

# Film-Tech

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SMART products are designed to deliver unsurpassed quality in workmanship and performance. The following information gives detailed instructions on the installation and operation of the SMART EXM556 processor. We strongly encourage new owners of the EXM556 to thoroughly read this entire manual before placing their new SMART product into service. This will ensure that the EXM556 will be operated properly to give the superior performance that it was designed to deliver.

For service or installation assistance, please call our  
Technical Support Department between the hours of  
8 a.m-5 p.m. E.S.T., Mon.-Fri.  
1-800-45-SMART

LIMITED WARRANTY: SMART products and accessories are warranted against malfunction or failure due to defects in workmanship or materials for a period of one year from the date of shipment. If a problem occurs during the warranty period, the unit will be repaired, or replaced at our option, without charge for materials or labor. If air freight is requested by the dealer, the difference between air and surface charges will be billed to the dealer. This limited warranty does not cover products that have been abused, altered, modified, or operated in other than specified conditions. Prior factory approval is required on all returns. Returned equipment or defective parts must be shipped freight prepaid to us by the dealer or customer.

Our limited warranty does not cover damages resulting from accident, misuse or abuse, lack of responsible care, or failures not attributable to manufacturing defects, except as provided herein. SMART Devices, Inc. makes no warranties, express or implied, including warranties of merchantability or fitness for a particular purpose.

RETURN POLICY: Factory authorization MUST be obtained before returning any product. A 15% restocking charge will be issued on unused equipment (in original box) that is returned for credit. Credit is issued to the dealers account. The credit may be used against future purchases and no cash transactions are offered. All returns must be shipped freight prepaid by the dealer. Equipment returned without a factory RA (Return Authorization) will be refused.

# Installation and Service Manual

## MN/EXM556 Cinema Booth Monitor/Exciter

### INTRODUCTION

The MN/EXM556 are the finest cinema booth monitors in the industry. All steel construction for strength and electrical shielding, quick connect P.C. board connections for faster service, easy operating controls and the many exclusive technical features make the MN/EXM556 monitors an excellent choice for today's cinema sound system needs.

A quick connect socket on the back of the chassis permits the processor to plug directly into the monitor without wiring. Special plug-in Entrelec connectors on the back provide a means to mate the MN/EXM556 monitors with any cinema processor or digital system.

A fully regulated computer type exciter switching supply mounts to the back of the EXM556 chassis and is easy to remove if repair is ever needed. Also, a low ripple DC exciter supply backup is included in the EXM556, along with the "Auto-Sense" automatic back-up switching circuitry. The MN556 is a monitor only unit, and has no exciter supply.

### FEATURES

#### MONITOR SECTION

The MN/EXM556 monitors feature full, constant display of the processor or power amplifier outputs, selectable audio monitoring through the speaker, and a headphone jack to analyze the sound on each channel for troubleshooting purposes. An active 10 watt

RMS monitor amplifier provides the sound for the monitor speaker and headphones and also substitutes for the main power amplifier in an emergency. Front panel pushbuttons select functions to allow separate monitoring of each channel of the processor (decoder) outputs and each channel of the power amplifier outputs (for conventional and biamplified systems)

There are audio inputs for both processor and amplifier outputs on the back of the chassis. Inputs are provided for split-surround systems where one surround amplifier feeds the left wall speakers, and another amplifier feeds the right wall surround speakers. The other inputs are for Left, Center, Right and Subwoofer channels. Two subwoofer amplifiers may be connected (Sub 1 and Sub 2). Both will be heard simultaneously when Amplifier Subwoofer is selected on the front panel.

#### MAIN AMPLIFIER BACKUP

A big feature of the MN/EXM556 is the ability to substitute the built-in 10 watt active monitor for the main center channel power amplifier if the main amp quits or becomes distorted.

#### HEADPHONE JACK

The monitor amplifier drives the internal JBL monitor speaker and the headphone jack. The jack is a stereo (ring, tip, and sleeve) type and will work with stereo headphones. The signal is mono from the single channel monitor amplifier. Any headphone impedance, from 4 ohms to Hi-Z is usable, although the higher



impedance headphones will not be as loud as the low impedance type.

### EXCITER SUPPLIES

The MN556 is a monitor only unit, and has no exciter supply. The EXM556 contains two exciter supplies. The main supply is a fully regulated switching type supply that sets new standards for tightness of regulation for line voltages from 109 VAC to 130 VAC. The output of the supply will not vary more than 1/10 of 1% within the specified AC operating range. Because the supply switches at 25,000 times a second, hum and noise are above the audio range. DC output is continuously variable from 4.5 VDC to 10 VDC and is installer adjusted from the rear of the EXM556. The supply runs very cool under continuous service and, unlike conventional “brute force” regulated supplies, does not contribute a lot of heat to the system. Field replacement of the regulated supply is easy. The 5100A module may be removed from the back of the EXM556 without taking the monitor/exciter out of the rack. Four phillips screws hold the module to the main chassis. A heavy, high current connector will disconnect the module from the main power source in the EXM556.

The second exciter supply in the EXM556 is the DC backup supply. This supply is unregulated. The HI and LO DC output voltages are selectable by the installer. The LO setting will produce about 5 volts and is used with European type exciter bulbs. The HI setting is used with domestic bulbs. The factory sets the emergency DC supply to the Hi setting before shipping unless the product is intended for export and has a 220/240 power transformer.

