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Installation and Service Manual

DA226

THEATRE NON-SYNC MUSIC DISTRIBUTION AMPLIFIER

SMART

THEATRE SYSTEMS

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DA226

MUSIC DISTRIBUTION SYSTEM

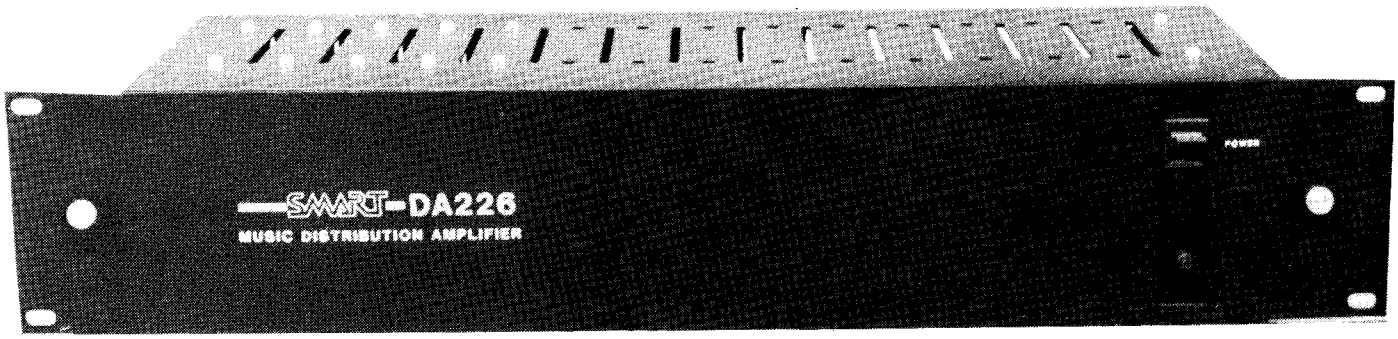
INTRODUCTION

The SMART DA - 226 DISTRIBUTION AMPLIFIER is a high quality, modular and expandable unit suited for use in a variety of professional or commercial environments. Its subjective performance in applications requiring long cable runs, with complex impedances and multiple feeds is practically indistinguishable from direct coupling of the music source. The DA-226 features operation from either an AC or DC power supply, high input impedance (47k ohms), low minimum output impedance (600 ohms), dual stereo (or quadruple monaural) buffered inputs and transformer isolated outputs (up to 26 stereo or monaural outputs or any combination may be selected), and shunt type switching on the output cards to allow the installer, and later the user, to configure each output card individually.

The technical specifications of the DA - 226 exceed any product in its price range. The signal to noise ratio is greater than 94 db (A weighted) and distortion above 300 Hz is no greater than 0.06 % (THD + noise using any output or combination of output configurations at 1v rms output) driving any impedance (complex or resistive) greater than 600 ohms. IM distortion is likewise very low at 0.02 % or less. Like the very best audiophile tube amplifiers whose outputs go through a transformer, the distortion figure of the DA - 226 rises at lower frequencies, however, the distortion figure does not rise again at higher frequencies.

Psychoacoustically, higher distortion at low frequencies is not as objectionable as it is at the midrange and above and is in fact completely undetectable in the DA-226 except by a trained listener using test tones. It is also necessary to point out that the distortion figures quoted were reached at a relatively high output using steady state signals after the output transformers magnetic field had been allowed to saturate. In real world situations with transient program material (i.e. any music) actual distortion figures are much lower. Frequency response is essentially flat (+- 1 db 20 Hz - 20,000 Hz/ -3db at 15 Hz and 23,000 Hz) throughout the audible range.

As a final note, all the IC's used in the DA - 226 are the same ones which Phillips has decided to use in their most highly rated CD player, all capacitors in the audio signal path are either polyester or metalized polyester film, and each card is individually decoupled from the power supply.



THE DA226 IS SUPPLIED WITH FOUR OUTPUT CARDS FOR 8 STEREO CHANNELS ADD ADDITIONAL OUTPUT CARDS FOR MORE THAN EIGHT AUDITORIUMS.

SYSTEM DESCRIPTION

The circuitry of the DA - 226 is contained in three printed circuit boards which mount on to the mother board (0226A330) via edge connectors. The connectors on the mother board and their respective pin assignments are identical for every card slot. In other words, the mother board is only providing signal and power bussing. The pin and trace assignments are:

A) Program A LEFT (from the INPUT CARD)

B) Program B LEFT (from the INPUT CARD)

C) Program A RIGHT (from the INPUT CARD)

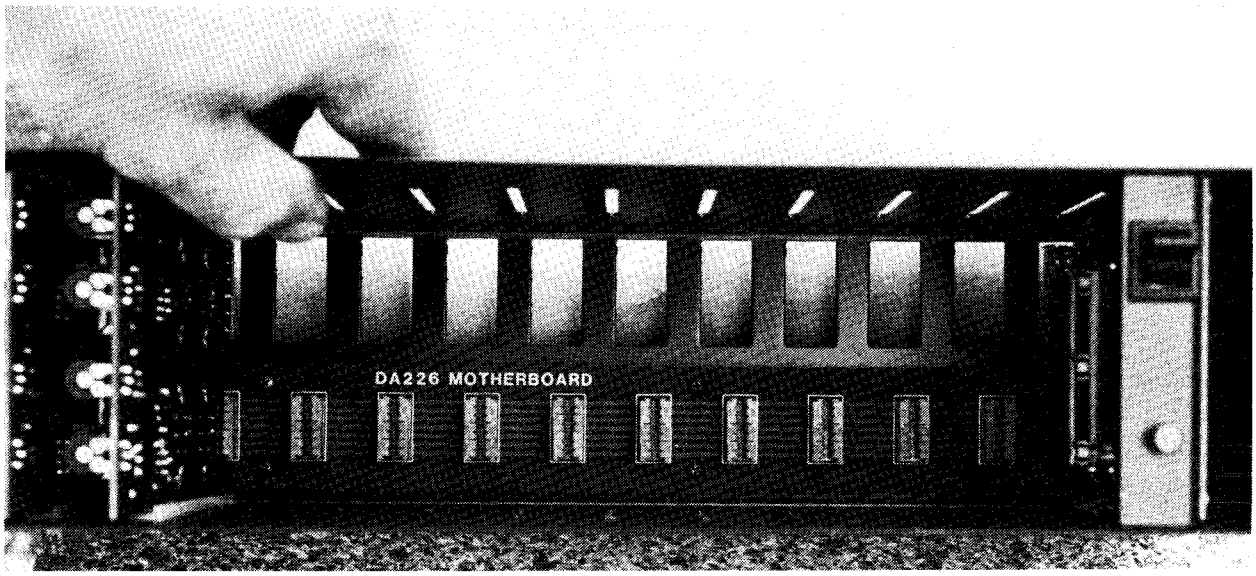
D) Program B RIGHT (from the INPUT CARD)

E) +10 to +20 VDC (from the POWER SUPPLY card)

F) -10 to -20 VDC (from the POWER SUPPLY card)

