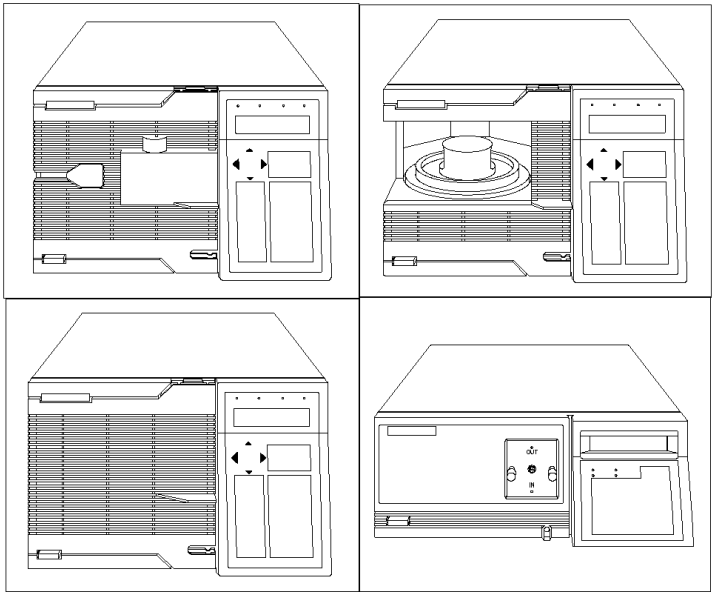
1050 Series of HPLC Modules

Service Handbook - Common Information



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IMPORTANT NOTE

This version of the 1050 service manual includes all sections from the 01050-90102 edition 4 (1995) and G1306-90102 edition 2 (May 1994). It merges both sections, the MWD and the DAD.

The series I opticals information (79854A MWD) information has been removed (product went out of support during 2000).

Part numbers have been updated as of 11/2001. Contact your local Agilent support office in case of part number issues or upgrades.

The latest version of this manual is available as Adobe Acrobat Reader (PDF) version only and can be downloaded from the Agilent Technolgies web page www.agilent.com.

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Common: General Information

This chapter provides general information about the 1050 Series of HPLC Modules

Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

General

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

Operation

Before applying power, comply with the installation section. Additionally the following must be observed.

Do not remove instrument covers when operating. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, and so on.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible. When inevitable, this should be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of

rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or make any unauthorized modification to the instrument.

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

When working with solvents please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet by the solvent vendor, especially when toxic or hazardous solvents are used.

Safety Symbols

Table 1 shows safety symbols that are used on the instrument and in the manuals.

Table 1 **Safety Symbols**

Symbol	Description
	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to prevent risk of harm to the operator and protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	Eye damage may result from directly viewing the light produced by the deuterium lamp used in this product. Always turn off the deuterium lamp before opening the metal lamp door on the side of the instrument.

WARNING **A warning alerts you to situations that could cause physical injury or damage to the equipment. Do not proceed beyond a warning until you have fully understood and met the indicated conditions.**

CAUTION A caution alerts you to situations that could cause a possible loss of data. Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

Radio Interference

Manufacturer's Declaration

This is to certify that this equipment is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost was notified that this equipment was put into circulation, the right to check the series for compliance with the requirements was granted.

Test and Measurement

If test and measurement equipment is operated with equipment unscreened cables and/or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

Sound Emission

Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure Lp < 70 dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)

UV-Radiation

Emissions of ultraviolet radiation (200-315 nm) from this product is limited such that radiant exposure incident upon the unprotected skin or eye of operator or service personnel is limited to the following TLVs (Threshold Limit Values) according to the American Conference of Governmental Industrial Hygienists:

Table 2 **UV-Radiation Limits**

Exposure/day	Effective Irradiance
8 hours	0.1 µW/cm^2
10 minutes	5.0 µW/cm^2

Typically the radiation values are much smaller than these limits:

Table 3 **UV-Radiation Typical Values**

Position	Effective Irradiance
Lamp installed, 50-cm distance	average 0.016 µW/cm^2
Lamp installed, 50-cm distance	maximum 0.14 µW/cm^2

Solvent Information

Observe the following recommendations on the use of solvents.

Flow Cell

Long term operation at pH > 11 should be avoided. Never leave strongly alkaline solutions in the flow cell without flow.

Solvents

Always filter solvents through 0.4 µm filters, small particles can permanently block the capillaries. Avoid the use of the following steel-corrosive solvents:

- Solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on).
- High concentrations of inorganic acids like sulfuric acid, especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer which are less corrosive against stainless steel).
- Halogenated solvents or mixtures which form radicals and/or acids, for example:

  $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

  This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol.
- Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropylether) such ethers should be filtered through dry aluminium oxide which adsorbs the peroxides.
- Solutions of organic acids (acetic acid, formic acid, and so on) in organic solvents. For example, a 1-% solution of acetic acid in methanol may attack steel.
- Mixtures of carbon tetrachloride with 2-propanol or THF dissolve stainless steel.

1050 Introduction

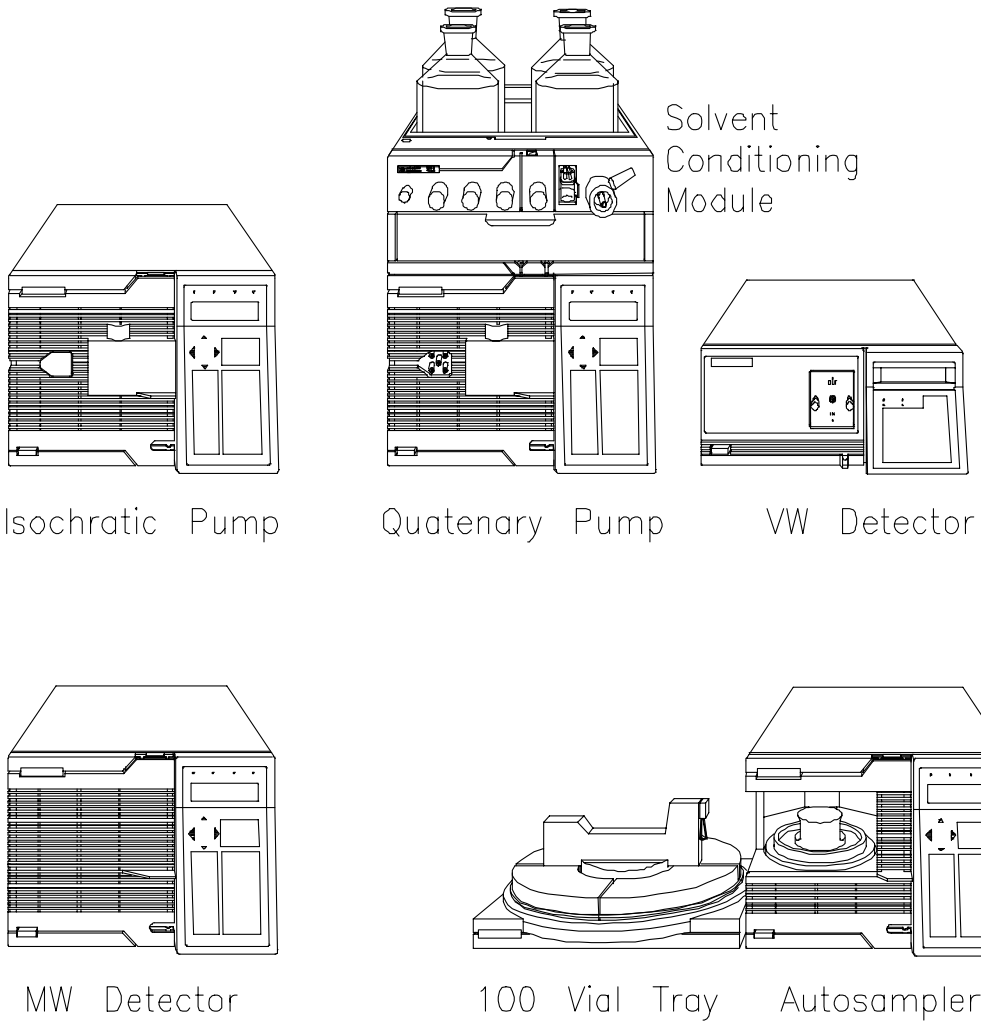
The Modules Overview

1050 is a series of HPLC products based on a modular concept. The necessary functions are broken down into independent stand-alone modules with standardized external design hydraulic- and external interfaces. Following modules will be available at introduction:

Table 4 **1050 Modules**

Module	Product Number
1050 Isocratic Pump	79851A
1050 Quaternary Pump	79852A
1050 Quaternary Pump (bio compatible)	79852B
1050 Variable Wavelength Detector	79853C
1050 Multiple Wavelength Detector	79854A
1050 Diode Array Detector	G1306A
1050 Autosampler	79855A
1050 Autosampler (bio compatible)	79855B

Figure 1 **1050 Modules**



1050 Identification

Each module is identified by a 5 digit product number and a 10 unit serial number on a label attached to the wall inside the module. The first four digits of the serial number are the serial prefix. The letter identifies the country of origin. The last five digits are an identification number unique to each module. Any changes to the modules will be covered initially by Service Notes. They will be sent out to all Service personnel prior to implementation of the change to the instrument. With every reprint these changes will be incorporated into the documentation.

