Model 904 - LPCVD Gas Panel Interface

Instruction Manual

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1. DESCRIPTION

1.1. Overview

The Model GPI-904 is a gas panel interface designed for semiconductor processes performed in diffusion furnaces under vacuum conditions. This includes processes such as LTO, Nitride and Polysilicon depositions.

1.2. Features

- *Universal Power input for international operation.*
- *+/- 15 VDC Power Supply adequate for (6) MFC's.*
- *+24 VDC Power Supply for solenoids and sensors.*
- *Jumper-selectable Override Relays to provide positive MFC shutoff.*
- *Adjustable Pressure input scaling to support various pressure sensors.*
- *Hardware interlocks on Toxic Gases based on Gate Valve Status, Door Sensor, Over Pressure Sensor and Pump Purge Sensor.*
- *Support for Upstream, Downstream and MFC Bypass/Purge Valves.*
- *Status LEDs for all Digital Outputs and Digital Inputs.*
- *Remote Connector with Galvanically isolated control signals for use with a Tymkon Process Sequencer.*

1.3. Suggested Tymkon Configuration

Following is a recommended function template for installations in which these Gas Panel Interfaces are used with vertical Tymkon process sequencers. The Tymkon software allows front panel functions to be remapped to different hardware ports, but adherence to the suggested layout minimizes hardware remapping and simplifies installation.

Outputs				Inputs	
0	Load	**8**	Backfill	**0**	BIC
1	Unload	**9**	TTL Enable	**1**	BOC
2	Gas 1 Sol	**A**	Gas 1 MFC	**2**	TMP Fault
3	Gas 2 Sol	**B**	Gas 2 MFC	**3**	Purge [1]
4	Gas 3 Sol	**C**	Gas 3 MFC	**4**	Door [2]
5	Gas 4 Sol	**D**	Gas 4 MFC	**5**	Leak
6	Soft Pump	**E**	N2 MFC	**6**	OP [3]
7	Gate Valve	**F**	Bypass	**7**	GPI Fault

[1] Digital Input 3 (Purge Monitor or Atmosphere Switch) prevents the Gate Valve and Toxic Gas Upstream Valves from energizing.
[2] Digital Input 4 (Door Sensor) prevents the Gate Valve and Toxic Gas Upstream Valves from energizing.
[3] Digital Input 6 (Over Pressure) prevents the Toxic Gas Upstream Valves from energizing.

2. INSTALLATION

2.1. DDC[4] Interface Connector, J7

The GPI-904 provides a 50-pin IDC ribbon cable connector for interface to a process controller. The pinout of the connector exactly matches that of the most common Tymkon I/O boards, but may be adapted to process sequencers from other manufacturers.

A typical ribbon-cable female mating connector is 3M P/N 3425-6000. The 3M part number for an optional strain relief is 3448-3050. These connectors may be used with standard flat ribbon cable (e.g. 3M P/N 3365-50) or with round, shielded ribbon cable (e.g. 3M P/N 3659F/50).

The pinout of the Interface Connector follows on the next page. The connector provides a generic interface that is shared by both atmospheric and LPCVD[5] gas panel interfaces.

The pins labeled “Digital Output” and those labeled “Analog Output” are signals from the process sequencer to the gas panel interface. Those labeled “Digital Input” and those labeled “Analog Input” are signals from the gas panel interface to the process sequencer.

Note that the (16) “Digital Output” pins expect to see either mechanical contact closures or solid-state relay closures to 24 Volt Return from the DDC or process sequencer. The 24 Volt Return signal is sent from the GPI to the DDC on pin 26 of the Interface Connector. Furthermore, the (8) “Digital Input” pins provide contact closures to 24 Volt Return to the DDC when the sensors are safe. Pin 49 of the Interface Connector provides +24 Volts to the DDC to power the opto-isolators usually found in the DDC.

Note also that the signals present on the “Analog Output” and “Analog Input” pins of the Interface Connector are generally 0 to 5 Volts DC.

[4]DDC: Direct Digital Control system - Computer-controlled system that sequences gas valves, furnace temperature, boat loaders etc. in response to time-based recipes and external sensors.
[5]LPCVD: Low Pressure Chemical Vapor Deposition.

DDC Interface Connector, J7

IDC Pin	Comm Pin	Function
1	1	ANALOG OUTPUT F
3	2	ANALOG OUTPUT E
5	3	ANALOG OUTPUT D
7	4	ANALOG OUTPUT C
9	5	ANALOG OUTPUT B
11	6	ANALOG OUTPUT A
13	7	ANALOG OUTPUT 9
15	8	ANALOG OUTPUT 8
17	9	ANALOG COMMON
19	10	DIGITAL GROUND
21	11	ALARM SILENCE INPUT
23	12	RUN INPUT
25	13	DIGITAL INPUT 7
27	14	DIGITAL INPUT 5
29	15	DIGITAL INPUT 3
31	16	DIGITAL INPUT 1
33	17	OUTPUT F (NO)
35	18	OUTPUT D (NO)
37	19	OUTPUT B (NO)
39	20	OUTPUT 9 (NO)
41	21	OUTPUT 7 (NO)
43	22	OUTPUT 5 (NO)
45	23	OUTPUT 3 (NO)
47	24	OUTPUT 1 (NO)
49	25	+ SUPPLY (+5 to +40 VOLTS)

