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INSTALLATION AND OPERATION MANUAL

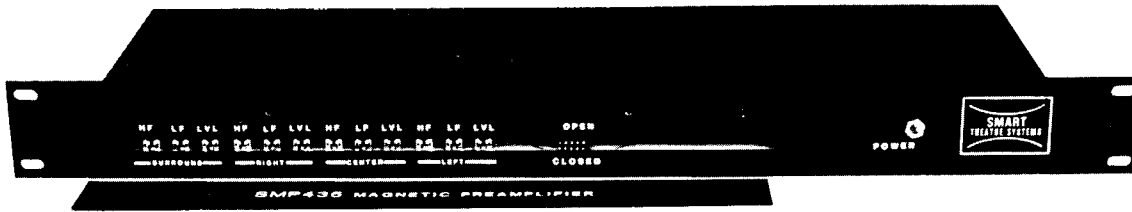
SMP435 MAGNETIC PREAMPLIFIER



SMART THEATRE SYSTEMS

3856 Green Industrial Way, Atlanta, GA 30341 (404) 452-1820

SMP435 MAGNETIC PREAMPLIFIER



**A modern solid state multi-channel preamplifier
for 35MM or 70MM stereophonic magnetic soundtracks.**

FEATURES

- 4 CHANNEL OPERATION
- MULTIPLES FOR 70MM
- SOLID STATE CHANGEOVER
- TRANSFORMER BALANCED INPUTS
- HIGH OUTPUT CAPABILITY
- FRONT PANEL ADJUSTMENTS
- REGULATED POWER SUPPLY
- UNIQUE MULTI-BUSSING
- MEETS NEW SMPTE STANDARD
- QUALITY ENGINEERED
- EASY WIRING
- 117VAC OR 230VAC 50/60HZ

The SMP435 magnetic preamplifier is an update of the popular SMP430 that incorporates several advancements and improvements that make it one of the leading magnetic preamps on the market. The product can work equally well in a single or dual projector 35MM installation, or a single or dual 6 channel 70MM booth. Several units can be combined for full 70MM/35MM dual projector systems with a minimum of wiring and interfacing. Part of the reason for this ease is the unique "bussing" arrangement at the outputs of each unit that allows each channel to feed directly to outputs of other units and be selectively and remotely enabled through the logic circuitry. Full changeover between units, muting, and method of changeover (automation or manual) is controlled by an intelligent solid state logic circuit in each chassis that can recognize outside commands and interface to many SMP435's in the total system. All logic options are controlled by a hidden DIP switch accessible from the front of the unit.

Each channel has its own HF and LF equalization controls along with level adjustment to permit exact matching of the individual characteristics of each head in the cluster. All controls are concealed behind a removable front panel security cover. The SMP435 has a very high output level capability and is easily used to replace old vacuum tube preamplifiers in existing magnetic systems. The premium input balancing transformers assure wide frequency response and high rejection to RF and electrical noise pickup. The product has a fully regulated power supply for stability and consistent performance. The SMP435 is warranted for a full year, and is one of the most cost effective products of its kind in the industry.

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SMP435

MAGNETIC PREAMPLIFIER

CRASH COURSE



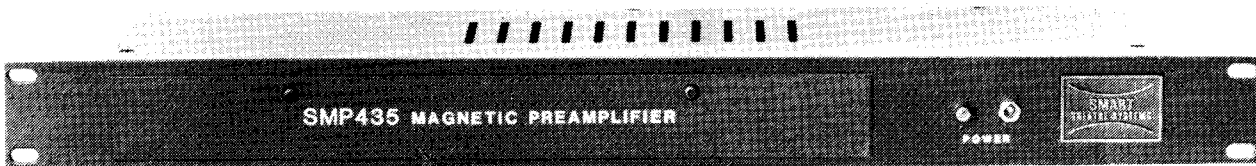
For those installers who have installed this product before, here is a brief checklist of each step of hookup and adjustment. A detailed description is offered for each phase or option within this manual. If you have not installed this product before, we suggest you become familiar with the unit by reading this manual.

