

# Troubleshooting

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This section is intended to aid a trained service engineer in the troubleshooting process. Included in this chapter is an overview of the failure indicators, a basic strategy of repair, and a detailed action list for each type of failure.

**WARNING**

HAZARDOUS VOLTAGES ARE PRESENT IN THE ELECTRICAL PORTIONS OF THIS INSTRUMENT WHEN THE POWER CORD IS CONNECTED. TO AVOID A POTENTIALLY DANGEROUS ELECTRICAL SHOCK, BE CERTAIN THE POWER CORD IS UNPLUGGED FROM ITS POWER SOURCE BEFORE REMOVING ANY ACCESS PANELS.

**WARNING**

MEASUREMENTS AND/OR TESTS THAT NEED TO BE MADE ON ELECTRICALLY ENERGIZED PORTIONS OF THE INSTRUMENT SHOULD BE PERFORMED ONLY BY SERVICE-TRAINED PERSONNEL WHO ARE AWARE OF ALL INVOLVED HAZARDS.

## Overview of Failure Indicators

Failures are indicated by the light patterns of the three LEDs on the front of the injector module and the two LEDs on the front of the controller module (Figure B-1).

When the sampler is turned on, the two green LEDs should be on and the two red LEDs should be off. The yellow LED should only be on during a run.

If one or both modules are not displaying the proper LED pattern, look at the chart on page B-5 for the LED lighting pattern and refer to the corresponding page in this section.

If the sampler is controlled by an external device such as an HP integrator or an HP ChemStation, the sampler will send a printed error message to the external device.

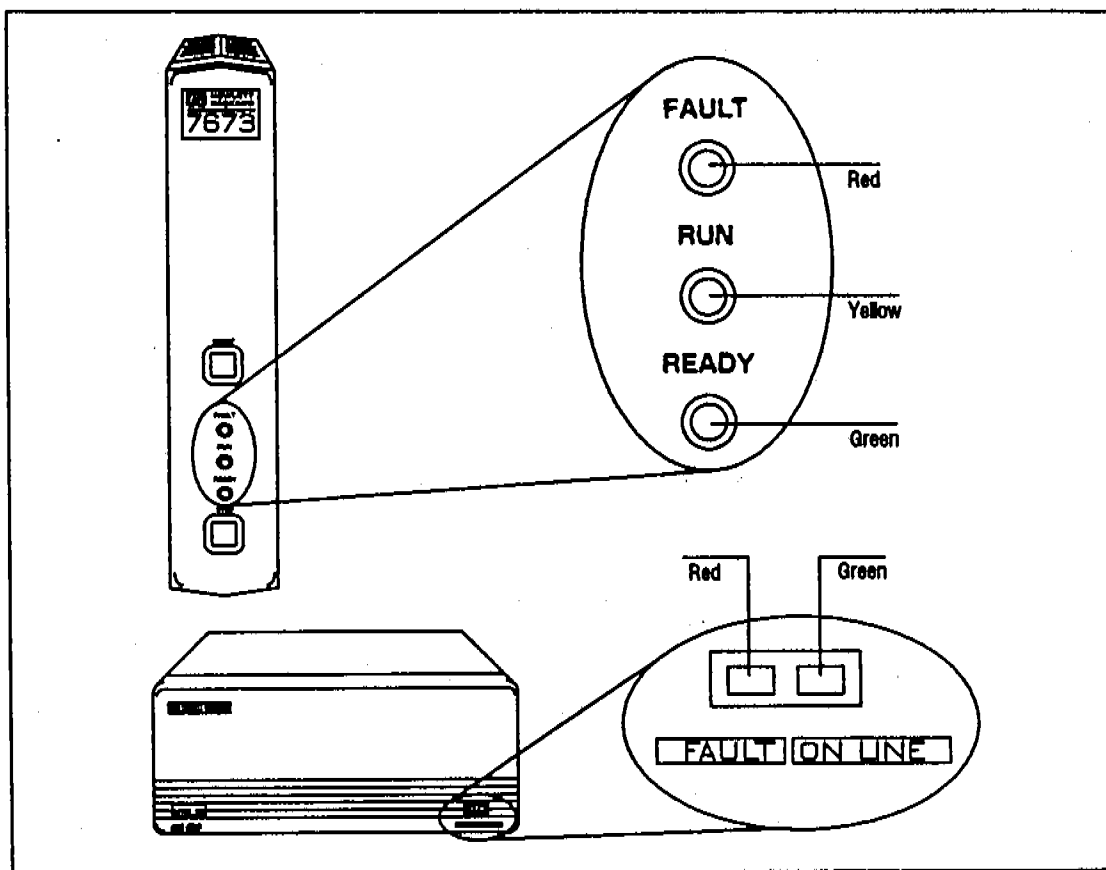


Figure B-1. Location of Sampler LEDs.

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## Basic Strategy of Repair

The troubleshooting strategy is to identify the failure, isolate the defective part, and replace it.

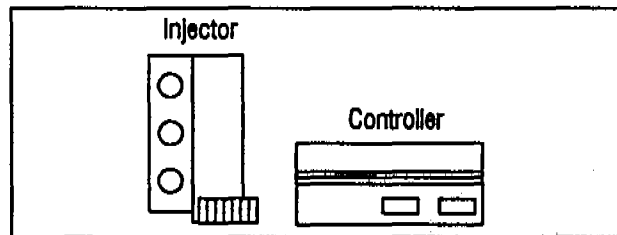
Carefully observe the operation of the failing module. Since the operations are so integrated, much can be learned by observing not only what is nonoperational, but also by what areas are working correctly. The sequence of normal functions for each module is described in other sections of this manual.

For further help in identifying the problem, there are diagnostics modes for both the injector and tray modules. These are described at the end of sections C and E.

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## Types of Failures

Throughout this section, the following symbols identify the LEDs.



Some error conditions can have more than one cause. The most frequent/simplest cause is listed first, with other possibilities listed second or third. If possible, use the diagnostic mode to isolate the problem to one of the causes and follow the steps for troubleshooting that cause.

Each action list contains several things for you to check. Go through each step in order, and stop when you have found the failure. You may not necessarily complete all the actions in the list. After you have repaired the failure, retest by running a normal sequence of movement or using the diagnostics mode.

**INJECTOR ERRORS**

Injector Led	Description	Page
Red Steady On	Safety Error	B-6
Red 2 Flashes	Injector Syringe Error	B-7
Red 3 Flashes	Injector Turret Error	B-8
Red 4 Flashes	Injector Plunger Error	B-9
Red 5 Flashes	Incomplete Injection Error	B-11
Red 6 Flashes	Injector Memory Error	B-11

**TRAY ERRORS**

Controller Led	Description	Page
Red Steady On	Tray Not Connected	B-12
Red 2 Single Flashes*	Vial Lost/Left in Gripper	B-13
Red 3 Single Flashes*	Theta Axis Error	B-15
Red 4 Single Flashes*	Radial Axis Error	B-17
Red 5 Single Flashes*	Gripper Axis Error	B-19
Red 6 Single Flashes*	Tray Processor Error	B-21
Red 7 Single Flashes*	Bottle Not Found	B-21

**CONTROLLER ERRORS**

Controller Led	Description	Page
Red 2 Double Flashes	Controller Processor Error	B-22
Red 3 Double Flashes	Controller RAM Error	B-22
Red 4 Double Flashes	Controller ROM Error	B-22
Red 5 Double Flashes	Configuration Error	B-23

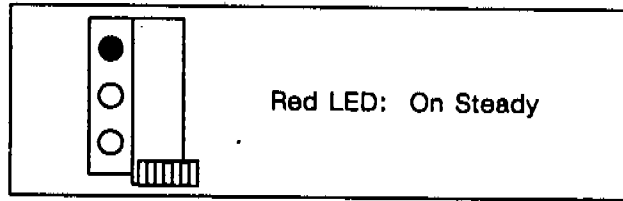
**MISCELLANEOUS ERRORS**

Injector Led	Controller Led	Description	Page
Red, Yellow, Green On	Green On	Injector Processor Error	B-24
Red, Yellow, Green On	Red On	18-Volt Supply Error	B-25
None	None	Power Supply Error	B-26

\* The HP-IB/controller board also uses single red flashes to communicate error conditions found during its power-up self-test. See "HP-IB/Controller Board Errors."

**Table B-1. LED Error Codes**

## Injector Errors



### Safety Error

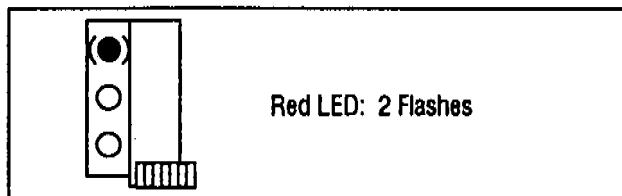
- Injector door open.
- Injector improperly mounted.

### Injector Door Open

1. Close injector door.
2. Verify door switch is working properly.
3. Press on door at switch. If this clears the problem, replace the front housing.
4. Check the switch connection at the injector logic board.
5. Replace door switch if necessary.

### Injector Improperly Mounted

1. Remount the injector.
2. Ensure the mounting post is making contact with the mounting switch
3. Check the switch connection at the injector logic board.
4. Replace the mounting switch if necessary.



### Injector Syringe Error

- Syringe carriage movement obstructed.
- Syringe motor inoperable.
- Syringe carriage sensor inoperable.

Using the diagnostics mode, determine if the syringe carriage is moving properly. If it is, suspect sensor failure; otherwise, check for obstructions or motor failure.

### Syringe Carriage Movement Obstructed

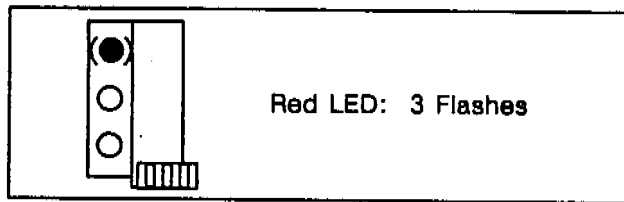
1. Check to see if the syringe carriage is moving freely on the guide rods. If not, remove the syringe carriage and clean the rods and/or remove any obstructions.
2. With the syringe carriage removed, ensure that the syringe motor/drive belt combination is moving freely. If not, remove the belt and check movement of both the idler pulley and the motor. If either piece is not moving, replace it.

### Syringe Motor Inoperable

1. Using the diagnostics mode, determine if the syringe motor is rotating. If not, check the PC board connection for the motor. Rerun the test, observing the LEDs that indicate the motor windings are energized.
2. Remove the motor and test it for opens and shorts. Replace motor if necessary.
3. Check for the presence of 18-V supplies at the injector logic board. If they are not at the proper voltage levels, proceed to diagnose the controller module and cables.
4. Although the LEDs indicate the motor windings are energized, they do not verify that the proper drive current is being supplied to the windings. Replace injector logic board and retest.

### Syringe Carriage Sensor Inoperable

1. Start diagnostics and move the syringe carriage to the home position. Check that the green LED of the injector module is lit.
2. Check the syringe carriage for a magnet. Using a known good magnet, test to see if the magnet in the carriage is installed properly (magnet faces should repel each other). If the magnet is missing or installed improperly, replace the syringe carriage.
3. Verify the syringe sensor is connected properly to the injector logic board. Retest the sensor with the syringe carriage in the home position. If necessary, replace the syringe carriage sensor (note that this is one of a pair of sensors and both must be replaced).



### Injector Turret Error

- Turret movement obstructed.
- Turret motor inoperable.
- Turret sensor inoperable.

Using the diagnostic modes, determine if injector turret is moving properly. If it is, suspect sensor failure; otherwise, check for obstructions or motor failure.

### Turret Movement Obstructed

1. Manually check to see if the injector turret is able to rotate freely through a full revolution. If it is not rotating freely, continue with next step.
2. Open the injector door and check the bottle stripper assembly. It should swing freely in and out. If not, remove the turret and check the arm for interference. Replace the bottle stripper assembly, spring or mounting sleeve if necessary.

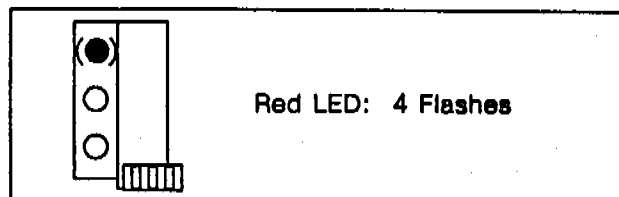
### Turret Motor Inoperable

1. Using diagnostics mode, determine if the turret motor is rotating freely and not locking at some positions. Replace motor if necessary.
2. Check the connection of the turret motor to the injector logic board and retest operation.
3. Check the injector turret motor for shorts or opens. Replace motor if necessary.
4. Replace injector board and retest.

### Turret Sensor Inoperable

1. Check the injector turret for a magnet. Using a known good magnet, test to see if the magnet is installed properly (magnet faces should repel each other). Replace the turret if necessary.
2. Manually verify that the sensor is working, using the diagnostics mode. The green LED should light when the sensor is tripped.
3. Verify that the turret sensor is connected properly to the injector logic board. If necessary, replace the sensor (note that this is one of a pair of sensors and both must be replaced).





### Injector Plunger Error

- Plunger movement obstructed.
- Plunger motor inoperable.
- Plunger carriage sensors inoperable.

Using the diagnostic mode, determine if the plunger carrier is moving properly. If it is not, suspect sensor failure; otherwise, check for obstructions or motor failure.

### Plunger Movement Obstructed

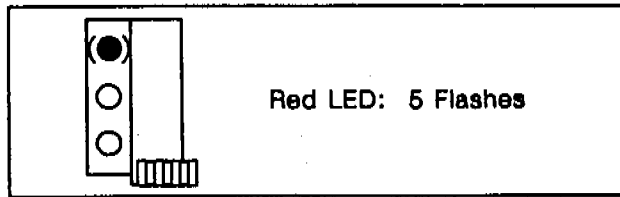
1. Remove syringe and check it for plunger stickiness or binding. Replace syringe if necessary.
2. Check the viscosity of the sample. Extremely viscous samples may have to be diluted with the proper solvent or heated using the tray's circulating water bath to allow proper movement of the plunger.
3. With the syringe removed, run the diagnostics on the plunger carrier. Look for interference between the syringe carriage and the plunger carriage. Replace the syringe carriage or plunger carriage as necessary.
4. Check the belt tension on the plunger carriage. If it is too tight or too loose, adjust the tension by adjusting the position of the plunger motor wedge.
5. Check the solenoid lever arm and return spring to verify proper installation and operation of the stop mechanism.

### Plunger Motor Inoperable

1. Check to see if the motor is connected to the sensor board.
2. Check the ribbon cable connections at the sensor board and the injector logic board. If connections are good, check the ribbon cable for open runs. Replace if necessary.
3. Check the DC motor operation using the diagnostic mode. If it not rotating, remove the motor and check to see if the pulley is loose. Replace the motor if necessary.
4. Check the motor winding resistance. If the motor is either open or shorted, replace it.
5. Replace the injector logic board and retest.

## **Plunger Carriage Sensor(s) Inoperable**

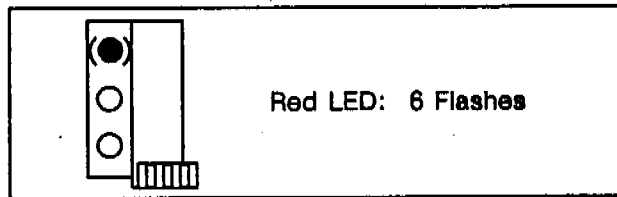
1. Start diagnostic mode and manually move the plunger carriage to the top of its movement. Check that the green LED is lit. Move the plunger to the bottom of the movement and check the green LED again.
2. With a known good magnet (faces should repel), test the plunger carrier magnet. If it is not good, replace the plunger carrier.
3. Check the ribbon cable connections at the sensor board and the injector logic board. If connections are good, check the ribbon cable for open runs. Replace if necessary.
4. Replace the plunger sensor board by replacing the syringe carriage and retest.
5. Replace the injector logic board and retest.



#### **Incomplete Injection Error**

- Plunger not sensed at bottom of movement during injection.

1. Remove the syringe from the injector and check it for stickiness and/or binding. Replace if necessary.
2. Run the diagnostics mode for the plunger carrier. Replace plunger carrier and/or syringe carriage if necessary.
3. Replace injector logic board and retest.

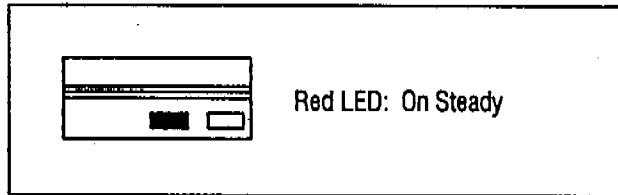


#### **Injector Memory Error**

- Processor on injector board is malfunctioning.

1. Verify that the injector processor (and the EPROM if present) is positioned properly and seated in the PC board socket.
2. Replace the injector processor (and/or EPROM) if necessary.
3. Replace the injector logic board if necessary.

## Tray Errors



### Tray Not Connected

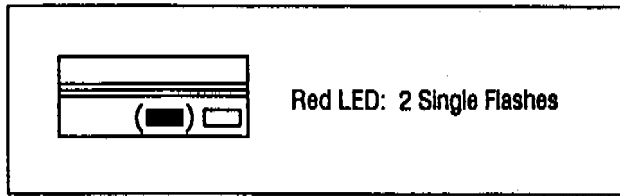
- Tray cable not installed.
- Tray board or controller board inoperable.

### Tray Cable Not Installed

1. Verify that the tray cable is plugged into the controller module and the fastening screws are seated.
2. Verify that the connection of the cable inside the tray is secure.
3. Check to see if the tray cable has opens or shorts.

### Tray Board or Controller Board Inoperable

1. Verify that the tray board and controller board are properly installed in the controller module and the connections are fully seated.
2. Replace the tray board and then the controller board if necessary.



#### **Vial Lost/Left in Gripper**

- Tray failed to deliver vial.
- Vial switch off when gripper is empty.
- Gripper dropped vial.

#### **Tray Failed to Deliver Vial**

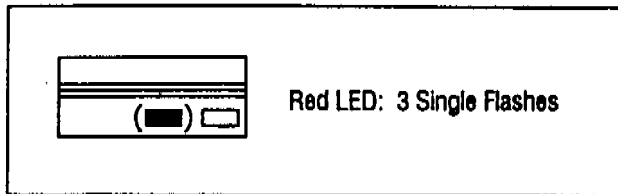
1. If there is a vial in the gripper, remove it and return the vial to its position in the tray.
2. Check the "deliver to" location for the vial and verify that the location is empty and free of obstructions.
3. Ensure that the tray is installed correctly on the mounting bracket.
4. Rerun the system to observe how the error may have occurred.

#### **Vial Switch Off When Gripper Is Empty**

1. Remove the cover from the controller module and turn on the power. Make sure the gripper is in the home position and the Z-LED is lit. Insert a bottle into the gripper and check that the B-LED goes off. Remove the bottle and check that the B-LED goes on again. If the B-LED is not lighting properly, continue.
2. Check the tray cable connection inside the bottom cover of the tray. Make sure the connector is seated.
3. Remove the tray arm from the tray turret. Remove the tray arm covers and check the gripper assembly. The lever should be holding a vial magnet and it should be aligned with the lower magnetic sensor on the sensor board. Press the gripper paddle. If the vial magnet does not move away from the sensor, replace the gripper assembly.
4. Ensure that the connections on both the R-flex and the theta-flex cables are installed properly.
5. Replace the arm sensor board and retest.
6. Replace the tray board and retest.

## **Gripper Dropped Vial**

1. Remove any obstructions that may have dislodged the vial from the gripper during tray arm movement.
2. Make sure sample vials meet HP specifications (see HP 7673 Operating Manual Appendix A, Consumables). If the vials are too tall, the vial in the gripper may be dislodged by the ones in the tray.
3. Check the gripper jaws for smooth spring action movement. If either gripper jaw does not close properly, replace gripper assembly.



### Theta Axis Error

- Tray rotation obstructed.
- Theta-motor inoperable.
- Theta-sensor inoperable.

Using diagnostic mode, determine if the tray arm is rotating properly. If the arm moves smoothly or if the theta motor fails to stop when the arm does, suspect sensor failure. Otherwise, check for obstructions or motor failure.

### Tray Rotation Obstructed

1. Remove any obstructions from the tray which may keep the arm from moving in its full rotation.
2. Slowly rotate the arm about its angular axis. It should move smoothly—do not force the arm. The arm should move approximately 356 degrees from one stop to the other.
3. Remove the tray turret from the base. Check the theta-motor gear and the turret gear for missing or broken teeth. Replace the motor assembly and/or turret assembly as needed.

### CAUTION

Improper mounting of turret assembly will damage the theta flex circuit. See figure E-8 for assembly instructions.

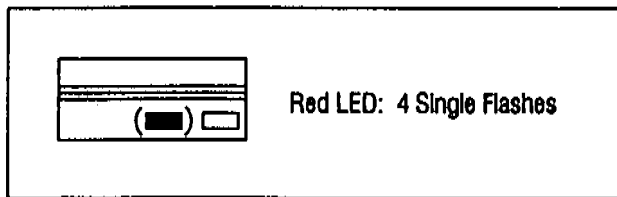
### Theta Motor Inoperable

1. Remove the bottom cover and unplug the theta motor. Check the winding resistance of the theta-motor. Replace motor if necessary.
2. Check the theta-motor gear for looseness. Replace the motor assembly if necessary.
3. Make sure that the screws holding the motor in place are present and tight. If the screws are loose, reposition the motor using the motor locating tool and tighten the screws.
4. Verify the continuity of the tray cable lines which carry the theta-motor signals. Check the connections of the tray cable to the tray board.
5. Replace the tray board if necessary.

## **Theta Sensor Inoperable**

1. Using the diagnostics mode, check the theta axis movement. Watch the T-LED on the tray board. It should be lit for half of the rotation and off for the other half.
2. Check the theta-sensor connection at the termination board. Check the tray cable connections at both ends.
3. Remove the tray turret from the base and replace the theta-sensor. Before reassembling, test the operation of the theta-sensor by interrupting the sensor with a thin object.
4. Replace the tray board and retest.





### Radial Axis Error

- Tray radial motion obstructed.
- R motor inoperable.
- Radial sensor inoperable.

Using diagnostic mode, determine if the tray arm is moving forward and backward properly. If the arm moves smoothly or if the R-motor fails to stop when the arm does, suspect sensor failure; otherwise, check for obstructions or motor failure.

### Tray Radial Motion Obstructed

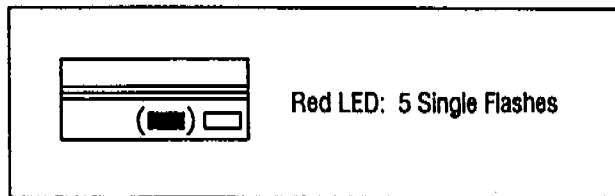
1. Remove any objects that obstruct the movement of the tray arm.
2. Remove the cover from the controller module and turn the power on. Hold the arm in the middle and gently move the arm in its radial axis to the full back (home) position. Do not force the arm to move. The R-LED should be lit.
3. Check arm rods and bushings for binding. Replace if necessary.
4. Open tray base and remove the large R-drive gear. Move the arm radially—the arm should move smoothly and freely.
5. Check the R-motor pinion gear and the arm rack for missing or broken teeth. Check that the pinion is free to turn in the turret. Replace as needed.

### R Motor Inoperable

1. Remove the bottom cover from the tray and unplug the radial motor. Check the resistance of the motor windings. Replace the motor if any windings are open or shorted.
2. Check the radial motor gear for looseness. Replace the motor if necessary.
3. Check the tray cable for continuity and proper connections.
4. Replace tray board and retest.

## Radial Sensor Inoperable

1. Start the diagnostics mode. The R-LED on the tray board should be lit when the arm is all the way back (home position).
2. Gently move the arm forward and check that the R-LED goes off.
3. Check the tray cable connections at both ends.
4. Remove the arm assembly and verify the presence and proper installation of the magnet in the turret. Check the continuity of the sensor lines through the R-flex circuit. Check the connection of the R-flex circuit to the theta-flex circuit on the turret.
5. With the arm removed, verify the continuity of the radial axis sensor's lines through the theta-flex circuit and the tray cable. Replace the tray cable or the theta-flex cable if necessary.
6. Replace arm sensor board and retest.
7. Replace the tray board and retest.



### **Gripper Axis Error**

- Gripper (Z) motion obstructed.
- Z-motor inoperable.
- Z-sensor inoperable.
- Tray firmware incompatibility.

Using the diagnostic mode, determine if the gripper is moving up and down properly. If the gripper moves smoothly or if the Z-motor fails to stop when the gripper does, suspect sensor failure; otherwise, check for obstructions or motor failure.

### **Gripper (Z) Motion Obstructed**

1. Remove the tray arm and the right arm cover and verify free movement of the gripper and drive assembly by moving the drive belt manually.
2. Check the belt tensioner assembly to ensure that the Z-drive belt has adequate tension.
3. Check the gripper drive for obstructions.
4. Remove the belt from the drive pulley and verify that the gripper is able to move on the gripper rod without sticking. Replace gripper rod and/or gripper assembly if necessary.

### **Z Motor Inoperable**

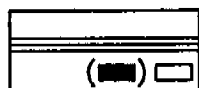
1. With the right half of the arm removed, run diagnostics. Watch the drive pulley on the Z-motor for movement. The motion should be smooth until the gripper reaches the top or the bottom of the stroke.
2. Check the connections for the Z-motor through the cables and reconnect or replace as necessary.
3. Check the Z-motor pulley for looseness. Replace the arm core/motor assembly if necessary.
4. Replace the tray board and retest.

## **Z Sensor Inoperable**

1. Using diagnostic mode, run the Z-axis test and check for sensor operation. The Z-LED should be on when the gripper is at the top of its movement.
2. Check the connections for the Z-axis sensor back through the flex circuits and tray cable. Replace parts as needed.
3. Using a known good magnet, verify that the sensor is operating. Check the gripper assembly for the presence of a magnet. Replace the gripper assembly if necessary.
4. Replace the tray board and retest.

## **Tray Firmware Incompatibility**

1. Check Eprom on tray board. If the Eprom part number is 18594-80130 or less, than it should be used with an 18596A tray. If the Eprom is 18594-80235 or greater, than it should be used with an 18596B tray.

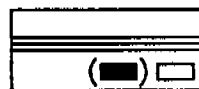


Red LED: 6 Single Flashes

#### Tray Processor Error

- Tray board processor failure.

Replace tray board's processor.



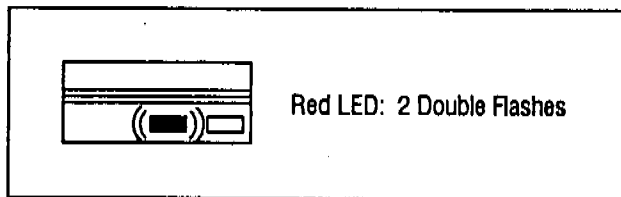
Red LED: 7 Single Flashes

#### Bottle Not Found

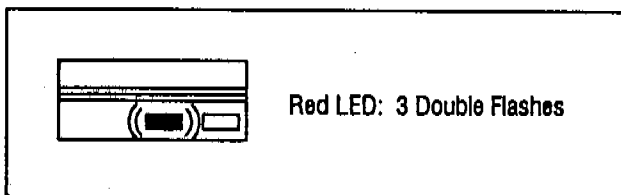
- Tray gripper failed to pick up sample bottle from injector.

1. Check the injector for proper installation on the mounting bracket. The right front foot pin should be inserted into the hole in the bracket disk. The other three injector feet should be in contact with the mounting bracket.
2. Check the tray for proper installation. The tray locks on the tray mounting bracket should be inserted into the tray base.
3. Check the standoffs connecting the tray bracket to the injector bracket. The "A" positions are for HP 5890A and HP 5700 GCs. The "B" positions are for the HP 5880A GC.
4. Make sure the sample vials meet HP specifications.
5. Make sure the needle support assembly has properly engaged the injector turret during bottle pickup. If not, troubleshoot the injector for turret errors.
6. Run a sequence and watch the tray gripper as it attempts to retrieve a bottle from the injector turret. The gripper should be aligned with the "neck" of the sample bottle. If the gripper is misaligned with the bottle, troubleshoot the tray for the misaligned axis (R, Z, or theta).

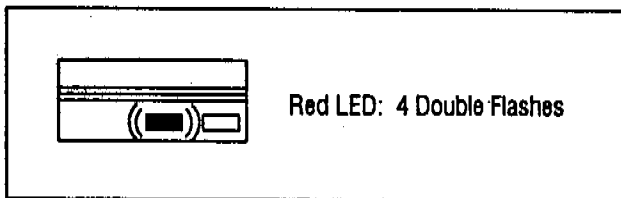
## Controller Errors



Replace the controller board.



Replace the controller board.



1. Replace the controller board EPROM.
2. Replace the controller board.

### Controller Processor Error

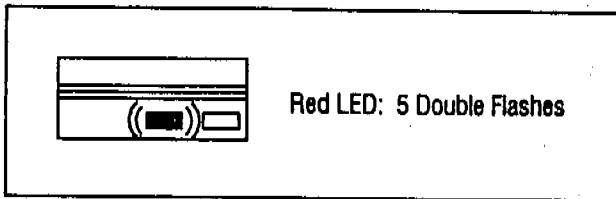
- Controller board processor failure.

### Controller RAM Error

- Controller board RAM failure.

### Controller ROM Error

- Controller board ROM failure.



#### **Configuration Error**

- Option boards not installed in the correct position.
- Option board failure.

#### **Option Boards Not Installed In the Correct Position**

1. Check that all cables are connected properly.
2. Verify that all option boards are installed properly.

#### **Option Board Failure**

1. Suspect INET or tray board failure. Replace if necessary.

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## Miscellaneous Errors

### Injector

Red - On  
Yellow - On  
Green - On

### Controller

Red - Off  
Green - On

### Injector Processor Error

- Processor on injector board malfunctioning.
- 18-V supplies not available on injector board.

### Processor on Injector Board Malfunctioning

1. Verify that the injector processor (and the EPROM if present) is positioned properly and seated in the PC board socket.
2. Replace the injector processor (and/or EPROM) if necessary.
3. Replace the injector logic board if necessary.

### 18-V Supplies Not Available on Injector Board

1. Check for +18 V and -18 V at the injector logic board.
2. Check the cable and connections. Replace cable if necessary.



<b>Injector</b>	<b>Controller</b>	<b>18-Volt Supply Error</b>
Red - On	Red - On	+18-V or -18-V supply inoperable on power supply board
Yellow - On	Green Off	
Green - On		

1. Check +18-V and -18-V fuses on power supply. Replace if necessary.
2. Unload the system by pulling out all the option boards plugged into the main power supply board. If the +18 V and/or -18 V works, plug in one option board at a time to determine the defective board. Replace it.
3. If system is not responding with all the boards pulled out, replace the main power supply board.

**Injector**

Red - Off  
Yellow - Off  
Green - Off

**Controller**

Red - Off  
Green - Off

**Power Supply Error**

No line voltage available  
+5-V supply on the main power  
supply board inoperable

**No Line Voltage Available**

1. Check to ensure that bench power is available, power cord is plugged in, and power switch is on.
2. Check the line fuse located inside the line module of controller. Replace fuse if necessary.
3. Check that the cables are connected.

**+5-V Supply on the Main Power Supply Board Inoperable**

1. Check the power supply main board for the presence of +5 V.
2. Unload the system by pulling out all the option boards plugged in the main power supply board. If the +5 V works, plug in one option board at a time to determine the defective board. Replace it.
3. Replace the main board if necessary.

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## HP-IB/Controller Board Errors

When a controller module containing an HP-IB/controller board is turned on, the HP-IB board executes a self-test. If a problem is found, one of the following error messages will be communicated through the controller's red LED:

Red LED	Error Message
2 flashes	Defective RAM on HP-IB/controller board
3 flashes	Defective ROM on HP-IB/controller board
4 flashes	Defective RAM on bar code reader board
5 flashes	Defective ROM on bar code reader board
6 flashes	Bar code reader cable not attached
7 flashes	Bar code reader board set to test mode

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## Printed Error Messages

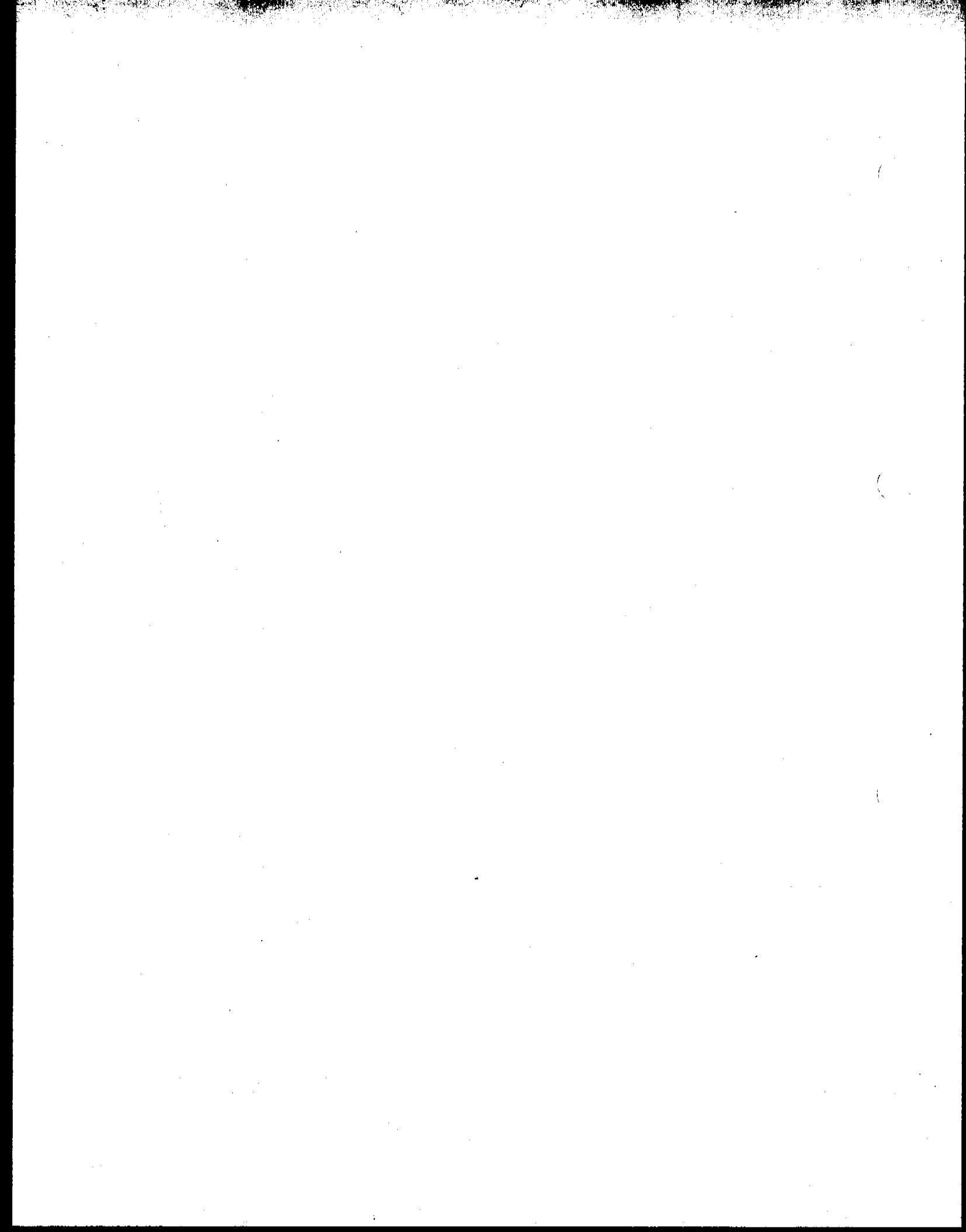
The following printed error messages may be sent to an INET integrator or ChemStation. There is no corresponding flashing LED pattern.

**Injector Communications Error**—A communication error occurred between the injector and the controller.

**Tray Communications Error**—A communication error occurred between the tray board and the controller.

**Injector Reset Error**—The +18-volt supply from the controller was interrupted.

**Tray Reset Error**—The +18-volt supply from the controller was interrupted.



# Injector Module

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## Injector Operation

The HP 18593B Injector Module loads a syringe with a sample and injects the sample into an HP gas chromatograph. The syringe and the sample vial are controlled by three key assemblies: the syringe carriage, the plunger carrier, and the injector turret.

### Syringe Carriage Movement

The syringe carriage assembly moves the syringe up and down within the injector tower (figure C-4). The syringe carriage is driven by the syringe motor (figure C-7). The syringe motor is a two-phase stepper motor with bidirectional currents in each phase. In addition, it is driven at two power levels. The high power level is used during the injection, when high torque and fast operation are required. The low power level is used during all other movements of the syringe.

For on-column injections, an on-column syringe must be used, and the on-column injection parameter set to "yes." During on-column injection, the syringe is inserted 19 mm deeper into the injection port and at a much slower speed.

The needle support assembly is attached to the syringe carriage (figure C-4). It supports the syringe needle when the needle enters a vial or the injection port. The needle support assembly also stabilizes the injector turret whenever the tray module arm is loading or removing sample vials.

When the syringe needle exits a vial, the bottle stripper assembly prevents the needle from lifting a vial out of the turret (figure C-8). The bottle stripper rides along the turret and rotates away from the syringe needle during injection.

### Syringe Carriage Homing

The home position of the syringe assembly is the full up position. The home position is checked on power-up by sensing a magnet at the bottom rear of the syringe carriage using a magnetic (hall effect) sensor located on the back plate (figure C-4). If the syringe carriage magnet is not on the sensor, the assembly moves up a few motor steps, down a few motor steps, and then up until the magnet is sensed. If the magnet was already on the sensor, the syringe carriage will check its position by moving a few steps down and up. These movements should be enough to turn the sensor off and then on again.

## **Plunger Carrier Movement**

The plunger pulls sample material into the syringe, measures the volume, and forces it out of the syringe.

The plunger is held by the plunger carrier, which is mounted on the syringe carriage. The plunger motor is a speed-controlled DC servomotor with tachometer feedback. With this feedback, the motor is driven with whatever torque is necessary to achieve the desired speed to drive the plunger. The plunger motor and tachometer are located at the top of the syringe carriage assembly (figure C-4).

Depending on the injector parameters, the plunger will stop at one of five "steps" to measure injection volume. The five steps correspond to 10-50% of the syringe volume. During sample and solvent washes, the plunger fills 80% of the syringe volume.

## **Plunger Carrier Homing**

The plunger's home position is the full down position and the magnet on the plunger carrier assembly is sensed by the magnetic sensor on the sensor board (figure C-4). There is an additional sensor at the full up position of the plunger.

## **Turret Movement**

The injector turret contains five positions for holding sample vials and wash/waste bottles (figure C-5). The turret is mounted directly on the turret motor. The turret motor is a four-phase stepper motor, with two common leads that are tied to +12 V. A phase is energized by driving it low. The turret rotates the vials and bottles into the injector tower to allow access by the syringe.

When operating with a tray, the turret rotates to a specific position for the tray gripper to pick up or deliver sample vials. The syringe carriage then engages the needle support assembly into the turret to prevent any turret rotation during vial pickup or delivery. After receiving the sample vial, the needle support is raised and the injector turret rotates to start the injection sequence.

## **Turret Homing**

The turret has a small magnet pressed into its lower, exterior surface. A magnetic sensor mounted behind the turret senses this magnet to find the turret home position (figure C-7). During homing, the turret motor rotates the turret until the magnet is sensed. The turret motor then rotates the turret a few steps in both directions to determine the center of the magnet.

If the sampler system is operating without a tray and is using stand-alone control, a magnetic bottle insert may be used to indicate the "last bottle" during a sequence. The turret sensor also will home on this magnetic insert during its homing routines.

## **Safety Switches**

There is a safety mechanism on the injector tower to protect the operator during injection. When the plastic door covering the syringe assembly is opened, all motor movement in the injector module is suspended. This is accomplished through a switch located inside the top right corner of the door (figure C-6).

A second switch is used to determine if the injector is mounted correctly. The mounting switch is located above the mounting sleeve and is closed by the mounting post when the injector is seated on the mounting bracket (figure C-8).

## **Injector Electronics**

All injector functions are controlled by a microprocessor on the injector main board (figure C-9). All motors, sensors, and switches connect directly or indirectly to the injector main board (figure C-1). The injector draws its power supplies from the controller module through the injector cable. The cable is also used to transmit TTL and serial communication between the injector and the controller modules.



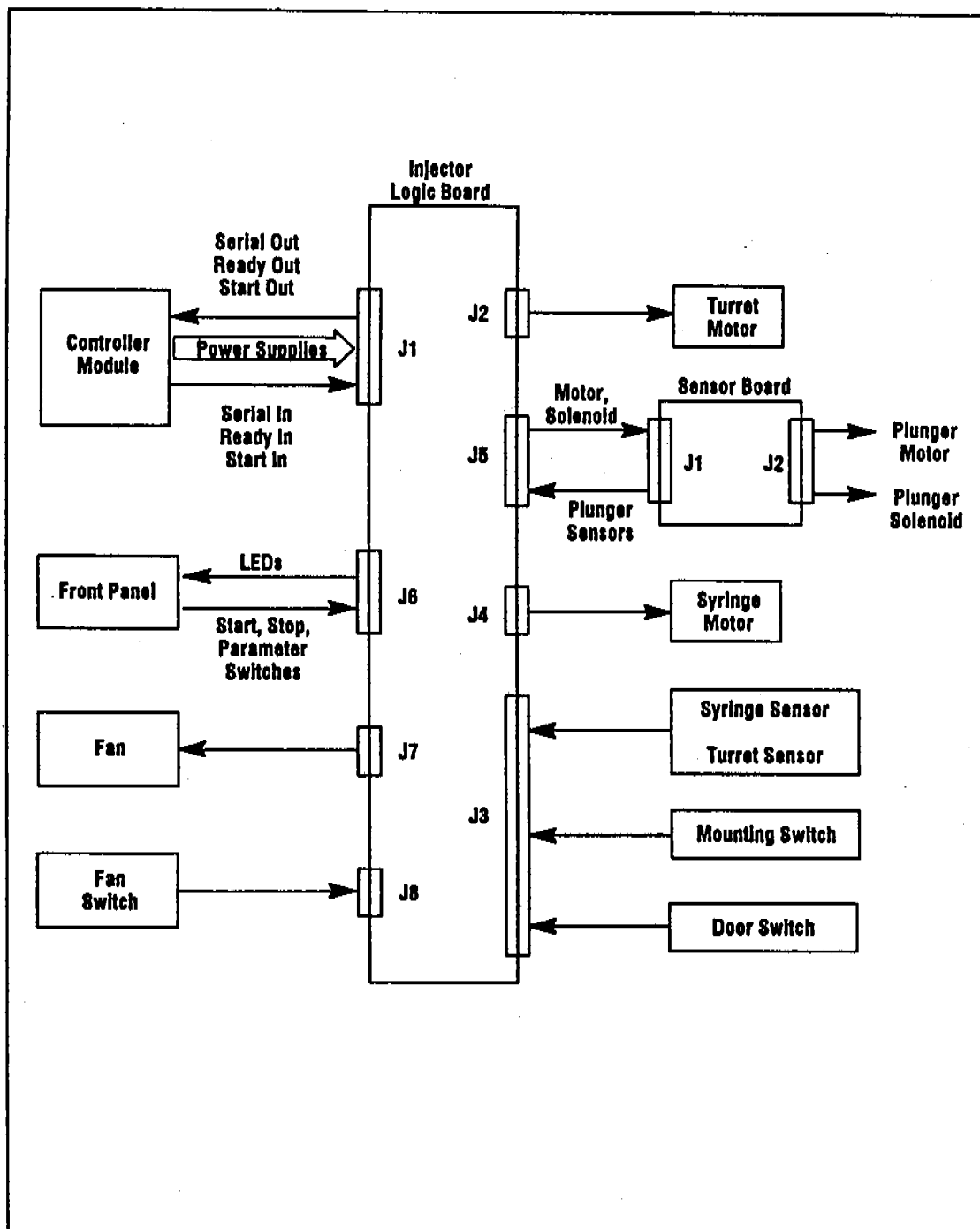


Figure C-1. Injector block diagram.

## Injector Replacement Parts

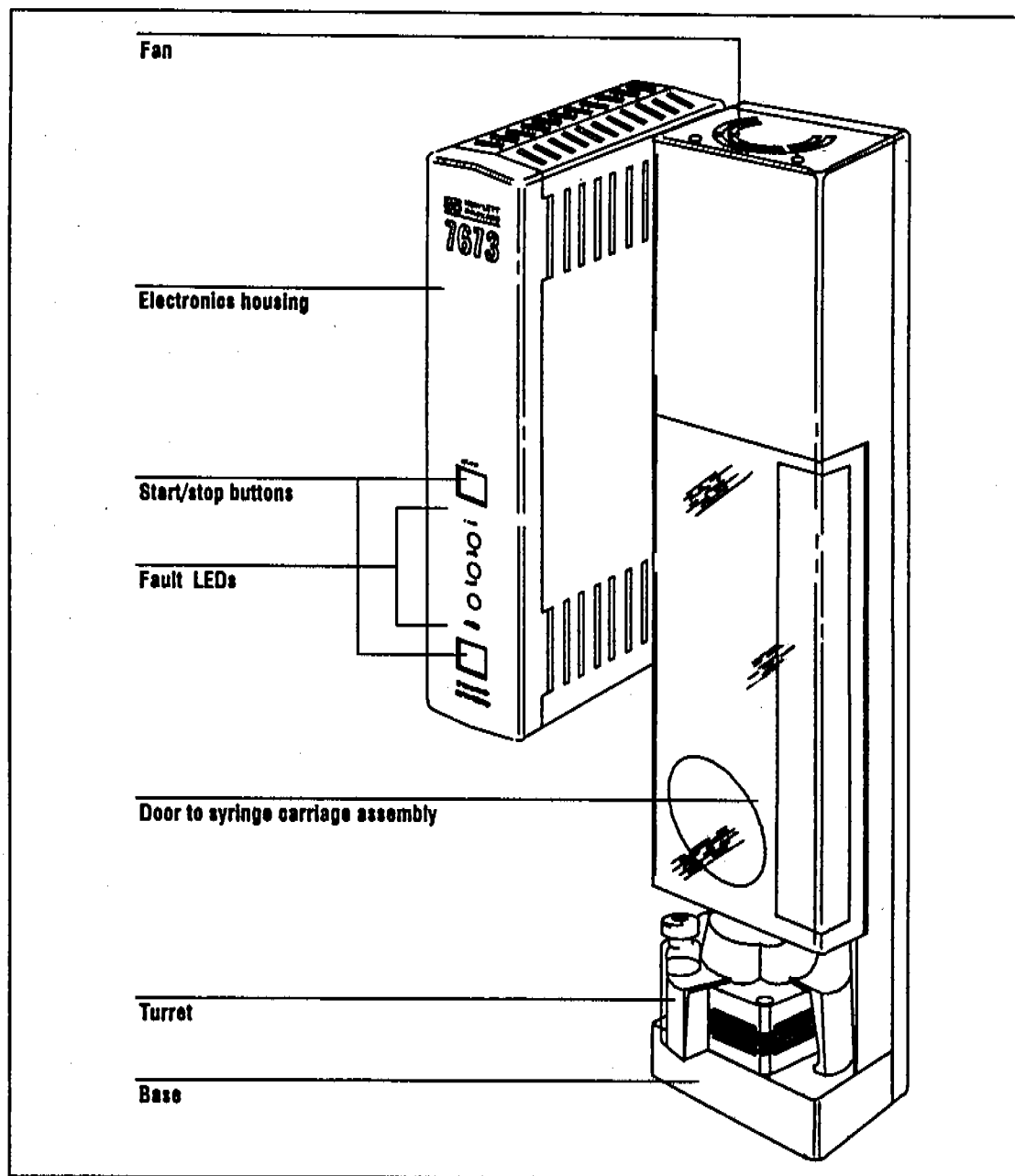


Figure C-2. HP 18593B Injector Module.