G) GROUND

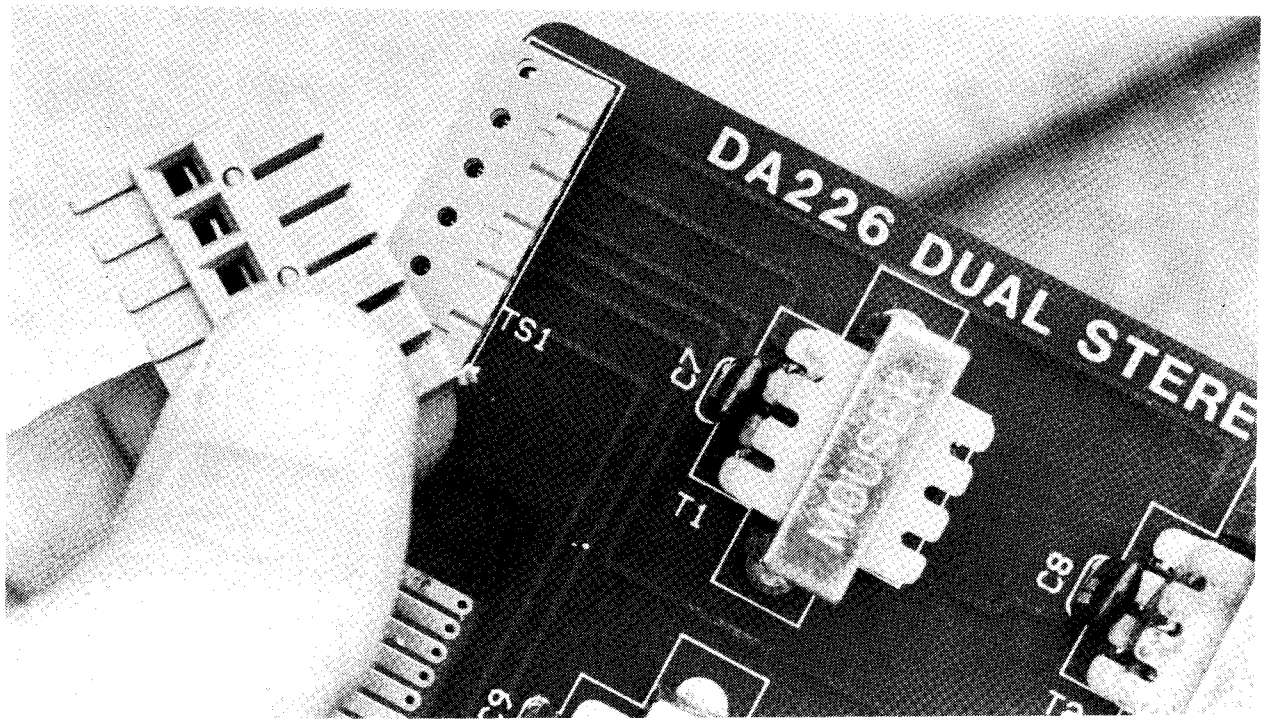
THE DA226 USES A UL RECOGNIZED POWER PACK TO POWER ALL CARDS.



INSIDE VIEW OF CARD CAGE SHOWS THE MOTHER BOARD WITH CONNECTORS FOR ALL PLUG IN CARDS.

Connections to or from the outside world to all the cards are made via grey, six position, screw - tight, quick disconnect terminal connectors which are provided for each card (contact SMART for extras). The pressure these connectors place on the cable has to be felt to be believed.

ONCE THE WIRING HAS BEEN ATTACHED TO THE REMOVABLE CARD CONNECTOR IT CAN BE PLUGGED ONTO THE CARD OR REMOVED AS REQUIRED TO SERVICE.



THE CONNECTOR FOR EACH CARD IS FURNISHED WITH THE DA226.

POWER SUPPLY CARD (0226B300)

The power supply card contains rectifying diodes, DC protection diodes, fuses and filter capacitors. Mounted on the front of this card, on a bracket with two machine screws, is the system power switch and power-on LED which are accessible through a hole on the front panel when the front panel is in place.

Although the power supply card will work in any card slot, it will only fit properly through the front panel when it is installed in the extreme right position.

Connections to the power supply card from the external supply are as follows:

(Keep in mind that position #1 on the terminal connector is at the bottom)

6) 12 VAC (from external wall mount type transformer)

5) No connection

4) 12 VA (from external wall mount type transformer.

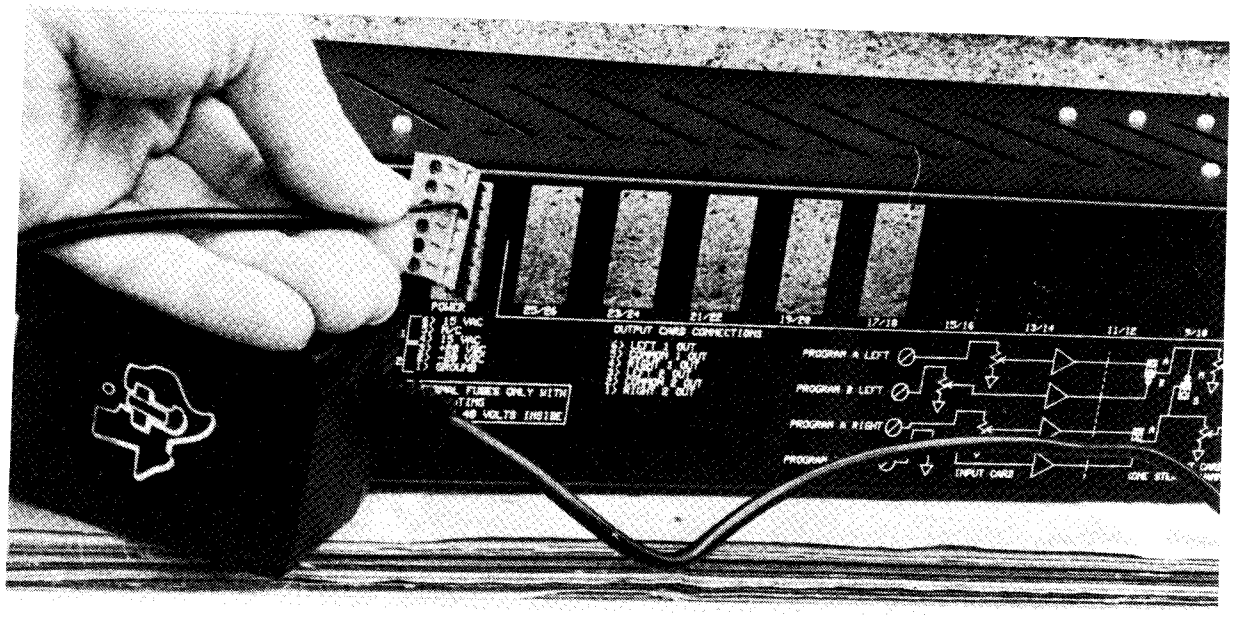
3) +20 V DC (from a dc supply such as the Xentek which is used with the MOD II)

2) GROUND (or common if used with the Xentek supply)

1) -20 V DC (from a dc supply such as the Xentek which is used with the MOD II)

Of course, only one of the two methods of powering the DA-226 (AC or DC) should be used, although the DA-226 would suffer no ill effect if both were accidentally connected.

Should the polarity be accidentally reversed at the DC entry points (connections 1 and 3) the

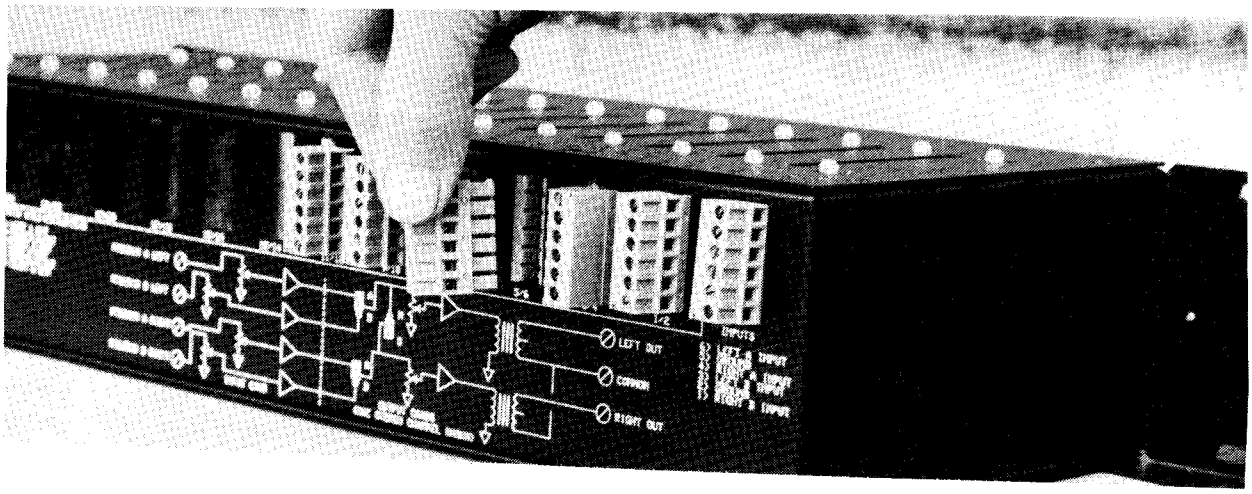


THE POWER PACK TRANSFORMER COMES WITH A CONNECTOR WIRED TO CABLE. JUST PLUG IT INTO THE POWER SUPPLY CARD. THE CONNECTOR PINS ARE POLARIZED AND WILL PLUG IN ONLY ONE WAY.

protection diodes (D1 and D4) would reverse bias and shut off therefore keeping the entire system from turning on until the situation is rectified (no pun intended). Quick blow fuses follow the diodes to protect against an internal short. Should the DA - 226 be powered by the same supply that would power a MOD II, these fuses will prevent the supply from "crowbarring" (shutting off to protect itself) and therefore not affect the film sound.

