the module.			VidLckMode	(Select a signal source)
Determine to which video signal the module is locked.			VidLckStat [RO]	(Detected signal)
Determine if input video contains black burst.			VidBrstDet [RO]	(Yes or No)

2. If the input source video has VITC or ATR, make the following selections:

Setting Description	Tree View Navigation			
Determine which type of embedded information is contained in the video signal. For a list of detectable embedded information, see page 188.	Input	Genlock	VidEmbDet [RO]	(Detected embedded information)
Select which embedded information you want locked the module's time.			VidEmbSel	(Select an embedded information type)

3. If VITC is embedded in the video input source, you must indicate to which VITC line you want locked to the module. To do this, make the following selection:

Setting Description	Tree View Navigation			
Select the line you want locked to the module.	Input	Clock	VidVitcLin	(Select a line)

4. To apply an offset to the embedded VITC input, make the following selections:

Setting Description	Tree View Navigation			
Set the input timecode to VITC. For cross-functional parameter changes, see "Cross-Functional Parameter Changes" on page 208.	Input	Clock	TcSel	VITC
Set the TC offset to apply to the VITC input. **Note** The offset value string consists of a value between -99999 and +99999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.			TcOfst	(enter a value)
Enable the TC offset.			TcOfstEn	On

5. If ATR is embedded in the input video source, you can apply an offset to the ATR value. To do this, make the following selections:

Setting Description	Tree View Navigation			
Set the ATR offset you want to apply to the ATR input. **Note** The offset value string consists of a value between -99999 and +99999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.	Input	Clock	ATROfst	(enter a value)
Enable the ATR offset.			ATROfstEn	On

6. If ATR is embedded in the input video, you can use the time zone information that is available in the ATR payload to set the time zone for the local time. To do this, make the following selection:

Setting Description	Tree View Navigation			
Enable the ATR time zone read.	Input	Clock	ATRRdTz	On

Setting Timecode Input

You can use input timecode, either Linear Timecode (LTC) or Vertical Interval Timecode (VITC), as an external reference source for the MTG-3901. Only SMPTE-12M, SMPTE-12M with Leitch extensions (for date and auxiliary offsets), and SMPTE-309M (with both Julian and modified Julian dates formats) at 24fps, 25fps, and 30fps (at 30Hz or NTSC drop frame) video timecode formats are supported. VITC sources are input to the MTG-3901 through the module’s genlock inputs. For information about MTG-3901 inputs, see “Genlock Input (GENLOCK IN)” on page 9.

To configure your MTG-3901 for timecode source input, follow these steps:

1. To select timecode as your input reference source, make the following selections:

Setting Description	Tree View Navigation			
Select timecode as your input reference source.(select one of the available LTC inputs).	Input	Routing	InputSrc	• LTC • LTC_10M • LTC_Video (select one)
Select the type of timecode source.		Clock	TcSel	• LTC • VITC (select one)

2. Navigate to the following parameters to obtain information about the format of the timecode and its user bit format:

Setting Description	Tree View Navigation			
Displays the timecode format. See page 180 for a list of detectable timecode formats.	Input	Clock	TcFrmtDet [RO]	(displayed timecode format)
Displays the timecode user bit format. See page 181 for a list of detectable timecode user bit formats.		Clock	TcUBits [RO]	(displayed timecode user bit format)

3. You can configure the module to obtain date, time zone, and auxiliary offset information from the timecode input. To do this, make the following selections:

Setting Description	Tree View Navigation			
Set the date according to the date information provided by the timecode user bits. **Note** If, at a later time, you set the **TcRdDate** parameter to **Off**, you must perform a manual input jam sync before the module applies the parameter change. See "Setting an Input Jam Sync" on page 107.	Input	Clock	TcRdDate	On
Set the auxiliary offset according to the auxiliary offset information provided auxiliary bits.			TcRdAux	On
Set the time zone according to the time zone information provided by the SMPTE-309M timecode format.			TcRdTZ	On

Applying an Input Offset

Each input source has an input offset parameter that you can apply to the input time and date information. The input offset is commonly used to correct time zone differences between the input source and the MTG-3901 system. It can also be used to correct the input information for other user-defined reasons. The input offset parameters are applied to the input time and date information after an offset value is entered and the corresponding offset enable parameter set to **On**. The module's input offset are listed in Table 3-9.

Table 3-9. MTG-3901 Input Offset Parameters

Input Offset Name	Parameter Offset Name
Timecode input offset	TcOfst
GPS input offset	GpsOfst,
Radio input offset	RadOfst
Modem input offset	ModOfst
Serial input offset	SerOfst

All input offsets are set using a string that is comprised of a user-defined numeric value that is between -99999 to +99999 and a time unit. For descriptions of parameter time units, see Table 3-3 on page 75.

All input offset parameters are set using similar steps. The example provided here demonstrates how to set an LTC input offset.

To set a timecode input offset, make the following selections:

Setting Description	Tree View Navigation			
Enter a timecode input offset. **Note** The offset value string consists of a value between -99999 and +99999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.	Input	Clock	TcOfst	(enter a value)
Enable the timecode input offset.			TcOfstEn	On

Input Offset Operation Considerations

- If the input time reference source has no date information, or if the **TcRdDate** parameter set to **Off**, applying an input offset of days, weeks, months, or years will have no effect.
- If either an input Leap Second auto-detection parameter, such as **ModAutoLS** or input DST auto-detection, such as **ModAutoDST** are set to **On**, applying an input offset of ±1 second or ±1 hour respectively will also cause a leap second or DST change to be detected. Ensure that all input offsets are applied prior to enabling the input Leap Second or DST auto-detection controls.

Setting an Input Jam Sync

When the MTG-3901 is locked to a reference input, an input jam sync updates the module’s main internal time keeping mechanism with time from the reference input. An input jam sync automatically occurs when the module calls out to an input reference to obtain time, date, and time base information. After the internal TAI time base is updated, all outputs are updated accordingly.

By setting the Input Jam Sync Discontinuity mode (**IpJamDMode**) parameter, you can determine whether or not the module’s output signals are disrupted when an input jam sync occurs. For more information see, “Input Jam Sync Discontinuity Mode” on page 110.

Also, using input jam sync control parameters, you can configure your module to apply an input jam sync either immediately or at a set time and date. In each case, specific parameter settings must be made and certain conditions must occur for a input jam sync to be initiated. The following section describes four scenarios that initiate an input jam sync. For information about configuring a input jam sync using the jam sync controls, see "Scheduling an Input Jam Sync Using Jam Sync Controls" on page 112 and "Using the IpTimeErr Parameter" on page 112.

Scenario 1

In this input jam sync scenario, the time base for the module's current input source (**CurIpSrc)** is either a 10MHz source or a video genlock source. An input jam sync occurs when the following input sources are set and the conditions met:

Input Source	Conditions
The **CurIpSrc** is set to the one of the following input sources: • GPS_10M or GPS_Video (for GPS-1600) • LTC_10M or LTC_Video • NTP_10M or NTP_Video • Ser_10M or Ser_Video (**SerSrc** set to **TCC_xxxx** and **SerTccCtrl** set to **ClientMode**) • 10M • Video	• Current TAI time is equal to or passed preset jam sync time (determined by jam sync controls). See "Scheduling an Input Jam Sync Using Jam Sync Controls" on page 112. • **IpJamNow** is set to **On**. See "Scheduling an Input Jam Sync Using Jam Sync Controls" on page 112. • The current input source (**CurIpSrc**) switches to a source with genlock time base, such as **LTC_Video**).

Scenario 2

In this jam sync scenario, the module calls out to an input time reference source. An input jam sync occurs when the following input sources are set and the conditions met:

Input Source	Conditions
The **CurIpSrc** is set to the one of the following input sources: • GPS (for GPS-5300 and GPS-3903/3902/3901) • Radio • Modem • Phone • Serial (with the **SerSrc** parameter set to **CSD**).	• Time is set from information received from a call out to an input time reference, such as a callout to GPS receiver (**GPSCallTim)** or a call out through a modem (**ModPhNow**). • Time is set manually through card edge controls using the **SetTimeNow** parameter. • Time is set using an external trigger (**SetTimTrig**) parameter. For information about setting time and date, see "Applying Time and Date Settings" on page 83.

Scenario 3

In this jam sync scenario, the time base for the current input source (**CurIpSrc**) is controlled by the software Phase Lock Loop and not from an external reference source (10MHz or genlock). An input jam sync occurs when the following input sources are set and the conditions met:

Input Source	Conditions
The **CurIpSrc** is set to the one of the following input sources: • LTC or GPS (for GPS-1600) • NTP • Serial (with • Phone • Serial (with the **SerSrc** parameter set to **TCC_xxxx** and **SerTccCtrl** set to **ClientMode**).	• The difference (absolute error) between the system TAI time and the input reference time is greater than 0.5 seconds. • If **IpFreqLock** changes from **DataNoLock** to **DataLock**.

Scenario 4

In this jam sync scenario, an input jam sync occurs when time and date information is set through the CSD-5300 user interface mode or the TCC-1302 user interface mode. For information about using the MTG-3901 with a CSD-5300, see “Providing Access to the CSD-5300 User Interface through Serial Port” on page 164.

Whenever an input jam sync occurs, any previously applied local and millisecond offsets are lost.

Input Jam Sync Discontinuity Mode

Using the Input Jam Sync Discontinuity Mode (**IpJamDMode**) parameter, you can determine how the MTG-3901 responds to discontinuities/interruptions caused by an input jam synchronization.

There are two input jam sync discontinuity mode (**IpJamDMode**) parameter options:

- **SoftJamSyn** When set to this option, the input jam sync updates the system time, but does not interrupt the MTG-3901 output signals. Instead, the MTG-3901 maintains the phasing error between the reference time and the system time. To correct the phasing error, the MTG-3901 performs skewing of all output signals until the phasing error is reduced to zero. It may take up to three days to correct the phasing error for NTSC output signals, and eight days for PAL-B output signals.

  Note

  The **SoftJamSyn** option is not valid for 10 MHz input or video (VITC or LTC) input reference sources.

- **HardJamSyn** When set to this option, the input jam sync interrupts the system time and output signals, and then restarts the system time with the updated time and date information. After a hard jam synchronization, there is no phasing error between the reference time and the system time.

By default, Input Jam Sync Discontinuity mode is set to **SoftJamSyn**.

Applying a Manual Jam Sync

You can use the module’s **IpJamNow** parameter to apply an immediate input jam sync. In some cases, a manual input jam sync is the only way in which parameter changes can take effect when they are applied. These special cases are described in the following sections:

Parameter Changed	Parameter Change Description
TcOfst	Changing the value of this parameter requires a manual input sync jam. Set the timecode input offset value to **0** before applying the input jam sync.
TcRdDate	Changing this parameter from **Off** to **On** requires a manual input sync jam. Set the parameter before applying the input jam sync.
TcDSTOn TcAutoDSTOn	Changing these parameters by enabling or disabling them parameter requires a manual input jam sync. Set the **TcDSTOn** and **TcAutoDST parameters** before applying the input jam sync.
TcAutoDSTOn	Enabling or disabling this parameter
TcSel	Any change in the type of linear timecode (LTC) input requires a manual input jam sync (For example, when the input LTC changes from Leitch12M to SMPTE_309M).

Note

Do not perform a manual jam sync during a leap second transition. Configure the **TcAutoLS** parameter before performing an input jam sync.

To apply an manual input sync jam, use your module’s card-edge controls to make the following selections:

Setting Description	Tree View Navigation			
Select an Input Jam Sync Discontinuity mode	Input	Clock	IpJamDMode	• SoftJamSyn • HardJamSyn
Apply an immediate input jam sync. **Note** When this parameter is set, the module performs the command and then resets the parameter to **Off**.			IpJamNow	On

Scheduling an Input Jam Sync Using Jam Sync Controls

To configure your MTG-3901 module for a scheduled input jam sync, make the following selections:

Setting Description	Tree View Navigation			
Set the time when you want the input jam sync to occur.	Input	Clock	IpJamTim	HH:MM:SS
Set the time when you want the input jam sync to occur.			IpJamDat	YYYY-MM-DD
Set the input jam sync frequency. **Note** Setting this parameter to **00001D** instructs the module to initiate an input jam sync once per day. To call out twice per day, set the parameter to **00012H**. To call out once every two days, set it to **00002D**. For best results, leave this parameter set to the default value **00001D** (once per day).			IpJamFrq	00001D
Select an Input Jam Sync Discontinuity mode.			IpJamDMode	• SoftJamSyn • HardJamSyn

Using the IpTimeErr Parameter

The **IpTimeErr** parameter detects any discrepancy between the MTG-3901 system TAI time and the time reference input. You can use it to track time differences that are due to:

- Video frame alignment when using a genlock time base
- Drift due to different time bases being used for the input source and for the MTG-3901

A positive **IpTimeErr** value indicates that the MTG-3901 system TAI time is ahead of the reference time. When it is negative, it indicates that the TAI time is behind the reference time. The **IpTimeErr** has a range of ± 0µs to 9.999s and indicates **Overflow** if the difference exceeds the indicated range.

Applying Output Video Settings

This section describes how to configure various MTG-3901 output settings. It includes the information on the following topics:

Setting Hz Out Control

You can use the MTG-3901 to generate a Hz output signal for timing purposes.You can use the **HzOut** and **HzPhasing** parameters to configure the frequency of the output square wave and any required phasing offsets that need to be applied. The square wave output is locked to the MTG-3901 time base.

When the **HzPhasing** parameter is set to **0**, the falling edge of the Hz out is aligned with the top of each second.

To configure the HZ output signal, make the following selections:

Setting Description	Tree View Navigation			
Select a Hz output rate. For a list of available output rates, see page 197.	Output	Synchronize	HzOut	(select an output rate)
Enter a Hz output phasing offset value (-999 to +999 ms).			HzPhasing	(enter a value in ms)

Setting DARS Control

You can use the MTG-3901 to generate a Digital Audio Reference Signal (DARS). To do this, make the following selection:

Setting Description	Tree View Navigation			
Enable DARS output.	Output	Synchronize	DarsEn	(select either Dars_NTSC or Dars_PALB)

Setting Impulse Drive Control

You can use the MTG-3901 to drive up to 20 impulse clocks. When you configure the MTG-3901 to drive impulse clocks, you must enter the current face time of the clock in the **ImpFaceTim** parameter. This time is used by the MTG-3901 to determine how to synchronize the impulse clock to the module's time. For example, if the impulse clock face time is ahead of the MTG-3901 time, the module will delay sending the pulses to drive the clock until the MTG-3901 time is the same as the clock face time. If the impulse clock face time is behind the MTG-3901 time, the module will double the frequency of pulses it sends to the clock until the face time is the same MTG-3901 time.

Table 3-10 provides information about the pin outs that are used to drive the impulse clocks.

Table 3-10. Impulse Drive Pin Outs

Module	Pin Out
ACO-3901-BM back module	• Pin 2 (not phase dependant) • Pin 4 (not phase dependant)
MTG-3901-BM back module	• Pin 12 is used for phase 1 • Pin 124 is used for phase 2
CSD-3902-BM back module	• Pin 12 is used for phase 1 • Pin 124 is used for phase 2
CSD-3902-BO breakout module (see "CSD-3902-BO Breakout Module" on page 10)	• Pin 1 is used for ground • Pin 2 is + on even phases • Pin 3 is + on odd phases

The MTG-3901 impulse drive outputs a DC voltage at a maximum of 13.0 V.

To configure the MTG-3901 to drive impulse clocks, follow these steps:

1. Record the face time of the downstream impulse clocks you want to drive with MTG-3901.
2. Use your module's card-edge to make the following selections:

Setting Description	Tree View Navigation			
Enter the face time of the downstream impulse clock(s).	Output	Synchronize	ImpFaceTim	(enter the clock time)
Issue a Start command to the impulse clock.			ImpStart	On

Note

If the MTG-3901 detects a short circuit condition, the **ImpShCct [RO]** parameter is updated and an alarm is generated.

Setting the Video Output Signal

You can use the black burst control parameters to configure the module's black burst video outputs. If you are using an MTG-3901, there are four black burst outputs that you can configure. If you are using a CSD-3902, there is one output. Each MTG-3901 black burst output can be configured independently of the other each, meaning that they can output different video standards and have different video settings applied. For each black burst video output, a separate set of values are stored for the following parameters: **OpVidEn**, **OpVidSetup**, **OTenFEn**, and all output ATR-related parameters.

Each black burst video output is locked to the module's time base using Absolute Timing Reference (ATR) information.

The following provides an overview of the steps required to configure your black burst video output signals:

1. Select and enable the black burst video output(s) you want to use.
2. Select a video standard for each video output.
3. Set ATR control parameters.
4. Set vertical integrated timecode control parameters.

To configure your module's black burst video outputs, follow these steps:

1. To select and enable a black burst video output, make the following selections:

Setting Description	Tree View Navigation			
Select the black burst video output you want to configure. By default, **BB1** is ATR enabled. **Note** If you are configuring an MTG-3901 module, you can configure up to four black burst video outputs (**BB1**, **BB2**, **BB3**, and **BB4**). If you are configuring a CSD-3902 module, you can configure one black burst video output (**BB1**).	Output	Routing	OpVidSel	(select an black burst video output)
Enable the selected black burst video output.		TestGen	OpVidEn	On
Select a video standard for the black burst video output. For a list of available parameter options, see page 197. **Note** When setting the **OpVidStd** to an **NTSC** or **PAL** format, a separate set of values can be stored for output VITC-related and output phase-related parameters for each format. **Note** With the exception of **1080i_60**, if you set the **OpVidStd** parameter to a high definition (HD) video standard, such as **1080i_60**, the **OpVidSetup** and **OTenFEn** are disabled. Also, any absolute time reference (ATR) related and vertical integrated timecode (VITC) related parameters such as **OATREn** or **OVitcEn** are disabled.			OpVidStd	(select a video standard for the output)

2. If you want to see 7.5 IRE NTSC Setup or a 10-field Sequence (in accordance with the SMPTE 318M-B standard), make the following selections:

Setting Description	Tree View Navigation			
Set this parameter to **On** to see a Ten-field Sequence from the selected black burst video output.	Output	Clock	OTenFEn	On
Set this parameter to **On** to see the 7.5 IRE NTSC Setup from the selected black burst video output.		TestGen	OpVidSetup	On

3. To configure the selected output to include Absolute Time Reference (ATR) information with the black burst video signal, make the following selections:

Setting Description	Tree View Navigation			
Enable ATR for the selected black burst video output. **Note** When this parameter is set to **On**, line 12 of the video output is reserved for ATR information.	Output	Clock	OATREn	On

4. If you are including ATR information with the black burst video output, you can set the **OATRTrVid** parameter to use ATR information to compensate for any differences between the output video and ATR. To set this parameter, make the following selection:

Setting Description	Tree View Navigation			
For this parameter, select from one of the following options: • **NoTrack** No tracking is required. • **ATROffset** Use the ATR offset to compensate for any phase differences (For information on setting an ATR offset, see the next step). • **ATRTime** Use the ATR time information to compensate for phase differences.	Output	Clock	OATRTrVid	(select an option)

5. To set the ATR offset, make the following selections:

Setting Description	Tree View Navigation			
Enter a value for the ATR offset. **Note** The offset value string consists of a value between -9999999 and +9999999 and a time unit. See Table 3-3 on page 75 for time unit descriptions. **Note** When this parameter is set to **On**, line 12 of the video output is reserved for ATR information.	Output	Clock	OATROSet	(enter a value)
Enable the ATR offset immediately. **Note** If you have set the **OATRTrVid** parameter to **ATROffset**, you must set this parameter to **On** in order for the ATR offset to be applied. For information about applying the ATR offset at a specific time, see "Applying an Output ATR Offset Delay" on page 122.			OATROLvlT	On
Display the current ATR offset value.			OATROfst [RO]	(applied ATR offset)

6. If you want to output vertical interval timecode (VITC) with the black burst video for the selected output, make the following sections:

Setting Description	Tree View Navigation			
Enable VITC output for the selected output.	Output	Clock	OVitcEn	On
Enter a position value for the first line of VITC. See page 212 for the parameter default value and range changes.			OVitcLine	(enter a value between 10 to 20)
Enter a position value for the second line of VITC. See page 212 for the parameter default value and range changes.			OVitcLine2	(enter a value between 10 to 20)

Setting Output Video Phasing

Using the output video phasing controls, you can configure video phasing settings for each black burst video output. For each video output, you can set and store output video phasing values for each video standard. For example, if you are configuring video output **BB1**, you can set output video phasing values for both NTSC and 1080i_60. The module then stores these values and recalls them when you set the output video format to either **NTSC** or **1080i_60**.

There are four output video phasing control parameters: Output Video Fine Phase, Output Video Horizontal Phase, Output Video Vertical Phase, and Output Video Frame Phase. Each control parameter has a maximum value on its adjustment scale. When this value is reached, the adjustment scale returns to zero and any associated parameter is incremented. Table 3-11 describes the association between the output video phasing parameters. Table 3-12 lists the maximum adjustment scale values for each output video phasing parameter.

Table 3-11. Output Video Phasing Associated Parameter Adjustments

Parameter Name	Parameter	Associated Parameter Adjustments
Output Video Fine Phase (in sub-27M clocks)	OpFPhase	• Positive maximum value in ns increases **OpHPhase** by 0.037 µs • Negative minimum value in ns decreases **OpHPhase** by 0.037 µs See Table 3-12 for maximum/minimum values.
Output Video Horizontal Phase (in sub-27M clocks)	OpHPhase	• Positive maximum value in µs increases **OpVPhase** increases by 1 line • Negative minimum value in µs decreases **OpVPhase** by 1 line See Table 3-12 for maximum/minimum values.
Output Video Vertical Phase	OpVPhase	• Positive maximum value in line increases **OpFrmPhase** by 1 frame • Negative minimum value in lines decreases **OpFrmPhase** by 1 frame See Table 3-12 for maximum/minimum values.
Output Video Frame Phase	OpFrmPhase	No associated parameter changes See Table 3-12 for maximum/minimum values.

Table 3-12. Output Video Phasing Maximum Adjustment Scale Values

Video Standard	OpfPhase (ns)	OpHPhase (μs)	OpVPhase (lines)	OpFrmPhase (frames)
NTSC, PAL-M	36.892	63.519	524	29
PAL-B	36.892	63.963	624	24
1080i_60, 1080p_30	36.892	29.593	1124	29
1080i_5994, 1080p_29.97	36.892	29.622	1124	29
1080i_50, 1080p_25	36.892	35.519	1124	24
1080psf_24, 1080p_24	36.892	37.00	1124	23
1080psf_23, 1080p_23.98	36.892	37.037	1124	23
720p_60	36.892	22.185	749	59
720p_59.94	36.892	22.207	749	59
720p_50	36.892	26.630	749	49

Configuring Video Output Phasing Controls

To configure video output phasing controls for a selected black burst video output, make the following selections:

Setting Description	Tree View Navigation			
Select the black burst video output to configure.	Output	Routing	OpVidSel	(select an black burst video output)
Ensure that the output is enabled.		TestGen	OpVidEn	On
Select the video standard to which you want to apply output video phasing controls. For a list of available parameter options, see page 197. **Note** You can set separate output video phasing values for each video standard. The settings for each video standard are stored and are then recalled when the video standard is selected.			OpVidStd	(select a video standard for the output)

(Continued)

Setting Description *(Continued)*	Tree View Navigation			
Set a value for output video fine (horizontal) phase. See Table 3-12 for maximum/minimum values.			OpFPhase	(set a value)
Set a value for output video horizontal phase. See Table 3-12 for maximum/ minimum values.			OpHPhase	(set a value)
Set a value for output video vertical phase. See Table 3-12 for maximum/ minimum values.			OpVPhase	(set a value)
Set a value for output video frame phase. See Table 3-12 for maximum/ minimum values.			OpFrmPhase	(set a value)

Applying an Output ATR Offset Delay

Using the ATR offset delay controls, you can program your module to apply an ATR offset to a selected black burst video output at a specified time. Output ATR offsets are applied in the offset field of the ATR payload.

You can apply an immediate ATR output offset using the **OATROLvlT** parameter or you can schedule a specific time when you want the offset applied using the ATR offset delay controls. Setting the ATR offset delay controls disables the **OATROLvlT** parameter. Be aware that if you are using the **OATROLvlT** parameter to provide the ATR offset value for phase tracking (**OATRTrVid**), configuring the ATR offset delay may affect when the ATR offset is applied. For more information about using the ATR offset for phase tracking, see “Setting the Video Output Signal” on page 115.

Applying An Immediate ATR Output Offset

To apply an immediate ATR output offset immediately, make the following selections:

Setting Description	Tree View Navigation			
Select the black burst video output to configure. **Note** You can set different output ATR-related control parameters to each of the modules black burst video outputs.	Output	Routing	OpVidSel	(select an black burst video output)
Enable the selected black burst video output.		TestGen	OpVidEn	On
Enter a value for the output ATR offset. **Note** The offset value string consists of a value between -9999999 and +9999999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.		Clock	OATROSet	(enter a value)
Enable the ATR offset immediately. **Note** If you have set the **OATRODlyT** parameter set to **On** this parameter is disabled.			OATROLvlT	On
Display the current ATR offset value. **Note** When the output ATR offset delay time has passed, the output ATR offset value you applied using the **OATROSet** parameter is displayed here.			OATROfst [RO]	(applied ATR offset)

Configuring a Delayed ATR Offset

To configure an ATR offset delay, follow these steps:

1. To set the video outputs and the ATR offset, make the following selections:

Setting Description	Tree View Navigation			
Select the black burst video output to configure. **Note** You can set different output ATR-related control parameters to each of the modules black burst video outputs.	Output	Routing	OpVidSel	(select an black burst video output)
Enable the selected black burst video output.		TestGen	OpVidEn	On
Enter a value for the output ATR offset. **Note** The offset value string consists of a value between -99999 and +99999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.		Clock	OATROSet	(enter a value)

2. To set the time and date you want the ATR offset applied to the video output, make the following selections:

Setting Description	Tree View Navigation			
Set the time when you want the output ATR offset applied to the selected black burst video output.			OATROTim	HH:MM:SS (enter a value)
Set the date when you want the output ATR offset applied to the selected black burst video output.			OATRODat	YYYY:MM:DD (enter a value)
Enable the output ATR offset delay. **Note** After the offset is applied, this parameter returns to **Off**.			OATRODlyT(†)	On
To display the current ATR offset value. **Note** When the output ATR offset delay time has passed, the output ATR offset value you applied using the **OATROSet** parameter is displayed here.			OATROfst [RO]	(applied ATR offset)

Note

Setting **OATROLvlT** to **Off** will not remove the offset. To remove the offset, **OATROSet** must be set to **0**.

Applying Output ATR Phasing

Using the output ATR phasing controls, you can configure ATR phasing settings for each black burst video output. For each video output, you can set and store output ATR phasing values for NTSC, PAL-B, and PAL-M. The module then stores these values and recalls them when you set the output video format to ether **NTSC** or **PAL-B**. Output ATR phasing controls are disabled for high definition video formats, such as 1080i_60.

There are three phasing controls for the ATR payload: Output ATR Clock Offset, Output ATR Line Offset, and Output ATR Frame Offset. These three ATR phasing controls combine to provide an overall phasing offset to the outgoing ATR payload on the selected black burst video output. Each control parameter has a maximum value on its adjustment scale. When this value is reached, the adjustment scale returns to zero and any associated parameter is increased. Table 3-13 describes the association between the output ATR phasing parameters. Table 3-14 lists the maximum adjustment scale values for each output video phasing parameter.

Table 3-13. Output ATR Phasing Associated Parameter Adjustments

Parameter Name	Parameter	Associated Parameter Adjustments
Output ATR Clock Offset (in sub-27M clocks)	OATRClOff	• Positive maximum value in µs increases **OATRLiOff** by 1 line • Negative minimum value in µs decreases **OATRLiOff** by 1 line See Table 3-14 for maximum/minimum values.
Output ATR Line Offset	OATRLiOff	• Positive maximum value in lines increases **OATRFrOff** by 1 frame • Negative minimum value in lines decreases **OATRFrOff** by 1 frame • See Table 3-14 for maximum/minimum values.
Output ATR Frame Offset	OATRFrOff	No associated parameter changes See Table 3-14 for maximum/minimum values.

Table 3-14. Output ATR Phasing Maximum Adjustment Scale Values

Video Standard	OATRClOff (μs)	OATRLiOff (lines)	OATRFrOff (frames)
NTSC, PAL-M	63.519	524	29
PAL-B	63.963	624	24

Configuring Video Output Phasing

To configure video output phasing controls for a select black burst video output, make the following selections:

Setting Description	Tree View Navigation			
Select the black burst video output to configure.	Output	Routing	OpVidSel	(select an black burst video output)
Ensure that the output is enabled.		TestGen	OpVidEn	On
Select the video standard to which you want to apply output video phasing controls. **Note** You can set separate output video phasing values for each NTSC, PAL-B, and PAL-M. Settings for these video standards are stored and are recalled when the video standard is selected.			OpVidStd	• NTSC • PAL-B • PAL-M (select a video standard for the output)
Set a value for output ATR clock offset. See Table 3-14 for maximum/ minimum values.		Clock	OATRClOff	(set a value)
Set a value for output ATR line offset. See Table 3-14 for maximum/ minimum values.			OATRLiOff	(set a value)
Set a value for output ATR frame offset. See Table 3-14 for maximum/ minimum values.			OATRFrOff	(set a value)

Applying Output Timecode Settings

The MTG-3901 can output timecode in a range of different timecode and user bit formats. The timecode output time is based on the current MTG-3901 local time. Even if user-defined offsets are applied to the timecode outputs, all scheduling is based on the MTG-3901 local time. This means that all leap second changes, DST changes, subsequent scheduled offsets, and jam sync occur when the MTG-3901 local time matches the scheduled time defined by the parameters. Table 3-15 describes how these changes are applied to timecode outputs.

Table 3-15. Changes in Timecode Output

Local Time	Output Time	Scheduled Event	Result
23:59:00	00:59:00 (+1 hour)	Positive leap second is applied at 00:00:00 (time will advance by 1 s)	When the MTG 3901 time reaches 00:00:00, the time goes back by 1 second. The timecode output reads: • 00:59:59, 00:59:60, 01:00:00, 01:00:01
01:59:00	00:59:00 (-1 hour)	DST enabled at 02:00:00 (time will advance 1 hour)	When the MTG-3901 time reaches 02:00:00, the time moves ahead by 1 hour. The timecode output reads: 00:59:59, 02:00:00, 02:00:01, 02:00:02
12:59:00	13:29:00 (+30 minutes)	+1 hour offset scheduled for 13:00:00	When the MTG-3901 time reaches 13:00:00, the 1 hour offset is applied.The output timecode reads: 13:29:59, 14:30:00, 14:30:01, 14:30:02.
17:59:00	17:44:00 (-15 minutes)	Output timecode jam sync scheduled for 18:00:00	When the MTG-3901 time reaches 18:00:00, the MTG-3901 initiates an output timecode jam sync. On the output, this event would occur at 17:45:00.