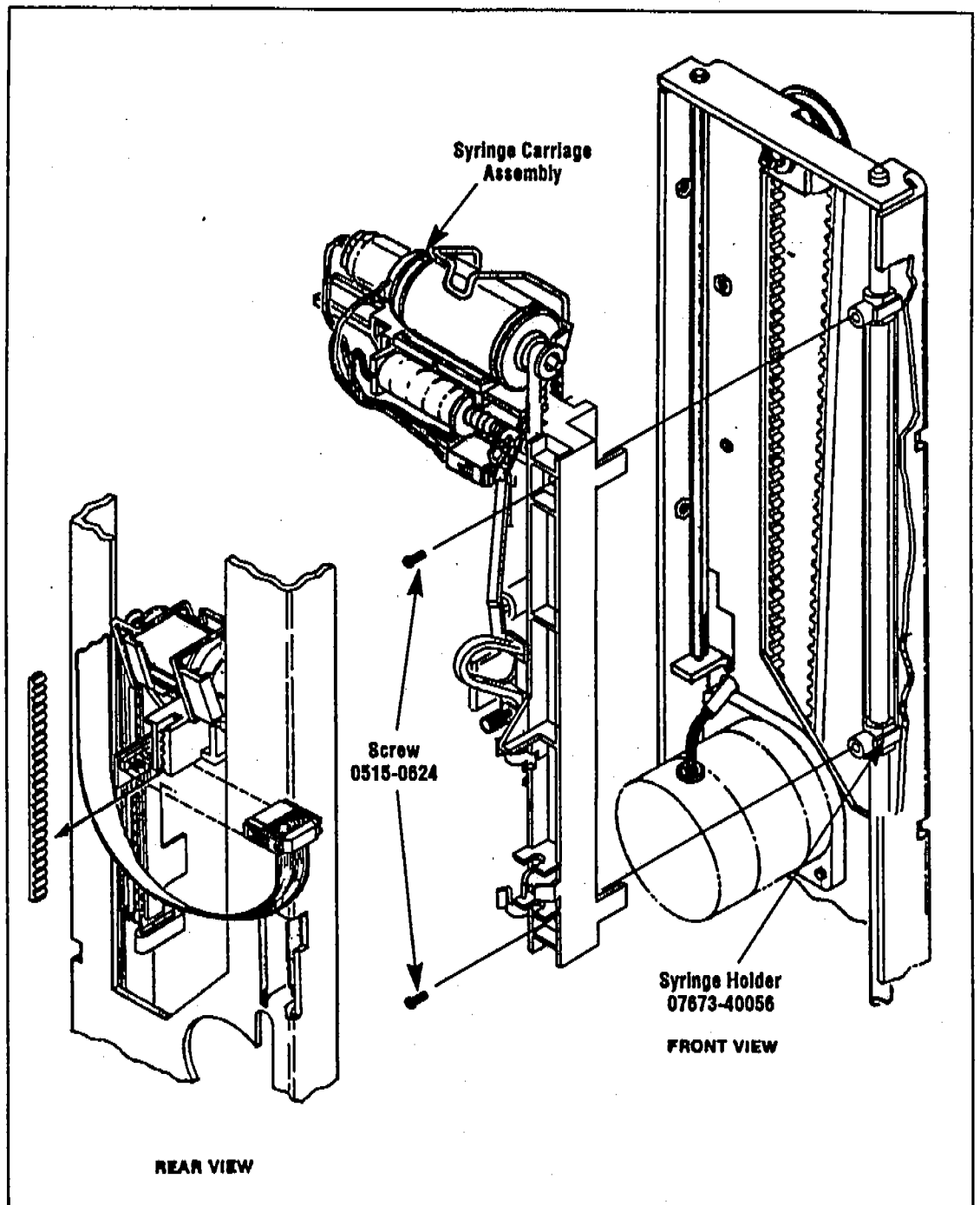


Figure C-3. Installing the syringe carriage assembly.

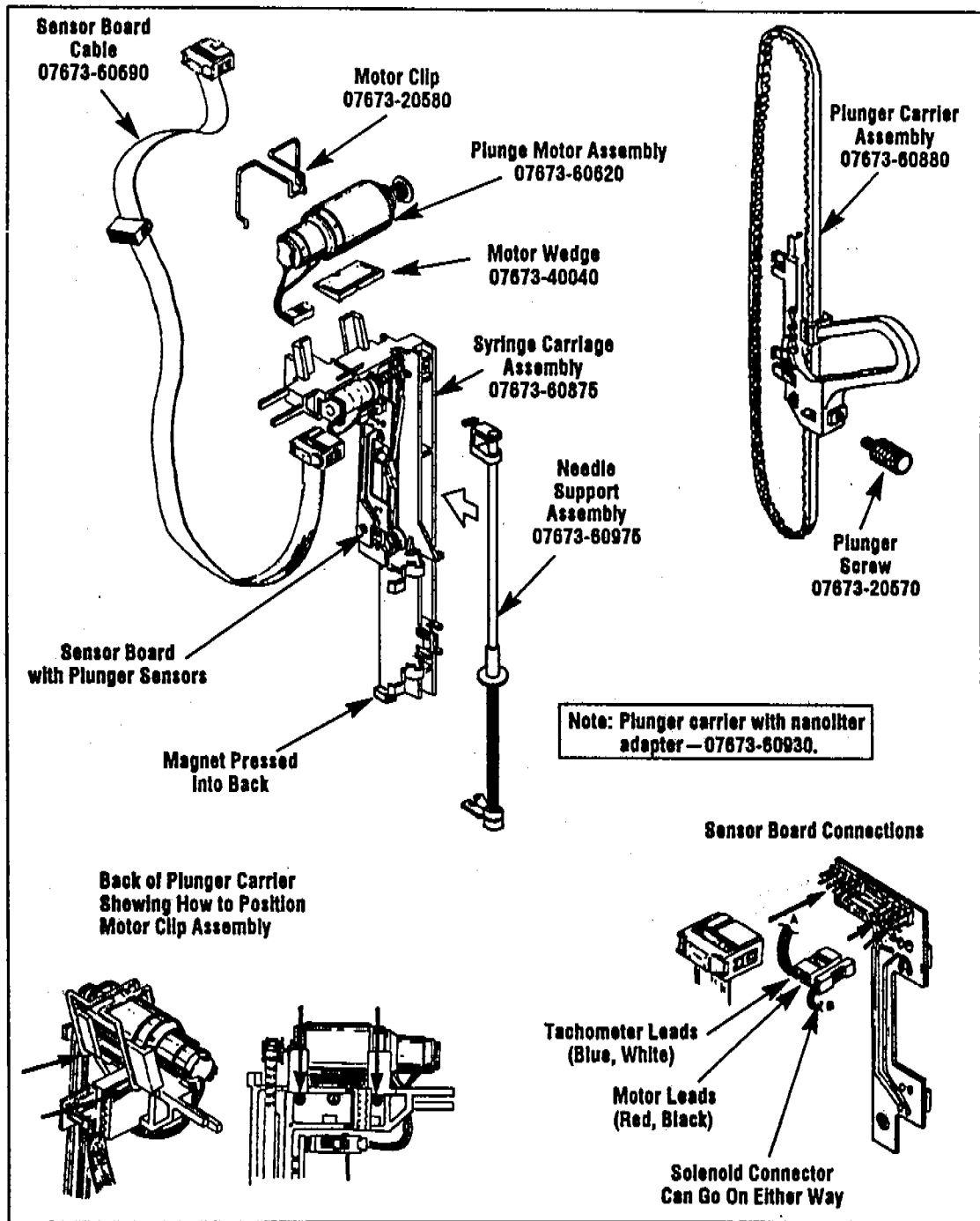


Figure C-4. Syringe carriage assembly.

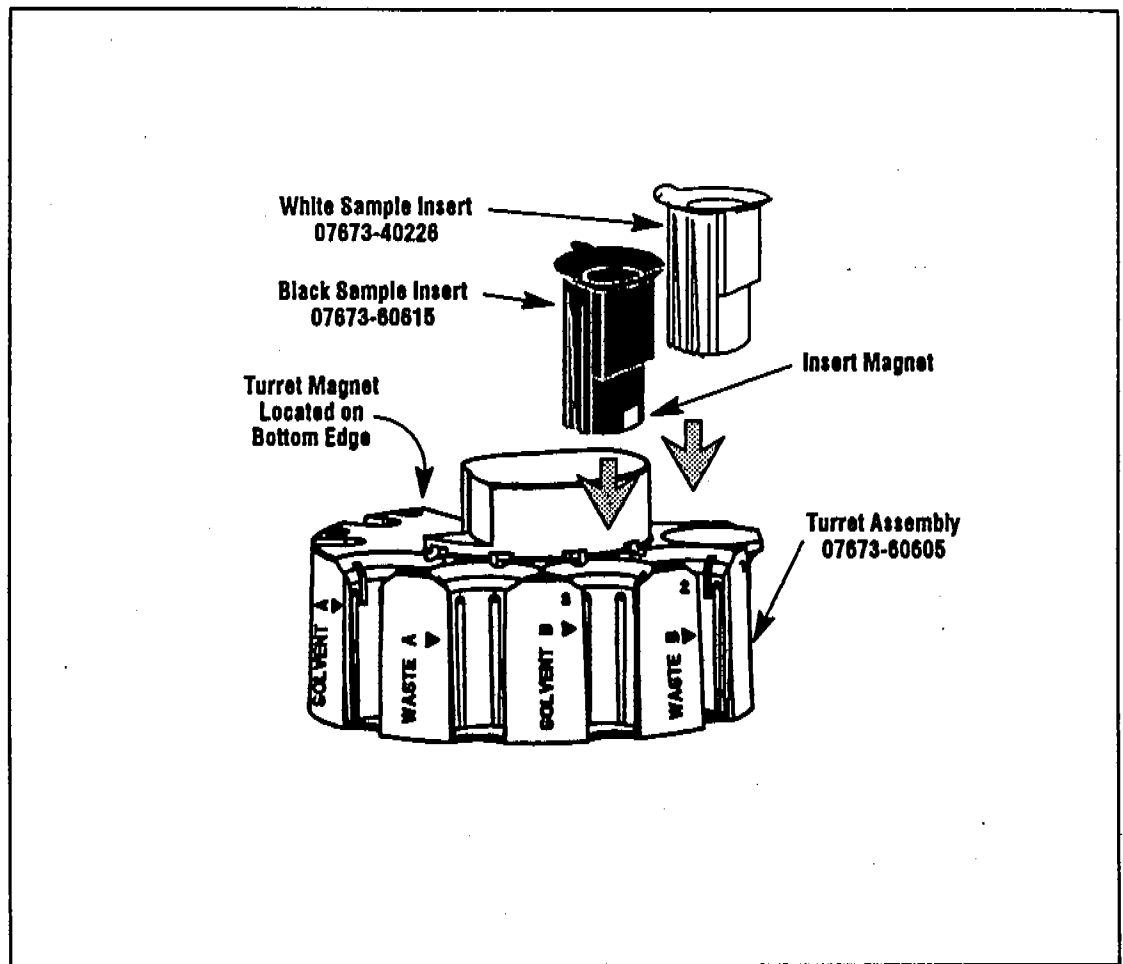


Figure C-5. Injector turret.

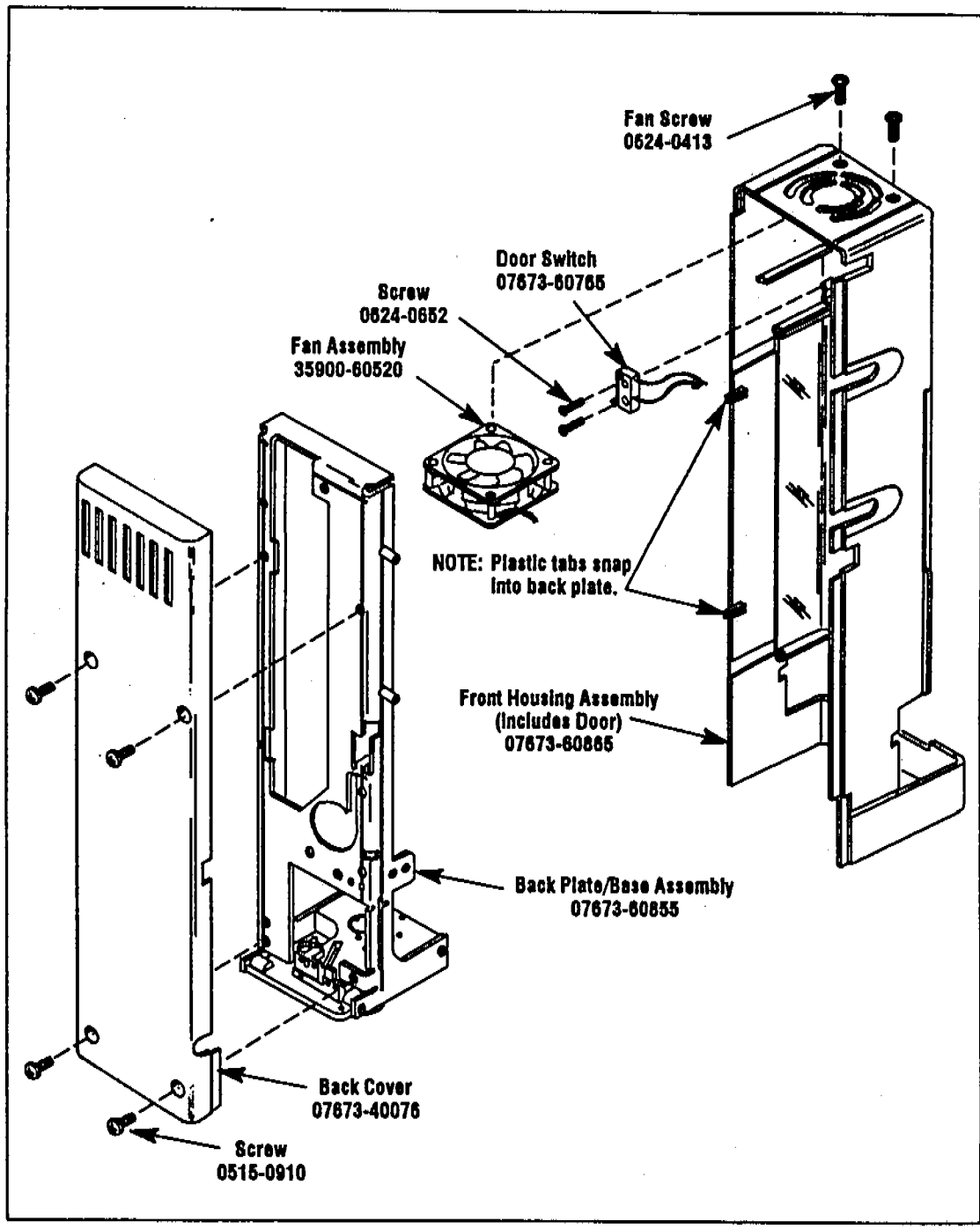


Figure C-6. Injector covers.

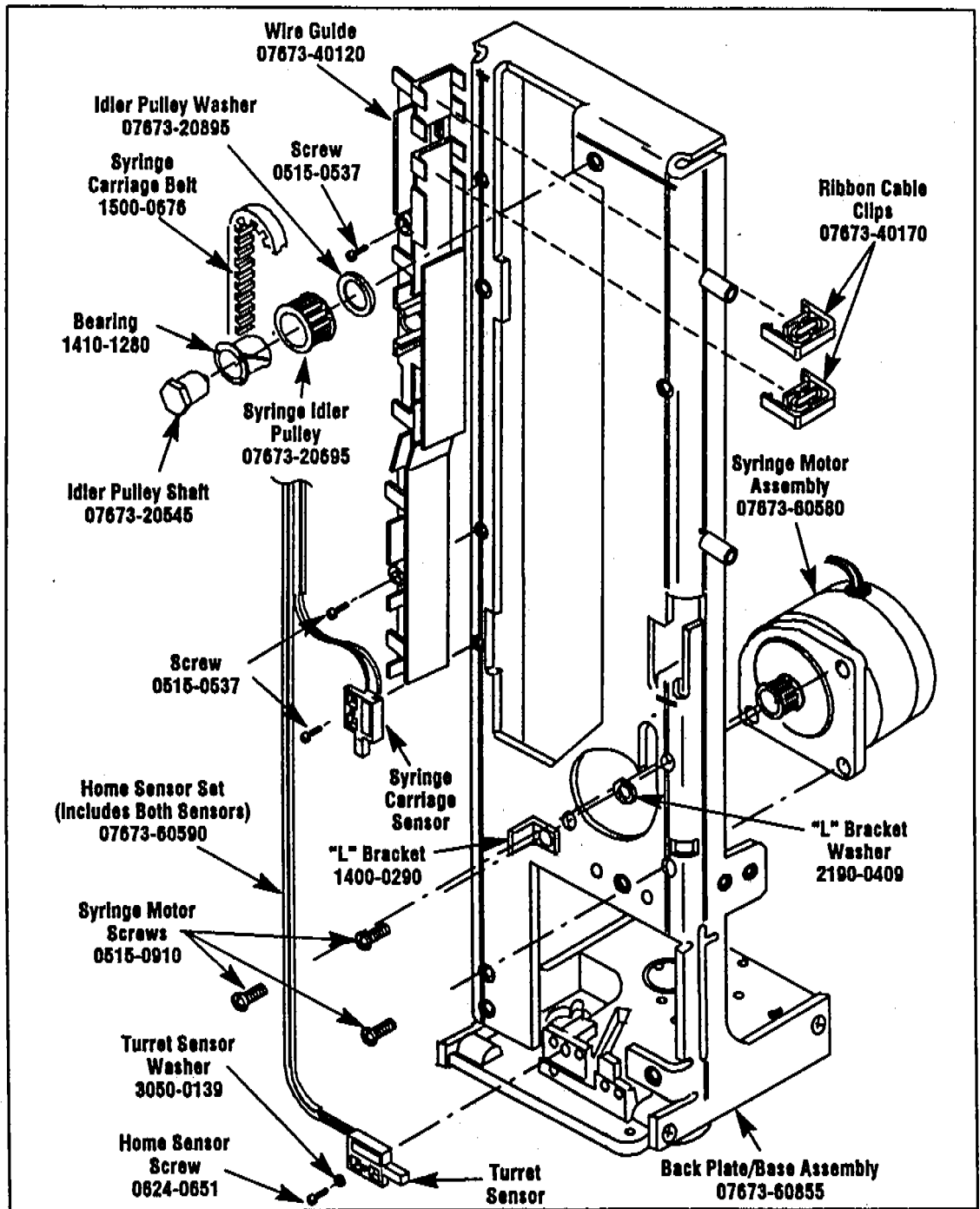


Figure C-7. Injector tower—rear view.

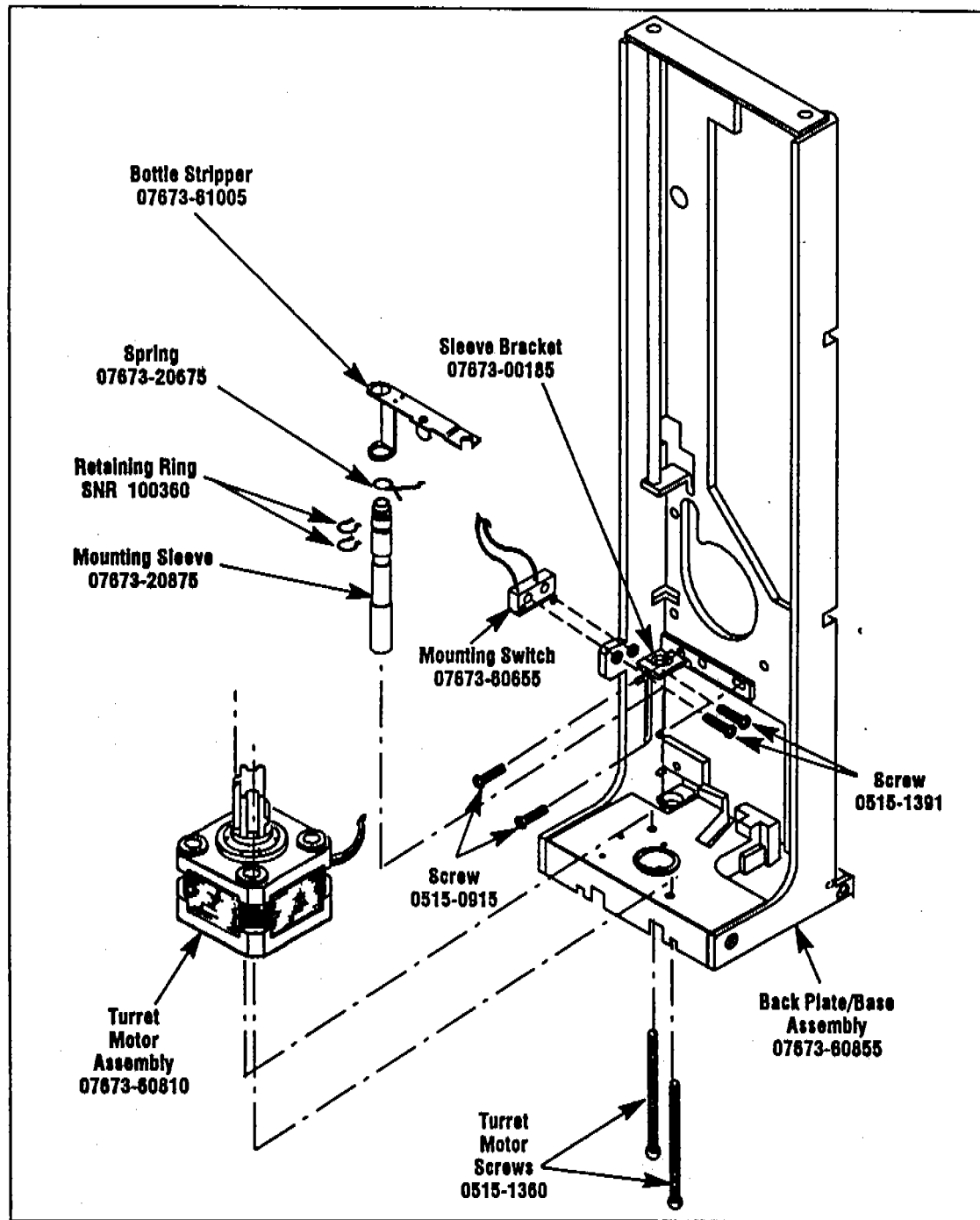
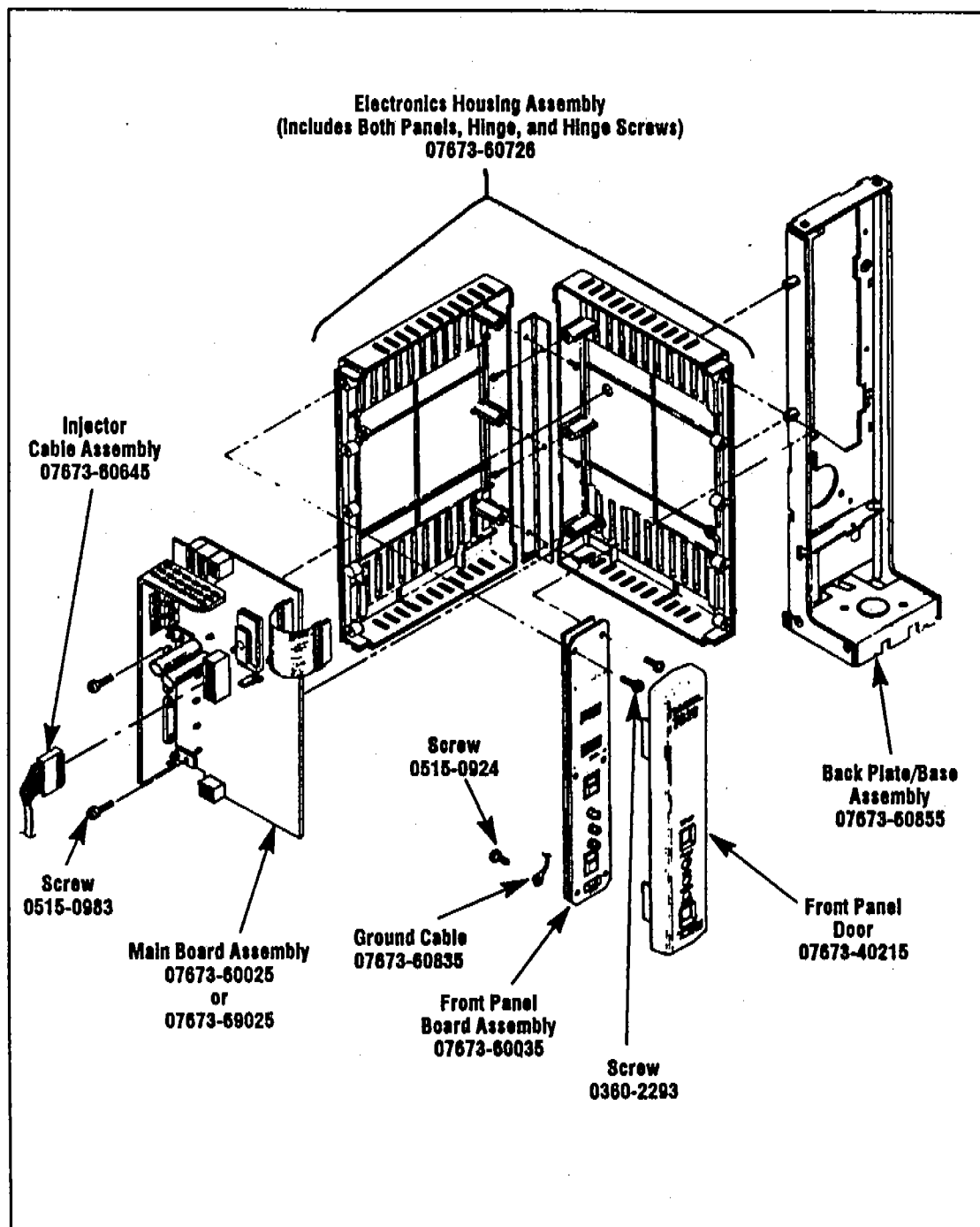


Figure C-8. Injector tower—front view.





**Figure C-9. Injector electronics.**

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## Injector Errors

An error condition is indicated if the red LED on the front panel is lit or flashing. Errors can be caused by:

- Objects obstructing the movement of any injector mechanism.
- Sensors not tripped when expected.
- Safety door open.
- Injector installed improperly.
- Motor failed.
- Wiring damaged.

Refer to Section B, "Troubleshooting", to see a full list of error conditions and courses of action. When the fault is corrected, clear the error by pressing the STOP button on the injector. Then restart the sequence.

## Injector Diagnostics

The Injector Diagnostic Mode allows the service engineer to observe the operation of injector motors and sensors during the troubleshooting process.

### CAUTION

The diagnostic mode overrides the door and mount safety switches. Be sure to take the syringe out of the injector before operating it in diagnostic mode. This mode should only be used by a trained service technician.

### Starting Diagnostics

1. Turn off the controller.
2. Simultaneously press the STOP and START buttons on the front of the injector. Keep pressing while you turn on the controller.
3. The Red LED should start flashing a double flash, indicating the first test in diagnostic mode.

### LED Diagnostic Functions

Each of the LEDs on the front of the injector has a special function for each of the three tests available in the diagnostic mode.

Test	Red LED	Yellow LED	Green LED
Syringe Carriage	Two flashes	On when syringe motor is energized	On when syringe carriage magnet is detected by syringe carriage sensor
Turret	Three Flashes	On when turret motor is energized	On when turret or bottle insert magnet is detected by the turret sensor
Plunger	Four Flashes	On when plunger motor is energized	On when plunger magnet is detected by upper or lower plunger sensor.

Table C-1. Injector Diagnostic LEDs

## Syringe Carriage Test

1. Press **START** on the front of the injector. The turret and syringe carriage will move to their home positions. The syringe motor will remain energized for a few moments. The green LED will light whenever the syringe carriage sensor detects the syringe carriage magnet.
2. Press **START** to drive the syringe motor one step (2 phases energized).
3. Hold **START** down to run the syringe motor continuously. Wait about 10 seconds for a response. Note the LEDs on the injector main board (figure C-11). They should light in the following sequence:

DS1	DS2	DS3	DS4
ON	OFF	OFF	ON
ON	OFF	ON	OFF
OFF	ON	ON	OFF
OFF	ON	OFF	ON

**Table C-2. LED Pattern during Syringe Motor Movement**

4. Press **STOP** to advance to the turret test.

## Turret Test

1. Press **START**. The turret will go through its homing routine. The motor remains energized for about 10 seconds. The green LED will light when the turret sensor detects the turret magnet.
2. Press **START** again. The turret will rotate and home on the next magnet. If there is no magnetic bottle insert, the turret will find the original magnet again.
3. Move the turret manually to verify the sensor trips when the magnet goes by.
4. Press **STOP** to advance to the plunger carrier test.

## Plunger Carrier Test

1. Press START. The plunger will go to the top of its movement while energizing the solenoid to catch the plunger carrier at each stop on the way up. The plunger motor then drives the plunger carrier to the bottom of its movement. The green LED will light when the plunger carrier is at the top or bottom of its travel.

Note the LEDs on the injector main board. DS6 lights when the processor is sending a signal to the plunger motor drive to enable the plunger motor.

DS5 is on except when the plunger motor is stalled. The plunger motor stalls briefly at the top and bottom of the plunger carrier travel and during the setting of the sample volume.

2. Manually move the plunger carrier up and down and verify that each sensor trips when the magnet moves by.
3. Press STOP to return to the syringe carriage test.

---

## Measuring Injector Alignment

Misalignment between key assemblies within the injector could cause errors and/or bend syringe needles. The following tools can be used to determine if the injector is properly aligned:

07673-20810	False Syringe
07673-20800	Turret Sleeve
07673-20820	Base Plug

These tools are part of the Alignment Tool Kit (HP part number 07673-60950).

### Measuring Alignment Between the Syringe Carriage and the Turret

1. Remove the syringe and the needle support assembly from the syringe carriage.
2. Install the false syringe in the syringe carriage (figure C-10).
3. Remove the turret, swing out the bottle stripper and replace the turret.
4. Place a vial insert into the second turret position.
5. Place the turret sleeve into the vial insert.
6. Rotate the turret sleeve under the false syringe.
7. Manually move the syringe carriage downward. The false syringe should slide cleanly through the turret sleeve. If it does not, do the following:
  - Check the alignment tools for proper installation.
  - Check the syringe carriage, the injector turret, and the turret motor for proper installation.
  - Replace the syringe carriage and check alignment again. Repeat this process with the injector turret and the injector back plate/base assembly if necessary.

## **Measuring Alignment between the Syringe Carriage and the Injector Base**

1. Move the syringe carriage back up but keep the false syringe installed.
2. Remove the turret.
3. Remove the injector from the GC. Stand it on a flat surface.
4. Place the base plug into the injector base hole. The narrow portion of the plug should face downward.
5. Manually move the syringe carriage downward. The false syringe should slide cleanly through the base plug. If it does not, do the following:
  - Check the alignment tools for proper installation.
  - Check the syringe carriage for proper installation.
  - Replace the syringe carriage and check alignment again.
  - Replace back plate/base assembly and check alignment again.

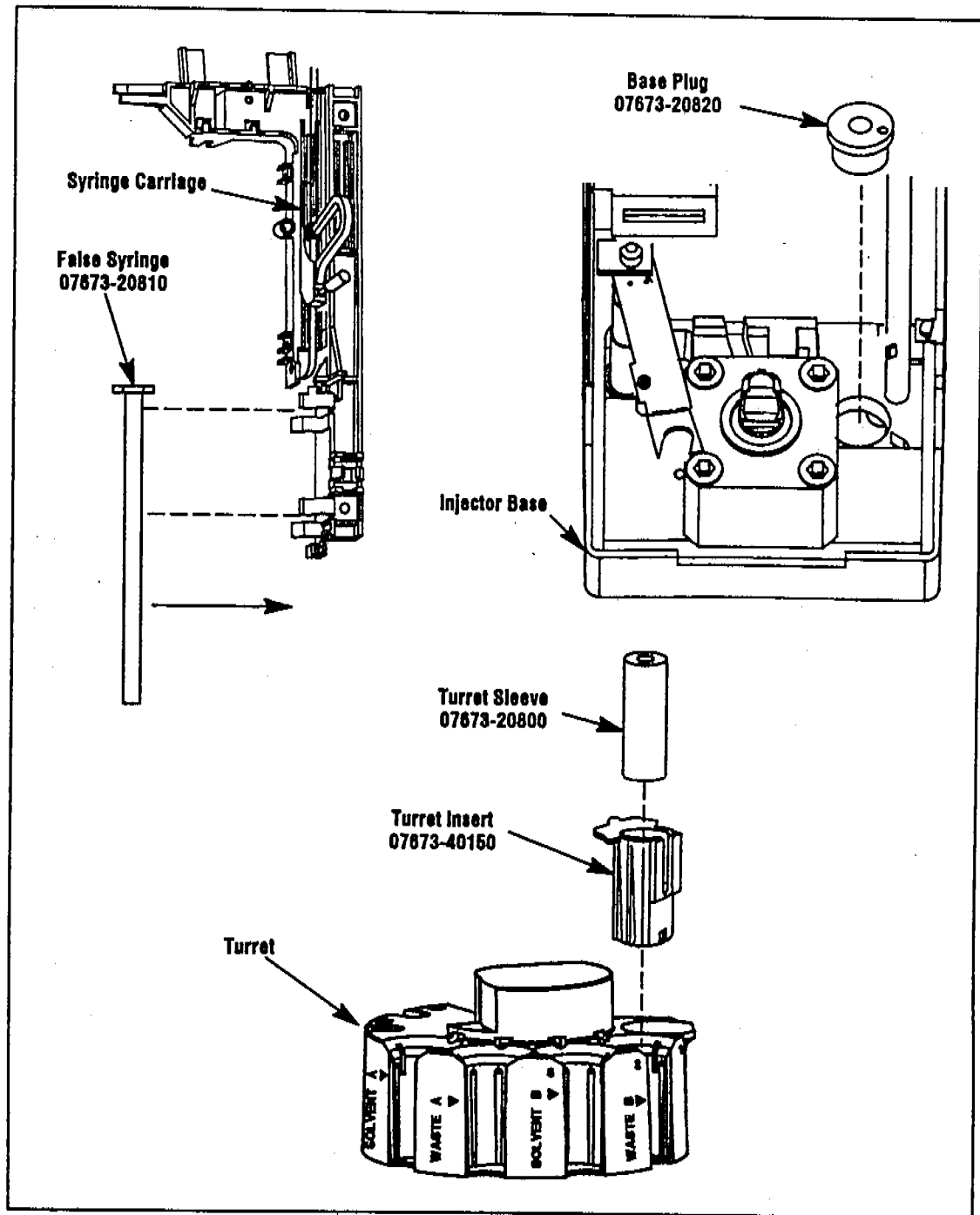


Figure C-10. Installing injector alignment tools.



# Print Circuit Boards Component Overlays

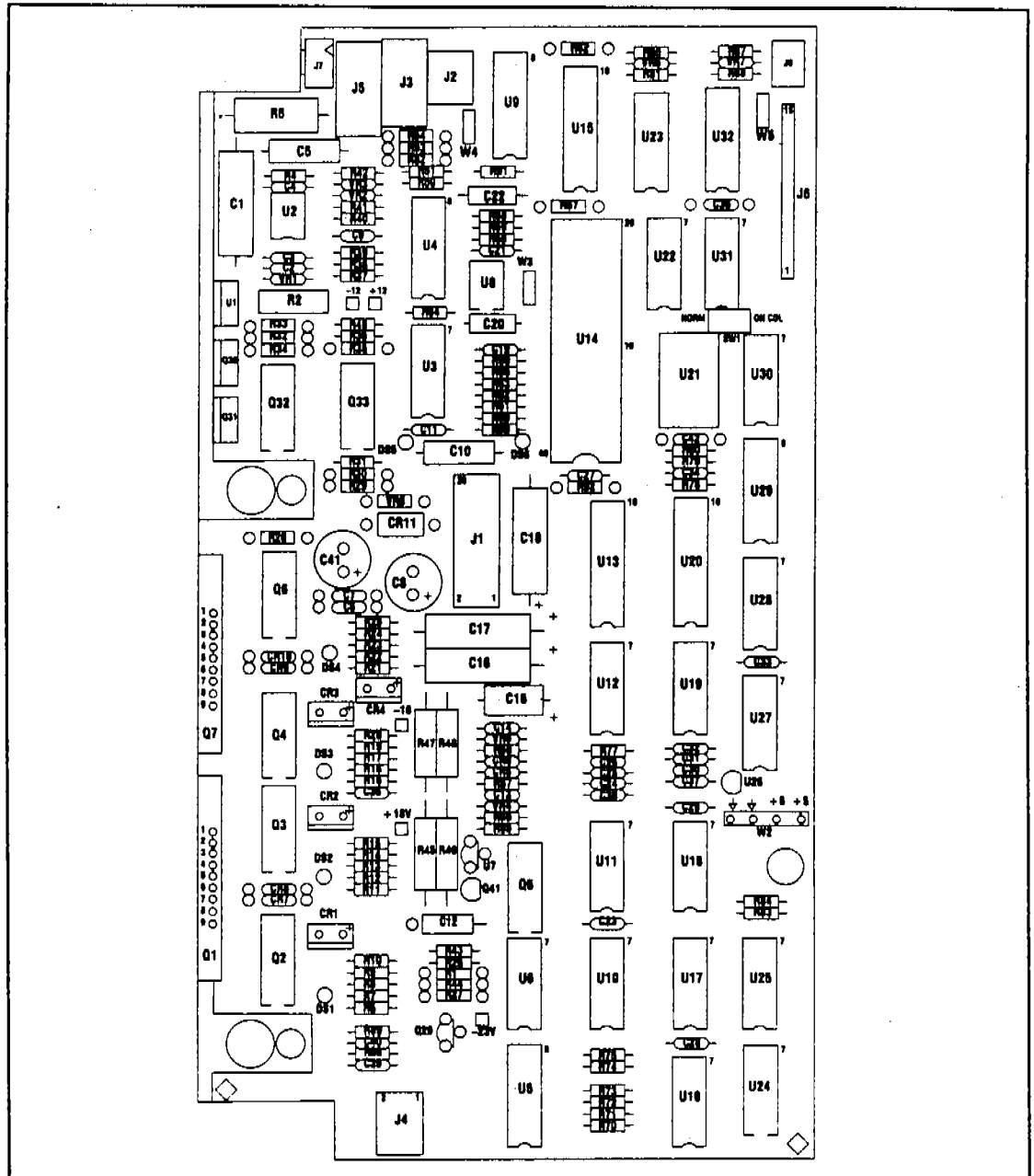


Figure C-11. Injector main board (07678-60025).

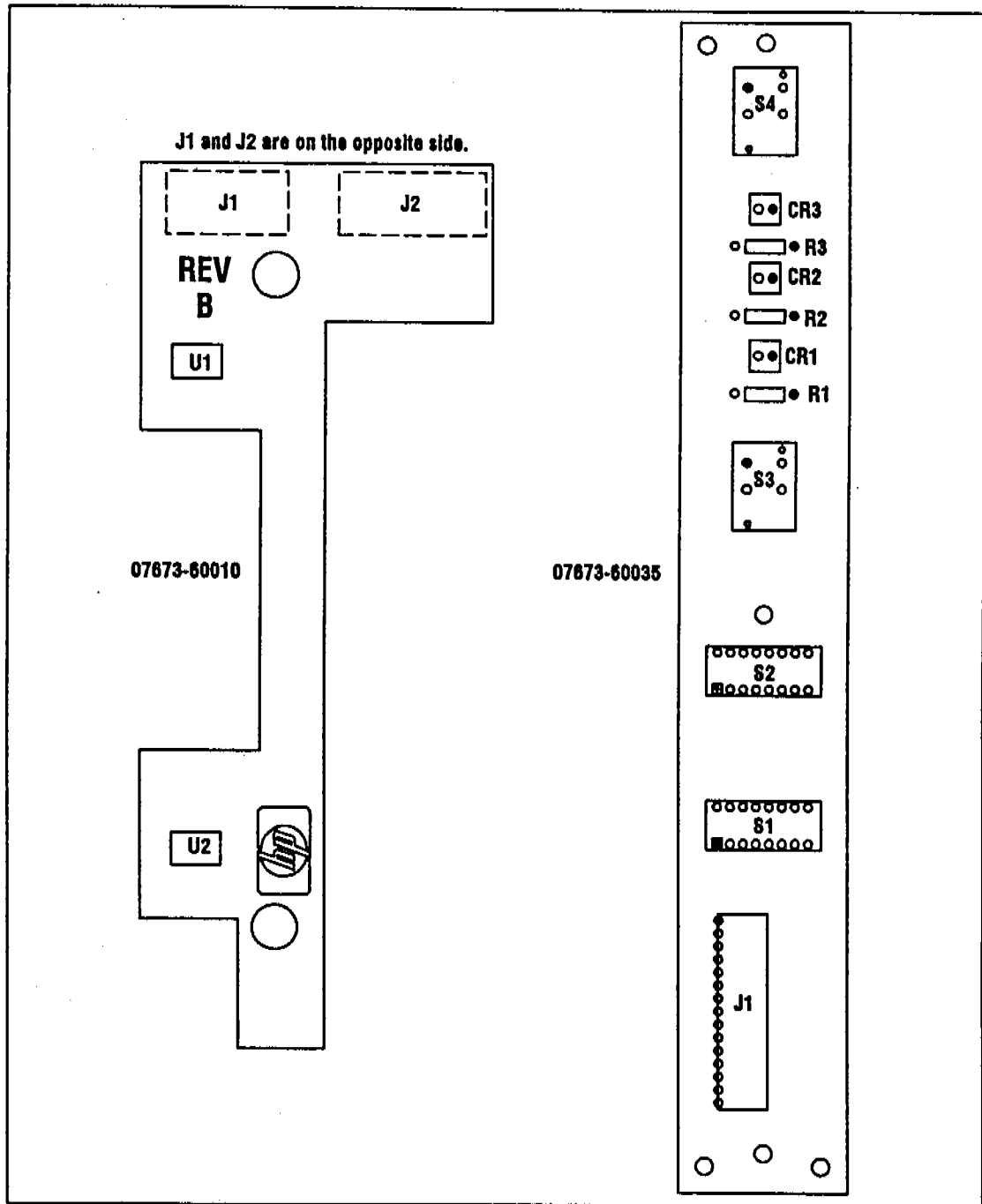


Figure C-12. Injector sensor board (07673-60010) and injector controls board (07673-60035).

# Injector Pin Out Diagrams

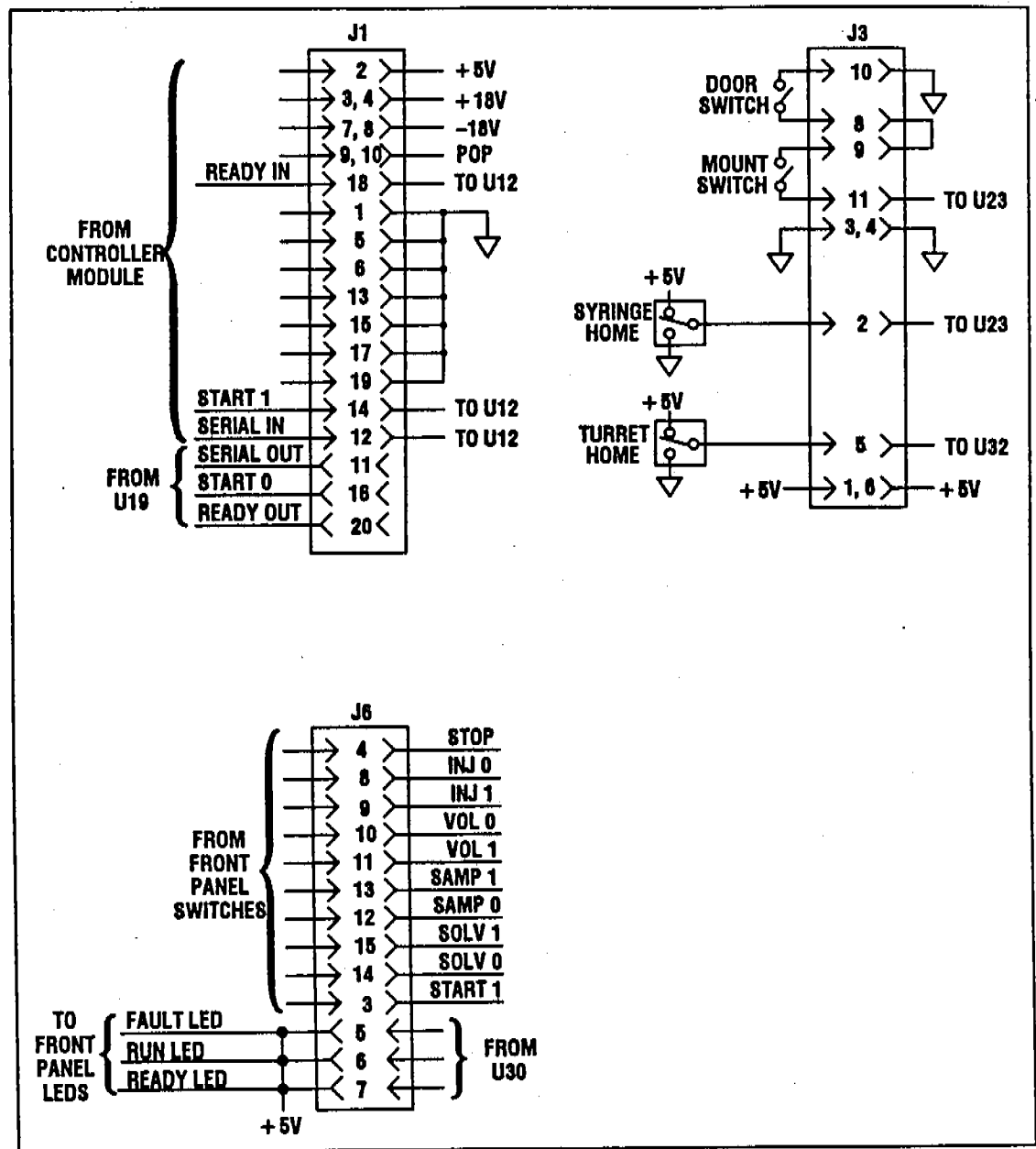


Figure C-13. Injector main board wiring diagram.