The exclusive “Auto Sense” circuit in the EXM556 monitors the output of the regulated main supply. In the event of a failure of the main supply, or if the supply is removed, the “Auto Sense” comparator will automatically switch the exciter lamp to the internal backup DC supply. The operator LED indicator on the front panel will switch from the NORMAL position to the BACKUP mode and begin blinking. This indication tells the operator that the exciter is in emergency backup and the sound engineer should be notified.

Even though both supplies are built of heavy duty components, the exciter supplies have been designed for one exciter lamp. The load should not exceed more than 5 amperes (at any voltage). If two projectors are used in the booth a relay or switch should be added to switch between one exciter lamp and the other. Often this can be a spare set of contacts on the controlling

device that performs other changeover functions. Make sure the switch or relay contacts can handle the required exciter lamp current.

**KILL CIRCUIT.** Another deluxe feature of the 5100A module is the “kill circuit” that drops the regulated output exciter voltage to about one volt when the show is in intermission. This bulb saver feature allows the bulb to stay in a pre-warmed condition. Bulbs that are turned on and off during the day will possibly have a shorter life due to the shock of the high inrush current into a cold filament. The kill circuit extends bulb life and is part of the turn-on soft start design of the 5100A module.

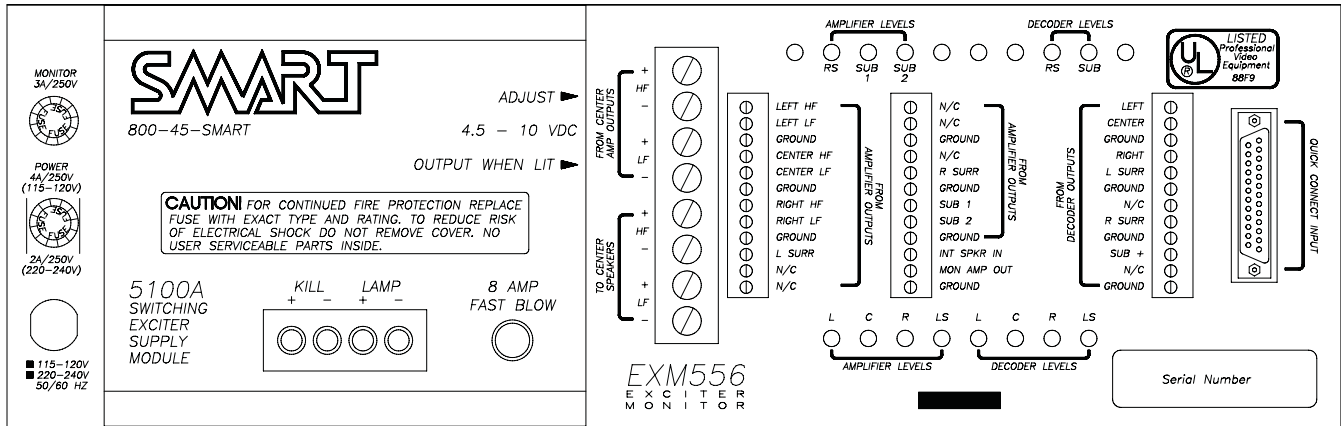
## INSTALLATION INSTRUCTIONS

### AMPLIFIER OUTPUTS

The stage speakers may use conventional broadband power amplifiers with a crossover network at the loudspeakers, or they may use a biamplified scheme where there is no crossover at the speaker, but a separate power amplifier feeds the high frequency driver and another feeds the bass speakers directly. An electronic crossover divides the audio spectrum into two parts to feed the inputs of the power amplifiers. If you are using conventional amplifiers, connect each amplifier output to the appropriate input terminals on the monitor labeled “FROM AMPLIFIER OUTPUTS.” **BE CAREFUL!** Most solid state power amplifiers tie the low output to amplifier ground. Connecting the HOT terminal to the monitor ground could “fry” the amplifier or monitor input.

Connect conventional amplifiers only to the LF inputs on the back of the monitor. Even though these inputs are labeled LF for biamplified systems, they are actually broadband, full range inputs. When connecting a biamplifier to the monitor inputs, the HF (high frequency) amplifier outputs are connected to the appropriate channel HF inputs on the MN/EXM556 monitor. The LF (low frequency) amplifier outputs are connected to the LF inputs of the monitor. The signals from the HF and LF amplifiers are summed at a 1:3 ratio inside the monitor so that the proper balance of HF and LF sound is heard in the monitor speaker and through the headphone jack. When listening to the monitor you can determine if a section of the biamplified signal has failed. If the monitor sounds bassy, the HF amplifier is not producing the HF sounds. If the monitor sounds shrill, the bass amplifier may have failed.

# EXM556 STEREO PROCESSOR



## CENTER AMP BACKUP

Connect the output of the center channel amplifier to the terminal strip labeled "FROM CENTER AMP OUTPUTS." This is important if you wish to take advantage of the center amp backup feature that is part of the MN/EXM556 monitor. Be sure to observe the correct polarity from the amplifier to the monitor terminals. A mistake can destroy the monitor or amplifier. Next, hook the stage speaker to the terminal strip labeled "TO CENTER SPEAKERS." Notice that terminals are provided for HF and LF amplifiers and speakers for use in biamplified systems. If you are using conventional amplification, connect only to the LF terminals.