- Choose a well ventilated place in the rack to install the SMP435 that is away from strong electrical fields.
- Run separate shielded cables from each channel of the penthouse to the respective input channels of the preamplifier. (observe polarity of each channel cable) Ground the shield to the nearest convenient ground terminal.
- Select changeover or switching scheme from the charts and diagrams for your particular application.
- Connect separate shielded cables to the output terminals of each channel and connect to next piece of equipment in the system.
- Remove the front panel security cover and adjust each HF and LF equalizer control with a "pink noise" film loop for the flattest response. Adjust the output level pots for uniform level between channels.
- Select changeover method (if used in system) and set DIP switches to proper position.
- Replace the security cover and run a magnetic print through the system. Check for sonic quality and noise.

The SMP435 may be combined with other units for 35MM/70MM single or dual projector applications. Refer to this manual for switching options. If the SMP435's are used with a Magnetic Programmer, also refer to the MP7035 manual for inter-wiring instructions.

SMP435 MAGNETIC PREAMPLIFIER

The SMP435 Magnetic Preamplifier is a modern, four channel solid state preamplifier specifically designed for motion picture theatres that utilize magnetic penthouse clusters for stereophonic sound. The unit may be used in multiples for dual projector installations, or for 70MM applications. Each SMP435 contains it's own solid state changeover and temporary muting capability, and can be used with manual or automation controlled switching formats. Each preamplifier channel has a balanced low impedance transformer isolated input with additional RF suppression circuits to assure quiet operation with minimum noise pickup from outside sources. A fully regulated bi-polar supply provides a constant playback level despite varying line voltages. Adjustable low frequency and high frequency controls allow the sound engineer to set the equalization curve for the flattest response with the various brands of penthouses on the market. The equalization curve follows the newly adopted SMPTE standard of 3180 μ s and 35 μ s characteristics now used on both 35MM and 70MM magnetic release prints.



BEFORE WIRING THE SMP435 special consideration must be given to the placement of the unit in the equipment rack. Because the product contains very high gain circuits, it is important to keep the SMP435 away from hum producing components. The SMP435 has no operator controls, other than POWER ON-OFF. Therefore, it may be placed as far as possible away from exciter lamp supplies, power transformers, and power amplifiers. This pre-planning can save time in troubleshooting hum and noise after the installation is complete.

INSTALLATION PRECAUTIONS

Magnetic systems are highly subject to noise and hum pickup because of the very high gain circuits employed. Also, long cables and the abundance of strong magnetic fields generated by booth equipment are potential problems. Carefully plan your job and avoid close proximity with suspected equipment. The main motor used on some brands of projectors can also radiate 60 Hz and 120 Hz magnetic fields that can be picked up by the head cluster. Check with the manufacturer to see if a hum shield is available. The "Zipper" changeover device is usually only a few inches away from the head cluster. It may be necessary to convert it to DC operation with a large diode and filter capacitor to remove the loud buzz that will occur in the sound system during changeover. Most 115VAC zippers work well with 24VDC power supplies.

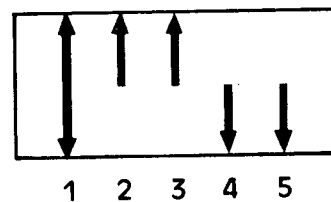
CABLES. If the SMP435 is used to replace an old vacuum tube unit, it is a good idea to replace the shielded cables from the penthouse with new low capacitance, oxygen-free premium audio shielded cable for each channel. The new technology cables are far superior in sound quality than the older and still accepted general purpose wire. Contact the factory for specific recommendations and a list of manufacturers that offer this type of product. **DO NOT GROUND THE SHIELD AT THE PENTHOUSE END OF THE CABLE.** Cut off the excess shield of each cable and wrap with electrical tape to prohibit the shield from touching a grounded projector part. The shield of each individual cable must be connected **ONLY** to the ground terminal on the rear barrier strip of the SMP435. Observe polarity of the color coded wires, so that all channels remain in phase. An out of phase audio channel will cause bass cancellation and image shifting in the stereophonic presentation. Generally the darker of the two conductors in each pair is regarded as negative and is connected to the minus (-) wire, and the lighter color is the positive (+) conductor.

Cable routing from the penthouse to the preamplifiers should be as short and direct as possible. *Avoid close routing of the cable near AC motors, fluorescent light ballasts, lamphouse power supplies, AC power lines, etc.* Running the cable in conduit offers extra protection. Make sure that high level signals such as speaker wires, AC power, etc are not run in the same conduit.

SWITCHING OPTIONS OF THE LOGIC CIRCUITS. The solid state logic circuits in the SMP435 can be adapted to many booth situations and conditions. Please read the following sections to determine which option will suit your needs best before installing the unit.