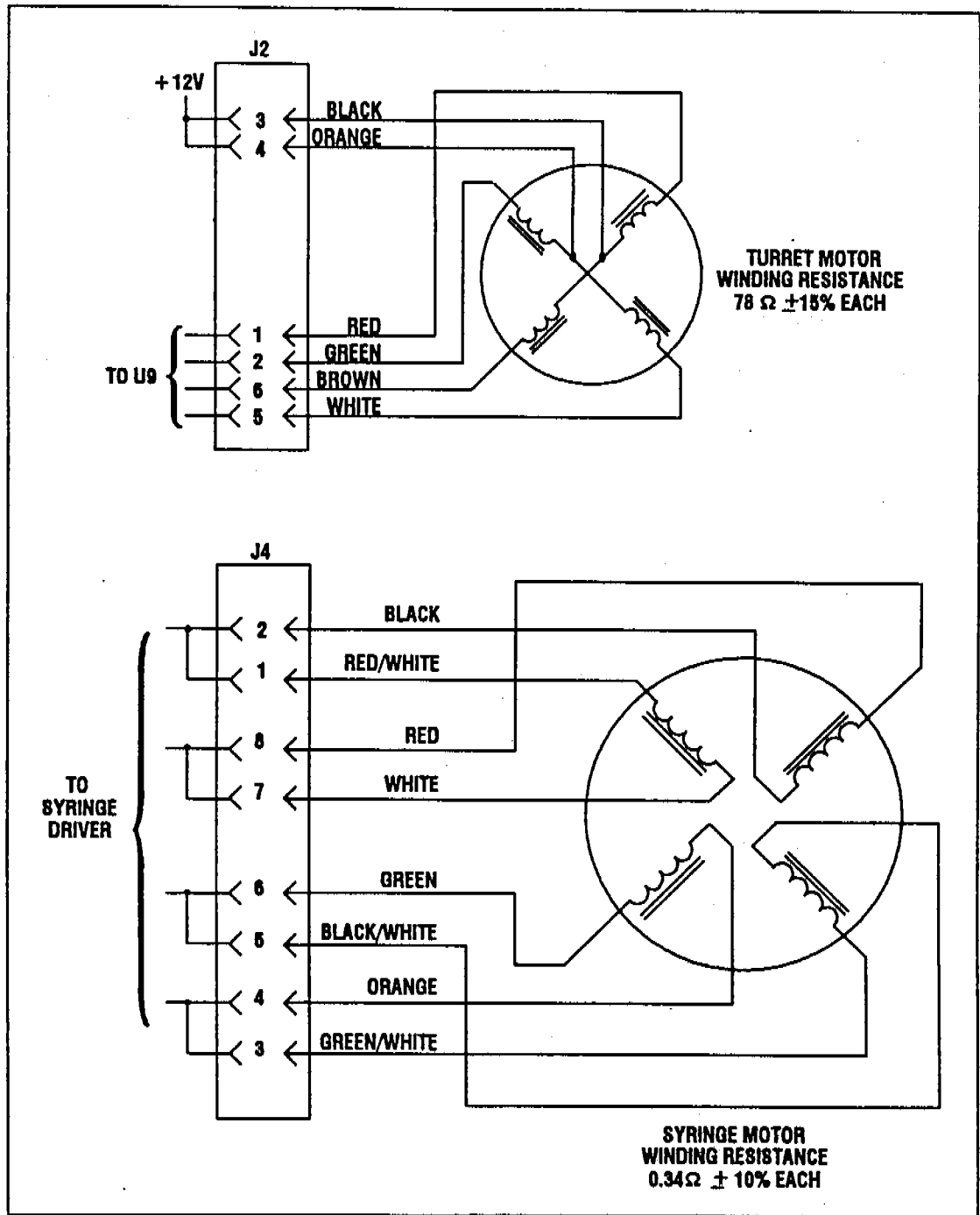


Figure C-14. Installing main board wiring diagram.

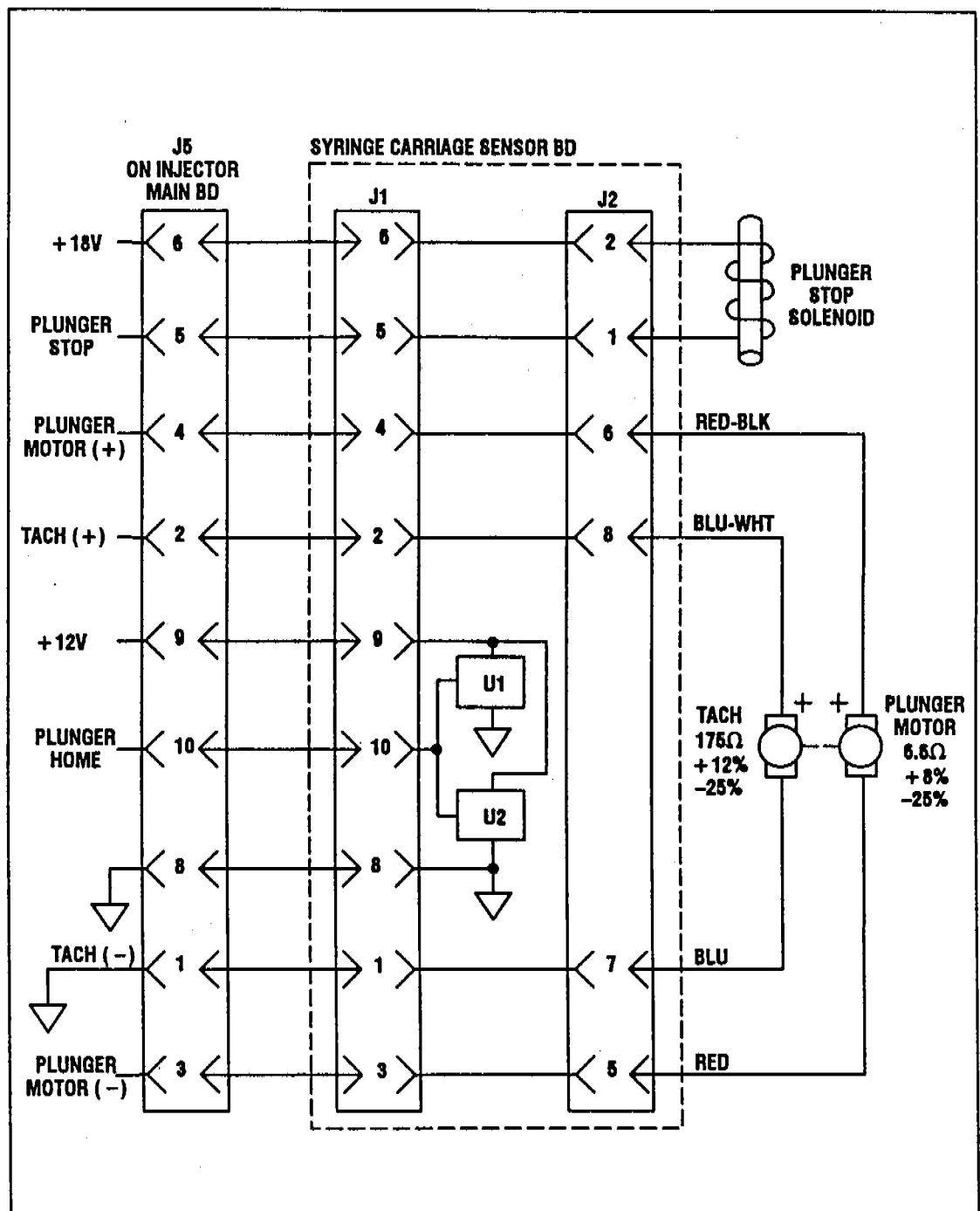
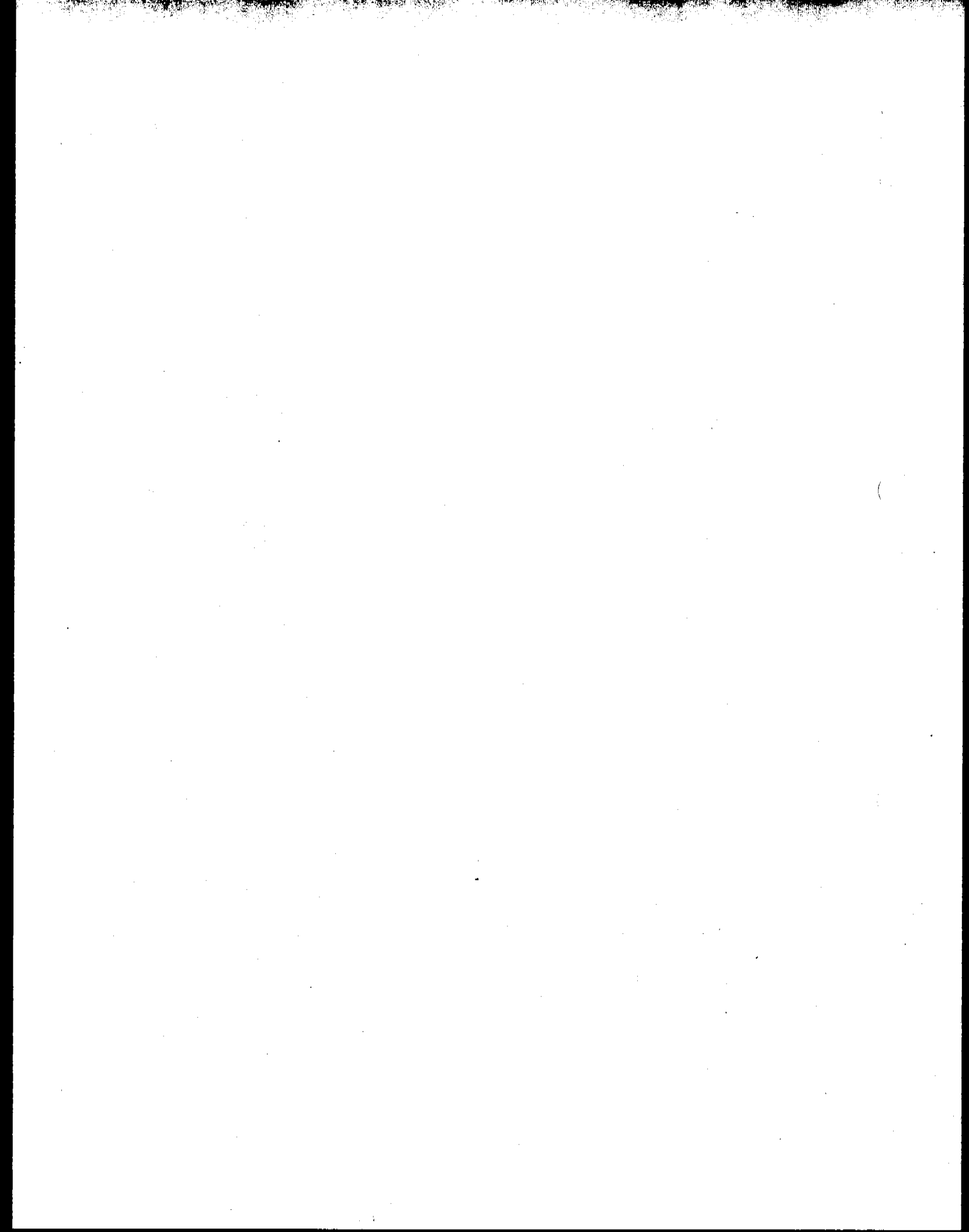


Figure C-15. Injector main board/sensor board wiring diagram.



# **Controller Module**

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## Controller Module Description

The HP 18594B Controller Module houses most of the electronics for an HP 7673 Automatic Sampler system and serves as an interface between the automatic sampler and other analytical instruments.

The automatic sampler can be configured in several different ways. Depending upon the configuration, the controller will have different option boards installed in it.

Each controller contains the power supply board (HP part number 18594-60125) which provides the necessary voltages to operate the sampler modules. The power supply board also provides a data bus for data communication between the option boards.

Depending upon the configuration of the automatic sampler, up to four boards may be mounted on the power supply board. The slots are labeled TRAY, AUX, COMM, and CONTROLLER (figure D-1).

### Controller Slot

The following boards may be put into the CONTROLLER slot:

Standard Controller (18594-60060) (Rebuilt 18594-69060)	Coordinates the tray, the bar code reader, one or two injectors for INET, stand-alone, "loop," or RS-232 control (see figure D-2).
HP 5880A Interface (18594-60050)	Provides an interface specific for HP 5880A GC control. It provides two-way communication between the HP 5880A GC (or the HP 3388A Integrator) and the controller module (see figure D-3).
HP-IB/Controller (18594-60110) (Rebuilt 18594-69110)	Allows HP-IB (IEEE-488) communications between the HP 7673 and HP ChemStations or "A" series 3350 LAS. It also acts as a controller board for these specific configurations. For "A" series 3350 LAS control, an RS-232 board is required in the COMM slot. The HP-IB/controller board does not support INET or stand-alone control (see figure D-4).



## Communication Slot

The following boards may be put into the COMM slot:

HP-IL (18594-60030)	INET communication board. Although the hardware on this board is INET compatible, the software to control it is on the controller board. Therefore, it can only function with a standard controller board in the CONTROLLER slot.
TTL (18594-60040)	Provides remote and BCD information to the integrator. If the TTL board is in this slot, the injector should be in the front position. It performs two distinct functions. The first function is the external interface for the READY IN/OUT and START IN/OUT signals. The second function provides a BCD bottle number to external data handling devices.
RS-232 (18594-60080)	Allows HP 7673 control through RS-232 communications. For more information see, the "RS-232-C Serial Interface Manual," HP part number 18594-90300.
Loop (18594-60090)	Allows an HP 3350A/3357A LAS system to send the next bottle number to the 7673. Valid bottle numbers with the tray module are 01-00 (where "00" is read as "100") or for an injector-only system, 01-03. Once a valid bottle number is sent to the HP 7673, the sampler begins its tray and injection sequences.

## Auxiliary Slot

The following boards may be put into the AUX slot:

TTL (18594-60040)	Provides remote and BCD information to the integrators. If the TTL board is in this slot, then the injector should be in the rear position.
Bar Code Reader (18594-60100) (Rebuilt: 18594-69100)	Controls the bar code reader (BCR) module. It also acts as a TTL board, so it can replace a TTL board in this slot with no loss of functionality. The BCR board contains a bank of eight dip switches to specify beeper operation, self-test mode, the position of the BCR on the tray, and the bar code label type.

## Tray Slot

If there is a tray module, the tray board (18594-60075 or rebuilt 18594-69075) must be in the TRAY slot to control tray operation. Also, when a tray board is installed, you must have the tray cable installed.

The main functions of the tray board are reading the status of the three homing sensors and the bottle sensor, driving the three stepper motors (Z, R, Theta) in the tray, and communicating with the controller board.

# Common Configurations

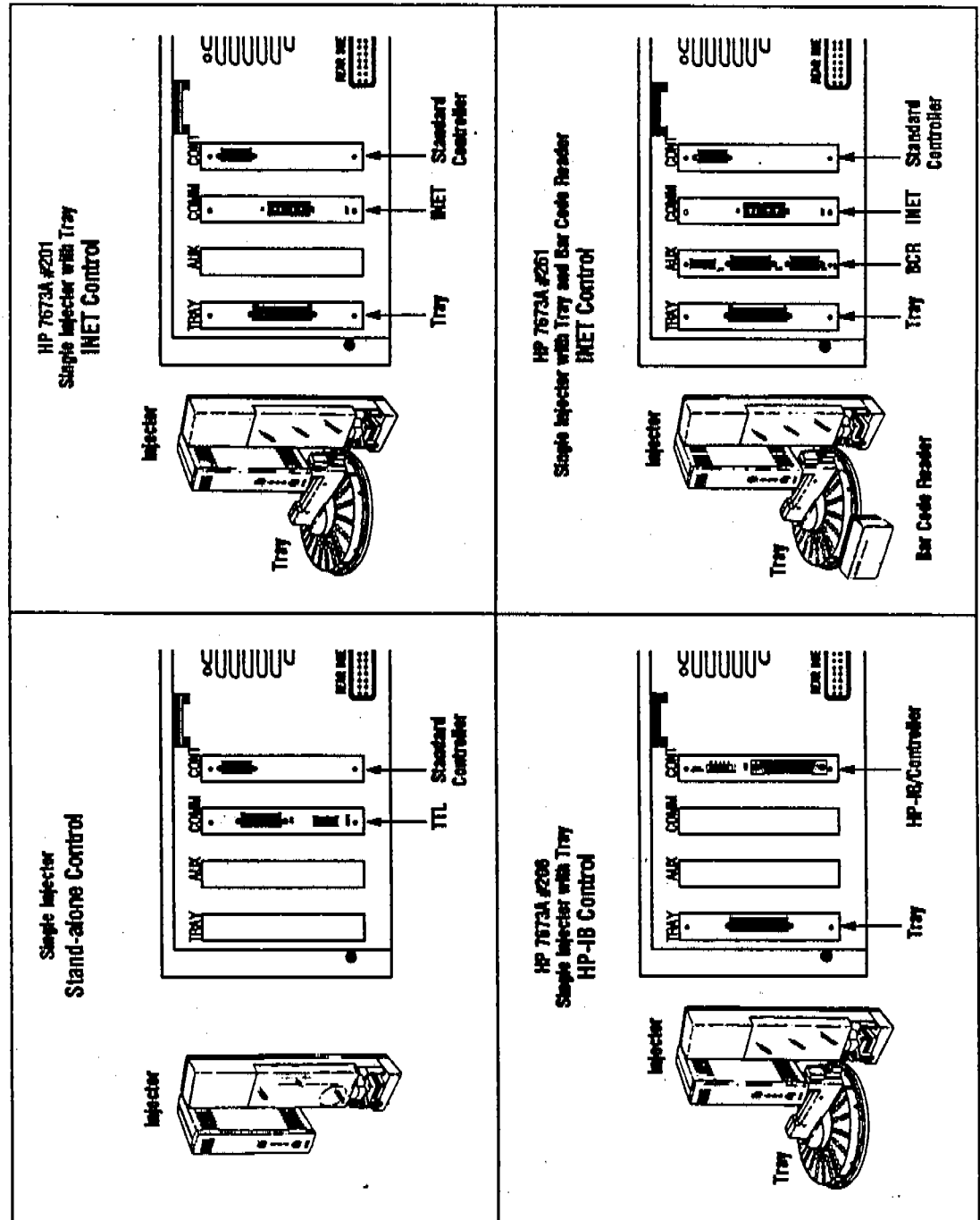
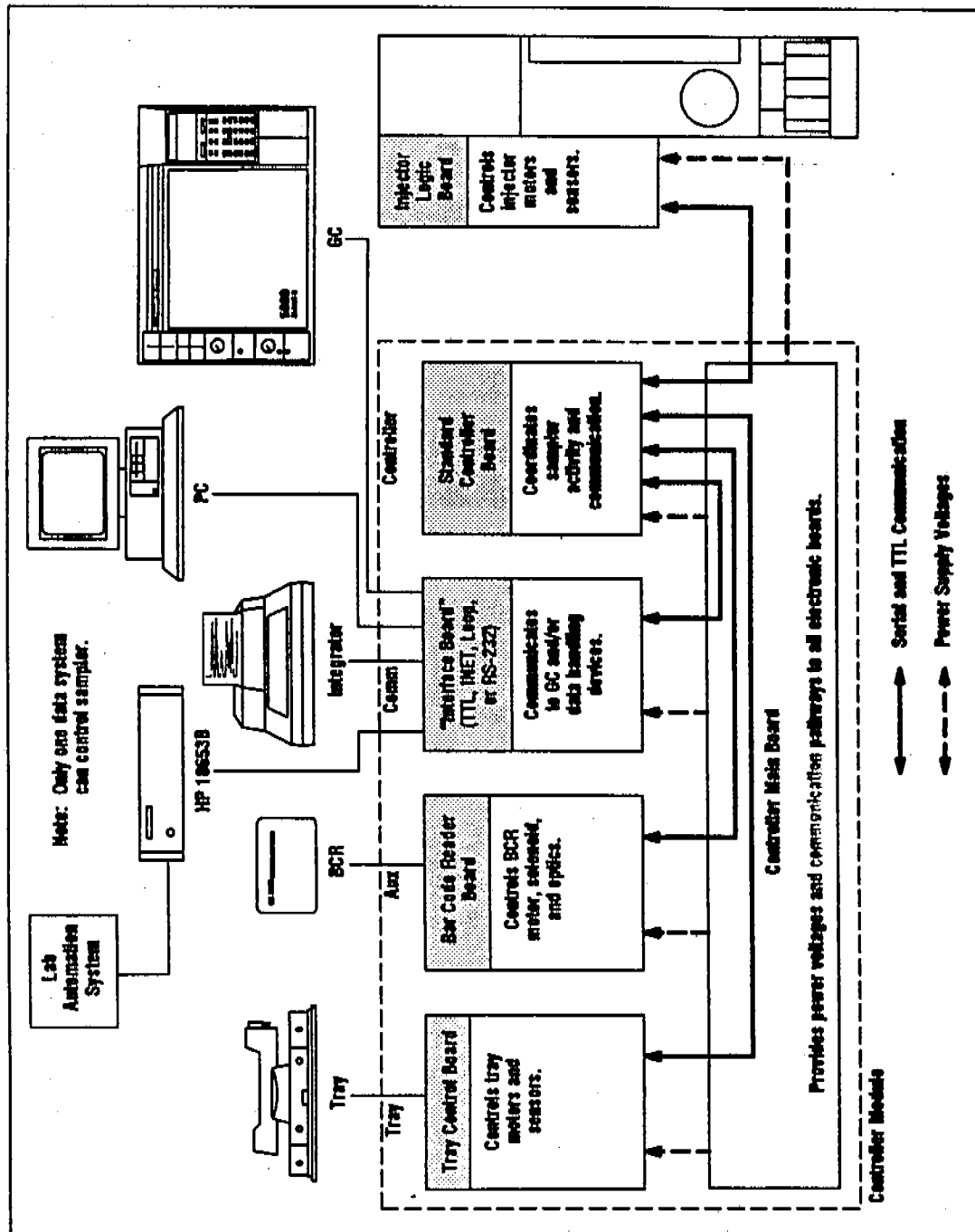


Figure D-1. Common controller module configurations.

# Controller Module Block Diagrams



D-6

Figure D-2. Controller module block diagram—standard controller board.

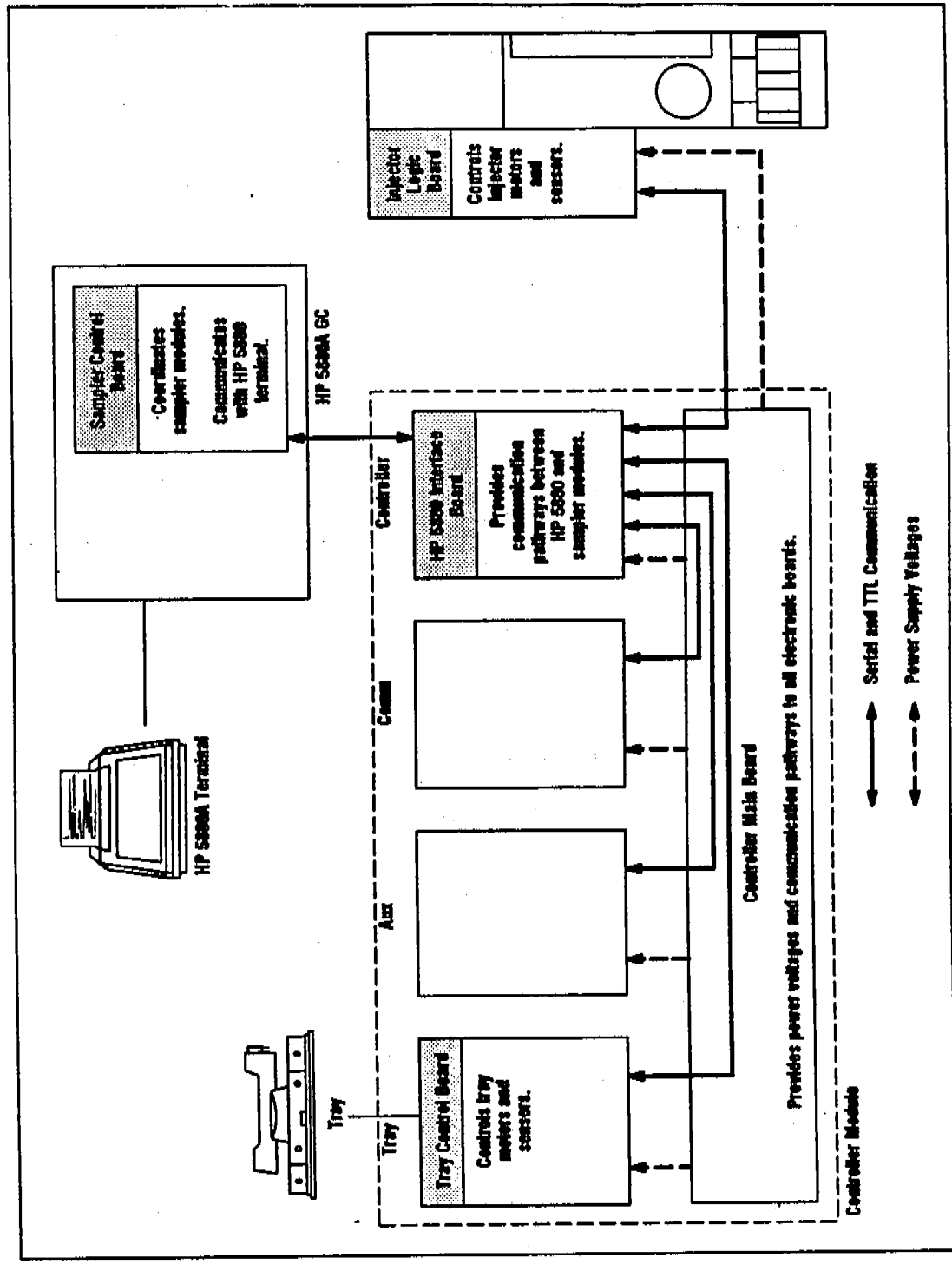
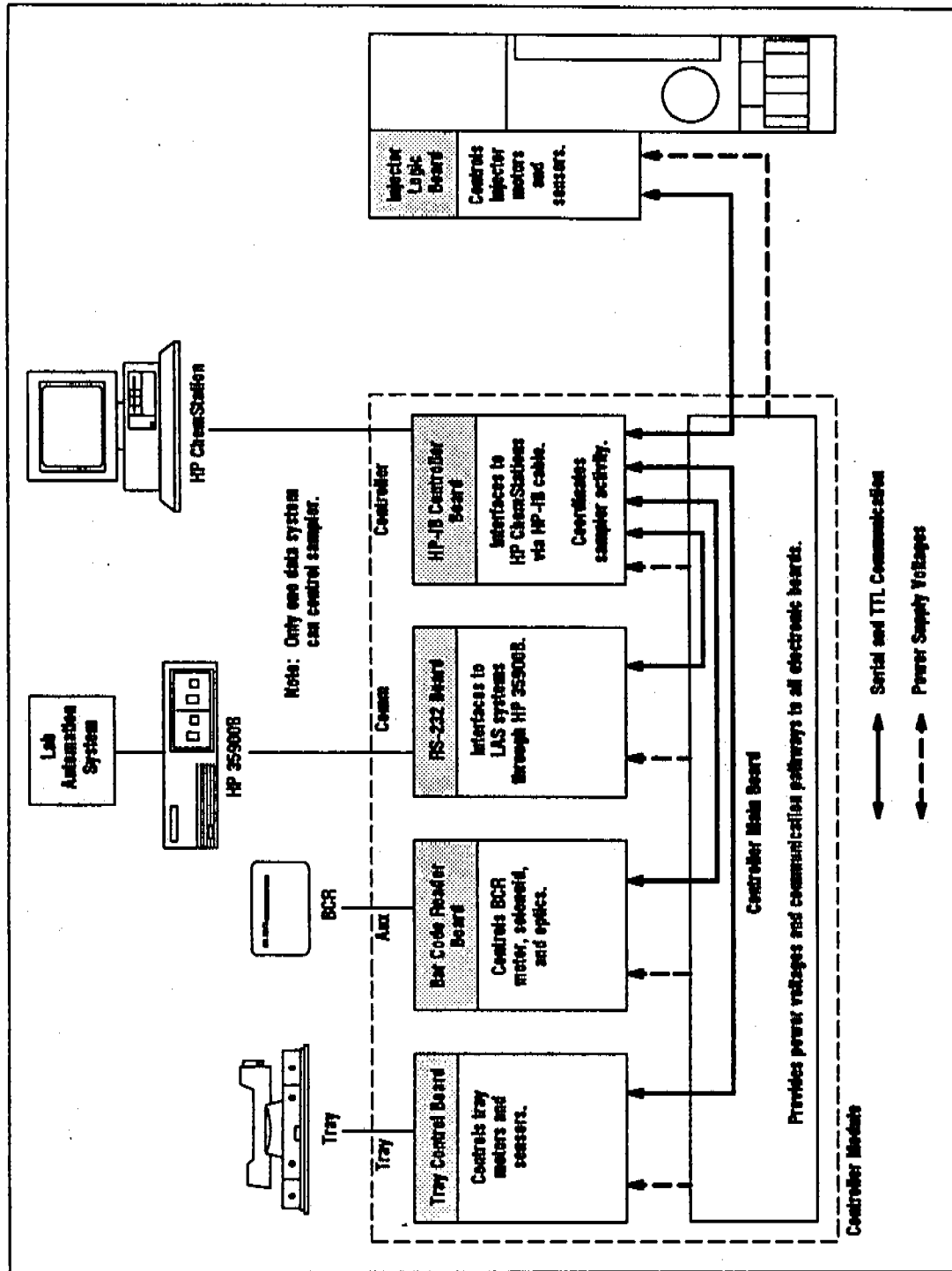


Figure D-3. Controller module block diagram—HP 5880A interface board.



D-8

Figure D-4. Controller module block diagram—HP-IB/controller board.

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## Control Signals

The control signals used between the controller and the injector are:

READY OUT	A logic high indicates injector readiness.
READY IN	A logic high indicates system outside of the injector is ready.
START IN	A negative going logic pulse tells the injector to start an injection sequence.
START OUT	The injector emits a negative going logic pulse at the time of injection, intended to start the system GC and integrator.
SERIAL COMM	A two-way serial communication link from the injector processor's UART.

All these signal lines are RS-232 compatible, and they are logically inverted. A logic high at the injector is seen at the RS-232 line as -12 volts, and a logic low at the injector is seen at the RS-232 line as +12 volts.

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## Fuses

Fuses have been installed at several locations within the instrument for the protection of major power circuits. They are designed to open as quickly as possible to prevent damage to other components within the circuit. Occasionally, an opened fuse may have been caused by a short one-time surge; however, it is far more common that a component within the protected circuit has failed. When an open fuse is noticed, replace it. If the replacement blows, suspect a component failure.

The following is a list of the fuses for the automatic sampler.

	Reference Designator	Fuse Type	HP P/N
Power Supply Board	F1, F2	15 A	2110-0054
Line Module	100 line	3.0 A (NTD)	2110-0003
	120 line	2.5 A (NTD)	2110-0083
	220/240 line	2 A (TD)	2110-0303

**Table D-1. Controller Module Fuses**

## Power Supply Usages

The main board in the controller module provides various voltages to the option boards and the sampler modules. The figure below shows where these voltages are used.

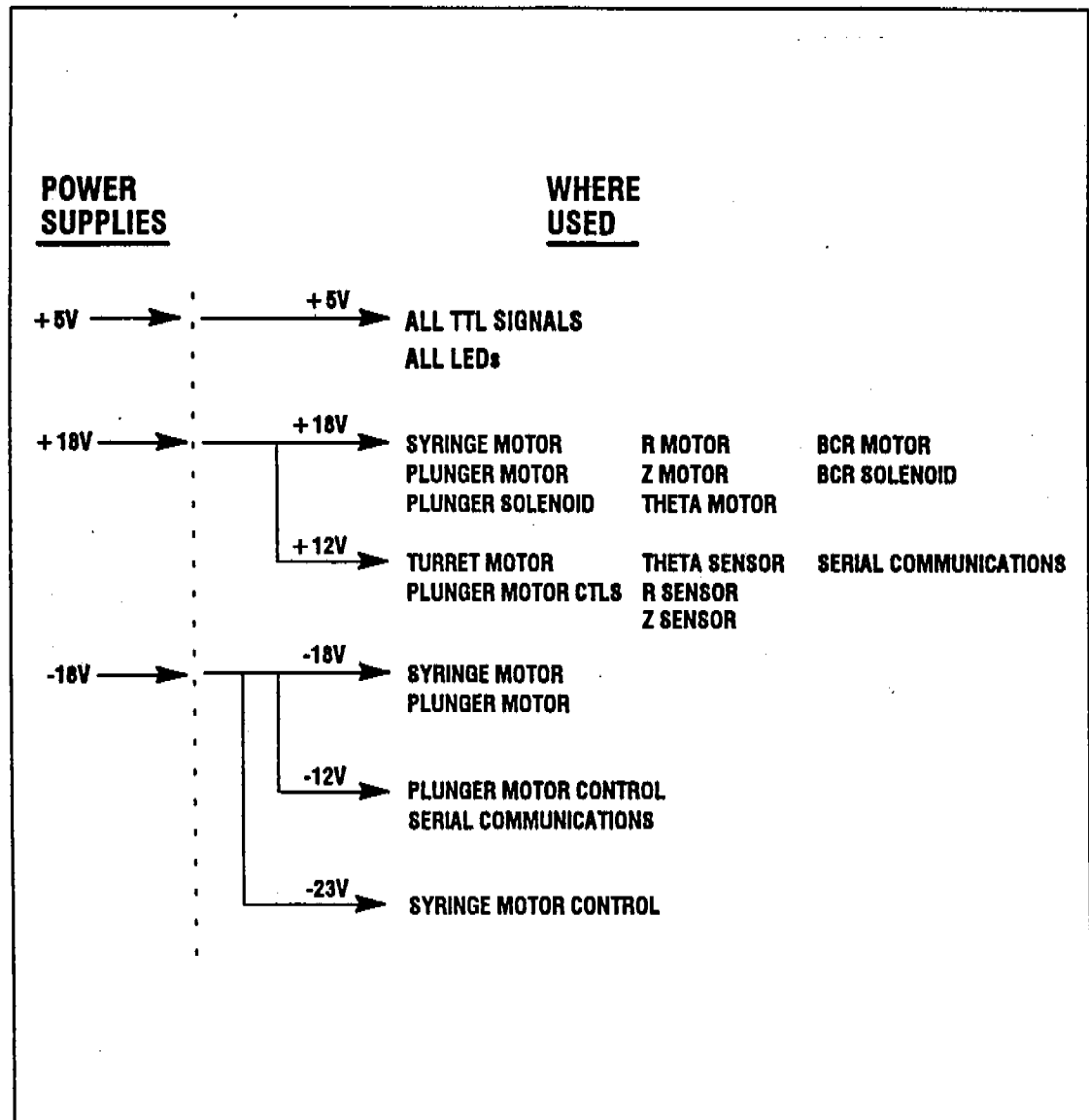


Figure D-5. Power supply usages.



# Controller Replacement Parts

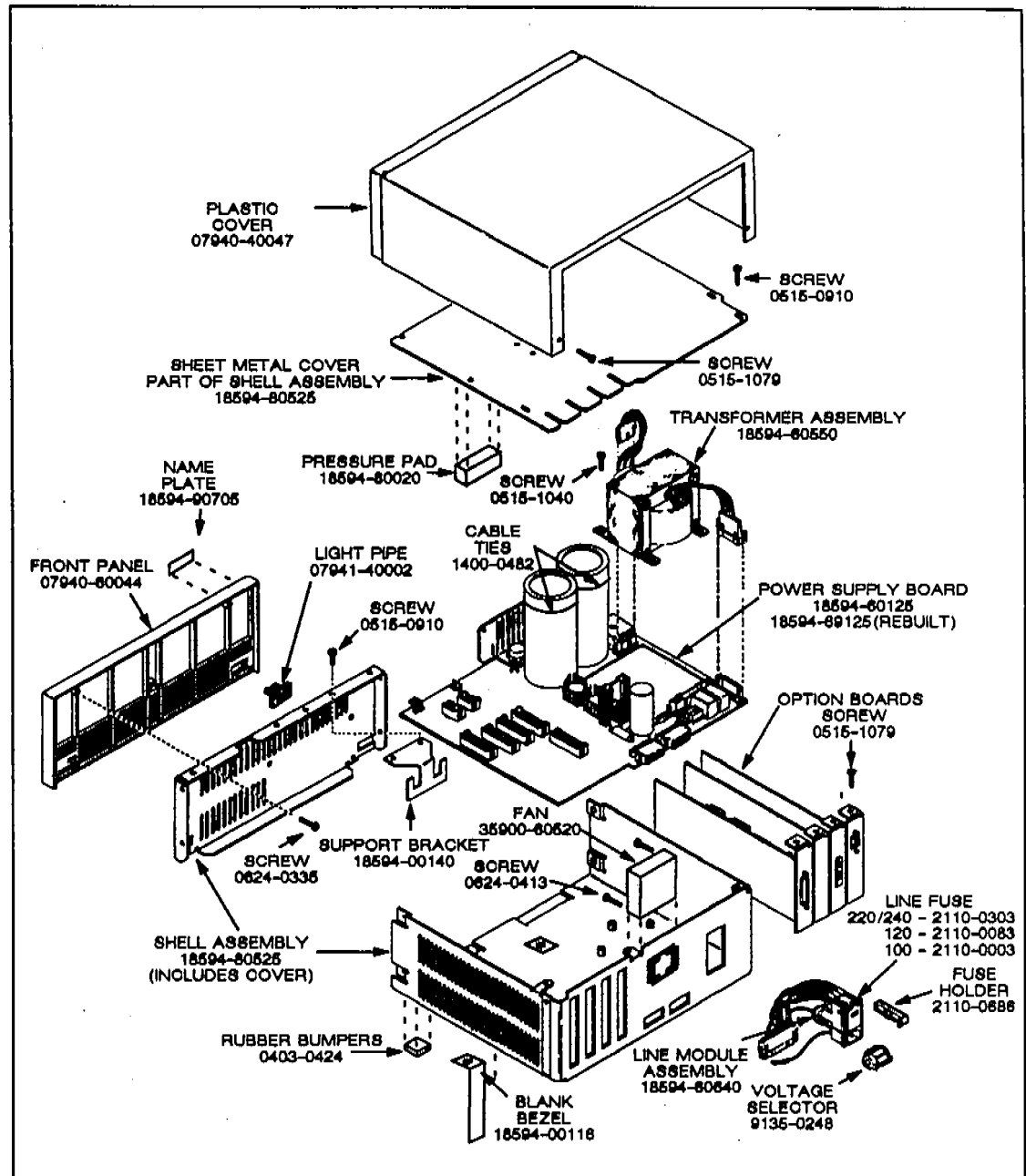


Figure D-6. Controller module replacement parts.

# Printed Circuit Boards—Component Overlays

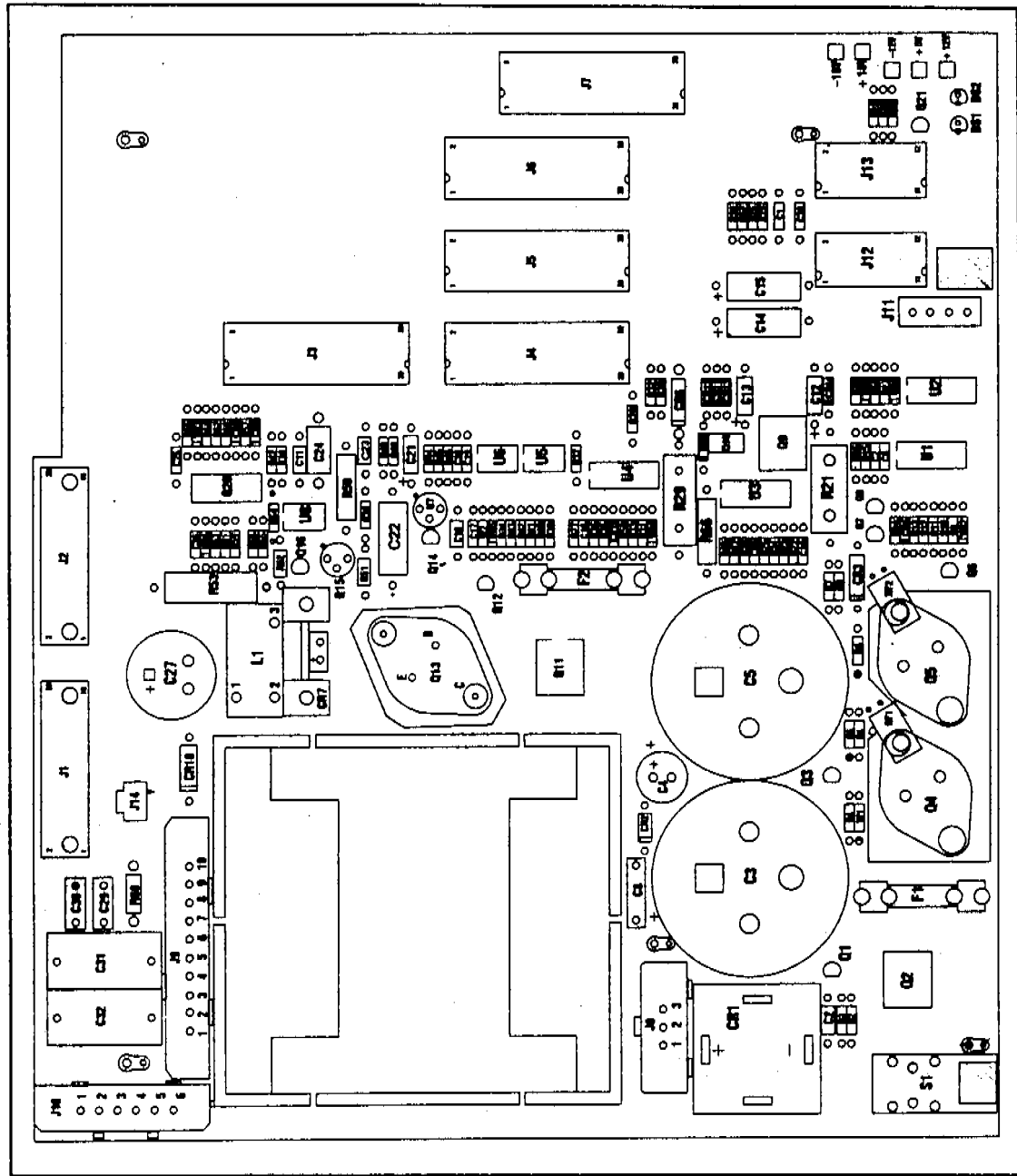


Figure D-7. Controller main board (18594-60125).