If you are configuring an MTG-3901 module, you can set and store a range of timecode parameter values for two Linear Timecode (LTC) outputs (**LTC1** and **LTC2**), and four Vertical Integrated Timecode (VITC) outputs (**VITC1**, **VITC2**, **VITC3**, and **VITC4**), which correspond to the module's four black burst video outputs. If you are configuring a CSD-3902 module, you can set and store a range of timecode parameter values for two LTC outputs (**LTC1** and **LTC2**) and one VITC output (**VITC1**). When you configure these timecode parameters, the module stores the values, then recalls them when the timecode output is selected using the **OTcSel** parameter. The following parameter options can be configured for each timecode output.

- Set output timecode format and timecode user bit format. See "Setting Timecode Format and User Bit Format" on page 128.
- Set an output timecode offset. See "Applying an Output Timecode Offset" on page 130.
- Set an output timecode auxiliary offset. See "Applying an Output Timecode Auxiliary Offset" on page 132.
- Set output LTC timecode phasing. See "Applying Output LTC Phasing" on page 134.
- Select either a hard jam sync or soft jam sync when a discontinuity in the LTC timecode output occurs. See "Using LTC Discontinuity Mode" on page 137.
- Set the output timecode to either 24 hour or 12 hour time format. See "Setting the Output Timecode Mode" on page 139.
- Set output timecode to UTC time. See "Setting the Output Timecode Mode" on page 139.

Setting Timecode Format and User Bit Format

Using the output timecode control parameters, you can set the timecode format and timecode user bit format for each timecode output.

When using the **OTcFrmt** parameter, the available options for timecode format combine either drop frame or non-drop frame with timecode frame rate. When selecting a timecode format, you have the following options:

Table 3-16. Output Timecode Format Options

Parameter	Timecode Format
FpsNTNDrop	NTCS (29.97 fps) non-drop frame
FpsNTDrop	NTSC (29.97 fps) drop frame
Fps25	25 fps
Fps24NDrop	24 fps non-drop frame
Fps30NDrop	30 fps non-drop frame

Using the **OTcUBits** parameter, you can choose the type of user bit format of the output timecode. When selecting a user bit format, you have the following options:

Table 3-17. Output Timecode User Bit Format Options

Parameter	Timecode Format
SMPPTE_12M	Standard SMPTE 12M
Leitch12M	SMPTE 12M with Leitch extensions
SMPTE_309M	Standard SMPTE 309M (Julian dates)
MJD_390M	SMPTE 309M (modifies Julian dates)
LTCSpain	30 fps non-drop frame

Setting Output Timecode Formats

To set the timecode format and user bit format for a specified timecode output, make the following selections:

Setting Description	Tree View Navigation			
Select the timecode output. **Note** You can set and store output timecode parameters for each available timecode format.	Output	Routing	OTcSel	(select an timecode output)
Select a timecode format for the selected timecode output. See Table 3-16 for descriptions of timecode format options.		Clock	OTcFrmt	(select a format)
Select a user bit format for the selected timecode output. See Table 3-17 for descriptions of timecode user bit format options.			OTcUBits	(select a format)

Applying an Output Timecode Offset

Using the output timecode offset controls, you can apply an offset to a timecode output. Output timecode offsets are set using a string that is comprised of a user-defined numeric value that is between -9999999 to +9999999 and a parameter time unit. For descriptions of parameter time units, see Table 3-3 on page 75.

You can immediately apply an offset to the timecode output using the **OTcOLvl** parameter, or you can schedule a specific time when you want the output timecode offset applied using the output timecode offset delay controls.

Applying an Immediate Output Timecode Offset

To immediately apply an output timecode offset to a selected timecode output, make the following selections:

Setting Description	Tree View Navigation			
Select the timecode output. **Note** You can set and store output timecode parameters for each available timecode format.	Output	Routing	OTcSel	(select an timecode output)
Enter a output timecode offset value. **Note** The offset value string consists of a value between -9999999 and +9999999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.		Clock	OTcOSet	(enter a value)
Apply an immediate output timecode offset. **Note** This parameter is disabled when the **OTcODlyT** parameter is set to **On**.			OTcOLvlT	On

Note

Setting **OTcOLvlT** to **Off** does not remove the offset value. To remove the offset, the **OTcOSet** value must be **0**.

Applying a Delayed Output Timecode Offset

To apply an output timecode offset at a specified time using the Output Timecode Offset Delay, follow these steps:

1. To select your timecode output and set your output timecode offset, make the following selections:

Setting Description	Tree View Navigation			
Select the timecode output. **Note** You can set and store output timecode parameters for each available timecode format.	Output	Routing	OTcSel	(select an timecode output)
Enter a output timecode offset value. **Note** The offset value string consists of a value between -9999999 and +9999999 and a time unit. See Table 3-3 on page 75 for time unit descriptions.		Clock	OTcOSet	(enter a value)

2. To set your output timecode offset delay controls, make the following selections:

Setting Description	Tree View Navigation			
Enter the time when you want the output timecode offset applied to the selected timecode output.	Output	Clock	OTcOTTim	HH:MM:SS
Enter the date when you want the output timecode offset applied to the selected timecode output.			OTcOTDat	YYYY:MM:DD
Enable the output timecode output delay. **Note** After the offset is applied, this parameter returns to **Off**. **Note** Setting this parameter to **On** disables the **OTcOLvlT** parameter.			OTcODlyT	On
Display the output timecode offset that is currently applied. **Note** When the offset time (**OTcOTTim**) and date (**OTcOTDat**) pass, the **OTcOSet** value is applied to the timecode output. This value is also displayed by the **OTcOfst** parameter.			OTctOfst [RO]	(displayed offset value)

Applying an Output Timecode Auxiliary Offset

Using the output timecode auxiliary offset control, you can apply an offset to a downstream device. To apply an auxiliary offset on the timecode output you are using, you must set the timecode user bit format (**OTcUBits**) to SMPTE 12M with Leitch extensions (**Leitch12M**). Output timecode auxiliary offsets are set in 30 minute (0.5 hour) adjustments within the valid range of -11.5 hours to +12.0 hours. The auxiliary offset is stored in the payload for the downstream device to decode, but it is not added to the output timecode.

To configure an output timecode auxiliary offset, follow these steps:

1. To set the timecode format and user bit format for a specified timecode output, make the following selections:

Setting Description	Tree View Navigation			
Select the timecode output for which you want to configure an auxiliary offset.	Output	Routing	OTcSel	(select an timecode output)
Select a timecode format for the selected timecode output. See Table 3-16 for descriptions of timecode format options.		Clock	OTcFrmt	(select a format)
Select SMPTE 12M with the Leitch extension as the timecode user bit format.			OTcUBits	Leitch12M

2. To set and enable the timecode auxiliary offset, make the following selections:

Setting Description	Tree View Navigation			
Set a value for the output the timecode auxiliary offset. **Note** For this parameter, values are set in 30 minute (0.5 hour) increments between of 0 and 12.0 (hours).	Output	Clock	OTcAux	(select a value)
Select whether you want the offset value you set for the **OTcAux** parameter to be a positive or negative value. **Note** The resulting minimum value that you can set for the **OTcAux** parameter is **-11.5.** If you have set the **OTcAux** parameter to **12** and this parameter to **Minus**, the module interprets the combined offset setting to be +12.0 instead of -12.		Clock	OTcAPM	(select either Minus or Plus)
Enable the output timecode auxiliary offset.			OTcAEn	On

Applying Output LTC Phasing

Using your module's Linear Timecode (LTC) phasing controls, you can configure phasing settings for the **LTC1** and **LTC2** outputs. Phasing settings are not supported for Vertical Integrated Timecode (VITC). For each LTC output, you can set and store output video phasing values for each video standard. For example, if you are configuring **LTC1**, you can set output LTC phasing values for both NTSC (29.97 fps) non-drop frame and 25 fps timecode formats. The module then stores these values and recalls them when you set the selected LTC output's timecode format to either NTSC (29.97 fps) or non-drop frame 25 fps.

Note

The 24 fps non-drop frame timecode format does not support timecode phasing controls.

There are three phasing controls for Linear Timecode (LTC) phasing: Output Timecode Clock Offset (**OTcClOff**), Output Timecode Line Offset (**OTcLiOff**), and Output Timecode Frame Offset (**OTcFrOff**). These three timecode phasing controls combine to provide an overall phasing offset to the outgoing LTC.

Note

If the **OTcSynCF** parameter is set **On**, the phasing controls will be applied on top of the current color-frame relationship.

Each phase control parameter has a positive maximum value on its adjustment scale. Table 3-18 lists the maximum timecode phasing values for each timecode format.

Table 3-18. Maximum Output Timecode Phasing Values

Timecode Standard	OTcClOff (µs)	OtcLiOff (lines)	OTcFrOff (frames)
NTSC (29.97 fps) non-drop frame	63.519	524	29
NTSC (29.97 fps) drop frame	63.519	524	29
30 fps non-drop frame	63.519	524	29
25 fps	63.963	624	24
24 fps	Not applicable	Not applicable	23

Configuring LTC Output Phasing Controls

To configure LTC output phasing controls for a selected black burst, make the following selections:

Setting Description	Tree View Navigation			
Select an LTC timecode output to configure.	Output	Routing	OTcSel	(select either LTC1 or LTC2)
Select the timecode standard to which you want to apply output video phasing controls. **Note** You can set separate output timecode phasing values for the following timecode formats: NTSC (29.97 fps) non-drop frame, NTSC (29.97 fps) drop frame, 30 fps non-drop frame, 24 fps non-drop frame, and 25 fps. Settings for these timecode standards are stored and are then recalled when the video standard is selected.			OTcFrmt	• FpsNTNDrop • FpsNTDrop • Fps25 • Fps30NDrop • Fps24NDrop
Set a value for the output timecode clock offset. See Table 3-18 for maximum/minimum values.		Clock	OTcClOff	(set a value)
Set a value for the output timecode line offset. See Table 3-18 for maximum/ minimum values.			OTcLiOff	(set a value)
Set a value for the output timecode frame offset. See Table 3-18 for maximum/minimum values.			OTcFrOff	(set a value)

Applying an Output Timecode Jam Sync

You can use the output timecode jam sync to correct timing errors that are introduced when NTSC frame rates are used for output timecode. Because of its fractional frame rate (29.97 fps), NTSC accumulates a 3 frame/day error over time. This error can be minimized by configuring the MTG-3901 to apply an output timecode jam sync each day. Doing so ensures that the MTG-3901 outputs accurate continuous timecode.

Using the output timecode jam sync control, you can configure your module to apply a manual (immediate) output timecode jam sync, or you can schedule a jam sync to occur at a set time and date.

Applying a Manual Output Timecode Jam Sync

To apply a manual (immediate) output timecode jam sync, make the following selections:

Setting Description	Tree View Navigation			
Select the timecode output to which you want to apply a output timecode jam sync.	Output	Routing	OTcSel	(select a timecode output)
Apply an immediate output timecode jam sync. **Note** This parameter is disabled when the **OTcJSEn** parameter is set to **On**.		Clock	OTcJSNow	On

Scheduling an Output Timecode Jam Sync

To configure your MTG-3901 for a scheduled output timecode jam sync, make the following selections:

Setting Description	Tree View Navigation			
Select a timecode output to which you want to apply a output timecode jam sync.	Output	Routing	OTcSel	(select a timecode output)
Set the time when you want the output timecode jam sync to occur.		Clock	OTcJSTim	HH:MM:SS

(Continued)

Setting Description	Tree View Navigation			
Set the date when you want the output timecode jam sync to occur.			OTcJSDat	YYYY-MM-DD
Set the output timecode jam sync frequency. **Note** Setting this parameter to **00001D** instructs the module to initiate an input jam sync once per day. To call out twice per day, set the parameter to **00012H**. To call out once every two days, set it to **00002D** Setting this parameter to **0,** causes the module to constantly attempt an output timecode jam sync. For **best results**, leave this parameter set to the default value **00001D** (once per day).			OTcJSFrq	00001D
Enable the scheduled output timecode jam sync. **Note** When this parameter is set to **On**, the **OTcJSNow** parameter is disabled.			OTCJSEn	On

Using LTC Discontinuity Mode

Using the LTC Discontinuity Mode (**OTcDMode)** parameter, you can define how the MTG-3901 responds to discontinuities/disruptions in the LTC time base. Discontinuities in LTC time base are caused by:

- Changes in LTC output timecode format (For more information about output timecode format, see “Setting Timecode Format and User Bit Format” on page 128)
- Updates to the input time source
- Changes to the input source time zone
- Changes in an output LTC phasing offset (For more information about output LTC phase offset, see “Applying Output LTC Phasing” on page 134)
- Scheduled or manual output timecode Jam syncs (For more information about output timecode jam syncs, see “Applying an Output Timecode Jam Sync” on page 135)

There are two LTC discontinuity mode (**OTcDMode**) parameter options:

- **HardJamSyn** Setting the parameter to this option will interrupt the output LTC stream and then restart the output with the updated time, date, and time base information.
- **SoftJamSyn** Setting the parameter to this option will not interrupt the output LTC stream. Only the output timecode payload will be updated with time and date information. Because the LTC stream is not interrupted and updated, there may be a small error in the time and date information. An error of -1/+1 frames may be present for NTSC, ± 2 frames for PAL, and ± ½ frame for 24 for 30 fps time bases.

LTC Discontinuity Mode Operational Considerations

The following information should be considered when determining which LTC discontinuity mode to use. Setting the **OTcSynCF** parameter to **On** ensures that the corresponding LTC output and color frame relationship is maintained. This setting may be required when disruptions to the LTC output occur due to phasing offsets, programmable offsets, and leap second or DST changes.

Note

In soft jam sync mode, the **OTcSynCF** parameter ensures that the color frame relationship is maintained, however, this does not mean that the timecode is color frame aligned to the output video.

If you change the LTC timecode output format (**OTcFrmt**) when the **OTcDMode** parameter set to **SoftJamSyn**, the LTC output will be misaligned with respect to the internal TAI time base.

Setting the LTC Discontinuity Mode

To set the LTC discontinuity mode (**OTcDMode**), make the following selections:

Setting Description	Tree View Navigation			
Select the LTC timecode output to which you want to apply an output timecode jam sync.	Output	Routing	OTcSel	(LTC1 or LTC2)
Set the output timecode discontinuity mode for the selected LTC timecode output.		Clock	OTcDMode	(select a mode)

Setting the Output Timecode Mode

Using the output timecode mode (**OTcMode**) parameter, you can configure the MTG-3901 to emulate some Harris/Leitch TCC-1302 Timecode Convertor features. If your input source reference is LTC or VITC and the user bit format is SMPTE-12M with Leitch extensions, you can use the “clear user bits” and “copy user bits” features.

For more information about timecode inputs, see “Setting Timecode Input” on page 104. For more information about the TCC-1302 timecode Convertor, see our web site at www.broadcast.harris.com/leitch.

There are three **OTcMode** parameter options:

- **SendDate** Date information is stored in the timecode output
- **ClearUBits** All user bit information is cleared from the timecode output (meaning no date, auxiliary offset, or time zone information is present in the output).
- **CopyUBits** All user bit information is copied from the timecode input source to the timecode output.

Note

If the **TcRdDate** and **TcRdAux** parameters are set to **On**, the user bit information can be processed by the MTG-3901. For information about the **TcRdDate** and **TcRdAux** parameters, see “Setting Timecode Input” on page 104.

To set the LTC discontinuity mode (**OTcDMode**), make the following selections:

Setting Description	Tree View Navigation			
Select the timecode output to which you want to apply output timecode mode settings.	Output	Routing	OTcSel	(select a timecode output)
Set the output timecode mode for the selected timecode output.		Clock	OTcMode	(select a mode)

Setting Output Timecode to UTC Time

Using the **OTcUtcTim** parameter, you can set a timecode output to output timecode based on UTC time. When you set the timecode output to UTC time, no time zone or DST changes are applied to the timecode output.

Note

If a leap second change is pending, the **OTcLSTim** parameter displays the corresponding UTC time that the leap second change is to occur. After the leap second change is complete, **OTcLsTim** is set to **NotApplied**.

To set a timecode output to UTC time, make the following selections:

Setting Description	Tree View Navigation			
Select the timecode output to which you want to set to UTC time.	Output	Routing	OTcSel	(select a timecode output)
Set the output timecode to UTC time.		Clock	OTcUtcTim	On

Applying Settings for GPS Receiver Operation

The MTG-3901 can receive time, date, and time base information from the GPS-3903/3902/3901, GPS-1600, and GPS-5300 global positioning system receivers. This section includes information on the following topics:

- “Using a GPS-3903/3902/3901 or GPS-5300 Receiver” on page 141.
- “Using a GPS-1600 Receiver” on page 144.
- “Performing a GPS Self-Survey” on page 147.

Using a GPS-3903/3902/3901 or GPS-5300 Receiver

To use the MTG-3901 to receive time, date, and time base information from a GPS-3903/3902/3901 or GPS 5300 receiver, you must:

- Connect your MTG-3901/CSD-3902 system to the GPS-3903/3902/GPS-3901 or GPS 5300 receiver as described in “Connecting MTG-3901/CSD-3902 Systems to GPS-3903 Receivers” on page 35 and “Connecting MTG-3901/CSD-3902 Systems to GPS-5300 Receivers” on page 44.
- Configure the MTG-3901 to input time, date, and time base information.
- Configure the MTG-3901 to make scheduled call outs to the GPS receivers to obtain time, date, and time base information.
- Monitor the current status of your GPS connection.

Configuring the MTG-3901 For GPS-3903/3902/3901 or GPS-5300 Operation

To configure your MTG-3901 for operation with a GPS-3903/3902/3901 or GPS-5300 receiver, follow these steps:

1. To configure the MTG-3901 to receive time, date and time base information, make the following selections:

Setting Description	Tree View Navigation			
Set the PPS input source.	Input	Clock	TrigPpsSel	PPS
Set the GPS source.			GpsSrc	• GPS5300 • GPS3901 • GPS3902 • GPS3903
Set the GPS configure mode.			GpsCfgMode	Active
Set the input source.		Routing	InputSrc	GPS

2. To set up the GPS automatic call out parameters, make the following selections:

Setting Description	Tree View Navigation			
Set the time when you want the module to call out to the GPS for time, date and time base information.	Input	Clock	GpsCallTim	HH:MM:SS
Set the date when you want the module to call out to the radio for time, date and time base information.			GpsCallDat	YYYY-MM-DD
Set the GPS call frequency. **Note** Setting this parameter to **00001D** instructs the module to call out once per day. To call out twice per day, set the parameter to **00012H**. To call out once every two days, set it to **00002D**. For best results, set this parameter to **00001D**.			GpsCallFrq	00001D
Set the GPS call enable.			GpsCallEn	On

Note

If you change one of the input sources to an input source that calls out for time and if the reference date/time setting of that input source has passed, then the MTG-3901 will immediately make a call out for time. After the initial call out, the MTG-3901 will use the reference date/time and call frequency to make subsequent call outs

3. After the module calls out, ensure the following parameter options appear as shown below:

Setting Description	Tree View Navigation			
Indicates that the callout was successful.	Input	Clock	IpTimeLock [RO]	On
Indicates the type of time the MTG-3901 is receiving from the GPS. For information about the types of time the MTG-3901 supports, see "MTG-3901 Supported Time Bases" on page 73.			GpsRcvTime [RO]	UTC
Provides information about the number of satellites that the MTG-3901 is using to obtain time information. See Table 3-19 for more information.			GpsDecStat [RO]	Should **not** see NoGPSTime
Indicates that the MTG-3901 is receiving valid GPS information packets. See Table 3-19 for more information.			GpsDisStat [RO]	Normal
Indicates that the module is locked to the incoming PPS signal.		Synchronize	IpFreqLock [RO]	PPS

Use Table 3-19 to determine the status of the module’s connection to the GPS.

Table 3-19. Connection Status for GPS-3903/3902/3901 and GPS-5300

Parameter	Parameter Option and Description
GpsDecStat [RO]	• **OK/SlfSrvy** The MTG-3901 is receiving information from more than three satellites and/or is currently performing a GPS self-survey. This is the best possible GPS status for this parameter. • **NoGPSTime** The MTG-3901 is not receiving valid GPS information packets. • **NoUseSate** No user satellite is detected. • **Only1Sat** The MTG-3901 is receiving information from one satellite. • **Only2Sat** The MTG-3901 is receiving information from two satellites. • **Only3Sat** The MTG-3901 is receiving information from three satellites.
GpsDisStat [RO]	• **NoSigPres** The MTG-3901 is not receiving a satellite signal. • **Normal** The MTG-3901 is currently receiving a satellite signal. This is the best possible GPS status for this parameter.

Using a GPS-1600 Receiver

To use the MTG-3901 to receive time, date, and time base information from a GPS-1600 receiver, you must:

- Connect your MTG-3901/CSD-3902 system to the GPS-1600 receiver as described on “Connecting MTG-3901/CSD-3902 Systems to GPS-1600 Receivers” on page 40.
- Configure the MTG-3901 to input time, date, and time base information.
- Monitor the current status of your GPS connection.

Note

When the MTG-3901 is properly connected and configured to operate with the GPS-1600 receiver, it receives time, date, and time base information from the GPS-1600 every second. Therefore, you do not need to configure the MTG-3901 to call out to the GPS-1600.

To configure your MTG-3901 for operation with a GPS-1600 receiver, follow these steps:

1. To configure the MTG-3901 to receive time, date, and time base information, make the following selections:

Setting Description	Tree View Navigation			
Set the GPS source.	Input	Clock	GpsSrc	GPS1600
Set the GPS configure mode.			GpsCfgMode	Active
Set the input source.		Routing	InputSrc	GPS_10M
Set the first backup source.			BackSrc1	10M
Set the second backup source.			BackSrc2	(select an input source)

2. Ensure the following parameter options appear as shown below:

Setting Description	Tree View Navigation			
Indicates that the callout was successful.	Input	Clock	IpTimeLock [RO]	On
Indicates the type of time the MTG-3901 is receiving from the GPS. For information about the types of time the MTG-3901 supports, see "MTG-3901 Supported Time Bases" on page 73.			GpsRcvTime [RO]	UTC
Provides information about the number of satellites that the MTG-3901 is using to obtain time information. See Table 3-20 for more information.			GpsDecStat [RO]	Should **not** see NoGPSTime
Indicates that the MTG-3901 is receiving valid GPS information packets. See Table 3-20 for more information.			GpsDisStat [RO]	Normal
Indicates that the module is locked to the incoming PPS signal. **Note** If the PPS is not connected, this parameter will read **10Mhz**.		Synchronize	IpFreqLock [RO]	TenMhz/PPS

Use the following table to determine the status of the GPS connection:

Table 3-20. Connection Status for the GPS-1600

Parameter	Parameter Option and Description
GpsDecStat [RO] **Note** If this parameter reads **Only1Sat**, the **GpsOneSat** parameter must be set to **On** in order to accept the GPS information packets.	• **OK/SlfSrvy** The MTG-3901 is receiving information from more than three satellites and/or currently performing a GPS self-survey. This is the best possible GPS status for this parameter. • **NoGPSTime** The MTG-3901 is not receiving valid GPS information packets. • **PDOP_2High** The MTG-3901 is not receiving valid GPS information packets. • **NoUseSate** No user satellite is detected. • **Only1Sat** The MTG-3901 is receiving information from one satellite. • **Only2Sat** The MTG-3901 is receiving information from two satellites. • **Only3Sat** The MTG-3901 is receiving information from three satellites. • **SatUnstble** The satellite from which the MTG-3901 is receiving valid GPS information packets is unstable. • **TraimRjFix** The Time-receiver Autonomous Integrity Monitor (T-RAIM) algorithm rejected position the fix.
GpsDisStat [RO]	• **NoSigPres** The MTG-3901 is not receiving a satellite signal. • **Normal** The MTG-3901 is currently receiving a satellite signal. This is the best possible GPS status for this parameter.

Performing a GPS Self-Survey

Using the GPS Self-Survey Select (**GpsSSSel**) parameter, you can start or restart a self-survey on the GPS receiver that is connected to your module. Performing a self-survey forces the GPS receiver to enter the position fix mode so that the receiver acquires more precise satellite positions. This results in sending more accurate timing information to the MTG-3901. A self-survey can be performed only when there are more than three visible satellites (when the **GpsDecStat** parameter displays **OK/SlfSrvy**).

To perform a GPS self-survey, make the following selections:

Setting Description	Tree View Navigation			
Ensure that three satellites are visible to perform the self-survey	Input	Clock	GpsDecStat	OK/SlfSrvy
Start the GPS self-survey.			GpsSSSel	On
Display the GPS self-survey progress. **Note** This parameter displays the self-survey progress as a percentage where **0** indicates that the survey has not yet started and **100** represents that the survey is complete.			GpsSSProg [RO]	(displayed progress as a percentage)

Applying Settings for Radio Operation

The MTG-3901 can receive time, date, and time base information from a Precitel radio receiver. The MTG-3901 can support the input time as either UTC or Local time (through the **RadioSrc** parameter).

To configure your MTG-3901 for operation with a radio receiver, follow these steps:

1. To configure the MTG-3901 to input time, date, and time base information from a radio receiver, make the follow selections:

Setting Description	Tree View Navigation			
Set the input source to the radio receiver.	Input	Routing	InputSrc	(select either Radio, Radio_10M, or RadioVideo)
Select the radio receiver's time source.		Clock	RadioSrc	(select either PrecLocal or PrecUTC)

2. To set up the radio automatic call out parameters, make the following selections:

Setting Description	Tree View Navigation			
Set the time when you want the module to call out to the radio for time, date and time base information.	Input	Clock	RadCallTim	HH:MM:SS
Set the date when you want the module to call out to the radio for time, date and time base information.			RadCallDat	YYYY-MM-DD
Set the radio call frequency. **Note** Setting this parameter to **00001D** instructs the module to call out once per day. To call out twice per day, set the parameter to **00012H**. To call out once every two days, set it to **00002D**. For best results, set this parameter to **00001D**.			RadCallFrq	00001D
Set the radio call enable.			RadCallEn	On

3. After the radio calls out, ensure the following parameter option appears as shown below:

Setting Description	Tree View Navigation			
Indicates that the MTG-3901 is properly receiving radio information packets.	Input	Clock	RadioStat [RO]	Normal

Applying Settings for Internal and External Modem Operation

Using the MTG-3901's internal modem, you can configure the module to obtain time, date, and timebase information from a time reference source through an analog telephone line. An external modem that is connected to the module's RS-232 serial connection can also be used to obtain time over an analog telephone line.

The MTG-3901 can also be configured as a time reference source for other MTG-3901/CSD-3902, CSD-3901, and CSD-5300 systems.

To configure your MTG-3901 to call out to time reference sources, see the next section. To configure your MTG-3901 for use as a time reference source, see "Configuring the MTG-3901 For Use as a Time Reference Source" on page 155.

Configuring the MTG-3901 to Call Out for Time Information

You can either use the module's internal modem to call out to time reference sources, or you can connect your module to an external modem and use the modem to call out. For information on making modem connections, see "Connecting MTG-3901/CSD-3902 Systems to External Modems" on page 50.

To use the module's internal modem or an external modem to call out to the time reference source, you must enter the source's telephone number for the **ModPhNum** parameter. The factory default value for this parameter is the telephone number of the Harris time reference source in Toronto, Canada (4164459408). This time reference is corrected for Eastern Daylight Saving Time (EDST). For UTC time, also known as Greenwich Mean Time (GMT), you can call the United States Naval Observatory (2026530721). This time reference source is not corrected for DST.

The telephone number is a string that can be, at most 50, characters and can consist of a set of characters including 0-9, #, *, “,” (space), D (delay), T (tone dialing) and P (pulse dialing). If you want to add a time delay to your time reference telephone number, add the letter “D” along with a numeric value between 0 and 9 to represent the delay time in seconds. Table 3-21 lists delay strings and their corresponding delay values.

Table 3-21. Call Delay Strings

String	**Delay (in seconds)**
D1 or D2	2
D3 or D4	4
D5 or D6	6
D7 or D8	8
D9	10

You can configure your module to apply a manual (immediate) call out to a time source reference or you can configure the module to call out periodically at a specific time and frequency.

Note

Your MTG-3901/CSD-3902 module’s internal modem is not certified for use in all regions of the world. If you experience problems with this modem, use an external modem instead.

Applying a Manual (Immediate) Call Out

To configure your MTG-3901 for a manual (immediate) call out to a time reference source, follow these steps:

1. To set the modem source, make the following selections:

Setting Description	Tree View Navigation			
Set the input source.	Input	Routing	InputSrc	Modem (external modem) Phone (internal modem)
Set the modem source.			ModemSel	Modem (external modem) Phone (internal modem)

2. To set the reference source telephone number and initiate the manual callout, make the following selections:

Setting Description	Tree View Navigation			
Set the time reference telephone number.	Input	Clock	ModPhNum	Example number: T912026530721
Initiate an immediate callout to the time reference source. **Note** When this parameter is set to **On**, the module performs the call out and then resets to **Off**. **Note** If the **ModCallEn** parameter is set to **On**, the **ModPhNow** parameter is disabled and you cannot use it to call out.			ModPhNow	On

3. To abort the callout and the impending time and date information update, make the following selection:

Setting Description	Tree View Navigation			
Immediately abort the callout.	Input	Clock	ModHangUp	On

Scheduling a Periodic Call Out

To configure your MTG-3901 to make scheduled callouts to a time reference source, follow these steps:

1. To set the modem source and configure the reference source telephone number, the following selections:

Setting Description	Tree View Navigation			
Set the input source.	Input	Routing	InputSrc	Modem (external modem) Phone (internal modem)
Set the modem source.			ModemSel	Modem (external modem) Phone (internal modem)
Set the time reference telephone number.	Input	Clock	ModPhNum	Example number: T912026530721

2. To set the time, date, and frequency of the callout to the time reference source make the following selections:

Setting Description	Tree View Navigation			
Set the modem call time. **Note** If you receive a busy single when calling, enter another call time setting.	Input	Clock	ModCallTim	HH:MM:SS
Set the modem call date (current date).			ModCallDat	YYYY-MM-DD
Set the modem call frequency. **Note** Setting this parameter to **00001D** instructs the module to call out once per day. To call out twice per day, set the parameter to **00012H**. To call out once every two days, set it to **00002D**. For best results, set this parameter to **00001D**.			ModCallFrq	00001D
Enable the modem to call out. **Note** When this parameter is set to **On**, the **ModPhNow** parameter is disabled.			ModCallEn	On

Modem Status Parameter Results

You can use the Modem Status parameter (**ModemStat** [RO]) to display information about the status of the module's last call out to a time reference source. Table 3-22 lists the possible **ModemStat** parameter options along with option descriptions.

