OPERATING AND MAINTENANCE

INSTRUCTIONS

MODEL SMX100

HIGH POWER SOLID STATE AMPLIFIER

DOCUMENT NUMBER
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SERIAL NUMBER

Prepared by:

Instruments for Industry
903 South Second Street
Ronkonkoma, NY 11779
Phone: 631 467-8400
Fax: 631 467-8558
Email: info@ifi.com

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SECTION 1.0

INTRODUCTION

Congratulations on the purchase of your new Wide Band Amplifier from Instruments For Industry, Inc. Your new Wide Band Amplifier incorporates the finest advancements in state of the art solid-state electronics technology available in a compact, portable and versatile package. Your Wide Band Amplifier's quality, performance and trouble free operation depends on you thoroughly reading through this manual and familiarizing yourself with its proper operation and usage.

Your Wide Band Amplifier comes with the following accessories, be sure to check your packaging for the items listed below before disposing of the packaging.

CONTENTS

(For a typical Wide Band Amplifier)

Quantity	Description
1	High Power Wide Band Amplifier, P/N SMX100
1	MS AC Connector
1	Operation and Instruction Manual, Doc. No. SMX100MAN
1	Amplifier Data Sheets (Included in this Manual)

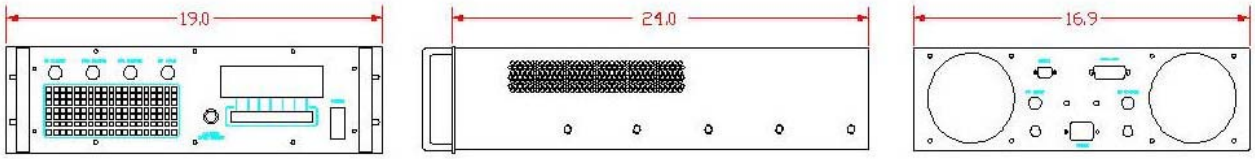


FIGURE 1.0
SMX100 ILLUSTRATION

SECTION 2.0

GENERAL DESCRIPTION

The Instruments For Industry, Inc. (IFI) manufactured SMX100 Wide Band Amplifier is a Bench Top or rack mount amplifier providing 100 Watts of RF power from 10 kHz to 1000 MHz. The SMX100 incorporates two frequency bands of operation identified as Band 1 and Band 2 which provides the operator easy frequency band switching without changing the RF Output connections. The Band 1 frequency range is 10 kHz - 220 MHz with Band 2 frequency range being 200 MHz to 1000 MHz. The minimum saturated output power over the entire operating frequency range is typically more than 100 Watts.

The SMX100 features a Liquid Crystal Display (LCD) that displays continuous forward and reflected power in four digit metering. The display also scrolls to provide the operator with operating status and self-diagnostic fault indications.

The SMX100 is unconditionally stable and incorporates protection circuits that monitor and control the VSWR input and outputs so the amplifier cannot be damaged by any mismatched load.

The SMX100 may be equipped with an optional IEEE-488 BUS interface, which allows the amplifier to be remotely controlled through the use of as computer and a GPIB BUS, refer to Section 7.0 for details.

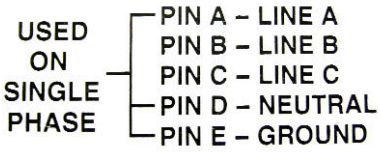
IFI recommends all interface cables used be shielded and communication cables like IEEE, RS232 etc. be shielded and less than 3 meters.

2.1 AC Connection and Set-Up

If your amplifier is equipped with a MS Connector for a power connection, the following instructions will assist a qualified technician to wire the supplied mating MS Connector.

Determine whether your amplifier is Single Phase or Three Phase by locating the Serial Number Label and noting the Phase (PH) identification. The Serial Number Label is located on the rear panel of the amplifier.

Located near the Power Connector is a wiring illustration as pictured below. If the unit requires Three Phase wiring, all pins illustrated are utilized, if the unit requires Single Phase, only the Pins identified with the "Used on Single Phase" lines are utilized which are Pins A, D and E.



Note 1: Pin letters are case sensitive, should the provided connector contain lower case letters, use only the upper case letters as shown.

Note 2: Wiring should be performed by qualified personnel and in accordance to applicable electrical standards using the appropriate wire colors, size and current considerations.

SECTION 3.0

WARRANTY INFORMATION

Instruments For Industry, Inc. (IFI) warrants each product of its manufacture to be free from any defect in material and workmanship for a period of three years from shipment to the original purchaser. All warranty returns, however, must first be authorized by our factory office representative. Refer to the Service Section for information on how to return items for warranty repair.

Warranty liability shall be limited to repair or replacement of, or part thereof, which proves to be defective after inspection by IFI. This warranty shall not apply to any IFI product that has been disassembled, modified, physically or electrically damaged or any product that has been subjected to conditions exceeding the applicable specifications or ratings.

IFI shall not be liable for any direct or consequential injury, loss or damage incurred through the use, or the inability to use, any IFI product.

IFI reserves the right to make design changes to any IFI product without incurring any obligation to make the same changes to previously purchased units.

This warranty is the full extent of obligation and liability assumed by IFI with respect to any and all IFI products. IFI neither makes, nor authorizes any person to make, any other guarantee or warranty concerning IFI Products.

SECTION 4.0

GENERAL INFORMATION

4.1 SCOPE OF THIS MANUAL

This manual is intended to inform a qualified transmitter operator or technician of the normal operating and maintenance procedures for the SMX100. It is not intended to be a course of instruction for unqualified personnel.

4.2 GENERAL SPECIFICATIONS

The specifications listed below represent the minimum performance characteristics at the time of delivery.

SPECIFICATIONS

Frequency Response:
- Band One: 10 kHz - 220 MHz
- Band Two: 200 MHz - 1000 MHz

Power Output:	Minimum 100 Watts
AC Source:	115 VAC, 50/60 Hz, Single Phase
Power Gain:	50 dB
Input Impedance:	Nominal 50 Ohms unbalanced
Output Impedance:	Nominal 50 Ohms unbalanced
Input Signal Levels:	< 0 dBm (1.0 mW) See data sheet for specific input drive levels
Harmonic Distortion:	-20dBc @ 60W
Duty Cycle:	CW
Spurious:	-50dBc

4.3 PROTECTION CIRCUITS

The SMX100 is designed with a variety of protection circuits to provide safeguards for the amplifier should any adverse electrical conditions occur or if the amplifier accidentally experiences operator deviation of the design application. Listed below are the safeguards built into the SMX100.

4.3.1 Over Heat Protection

The SMX100 critical components are mounted to heat sinks, which are, in turn, air cooled by four fans. Should an over heating condition occur, either through component failure or by a restricted airflow, the SMX100 contains heat sensors that will shut down the system. As a result, the air inlet and outlet openings should be free of obstructions for proper cooling of the amplifier. Operation is restored automatically when the amplifier cools to normal temperature levels.

4.3.2 Input Protection

The SMX100 is designed to operate with less than a 0 dBm (1.0 mW) input signal however, to prevent overdriving the amplifier, the Input Protection circuit will activate if the input signal exceeds 3 dBm (2.0 mW) and will automatically compensate for the increased input signal by reducing the gain of the preamplifier. Even though the amplifier has an Input Protection Circuit, overdriving the amplifier is not recommended; refer to paragraph 5.1.2 for more details.

4.3.3 Output Protection

The SMX100 incorporates a microprocessor controlled Output Protection Circuit which monitors the Forward Power Meter indication and limits the output power. This feature protects the amplifier from being over driven and causing damage to the power transistors.

It is important to note that this feature only operates when the Forward and Reverse Sample Ports on the amplifier have 50 Ohm Terminations installed.

IMPORTANT NOTE:

The SMX100 Sample RF Output connector must be terminated with the supplied 50 Ohm load if the output is not being used. Should the SMX100 be operated without a termination on the Sample RF Output connection will jeopardize the accuracy of the metering and output protection; which are based on the Forward Power Readings, which may result in damaging the amplifier and voiding the unit's warranty.

4.3.4 Power Supply Faults

The Power Supply Fault circuit monitors the 28 VDC, ± 12 VDC and 5 VDC power supplies and produces a fault indication should any voltage level deviate from normal operating parameters. Each power supply voltage output is monitored and displayed to indicate the power supplies are operating within design parameters. Some units may have Green Status LED Indicators in addition to the Controller Display. Should any power supply voltage deviate from the design parameters, the corresponding power supply fault will be displayed

4.3.5 Mismatch Protection

The SMX100 is designed to operate with a tuned 50 Ohm load and should any mismatching of the 50 Ohm load occur, the Reverse Power, also called Reflective Power, will increase producing a high VSWR. The SMX100 microprocessor monitors the Reverse Power levels by utilizing a Dual Directional Coupler and begins to turn down the gain of the preamplifier when the Reflected Power exceeds 40%. The Reverse Power is also displayed on the LCD Display for operator monitoring for any mismatched load.

4.3.6 Short Circuit Protection

The SMX100 utilizes three different power supply voltages, + 28 VDC, ± 12 VDC and the + 5 VDC, each of the power supplies are designed with a short circuit and overload protection device.

4.4 STATUS INDICATORS, CONTROLS AND CONNECTORS

The SMX100 has various controls and status indicators, which are identified below and can be visually located on Figure 1.0, SMX100 Illustration and Figure 2.0, SMX100 Rear Panel Illustration. A narrative description for the function and purpose of each control and status indicator is provided within paragraphs 4.4.1 and 4.4.2.

SMX100 RF AMPLIFIER

Front Panel:

Local/Remote Switch
Amp ON / OFF Switch
Operate / Standby Switch
Fault/Reset Switch
LCD Status Display
Control Level Adjust Knob
RF Input, N Type, Female
RF Output, N Type, Female
FWD Sample Port, N Type Female

Rear Panel:

AC PWR, IEC Power Connector
ALC INPUT, BNC Type (Optional)
INTERLOCK, BNC Type (Optional)
IEEE-488, Connector

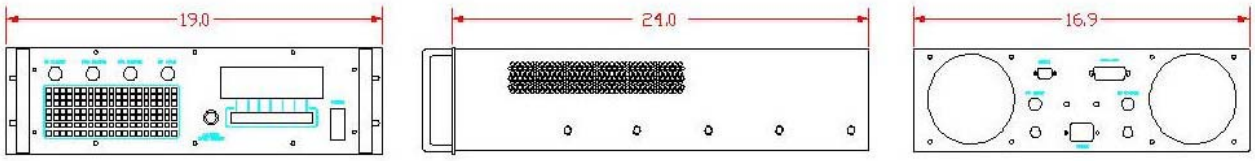


FIGURE 2.0
SMX100 REAR PANEL ILLUSTRATION

4.4.1 SMX100 PANEL STATUS INDICATORS

INDICATOR	FUNCTION
FAULT INDICATOR	The Fault indicator displays a fault when either a Thermal, Power Supply or Module Fault occurs on Front panel display. Some units may have Green Status LED Indicators in addition to the Controller Display. A Thermal Fault occurs when the amplifier is operating outside design temperatures. Should an excessive temperature condition occur, the +28 VDC Supply is shut down and a Power Supply fault is indicated. Once the thermal condition returns to the operational limits, the +28 VDC Supply will activate. A Power Supply Fault is displayed when the +28 VDC Power Supply voltage shuts down.
Hi VSWR	When the Hi VSWR fault is displayed; the amplifier is subjected to a condition where the Reflected Power exceeds 40%. The microprocessor turns down the gain of the preamplifier and displays the Reverse Power on the LCD Display.
RMT /LCL	When remote displays on the front panel the amplifier is in the remote control mode of operation via the IEEE-488 GBIP Bus. The address selection can be done through the front panel using the Control Knob. Follow instructions on the LCD display.
TOTL/OPRT HOUR	Elapsed time Indication on the LCD display, presents total hours of the amplifier or operate hours that it has been energized.