When a biamplified system is used, the MN/EXM556 will send a signal to both the HF driver and LF woofer. The HF driver is protected in the backup mode of operation by a passive network in the MN/EXM556. The emergency audio backup system is a valuable feature for your theatre customer.

## QUICK CONNECT INPUT

A DB25 computer type connector is provided on the

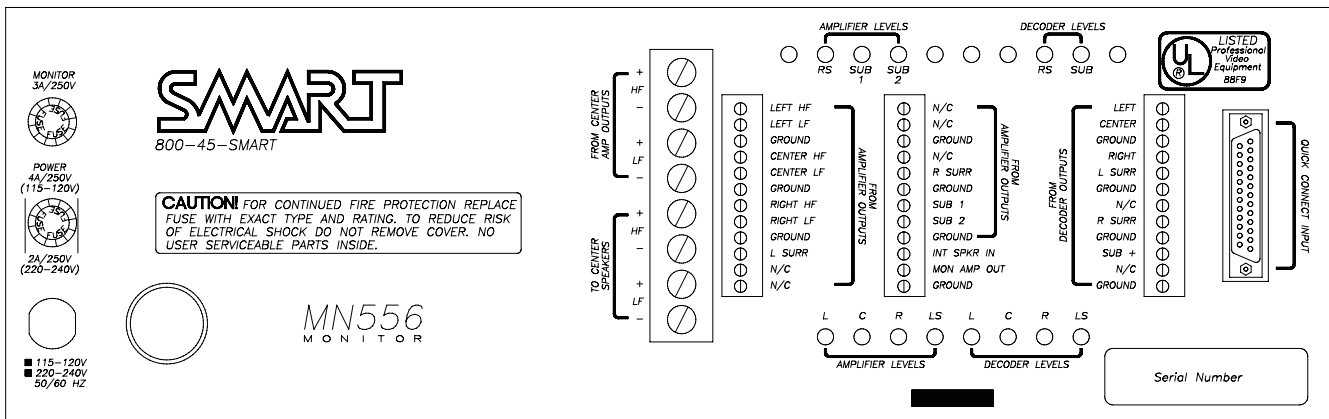
rear of the chassis for quick connection of a SMART stereo processor. The pin wiring of this connector conforms to the pin wiring of the THX monitor. Simply connect a standard serial computer cable to the SMART processor output plug and connect the other end to the MN/EXM556 quick connect DB25 input connector. Signals from the processor will feed the processor (decoder) inputs of the monitor.

## PROCESSOR OUTPUTS

If you are not using the QUICK CONNECT INPUT connector, then the outputs of a cinema processor (decoder) may be connected to the "FROM PROCESSOR" input terminals. Usually a ground terminal from the processor is hooked to a ground on the input to the monitor. However, a ground connection from processor to monitor may create ground loops in some cases, resulting in a hum or buzz. In these cases, removing the ground connection may improve things.

## REMOTE BOOTH SPEAKER

A remote speaker may be used with the MN/EXM556 monitor. Remove the jumper on the connector between "INT(ernal) SPEAKER IN" and "MON(itor) AMP OUT". This will break the connection between



the internal speaker and the monitor amplifier. Connect the external speaker to the "MON AMP OUT" terminal and GROUND. The monitor Fader on the front panel will control the volume to the remote speaker. Both the internal and remote speaker may be used simultaneously by leaving the jumper in place and connecting the remote speaker to the "MON AMP OUT" terminal and "GROUND", as long as the remote speaker has an impedance of 8 ohms or more.

### EXCITER SUPPLY

When connecting the exciter supply to the lamp, be sure to use the proper gauge of wire. Usually a 10AWG or 12AWG is recommended for relatively short runs.



Measure the lamp voltage at the bulb end of the wire when adjusting the regulated exciter output control labeled "ADJUST." The industry recom-

mends that at least 80% of the bulb voltage should be used for stereo systems. A 10 volt bulb will run well at 8 volts, a 9 volt bulb at 7.2, etc. This gives extended life to the bulb yet does not cause the filament to cool on the edges while the center of the filament is hot. If the bulb voltage is too low, then improper "scanning" of the full width of the soundtrack will result in distortion during loud sound passages due to the extremes of the soundtrack not being properly lit.

A "tuning wand" adjustment tool is required to adjust the 15 turn control that is inside the 5100A module. This recessed control deters tampering once the lamp voltage has been properly set.

To change the backup DC exciter supply from a HI to a LO output, it is necessary to remove the top cover on the chassis of the EXM556. Make sure power to the EXM556 has been removed. A diode bridge rectifier is located on the bottom of the chassis near the power toroid transformer, near the rear of the chassis. FASTON push-on connectors are used to connect the wires to the terminals of the bridge. One lead



from the bundle of wires that goes to the bridge is free. If the GRAY wire (8.5VDC) is connected to one terminal lug, pull it from the terminal and plug the GREEN (5.5 VDC) ONTO THE SAME TERMINAL LUG. This will change the DC backup output voltage to the opposite selection. You may need pliers to pull the FASTON because the connection is positive and tight. The DC backup voltage is set for the HI position before shipment for domestic bulbs. The LO position is set for export models.