SINGLE PROJECTOR OPERATION. When the SMP435 is used in a single projector 35MM installation, it is necessary to lock the solid state changeover into a *permanent ON* position. Remove the security cover on the front panel and check the position of the programmable DIP switches to see that they are properly set for single projector operation. None of the changeover wiring on the rear barrier strip has to be wired, because only a single projector is being used. However, it is recommended that you ground the X-over 1 terminal to prohibit the system from accidentally "toggeling" to the other changeover logic state due to an AC line spike on the system. Refer to PROGRAMMING THE DIP SWITCHES section of this manual.

DIP switches for Single Projector operation should be set as shown in this diagram. Switch number 1 determines whether the unit will respond to a (C)ontinuous or (A)lternate changeover command. The switch can be left in either position as long as the rear barrier X-OVER 1 terminal is grounded.

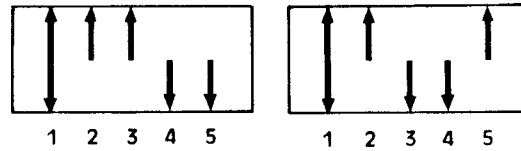


SINGLE PROJECTOR 70MM OPERATION. Because six (6) channels are required for 70MM, two SMP435's must be used together. This provides a total of eight (8) preamplifier channels. The extra unused preamps can be reserved for standby use. Both units must be programmed for single projector operation with the hidden DIP switches behind the removable front panel security cover. Refer to PROGRAMMING THE DIP SWITCHES section of this manual.

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FIGURE 2

DIP switches for 2 SMP435 units used in six(6) channel 70MM are both set as shown. Be sure the X-OVER 1 rear barrier terminal is grounded on both units.



TWO PROJECTOR INSTALLATIONS. Preamplifier channels must be provided for each and every head channel in single or multiple penthouse systems. Trying to switch heads into too few preamp channels *will result in poor performance* because each head requires individual equalization and level adjustments due to the differing characteristics of each head. Also, severe "popping" will occur during changeover as heads are switched to the preamps. Be sure to provide the same number of preamp channels as you have heads in the clusters.

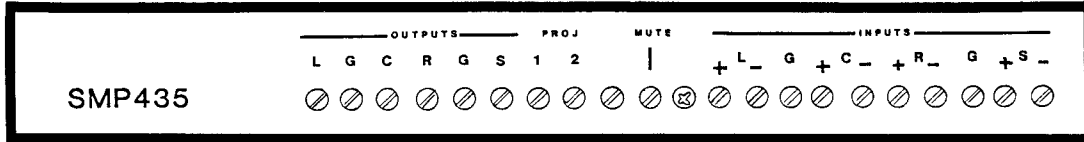
Dual 35MM systems require two SMP435's. Four channels per projector. However, dual 70MM systems only require three (3) SMP435's because the third unit in the system can be "split" by programming the logic DIP selector. Two channels are used with the first 70MM penthouse, and the other two channels are associated with the second 70MM penthouse.

TWO PROJECTOR 35MM-70MM INSTALLATIONS. Five (5) SMP435's will handle all 20 channels of a dual projector 35-70 magnetic system. Refer to PROGRAMMING THE DIP SWITCHES section of this manual.

The SMP435 uses a unique output switching method that allows several units to be combined in one system. This method is ideal when running 35MM and 70MM clusters through the same power amplifiers and auditorium speakers. When a SMP435 is either muted or commanded to change over to another SMP435, the four preamplifier channels inside the chassis *are disconnected* from the output terminals by a quad electronic switch. This means that the output terminals of one SMP435 may be connected directly to the output terminals of another unit, or many other units and each will pass audio only when commanded. All other units connected to this "bus" are not providing an output to the bus, except when commanded to do so. By switching the mute or changeover terminals of each SMP435, you can control a large number of channels with a minimum of wiring.

INPUT MATCHING AND WIRING. Most American penthouses contain either 5mH or 10mH heads. The SMP435 will accept either type without wiring changes. However, if the SMP435 is to be used with a fullcoat magnetic reproducer, instead of a penthouse, higher impedance heads will be encountered. Please contact the factory for details if you have special matching problems.