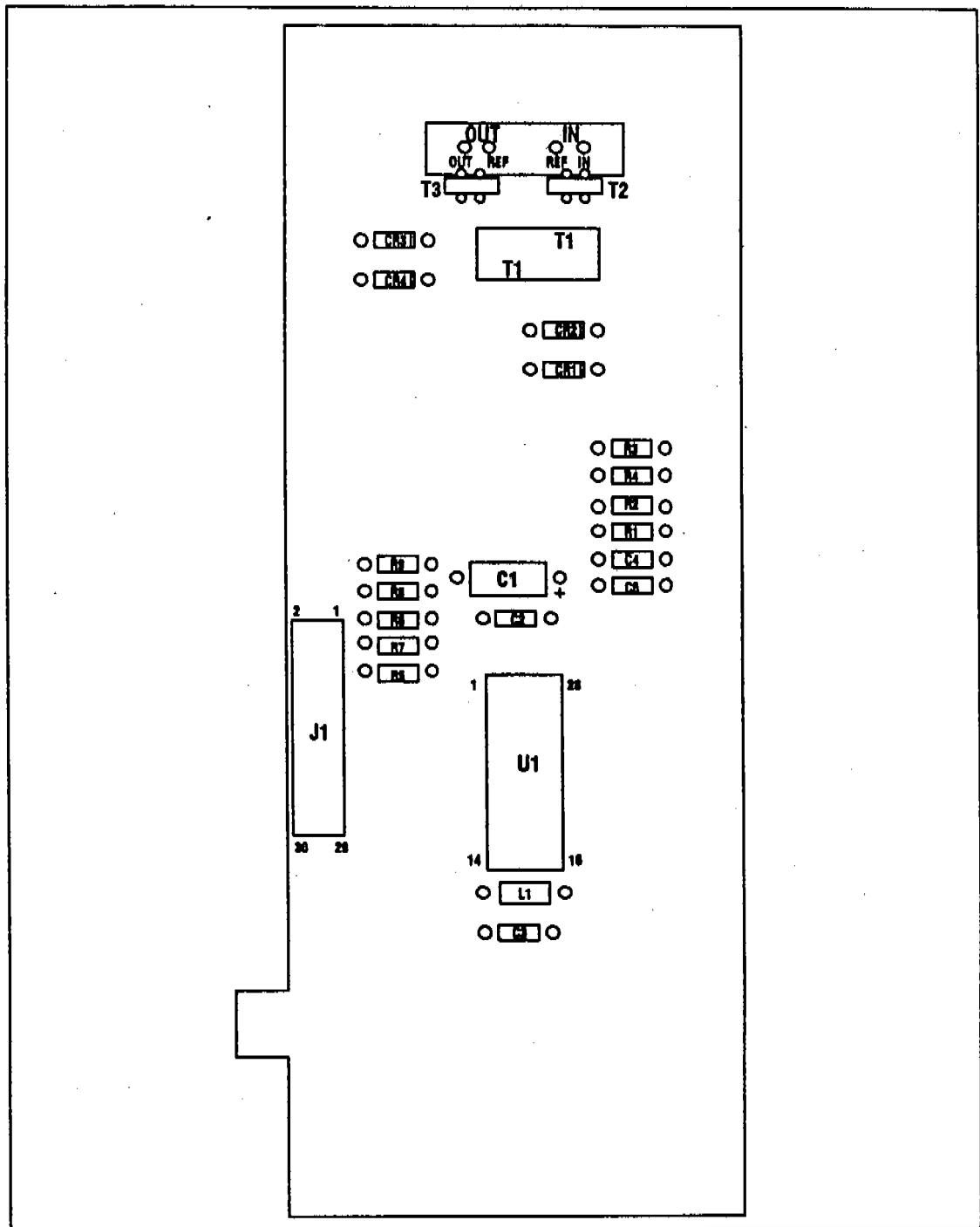


Figure D-8. HP-IL board (18594-60030).

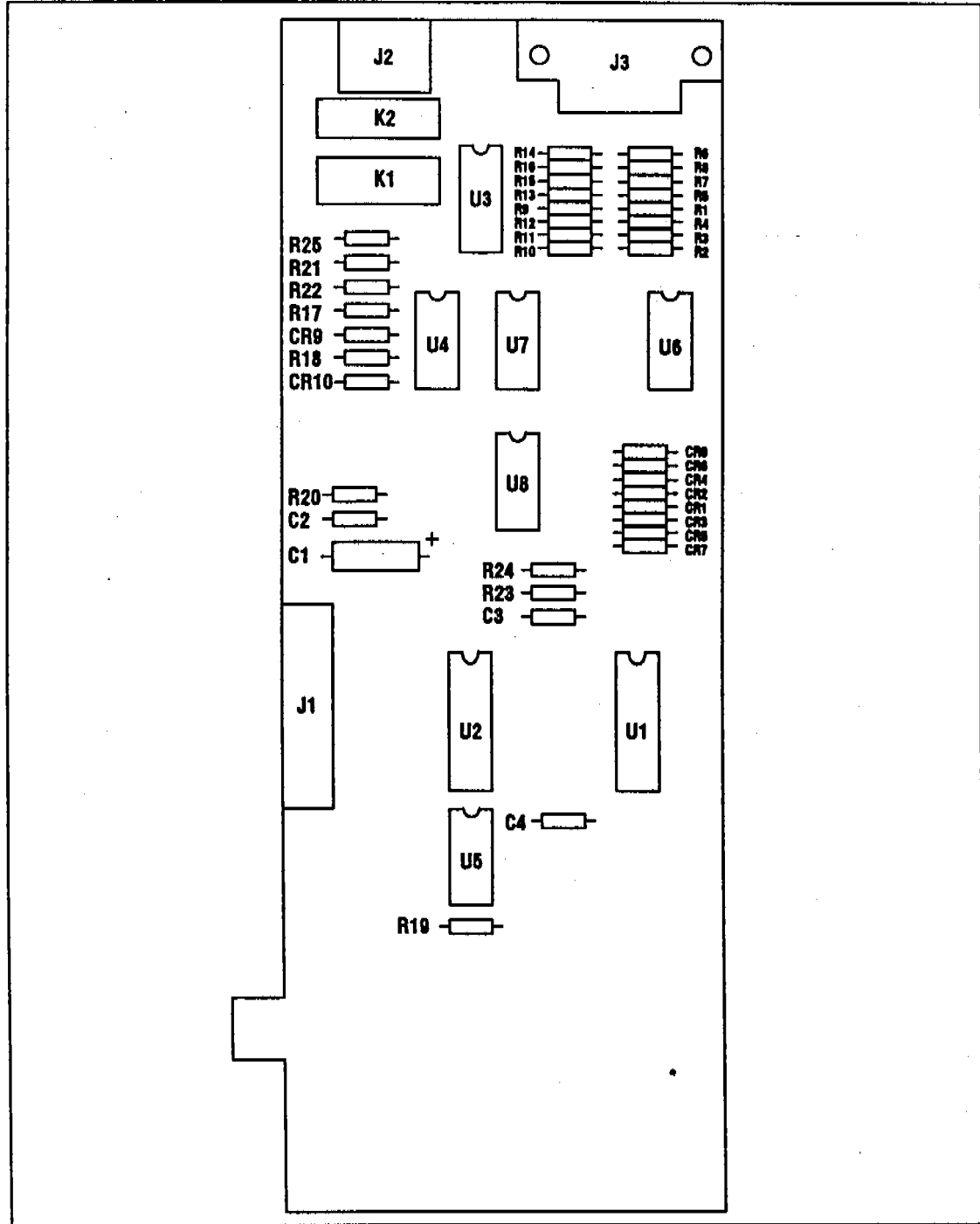


Figure D-9. TTL board (18594-60040).

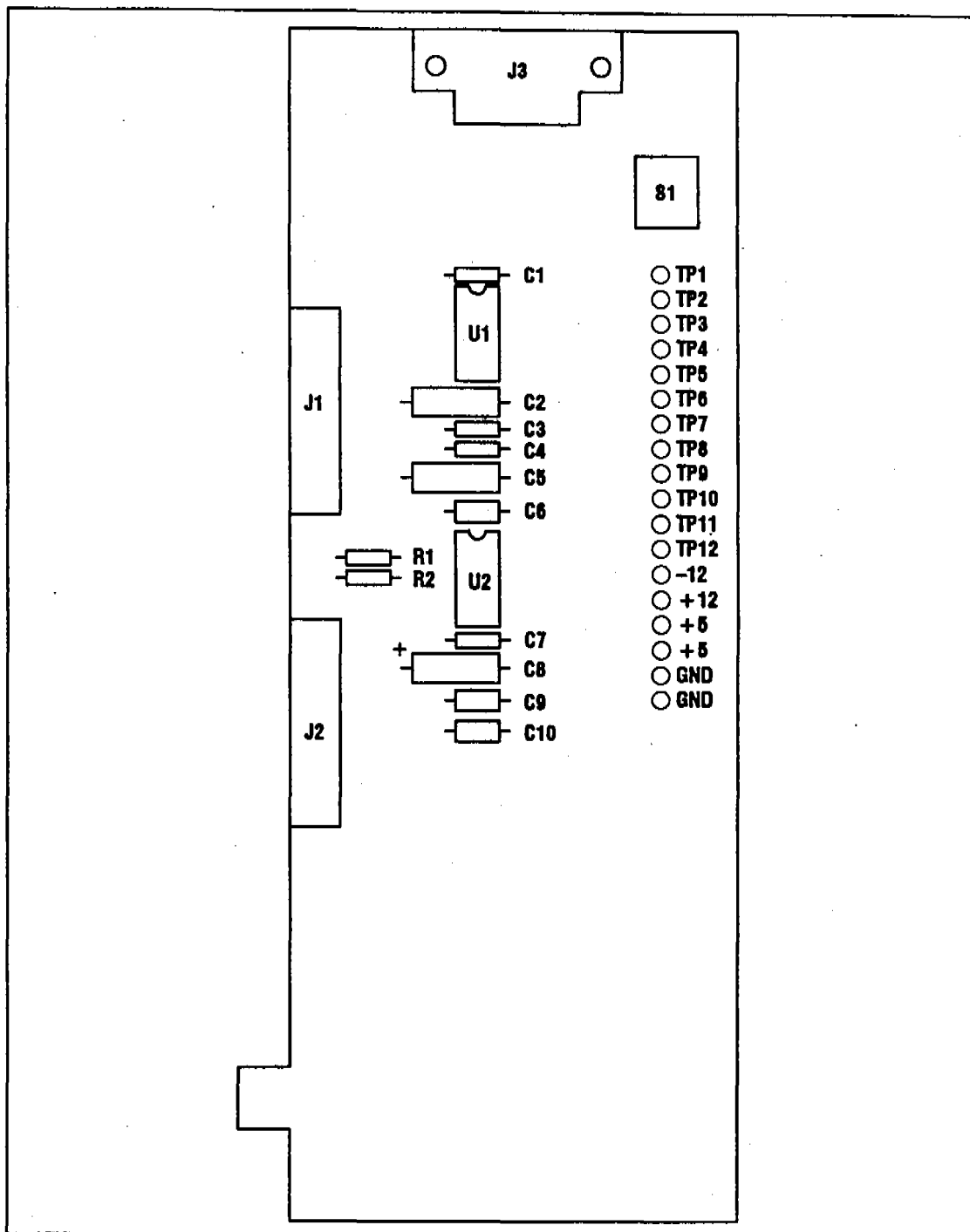


Figure D-10. HP 5880A interface board (18594-60050).

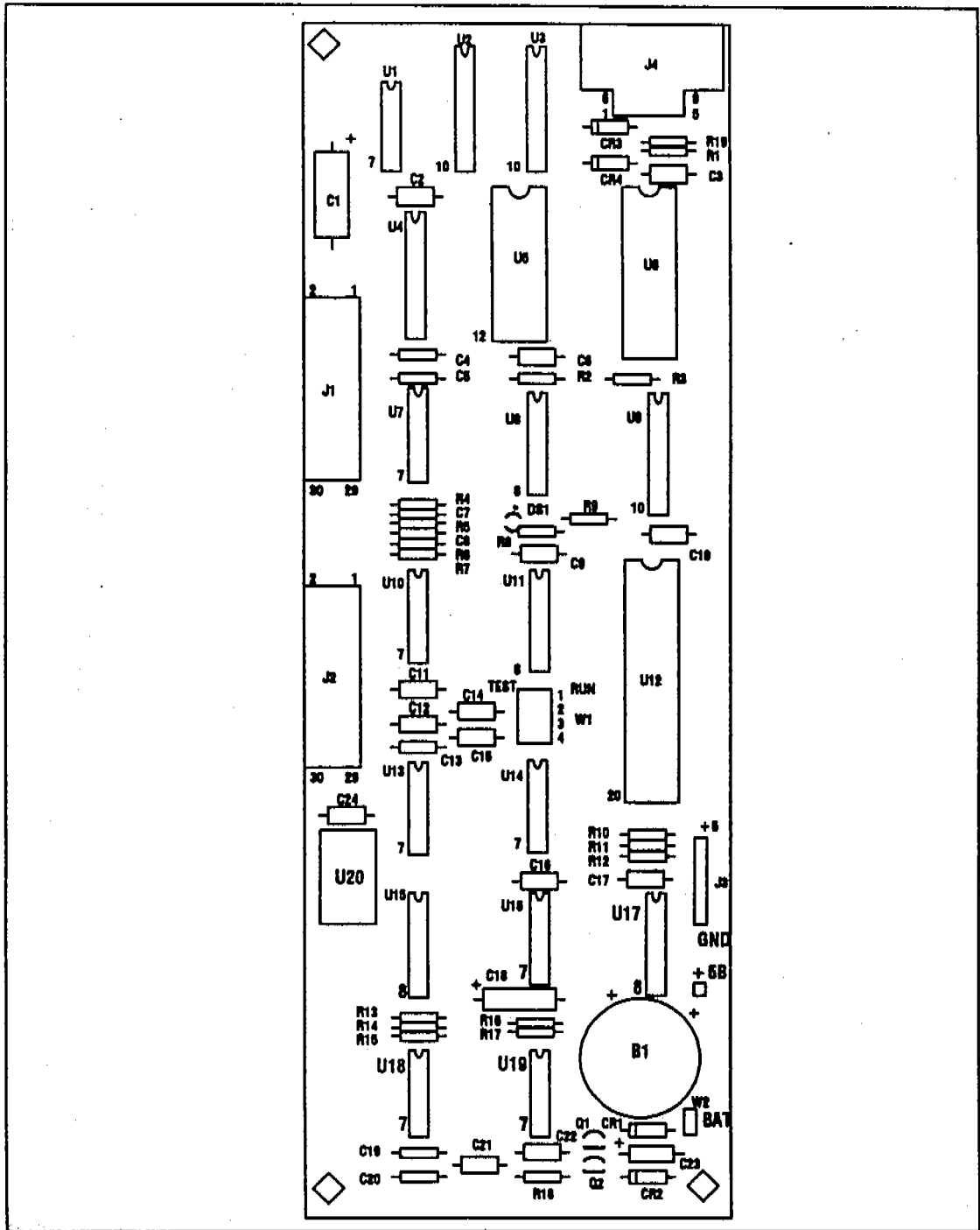


Figure D-11. Standard controller board (18594-60060).

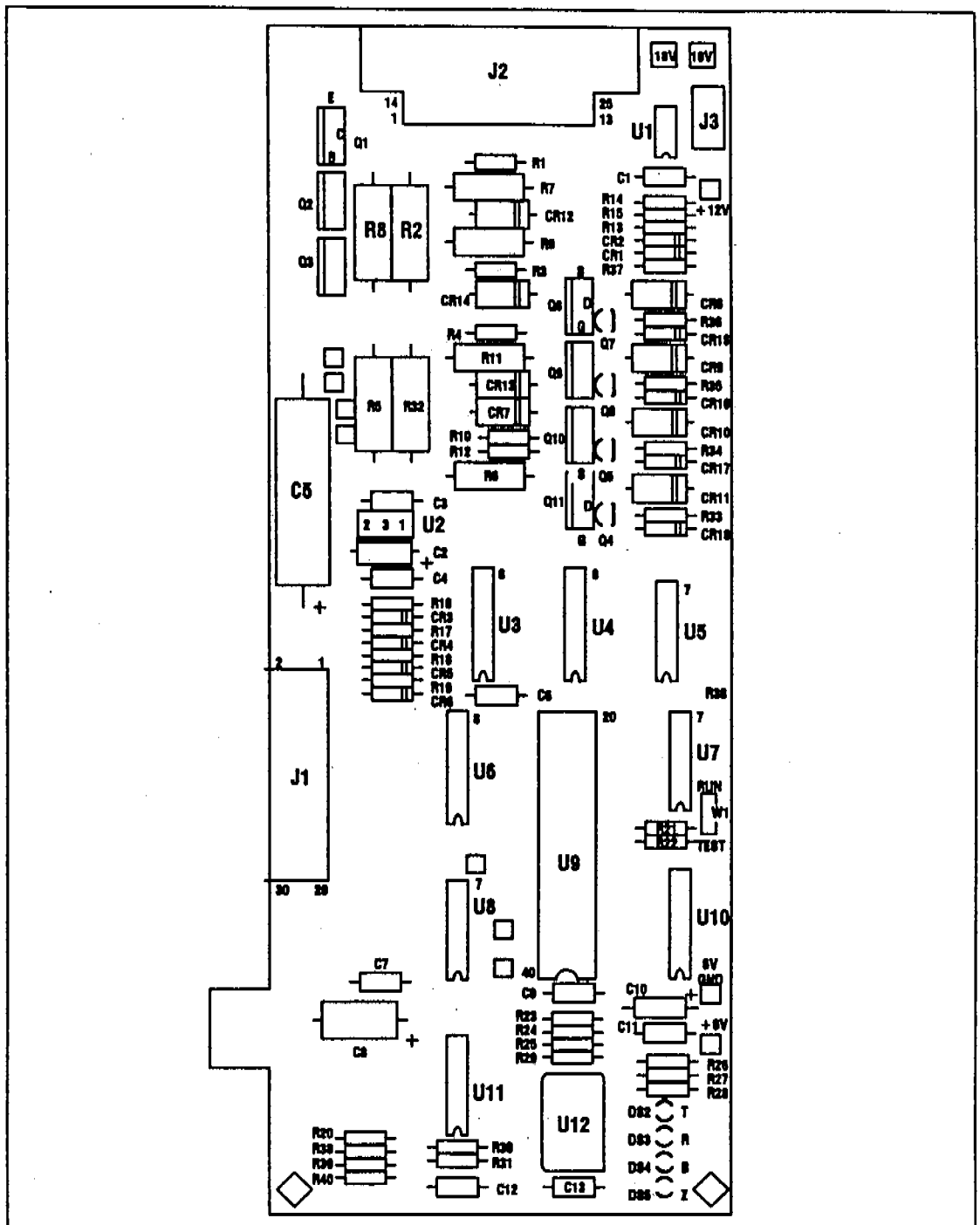


Figure D-12. Tray controller board (18594-60075).

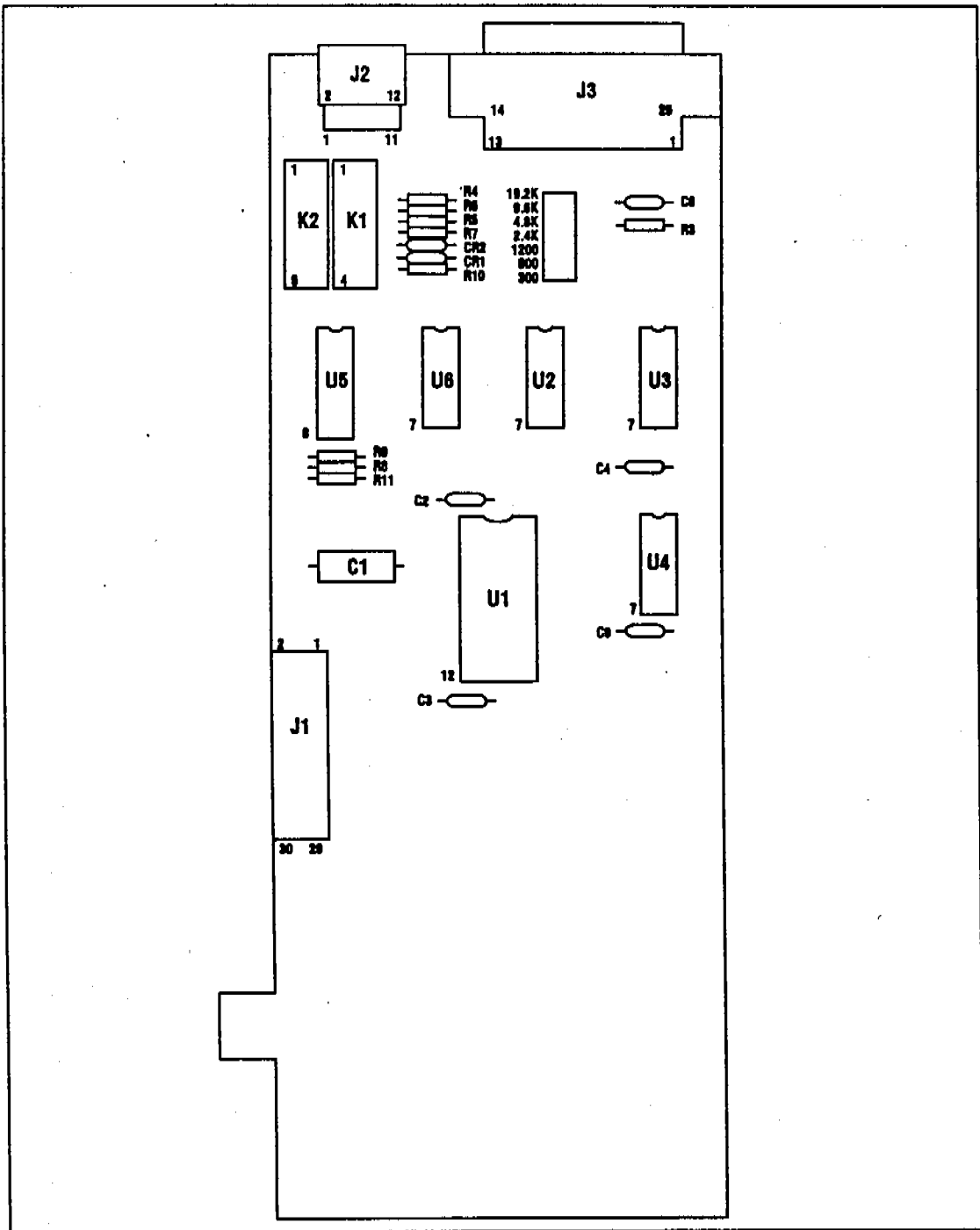


Figure D-13. RS-232 board (18594-60080).



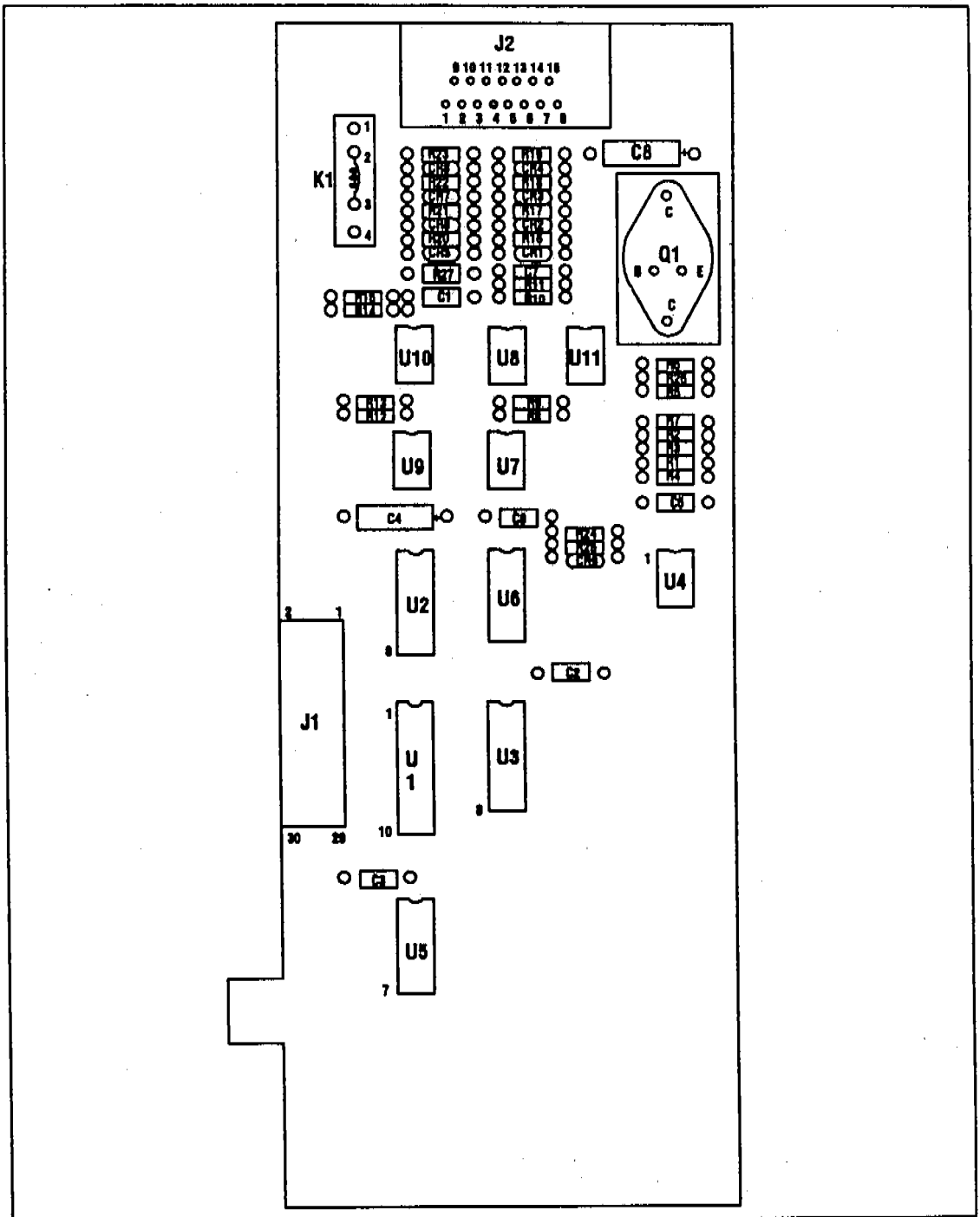


Figure D-14. Loop board (18594-60090).

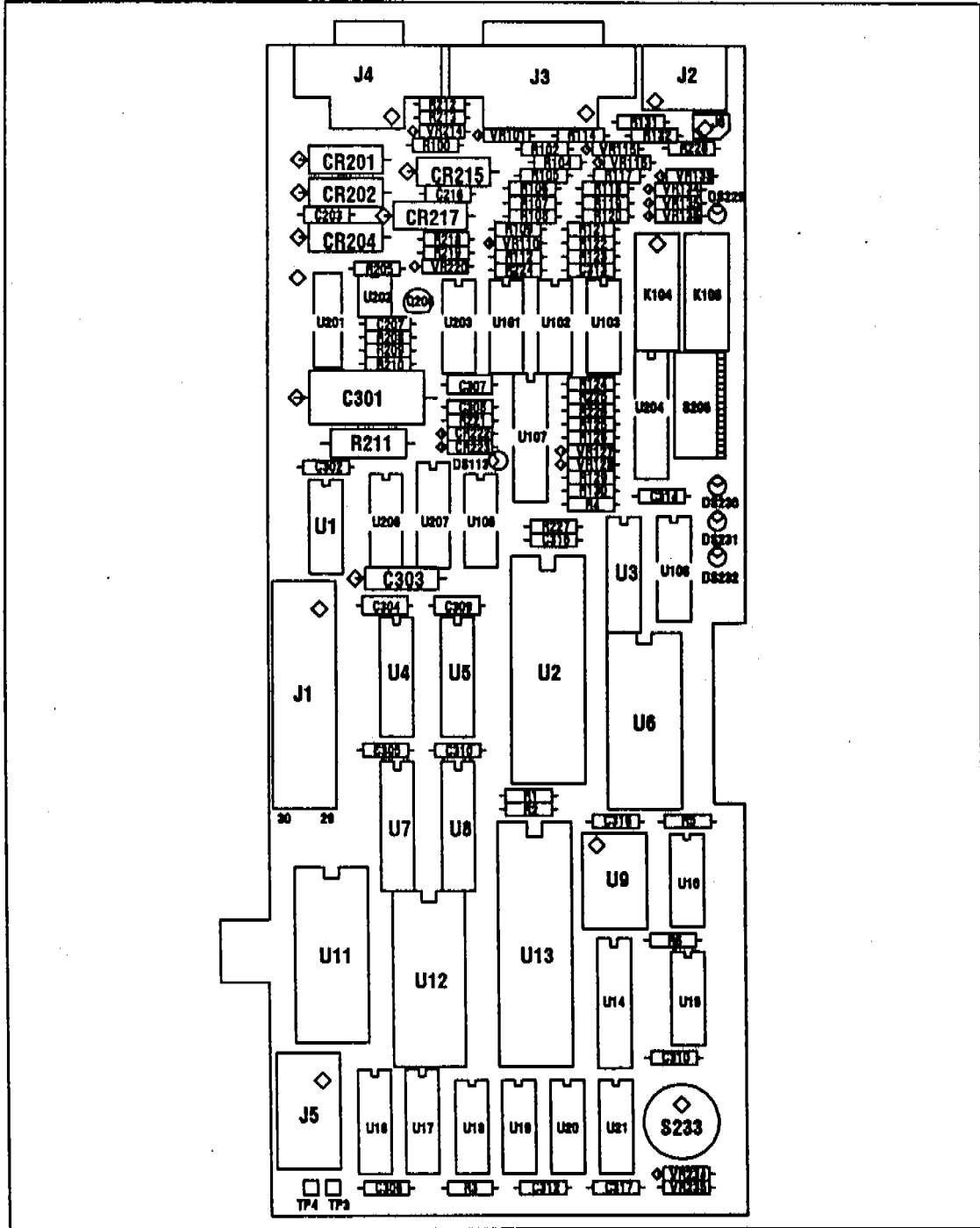


Figure D-15. Bar code reader board (18594-60100).

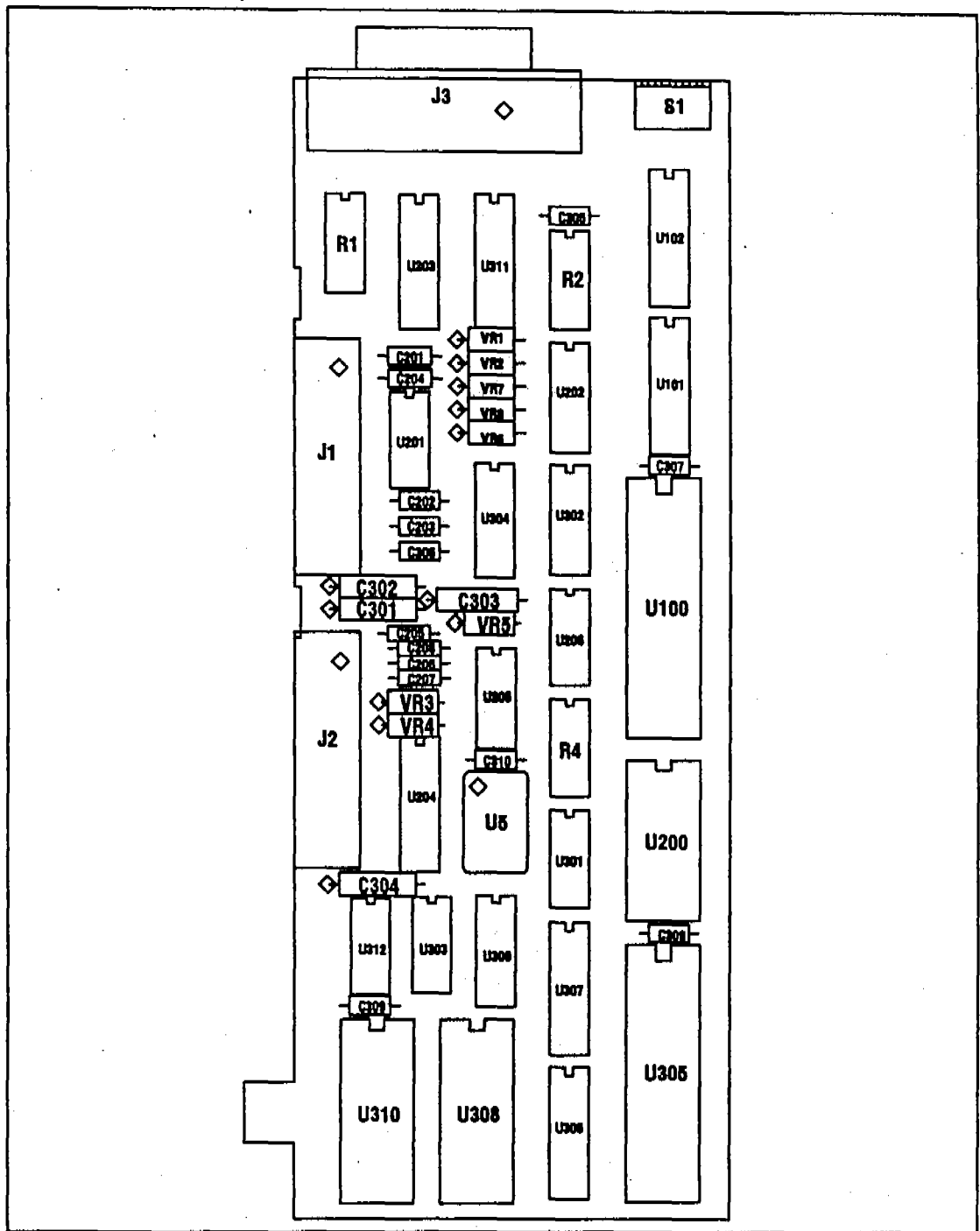


Figure D-16. HP-IB/controller board (18594-60110).

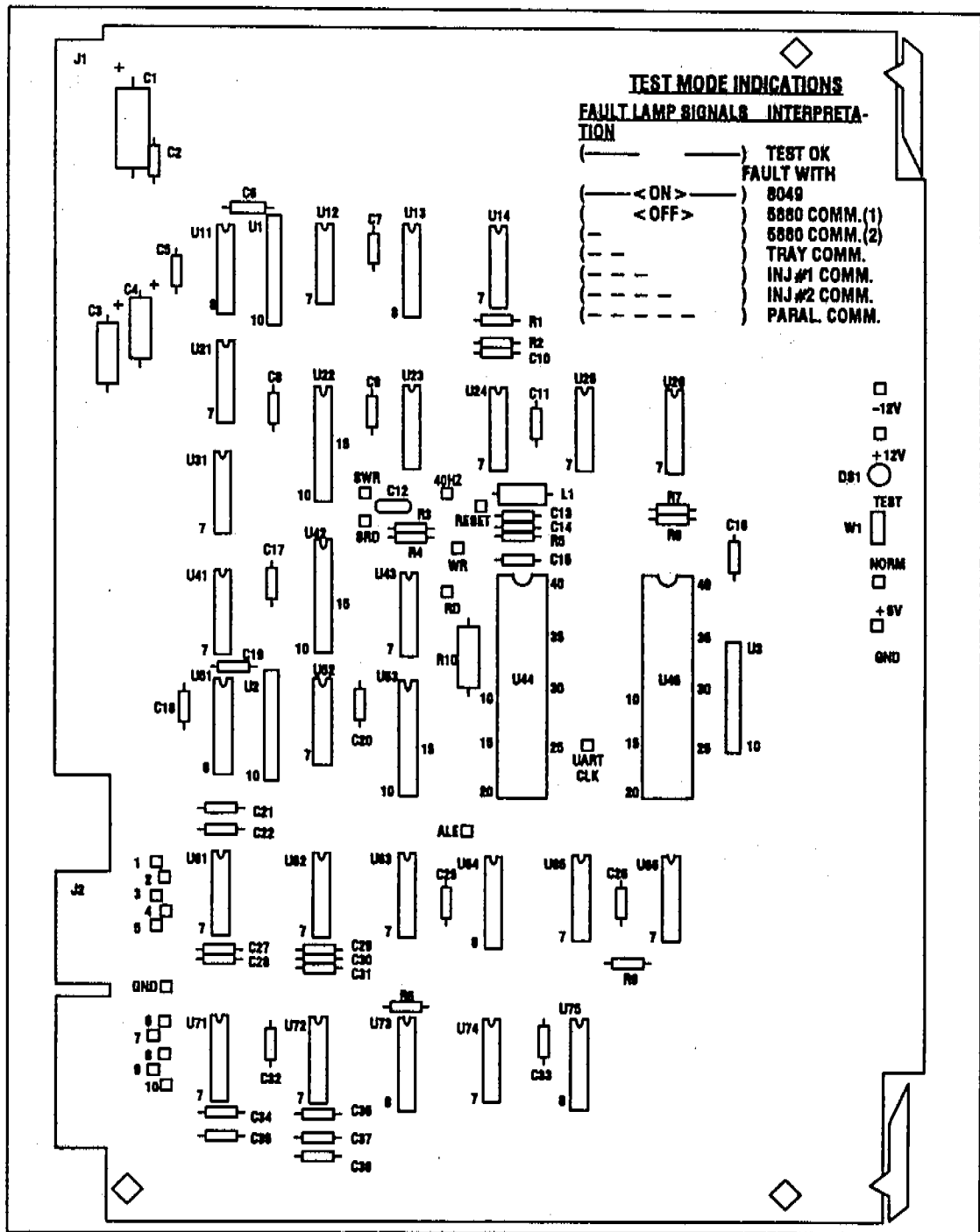


Figure D-17. HP 5880A mainframe board (19321-60010).

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## HP 5880A Diagnostic Mode

The interface provides two-way communication between the HP 5880A GC (or the HP 3388A Integrator) and the HP 7673A controller module. The system consists of four assemblies:

HP 5880A mainframe board	Part No. 19321-60010
HP 18594B interface board	Part No. 18594-60050
Cable (HP 5880A internal)	Part No. 19321-60500
Cable (HP 5880A/HP 18594B)	Part No. 19321-60510

On the HP 5880A end of the 19321-60010 mainframe board, the communication is done over the standard MC5 (or MC2) bus. Communications between the HP 5880A control board and the automatic sampler controller is encoded using +12V and -12V.

The U44 code includes a system self-test program. The test covers the HP 5880A mainframe board, the cables, and the automatic sampler control board. For the purpose of this test, the system is divided into 5 sections:

- HP 5880A communications
- TRAY communications
- INJ#1 communications
- INJ#2 communications
- PARALLEL communications

Each section is tested in sequence. If the test of the first section is successful, the test program proceeds with the second section, and so on. After the fifth section is tested successfully, the test LED (DS-1 on the control board) is turned ON for one second, and then the complete test is repeated. If any of the sections fails the test, a corresponding light pattern is displayed by the test LED and the failed section is tested again.

To get into the test mode, the following procedure needs to be followed.

1. Turn OFF power to both the HP 5880A and the HP 7673A instruments.
2. Move the "NORMAL / TEST" Jumper on the HP 5880A mainframe board to the "TEST" position.
3. Set all switches of S1 on the HP 5880A interface board (HP part number 18594-60050) to TST MODE.
4. Verify that the cable (HP part number 19321-60510) is connected properly between the controller and the HP 5880A.
5. Turn the HP 5880A power ON.
6. Check the test LED on the mainframe board for one of the flashing patterns listed under "symptom" in Table D-2. Follow the corresponding "Action" instructions to troubleshoot the failure.

<p><b>SYMPTOM</b></p> <p>HP 5880A LED Signal:  1 sec ON  1 sec OFF  1 sec ON  etc.</p>	<p><b>ACTION</b></p> <p>HP 5880A mainframe board (19321-60010) and HP 5880A interface board (18594-60050) and cables between them are all okay. Check injector and controller LEDs for problem indications. Troubleshoot non-HP 7673A related aspects of the HP 5880A.</p> <p>Means everything okay. No problem in HP 5880A/HP 7673A control circuits.</p>
<p><b>SYMPTOM</b></p> <p>HP 5880A LED Signal:  ON Continuously</p>	<p><b>ACTION</b></p> <p>Replace HP 5880A mainframe board (HP part number 19321-60010)</p> <p>Means defective microprocessor (8049) or associated components on the mainframe board.</p>
<p><b>SYMPTOM</b></p> <p>HP 5880A LED Signal:  OFF Continuously</p>	<p><b>ACTION</b></p> <ol style="list-style-type: none"> <li>1. Replace HP 5880A mainframe board (HP part number 19321-60010)</li> <li>2. Replace HP 5880A ROM, RAM and processor boards.</li> </ol> <p>Means defective communications between HP 5880A processor and the mainframe board.</p>
<p><b>SYMPTOM</b></p> <p>HP 5880A LED Signal:  1 SHORT FLASH</p>	<p><b>ACTION</b></p> <ol style="list-style-type: none"> <li>1. Replace HP 5880A mainframe board (HP part number 19321-60010).</li> <li>2. Replace HP 5880A ROM, RAM and processor boards.</li> </ol> <p>Means defective communication between HP 5880A processor and the mainframe board (bad data).</p>
<p><b>SYMPTOM</b></p> <p>HP 5880A LED Signal:  2 SHORT FLASHES</p>	<p><b>ACTION</b></p> <ol style="list-style-type: none"> <li>1. Replace HP 5880A mainframe board (HP part number 19321-60010).</li> <li>2. Replace HP 5880A interface board (HP part number 18594-60050)</li> <li>3. Check interconnecting cables.</li> </ol> <p>Means defective communication in the tray path between HP 5880A interface board and the HP 5880A mainframe board.</p>

**Table D-2. HP 5880A Diagnostics Mode (continued next page)**

<p><b>SYMPTOM</b></p> <p>HP 5880A LED Signal: 3 SHORT FLASHES</p> <p>Means defective communication in the Injector #1 path between HP 5880A interface board and the HP 5880A mainframe board.</p>	<p><b>ACTION</b></p> <ol style="list-style-type: none"> <li>1. Replace HP 5880A mainframe board (Part No. 19321-60010).</li> <li>2. Replace HP 5880A interface board (Part No. 18594-60050).</li> <li>3. Check interconnecting cables.</li> </ol>
<p><b>SYMPTOM</b></p> <p>HP 5880A LED Signal: 4 SHORT FLASHES.</p> <p>Means defective communication in the Injector #2 path between HP 5880A interface board and the HP 5880A mainframe board.</p>	<p><b>ACTION</b></p> <ol style="list-style-type: none"> <li>1. Replace HP 5880A mainframe board (Part No. 19321-60010).</li> <li>2. Replace HP 5880A interface board (Part No. 18594-60050).</li> <li>3. Check interconnecting cables.</li> </ol>
<p><b>SYMPTOM</b></p> <p>HP 5880A LED Signal: 5 SHORT FLASHES</p> <p>Means defective communication in the Injector's parallel paths between HP 5880A interface board and the HP 5880A mainframe board.</p>	<p><b>ACTION</b></p> <ol style="list-style-type: none"> <li>1. Replace HP 5880A mainframe board (Part No. 19321-60010).</li> <li>2. Replace HP 5880A interface board</li> <li>3. Check interconnecting cables.</li> </ol>

**Table D-2. HP 5880A Diagnostics**

Test points for all the key signals are provided throughout the board (resets, clocks, R/W strobes, inputs, and outputs). The "ALE" (Address Latch Enable) test point carries a signal that is 1/15th of U44 clock frequency. This signal indicates the U44 is alive.



# **Tray Module**

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## **Section E—Contents**

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Theta-Flex Assembly Procedures .....	E-12
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## Tray Operation

The HP 18596B Tray Module includes four tray quadrants that hold sample vials and a robotic manipulator that moves the sample vials to and from the injector module and the bar code reader module.

There are three axes of movement for the tray module:

1. The Gripper (Z) Axis represents the vertical movement of the gripper.
2. The Radial (R) Axis represents the inward and outward movement of the arm.
3. The Angular (Theta) Axis represents the circular movement of the arm.

### Gripper (Z) Axis Movement/Homing

The gripper picks up and releases the vials and moves up and down along the Gripper or Z-axis. The gripper assembly (figure E-4) consists of the housing, the gripper jaws, a series of levers, and magnets for bottle sensing and homing. When a bottle is in the gripper, it pushes a lever that moves a small arm containing a magnet in the tray arm away from its magnetic (hall effect) sensor.

The Z-motor, is a stepper motor and is located in the arm. It drives the Z-belt which, in turn, moves the gripper in the Z-axis.

The gripper's home position is a specific position at the top of the Z-axis. To find the home position, the gripper is moved up until the Z-magnet is sensed by the magnetic sensor mounted on the sensor board in the arm (figure E-1). It continues upward until the Z-home magnet passes the sensor. It then moves back down to the center of the sensor which becomes the home reference position. The gripper will then move up eight steps to position the bottle magnet in front of the bottle sensor. It is only in this position that the gripper can sense whether it is holding a bottle.

### Radial (R) Axis Movement/Homing

The arm itself has two axes of movement, the radial (R) and the angular (theta).

The arm is driven in the R-axis by a stepper motor located in the tray base (figure E-6). The motor has a pressed-on gear that meshes with a larger drive gear. The drive gear is attached to a pinion which, in turn, meshes with the rack gear on the left arm cover.

The radial (R) home position is sensed when the arm is fully back. To find home, the arm moves to the full back position until the R-magnet in the turret assembly (figure E-5) is sensed by the R-sensor mounted at the bottom of the arm sensor board. It continues moving back in small steps to ensure it hits the fixed stop. It then moves small steps forward and backward to find the edge of the sensor. This position becomes the R-home position.

## **Angular (Theta) Axis Movement/Homing**

The rotational axis of the arm about the center of the tray is called the angular (theta) axis. The arm is driven on this axis by a stepper motor located in the tray base (figure E-6). The motor rotates the turret directly through a circular gear rack molded into the tray turret.

The theta home position is determined by a photo-interrupter (emitter/collector pair) being triggered by a plastic vane molded into the turret. The vane covers half of a full rotation of the turret; thus, the interrupter is on for half a revolution and off for half a revolution. During homing, the turret rotates until a change of state (on/off) is sensed. The direction of rotation is then reversed and the turret rotates a fixed number of steps. The direction is reversed again and the turret rotates one small step at a time until the edge of the vane is sensed. This position becomes the theta-home position.

## **Tray Quadrants**

The tray has four removable quadrants, each of which accommodates 25 sample vials. Quadrants can be temperature controlled through the use of a circulating water bath. See the HP 7673 Automatic Sampler Operating Manual for temperature and inlet pressure specifications.

## **Tray Electronics**

The tray module is controlled by the tray board located in the controller module. The signal paths for the tray sensors and motors travel through the tray cable and two flex circuits. The theta-flex circuit rotates within the tray turret. The R-flex circuit moves within the arm in the R-axis (figure E-1).

