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# Appendix a

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## a.1 Enhanced External I/O board

The optional Enhanced External I/O board replaces the standard External I/O board and provides for AES audio inputs and an on-board audio signal generator for test purposes. The lay out and basic function of the I/O board is the same, however several test points and jack numbers has changed.

The Enhanced External I/O board has connections for the customer to make to interface to his equipment. These include Control inputs, status outputs, metering outputs, audio input, modulation monitor sample output, safety interlock connections. There is also an external 10 Mhz reference output, External RF carrier input and a synthesizer output.

## a.2 Customer remote connection

The optional Enhanced External I/O board has all the input and output connections for status and control including interlocks, audio input, customer controlled fold-back. See figure a-1. There are 16 Remote Control Inputs on J20 and J21 listed and their logic level is indicated.

1. ON. Low to set Tx to ON state
2. OFF. Low to set Tx to OFF state
3. RAISE. Low to raise Tx power
4. LOWER. Low to lower Tx power
5. HIGH POWER. Low to set Tx to High power state
6. MED POWER. Low to set Tx to Med power state
7. LOW POWER. Low to set Tx to Low power state
8. MUTE. Low to Mute Tx
9. AC MAINS RECYCLE. Low to set Tx to Recycle state
10. FAULT OFF. Low to set Tx to OFF state
11. FOLDBACK2. See foldback chart in table 2-1
12. FOLDBACK1. See foldback chart in table 2-1
13. FOLDBACK0. See foldback chart in table 2-1
14. ARC FLT. Low to indicate arc fault.

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15. COOL FLT. Low to indicate cooling fault.

16. INTERLOCKS 1 and 2. Open to trip interlock.

All inputs are disabled when REMOTE DISABLE is active from the front panel. The input parameters are;

10mA nominal sink current for input active

Inputs referenced to TB1 GNDA

GNDA to transmitter GND voltage difference 30V maximum

Maximum input voltage +30V, -2V with respect to GNDA with no damage to the board.

### RF Foldback Encoding-Relative Mode

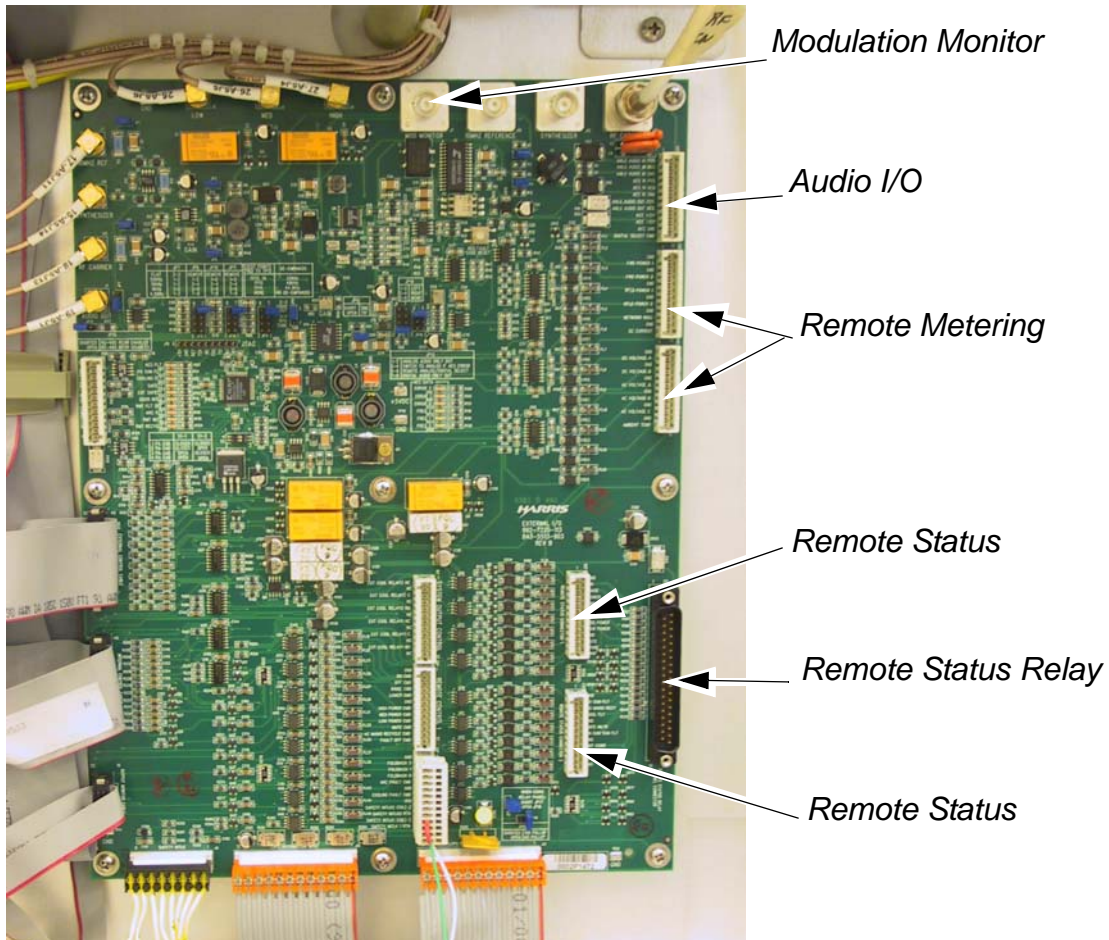
FOLDBACK2	FOLDBACK1	FOLDBACK0	
Open	Open	Open	No foldback *
Open	Open	Low	½ dB foldback *
Open	Low	Open	1 dB foldback *
Open	Low	Low	2 dB foldback *
Low	Open	Open	3 dB foldback *
Low	Open	Low	4 dB foldback *
Low	Low	Open	6 dB foldback *
Low	Low	Low	12 dB foldback *