The large 4700uF filter capacitors are, of course, for power supply hum and ripple rejection. Since large value electrolytic capacitors tend to become resistive at high frequencies, they are bypassed by two 1uF metalized polyester film to insure high frequency noise rejection. To minimize turn on thumps the fuses are electrically placed after the diodes and fuses but before the power switch and power - on LED.

As an aid in diagnosing any problems which may arise, the power - on LED is electrically placed in such a way that should either of the voltage rails on the mother board fail the LED will light to only half its normal intensity.



REAR VIEW OF THE CHASSIS CARD CAGE WITH SOME CARDS INSTALLED.

INPUT CARD (0226B320)

It is to this card that the program material(s) (i.e. a compact disk or tape output) is actually connected and it is the output of this card which is routed to the mother board and then to the individual output cards. The only actual gain of the system is provided by this card.

The input card actually consists of four completely isolated sections, as each signal goes through a different IC. (NE 5532's) and each pair of IC's is decoupled from the power supply. Each section consists of a high impedance (47k ohms) buffer stage which feeds a gain stage. Trim pots at the forward edge of the cards control the gain of this stage. The maximum gain of this stage is about 10 db and maximum output voltage is about 16 V rms, when powered by the MOD II power supply.

Connections to the input card from the music source(s) are as follows:

6) Program A LEFT

5) SHIELD (GROUND)

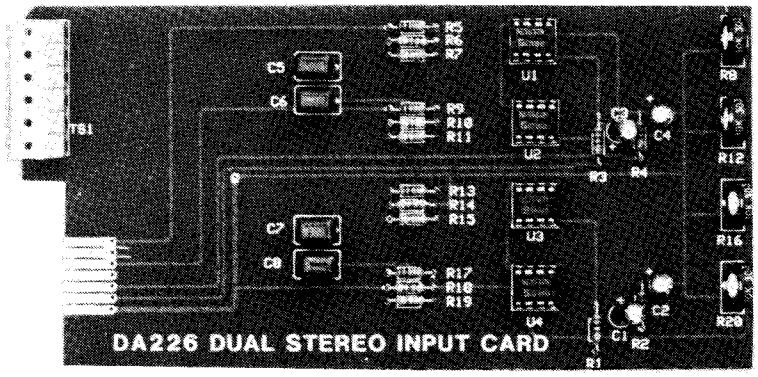
4) Program A RIGHT

3) Program B LEFT

2) SHIELD (GROUND)

1) Program B RIGHT

OUTPUT CARD (0226B310)



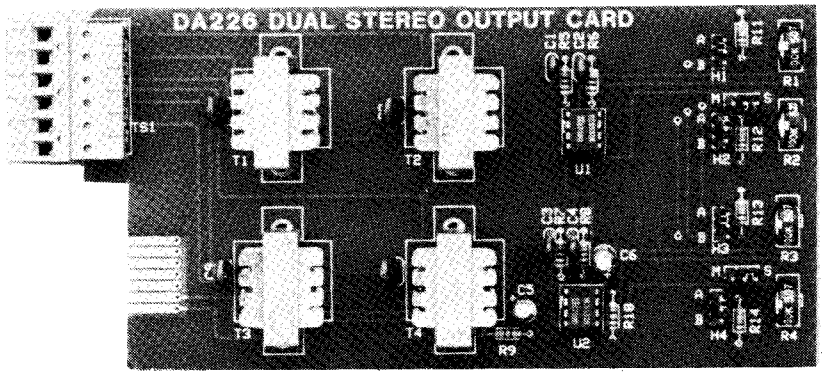
STEREO INPUT CARD CONTAINS TWO STEREO INPUTS. TWO ARE FOR THE MAIN INPUT PROGRAM AND TWO ARE FOR A SECOND SOURCE PLAYER.

The output cards take the signal from the input card via the mother board, buffer them and then send them through the transformer to the grey terminal strips, ready to be connected to the auditoriums. By using this configuration a low crosstalk figure is maintained and interaction between the output cards and the input cards and interaction between each individual output signal is practically nonexistent.

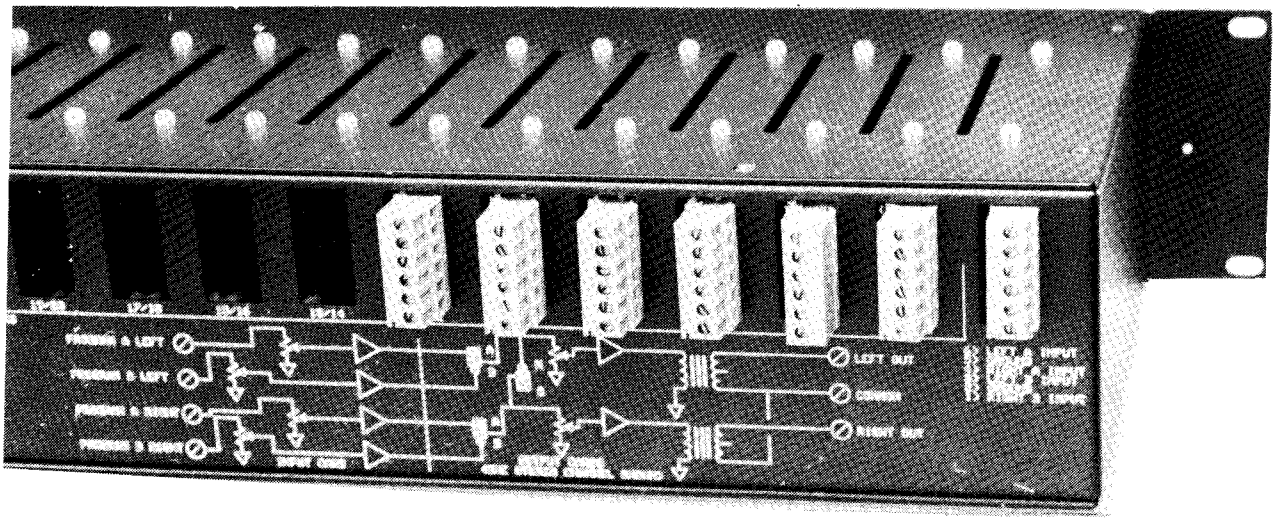
Each output card has six shunts which allow the installer to configure each card to the needs of each auditorium. The A-B shunts select which of the A or B program (see the section on the input card) is to be used. The shunts labeled M-S select whether the outputs of the transformer pair will operate in Stereo (independently, with no interaction) or whether they will operate Monaurally (which causes the output pair to mix the signals being fed to them).

It is recommended that the installer not feed a single channel of a stereo program to an auditorium (for example, to feed the left channel of a CD player to auditorium number one and the right channel to auditorium number two) since the separation with todays music sources can cause a great deal of the music content to simply not be present on a channel. Todays compact disk players typically achieve a minimum of 75 db separation which usually exceeds 90 db at midband. Instead, when feeding a single signal to an auditorium we recommend mixing the stereo signal at the output card by moving the M - S shunts to the M (mono) position. Of course, SCA broadcasts are always monaural.

Connections from the output card to their respective auditoriums are as follows:



THE DUAL STEREO OUTPUT CARD HAS INDIVIDUALLY ADJUSTABLE OUTPUT CONTROLS FOR THE LEFT AND RIGHT OUTPUTS OF EACH STEREO CHANNEL.



