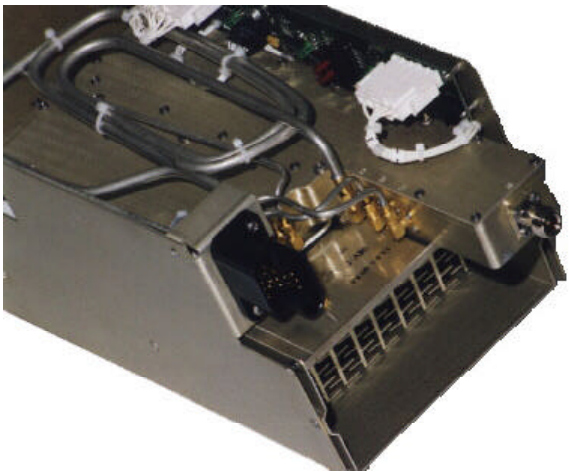


Transmitter Model	Output Power Rating	Amplifier Module Style	Bias Protection Board
5721	2.5W QAM 10W Analog 20W PEP		1 Section Bias Protection Board
5722	5W QAM 20W Analog 40W PEP		3 Section Bias Protection Board
5723	10W QAM 30W Analog 50W PEP	Feed Forward Linearization	3 Section Bias Protection Board
5724	15W QAM 50W Analog 70W PEP	Feed Forward Linearization	5 Section Bias Protection Board

Bias Protection Board

The RF power transistors contained in the amplifier module are supplied current and voltage through the bias protection board. The number of transistors contained in the amplifier module determines the size of the Bias Protection Boards as listed in the previous table. Logic circuitry on this board protects the transistors by shutting off power to the module in the event that the gate bias voltage is lost. This circuitry also monitors the status of the amplifier module and triggers fault conditions in the Control and Monitoring Module if either a transistor is damaged or the gate bias voltage is lost.

Dual Power Detector

Detection of the forward and reflected output power levels is performed by the Dual Power Detector Board. This board produces DC outputs representing the forward and reflected output power levels of the transmitter. Depending on the type of modulation used in the system the Power Detector can be configured for either average power detection or peak power detection by positioning the selection jumper on the back of the board. If the system is to be used to transmit a QAM signal average detection should be selected. If the system is to be used to transmit an analog video signal the peak detection should be selected. There are also a set of potentiometers and test points on the front of the module to provide a means of calibrating the detection circuitry. There are two zero adjustments and two metering level adjustments used to calibrate the detector outputs for 1V at 100% power. When the transmitter is used with an analog video scrambling system that suppresses the synchronizing pulse there are two additional potentiometers provided to realign the power detection with these types of video signals. They work with a gating pulse that is applied to the detector module and is provided by the scramling system. This pulse signals the detec tor to readjust its gain during the regions of video where the synchronizing pulse has been suppressed.

Power Amplifier Module Controls

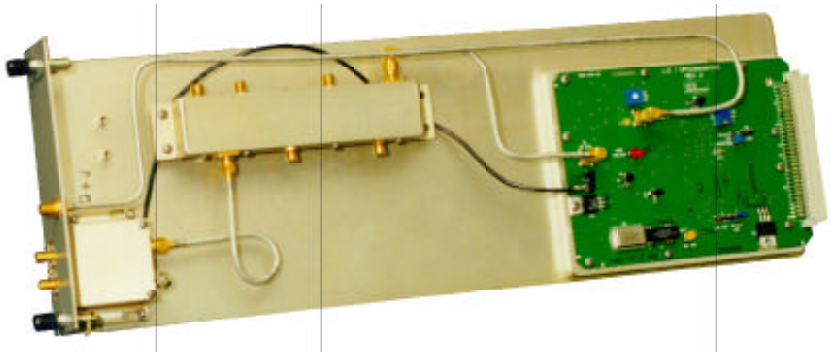
Potentiometers	Description
FWD LEV	Forward Level Adjust potentiometer calibrates the forward power metering level.
REFL LEV	Reflected Level Adjust potentiometer calibrates the reflected power metering level.
FWD ZERO	Forward Zero Adjust potentiometer calibrates the zero level for the forward power metering.
REFL ZERO	Reflected Zero Adjust potentiometer calibrates the zero level for the reflected power metering.
GATE LEV	Gate Level Adjust potentiometer sets the detected forward power level in conjunction with an external gating pulse provided by certain video scrambling systems to properly reference the peak power level.
GATE TMG	Gate Timing Adjust potentiometer sets the trigger timing of an external gating pulse provided by certain video scrambling systems to properly reference the peak power level.

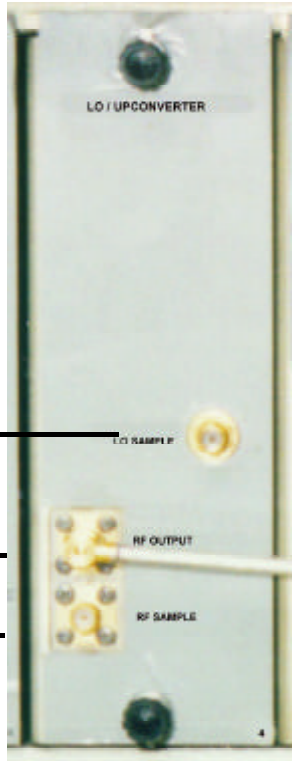
Test Points	Description
FWD DET LEV T/P	Forward Power Detection Level Test Point provides a DC voltage that is proportional to the forward output power of the transmitter. (1V=100%)
REFL DET LEV T/P	Reflected Power Detection Level Point provides a DC voltage that is proportional to the reflected output power of the transmitter. (1V=100%)
ENV DET T/P	Envelope Detection Test Point provides a representation of the RF envelope used to align the gating pulse provided by certain video scrambling systems to properly reference the peak power level.

Jumpers

J2	Peak / Average Detection	peak 2,3 average 1,2

LO / Upconverter Module





LO Sample - SMA connector

RF Output - SMA connector

Sample - SMA connector

This module consists of the A1, LO/ Upconverter board, a channel filter, and an output amplifier board. This module takes an external IF and converts it to the final RF output frequency using an internally generated local oscillator.

