TITUS
TECHNOLOGICAL
LABORATORIES

MLW-2

Operating Manual

Introduction

The Titus Technological Laboratories MLW-2 was inspired by years of products like the MLW-1, MLW-4, MLW-8, and The Last Word (I and II). The features of the MLW-2 make it the superior choice for automatic stereo and alternate channel routing.

The MLW-2 can be not only used for simple correction of a problem with an input source but be used to integrate EAS broadcast tests and emergency notices, testing of audio sources prior to putting them on the air, AND control of audio for an SCA or SAP channel or even monitoring and control of an AM and FM stereo facility with one box!

Almost all of the automatic functions are programmed via the front panel push buttons including time delays, sequencing, and thresholds. All programming is stored internally in non-volatile ram.

The MLW-2 is primarily designed for the main audio path, both main channel programming (Primary outputs) and SAP/SCA channel programming (Secondary output) and can be located either at the studio end or the transmitter end to provide automatic audio redundancy paths.

The inputs to the MLW-2 are programmable level inputs (+10 dBm to -10 dBm in 1 dB increments), balanced, bridging. The output levels are adjustable between +18 dBm and -40 dBm in 1 dB increments making the MLW-2 a perfect level translation device. The outputs are crossed balanced differential drivers capable of driving 600 ohms or greater.

Manual control provides the user with selection of which source is on the air, and how that source is treated (stereo, out-of-phase stereo, the sum of the input channels, the difference between the input channels, the left or the right input channel into both outputs). Automatic “channel fill” is provided for missing channel conditions. Automatic routing to another source with an error condition (loss of channel or silence of the source) is also accommodated with threshold set in 1 dB increments.

Polarity correction of audio inputs is also automatic. The threshold of what really “constitutes” out-of-phase is also settable to accommodate surround sound polarity problems.

The secondary output can either be the output from an Auxiliary audio source or the sum of the audio present on the main Primary output channels. Thus, a

second language channel can appear on the Auxiliary audio input and when that source disappears (goes silent) the MLW-2 will automatically bring up the sum of the main Primary output channels (or main program audio). The time delay and silence threshold are user programmable (1 second increments, 1 dB level).

Remote control via the DB-37 provides the user with manual remote control of which source is on line, which source is feeding the Secondary output, and full alarm outputs (either open collector out or relay outputs are provided for various operating alarms).

A secondary remote control is provided via an RS-232 link (9,600 8/N/1) which provides alarm messages to a “dumb terminal” as well as some more precise calibration procedures for the MLW-2.

An optional built-in modem lets the MLW-2 be called from a remote location for remote control and reporting as well as remote down load of custom software for the MLW-2.

The MLW-2 remote control DB-37 also provides the user with a source of audio the can be directly fed into a stereo amplifier and speakers for monitoring of ANY of the input sources.

The front panel of the MLW-2 provides metering and alarm and programming messages on an LCD display. Alarm and active source LEDs are also provided. Unique to the MLW-2 is a headphone jack and pushbutton volume controls. Using the source selection control the user can monitor any of the input sources using a pair of headphones. The front panel metering LCD can be switched to read either Left channel and Right channel or the Sum and Difference of the selected input source.

OPERATION OF THE MLW-2

The MLW-2 will need to be configured for the specific needs of the station. If an input is not to be monitored it should be disabled via the front panel programming buttons (**see MLW-2 FRONT PANEL PRGGRAMMING GUIDE - 8.Active Source**).

All conditions should be tested prior to putting the MLW-2 on line as there may be unexpected results from some operating conditions. When operating in either the programming mode or the manual mode the MLW-2 will NOT respond to alarm/error conditions on the inputs.

AUTOMATIC MODE

In the automatic mode, pressing the “up” button will put the meters in the “stereo” mode. Pressing the “down” button will put the meters into the “sum/difference” mode. If an alarm occurs during automatic operation and the alarm is not displayed on the LCD display then simply pressing either the “left” or the “right” button will display the current alarm on the LCD display. Normally, error/alarm conditions are displayed for about 1 second on the display.

The “1/2 Look Ahead” mode has the MLW-2 look at the next source (if programmed to go there with alarm) and see if it has the same problem. If it does then the MLW-2 will not bring up that source.

The “1/2/3 Cascade mode” tells the MLW-2 to keep looking at the source that it switched from (the one that caused the alarm) and when the alarm is removed then switch back to that source. Without the “Cascade” mode on the MLW-2 will switch to another source and stay there until user command to change back.

The level set of the MLW-2 is designed to meet the requirements of most facilities. Each input can be set to it’s own operating level. For example, if the standard operating level of a VTR is +4 dBm then the level for the input assigned to that source should be set to +4 dBm. This ensures that the “normal” operating range internal to the MLW-2 is met and all thresholds are set to a common level. The output level of the MLW-2 is also similarly set. The Primary output levels are set independent of the Secondary output levels and have a wide range of operating levels.