Table 3-22. Modem Status Parameter Options

Parameter Result	Parameter Result Description
NoCall	The MTG-3901 has not made a callout for time.
Normal	The MTG-3901 has successfully made a callout for time.
Busy	The MTG-3901 encountered a busy signal when calling out for time.
Redial	The MTG-3901 is attempting to redial the number. A redial will occur if the MTG-3901 attempts to call out and the remote unit is busy. A redial will occur 10 seconds after the busy signal. The MTG-3901 will redial a maximum of 10 times.
CallFailed	The MTG-3901 called out for time, but the call was not successful because: • The remote unit did not answer or remained busy after 10 redial attempts. • The MTG-3901 could not obtain time and date information from the time reference source.
SrcCallFai	The time reference source the MTG-3901 called received a **CallFailed** status.
SrcTimeInv	The time reference source the MTG-3901 called, did not have valid time. In this case, the Time Valid LED should not be on.
SrcDiagFai	The time reference source the MTG-3901 called failed its diagnostic test.
DlyWinBnd	The MTG-3901 call out falls within the delay bound window and is considered invalid.

Configuring the MTG-3901 For Use as a Time Reference Source

You can configure the MTG-3901 so that it can be used as a time reference source for other MTG-3901 and CSD-3902/3901 systems. When you set the Modem Answer Parameter (**ModAutoAns**) parameter, your MTG-3901 system will answer calls from other remote MTG/CSD systems and provide them with time, date and timebase information. During the call, your MTG-3901 operates in CSD-5300 user interface mode.

Operational Considerations

The following information should considered if you want to use your MTG-3901 system as a time reference source for other MTG-3901 or CDS-3902/3901 systems:

- When using your module's RS-232 serial port or internal modem to call out to time reference sources as well as to receive calls from other MTG/CSD systems, your module's last callout must have completed successfully. Otherwise, the port will be unavailable to receive calls from other MTG/CSD systems.
- Your MTG-3901 internal time must be considered valid time. See the Time Valid LED on your module's card edge to determine whether or not your MTG-3901 is maintaining valid time. If your MTG-3901 is not maintaining valid time, other MTG/CSD systems that are calling out to it for time and date information will receive a **CallFailed** status for the **ModemStat** parameter option. For more information about Modem Status parameters, see Table 3-22 on page 154.

Setting the Modem Answer Parameter

To set the Modem Answer Parameter, make the following selection:

Setting Description	Tree View Navigation			
Enable the modem automatic answer feature.	Output	Clock	ModAutoAns	On

Configuring Loop-Back Delay and Propagation Delay

Each time your MTG-3901 uses the internal or external modem to call out to a time reference source, it automatically calculates the duration of time required to receive information from the reference source. This duration is known as propagation delay. The MTG-3901 uses the calculated propagation delay to correct the incoming time information.

The MTG-3901 calculates propagation delay using a modem loop-back delay feature. When the MTG-3901 calls a reference source for time information, it sends a character to the time source with a request to send the character back to the module. The MTG-3901 calculates the difference between the time that it sent the character to the reference source and the time it received the character back from the reference source. This time difference duration is the modem loop-back delay. The MTG-3901 then calculates propagation delay by dividing the modem loop-back delay by two, thus determining the duration required for time information to travel from the reference source to the MTG-3901 input. The module’s input time is automatically corrected using for propagation delay.

In some instances, telephone line irregularities, such as high telephone line traffic or poorly functioning telephone system equipment may cause the MTG-3901 to calculate inaccurate or irregular propagation delay values. In this case, you can use the modem millisecond offset parameter to manually configure propagation delay with a constant value.

To ensure that irregular propagation delays do not affect the accuracy of the module’s input time, you can also configure a delay window. Based on lower and upper delay values, you can configure the MTG-3901 to either accept or refuse input time based on whether or not the automatic propagation delay values falls outside or inside the modem delay window.

Note

By default, your MTG-3901 is configured for automatic propagation delay detection and compensation, and the modem delay window ranges between 0 and 1 ms.

Setting Loop-back Delay and Propagation Delay Corrections

You can configure your MTG-3901 to automatically measure loop-back delay and compensate for propagation delays that occur when using the internal or external modem. To enable this feature, you must set the **ModOfstMs** parameter to **0**.

If you suspect that the MTG-3901 is calculating inaccurate or irregular propagation delays, you can specify a constant propagation delay (manual propagation delay) by entering a value other than zero in the **ModOfstMs** parameter setting.

Note

When you enter a value other than **0** in the **ModOfstMs** parameter settings, the automatic loop-back delay measurement and compensation feature is disabled.

To configure your MTG-3901 for automatic or manual propagation delay correction, make the following selection:

Setting Description	Tree View Navigation			
Enter a modem offset value in milliseconds between **1** and **999**. This value will be used to correct your modem input time for propagation delay. **Note** Entering **0** enables the automatic propagation delay and compensation feature.	Input	Clock	ModOfsMs	(enter a value)

Configuring a Modem Delay Window

You can use the modem delay window to detect asymmetrical path delays when the MTG-3901 uses an internal or external modem to call out for time information. These delays can be caused due to telephone line irregularities, such as high telephone line traffic or poorly functioning telephone system equipment. When you configure a modem delay window, all call outs to a reference source that incur a propagation delay that falls within the delay range set by the window (between lower bound propagation delay, **ModDlyLBnd**, and upper bound propagation delay, **ModDlyUBnd**) are automatically rejected and the time received from the source is considered invalid. All call outs to a reference source that incur a propagation delay that is shorter than the lower bound delay value are accepted and the time received from the source is considered valid. The MTG-3901 will attempt to call out to the source until it receives valid time.

Note

To use the modem delay window, you must set the **ModOfsMs** parameter to **0** (meaning that the automatic loop-back delay feature must be enabled).

To configure a delay window to validate input time, make the following selections:

Setting Description	Tree View Navigation			
Enter the lower bound propagation delay value in milliseconds. This value can be between **0** and **999**.	Input	Clock	ModDlyLBnd	(enter a value)
Enter the upper bound propagation delay value in milliseconds. This value can be between **1** and **999**.			ModDlyUBnd	(enter a value)

Applying Serial Connection Settings

You can use your module's RS-232 serial connection to communicate with other MTG-3901, CDS-3902/3901 and TCC-1302 systems. Using the module's serial connection, you can configure your MTG-3901 to either call out to other MTG/CSD systems to obtain time, date, and timebase information, or connect to a TCC-1302 to receive continuous timecode. You can also configure your MTG-3901 as a time reference source and to receive calls from other MTG/CSD systems.

This section includes information on the following topics:

- "Calling Out for Time Information Using the Serial Connection" on page 159
- "Locking the Serial Connection to Continuous Timecode Conversion Output" on page 161
- "Generating Continuous TCC Output" on page 163
- "Using the Serial Port to Provide Remote Access" on page 164
- "Setting Up Dual Serial Port Mode" on page 166
- "Dual Serial Port Mode Configuration Scenarios" on page 167

For more details about serial connections, see Appendix E, "RS-232 Configuration" (page 291).

Calling Out for Time Information Using the Serial Connection

To use the MTG-3901 to receive time, date, and time base information from another MTG-3901or CSD-3902 system, you must make the system connections that are described on "Connecting Two MTG-3901/ CSD-3902 Systems Together" on page 56.

To configure your MTG-3901 to obtain time and date information from other MTG-3901/CSD-3902 systems, follow these steps:

1. To set the module's input to a serial source, make the following selections:

Setting Description	Tree View Navigation			
Set a serial input source.	Input	Routing	InputSrc	• Serial_10M • Serial • Ser_Video
Set the serial source. **Note** The baud rate for the **CSD** parameter option is 300.		Clock	SerSel	CSD

2. To set the time, date, and frequency of the callout to the other MTG-3901/CSD-3902 system, make the following selections:

Setting Description	Tree View Navigation			
Set the serial port call time.	Input	Clock	SerCallTim	HH:MM:SS
Set the serial port call date (current date).			SerCallDat	YYYY-MM-DD
Set the serial port call frequency. **Note** Setting this parameter to **00001D** instructs the module to call out once per day. To call out twice per day, set the parameter to **00012H**. To call out once every two days, set it to **00002D**. For best results, set this parameter to **00001D**.			SerCallFrq	00001D
Enable the serial port to call out.			SerCallEn	On

Serial Port Status Parameter Results

You can use the Serial Status parameter (**SerStat** [RO]) to display information about the status of the module's last call out to a time reference source. Table 3-22 lists the possible **SerStat** parameter options along with option descriptions.

Table 3-23. Serial Status Parameter Options

Parameter Result	Parameter Result Description
NoCall	The MTG-3901 has not made a callout for time.
Normal	The MTG-3901 has successfully made a callout for time.
CallFailed	The MTG-3901 called out for time, but the call was not successful, but the MTG-3901 could not obtain time and date information from the time reference source.
SrcCallFai	The time reference source the MTG-3901 called received a **CallFailed** status.
SrcTimeInv	The time reference source the MTG-3901 called, did not have valid time. In this case, the Time Valid LED should not be on.
SrcDiagFai	The time reference source the MTG-3901 called failed its diagnostic test.

Locking the Serial Connection to Continuous Timecode Conversion Output

You can configure your MTG-3901 to lock to continuous timecode conversion (TCC) output, through the serial port connection. To do this, you must connect your MTG-3901 system to a timecode converter such as the TCC-1302 using a serial cable.

To configure your MTG-3901 so that it locks to a TCC output, follow these steps:

1. To set the module's input to a serial source and lock it to TCC output, to make the following selections:

Setting Description	Tree View Navigation			
Set a serial input source.	Input	Routing	InputSrc	Serial
Set the serial source to a TCC output with the appropriate baud rate.		Clock	SerSel	• TCC_300 • TCC_600 • TCC_1200 • TCC_2400 • TCC_4800 • TCC_9600

2. To set serial TCC control mode, make the following selection:

Setting Description	Tree View Navigation			
Set the serial TCC control mode.	Processing	Clock	SerTccCtrl	ClientMode

Serial Port Status Parameter Results

You can use the Serial Status parameter (**SerStat** [RO]) to display information about the status of your module's connection with the TCC output source. Table 3-22 lists the possible **SerStat** parameter options along with option descriptions.

Table 3-24. Serial Status Parameter Options for Receiving TCC

Parameter Result	Parameter Result Description
Normal	The MTG-3901 is properly receiving continuous TCC output.
NoSignal	The MTG-3901 cannot detect any TCC continuous output.

Generating Continuous TCC Output

You can configure the MTG-3901 to generate continuous time output through its RS-232 serial port connection. The MTG-3901 outputs converted time in an ASCII format similar to the TCC-1302 output. Using the serial TCC LTC destination control (**SerTCCDst**) parameter, you can configure the MTG-3901 to synchronize the converted time output with one of the module's linear timecode (LTC) outputs. Using the serial TCC output mode, you can choose to include frames with the output timecode. This option is available for TCC sources with a baud rate of 4800 or 9600 only.

To configure your MTG-3901 for continuous TCC output, follow these steps:

1. To set serial TCC baud rate and the TCC control mode, make the following selections:

Setting Description	Tree View Navigation			
Set the serial source to a TCC output with the appropriate baud rate.	Input	Clock	SerSel	• TCC_300 • TCC_600 • TCC_1200 • TCC_2400 • TCC_4800 • TCC_9600
Set the serial TCC control mode.	Processing	Clock	SerTccCtrl	OutputTime

2. To set the serial TCC output controls, make the following selection:

Setting Description	Tree View Navigation			
Set the TCC output to **TimeOnly** to output time information only, or to **TimeFrame** to output time and frame information.	Output	Clock	SerTccOp	• TimeOnly • TimeFrame
Select which LTC output you want synchronize with the TCC output.			SerTccDst	• LTC1 • LTC2

Using the Serial Port to Provide Remote Access

You can configure the RS-232 serial port to provide users remote access your MTG-3901/CSD-3902 system. The following sections describe how to provide remote access to CSD-5300 and TCC-1302 systems.

Providing Access to the CSD-5300 User Interface through Serial Port

Using the CSD-5300 user interface, you can control most MTG-3901 parameters through a terminal program. For more information about the CSD-5300 user interface, see Appendix F: “CSD-5300 and TCC-1302 User Interface” on page 295

To set up remote access to the MTG-3901 through the CSD-5300 user interface, make the following selection:

Setting Description	Tree View Navigation			
Set the serial source.	Input	Clock	SerSel	CSD

Note

When setting up remote access to the MTG-3901, you must set the **SerCallEn** parameter to **Off** and ensure that the **InputSrc** parameter is not set to **Serial**, **Ser_10M**, or **Ser_Video**.

Providing Access to the TCC-1302 User Interface through Serial Port

When accessing the TCC-1302 user interface through the serial interface, all commands can be applied to one of the two LTC outputs. This can be controlled using the **SerTccUDst** parameter. To set up remote access to the MTG-3901 through the TCC-1302 user interface, follow these steps:

1. To set the serial TCC baud rate and the TCC control mode, make the following selections:

Setting Description	Tree View Navigation			
Set the serial source to a TCC output with the appropriate baud rate.	Input	Clock	SerSel	• TCC_300 • TCC_600 • TCC_1200 • TCC_2400 • TCC_4800 • TCC_9600
Set the serial TCC control mode.	Processing	Clock	SerTccCtrl	CtrlMode

2. To select the LTC port to which all commands will be applied, make the following selection:

Setting Description	Tree View Navigation			
Select an LTC output.	Output	Clock	SerTccDst	• LTC1 • LTC2

Setting Up Dual Serial Port Mode

Using the CAB-CSD-SER-Y cable, you can connect two serial devices such as a GPS receiver and an external modem to the MTG-3901 at the same time. You can also designate the serial devices as either the primary input source or the secondary input source.

The CAB-CSD-SER-Y cable has two 9-pin male connectors on one end, and one 9-pin female connector on the other end (see page 284 for an illustration of the cable). One of the cable's two 9-pin male connectors is designated as the "Primary" serial port and the 9-pin male connector is designated as the "Secondary" serial port. Table 3-25 shows the lines that are available for each port when the two serial ports are activated.

Table 3-25. Lines Available for Dual Serial Ports

Pin	Serial Connector/ Port	Acronym	Description
1	Primary	RLSD	Received Line Signal Detector
2	Primary	RD	Received Data
3	Primary	TD	Transmitted Data
4	Primary	DTR	DTE Ready
5	Primary/ Secondary	Ground	Signal Common
6	Secondary	RD	Received Data
7	Secondary	TD	Transmitted Data
8	Primary	CTS	Clear to Send
9	Primary	RI	Ring Indicator

The DCR and RTS lines are disabled on the Primary port but looped back to the DTR and CTS lines respectively in the CAB-CSD-SER-Y cable.

Note

When using an external modem as an input source for Dual Serial Port mode, it must always be connected to the CAB-CSD-SER-Y cable's primary port.

Configuring the Serial Ports

To activate the two serial ports, you must set the Dual Serial Port (**DualSerEn**) control parameter to either **BackScndry** or **PrimScndry**. Doing so produces the following results:

- **BackScndry** maps the primary port of the CAB-CSD-SER-Y cable to the primary input source parameter (**InputSrc**). The Secondary port is mapped to the Backup Source 1 parameter (**BackSrc1**).
- **PrimScndry** maps the secondary port of the CAB-CSD-SER-Y cable to the primary input source parameter (**InputSrc**). The primary port is mapped to the Backup Source 1 parameter (**BackSrc1**).

After you set the Dual Serial Port (**DualSerEn**) control parameter, use the primary input source (**InputSrc**) and backup source 1 (**BackSrc1**) parameters to select the module's primary input source and first backup source.

Dual Serial Port Mode Configuration Scenarios

The following section provides MTG-3901configuration information about different Dual Serial Port mode usage scenarios. These scenarios include:

- "Connecting an External Modem and GPS Receiver to the MTG-3901" on page 167
- "Connecting the MTG-3901 to a Reference Source and Providing Access the CSD User Interface" on page 170

Connecting an External Modem and GPS Receiver to the MTG-3901

When using dual serial mode, you can connect to two reference input sources to the MTG-3901 and designate one source as the primary input source and the other as the first backup input source. If the primary input source needs to call out for time and date information (for example GPS, modem, or radio), and the callout fails, it will automatically switch to the first backup input source without attempting another call out. If the backup source is also down, the MTG-3901 will not detect this until it attempts to callout to the backup source for time information. If the MTG-3901 is configured with a secondary backup source, this source will be used as the input time source. Otherwise, the MTG-3901 will generate time internally (free run).

Note

When using an external modem as an input source for Dual Serial Port mode, it must always be connected to the CAB-CSD-SER-Y cable's primary port.

To connect an external modem and a GPS receiver to your MTG-3901 system while using Dual Serial Port mode, follow these steps:

1. Using the CAB-CSD-SER-Y cable, connect the cable's 9-pin male "Secondary" serial port connector to the GPS's 9-pin female connector (see page 284 for an illustration of the cable).
2. Connect the cable's 9-pin "Primary" serial port connector to the external modem's 9-pin female connector (see page 284 for an illustration of the cable).

3. To designate the GPS receiver as the primary input source and the external modem as the first backup source, to make the following selections:

Setting Description	Tree View Navigation			
Enable Dual Serial Port mode by setting the parameter to **PrimScndry**. **Note** Setting this parameter to **PrimScndry** maps the secondary port of the CAB-CSD-SER-Y cable to the primary input source parameter (**InputSrc**). The primary port is then mapped to the first backup source parameter (**BackSrc1**).	Processing	Multiplex	DualSerEn	PrimScndry
Set the GPS input as the primary input source.	Input	Routing	InputSrc	GPS
Set the modem as the first backup input source. **Note** When Dual Serial Port mode is enabled, the internal modem (**phone**) is disabled as an input source. **Note** When using Dual Serial Port mode, you cannot use the second backup source (**BackSrc2)** parameter.			BackSrc1	Modem

OR

To designate the external modem as the primary input source and the GPS receiver as the first backup source, use your module's card-edge controls to make the following selections:

Setting Description	Tree View Navigation			
Enable Dual Serial Port mode by setting the parameter to **PrimScndry**. **Note** Setting this parameter to **BackScndry** maps the primary port of the CAB-CSD-SER-Y cable to the primary input source parameter (**InputSrc**). The secondary port is then mapped to the Backup Source 1 parameter (**BackSrc1**).	Processing	Multiplex	DualSerEn	BackScndry
Set the modem as the primary input source. **Note** When Dual Serial Port mode is enabled, the internal modem (**phone**) is disabled as an input source.	Input	Routing	InputSrc	Modem
Set the GPS receiver as the first backup input source. **Note** When using Dual Serial Port mode, you cannot use the second backup source **BackSrc2** parameter.			BackSrc1	GPS

Connecting the MTG-3901 to a Reference Source and Providing Access the CSD User Interface

When using the Dual Serial Port mode, you can connect the MTG-3901 to a reference source and access the module's CSD-5300 user interface mode simultaneously. Using the CSD-5300 user interface, you can control most MTG-3901 parameters through a terminal program. For more information about the CSD-5300 user interface, see Appendix F: "CSD-5300 and TCC-1302 User Interface" on page 295.

To configure your MTG-3901 to input time from a reference source and provide access to the CSD-5300 interface simultaneously, follow these steps:

1. Using the CAB-CSD-SER-Y cable, connect the cable's 9-pin "Primary" serial port connector to the reference source's 9-pin female connector (see page 284 for an illustration of the cable).

2. Connect the cable's 9-pin male "Secondary" serial port connector to access the CSD interface.
3. To configure the MTG-3901 to obtain time and date information from an input source while providing access to the CSD interface, to make the following selections:

Setting Description	Tree View Navigation			
Enable Dual Serial Port mode by setting the parameter to **BackScndry**. **Note** Setting this parameter to **BackScndry** maps the primary port of the CAB-CSD-SER-Y cable to the primary input source parameter (**InputSrc**).	Processing	Multiplex	DualSerEn	BackScndry
Set the primary input source to the input device that is connected to the CAB-CSD-SER-Y cable's "Primary" serial port connector. **Note** This example assumes that a GPS receiver is being used as the time reference source.	Input	Routing	InputSrc	GPS
Set the module's serial source to CSD. For information on providing access to the CSD interface, see "Using the Serial Port to Provide Remote Access" on page 164.		Clock	SerSrc	CSD

Dual Serial Port Mode Operational Considerations

The following section provides additional information about using Dual Serial Port mode with input time sources that call out for time and date information:

- The MTG-3901 status (**SerStat**, **ModemStat**) parameters displays the status of a device's last callout. If a device's last callout is successful (status parameter reads **Normal**), the time obtained during the callout is considered valid time. If you change the device's input source designation from being the first backup source to being the primary input source, the module will use this time until the next callout for time and date information.

Chapter 4

Parameters

Overview

Installation, navigation, configuration, and setup information is now included in the *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*. If your current NEO frame manual is Edition A, B, C, or D, you will need to download an updated version from the our Web site to access this information.

This chapter describes how to operate an MTG-3901 or a CSD-3902 module using card-edge controls. This chapter also includes a complete list of parameter settings arranged according to the Tree View structure of your MTG-3901 module.

To view a complete list of MTG-3901parameters arranged as an Operator and All list of parameters, see Appendix A: “Operator and All List Parameters”.

The following topics are found in this chapter:

- "LED Indicator Overview" on page 219

Note

Except where noted, the term "MTG-3901" will be used to refer to both MTG-3901 and CSD-3902 modules.

Operation Notes

When using an MTG-3901 module, the following operation notes should be observed:

Caution

Failure to observe these "Operation Notes" will result in accidental changes to the module's parameter settings.

- Although the effect of a parameter change may appear to be immediate, the module requires 20 seconds to save the latest change. If another change is made during these 20 seconds, the first parameter change and the second parameter change will not be saved until 20 seconds after the second parameter change. There is no limit to the number of changes that can be made within 20 seconds of each other. However, none of these changes will be saved until 20 seconds after the last parameter change.
- When you set the **FctryRcl** (factory recall) parameter to **Yes**, the module takes several seconds to reset all of the parameters. (**Setup** parameters are not affected by this factory recall mode.) The "Tree View Parameters" on page 178 indicate the parameter default settings that are restored when **FctryRcl** is set to **Yes**.
- Some parameters will be locked out if certain settings are made. When this occurs, a lock icon will appear beside the affected parameters in the card-edge VFD.
- Whenever the module is powered up with no backup battery or if the TIME VALID LED is off when the main power is recovered, the module system time will be set to either midnight local time of the last known date, or the time set during the previous input jam sync (depending on which one is the most recent).
- When changing the **OpVidSel** parameters, the module requires several seconds to load the settings for the particular black burst output.
- When changing the **TcSel** parameters, the module requires several seconds to load the settings for the particular LTC or VITC input.
- When changing the **OTcSel** parameters, the module requires several seconds to load the settings for the particular LTC or VITC outputs.

- When changing the **ModemSel** parameters, the module requires several seconds to load the settings for the phone or modem function.

Special Instructions for Operating a CSD-3902 Module

When using a CSD-3902 module, all of the operation notes apply except for the following:

- Only **BB1** is selectable with the **OpVidSel** parameter.
- Only **LTC1**, **LTC2** and **VITC1** are selectable with the **OTcSel** parameter.

MTG-3901 Parameter List

This chapter includes a complete list of parameter settings arranged according to the Tree View structure of your MTG-3901 module. Unlike the Operator and All List navigation modes, the Tree View is a multi-level structure that includes all of the available card-edge parameters.

For information about using the All List to navigate, view, and change parameter settings, see “Cross-Functional Parameter Changes” on page 208.

Navigating the Tree View

To navigate and then view or change a parameter from the Tree View, follow these steps:

1. Open the front panel of the NEO frame.
2. Press any card-edge control to turn on the VFD display.

   The message **MTG-3901** will appear as the banner on the card-edge display.
3. Press the ENTER button.

   The first two items in the Level One list will appear.
4. Click **Nav-** (down) on the **Nav-/Nav+** switch to view more items in the Level One list.
5. Select the desired item in the Level One list, and then press ENTER.

   This leads you to the Level Two list.

   Note

   If you do not wish to make changes to your settings, return to the previously selected item in the list, and then press **Escape** to move up a level. See **SelPar Adj Mode** in the **Setup** section at the end of the Tree View to enable or disable this delayed adjust mode feature.
6. Repeat steps 3 and 4 to view more items in Levels Two, Three, and Four.

7. If the parameter is selectable, slide the bar to the desired parameter using the **Nav+/Nav-**switch.

   OR

   Select the desired item in the Level Four list, and then press ENTER.

Note

After several seconds of inactivity, a scrolling message will appear, describing the purpose of the currently selected parameter.

8. Once the Level Four parameter is set or viewed, you can leave the parameter in its current state, or return to the banner. To return to the **MTG-3901** banner, repeatedly press the **Escape** button.
9. Close the front panel of the frame to ensure the cooling system continues to operate properly

Tree View Parameters

The Tree View is a multi-level list of parameters, arranged in the following main groups:

- Input
- Other
- Output
- Processing
- Setup

As with the other navigation modes, the module’s **Setup** parameters are located at the end of the Tree View.

Note

The factory recall parameter does not return **Setup** values to their original condition.

When navigating the Tree View parameter list of your MTG-3901 module, the following parameter notes should be observed:

- Parameters marked with the designation [RO] are “read-only.”
- Parameter options in **bold** text indicate the default user range or value.

- Parameters marked with double asterisks (**), after being set **On**, the module performs the command immediately, and then resets the parameter to **Off**.
- Parameters marked with a dagger (†), after being set to **On**, the module performs the command, and then resets the parameter to **Off**. In contrast to the parameters marked with double asterisks (**), these parameters are associated with a delayed command or a command that is to occur at a specified time.
- Parameters marked with a double dagger (‡) are updated by the module, depending on information that the module reads from the input data.

See page 215 for more information on the use of **Setup** parameters, which govern the operation of the card-edge controls.

If your module is not in Tree View mode, switch to Tree View via the card-edge control settings:

Setup > **Nav Mode** > **Tree View**

The following tables list all of the MTG-3901 parameter settings arranged according to the module's Tree View structure.