The local oscillator consists of a VCO that is phase locked to an external 10 MHz reference. The 10 MHz reference and the VCO are both divided down to 500kHz and compared by the phase lock loop. Error signal from this comparison is generated in the form of an error cur rent that is converted to a bias voltage to the VCO. This voltage adjusts the output fre quency of the VCO until it is on the desired frequency.

Phase lock loop is programmed by loading in data generated by the control module . This data sets the dividers so that the 10MHz and the VCO frequency are divided to 500kHz. These divide numbers are loaded into U6 using the clock, data and LE lines. This data is sent whenever the module is first plugged into the back plain or when power is applied to the tray. This is necessary because the divide numbers are lost when power is removed from the module.

There is an alarm generated if the phase locked loop is unlocked. This alarm is displayed locally and is also sent to the control module in the transmitter to be displayed as a fault. The bias voltage to the VCO is also available to be monitored at TP1 and also can be viewed an the transmitter front panel display. Normal values for this voltage are 0.5 to 5V.

The 10 MHz reference is normally an external reference. There is also a high stability inter nal reference option that is available if there is a desire to operate the transmitter without an external reference. Jumper W1 determines whether an external or internal high stability reference is to be used.

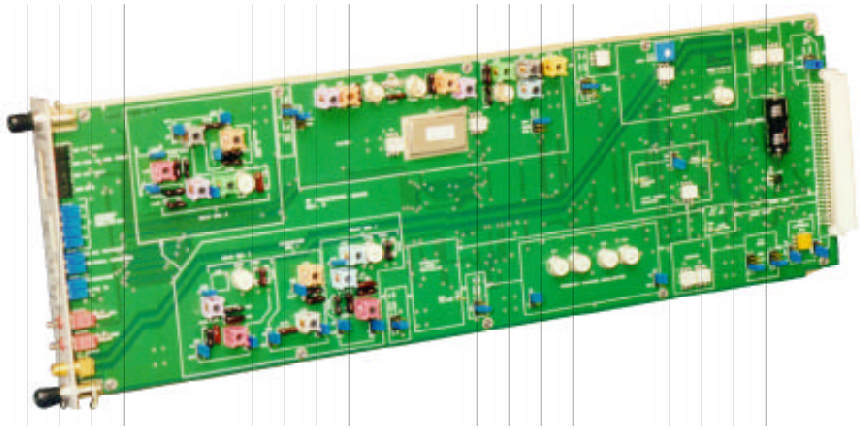
The IF signal is applied at a level of -5dbm peak sync plus sound and is converted to the final RF channel frequency. The RF signal is applied to a filter that selects the right conver sion product. Next, the signal is amplified to -7 dBm by A3 and exits the front of the module at J2. There is also a front panel sample of the RF output , J3, and the LO, J1. The RF sample level is approximately -20 dB below the RF output. The LO sample level is -13 dBm.

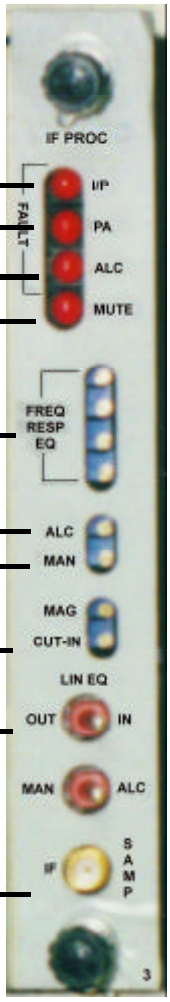
Jumpers

J2	Internal / external 10 MHz reference	internal 2,3 external 1,2
J4	Setup / operate to set L.O. oscillator frequency works with R10 setup frequency adjustment	operate 1,2 setup 2,3

IF Processor Module

The IF Processing module provides frequency response, group delay, and linearity equal ization for the transmission system. This module also monitors and controls the level of output power generated by the power amplifier.





I/P - red LED indicates an input fault

P/A - red LED indicates a PA fault (peak to ave)

ALC - red LED indicates an ALC fault

MUTE - red LED indicates loss of video or IF when in ALC Mode.

Frequency Response Equalization -

ALC -sets reference level of the ALC circuit.

MAN -adjusts gain when ALC is disabled.

MAG/CUT-IN-MAG potentiometer to set linear equalization of system. CUT-IN sets reference power level above when the linearity equalization is active.

OUT/IN - Toggle switch that changes linearity equalization out or in

MAN/ALC -Toggle switch that changes linearity equalization into ALC or manual

IF SAMPLE - SMA connector

The circuitry of the IF Processor Module goes through the following stages as described in the text that follows.

Impedance Matching and Gain Selection Circuitry

The IF input signal is applied from the backplane connection to J1-32B, the DIN connector located at the back of the module. An input impedance transformer can be set to 50Ω or 75Ω using jumper J28 and J29. The input range is selected with the I/P gain jumpers J8, J9, J10, and J11.

Gain Jumper Setting	Input Range
HI Gain	-22 to -12 dBm PEP
MED Gain	-17 to -7 dBm PEP
LO Gain	-12 to -2 dBm PEP

Input Signal Detection Circuitry

A sample of the IF input signal that is taken through a directional coupler after passing through the impedance matching and gain circuitry, is applied to an envelope detector. The average and peak amplitudes of the envelope are measured and sent to a set of comparator circuits. These circuits will detect the following fault conditions if present.

Fault	Condition	Action
Input Fault	The peak level of the input signal drops below the specified I/P range	When the module is in ALC mode set the input fault line J1-8C to logic low and mute ALC circuitry. Illuminate RED I/P fault LED
Peak vs Average Fault	The average level of the input signal is 1dB or less below the peak level of the input signal	Set the peak vs average line to logic low and mute the ALC curcuitry. Illuminate RED P/A fault LED.