Repair Policy

Major mechanical and electrical assemblies inside the 1050 modules will be repaired on an assembly-exchange level. All other items have to be repaired on board/component level. Repair procedures are given in the respective sections of this manual (refer to Table of Contents). Assemblies can be set up to the Blue Stripe Exchange system or can be removed. If in doubt contact Waldbronn Product Support (Europe/ICON) or Little Falls Product Support (USA/Canada).

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Common: Electronic Information

This chapter provides common electronic information about the 1050 Series of HPLC Modules

Common: Electronic Information

This chapter gives information about the common electronics used in more than one of the 1050 Series of modules:

- Overview
- Common Main Processor (CMP)
- Remote Control
- Firmware Boards (FIM, SFW)
- Fluorescent Indicator Module (FIP)
- External Contacts
- Poweer Supplies (DPS-B, DPS-A)
- Communication Interfaces (CIB, CRB)

Overview

Some of the electronic boards are used in more than one 1050 module.

The following table shows common electronic assemblies:

Table 1 **Common Electronic Boards**

Description	Modules	Part Number	Exchange
Power Supply (DPS-B)	pump, sampler	5061-3374	01050-69374
Power Supply (DPS-A)	MWD, DAD, VWD	5061-3375	01050-69375
Common Main Processor (CMP)	pump, sampler, MWD, DAD	5061-3380	01050-69580
Display Interface Board (FIP)	pump, sampler, MWD, DAD	5061-3376	no
Communication Interface (CIB)	pump, sampler	5061-3382	no
Communication Interface (CRB)	MWD, DAD	5062-2482	no

Common Main Processor Board (CMP)

Repair Level: Board

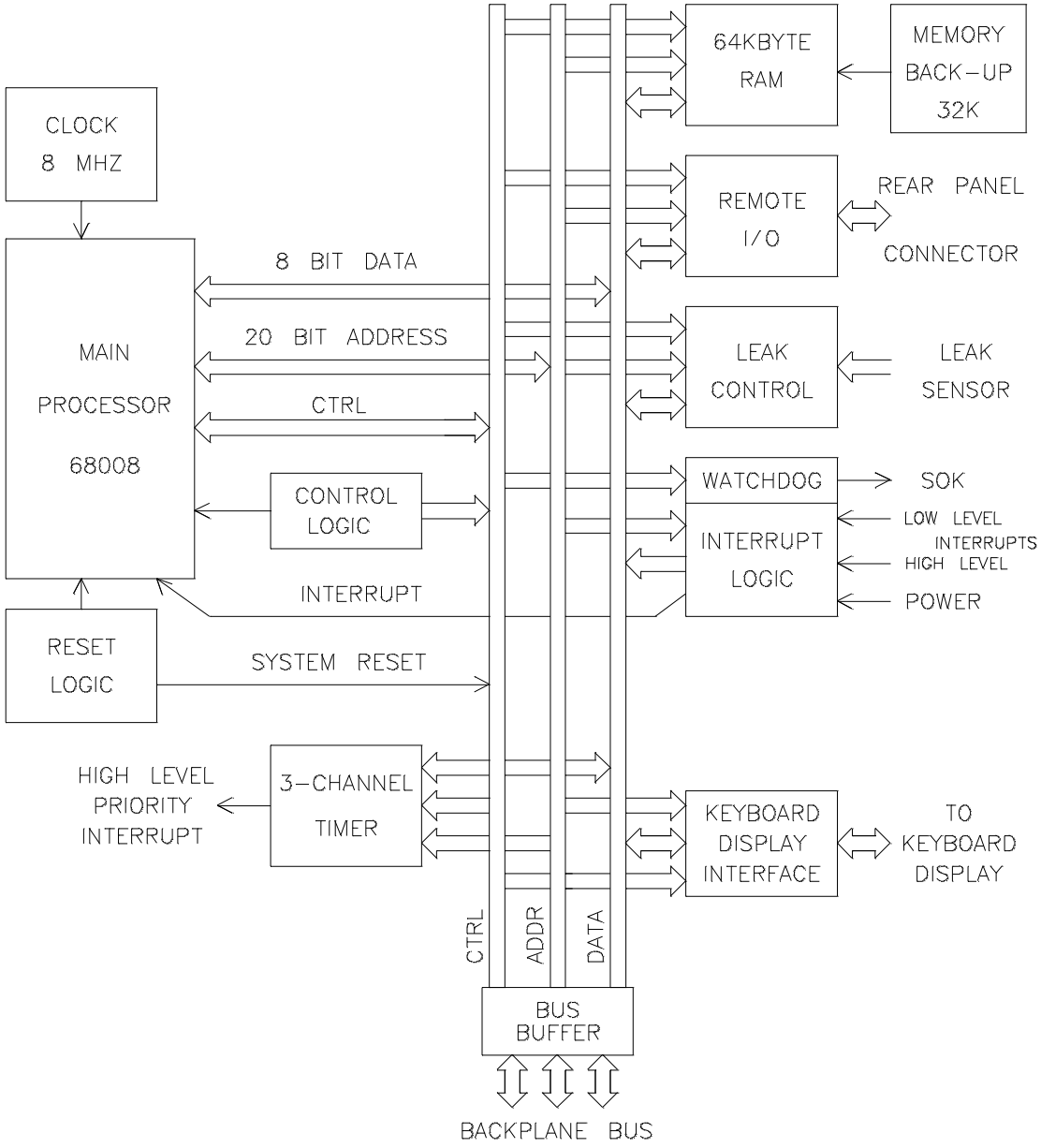
Table 2 **Part Numbers for CMP Board**

Item	Part Number
CMP Board (Exchange)	01050-69580
CMP Board (NEW)	5061-3380

Common 1050 Functions

- display handling
- keyboard polling
- remote control input and output
- leak sensing
- option interfacing
- time programming
- method storage
- module configuration
- memory switching
- 32 kbyte RAM with battery back-up for parameter storage.

Figure 1 **Blockdiagram CMP**



According to the above functions the main processor board contains some basic hardware which is common to all 1050 modules:

- 68008 main processor running at 8 MHz;
- 64 kByte RAM (32 kbyte RAM with battery back-up for parameter storage. The data will be lost when CMP is removed from the slot);
- interrupt logic for system communication;
- 3 channel software controlled timer;
- interface to keyboard/display module;
- remote I/O hardware;
- leak sensor electronics;
- interface to backplane bus;
- watchdog hardware.

Firmware is not part of this board, because parts of the main processor's software are module specific. The main processor firmware will be located on the 'personality module' (AQB-, RAD, VMD-Board) or on an optional board.

CMP Details

Interrupt system

There are one non-maskable interrupt six high priority hardware interrupt lines and seven low priority mail interrupt lines. The non-maskable interrupt is connected to the powerfail line of the power supplies (DPS-A/B).

The high priority interrupt lines are: One from timer 6840 for hardware synchronization and five from remaining slots (these lines are disabled by SOK- = HIGH (system not ok).

The low priority interrupt lines are: Five lines from all slots except power supply used for communication with local processors via dual port RAMs and two lines for CMP controlled software interrupts.

Watchdog timer

(Test for CPU hang-up) This circuitry is software retriggerable and is disabled during CPU initialization. In case of CPU hang-up SOK line is set the CPU is halted and the remote line 'shutdown' is set.