The terminals labeled KILL on the back of the supply module may be connected directly to an automation system that controls the intermission mode of operation in the booth. Shorting the KILL(+) and KILL(-) terminals will put the supply into the KILL low voltage mode. Releasing the short will allow the bulb to run at the calibrated voltage. MAKE SURE THE CONTACTS USED TO OPERATE THE KILL CIRCUIT HAVE NO VOLTAGE ON THEM AND ARE NOT TIED TO GROUND. A "dry" set of contacts is mandatory, or damage can occur to the transistor input of the kill circuit.

### CALIBRATION

After the MN/EXM556 has been installed and wired into the system, and after the stereo processor has been calibrated, the EXM556 input levels should be calibrated so that the display meters represent the level of each channel of the processor and power amplifiers. On the rear of the chassis are two sets of calibration pots. One set is for the processor (decoder) monitoring and the other is for the amplifiers (conventional or biamplifiers).

Use the pink noise source that you used earlier to calibrate the SPL level in the auditorium when setting up the processor and amplifier levels. Select each channel one at a time, and adjust the appropriate level pot on the rear of the MN/EXM556 until the display meter reaches the lower yellow LED. Select the DECODER button on the front panel to look at the processor outputs and then push the AMPLIFIER button to see each of the amplifier outputs on the front panel displays. Again, set each adjust pot to the lower yellow LED. You will notice that each display will show a moving dot unless you select that channel on the audio monitor by pushing the appropriate selector button. A selected channel will show a bar of light to indicate that it is the information playing through the monitor speaker. The ALL selector button will sum the Left, Center, and Right channels, but not the subwoofer or surround channels. Because the surround channel is time delayed, a distracting echo would be heard and

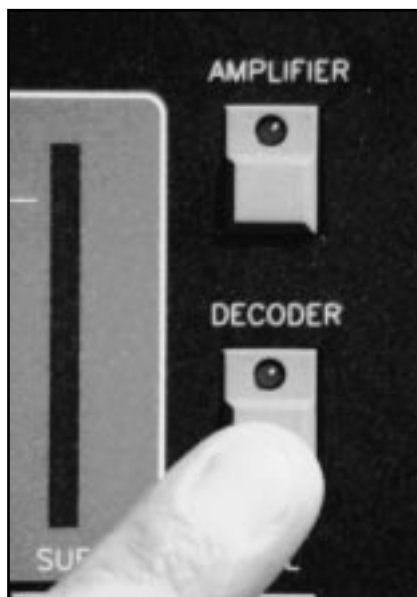
is, therefore, not included in the ALL group.

Before leaving the installation verify that all processor and amplifier channels are active on the monitor. Next, pull the fuse on the 5100A regulated exciter supply to confirm that the "Smart Logic" switches automatically to the backup DC exciter supply. Finally, flip the red AUDIO/BACKUP switch to the backup position to see that the monitor amplifier is feeding the center stage speaker. Remember, the monitor fader controls the auditorium level during audio backup. Also, check the "kill" circuit if it is connected to an automation system.

## OPERATING INSTRUCTIONS

When you turn the MN/EXM556 monitor on each day, the SMART LOGIC will default the stereo monitoring to the AMPLIFIER monitoring mode. This means the outputs of the system power amplifiers are being displayed on the visual front panel LED indicators. Also, the amplifier outputs are heard on the monitor speaker. Each channel is selected by pushing the buttons labeled Left, Center, Right, Left Surround, Right Surround and Subwoofer. When a single channel is selected, the corresponding LED display will show the sound level on that channel in the form of a lighted bar and the channel will be heard through the monitor speaker or headphone jack. Other channels in the display will show a moving dot. You are able to see the levels of the six channels, but you will hear only the selected channel through the speaker. This feature is valuable in troubleshooting a sound system channel by channel.

The output of the stereo processor may be monitored by pushing the DECODER button on the front panel. An LED in the button will indicate that the DECODER mode of monitoring is activated. Again, you can selectively monitor each channel from the output of the processor.



The ALL button will sum the signals of the Left, Center, and Right channels and will allow them to be heard together through the monitor speaker. All three of the front stage channel LED's will show a bar of light to indicate that three channels are being heard through the speaker. The surround channel will show a moving dot to indicate the level of the surround track. Because the surround channel is time delayed, it is not considered as part of the ALL group.

The FADER on the front panel adjusts the volume from the built-in monitor amplifier to the internal speaker. This control does not affect the sound level in the auditorium, unless the monitor is in AUDIO BACKUP mode.

The headphone jack is provided in order to closely analyze the sound quality of each channel. A noisy booth will cover subtle sounds that would be heard on headphones. The speaker and amplifier in the MN/EXM556 have a shaped frequency response that will penetrate the projector, exhaust fan, and platter noises normally found in the booth to make listening more intelligible. The headphone output is smoother in response. Any stereo headphone with an impedance of 4 ohms to Hi-Z is usable. A mono headphone will not work.