IDC Pin	Comm Pin	Function
2	26	ANALOG INPUT F
4	27	ANALOG INPUT E
6	28	ANALOG INPUT D
8	29	ANALOG INPUT C
10	30	ANALOG INPUT B
12	31	ANALOG INPUT A
14	32	ANALOG INPUT 9
16	33	ANALOG INPUT 8
18	34	ALARM (-) OUTPUT
20	35	ALARM (+) OUTPUT
22	36	ABORT INPUT
24	37	RESET INPUT
26	38	- SUPPLY (-5 to -40 VOLTS)
28	39	DIGITAL INPUT 6
30	40	DIGITAL INPUT 4
32	41	DIGITAL INPUT 2
34	42	DIGITAL INPUT 0
36	43	OUTPUT E (NO)
38	44	OUTPUT C (NO)
40	45	OUTPUT A (NO)
42	46	OUTPUT 8 (NO)
44	47	OUTPUT 6 (NO)
46	48	OUTPUT 4 (NO)
48	49	OUTPUT 2 (NO)
50	50	OUTPUT 0 (NO)

Note: The numbers in the columns labeled “Comm Pin” refers to the respective pin numbers as they would appear if an attached ribbon cable were terminated in a communications connector as is sometimes used on process sequencers. The numbers in the columns labeled “IDC Pin” are the conductor numbers in a ribbon cable.

2.2. MFC Connectors, J1 through J6

20-conductor ribbon cables are used to connect the GPI to the Mass Flow Controllers. Following is the pinout of MFC 1 through MFC 6 (J1 through J6 respectively) on the Gas Panel Interface. (The numbers in the "IDC" columns are the ribbon cable conductor numbers.)

Card Edge	IDC		Card Edge	IDC	
1	1	Case GND	A	2	Setpoint
2	3	Power Common	B	4	Signal Common
3	5	Output (0-5v)	C	6	Signal Common
4	7	+15 VDC	D	8	Valve Test
5	9	N/C	E	10	N/C
6	11	N/C	F	12	-15 VDC
7	13	Keyway	G	14	Keyway
8	15	N/C	H	16	N/C
9	17	N/C	I	18	N/C
10	19	Common	J	20	Valve Off

Unless specified by the customer, the GPI's provide an ***MFC Override*** relay for each gas channel. These six relays are controlled by Digital Outputs 'A' through 'F'.

A jumper is provided for each override relay to select Normally Open or Normally Closed operation. This allows the relays to be used for MFC Override control when jumpered Normally Closed or as ON/OFF control signals when the MFC connectors are used to control other peripheral equipment.

When jumpered Normally Closed, the relays provide a set of normally closed contact to connect the appropriate *MFC Valve Off* pin to the *MFC Common* pin thereby forcing the MFC closed regardless of the analog setpoint. When the relay is energized, the override signal is released and the MFC is allowed to soft-start to the setpoint.

2.3. Solenoid Valves, J8

Either a 25-pin female 'D' connector or a 26-pin IDC header or both is provided to drive up to sixteen pilot valves or gas solenoids. If the valves are polarized, the positive side of the coil must be connected to one of the +24 Volts pins, while the negative side must be connected to one of the valve output signals.

Note: Shorting any of the outputs on the Valve Connector may cause permanent damage to the GPI or to the process sequencer or DDC which drives the outputs.

Note that Digital Outputs 0 and 1 are not located on the first two pins as might be expected. Since these signals are normally not assigned to pilot valves, they have been relocated to provide better compatibility with pilot valve manifolds.

The pin-out is as follows:

J8 Pin IDC	J8 Pin 'D'	Function	Valve	Recommended Use
1	1	Output 2 (Interlocked)	1	Gas 1 Upstream
2	14	Output 3 (Interlocked)	2	Gas 2 Upstream
3	2	Output 4 (Interlocked)	3	Gas 3 Upstream
4	15	Output 5 (Interlocked)	4	Gas 4 Upstream
5	3	Output 6	5	Soft Pump
6	16	Output 7 (Interlocked)	6	Gate Valve
7	4	Output 8	7	
8	17	Output 9	8	Backfill
9	5	Output A	9	Gas 1 Dnstream
10	18	Output B	10	Gas 2 Dnstream
11	6	Output C	11	Gas 3 Dnstream
12	19	Output D	12	Gas 4 Dnstream
13	7	Output 2 (+ Divert)	13	Gas 1 Bypass/Purge
14	20	Output 3 (+ Divert)	14	Gas 2 Bypass/Purge
15	8	Output 4 (+ Divert)	15	Gas 3 Bypass/Purge
16	21	Output 5 (+ Divert)	16	Gas 4 Bypass/Purge
17	9		24V Return	
18	22		+24 VDC	Sol Common
19	10		+24 VDC	Sol Common
20	23		+24 VDC	Sol Common
21	11		+24 VDC	Sol Common
22	24		+24 VDC	Sol Common
23	12		+24 VDC	Sol Common
24	25		+24 VDC	Sol Common
25	13		+24 VDC	Sol Common
26			+24 VDC	Sol Common

2.4. Sensors, J9

Either a 9-pin female 'D' connector or a 10-pin IDC header or both is provided for a Door Switch and/or other sensors. Any sensor that provides a relay contact or an NPN transistor output may be used to pull the sensor inputs to 24 Volt Return.