The peak vs average fault condition can be enabled or disabled with jumper J30 on the module

Frequency Response Equalization Circuitry

Placing jumper J2 and J3 to the IN position will form a four point frequency response equal ization circuit in the IF path to offset any frequency response in the system.

Output Signal Detection Circuitry

Analog DC signals relating the level of output power generated by the power amplification stages of the system provide feedback to the ALC circuit. These signals are applied to the IF processing module through DIN connectors J1-24C INNER LOOP IN and J1-25C OUTER LOOP IN. Next, the signals are processed through the output signal detection circuitry before being applied to the ALC circuit.

The inner loop signal is a DC voltage that originates from within the unit that contains the IF processing module and represents the level of RF output power generated from the PA stages of the unit. The optional outer loop signal is a DC voltage generated from outside the unit and represents the level of RF output power generated from an external amplifier. For both signals 1 volt equals 100% output power. The output signal detection circuit selects one of these signals and applies it to the ALC circuit. If the outer loop signal is greater than 90% it will be selected, otherwise the inner loop signal will be selected. Both signals are buffered and sent back out of the module through DIN connectors J1-23C and J1-26C. Test point TP5 loop voltage is used to measure the level of the loop signal being applied to the ALC circuit.

Automatic Level Control Circuitry

A voltage controlled attenuator placed after the frequency response equalization circuit allows dynamic adjustment of the IF signal gain and provides a means of controlling the level of output power generated by the power amplification stages of the system.

Mode	Operation
Manual - the attenuator gain is controlled manually by selecting the manual mode of operation with the toggle switch SW2 on the front of the module	The voltage to the attenuator can be adjusted directly by the manual gain poteniometer R149 on the front of the module
ALC - the output power of the system is controlled automatically by selecting the ALC mode of operation with the toggle switch SW2 on the front of the module.	The desired level of output power can be adjusted from the fron of the module by the ALC potentiometer R139. The ALC circuit will automatically adjust the voltage to the attenuator in order to maintain the desired output power.

The voltage to the attenuator can be monitored externally through the DIN connection J1-11C ALC VOLTAGE. If the attenuator voltage exceeds 8V the Red ALC FAULT LED on the front of the module will illuminate. If this occurs the ALC has reached the end of its operat ing range and will no longer maintain the proper output power level.

Certain conditions will also place the ALC in a mute state. In this condition the attenuator voltage is reduced to zero and the level of output is extremely low. A red LED labeled MUTE on the front of the module indicates this condition. The mute status can also be monitored externally through DIN connector J1-9 which is set to logic low when the ALC circuit is in a mute state, however when operating in manual mode the mute condition will be overidden. Various conditions are described in the table below.

Condition	Action
The input signal detection circuitry senses an input fault.	The ALC will be forced into the mute state to prevent transmission of noise.
The input signal detection circuitry senses a peak vs average fault	The ALC will be forced into the mute state to prevent overloading the final transit path and the antenna.
An external device is commanding the ALC circuit to be placed in the mute state.	There is an external mute signal that can be applied to the module through DIN connector J1-10C MUTE I/P. Pulling this connection to ground will force the ALC circuit to the mute state.

Group Delay Equalization Circuitry

A set group of delay equalizer circuits can be inserted into the signal path after the ALC attenuator circuit. These have been designed for improved group delay performance for certain filtering and channel combining schemes. A description of these circuits are given below.

44 MHz Version

Equalizer Circuit	Operation
Delay Equalizer 1 selected with jumper J35 and J36	Selected for equalization of digital systems using adjacent or channel combiners non adjacent channel combiners as well as analog systems using adjacent combiners
Attenuation Equalizer 1 selected with jumper J37 and J38	Always selected when delay equalizer 1 is selected
Delay Equalizer 2 selected with jumper J43 and J44	Selected for equalization of lumped element band pass filter circuit which can also be selected on the module
Delay Equalizer 3 selected with jumper J33 and J34	Selected for equalization of analog systems using adjacent or non adjacent channel combiners

36 MHz Version

Equalizer Circuit	Operation
Delay Equalizer 1 selected with jumper J35 and J36	Selected for analog systems using adjacent combiners
Attenuation Equalizer 1 selected with jumper J37 and J38	Always selected when delay equalizer 1 is selected
Delay Equalizer 2 selected with jumper J43 and J44	Selected for equalization of lumped element band pass filter circuit which can also be selected on the module
Delay Equalizer 3 selected with jumper J33 and J34	Selected for equalization of analog systems using adjacent or non adjacent channel combiners
Attenuation Equalizer 3 selected with jumper J33 and J34	Always selected when delay equalizer 3 is selected

Band Pass Filtering Circuitry

Several selections of band pass filters are provided after delay equalization to reduce out of band products.

Filter Circuit	**Operation**
BPF Lumped element band pass filter	Used in most analog and digital systems. Delay equalization for this filter is activated by selecting delay equalizer 2
SAW (optional) Surface acoustic wave filter	Used in digital systems that require sharper out of band filtering of the IF input
NONE	Filtering is bypassed with this option.

Linearity Equalization Circuitry

After the filtering circuitry a linearity equalization circuit can be placed in the signal path to compensate for nonlinear distortions that may appear at a later stage in the transmission system. These distortions are the result of gain compression in high power amplifier stages. The linearity equalization circuit will offset gain compression by increasing signal gain through the module as the signal increases in power. This will maintain a more consistent gain through the system.

The linearity equalization circuit can be placed in the signal path by selecting the IN position with the toggle switch SW1 on the front of the module. The amount of equalization can be set through CUT-IN and MAGNITUDE potentiometer on the front of the module as described below.

Potentiometer	Operation
Cut in R64	Sets the signal level at which the equalizer circuit begins to increase the signal gain
Mag R65	Sets how much the signal gain will increase through the module

Output Gain Circuitry

The IF output signal is applied to the backplane board connection J1-1B the DIN connector located at the rear of the module. The output range is selected with O/P gain jumper J26 and J27.