All automatic routing programming is done via the front panel push buttons (see the section “**MLW-2 FRONT PANEL PROGRAMMING GUIDE**”). In most cases pressing the “up” button will bring you back one menu item, the “down” button brings you to the next menu item. The “left” and “right” buttons perform specific actions on the menu items. Pressing the “ENTER” button will usually cause the

MLW-2 to revert to the Automatic operating mode, locking in any changes in the programming and storing those changes in nonvolatile RAM.

MANUAL MODE

By pressing the “ENTER” button in the Automatic mode lets the user select either the Automatic programming menu or the Manual programming menu. In the Manual mode, direct control of all of the functions of the MLW-2 can be controlled. For example, the user can bring up Source 1 Left channel only into both Primary outputs. Or the user can select which source is feeding the Secondary output. (See the section “**MLW-2 FRONT PANEL PROGRAMMING GUIDE**”).

While in the Manual mode the MLW-2 will not respond to error/alarm conditions. The “Programming/Manual” led illuminates to indicate this mode of operation.

There are no user settable controls inside of the MLW-2.

METERING

The MLW-2 metering is designed to indicate the **average** level of the selected input source. Typically the meter will read -12 when the input level matches the input level set by the user. For example, the meter will indicate a level of -12 if the user set the input level at a +8 operating level and the audio input is indeed +8 dBm. The meter indicates a range of 61 decibels which should be adequate for most situations. The precise metering of input levels is left up to the user by other means.

SYSTEM CONFIDENCE

When the System Confidence LED illuminates then the system has undergone a self-checking process that includes measuring the +15 volt rail, the -15 volt rail, and an internal +2.5 volt rail for compliance. It also indicates that the system is in basic functioning condition.

There is an audio bypass relay that connects the Source 1 inputs directly to the Primary audio outputs when power fails *OR* when the System Confidence fails! If the MLW-2 detects a voltage failure it will automatically bypass the audio and alarm.

AUDIO MONITORING

The front panel headphone jack provides the user with a handy way to quickly "QC" the source audio for all of the inputs on the MLW-2. Pressing the Source Select button will change the selected source not only in the headphones but on the external monitor as well (provided on the DB-37 connector). The Volume "up" and "down" buttons only control the headphone audio level. Pressing the "source select" button also changes which source is being metered on the LCD display providing a handy reference for the operating condition of the input sources.

REMOTE CONTROL

Remote control of the MLW-2 is detailed in the **MLW-2 REMOTE CONTROL GUIDE.** All inputs are TTL low active - non buffered. Care should be taken to minimize the length of the leads to the MLW-2 for control functions, limiting the length to under 10 feet.

There are two types of outputs, one open-collector and the other dry relay contacts. A relay closure is provided for each of the Primary source outputs (Source 1 On, Source 2 On, Source 3 On). A fourth relay is user programmable for any combination of alarm conditions.

The open collector outputs can drive up to 60 volts (DC) at 600 MA maximum, non-inductive.

The MLW-2 also supports an RS-232 data link. The output is the alarm messages that can be fed to a serial printer or a dumb terminal. Control input at this point is limited to simple commands and specific setup controls.

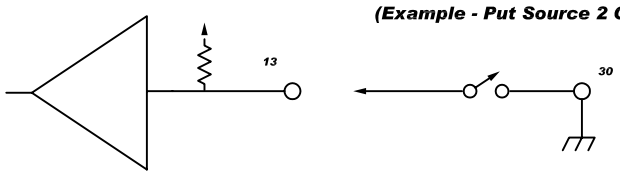
MLW-2 REMOTE CONTROL GUIDE

The following is the pin-out for the MLW-2 rear panel remote control:

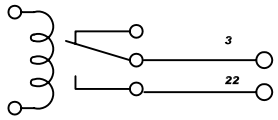
PIN #	FUNCTION	PIN #	FUNCTION
1.	Programmable input	20.	Source 3 loss of channel
2.	Source 1 Silent	21.	Source 2 loss of channel
3.	Source 1 ON relay	22.	Source 1 ON relay
4.	Source 2 Silent	23.	Source 1 loss of channel
5.	Source 3 Silent	24.	Source 2 ON relay
6.	Source 2 ON relay	25.	Auxiliary Silent
7.	Auto/Manual indicator	26.	Polarity Alarm
8.	Source 3 ON relay	27.	Source 3 ON relay
9.	Warn output	28.	Secondary out is Auxiliary in
10.	Programmable relay	29.	Programmable relay
11.	GROUND	30.	GROUND
12.	Put Source 1 on	31.	GROUND
13.	Put Source 2 on	32.	GROUND
14.	Put Source 3 on	33.	GROUND
15.	Manual operation on	34.	GROUND
16.	Secondary output to Primary mix	35.	GROUND
17.	(gateway in)	36.	GROUND
18.	AUDIO OUT RIGHT	37.	GROUND
19.	AUDIO OUT LEFT		

NOTE: Pins 1,2,4,5,7,9,20,21,23,25,26, and 28 are open collector outputs
Pins 3/22, 6/24, 8/27, and 10/29 are normally open dry relay closure out
Pins 12,13,14,15,16, and 17 are TTL low active inputs (caution!)
Pins 18 and 19 are unbalanced audio out equal to 1 v P-P at nominal operating input level .