Sensors that provide a relay contact output should be wired "*closed when safe*" and must provide contact closures to 24-volt return. Sensors that provide NPN current sinking outputs should be configured "ON when Safe" and should be capable of 24-volt operation. A 24 Volts DC power supply is available on this connector to provide power for sensors. The emitter of the sensor's output transistor should be wired to 24-Volt Return and the collector of the sensor's output transistor should be wired to the appropriate Digital Input pin on J9.

J9 Pin IDC	J9 Pin 'D'	Function	Sensor
1	1	Digital Input 2	
2	6	+24 V	
3	2	Digital Input 3 *	Pump Purge
4	7	24 Volt Return	Sensor Common
5	3	Digital Input 4 *	Door
6	8	24 Volt Return	Sensor Common
7	4	Digital Input 5	Leak
8	9	24 Volt Return	Sensor Common
9	5	Digital Input 6 *	OverPressure
10		24 Volt Return	Sensor Common

The Pump Purge, Door and OverPressure are used in the Toxic Gas Upstream Valve Hardware Interlocks. Any of these sensors that are not implemented must be jumpered to 24 Volt Return.

An optional internal Door Pressure switch is provided if specified by the customer. This sensor is typically set to activate at 5 PSI. When an internal Door Sensor is provided, do not jumper Digital Input 4 unless you intend to bypass the Door interlock.

2.5. Loader, J10

Either a 15-pin female 'D' connector or a 16-pin IDC header or both is provided for connection to a boat loader.

J10 Pin IDC	J10 Pin 'D'	Function	
1	1	Digital Output 0	Load
2	9	+24 Volts	Output Common to Loader
3	2	Digital Output 1	Unload
4	10	Digital Input 0	BIC
5	3	24 Volt Return	Input Common to Loader
6	11	Digital Input 1	BOC
7	4	Speed Setpoint	Analog Output 8
8	12	Position	Analog Input 8
9	5	Analog Common	
10	13	LDR +24V	*
11	6	LDR 24V Return	*
12	14	LDR +24V	*
13	7	LDR 24V Return	*
14	15	LDR +24V	*
15	8	LDR 24V Return	*
16		LDR +24V	*

* Pins 10 through 16 on the IDC connector, or the corresponding pins on the 'D' connector, are provided for those applications in which the loader is powered from the GPI-904. Note: Some boat loader boards, especially older versions, may require modification to be compatible with this pinout.

2.6. Remote, J11

Either a 9-pin female 'D' connector or a 10-pin IDC header or both is provided for connecting control signals from a remote control panel to the process sequencer. These signals are not used by the GPI directly, however, the GPI does provide a Solid State Relay to buffer an Alarm signal that may originate at the process controller. Generally, the RUN/HOLD/RESET signals would be isolated at the process sequencer. An external buzzer and any remote control switches may be powered by the internal 24-volt power supply or by an external +5 volt to +24 volt power supply.

J11 Pin IDC	J11 Pin 'D'	Function	
1	1	RUN	Switch to Ground to RUN
2	6	ALARM OUT (-)	ALARM -
3	2	RESET	Switch to Ground to RESET
4	7	+24 Volts	ALARM +
5	3	ALARM SILENCE	Switch to Ground to Silence
6	8	+24 Volts	Tie to Remote Common
7	4	ABORT	Switch to Ground to ABORT
8	9	REMOTE COMMON	+5VDC to +24VDC
9	5	24 Volt Return	
10		24 Volt Return	

2.7. Auxiliary, J12

Either a 15-pin female 'D' connector or a 16-pin IDC header or both is provided for access to various calibration and control signals. The signals on this connector may be used for general Analog and Digital I/O or for Throttle Valve Control. Note that the Leak and OverPressure signals on this connector are the same signals that also appear on the Sensor Connector.

J12 Pin IDC	J12 Pin 'D'	Function	
1	1	+24 VDC	
2	9	24V RETURN	Sensor Common
3	2	DIGITAL INPUT 7	
4	10	AUX 2, NC	
5	3	AUX 2, NO	
6	11	AUX COMMON	TTL Command Common
7	4	AUX 1, NO	TTL Enable
8	12	AUX 1, NC	TTL Open
9	5	DIGITAL INPUT 5	Leak
10	13	24V RETURN	Sensor Common
11	6	DIGITAL INPUT 6	Over Pressure (OP)
12	14	ANALOG INPUT 9	TTL Actual
13	7	ANALOG OUTPUT 9	TTL Setpoint
14	15	ANALOG COMMON	Analog Common
15	8	N/C	
16		ANALOG COMMON	

The circuit board in the GPI 904 contains a jumper, JP7, to select the source of Digital Input 7. When JP7 is jumpered between Pin 1 and Pin 2, Digital Input 7 becomes a 'GPI Fault' sensor that informs the DDC when the GPI power supply has failed. When JP7 is jumpered between Pin 2 and Pin 3, Digital Input 7 is connected to J12 and is available for some alternate purpose.