A CIRCUIT FLOW CHART IS SCREENED ON REAR OF CARD CAGE.

6) LEFT OUT 1

5) COMMON 1 (NOT ground) at the DA226 end; connect GROUND at the sound system end only.

4) RIGHT OUT 1

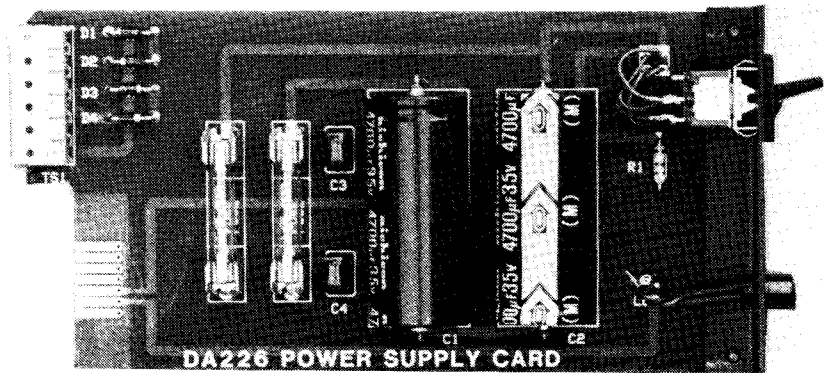
3) LEFT OUT 2

2) COMMON 2 (NOT ground). Same as above GROUND.

1) RIGHT OUT 2

Please take a moment to note that positions numbered 5 and 2 are NOT ground. Because the outputs are transformer isolated they must be connected to the ground terminals of their respective receptors, although it need only be connected once on either side of the cable used. If a ground loop problem is encountered it should not be solved by disconnecting the COMMON returns as this causes worse difficulties which may or may not be readily apparent. A ground loop would be solved more readily by disconnecting one or more of the shields going to the input card at the source (i.e. CD player) side. If questions arise concerning proper grounding techniques please stop and ask someone BEFORE cutting a shield loose.

DA-226 INSTALLATION GUIDE



POWER SUPPLY CARD CONTAINS FUSES. USE 1/2 AMP 3AG TYPE FOR UP TO 10 OUTPUT CHANNELS AND 1 AMP 3AG FOR 12 OR MORE OUTPUT CHANNELS. ALSO USE 1 AMP 3AG WHEN USING THE MOD II (XENTEK) POWER SUPPLY REGARDLESS OF THE NUMBER OF CHANNELS.

PRE-PLANNING. Before the actual installation of the DA-226 begins we recommend that the installer (you) take a few minutes to plan ahead. First, decide which sound rack will hold the DA-226. It is generally considered good practice to choose a rack which is not sitting extremely close to a lamphouse or to a motor or rectifier. Even though the DA-226 is very well isolated from noise, keep in mind that in the very unlikely event that noise is introduced to the input card it will be distributed to all of the output cards and, subsequently, to their respective auditoriums. After you meet this prerequisite, the remaining placement considerations are the availability of a power source (a Xentek power supply which is powering a MOD II film signal processor is ideal) and, of course, the ease of routing the signal cable from the DA-226 to the auditoriums.

Next, make a list of all the auditoriums and whether they will get a mono or stereo signal. If you plan to use more than one music source note which auditorium should get which program. Unless all the auditoriums are identical, you will need this list when you configure the output cards.

HARDWARE SETUP

I Run shielded, two conductor cables from the auditorium sound racks to the rack which will hold the DA-226. Canare quad conductor or Mogami " mini-quad " will provide the best noise rejection. Make the necessary connections at the auditoriums.

II Run shielded, two conductor cable from each music source. If you decide to use two cables per music source (one for the left and one for the right channel) connect only one shield at the source but later connect both at the input card.

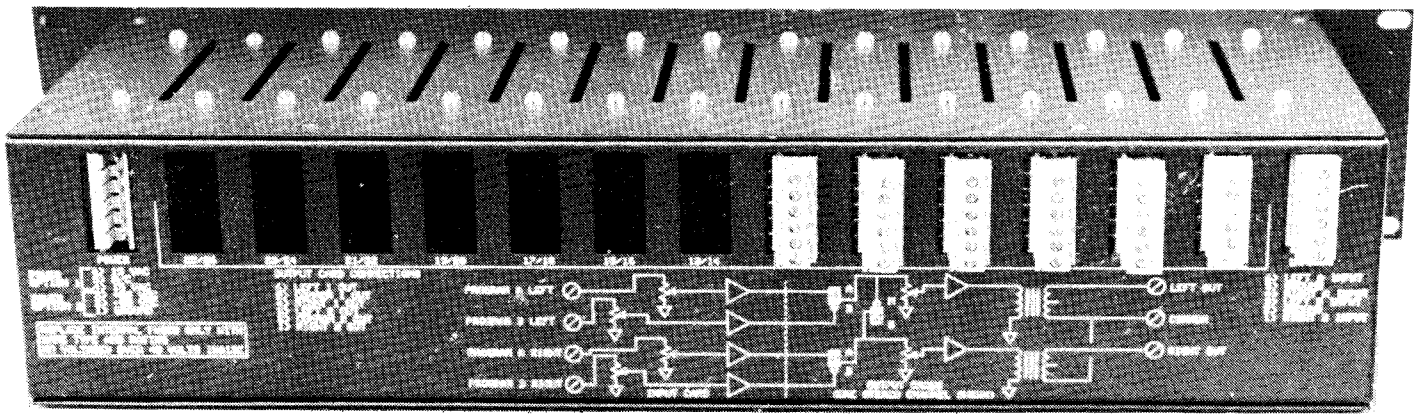
III Run the cable to the power supply. Do NOT use shielded, signal type cable. Use a minimum of 18 gauge wire. You will need to run three wires if you are able to hook the DA-226 to a DC power supply such as the Xentek and two wires if you are using the AC wall type transformer option.

Use the following chart to prepare the grey terminal strips for the power supply card:

AC	DC
6) 12 VAC	6) no connection
5) no connection	5) no connection
4) 12 VAC	4) no connection
3) no connection	3) +20 V DC
2) no connection	2) GROUND (COMMON on the Xentek supply)
1) no connection	1) -20 V DC

Remember that position #1 is at the bottom for all the terminal connectors.

Plug the power supply card into the extreme right card slot in the DA-226 and connect the grey terminal connector. Turn the power switch on. You should see the LED brightly and evenly lit.



POWER SUPPLY CONNECTOR IS AT FAR LEFT OF CARD CAGE WHEN VIEWED FROM REAR.

If it lights but only dimly this could signal a fault in one of the power rails.

IV Prepare the terminal connector for the input card as follows:

6) LEFT IN A (from the music source)

5) SHIELD

4) RIGHT IN A (from the music source)

3) LEFT IN B (from a second music source if needed)