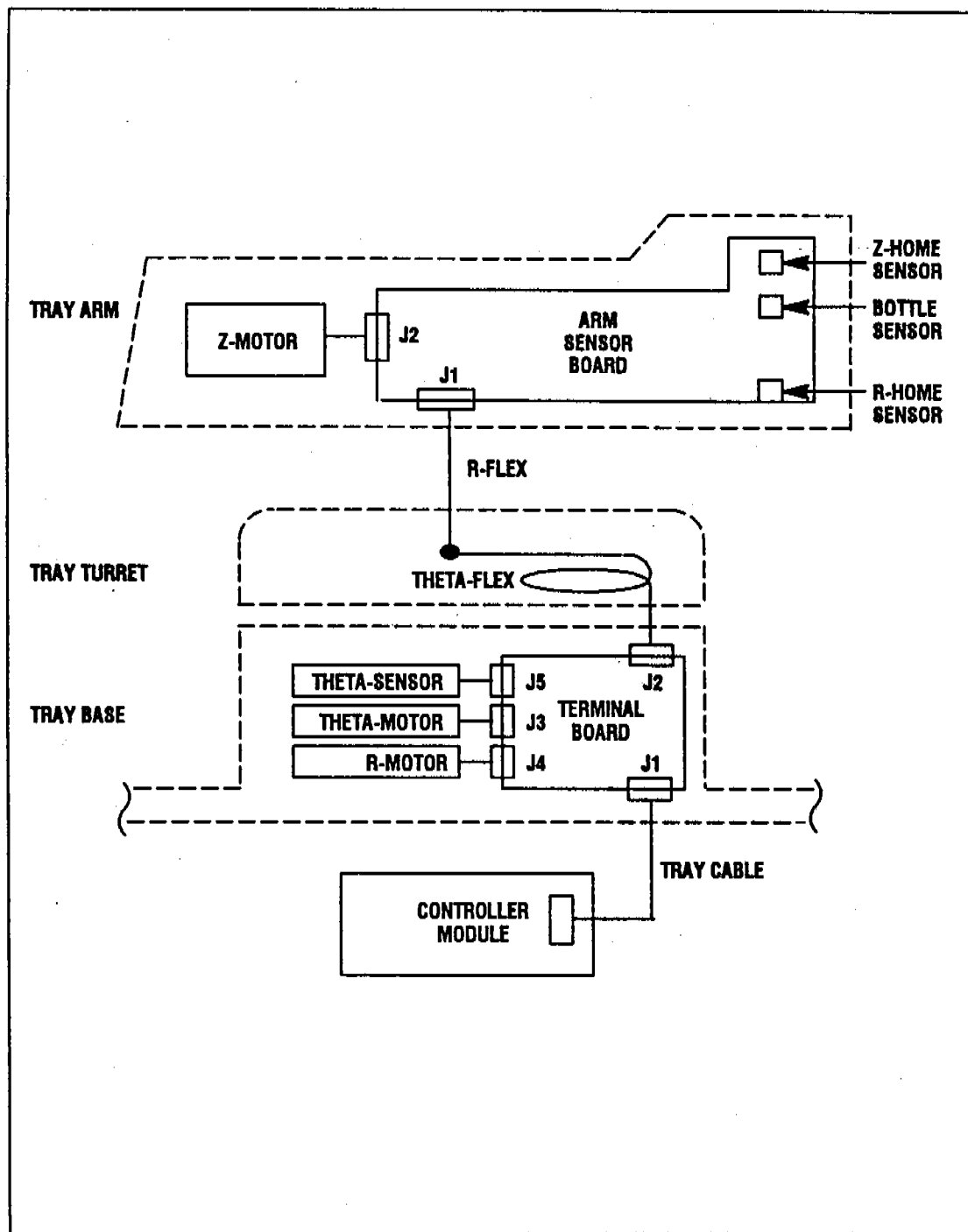


Figure E-1. Tray module block diagram.

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## Vial Movement Sequence

- Start Operation** The sequence starts when the START button on the front panel is pressed, or via remote signal from an external controller such as INET.
- Homing Routine** The arm finds its home position for the Z-axis, the R-axis, and the theta-axis.
- Vial Check** If this is a start-up after a sequence interruption, the tray arm checks for the presence of a sample vial in the gripper, the injector turret, and the bar code reader (if installed). If a vial is found, it is returned to its proper position in the tray. The arm then returns to the home position to begin the sequence.
- Pick up a Vial** The arm moves on the R-axis to the center row and then rotates on the theta-axis to the proper angular position. It next moves on the R-axis to align with the vial. The gripper moves down to the proper height and rotates to grip the vial's neck. The arm makes small radial adjustments during pickup to optimize alignment with the vial. The gripper moves up to the Z-home position to confirm the presence of a vial.
- Deliver the Vial to the Injector** The arm moves to the middle row on the R-axis then rotates on the theta-axis to align radially with the injector. It moves on the R-axis to the turret location then rotates on the theta-axis slightly to move the vial over the sample position in the injector turret. The gripper lowers the vial into the turret, helped by the cone shape of the sample position. The gripper rotates to disengage the vial, while the injector turret is stabilized by the needle support assembly. The motions are then reversed to return the arm to the home position.
- Finish** All tray module movement is completed before the Injector Module is activated.

## Tray Replacement Parts

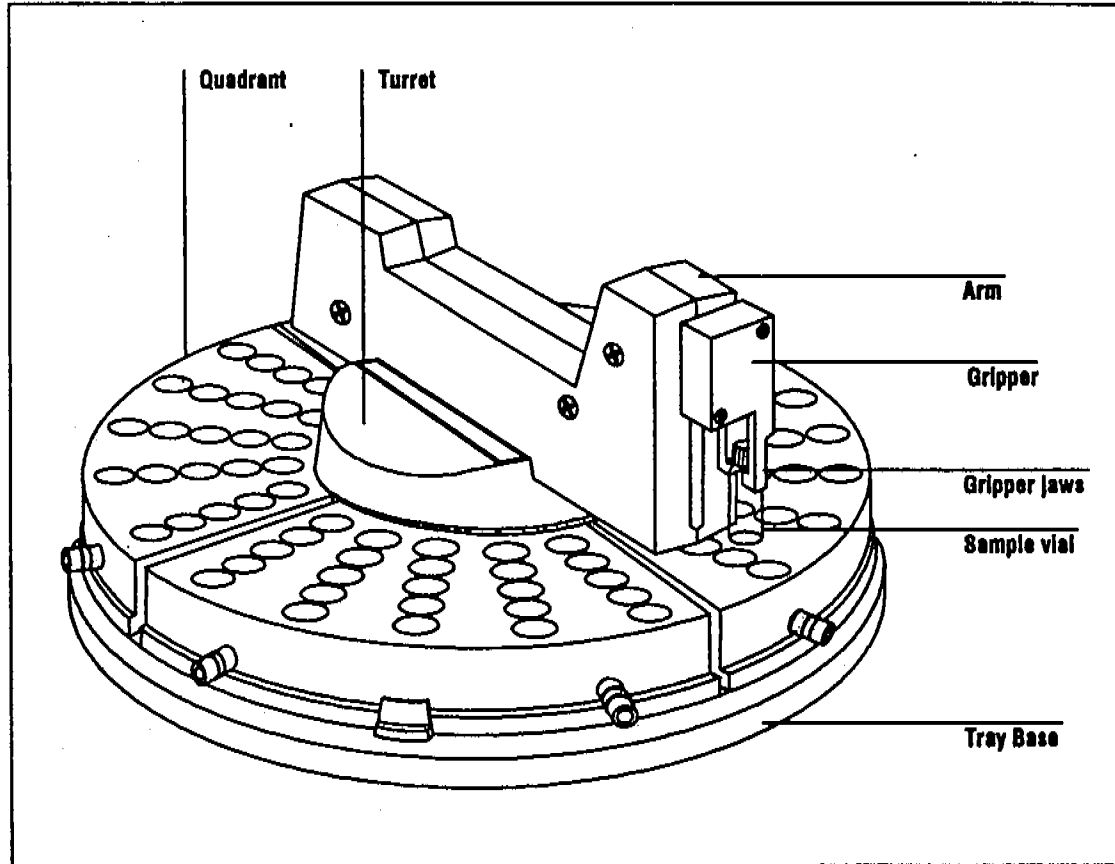


Figure E-2. HP 18596B Tray Module.

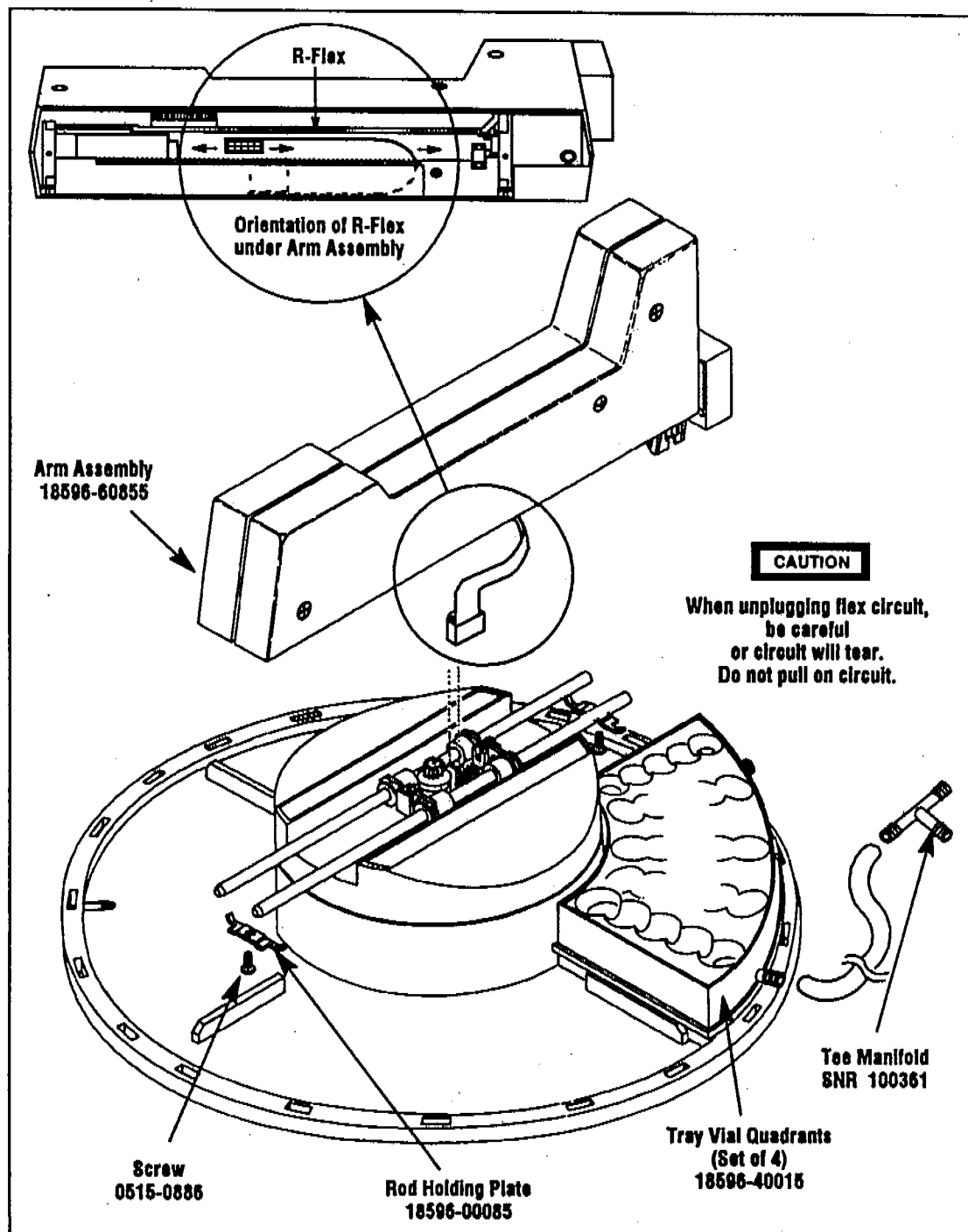


Figure E-3. Removing the tray arm assembly.

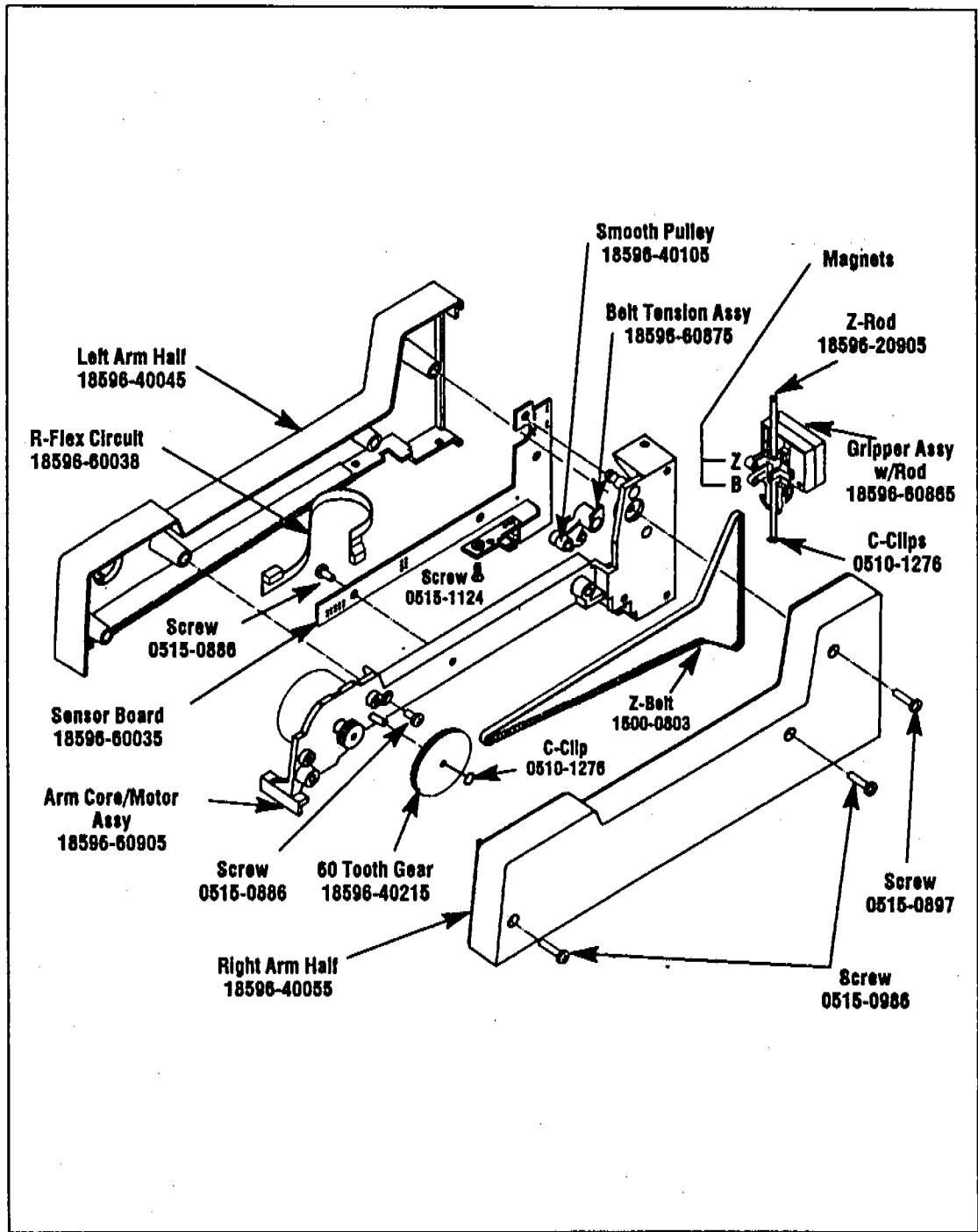


Figure E-4. Tray arm assembly (18596-60855).



**CAUTION**

Do not remove bushings from turret assembly or the arm will become misaligned.

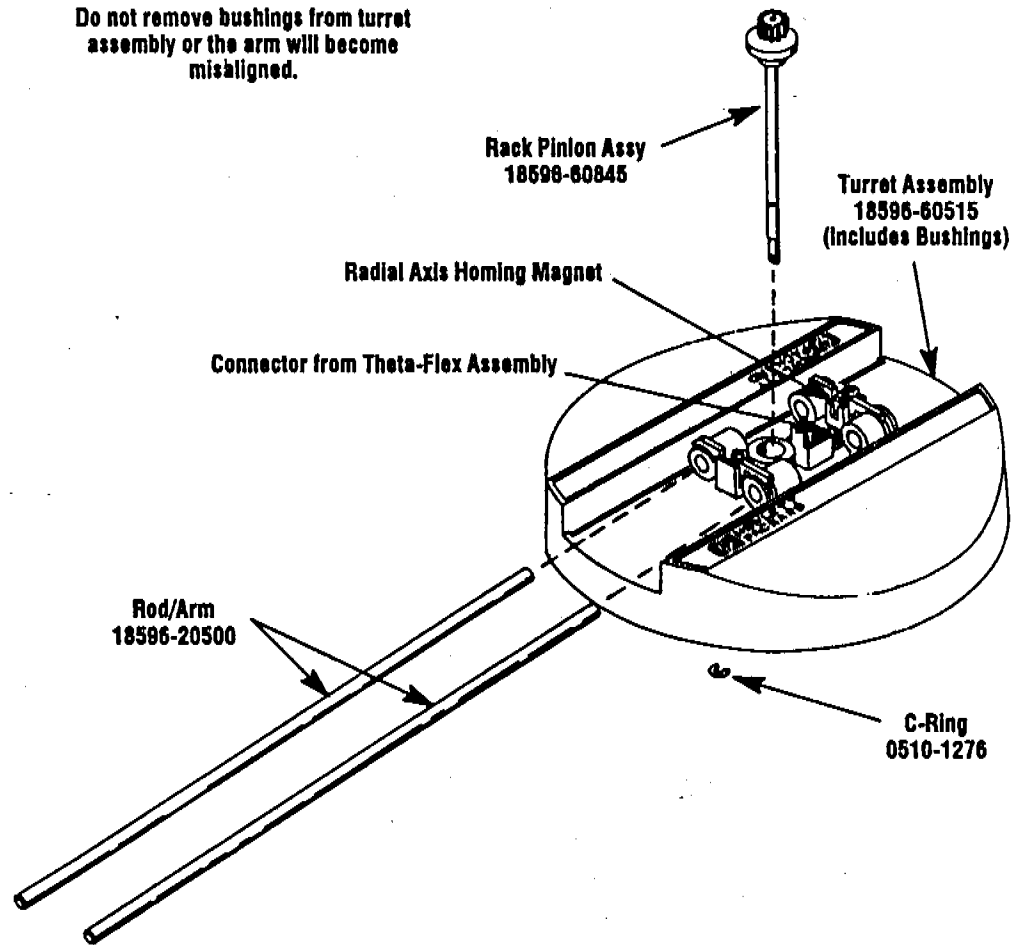


Figure E-5. Tray turret.

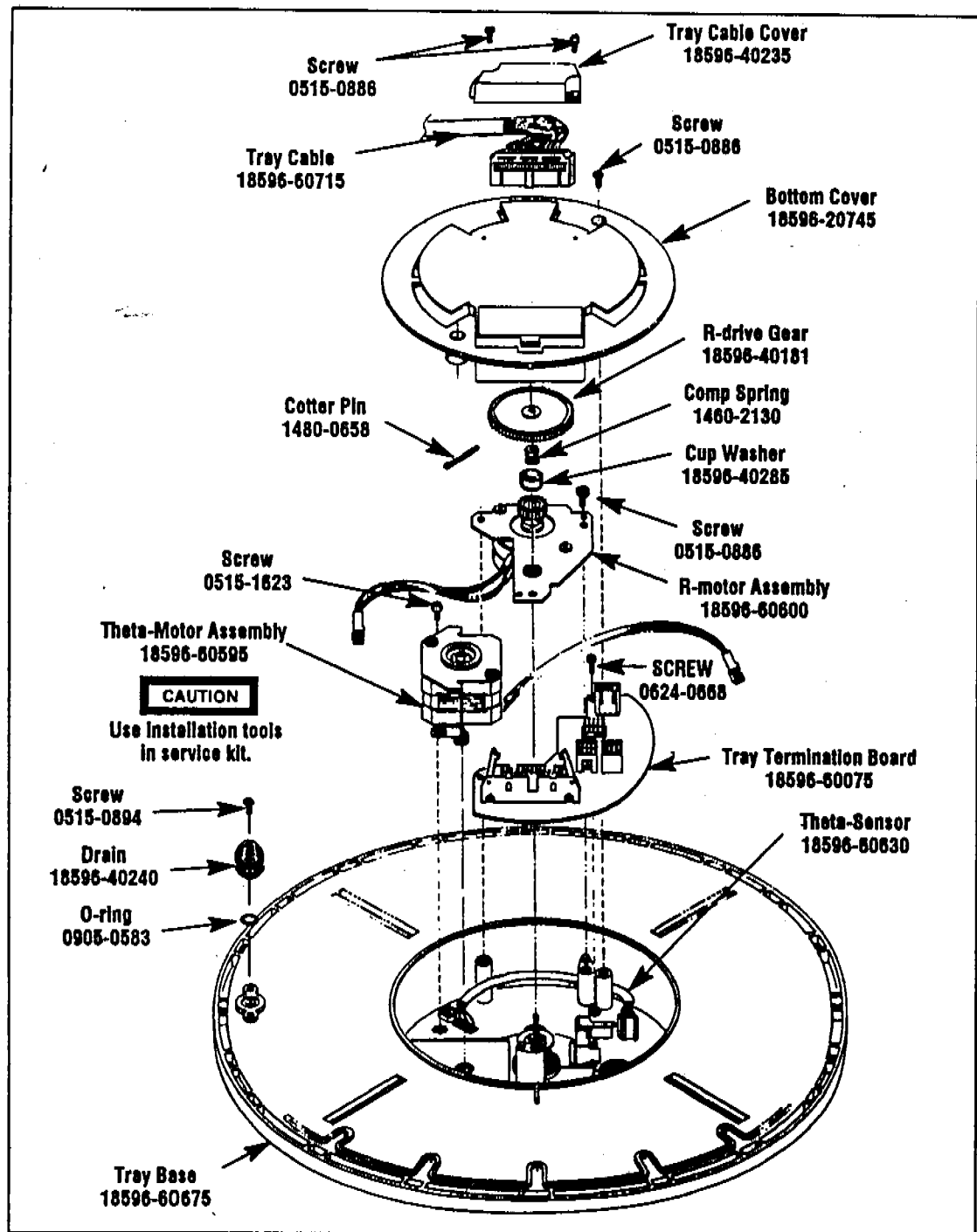


Figure E-6. Tray base.

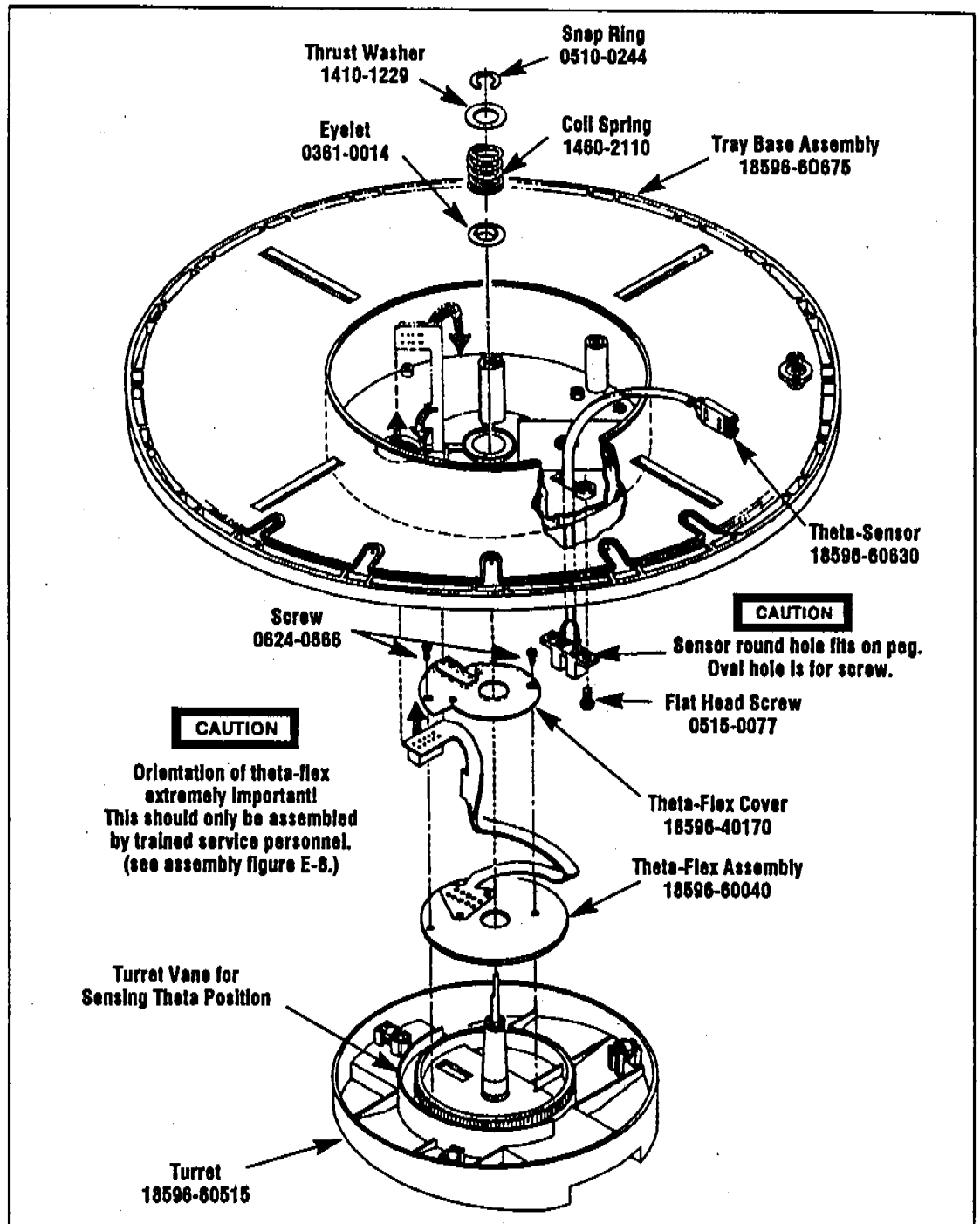


Figure E-7. Tray base/turret.

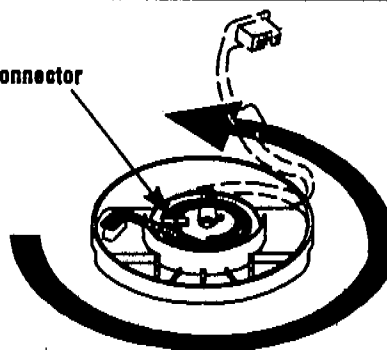
## Theta-Flex Assembly Procedures

**1**

Turn the turret so that the J1 connector is on the left.

Unwind the theta-flex 3/4 of a turn.

J1 Connector



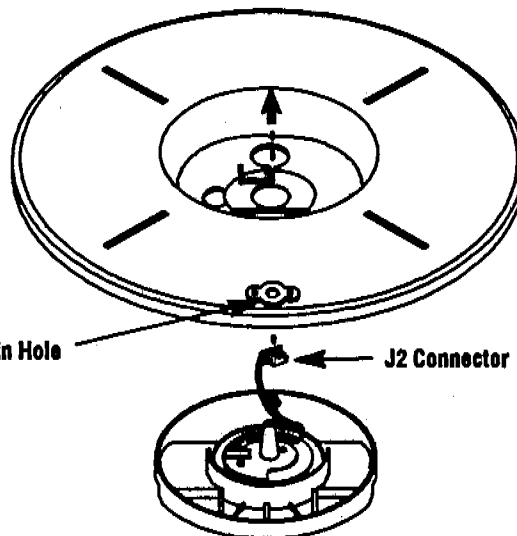
**2**

Turn the tray base so that the drain hole is at the front.

Thread the J2 connector through the tray base.

Drain Hole

J2 Connector



**3**

Place the square tab of the theta-flex within the ridges inside the base.

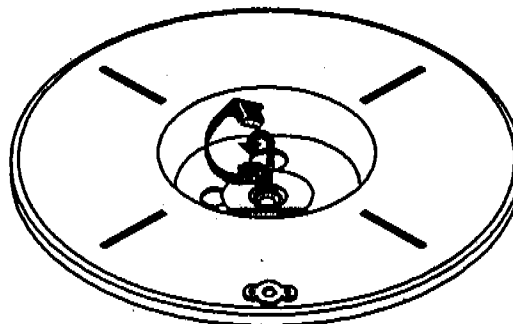


Figure E-8. Theta-flex assembly procedures.

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## Tray Errors

If the red LED on the front panel of the controller is lit or flashing, an error condition is indicated. Errors can be caused by:

- Objects obstructing the movement of the arm or gripper.
- Sensors not being tripped when expected.
- The tray cable not plugged in when the tray board is installed.
- Motor failure.
- Damaged wiring or flex circuits.

Refer to Section B, "Troubleshooting," to see a full list of error conditions and courses of action. When the fault is corrected, press the STOP button on the injector to clear the error. Then restart the sequence.

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## Tray Diagnostics

The Tray Diagnostics Mode allows the service engineer to observe the operation of tray motors and sensors during the troubleshooting process.

Follow these steps to take the Tray Module through its Diagnostic tests.

1. Turn the controller off.
2. Move the jumper on the tray board (figure D-12) to the TEST position. Note the four yellow LEDs (R,Z,T,B) on the tray board.
3. Turn the controller on. The tray automatically starts the diagnostic tests.
4. **Setup**—The gripper moves to the home position (full up) and the Z-LED lights. The B (Bottle Sensor) LED will also light. **The B LED is lit only when the gripper is empty and the gripper is in the home position.**
5. **R-Cycle**—The arm moves to the R-home position (full back) and the R-LED lights. The arm moves one full cycle (out and back) and the R-LED lights again at home.
6. **Theta Cycle**—The arm moves out to the center row and rotates counterclockwise to the stop pin on the theta-axis, then reverses direction and rotates clockwise, again to the stop pin. The T-LED lights for half of the revolution and is off for half the revolution. The arm then rotates back to the theta home position. The T-LED remains lit throughout the other tests.
7. **Z-Cycle**—The arm moves forward on the R-axis beyond the edge of the tray. The gripper moves one full cycle (down and up). The Z-LED lights at the top (home position) of the cycle.

The tray repeats this pattern until the controller is turned off. To keep the tray in the same axis test, insert a vial into the gripper during the desired test. The tray continues to cycle through the selected axis until the vial is removed or the power is turned off. **Note that the B-LED is not lit while there is a vial in the gripper.**

# Printed Circuit Board Component Overlays

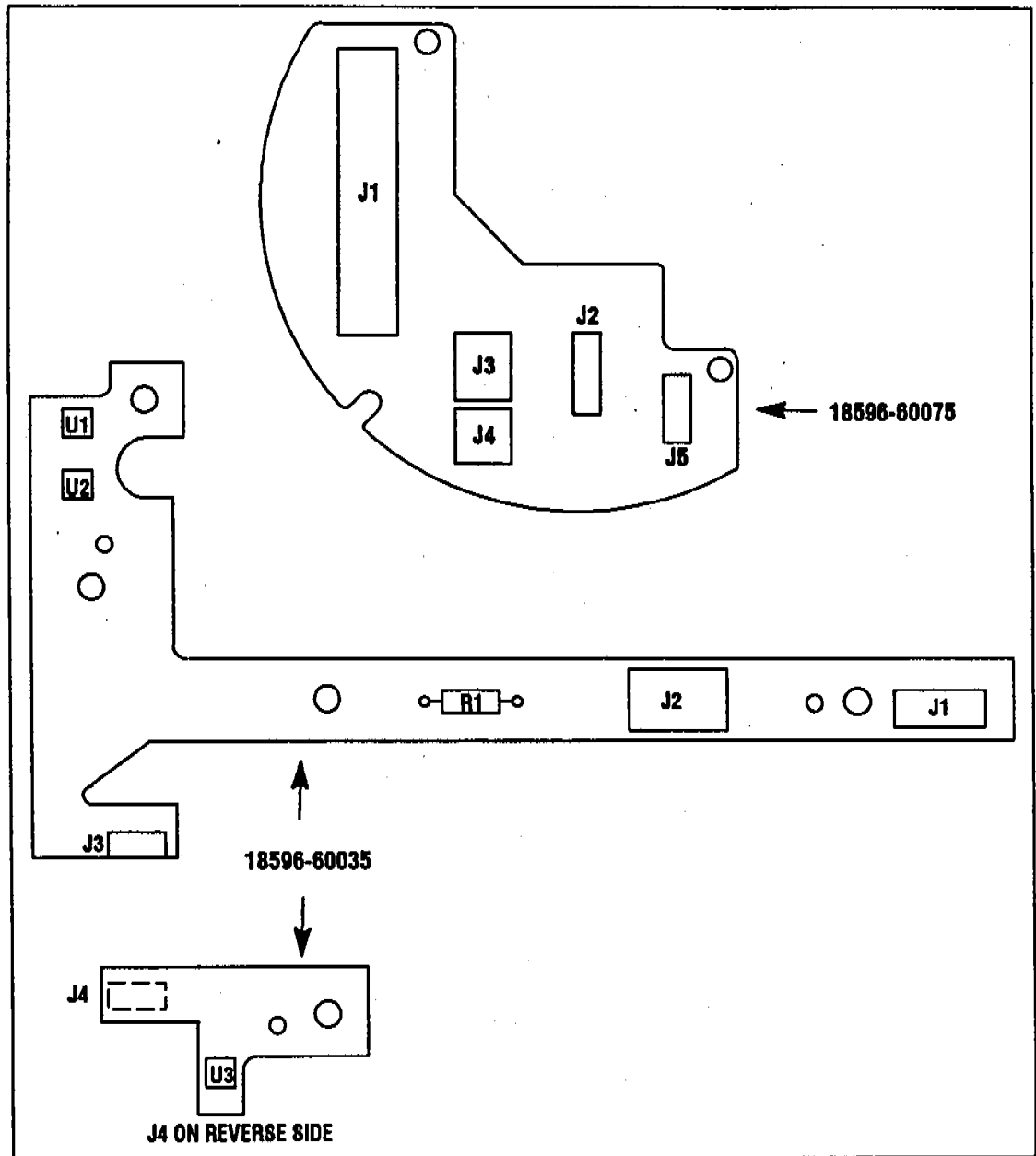


Figure E-9. Tray termination board (18596-60075) and arm sensor board (18596-60035).

# Tray Pinout Diagrams

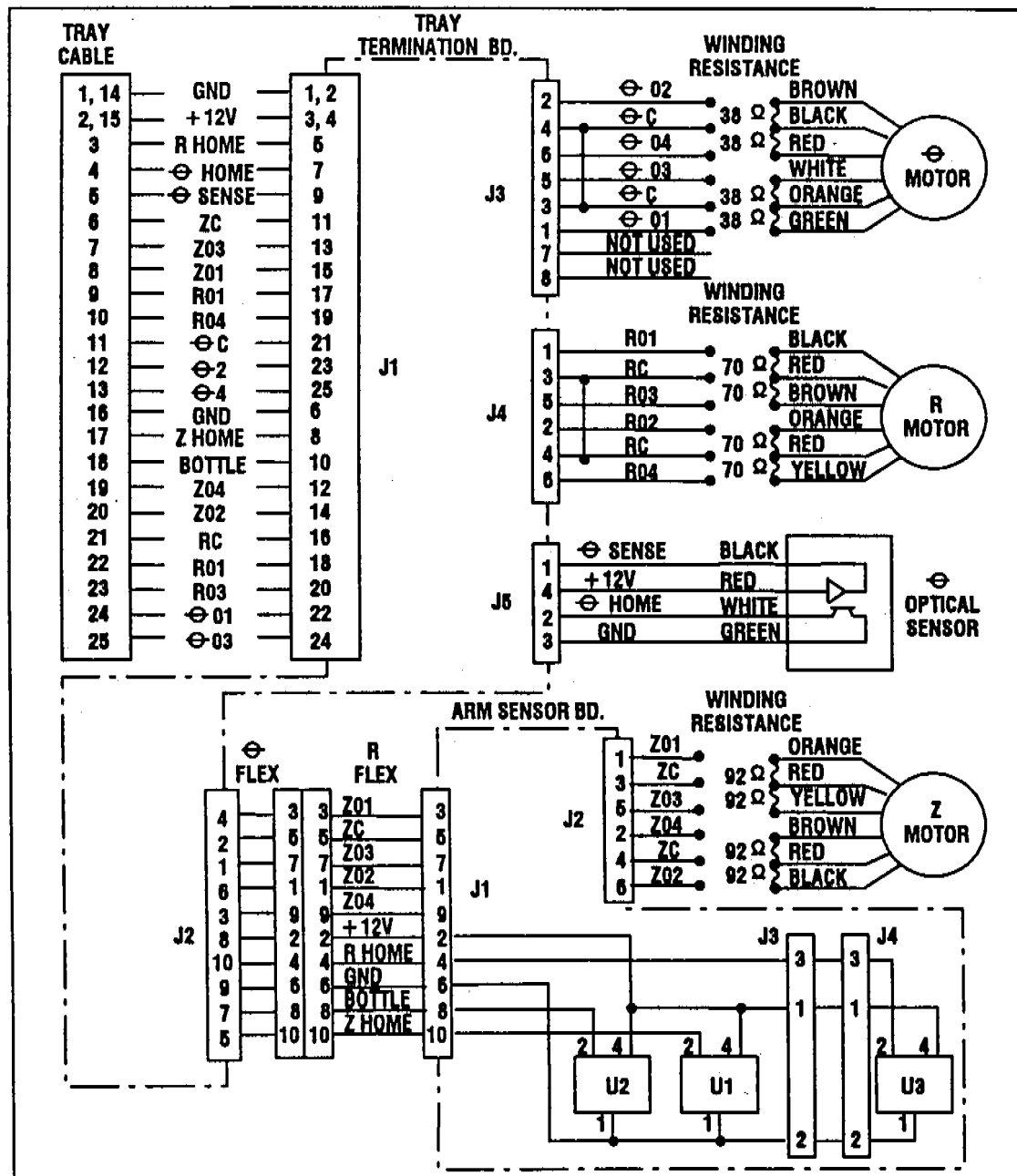


Figure E-10. Tray pinout diagram.



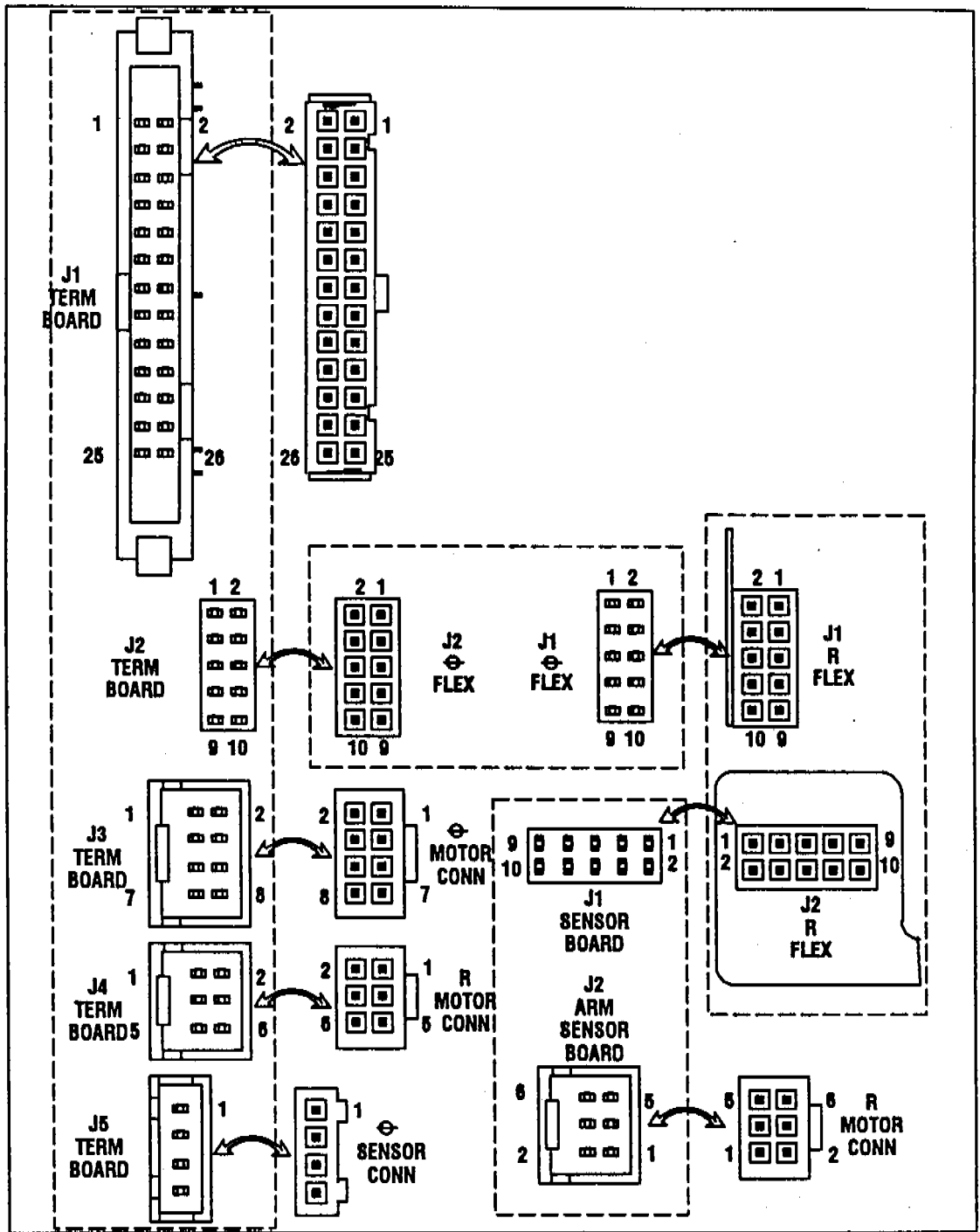
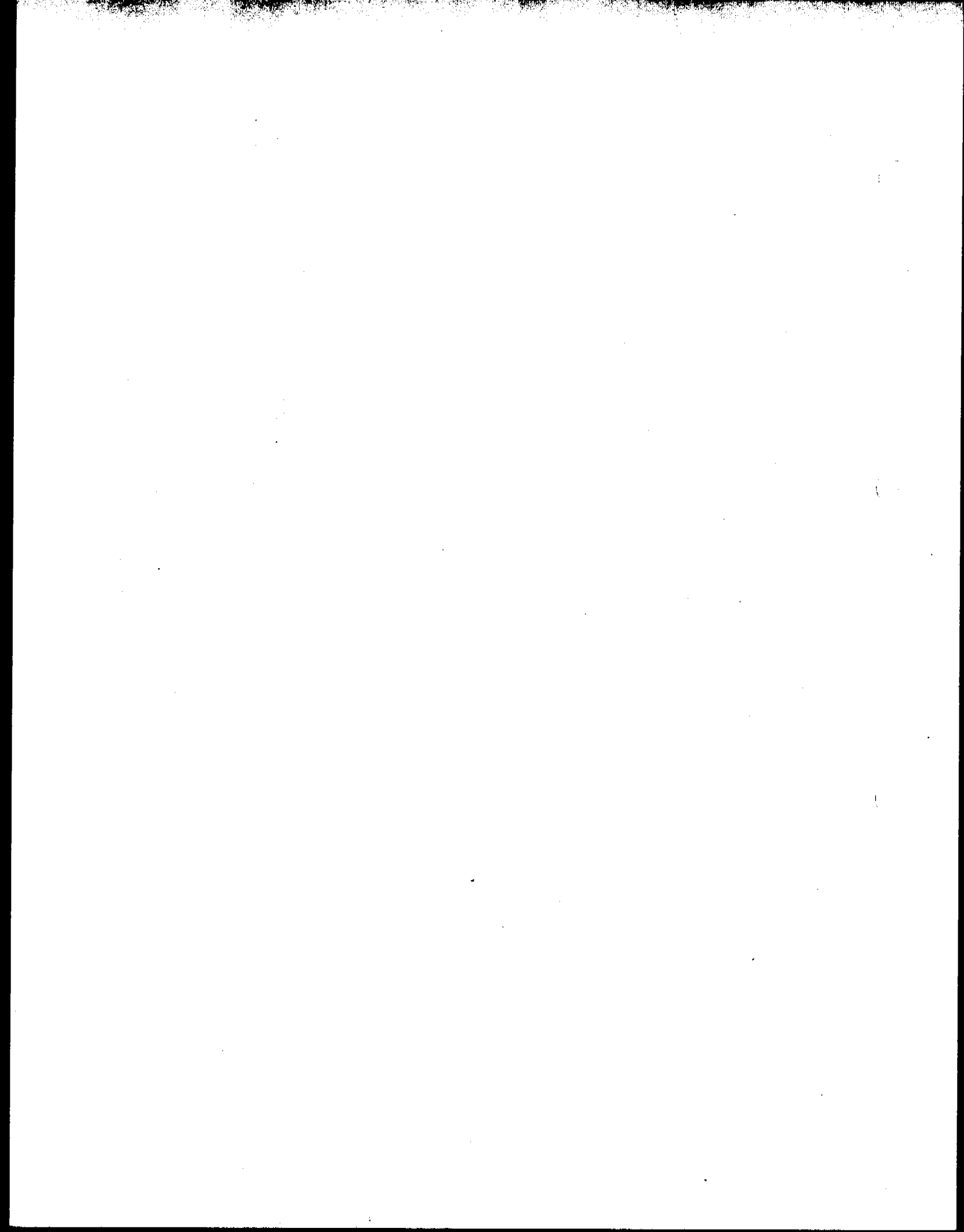


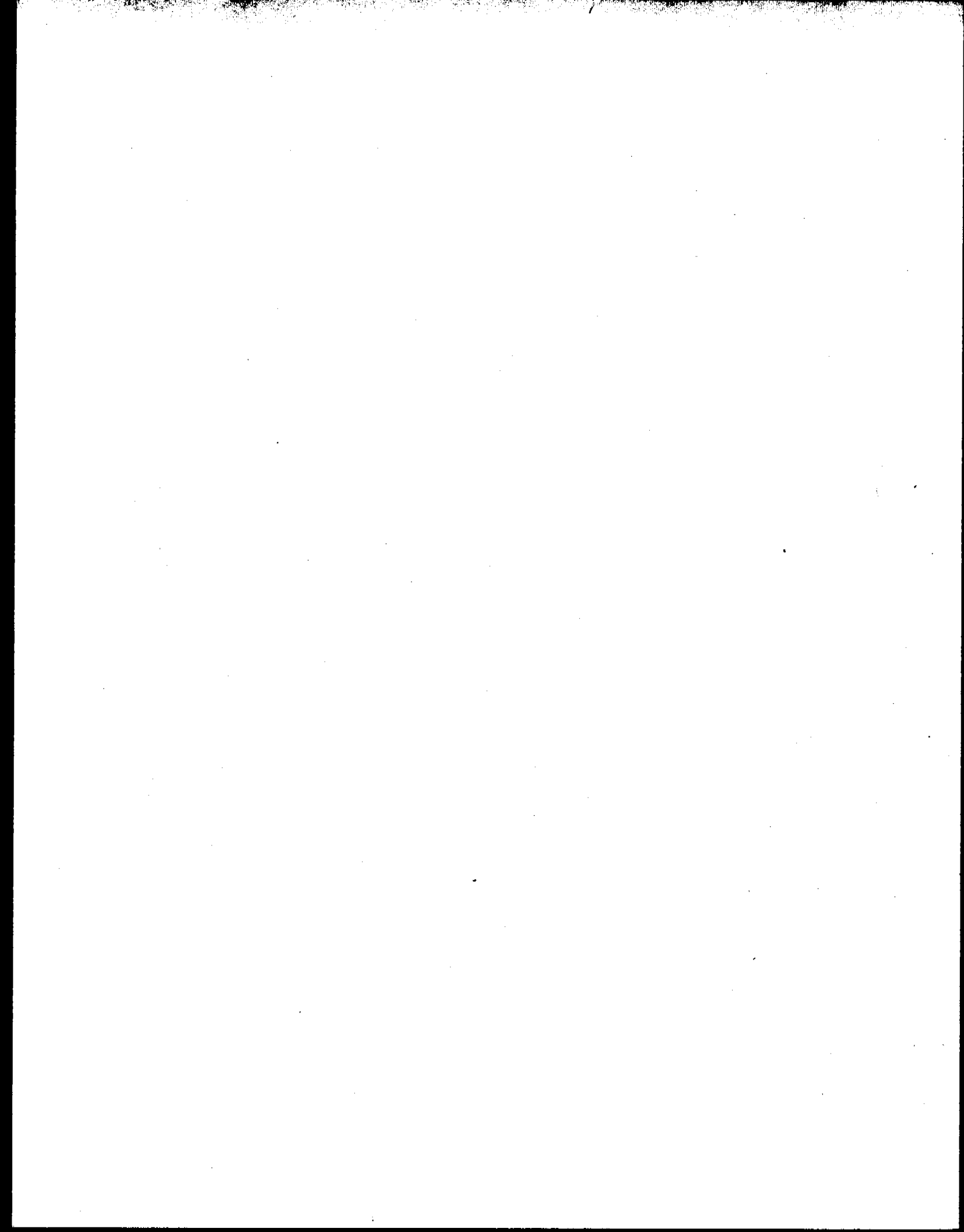
Figure E-11. Tray connector pinout diagrams.