2.8. Power Input

The GPI-904 operates on AC voltages ranging from 85 VAC to 264 VAC at frequencies ranging from 47 to 63 Hertz without the need for jumpers or selector switches. Operation on DC power sources is also specified. A standard IEC power receptacle is provided for connection to an AC power source. See page 15 for additional information.

Note: Do not connect the unit to AC power until the valves and sensors are connected.

3. CONFIGURATION AND OPERATION

3.1. Auxiliary Relays, JP8 & JP9

Two sets of relay contacts are provided on connector J12. One of the relays may be controller by either Output 0 or by Output 8 as selected by Jumper JP8. The second relay may be controller by either Output 1 or by Output 9 as selected by Jumper JP9. The default jumper settings link to two auxiliary relays to Outputs 8 and 9.

3.2. MFC Override Relays, JM1 to JM6

A relay is provided for each of the six Mass Flow Controller (MFC) connectors, J1 through J6. Most MFC's include an "Override" feature that forces the flow controller closed regardless of the analog setpoint. This feature is typically activated by a contact closure between the Override pin and the Digital Common pin on the MFC.

The Override relays in the Gas Panel Interface are typically jumpered to the "Normally Closed" contacts of the relay. In this configuration, the signal that energizes the relay permits gas to flow by releasing the Override command.

In the event that a particular MFC connector is used for some other peripheral, the associated relay may be jumpered "Normally Open". In this configuration, the signal that energizes the relay closes the contact thereby enabling the peripheral.

3.3. Gate Valve Interlocks

In a standard GPI-904 configuration, Output 7 controls the Gate Valve.

The Gate Valve is prevented from opening until three hardware conditions are met:

- Output 7 must be energized by the DDC.
- The sensor connected to Input 3 must be satisfied (usually an Atmosphere switch or a Pump Purge monitor or both wired in series).
- A Door Sensor connected to Input 4 must be satisfied.

In some installations, additional software interlocks may prevent the DDC from energizing Output 7.

The Soft Pump (1/2 Gate) Valve, if present, is typically not hardware interlocked.

3.4. Toxic/Flammable Gas Control

The circuit board for the GPI-904 provides circuitry for interlocking up to (4) Upstream Gas Valves. In addition, a set of Bypass/Purge relays is provided to divert the (4) upstream gas control signals to an alternate set of valves. The alternate solenoids may be used to either introduce a purge gas upstream to any of the MFC's or to bypass any of the MFC's thereby allowing the upstream tubing to be pumped out. In either case, relay logic prevents the upstream process gas valves from being energized simultaneously with any Bypass or Purge solenoids.

3.4.1. Divert Function

Any of the signals that normally control the first (4) Upstream Gas Valves may be diverted to an alternate set of valves. When JP5 is jumpered across the pins labeled "DOUT F TO DIVERT RELAY", the Output F signal that normally controls the Override Relay on MFC 6 is reassigned to control the Divert Relays. In many installations, MFC 6 is either unused or may be assigned to an inert gas that doesn't require an Override function.

Pins 1 and 2 may be jumpered on JP1 through JP4 to selectively disable the Divert Function on any combination of the first (4) gas channels. In addition, omitting the jumper on JP5 effectively disables the Divert Function on all gas channels.

3.4.2. Gas Interlocks

When the Divert Function is not configured or not activated, additional interlocks must be satisfied to activate any of the first (4) Upstream Gas Valves:

- The Gate Valve must be open. Therefore, all of the Gate Valve interlocks specified above must be satisfied.
- The sensor connected to Input 6 must be satisfied (usually a Throttle Valve Controller OverPressure signal).

Pins 3 and 4 may be jumpered on JP1 through JP4 to selectively disable the interlocks on any combination of the first (4) gas channels.

In some installations, additional software interlocks may further restrict specific combinations of gases.

4. SPECIFICATIONS

4.1. Physical

Dimensions:	10.05 in. high x 6 in. wide x 4 in. deep
Weight:	4 lbs. maximum
Finish:	Cardinal, high bake, water-based paint, medium texture.

