FMX®
STEREO

INOVONICS QUICK INSTALL PROCEDURE

The Inovonics 705 FMX Stereo™ generator is intended to replace your existing stereo generator. It does not replace or preclude the use of your existing audio processing. Once the installation is complete, A/B comparisons between your present system and your system with FMX stereo should result in no audible difference when monitored on Non-FMX receivers.

These instructions were written with the understanding that "down time" is never convenient and adjusting equipment while the station is "off the air" is trying at best. We therefore offer a method with a "down time" requirement of 1 to 3 seconds. The time required to exchange BNC coaxial cables on your present composite audio line.

The Setup procedure entails 4 steps. All adjustments are located on the front panel of the Inovonics 705 FMX Stereo generator. With these installation techniques the Inovonics 705 can be adjusted to match your current loudness and peak indications, before going on line.

An A/B selector switch installed on the composite line to the FM exciter is invaluable. (See Figure 2.) This allows instant comparisons of your broadcast signal with and without the Inovonics 705 on line.

Figure 1 shows a typical broadcast equipment chain. Figure 2 shows the same chain configured for an FMX Stereo generator installation. BNC "T" connectors installed at the A/B switch allow both composite signals to be compared while only the original is broadcast. Once the composite levels have been matched then the FMX Stereo generator can easily be switched on air. Quality switches, such as those available through "Black Box", can be operated while on the air with no detectable switching transient heard in receivers.

Each of the following 4 steps for the Inovonics 705 FMX Stereo generator installation will be discussed in detail. This will follow a brief over view of the 705 operation. Refer to Figure 3. A functional diagram of the 705.

1. Set input level (high)

2. Set composite output level

3. Set 19 kHz pilot level

4. Lower Inovonics input audio levels (loudness) to match your existing generator

As can be seen in Figure 3 the input audio level (Left & Right) are followed by an input clipper/limiter this is active when the front panel O-SHOOT switch is on. This clipping activity can be monitored with the Inovonics front panel indicator lights and can also be seen on an oscilloscope monitoring the composite output. This input audio clipping also serves to indirectly limit the composite output with high levels of audio input. (useful in set up).

This input clipping threshold is not directly adjustable. The level of input audio determines the amount of clipping. The input audio level is adjustable on the front panel. The FMX L-R signal injection level is referenced to this clipping threshold. Therefore the FMX injection level is correct when 75 khz of deviation occurs while the input clip lights just turn on.

One dB of input audio clipping serves to lower the amount of FMX injection possible by 1 dB.

Conversely if the composite level adjust is set for 75 kHz deviation with peak input audio 1 dB below the clipping threshold then FMX injection will increase, This excess FMX injection when added to the normal difference channel may cause total modulation to exceed 100%

It can also be seen in Figure 3 that the 19 kHz pilot tone and the FMX Stereo 10 Hz identification tone track with the Composite level potentiometer. The 19 kHz pilot adjust is located on the front panel as a user convenience. The 10 Hz identification tone level adjustment is located internally since variance from 1% injection is not required nor desireable.

The following equipment and cables should be on hand for installation of the Inovonics 705 stereo generator.

MODULATION MONITOR

A standard modulation monitor with the following features;

1. adjustable peak flasher threshold.
2. standard meter functions (left,right, L+R, L-R, total modulation)

FMX signal levels can be checked with your existing modulation monitor or oscilloscope.

OSCILLOSCOPE

Those stations where the modulation monitor is also the studio monitor receiver and all measurements are done "off the air" will require an oscilloscope to monitor composite audio levels out of the stereo generators. The oscilloscope is recommended for all installations however it is not necessary if the modulation monitor can be taken off line and is equipped with a composite input jack.

A/B SWITCH (BNC coaxial connectors)

This switch will be installed in line, at the input to your FM exciter. Its purpose is to easily and quickly select the desired composite audio for broadcast. It helps when verifying various modulation levels during setup and is also useful for easy FMX Stereo compatibility verification. Incidently the switch also provides for quick backup capabilities in the unlikely event that either stereo generator should fail.

CABLES etc.

1. Three coaxial cables with BNC male connectors. These cables should be of sufficient length to allow A/B switching from the front of the equipment rack. This allows for front panel adjustment of the Inovonics 705 along with observation of the modulation monitor and oscilloscope by one person from one location. The impedance of the cables (50 or 75 ohm) does not matter since composite audio signals do not behave as do RF signals.