LED on board

There is a RED LED on the board which is the output of the watchdog circuit. It is ON during initialization and when the processor has a hang-up (LD 101).

Programmable timer

It includes 3 independent timers:

- Timer 1 is connected to the backplane bus it's free for module special use.
- Timer 2 is used as software timer for the CMP.
- Timer 3 is used to generate the BUS ERROR signal.

Reset system

A harware reset is performed

- at power
- manually by on-board switch

Hardware reset will reset all devices connected to the bus but main processor can reset these devices by software too.

Reset for display unit

The latch for the status LEDs and the brigthness control will not be reseted by power on or by software reset. The alphanumeric display is reseted at power on.

I/O

Two remote connectors are at the rear panel. They provide start, stop, not ready, shutdown, prepare-run and power on signals. The remote lines are input and output and are decoupled for EMC. The shutdown line is set by hardware in the case of leak or CPU hang-up.

System control

The POK (peripheral OK) is driven from all devices. The SOK- (system OK)

- is outputted from main processor to all devices;
- is hardware and software controlled
- disables/enables all devices by main software;
- disables all devices if main processor watchdog becomes active (main processor hang-up);

All devices are enabled after initialization. Bus control After bus request the main processor will pass bus control to the requesting external controller. The local main processor areas including I/O are accessible too.

This may be a feature for diagnostics or if data rate is increasing to much with later options. For this second case an external fast transfer hardware (for example DMA device) could do the transfers after set-up by the main processor.

Leak sensing

The leak detection circuit is located on the CMP board and checks continuously for presence and leak conditions. If the sensor is missing (defect) or in leak condition the PTC is cooled down the error message appears. When the module is turned on the leak message is disabled for some time to allow the sensor to reach its working range.

	Working condition of the PTC	
Normal:	about 75°C	400...500 Ohm
Error:	below 55°C	about 150 Ohm

Actions:

- ❏ Check for leak.
- ❏ Check connector of the sensor.
- ❏ Check resistance of leak sensor.
- ❏ Change leak sensor.
- ❏ Change CMP board.
- ❏ Change FIM board.

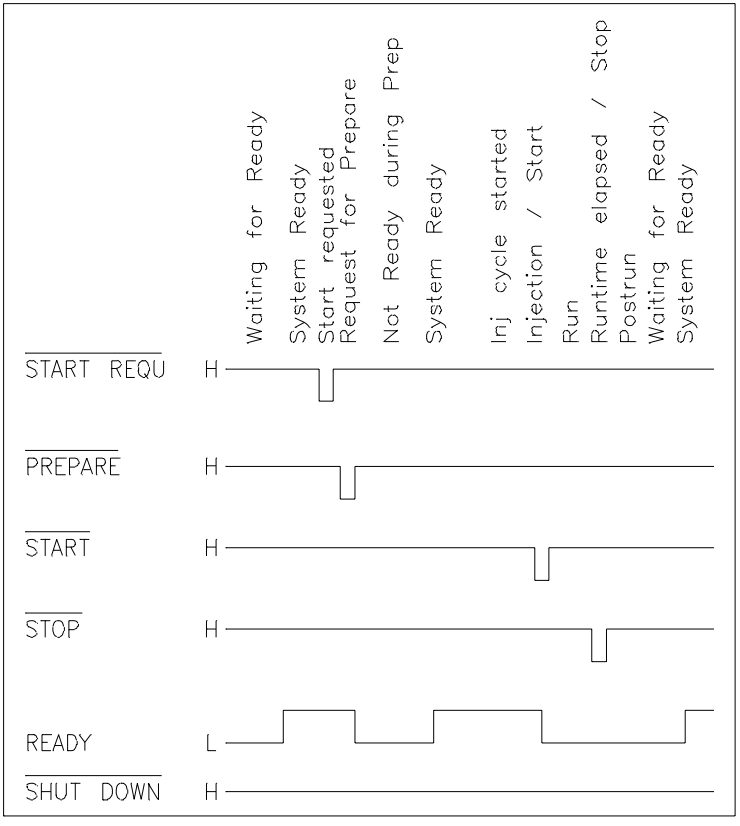
Remote Control

The CMP board provides two remote connectors.

Remote control allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements.

When 1050 System is started from the autosampler the following signals can be measured at the remote lines. The START REQUEST signal is only available when the autosampler was started from any other module (remote configuration set to HPSystem).

Figure 2 **Remote Control Analysis**



For the 1050 Series of HPLC Modules the subminiatur D connector is used. Each module provides two remote connectors which are both parallel and inputs/outputs (wired-or technique).

To provide maximum safety within a distributed analysis system one line is dedicated to SHUT DOWN the system's critical parts in case any module detects a serious problem.

To detect whether all participating modules are switched on or properly powered one line is defined to summarize the POWER ON state of all connected modules.

Control of analysis is maintained by signal readiness READY for next analysis followed by START of run and optional STOP of run triggered on the respective lines. In addition PREPARE and START REQUEST may be issued.

Signal description

SHUT DOWN	(L) System has serious problem (e.g. leak: stops pump). Receiver is any module capable to reduce safety risk.
POWER ON	(H) All modules connected tosystem are switched on. Receiver is any module relying on operation of others.
READY	(H) System is ready for next analysis. Receiver is any sequence controller.
PREPARE	(L) Request to prepare for analysis (e.g. calibration detector lamp on). Receiver is any module performing preanalysis activities.
START REQUEST	(L) Request to start injection cycle (e.g. by start key on any module). Receiver is the autosampler.
START	(L) Request to start run / timetable. Receiver is any module performing runtime controlled activities.
STOP	(L) Request to reach system ready state as soon as possible (e.g. stop run abort or finish and stop injection). Receiver is any module performing runtime controlled activities.

The signal level are defined as standard TTL levels (0 V is logic true, + 5 V is logic false). The remote lines can be input or output (wired or technique).

- Fan-out is 10
- Input Load 2 kOhm against + 5 V
- Outputs are open collector type

The REMOTE Connector

To help you make the correct connections the signals carried on each pin are listed in the table below (the colors refer to wires of remote cable 01046-60201).

Figure 3 **APG Remote Connector**

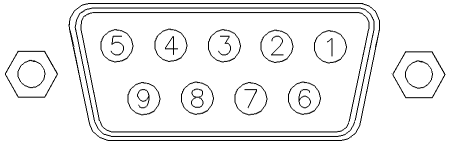


Table 3 **Remote Signals**

Pin	Signal	Active	Color
1	Digital ground		white
2	Prepare run	LOW	brown
3	Start	LOW	gray
4	Shut down	LOW	blue
5	Reserved		pink
6	Power ON	HIGH	yellow
7	Ready	HIGH	red
8	Stop	LOW	green
9	Start request	LOW	black

Remote Configuration

The 1050 Series provides three remote configurations:

HPsystem	Start of automatic operation from any modules' start key. Start request is outputted.
GLOBAL	Synchronized start of several modules for a single run. Start / Stop is outputted.
LOCAL	Single modules' start. No pulses outputted.