Typical Command Input

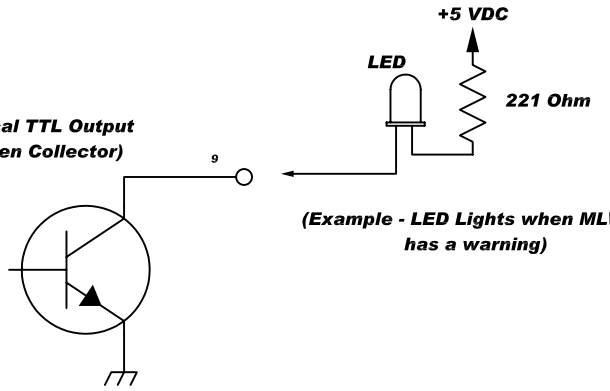


Typical Relay Out

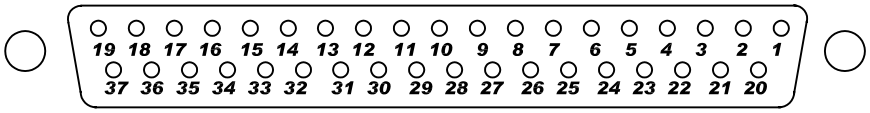


(Example - Relay indicates Source 1 is ON when closed)

Typical TTL Output (Open Collector)



(Example - LED Lights when MLW-2 has a warning)



1 - Programmable Input
2 - S1 Silent (TTL)
3 - S1 ON Relay ------>>
4 - S2 Silent (TTL)
5 - S3 Silent (TTL)
6 - S2 ON Relay ------>>
7 - Auto|Manual Indicator (TTL)
8 - S3 ON Relay ------>>
9 - Warn Output (TTL)
10 - Programmable Relay ------>
11 - Ground
12 - Put S1 ON Command
13 - Put S2 ON Command
14 - Put S3 ON Command
15 - Manual Mode ON Command
16 - Sec Out to Primary Mix Cmd
17 - (Gateway In Command)
18 - Audio Out Right Monitor
19 - Audio Out Left Monitor
20 - S3 Loss of Channel (TTL)
21 - S2 Loss of Channel (TTL)
22 - S1 ON Relay
23 - S1 Loss of Channel (TTL)
24 - Source 2 ON Relay
25 - Aux Silent (TTL)
26 - Polarity Alarm (TTL)
27 - S3 ON Relay
28 - Secondary Out is Aux In (TTL)
29 - Programmable Relay
30 - Ground
31 - Ground
32 - Ground
33 - Ground
34 - Ground
35 - Ground
36 - Ground
37 - Ground