2. Three BNC "T" connectors. These provide convenient monitor points of the two composite audio signals regardless of the position of the A/B switch. These can be located at the three connectors found on the A/B selector switch. Again at composite audio frequencies these "T" connectors will not act as "tuned stubs". These connectors can possibly present an entry point for RF energy or 60 Hz hum although this has not been a problem with any installations to date.

STATION MONITOR

With any installation of this nature it is advisable to monitor the "on air" audio. This will insure that any "miscues" are immediately detected and not inadvertently ignored until DJ notification etc. Headphones are also advisable where transmitter room noise significantly hinders listening.

Configuring the equipment as in figure 2.

Feed Processed Left and Right program audio into the left and right inputs of the Inovonics 705

Connect composite audio out from the Inovonics to the A input of the A/B switch box.

Connect two more BNC coaxial cables to the B and C positions of the A/B switch box.

Place the Switch Box in position B. During a pause in programing remove your present coaxial cable located between your stereo generator and FM exciter and place the B cable on your generator and the "C" cable on the exciter. (You should now be back on the air with no change in performance.)

Connect the oscilloscope and/or mod monitor to the B line and establish a 100% reference level for your existing stereo generator.

ADJUSTMENT PROCEDURE

With the Inovonics front panel switches in the following positions:

stereo	on
19 kHz pilot	on
FMX Stereo	off
O-/shoot	on
Pre-emphasis	off (if provided by audio processing)

1. Set the Left and Right input controls in the Inovonics 705 for heavy clipping. The "duty cycle" of the lights should appear to be 90% or more. The channel balance is not critical at this time but have them close, "within a turn or so". This should yield an easily recognized peak level of the composite as seen on the oscilloscope.

2. Set the composite output to match the peak indications of your existing stereo generator. The peaks will be much more frequent due to the above input level settings on the Inovonics but they should not be higher. This can be verified on a mod monitor if the peak flasher is set 1% above its highest peak reading level.

3. The pilot Level should now be close to 9% since it tracks the composite level control. You may set the pilot level to that which you currently use minus 1%. That 1% being taken by the 10 Hz FMX Stereo identification tone. We recommend the following:

90%	audio
9%	19 Khz pilot
1%	FMX Stereo 10 Hz ID tone
100%	Total Modulation

4. Lower the Inovonics left and right channel input level controls until the peak readings match in frequency. This also matches loudness or modulation density. The input clip (green) and O-shoot (red) indicators should both be active during peak program. Channel balance should be checked at this time. Any subsequent change to the input level controls should be followed by a channel balance check. This is particularly true for FMX operation as off center mono program increases unnecessary stereo channel loading.

Note on Inovonics O-shoot indicators: For loud program they may appear to have a 50 % or greater duty cycle. The persistence of the human eye exaggerates the amount of clipping. Clipping should not exceed more than 1/2 dB to achieve equal loudness with your existing stereo generator.. This should not produce audible clipping distortion.

Switching FMX on should cause no increase in the modulation monitor peak flasher activity.

The 10 Hz FMX Stereo ID tone can be seen in the L-R channel at -40 to -43 dB when no audio program is present.

For light processing or soft stereo passages an increase in the L-R channel of the modulation monitor can be noticed during FMX operation. With loud programing little or no difference will be see in the L-R channel.

Installation is now Complete. switching from generator to generator with FMX Stereo "on" or "off" should not be audible in standard FM receivers. The benefits can clearly be heard in FMX Stereo receivers.

Black Box A/B switches are available through:

Black Box Corporation
P.O. Box 12800
Pittsburgh, PA 15241

Description	Order code	Price
BNC coaxial connector switch	TJ-SW550A	$69.00

To order: (412) 746-5530

For Technical support: (412) 746-5565

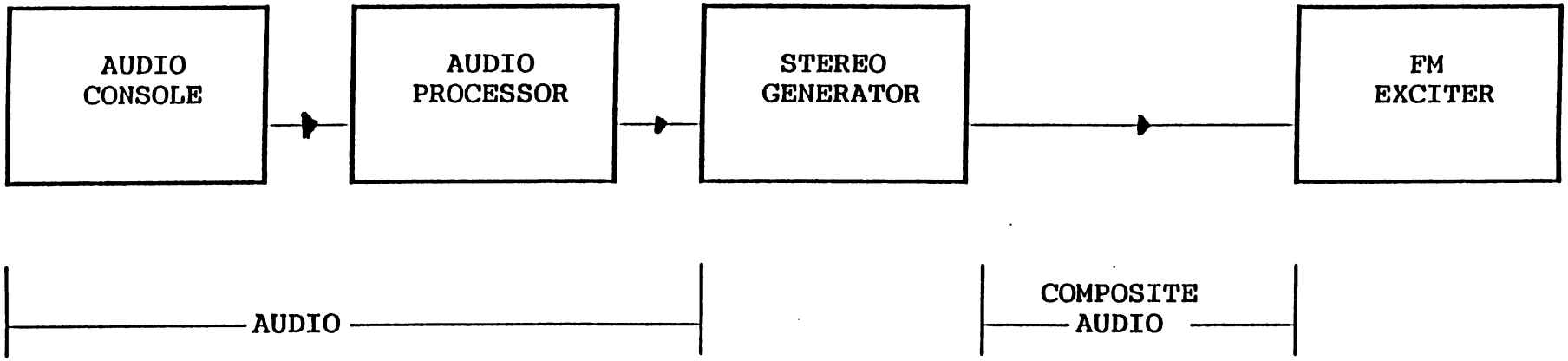

Figure 1. BLOCK DIAGRAM BROADCAST EQUIPMENT CHAIN

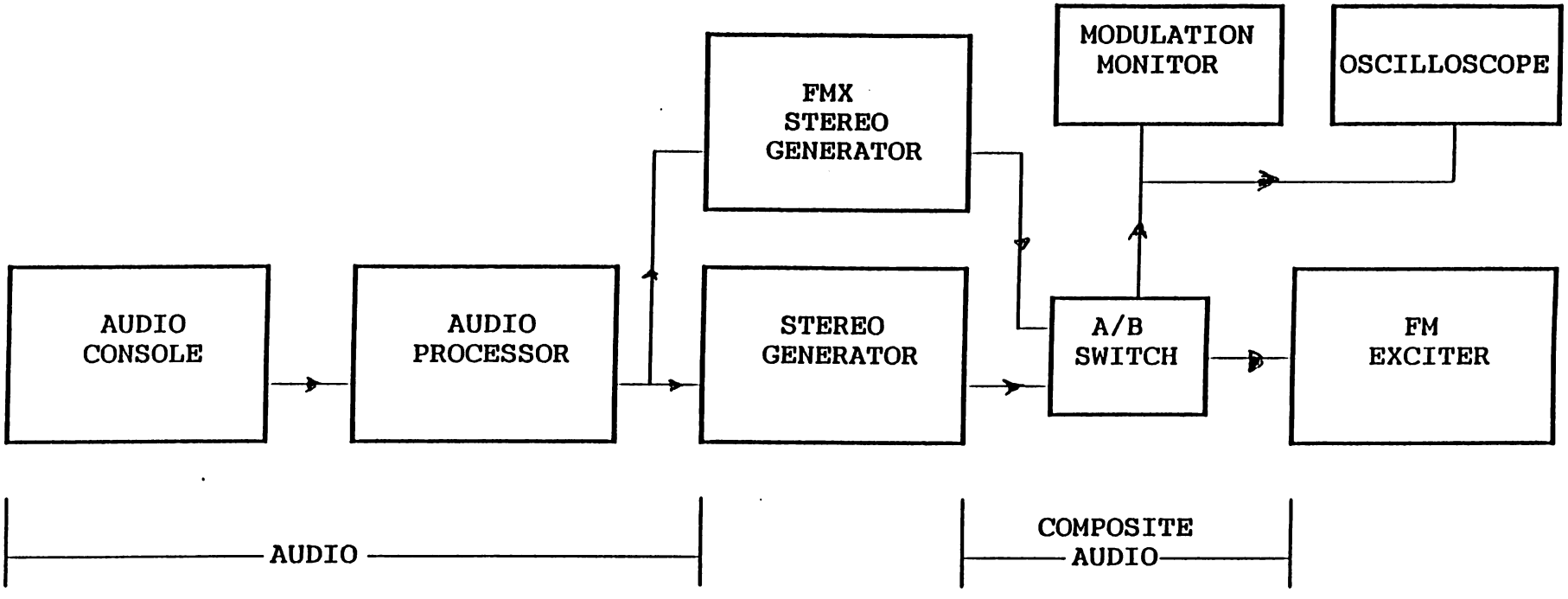

Figure 2. BLOCK DIAGRAM BROADCAST EQUIPMENT CHAIN

FMX STEREO CONFIGURATION

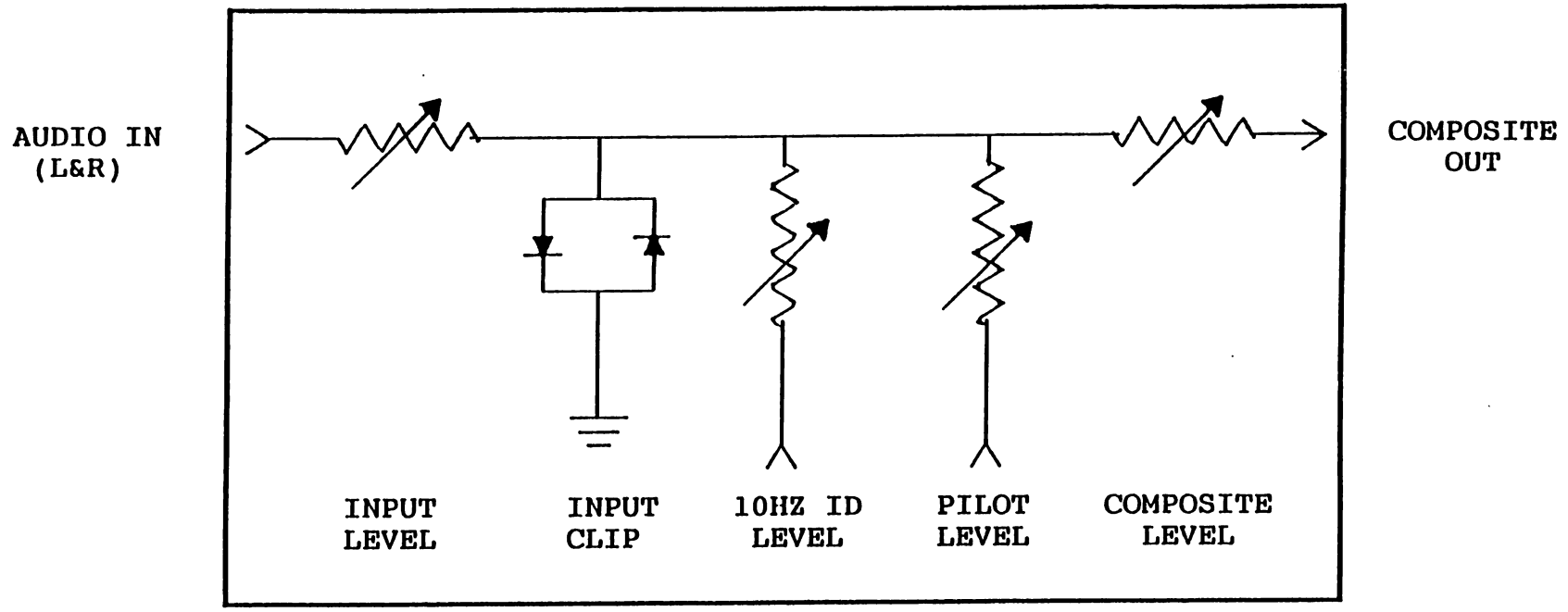

Figure 3. INOVONICS 705 FMX STEREO GENERATOR
(functional diagram of setup adjustments)

** LIST OF MATERIALS **

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DRAWING NO.

ITEM	SCHEMATIC DESIGNATION	PART NO.	COMPONENT DESCRIPTION & MFG.'S CODE	QUAN. USED	REMARKS
1		187500	Chassis	1	
2		185100	front panel	1	
3		187400	Suprise panel	1	
4		185200	Door	1	
5	X	2908	Handels	2	