Input				
Clock	IpJamTim	Input Jam Sync Time	Sets the time when an input jam sync will occur	String (**00:00:00**)
	IpJamDat	Input Jam Sync Date	Sets the date when an input jam sync will occur	String (**2001-01-01**)
	IpJamFrq	Input Jam Sync Frequency	Sets how often the input jam sync will occur	String (**00001D**)
	IpJamNow	Input Jam Sync Now	Applies an immediate input jam signal	• On • **Off**
	IpJamDMode	Input Jam Sync Discontinuity Mode	Sets how system time discontinuity/interruptions are handled when an input jam sync occurs	• **SoftJamSyn** • HardJamSyn

Input *(Continued)*

IpTimeErr [RO]	Input Time Error	Displays the time error between the input reference time and internal time	String
IpTimeLock [RO]	Input Time Lock	Indicates whether the input time/ date are locked	• On • Off
TrigPpsSel	Trig/PPS Select	Sets the function of the Trip/PPS pin	• **Disable** • PPS • Trigg
VidVitcLin	Video VITC Line Position	Sets the line position of VITC input video	10 to 20 (clip) (**14**)
ATROfst	ATR Offset	Offset to be applied to the ATR input	String (**+00000S**)
ATROfstEn	ATR Offset Enable	Enables/disables the ATR offset	• On • **Off**
ATRRdTz	ATR Read Time zone	Sets whether to set the time zone that is provided in the ATR payload	• On • **Off**
TcSel	Input TC Select (For cross-functional parameter changes, see page 210).	Selects the TC input	• **LTC** • VITC
TcFrmtDet [RO]	TC Format Detect	Indicates format of input TC timecode	• NoSignal • FpsNTNDrop • FpsNTDrop • Fps25 • Fps24NDrop • Fps30NDrop • NotAvail
TcOfst	IC Offset	Offset to be applied to TC input	String (**+00000S**)

Input *(Continued)*

TcOfstEn	TC Offset Enable	Enables/disables the TC offset	• On • **Off**
TcUBits[RO]	TC User Bits Format Detect	Indicates format for incoming user bits	• SMPTE_12M • **Leitch12M** • SMPTE_309M • MJD_309M • LTCSpain
TcRdDate	TC Read Date	Sets whether to take date from user bits	• On • **Off**
TcRdAux	TC Read Auxiliary Offset	Sets whether to take offset from auxiliary bits	• On • **Off**
TcRdTZ	TC Read Time zone	Sets whether to the set time zone provided in the SMPTE-309M format	• On • **Off**
TcDSTOn‡	TC Input Automatic DST Detect	Sets whether or not the incoming TC input is DST compensated	• On • **Off**
TcAutoDST	TC Input Automatic DST Detect	Sets whether to detect plus/minus 1 hour differences and interpret it as DST for TC input	• On • **Off**
TcAutoLS	TC Input Automatic LS Detect	Sets whether to detect plus/minus 1 second differences and interpret it as LS change for TC input	• On • **Off**
GpsSrc	GPS Source	Sets the GPS receiver source	• GPS5300 • GPS1600 • GPS3901 • GPS3902 • **GPS3903**

Input *(Continued)*

	GpsCfgMode	GPS Configuration Mode	Sets whether the unit is to actively configure the GPS receiver or wait for another unit to configure it (passive mode)	• Active • **Passive**
	GpsSSSel	GPS Self Survey Select	Enables/disables the GPS receiver self-survey mode	• On • **Off**
	GpsSSProg [RO]	GPS Self Survey Progress	Indicates the percentage completion of the self-survey progress	0 to 100 (clip)
	GpsOneSat	GPS One Satellite	Sets whether or not one satellite only is suitable to obtain time/date reference	• On • **Off**
	GpsRcvTime [RO]	GPS Receive Time	Indicates whether the time received is GPS or UTC time	• GPS • UTC
	GpsDecStat [RO]	GPS Decoding Status	Indicates status of GPS receiver	• OK • SlfSrvy • NoGPSTime • PDOP_2High • NoUseSate • Only1Sat • Only2Sat • Only3Sat • SatUnstble • TraimRjFix
	GpsDisStat [RO]	GPS Discipling Status	Indicates the status of GPS discipling	• NoSigPres • GPSMalFunc • Normal • PowerUp • AutoHoldOv • ManHoldOv • Recovery • FastRecov • DiscDisab

Input *(Continued)*

GpsOfst	GPS Offset	Offset to be applied to the GPS input	String (**+00000S**)
GpsOfstEn	GPS Offset Enable	Enables/disables the GPS offset	• On • **Off**
GpsCallTim	GPS Call Time	Sets the GPS callout time	String (**HH:MM:SS**)
GpsCallDat	GPS Call Date	Sets the GPS callout date	String (**YYY-MM-DD**)
GpsCallFrq	GPS Call Frequency	Sets the GPS callout frequency	String (**00001D**)
GpsCallEn	GPS Call Enable	Enables/disables the GPS callout	• On • **Off**
RadioSrc	Radio Receiver Source	Sets the radio receiver source	• **PrecLocal** • PrecUTC
RadioStat [RO]	Radio Receiver Status	Indicates the status of the radio receiver	• NoSignal • Normal
RadOfst	Radio Receiver Offset	Offset to be applied to the radio receiver input	String (**+00000S**)
RadOfstEn	Radio Receiver Offset Enable	Enables/disables the radio receiver offset	• On • **Off**
RadCallTim	Radio Receiver Call Time	Sets the radio receiver callout time	String (**HH:MM:SS**)
RadCallDat	Radio Receiver Call Date	Sets the radio receiver callout date	String (**YYYY-MM-DD**)

Input *(Continued)*

RadCallFrq	Radio Receiver Call Frequency	Sets the radio receiver callout frequency	String (**00001D**)
RadCallEn	Radio Receiver Call Enable	Enables/disables the radio receiver callout	• On • **Off**
RadDSTOn‡	Radio Input DST On	Sets whether or not to recognize the incoming radio input as DST compensated	• On • **Off**
RadAutoDST	Radio Input Automatic DST Detect	Sets whether to detect plus/minus 1 hour differences and interpret it as DST for radio receiver input	• On • **Off**
RadAutoLS	Radio Input Automatic LS Detect	Sets whether to detect plus/minus 1 second differences and interpret it as DST for radio receiver input	• On • **Off**
CsdPhOfst	CSD USer Interface Phone Offset Apply	Sets to which device the phone offset set by user through the CSD user interface will be applied	• Modem • Phone • **ModemPhone**
ModemStat [RO]	Modem Status	Indicates the status of the external or internal modem	• NoCall • Normal • Busy • Redial • CallFailed • SrcCallFai • SrcTimeInv • SrcDiagFai • DlyWinBnd
ModOfst	Modem Offset	Offset to be applied to the external or internal modem input	String (**+00000S**)
ModOfstEn	Modem Offset Enable	Enables/disables the modem offset	• On • **Off**

Input *(Continued)*

ModPhNum	Modem Phone Number	Sets the telephone number of reference source for the external or internal modem calls for time and information	String (**T94164459408**)
ModCallTim	Modem Call Time	Sets the external or internal modem callout time	String (**HH:MM:SS**)
ModCallDat	Modem Call Date	Sets the external or internal modem callout date	String (**YYYY-MM-DD**)
ModCallFrq	Modem Call Frequency	Sets the external or internal modem callout frequency	String (**00001D**)
ModCallEn	Modem Call Enable	Enables/disables the external or internal modem callout	• On • **Off**
ModPhNow**	Modem Phone Now	Initiates an immediate external or internal modem call out to the reference source	• On • Off
ModHangUp**	Modem Hang up	Initiates an immediate hang up command to the external or internal modem input	• On • Off
ModOfstMs	Modem Offset in Milliseconds	Sets the offset between the current unit and input in milliseconds	0 to 999 (clip) (**0 ms**)
ModDlyLBnd	Modem Delay Window Lower Bound	Sets lower bound for delay window parameter (for asymmetric path delays)	0 to 999 (clip) (**0 ms**)
ModDlyUBnd	Modem Delay Window Upper Bound	Sets upper bound for delay window parameter (for asymmetric path delays)	1 to 9999 (clip) (**1 ms**)
ModDSTOn‡	Modem Input DST On	Sets whether to recognize the incoming external or internal modem input as DST compensated	• On • **Off**

Input *(Continued)*

ModAutoDST	Modem Input Automatic DST Detect	Sets whether to detect plus/minus 1 hour differences and interpret it as DST for external or internal modem input	• On • **Off**
ModAutoLS	Modem Input Automatic LS Detect	Sets whether to detect plus/minus 1 second differences and interpret it as LS change for external or internal modem input	• On • **Off**
ModHMSDST	Modem Automatic DST Detect on HMS Offset	Sets whether a HMS offset change of plus/minus 1 hour is to be interpreted as DST on CSD user interface through external or internal modem	• On • **Off**
ModHMSLS	Modem Automatic LS Detect on HMS Offset	Sets whether a HMS change of plus/minus 1 seconds is to be interpreted as LS change of CSD user interface through external or internal modem	• On • **Off**
SerStat [RO]	Serial Status	Indicates status of the RS-232 serial input	• NoCall • Normal • NoSignal • CallFailed • SrcCallFai • SrcTimeInv • SrcDiagFai
SerSrc	Serial Source	Sets the configuration for RS-232 serial input	• **CSD** • TCC_300 • TCC_600 • TCC_1200 • TCC_2400 • TCC_4800 • TCC_9600

Input *(Continued)*

SerOfst	Serial offset	Offset to be applied to the RS-232 serial input	String (**+00000S**)
SerOfstEn	Serial Offset Enable	Enables/disables the serial offset	• On • **Off**
SerCallTim	Serial Call Time	Sets the RS-232 serial input callout time	String (**HH:MM:SS**)
SerCallDat	Serial Call Date	Sets the RS-232 serial input callout date	String (**YYYY-MM-DD**)
SerCallFrq	Serial Call Frequency	Sets the RS-232 serial input callout frequency	String (**00001D**)
SerCallEn	Serial Call Enable	Enables/disables the RS-232 serial input callout	• On • **Off**
SerDSTOn‡	Serial Input DST On	Sets whether to recognize the incoming serial input is DST compensated	• On • **Off**
SerAutoDST	Serial Input Automatic DST Detect	Sets whether to detect plus/minus 1 hour differences and interpret it as DST for RS-232 serial input	• On • **Off**
SerAutoLS	Serial Input Automatic DST Detect	Sets whether to detect plus/minus 1 second differences and interpret it as DST for RS-232 serial input	• On • **Off**
SerHMSDST	Serial Auto DST Detect on HMS Offset	Sets whether an HMS offset change of plus/minus 1 hour is to be interpreted as DST on CSD user interface through RS-232 serial	• On • **Off**

Input *(Continued)*				
	SerHMSLS	Serial Auto LS Detect on HMS Offset	Sets whether an HMS offset change of plus/minus 1 second is to be interpreted as LS change on CSD user interface through RS232 serial	• On • **Off**
Genlock	VidStdDet [RO]	Video Standard Detect For cross-functional parameter changes, see page 209.	Indicates the input video standard detected	• NoSignal • NTSC • PAL-B • PAL-M • 1080i_60 • 1080i_5994 • 1080i_50 • 1080psf24 • 1080psf23 • 1080p_30 • 1080p_2997 • 1080p_25 • 1080p_24 • 1080p_2398 • 720p_60 • 720p_5994 • 720p_50
	VidLckMode	Video Lock Mode	Sets to which input to lock the video	• **AutoDetect** • Mono_HSync • ColorBurst
	VidLckStat [RO]	Video Lock Status	Indicates to which input video is locked	• Unlocked • Mono_HSync • ColorBurst
	VidBrstDet [RO]	Video Burst Detect	Indicates if input video contains burst	• On • Off
	VidEmbDet [RO]	Video Embedded Detect	Indicates if other information is embedded in the input video	• NoEmb • VITC • ATR • VITC_ATR

Input *(Continued)*

	VidEmbSel	Video Embedded Select	Sets whether to lock the time to VITC or ATR when locked to input video	• **None** • VITC • ATR
	VidGLSel	Genlock Select	Sets from which genlock source to select	• **ACO** • External
Routing	InputSrc	Primary Input Source For cross-functional parameter changes, see page 208.	Sets the primary source of reference time and/or date information	• **FreeRun** • LTC • GPS • 10M • LTC_10M • GPS_10M • Radio_10M • Modem_10M • Serial_10M • Phone_10M • Radio • NTP_10M • Modem • Serial • Video • LTC_Video • GPS_Video • RadioVideo • ModemVideo • Phone • Ser_Video • PhoneVideo • NTP_Video • NTP
	BackSrc1	Backup source 1 For cross-functional parameter changes, see page 209.	Sets the first backup reference source for input if primary source fails	Supports the same user range values as **InputSrc** (See InpuSrc above)

Input *(Continued)*				
	BackSrc2	Backup source 2	Sets the second backup reference source for input if primary and first backup sources fail	Supports the same user range values as **InputSrc** (See InpuSrc above)
	CurlpSrc	Current Input Source	Displays the current input source based on the input and the two backup sources	Supports the same user range values as **InputSrc** (See InpuSrc above)
	TenMhzSel	Ten MHz Select	Indicates from which 10 MHz signal to select	• **External** • MI
	ModemSel	Modem Select (For cross-functional parameter changes, see page 211.)	Sets whether to use the internal modem (phone) or an external modem (modem) as the modem input	• **Phone** • Modem
Synchronize	IpFreqLock [RO]	Input Frequency Lock	Indicates to which reference the module is locked	• None • DataNoLock • DataLock • PPS • TenMhz • InputVideo • TenMhzPPS

Other				
	NTP_Enable	NTP Enable	Enables/disables the NTP daemon	• **On** • Off
	NTP_Status [RO]	NTP Status	Indicates whether NTP daemon is running	• On • Off
	NPTLLogMsg [RO]	NTP Last Log Message	Indicates the last message in sys. log of the NTP daemon	String

Other *(Continued)*

	FctryRcl	Factory Recall	Restores factory settings for calibrated parameters	• **Yes** • No
	EthIPMask	Ethernet IP Mask	Used to store the IP mask for the external Ethernet port	String
	EthIPAddr	Ethernet IP Address	Used to store the IP address for the external Ethernet port	String
	DGatIPAddr	Ethernet Default Gateway IP Address	Used to store the IP address of the gateway when using NTP	String

Output

Clock	OTenFEn	Output Video 10 Field Enable For cross-functional parameter changes, see page 210.	Enables/disables the 10 field sequence in the black burst output	• On • **Off**
	OATREn	Output Video ATR Enable (For cross-functional parameter changes, see page 210.	Enables/disables ATR in the black burst output	• On • **Off**
	OATRTrVid	Output Video ATR Track Video	Sets whether to use the ATR time to tracks the video phasing	• **NoTrack** • ATROffset • ATRTime
	OATROfst[RO]	Output ATR Offset	Indicates the offset value currently applied to the ATR output	String **(+0000000S)**
	OATROSet	Output ATR Offset Set	Offset to be applied to the ATR output	String (**+0000000S**)
	OATROTTim	Output ATR Offset Trigger Time	Sets the time when the output ATR offset will be applied	String (**HH:MM:SS**)

Output *(Continued)*

OATROTDat	Output ATR Offset Trigger Date	Indicates the date when the output ATR offset will be applied	String (**YYYY-MM-DD**)
OATRODlyT†	Output ATR Offset Delay Trigger (For cross-functional parameter changes, see page 210.)	Enables/disables the trigger that is to apply the offset to the output ATR at the specified time and date	• On • **Off**
OATROLvlT	Output ATR Offset Level Trigger	Applies offset to output ATR when set On (retains existing offset when set Off)	• On • **Off**
OATRClOff	Output ATR Clock Offset (For range changes, see page 212),	Applies phasing in 27M clocks to output ATR	0 to 63519 (clip) (**0.0** µs)
OATRLiOff	Output ATR Line Offset (For range changes, see page 212),	Applies phasing in lines to output ATR	0 to 524 (clip) (**0 Ln**)
OATRFrOff	Output ATR Frame Offset (For range changes, see page 212),	Applies frame offset to output ATR	0-29 (clip) (**0 frm**)
OVitcEn	Output Video VITC Enable	Enables/disables the VITC in the black burst output	• On • **Off**
OVitcLine	Output Video VITC Line Position (For cross-functional parameter changes, and range changes, see page 210 and page 212.)	Sets the line position of VITC in BB output	10 to 20 (clip) (**14**)
OVitcLine2	Output Video VITC Line 2 Position (For range changes, see page 212)	Sets the 2nd line position of VITC in BB output	10 to 20 (clip) (**14**)
CsdLtcUDst	CSD User Interface LTC Destination	Sets the LTC output to which all CSD user interface controls will apply	• **LTC1** • LTC2

Output *(Continued)*

OTcUtcTim	Output Time Code UTC Time Mode	Set whether the timecode output is to generate UTC time	• On • **Off**
OTcLSTim [RO]	Output Time Code UTC Leap Seconds Apply Time	Indicates the UTC time when a leap second change will be applied for UTC timecode output	String (**NotApplied)**
OTcFrmt	Output Time Code Format	Sets output timecode format	• FpsNTNDrop • FpsNTDrop • Fps25 • Fps24NDrop • **Fps30NDrop** • 274M_NTNDr • 274M_NTDrp • 274M_30NDr
OTcOfst[RO]	Output Time Code Offset	Indicates the offset currently applied to the output timecode	String (**+0000000S**)
OTcOSet	Output Time Code Offset Set	Offset to be applied to output timecode	String (**+0000000S**)
OTcOTTim	Output Time Code Offset Trigger Time	Sets the time when the output TC offset will be applied	String (**HH:MM:SS**)
OTcOTDat	Output Time Code Offset Trigger Date	Sets the date when the output TC offset will be applied	String (**YYYY-MM-SS**)
OTcODlyT†	Output Time Code Offset Delay Trigger	Enables/disables the trigger that is to apply an offset to the output timecode at the specified time and date	• On • **Off**
OTcOLvIT	Output Time Code Offset Level Trigger	Applies offset to output timecode when set On (retains existing offset when set Off)	• On • **Off**
OTcClOff	Output Time Code Clock Offset	Applies phasing in 27M clocks to output timecode	0 to 63519 (clip) (**0.0** µs)

Output *(Continued)*

OTcLiOff	Output Time Code Line Offset	Applies phasing in lines to output timecode	0 to 524 (clip) (**0 Ln**)

OTcFrOff	Output Time Code Frame Offset	Applies frame offset to output timecode	0 to 29 (clip) (**0 frm**)

OTcUBits	Output Time Code User Bits Format (For cross-functional parameter changes, see page 211.)	Sets output timecode user bit format	• SMPTE_12M • **Leitch12M** • SMPTE_309M • MJD_309M • LTCSpain

OTcAux	Output Time Code Auxiliary. Offset	Sets the auxiliary offset to be applied to output timecode	0 to 120 (clip) (**0.0 hr**)

OTcAPM	Output Time Code Auxiliary Offset (Plus/Minus)	Sets the direction of auxiliary offset to be applied to output timecode	• Minus • **Plus**

OTcAEn	Output Time Code Auxiliary Offset Enable	Enables/disables the auxiliary offset in output timecode	• On • **Off**

OTcMode	Output Time Code Mode	Set output timecode	• **SendDate** • ClearUBits • CopyUBits

OTc_12Hr	Output Time Code (12 Hour)	Sets output timecode to 12 hour format	• On • **Off**

OTcClrCF	Output Time Code Clear Color Frame Flag	Clears color frame flag on output timecode	• On • **Off**

OTcCFSts [RO]	Output Time Code Color Frame Status	Shows setting on output timecode bits (color frame flag)	• On • Off

OTcDMode	Output Time Code Discontinuity Mode	Sets how discontinuity is handled in output timecode	• SoftJamSyn • **HardJamSyn**

Output *(Continued)*

OTcJSTim	Output Time Code Jam Sync Time	Sets time when a timed jam sync will occur in the output timecode	String (**HH:MM:SS**)
OTcJSDat	Output Time Code Jam Sync Date	Sets date when a timed jam sync will occur in output timecode	String (**YYYY-MM-DD**)
OTcJSFrq	Output Time Code Jam Sync Frequency	Indicates how often the jam sync will occur in output timecode	String (**00001D**)
OTcJSEn	Output Time Code Jam Sync Enable	Enables/disables the scheduled jam sync in the output timecode	• On • **Off**
OTcJSNow**	Output Time Code Jam Sync Now	Applies an immediate manual jam sync in the output timecode	• On • **Off**
OTcSynCF	Output Time Code Sync Color Frame	Sets whether to jam sync output timecode to proper color frame relationship	• On • **Off**
OTcSkSts [RO]	Output Time Code Skew Status	Indicates whether output timecode is in skew mode or not	• On • Off
ModAutoAns	Modem Auto Answer	Enables/disables unit to automatically answer any incoming calls for time information	• On • **Off**
ModSysMoEn	Modem System Modes Enable	Sets whether a remote user can access the system mode using the external (RS-232) modem	• On • **Off**
SerTccOp	Serial TCC Output Mode	Sets the output type for TCC output mode	• **TimeOnly** • TimeFrames
SerTccDst	Serial TCC LTC Destination	Sets to which LTC output to associate the TCC output	• **LTC1** • LTC2

Output *(Continued)*				
	SerTccUDst	Serial TCC UI Dest	Sets to which LTC output to associate the TCC UI	• **LTC1** • LTC2
Routing	OpVidSel	Output Video Select For cross-functional parameter changes, see page 209.	Selects which blackburst output controls to use	• **BB1** • BB2 • BB3 • BB4
	OTcSel	Output Time Code Select (For cross-functional parameter changes, see page 210.)	Selects which output timecode controls to use	• **LTC1** • LTC2 • VITC1 • VITC2 • VITC3 • VITC4
Synchronization	DarsEn	Dars Enable	Enables DARS on output	• **Off** • Dars_NTSC • Dars_PALB
	ImpStart	Impulse Start	Issues a start command to impulse clocks	• On • **Off**
	ImpFaceTim	Impulse Face Time	Sets the time that is currently on the impulse clocks	String (**HH:MM:SS**)
	ImpShCct [RO]	Impulse Short Circuit Warning	Indicates that a short circuit has been detected in the impulse drive connection	0 to 5000000 (clip)

Output *(Continued)*				
Synchronize	HzOut	Hz Out	Sets the output rate for the Hz Out	• **Disable** • Hz1 • Hz23_98 • Hz24 • Hz25 • Hz29_97 • Hz30 • Hz50 • Hz59_94 • Hz60
	HzPhasing	Hz Phasing	Offset for the Hz Out	-999 to 999 (clip) (**0** ms)
TestGen	OpVidEn	Output Video Enable	Enables/disables the selected black burst output	• On • **Off**
	OpVidStd	Output Video Standard For cross-functional parameter changes, see page 209.	Sets video standard for the selected black burst video output	• **NTSC** • PAL-B • PAL-M • 1080i_60 • 1080i_5994 • 1080i_50 • 1080psf24 • 1080psf23 • 1080p_30 • 1080p_2997 • 1080p_25 • 1080p_24 • 1080p_2398 • 720p_60 • 720p_5994 • 720p_50
	OpVidSetup	Output Video Setup Enable	Enables/disables setup within the black burst output	• On • **Off**

Output *(Continued)*

	OpFPhase	Output Video Fine Phase	Fine phasing controls for BB output in sub-27M clock phasing	0 to 36892 (wrap) (**0.0 ns**)
	OpHPhase	Output Video Horizontal Phase (For range changes, see page 212),	Controls horizontal phasing for BB output	0 to 63519 (wrap) (**0.0** µs)
	OpVPhase	Output Video Vertical Phase (For range changes, see page 212),	Controls vertical phasing for BB output	0 to 524 (wrap) (**0 Ln**)
	OpFrmPhase	Output Video Frame Phase (For range changes, see page 212),	Controls frame phasing for BB output	0 to 4095 (clip) (**0 frm**)

Processing

Clock	Time_Disp [RO]	Display Time and Date	Displays current time and date	String
	Date [RO]	Display Date	Displays local date	String
	LpSecs [RO]	Leap Seconds Offset	Indicates the prevailing leap seconds offset in the system	-59 to 59 (clip)
	LpSecsChng [RO]	Leap Seconds Changed	Indicates if a leap second change will occur at the output	• On • Off

Processing *(Continued)*				
	Loc [RO]	Locale	Indicates the current locale	• **NoLocale** • Greenwich • SAfrica+2 • Israel+2 • SaudArb+3 • Russia+3 • Iran+3.5 • Arabia+4 • Afghn+4.5 • WAsia+5 • India+5.5 • CAsia+6 • MonorCasab • Bangkok+7 • Beijing+8 • Taipei+8 • Tokyo+9 • Adeld+9.5 • Darwn+9.5 • Brisbn+10 • EAustl+10 • WPacif+10 • Tasman+10 • WEurope+1 • CPacif+11 • Fiji+12 • NewZld+12 • Azores-1 • MidAtln-2 • Brasili-3 • SAmEast-3 • Nfld-3.5 • Atlanti-4 • SAmWest-4 • Romance+1 • SAmPacf-4 • Eastern-5 • EIndian-5

Processing *(Continued)*

	Loc [RO] (Continued)	Locale (Continued)	Indicates the current locale (Continued)	• Mexico-6 • Sasktch-6 • Arizona-7 • Mountai-7 • Pacific-8 • Alaska-9 • PragBra+1 • Hawaii-10 • Samoa-11 • Dateln-12 • Warsaw+1 • GrFinTu+2 • Egypt+2 • EEurope+2

Processing *(Continued)*

TZ [RO]	Time Zone	Indicates the current timezone	• **UTC** • UTC-01:00 • UTC-00:30 • UTC-01:30 • UTC-02:30 • UTC-03:30 • UTC-04:30 • UTC-05:30 • UTC-10:00 • UTC-11:00 • UTC-12:00 • UTC+13:00 • UTC-02:00 • UTC+12:00 • UTC+11:00 • UTC+10:00 • UTC+09:00 • UTC+08:00 • UTC+07:00 • UTC-06:30 • UTC-07:30 • UTC-08:30 • UTC-09:30 • UTC-03:00 • UTC-10:30 • UTC-11:30 • UTC+06:00 • UTC+05:00 • UTC+04:00 • UTC+03:00 • UTC+02:00 • UTC+01:00 • UTC-04:00 • UTC+11:30 • UTC+10:30 • UTC+09:30 • UTC+08:30 • UTC+07:30 • UTC+06:30 • UTC-05:00

Processing *(Continued)*

TZ [RO] (Continued)	Time Zone (Continued)	Indicates the current timezone (Continued)	• UTC+12:45 • UTC+05:30 • UTC+04:30 • UTC-06:00 • UTC+03:30 • UTC+02:30 • 1UTC+01:30 • UTC+00:30 • UTC-07:00 • UTC-08:00 • UTC-09:00
DST [RO]	Daylight Savings Time	Indicates whether DST is enabled or not	• On • Off
LpYr [RO]	Leap Year	Indicates whether or not the current year is a leap year	• Yes • No
SetTime	Set Time	Sets new time	String (**HH:MM:SS)**)
SetDate	Set Date	Sets new date	String (**YYYY-MM-DD**)
SetTimTrig†	Set Time Trigger (For cross-functional parameter changes, see page 208).	Sets the time and date using the external trigger	• **Off** • Time • Date • Time_Date • DSTTime • DSTTimDa
SetTimeNow**	Set time now	Sets the time and date immediately	• **Off** • Time • Date • Time_Date • DSTTime • DSTTimDa

Processing *(Continued)*

	SetLocale	Set Locale (For cross-functional parameter changes, see page 208).	Sets the current locale	• **NoLocale** • Greenwich • SAfrica+2 • Israel+2 • SaudArb+3 • Russia+3 • Iran+3.5 • Arabia+4 • Afghn+4.5 • WAsia+5 • India+5.5 • CAsia+6 • MonorCasab • Bangkok+7 • Beijing+8 • Taipei+8 • Tokyo+9 • Adeld+9.5 • Darwn+9.5 • Brisbn+10 • EAustl+10 • WPacif+10 • Tasman+10 • WEurope+1 • CPacif+11 • Fiji+12 • NewZld+12 • Azores-1 • MidAtln-2 • Brasili-3 • SAmEast-3 • Nfld-3.5 • Atlanti-4 • SAmWest-4 • Romance+1 • SAmPacf-4 • Eastern-5 • EIndian-5 • Central-6

Processing *(Continued)*

SetLocale (Continued)	Set Locale (For cross-functional parameter changes, see page 208).	Sets the current locale	• Mexico-6 • Sasktch-6 • Arizona-7 • Mountai-7 • Pacific-8 • Alaska-9 • PragBra+1 • Hawaii-10 • Samoa-11 • Dateln-12 • Warsaw+1 • GrFinTu+2 • Egypt+2 • EEurope+2
SetTZ	Set Timezone	Sets the current timezone	• **UTC** • UTC-01:00 • UTC-00:30 • UTC-01:30 • UTC-02:30 • UTC-03:30 • UTC-04:30 • UTC-05:30 • UTC-10:00 • UTC-11:00 • UTC-12:00 • UTC+13:00 • UTC-02:00 • UTC+12:00 • UTC+11:00 • UTC+10:00 • UTC+09:00 • UTC+08:00 • UTC+07:00 • UTC-06:30 • UTC-07:30 • UTC-08:30 • UTC-09:30

Processing *(Continued)*

SetTZ (Continued)	Set Timezone	Sets the current timezone	• UTC-03:00 • UTC-10:30 • UTC-11:30 • UTC+06:00 • UTC+05:00 • UTC+04:00 • UTC+03:00 • UTC+02:00 • UTC+01:00 • UTC-04:00 • UTC+11:30 • UTC+10:30 • UTC+09:30 • UTC+08:30 • UTC+07:30 • UTC+06:30 • UTC-05:00 • UTC+12:45 • UTC+05:30 • UTC+04:30 • UTC-06:00 • UTC+03:30 • UTC+02:30 • UTC+01:30 • UTC+00:30 • UTC-07:00 • UTC-08:00 • UTC-09:00
DSTMode	DST Mode	Sets which DST mode to use	• **NoDST** • ManualDST • AutoDST • InputDST
MnDSTOnTim	Manual DST On Time	Sets the DST on time	String (**HH:MM:SS**)
MnDSTOnRul	Manual DST On Rule	Sets the rule when DST will be on	String (**WLD7M10**)

Processing *(Continued)*

MnDSTOfTim	Manual DST Off Time	Sets the DST off time	String (**HH:MM:SS**)
MnDSTOnRul	Manual DST OnffRule	Sets the rule when DST will be off	String (**WLD7M10**)
MnDSTEdgTr	Manual DST Edge Trigger (For cross-functional parameter changes, see page 208.)	Enables/disables custom manual DST times and rules	• On • **Off**
MnDSTEn	Manual DST Enable	Sets DST On or Off when in manual DST mode	• On • **Off**
LpSecsTim	Leap Seconds Apply Time	Sets local time when leap second change will be applied	String (**00:00:00**)
MnLpSeTDat	Manual Leap Seconds Trigger Date	Sets the date when the programmable leap seconds will be applied	• **Dec_31** • Jun_30 • Mar_31 • Sep_30
MnLpSeDelt	Manual Leap Seconds Trigger Delta	Sets the change in the leap seconds at the programmed date	-1 to 1 (clip) (**0** s)
MnLpSeDlyE†	Manual Leap Seconds Delay Edge Trigger	Schedules an upcoming leap second change	• On • **Off**
msOfst	Millisecond Offset	Millisecond offset to be applied	-999 to 999 (clip) (**0 ms**)
msOfstNow**	Millisecond Offset Now	Sets the millisecond offset immediately	• On • **Off**
LocOfst	Local Offset	Local offset to be applied	String (**+00000S)**
LocOfstTim	Local Offset Time	Set the time when the local offset is to be applied	String (**HH:MM:SS**)

Processing *(Continued)*				
	LocOfstDat	Local Offset Date	Set the date when the local offset is to be applied	String (**YYYY:MM:DD**)
	LocOfsDlyE†	Local Offset Delay Edge Trigger (For cross-functional parameter changes, see page 208.)	Enables/disables the trigger that applies the offset at the scheduled time and date	• On • **Off**
	LocOfstNow**	Local Offset Now	Sets the local offset immediately	• On • **Off**
	SerTccCtrl	Serial TCC Control Mode	Sets the configuration of TCC mode	• **ClientMode** • OutputTime • CrtlMode
Multiplex	DualSerEn	Dual Serial Port Enable	Allows two serial ports to be available on the DB9 connector, and determines which input source to connected to the Secondary port	• **Off** • BackScndry • PrimScndry
Routing	OperMod [RO]	Operational Mode (For Cross-functional parameter changes, see page 208).	Indicates whether the MTG is a stand-alone unit or part of an ACO redundant system (MTG-3901/ CSD-3902-SYS-*X* system)	• Standalone • Primary • Backup
	ACOSlotId [RO]	Master ACO Slot Id	Indicates the Slot ID of the master ACO	String
	SynCfgMode	Synchronization Configuration Mode	Sets the configuration mode of the primary and backup MTG when acquiring time and synchronizing with one another	• **ACO** • External

Cross-Functional Parameter Changes

Changes that are made to parameter settings sometimes cause unexpected changes in other parameter settings. The following table lists the forced settings and disabled parameters that result when certain parameter settings are changed.