4.2. AC Power Requirements

AC Frequency:	47 to 63 Hertz
AC Voltage:	85 to 264 Volts AC
DC Voltage:	120 to 370 Volts DC
Power:	100 watts maximum
Efficiency:	75-85% Typical

5. JUMPER SUMMARY

5.1. Jumper Definition

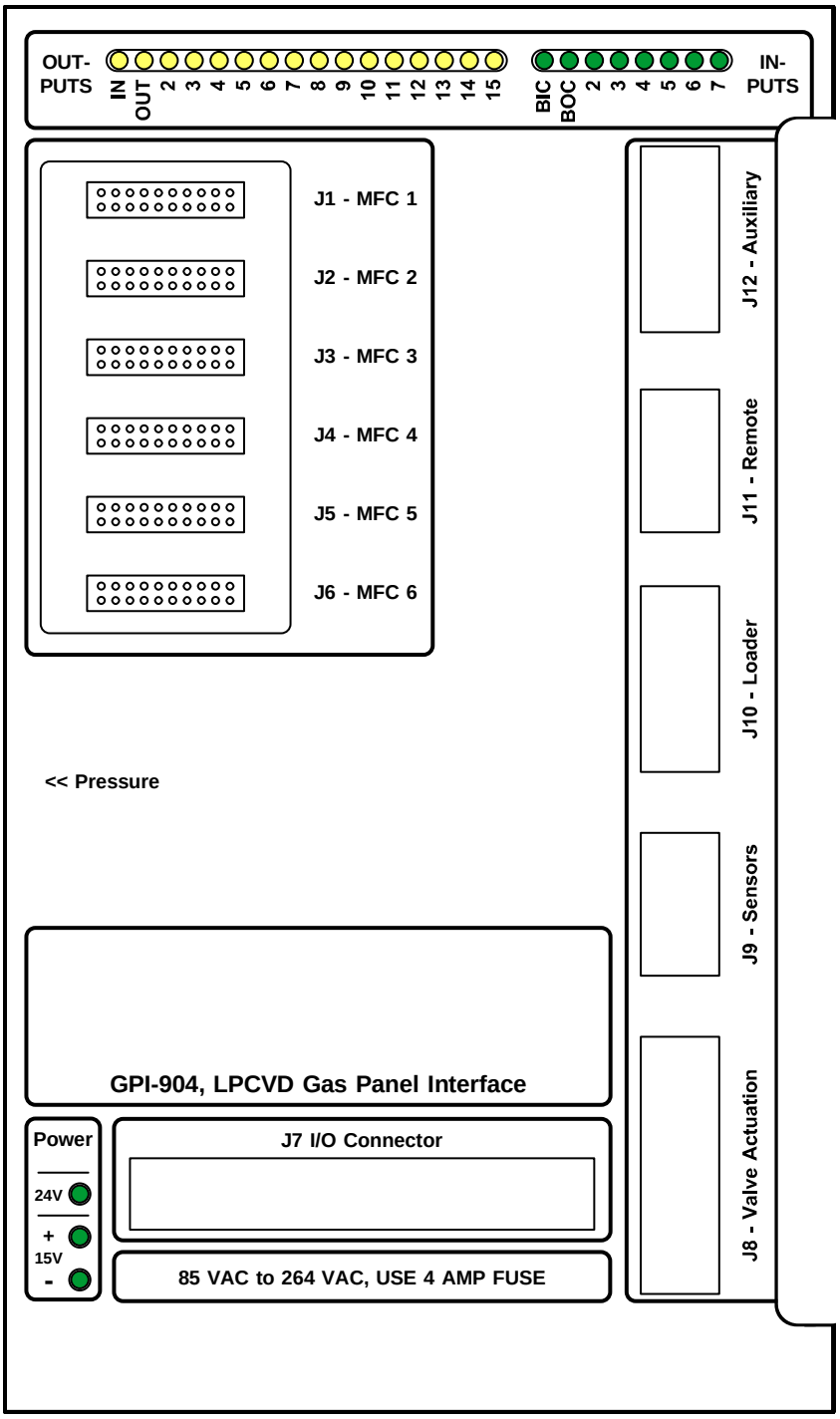
Jumper	Function	Pins 1-2	Pins 3-4	
JP1	Gas 1	Bypass Divert	Bypass Interlocks	Shunt Pins 1 & 2 on any Gas Channels that do not have an MFC Purge Valve or an MFC Bypass Valve. Shunt Pins 3 & 4 on any Gas Channels that do not require hardware interlocks on the Upstream Gas Valve.
JP2	Gas 2	Bypass Divert	Bypass Interlocks	
JP3	Gas 3	Bypass Divert	Bypass Interlocks	
JP4	Gas 4	Bypass Divert	Bypass Interlocks	
Jumper	Function	Pins 1-2	Pins 2-3	
JP5	Digital Output F	Send Output F to MFC 6 Override Relay	Send Output F to Divert Relay	Determines whether Digital Output F controls the MFC 6 Override relay or the Gas 1 thru Gas 4 Divert Relays (Bypass/Purge Valves)
JP7	Digital Input 7	24V Return	INP 7	Determines source of Digital Input 7 signal
JP8	Aux 1	Dig Out 0	Dig Out 8	Determines source of control signal for Aux 1 relay
JP9	Aux 2	Dig Out 1	Dig Out 9	Determines source of control signal for Aux 2 relay
JM1 to JM6	MFC OR	N.C.	N.O.	Selects Normally Closed/Normally Open contacts on MFC relays