The INPUT TERMINALS of each channel are clearly labeled for easy identification. Shields from each cable must be connected to the (G)round terminals. Be sure to *observe polarity* for each input cable, because the balanced inputs can accept a reversed cable that will result in channels being out of phase with other channels. A plus(+) mark and minus(-) mark are placed on the barrier strip labeling to denote proper polarity.



OUTPUT WIRING FOR SINGLE PROJECTOR INSTALLATIONS. Connect the “hot” conductor of a shielded audio cable to the LEFT output terminal on the rear of the SMP435. Connect the shield of this cable to the nearest GROUND terminal. Connect the other end of the cable to the next stage of the system (equalizer, power amplifier, MP 7035, SR300, etc.) input terminal. Do the same with the RIGHT, CENTER, AND SURROUND outputs. Make sure that your high level output cables are dressed away from the low level input cables to avoid oscillation from the output to the input of the SMP435. The low impedance output of the line amplifiers in the SMP435 will work into either a low or high input of the next piece of equipment in the system. Each output is unbalanced. Check the input requirements of the product that follows the SMP435 for any special considerations.

OUTPUT WIRING OF MULTIPLE SMP435’S. Using the “bussing” method outlined under “Two Projector Installations”, connect a short piece of shielded audio cable from the LEFT output terminal of one SMP435 to the LEFT output terminal of the other SMP435(s). Connect the shield of the cable to the nearest ground terminal. Run the cable to the input of the next piece of equipment in the system. Do the same with the CENTER, RIGHT, and SURROUND channels. In 70MM applications, channels within a SMP435 are *split* so that 6 channels are available between two units. See the section regarding 70MM DIP programming before wiring these extra channels.

CHANGEOVER WIRING. There are three options available to changeover penthouse audio when more than one SMP435 is used in a system. Please read each option to determine which is best for your manual or automated system.

MUTING OF AUDIO FOR ALL CHANNELS. When the MUTE terminal on the rear terminal barrier strip is grounded to one of the ground terminals, the four audio outputs will silently turn off for as long as the mute terminal is grounded. Ungrounding the mute terminal will restore sound to all channels. This feature is valuable for two common applications. One is to join several SMP435’s on a common output bus (one bus for each channel) and mute the unused channels with the MUTE terminal. The other application is to temporarily mute the preamplifiers when “start-up” noises are encountered from motor starts or xenon ignitors. Some booths use a “Zipper” for black out. The zipper electromagnet generates a strong AC field in the penthouse cluster that is picked up by the heads and amplified. Some automation systems have a momentary relay closure during the start cycle that can be used to mute the preamps during start-up.

The muting terminal may also be used as a simple manual changeover between two SMP435’s. A SPDT will mute one unit while un-muting the other, and vice versa.

PROJECTOR ASSIGNMENT. When two or more SMP435’s are used in a system, you must determine which units are to be used for projector one. Refer to the “Programming the DIP switches” section of this manual.

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ALTERNATE COMMAND CHANGEOVER. This method of changeover is primarily intended for manual changeover equipped booths and requires two momentary contact (SPST) switches. One switch is placed near projector each projector, and wired back to the two SMP435 preamplifiers. Connect a pair of unshielded wires to each switch and route to where the SMP435's are mounted. Connect one wire of the twisted pair from the first switch to projector 1 X-OVER and ground the other wire of the pair. Connect one wire of the twisted pair from the second switch to projector 2 X-OVER, and ground the other conductor. Refer to the section of this manual that explains the DIP switch programming in order to select the proper options for alternate command changeover.

CONTINUOUS COMMAND CHANGEOVER. Another method of remote changeover between pairs of SMP435's uses only a single pair of wires. This method is preferred for automated systems. A relay closure in the automation equipment will execute a changeover by grounding the X-OVER terminals. Run a pair of twisted unshielded wires to the "dry" contacts of the automation changeover relay. Connect the other end of the pair to the projector one X-OVER terminal of the SMP435 assigned to projector one. Ground the other wire of the pair to the nearest ground terminal. Now, take a short piece of wire and join the X-OVER 1 terminal of the first SMP435 to the X-OVER 1 terminal of the second SMP435. When the automation relay closes, all four channels of the projector one SMP435 will be "enabled", and the output channels of the second SMP435 will be "disabled". Releasing the relay will cause the reverse action to occur. Select the "continuous" option by programming the logic DIP switch for each unit.