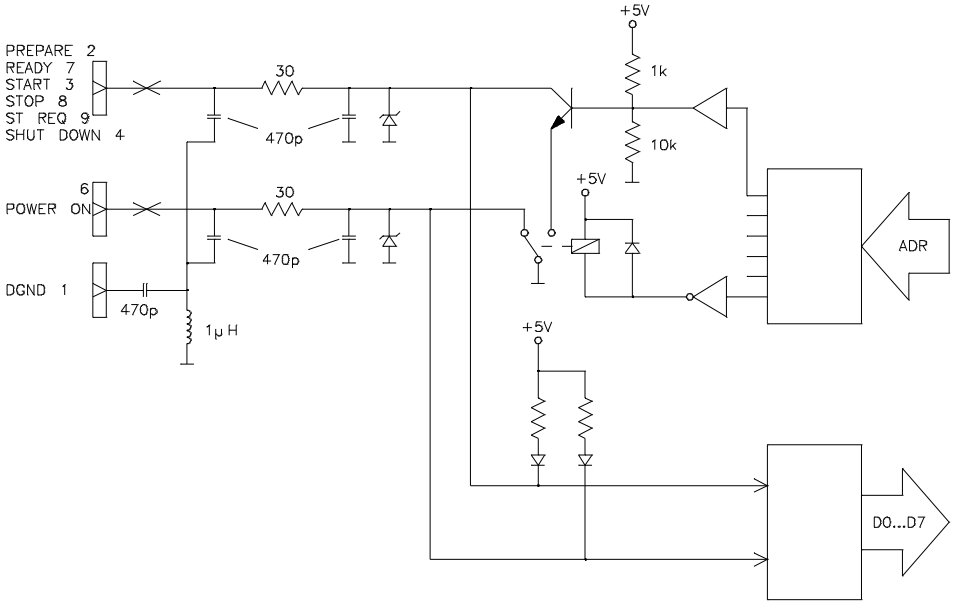
Figure 4 **Table of line definition**

	REMOTE OUTPUTS						REMOTE INPUTS				
Pump / Detector	pre-pare	start run	ready	stop	start requ		pre-pare	start	ready	stop	start requ
HPsystem	Y1	N	Y	Y	Y		Y2	Y	N	Y	N
GLOBAL	N	Y	Y	Y	N		Y3	Y	N	Y	N
LOCAL	N	N	Y	N	N		Y3	Y	N	Y	N
Injector	pre-pare	start run	ready	stop	start requ		pre-pare	start	ready	stop	start requ
HPsystem	Y	Y	Y	Y	N		N	N	Y	Y	Y
GLOBAL	Y	Y	Y	Y	N		N	N	Y	Y	Y
LOCAL	N	N	Y	N	N		Y	Y	N	Y	N

Notes

- Y1 is done by balance key of MWD only.
- Y2 BALANCE on detectors is performed.
- Y3 is not used in the module.
- The remote line SHUT DOWN will always be active.
- The remote line POWER ON will not be processed.

Figure 5 **Schematic of Remote Control**

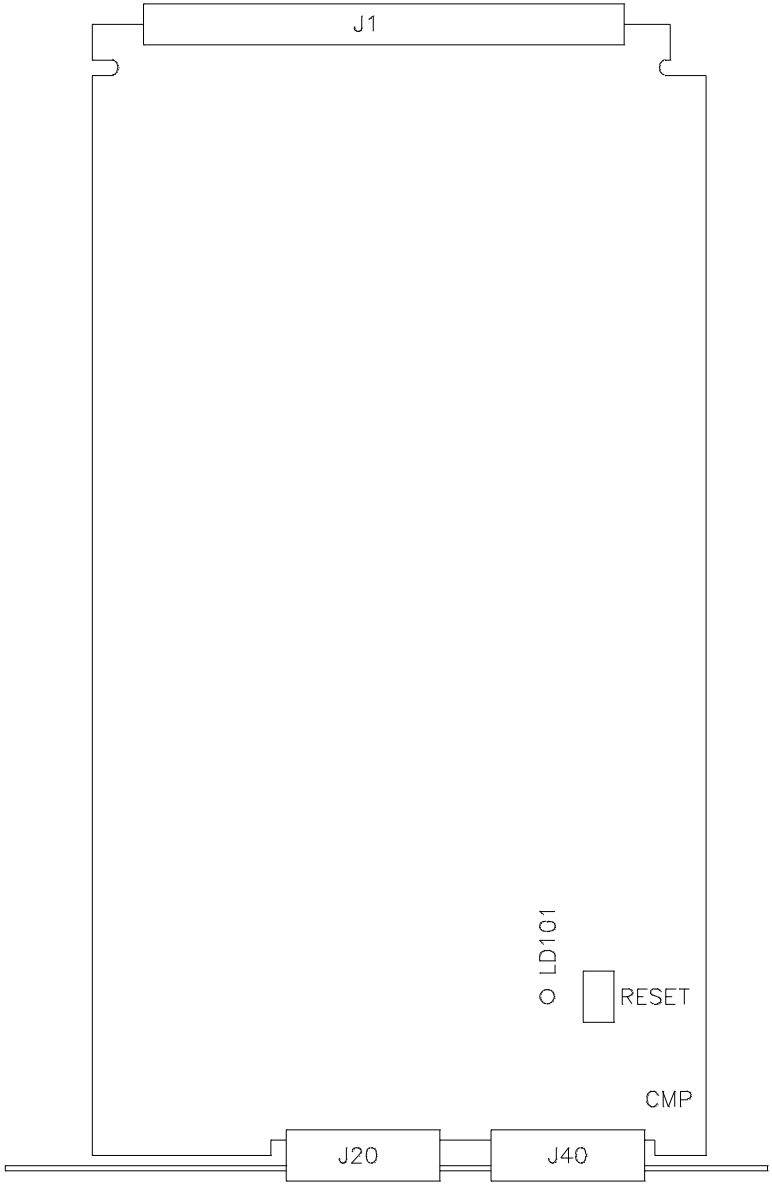


NOTE Above schematic is for Pump, Autosampler, MWD and DAD.

The signal level are defined as standard TTL levels

- (0 V is logic true, +5 V is logic false).
- The remote lines can be input or output (wired or technique).
- Fan-out is 10
- Input Load >=2.2 kOhm against + 5 V
- Outputs are open collector type

Figure 6 **Board Layout CMP**



Firmware Board (FIM)

Repair Level: Exchange Board

Table 4 **Part Numbers for Firmware Boards**

Item	Part Number	Exchange
for Pumps (79851/2A/B) on RAD Board	01018-66518	no
for Autosamplers (79855A/B) on VMD Board	01078-66504	no
for Multiple Wavelength Detectors (79854A) on AQB Board	01048-66504	no
for Diode ArrayDetectors (G1306A) on AQB Board	G1306-66524	no

Firmware Description

Figure 3-7 shows the firmware structure for the 1050 Series of modules (pump, autosampler, multiple wavelength detector and diode array detector). As many as possible tasks use the same core firmware and only special routines for each module are developed seperate (control of the hardware sensors motors and so on). This common structure gives maximum flexibility for later development of similar products.

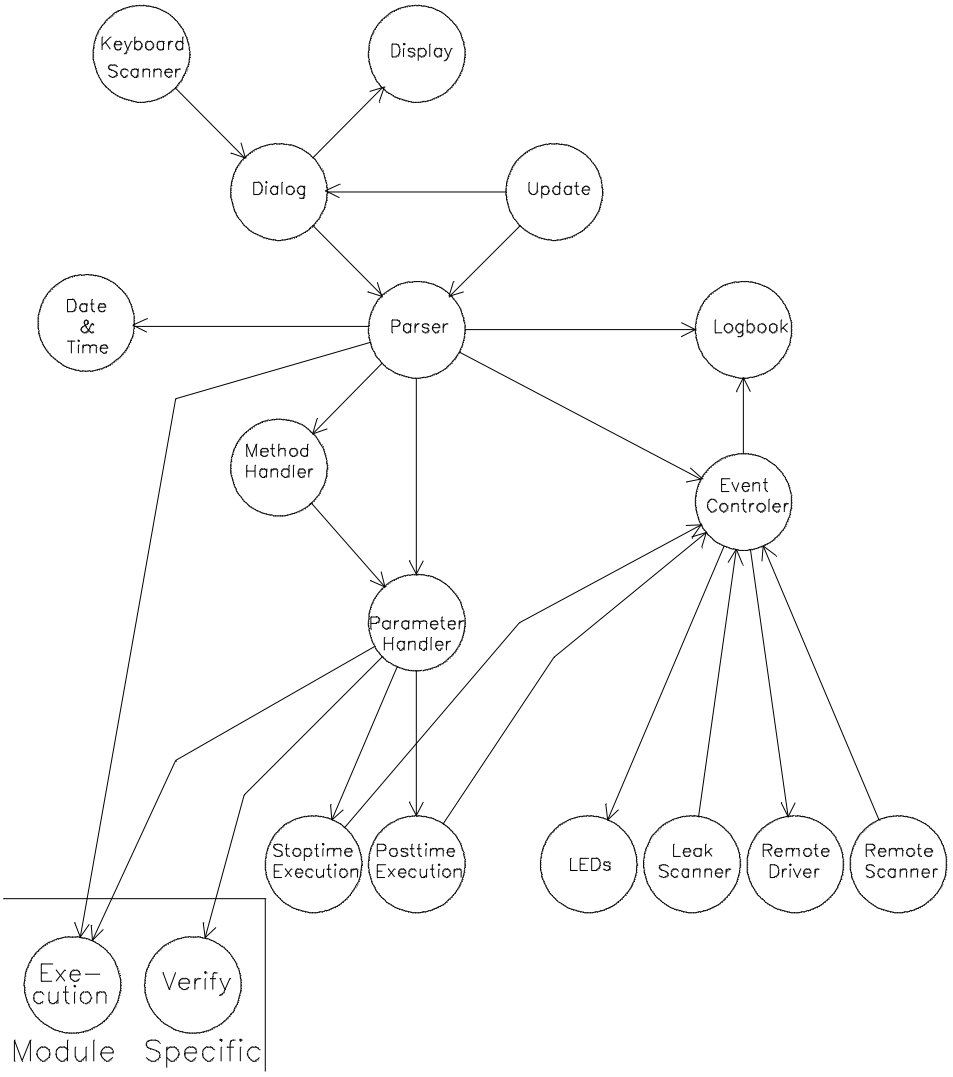
It is obvious that also in the common firmware different commands display contents method parameters and so on. appear (Dialog, Method Handler, Parameter Handler). But nevertheless the structure is the same. In each part of the firmware there exist tables which hold the module specific commands parameters and so on, which are all handled under the same conditions.