2) SHIELD

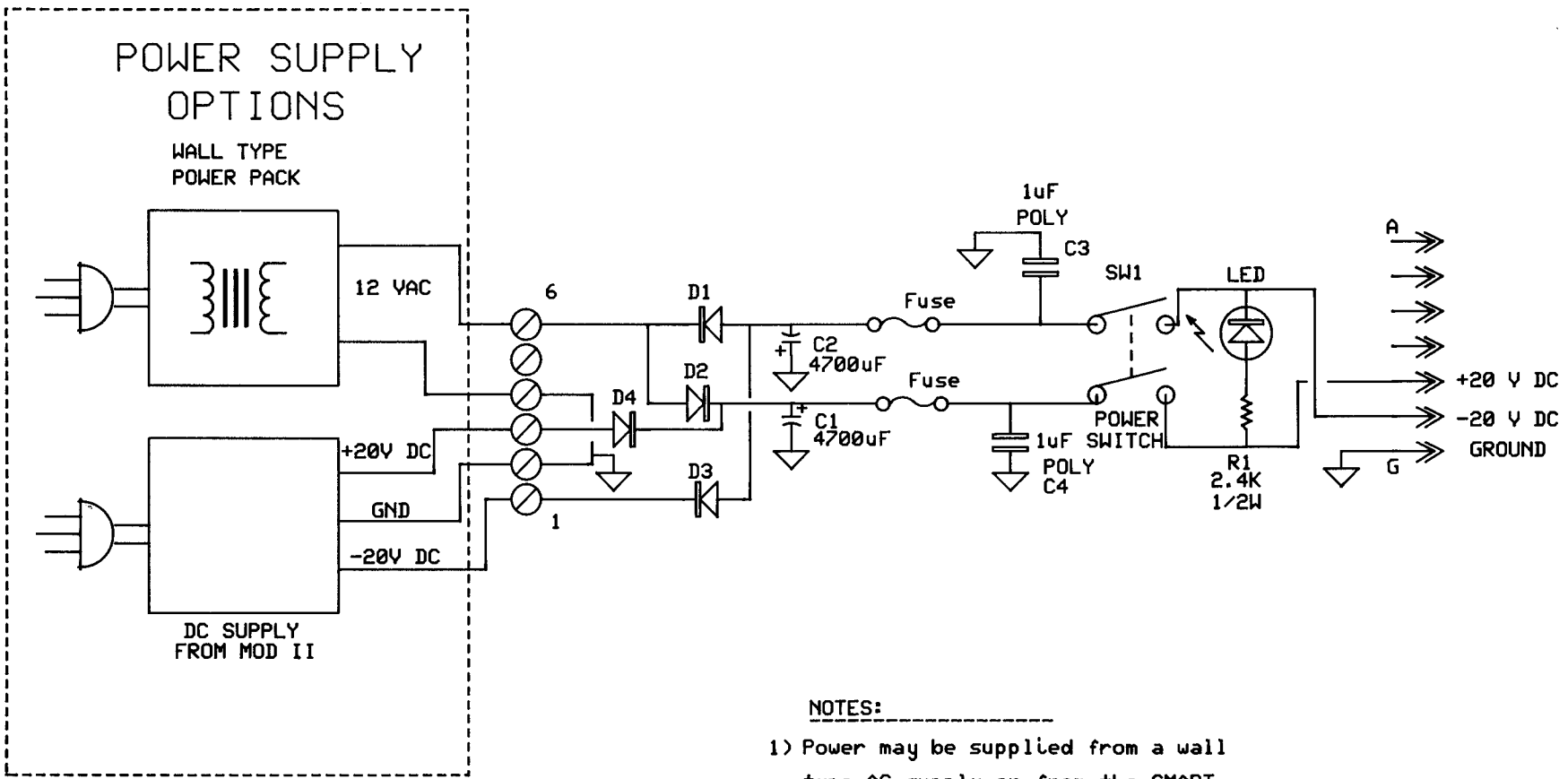
1) RIGHT IN B (from a second music source if needed)

Set the gain trimpots to about their halfway position. They are physically positioned on the same relative position as the input channels to which they correspond. Plug the input card into the extreme left of the DA-226 chassis. The position of this card in the chassis isn't critical but we recommend it for convention and for easiest wiring of the rack as low level signals ar usually routed on the left of a sound rack. Plug the terminal connector onto the input card.

V Using the list you have prepared as described in the pre - planning section, configure each output card to your needs by using the shunts. If you only have one source connected, set all the A - B shunts to match the input you have selected to use (usually A). If you have two or more music sources you will have to place the shunts according to which auditorium gets which program material. The physical position of the trimpots and the shunts correspond to the position of the output pin which goes to the grey terminal strips.

If you plan to run a stereo signal to an auditorium you should move the M - S shunt to the S (stereo) position. If you want to send monaural signal to an auditorium from a stereo signal input, you should select the M (monaural) position. Note that the shunts on an output card do not affect the signal going out on any other card.

REPLACE FRONT SECURITY COVER AFTER ALL ADJUSTMENTS HAVE BEEN MADE.



NOTES:

1) Power may be supplied from a wall type AC supply or from the SMART MODII supply.
   The wall type supply is used for standalone applications
2) Fuse = 1/2 amp 3AG/AGC type for wall type AC supply
   1 amp 3AG/AGC type for MOD II supply