5.2. Default Jumper Settings

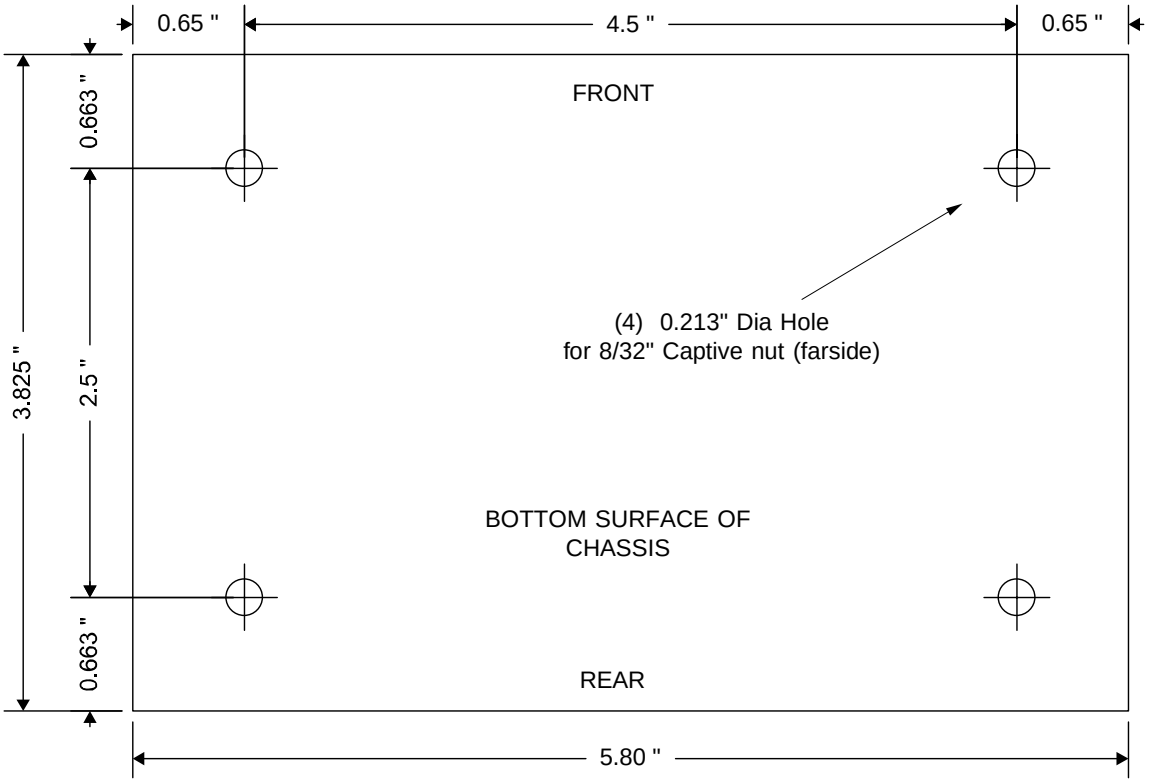
Jumper	Function		GPI-904
JP1			No Jumpers
JP2			No Jumpers
JP3			No Jumpers
JP4			No Jumpers
JP5			MFC 6
JP6			Not Present
JP7	Digital Input 7		INP 7
JP8	Aux 1		Dig Out 8
JP9	Aux 2		Dig Out 9
JM1 to JM6	MFC Override		N.C.

6. APPENDIX

6.1. Front Panel Artwork



6.2. Bottom View



REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

PROCESS SEQUENCER

J7 (IDC version)

SUPPLY(+) 49 +24V
SUPPLY(-) 26 24V_RET

DOUT_0 50 DOUT_0
DOUT_1 47 DOUT_1
DOUT_2 48 DOUT_2
DOUT_3 45 DOUT_3
DOUT_4 46 DOUT_4
DOUT_5 43 DOUT_5
DOUT_6 44 DOUT_6
DOUT_7 41 DOUT_7
DOUT_8 42 DOUT_8
DOUT_9 39 DOUT_9
DOUT_A 40 DOUT_A
DOUT_B 37 DOUT_B
DOUT_C 38 DOUT_C
DOUT_D 35 DOUT_D
DOUT_E 36 DOUT_E
DOUT_F 33 DOUT_F

DINP_0 34 DINP_0
DINP_1 31 DINP_1
DINP_2 32 DINP_2
DINP_3 29 DINP_3
DINP_4 30 DINP_4
DINP_5 27 DINP_5
DINP_6 28 DINP_6
DINP_7 25 DINP_7

AOUT_8 15 AOUT_8
AOUT_9 13 AOUT_9
AOUT_A 11 AOUT_A
AOUT_B 9 AOUT_B
AOUT_C 7 AOUT_C
AOUT_D 5 AOUT_D
AOUT_E 3 AOUT_E
AOUT_F 1 AOUT_F

AINP_8 16 AINP_8
AINP_9 14 AINP_9
AINP_A 12 AINP_A
AINP_B 10 AINP_B
AINP_C 8 AINP_C
AINP_D 6 AINP_D
AINP_E 4 AINP_E
AINP_F 2 AINP_F

ANALCOM 17

REM_COM 19 REM_COM
RUN 23 RUN
RESET 24 RESET
AL_SIL 21 AL_SIL
ABORT 22 ABORT

ALARM(+) 20 ALARM+
ALARM(-) 18 ALARM-

DOUT_F → J16 (+24V, DINP_4, 24V_RET)