MASTER FADER. An external 4 gang fader control must be added to the outputs of the SMP435 when equipment following this device *has no ability to control audio level*. A 10K ohm per section control similar to the Allen Bradley Mod Pot series is suitable. If the SMP435(s) are followed by a SMART SR300 STEREO DECODER or MP7035 MAGNETIC PROGRAMMER, then the 4 gang pot is not necessary.

DIP SWITCH PROGRAMING INSTRUCTIONS

The DIP (dual inline package) programming switches located behind the security cover to the right of the adjustment trim pot are numbered (left to right) 1 thru 5. They are each S.P.S.T. (form A) type. All switches are OPEN when UP and CLOSED when DOWN. Their functions are:

1-CHANGEOVER MODE. When DOWN, momentarily grounding the projector 1 or 2 logic terminal (on the rear barrier strip) will cause that selection to be activated. NOTE: The unit *always selects projector one when the power is first turned on*. When UP, a maintained ground on the projector 1 terminal selects projector 1, and an OPEN selects projector 2.

2-LEFT/CENTER PROJ 2 SELECT. When DOWN, the left and center channel outputs are ON if projector 2 is selected. When UP, switch 4 should be DOWN. Switches 2 and 4 *should never* both be set in the same position.

3-RIGHT/SURROUND PROJ SELECT. When DOWN, the right and surround channel outputs are ON if projector 2 is selected. When UP, switch 5 should be DOWN. Switches 3 and 5 *should never* both be set in the same position.

4-LEFT/CENTER PROJ 1 SELECT. When DOWN, the left and center channel outputs are ON IF projector 1 is selected. When UP, switch 2 should be DOWN. Switches 2 and 4 should never both be set in the same position.

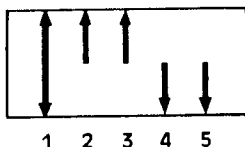
5-RIGHT/SURROUND PROJ SELECT. When DOWN, the right and surround channel outputs are ON if projector 1 is selected. When UP, switch 3 should be DOWN. Switches 3 and 5 should never both be set in the same position.

When the 435 is used in a single projector booth, the switches should be set: **1-DOWN, 2-UP, 3-UP, 4-DOWN, 5-DOWN**, and the Projector 1 logic terminal should be strapped to GND.

The MUTE function will override all switch functions causing all outputs to be OFF (and OPEN) while the MUTE terminal is at ground potential. This terminal is also used by the SMART SR300 and MP7035 for system programming:

The SMP435 may be used for either 35MM 4 channel magnetic soundtracks or 70MM 6 channel soundtracks. Two SMP435 units must be used for 70MM in order to gain the extra preamplifier channels needed. For this reason, there is a "split" mode that is *selectable by the DIP switches*, that will allow one unit to switch two of its channels on and off, along with the switching command to the first unit. When two channels are on, the other two channels are off, and vice versa. This is convenient for two projector 70MM installations where each "pair" of preamps in the extra SMP435 unit provide the needed extra channels.

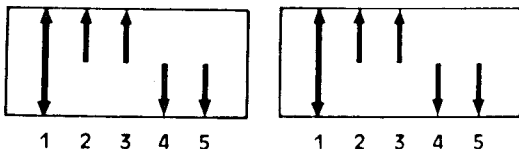
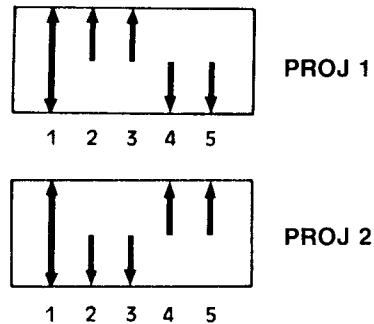
When the DIP switches are programmed for the 70MM "split" mode, you must *re-label the channels* of the extra SMP435, and connect the inputs and outputs for the following operation: The previous LEFT channel becomes your new Left/Center (left extra) channel on Projector 1. The previous CENTER channel is now the Right/Center (right extra) channel for Projector 1. The previous RIGHT channel becomes the Left/Center channel for Projector 2 (if this is a two projector installation), and the SURROUND channel will now be the new Right/Center channel of projector 2. The switch settings should be: 1-As required, 2-UP, 3-DOWN, 4-DOWN, 5-UP.



SINGLE PROJECTOR 35MM OPERATION. The No.1 DIP switch should be set for (alternate) or (C)ontinuous changeover and the X-OVER one terminal grounded.