In the event of a failure of the center amplifier, a center amp backup is built into the MN/EXM556. This will ensure that the dialog in a movie is not lost. Since the processor is always sending a signal to the monitor, the amplifier used for the monitor speaker may be rerouted to the center stage speaker by throwing the red AUDIO/BACKUP switch on the front panel. Several things happen when this switch is moved from the normal position to the backup position. First, the SMART LOGIC circuits default to the processor input monitoring (you may have been monitoring the power amplifiers). Next, the SMART LOGIC sums the stage channel inputs so that the Left, Center, and Right processor channels are present at the monitor amplifier output. Finally, the monitor speaker is disconnected and all of the power is switched to the center stage speaker. This is all accomplished with the one RED backup switch. The monitor fader control is now used to adjust level in the auditorium. Since most stage speakers are very high efficiency devices, 10 watts is plenty to keep sound in the center channel speaker. For center amp backup to work properly, the center amp and speaker MUST be connected to the monitor properly (see CENTER AMP BACKUP in the INSTALLATION INSTRUCTIONS section).

# **SCHEMATICS**

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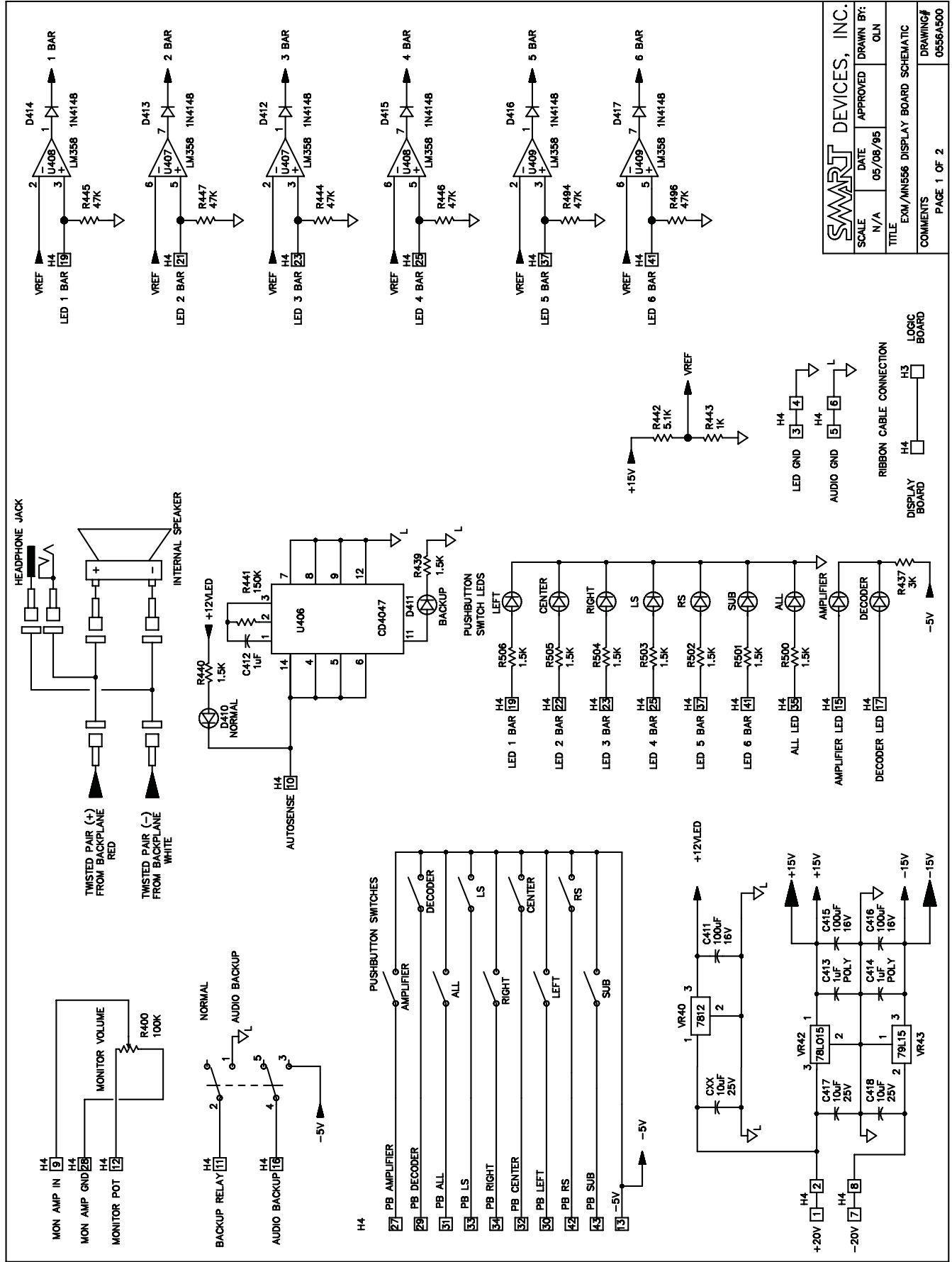
EXM/MN556 Display Board (0556x300) – pages 8-9