Gain Jumper Settings	Output Range
HI gain	-13 to -3 dBm PEP
LO gain	-18 to -8 dBm PEP

A sample of the IF output signal is provided on the front of the module through a directional coupler placed before the O/P gain selection circuitry.

Gain Jumper Settings	Sample Coupling
HI gain	-21 dB
LO gain	-26 dB

IF Processing Module Controls

LED Indicators	Description
I/P Fault	Illuminates when there is a loss of IF input signal
P/A Fault	Illuminates when the peak to average power ratio of the IF input signal exceeds the safety threshold.
ALC Mute	Illuminates when the required gain has exceeded the operation range of the ALC circuit
Mute	Illuminates when the IF input signal is muted by the IF processing module

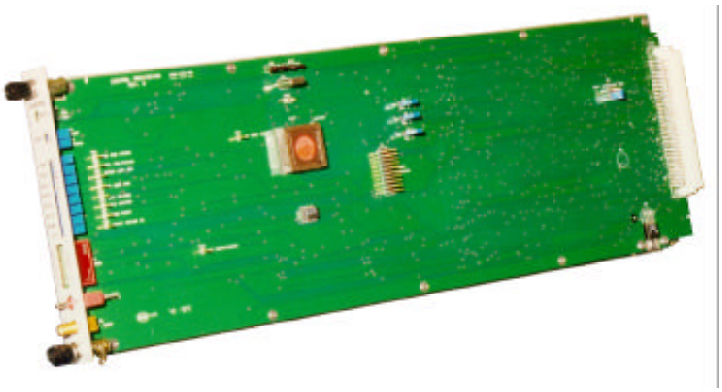
Poteniometers	Description
Freq Resp Eq (x4)	Fine adjustment of the system frequency response
ALC	Sets the reference level of the ALC circuit
MAN	Adjusts transmitter gain when ALC disables
MAG	Produces linear equalization of the system
Cut-in	Sets a reference power level above which the linearity equalization circuit is active

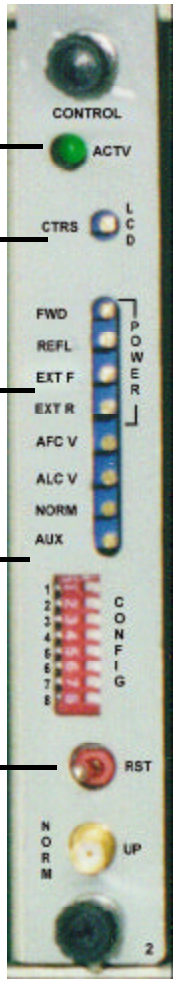
Toggle Switches	Description
Lin Equ	Places the linearity equalization IN or OUT of the signal path
Man / ALC	Selects manual or automatic level control of the transmitter

SMA Connector	Description
IF Samp	A sample of the output signal from the IF processing module

Control and Monitoring Module

The control and monitoring module interfaces with all other modules. Refer to the tables on the following pages for specific details about the functions of this module.





ACTV - green LED that is dim during microprocessor boot up and bright when active.

CTRS LCD - potentiometer that adjusts level of contrast on the front panel LCD

POWER - potentiometers that set power levels
FWD - Forward power should be set to approx 100%
REFL - Reflected power should be less than 10%
EXT F- External forward power should be set to approx 100%
EXT R - external reflected power should be less than 10%
DO NOT make any adjustmens to these pots, they are set to a reference point at the factory.

NORM and AUX - these are for future expansion and presently not used

DIP SWITCH
1 - EXT AMP - place in on position when an external amplifier is used
2 - INT MOD - place in on position when an internal modulator is used
3- EXT IF TO MOD - external IF carrier option
4-6 spares
7-8 LANGUAGE - sets up the language of the LCD display
00 = English
01 = Portugese
10= Spanish
11=

Reset switch must be pushed anytime dip switch settings are changed.

IF Processor Module Interface

Signal Name	Backplane	Backplane IF Processor Pin	Signal Type	Description
Outer loop Mon	J19-11A	J20-26C	Analog Input 0-1.25V	Indicates the output power of an external amplifier. The scale factor of this input is 100% / V
Forward Power Metering	J19-13A	J20-23C	Analog Input 0-1.25V	Indicates the output power of the PA. Also referred to as the internal loop monitor, the factor of this input is 100% / V
IF Processor Interlock	J19-17A	J20-12C	Discrete contact closure input	Provides a pull down to indicate that the IF processor module is installed. Low indicates the module is installed
ALC Voltage	J19-18A	J20-11C	Analog input 0-10V	Indicates the voltage applied to the pin attenuator in the ALC.
Mute IF Processor	J19-19A	J20-10C	Discrete open collector output	Controls the muste feature in the IF processpr. Pulling this line low causes the IF pprocessor to force the pin attenuator into full attenuation.
Input Fault	J19-21A	J20-8C	Discrete open collector input	A low level indicates that the IF is not present in the IF processor module.
Peak vs Average Fault	J19-22A	J20-7C	Discrete open collector output	A low level indicates the the peak vs average ratio is at a dangerous level
ALC Conditioning	J19-23A	J20-6C	Analog output -1 to +1 V	Provides an adjustment voltage to the ALC circuitry to correct for the frequency dependance of the peak detector

Modulator Module Interface

Signal Name	Backplane	Backplane Modulator Pin	Signal Type	Description
Modulator Interlock	J19-27B	J18-1C	Discrete Contact Closure Input	Provides a pull down to indicate that the modulator module is installed. A low level indicates the module is installed
Unlock Mute	J19-28B	J18-1B	Discrete Open Collector Input	A low indicates the modulator PLL is unlocked.
External IF present	J19-32A	J18-1A	Discrete Open Collector Input	A low indicates the external IF CW is present to the modulator
Video Loss	J19-1B	J18-2A	Discrete Open Collector Input	A low indicates video loss at the modulator input

Power Supply Module Interface

Signal Name	Backplane	Backplane P.S. Pin	Signal Type	Description
P.S. Good	J19-2A	J26-5	Discrete Open Collector Input	A low indicates that the +10.8 DC power is operating properly
P.S. Enable	J19-3A	J26-4	Discrete Open Collector Output	A low enables the +10.8 DC power supply