4.4.2 SMX100 CONTROLS

CONTROL	FUNCTION
Local	When depressed, the amplifier is restored to the local control from the GPIB mode of control.
ALC Switch **(Option)**	The optional Automatic Leveling Control (ALC) is a feature, which selects the method for leveling, either internal, external or manual.
Power ON/OFF	The Power On/Off switch is a circuit breaker that is used as an On/Off switch as well as a circuit protection device. This switch turns the driver either on or off.
Control Level Adjust Knob **(Option)**	The optional Level Adjust control is a ten-turn pot, which allows a minimum of a 30 dB range of gain. Turning the control Counter Clockwise (CW) produces a minimum gain. **Important Note:** If the amplifier is not equipped with this option, the display will still indicate a GAIN percentage (refer to Figure 5.0). This percentage indication is still controlled by Level Adjust Control but the both the Level Adjust Control and the corresponding GAIN percentage indication has no effect on the amplifier gain.
FLT/RST	The Reset/Fault (FLT/RST) is a reset switch that resets the fault indication. If a fault indication is present, the fault indication can remove the by depressing this switch.
OPR/STB	The Operate/Standby (OPR/STB) switch which when the switch is set in the Standby mode, the Power Supply is turned off to the amplifier circuitry. When set in the Operate mode, the Power Supply delivers voltage to the amplifier circuitry.
BAND 1/BAND 2	The Band 1/Band 2 (B1/B2) switches the frequency bands of operation. This switch allows frequency band switching without changing the RF Output connections. The Band 1 frequency range is 10 kHz - 220 MHz with Band 2 frequency range being 200 MHz - 1000 MHz.

4.5 OPERATING INSTRUCTIONS

4.5.1 Power On

FIGURE 3.0 – FRONT PANEL DISPLAY (START-UP MENU)

Apply power to the unit using the front panel ON/OFF switch. When the circuit breaker or AC Power On switch is energized, the above menu will be displayed after the Microprocessor (MPU) booting cycle has completed. This menu displays the company information, the amplifier model number and serial number along with the firmware version used. The Start-Up menu will be replaced by the Operate Menu after about 5 seconds or the operator my elect to bypass the Start-Up Menu by pressing the CONT button.

From this menu, the GPIB ADDRESS (GPIB ADDR) Number can be entered.

4.5.3 - Entering the GPIB Address

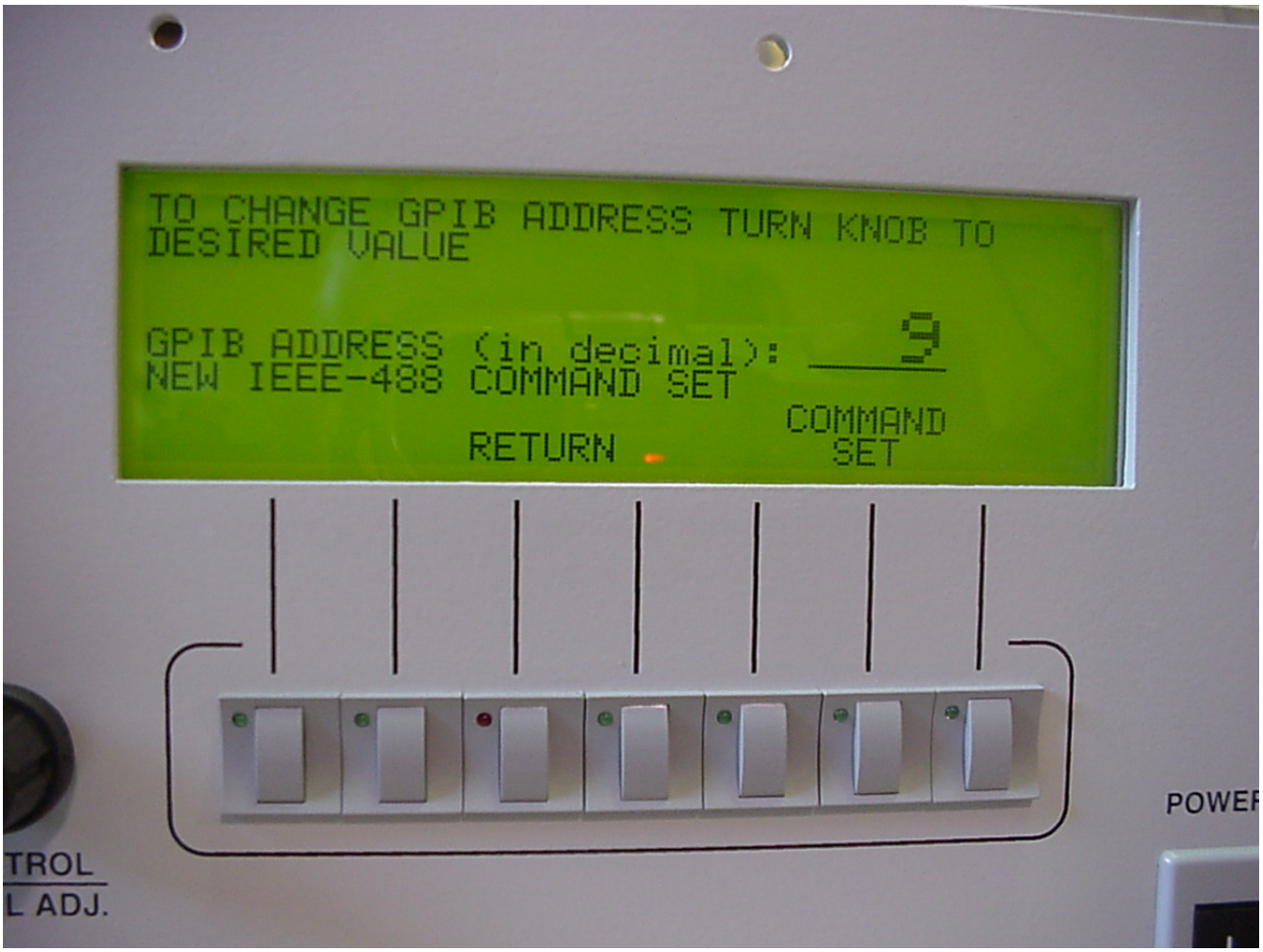


FIGURE 4.0 - GPIB ADDRESS MENU

From the START-UP Menu in Figure 3.0, press the button located under the GPIB ADDR indication on the display. In this screen, Figure 4.0, the GPIB Address is entered by dialing in the desired number using the Control Level Adjust knob and pressing the RETURN button. The START-UP Menu in Figure 4.0 will be displayed after pressing the RETURN button.

Wait approximately 5 seconds (or press the Continue (CONT) button) for the Main Menu, as seen in Figure 3.0.

4.5.4 Turning ON the Amplifier

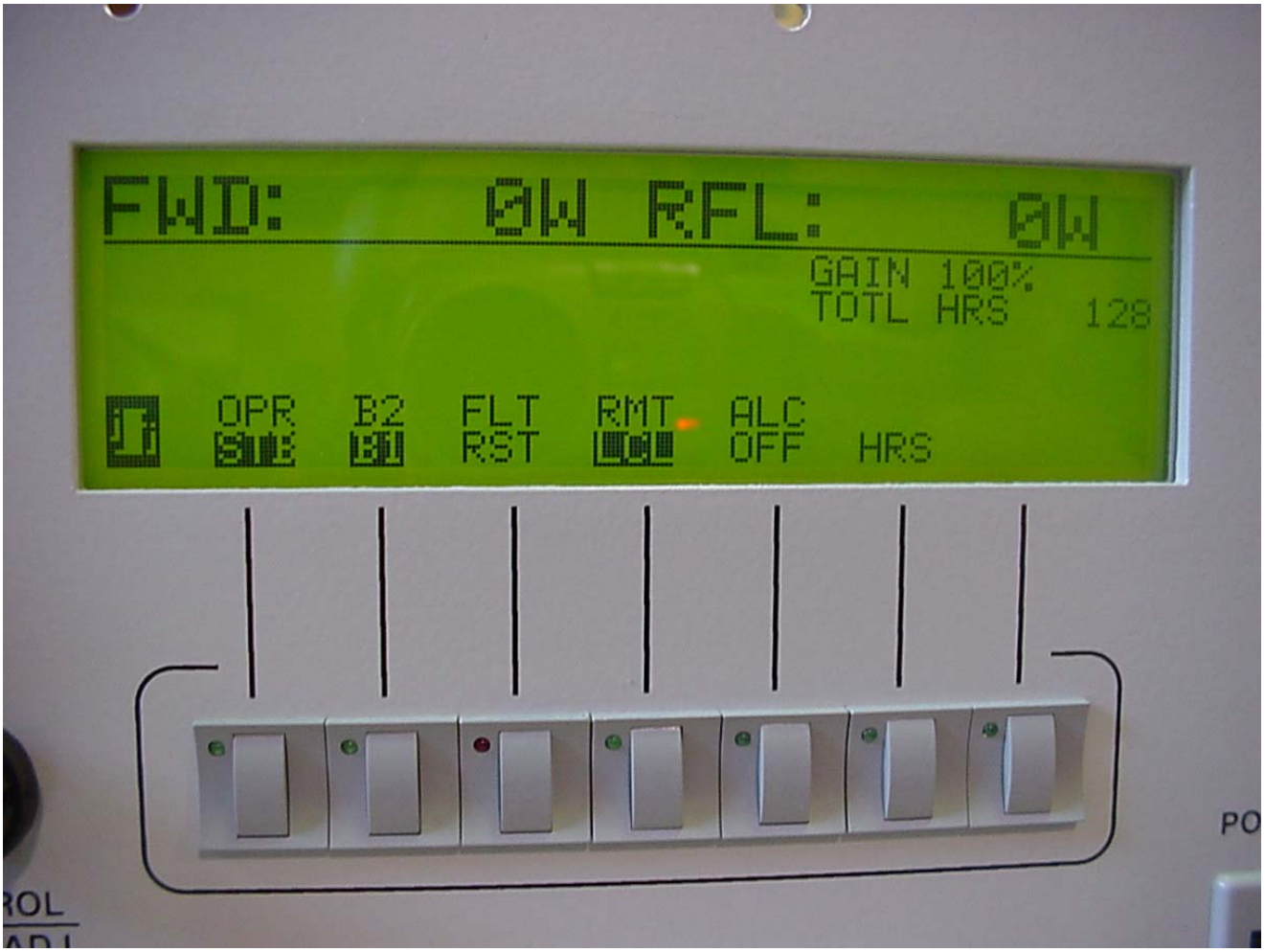


FIGURE 5.0 – MAIN MENU AND STATUS DISPLAY (Typical)

The amplifiers status can be monitored using the Main Menu. The Gain (GAIN), Total Hours (TOTL HRS), Operating Hours (OPRT HRS), Forward (FWD) and Reflected (RFL) statuses are continuously displayed.