The firmware works with a foreground background mode. All time critical tasks (timetable execution, sensor and motor information) are working in the foreground mode and have highest priority. All other tasks share the remaining time in the background. If there are no tasks running the processor goes into the idle state.

The firmware per module has approxmiately 300 kByte, where 170 kByte is Common and 130 kByte module specific).

The firmware is located on the module specific firmware board which is piggy back on the personality board of each module (AQB-, RAD- or VMD-board) and can be exchanged easily.

Figure 7 **Firmware Structure**



Fluorescent Indicator Module (FIP)

Repair Level: Board or Fuse ICP1

Table 5 **Part Numbers for FIP Board**

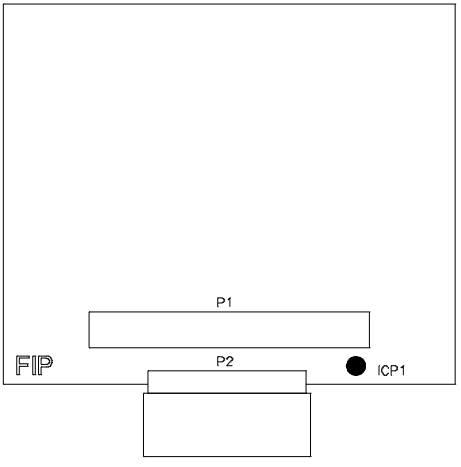
Item	Part Number	used for
FIP Board	5061-3376	pumps, autosampler, MWD amd DAD
Fuse 1 A	2110-0099	

The FIP module is located behind the keyboard module of pump, autosampler and multiple wavelength detector.

The function of the FIP module is to provide an interface between a host system and the user. Messages can be displayed with up to 32 characters (2 lines x 16 characters/line). A matrix keyboard is scanned for numeric or special function input and status information is displayed through 4 LEDs. The characters are displayed in a 5 x 7 dot matrix.

In case of a dark display, check the on board fuse ICP1 (1 A) which is soldered in close to the connector P1/P2.

Figure 8 **Board Layout FIP**



External Contacts

The personality boards of the 1050 modules (MWD/DAD: AQB, Pumps: RAD and Autosampler: VMD) have two external conacts at the rear.

- 1 contact without supply (contact closure) <newline>max. 30 V/250 mA (fused with 250 mA)
- 1 contact with internal 24 V supply (max. 250 mA output with fuse)

The schematic for all three boards (AQB, NMD and RAD) is in general the same. Only the values of the components vary from board to board due to internal specifications.

Figure 9 **External Contacts**

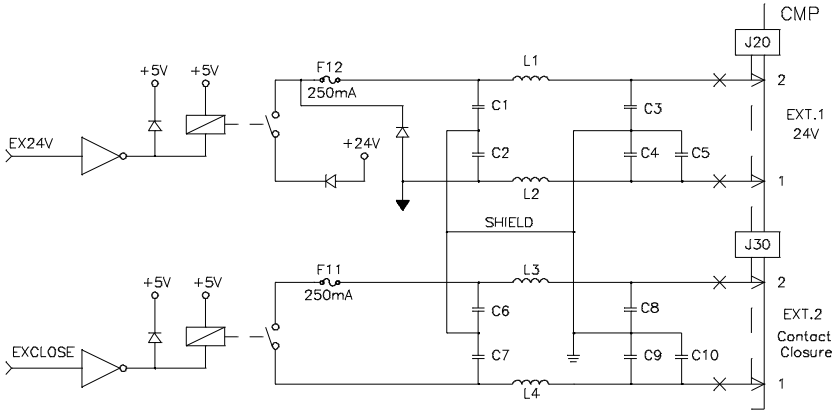


Table 6 **Components of External Contacts**

Components	AQB	RAD	VMD
L1, L2, L3, L4	4.7 µH	10 µH	1 µH
C1, C2, C6, C7	100 nF	1 nF	
C3, C4, C8, C9	10 nF	10 nF	10 nF
C5, C10	1 nF		
Fuse F250 mA (2110-0004)			

Power Supply (DPS-B / DPS-A)

Repair Level: Fuses and DPS-B / DPS-A

Table 7 **Part Numbers for LUC/LPC Board**

Item	Part Number	used for
DPS-B (Exchange)	01050-69374	Pumps and Autosamplers
DPS-B (New)	5061-3374	Pumps and Autosamplers
DPS-A (Exchange)	01050-69375	MWD, DAD, VWD
DPS-A (New)	5061-3375	MWD, DAD, VWD
Fuse for 110 V operation 3 A	2110-0003	
Fuse for 220 V operation 2 A	2110-0002	

General Description

The power supply is a primary switching regulated type. It consists of two parts. the Base Supply and the Lamp Supply. The Base Supply provides outputs of +5 V, ±19 V, +24 V and +36 V. In addition the Lamp Supply provides all circuits necessary for the operation of a deuterium lamp.

Base Supply (DPS-B)

Figure 11 on page 59 shows the base part of the DPS-A. The line voltage is rectified filtered and switched with about 50 kHz by a power MOS-FET. The complete control of frequency and pulsewidth is made by the control board #1 containing the logic needed and the FET driver.