AGND TP1

VLV_1 VLV_2 VLV_3 VLV_4 VLV_6

CR1–CR16, R1–R16, D1–D16, RD01–RD15

+24V 24V_RET

ALARM- ALARM+ → R30 → SSR1 (ALM_OUT, 24V_RET)

DOUT_1 DOUT_9 DOUT_0 DOUT_8 → JP9, JP8

+24V → RL10, RL11 (COM, NC, NO)

DINP_7 → JP7 (GPI OK, 24V_RET)

AINP_9 → R31, POT1 (CCW, CW), R26, R29, R28, R32, R27, U3-B, U3-A, Z1

AOUT_9 → U3-D

+24V → R17–R24, D17–D24 → DINP_0 … DINP_7

PWCOM_A … PWCOM_F, +15V_RET, -15V_RET → ZTL2 … ZTL9

ZBL1 … ZBL7 → SIGCOM_A … SIGCOM_F

UNIPOTENTIAL PAD

VALVES

IDC8 J8

VLV_1 VLV_2 VLV_3 VLV_4 DOUT_6 VLV_6 DOUT_8 DOUT_9 DOUT_A DOUT_B DOUT_C DOUT_D
BYP_1 BYP_2 BYP_3 BYP_4 24V_RET
+24V

SENSORS

IDC9 J9

DINP_2 +24V
Purge DINP_3
Door DINP_4
Leak DINP_5
OP DINP_6

LOADER

IDC10 J10

DOUT_0 +24V DOUT_1
DINP_0 24V_RET DINP_1 AOUT_8 AINP_8
LDR+24V LDR_RET

REMOTE

IDC11 J11

RUN ALM_OUT
RESET +24V
AL_SIL +24V
ABORT REM_COM 24V_RET

AUX

IDC12 J12

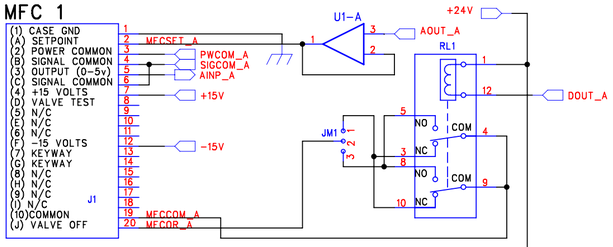
+24V 24V_RET DINP_7J AUX2_NC AUX2_NO AUXRLYCOM AUX1_NO AUX1_NC DINP_5 DINP_6 TTLAGT TTLSET AGND AGND
Leak OP

ZL1 ITS LOGO

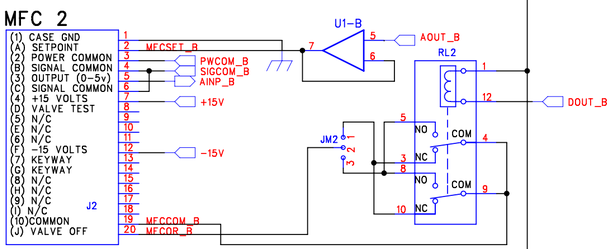
DRAWN: wrt	DATED: 15JAN2008	COMPANY: Integrated Time Systems, Inc. San Jose, CA U.S.A.	
CHECKED:	DATED:	TITLE: Gas Panel Interface Board LPCVD, Model 904	
QUALITY CONTROL:	DATED:	CODE:	SIZE: C
RELEASED:	DATED:	DRAWING NO: 9990534	REV: A
		SCALE:	SHEET: 1 OF 2

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

MFC 1



MFC 2



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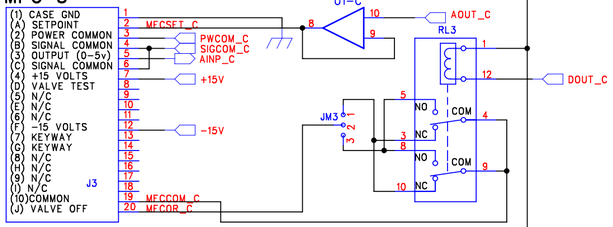
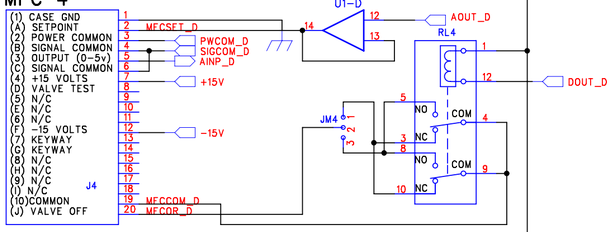
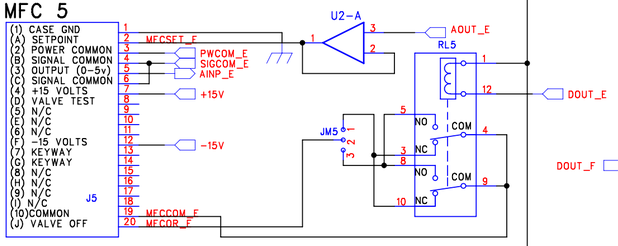