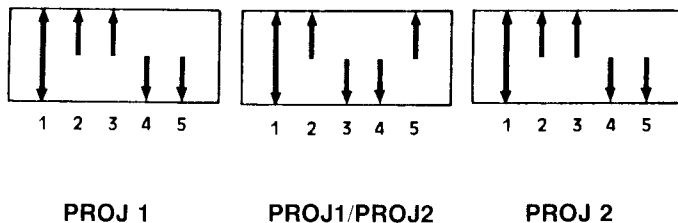
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DUAL PROJECTOR 35MM OPERATION. The first SMP435 should be set according to the same setting as a single projector. The second SMP435 DIP switches are set as shown. Connect the X-OVER 1 terminal to X-OVER 1 of the first unit. Connect X-OVER 2 to X-OVER 2 of the second unit. Now when the terminals are "instructed" by an external switch or automation, both units respond with opposite action.



70MM SINGLE PROJECTOR. Two SMP435 's are used together for six(6) channel sound. (8 channels are available) Both preamps are set up with identical DIP switch settings. Ground X-OVER 1 logic terminals on both units.

70MM DUAL PROJECTOR. Three SMP435's are required. Two units e first unit contain four (4) channels each, and the third unit is split (two channels for projector one, and two for projector two). Connect X-OVER terminals in the same manner as dual projector 35MM operation, but set DIP switch in the third unit for split operation.



SET-UP AND CALIBRATION

SOUNDTRACK EQUALIZATION. A high frequency and low frequency control on each channel hidden behind the removable front panel security cover permits accurate track equalization for each preamplifier in the SMP435. The playback curve employed in this product follows the recommended Academy Standard of 3180 μ s and 35 μ s turnover. Use a "pink noise" magnetic test film, and a real-time analyzer for equalization adjustments. Adjust the HF and LF controls for the *flattest playback response*. The HF control allows some additional high frequency droop to be added if the house system sounds too bright when adjusted for flat playback. IF YOU ARE

USING HOUSE EQUALIZERS after the SMP435, adjust the preamps for flat response. The house equalizer is then used to achieve the desired room response in the auditorium. If no test film or equipment is available, leave the HF and LF controls in the same position as they arrive from the factory and make minor adjustments using a print of known quality.

OUTPUT LEVELS. Internal output level trim controls permit the sound engineer to balance the tracks within the penthouse, and interface into the next device in the system at the proper level. The four controls are hidden behind the removable front panel security cover. All adjustments are made from the outside of the chassis. Clockwise rotation of each channel of the output trim controls will *increase* the output of that channel.

POWER SWITCH AND LAMP. The front panel power switch and L.E.D. allows the operator to turn the SMP435 ON and OFF, and to monitor the power supply operation. The L.E.D. is connected across the bi-polar power supply output and indicates that the supply is operating.

HOUSE EQUALIZERS. The SMP435 may be followed by house equalizers that shape the playback to suit various room acoustics and stage speaker variations. We recommend the SMART EQ600 which incorporates special features for motion picture use.