# **Bar Code Reader Module**

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The next revision of the Bar Code Reader Service Manual will be in this smaller format.  
The current revision is available as HP part number 18587-90120.



# Cable Diagrams

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## Remote Cables

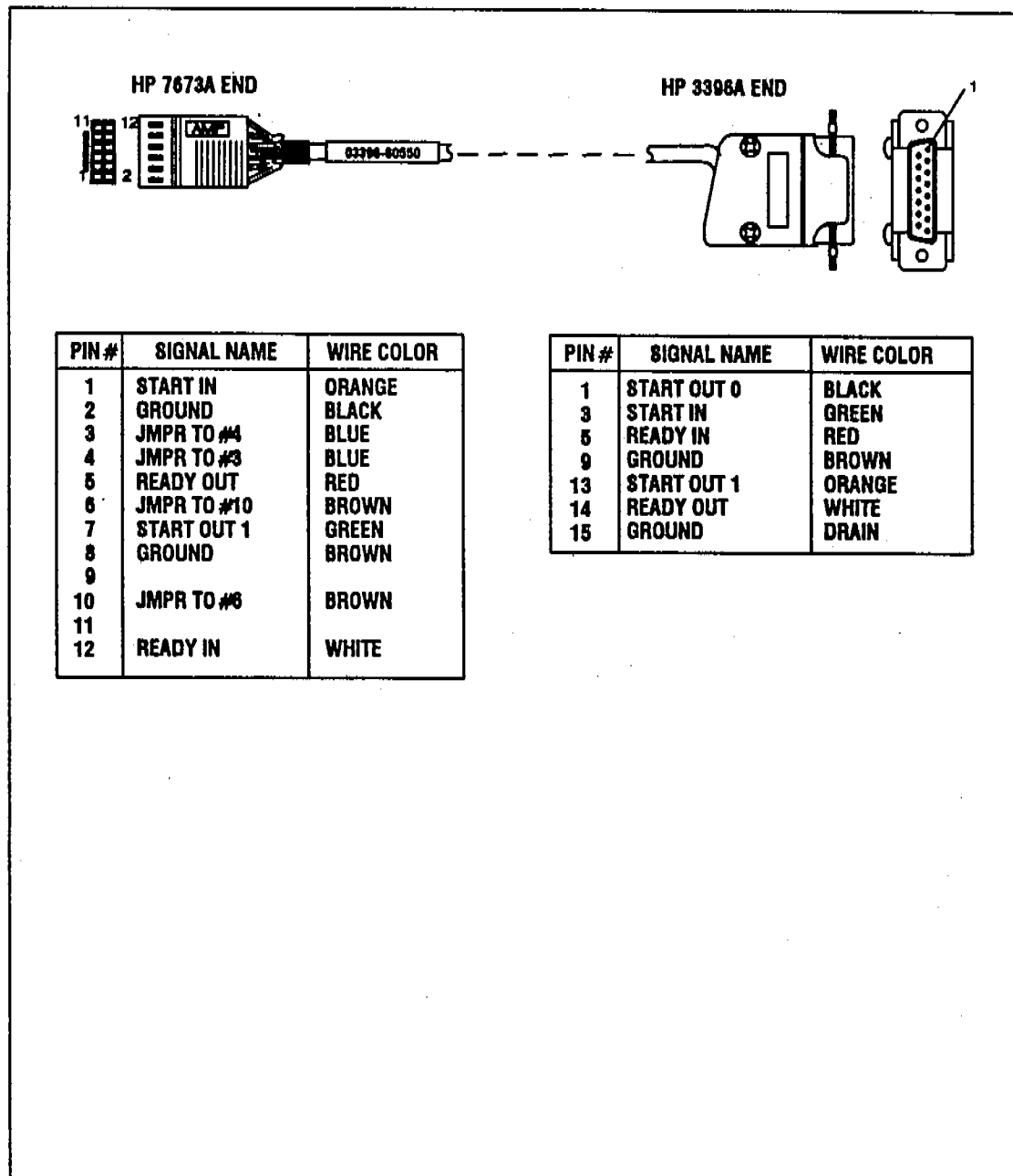
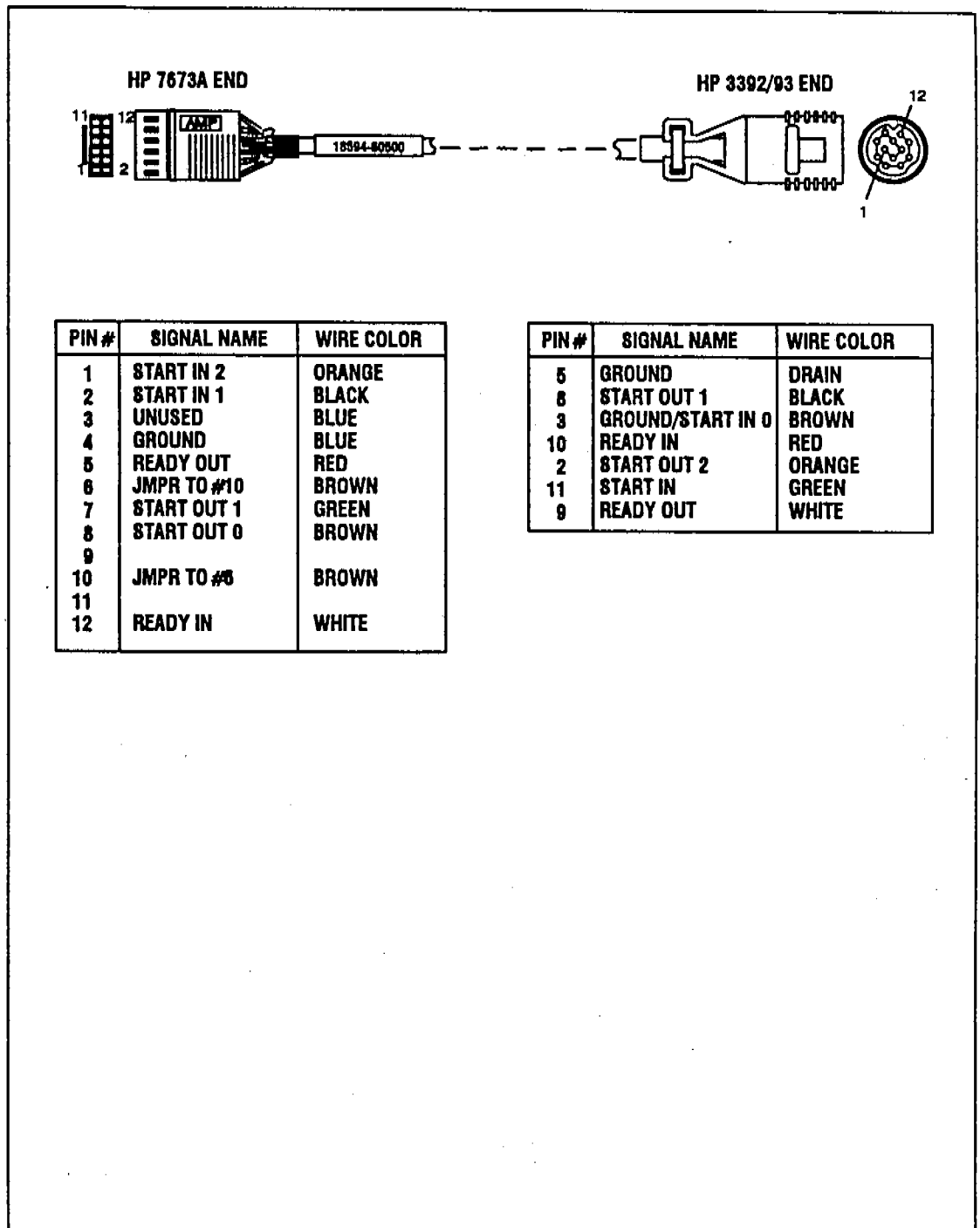
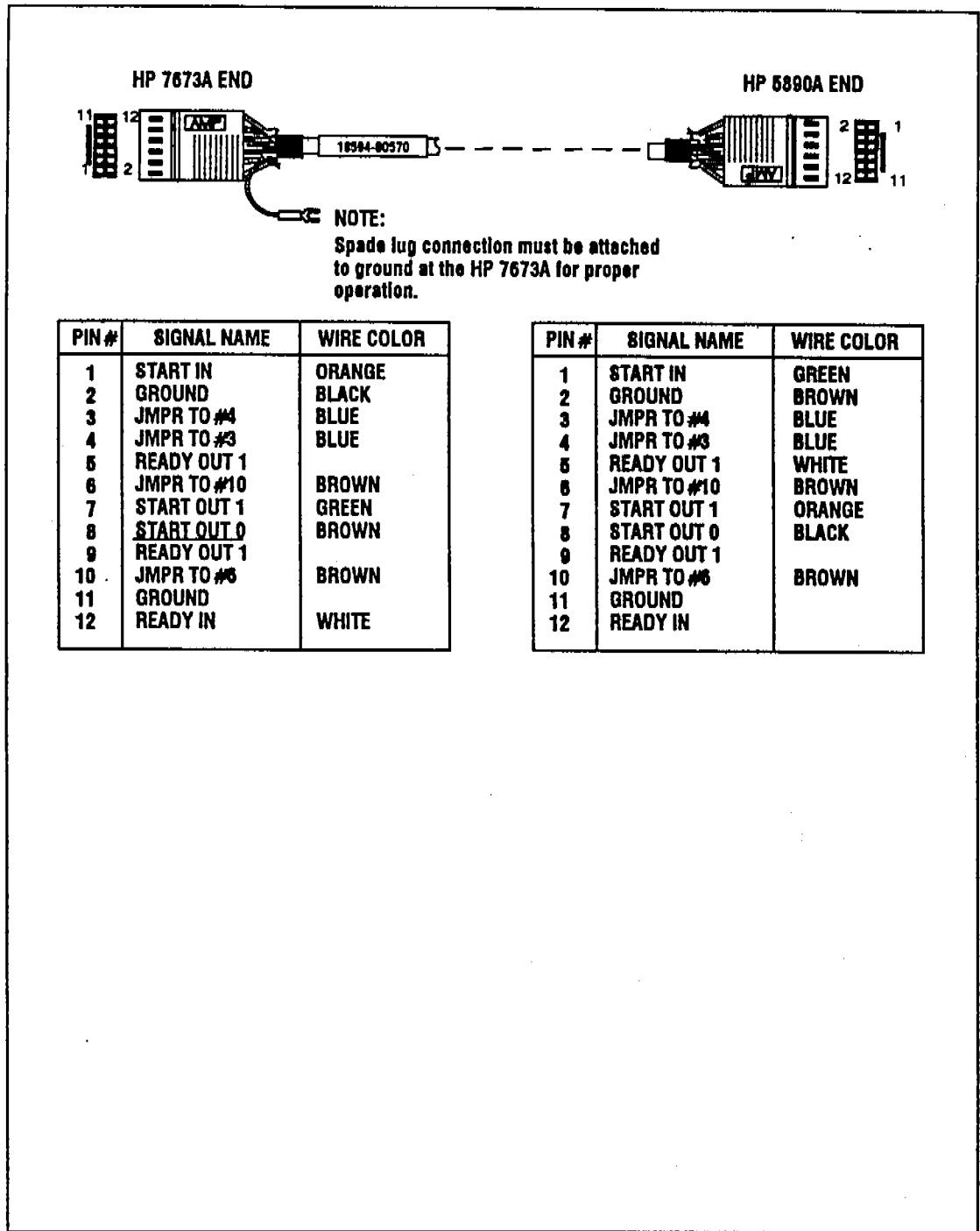


Figure G-1. Remote cable, HP 3396A (03396-60550).



**Figure G-2. Remote cable, HP 3392A/3393A (18594-60500).**

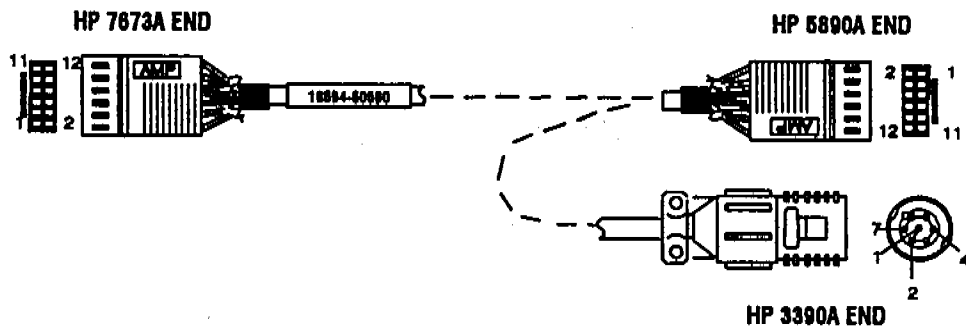


**Figure G-3. Remote cable, HP 5890A (18594-60570).**



PIN #	SIGNAL NAME	WIRE COLOR
1	START IN	ORANGE
2	GROUND	BLACK
3	JMPR TO #4	BLUE
4	JMPR TO #3	BLUE
5	READY OUT 1	
6	JMPR TO #10	BROWN
7	START OUT 1	GREEN
8	START OUT 0	BROWN
9	READY OUT 1	
10	JMPR TO #6	BROWN
11	GROUND	
12	READY IN	WHITE

PIN #	SIGNAL NAME	WIRE COLOR
1	START IN	BLUE
2	GROUND	RED
3	JMPR TO #4	BLUE
4	JMPR TO #3	BLUE
5	READY OUT 1	WHITE
6	JMPR TO #10	BROWN
7	START OUT 1	ORANGE
8	START OUT 0	BLACK
9	READY OUT 1	
10	JMPR TO #6	BROWN
11	GROUND	
12	READY IN	

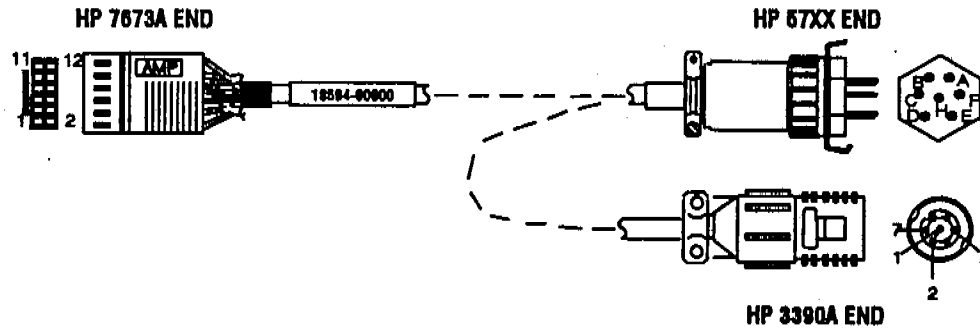


PIN #	SIGNAL NAME	WIRE COLOR
1	START OUT	BLUE
2	START IN 1	GREEN
4	GROUND	RED
7	START IN 0	BROWN

Figure G-4. "Y" remote cable, HP 5890A/3390A (18594-60590).

PIN #	SIGNAL NAME	WIRE COLOR
1	START IN 2	BROWN
2	GROUND	
3	UNUSED	
4	GROUND	
5	READY OUT 1	ORANGE
6	READY OUT 0	
7	START OUT 1	BLACK
8	START OUT 0	
9	READY OUT 1	DRAIN
10	START OUT 0	
11	GROUND	
12	READY IN	RED

PIN #	SIGNAL NAME	WIRE COLOR
A	READY OUT 1	RED
E	READY OUT 0	BROWN
E	START IN 0	BROWN
E	START IN 1	GREEN

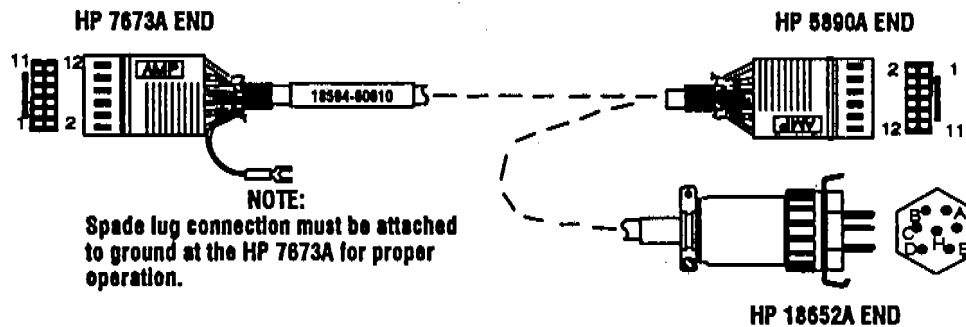


PIN #	SIGNAL NAME	WIRE COLOR
1	START OUT 0	BROWN
2	START IN 0	BLACK
4	START OUT 1	GREEN
7	START IN 1	ORANGE

Figure G-5. "Y" remote cable, HP 5700A Series/3390A (18594-80600).

PIN #	SIGNAL NAME	WIRE COLOR
1	START IN	ORANGE
2	GROUND	BLACK
3	JMPR TO #4	BLUE
4	JMPR TO #3	BLUE
5	READY OUT 1	
6	JMPR TO #10	BROWN
7	START OUT 1	GREEN
8	START OUT 0	BROWN
9	READY OUT 1	
10	JMPR TO #6	BROWN
11	GROUND	
12	READY IN	WHITE

PIN #	SIGNAL NAME	WIRE COLOR
1	START IN	BLUE
2	GROUND	RED
3	JMPR TO #4	BLUE
4	JMPR TO #3	BLUE
5	READY OUT 1	WHITE
6	JMPR TO #10	BROWN
7	START OUT 1	ORANGE
8	START OUT 0	BLACK
9	READY OUT 1	
10	JMPR TO #6	BROWN
11	GROUND	
12	READY IN	

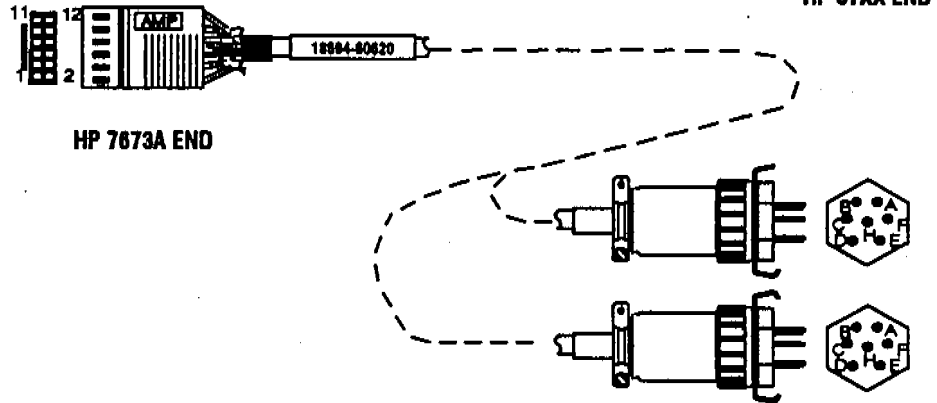


PIN #	SIGNAL NAME	WIRE COLOR
B	START OUT 1	GREEN
B	START IN	BLUE
C	START OUT 0	BROWN
C	GROUND	RED

Figure G-6. "Y" remote cable, HP 5890A/18652A (18594-60610).

PIN #	SIGNAL NAME	WIRE COLOR
1	START IN 1	GREEN
2	GROUND	BROWN
3		BLUE
5	READY OUT 1	GRAY
6		VIOLET
7	START OUT 1	ORANGE
8	START OUT 0	BLACK
9	READY OUT 1	YELLOW
11	DRAIN	
12	READY IN	RED

PIN #	SIGNAL NAME	WIRE COLOR
B	START IN 1	ORANGE
A	READY OUT	RED
E	GROUND	BROWN
E	START IN 0	BLACK



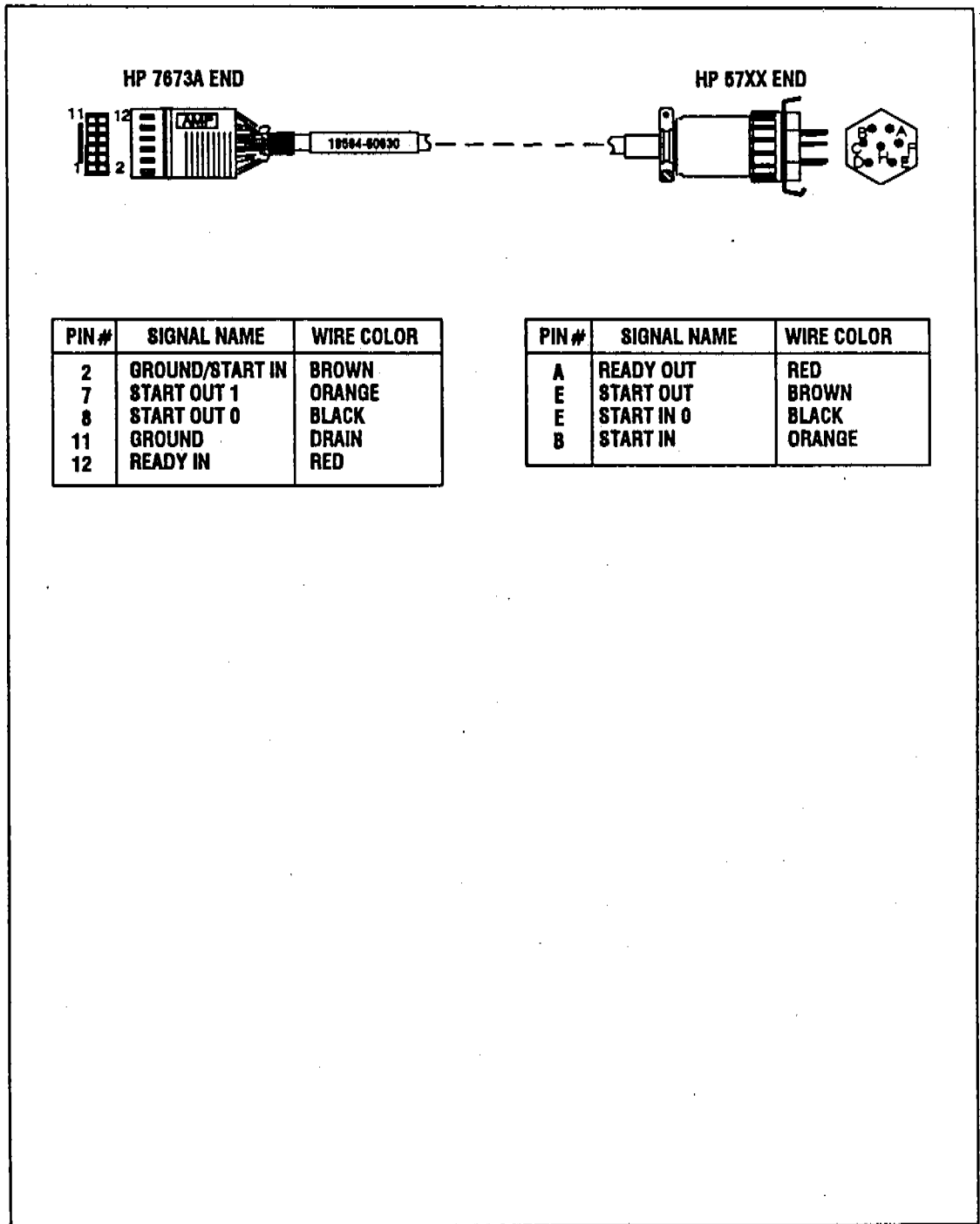
HP 57XX END

HP 7673A END

HP 18652A END

PIN #	SIGNAL NAME	WIRE COLOR
C	GROUND	BROWN
B	START IN	ORANGE

Figure G-7. "Y" remote cable, HP 5700A Series/18652A (18594-60620).



**Figure G-8. Remote cable, HP 5700A Series (18594-60630).**

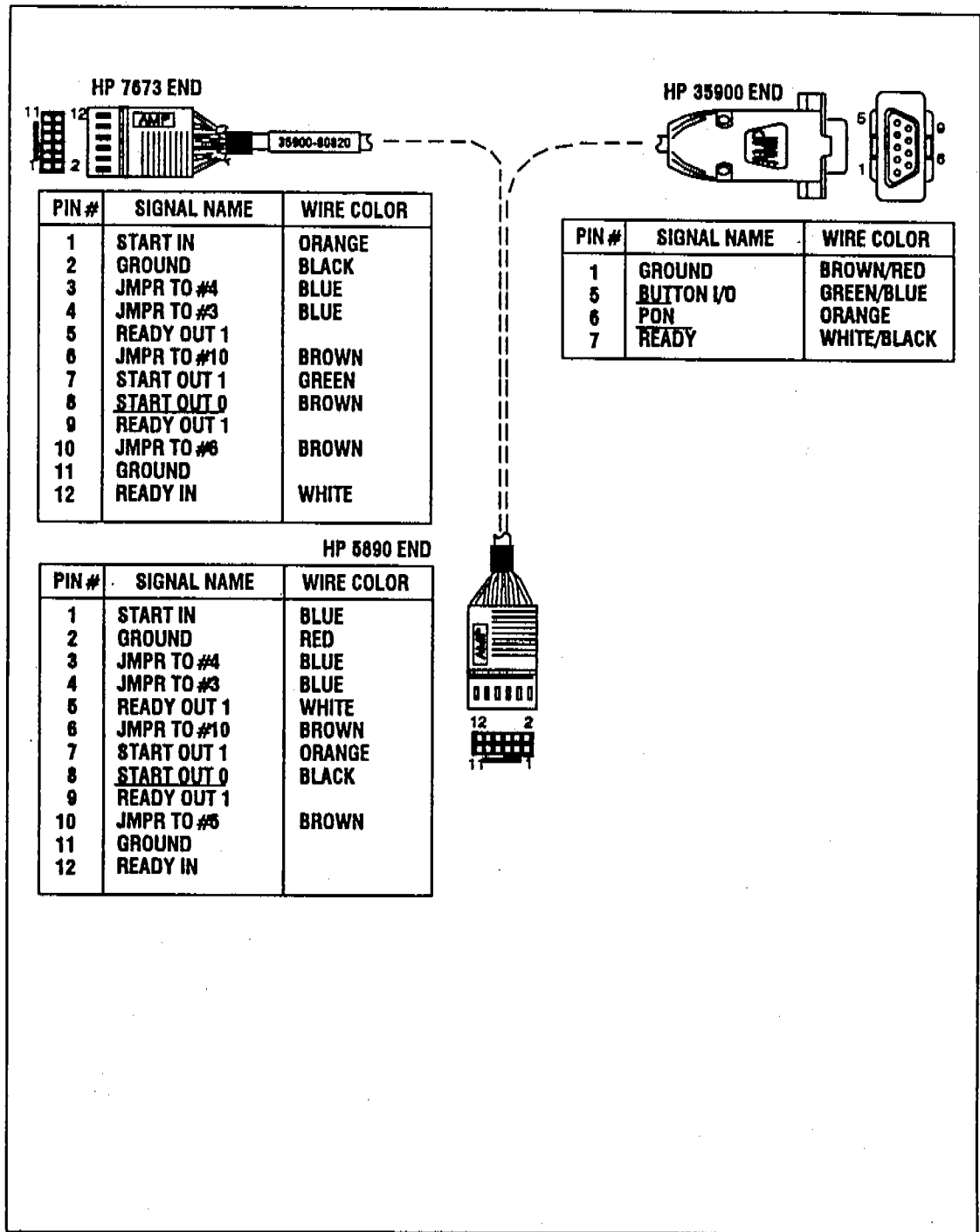


Figure G-9. "Y" remote cable, HP 5890A/35900A/B (35900-60820).

## BCD Cables

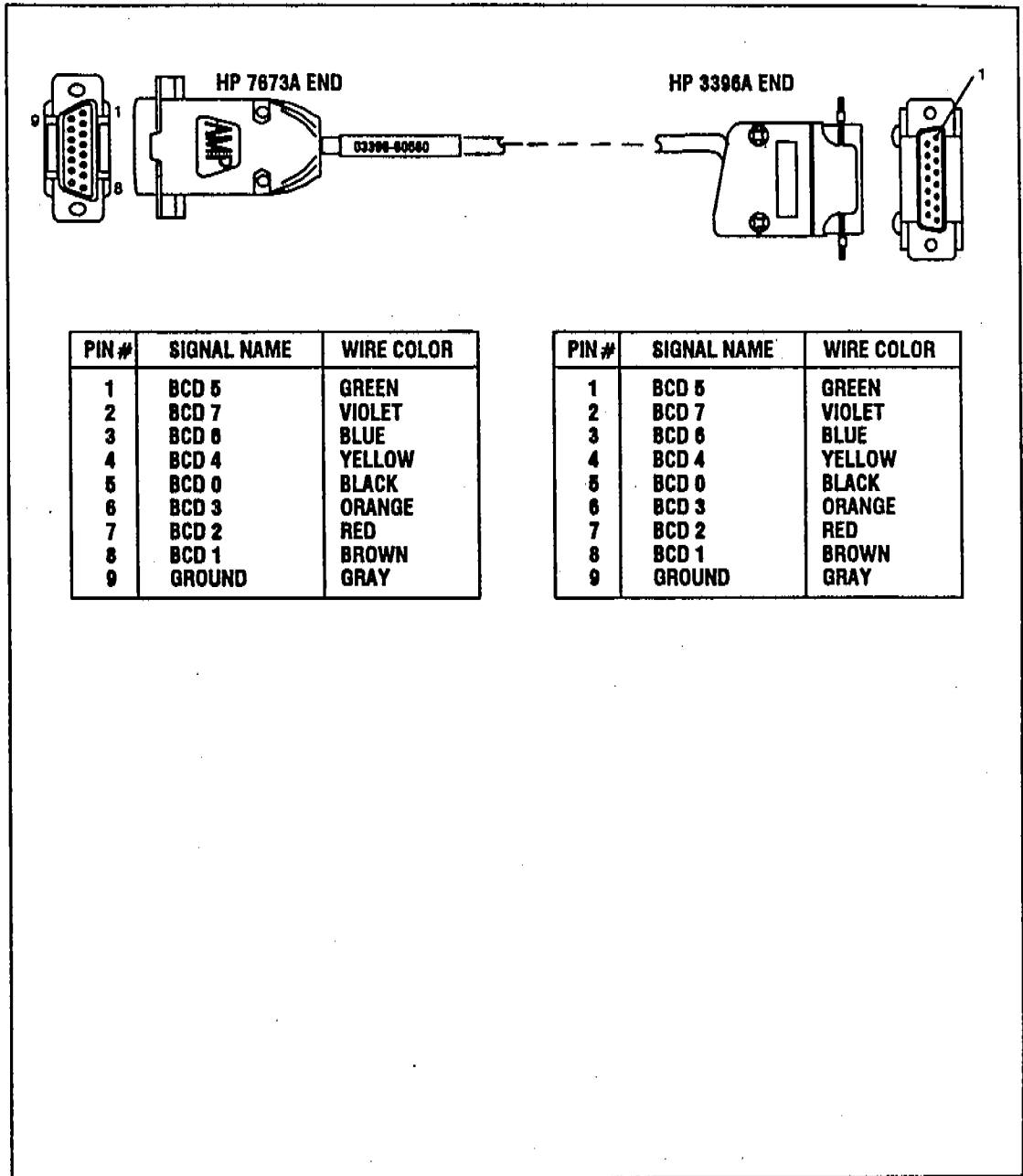
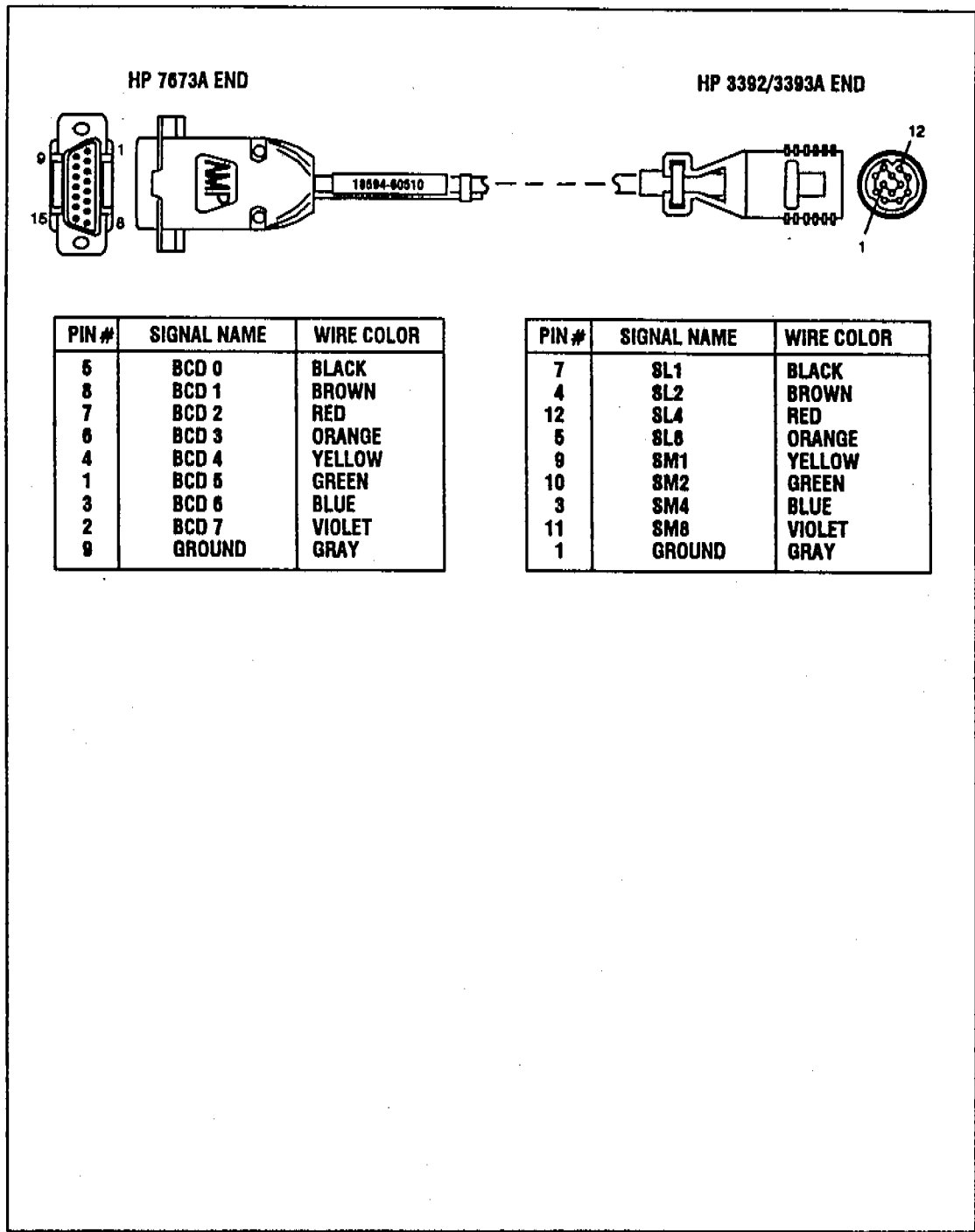


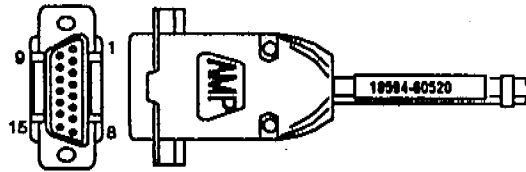
Figure G-10. BCD cable, HP 3396A (03396-80560).



**Figure G-11. BCD cable, HP 3392A/3393A (18594-60510).**

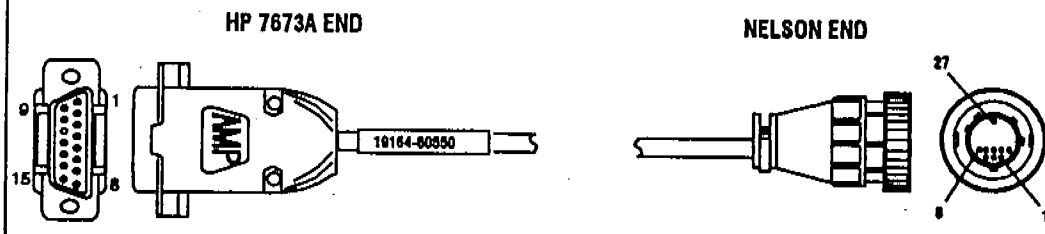


HP 7673A END



PIN #	SIGNAL NAME	WIRE COLOR
1	BCD 5	GREEN
2	BCD 7	VIOLET
3	BCD 6	BLUE
4	BCD 4	YELLOW
5	BCD 0	BLACK
6	BCD 3	ORANGE
7	BCD 2	RED
8	BCD 1	BROWN
9	GROUND	GRAY
15	+5 VDC	WHITE

Figure G-12. BCD cable, general purpose (18594-60520).



PIN #	SIGNAL NAME	WIRE COLOR
5	BCD 0	BLACK
8	BCD 1	BROWN
7	BCD 2	RED
6	BCD 3	ORANGE
4	BCD 4	YELLOW
1	BCD 5	GREEN
3	BCD 6	BLUE
2	BCD 7	VIOLET
9	GROUND	GRAY

PIN #	SIGNAL NAME	WIRE COLOR
1	BCD 0	BLACK
2	BCD 1	BROWN
3	BCD 2	RED
4	BCD 3	ORANGE
5	BCD 4	YELLOW
6	BCD 5	GREEN
7	BCD 6	BLUE
8	BCD 7	VIOLET
27	GROUND	GRAY

Figure G-13. BCD cable, Nelson (19164-60550).

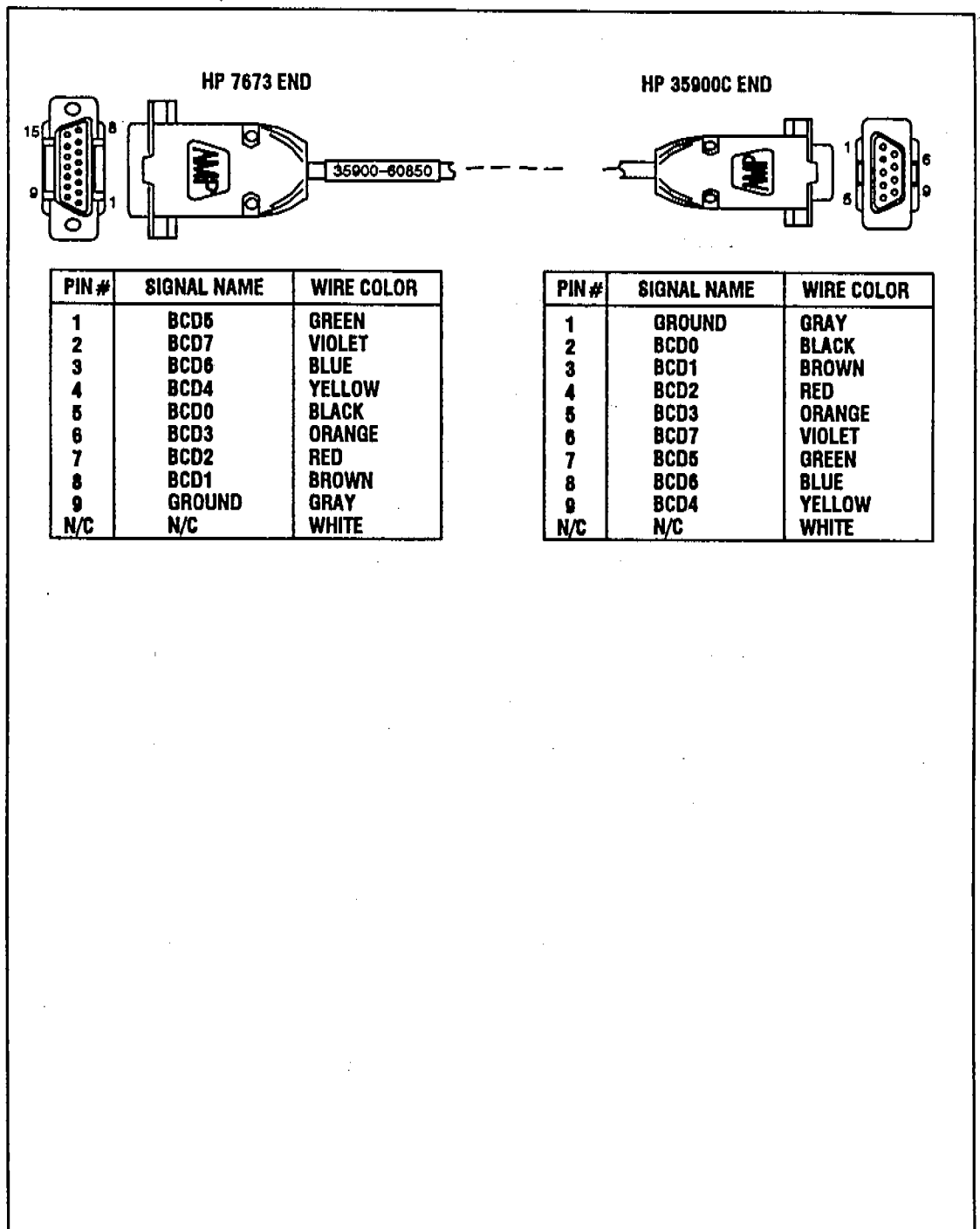


Figure G-14. BCD cable, HP 35900C (35900-60850).

## Instrument Cables

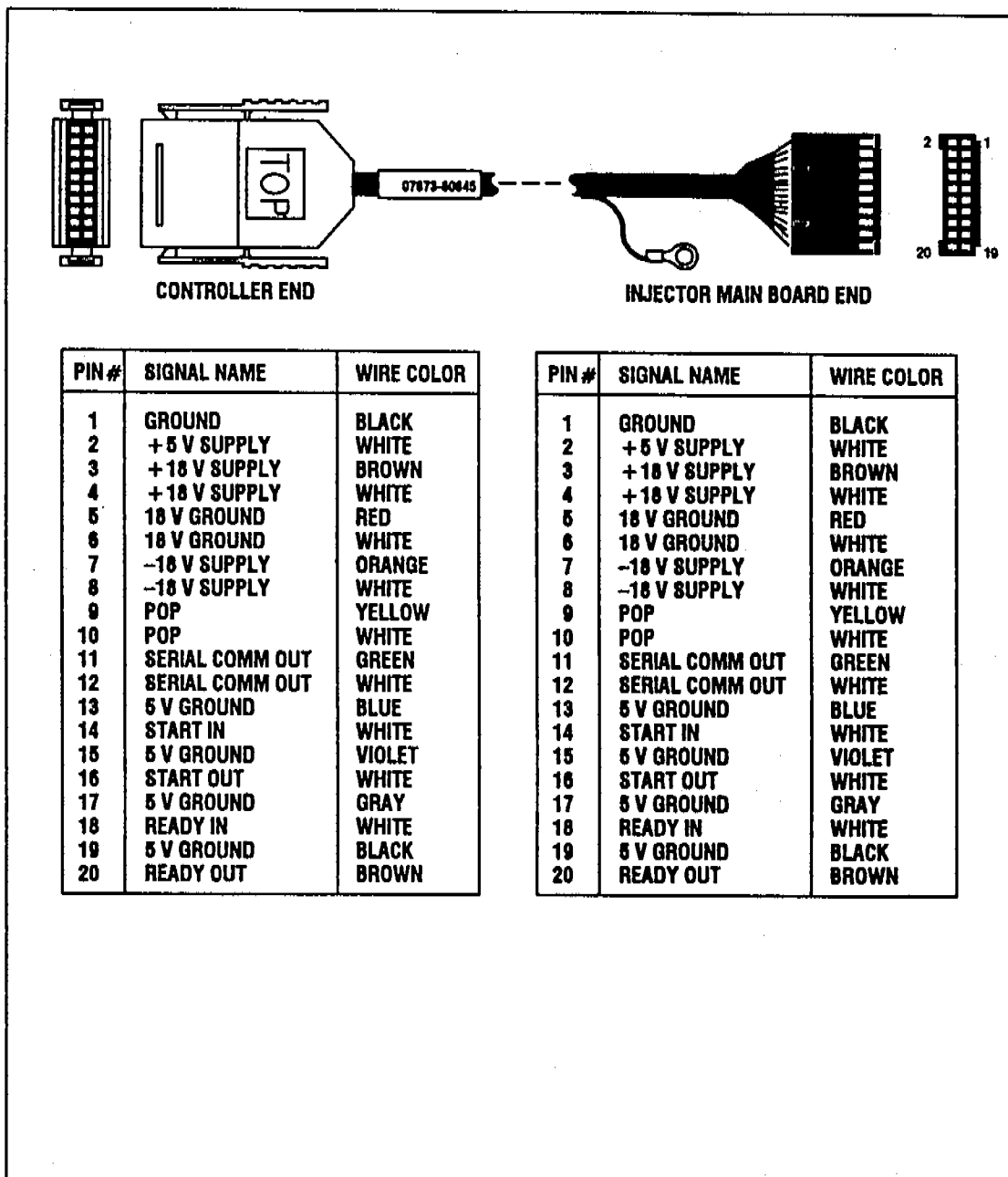
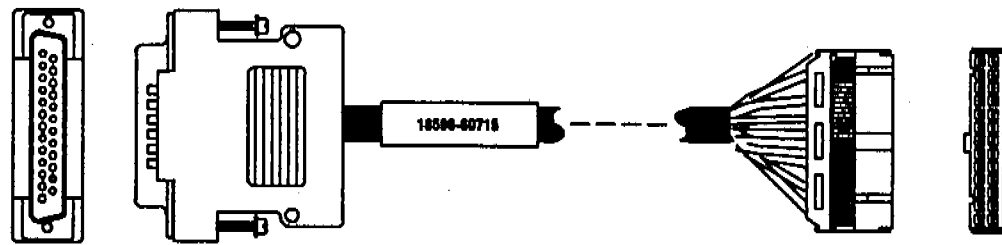


Figure G-15. Injector cable (07673-60645).