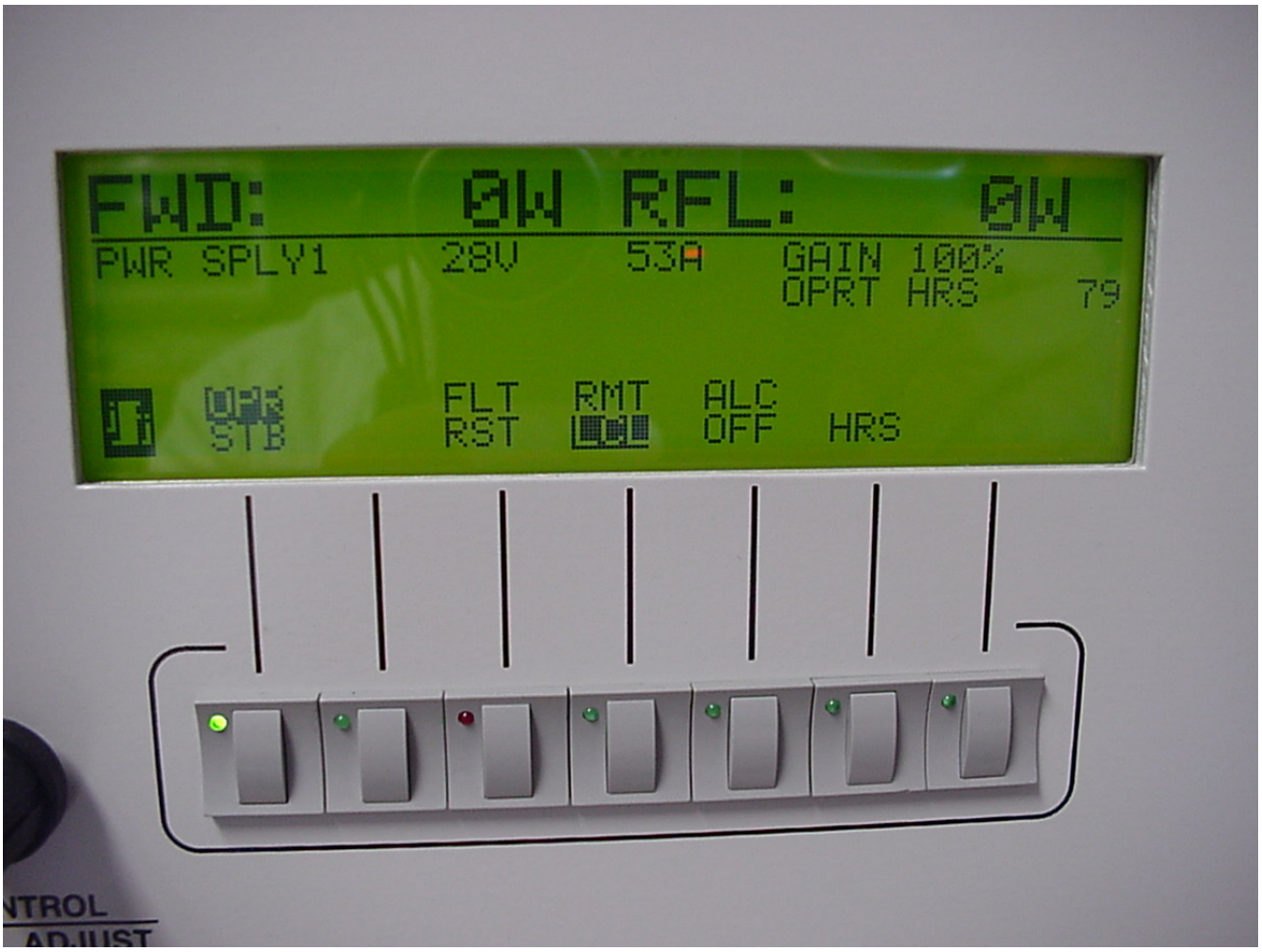


FIGURE 6.0 – TURNING ON THE AMPLIFIER (Typical)

1. From the MAIN MENU in Figure 6.0, press the button located under the Operate/Standby (OPR/STB) indication on the display. Place the unit in Operate (OPR) mode. At this mode the AMPLIFIER will be turned ON.

2. The display will show the Main DC power supply Voltage and current as per AMPLIFIER operating data sheet (enclosed in the manual).

4.6 DATA SHEETS

Provided with each SMX100 are specific Amplifier Data Sheets measured from the amplifier using a calibrated 50 Ohm Pad to assist the operator in maximizing the performance of the Wide Band Amplifier.

The Amplifier Data Sheets are provided with each amplifier exhibiting the actual metering indication required to produce rated power output as indicated on the data sheet. The actual metering values were derived by measuring the power output of the amplifier using a calibrated Power Meter and a calibrated 30 dB Attenuator Pad by inducing an appropriate input signal level to obtain rated power output. Once the appropriate signal level has been determined to obtain the desired power level, the actual Front Panel Metering Indication correlates to that power level.

The amplifier data sheets provide the operator with the over all frequency response of the amplifier in perspective to the amplifier operating frequency ranges. The amplifier data sheets provide the operator with the actual gain of the amplifier over the frequency band.

The Amplifier Data Sheets are located within Appendix A

SECTION 5.0

PRINCIPLES OF OPERATION

5.1 PROPER USAGE AND WARNINGS

5.1.1 Controlling Power Output

With a nominal 50 ohm resistive load and an input signal appropriate to produce a power output within the limitations specified above, the amplifier may be placed in operation. To interrupt the output, simply interrupt the input signal or increase the input attenuation setting to produce commensurate output level reduction. The amplifier may be run indefinitely at rated output. Output power is usually measured with a power meter and suitable power attenuators.

5.1.2 Input Signal Levels

The SMX100 is designed to operate with less than a 0 dBm (1.0 mW) input signal however, to prevent over driving the amplifier, the Input Protection circuit will activate if the input signal exceeds 3 dBm (2.0 mW) and will automatically compensate for the increased input signal by reducing the gain of the preamplifier.

It is not advisable to overdrive any amplifier and depend on protection circuits to maintain proper gain control. IFI makes available with each shipped amplifier, specific amplifier data so the operator will know the proper input signal levels to more efficiently operate the amplifier. Refer to the test data sheets information located in Paragraph 4.6 herein.

5.1.3 Sample RF Output Cautions

The SMX100 Sample RF Output connector located on the rear panel must be terminated with the supplied 50 Ohm load if the output is not being used. Should the SMX100 be operated without a termination on the Sample RF Output connection, the lack of loading will jeopardize the accuracy of the metering and output protection; which are based on the Forward Power Readings.

Important Note: If the amplifier is operated without the 50 Ohm termination, damage to the amplifier may occur which would void the units warranty.

5.2 FEATURES OF THE SMX100 AMPLIFIER

The SMX100 amplifier is intended for applications requiring high gain and power output to 100 Watts, over a wide range of frequencies, without tuning adjustments. The SMX100 amplifies an input signal source over the frequency range from 10 kHz to 1000 MHz and at a minimum gain of 50dB dB.

The SMX100 is an integrated system with band switching capability for the frequency range required for operation. With the SMX100 in Low Band (BAND 1) mode of operation, the input RF signal is directed by RF Relays to the Band 1 PA and Driver section which in then to the output. With the SMX100 in the High Band (BAND 2) mode of operation, the input signal is directed by RF Relays to the Band 2 PA and Driver section which in then to the output. Both bands utilize only one input and output connector with the signal routed internally by RF Relays. Refer to Figure 7.0, SMX100 Schematic Diagram for an illustration of the SMX100 circuitry.

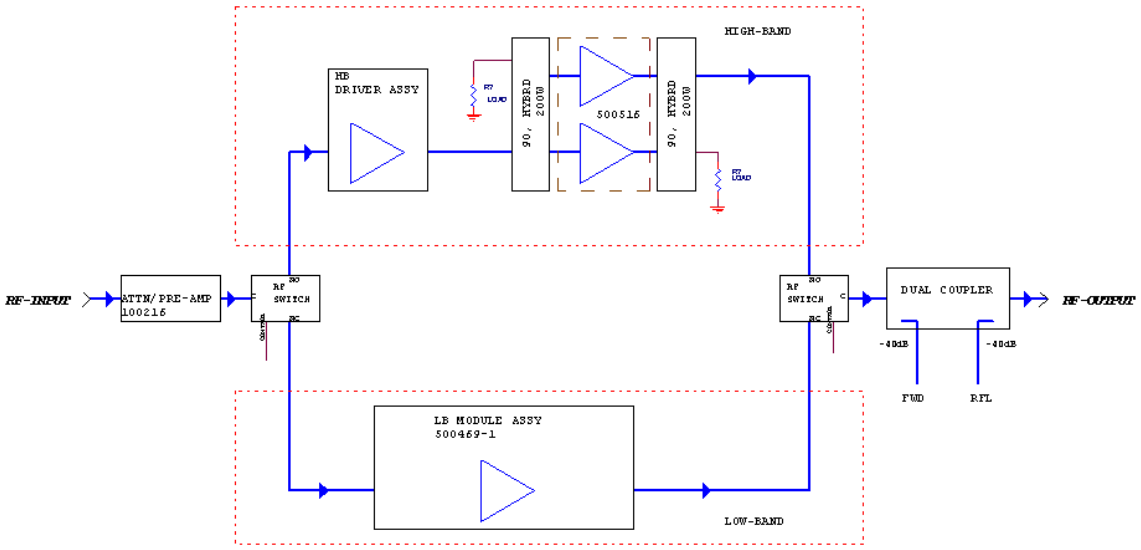


FIGURE 7.0
SMX100 SCHEMATIC DIAGRAM

5.2.1 Preamplifier or Optional Preamplifier/Attenuator

The SMX100 amplifier has a preamplifier with approximately 10dB gain; which is powered from an independent low voltage power supply.

If the amplifier is equipped with the Optional Preamplifier/Attenuator, it provides the amplifier with remote level control and leveling capability over the entire operating frequency range. With the front panel level control set at maximum output it has a nominal 4 dB gain and can be adjusted with the front panel level control over a greater than 30 dB range.

5.2.2 Power Amplifier - continued

This amplifier consists of four amplification sections, the final stage having four cascaded high-power, push-pull devices operating in parallel and combined through a transmission type impedance transformer.

5.3 MANUAL LEVEL CONTROL (Option)

Manual level control is accomplished by adjusting the front panel ten-turn potentiometer, located on the power supply control unit, to a reference voltage setting between 0 to 5 volts.

5.3.1 Automatic Level Control (Option)

In this mode, the SMX100 serves as the voltage comparator and variable gain stage. It will enable the maintenance of a constant RF voltage vs. frequency at the input to an imperfect load or a virtually constant E-Field at a measurement point in space. For further information regarding the ALC operation, refer to Section 6.0.