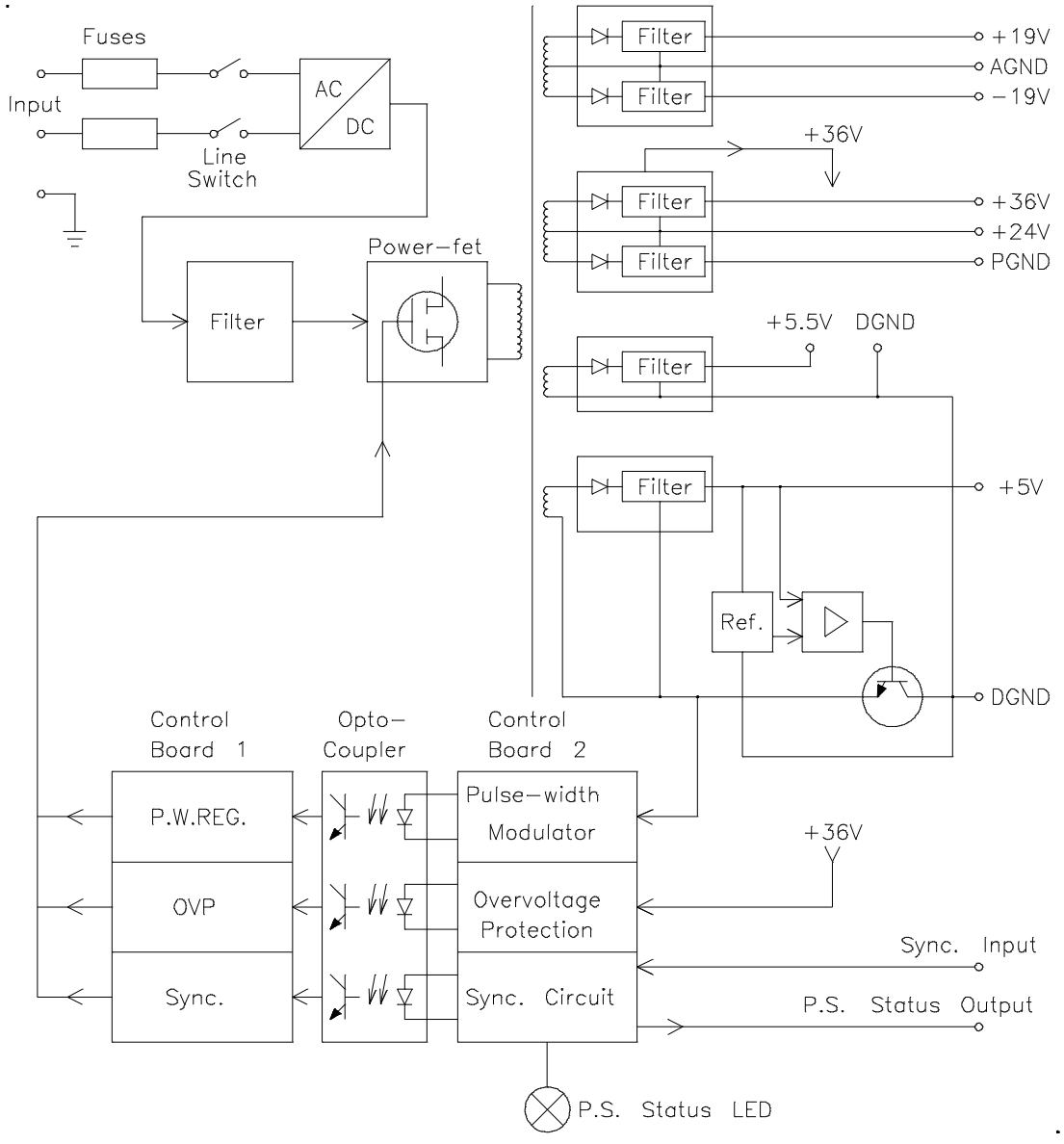
The isolation between the primary and the secondary part is made by opto-couplers and the switching transformer. The DC-output voltages are generated by single-phase rectifiers and LC-filtering with the additional features: The +36 V output has an separate over-voltage protection to limit the voltage to +45 V maximum. The +5 V output contains an additional analog series regulator to provide a stable output for all load conditions under different applications. The synchronization input is used in the 1050 MWD/DAD only to synchronize the switching frequency to a value of three times (54 kHz) of the diode array readout frequency. This output is not used in the other modules.

The power supply status is monitored by the processor system to detect a powerfail condition and to save all important data. The Power Supply STATUS LED (GREEN) at the rear panel shows the OK condition of the power supply.

NOTE

OK means that the pulsewidth of the switching FET is inside the allowed limits. OK does not means that all voltages at the output are present (for example a broken inductor is not detected).

Figure 10 **Block Diagram DPS-B (Base Supply)**



Lamp Supply (DPS-A)

Figure 12 on page 61 and Figure 13 on page 62 show the additional circuits necessary for the deuterium lamp:

- a DC output of 5.5 V for the regulated heater output (located on the primary board);
- a regulated constant current source with selectable current of 320 mA, 360 mA or 400 mA;
- a 600 V lamp ignition circuit;
- a 12 V regulated output for future use.

WARNING **Hazardous voltage present at the output connector with instrument power cord connected to AC line.**

The main feature of this power supply is a low noise current source for the deuterium lamp. For realization a pulse-width modulated DC-DC converter (36 V input, 170 V no load output) is built-up with a switching FET and high voltage transformer. The pulse-width is regulated so that the DC-output is about 12V above the actual anode voltage of the deuterium lamp.

This design allows minimum power loss if the anode voltage varies from lamp to lamp and by aging between 65 V and 100 V. The final regulation to the selected current is made by an analog power regulator. Again the switching frequency is synchronized to 54 kHz in the 1050 MWD/DAD.

Figure 11 **Block Diagram DPS-A (Lamp Supply I)**

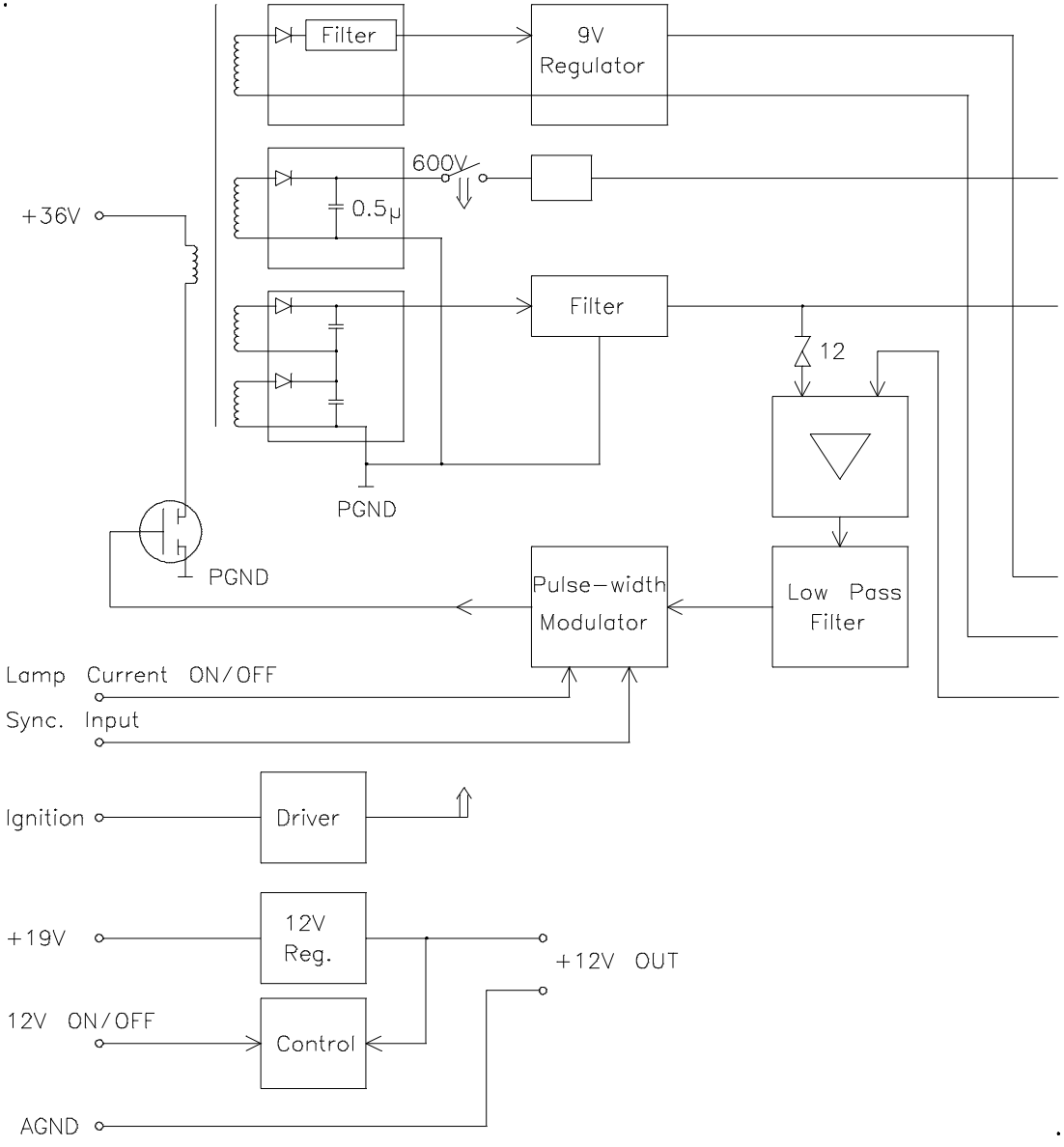
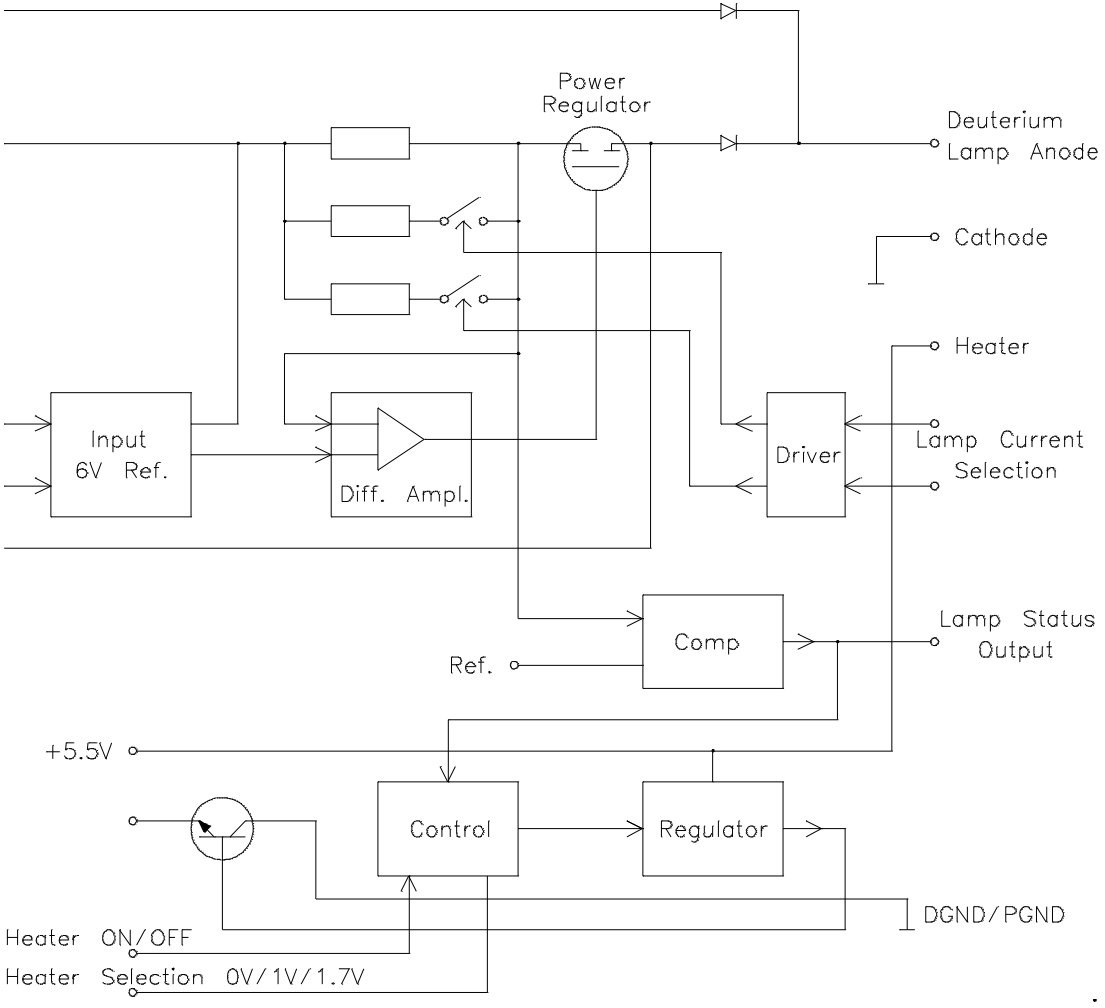