SCADA Communications Interface

Signal Name	Backplane	Backplane SCADA Pin	Signal Type	Description
+ Serial Line	J19-26C	J15-4, J16-4	+ RS-485 Communication line	Provides the + differential line for the bidirectional RS-485 communications
- Signal Line	J19-28C	J15-5, J16-5	+ RS-485 Communication line	Provides the - differential line for the bidirectional RS-485 communications

Front Panel Interface

Signal Name	Backplane	Backplane Front Panel Pin	Signal Type	Description
Fault Anode	J19-1C	J22-26	Drive voltage to the fault LED	Voltage is derived from the +5 supply which is passed through a resistor to supply the anode of the fault LED
Fault Cathode	J19-2C	J22-25	Discrete open collector output	Provides a pull down to turn on fault LED
Operate Anode	J19-3C	J22-24	Drive voltage to the operate LED	Voltage is derived from the +5 supply which is passed through a resistor to supply the anode of this LED.
Operate Cathode	J19-4C	J22-23	Discrete open collector output	Provides a pull down to turn on operate LED
S5	J19-5C	J22-21	Discrete contact closure input	S5 is the switch on the far right of the front panel For this switch and the five listed below a contact closure or low indicates the switch has been depressed
S4	J19-6C	J22-20	Discrete contact closure input	second from the right on the front panel
S3	J19-7C	J22-19	Discrete contact closure input	center switch on the fron panel
S2	J19-8C	J22-18	Discrete contact closure input	second from the left on the front panel
S1	J19-9C	J22-17	Discrete contact closure input	first switch on the left of the front panel
V_{ss} (GND)	J19-10C	J22-16	Ground	Provides a return to the front panel board
V_{cc} (+5V)	J19-11C	J22-15	+5V Power	Provides +5V to the front panel display logic.
V_{EE} (Contrast)	J19-12C	J22-14	Control Voltage Output 0 to 5V	Controls the contrast of the LCD
RS	J19-13C	J22-13	Discrete TLL / HMOS Output	Indicates to the display is an instructino or data command is being sent. High indocates the byte is being written as data, low indicates that an instruction command is being written to the display.
RW	J19-14C	J22-12	Discrete TTL / HCMOS Output	Indicates if data transfer to the display is read or write. A high indicates that the microcontroller is reading data from the display while a low indicates that data is being written to the display
E	J8-15C	J22-11	Discrete TTL / HCMOS Output	Indicates the transfer of data to / from the display During a write operation data is transferred to the display on a high to low transition of the signal. During a read operation the display will drive the data bus when high
DB0-DB7	J19-16C to 23C	J22-10 to 3	Discrete TTL / HCMOS Bidirectional Data Lines	Data lines which pass data between the display and the control board.
Anode (+) Backlight	J19-24C	J22-2	Control voltage output 3.8 - 4.6V	Provides voltage to the LCD backlight in the display
Cathode Backlight	J19-25C	J22-1	Control Voltage return	Return for the control voltage specified above

Control and Remote Interface

Signal Name	Backplane	Backplane Control/Remote Pin	Signal Type	Description
Standby CMD (FA)	J19-29C	J12-1	Discrete open collector input	Low indicates FA requests the xmrt go to standby
Operate CMD (FA)	J19-30C	J12-3	Discrete open collector input	Low indicates FA requests the xmrt go to operate
Aural / Visual Mute (FA)	J19-31C	J12-5	Discrete open collector input	Low indicates FA requests an aural visual mute
Visual Mute (FA)	J19-32C	J12-3		spare input
Ext Ref Present (FA)	J19-2B	J12-9		spare input
ABS Standby CMD	J19-3B	J12-11	Discrete open collector input	Low indicates FA requests the xmtr go to standby
EXT Operate output	J19-4B	J12-13	Discrete open collector input	Low enables ext amp when xmtr goes to operate.
EXT Visual ALC Input	J19-5B	J12-15		spare input
XMTR Interlock Iso Return	J19-6B	J12-18	Ground	Ground return. Can be jumpered directly to gnd or source pin of FET so the xmtr interlock can be daisy chanied w/ an external amp
XMTR Interlock	J19-7B	J12-19	Discrete open collector input	low indicates xmtr interlock and no faults
EXT O/P Amp Mod Status	J19-8B	J12-24, J13-23	Discrete open collector input	low indicates external amp fault
EXT P.S. Status Amo O/P	J19-9B	J12-26, J13-24	Discrete open collector input	low indicates external amp power supply failure
Operate Ind	J19-10B	J12-31	Discrete open collector input	low indicates xmtr is in operate mode
EXT Overtemp (Amp) I/P	J19-11B	J12-33, J13-20	Discrete open collector input	low indicates ext amp above normal temperature
EXT Refl Pwr (Amp) I/P	J19-13B	J12-37, J13-20	Discrete open collector input	indicates reflected power of the remote amplifier
Standby CMD (RCVR)	J19-14B	J12-29	Discrete open collector input	low indicates external RCVR requests xmtr go into standby mode
Operate CMD (RCVR)	J19-15B	J12-29	Discrete open collector input	low indicates external RCVR reguests xmtr go into operate mode
RMT Operate Indicator	J19-17B	J13-4	Discrete open collector input	low indicates xmtr is in operate
O/P Amp Mod Status O/P	J19-18B	J13-7	Discrete open collector input	low indicates no faults in the amp mod
RMT FWD Power O/P	J19-19B	J13-8	Analog O/P 0-1.25V	loop through from IF proc, indicates fwd o/p pwr
RMT REFL Power	J19-20B	J13-12	Analog O/P 0-1.25V	loop through from pwr amp mod's refl pwr
RMT XMTR Fault Ind	J19-21B	J13-14	Discrete open collector input	low indicates xmtr fault
IF Present Status O/P	J19-22B	J13-15	Discrete open collector input	low indicates no IF to the IF processor module
RMT PLL Locked Ind O/P	J19-23B	J13-16	Discrete open collector input	low indicates freq gen / upconv is unlocked
RMT XMTR Overtmp Ind	J19-24B	J13-18	Discrete open collector input	low indicates xmtr pwr amp above normaltemp
P.S. Fault Indicator	J19-25B	J13-19	Discrete open collector input	low indicates xmtr P.S. failure
EXT PLL Ref Present O/P	J19-26B	J13-25	Discrete open collector input	low indicates loss of 10MHz reference
RMT XMTR Standby CMD	J19-24A	J13-3	Discrete open collector input	low indicates remote interface requests xmtr go to standby
RMT XMTR Operate CMD	J19-25A	J13-1	Discrete open collector input	low indicates remote interface requests xmtr go to operate
Encoding Pulse I/P		J12-17	Input	input from external encoder / scrambler