EXM/MN556 Logic board (0556x320) – pages 10-11

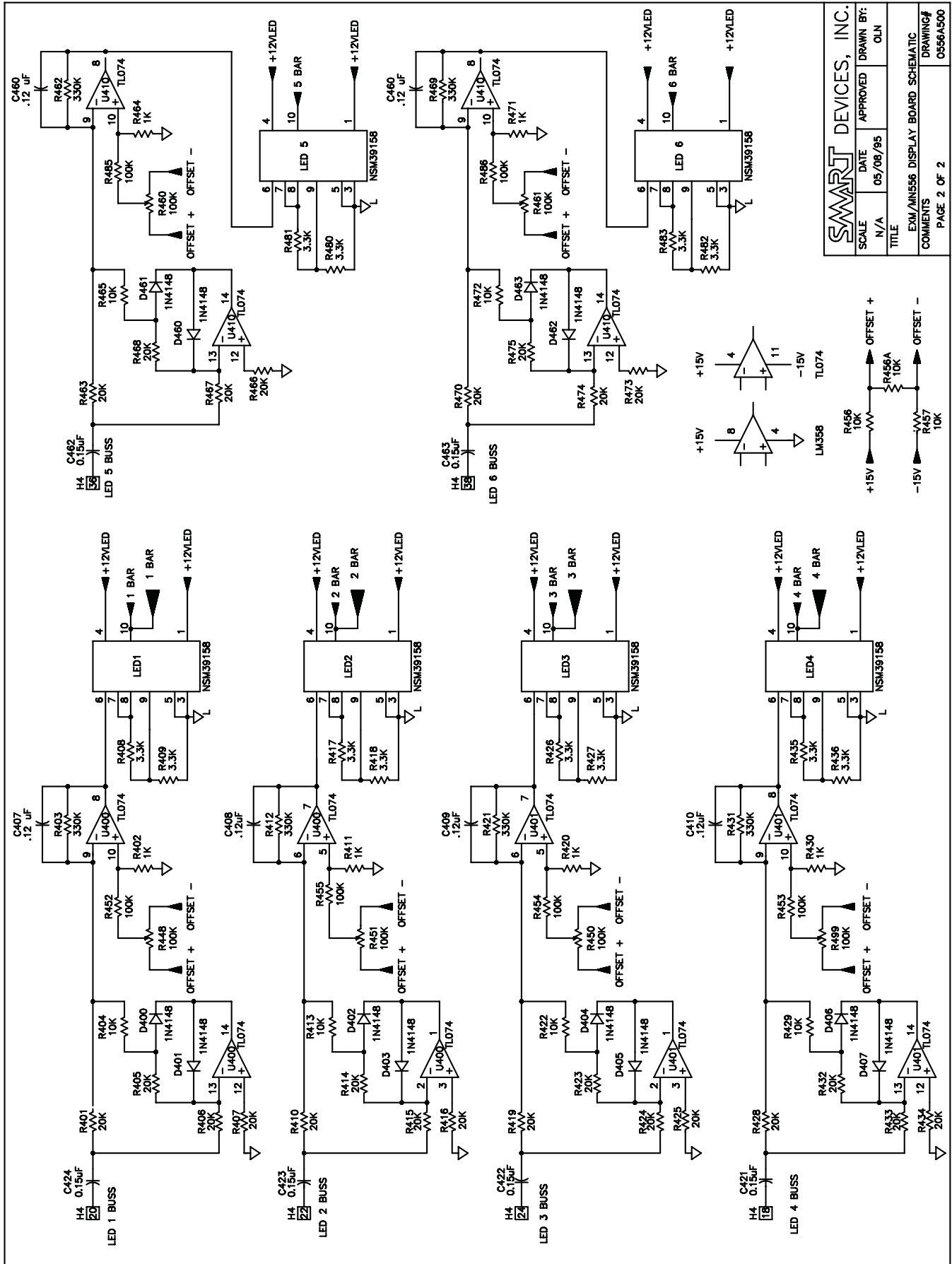
EXM/MN556 Backplane Board (0554x390) – pages 12-13