Table 4-1. Cross-Functional Parameter Changes

Condition	Forced Setting	Changed Parameters
OperMod	**OperMod** = Primary and **OpVidSel** = BB1	**VidGLSel** = External **OpVidStd** = • NTSC • PAL_B • PAL_M (TriLevel Sync formats are disabled)
OperMod	**OperMod** = Primary and **OpVidSel** is not BB1	**VidGLSel** = External
OperMod	**OperMod** = Backup	**VidGLSel** = ACO
OperMod	**OperMod** = Standalone	**VidGLSel** = External
SetTimTrig	**SetTimTrig** = • Time • Date • Time_Date • DSTTime • DSTTimDat	**SetTimNow** is disabled
SetLoc	**SetLoc** = NoLocale	**SetTZ** is disabled
MnDSTEdgTr	**MnDSTEdgTr** = On	**MnDSTEn** is disabled
LocOfsDlyE	**LocOfsDlyE** = On	**LocOfstNow** is disabled
InputSrc	**InputSrc** = • GPS • Radio • Modem	Serial sources are disabled in **BackSrc1** and all RS-232 sources are disabled in **BackSrc2**

Table 4-1. Cross-Functional Parameter Changes*(Continued)*

Condition	Forced Setting	Changed Parameters
InputSrc	**InputSrc** = Serial	All RS-232 sources in **BackSrc1** and **BackSrc2** are disabled
BackSrc1	**BackSrc1** = •GPS •Radio •Modem •Serial	All RS-232 sources in **BackSrc2** are disabled
VidStdDet	**VidStdDet** is not NTSC, PAL_B or PAL_M	**VidVitcLin** is disabled
OpVidSel	BB1, BB2, BB3 or BB4	A separate set of values will be stored for output video parameters: **OpVidEn, OpVidSetup, OTenFEn, OATR**… parameters depending on what **OpVidSel** is set to In addition, for each given standard (NTSC, PAL_M, PAL_B, etc.) in a particular video output, a separate set of values will be stored for **OVitc…** and **Op…Phase** parameters
OpVidStd	**OpVidStd** = PALB	**OpVidSetup** is disabled
OpVidStd	**OpVidStd** = TRI1080I30	**OpVidSetup** is disabled **OTenFEn** is disabled **OATR…** parameters are disabled

Table 4-1. Cross-Functional Parameter Changes*(Continued)*

Condition	Forced Setting	Changed Parameters
OpVidStd	**OpVidStd** = • TRI1080I23 • TRI1080I24 • TRI1080I25 • TRI1080I29 • TRI1080P23 • TRI1080P24 • TRI1080P25 • TRI1080P29 • TRI1080P30 • TRI720P50 • TRI720P59 • TRI720P60	**OpVidSetup** is disabled **OTenFEn** is disabled **OATR…** parameters are disabled **OVitc…** parameters are disabled
OTenFEn	**OTenFEn** = On	Skip line 15 on **OVitcLine** and **OVitcLine2**
OATREn	**OATREn** = On	Skip line 12 on **OVitcLine** and **OVitcLine2**
OATRODlyT	**OATRODlyT** = On	**OATROLvlT** is disabled
OVitcLine	**OVitcLine** = line x	Skip line x on **OVitcLine2**
TcSel	**LTC** or **VITC**	A separate set of values will be stored for **Tc…** parameters depending on what **TcSel** is set to

Table 4-1. Cross-Functional Parameter Changes*(Continued)*

Condition	Forced Setting	Changed Parameters
OTcSel	**LTC1**, **LTC2**, **VITC1**, **VITC2**, **VITC3** or **VITC4**	A separate set of values will be stored for **OTc…** parameters depending on what **OTcSel** is set to **OTcClOff**, **OTcLiOff**, **OTcFrOff**, **OTcDMode** are disabled for **VITC1**, **VITC2**, **VITC3** and **VITC4** In addition, for each given output timecode standard (**Fps30NDrop**, **Fps25**, etc.) in **LTC1** or **LTC2**, a separate set of values will be stored for **OTcClOff**, **OTcLiOff** and **OTcFrOff** parameters
OTcDlyT	**OTcDlyT** = On	**OTcLvlT** is disabled
OTcUBits	**SMPTE_309M** or **MJD_309M**	**OTcMode** is disabled (force option to **SendDate**)
ModemSel	**Modem** or **Phone**	A separate set of values will be stored for **Mod…** parameters depending on what **ModemSel** is set to
ModCallEn	**ModCallEn** = On	**ModPhNow** is disabled
SerSrc	**SerSrc** = • TCC300 • TCC600 • TCC1200 • TCC2400	**SerTccOp** = **TimeOnly** (**TimeFrames** is disabled)

In addition, the following parameters' default value and range will change depending on a change in another parameter setting — specifically for video standard and/or timecode formats.

Table 4-2. Parameter Default Value and Range Changes

Video Standard	Video Parameter	Default Value/Range Change
NTSC/PAL-M	**OVitcLine** **OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Default = 14 Range = 10-20 • Default = 16 Range = 10-20 • Range = 0 – 63.519µs • Range = 0 – 524 lines • Range = 0 – 29 frames
PAL-B	**OVitcLine** **OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Default = 19 Range = 6-22 • Default = 21 Range = 6-22 • Range = 0 – 63.963µs • Range = 0 – 624 lines • Range = 0 – 24 frames
1080I_60	**OVitcLine** **OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Default = 14 Range = 7-40 • Default = 16 Range = 7-40 • Range = 0 – 29.593µs • Range = 0 – 1124 lines • Range = 0 – 29 frames
1080I_5994	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 29.622µs • Range = 0 – 1124 lines • Range = 0 – 29 frames
1080I_50	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 35.519µs • Range = 0 – 1124 lines • Range = 0 – 24 frames
1080psf_24	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 37.000µs • Range = 0 – 1124 lines • Range = 0 – 23 frames
1080psf_23	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 37.037µs • Range = 0 – 1124 lines • Range = 0 – 23 frames

Table 4-2. Parameter Default Value and Range Changes*(Continued)*

Video Standard	Video Parameter	Default Value/Range Change
1080p_30	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 29.593µs • Range = 0 – 1124 lines • Range = 0 – 29 frames
1080p_2997	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 29.622µs • Range = 0 – 1124 lines • Range = 0 – 29 frames
1080p_25	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 35.519µs • Range = 0 – 1124 lines • Range = 0 – 24 frames
1080p_24	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 37.000µs • Range = 0 – 1124 lines • Range = 0 – 23 frames
1080p_2398	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 37.037µs • Range = 0 – 1124 lines • Range = 0 – 23 frames

Table 4-2. Parameter Default Value and Range Changes*(Continued)*

Video Standard	Video Parameter	Default Value/Range Change
720p_60	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 22.185µs • Range = 0 – 749 lines • Range = 0 – 59 frames
720p_5994	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 22.207µs • Range = 0 – 749 lines • Range = 0 – 59 frames
720p_50	**OVitcLine/OVitcLine2** **OATRClOff/OpHPhase** **OATRLiOff/OpVPhase** **OATRFrOff/OpFrmPhase**	• Disabled • Range = 0 – 26.630µs • Range = 0 – 749 lines • Range = 0 – 49 frames

Setup Parameters

You can modify the **Setup** parameters to configure the card-edge controls for your personal needs.

Note

Setup parameters on a local or remote control panel may be different from the card-edge parameters described here.

The **Setup** section appears at the end of all three navigation lists and consists of these items:

- Alarms
- Navigation modes
- Adjustment modes
- Browse modes
- Scroll modes
- Display intensity
- Parameter descriptions
- Name
- FrameIP
- Sync full
- About mode

Table 4-3 provides a tree view list of the MTG-3901 **Setup** parameters.

Table 4-3. Setup Parameters

Parameter	Parameter Name	Option
Alarms	Configuration	(list of module alarms)
	Active Alarms	(list of active alarms)
Nav Mode	Navigation Mode	• All List • Tree View • Oper List*

Table 4-3. Setup Parameters *(Continued)*

Parameter	Parameter Name	Option
SelPar Adj	Selectable Parameter Adjustment Mode	• Immediate • Delayed
Brsw Mode	Browse Mode	• Param List • Param+Val
Scrl Mode	Scroll Mode	• WRAP • DON'T WRAP
Disp Inten	Display Intensity	• 100% • 50% • 25% • 12%
Param Desc	Parameter Description	• Disabled • Enabled
Name	Device Name	MTG-3901 or CSD-3902
Frame IP	NEO Frame IP Addresses	• IP Address • Subnet • Gateway
SyncFull	Using this feature, you can manually override the Deja View data for the module with the most-up-to-date parameter settings, instead of waiting for the five minute update cycle.	• Yes • No
About	Provides information about the module version (hardware) and firmware version (software).	• Hw_Ver • Sw_Ver

See your *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual* for more information on **Setup** items, including descriptions and operation notes.

Alarms

MTG-3901 and CSD-3902 modules provide a default list of six alarms. You can disable any alarm by modifying the **Alarms** parameter in the **Setup** section.

When you select **Alarms**, all of the active alarms are visible in the display, below **Config** (Configurations). If no alarms are active, only **Config** appears.

Alarm Synchronization

Alarm synchronization is available for this module if your NEO frame contains a 3901RES-E resource module that supports the feature. When active, alarm synchronization ensures that the alarm configuration settings of card-edge controls and the CCS control software and control panels are consistent.

If the MTG-3901 and CSD-3902 module is set for local control, the alarm settings will appear the same at both the card edge and via CCS, but the settings can only be changed using the card-edge controls. If the module is set for remote control, the alarm settings can be changed via both the card edge and CCS control software and control panels.

Alarm configuration settings undergo DejaView (state recovery) automatically. This means that when a module is hot-swapped, the alarm configuration for the new module is updated to the settings of the module that was previously in that slot. See “State Recovery Parameter Availability” in this chapter for more information.

Identifying the Cause of an Alarm

To identify the reason for an alarm, select the active alarm, and then press **Enter**. A scrolling message appears on the VFD describing the cause of the fault.

Enabling or Disabling an Alarm Parameter

To enable or disable an alarm parameter, follow these steps:

1. Select **Alarms**, then select **Config**, and then press **Enter**.
2. Select one of the alarm parameters, and then press **Enter**.
3. Press **Enabled** or **Disabled**.
4. Press **Enter** to activate the selection.

Restoring Default Settings

To restore the alarms to their default settings, follow these steps:

1. Select **Alarms**, select **Config**, and then press **Enter**.
2. Scroll down the list of alarms, and then select **Reset.**
3. Press **Enter** to activate the selection.

Table 4-4 lists the default alarm settings for the MTG-3901. These settings can be enabled or disabled, but the level of the alarm (“Major” or “Minor”) cannot be changed.

Table 4-4. Default Alarm Settings for the MTG-3901

Card-Edge Alarm	Name of Alarm	Alarm Level	Meaning
IpTimeLock	Input Time Lock	Info	Input Time Lock is **Off**
IpFreqLock	Input Frequency Lock	Minor	Input Freq Lock is **None** or **DataNoLock**
ImpShCct	Impulse Short Circuit Warning	Minor	Impulse Short Circuit Warning is **Yes**
VidStdDet	Video Standard Detect	Minor	Video Standard Detect is **NoSignal**
VidBrstDet	Video Burst Detect	Minor	Video Burst Detect is **Off**

LED Indicator Overview

The MTG-3901 module has six card-edge LEDs and four standard module indicators. (See page 220 for the meanings of the LED indicators. See page 221 for the meanings of the module indicators.)

The module generates visible alarm signals to alert users of failures or impending failures. These alarm signals can be found in the following locations:

- As red or yellow LEDs on the front module card-edge
- As red or yellow LEDs on the 3901AIC Alarm Interconnect Module or the 3901RES-E Resource Module (visible via light pipes through the frame’s front panel)
- As part of a list of activated alarms found in the Setup menu
- In external systems connected to the alarm contact closures at the back of the NEO frames
- On a PC screen where CCS-Pilot™ or another GUI-based control application is being used

LED Locations

Alarm signals are generated both by the decoder modules, and by other modules and components in the NEO frame. For details on these alarms, refer to the relevant frame or module manuals.

Figure 4-1 illustrates the locations of the LEDs and standard module indicators of the MTG-3901.

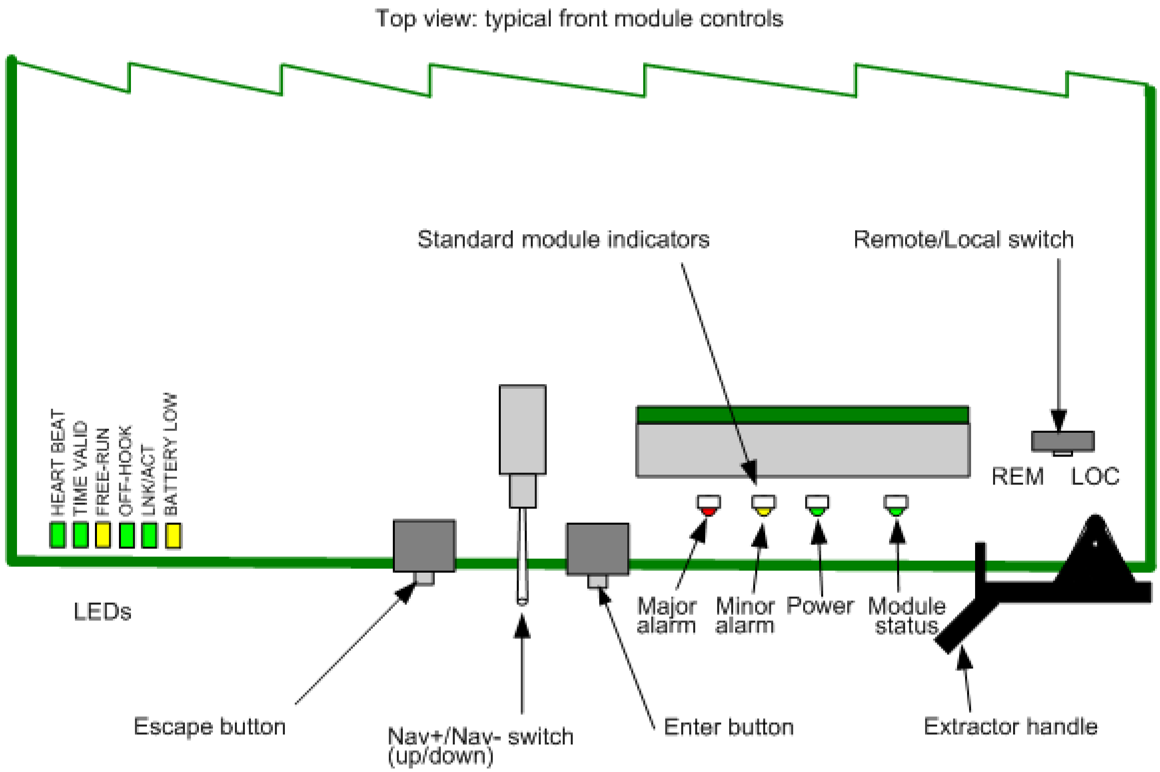

Figure 4-1. Card-Edge LEDs and Standard Module Indicators, Top View

LED Indicators Descriptions

Table 4-5 describes the meaning of each MTG-3901-specific LED indicator:

Table 4-5. LED Indicators and Meanings

LED Indicator	Color	Meaning (When Illuminated)
HEART BEAT	Green	Flashes to indicate that the processor is alive and running.
TIME VALID	Green	Indicates that a valid time has been set on the MTG-3901.
FREE-RUN	Yellow	Indicates No Reference.

Table 4-5. LED Indicators and Meanings *(Continued)*

LED Indicator	Color	Meaning (When Illuminated)
OFF HOOK	Green	Indicates that the modem is off-hook and is either making a call or answering a call.
LNK/ACT	Green	• Solid: Indicates that an Ethernet link has been established. • Blinking: Indicates that there is an Ethernet link and activity is occurring. • Off: There is no Ethernet link.
BATTERY LOW	Yellow	Indicates that the on-board battery is low and should be replaced. See Appendix B (page 278) for servicing instructions.

Card-Edge Standard Module Indicators

Table 4-6 describes the meaning of each standard NEO module card-edge LED indicator:

Table 4-6. Card-Edge LEDs and Meanings

LED Name	Color	Meaning (When Illuminated)
Major Alarm	Red	Currently not used
Minor Alarm	Yellow	Minor alarm has occurred. See Chapter 4, “Alarms” (page 217).
Power	Green	Power is being provided to the module.
Module Status	Green	The module is configured, loaded, and operational.

Chapter 5

Network Time Protocol (NTP) Support

Overview

The MTG-3901 supports Network Time Protocol (NTP) through the ntp-4.1.1a software distribution application. This application is a sophisticated, hybrid client/server application capable of acquiring time and date information from NTP servers, and then distributing this information to NTP clients. For more information, see the NTP Project website at www.ntp.org.

NTP-4.1.1A Copyright

The following copyright notice applies to the ntp-4.1.1a software implementing the Network Time Protocol (NTP) on the MTG-3901 and CSD-3902, and to all documentation in this manual.

MTG-3901 Network Time Protocol Support

The MTG-3901 NTP application continuously performs client and server operations. Depending on how you configure your module, the MTG-3901 can function as an NTP client and/or an NTP server. Figure 5-1illustrates how the MTG-3901 and the NTP application operate together.

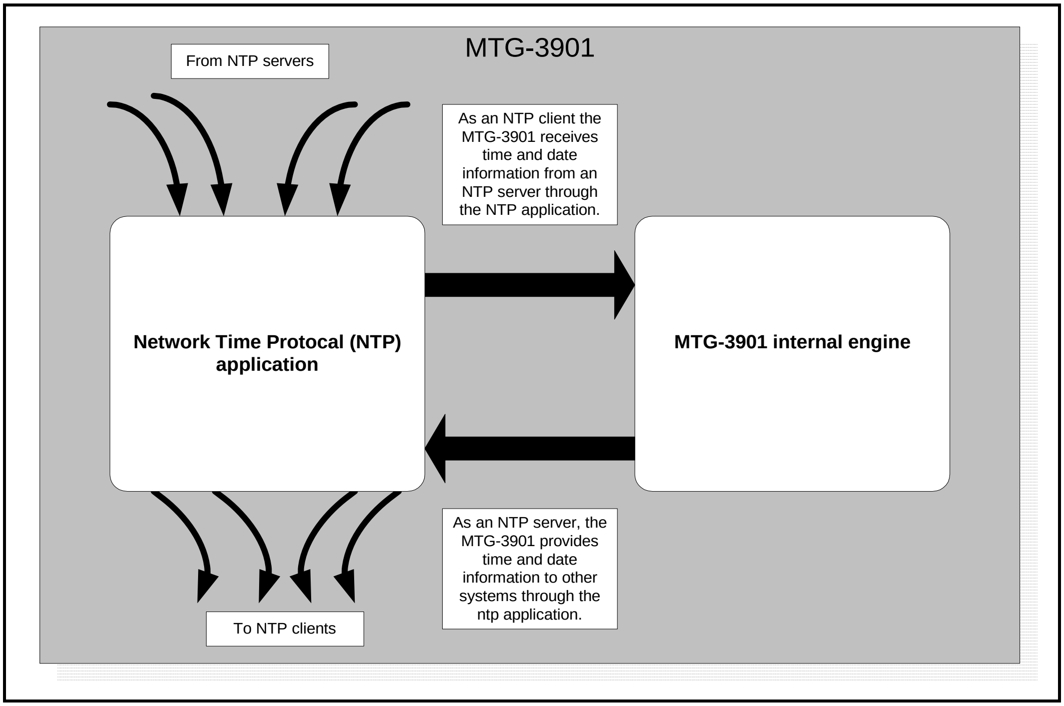

Figure 5-1. ntp-4.1.1A – MTG-3901 Relationship

Configuring the MTG-3901 For NTP Support

The following sections describe how to configure your MTG-3901 as an NTP client or NTP server. This section covers the following topics:

- "Connecting Your MTG-3901/CSD-3902 System to a Network" on page 225.
- "Configuring NTP Control Parameters" on page 228.
- "Using NTP Configuration Files" on page 231.

Connecting Your MTG-3901/CSD-3902 System to a Network

To configure your MTG-3901system for NTP support, you must connect the module directly to an active network. This Ethernet connection is in addition and separate from the Ethernet connection that can be used to connect your NEO frame's resource module to a CCS network. For MTG-3901/CSD-3902-SYS-x systems, use both Ethernet connectors on the ACO-3901-BM back module to connect your system to a network. For stand-alone systems, use the Ethernet connections on the MTG-3901-BM or CSD-3902-BM back modules to connect your system to a network. You must obtain an Ethernet network *static* (not dynamic) IP address and a Subnet mask address for your MTG-3901. This address is different from the NEO frame's IP address. If you are using a MTG-3901/CSD-3902-SYS-x system, you must obtain different Ethernet IP and Gateway IP (if required) addresses for each module (primary module and secondary module). Contact your network administrator about obtaining IP addresses for your MTG-3901.

Note

A static IP address is a fixed address that is assigned by your network administrator. A dynamic IP address is an address that is automatically assigned to a device each time the device is connected to the network.

Figure 5-2 illustrates an example of the MTG-3901 network connections that are required for NTP support.

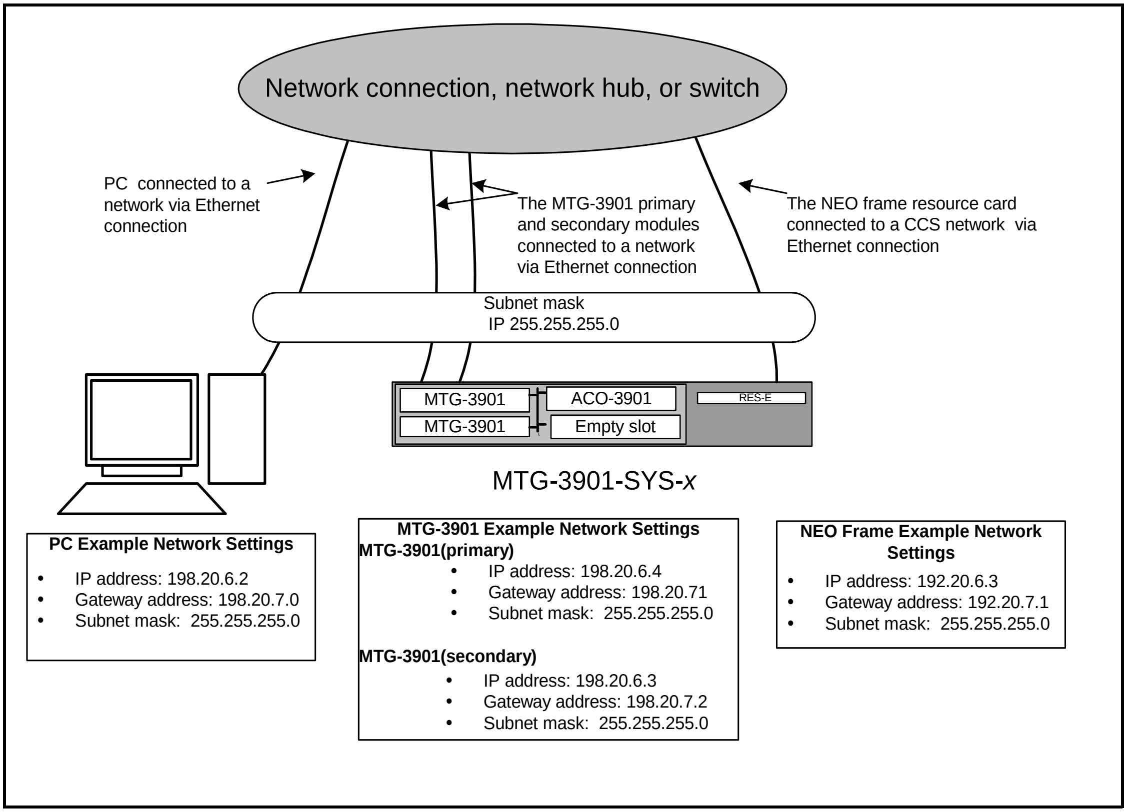

Figure 5-2. MTG-3901 Network Connections For NTP Support

The MTG-3901 module's network connection performs the following functions:

- **Receives and sends time information for NTP client and server operations** When the MTG-3901 is configured for use as an NTP client or NTP server, the module's Ethernet connection is used to communicate with other NTP servers and clients. If you are using the MTG-3901 as an NTP client, to use the Ethernet connection, you must also configure one of the module's input source parameters (**InputSrc**, **BackSrc1**, or **BackSrc2**) for NTP input. For more information about configuring you NTP control parameters, see "Configuring NTP Control Parameters" on page 228.

- **Communicates with the network or local PC so that NTP configuration files can be uploaded to the MTG-3901** Depending on whether you are using your MTG-3901 as an NTP client or NTP server, you may need to upload an NTP configuration file to your MTG-3901. The NTP configuration file provides the module with IP addresses of NTP servers from which it can receive time and date information. The NTP configuration file also provides the IP address which identifies the MTG-3901 as an NTP server. For information about using the network connection to upload NTP configuration files to your MTG-3901/CSD-3902 system, see "Using NTP Configuration Files" on page 231

Note

If you are using a MTG-3901/CSD-3902-SYS-x system, you must obtain different Ethernet IP and Gateway IP (if required) addresses for each module (primary module and secondary module).

Connecting Your Module to a Network

To connect your MTG-3901/CSD-3902-SYS-*x* system to a network, follow these steps:

1. Depending on the type of system you have, connect it in one of the following ways:

    - To connect your MTG-3901/CSD-3902-SYS-*x* system to a network, connect one end of a straight-through network cable to the **ETHERNET 1** connector and the **ETHERNET 2** connector of the ACO-3901-BM back module. Connect the other end of the cable to a network connection or network hub.

    OR

    - To connect your stand-alone MTG-3901/CSD-3902 system to a network, connect one end of a straight-through network cable to the **ETHERNET** connector of the MTG-3901-BM or CSD-3902-BM back modules. Connect the other end of the cable to a network connection or network hub.

2. Ensure that you have an active Ethernet connection by checking to see that the module's card-edge **LINK/RX** LED is blinking.

Connecting Your Module to a Local PC

If your MTG-3901 is not connected to a network, you can connect it to a local PC using an RJ-45 Ethernet *cross-over* cable. When you connect your MTG-3901 to a local PC, you can upload NTP configuration files from the PC to your module, however, you cannot receive information from an NTP server or send information to an NTP client. Your module must be on an active network to operate as an NTP client or NTP server.

To connect your module to a local PC, follow these steps:

1. Depending on the type of system you have, connect it in one of the following ways:
   - To connect a MTG-3901/CSD-3902-SYS-x system to a local PC, connect one end of an RJ-45 Ethernet cross-over cable to the **ETHERNET 1** connector of the ACO-3901-BM back module. Connect the other end of the cable to the PC's Ethernet connection.

   OR

   - To connect a stand-alone MTG-3901 or CSD-3902 to a local PC, use connect one end of the RJ-45 Ethernet cross-over cable to the **ETHERNET** connector of the MTG-3901-BM or CSD-3902-BM back module. Connect the other end of the cable to the PC's Ethernet connection. Your MTG-3901 and PC must be set up to reside on the same IP subnet.
2. Ensure that you have an active Ethernet connection by checking to see that the module's card-edge **LINK/RX** LED is blinking.

Configuring NTP Control Parameters

If you have obtained an Ethernet network address and a Subnet mask address (and Gateway IP Address if required) from your network administrator, you can now configure your NTP control parameters. If you have not obtained these addresses from your network administrator, do so now.

Note

You may also need to set up a default gateway (**DGatIPAddr** parameter) for routing IP packets to remote networks. The Gateway IP address you use must be different than the module's Ethernet address (otherwise NTP support will not work). If a default gateway is not required, you can leave the **DGatIPAddr** parameter blank.

To use the MTG-3901 as an NTP client, you must also configure one of the module’s input source parameters (**InputSrc**, **BackSrc1**, or **BackSrc2**) for NTP input. To configure your NTP control parameters and set the module’s network addresses, follow these steps:

1. To enable NTP and set your module’s Ethernet IP addresses, use your module’s card-edge controls to make the following selections:

Setting Description	Tree View Navigation		
Enable the NTP option.	Other	NTP_Enable	On
Enter the module’s Subnet mask IP address.		EthIPMask	(enter the IP address)
Enter the module’s Ethernet IP address.		EthIPAddr	(enter the IP address)
If required, enter the IP address of the Ethernet gateway. **Note** The Gateway IP address you use must be different than the module’s Ethernet address (otherwise NTP support will not work).		DGatIP	(enter the IP address)

Note

If you are using configuring an MTG-3901/CSD-3902-SYS-x system, you must obtain different Ethernet IP and Gateway IP (if required) addresses for each module (primary module and secondary module).

2. If you are using the MTG-3901 as an NTP client, configure your module so that **NTP** is designated as an input source (primary input, first backup, or second backup) by making the following selection:

Setting Description	Tree View Navigation			
Set the input source for NTP support. This example assumes that the NTP source is the primary reference source.	Input	Routing	InputSrc	NTP

3. If you are configuring an MTG-3901/CSD-3902-SYS-x system, repeat **Steps 1** and **2** for your systems secondary module.

4. Restart the NEO frame that contains your MTG-3901/CSD-3902 system (otherwise, the new network addresses will not take effect).

Using NTP Configuration Files

Your MTG-3901 is shipped with an NTP configuration (*ntp.conf*) file loaded on the module. By default, this file configures your MTG-3901 for use as an NTP server. The *ntp.conf* file provides an IP address that identifies the MTG-3901 as a NTP server so that NTP clients can communicate with your MTG-3901 to obtain time and date information. If you want to use your MTG-3901 as an NTP client, you must edit the NTP configuration file. You can use a text editor such as Microsoft® Notepad to edit or create new NTP configuration (*ntp.conf*) files. After you have edited the file, you can upload the file to the MTG-3901 using a PC that is on same network as your MTG-3901. If your MTG-3901 and local PC are not on the same network, you can connect your MTG-3901 directly to a PC. For details about connecting your MTG-3901 directly to a local PC, see “Connecting Your Module to a Local PC” on page 228.

Note

Before you can download or upload your module’s *ntp.conf* file, you must connect your MTG-3901 to a network as described in “Connecting Your MTG-3901/CSD-3902 System to a Network” on page 225 and then configure your module’s NTP control parameters as described in “Configuring NTP Control Parameters” on page 228.

The following sections describe how to download your module’s NTP configuration (*ntp.conf*) file to a local PC, edit it, and then upload it to the MTG-3901.

Validating the MTG-3901 Network Connection

Before you download your module’s *ntp.conf* file, it is recommended that you first validate your module’s network or direct connection with the local PC by using the DOS “ping” command.

To validate your module’s connection, follow these steps:

1. From the **Start** menu on your PC, choose **Accessories** > **Command Prompt**.

2. In the **DOS Prompt** dialog box, type **ping** (“ping” command) followed by your module’s Ethernet IP address (your module’s **EthIPAddr** parameter value), and then press **Enter**.

   If your connection was successfully validated, your **DOS Prompt** dialog box should be similar to the following example:

```
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>ping 172.25.96.70

Pinging 172.25.96.70 with 32 bytes of data:

Reply from 172.25.96.70: bytes=32 time=2ms TTL=64
Reply from 172.25.96.70: bytes=32 time=1ms TTL=64
Reply from 172.25.96.70: bytes=32 time=1ms TTL=64
Reply from 172.25.96.70: bytes=32 time=1ms TTL=64

Ping statistics for 172.25.96.70:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum =  2ms, Average =  1ms

C:\>
```

   If you receive a **`Request timed out message`**, your module’s network communication validation failed. In this case, check the following:

   - Ensure that the Ethernet cable is properly inserted into the **ETHERNET** connector of your MTG-3901/CSD-3902 system’s back module and into your network’s connection, network hub, or local PC.
   - Ensure that you have entered the correct Subnet mask address and Ethernet IP address into the module’s **EthIPMask** and **EthIPAddr** parameter.
   - Ensure that your MTG-3901 is using the same Subnet mask address (**EthIPMask** parameter value) as the local PC you are using.
   - Ensure that you have entered the correct Ethernet IP address in the **DOS Prompt** dialog box after the “ping” command.