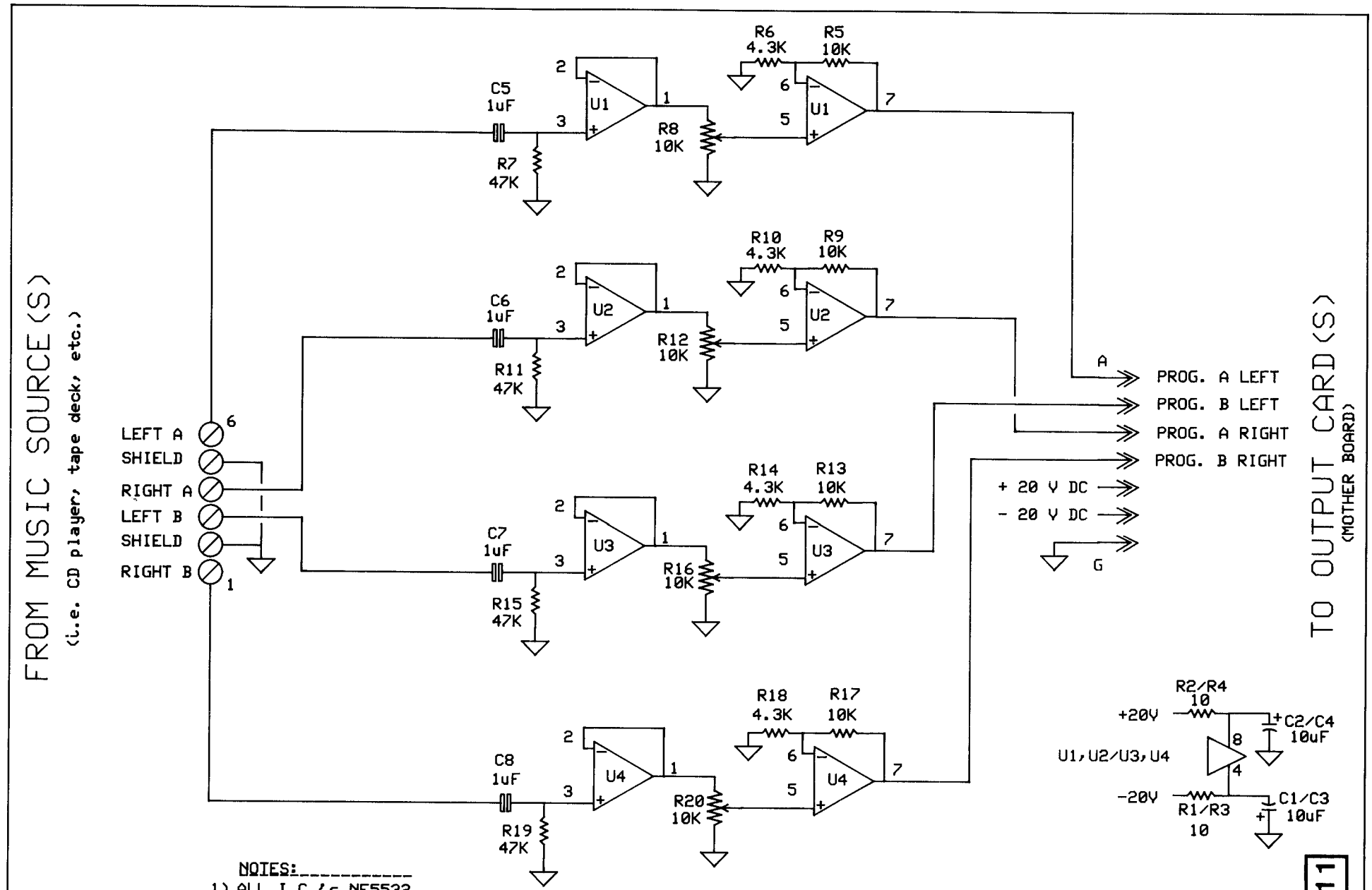
10

REV	BY	DATE
A	EKS	6-17-87
B	EKS	9-18-87

SMART THEATRE SYSTEMS

TITLE DA226 POWER SUPPLY CARD

DATE 6-17-87 DRAWN BY EKS DRAWING # 0226B500



NOTES:
1) ALL I.C.'s NE5532
2) ALL RESISTORS IN OHMS

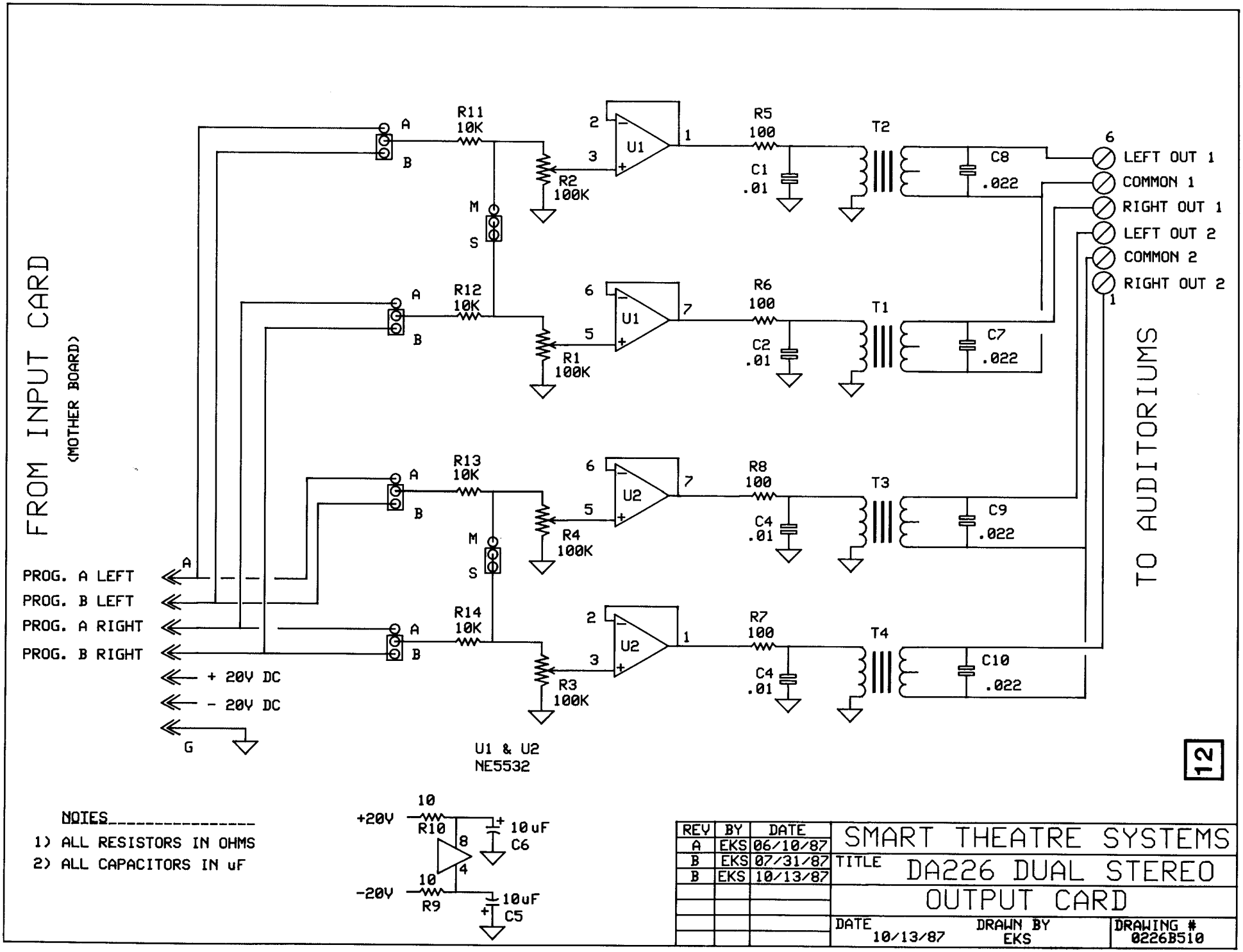
11

REV	BY	DATE
A	EKS	6-18-87
B	EKS	9-18-87

SMART THEATRE SYSTEMS

TITLE DA226 DUAL STEREO INPUT CARD

DATE 6-18-87 DRAWN BY EKS DRAWING # 0226B520



NOTES

1) ALL RESISTORS IN OHMS
2) ALL CAPACITORS IN uF

REV	BY	DATE
A	EKS	06/10/87
B	EKS	07/31/87
B	EKS	10/13/87

SMART THEATRE SYSTEMS

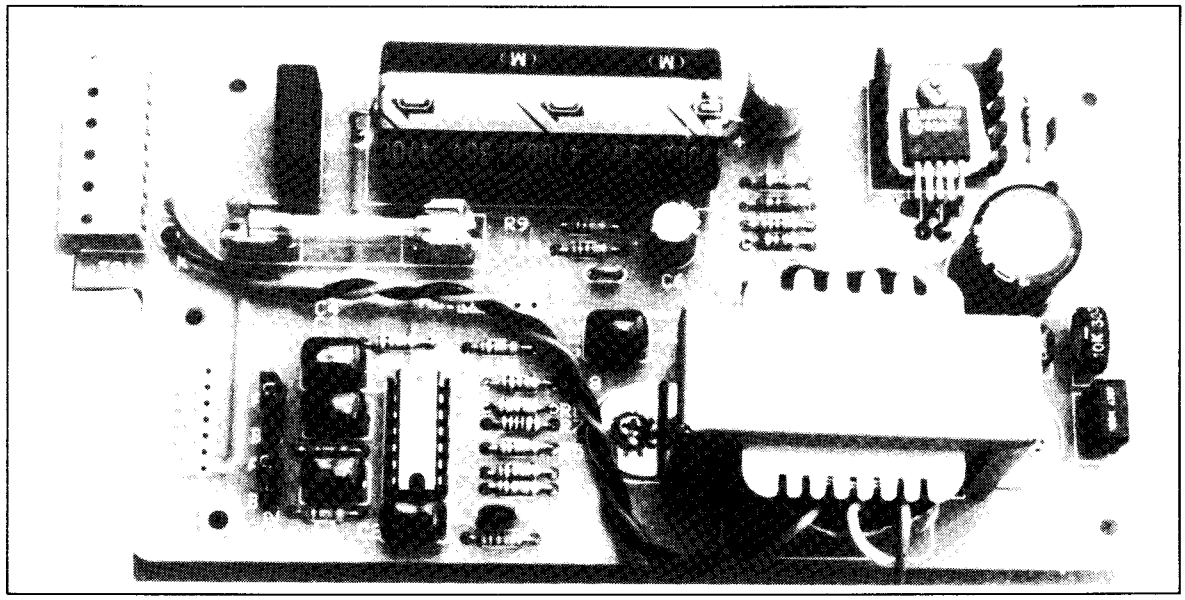
TITLE DA226 DUAL STEREO OUTPUT CARD

DATE 10/13/87 DRAWN BY EKS DRAWING # 0226B510

12

INSTALLATION OF MODULAR POWER AMPLIFIER FOR THE DA226

MODEL DA26X350



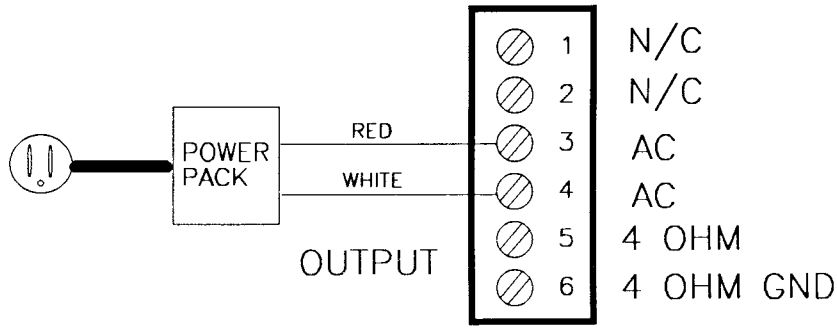
It is not likely that the full capacity of the DA226 distribution amplifier will ever be used. In almost all installations the card slots on the far right are empty. If this is the case, a DA26X350 modular amplifier may be installed in the vacant card slots. Two amplifiers may be used, if space permits, for stereo lobby music (one amplifier per stereo channel).