# EXM556 STEREO PROCESSOR

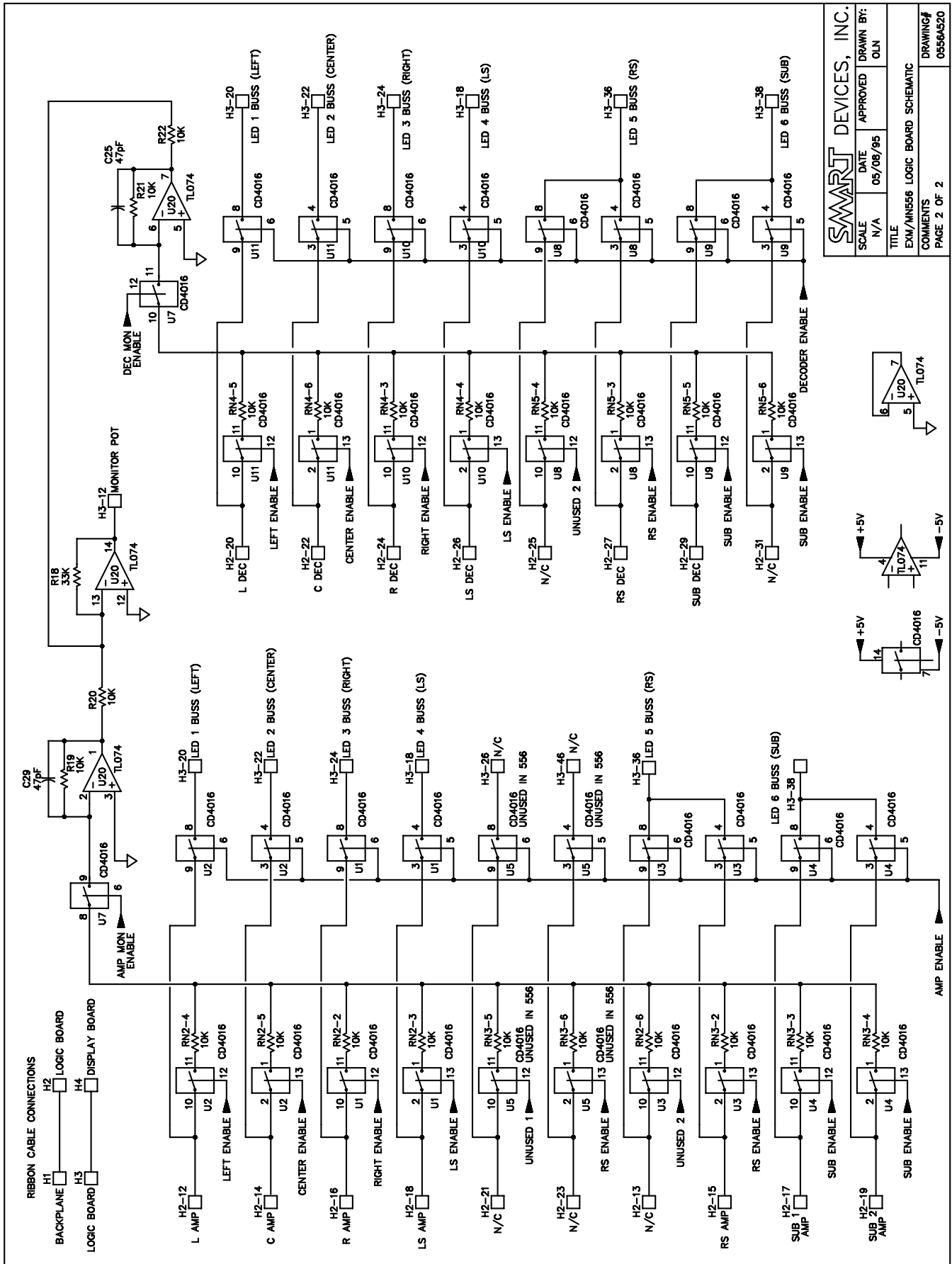


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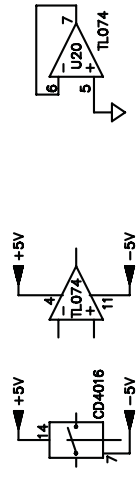


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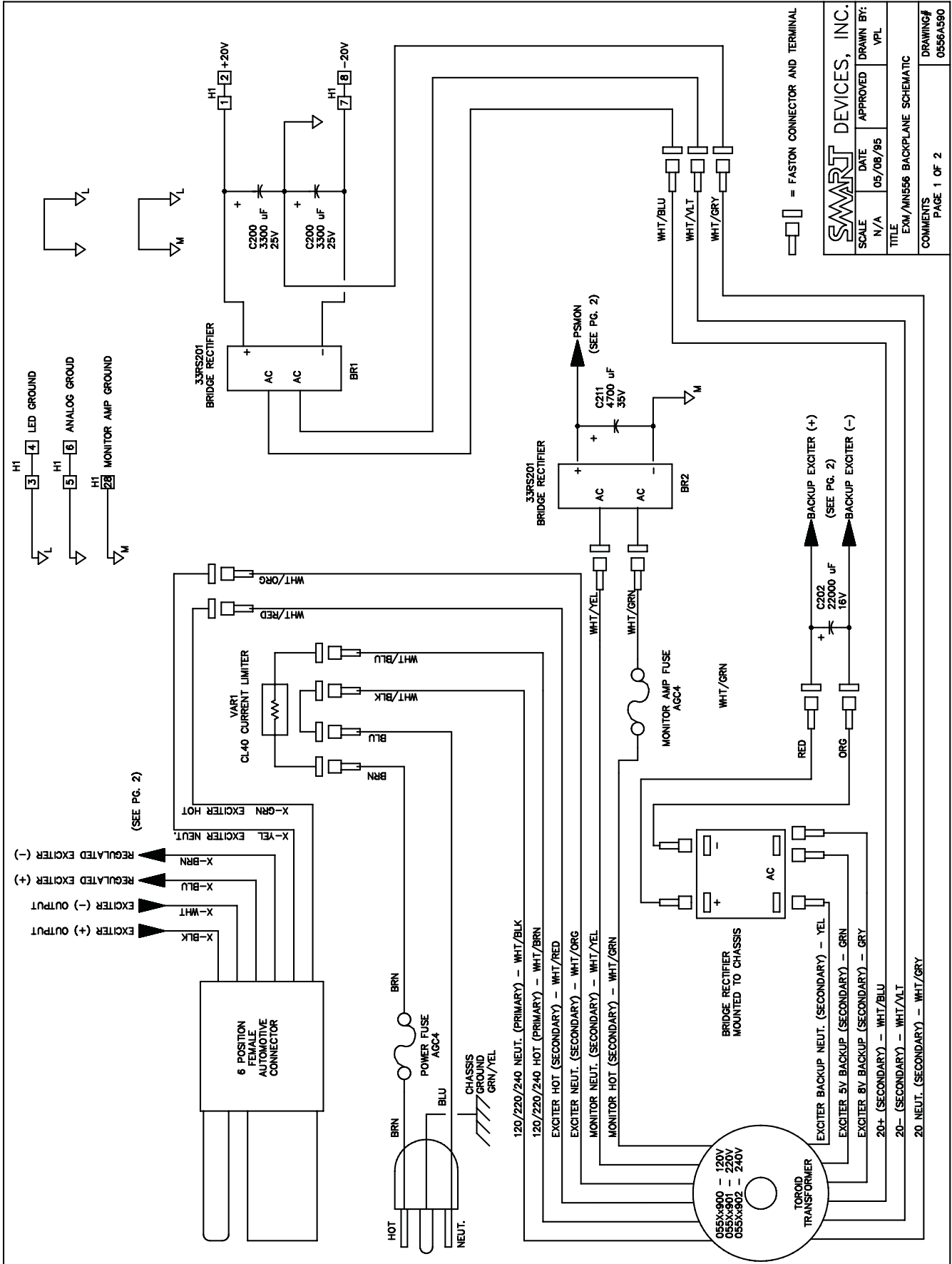