Downloading Your Module’s *ntp.conf* File to a Local PC

If you have successfully validated your module’s network connection, you can use DOS to access the MTG-3901 and download its *ntp.conf* file. To download your module’s *ntp.conf* file, follow these steps:

1. From the **Start** menu, choose **Accessories** > **Command Prompt**.

2. In the DOS Prompt dialog box, type **`ftp`** and your module’s Ethernet address, and then press **Enter**.

   Your **DOS Prompt** dialog box should be similar to the following example:

```
C:\>ftp 172.25.96.70
Connected to 172.25.96.70.
220 VxWorks (5.4.2) FTP server ready
User (172.25.96.70:(none)):
```

3. At the prompt, type **`ntpadmin`** after the **`User`** <network address>, and then press **Enter**.
4. Type **`ntpadmin`** for the **`Password`**, and then press **Enter**.

   Your **DOS Prompt** dialog box should be similar to the following example:

```
User (172.25.96.70:(none)): ntpadmin
331 Password required
Password:
230 User logged in
ftp>
```

5. Access the module’s *ntp.conf* file type **`cd /fl0`**, and then press **Enter**.

   Your **DOS Prompt** dialog box should be similar to the following example:

```
ftp> cd /fl0
250 Changed directory to "/fl0"
```

6. Download a copy of your module’s *ntp.conf* file to your local PC by typing **`get ntp.conf`**, and then press **Enter**.

   Your **DOS Prompt** dialog box should appear similar to the following example:

```
ftp> get ntp.conf
200 Port set okay
150 Opening ASCII mode data connection
226 Transfer complete
ftp: 90 bytes received in 0.00Seconds 90000.00Kbytes/sec.
ftp>
```

   A copy of your module’s *ntp.conf* file should now be on your local PC.

7. Close your FTP session by typing **`Quit`**, then press **Enter**.

Editing and Creating NTP Configuration Files

By default, your MTG-3901 is loaded with an *ntp.conf* file that configures the module for use as a NTP server. Figure 5-3 displays the contents of your module's *ntp.conf* file.

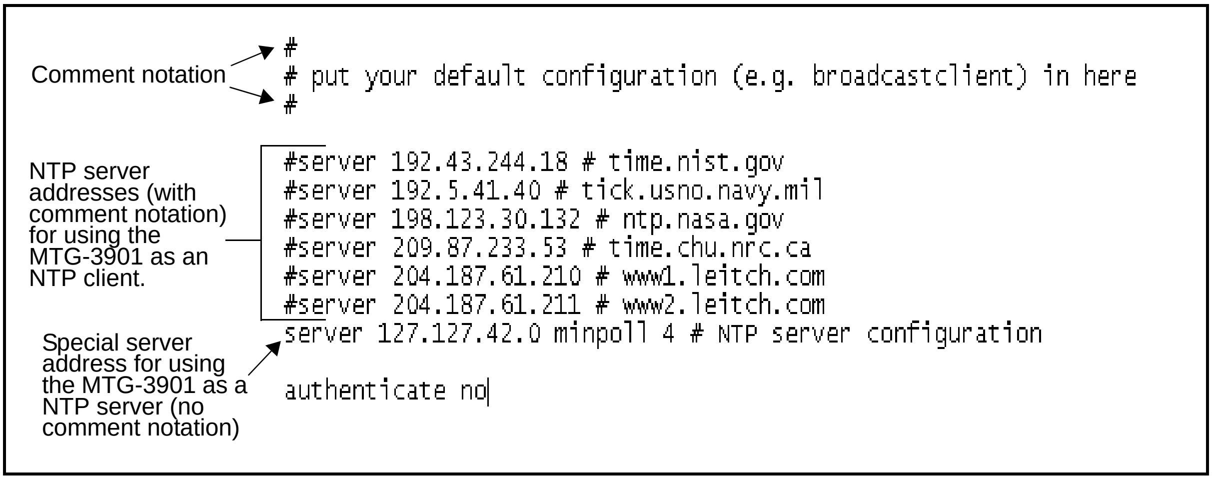

Figure 5-3. Default *ntp.conf* File

In Figure 5-3, the lines with comment notation (#) are ignored by the MTG-3901. The line, **`server 127.127.42.0. minpoll 4 # NTP server configuration`**, does not have comment notation and therefore this information is read by the MTG-3901. This line identifies the MTG-3901 as an NTP server.

To use the MTG-3901 as an NTP client, your must update the default NTP configuration file. The easiest way to do this is to add comment notation (#) to the last line of the file so that the MTG-3901 ignores the information in that line. Then, remove the "#" from a line that has an NTP server IP address so that the MTG-3901 reads the information. Figure 5-4 displays an updated *ntp.conf* file that configures the MTG-3901 for use as an NTP client.

NTP server address with comment notation removed

Comment notation added

```
#
# put your default configuration (e.g. broadcastclient) in here
#

#server 192.43.244.18 # time.nist.gov
 server 192.5.41.40 # tick.usno.navy.mil
#server 198.123.30.132 # ntp.nasa.gov
#server 209.87.233.53 # time.chu.nrc.ca
#server 204.187.61.210 # www1.leitch.com
#server 204.187.61.211 # www2.leitch.com
#server 127.127.42.0 minpoll 4 # NTP server configuration

authenticate no
```

Figure 5-4. Updated *ntp.conf* File

Ensure that you save your updated NTP configuration file as *ntp.conf*, otherwise the module will not be able to read your file. When the updated *ntp.conf* file is uploaded to the MTG-3901, the module will read the line in the file that has no comment notation. It will then use the NTP server IP address to obtain time and date information.

Note

The server IP addresses shown in the example in Figure 5-4 were valid at the time of printing of the manual, but may have changed since then. Accuracy of the time information provided by the NTP servers listed above may vary.

Uploading the Updated NTP Configuration File to MTG-3901

After you have modified your module's *ntp.conf* file, you can upload it to your MTG-3901. To upload the updated *ntp.conf* file to your MTG-3901, follow these steps:

1. Access your PC's DOS prompt by selecting **Start** menu, and then choose **Accessories** > **Command Prompt**.

2. In the **DOS Prompt** dialog box, type **`ftp`** and your module's Ethernet address, and then press **Enter** to access the module.

   Your **DOS Prompt** dialog box should be similar to the following example:

```
C:\>ftp 172.25.96.70
Connected to 172.25.96.70.
220 VxWorks (5.4.2) FTP server ready
User (172.25.96.70:(none)):
```

3. At the DOS prompt, type **`ntpadmin`** for the **`User`** <network address>, and then press **Enter**.
4. Type **`ntpadmin`** for the **`Password`**, and then press **Enter**.

   Your **DOS Prompt** dialog box should be similar to the following example:

```
User (172.25.96.70:(none)): ntpadmin
331 Password required
Password:
230 User logged in
ftp>
```

5. Access the module's *ntp.conf* file type at the DOS prompt by typing **`cd /fl0`**, and then press **Enter**.

   Your **DOS Prompt** dialog box should be similar to the following example:

```
ftp> cd /fl0
250 Changed directory to "/fl0"
```

6. Upload your updated (or newly created) *ntp.conf* file to the MTG-3901 at the DOS prompt by typing **`put ntp.conf`**, and then press **Enter**.

   Your **DOS Prompt** dialog box should be similar to the following example:

```
ftp> put ntp.conf
200 Port set okay
150 Opening ASCII mode data connection
226 Transfer complete
ftp: 395 bytes sent in 0.00Seconds 395000.00Kbytes/sec.
ftp>
```

7. Close your FTP session by typing **`Quit`**, and press **Enter**.

8. Restart the NEO frame that contains your MTG-3901/CSD-3902 system (otherwise, the updates to the *ntp.conf* file will not take effect).

For information about ntp configuration file commands, options and status messages, see the NTP Project website at www.ntp.org.

Creating Customized NTP Configuration Files

You can use a text editor such as Microsoft® Notepad to edit or create customized NTP configuration (*ntp.conf*) files. After you have edited the file you can upload the file to the MTG-3901. When you upload a custom NTP configuration file, the default *ntp.conf* file (described in "Editing and Creating NTP Configuration Files" on page 234) is replaced by the new file.

Note

Uploading customized NTP configuration files to the MTG-3901 is recommended for advanced users only. Before you upload a customized NTP configuration file, ensure that your MTG-3901 operation requires the additional functionality the customized file provides.

The following sections provide example NTP configuration files that have been optimized for specific NTP client and server conditions.

Using the `iburst` Command

You can create a customized NTP configuration file that uses the `iburst` command to speed up the time required for NTP time and MTG-3901 time to become synchronized. If you are experiencing time syncronization delays, the example provided here may help to resolve this problem. For information about NTP configuration file commands, such as `iburst`, see the NTP Project website at www.ntp.org.

Figure 5-5 diplays an example of an NTP configuration file that uses the `iburst` command.

```
#
# put your default configuration (e.g. broadcastclient) in here
#
#server 204.187.61.210  iburst minpoll 4 maxpoll 14   # www1.leitch.com
#server 204.187.61.211  iburst minpoll 4 maxpoll 14   # www2.leitch.com
#
# known stratum-1 NTP internet hosts, minpoll 8 to not flood these hosts with requests
#
#server 192.43.244.18   iburst minpoll 8 maxpoll 14   # time.nist.gov
#server 132.163.4.103   iburst minpoll 8 maxpoll 14   # time-C.timefreq.bldrdoc.gov
#server 198.123.30.132  iburst minpoll 8 maxpoll 14   # ntp-nasa.arc.nasa.gov
#server 209.87.233.52   iburst minpoll 8 maxpoll 14   # toc.chu.nrc.ca
#server 132.246.168.2   iburst minpoll 8 maxpoll 14   # toc.nrc.ca
#server 216.81.158.217  iburst minpoll 8 maxpoll 14   # clock.relay.net
#server 67.64.199.49    iburst minpoll 8 maxpoll 14   # mail.tcsys.com
#server 192.5.41.40     iburst minpoll 8 maxpoll 14   # ntp0.usno.navy.mil
#server 192.5.41.41     iburst minpoll 8 maxpoll 14   # tock.usno.navy.mil
#server 140.221.8.88    iburst minpoll 8 maxpoll 14   # ntp0.mcs.anl.gov
#
server 127.127.42.0     iburst minpoll 4 maxpoll 14   # CSD internal reference clock
#
authenticate no
#
```

Figure 5-5. NTP Configuration File Using the Iburst Command

Customized NTP Files For Use With NEO Control Panels

If you are using your MTG-3901 with NEO LCP or RCP control panels, you can create customized NTP configuration files for both the MTG-3901 and for the control panel. The example provided below enables the MTG-3901 and the local control panel to peer with one another to provide redundant local time display. Also, using this customized file allows the time displayed by the panel to quickly synchronize with the time provided by the MTG-3901. For information about NTP configuration file commands, options and status messages, see the NTP Project website at www.ntp.org.

Note

Uploading customized NTP configuration files to the MTG-3901 is recommended for advanced users only. Before you upload a customized NTP configuration file, ensure that your MTG-3901 operation requires the additional functionality the customized file provides.

Figure 5-6 display the customized for the MTG-3901 NTP configuration file.

```
#
# put your default configuration (e.g. broadcastclient) in here
#
#server 204.187.61.210  iburst minpoll 4 maxpoll 14   # www1.leitch.com
#server 204.187.61.211  iburst minpoll 4 maxpoll 14   # www2.leitch.com
#
# known stratum-1 NTP internet hosts, minpoll 8 to not flood these hosts with requests
#
#server 192.43.244.18   iburst minpoll 8 maxpoll 14   # time.nist.gov
#server 132.163.4.103   iburst minpoll 8 maxpoll 14   # time-C.timefreq.bldrdoc.gov
#server 198.123.30.132  iburst minpoll 8 maxpoll 14   # ntp-nasa.arc.nasa.gov
#server 209.87.233.52   iburst minpoll 8 maxpoll 14   # toc.chu.nrc.ca
#server 132.246.168.2   iburst minpoll 8 maxpoll 14   # toc.nrc.ca
#server 216.81.158.217  iburst minpoll 8 maxpoll 14   # clock.relay.net
#server 67.64.199.49    iburst minpoll 8 maxpoll 14   # mail.tcsys.com
#server 192.5.41.40     iburst minpoll 8 maxpoll 14   # ntp0.usno.navy.mil
#server 192.5.41.41     iburst minpoll 8 maxpoll 14   # tock.usno.navy.mil
#server 140.221.8.88    iburst minpoll 8 maxpoll 14   # ntp0.mcs.anl.gov
#
peer xxx.yyy.zzz.nnn    iburst minpoll 4 maxpoll 14   # LCP/RCP IP address
peer 127.127.42.0       iburst minpoll 4 maxpoll 14   # CSD Oscillator
fudge 127.127.42.0      stratum 5                     # Force CSD time source to low stratum - if no external NTP available
```

Figure 5-6. Customized NTP Configuration File for the MTG-3901

Figure 5-7display the customized for the NEO LCP or RCP control panel NTP configuration file.

```
#
# put your default configuration (e.g. broadcastclient) in here
#
#server 204.187.61.210  iburst minpoll 4 maxpoll 14   # www1.leitch.com
#server 204.187.61.211  iburst minpoll 4 maxpoll 14   # www2.leitch.com
#
# known stratum-1 NTP internet hosts, minpoll 8 to not flood these hosts with requests
#
#server 192.43.244.18   iburst minpoll 8 maxpoll 14   # time.nist.gov
#server 132.163.4.103   iburst minpoll 8 maxpoll 14   # time-C.timefreq.bldrdoc.gov
#server 198.123.30.132  iburst minpoll 8 maxpoll 14   # ntp-nasa.arc.nasa.gov
#server 209.87.233.52   iburst minpoll 8 maxpoll 14   # toc.chu.nrc.ca
#server 132.246.168.2   iburst minpoll 8 maxpoll 14   # toc.nrc.ca
#server 216.81.158.217  iburst minpoll 8 maxpoll 14   # clock.relay.net
#server 67.64.199.49    iburst minpoll 8 maxpoll 14   # mail.tcsys.com
#server 192.5.41.40     iburst minpoll 8 maxpoll 14   # ntp0.usno.navy.mil
#server 192.5.41.41     iburst minpoll 8 maxpoll 14   # tock.usno.navy.mil
#server 140.221.8.88    iburst minpoll 8 maxpoll 14   # ntp0.mcs.anl.gov
#
peer xxx.yyy.zzz.nnn    iburst minpoll 4 maxpoll 14   # CSD IP address
peer 127.127.1.1        iburst minpoll 4 maxpoll 14   # LCP/RCP VxWorks/PowerPC Oscillator
fudge 127.127.1.1       stratum 6                     # Force the VxWorks local oscillator to a lower confidence than CSD
```

Figure 5-7. Customized NTP Configuration File for the LTP or RCP Control Panels

Chapter 6

Specifications

Overview

The tables in this chapter list the following specifications for the Test Signal Generator module:

- “General” on page 244
- “Interface” on page 244
- “Oscillator” on page 244
- “Analog Video Input” on page 245
- “Performance of Analog Front End” on page 246
- “Analog Video Output” on page 247
- “Performance of Analog Back End” on page 248
- “Analog / Digital Audio Output” on page 249

Specifications and designs are subject to change without notice.

Note

Except where noted, the term MTG-3901 will be used in this manual to refer to both MTG-3901 and CSD-3902 modules.

General

Table 6-1. General Specifications

Item	Specification
Power Dissipation	< 20W
Internal Battery Backup	3V rechargeable battery provides better than 8 hours of internal timekeeping
External Power Supply Backup	24V 1.0A DC input powers entire module
Heartbeat	Heartbeat LED pulses periodically to indicate internal timekeeping is alive

Interface

Please see the *ACO-3901 Installation and Operation Manual* for specifications on the inputs and outputs.

Oscillator

Table 6-2. Oscillator Specifications

Item	Specification
Type	Free-run oscillator performance
Aging	± 1.0 PPM/year
Stability over 32° F to 158° F (0° C to 70° C)	± 0.5 PPM

Analog Video Input

Table 6-3. Analog Video Input Specifications

Specification	NTSC	PAL-B	PAL-M
Dynamic range	1.22 Vp-p	1.2335 Vp-p	1.2335 Vp-p
Quantization	10 bits	10 bits	10 bits
Input impedance	75Ω	75Ω	75Ω
Input level	1Vp-p, ± 10%	1Vp-p, ± 10%	1Vp-p, ± 10%
Input video sync level	± 6 dB	± 6 dB	± 6 dB
Input chroma burst level	± 6 dB	± 6 dB	± 6 dB
Input super black signal transparency	Yes	Yes	Yes
Input video level	1Vp-p, ± 6dB	1Vp-p, ± 6dB	1Vp-p, ± 6dB
Input cable equalization (Belden 8281)	300 m	300 m	300 m
SCH variation	± 45°	± 45°	± 45°

Performance of Analog Front End

Table 6-4. Analog Front End Performance Specifications

Specification	NTSC	PAL-B	PAL-M
Input sub-carrier frequency deviation	± 135 Hz	± 135 Hz	± 135 Hz
Input hot switch adaptability	Yes	Yes	Yes
Input level adjustment range	± 3 dB	± 3 dB	± 3 dB
Input noise sensitivity	–20 dB	–20 dB	–20 dB
Input jitter Sensitivity	> 1°	> 1°	> 1°
Input Japanese NTSC compatibility	Yes	N/A	N/A
Max. common mode signal	6 Vp-p	6 Vp-p	6 Vp-p
CMRR	>60 dB to 10 kHz	>60 dB to 10 kHz	>60 dB to 10 kHz
Frequency response	±0.05 dB to 6 MHz	±0.05 dB to 6 MHz	±0.05 dB to 6 MHz
K factor	< 1%	< 1%	< 1%
Diff. gain (10% - 90% APL)	< 1%	< 1%	< 1%
Diff. phase (10% - 90% APL)	< 1°	< 1°	< 1°
SNR (indicate measurement bandwidth)	> 65 dB to 10 MHz	> 65 dB to 10 MHz	> 65 dB to 10 MHz
LNL (Luminance Non-Linearity)	< 1%	< 1%	< 1%

Analog Video Output

Table 6-5. Analog Video Output Specifications

Specification	NTSC	PAL-B	PAL-M
Number of outputs	4	4	4
Standard	SMPTE 170M-1994	ITU-R BT.470-6	ITU-R BT.470-6
Output impedance	75Ω	75Ω	75Ω
Setup level	7.5 IRE, ±1	N/A	N/A
Video output level	140 IRE	1 Vp-p	1 Vp-p
Blanking level	0 IRE	0 V	0 V
Burst amplitude	40 IRE, ±1	300 mVp-p	300 mVp-p
Output isolation (between multiple outputs)	> 30 dB up to 10 MHz	> 30 dB up to 10 MHz	> 30 dB up to 10 MHz
Response variation (load dependence)	<0.1 dB, 1 to 8 loads to 10MHz	<0.1 dB, 1 to 8 loads to 10MHz	<0.1 dB, 1 to 8 loads to 10MHz

Performance of Analog Back End

Table 6-6. Analog Back End Performance Specifications

Description	NTSC	PAL-B	PAL-M
DC offset	0 V, ± 100 mV	0 V, ± 100 mV	0 V, ± 100 mV
Quantization	8-bit	8-bit	8-bit
VBI transparency	Pass & Blank	Pass & Blank	Pass & Blank
Frequency response	± 0.05 dB to 6 MHz	± 0.05 dB to 6 MHz	± 0.05 dB to 6 MHz
Diff. gain (10% - 90% APL)	< 1%	< 1%	< 1%
Diff. phase (10% - 90% APL)	< 1°	< 1°	< 1°
K Factor	< 1%	< 1%	< 1%
SNR (indicate measurement bandwidth)	> 65dB to 10 MHz	> 65dB to 10 MHz	> 65dB to 10 MHz
Chrominance/luminance gain	1%	1%	1%
Chrominance/luminance delay	< 20 ns	< 20 ns	< 20 ns
Line distortion	< 1%	< 1%	< 1%
Field distortion	< 1%	< 1%	< 1%
Burst frequency	3.579545 MHz, ± 10 Hz	4.4436185 MHz, ± 5 Hz	3.57961149 MHz, ± 10 Hz
Field frequency	59.94 Hz	50 Hz	50 Hz
Line frequency	15,734.265Hz	15,625 Hz	15,750 Hz
Video signal vertical timing	Comply with SMPTE170M	Comply with ITU-R BT.470-6	Comply to ITU-R BT.470-6
Video signal horizontal timing	Comply with SMPTE170M	Comply to ITU-R BT.470-6	Comply to ITU-R BT.470-6

Analog / Digital Audio Output

Table 6-7. Analog / Digital Audio Output Specifications

Item	Specification
Number of outputs	1
Standard	SMPTE 276M, AES-3, AES- 3id, AES-17
Connector (indicate if there is active/ passive loop through)	IEC 169-8 for (75) DB-25 or Weid Muller (110)
Sample rates	32 kHz to 96 kHz
AES signal format	Comply with AES3-1992
Sampling locked to an external reference	32 kHz to 96 kHz
Signal level	1.0 Vp-p, ± 10% (75 Ω) 2 to 7 Vp-p (110 Ω)
Rise/ fall time	30 ns to 44 ns (75 Ω) 5 ns to 30 ns (110 Ω)
Channel status	Comply with AES-3 1992
V-bit	Comply with AES-3 1992
Jitter	< 5 ns

Appendix A

Operator and All List Parameters

Overview

The Operator and All List is a long flat list of all the available parameters, arranged from the most-used to the least-used. The All List is a long flat list of all the available parameters, arranged from the most-used to least-used. It is intended for a “Supervisor” security designation. The Operator List is a condensed version of the All List, and is intended for an “Operator” security designation. The following table shows all available parameters. Parameters accessed only from within the All List are shaded in gray.

See “Navigating the Operator and All List” on page 252 for instructions on navigating this list using card-edge controls.

Note

Except where noted, the term “MTG-3901” will be used to refer to both MTG-3901 and CSD-3902 modules.

To view MTG-3901 **Setup** parameters, see “Setup Parameters” on page 215.

Navigating the Operator and All List

To navigate, and then view or change a parameter from the Operator List, follow these steps:

1. Open the front panel of the NEO frame.
2. Press any card edge control to turn on the VFD display.

   The message **MTG-3901** (or **CSD-3902**) appears. (If a previous user has left the display at a different parameter name, repeatedly press the ESCAPE button until MTG-3901 appears.)
3. Press the ENTER button.

   The message **Time_Disp** appears.

   Note

   After several seconds of inactivity, a scrolling message will appear, describing the purpose of the parameter currently selected.
4. Press the ENTER button again, to access the parameter value options for the **Time_Disp** item.

   OR

   Press the **Nav +/Nav-** button down repeatedly to view other parameters, and then press the ENTER button to access an item's parameter value options.
5. Press the **Nav+/Nav-** button up or down to scroll through the different selectable parameter value options, and then press the ENTER button to select the value you want.

   OR

   Press the **Nav+/Nav-** button up or down to adjust the numerical parameter value, and then press the ENTER button.
6. Close the front panel of the frame to ensure the cooling system continues to operate properly.

Operator and All List Parameters

The All List includes all of the available MTG-3901 card-edge parameters, arranged in a most-used to least-used order.

- Parameters with the symbol [RO] are *read-only.*
- Default values are marked with an asterisk (*).
- Parameters marked with double asterisks (**), after being set On, will then be set Off. Therefore, you do not need to turn the parameter Off.
- Parameters marked with a dagger (†) will be set to Off by the MTG-3901 after they have been set On.
- Parameters marked with a double dagger (‡) are updated by the MTG-3901.

See page 275 for instructions on navigating the All List using card-edge controls.

Table A-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	User Range
Time_Disp [RO]	Display Time/Date	Single control to display time and date	String
Date [RO]	Date	Displays local date	String
OperMode [RO]	Operational Mode	Indicates whether the MTG is a standalone unit or part of an ACO redundant system	• Standalone • Primary • Backup
ACOSlotId [RO]	Master ACO Slot Id	Indicates the Slot Id of the master ACO	String
EthIPMask [RO]	Ethernet IP Mask	Used to store the IP mask for the external Ethernet port	String
EthIPAddr [RO]	Ethernet IP Address	Indicates IP address of the NTP server	String
DGatIPAddr [RO]	Ethernet Default Gateway IP Address	Used to store the IP address of the gateway when using NTP	String
LpSecs [RO]	Leap Seconds Offset	Indicates the prevailing leap seconds offset in the system	-59 to 59 (clip)
LpSecsChng [RO]	Leap Seconds Changed	Indicates a leap second change will occur at the output	• On • Off
Loc	Locale	Indicates the current locale	• NoLocale* • Greenwich • Safrica+2 • Israel+2 • SaudArb+3

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• Russia+3 • Iran+3.5 • Arabia+4 • Afghn+4.5 • Wasia+5 • India+5.5 • Casia+6 • MonorCasab • Bangkok+7 • Beijing+8 • Taipei+8 • Tokyo+9 • Adeld+9.5 • Darwn+9.5 • Brisbn+10 • Eaustl+10 • Wpacif+10 • Tasman+10 • Weurope+1 • Cpacif+11 • Fiji+12 • NewZld+12 • Azores-1 • MidAtln-2 • Brasili-3 • SamEast-3 • Nfld-3.5 • Atlanti-4 • SamWest-4 • Romance+1 • SamPacf-4 • Eastern-5 • Eindian-5 • Central-6 • Mexico-6 • Sasktch-6

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• Arizona-7 • Mountai-7 • Pacific-8 • Alaska-9 • PragBra+1 • Hawaii-10 • Samoa-11 • Dateln-12 • Warsaw+1 • GrFinTu+2 • Egypt+2 • Eeurope+2
TZ	Time Zone	Indicates the current timezone	• UTC* • UTC-01:00 • UTC-00:30 • UTC-01:30 • UTC-02:30 • UTC-03:30 • UTC-04:30 • UTC-05:30 • UTC-10:00 • UTC-11:00 • UTC-12:00 • UTC+13:00 • UTC-02:00 • UTC+12:00 • UTC+11:00 • UTC+10:00 • UTC+09:00 • UTC+08:00 • UTC+07:00 • UTC-06:30 • UTC-07:30 • UTC-08:30 • UTC-09:30 • UTC-03:00

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• UTC-10:30 • UTC-11:30 • UTC+06:00 • UTC+05:00 • UTC+04:00 • UTC+03:00 • UTC+02:00 • UTC+01:00 • UTC-04:00 • UTC+11:30 • UTC+10:30 • UTC+09:30 • UTC+08:30 • UTC+07:30 • UTC+06:30 • UTC-05:00 • UTC+12:45 • UTC+05:30 • UTC+04:30 • UTC-06:00 • UTC+03:30 • UTC+02:30 • UTC+01:30 • UTC+00:30 • UTC-07:00 • UTC-08:00 • UTC-09:00
DST [RO]	Daylight Savings Time	Indicates if DST is enabled or not	• On • Off
LpYr [RO]	Leap Year	Indicates if the current year is a leap year or not	• Yes • No
SetTime	Set Time	Sets the new time	String (00:00:00*)
SetDate	Set Date	Sets the new date	String (2058-01-01*)

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
SetTimTrig†	Set Time Trigger	This parameter sets the time and date using the external trigger	• Off* • Time • Date • Time_Date • DSTTime • DSTTimDat
SetTimNow**	Set Time Now	This parameter sets the time and date now	• Off* • Time • Date • Time_Date • DSTTime • DSTTimDat
SetLoc	Set Locale	Sets the current locale	• NoLocale* • Greenwich • SAfrica+2 • Israel+2 • SaudArb+3 • Russia+3 • Iran+3.5 • Arabia+4 • Afghn+4.5 • WAsia+5 • India+5.5 • CAsia+6 • MonorCasab • Bangkok+7 • Beijing+8 • Taipei+8 • Tokyo+9 • Adeld+9.5 • Darwn+9.5 • Brisbn+10 • EAustl+10 • WPacif+10 • Tasman+10 • WEurope+1

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• CPacif+11 • Fiji+12 • NewZld+12 • Azores-1 • MidAtln-2 • Brasili-3 • SAmEast-3 • Nfld-3.5 • Atlanti-4 • SAmWest-4 • Romance+1 • SAmPacf-4 • Eastern-5 • EIndian-5 • Central-6 • Mexico-6 • Sasktch-6 • Arizona-7 • Mountai-7 • Pacific-8 • Alaska-9 • PragBra+1 • Hawaii-10 • Samoa-11 • Dateln-12 • Warsaw+1 • GrFinTu+2 • Egypt+2 • EEurope+2
SetTZ	Set Timezone	Sets the current timezone	• UTC* • UTC-01:00 • UTC-00:30 • UTC-01:30 • UTC-02:30 • UTC-03:30 • UTC-04:30

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• UTC-05:30 • UTC-10:00 • UTC-11:00 • UTC-12:00 • UTC+13:00 • UTC-02:00 • UTC+12:00 • UTC+11:00 • UTC+10:00 • UTC+09:00 • UTC+08:00 • UTC+07:00 • UTC-06:30 • UTC-07:30 • UTC-08:30 • UTC-09:30 • UTC-03:00 • UTC-10:30 • UTC-11:30 • UTC+06:00 • UTC+05:00 • UTC+04:00 • UTC+03:00 • UTC+02:00 • UTC+01:00 • UTC-04:00 • UTC+11:30 • UTC+10:30 • UTC+09:30 • UTC+08:30 • UTC+07:30 • UTC+06:30 • UTC-05:00 • UTC+12:45 • UTC+05:30 • UTC+04:30

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• UTC-06:00 • UTC+03:30 • UTC+02:30 • UTC+01:30 • UTC+00:30 • UTC-07:00 • UTC-08:00 • UTC-09:00
DSTMode	DST Mode	Selects how the DST will be enabled	• NoDST* • ManualDST • AutoDST • InputDST
MnDSTOnTim	Manual DST On Time	Sets the time when DST will be on	String (00:00:00*)
MnDSTOnRul	Manual DST On Rule	Sets the rule when DST will be on	String (WFD7M04*)
MnDSTOfTim	Manual DST Off Time	Sets the time when DST will be off	String (00:00:00*)
MnDSTOfRul	Manual DST Off Rule	Sets the rule when DST will be off	String (WLD7M10*)
MnDSTEdgTr	Manual DST Edge Trigger	Enables custom manual DST times and rules	• On • Off*
MnDSTEn	Manual DST Enable	Sets DST on/off (in manual DST mode)	• On • Off*
LpSecsTim	Leap Seconds Apply Time	Sets local time when leap second change will be applied	String (00:00:00*)
MnLpSeTDat	Manual Leap Seconds Trigger Date	Sets the date when the programmable leap seconds will be applied	• Dec_31* • Jun_30 • Mar_31 • Sep_30
MnLpSeDelt	Manual Leap Seconds Trigger Delta	Indicates the change in the leap seconds at the programmed date	-1 to 1 (clip) (0 s*)
MnLpSeDlyE†	Manual Leap Seconds Delay Edge Trigger	Schedules an upcoming leap second change	• On • Off*
msOfst	Millisecond Offset	Sets the millisecond offset to be applied	-999 to 999 (clip)
msOfstNow	Millisecond Offset Now	Sets the millisecond offset now	• On • Off*
LocOfst	Local Offset	Indicates the local offset to be applied	String (+00000S*)
LocOfstTim	Local Offset Time	Indicates the time when local offset will be applied	String (00:00:00*)
LocOfstDat	Local Offset Date	Indicates the date when local offset will be applied	String (2058-01-01*)