Frequency Generator / Upconverter Module Interface

Signal Name	Backplane	Backplane U/C Pin	Signal Type	Description
External Ref Indicator	J19-4A	J21-26C	Discrete Open Collector Input	High indicates prescence of a 10MHz reference
Logic Enable	J19-5A	J21-25C	Discrete CMOS Output	Provides a load enable signal to PLL in the freq synthesizer chip. A transition from low to high loads data stored into synthesizer latches.
Data	J19-6A	J21-24C	Discrete CMOS Output	Provides serial data to the freq synthesizer chip. Works in conjunction with the clock output to synchronously transfer data.
Clock	J19-7A	J21-23C	Discrete CMOS Output	Provides serial clock to the freq synthesizer chip. A rising edge on this clock transfers data into the freq synthesizer chip.
AFC	J19-8A	J21-22C	Analog Input 0-10V	Indicates level of AFC in the freq gen upconverter
Freq Gen U/C Interlock	J19-9A	J21-21C	Discrete Contact closure input	Provides a pull down to indicate the freq gen module is installed. Low indicates it is installed.
Unlock Indicate	J19-10A	J21-8C	Discrete Open Collector Input	Indicates the freq/upconverter module is locked on the external or onternal 10Mhz reference. A low indicates the module is unlocked.

Power Amplifier Module Interface

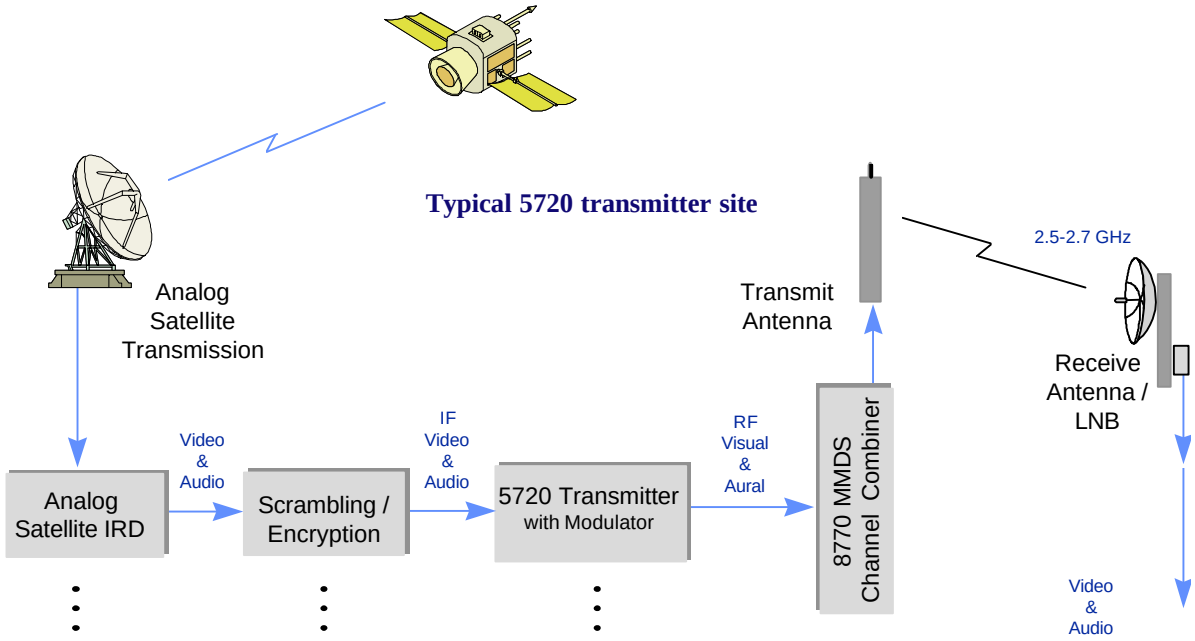
Signal Name	Backplane	Backplane PA Pin	Signal Type	Description
Amplifier Interlock	J19-1A	J23-1	Discrete Contact Closure Input	Provides a pull down to the control and monitor ing board to indicate the power amplifier module is installed. Loe indicates the module is installed.
Reflected Power Metering	J19-32	J23-7	Analog Input 0-1.25V	Indicates the reflected power from the power amplifier module. The scale factor for the reflected power meterimg is 100%
Overtemperature Fault	J19-31B	J25-3	Discrete Contact Closure Input	Indicates an overtemperature condition exists in the power amplifier module. A contact closure (low) indicates a fault condition exists.
O/P Amplifier Status	J19-30B	J25-2	Discrete Open Collector Input	Indicates the operating status of the O/P amplifier A pulled down low indicates that current is flowing in all five transistors in the power amplifier.
-5V Bias Sense	J19-29B	J25-1	Analog Input 0 to -6V	Indicates voltage level of the -5V bias supply. There is a 1:1 relationship between this voltage and the -5V bias supply.

LCD Display Connections

The LCD display assembly is located on the front panel behind the display. It interfaces with other devices through a ribbon cable.