TITUS TECHNOLOGICAL LABORATORIES

MLW-2

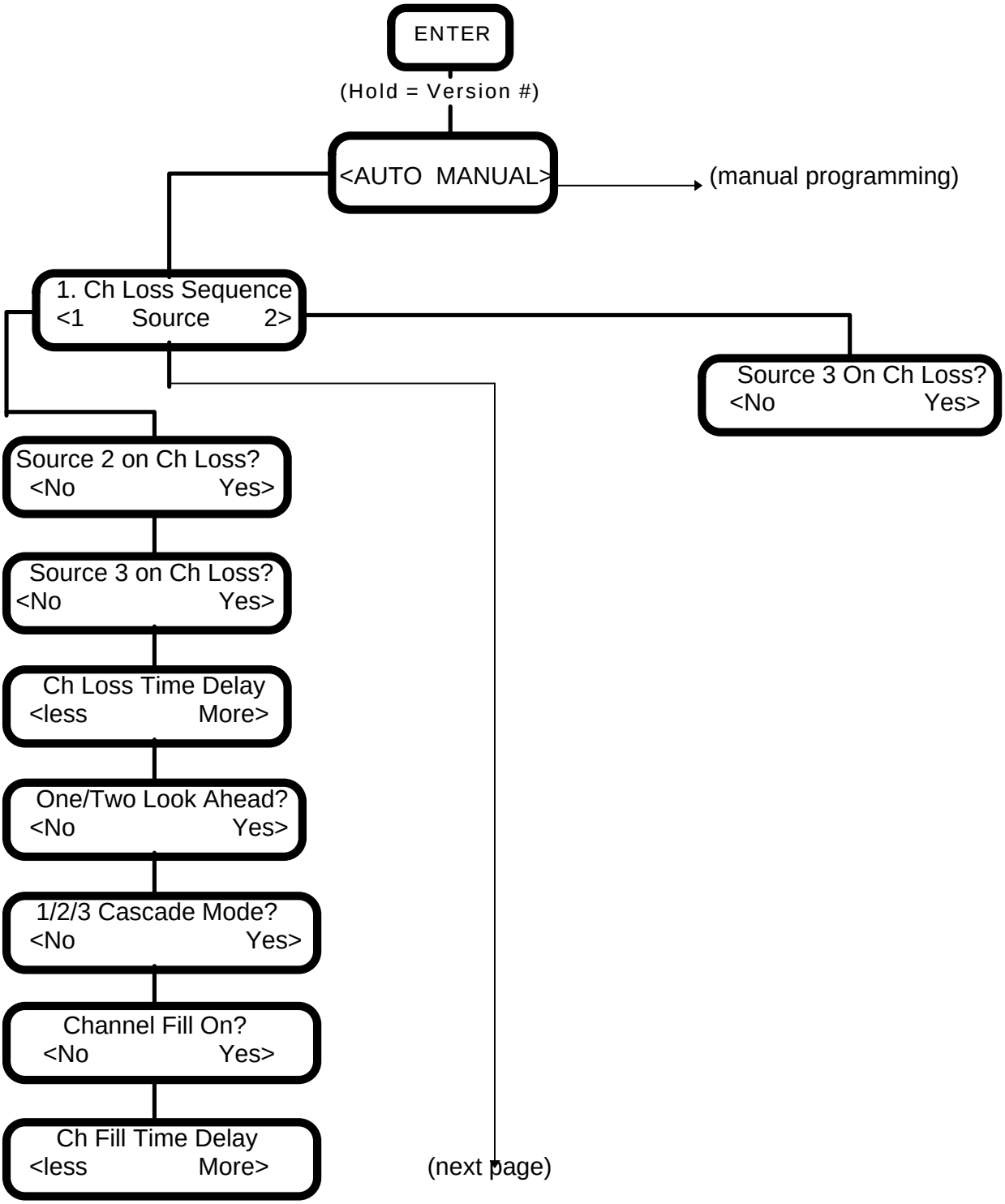
Remote I/O

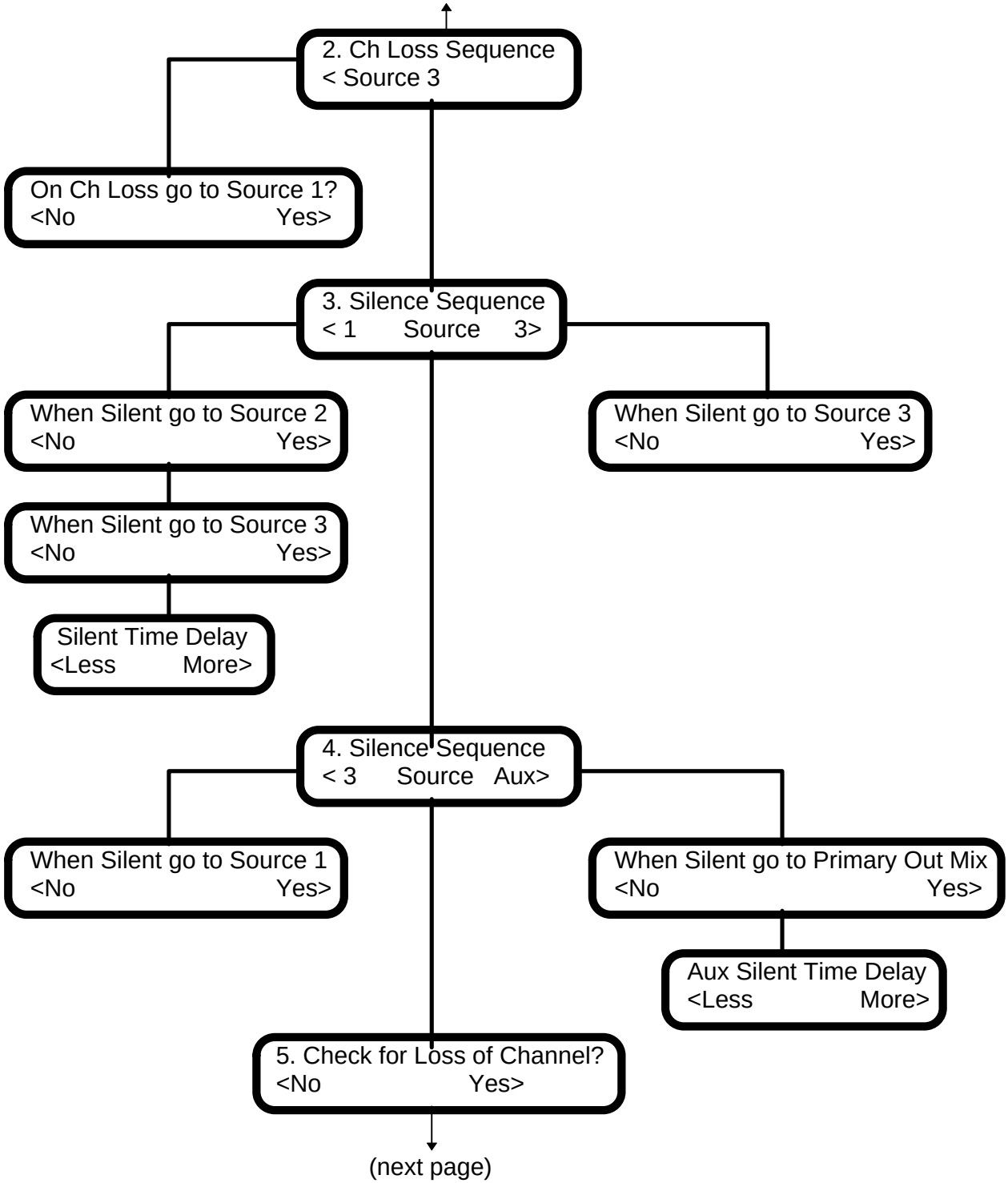
Special programming features

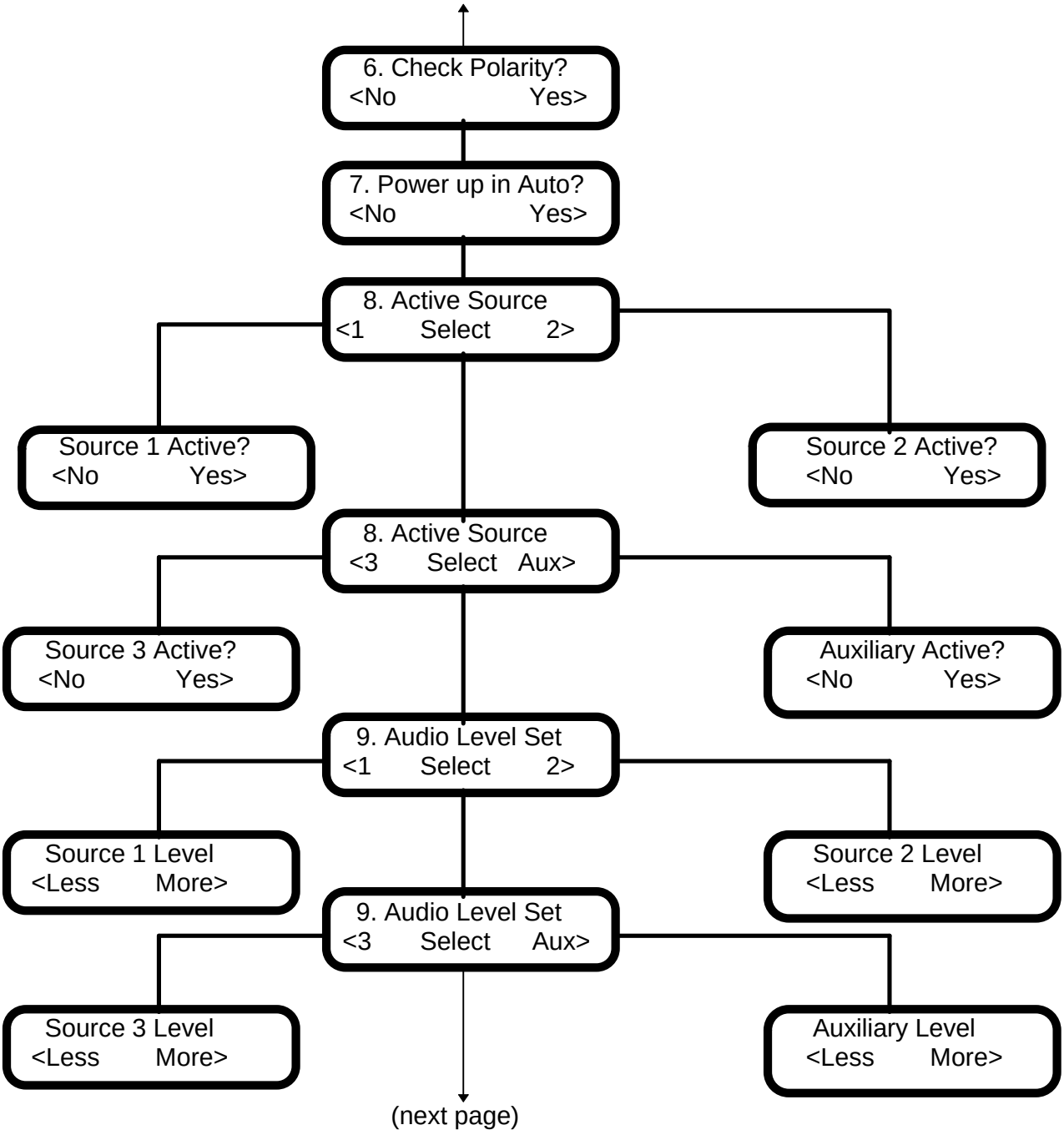
The MLW-2 has several special function programming features. One of which is the “Alternate Primary Mode” which is accessed via the front panel programming switches under “3. Silence Sequence - 1”. This feature, when turned on (“YES”) will turn off the 1/2/3 cascade mode if it is preprogrammed (described elsewhere in this section), and changes the function of the MLW-2.