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
LocOfsDlyE†	Local Offset Delay Edge Trigger	Schedules the local offset to be applied at the predetermined time and date	• On • Off*
LocOfstNow**	Local Offset Now	Indicates to apply the local offset now	• On • Off*
DualSerEn	Dual Serial Port Enable	Allows two serial ports to be available on DB9 connector and determines which input source to connected to Secondary port	• Off* • BackScndry • PrimScndry
InputSrc	Primary Input Source	Indicates primary source of reference time and/or date information	• FreeRun* • LTC • GPS • 10M • LTC_10M • GPS_10M • Radio_10M • Modem_10M • Serial_10M • Phone_10M • Radio • NTP_10M • Modem • Serial • Video • LTC_Video • GPS_Video • RadioVideo • ModemVideo • Phone • Ser_Video • PhoneVideo • NTP_Video • NTP
BackSrc1	Backup Source 1	Indicates first backup source for input if primary source fails	• FreeRun* • LTC • GPS • 10M • LTC_10M • GPS_10M

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• Radio_10M • Modem_10M • Serial_10M • Phone_10M • Radio • NTP_10M • Modem • Serial • Video • LTC_Video • GPS_Video • RadioVideo • ModemVideo • Phone • Ser_Video • PhoneVideo • NTP_Video • NTP
BackSrc2	Backup Source 2	Indicates second backup source for input if primary and first backup source fails	• FreeRun* • LTC • GPS • 10M • LTC_10M • GPS_10M • Radio_10M • Modem_10M • Serial_10M • Phone_10M • Radio • NTP_10M • Modem • Serial • Video • LTC_Video • GPS_Video • RadioVideo

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• ModemVideo • Phone • Ser_Video • PhoneVideo • NTP_Video • NTP
CurIpSrc	Current Input Source	Displays the current input source based on the input and two backup sources	• FreeRun* • LTC • GPS • 10M • LTC_10M • GPS_10M • Radio_10M • Modem_10M • Serial_10M • Phone_10M • Radio • NTP_10M • Modem • Serial • Video • LTC_Video • GPS_Video • RadioVideo • ModemVideo • Phone • Ser_Video • PhoneVideo • NTP_Video • NTP
IpJamTim	Input Jam Sync Time	Sets time when an input jam sync will be issued	String (00:00:00*)
IpJamDat	Input Jam Sync Date	Sets date when an input jam sync will be issued	String (2001-01-01*)
IpJamFrq	Input Jam Sync Freq	Indicates how often the input jam sync will occur	String (00001D*)

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
IpJamNow	Input Jam Sync Now	Applies an input jam sync	• On • Off*
IpJamDMode	Input Jam Sync Discontinuity Mode	Sets how system time discontinuity/ interruptions are handled when an input jam sync occur	• SoftJamSyn* • HardJamSyn
IpTimeErr [RO]	Input Time Error	Displays the time error between the input reference time and internal time	String
IpTimeLock [RO]	Input Time Lock	Indicates whether input time/date has been locked to	• On • Off
IpFreqLock [RO]	Input Frequency Lock	Indicates which reference the module has locked to	• None • DataNoLock • DataLock • PPS • TenMhz • InputVideo • TenMhzPPS
TrigPpsSel	Trig/PPS Select	Indicates function of Trig/PPS pin	• Disable* • PPS • Trig
TenMhzSel	Ten Mhz Select	Indicates which 10Mhz signal to select from	• External* • MI
DarsEn	Dars Enable	Enables DARS on output	• Off* • Dars_NTSC • Dars_PALB
HzOut	Hz Out	Indicates the output rate of the Hz Out	• Disable* • Hz1 • Hz23_98 • Hz24 • Hz25 • Hz29_97 • Hz30 • Hz50 • Hz59_94 • Hz60
HzPhasing	Hz Phasing	Indicates the offset for the Hz Out	-999 to 999 (clip) (0 ms*)

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
ImpStart	Impulse Start	Issues a start command to impulse clocks	• On • Off*
ImpFaceTim	Impulse Face Time	Set the time that is currently on the impulse clocks	String (00:00:00*)
ImpShCct [RO]	Impulse Short Circuit Warning	Indicates that a short circuit has been detected in the impulse drive connection	0 to 5000000 (clip)
VidStdDet [RO]	Video Standard Detect	Indicates the input video standard detected	• NoSignal • NTSC • PAL-B • PAL-M • 1080i_60 • 1080i_5994 • 1080i_50 • 1080psf24 • 1080psf23 • 1080p_30 • 1080p_2997 • 1080p_25 • 1080p_24 • 1080p_2398 • 720p_60 • 720p_5994 • 720p_50
VidLckMode	Video Lock Mode	Determines what to lock input video to	• AutoDetect* • Mono_Hsync • ColorBurst
VidLckStat	Video Lock Status	Displays what input video is locked to	• Unlocked* • Mono_Hsync • ColorBurst
VidBrstDet [RO]	Video Burst Detect	Determines if input video contains burst	• On • Off
VidEmbDet [RO]	Video Embedded Detect	Displays what other information is embedded in input video	• NoEmb • VITC • ATR • VITC_ATR

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
VidEmbSel	Video Embedded Select	Indicates whether to lock to VITC or ATR for time when locked to input video	• None* • VITC • ATR
VidVitcLin	Video VITC Line Position	Determines the line position of VITC in input video	10 to 20 (clip) (14*)
ATROfst	ATR Offset	Indicates offset applied to ATR input	String (+00000S *)
ATROfstEn	ATR Offset Enable	Determines whether ATR offset is enabled or not	• On • Off*
ATRRdTZ	ATR Read Timezone	Indicates whether to set timezone provided in ATR payload	• On • Off*
VidGLSel	Genlock Select	Indicates which genlock to select from	• ACO* • External
OpVidSel	Output Video Select	Selects which BB output controls to use	• BB1* • BB2 • BB3 • BB4
OpVidEn	Output Video Enable	Enables BB output	• On • Off*
OpVidStd	Output Video Standard	Indicates the BB output video standard	• NTSC* • PAL-B • PAL-M • 1080i_60 • 1080i_5994 • 1080i_50 • 1080psf24 • 1080psf23 • 1080p_30 • 1080p_2997 • 1080p_25 • 1080p_24 • 1080p_2398 • 720p_60 • 720p_5994 • 720p_50
OpVidSetup	Output Video Setup Enable	Indicates whether to enable/disable setup within BB output	• On • Off*

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
OTenFEn	Output Video 10 Field Enable	Determines whether 10 field sequence is enable in BB output	• On • Off*
OATREn	Output Video ATR Enable	Determines whether ATR is enable in BB output	• On • Off*
OATRTrVid	Output Video ATR Track Video	Whether the ATR time tracks the video phasing	• NoTrack* • ATROffset • ATRTime
OATROfst	Output ATR Offset	Indicates the offset being applied to the ATR output	String (+0000000S*)
OATROSet	Output ATR Offset Set	Indicates the offset to be applied to ATR output	String (+0000000S*)
OATROTTim	Output ATR Offset Trigger (Time)	Indicates the time when the output ATR offset will be applied	String (00:00:00*)
OATROTDat	Output ATR Offset Trigger (Date)	Indicates the date when the output ATR offset will be applied	String (2058-01-01*)
OATRODlyT†	Output ATR Offset Delay Trigger	Sets trigger to apply offset to output ATR at the specified time and date	• On • Off*
OATROLvlT	Output ATR Offset Level Trigger	Applies offset to output ATR when set On (retains existing offset when set Off)	• On • Off*
OATRClOff	Output ATR Clock Offset	Applies phasing in 27M clocks to output ATR	0 to 63519 (clip) (0.0 µs*)
OATRLiOff	Output ATR Line Offset	Applies phasing in lines to output ATR	0 to 524 (clip) (0 Ln*)
OATRFrOff	Output ATR Frame Offset	Applies frame offset to output ATR	0-29 (clip) (0 frm*)
OVitcEn	Output Video VITC Enable	Determines whether VITC is enable in BB output	• On • Off*
OVitcLine	Output Video VITC Line Position	Determines the line position of VITC in BB output	• On • Off*
OVitcLine2	Output Video VITC Line 2 Position	Determines the 2nd line position of VITC in BB output	10 to 20 (clip) (14*)
OVitcTrVid [RO]	Output Video VITC Track Video	Whether the VITC time tracks the video phasing	10 to 20 (clip)
OpFPhase	Output Video Fine Phase	Fine phasing controls for BB output in sub-27M clock phasing	0 to 36892 (wrap) (0.0 ns*)
OpHPhase	Output Video Horizontal Phase	Controls horizontal phasing for BB output	0 to 63519 (wrap) (0.0 µs*)
OpVPhase	Output Video Vertical Phase	Controls vertical phasing for BB output	0 to 524 (wrap) (0 Ln*)

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
OpFrmPhase	Output Video Frame Phase	Controls frame phasing for BB output	0 to 4095 (clip) (0 frm*)
TcSel	Input TC Select	Selects which input TC controls to use	• LTC* • VITC
TcFrmtDet [RO]	TC Format Detect	Indicates format of input TC timecode	• NoSignal • FpsNTNDrop • FpsNTDrop • Fps25 • Fps24Ndrop • Fps30Ndrop • NotAvail
TcOfst	TC Offset	Indicates offset applied to TC input	String (+00000S*)
TcOfstEn	TC Offset Enable	Determines whether TC offset is enabled or not	• On • Off*
TcUBits	TC User Bits Format Detect	Indicates format for incoming user bits	• SMPTE_12M • Leitch12M* • SMPTE_309M • MJD_309M • LTCSpain
TcRdDate	TC Read Date	Indicates whether to take date from user bits	• On • Off*
TcRdAux	TC Read Auxiliary Offset	Indicates whether to take offset from auxiliary bits	• On • Off*
TcRdTZ	TC Read Timezone	Indicates whether to set timezone provided in SMPTE-309M format	• On • Off*
TcDSTOn‡	TC Input DST On	Determines if the incoming TC input is DST compensated or not	• On • Off*
TcAutoDST	TC Input Automatic DST Detect	Determines whether to detect plus/minus 1 hour differences and interpret it as DST for TC input	• On • Off*
TcAutoLS	TC Input Automatic LS Detect	Determines whether to detect plus/minus 1 second differences and interpret it as LS change for TC input	• On • Off*
OTcSel	Output TC Select	Selects which output TC controls to use	• LTC1* • LTC2 • VITC1 • VITC2 • VITC3

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• VITC4
CsdLtcUDst	CSD User Interface LTC Dest	Indicates the LTC output which all CSD user interface controls will apply to	• LTC1* • LTC2
OTcUtcTim	Output TC UTC Time Mode	Indicates whether timecode output is generating UTC time	• On • Off*
OTcLSTim [RO]	Output TC UTC Leap Secs Apply Time	Sets UTC time when leap second change will be applied for UTC timecode output	String (NotApplied*)
OTcFrmt	Output TC Format	Indicates format of output TC	• FpsNTNDrop • FpsNTDrop • Fps25 • Fps24Ndrop • Fps30Ndrop* • 274M_NTNDr • 274M_NTDrp • 274M_30NDr
OTcOfst	Output TC Offset	Indicates the offset being applied to the output TC	String (+0000000S*)
OTcOSet	Output TC Offset Set	Indicates the offset to be applied to output TC	String (+0000000S*)
OTcOTTim	Output TC Offset Trigger (Time)	Indicates the time when the output TC offset will be applied	String (00:00:00*)
OTcOTDat	Output TC Offset Trigger (Date)	Indicates the date when the output TC offset will be applied	String (2058-01-01*)
OTcODlyT†	Output TC Offset Delay Trigger	Sets trigger to apply offset to output TC at the specified time and date	• On • Off*
OTcOLvlT	Output TC Offset Level Trigger	Applies offset to output TC when set On (retains existing offset when set Off)	• On • Off*
OTcClOff	Output TC Clock Offset	Applies phasing in 27M clocks to output TC	0 to 63519 (clip) (0.0 µs*)
OTcLiOff	Output TC Line Offset	Applies phasing in lines to output TC	0 to 524 (clip) (0 Ln*)
OTcFrOff	Output TC Frame Offset	Applies frame offset to output TC	0 to 29 (clip) (0 frm*)
OTcUBits	Output TC User Bits Format	Indicates format of user bits to set on output TC	• SMPTE_12M • Leitch12M* • SMPTE_309M • MJD_309M • LTCSpain

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
OTcAux	Output TC Aux Offset	Sets the auxiliary offset to be applied to output TC	0 to 120 (clip) (0.0 hr*)
OTcAPM	Output TC Aux Offset (Plus/Minus)	Sets the direction of auxiliary offset to be applied to output TC	• Minus • Plus*
OTcAEn	Output TC Aux Offset Enable	Enables the auxiliary offset in output TC	• On • Off*
OTcMode	Output TC Mode	Sets mode for output TC	• SendDate* • ClearUBits • CopyUBits
OTc_12Hr	Output TC (12 Hour)	Sets output TC to 12 hour format	• On • Off*
OTcClrCF	Output TC Clear Color Frame Flag	Clears color frame flag on output TC	• On • Off*
OTcCFSts [RO]	Output TC Color Frame Status	Shows setting on output TC bits (color frame flag)	• On • Off
OTcDMode	Output TC Discontinuity Mode	Sets how discontinuity is handled in output TC	• SoftJamSyn • HardJamSyn*
OTcJSTim	Output TC Jam Sync (Time)	Sets time when a timed jam sync will be issued in output TC	String (00:00:00*)
OTcJSDat	Output TC Jam Sync (Date)	Sets date when a timed jam sync will be issued in output TC	String (2058-01-01*)
OTcJSFrq	Output TC Jam Sync (Freq)	Indicates how often the jam sync will occur in output TC	String (00001D*)
OTcJSEn	Output TC Jam Sync Enable	Enables the timed jam sync to occur at the specified time and date and frequency in output TC	• On • Off*
OTcJSNow**	Output TC Jam Sync Now	Applies a manual jam sync in output TC	• On • Off*
OTcSynCF	Output TC Sync Color Frame	Indicates whether to jam sync output TC to proper color frame relationship	• On • Off*
OTcSkSts [RO]	Output TC Skew Status	Indicates whether output TC is in skew mode or not	• On • Off
GpsSrc	GPS Source	Indicates the GPS receiver source	• GPS5300 • GPS1600 • GPS3901 • GPS3902 • GPS3903*

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
GpsCfgMode	GPS Configuration Mode	Indicates whether the unit actively configures the GPS receiver or waits for another unit to configure it (passive mode)	• Active • Passive*
GpsSSSel	GPS Self Survey Select	Indicates whether to put the GPS receiver in self-survey mode	• On • Off*
GpsSSProg [RO]	GPS Self Survey Progress	Indicates the percentage completion of the self-survey progress	0 to 100 (clip)
GpsOneSat	GPS One Satellite	Indicates if only one satellite is suitable to obtain time/date reference	• On • Off*
GpsRcvTime [RO]	GPS Receive Time	Indicates whether the time received is GPS or UTC time	• GPS • UTC
GpsDecStat [RO]	GPS Decoding Status	Indicates status of GPS receiver	• OK • SlfSrvy • NoGPSTime • PDOP_2High • NoUseSate • Only1Sat • Only2Sat • Only3Sat • SatUnstble • TraimRjFix
GpsDisStat [RO]	GPS Discipling Status	Indicates the status of GPS discipling	• NoSigPres • GPSMalFunc • Normal • PowerUp • AutoHoldOv • ManHoldOv • Recovery • FastRecov • DiscDisab
GpsOfst	GPS Offset	Indicates the offset to be applied to GPS input	String (+00000S*)
GpsOfstEn	GPS Offset Enable	Applies an offset to the GPS input	• On • Off*
GpsCallTim	GPS Call (Time)	Indicates the time to call the GPS receiver input for time	String (00:00:00*)
GpsCallDat	GPS Call (Date)	Indicates the starting date when to call out to GPS receiver	String (2058-01-01*)

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
GpsCallFrq	GPS Call (Freq)	Indicates how often to call the GPS receiver for time/date	String (00001D*)
GpsCallEn	GPS Call Enable	Enables call out to the GPS receiver input for time/date	• On • Off*
RadioSrc	Radio Receiver Source	Indicates the radio receiver source	• PrecLocal* • PrecUTC
RadioStat [RO]	Radio Receiver Status	Indicates the status of the radio receiver	• NoSignal • Normal
RadOfst	Radio Receiver Offset	Indicates the offset to be applied to the radio receiver input	String (+00000S*)
RadOfstEn	Radio Receiver Offset Enable	Indicates whether to apply to the offset to the radio receiver input	• On • Off*
RadCallTim	Radio Receiver Call (Time)	Indicates the time to call the radio receiver input for time	String (00:00:00*)
RadCallDat	Radio Receiver Call (Date)	Indicates the starting date when to call out to radio receiver	String (2058-01-01*)
RadCallFrq	Radio Receiver Call (Freq)	Indicates how often to call the radio receiver for time/date	String (00001D*)
RadCallEn	Radio Receiver Call Enable	Enables call out to the radio receiver input for time/date	• On • Off*
RadDSTOn‡	Radio Input DST On	Determines if incoming radio input is DST compensated or not	• On • Off*
RadAutoDST	Radio Input Automatic DST Detect	Determines whether to detect plus/minus 1 hour differences and interpret it as DST for radio receiver input	• On • Off*
RadAutoLS	Radio Input Automatic LS Detect	Determines whether to detect plus/minus 1 second differences and interpret it as LS change for radio receiver input	• On • Off*
ModemSel	Modem Select	Indicates which LTC output to associate the TCC UI with	• Phone* • Modem
CsdPhOfst	CSD User Interface Phone Offset Apply	Determines where phone offset set by user through the CSD user interface will be applied to	• Modem • Phone • ModemPhone*
ModemStat [RO]	Modem Status	Indicates the status of the RS232 modem	• NoCall • Normal • Busy • Redial • CallFailed • SrcCallFai

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
			• SrcTimeInv • SrcDiagFai • DlyWinBnd
ModOfst	Modem Offset	Indicates the offset to be applied to the RS232 modem input	String (+00000S*)
ModOfstEn	Modem Offset Enable	Applies an offset to the RS232 modem input	• On • Off*
ModPhNum	Modem Phone Number	Indicates phone number of reference source to call for time/date using RS232 modem	String (T94164459408*)
ModCallTim	Modem Call (Time)	Indicates the time to call the RS232 modem input for time	String (00:00:00*)
ModCallDat	Modem Call (Date)	Indicates the starting date when to call out to RS232 modem	String (2058-01-01*)
ModCallFrq	Modem Call (Freq)	Indicates how often to call the RS232 modem for time/date	String (00001D*)
ModCallEn	Modem Call Enable	Enables call out to the RS232 modem input for time/date	• On • Off*
ModPhNow**	Modem Phone Now	Calls out on the RS232 modem input to get the time/date	• On • Off*
ModHangUp**	Modem Hang Up	Issues a hang up to the RS232 modem input	• On • Off*
ModAutoAns	Modem AutoAnswer	Sets up unit to automatically answer any incoming calls for time	• On • Off*
ModSysMoEn	Modem System Mode Enable	Determines whether a remote user can access the system mode using the RS232 modem remotely	• On • Off*
ModOfstMs	Modem Offset Milliseconds	Determines offset between current unit and input	0 to 999 (clip) (0 ms*)
ModDlyLBnd	Modem Delay Window Lower Bound	Sets lower bound for delay window parameter (for asymmetric path delays)	0 to 9999 (clip) (0 ms*)
ModDlyUBnd	Modem Delay Window Upper Bound	Sets upper bound for delay window parameter (for asymmetric path delays)	1 to 9999 (clip) (1 ms*)
ModDSTOn‡	Modem Input DST On	Determines if incoming RS232 modem input is DST compensated or not	• On • Off*
ModAutoDST	Modem Input Automatic DST Detect	Determines whether to detect plus/minus 1 hour differences and interpret it as DST for RS232 modem input	• On • Off*
ModAutoLS	Modem Input Automatic LS Detect	Determines whether to detect plus/minus 1 second differences and interpret it as LS change for RS232 modem input	• On • Off*

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
ModHMSDST	Modem Automatic DST Detect on HMS Offset	Determines if HMS offset change of plus/ minus 1 hour is interpreted as DST on CSD user interface through RS232 modem	• On • Off*
ModHMSLS	Modem Automatic LS Detect on HMS Offset	Determines if HMS change of plus/minus 1 seconds is interpreted as LS change of CSD user interface through RS232 modem	• On • Off*
SerStat [RO]	Serial Status	Indicates status of RS232 serial input	• NoCall • Normal • NoSignal • CallFailed • SrcCallFai • SrcTimeInv • SrcDiagFai
SerSrc	Serial Source	Indicates configuration for RS232 serial input	• CSD* • TCC_300 • TCC_600 • TCC_1200 • TCC_2400 • TCC_4800 • TCC_9600
SerOfst	Serial Offset	Indicates the offset to be applied to the RS232 serial input	String (+00000S*)
SerOfstEn	Serial Offset Enable	Applies an offset to the RS232 serial input	• On • Off*
SerTccCtrl	Serial TCC Control Mode	Indicates the configuration of TCC mode	• ClientMode* • OutputTime • CtrlMode
SerTccOp	Serial TCC Output Mode	Indicates output type for TCC output mode	• TimeOnly* • TimeFrames
SerTccDst	Serial TCC LTC Dest	Indicates which LTC output to tie the TCC output to	• LTC1* • LTC2
SerTccUDst	Serial TCC UI Dest	Indicates which LTC output to associate the TCC UI with	• LTC1* • LTC2
SerCallTim	Serial Call (Time)	Indicates the time to call the RS232 serial input for time	String (00:00:00*)
SerCallDat	Serial Call (Date)	Indicates the starting date when to call out to RS232 serial input	String (2058-01-01*)
SerCallFrq	Serial Call (Freq)	Indicates how often to call the RS232 serial input for time/date	String (00001D*)

Table A-1. Operator and All List Parameters *(Continued)*

Card-Edge ID	Parameter Name	Function	User Range
SerCallEn	Serial Call Enable	Enables call out to the RS232 serial input for time/date	• On • Off*
SerDSTOn‡	Serial Input DST On	Determines if incoming serial input is DST compensated or not	• On • Off*
SerAutoDST	Serial Input Automatic DST Detect	Determines whether to detect plus/minus 1 hour differences and interpret it as DST for RS232 serial input	• On • Off*
SerAutoLS	Serial Input Automatic LS Detect	Determines whether to detect plus/minus 1 second differences and interpret it LS change for RS232 serial input	• On • Off*
SerHMSDST	Serial Auto DST Detect on HMS Offset	Determines if HMS offset change of plus/ minus 1 hour is interpreted as DST on CSD user interface through RS232 serial	• On • Off*
SerHMSLS	Serial Auto LS Detect on HMS Offset	Determines if HMS offset change of plus/ minus 1 second is interpreted as LS change on CSD user interface through RS232 serial	• On • Off*
NTP_Enable	NTP Enable	Manually enables/disables the NTP daemon	• On* • Off
NTP_Status [RO]	NTP Status	Indicates whether NTP daemon is running	• On • Off
NTPLLogMsg [RO]	NTP Last Log Message	Indicates the last message in sys log of NTP daemon	String
Hw_Ver [RO]	Hardware Version	Displays hardware version of unit	0 to 999 (clip)
Sw_Ver [RO]	Software Application	Displays software version of unit	0 to 999 (clip)
FctryRcl	Factory Recall	Restores factory settings for calibrated parameters	• None* • VITC • ATR
SynCfgMode	Synchronization Config Mode	Determines the configuration of primary and backup MTG for acquiring time and synchronization with one another	• ACO* • External

Appendix B

Servicing Instructions

Overview

In the event of equipment failure, user-servicing is primarily limited to the installation of the telecom cable, the connection of the power supply cable, and the replacement of batteries. Instructions for these procedures follow. Attempts to make repairs to frame or module components—other than the three listed above—will result in the voiding of the product's warranty.

Note

Except where noted, the term MTG-3901 will be used in this manual to refer to both MTG-3901 and CSD-3902 modules.

Caution

THESE SERVICING INSTRUCTIONS 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.

Battery Replacement Procedure and Disposal Information

Battery Use Warnings

Caution

DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

Battery Information

Table B-1. Lithium Battery Information

Manufacturer	Battery Type
Panasonic	DL123A

Replacing the Battery

Replace the battery after every 8 hours of battery use, every 12 months, or when the “BATTERY LOW” warning LED lights up, whichever occurs first.

Follow these steps to replace the battery:

1. Remove the two screws from the battery clip located at the board front edge (see Figure B-1). The clip will fall off when the screws have reached the ends of their threads.

2. Remove the depleted battery. (See page 280 for battery disposal information.)

Caution

Never attempt to remove a battery from its holder without first removing the battery clip. Pulling the battery out with the battery clip firmly attached will cause damage to the battery and may pose a safety hazard

3. Insert the fresh battery, with the positive (+) end facing toward the rear of the board.
4. Reattach the battery clip.
5. Fully tighten each clip screw. (The battery will not be connected unless the clip is completely attached.)

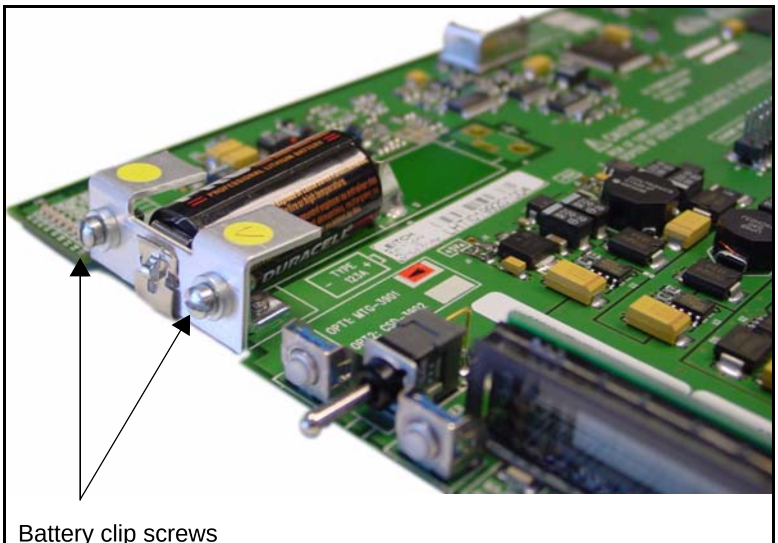

Figure B-1. Battery Replacement

Disposing of the Battery

A depleted battery may be safely disposed of in normal waste. Contact your local government for disposal or recycling practices in your area.

Caution

Never dispose of battery in fire, as it could explode. Remove depleted battery from equipment immediately and dispose of promptly. Do not attempt to recharge the battery.

Appendix C

Cables

Overview

This appendix provides information about the various cables described throughout this manual. For information about purchasing cables, contact your product sales representative.

CAB-CSD-GPS3901

This cable is used to connect GPS receivers to stand-alone MTG-3901/ CSD-3902 systems (see "Making MTG-3901/CSD-3902 System Connections" on page 31).

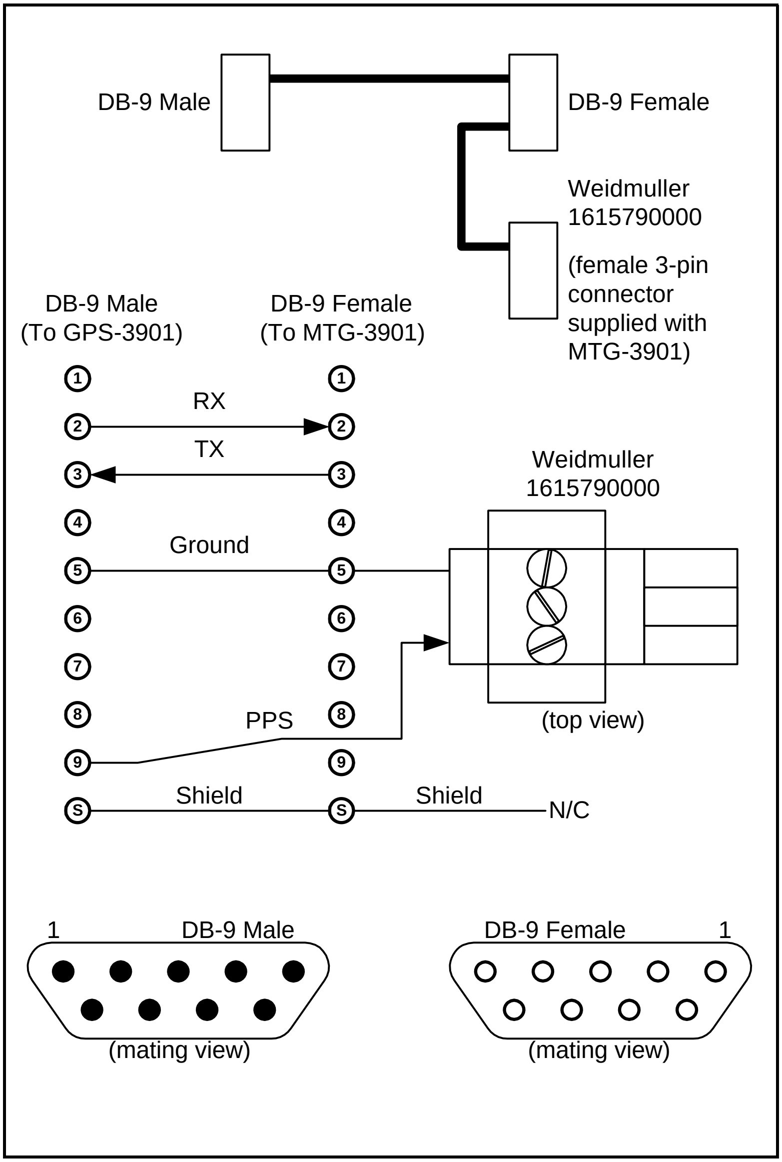

Figure C-1. CAB-CSD-GPS3901 Cable

CAB-CSD-TCC1302

(25M — convert — 9F)

This cable is used to connect TCC-1302 units to MTG-3901/CSD-3902 systems (see "Connecting Other Devices to MTG-3901 and CSD-3902 Systems" on page 54).