5.4 OPTIONAL FEATURES

5.4.1 Interlock Feature

The Interlock Feature is an option for the SMX100 that utilizes an Electro Magnetic Interference (EMI) Testing Room door switch that is mounted to the door in such a manner that when opened, the switch will automatically induce an ordered shut down of the amplifier and produce a STAND-BY MODE indication on the LCD Metering Display. When the door is closed, the amplifier resumes previous testing conditions.

The advantage to this feature is providing an additional safety feature for the growing concerns for potential hazards due to exposure to EMI Fields. With the Interlock option, all Testing Personnel will be protected from accidental exposure to EMI Fields. Should the operator desire this optional feature, the amplifier can be returned to IFI for installation. Refer to Section 8.0 for Equipment Return Procedure.

SECTION 6.0

AUTOMATIC LEVELING CONTROL (Optional)

6.1 ALC FEATURES

The Automatic Leveling Control (ALC) switch located on the front panel has three positions, 'INT', 'OFF' and 'EXT'. Described below are the features of each position

Important Note: Figures 5.0 and 6.0 indicates the display for a typical amplifier and the ALC option is indicated however if the amplifier is not equipped with this option, the ALC option will not be displayed.

6.1.1 The 'INT' Position

The 'INT' or Internal position enables the amplifier to automatically level on an RF power level selected by an operator displayed on the Forward Power reading located on the Front Panel LCD display. Using the 'INT' feature, no external sources are required for leveling control and the operator determined power level will be automatically maintained even though the frequency or input signal levels might change. Refer to Paragraph 6.2 for the procedure to operate the amplifier in the 'INT' mode.

6.1.2 The 'OFF' Position

The 'OFF' position enables the amplifier to operate in a passive mode with no automatic features controlling input drive levels or output power levels. In this mode, the operator has full manual control of the amplifier including the input signal gain, frequency and power output. As a result, the operator must be fully knowledgeable of the effects of these variables in relationship to the operating characteristics of the amplifier. With this in mind, the two most important factors are the dB flatness of the amplifier over the operating frequency range and the rated output power of the amplifier.

Depending on the response curve provided on the S21 Parameter Plot for the amplifier flatness, which is located within Appendix A, and the size of the frequency steps of the signal generator can increase or decrease the power level by as much as 4 dB. This is the result of the design tolerance of the amplifier to operate within a ± 2 dB over the rated frequency range. A ± 2 dB tolerance means that the maximum deflection from minimum to maximum of the flatness curve can represent a delta change up to 4 dB. With this factor in mind, it is advisable to identify the specific frequencies that represent the greatest change from the nominal 0 dB level and adjust the input signal accordingly in so that the amplifier is not over driven beyond the rated power specification. Taking these precautions will prolong the reliability on the amplifier.

6.1.3 The 'EXT' or External Position

The SMX100 serves as the voltage comparator and variable gain stage. It will enable the maintaining of a constant RF voltage vs. frequency at the input to an imperfect load or a virtually constant E-Field at a measurement point in space.

The front panel, ALC control, switches direct level control from the front panel Level Control potentiometer to the output of a linear comparator. The comparator output level is dependent on the reference input from the front panel Level Control and the input from the aforementioned detected voltage or E-Field. The total gain of the leveling loop serves to maintain the output of the comparator virtually constant and thus maintain the desired test level at the remote detector or remote E-Field sensor.

The 'EXT' position enables the amplifier to automatically control an operator determined power level by means of an external 0.0 to 5.0 VDC reference source connected to the External Source connector. An example of a 0.0 to 5.0 VDC external input would be the output of a LDI or an EFS. Refer to Paragraph 6.3 for procedures on leveling with an external voltage level.

6.2 LEVELING USING THE 'INT' MODE

When in the INT position, no outside controls are required. The only equipment required is a frequency generator and the intended load. The procedure to use Internal ('INT') Leveling is described below:

1) Turn the RF Level Potentiometer fully counter clockwise to Full Attenuation.

2) Set the ALC Switch to the 'INT' position.

3) Set the Signal Generator to the proper input drive level to obtain the desired power level. Identify the desired testing parameters and determine the required input drive levels from the Amplifier Data Sheets provided within Appendix A It is important to determine that sufficient signal drive signal is generated to obtain and maintain the desired programmed power level. An adequate load capable to operate within the power requirements should also be selected.

4) Adjust the RF Level Potentiometer until the desired Forward Power Level is displayed on the front panel LCD display.

5) The amplifier is now ready to sweep a frequency range and automatically maintain the desired power level with no further adjustments required. The power level will be maintained at the operator set level and remain independent of changes to the input frequency or input signal level.

6) When sweeping the frequency range, best results are obtained at a sweep rate that is slower than 500 ms.

6.3 LEVELING USING THE 'EXT' MODE

When operating the amplifier in the External (EXT) mode, it is important to understand that the power output levels are determined by the external voltage reference source. The applicable Amplifier Data Sheets should be reviewed to determine the appropriate drive signal level so that the amplifier does not exceed the specified power output rating. As described in paragraph 6.1.2, due to the flatness curve tolerances at certain frequencies, the rated power output power could be exceeded by an additional 40% and that will jeopardize the longevity of the amplifier. The amplifier should not be over driven and should a particular application require additional power beyond the rated power of the SMX100, contact IFI's Customer Service for additional high powered amplifiers.

Detailed below are specific applications for using the External (EXT) Mode with a variety of external inputs.

6.3.1 Constant RF Voltages Verses Frequency At A Remote Load

With remote detectors suitably rated for power and frequency, the SMX100 provides the means for feeding a mismatched load with constant RF drive voltage over the entire frequency range. Full leveling, at half the SMX100 rated output power, is realizable with most reasonable load variations. Extremely mismatched loads, particularly those presenting near short circuit conditions to the amplifier, will reduce the maximum voltage leveling capability of the system. Load impedance variation from 50 Ohms to an open circuit will permit peak voltage leveling within the VSWR capability of the amplifier. Variations in impedance from 50 Ohms down to a short circuit will rapidly diminish the peak voltage leveling capability toward zero. Amplifier VSWR limitations will, of course, further limit the maximum leveled voltage into mismatched low impedance loads.

To operate in this mode, after selecting the desired band, place the ALC switch in the EXT position. Connect the ALC on the rear panel to the detected output port on the remote detector. Connect the remote detector in series with the SMX100 output and at the input to the load. The system is now ready for operation. Amplitude adjustments can be made with the level control as in manual operation.

NOTE: When the SMX100 is used as a driver for higher power amplifiers, automatic level control can be accomplished in the same manner but at the power and frequency limitations of the driven amplifier.

6.3.2 Leveling On A Constant E-Field Using Sensors

In order to avoid a potential RF radiation hazard condition during these initial set up procedures, it is best to operate on the lowest field intensity range (0 to 3 V/M). It is also advisable to use an initial test frequency less than 10 MHz. This will avoid the complications of reflected fields and room resonances.

The Test Set-Up Procedure, refer to Figure 8.0 for a Typical 'E' Field Leveling set-up

1) Connect the RF Output of the Signal Generator to the RF Input of the SMX100.

2) Connect the RF Output of the SMX100, located on the same panel as the RF Input connector, to the antenna.

3) Connect the ALC Input, located in the rear panel of the SMX100, to the output of the Light Demodulator Indicator, IFI P/N LDI. Refer to Figure 2.0, SMX100 Rear Panel Illustration, for location of the ALC Input.

4) Connect a Light Pipe to the Input of the Light Demodulator Indicator, IFI P/N LDI, and to the LMT output of an IFI 'E' Field Sensor.

Leveling Procedure

1) Turn on all equipment shown in Figure 8.0 and allow a three minute warm-up period.

2) Turn the RF Level Adjust fully clockwise to the maximum gain setting and set the tracking of the EFS and LDI to a suitable input drive level required to obtain a full scale reading.

3) Turn the RF level adjust fully counter clockwise to the minimum gain setting and set the ALC switch to the EXT position making sure that the LDI is properly attached to the ALC port located in the rear of the unit.

4) Turn the RF Level Adjust on the front panel to the desired field level for leveling. The desired level should automatically be maintained within 1 dB for each 20 dB change in the input drive.

5) If the leveling loop should exhibit an unstable condition, vary the RF Signal Generator output until the indication stabilizes and is maintainable.

6) The system is now ready to be tested with a swept analog or stepped frequency input signal. All IFI component blocks shown in Figure 8.0 are capable of operating continuously from 10 kHz to 220 MHz. Extended frequency coverage, over the full range of the unit, can be provided by substituting an EFS-5 for the EFS-1 and adding a second log periodic or ridged horn antenna.

Set a sweep rate that enables good level control with the field gradients encountered in the test room. This may be anywhere from 15 seconds to 2 minutes depending on the field conditions and the bandwidth of continuous sweep. Dwell time, a user determined specification, will also determine the proper sweep or step rate.

7) Electric Null Fields, or E Null Fields, are a phenomena that may be observed when performing a sweep test. In a typical EMI/EMC Set Up where an amplifier and a frequency generator are used to generate an E Field, an E Null Field can be noted when the generated E Field is swept through a frequency range and at certain frequencies the field level will drop. These nulls are due to antenna pattern nulls and/or out of phase reflections from screen room walls or other obstacles that cancel or nullify the generated E Fields at the precise location of the E Field Sensor. This phenomenon is a natural occurrence and can be corrected by temporarily relocating the E Field Sensor with the test sample for those specific noted frequencies where these phenomena occurred.

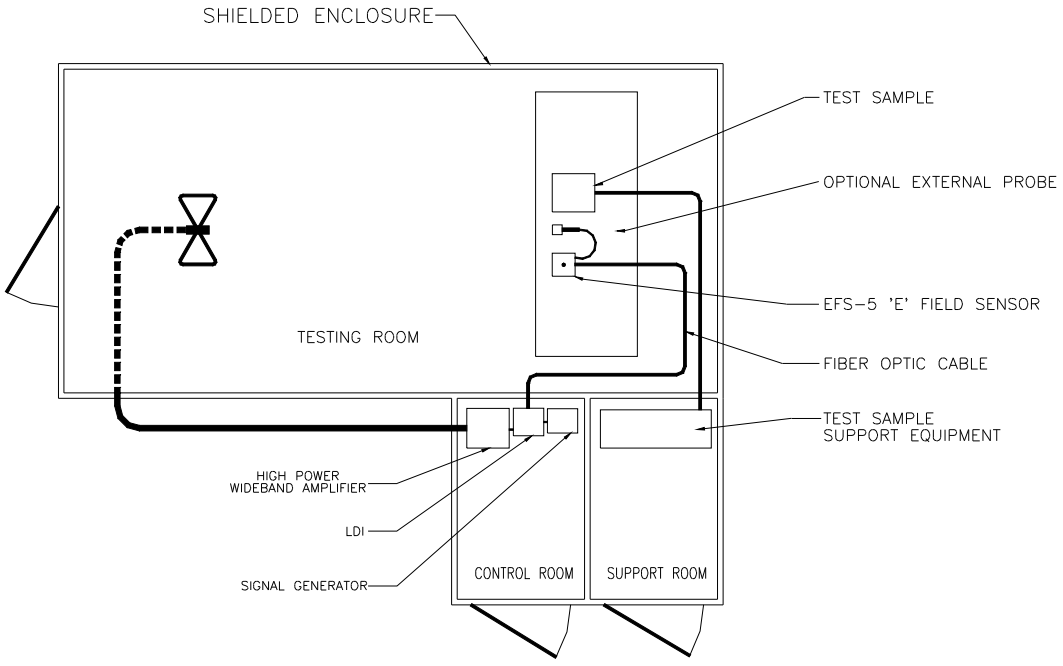


FIGURE 8.0

E-FIELD LEVELING SET-UP

SECTION 7.0

IEEE-488.2 INTERFACE

7.1 INTRODUCTION

The Instruments For Industry, Inc. (IFI) Amplifiers can be operated remotely from a personal computer having an IEEE-488 interface. This interface allows the amplifier to be remotely controlled over the General Purpose Interface Bus (GPIB) by sending commands to the amplifier. Additionally, amplifier status and forward and reverse power readings may be read over the GPIB. All functions can be controlled by coded messages sent over the interface bus via the 24-pin socket connector on the rear panel of the unit. IEEE-488.2 Standard is implemented, which defines the protocols and syntax of commands. The GPIB command codes for the IFI Amplifier series are discussed on subsequent pages and, for ease of identification; the command codes are identified within the text by bold capital characters. For full information on the IEEE protocols and syntax the IEEE-488.2 Standard should be consulted.