With this mode enabled, the MLW-2 will go to Source 2 with silence on Source 1. When Source 1 audio returns the MLW-2 will stay on Source 2. When audio is lost on Source 2, the MLW-2 will look to Source 1 for audio and go there if it has audio. If Source 1 doesn’t have audio as well then the MLW-2 will switch to Source 3. When audio returns to Source 1 or Source 2 then the MLW-2 will switch to the one that has audio, slightly favoring Source 1.

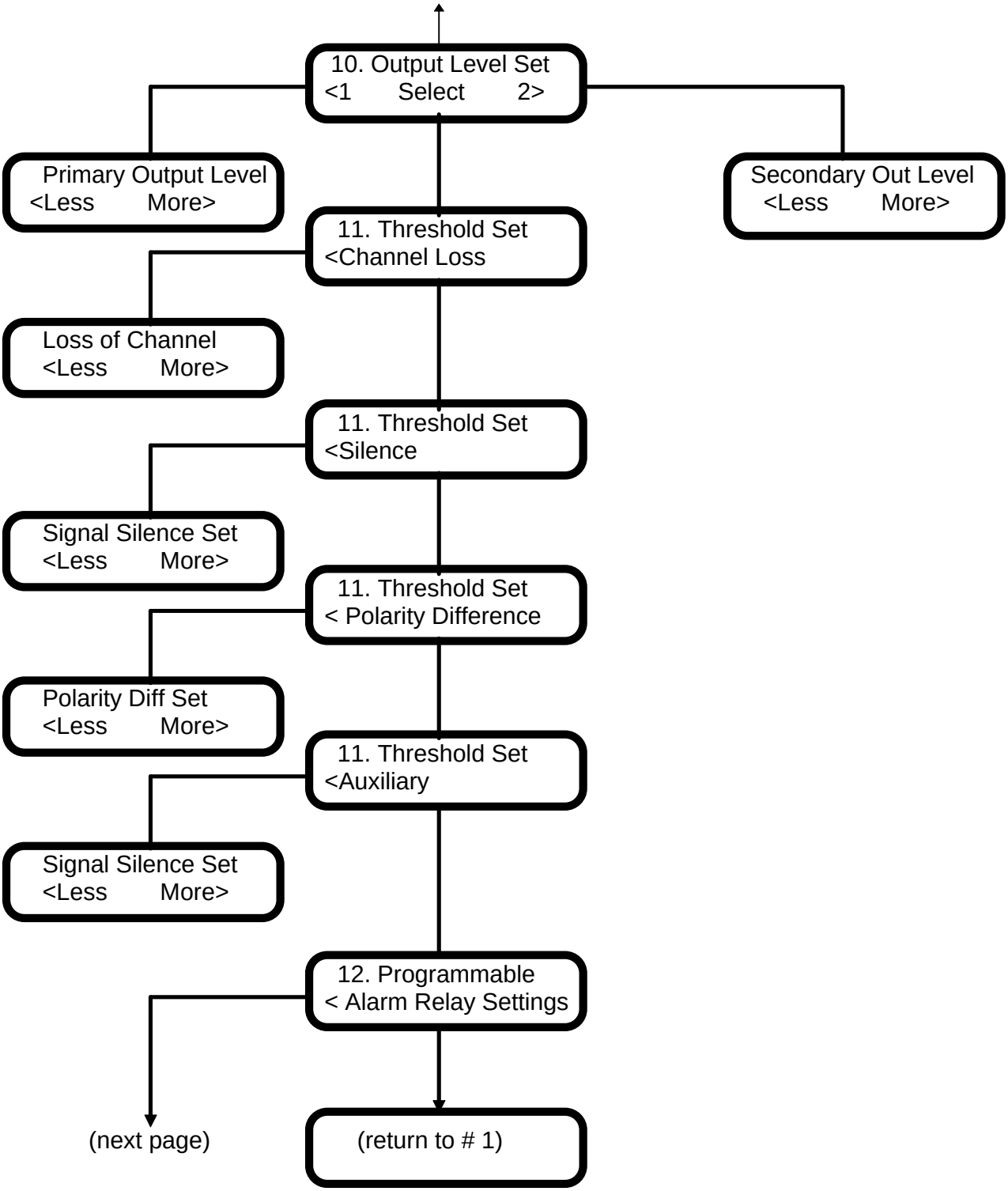
MLW-2 FRONT PANEL PROGRAMMING GUIDE

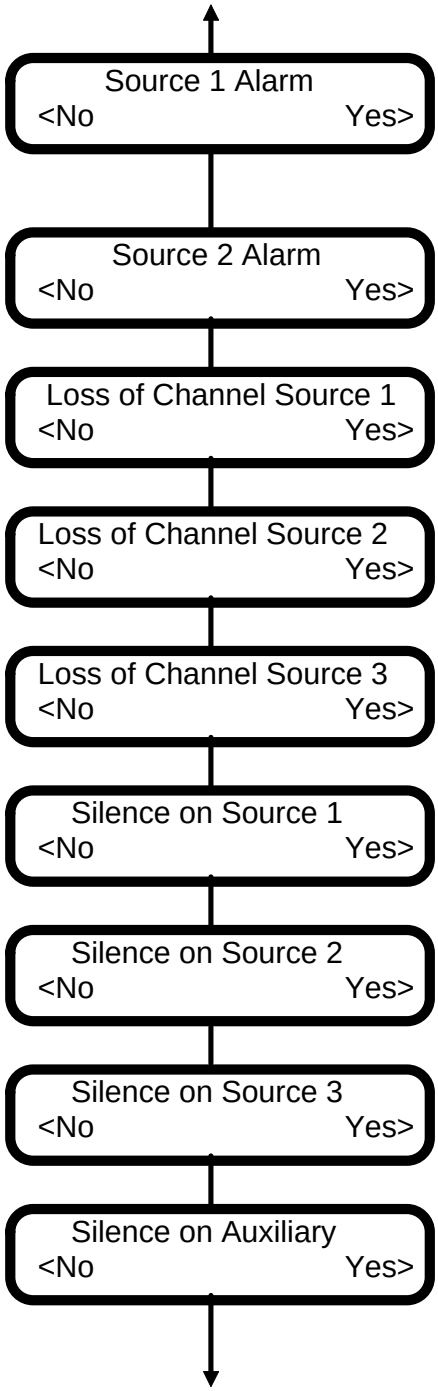



2. Ch Loss Sequence
< Source 3
On Ch Loss go to Source 1?
<No Yes>
3. Silence Sequence
< 1 Source 3>
When Silent go to Source 2
<No Yes>
When Silent go to Source 3