Figure 12 **Block Diagram DPS-A (Lamp Supply II)**



Lamp Ignition

To ignite the deuterium lamp a 0.5 µF capacitor loaded with 600 V is discharged via a 10 kOhm resistor to the anode. These 600 V are generated by a separate winding.

The lamp status output signal shows "OK" if the lamp current has the selected value. Otherwise an error message is generated.

The heater output made by a series regulator is in the pre-heating status 2.5 V always. After ignition a different output voltage is selected depending on the lamp type used:

In the 79853C VWD, 79854A MWD and the G1306A DAD, the heater is switched off after ignition.

The 12 V low noise output is made by a series regulator connected to the +19 V output.

Communication Interface (CIB / CRB)

Repair Level: Exchange Board

Table 8 **Part Numbers for CRB Board**

Item	Part Number	used for
CIB Board (NEW)	5061-3382	Pumps and Autosampler
CRB Board (NEW)	5062-2482	79854A MWD / G1306A DAD

NOTE

This section describes the communication interface for the 1050 Pumps (79851/2A/B), Autosamplers (79855A/B), Multiple Wavelength Detectors (79854A) and Diode Array Detector (G1306A) only.

The communication interface for the 1050 Variable Wavelength Detector (79853C) is described in the chapter of the 1050 VW Detector.

The communication interface board is necessary for the control by a Personal Computer and to connect printer or plotter devices. The communication interface board provides one GPIB and one RS-232 interface. The CRB for the 1050 MWD/DAD has a 96 kbyte runbuffer for the data/spectrum operation with the Multiple Wavelength Detector. The interface is located in Slot #2 of the module.

Compatibilities

Table 9 **CIB/CRB Compatibility**

Instrument	CIB	CRB	Firmware
1050 Pump	R	P	REV 3.1
1050 Sampler	R	P	REV 3.1
1050 MWD	C	R	REV 3.1
1050 DAD	C	R	REV 1.0

R	recommended configuration
P	possible but not neccessary
C	only for instrument control

Firmware

To use the communication interface board it is mendatory to have the 1050 Modules equipped with the latest firmware revisions (see Table 13).

Baud rate

The board contains a baudrate generator. The baudrate is setable up to 19200 baud from the keyboard. The transmitter and receiver baudrate are independent adjustable.

RS-232 Interface

The implemented serial interface is a subset of the RS-232 standard only. It contains at

PIN 2	RxD receive data (data input)
PIN 3	TxD transmit data (data output)
PIN 4	GND (Ground)

The 1050 modules are designed as DCE (data communication equipment) without hardware handshake.

1

Common: Cable Information

This chapter provides information on cables for the 1050 Modules

Common: Cable Information

Overview

The 1050 Modules provide

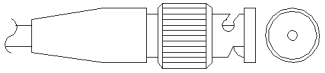
- Analog Signal Output (Pumps, Detectors)
- Remote Control Connector (all)
- BCD Connector (Autosampler)

WARNING **Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.**

Table 1 **Cables Overview**

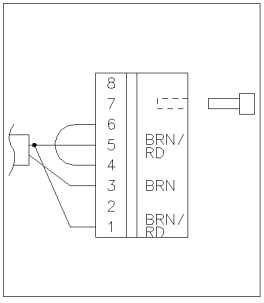
Type	Description	Part Number
Analog cables	3390/2/3 integrators	01040-60101
	3394/6 integrators, 35900A A/D converter	35900-60750
	General purpose (spade lugs)	01046-60105
Remote cables	3390 integrator	01046-60203
	3392/3 integrators	01046-60206
	3394 integrator	01046-60210
	3396A (Series I) integrator	03394-60600
	3396 Series II / 3395A integrator, see page 74	
	3396 Series III / 3395B/96C/97A integrator	03396-61010
	1100 / 1050 modules / 1046A FLD / 35900A A/D converter	5061-3378
	1040 DAD / 1090 liquid chromatographs / SDM	01046-60202
BCD cables	3392/3 integrators	obsolete
	3396 integrator	03396-60560
	General purpose (spade lugs)	18594-60520
GP-IB cable	1100 module to ChemStation, 1 m	10833A
	1100 module to ChemStation, 2 m	10833B
	1100 module to ChemStation, 5 m	10833D

Analog Cables

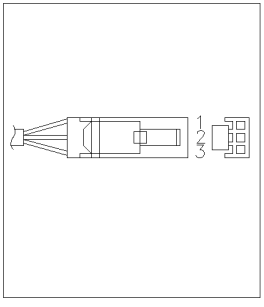


One end of these cables provides a BNC connector to be connected to 1050 Series modules. The other end depends on the instrument to which connection is being made.