7.2 REMOTE INITIALIZATION

When the amplifier receives a command over the GPIB, it automatically switches to REMOTE operation. Pressing the LOCAL key on the front panel returns the unit to normal manual local operation.

7.3 GPIB ADDRESS

The GPIB address of the amplifier is set by via the Front panel using the Control knob at the start up menu.

NOTES ON USING NATIONAL INSTRUMENTS' GPIB CONTROLLERS:
In order for the amplifier to operate correctly with a National Instruments GPIB controller card, the following must be done: (Items 1-5 are done in the IBCONF program.)

1. Set "Terminate reads on **EOS**" to **yes**.

2. Set "Set **EOI** with **EOS** on Writes" to **yes**.

3. Set the **EOS** byte to **0Ah** (an ASCII line feed character).

4. Set "Send **EOI** at end of writes" to **yes**.

5. Set "Enable **repeat addressing**" to **yes** at the board level.

6. When sending command strings to the amplifier, a carriage return character (**0Dh**) followed by a line feed character (**0Ah**), must always be appended to the command, otherwise the amplifier will wait indefinitely for the **CR-LF** combination. If this happens the unit will have to be powered off and back on to reset this condition. (The interface device will automatically assert the **EOI** line during the **LF** if items 2 - 4, above, are set to yes in the IBCONF program.) As an example, when issuing the zero attenuation command using the IBIC or WIBIC program, the command string would look like this: "**ZA\r\n**". (The \r is National Instruments' notation for the carriage return, and the \n is the line feed or 'new line' character.) Notice that the commands are upper case only.

7.4 STATUS COMMANDS

IEEE COMMANDS FOR SOLID STATE AMPLIFIER

CODE	AMPLIFIER FUNCTION
STBY	Standby
OPRT	Operate
RESET	Fault Reset
ATTU	Increase Attenuation [Response with Gain value](optional)
ATTD	Decrease Attenuation [Response with Gain value](optional)

REQUEST STATUS

CODE	AMPLIFIER STATUS
STATUS	STANDBY
	OPERATE
	FAULT
FAULT	DETAILED MESSAGE

REQUEST AMPLIFIER STATUS (POWER AND METERING)

CODE	AMPLIFIER FUNCTION
POWERFWD	Returns Forward Power Value
POWERRFL	Returns Reflected Power Value
PS1V	Returns Power Supply 1 Volts Value
PS1I	Returns Power Supply 1 Current Value
PS2V	Returns Power Supply 2 Volts Value [when applicable]
PS2I	Returns Power Supply 2 Current Value [when applicable]
TOTALH	Returns Filament Hours Value
OPERATEH	Returns Beam Hours Value
BAND1	Selects Band 1 of Operation [In Dual Band units only]
BAND2	Selects Band 2 of Operation [In Dual Band units only]
NOLEV	Selects NO Leveling [Optional]
INTLEV	Selects INTERNAL Leveling [Optional]
EXTLEV	Selects EXTERNAL Leveling [Optional]
ZEROATT	Sets the Amplifier for ZERO Attenuation
FULLATT	Sets the Amplifier for FULL Attenuation
GAIN	Returns Gain Value in percentage
***IDN?**	Returns ASCII response comprising of four data fields in the format <Manufacturer>, <Model>, <Serial Number>, <Firmware Version>
***RST**	Reset Command, Sets the Amplifier to the factory default power up state

NOTES:

1. ALL GPIB COMMANDS AND REQUESTS MUST CONSIST ENTIRELY OF UPPER CASE ALPHANUMERIC CHARACTERS.

2. WHEN SENDING COMMAND STRINGS TO THE AMPLIFIER, A CARRIAGE RETURN CHARACTER **(0Dh)** FOLLOWED BY A LINE FEED CHARACTER **(0Ah)**, MUST ALWAYS BE APPENDED TO THE COMMAND, and OTHERWISE THE AMPLIFIER WILL WAIT INDEFINITELY FOR THE **CR-LF** COMBINATION.

7.5 RS-232 INSTRUCTIONS (Option)

RS-232

Operation of Serial Port on RF Amplifier

1.0 Connect serial port of amplifier to computer using a null modem cable or a standard serial cable with a null modem adapter.

2.0 Use a program such as Hyperterm to communicate with the amplifier. (To reach "Hyperterm" on windows '98 go to Start → Programs → Accessories → Communications → Hyper Terminal. In Hyper terminal double click on


Hypertrm.exe

2.1 Enter a name and choose an icon.
2.2 In the connect using box select "Direct to Com1".
2.3 Click OK.
2.4 Select 9600 baud.
2.5 In Data Bits select 8
2.6 In Parity Select "None"
2.7 In Stop bits select "1".
2.8 In Flow control select "None"
2.9 Press enter.

3.0 The procedure in the paragraph above will set up Com1 to communicate at 9600 baud, 8 bits, and no parity with 1 stop bit.

4.0 Turn amplifier line power ON.

5.0 To place the amplifier in remote operation type in a valid command such as "STATUS". The amplifier will then go into remote operation and the status will be displayed on the computer. Use the same commands as the IEEE 488 interface

SECTION 8.0

MAINTENANCE AND SERVICING

8.1 PERIODIC MAINTENANCE

The only periodic maintenance required on the SMX100 amplifier system is ensuring that the cooling vents are not obstructed in such a manner that the airflow is restricted. Periodic cleaning of the vents may be required depending on the degree of dust in the atmosphere.

8.2 SERVICING THE AMPLIFIER

Servicing of the amplifier by the operator is not recommended. Most of the internal circuitry requires special and unique test instruments to trouble shoot, align and calibrate the circuits. Should servicing be required, refer to Paragraph 8.3.

8.2.1 TROUBLESHOOTING

PROBLEM	***CAUSE***	***SOLUTION***	***COMMENTS***
LCD display blank	No service voltages	Check line power. Check service voltages, +12VDC, -12Vdc, 5VDC	Connect AC line to specified Prime power source. Refer to S/N tag on unit
Amp will not go to Operate mode	Door interlock open,	Check that door interlock BNC connector is terminated with either 50 Ohms or short.	
Power Supply fault	Main Power supply faulty	Check either for 28VDC for Band 1, or 13VDC for band 2	Check on the LCD display for the fault description.
Thermal fault	Over-heating	Make sure airflow is adequate and ambient temperature within the limit.	
Meter Inaccuracy	Un-terminated Forward and/or Reverse Sample Ports	Use 50 Termination on Forward and Reverse Sample Ports	

8.3 EQUIPMENT RETURN PROCEDURE

Should the SMX100 require repair or it is recommended that the reader follow the Equipment Return Procedure so the equipment can be repaired or calibrated and returned in an efficient and timely manner.

8.3.1 Request a RMA Number

Contact the IFI Service Department either in writing or by calling (631) 467-8400 and request a Return Material Authorization (RMA) Number.

The RMA Number is the method IFI uses to prepare its services for returned material in transit and acts as a tracking document for the returned material through the repair or process.

The RMA also documents the customer's specific instructions or reason related to the return of the material.

8.3.2 Return All Accessories

In the interest of saving time and expediting the repair or process, return all the associated accessories described in Section 1.0 when returning the equipment for repair.

In many cases, a faulty accessory could give the illusion that the equipment itself has failed. For this reason it is important to return all the accessories with the equipment. It is also IFI's policy to verify performance of all associated accessories of Section 1.0 before returning the equipment to service.

8.3.3 Packaging The Equipment

When returning equipment to the manufacturer, always wrap each accessory separately, and provide sufficient protective material around each item to prevent damage from handling and shipping conditions. It is **strongly** recommended the equipment be returned in its **original wooden crate** (or equivalent) for maximum protection. Cardboard boxes do not provide sufficient protection of the equipment.

8.3.4 Reference The RMA Number

As detailed in Paragraph 8.3.1, always reference the IFI assigned RMA Number on your Packing List and Purchase Order and when any inquiries are made.

APPENDIX A

AMPLIFIER DATA SHEETS

APPENDIX B

DRAWINGS

BOM	**SMX100 BILL OF MATERIALS (BOM)**
900703C	**INTERCONNECT DIAGRAM**
500466	**POWER/VSWR METERING BD.**
500499-1	**SWITCH/LED BOARD ASSY**
500523	**SS HALLEFFECT BD ASSY, 1 CHN**
500540	**PS, ENABLE XSTR BD ASS`Y**