<No Yes>
When Silent go to Source 3
<No Yes>
Silent Time Delay
<Less More>
4. Silence Sequence
< 3 Source Aux>
When Silent go to Source 1
<No Yes>
When Silent go to Primary Out Mix
<No Yes>
Aux Silent Time Delay
<Less More>
5. Check for Loss of Channel?
<No Yes>
(next page)

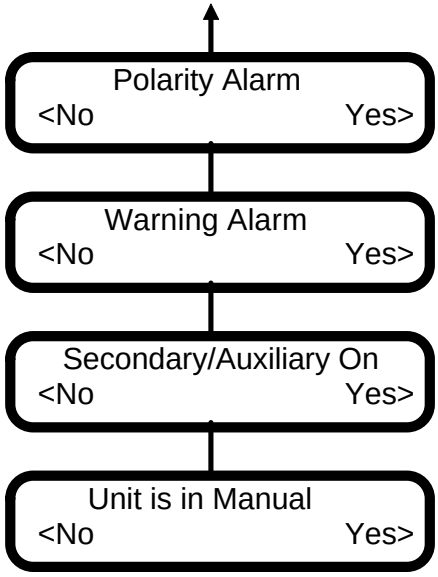

6. Check Polarity?
<No Yes>
7. Power up in Auto?
<No Yes>
8. Active Source
<1 Select 2>
Source 1 Active?
<No Yes>
Source 2 Active?
<No Yes>
8. Active Source
<3 Select Aux>
Source 3 Active?
<No Yes>
Auxiliary Active?
<No Yes>
9. Audio Level Set
<1 Select 2>
Source 1 Level
<Less More>
Source 2 Level
<Less More>
9. Audio Level Set
<3 Select Aux>
Source 3 Level
<Less More>
Auxiliary Level
<Less More>
(next page)