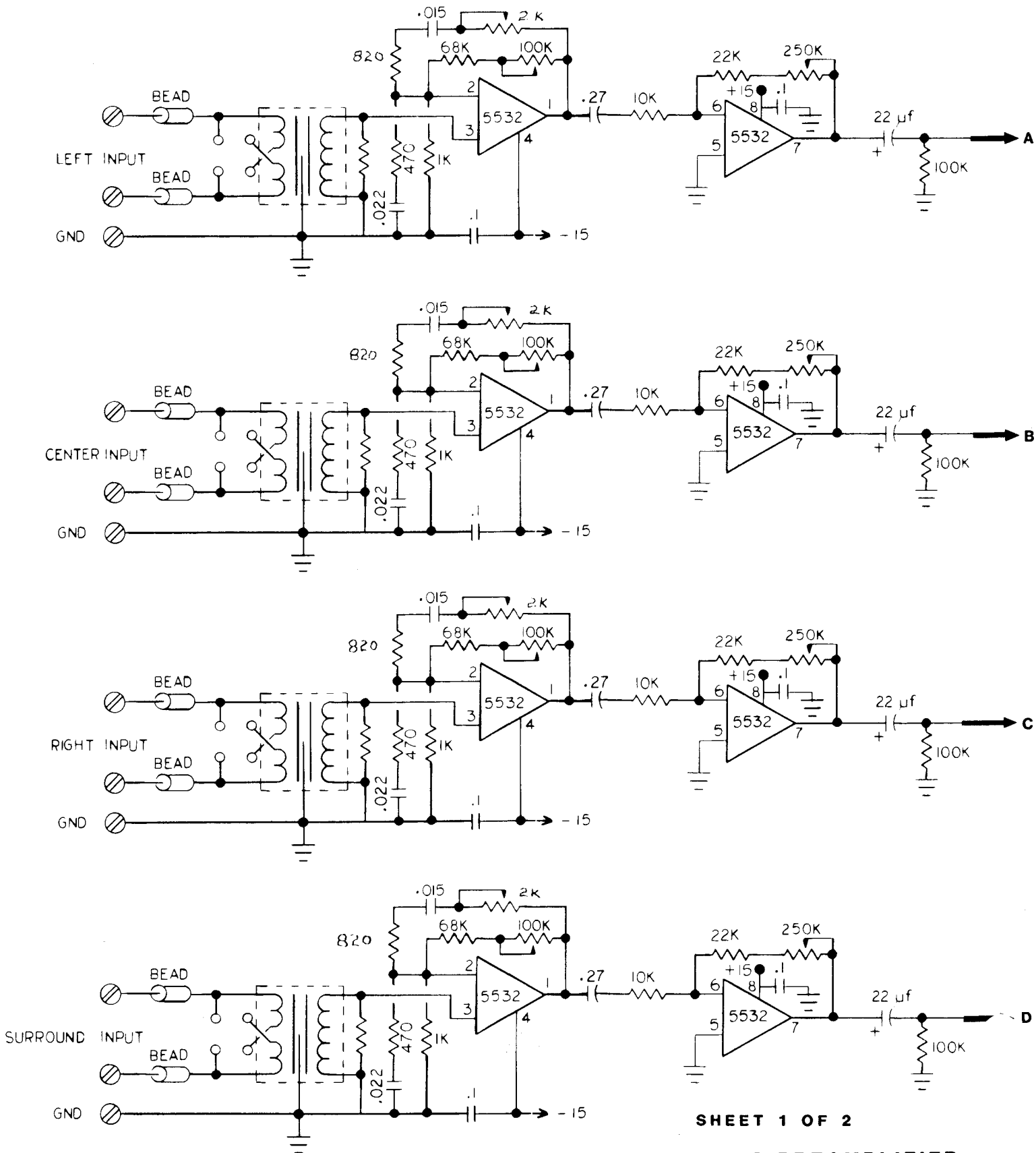
STAND ALONE USE. The SMP435 is capable of running by itself, or interfacing to the logic switching sections of an SR300 or MP7035. If the SMP435 is used alone, external four channel faders *must be provided* for the operator to accomodate various magnetic print levels. If the unit is used with the other compatible equipment mentioned, then the faders are not required.

MP7035 MAGNETIC PROGRAMMER. The MP7035 is an ideal companion to the SMP435 when several units are to be used in a 70MM/35MM installation. This product incorporates noise reduction circuits for 70MM encoded prints and special channel formatting with bass enhancement on the LEFT-EXTRA and RIGHT-EXTRA stage channels. Regular non-encoded 70MM prints are routed to each of the 5 stage speaker systems without noise reduction. Also, the 35MM circuits may be selected through four patented DNR noise reduction sections for ultra quiet playback. All format switching for multiple SMP435 systems is performed by the MP7035. A six channel Master Fader is included in this product.

SR300 INTERFACE. The SMART SR300 Stereo Decoder provides external logic switching for the MP7035 Magnetic Programmer and it's associated SMP435 preamplifiers. This product provides a simple way to "command" the magnetic system and is easy to understand and operate. Refer to the manual on this product for details.