PIN #	SIGNAL NAME
1	GROUND
2	+ 12 V SUPPLY
3	R-HOME
4	THETA-HOME
5	THETA-SENSE
6	Z-MOTOR COMMON
7	Z-MOTOR 03
8	Z-MOTOR 01
9	R-MOTOR 02
10	R-MOTOR 04
11	THETA-MOTOR
12	THETA-MOTOR 02
13	THETA-MOTOR 04
14	GROUND
15	+ 12 V SUPPLY
16	INTERLOCK
17	Z-HOME
18	BOTTLE SENSOR
19	Z-MOTOR 04
20	Z-MOTOR 02
21	R-MOTOR COMMON
22	R-MOTOR 01
23	R-MOTOR 03
24	THETA-MOTOR 01
25	THETA-MOTOR 03

PIN #	SIGNAL NAME
1	GROUND
2	GROUND
3	+ 12 V SUPPLY
4	+ 12 V SUPPLY
5	R-HOME
6	GROUND
7	THETA-HOME
8	Z-HOME
9	THETA-SENSE
10	BOTTLE SENSOR
11	Z-MOTOR COMMON
12	Z-MOTOR 04
13	Z-MOTOR 03
14	Z-MOTOR 02
15	Z-MOTOR 01
16	R-MOTOR COMMON
17	R-MOTOR 02
18	R-MOTOR 01
19	R-MOTOR 04
20	R-MOTOR 03
21	THETA-MOTOR COMMON
22	THETA-MOTOR 01
23	THETA-MOTOR 02
24	THETA-MOTOR 03
25	THETA-MOTOR 04

Figure G-16. Tray cable (18596-60715).

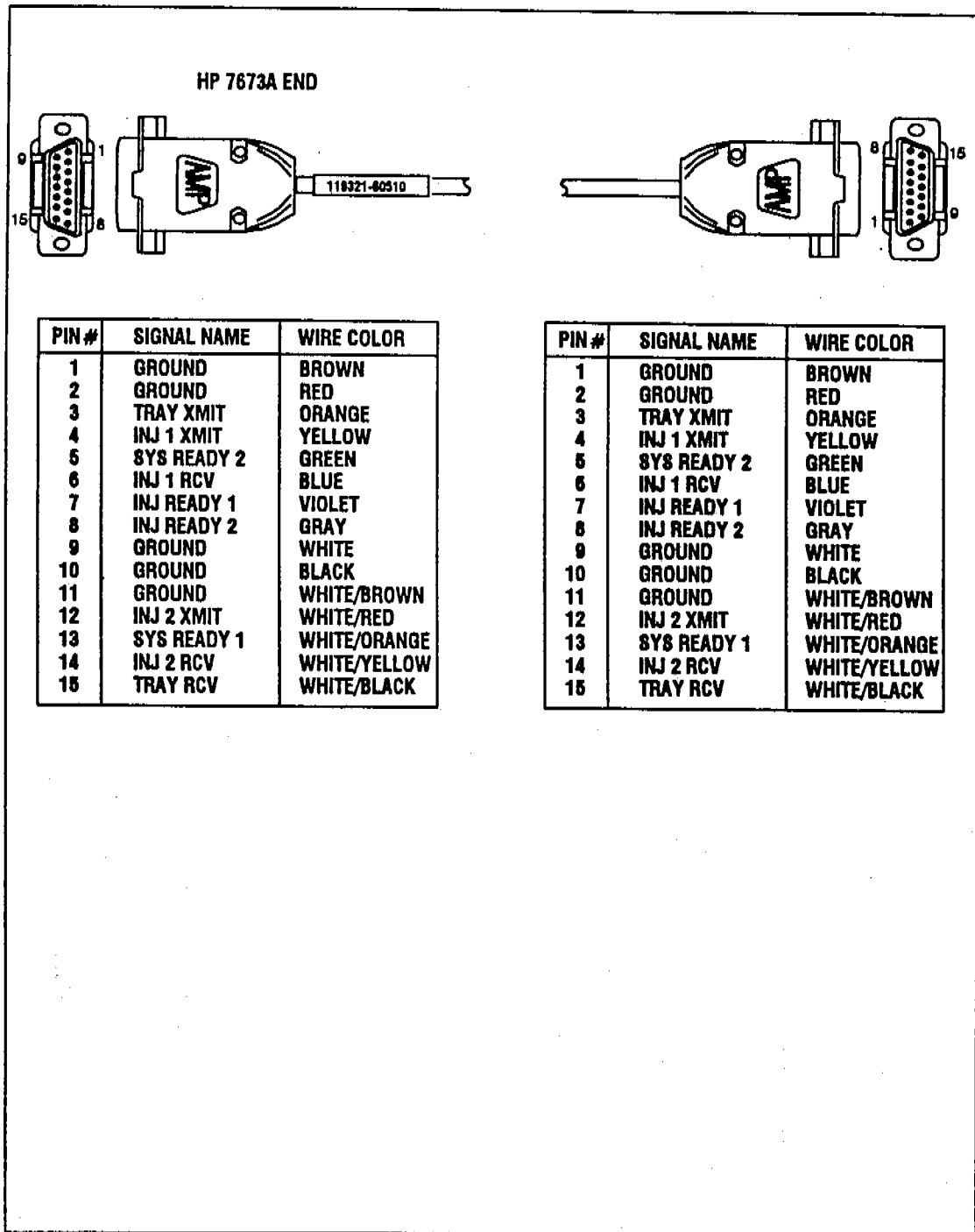


Figure G-17. HP 5880A control cable (19321-60510).

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 Tepapan  
 16010 XOCHIMILCO D.F.  
 Tel: (905) 6-76-46-00  
 Telex: 1774507 HPM

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 C.P. 06700 Mexico D.F.  
 Tel: 864-1522

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 Private Bag, Newmarket  
 AUCKLAND  
 Tel: 794-091  
 Telex: NZ 21570 NRTPAK

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28 Moorhouse Avenue  
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 Tel: 707727, 707723  
 707719  
 Telex: 3885

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 Cable: FEMUS Islamabad

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61  
Telex: 23615

08029 Barcelona  
Entenza, 321  
Tel: (93) 322 24 51/321 73  
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Telex: 52603

41008 Sevilla  
Luis de Morales  
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Tel: (96) 351 59 44  
Telex: 63435

49030 Las Arenas  
Guecho (Vizcaya)  
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Tel: (94) 464 32 55/464 29  
33  
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Hewlett-Packard (Schweiz)  
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Fax: 061-681-98-69

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Telex: 24439 HEWPACK  
Cable: HEWPACK Taipei

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Chung Hsiao East Road  
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Hewlett-Packard Ltd.  
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Cheadle Heath  
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Avenida Italia 2877  
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MONTEVIDEO  
Tel: 69-82-802-588  
Telex: 398802888

## VENEZUELA

Analytical Supplies C.A.  
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Quinta 103  
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Tel: 36-4904, 239-4047  
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Do Hermes  
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Telex: 910-338-0588

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South, Suite A  
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Building 6  
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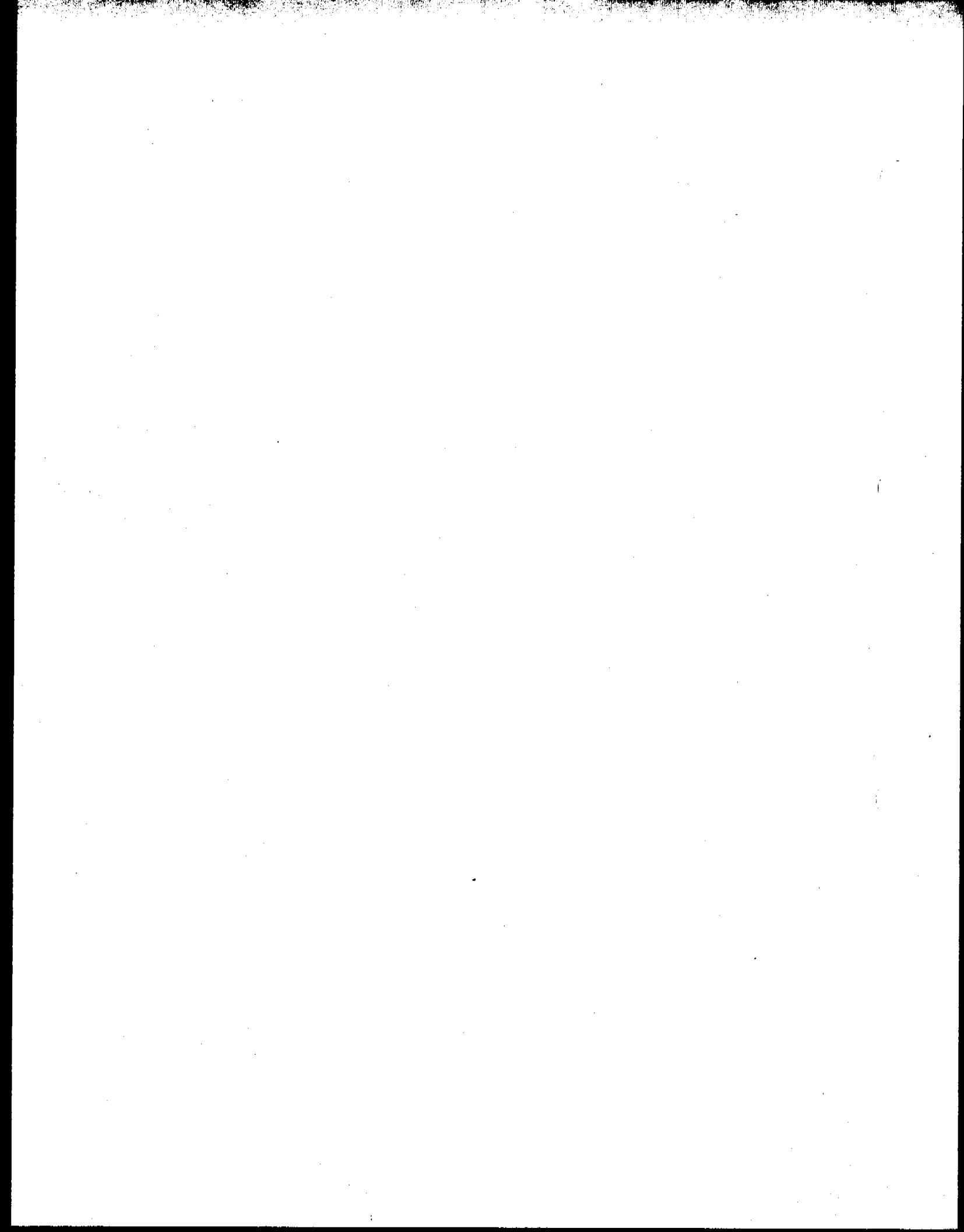
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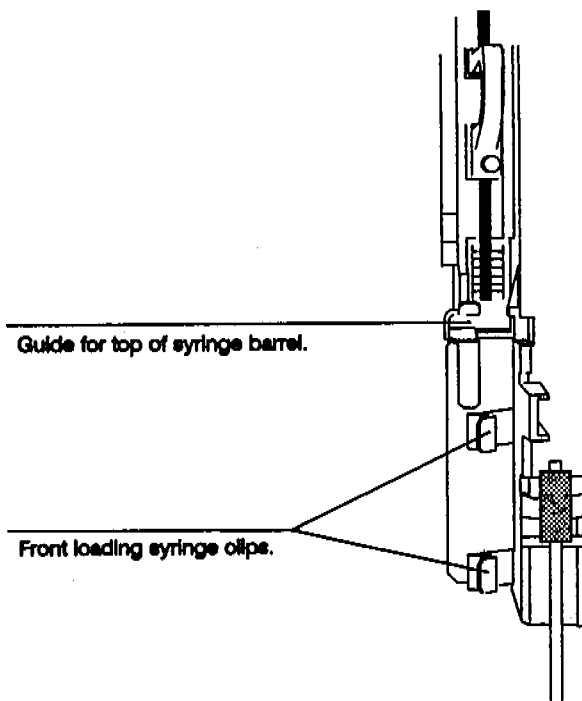




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## Manual Update: Installing a syringe

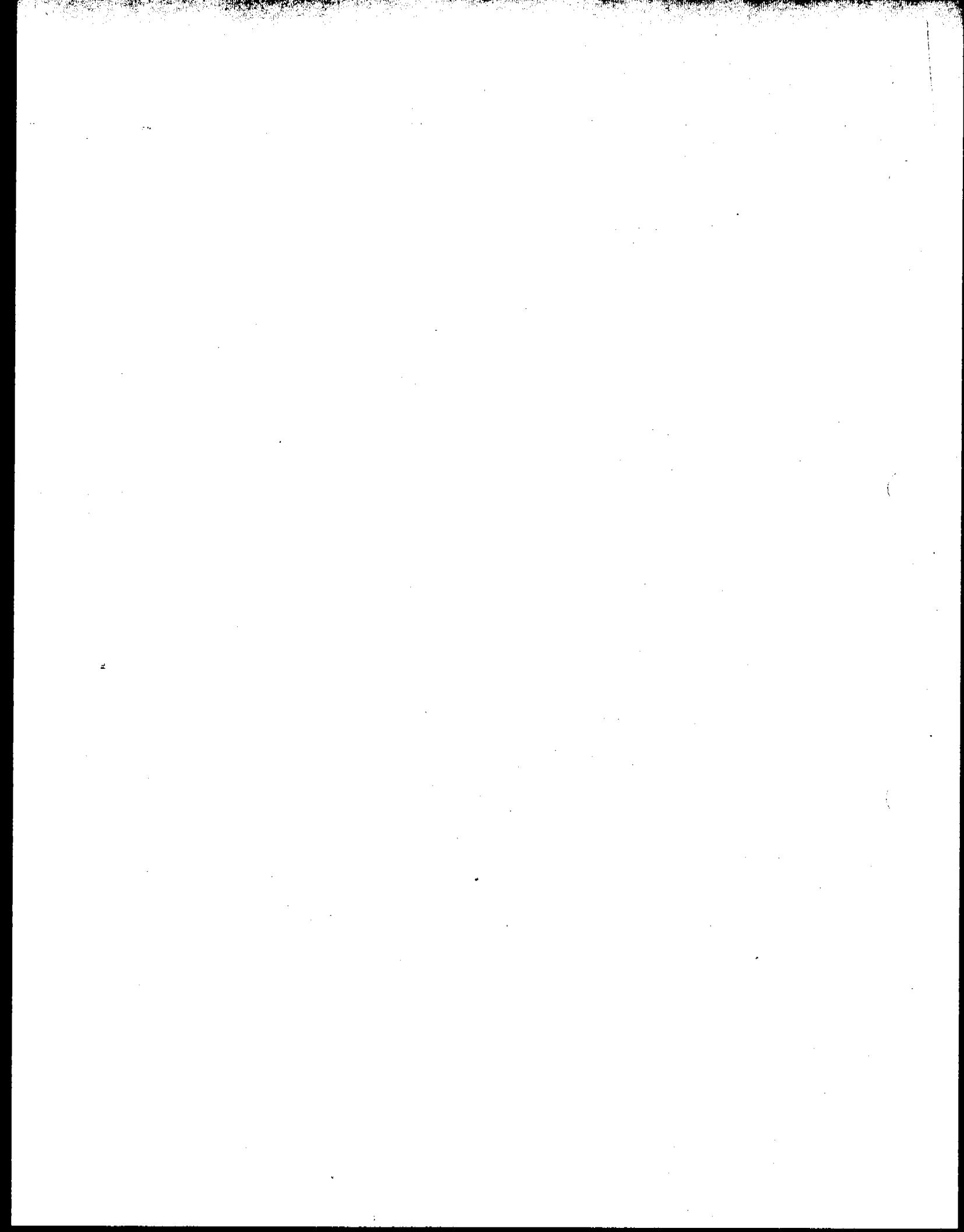
This update provides new information for installing syringes into the HP 18593B Injector Module. Metal syringe clips enable you to install a syringe from the front, similar to the A modules.



**To update your manual, follow this instruction.**

- Replace these pages in the Automatic Sampler Operating Manual (manual kit part number 07673-60995).

Title page, Print History, RFI and Sound Emission Certification,  
2-7, 2-8, 3-29, 3-30, 3-31, and 3-32



# Printing History

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First edition—October 1989  
Printed in USA

Second edition—April 1991  
Printed in USA

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# RFI and Sound Emission Certification for the Federal Republic of Germany

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## Manufacturer's Declaration

This is to certify that the equipment HP 7673 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 and the right to check the series for compliance with the requirements was granted.

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

- Sound Pressure  $L_p < 70 \text{ dB(A)}$
- At Operator Position
- Normal Operation
- According to ISO 7779 (Type Test)

## Herstellerbescheinigung

Hiermit wird bescheinigt, daß das Gerät/System HP 7673 in Übereinstimmung mit den Bestimmungen von Postverordnung 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/Systems angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Diese Information steht im Zusammenhang mit den Anforderungen der Maschinenlärminformationsverordnung vom 18 Januar 1991.

- Schalldruckpegel  $L_p < 70 \text{ dB(A)}$
- Am Arbeitsplatz
- Normaler Betrieb
- Nach DIN 45635 T. 19 (Typprüfung)



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---

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## Chapter 2. Example of Operation

Designed for the beginner, this 15-minute "dry run" illustrates how to prepare the automatic sampler and run a three vial sequence using the following methods of control:

- HP 3396A Integrator with the Instrument Network (INET).
- HP 3365 ChemStation (DOS Series).
- HP 5880A Gas Chromatograph.
- Standalone control using the injector's control switches.

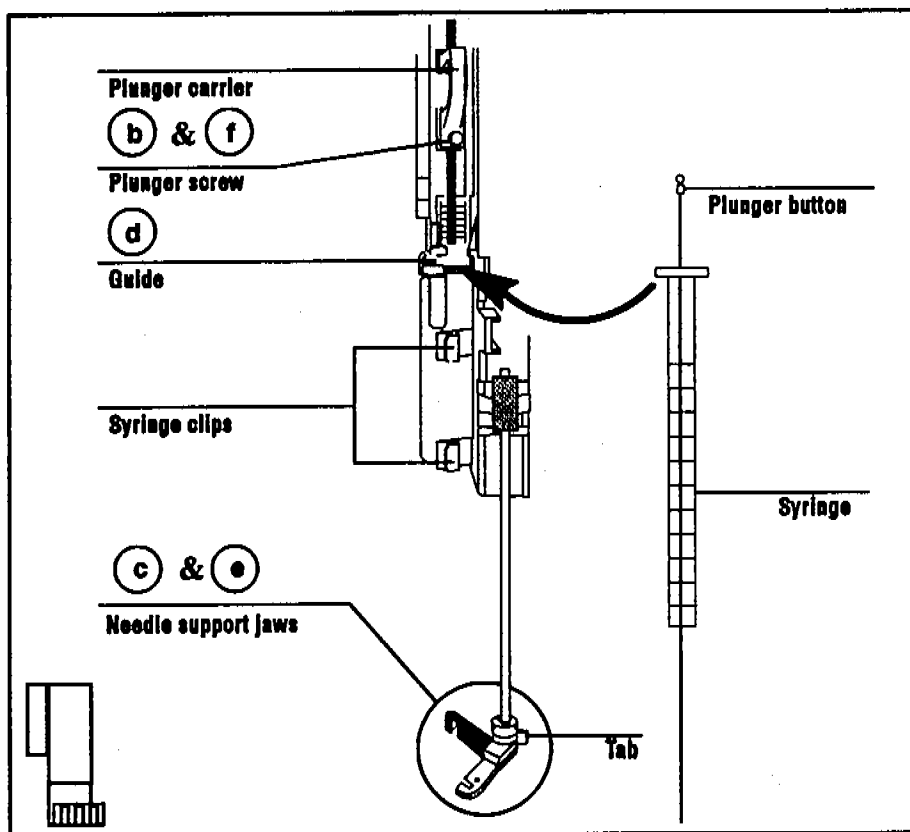
## Chapter 3. Operation

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## 5. Install the Syringe

Use a 23 gauge syringe with packed and capillary inlets or a 26/23 gauge tapered syringe with on-column inlets. However, you can complete the dry run without a syringe.

- a. Open the injector door.
- b. Slide up the gray loop of the plunger carrier and loosen the plunger screw about five turns.
- c. With your fingernail, lift and turn the tab of the needle support jaws so that the upper jaw of white plastic swings toward you.
- d. Line up the top of the syringe barrel with the guide at the top of the metal clip and snap it into place.
- e. Lift and close the white jaw around the needle.
- f. Slide down the gray loop of the plunger carrier and tighten the plunger screw around the plunger button of the syringe. Slide the loop up and down to be sure that it is holding the plunger. Close the injector door.



For more information on selecting and installing a syringe, see page 3-28.

## Preparing the GC and Controlling Device

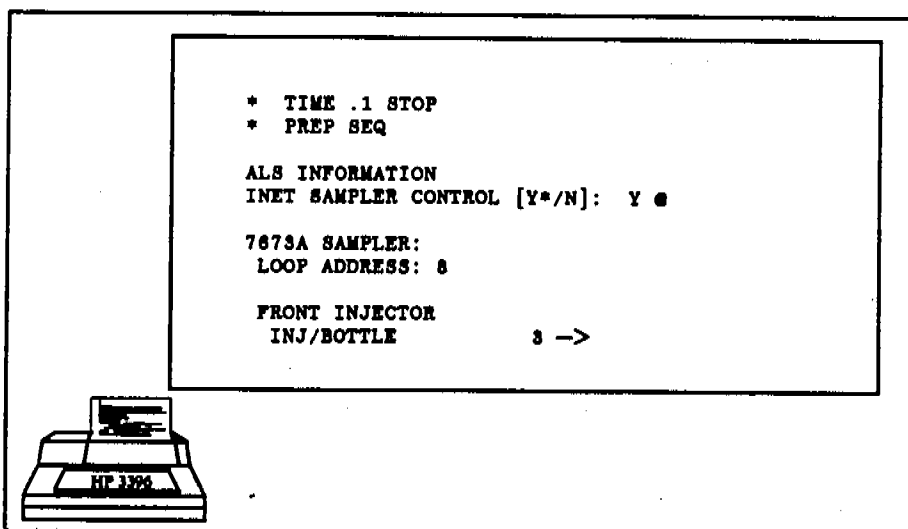
To minimize the amount of time between injections, enter the appropriate set points for oven temperature, equilibration time, initial time, and data analysis.

You can minimize the time for the GC to be ready by setting the oven to a low temperature, remove any temperature ramp program, and set the equilibration time to zero. You can minimize the amount of time the integrator or computer collects data by turning the detector or signal off and setting the run time to about 10 seconds.

Turn to the section for the controlling method that you are using and complete the list of tasks.

### HP 3396A Integrator

1. Set the run time to 0.1 minutes by pressing **TIME** **0** **1** **STOP**.
2. Begin the dialogue to prepare a sequence by pressing the keys for **[PREP][SEQ]**.
3. Answer yes to INET SAMPLER CONTROL by pressing **Y** **ENTER**.
4. Turn to page 2-12, column two for instructions on setting the run parameters.



**CAUTION**

Failure to use the on-column syringe when injecting into an on-column inlet could damage the injector, syringe, and column.

## Inspecting Syringes

Before installing the syringe.

1. Roll the syringe on the edge of a clean flat surface. If the tip of the needle seems to follow a circular motion, bend it slightly near where it connects to the syringe barrel and check it again.

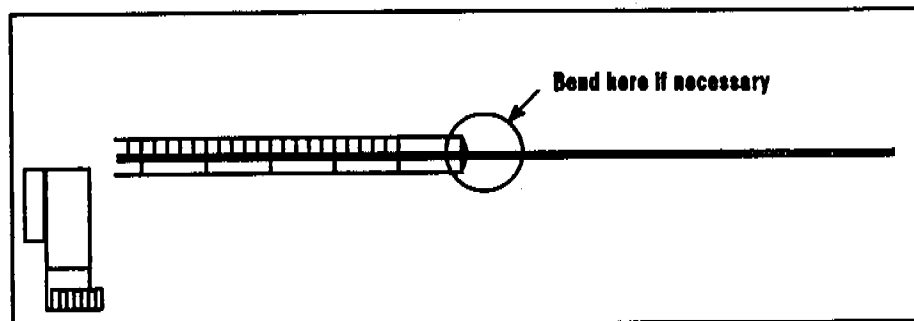


Figure 3-21. Syringe parts and needle inspection.

2. Check for a rough needle. The needle may contain closely spaced concentric ridges that act like a miniature file and abrade pieces of the septum into the inlet. The ridges are easy to see under 10X magnification.  
  
If there are ridges, polish the needle by pulling it through a folded piece of fine emory paper between you finger and thumb until the ridges are gone. Be careful not to modify the special blunt tip of the syringe.
3. Check for a sticky plunger. Slide the plunger of the syringe up and down a few times. It should move smoothly—without sticking or binding.

## Installing Syringes

After completing this task, check your work with the instructions on page 3-32. There are three functioning parts to keep in mind.

- The syringe is held onto a plastic syringe carrier by metal spring clips.
- The needle is supported by a set of plastic jaws at the end of a spring loaded rod.
- The plunger carrier moves the syringe plunger up and down. The carrier holds the plunger with a thumb screw.

1. Open the injector door.
2. Slide the gray loop of the plunger carrier up as far as it will go.
3. Find the black and white plastic needle support jaws.
4. With your fingernail, lift and turn the tab of the upper, white plastic jaw so that it swings toward you.

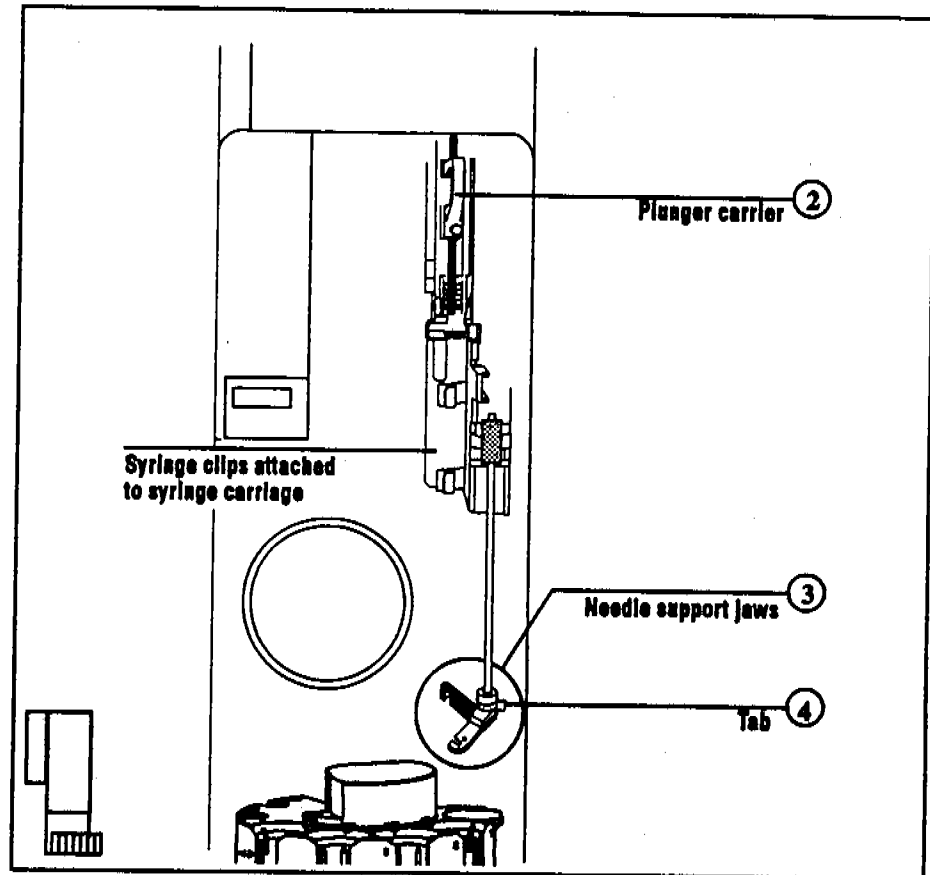


Figure 3-22. Plunger carrier and needle support.

5. Position the syringe in front of the metal syringe clips. The top of the syringe barrel should fit into the guide.
6. Push the syringe against the clips until it snaps in place.
7. Move the tip of the needle into the notch of the black plastic needle support jaw. Lift and close the white plastic jaw around the needle.
8. Loosen the plunger screw about 5 turns. Slide the gray loop of the plunger carrier down so that the plunger button fits into the hole of the plunger carrier. Tighten the plunger screw.

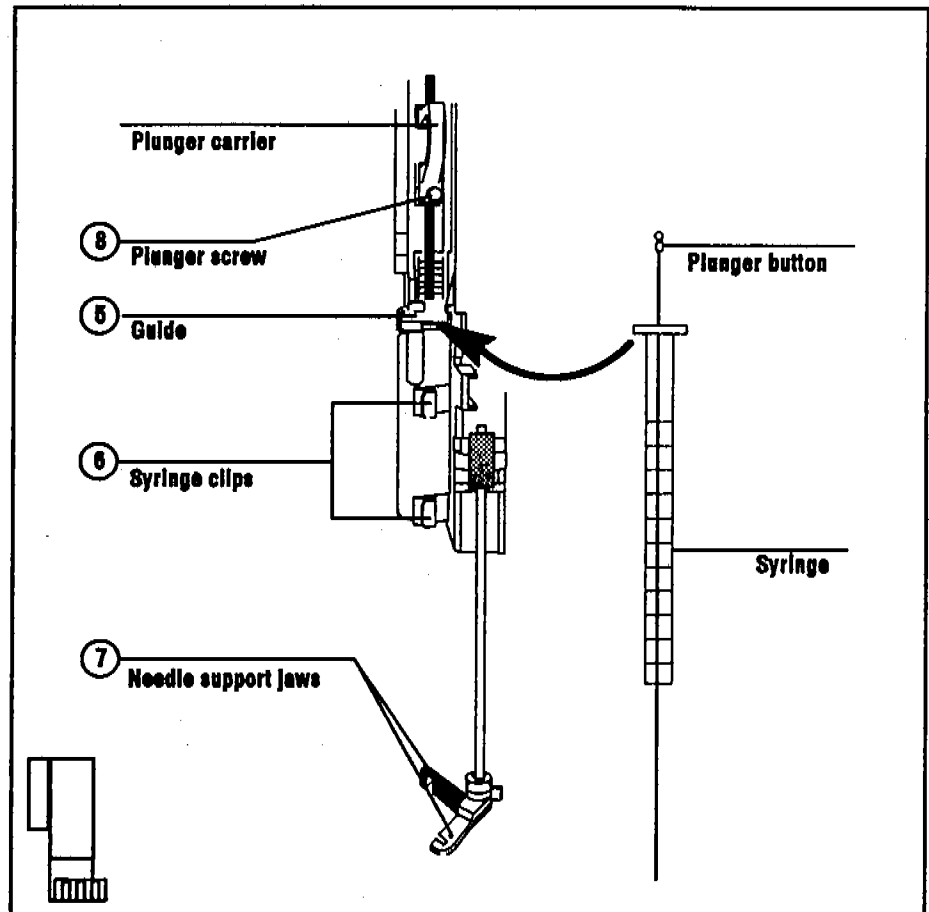
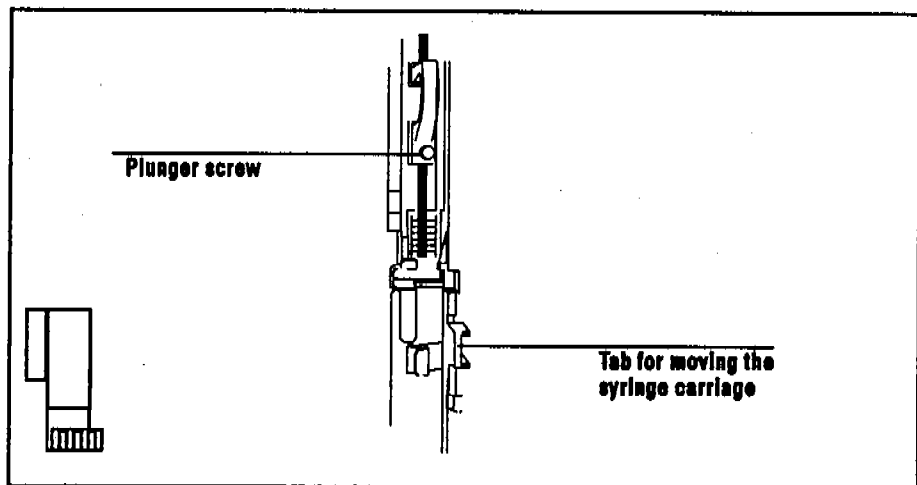


Figure 3-23. Snapping the syringe into place.

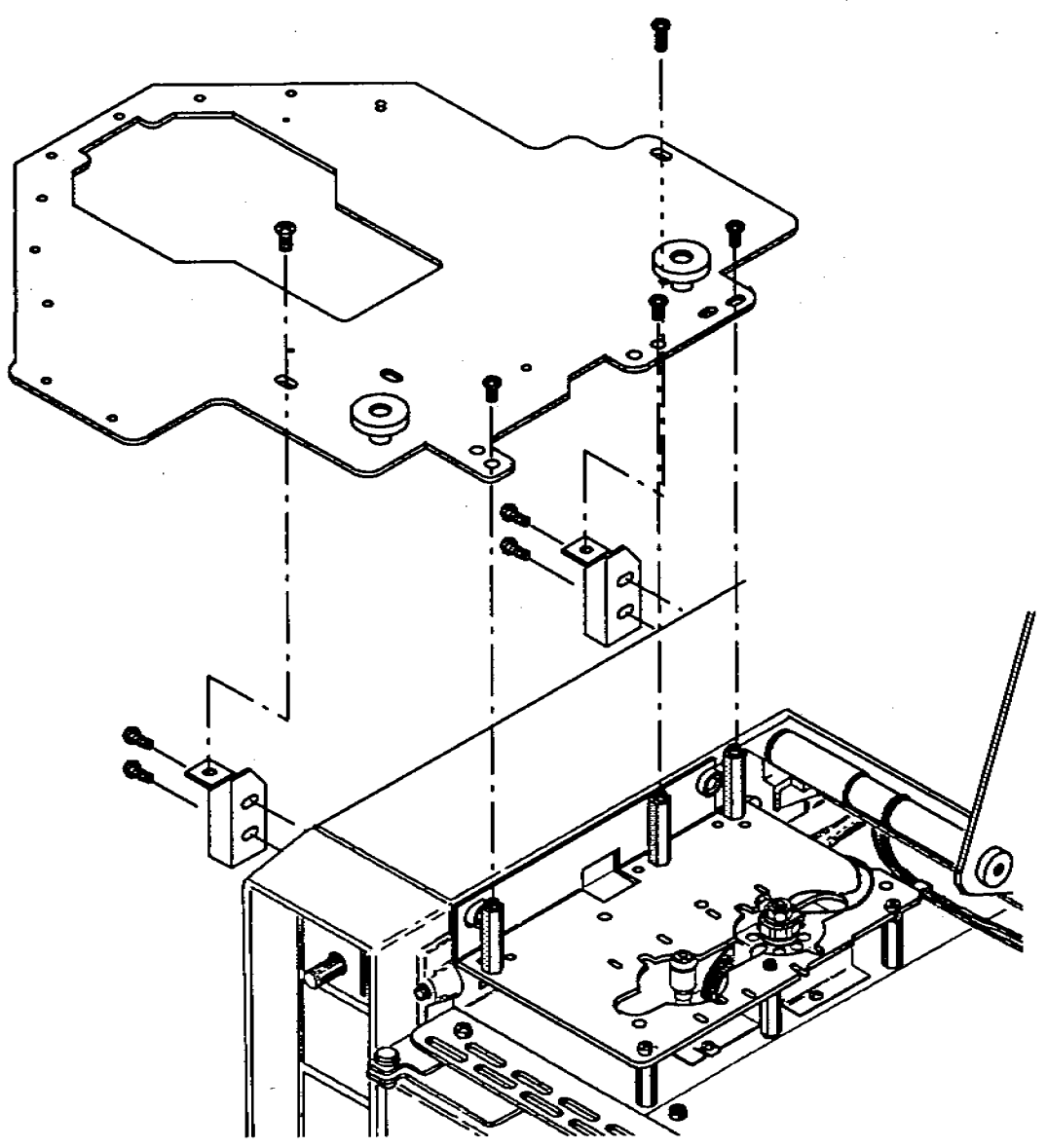
## Checking Your Work

- Move the gray loop of the plunger carrier up and down. If the syringe plunger does not move along with the carrier, return to step 8. Be sure the plunger carrier screw is tight.
- Be sure the jaws of the needle support are closed around the needle. Push up on the bottom of the needle support jaws (compressing the spring). If the jaws of the needle support do not slide up and down the needle freely, return to step 4. Also check for flaws on the needle as described in "Inspecting Syringes" on page 3-29.
- Check the alignment of the syringe needle with the cone shaped lead on the septum nut to ensure an average septum life of 200 injections. Follow these instructions.
  1. Pull down the syringe carriage until the needle tip is near the top of the inlet's septum retainer nut. Use the plastic tab on the syringe carriage. Figure 3-24 shows a syringe needle over the septum retainer nut of a packed inlet.



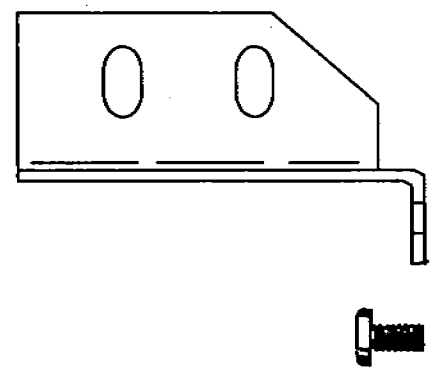
The needle should be centered exactly over the hole in the septum retainer nut. Use a small light to see that the needle will hit the septum without rubbing on the nut.

Exploded diagram



**1** Attach the Bracket Supports

No. 2 Point Pozidriv

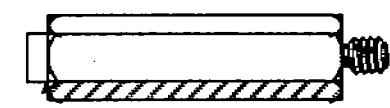


2 bracket supports (18597-00235)  
( Drawn full scale )

4 pan head screws (0515-0915)  
( Drawn full scale )

**2** Attach the Tray Standoffs

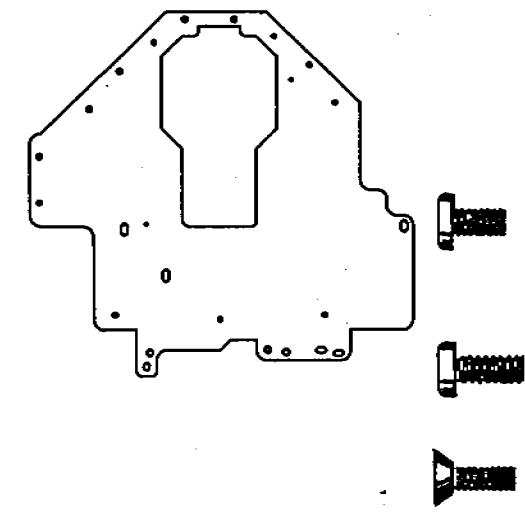
3/8-in. crescent wrench



3 standoffs (18597-20710)  
( Drawn full scale )

**3** Attach the Tray Bracket

No. 2 Point Pozidriv



1 tray bracket (18597-00135-1)

3 pan head screws (0515-0915)  
( Drawn full scale )

1 pan head screw (0515-0910)  
( Drawn full scale )

1 flat head screw (0515-0913)  
( Drawn full scale )



This worksheet is for installing the mounting bracket for the HP 185968 Tray Module to an HP 5890A or HP 5890 SERIES II Gas Chromatograph.

### 3. Attach the Tray Bracket

- a. Place the tray bracket on the mounting supports and the standoffs installed in steps 1 and 2. The top of the standoffs should fit into the holes labeled with the letter A on the tray bracket.
- b. If the top of the standoffs do not line up with the holes labeled with the letter A, check the location of the standoffs against figure 2 on page 5.
- c. Using a No. 2 Point Pozidriv, screw in the three pan head screws through the holes labeled A and into the standoffs.

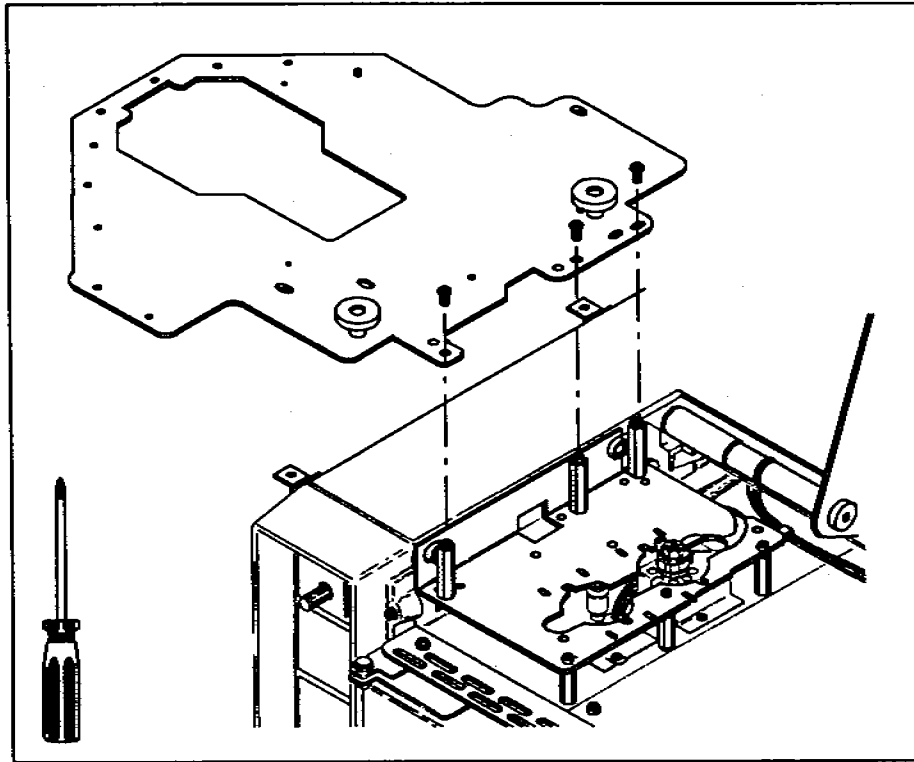


Figure 3. Attaching the tray bracket to the standoffs.

- d. Push the mounting supports you installed in step 1 so they are flush against the left side panel.
- e. Line up the hole on the far side of the bracket (labeled 5890) with the threaded hole of the rear mounting support. Screw one pan head screw into the mounting support with a No. 2 Point Pozidriv.
- f. Line up the hole on the near side of the bracket (labeled 5890) with the threaded hole of the front mounting support. Screw one flat head screw into the mounting support with a No. 2 Point Pozidriv.
- g. Tighten the four screws that attach the mounting supports to the side of the flow panel.

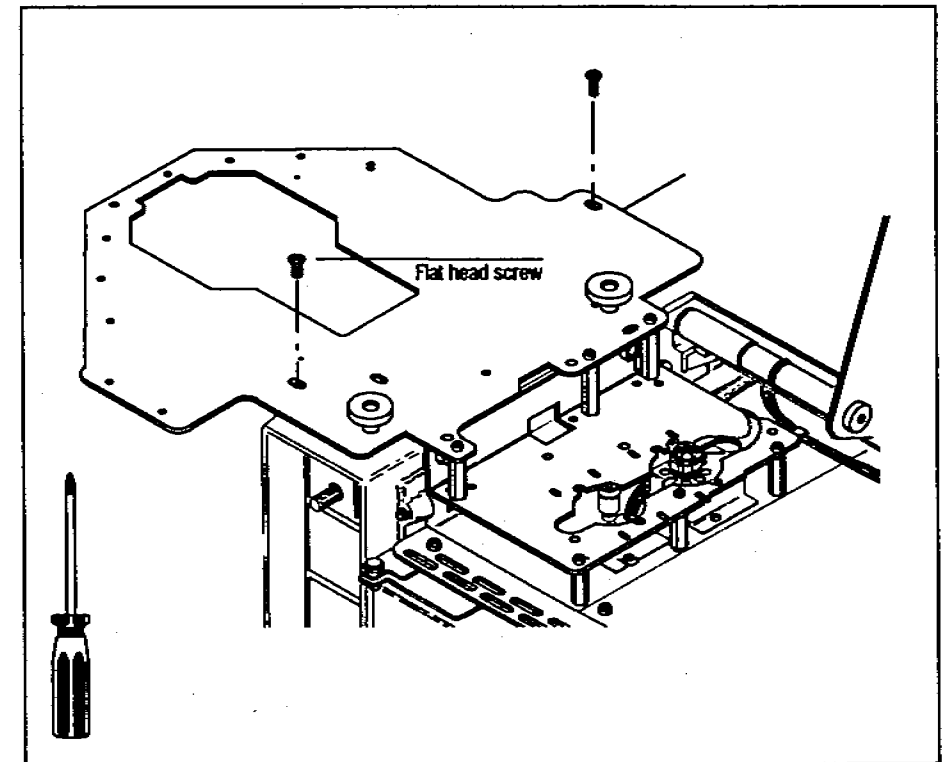


Figure 4. Attaching the tray bracket to the bracket supports.