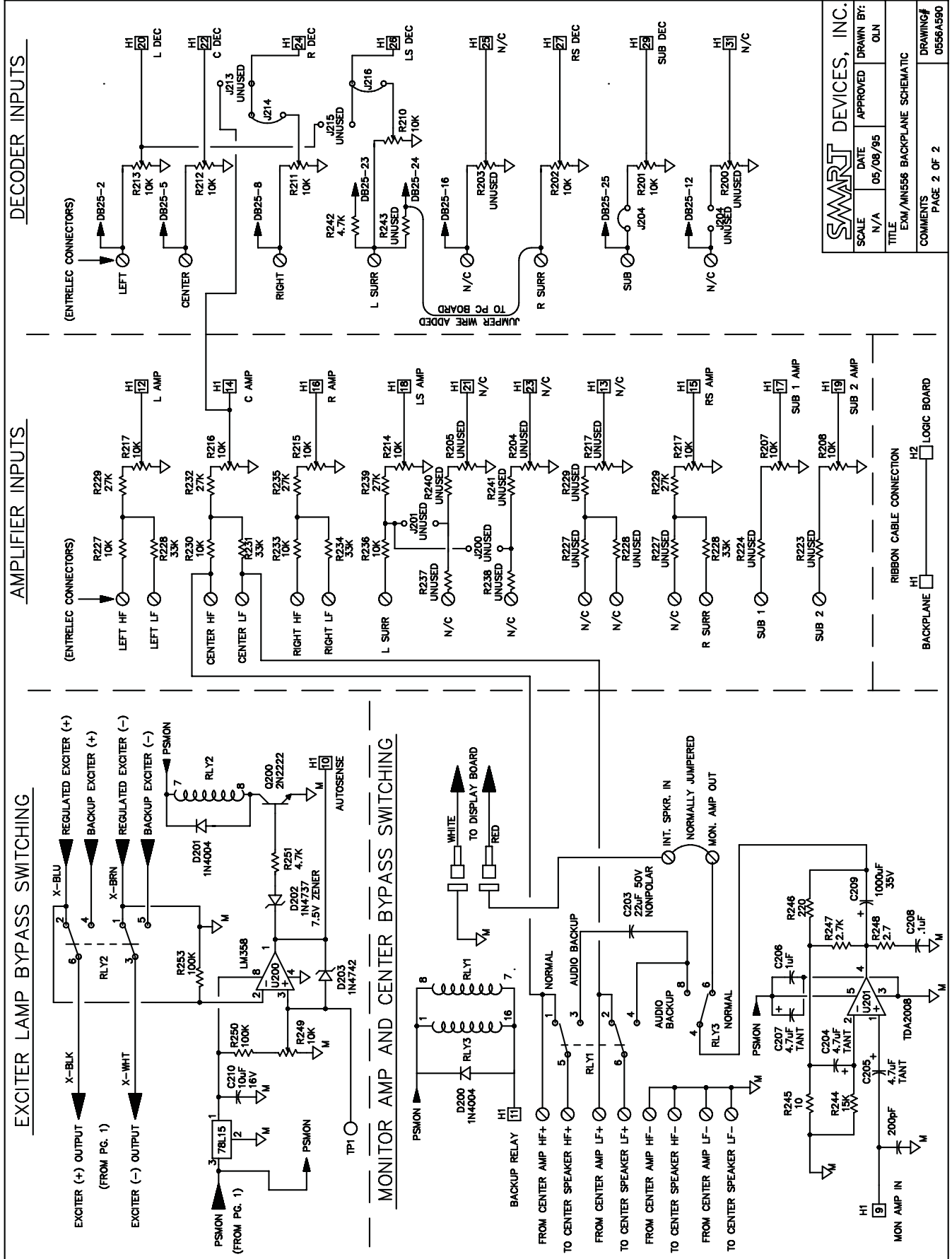
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# EXM556 STEREO PROCESSOR



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