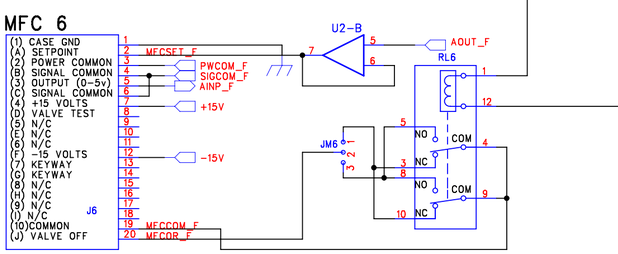
MFC 4



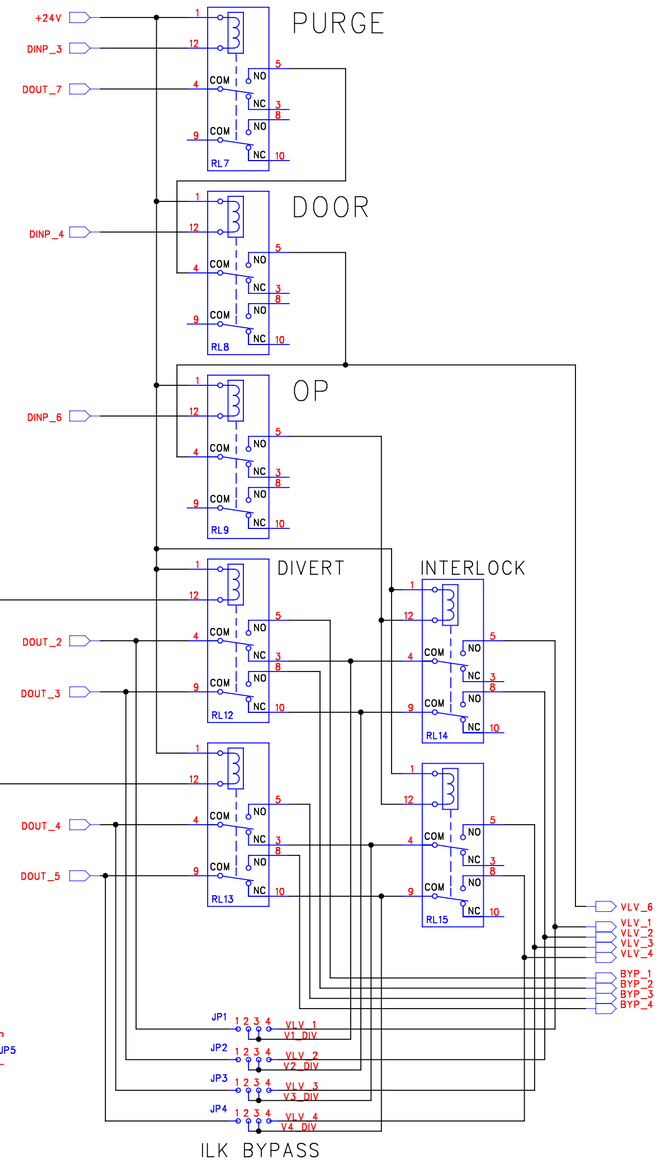
MFC 5

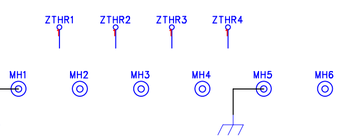


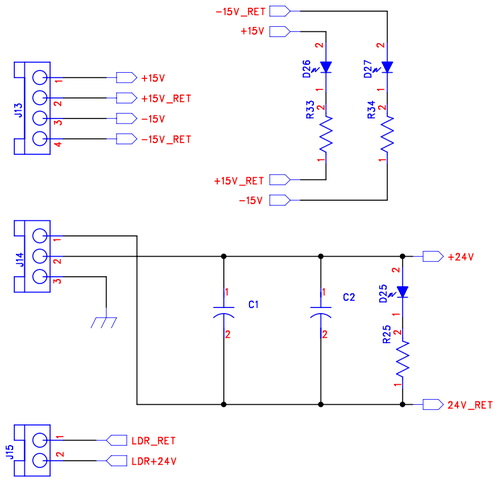
MFC 6

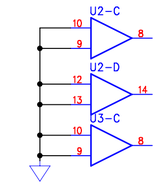


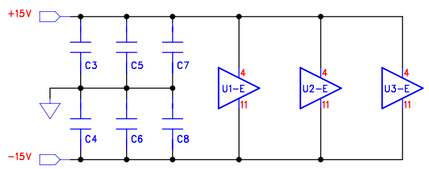
GAS INTERLOCKS











DRAWN: wrt	DATED: 15JAN2008	COMPANY: Integrated Time Systems, Inc. San Jose, CA U.S.A.	
CHECKED:	DATED:	TITLE: Gas Panel Interface Board LPCVD, Model 904	
QUALITY CONTROL:	DATED:	CODE:	SIZE: C
RELEASED:	DATED:	DRAWING NO: 9990534	REV: A
		SCALE:	SHEET: 2 OF 2