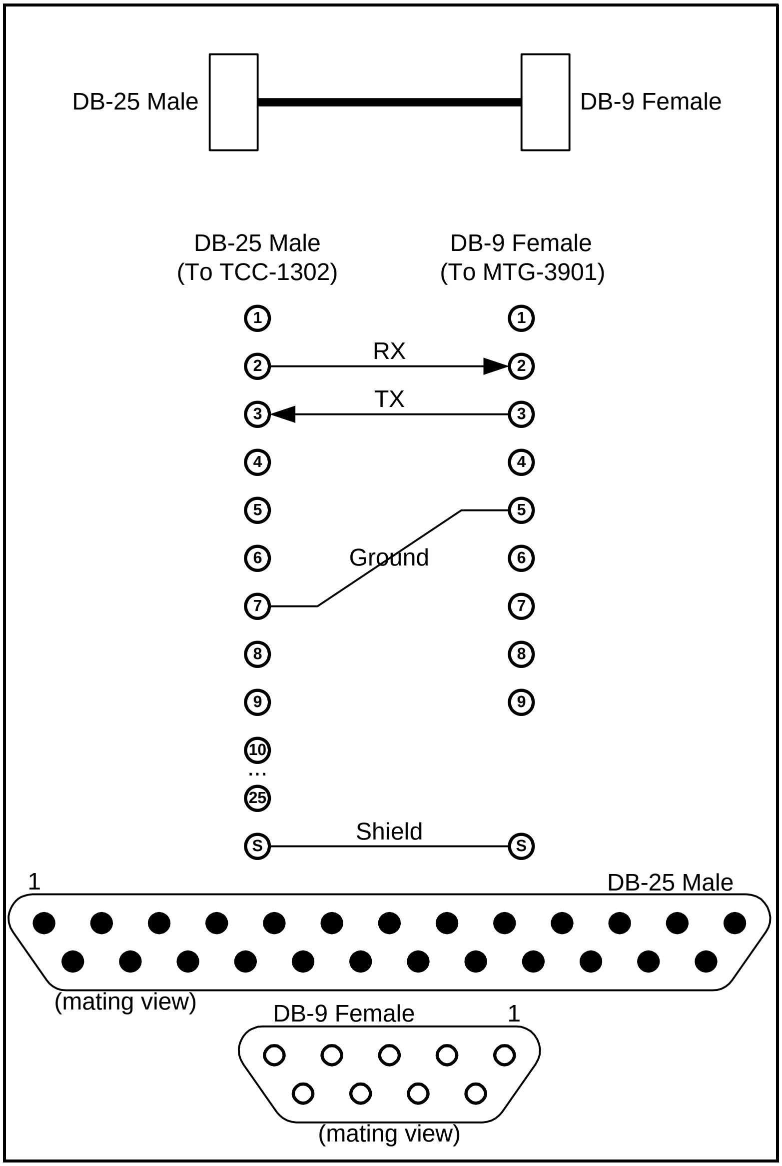

Figure C-2. CAB-CSD-TCC1302 Cable

CAB-CSD-SER-Y

This cable is required when using Dual Serial Port mode to connect two serial devices to MTG-3901/CSD-3902 systems (see “Applying Serial Connection Settings” on page 159).

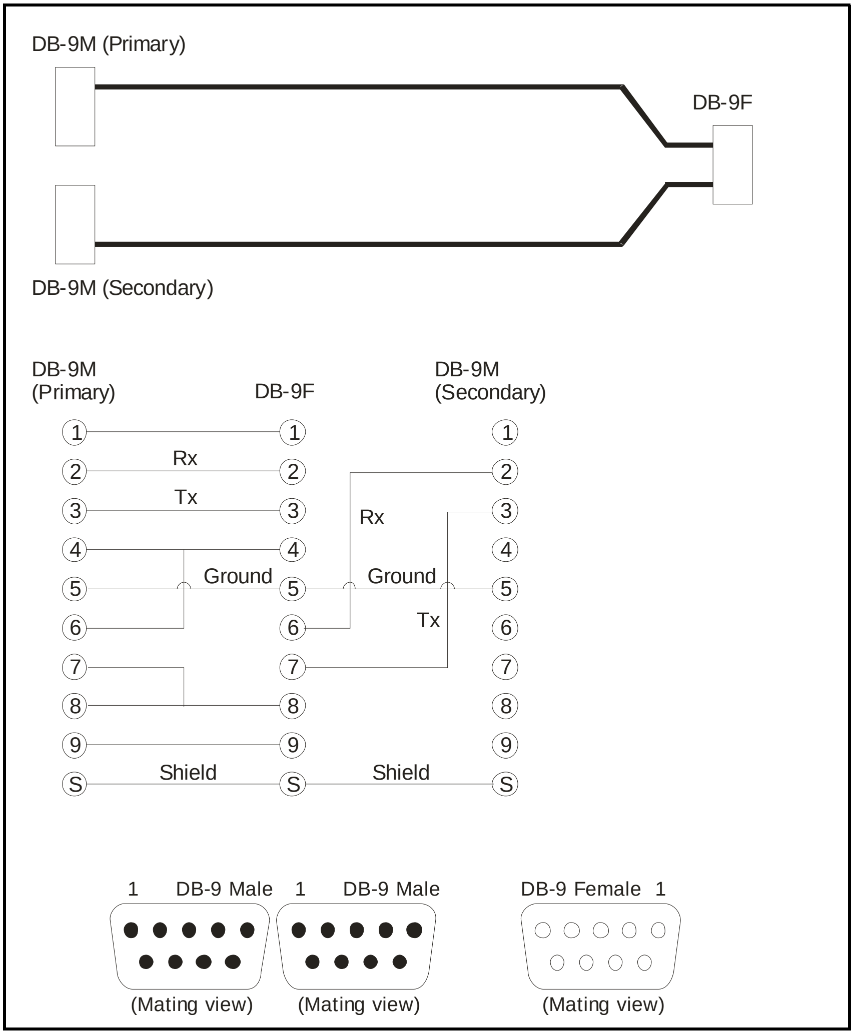

Figure C-3. CAB-CSD-SER-Y Cable

CAB-CSD-GPS53A

This cable is used to connect MTG-3901/CSD-3902 stand-alone systems to GPS-5300 receivers. This cable is used along with the CAB-CSD-GPS3901 to make the connection (see "Making MTG-3901/CSD-3902 System Connections" on page 31).

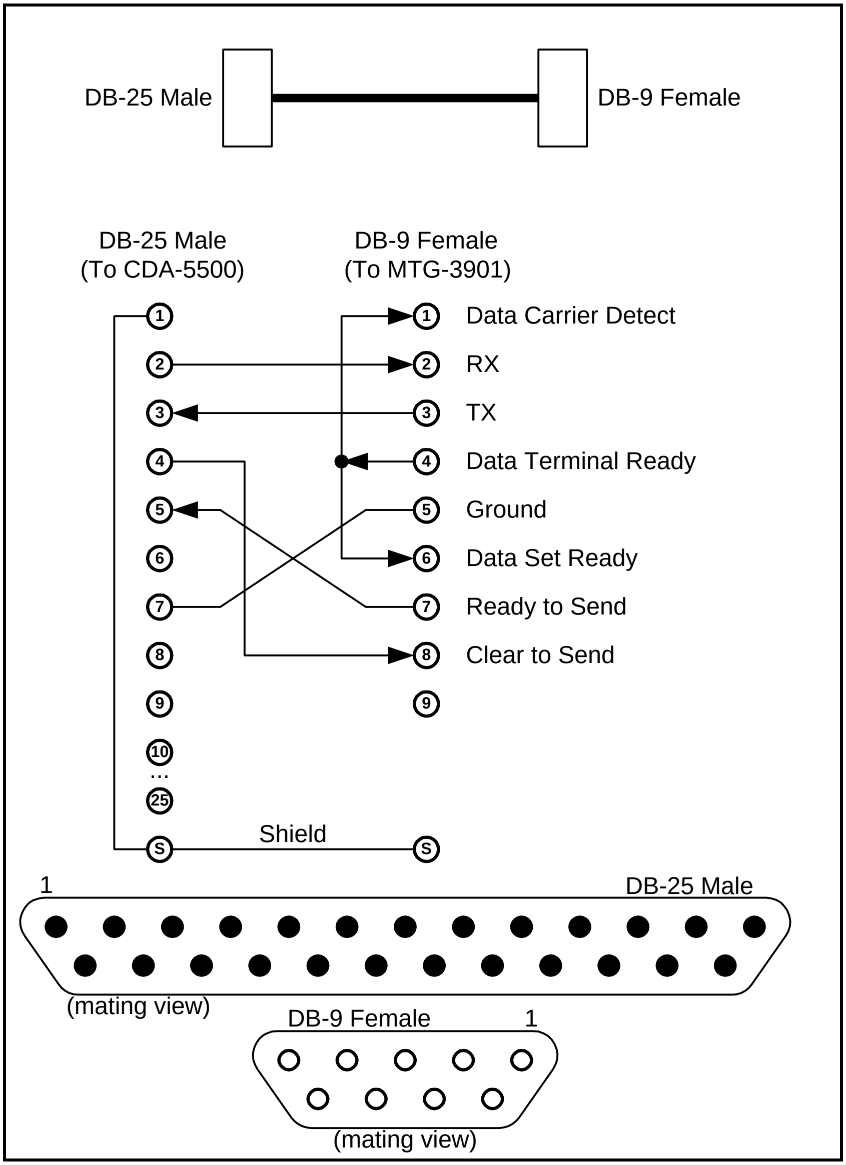

Figure C-4. CAB-CSD-GPS53A Cable

Appendix D

Locale Settings

Overview

This appendix provides information about locale settings available with the MTG-3901 master timing generator module.

Note

Except where noted, the term MTG-3901 will be used in this manual to refer to both MTG-3901 and CSD-3902 modules.

Table D-1 details the available locale settings for the MTG-3901, their corresponding time zone, and DST rules.

Table D-1. MTG-3901 Available Locale Settings

Locale Name	Details	Time Zone	DST Enable Rule	DST Disable Rule
NoLocale	No Locale	UTC	None	None
Greenwich	Greenwich Mean Time; Dublin; Edinburgh; London; Lisbon	UTC	Last Sunday in March at 1:00 a.m.	Last Sunday in October at 1:00 a.m.
MonorCasab	Monorovia; Casablanca	UTC	None	None
WEurope+1	Berlin; Stockholm; Rome; Bern; Brussels; Vienna; Amsterdam	UTC+1:00	Last Sunday in March at 1:00 a.m.	Last Sunday in October at 1:00 a.m.
Romance+1	Paris; Madrid	UTC+1:00	Last Sunday in March at 1:00 a.m.	Last Sunday in October at 1:00 a.m.

Table D-1. MTG-3901 Available Locale Settings *(Continued)*

Locale Name	Details	Time Zone	DST Enable Rule	DST Disable Rule
PragBra+1	Prague; Bratislava	UTC+1:00	Last Sunday in March at 1:00 a.m.	Last Sunday in October at 1:00 a.m.
Warsaw +1	Warsaw	UTC+1:00	Last Sunday in March at 1:00 a.m.	Last Sunday in October at 1:00 a.m.
GrFinTu+2	Athens; Helsinki; Istanbul	UTC+2:00	Last Sunday in March at 1:00 a.m.	Last Sunday in October at 1:00 a.m.
Egypt +2	Cairo	UTC+2:00	Last Friday in April at 12:00 a.m.	Last Thursday in September at 11:00 p.m.
EEurope+2	Eastern Europe	UTC+2:00	Last Sunday in March at 1:00 a.m.	Last Sunday in October at 1:00 a.m.
SAfrica+2	Harare; Pretoria	UTC+2:00	None	None
Israel +2	Israel	UTC+2:00	Last Friday in March at 2:00 a.m.	Third Sunday in September at 2:00 a.m.
SaudArb+3	Baghdad; Kuwait; Nairobi; Riyadh	UTC+3:00	None	None
Russia +3	Moscow; St. Petersburg	UTC+3:00	Last Sunday in March at 2:00 a.m.	Last Sunday in October at 2:00 a.m.
Iran +3.5	Tehran	UTC+3:30	None	None
Arabia +4	Abu Dhabi; Muscal; Tbilisi; Kazan	UTC+4:00	None	None
Afghn+4.5	Kabul	UTC+4:30	None	None
WAsia +5	Islamabad; Karachi; Tashkent	UTC+5:00	None	None
India+5.5	Bombay; Calcutta; Madras; New Delhi; Colombo	UTC+5:30	None	None
CAsia +6	Almaty; Dhaka	UTC+6:00	None	None
Bangkok+7	Bangkok; Jakarta; Hanoi	UTC+7:00	None	None
Beijing+8	Beijing; Chongqing; Urumqi	UTC+8:00	None	None
Taipei +8	Hong Kong; Singapore; Taipei	UTC+8:00	None	None
Tokyo +9	Tokyo; Osaka; Sapporo; Seoul	UTC+9:00	None	None

Table D-1. MTG-3901 Available Locale Settings *(Continued)*

Locale Name	Details	Time Zone	DST Enable Rule	DST Disable Rule
Adeld+9.5	Adelaide	UTC+9:30	Last Sunday in October at 2:00 a.m.	Last Sunday in March at 2:00 a.m.
Darwn+9.5	Darwin	UTC+9:30	None	None
Brisbn+10	Brisbane	UTC+10:00	None	None
EAustl+10	Canberra; Melbourne; Sydney	UTC+10:00	Last Sunday in October at 2:00 a.m.	Last Sunday in March at 2:00 a.m.
WPacif+10	Guam; Port Moresby	UTC+10:00	None	None
Tasman+10	Hobart	UTC+10:00	First Sunday in October at 2:00 a.m.	Last Sunday in March at 2:00 a.m.
CPacif+11	Solomon Is.; New Caledonia	UTC+11:00	None	None
Fiji +12	Fiji; Marshall Is.	UTC+12:00	None	None
NewZld+12	Wellington; Auckland	UTC+12:00	First Sunday in October at 2:00 a.m.	Third Sunday in March at 2:00 a.m.
Azores -1	Azores	UTC-1:00	Last Sunday in March at 1:00 a.m.	Last Sunday in October at 1:00 a.m.
MidAtln-2	Mid-Atlantic	UTC-2:00	Last Sunday in March at 2:00 a.m.	Last Sunday in September at 2:00 a.m.
Brasili-3	Brasilia	UTC-3:00	First Sunday in November at 2:00 a.m.	Last Sunday in February at 2:00 a.m.
SAmEast-3	Buenos Aires; Georgetown	UTC-3:00	None	None
Nfld -3.5	Newfoundland	UTC-3:30	Second Sunday in March at 2:00 a.m.	First Sunday in November at 2:00 a.m.
Atlanti-4	Atlantic Time (Canada)	UTC-4:00	Second Sunday in March at 2:00 a.m.	First Sunday in November at 2:00 a.m.
SAmWest-4	Caracas; La Paz	UTC-4:00	None	None
SAmPacf-4	Bogota; Lima	UTC-4:00	None	None
Eastern-5	Eastern Time (US & Canada)	UTC-5:00	Second Sunday in March at 2:00 a.m.	First Sunday in November at 2:00 a.m.
EIndian-5	Indiana (East)	UTC-5:00	Second Sunday in March at 2:00 a.m.	First Sunday in November at 2:00 a.m.

Table D-1. MTG-3901 Available Locale Settings *(Continued)*

Locale Name	Details	Time Zone	DST Enable Rule	DST Disable Rule
Central-6	Central Time (US & Canada)	UTC-6:00	Second Sunday in March at 2:00 a.m.	First Sunday in November at 2:00 a.m.
Mexico -6	Mexico City	UTC-6:00	First Sunday in April at 2:00 a.m.	Last Sunday in October at 2:00 a.m.
Sasktch-6	Saskatchewan	UTC-6:00	None	None
Arizona-7	Arizona	UTC-7:00	None	None
Mountai-7	Mountain Time (US & Canada)	UTC-7:00	Second Sunday in March at 2:00 a.m.	First Sunday in November at 2:00 a.m.
Pacific-8	Pacific Time (US & Canada)	UTC-8:00	Second Sunday in March at 2:00 a.m.	First Sunday in November at 2:00 a.m.
Alaska -9	Alaska	UTC-9:00	Second Sunday in March at 2:00 a.m.	First Sunday in November at 2:00 a.m.
Hawaii-10	Hawaii	UTC-10:00	None	None
Samoa -11	Midway Island; Samoa	UTC-11:00	None	None
Dateln-12	Eniwetok; Kwajalein	UTC-12:00	None	None

Appendix E

RS-232 Configuration

Overview

The RS-232 port on the MTG-3901 provides multiple options to the user including

- Connecting to a GPS receiver, radio receiver, external modem or to another MTG unit
- Sending time to a remote unit through an External modem or direct serial connection
- Access to the CSD-5300 or TCC-1302 user interface

These options are all configured using the various card-edge controls that are provided. However, there are only certain combinations that are valid for a given purpose. This appendix provides a summary of the most common configurations and the card-edge parameter settings required.

Note

Except where noted, the term MTG-3901 will be used in this manual to refer to both MTG-3901 and CSD-3902 modules.

RS-232 Setup

Table E-1 summarizes the card-edge parameter settings required to achieve the basic RS-232 functionality.

Table E-1. RS-232 Setup Summary

RS-232 Port Usage	InputSrc / BackSrc1 / BackSrc2	SerSrc	SerTccCtrl	GpsCfgMode
GPS (active)	GPS	Don’t care	Don’t care	Active
GPS (passive)	GPS	Don’t care	Don’t care	Passive
Radio	Radio	Don’t care	Don’t care	Don’t care
Periodically call another CSD for time using external modem	Modem	Don’t care	Don’t care	Don’t care
Periodically call another CSD for time using direct serial connection	**Serial**	MTG	Don’t care	Don’t care
TCC time input	**Serial**	TCC_xxxx	**ClientMode**	Don’t care
TCC time output	Non-RS-232 device for all 3 input sources	TCC_xxxx	**OutputTime**	Don’t care

RS-232 Port Usage

Table E-2 indicates what can be done on the RS-232 port based on the configuration of the MTG-3901. In the table, the CSD user mode and system mode access can be done through either the external modem, phone, or a direct RS-232 serial connection. The external modem and phone remote access only supports the CSD-5300 user interface mode and not the TCC-1302 user interface mode.

Table E-2. RS-232 Port Usage

Any of the 3 input sources has the following RS-232 device set as input source	**RS-232 serial source and TCC Control mode**	**Answer remote calls from RS-232 modem (only CSD mode)**	**Answer remote calls from phone (only CSD mode)**	**Direct RS-232 remote control (CSD and TCC modes)**	**RS-232 port usage**	**Comments**
No RS-232 device	MTG	Yes	Yes	Yes (CSD modes)	Remote access (CSD user/system mode)	
No RS-232 device	TCC client	No	Yes	No	None	
No RS-232 device	TCC output	No	Yes	No	Continuous TCC output	
No RS-232 device	TCC control	No	Yes	Yes (TCC control mode)	Remote access (TCC control mode)	
GPS	MTG	No	Yes	No	GPS time input	
GPS	TCC client	No	Yes	No	GPS time input	
GPS	TCC output	No	Yes	No	GPS time input	TCC output is disabled
GPS	TCC control	No	Yes	No	GPS time input	TCC control is disabled
Radio	MTG	No	Yes	No	Radio time input	
Radio	TCC client	No	Yes	No	Radio time input	
Radio	TCC output	No	Yes	No	Radio time input	TCC output is disabled

Table E-2. RS-232 Port Usage*(Continued)*

Any of the 3 input sources has the following RS-232 device set as input source	**RS-232 serial source and TCC Control mode**	**Answer remote calls from RS-232 modem (only CSD mode)**	**Answer remote calls from phone (only CSD mode)**	**Direct RS-232 remote control (CSD and TCC modes)**	**RS-232 port usage**	**Comments**
Radio	TCC control	No	Yes	No	Radio time input	TCC control is disabled
RS-232 Modem	CSD	Yes	Yes	No	External modem (MTG3901 calls periodically for time or remote CSD user/system mode access)	
RS-232 Modem	TCC client	No	Yes	No	External modem (CMTG901 calls periodically for time)	
RS-232 Modem	TCC output	No	Yes	No	External modem (MTG3901 calls periodically for time)	TCC output is disabled
RS-232 Modem	TCC control	No	Yes	No	External modem (MTG901 calls periodically for time)	TCC control is disabled
RS-232 Serial	MTG	No	Yes	No	MTG input (MTG3901 calls periodically for time)	
RS-232 Serial	TCC client	No	Yes	No	Continuous TCC input	
RS-232 Serial	TCC output	No	Yes	No	None	TCC output is disabled
RS-232 Serial	TCC control	No	Yes	No	None	TCC control is disabled

Appendix F

CSD-5300 and TCC-1302 User Interface

Overview

The MTG-3901 supports the use of the CSD-5300 and/or TCC-1302 user interface modes in order to provide control over most of the parameters in the module. The commands in the user interface modes are translated into the corresponding card edge controls. The following sections detail the differences between these respective user interface modes in the MTG-3901.

Note

Except where noted, the term MTG-3901 will be used in this manual to refer to both MTG-3901 and CSD-3902 modules.

When attempting to access the MTG-3901 using the CSD-5300 user interface through an external modem or serial connection, or the TCC-1302 user interface through a serial connection, the current input source cannot be a RS-232 source (unless **DualSerEn** parameter is set **On**). On the other hand, you can connect to the MTG-3901 using the CSD-5300 user interface through a phone connection even if the current input source is set to **Phone**. However, if the MTG-3901 attempts to call out for time while you are accessing the user interface, then the call out will fail because the line is busy.

Note

If the current input source is set to a LTC, GPS or serial (in TCC mode), and you access the user interface in order to set the time and/or date, then the time and/or date entered will be overwritten by the current input source.

CSD-530 User Interface

The CSD-5300 user interface mode is accessible through either the phone, external modem, or serial connection. For a serial connection, the **SerSrc** parameter must be set to **CSD**. When you are connected to the MTG-3901 through a terminal program, type HELP, followed by a carriage return, to obtain the following menu:

```
USER HELP MENU
LEITCH VIDEO MTG-3901

T (CR) -> SEND TIME (HHMMSS)
D (CR) -> SEND DATE 2 DIGIT YEAR (YYMMDD)
E (CR) -> SEND DATE 4 DIGIT YEAR (YYYYMMDD)
L (CR) -> LOOP BACK
HU (CR) -> HANG UP
S (CR) -> SEND STATUS

FOR MORE INFORMATION SEE MANUAL
```

The CSD-5300 user menu, emulated under the MTG-3901, does not echo all received characters.

To enter the system mode of the MTG-3901, type the string LEITCH on the terminal program, followed by a carriage return, then the serial number of the MTG-3901 unit followed by another carriage return. For example, if the serial number of the MTG-3901 is 1234567890, you would type the following in the terminal program (assuming CR represents a carriage return):

```
LEITCH CR
1234567890 CR
```

At this point, you will see the system mode menu asking whether you want line feeds or not. After selecting **Y** or **N**, type **HELP** followed by the carriage return to see the following menu:

```
SYSTEM HELP MENU
LEITCH VIDEO MTG-3901

M2  (CR) -> INPUT NEW TIME
M3  (CR) -> INPUT NEW DATE
M4  (CR) -> IMPULSE CLOCK TIME
M5  (CR) -> HOURS, MIN,SEC OFFSET
```

```
M6  (CR) -> MILLI SEC. OFFSET
M7  (CR) -> TELEPHONE OFFSET
    (HMS & MILLI SEC)
AUX (CR) -> AUXILIARY OFFSET
PHONE# (CR) -> INPUT NEW PHONE NUMBER
L1  (CR) -> SELECT LTC1 OUTPUT
L2  (CR) -> SELECT LTC2 OUTPUT
P0  (CR) -> SETTINGS APPLY TO MODEM
P1  (CR) -> SETTINGS APPLY TO PHONE
P2  (CR) -> SETTINGS APPLY TO MODEM + PHONE

HELP (CR) -> GIVES THIS MENU
TEST (CR) -> SELF DIAGNOSTICS
QUIT (CR) -> BACK TO USER MODE
HANGUP (CR) -> HANG UP TELEPHONE LINE
LF  (CR) -> LINE FEEDS (Y/N)

P -> PLUS
M -> MINUS
C -> CANCEL
(CR) -> ENTER
=>
```

The CSD-5300 system menu, emulated under the MTG-3901, echoes all received characters.

In the CSD-5300 system menu, there are five additional commands not found on the original CSD-5300. They are **L1**, **L2**, **P0**, **P1** and **P2**.

- The **L1** and **L2** parameters are used to indicate which LTC output the auxiliary offset is destined for. These are mapped to the card-edge controls with the **CsdLtcUDst** parameter.
- The **P0**, **P1**, and **P2** parameters indicate to which set of controls the HMS offset, millisecond offset, telephone offset, and telephone number apply: either the phone controls, external modem controls, or both. These are mapped to the card-edge controls with the **CsdPhOfst** parameter.

Note that in the **PHONE#** command, when requested to enter a **CALL DAY** and **CALL TIME**, if both entries are 0, the MTG-3901 will make a call out immediately.

When using **M2** and **M3** to set a new time and date, there is currently no provision to indicate whether the new time or date is DST enabled or not. However, if the **PhHMSDST**, **ModHMSDST**, or **SerHMSDST** parameters are set **On** (and if you are going through the corresponding phone, external modem or serial interface), then a 1 hour HMS offset can be applied and it will be interpreted as being a DST on transition. As a result, executing M2 and/or M3 followed by a M5 (with a +1 hour offset) can perform the same function as the **DSTTime** or **DSTTimDat** settings in the **SetTimNow** control.

The time/date can be set at any time during the operation of the MTG-3901 using the CSD-5300 system menu. However, unless the current input source is **FreeRun**, the time/date may be updated by the active input source and the changes lost.

Please note if there is no activity in the CSD-5300 system menu after 4 minutes, then the MTG-3901 will switch to user mode and send out the time.

Entering the serial number on the MTG-3901 to access the CSD-5300 system menu mode is not case-sensitive.

Note

You cannot use the HMS offset to apply a ± 1 second change at a schedule time during a leap second period. See “Applying Input Leap Second Auto-Detection” on page 94 for more details.

TCC-1302 User Interface

The TCC-1302 user interface mode is accessible only through the serial connection. The **SerSrc** parameter should be set to one of the TCC options (depending on the desired baud rate) and the **SerTCCCtrl** parameter should be set to **CtrlMode**.

```
LEITCH INC. (C) 2004
MTG-3901
Version 1.0 2004-04-01

T - SET TIME
O - SET OFFSET TIME
L - SET JAM SYNC TIME
J - PERFORM JAM SYNC
D - SET DATE
S - STATUS
W - WRITE TO EERAM
Q or ESC - EXIT COMMAND
1 - SELECT LTC1 OUTPUT
2 - SELECT LTC2 OUTPUT
H or ? - HELP

#
```

The TCC-1302 menu, emulated under the MTG-3901, echoes all received characters. There are two additional commands found in the MTG-3901 version that are not in the original TCC-1302. These are commands **1** and **2**.

- **1** and **2** are used to indicate which LTC output the TCC commands are destined for. This includes the **Set Offset Time, Set Jam Sync Time,** and **Perform Jam Sync**.

The time/date can be set at any time during the operation of the MTG-3901 using the TCC-1302 menu. However, unless the current input source is **FreeRun**, the time/date may be updated by the active input source and the changes lost. When issuing the **Time** command, the previous time shown is the actual current time rather than the time that was previously issued by the user using the **Time** command.

Please note all offset and jam sync commands in the TCC-1302 are applied to the LTC output times and not the local time. As a result, for a TCC-1302 running in Free-Run mode, there is currently no way through the TCC-1302 user interface to set the time/date as being DST enabled or to apply an offset to the local time.

Some additional information about the TCC-1302 offset and jam sync controls:

- An offset applied through the TCC-1302 user interface will not be applied until a jam sync is performed.
- When using the **Offset Time** command, the previous offset shown may not necessarily reflect the actual offset being applied on the LTC output. For verification, check the **OTcOfst** parameter.
- A jam sync can be performed without requiring the LTC input to be present.
- If the **Set Offset Time** command is called while the level trigger is **On (OTcOLvlT)**, then the offset entered will be automatically applied to the designated output LTC.
- A frame offset can be added to the time offset when issuing command **O** in the TCC-1302 user interface mode. The offset is applied to the corresponding LTC output (determined by the control **SerTccUDst**) at the preset Jam Sync time or when you issue a **Perform Jam Sync** command.

Note

You cannot enter any frame offset equal to or greater than the total number of frames per second for the corresponding LTC output.

Appendix G

MTG-3901 Compliance Information

Overview

This appendix provides MTG-3901 compliance information as it pertains to terminal equipment technical specifications and telephone equipment.

Note

Except where noted, the term MTG-3901 will be used in this manual to refer to both MTG-3901 and CSD-3902 modules.

ACTA Registration number: US: FVDMD03ATCSD3901
Industry Canada Registration number: IC: 824A-CSD3901

NOTICE: This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

NOTICE: The Ringer Equivalence Number (REN) for this terminal equipment is 0.3A. The REN assigned to each terminal equipment provides an indication of the maximum number of terminals allowed to be connected to a telephone interface or line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed five

(5.0) (in most cases). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company. For products approved after July 23, 2001, the REN for this product is part of the product identifier that has the format US:AAAEQ##TXXXX. The digits represented by ## are the REN without a decimal point (e.g. 03 is a REN of 0.3). For earlier products, the REN is separately shown on the label.

This equipment complies with Part 68 of the Federal Communications Commission (FCC) rules and requirements as adopted by the ATCA (Administrative Council for Terminal Attachments). On the MTG-3901-FM of this equipment is a label that contains, among other information, a product identifier in the format US:AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC part 68 rules and requirements adopted by the ACTA. A compliant telephone modular RJ11C jack is provided with this product. It is designed to be connected to a compatible modular jack that is also compliant. See Installation Instructions for details.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of this equipment. If this happens the telephone company will provide, advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment MTG-3901, for repair or warranty information, please contact your Customer Service representative. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

NOTICE: Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

Note

If this equipment MTG-3901 causes harm to the telephone network, the telephone company will notify you in advance that a temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the Federal Communications Commission (FCC) if you believe it is necessary.

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