\* From current power setting

### RF Foldback Encoding-Absolute Mode

FOLDBACK2	FOLDBACK1	FOLDBACK0	
Open	Open	Low	User defined power
Open	Low	Open	User defined power
Low	Open	Open	User defined power

**Table 1: External Foldback Encoding for Customer remote foldback.**



**Figure 1-1 Enhanced External Input/Output board.**

### a.2.1 Status Outputs

The External I/O has Status and control Outputs at J26 and J27 that can be connected to a remote control for status feedback or to enable other building equipment;

1. ON STATUS. Low indicates transmitter ON
2. RAISE STATUS. Low indicates RAISE condition
3. LOWER STATUS. Low indicates LOWER condition
4. REMOTE ENABLED STATUS. Low indicates Remote Control Enabled
5. HIGH POWER STATUS. Low indicates Tx set to High Power
6. MED POWER STATUS. Low indicates Tx set to Med Power
7. LOW POWER STATUS. Low indicates Tx set to Low Power
8. MUTE STATUS. Low indicates TX in Mute state.
9. TX SUMMARY FAULT STATUS. Low indicates Tx summary fault

10. AC MAINS RECYCLE STATUS. Low indicates Tx in RECYCLE state
11. COOLING FAULT STATUS. Low indicates Cooling Fault active
12. SAFETY INTERLOCK STATUS. Low indicates Safety Interlock active
13. PA CAB SUM FAULT. Low indicates PA cabinet fault.
14. ANTENNA VSWR STATUS. Low 1 second pulse/VSWR fault
15. RF FOLDBACK ACTIVE STATUS. Low indicates Tx in RF Foldback state
16. AES FAULT STATUS. Low indicates AES fault.

Status outputs are open-drain when active low with an absolute maximum sink current of 100mA.

Outputs referenced to TB2 GNDB

GNDB to transmitter GND voltage difference 30V maximum

Absolute maximum voltage applied to output +30V, -2V with respect to GNDB

### a.2.2 Remote Status Outputs

The Remote Status Outputs can be used to drive the Harris 16-channel Relay Panel. Using the 16-Channel Relay Panel allows the customer to control or activate external devices in response to the status outputs. If the relay panel is used, jumper JP17 must be shorted. If the Relay Panel is not used, Jumper JP17 must be set to the open position.