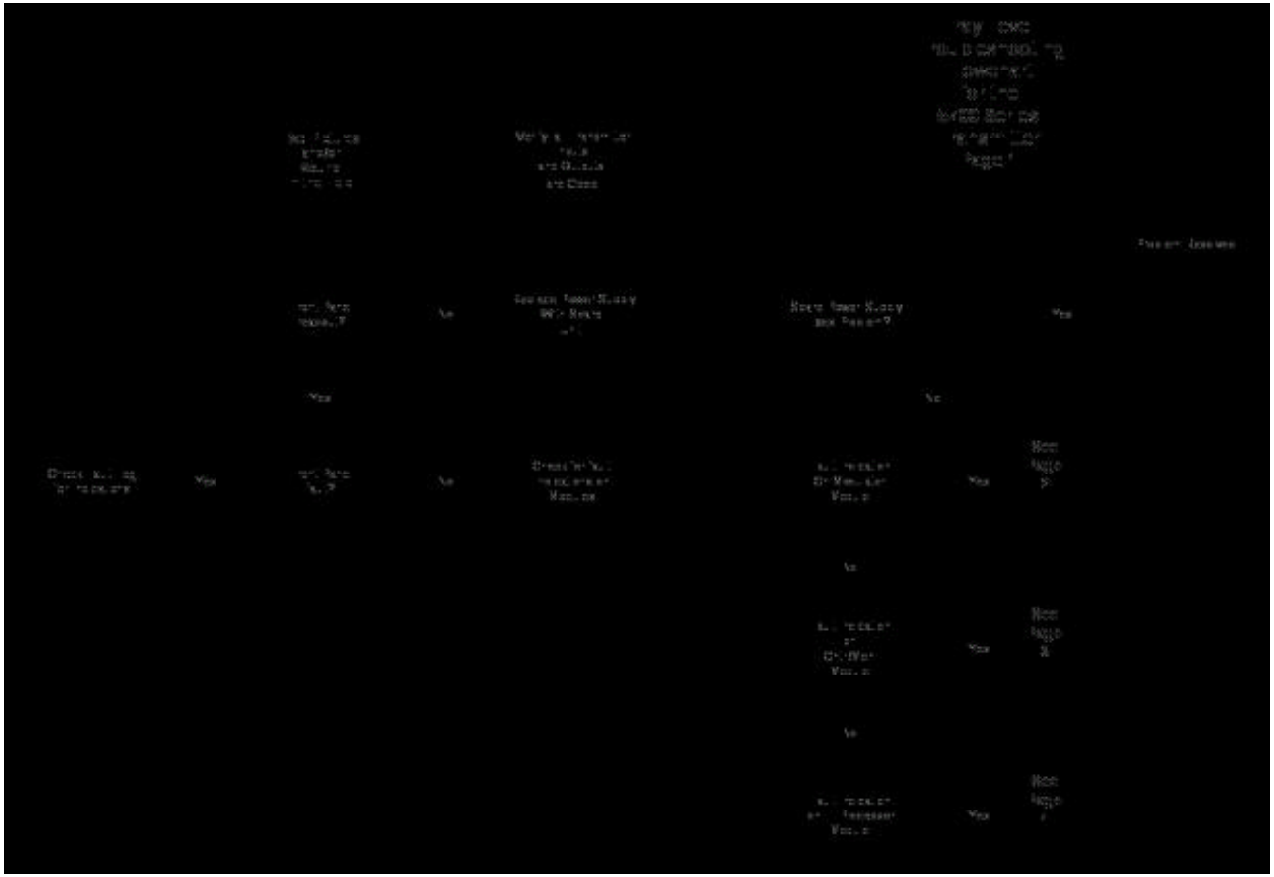
Pin Number on J2 16 Pos female connector on the LCD Module	**Position Number on J1** 26 Pos male connector on backplane ribbon cable	**Function**
J2-16	J1-1	Cathode (GND) Backlight
J2-15	J1-2	Andoe (+) Backlight
J2-14	J1-3	DB7 (Data Bus)
J2-13	J1-4	DB6 (Data Bus)
J2-12	J1-5	DB5 (Data Bus)
J2-11	J1-6	DB4 (Data Bus)
J2-10	J1-7	DB3 (Data Bus)
J2-9	J1-8	DB2 (Data Bus)
J2-8	J1-9	DB1 (Data Bus)
J2-7	J1-10	DB0 (Data Bus)
J2-6	J1-11	E
J2-5	J1-12	R/W (read-write)
J2-4	J1-13	RS
J2-3	J1-14	V_{ee} (contrast)
J2-2	J1-15	V_{cc} (+5V)
J2-1	J1-13	V_{ss} (ground)
None	J1-17	S1
None	J1-18	S2
None	J1-19	S3
None	J1-20	S4
None	J1-21	S5
None	J1-22	Key (no connection)
None	J1-23	DS1 Operate LED (green) cathode
None	J1-24	DS1 Operate LED (green) anode
None	J1-25	DS2 Fault LED (red) cathode
None	J1-26	DS2 Fault LED (red) anode

Typical Transmitter Site



Troubleshooting

Typical troubleshooting of the 5700 series entails module replecement, however some circumstances may require adjustments to the unit. Refer to the charts that follow for troubleshooting guidance.



Material Return Procedure / Exchanges

In order to efficiently handle equipment or components returned for repair or sent out on loan, Axcera requests that each returned item be accompanied by a Material Return Authorization Number (MRA#).

To obtain an MRA follow the procedures below:

- **Call Axcera Customer Service at (724) 873-8100 or FAX (724) 873-8105**
- **A Service Engineer will provide you with an MRA#**
- **Write the MRA# on the packing list or in the case of repairs, a note describing the reason for return. Also, be sure to include contact information.**
  - **Send <u>ALL</u> MRA items to the following address**

Axcera, LLC
103 Freedom Drive
P.O. Box 525
Lawrence, PA 15055-0525

% Telephone Technical Support

Axcera currently provides free telephone technical support. When calling, be prepared to provide the following information:

- **Transmitter model number <u>AND</u> Serial number**
- **Status of front panel LED's (are any red LED's on ?)**
- **Have a copy of your operation manual ready prior to calling**

For technical support call (724) 873-8100. Listen carefully for instructions. If the call is placed after hours, follow the procedure as stated in the prerecorded message. A Service Engineer will return your call as soon as possible.