BILL OF MATERIALS

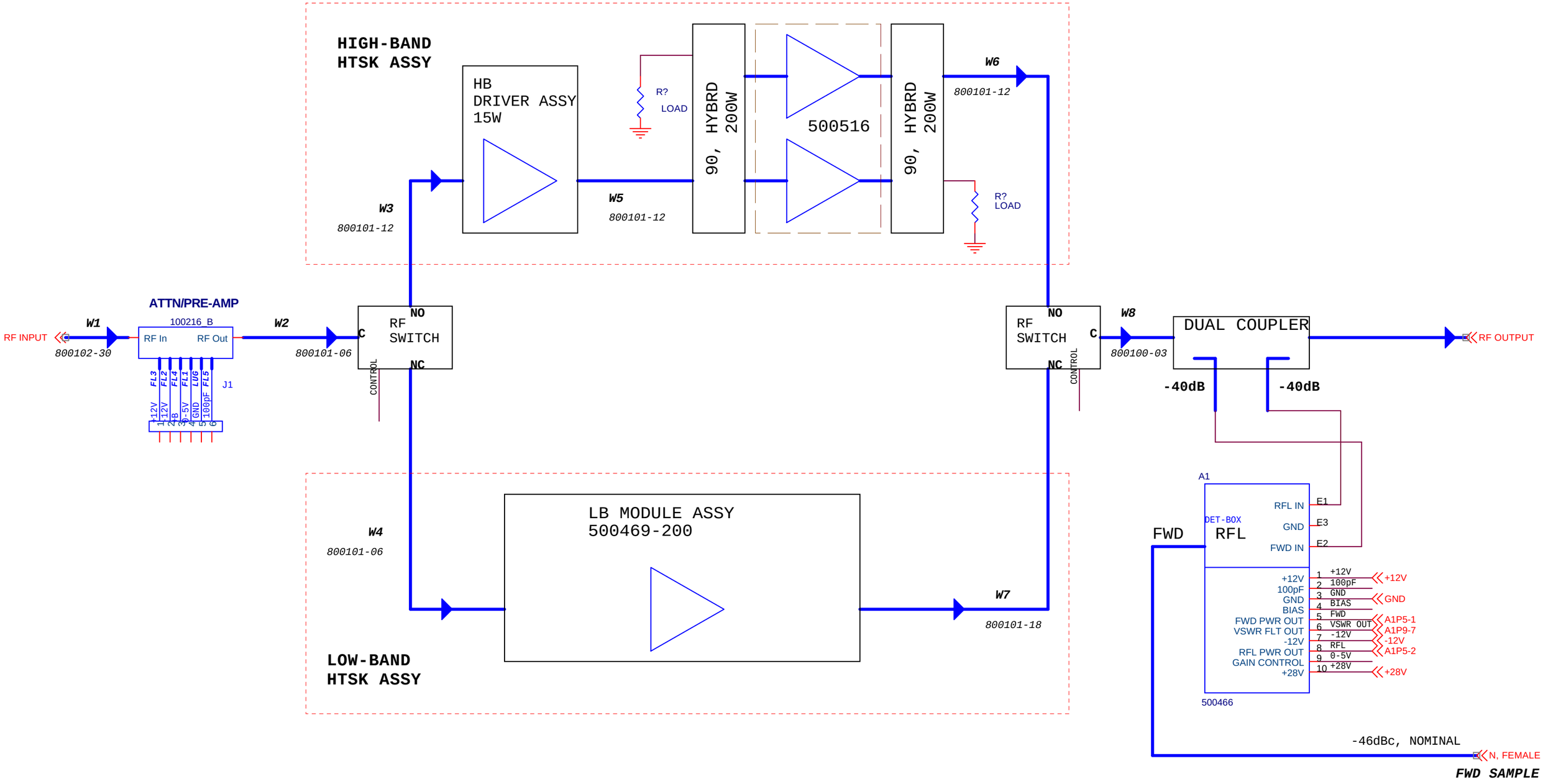
ITEM PART NUMBER	PRODUCT DESCRIPTION	REV LTR
SMX100-TEMPLATE	AMPLIFIER, SS, 10K-1000MHZ, 100W, 115/230VAC, 50/60HZ, 1PH, 19W-24D-7H	C

COMPONENTS

Upper Level Part Number	Component Part Number	Part Description	No. Req'd	Rev Level	Desg Code
SMX100-TEMPLATE	0A-100295	ASSY DWG, SMX100, 7"Hx24"D CHASSIS, New Controller	0	NR	
SMX100-TEMPLATE	0I-900703	INTERCONNECT DIAGRAM, SMX100	1	B	
SMX100-TEMPLATE	0O-850052	OUTLINE DRAWING, SMX100	1	A	
SMX100-TEMPLATE	100216-2	PRE AMP/ATT ASSEMBLY	1	F	
SMX100-TEMPLATE	302352	SIDE, CHANNEL	3	F	
SMX100-TEMPLATE	302355	PARTITION	2	A	
SMX100-TEMPLATE	302356	PARTITION	1	B	
SMX100-TEMPLATE	302358	COVER, PERFORATED, LOW BAND	1		
SMX100-TEMPLATE	302372	PARTITION, LOW BAND	1	A	
SMX100-TEMPLATE	302456	COVER, 7" CHASSIS	2	B	
SMX100-TEMPLATE	302464	PAN, POWER SUPPLY	1	I	
SMX100-TEMPLATE	302470	BRACKET, MPU BD	1	G	
SMX100-TEMPLATE	302511	PANEL, FRONT , 7" H	1	G	
SMX100-TEMPLATE	302511-G-S	PANEL, FRONT, SCREENED AND PAINTED GREY	1	E	
SMX100-TEMPLATE	302512	PANEL, BACK , 7" H	1	E	
SMX100-TEMPLATE	302512-S	PANEL, BACK, SCREENED ONLY NO PAINT	1	E	
SMX100-TEMPLATE	302601	BRACKET, COUPLER	1	C	
SMX100-TEMPLATE	400359	TOP HEATSINK LAYOUT, HIGH BAND	1	H	
SMX100-TEMPLATE	400365	BOTTOM HEATSINK LAYOUT, LOW BAND	1	UR	
SMX100-TEMPLATE	500466	POWER/VSWR METERING BD	1	NR	
SMX100-TEMPLATE	500469-200	RF MODULE ASSY, 10K-230MHz, 100W	1	H	
SMX100-TEMPLATE	500499-1	SWITCH/LED BOARD ASSY	1	A	
SMX100-TEMPLATE	500516-2M	HIGH BAND HIGH POWER MOD, 200-1000MHZ, PA, MALE CONN	1	H	
SMX100-TEMPLATE	500523-1	SS HALLEFFECT BD ASSY, 1 CHN	1	D	
SMX100-TEMPLATE	500532	DUAL BAND RELAY BD ASSY	1	A	
SMX100-TEMPLATE	500536	BOARD ASSY, MPU MICROCHIP 8680 PROCESSOR	1	A	
SMX100-TEMPLATE	700259-3	SPLIT/DETECT, (FWD/RFL) SAMP	1	B	
SMX100-TEMPLATE	700543-40	RIBBON CABLE , IEEE-488, A1P10-GPIB	1		

SMX100-TEMPLATE	700544-6	CABLE, RIBBON, A1P7-LED/SW BD	1	
SMX100-TEMPLATE	700545-6	CABLE, RIBBON, A1P3-LCD DISPL	1	
SMX100-TEMPLATE	700588	HYBRID, DIVIDER, ASSY, 200-1000MHZ, 200W	2	B
SMX100-TEMPLATE	700589-42	RIBBON CABLE ASSY, RS 232, 42" LONG	1	A
SMX100-TEMPLATE	800100-03	CABLE, RF ASSY, EZ FLEX .141, SMA/MALE - N/MALE	1	
SMX100-TEMPLATE	800101-03	CABLE, RF, .141, SMA/M-SMA/M	2	
SMX100-TEMPLATE	800101-06	CABLE, RF, .141, SMA/M-SMA/M	3	
SMX100-TEMPLATE	800101-8	CABLE, RF, .141 SMA/M - SMA/M	1	
SMX100-TEMPLATE	800102-12	CABLE, RF, .141 FLEX, SMA/M-N/F PRECISION BULKHEAD	1	
SMX100-TEMPLATE	800102-30	CABLE, RF, .141 FLEX, SMA/M-N/F PRECISION BULKHEAD	1	
SMX100-TEMPLATE	800103-10	CABLE ASSY, RG223, BNC/M-SMA/M, 10" LG	1	
SMX100-TEMPLATE	800103-12	CABLE ASSY, RG223, BNC/M-SMA/M, 12" LG	1	
SMX100-TEMPLATE	800134-72	CABLE, RF ASSY, CABLE RG-174A, BNC/F BLKHD	1	
SMX100-TEMPLATE	AMP-E201000M25W	AMP, SS. 20-1000 MHZ , 25W	1	
SMX100-TEMPLATE	ATT-VAT6G-10	ATTEN, FIXED COAX SMA M/F, DC-6 GHZ, 2W, 10DB	1	
SMX100-TEMPLATE	ATT-VAT6G-3	ATTEN, FIXED COAX SMA M/F, DC-6 GHZ, 2W, 3DB	1	
SMX100-TEMPLATE	ATT-VAT6G-6	ATTEN, FIXED COAX SMA M/F, DC-6 GHZ, 2W, 6DB	1	
SMX100-TEMPLATE	CAB-LC14AC90-15A	CABLE, POWER CORD DETACHABLE, 6`, 14/3, 3CONDUCTOR, 15A, IEC	1	NR
SMX100-TEMPLATE	CAP-CM-CK104	CAP, 0.1UF, 100V	1	
SMX100-TEMPLATE	CAP-ELA-4700MF50V	CAP, 4700MFD, 50V, AXIAL LEAD, 85 DEGREES	1	NR
SMX100-TEMPLATE	CAP-FL-2425	CAP, TUSCONIX FILTER 2425-001X5U0	1	
SMX100-TEMPLATE	CBR-R112P12A	BREAKER, CKT, SINGLE POLE, ROCKER, 12 AMPS, GREY	1	
SMX100-TEMPLATE	CON-08500114	CONN, PIN, CONTACT 0.100 SERIES	14	
SMX100-TEMPLATE	CON-102387-2	CONN, IDC FEMALE WIRE APPLIED HOUSING, 14 PIN, .	1	
SMX100-TEMPLATE	CON-102387-3	CONN, IDC FEMALE WIRE APPLIED HOUSING, 16 PIN, .	1	
SMX100-TEMPLATE	CON-102387-8	CONN, IDC FEMALE WIRE APPLIED HOUSING, 34 PIN,	1	
SMX100-TEMPLATE	CON-2201-12	CONN, 12 PIN, MOLEX 0.100"	1	
SMX100-TEMPLATE	CON-2201-2	CONN, 0.100" HOUSING WITH LOCKING RAMP, 2 POSITIO	2	
SMX100-TEMPLATE	CON-39-01-2020	CONN, 2 PIN MOLEX - FEMALE	2	
SMX100-TEMPLATE	CON-39-01-2060	CONN, 6 PIN, FEMALE, MOLEX	1	
SMX100-TEMPLATE	CON-39-01-2100	CONN, SOCKET HOUSING 10 PIN, FEMALE, DUAL ROW	1	
SMX100-TEMPLATE	CON-39-01-3023	CONN, 2 PIN, MALE, MOLEX	1	
SMX100-TEMPLATE	CON-553636	CONN, GPIB, ACCESSORY, MTG HD	1	
SMX100-TEMPLATE	CON-87523-6	CONN, CONTACT, SNAP IN, PINS	64	
SMX100-TEMPLATE	CON-B52C4U02T	CONN, PLUG, 5MM, R/A, 2 POS.	1	
SMX100-TEMPLATE	CON-COA-2990-6005	CONN, BULKHEAD SMA F TO F ADAP. (M	2	
SMX100-TEMPLATE	COU-C2630	COUPLER 0.01-1000 MHZ, 40DB, N/F - N/F MAINLINE SMA PORTS	1	