The DA26X350 uses an external UL listed power supply for power. The power supply for the DA226 will not carry all the distribution cards along with the 10 watt power amplifier.

The DA26X350 is available in either 70 volt line audio output **or** 4 ohm direct output for series-parallel voice coil wiring of lobby music speakers. Please order the desired output configuration before installation.

INSTALLATION

Place the DA26X350 card in a vacant card slot at the far right of the DA226 card cage chassis. The amplifier module will occupy three spaces in the card cage.

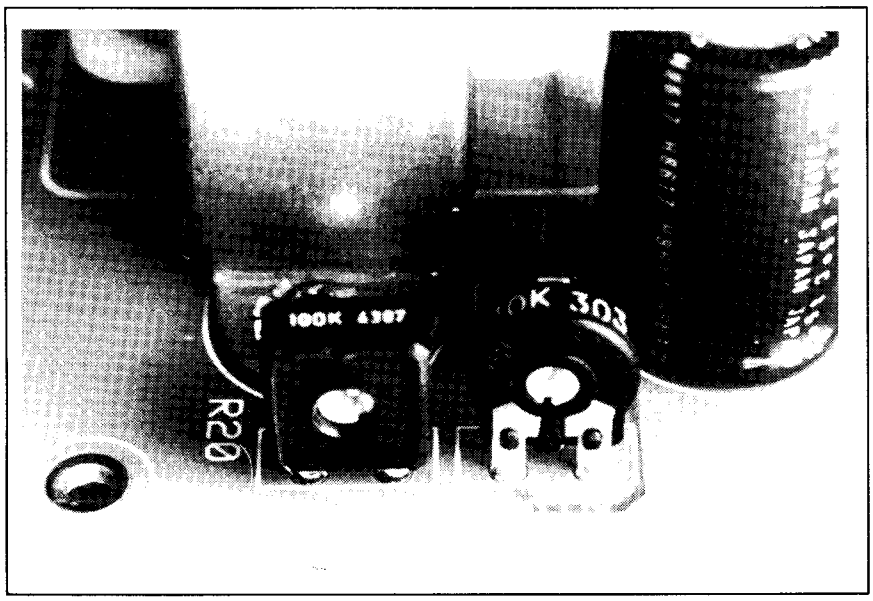


Plug the mating Output-Power connector to the card at the rear of the chassis while carefully observing the polarity of the plug. A reversed plug will result in no output to the speakers.

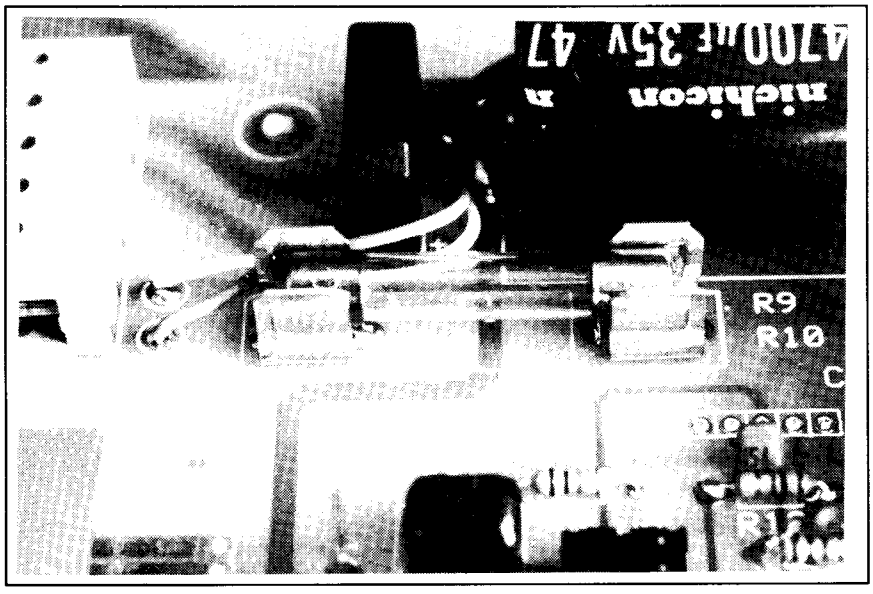
Mating connector to the DA26X350 must be carefully wired before plugging onto the DA226 card cage. NEVER APPLY POWER TO THE AMPLIFIER BEFORE A SPEAKER LOAD HAS BEEN WIRED.

The amplifier module is supplied with either a 70 volt balanced audio output **or** a 4 ohm unbalanced output for the speaker load. Please verify that you have received the desired version before connecting the speaker load. The 70 volt version has a large audio transformer mounted on the card.

A common mistake when selecting speaker taps for 70 volt line operation is to arbitrarily connect each speaker for 1 or 2 watt operation and then raise the input level on the amplifier for a suitable level in the lobby. Most 8" lobby music speakers have a sensitivity of 96 dB with one watt input when measured at 1 foot. This is often too loud. A more practical use of amplifier power is to tap the speakers at 1/2 watt for most lobbies. Rest room music speakers should be tapped at 1/4 watt. These conservative taps will allow up to 20 speakers to be added to the 70 volt line without amplifier overload. Theatres with tall ceilings (18 feet or more) will typically need 1 watt per speaker for proper sound level on the floor.



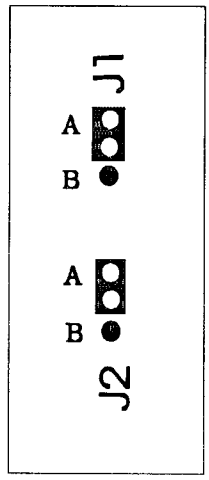
A HF (High Frequency) rolloff control is available on the front of the amplifier module. This pot allows an attenuation of 4 dB at 10 kHz for installations where the high frequency response of the speakers is "ragged" at high frequencies. This control should be adjusted for the best overall sound quality.



The protection fuse on the PC card amplifier should be replaced with the same type and rating if blown. This fuse is in the AC power supply circuit. Replace only with a 3AG 4 amp fuse.

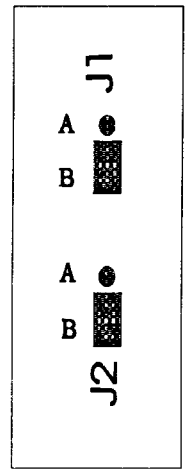
Two sets of input selector shunt jumpers allow the installer to pick either the Left and Right channels of program "A" from the DA226 distribution system, or Left and Right channels of program "B". The channels (of the selected stereo buss) are summed for a mono mix through the power amplifier module. The jumpers are placed on the "A" buss by the factory during testing.

For stereo lobby music two DA26X350 modules may be used in the DA226 card cage. One power amplifier module must have the shunt jumper on J1 pins for the Left channel of the desired stereo buss, and the other amplifier module should be configured with the J2 jumper set for a Right input from the desired stereo buss.

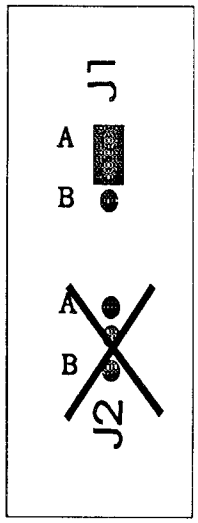


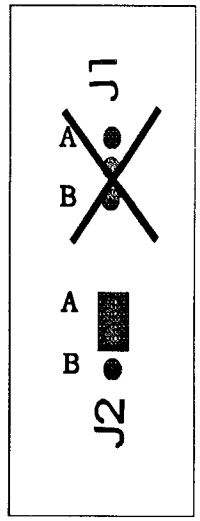
Left Stereo Buss

Right Stereo Buss



Select either the "A" buss on both jumpers or the "B" program buss.





For Stereo music in lobby, Two DA26X350 amplifier modules are required. Set jumper on one amplifier to "A" on J1 and "A" on J2 of the second amplifier. Leave second jumper out of each card. If the "B" stereo buss is desired, follow same setup as used for "A".