Proper Packing Of Materials

When returning materials to Axcera, it is extremely important to pack them properly. Due to the delicate nature of components contained within the equipment, major damage can occur without proper packing. Please adhere to the following guidelines when returning materials.

- **Save the boxes that the transmitter is shipped in. Each tray is sent double boxed and enclosed in foam padding. Use the same packing method when returning materials.**

- **In the event original packing materials are not available call Axcera at (724) 873-8100 to request proper shipping materials. The necessary items will be sent out immediately.**

Failure to properly pack any returned materials may result in damage to the equipment. Axcera is not responsible for damaged equipment under these circumstances. Many freight companies will not compensate for damages when items are not packed properly. Please pack items properly!

LIMITED WARRANTY
ONE YEAR

Seller warrants each new product manufactured and sold by Seller against defects in material and workmanship under normal use and service, for a period of one (1) year from the date of shipment from Seller's plant, when operated in accordance with Seller's operating instructions. This warranty shall not apply to tubes, fuses, batteries, or bulbs.

Warranties are valid only when and if (a) Seller receives prompt written notice of breach within the period of warranty, (b) the defective product is properly packed and returned by the Buyer (transportation and insurance prepaid), and (c) Seller determines, in its sole judgment, that the product is defective and not subject to any misuse, neglect, improper installation, negligence, accident, or (unless authorized in writing by Seller) repair or alteration. Seller's exclusive liability for any personal and/or property damage (including direct, consequential or incidental) caused by the breach of any or all warranties, shall be limited to the following: (a) repairing or replacing (in Seller's sole discretion) any defective parts free of charge (F.O.B. Seller's plant), and/or (b) crediting (in Seller's sole discretion) all or a portion of the purchase price to the Buyer.

Equipment furnished by Seller, but not bearing its trade name, shall bear no warranties other than the special hours-of-use or other warranties extended by or enforceable against the manufacturer at the time of delivery to the buyer.

NO WARRANTIES, WHETHER STATUTORY, EXPRESSED OR IMPLIED, AND NO WARRANTIES OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR FREEDOM FROM INFRINGEMENT, OR THE LIKE, OTHER THAN AS SPECIFIED IN PATENT LIABILITY ARTICLES, AND IN THIS ARTICLE, SHALL APPLY TO THE EQUIPMENT FURNISHED HEREUNDER.

Axcera

WARNING!!!

<u>DO NOT</u> ATTEMPT TO REPAIR OR TROUBLESHOOT THIS EQUIPMENT UNLESS YOU ARE FAMILIAR WITH ITS OPERATION AND EXPERIENCED IN SERVICING HIGH VOLTAGE EQUIPMENT. LETHAL VOLTAGES ARE PRESENT WHEN POWER IS APPLIED TO THIS SYSTEM. IF POSSIBLE, TURN OFF POWER BEFORE MAKING ADJUSTMENTS TO THE SYSTEM.

EMERGENCY FIRST AID INSTRUCTIONS

Personnel engaged in the installation, operation, or maintenance of this equipment are urged to become familiar with the following rules both in theory and practice. It is the duty of all operating personnel to be prepared to give adequate Emergency First Aid and thereby prevent avoidable loss of life.

RESCUE BREATHING

1. Find out if the person is breathing. If you think he is not breathing , place him flat on his back. Put your ear close to his mouth and look at his chest. If he is breathing you can feel the air on your cheek. You can see his chest move up and down. If you do not feel the air or see the chest move, he is not breathing.

2. If he is not breatning, open the airway by tilting his head backwards. Lift up his neck with one hand and push down on his forehead with the other. This opens the airway. Sometimes doing this will let the person breathe again by himself.

3. If he is still not breathing, begin rescue breathing. Keep his head tilted backward. Pinch nose shut. -Put your mouth tightly over his mouth. -Blow into his mouth once every five seconds -**DO NOT** stop rescue breathing until help arrives. LOOSEN CLOTHING - KEEP WARM: Do this when the victim is breathing by himself or help is available. Keep him as quiet as possible and from becoming chilled. Otherwise treat him for shock.

BURNS

SKIN REDDENED: Apply ice cold water to burned area to prevent burn from going deeper into skin tissue. Cover area with clean sheet or cloth to keep away air. Consult a physician.

SKIN BLISTERED OR FLESH CHARRED: Apply ice cold water to burned area to prevent burn from going deeper into skin tissue. Cover area with clean sheet or cloth to keep away air. Treat victim for shock and take to hospital.

EXTENSIVE BURN - SKIN BROKEN: Cover area with clean sheet or cloth to keep away air. Treat victim for shock and take to hospital.

ABBREVIATIONS/ACRONYMS

A/D	Analog to digital
AC	Alternating Current
AFC	Automatic Frequency Control
ALC	Automatic Level Control
AM	Amplitude modulation
AGC	Automatic Gain Control
AWG	American wire gauge
BER	Bit Error Rate
BW	Bandwidth
DC	Direct Current
D/A	Digital to analog
dB	Decibel
dBm	Decibel referenced to 1 milliwatt
dBmV	Decibel referenced to 1 millivolt
dBw	Decibel referenced to 1 watt
FEC	Forward Error Correction
FM	Frequency modulation
Hz	Hertz
ICPM	Incidental Carrier Phase Modulation
I/P	Input
IF	Intermediate Frequency
LED	Light emitting diode
LSB	Lower Sideband
MPEG	Motion Pictures Expert Group
O/P	Output
PLL	Phase Locked Loop
PCB	Printed circuit board
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
SAW	Surface Acoustic Wave
SNR	Signal to Noise Ratio
USB	Upper sideband
VCXO	Voltage Controlled Crystal Oscillator
VSB	Vestigial Sideband
VSWR	Voltage Standing-wave Ratio

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