SMX100-TEMPLATE	DIO-1N4007	DIODE	2	
SMX100-TEMPLATE	DIO-UF5408	DIODE, RECT, HV, 1KV, 3A, 75NS	2	
SMX100-TEMPLATE	DIS-DMF5005	DISPLAY, MODULE, LCD, 240X64 DO	1	
SMX100-TEMPLATE	FAN-03245	FAN, GUARD, 6" OR 08126	1	
SMX100-TEMPLATE	FAN-4	FAN, 4 INCH GUARD	1	
SMX100-TEMPLATE	FAN-JD24B2	FAN, 6", 24VDC (12-28VDC), 250CFM, 0.8 Static Pressure, 3500RPM	1	A
SMX100-TEMPLATE	FER-T502525T	FERRITE CORES, TOROID, CN20 MATERIAL, SIZE 0.5" OD, 0.25" ID, 0.25"T	6	
SMX100-TEMPLATE	FER-ZW-43813TC	FERRITE,TOROID 1.5"OD 0.75ID	1	
SMX100-TEMPLATE	FIL-5110.1533.1	FILTER, LINE, IEC EMI, 15A, 115/230 SINGLE PHASE	1	
SMX100-TEMPLATE	HAN-245-26	HANDLE, BLK, 10-32 THREAD, 6"	2	
SMX100-TEMPLATE	HDW-HOL-3092	HDW, PLUG, BLACK 1/2 HOLE H.H. SMI	3	
SMX100-TEMPLATE	HDW-HOL-790-3158	HDW, PLUG, HOLE, 5/8 BLACK PLASTIC	2	
SMX100-TEMPLATE	HDW-PLA-FTH-1	HDW, RICHO WIRE TIE HOLDER	25	
SMX100-TEMPLATE	HWD-SC-21005	HDWR MOUNTING, RS232	1	
SMX100-TEMPLATE	KNO-RKP3SB	KNOB, SKIRTED, BLACK TEXTURE	1	
SMX100-TEMPLATE	POW-RQ65D	PS, QUAD OUTPUTS, 5V @ 8A, 12V @ 3A, 24V @ 1.5A, -12V @ 1A, 65W	1	NR
SMX100-TEMPLATE	POW-SWS600W24V	PS ENCLOSED, 24V @ 25A, 600W, UNIVERSAL INPUT, W/PF	1	
SMX100-TEMPLATE	REL-401-2308	RELAY, SPDT, RF SMA CONNS, FAILSAFE, 24VDC	2	
SMX100-TEMPLATE	RES-CFH-680	RESISTOR, 680 OHM, 1/2 W, CARBON FILM	1	
SMX100-TEMPLATE	RES-MO2-10K	RESISTOR, 10K, 2 W, METAL OXIDE, METAL OX	1	
SMX100-TEMPLATE	SWI-67F065	SWITCH, THERMAL 65 C, NO, CLOSE ON RISE, TO220	2	A
SMX100-TEMPLATE	TER-35559	16-14 WIRE,#6 NYLON INS.BLOC	25	
SMX100-TEMPLATE	TER-S05305FN	MIDLAN ROSS BLUE QUICK DISCONNECT, 16/14, FULLY INSULATED	5	
SMX100-TEMPLATE	TER-STR-8-141	TERMINAL STRIP-BLOCK DOUBLE, 0.438 SPACING, 20A, #14 AWG, 8 POS	1	A
SMX100-TEMPLATE	TER-STR-MS-8-141	MARKER, TERMINAL STRIP	1	
SMX100-TEMPLATE	TYR-08461	SMALL TYWRAP PADS	16	
SMX100-TEMPLATE	Y-CLIP-L	CLIP, CABLE, RIBBON, LARGE	1	



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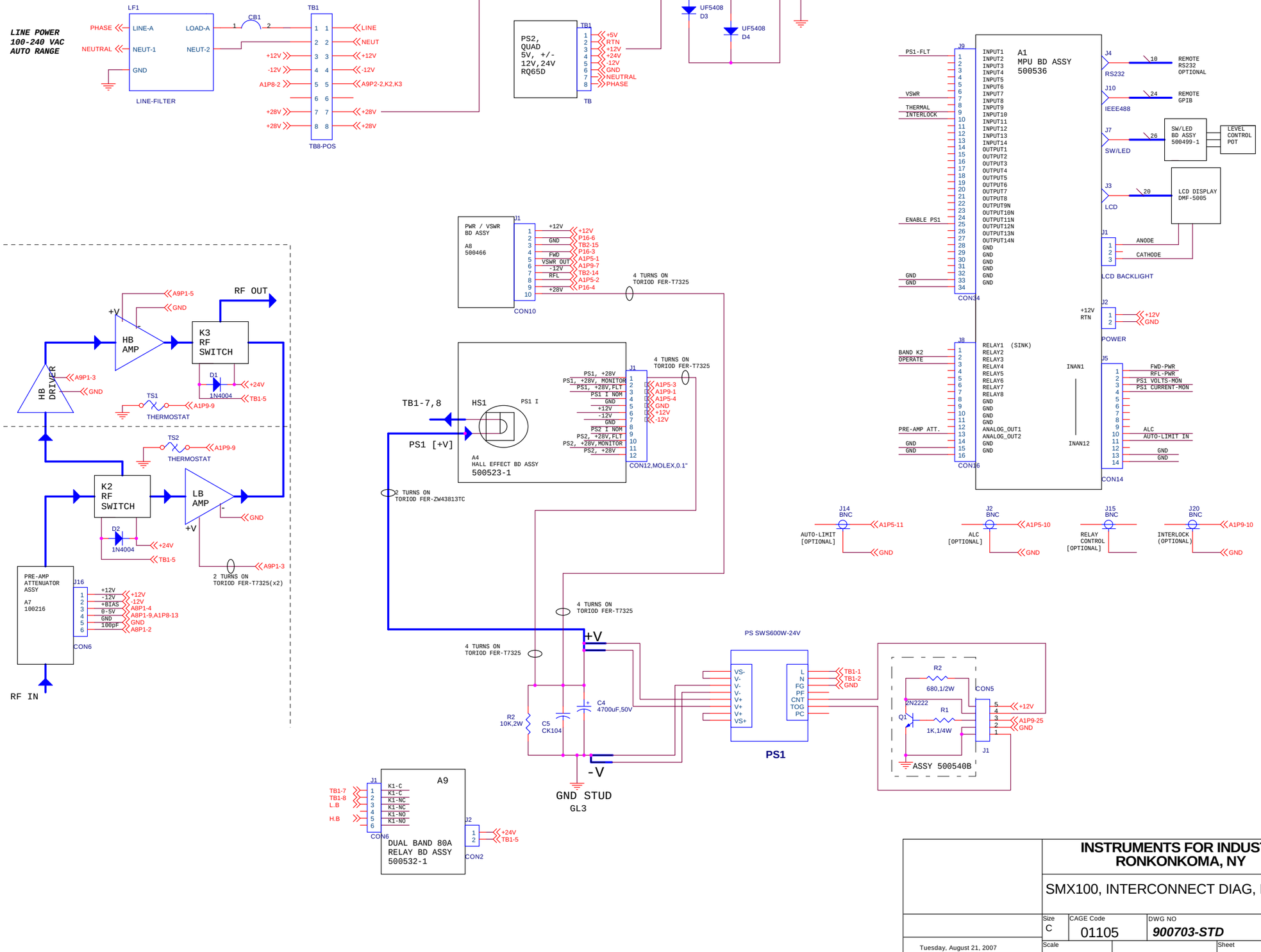
	RF BLOCK DIAG, SMX100			
	Size: B	CAGE Code: 01105	DWG NO: ***900703-STD***	Rev: D
Tuesday, August 21, 2007	Scale:		Sheet: 1 of 1	



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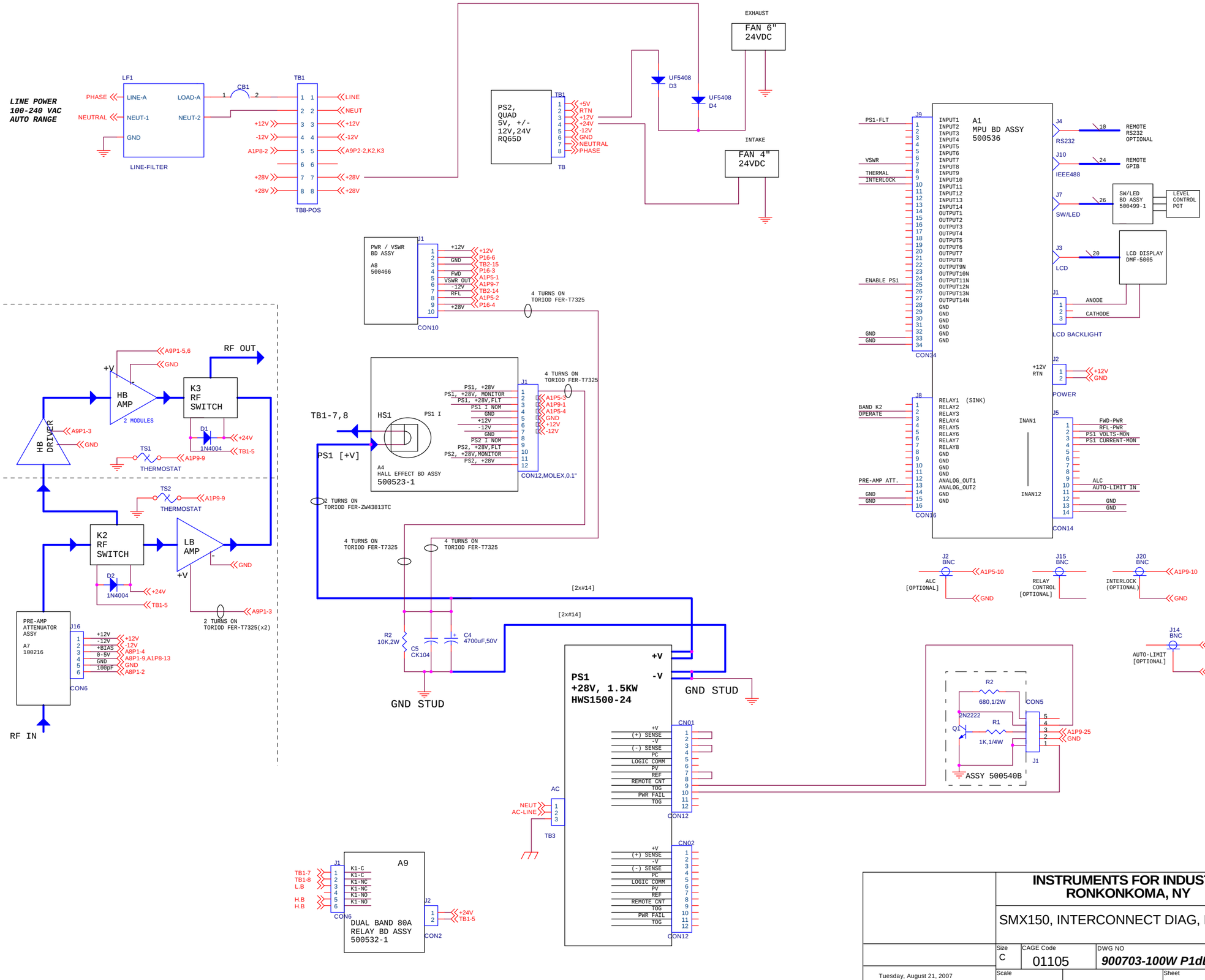
Tuesday, August 21, 2007	Size C	CAGE Code 01105	DWG NO ***900703-STD*** Rev D
	Scale		Sheet 1 of 1