SMART

3856 Green Industrial Way
Atlanta, Ga 30341
(800) 45-SMART

CAUTION ! Do not apply power to the DA26X350 amplifier before a speaker load has been wired to the outputs.

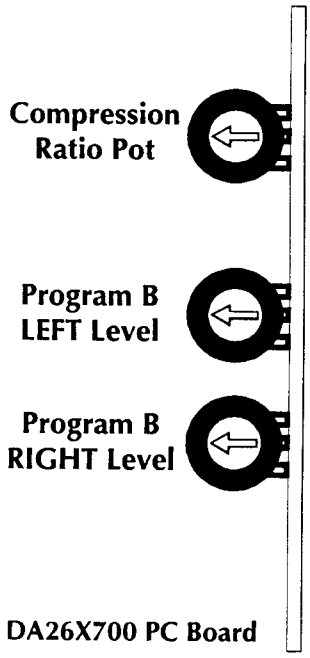
DA26X700 INPUT STEREO LIMITER CARD

INSTALLATION INSTRUCTIONS

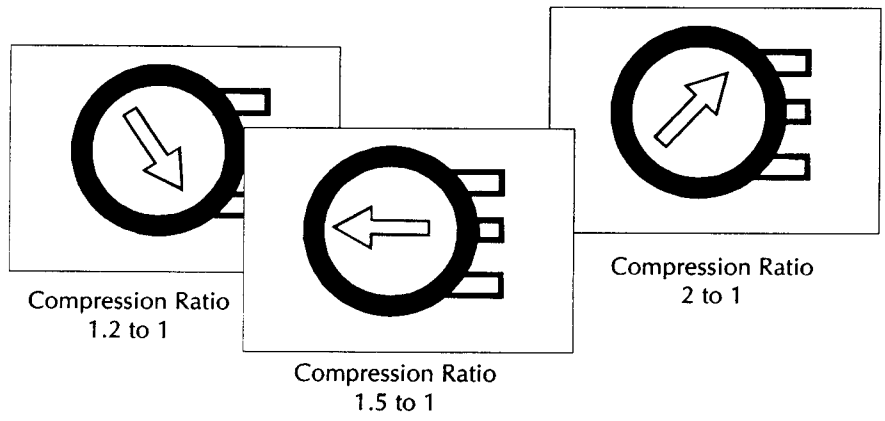
The DA26X700 Input card with stereo limiter (part number 0226A321) is a direct replacement for upgrading the DA226E320 standard linear input card. The DA26X700 is a direct pin compatible replacement and will work properly in any DA226 system.

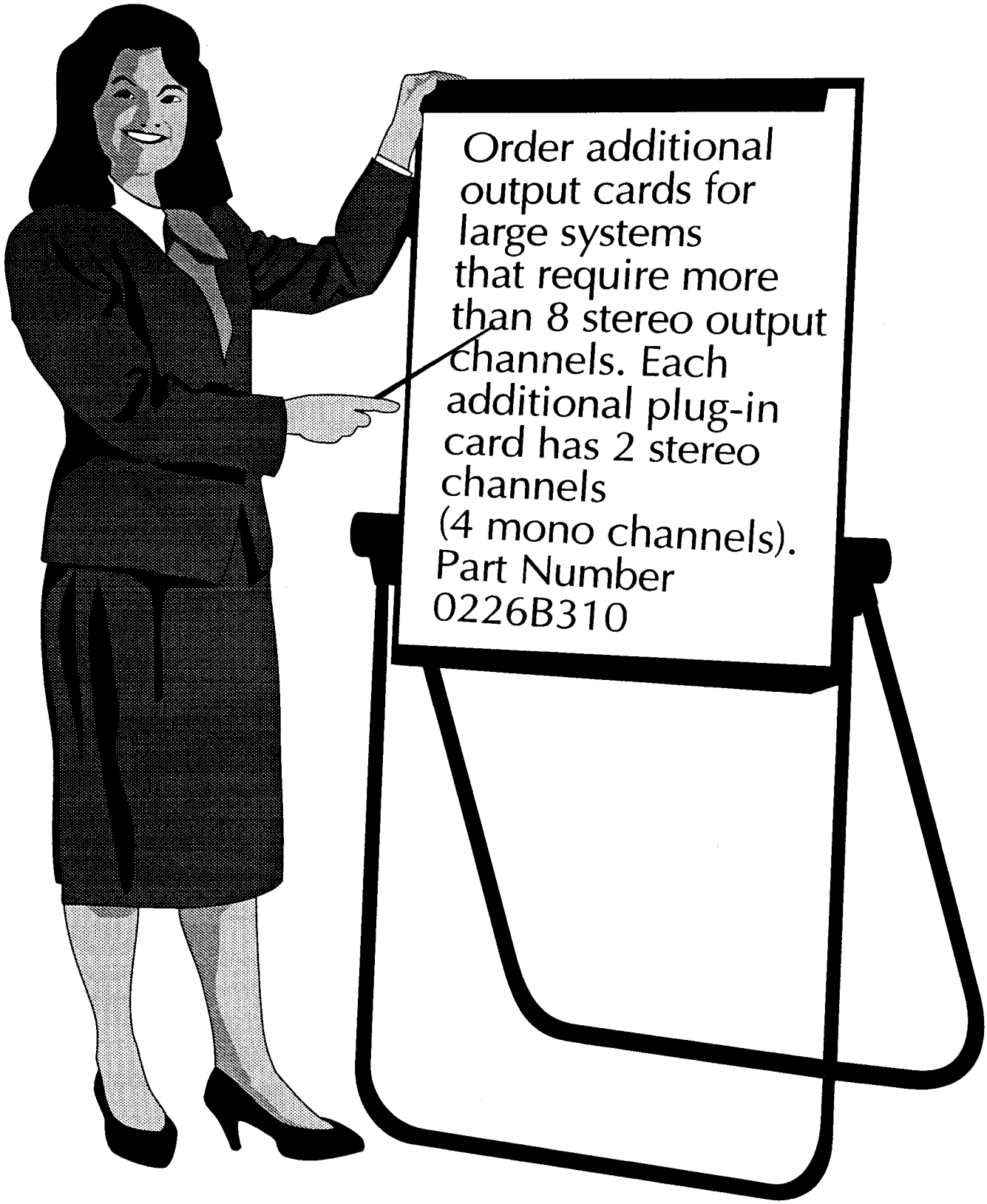
To install the new card, remove the Entrelec connector on the back side of the DA226 chassis that has the input audio source connected to it. Remove the front panel and pull the old card. Put the new card in the first slot and push until it clicks into the mother board connector. Replace the Entrelec connector while holding the new board at the front. Replace the cosmetic front cover of the DA226.

The DA26X700 is factory adjusted for a 1.5:1 compression ratio. This is a good setting for most high quality CD or cassette material. The product is not sensitive to input level and, therefore, no input adjustment pot is provided. Rotating the "Program A COMP. RATIO" clockwise will increase the compression ratio to a maximum of 2:1. This is a great deal of compression that may make music sound "squashed" with little dynamic range from the soft passages to loud passages. Rotating the compression ratio pot counterclockwise will decrease the compression ratio to a minimum of 1.2:1. When the board is installed the arrow in the pot will appear to be at your 9 o'clock position.



The DA226 Audio Distribution Amplifier has 4 audio busses. Two are used for the stereo channels of PROGRAM A and 2 busses are used for stereo channels of PROGRAM B. The pots to control PROGRAM B levels are linear and any adjustment will affect the level of all output cards on its respective buss. This scheme is identical to the input section of the standard input card. The dual channel compressor is only available on the PROGRAM A channels for stereo use. The limiter/compressor circuit is designed to "track" between the LEFT and RIGHT signals for stereo applications. The LEFT channel knows when there is audio on the RIGHT channel and will equally compress the channels simultaneously to avoid a shift in stereo perspective.




Order additional output cards for large systems that require more than 8 stereo output channels. Each additional plug-in card has 2 stereo channels (4 mono channels). Part Number 0226B310