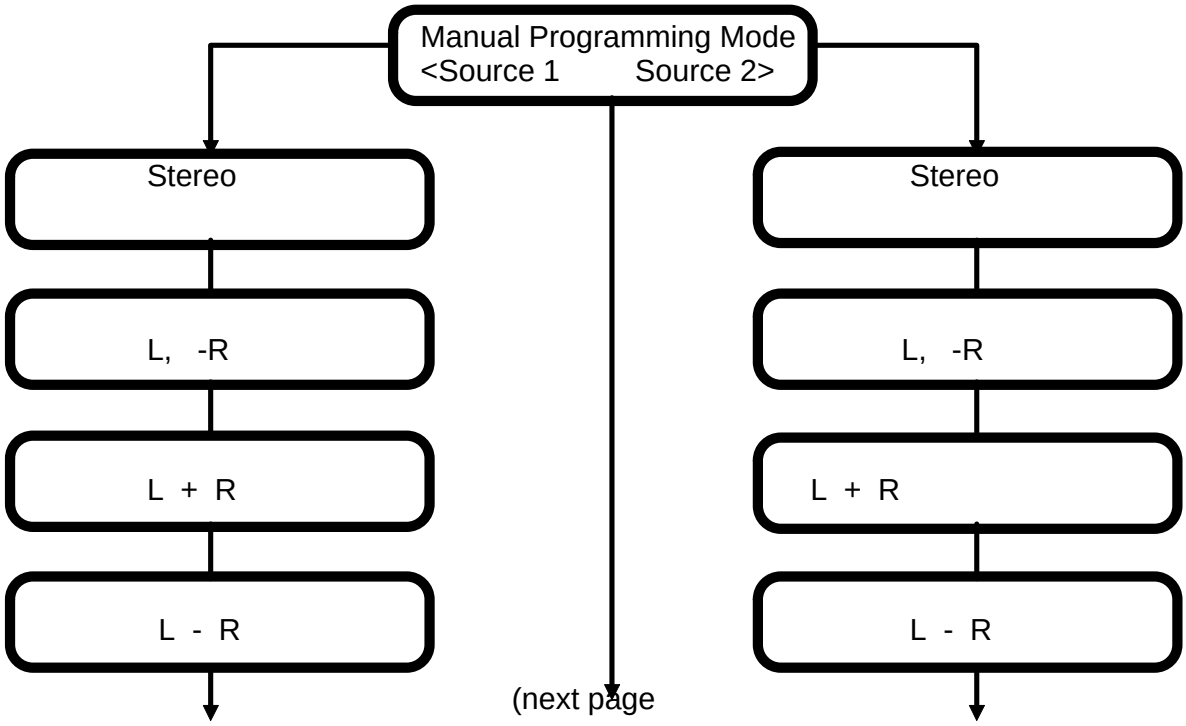
MLW-2 FRONT PANEL PROGRAMMING GUIDE




Source 1 Alarm
<No Yes>
Source 2 Alarm
<No Yes>
Loss of Channel Source 1
<No Yes>
Loss of Channel Source 2
<No Yes>
Loss of Channel Source 3
<No Yes>
Silence on Source 1
<No Yes>
Silence on Source 2
<No Yes>
Silence on Source 3
<No Yes>
Silence on Auxiliary
<No Yes>
(next page)

MLW-2 FRONT PANEL PROGRAMMING GUIDE





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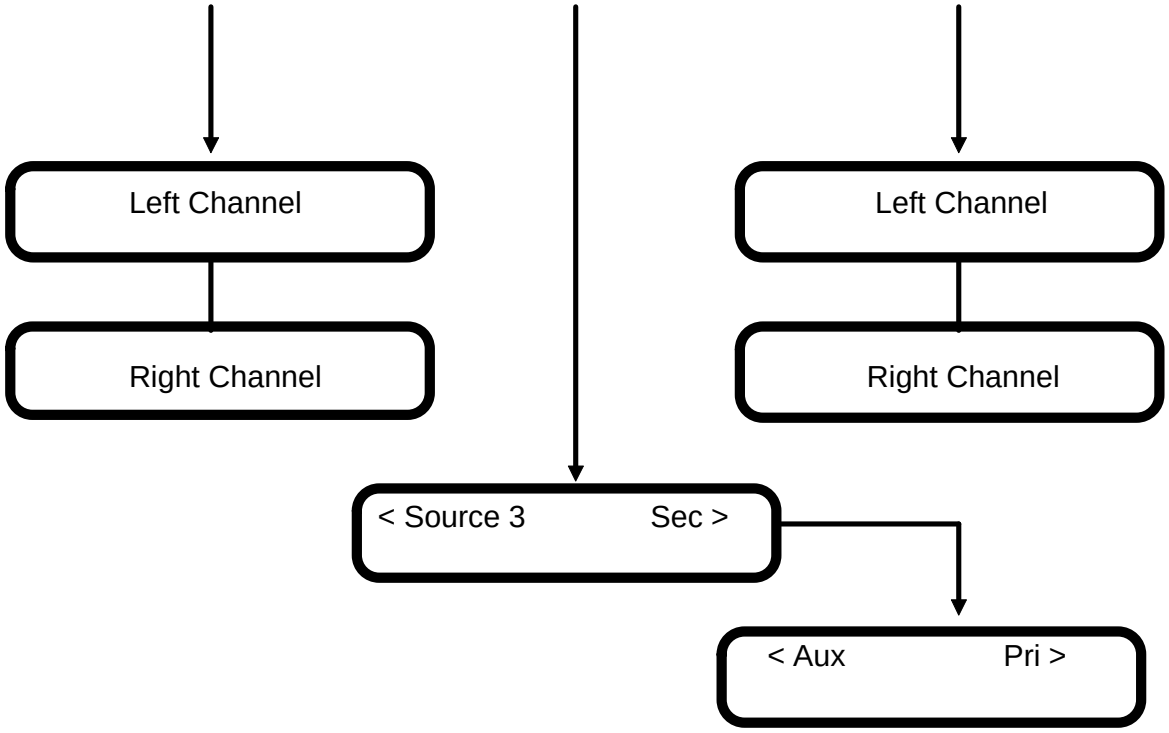

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LIMITED WARRANTY

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