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	SMX150, INTERCONNECT DIAG, NEW CNTRL	
	Size: C	CAGE Code: 01105
	DWG NO: *900703-100W P1dB*	Rev: D
Tuesday, August 21, 2007	Scale:	Sheet: 1 of 1

NOTE:
PRELIMINARY SETTING FOR VSWR ADJUSTMENT
SET TP8 TO 10.8V & ADJUST R19 UNTIL
HIGH VSWR STOP FLASHING ON DISPLAY

REV. DET. IN
E1
R38*
C30 *
C27 1000pF
R13 1K
R5 20K
R6 20K
+12V
U6 OP07
U7 OP07
U8 OP07
TP2
R9 10K
R10 10K
TP1
REV_PWR
J1-8
R12 SAT
R16 100K
R14 51K
C3 0.1uF
C4 0.1uF
C6 0.1uF
C7 0.1uF
C8 0.1uF
C9 0.1uF
-12V
+12v
CR2 1N751
SENSE ADJ.
R15 470
R11 5K
C5 0.1uF
+28V
R7 2K
R2 5K
R8 470
Q1 2N2222A
U3 LM723
NINV IN
VOUT
NC
CUR LIM
NC
CUR SEN
VREF
INV IN
NC
VZ
FCOMP
V+
VC
V-
R1 6.2
R3 1.2K
R4 2.2K
TP8
SET TO 11.8V FOR NORMAL OPR.
C1 68pF
C2 100pF
J1-4
R18 13K
R19 5K
R21 5.1K
U5A LM393
C10 0.1uF
R17 4.7K
TP6
ISO1 H11L1
R20 1K
+5V
VSWR_OUT
J1-6

FWD. DET. IN
E2
R39*
C31*
C28 1000pF
R27 1K
R22 20K
R23 20K
U9 OP07
U10 OP07
TP3
R24 10K
R26 SAT
R29 100K
C18 0.1uF
C19 0.1uF
C20 0.1uF
C21 0.1uF
R25 10K
TP4
FWD_PWR
J1-5
R28 51K
CR3 1N751

J1-2
R33*
C22*
R34 1K
R30 20K
R31 20K
U11 OP07
U12 OP07
TP5
R32 10K
R35 3.9K
R37 100K
C23 0.1uF
C24 0.1uF
C25 0.1uF
C26 0.1uF
TP7
CR1 1N5817
J1-9
R36 51K

INPUT OVERDRIVE CKT

NOTES:
1. * INDICATES OPTIONAL COMPONENT.
2. UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE 1/4 W, +/-5%

100pF, Detected RF Input(from ATT/Pre-Amp)
+12V
J1-2
J1-4
FWD_PWR
J1
VSWR_OUT
REV_PWR
J1-9
12V
0-5V, Gain Control(from ATT/Pre-Amp)
+28V

U4 MC78L05ACP
VIN VOUT GND
C11 1uF
C12 0.1uF
+5V

C13 500uF
C14 1.OuF
C15 10uF
C16 1.OuF
C17 10uF
C29 1.OuF

REV B;
08-22-2000

CONTRACT NO

	APPROVALS	DATE
DRAWN	S.FOSCHINO	4/10/96
CHECKED		

NEXT ASSY | USED ON
APPLICATION

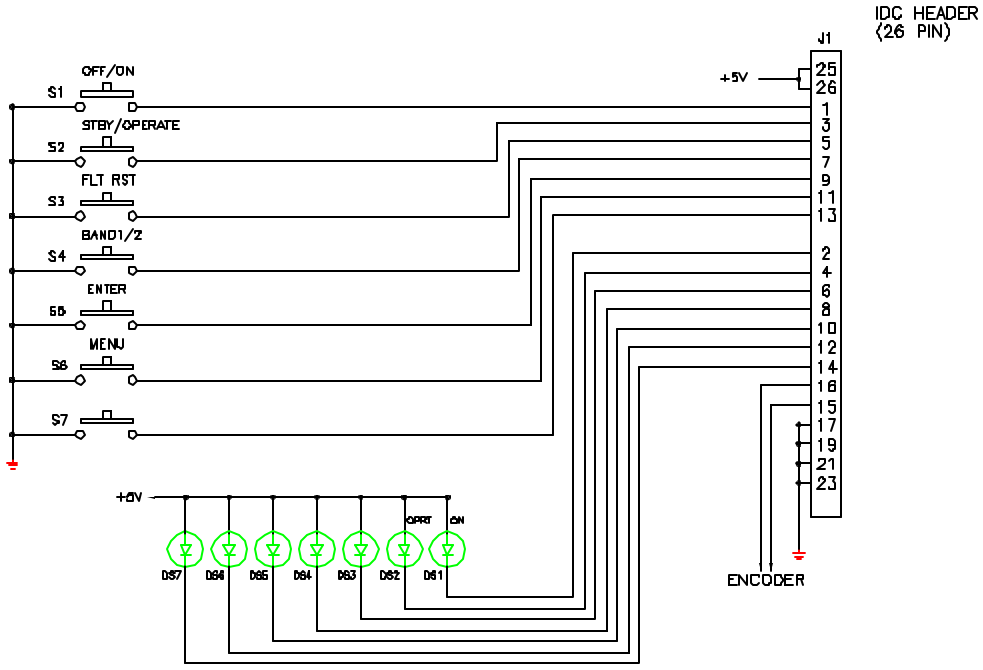
INSTRUMENTS FOR INDUSTRY, INC.
731 UNION PKY., RONKONKOMA, NY 11779

POWER/VSWR METERING BOARD

SIZE	CODE IDENT NO	DRAWING NO	
C		500466	B

SCALE | SHEET 1 OF 1

REVISIONS			
REV	DESCRIPTION	DATE	APPVD
"NR"	INITIAL RELEASE	6/12/98	



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLLERANCES ARE: FRACTIONS ± 1/64 DECIMALS .XX ± .01 .XXX ± .005 ANGLES ± 1/2

CONTRACT NO

APPROVALS	DATE
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731 UNION PKY., RONKONKOMA, N.Y. 11779

SCHEMATIC SWITCH/LED CKT BD

SIZE	CODE IDENT NO	DRAWING NO	REV
B		500499-1	

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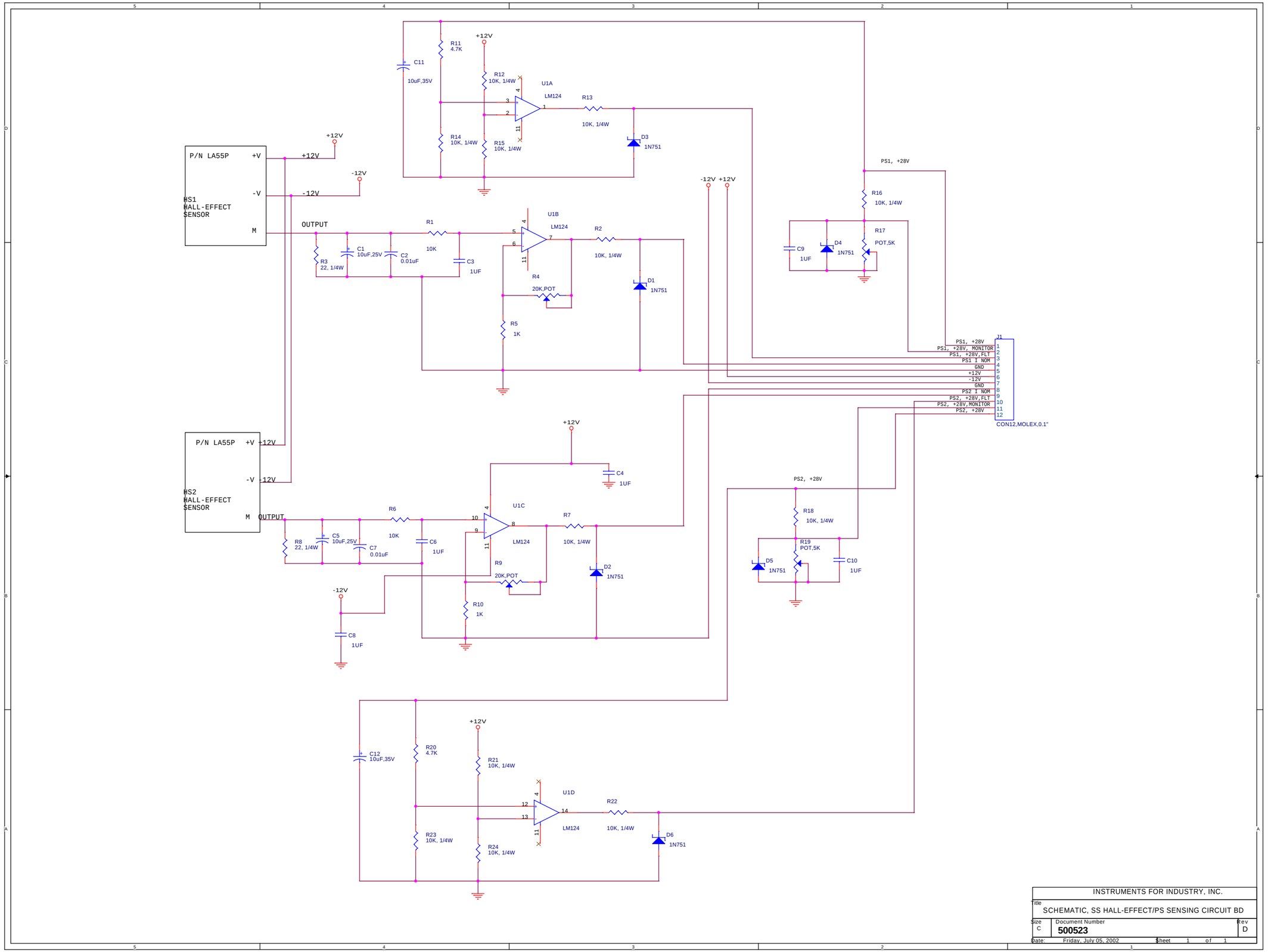
SHEET 1 OF 1



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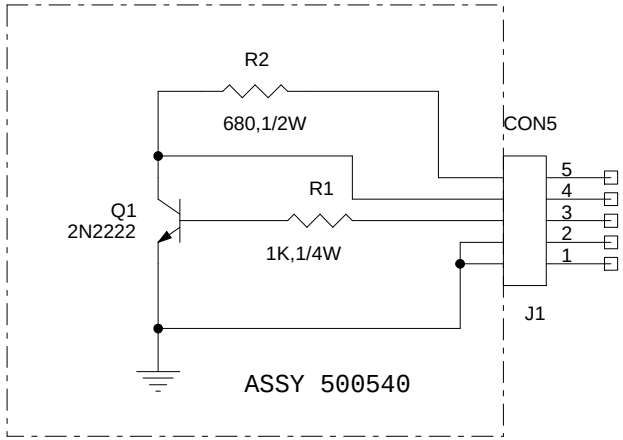
Size: C	Document Number: 500523	Rev: D
Date: Friday, July 05, 2002	Sheet 1 of 1	



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Size A	Document Number ***500540***	Rev B
Date: Friday, December 01, 2006	Sheet 1 of 1	

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