1050 to 3390/2/3 Integrators

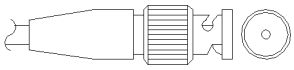
Connector 01040-60101	Pin 3390/2/3	Pin 1050	Signal Name
	1	Shield	Ground
	2		Not connected
	3	Center	Signal +
	4		Connected to pin 6
	5	Shield	Analog -
	6		Connected to pin 4
	7		Key
	8		Not connected

1050 to 3394/6 Integrators

Connector 35900-60750	Pin 3394/6	Pin 1050	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +

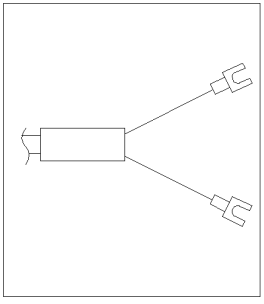
1050 to BNC Connector

Connector 8120-1840	Pin BNC	Pin 1050	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +



1050 to General Purpose

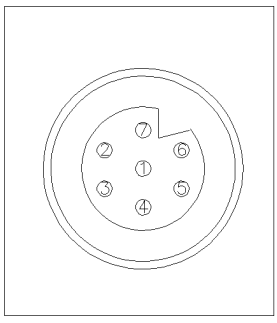
Connector 01046-60105	Pin 3394/6	Pin 1050	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +



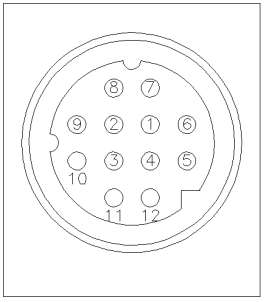
Remote Cables

One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to 1050 Series modules. The other end depends on the instrument to be connected to.

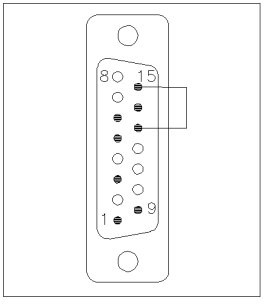
1050 to 3390 Integrators

Connector 01046-60203	Pin 3390	Pin 1050	Signal Name	Active (TTL)
	2	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	7	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	NC	7 - Red	Ready	High
	NC	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low

1050 to 3392/3 Integrators

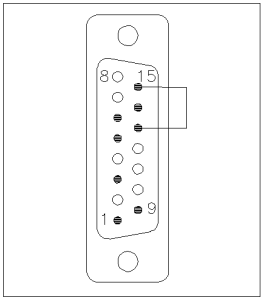
Connector 01046-60206	Pin 3392/3	Pin 1050	Signal Name	Active (TTL)
 4 - Key	3	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	11	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	9	7 - Red	Ready	High
	1	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low

1050 to 3394 Integrators

Connector 01046-60210	Pin 3394	Pin 1050	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	5,14	7 - Red	Ready	High
	6	8 - Green	Stop	Low
	1	9 - Black	Start request	Low
	13, 15		Not connected	

NOTE START and STOP are connected via diodes to pin 3 of the the 3394 connector.

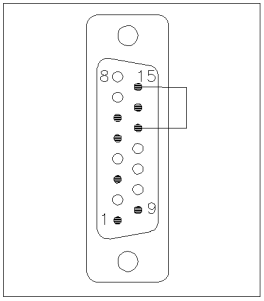
1050 to 3396A Integrators

Connector 03394-60600	Pin 3394	Pin 1050	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	5,14	7 - Red	Ready	High
	1	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low
	13, 15		Not connected	

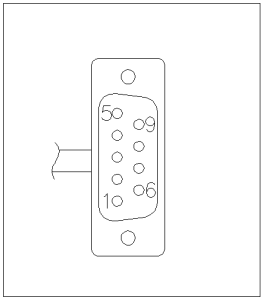
1050 to 3396 Series II / 3395A Integrators

Use the cable 03394-60600 and cut pin #5 on the integrator side. Otherwise the integrator prints START; not ready.

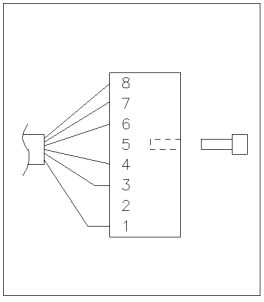
1050 to 3396 Series III / 3395B Integrators

Connector 03396-61010	Pin 33XX	Pin 1050	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	14	7 - Red	Ready	High
	4	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low
	13, 15		Not connected	

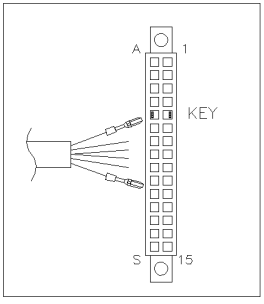
1050 to 1050, 1046A or 35900 A/D Converters

Connector 5061-3378	Pin 1050 / ...	Pin 1050	Signal Name	Active (TTL)
	1 - White	1 - White	Digital ground	
	2 - Brown	2 - Brown	Prepare run	Low
	3 - Gray	3 - Gray	Start	Low
	4 - Blue	4 - Blue	Shut down	Low
	5 - Pink	5 - Pink	Not connected	
	6 - Yellow	6 - Yellow	Power on	High
	7 - Red	7 - Red	Ready	High
	8 - Green	8 - Green	Stop	Low
	9 - Black	9 - Black	Start request	Low

1050 to 1090 LC, 1040 DAD or Signal Distribution Module

Connector 01046-60202	Pin 1090	Pin 1050	Signal Name	Active (TTL)
 5 - Key	1	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	4	3 - Gray	Start	Low
	7	4 - Blue	Shut down	Low
	8	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	3	7 - Red	Ready	High
	6	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low

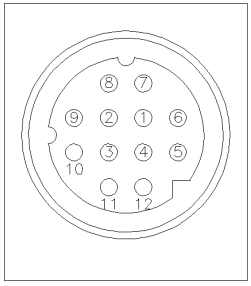
1050 to General Purpose

Connector 01046-60201	Pin Universal	Pin 1050	Signal Name	Active (TTL)
		1 - White	Digital ground	
		2 - Brown	Prepare run	Low
		3 - Gray	Start	Low
		4 - Blue	Shut down	Low
		5 - Pink	Not connected	
		6 - Yellow	Power on	High
		7 - Red	Ready	High
		8 - Green	Stop	Low
		9 - Black	Start request	Low

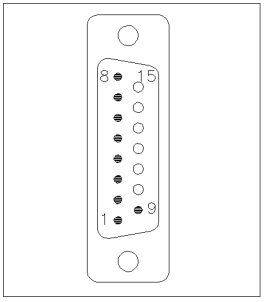
BCD Cables

One end of these cables provides a 15-pin BCD connector to be connected to the 1050 Series modules. The other end depends on the instrument to be connected to.

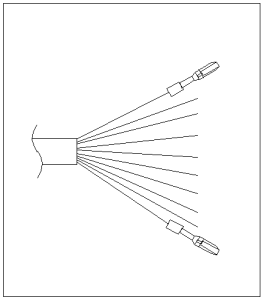
1050 to 3392/3 Integrators (Obsolete)

Connector 18584-60510	Pin 3392/3	Pin 1050	Signal Name	BCD Digit
 6 - Key	10	1	BCD 5	20
	11	2	BCD 7	80
	3	3	BCD 6	40
	9	4	BCD 4	10
	7	5	BCD 0	1
	5	6	BCD 3	8
	12	7	BCD 2	4
	4	8	BCD 1	2
	1	9	Digital ground	
	2	15	+ 5 V	Low

1050 to 3396 Integrators

Connector 03396-60560	Pin 3392/3	Pin 1050	Signal Name	BCD Digit
	1	1	BCD 5	20
	2	2	BCD 7	80
	3	3	BCD 6	40
	4	4	BCD 4	10
	5	5	BCD 0	1
	6	6	BCD 3	8
	7	7	BCD 2	4
	8	8	BCD 1	2
	9	9	Digital ground	
	NC	15	+ 5 V	Low

1050 to General Purpose

Connector 18594-60520	Wire Color	Pin 1050	Signal Name	BCD Digit
	Green	1	BCD 5	20
	Violet	2	BCD 7	80
	Blue	3	BCD 6	40
	Yellow	4	BCD 4	10
	Black	5	BCD 0	1
	Orange	6	BCD 3	8
	Red	7	BCD 2	4
	Brown	8	BCD 1	2
	Gray	9	Digital ground	
	White	15	+5 Vt	Low

Agilent Technologies

In This Book

This manual contains technical information about the Agilent 1050 liquid chromatographs.

This manual is available as electronic version (Adobe Acrobat Reader file) only.