6		450050	1/2" Spacers Hex #4	8	
7	X	410031	5/16" flat head #4 screw	8	
8		401025	1/4" phil pan head screw #4	21	
9	X	451200	2" spacer hex #4	4	
10	X	451125	1 1/4 ? spacer hex #4	4	
11		411050	#4 Button head screw	1	
12		999000	Small Bracket Keystone	5	
13	X	450087	4-40 X 7/16 Spacer	4	
14		450037	4-40 X 3/8 Spacer	4	
15		601025	6-32 X 1/4 phil pan screw	16	
16	X	401050	4-40 X 1/2 phil pan screw	2	
17	X	100050	#10 X 1/2" phil pan screw	2	
18		187600	Top / Bottom Cover	2	

USED ON MODEL NO.: 706 ASSEMBLY NO.: Chassis

INOVONICS, INC.
CAMPBELL, CALIFORNIA

** LIST OF MATERIALS **

PAGE ____ OF ____ | DRAWING NO.

ITEM	SCHEMATIC DESIGNATION	PART NO.	COMPONENT DESCRIPTION & MFG.'S CODE	QUAN. USED	REMARKS
19		621025	#6X32 Hex nut	2	
20		421025	#4X32 - Hex nut	1	

USED ON MODEL NO.:_____ ASSEMBLY NO.:_____

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