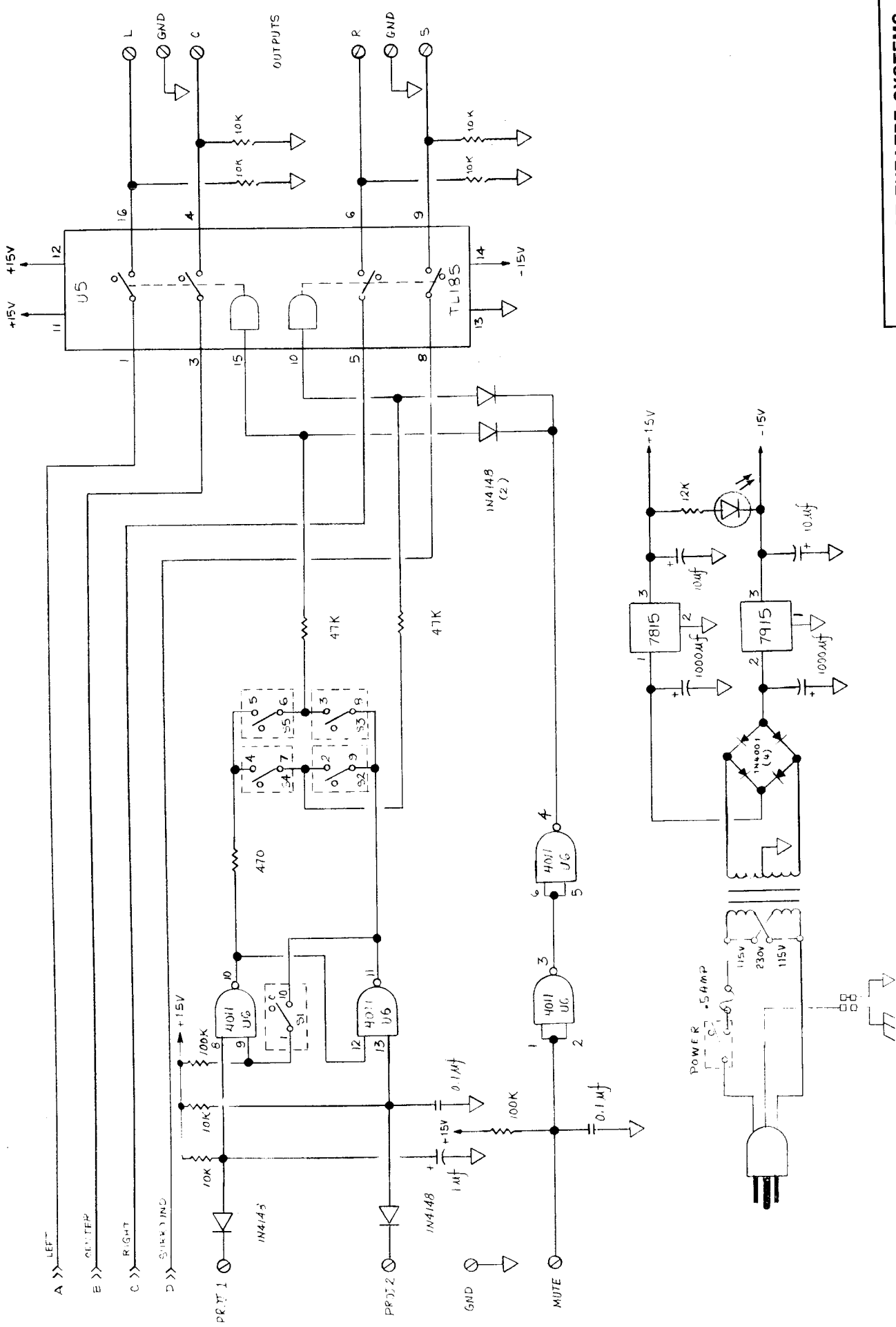
OUTPUT SWITCHING SCHEME. The output switching of the SMP435 is different than any product used in motion picture booth sound equipment. It's unique capability makes it easy to interface the unit with many other preamps with a minimum of inter-wiring. A TL185 integrated circuit used in the product is a four channel electronic switch that receives it's switching instructions from the internal logic circuitry. When it is commanded to change over to another unit, it disconnects the audio outputs from the rear barrier terminals. Therefore nothing is connected to these terminals. Other units may be "bussed" by connecting each channel output terminal to many other units, and selectively switch each SMP435 on and off through external switching. SMART products such as the SR300 stereo decoder, SG1130B and SG1130bx Stereo Generators, and others may also join the "bus" because their output switching scheme is similar.

SMP435 AUDIO SECTION



SHEET 1 OF 2

SMP435 MAGNETIC PREAMPLIFIER



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SCALE: _____ DATE: 3/30/84

APPROVED BY: *[Signature]* DRAWN BY: _____

REVISED: _____

DRAWING NUMBER: SMP435 LOGIC

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