### a.2.3 Metering Outputs

Analog metering outputs at J23 and J24 include;

1. FWD PWR 1. Analog 3VDC = 50KW
2. FWD PWR 2. Analog 3VDC = 50KW
3. RFLD PWR1. Analog 3VDC = 3.5KW
4. RFLD PWR 2. Analog 3VDC = 3.5KW
5. NETWORK NULL. Analog 3VDC = 3.5KW
6. DC CURRENT. Analog 3VDC = 400A
7. DC VOLTAGE A. Analog 3VDC = 300VDC
8. DC VOLTAGE B. Analog 3VDC = 300VDC
9. AC VOLTAGE A. Analog 3VDC = 480VAC
10. AC VOLTAGE B. Analog 3VDC = 480VAC
11. AC VOLTAGE C. Analog 3VDC = 480VAC
12. AMBIENT TEMP. Analog 3VDC = 50 ° C

The analog outputs have a 0 - 5VDC analog range.

Outputs are referenced to TB3 GND and wires should go through a toroid for filtering. They have a 5mA output capability and are short circuit protected, note that the absolute maximum voltage is  $V_o +7VDC -2Vdc$ .

### a.2.4 Audio Input Connections

Audio input typically enters the top of the transmitter at the Output Network cabinet and connects to the external I/O board on J25. Jumpers on the board are labeled for correct configuration:

Balanced audio has a selectable 600/20K input termination at JP2 and JP4. Jumpers in will provide 600 ohm termination, jumpers out for high impedance termination.

Selectable lowpass filters 4.5KHz, 9KHz, 10KHz, 50KHz, Flat at JP7, JP9, JP10 and JP11. Refer to the board or schematic for a chart on configuring these jumpers.

Selectable AC/DC input coupling of the audio at JP3 and JP6. Jumpers in provide DC coupling, out for AC coupling.

Audio input adjustment at R34 will adjust the input sensitivity from +10dBm to -10dBm range to fully modulate the transmitter. 10dBm overdrive will result in no damage.

#### a.2.4.1 Digital Audio Input Connections

EAS/EBU digital audio can be input to the transmitter via the AES input on connector J25. Jumper JP14 can be used to input left, right or mono audio to the transmitter.

Jumper JP13 is used to configure the audio input to the transmitter and allows the user to choose whether the analog or digital audio inputs are routed to the transmitter. JP13 also allows for two methods of switching between the analog and digital audio inputs. One configuration employs the digital audio input as the primary input to the transmitter but automatically switches to the analog input is seven seconds if there is a fault on the digital audio data line. A second configuration allows remote switching between the digital and analog inputs by either connecting the /DIGITAL\_SELECT\_CMD\_IN line to AGND or letting this line float.

- JP12 - Connect to 6.144 MHz oscillator
- JP18 - Disconnect to enable the OMCK system clock mode, that allows the OMCK input, to automatically replace RMCK when the PLL becomes unlocked
- JP22 - Connect to CPLD to enable AES fault reset
- JP27 - Disconnect
- JP25 - Connect, JP19 - Disconnect to select the frequency of RMCK to 6.144 MHz at reset
- R58 - Adjust the amplitude of AES signal

### a.2.5 Modulation Monitor Output

The output power level is 30dBm maximum and capable of driving a 50 ohm termination. The Output Monitor's RF output sample at J7 for the Modulation Monitor goes through an attenuator box which pads down the RF sample on Medium and High power levels.

### a.2.6 Safety Interlocks

There are 2 External Safety Interlocks on J21 for customer use which are to be interfaced directly to dry contact circuits. Nominal 20 mA sink current required.

### a.2.7 External 10MHz Reference Input

For precise carrier frequency control at J10, an external 10 MHz reference can be used with 1 Vrms to 5 Vrms input range, with a Sine/Square wave input. The input has a selectable 50/10K ohm termination with JP 1 in for 50 ohms, out for 10K ohms.

### a.2.8 RF Carrier External Input

- 1 Vrms to 5 Vrms input range.
- Sine/Square wave input acceptable
- The input impedance is selectable between a 50 ohm and 10K ohm termination at JP5. Jumper in for 50 ohms, out for 10 K ohms.

### a.2.9 Synthesizer Output

- TTL compatible
- Short circuit protected
- 50 ohm termination minimum
- Fcarrier +/- 2ppm maximum (using internal 10MHz reference)

### a.2.10 Test Tone Generator

An audio test tone generator is provided for testing purposes. JP8 1-2 puts the generator in-circuit, pins 3-2 puts the audio input in-circuit. The tone generator can produce a triangle, square and sine waves;

- Triangle wave JP20.1-2 and JP21.1-2
- Square wave JP20.2-3 and JP21.1-2
- Sine wave JP21.2-3
- The amplitude of generator is adjusted with R59