# 3

## Checking Your Work

Double-check the following:

- The three screws that attach the tray bracket to the standoffs on the injector bracket must go through the holes labeled A on the tray bracket.
- All screws and standoffs are tight.

To mount the tray on the bracket and connect the cable to the controller, see chapter 1 of the operating manual "Setting Up."

## 2. Attach the Tray Standoffs

- a. Screw the three standoffs (hexagonal posts) into the injector mounting bracket. Use the holes identified in figure 2. If you do not use the correct holes, the tray will not be able to deliver sample vials to the injector.
- b. Tighten the standoffs with a 3/8-in. crescent wrench.

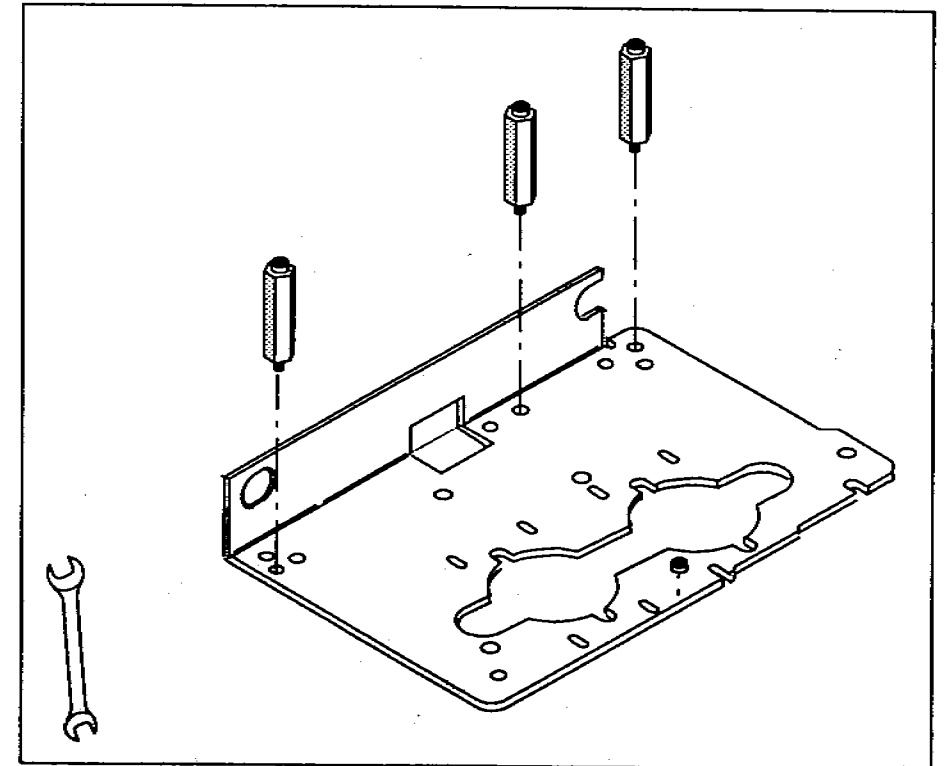


Figure 2. Mounting bracket holes for the tray standoffs.

## 1. Attach the Bracket Supports

- a. Using a No. 2 Point Pozidriv, attach the two bracket supports to the flow panel on the left-hand side of the GC. Do not tighten the screws until the end of step 3.

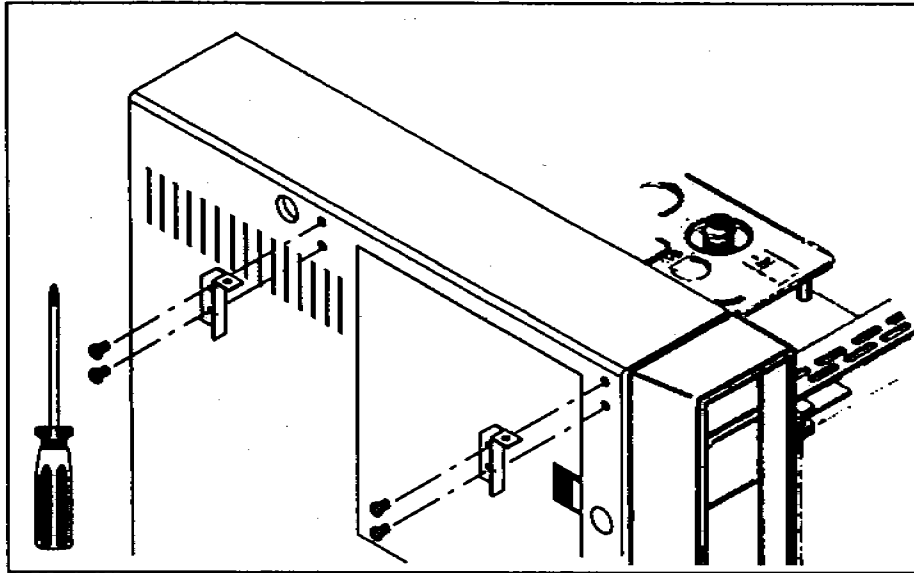
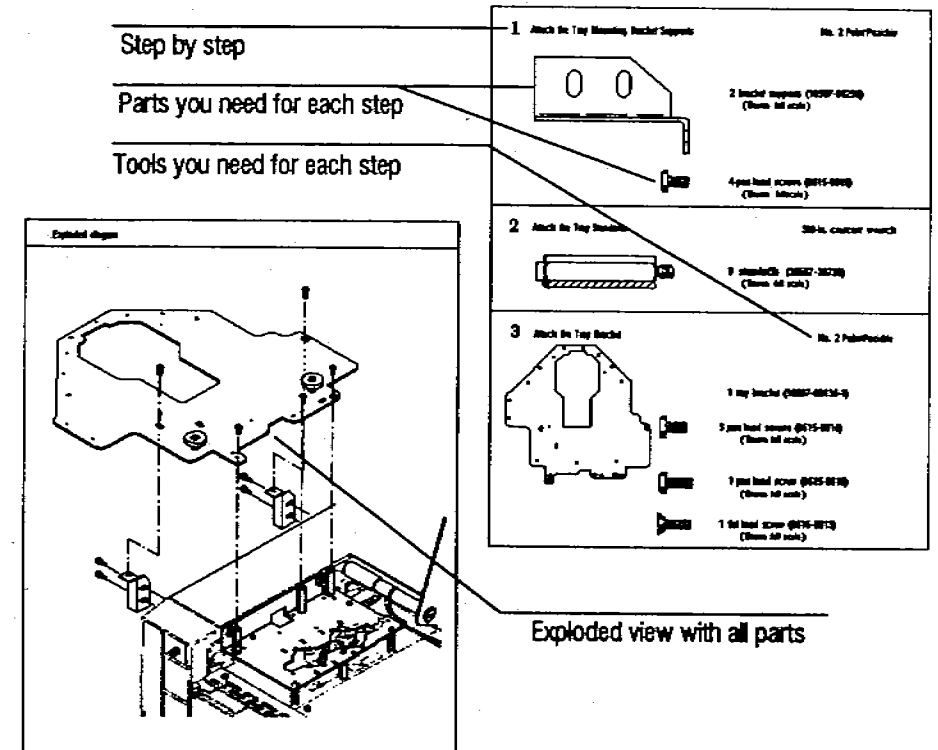


Figure 1. Attaching the bracket supports.

# Installing the Tray Bracket

Pull out the yellow worksheet from the center of this guide. Organize the hardware and tools for each step. Full-scale drawings of the screws help identify which ones you need for each step. If any of the hardware is missing, contact your HP representative.



## Before You Start

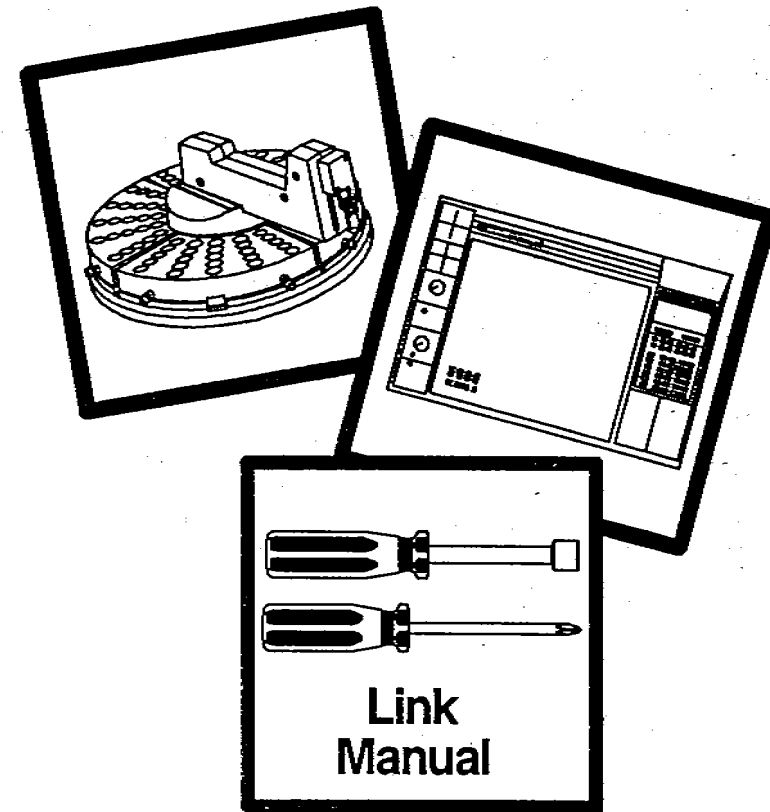
---

Before you install the tray bracket, you must do the following:

- Install the split top cover for the HP 5890 SERIES II Gas Chromatograph (Kit No. 07673-61065)(only if installing onto an HP 5890A Gas Chromatograph).
- Install the mounting bracket for the HP 18593B Injector Module (Kit No. 18957-60655).
- Remove any injectors from the injector mounting bracket.
- Install the left side panel (Part No. 05890-61480) for the HP 5890 SERIES II Gas Chromatograph (only if not already installed). You can also install the bracket on the support rails.

After you have completed the installation, place this link manual in the binder of your operating manual for the HP 7673 Automatic Sampler (Part No. 07673-60995) after the tab for appendix C "Link Manuals."

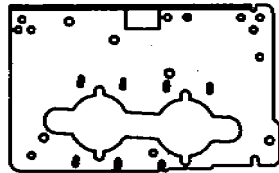
# HEWLETT-PACKARD



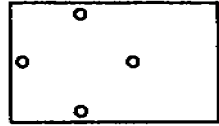
## HP 7673 Automatic Sampler Installing the Tray Bracket on 5890 GCs



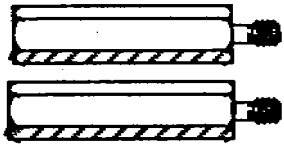
**3** Attach the Injector Bracket Supports



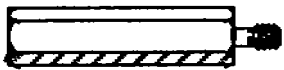
1 injector bracket (18957-00175)



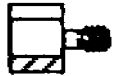
1 sheet metal (18597-00245)



4 standoffs (18597-20520)  
(Drawn full scale)



2 brass-colored standoffs (18597-20755)  
(Drawn full scale)



4 standoffs (18597-20745)  
(Drawn full scale)

No. 2 point Pozidriv  
3/8-in. crescent wrench  
1/4-in. nut driver

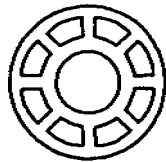
**4** Place the Bracket



4 pan head screws (0515-0915)  
(Drawn full scale)

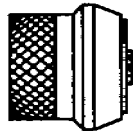
No. 2 point Pozidriv  
inlet wrench

**5** Align the Bracket



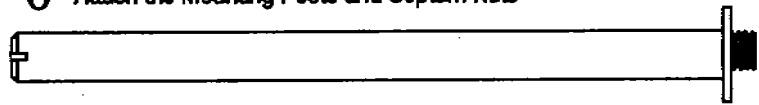
2 alignment tools (18597-40030)

No. 2 point Pozidriv



1 septum nut (19243-60500)  
(Drawn full scale)

**6** Attach the Mounting Posts and Septum Nuts



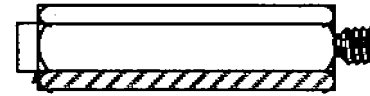
2 injector mounting posts (07673-61035)  
(Drawn full scale)

flathead screwdriver



1 dummy septum nut (18597-20580)  
(Drawn full scale)

**7** Attach the Tray Standoffs



3 standoffs (18597-20710)  
(Drawn full scale)

3/8-in. crescent wrench

**8** Attach the Tray Bracket Support



2 pan head screws (0515-0915)  
(Drawn full scale)

No. 2 point Pozidriv  
3/8-in. crescent wrench

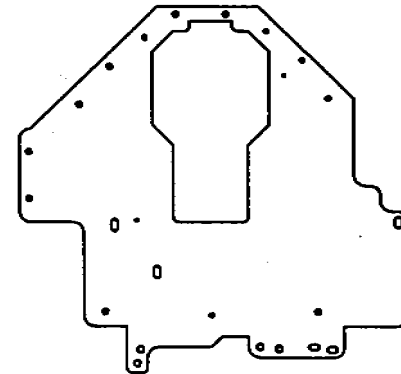


2 standoffs (18597-20745)  
(Drawn full scale)



1 tray bracket support (18597-00195)

**9** Attach the Tray Bracket



1 tray bracket (18597-60515)

No. 2 point Pozidriv



3 pan head screws (0515-0915)  
(Drawn full scale)

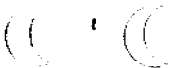


1 pan head screw (0515-0910)  
(Drawn full scale)



1 flat head screw (0515-0913)  
(Drawn full scale)



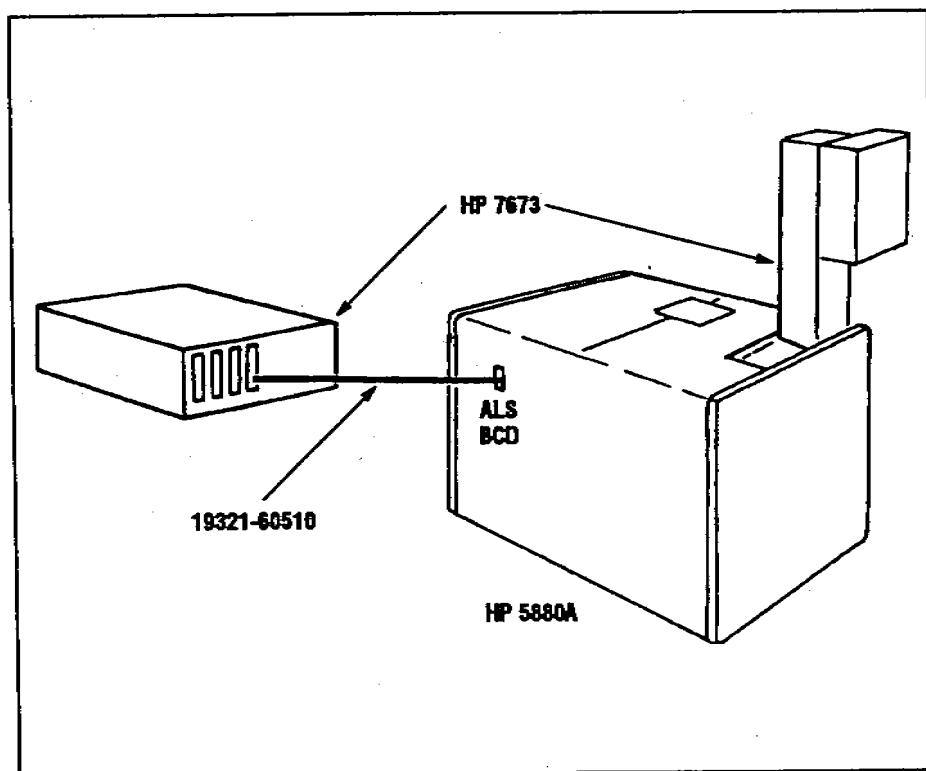


This worksheet is for installing the mounting bracket for the HP 18593B Injector Module and the HP 18596B Tray Module to an HP 5880A Gas Chromatograph.

## Connecting the Cables

Referring to the figure below, connect the HP 5880A control cable to the rear of the HP 5880A and the rear of the controller. This control cable is the only controlling cable needed, whether one or two injectors are installed.

The type of data-handling device and communications configuration you use may require additional cables. Refer to manuals for that device.



## Operation

This section contains operating information for the automatic sampler, including:

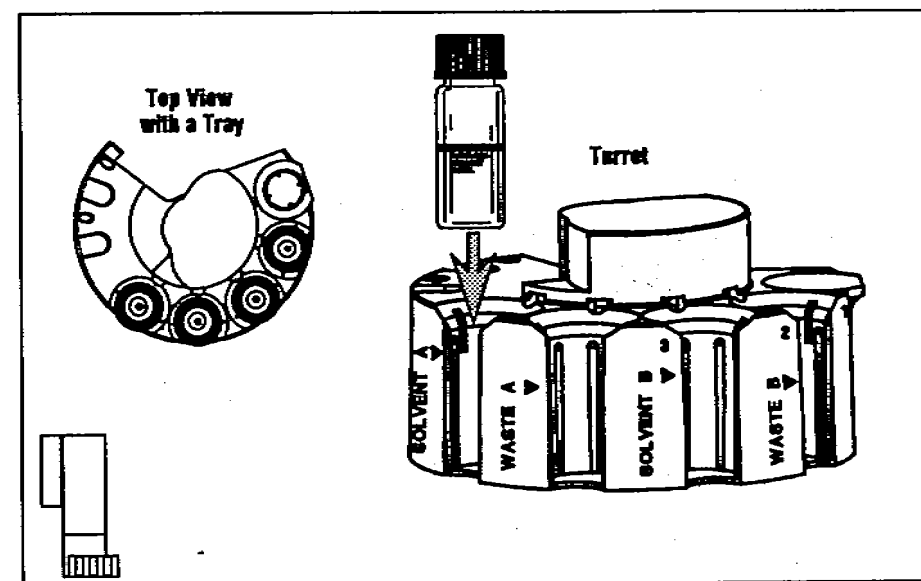
- Filling and placing the bottles.
- Setting the run parameter.

Several examples illustrate setting the run parameters. Refer to the HP 5880A Instrument Manual for operating instructions for the GC itself. Refer to the HP 7673 Automatic Sampler Operating Manual for detailed examples and information on preparing the sampler.

### Filling and Placing the Bottles

Always place two 4-ml waste bottles into waste positions A and B on the turret. Place one or two 4-ml solvent bottles into the solvent positions according to the run parameters.

The following illustration shows bottles placed in both waste and both solvent positions.



When using the HP 5880A, do not use sample inserts in the turret.

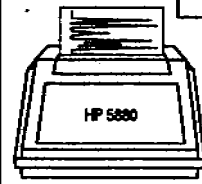
When the tray is installed, all sample vials are loaded into the tray, and the sample position in the injector turret is left empty. Without a tray you can only run one sample at a time by placing it in the turret's sample position.

## Setting the Run Parameters

Injector and sequence parameters are maintained in an "auto sequence table" within the HP 5880A. There is a separate table for each injector. The HP 5880A executes instructions provided in the auto sequence table and ignores front panel switches on the injector itself.

A complete auto sequence table requires ten parameters. A default value is used if no value is entered for a given parameter. The following illustration lists these parameters and their default values for the front injector.

List the parameters stored in the auto sequence table for the front injector from terminal #1 by pressing

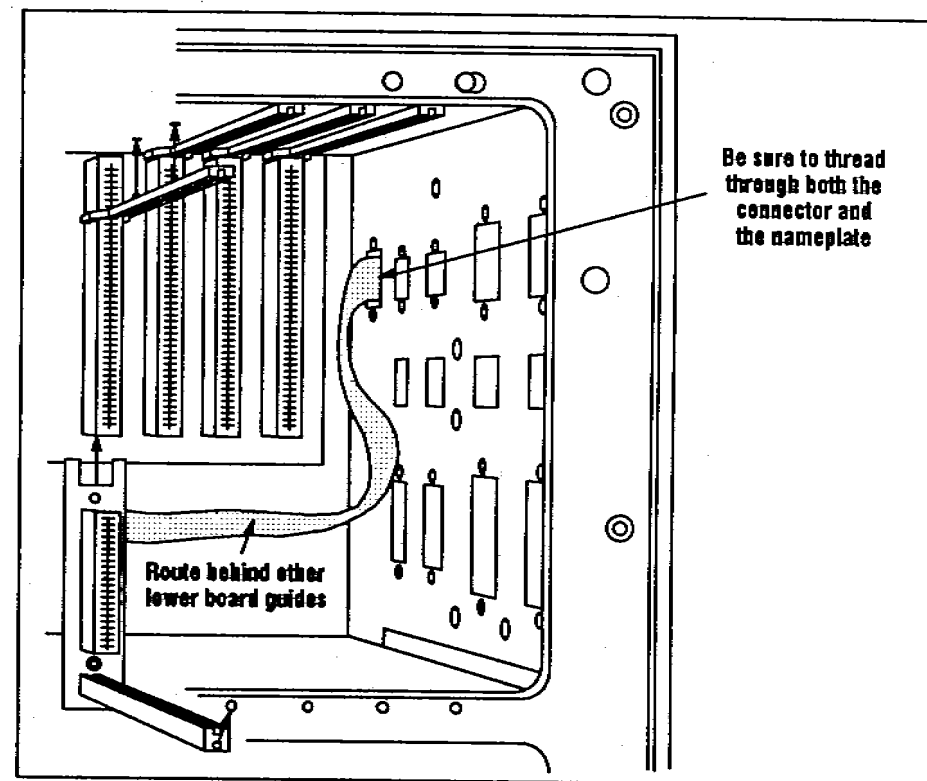


```
LIST AUTO SEQ
INJECTOR 1:
0. MODE (0=NORMAL, 1=ON COLUMN) = 0
1. PRE-INJECTION SAMPLE WASHES = 2
2. VISCOSITY = 0
3. SAMPLE PUMPS = 6
4. SAMPLE VOLUME = 1
5. POST-INJECTION SOLVENT A WASHES = 2
6. POST-INJECTION SOLVENT B WASHES = 2
7. INJECTIONS PER BOTTLE = 1
8. FIRST BOTTLE = 1
9. LAST BOTTLE = 1
```

- d. Directly above the selected slot, install the plastic board guide (notched end away from you) in the roof of the card cage.
- e. Install the lower board guide, J2 connector, and ribbon cable assembly.

Route the J2 connector and cable behind the other J2 connectors. Thread the connector through the hole in the back panel labeled ALS/BCD. Attach it with the small brass nuts and washers.

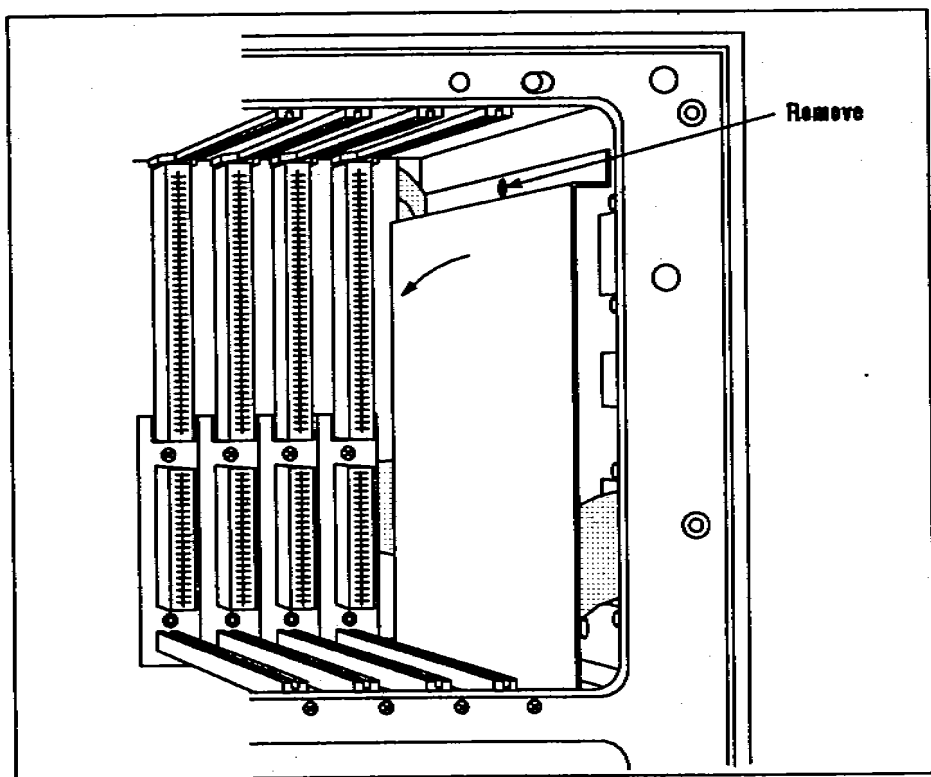
Attach the lower board guide to the card cage with the pan-head screws.



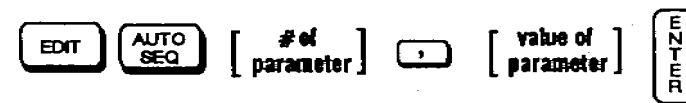
- f. Reinstall the cable shielding plate.
- g. Install the sampler board (part number 19321-60010).
- h. Reinstall the boards you removed in step b.
- i. Attach the side panel.
- j. Replace the blank key caps from the terminal keyboard with the AUTO SEQ keycaps in this kit.

## 2. Install the Sampler Board

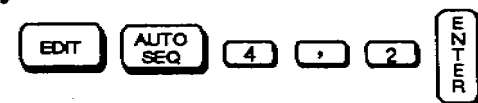
- Select a slot in the card cage for the sampler board. You can use slots 9, 10, 11, or 12. If an HP7671/72A board is installed, it must be removed.
- Remove the boards between the selected slot and the back of the GC. As each board is removed, record its location so that it can be placed in the same location when reinstalled.
- Remove the cable shielding plate.



Change a parameter in the auto sequence table by pressing



For example, to set the sample volume parameter for the front injector to 2, press these keys on terminal #1



You can change a parameter in the auto sequence table for either injector from the same terminal. Indicate the number of the injector, the number of the parameter, and the value of the parameter by pressing



Injector #1 is the front injector and injector #2 the rear injector.

If you do not enter an injector number, the edit affects the auto sequence table associated with the terminal you are using. Terminal #1 controls the front injector (#1) and terminal #2 controls the rear injector (#2).

The [inj #] may be 3; "3" indicates that you want simultaneous injections (i.e., front and rear injectors inject at the same time).

For more information on simultaneous injection see "SYNC Mode" on page 28.

Any of the ten parameters can be entered or changed manually or automatically using keystroke or BASIC programs. If an incorrect entry is made for any parameter, the HP 5880A will refuse the entry and indicate the cause of the error. The first and last bottle parameters may be BASIC variables. All others must be simple numbers.

## Description of Parameters

**0. INJECTION MODE:** Specifies whether the injector is in the normal or on-column injection mode. The on-column injection mode is used with cool on-column inlets. For the on-column injection mode, the injector changes the injection speed to 500 milliseconds and lowers the tip of the syringe needle an additional 19 mm (3/4 inch) to the column.

- Set to "0" for normal injection mode. Use this setting with packed and capillary inlets.
- Set to "1" for on-column injection mode. Use a 26/23-gauge syringe.

**1. PRE-INJECTION SAMPLE WASHES:** Specifies the number of times the syringe is rinsed with sample before the injection. The injector lowers the needle into the sample vial, fills the syringe to eight-tenths its full volume, and empties it into one of the waste bottles.

The allowable values for this parameter are 0 to 15.

An excessive number of sample washes can create a vacuum in the sample bottle and affect the reproducibility of the injection volume.

**2. VISCOSITY:** Specifies the number of seconds the plunger pauses at the top of the pump stroke and injection stroke. For viscous samples, the pause allows the sample to flow into the vacuum created in the syringe.

The allowable values for this parameter are 0 to 7.

**3. SAMPLE PUMPS:** Specifies the number of times the syringe plunger is moved up and down while the needle is in the sample to expel air bubbles and improve reproducibility.

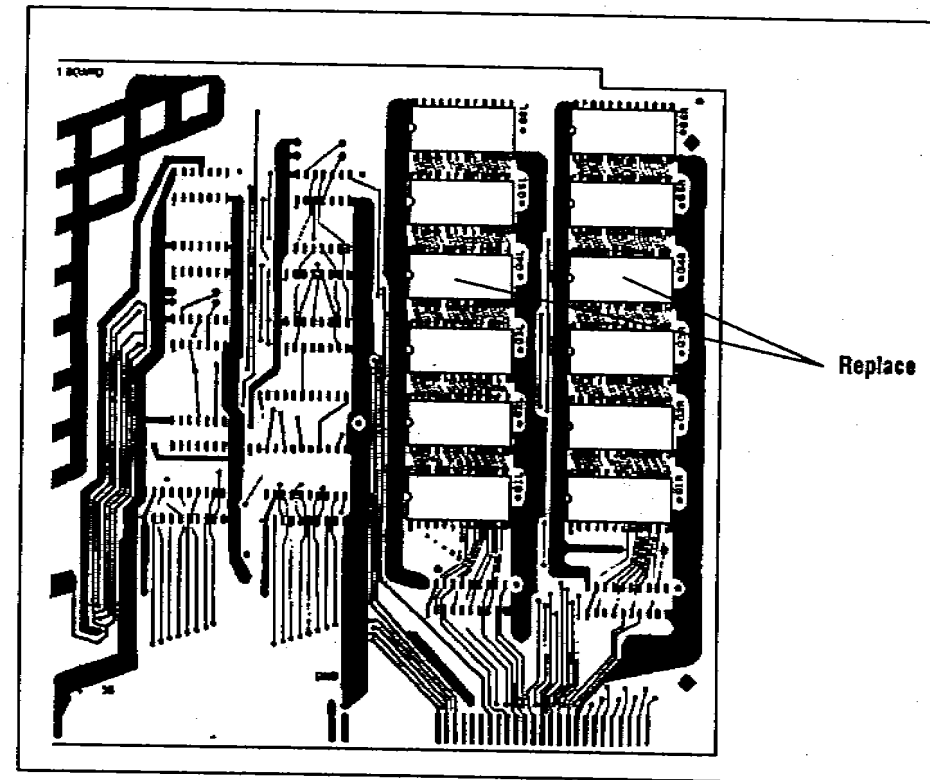
The allowable values for this parameter are 0 to 15.

## 1. Upgrade the ROM Board

- Remove the right side panel of the GC.
- Remove the ROM board (part number 19300-60155) from slot 2 of the HP 5880A card cage.
- Replace the group 4 EPROMs (labeled G4L and G4R) with the EPROMs in this kit according to the following table and illustration. The table shows which EPROMs are in each accessory and whether they go into the left or right position.

<u>Accessory Number</u>	<u>Left (G4L)</u>	<u>Right (G4R)</u>
HP 19321A	19300-80070	19321-80080
HP 19321B	19300-80090	19321-80100
HP 19321C	19300-80110	19321-80120

- Insert the ROM board into slot 2.



## Installing the Electrical Components

This section explains how to upgrade the EPROMs on the ROM board and how to install the sampler board to the GC.

### WARNING

TURN THE POWER SWITCH ON THE GC TO "OFF" AND DISCONNECT THE POWER CORD BEFORE INSTALLING THE AUTOMATIC SAMPLER BOARD IN THE GC.

### CAUTION

Turning off the power immediately erases data stored in the instrument's memory. To save this data, list the set points and programmed events. Reenter the data when you have completed the installation.

This procedure requires protection against electrostatic discharge. Use a static control wrist strap (part number 9300-0969 for large wrist strap or part number 9300-0970 for small) connected to a ground. If you do not use static protection, you may damage the electronics of the board or controller.

**4. SAMPLE VOLUME:** Specifies the injection volume. Each volume unit corresponds to one-tenth the syringe's capacity. For example, each unit for a 5- $\mu$ l syringe is 0.5  $\mu$ l.

The allowable values for this parameter are 1 to 5.

### CAUTION

Do not set the volume parameter for splitless inlets to volumes more than 2  $\mu$ l. Larger volumes cause sample to be lost through the purge vent and may contaminate carrier inlet lines.

**5. POST-INJECTION SOLVENT "A" WASHES:** Specifies the number of times the syringe is rinsed with solvent from the solvent A bottle. The injector lowers the needle into the solvent A bottle, fills the syringe to eight-tenths its full volume, and empties it into one of the waste bottles.

The allowable values for this parameter are 0 to 15.

**6. POST-INJECTION SOLVENT "B" WASHES:** Specifies the number of times the syringe is rinsed with solvent from the solvent B bottle. The injector lowers the needle into the solvent B bottle, fills the syringe to eight-tenths its full volume, and empties it into one of the waste bottles.

The allowable values for this parameter are 0 to 15.

**7. INJECTIONS PER BOTTLE:** Specifies the number of times the run is repeated for each sample vial. For example, if the value is two, each vial is analyzed twice.

The allowable values for this parameter are 0 to 5.

### CAUTION

An excessive number of injections per vial can create a vacuum in the vial. This may affect the reproducibility of the injection volume.

**8. FIRST BOTTLE:** Specifies the tray or injector turret position of the first sample vial. Each position on the tray and turret is numbered. Tray values range from 1 to 100. Injector turret value is 1. This parameter may be a BASIC variable.

Without a tray, the HP5880A GC can only run one sample at a time.

**9. LAST BOTTLE:** Specifies the tray or injector turret position of the last sample vial. Tray values range from 1 to 100. Injector turret value is 1. This parameter may be a BASIC variable.

An empty bottle position between the FIRST BOTTLE and the LAST BOTTLE parameters will be interpreted as an error, and the sequence will abort.








### Starting a Run or Sequence

With a tray, press   

Without a tray, press    

GC readiness is required before injection. Conditions required include oven readiness and the absence of conflicting operations, such as already running an analysis, auto sequences, or programs.

You can override the parameters in the auto sequence table for FIRST BOTTLE and LAST BOTTLE. The following example starts a sequence for sample vials in tray positions 6 through 26 using the injector associated with the terminal you use.

## Checking Your Work

Double-check the following:

- Be sure the new septum nut(s) and dummy septum nut(s) are installed properly.
- Be sure the three screws that attach the tray bracket to the standoffs on the injector bracket go through the holes labeled B on the tray bracket.
- Be sure the flat head screw for attaching the tray bracket is in the correct position. See page 14.
- All screws and standoffs are tight.

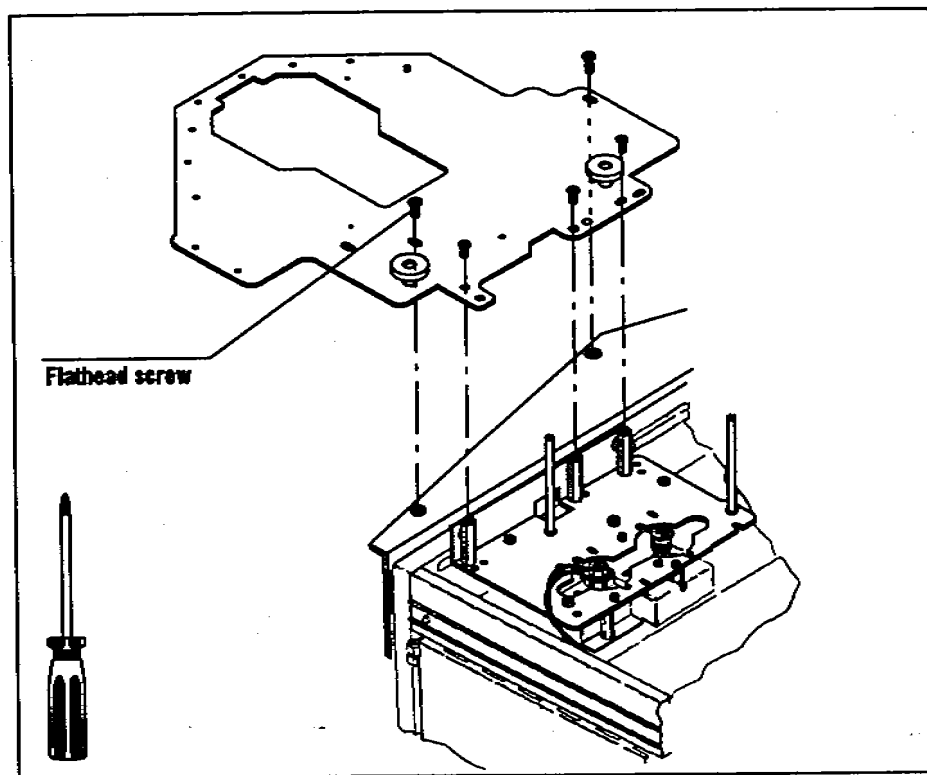
For detailed information on mounting and connecting the injector and tray, see chapter 1, "Setting Up" in your Operating Manual.

An example cable diagram for your GC is in the next section.

After you have completed the installation, place this Link Manual in the binder of your Operating Manual for the HP 7673 Automatic Sampler (part number 07673-60995) after the tab for appendix C "Link Manuals."

## 9. Attach the Tray Bracket

- a. Place the tray bracket on the mounting supports and the standoffs installed in steps 1 and 2. The top of the standoffs should fit into the holes labeled with the letter B on the tray bracket.
- b. If the top of the standoffs do not line up with the holes labeled with the letter B, check the location of the standoffs against the figure on page 12.
- c. Using a No. 2 point Pozidriv, screw in the three pan-head screws through the holes labeled B and into the standoffs.
- d. Line up the hole on the rear of the bracket (labeled 5880) with the threaded hole of the tray bracket support. Screw one pan-head screw into the mounting support with a no. 2 point Pozidriv.
- e. Line up the hole on the front of the bracket (labeled 5880) with the threaded hole of the tray bracket support. Screw one flathead screw into the mounting support with a no. 2 point Pozidriv.



## Stopping a Sequence

To stop a run, press **STOP** **AUTO SEQ** **ENTER**.

This command can be used at any time. The run in progress is completed, and no further injections are made. The command must be entered on the same terminal or channel that you started the sequence.

## Single Sample

With a tray installed, you can interrupt a sequence and run a single sample from the turret of an injector by the following procedure.

1. Note the sample vial number currently running and interrupt the sequence by pressing

**STOP** **AUTO SEQ** **ENTER**.

2. Change any run parameters using the EDIT SEQ keys explained on page x.
3. Place the sample in the sample position of the turret.
4. Start the single run by pressing

**START** **AUTO SEQ** **-** **ENTER**.

5. Reset the run parameters for the sequence you interrupted, including the FIRST BOTTLE, and restart the sequence.



## SYNC Mode

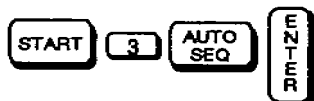
The synchronous mode (SYNC) is used to synchronize injectors and terminals. When the synchronous mode is turned on, both terminals start at the same time. If there are two injectors, the injectors inject at the same time.

For these types of applications, the SYNC feature must be turned "ON" by pressing

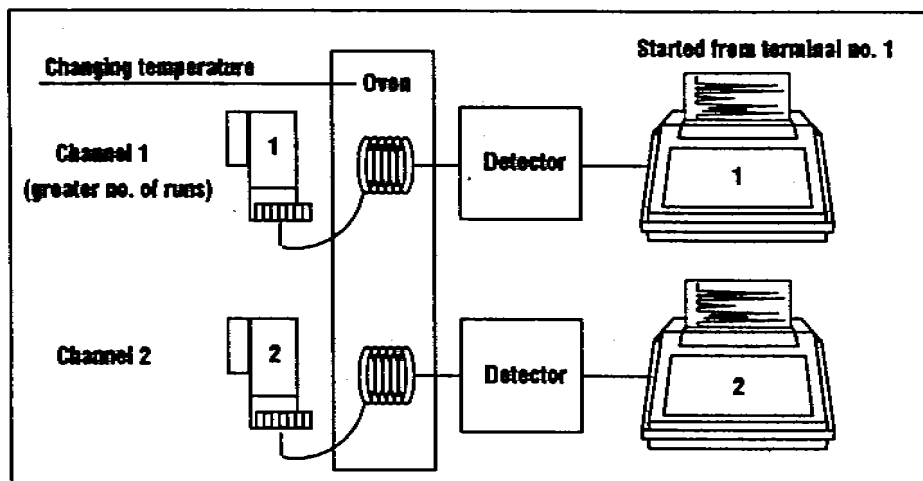


When using an oven temperature program, enter the parameters for each injector from its own terminal. Also set the SYNC feature to "ON" on both terminals.

Start the synchronous sequences from the terminal associated with the greater number of runs by pressing



The following illustration shows using two injectors and an oven temperature program. The injectors and terminals must be synchronized so that they start at the same time.

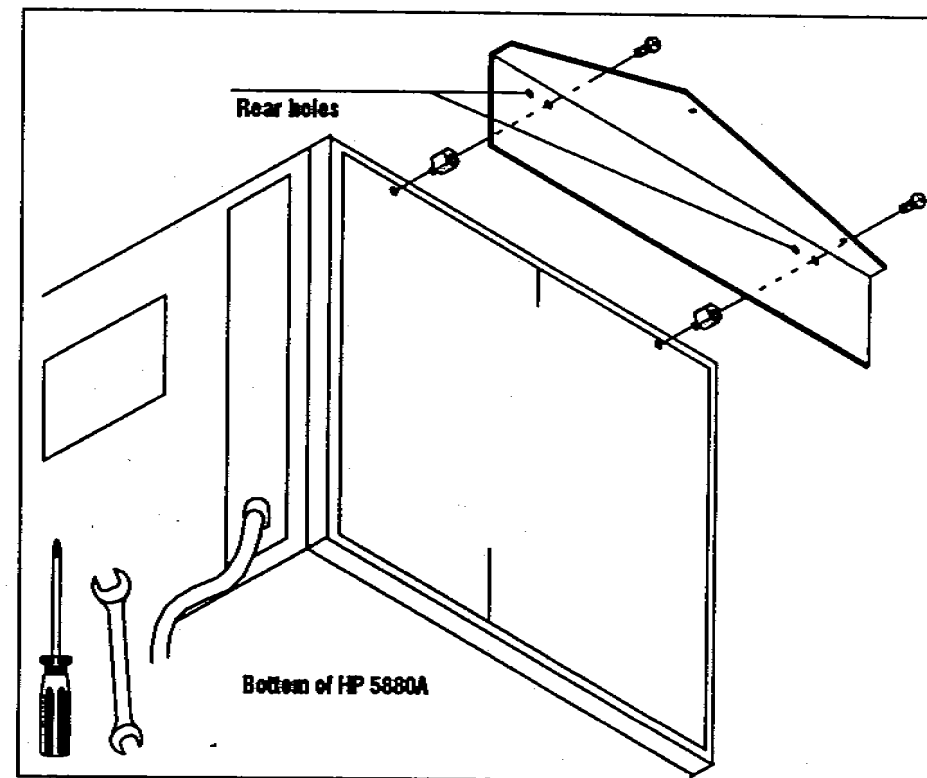


## 8. Attach the Tray Bracket Support

- Using a no. 2 point Pozidriv, remove the two screws that hold on the panel on the left-hand side of the GC. Remove the side panel.
- Position the new side panel (part number 19300-01260) and attach it with two short standoffs (part number 18597-20745). Tighten them with a 3/8-in. crescent wrench.
- Using a no. 2 point Pozidriv, attach the tray bracket support with two pan-head screws.

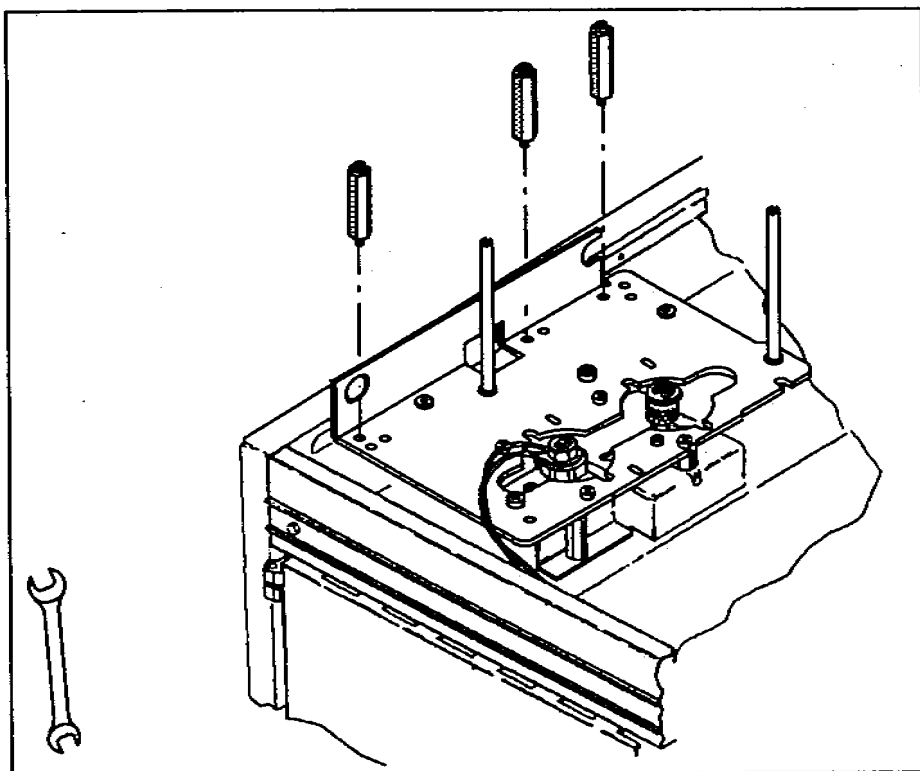
If the injector bracket is installed over the **A and C inlets**, use the rear set of holes.

If the injector bracket is installed over the **B and D inlets**, use the front set of holes.



## 7. Attach the Tray Standoffs

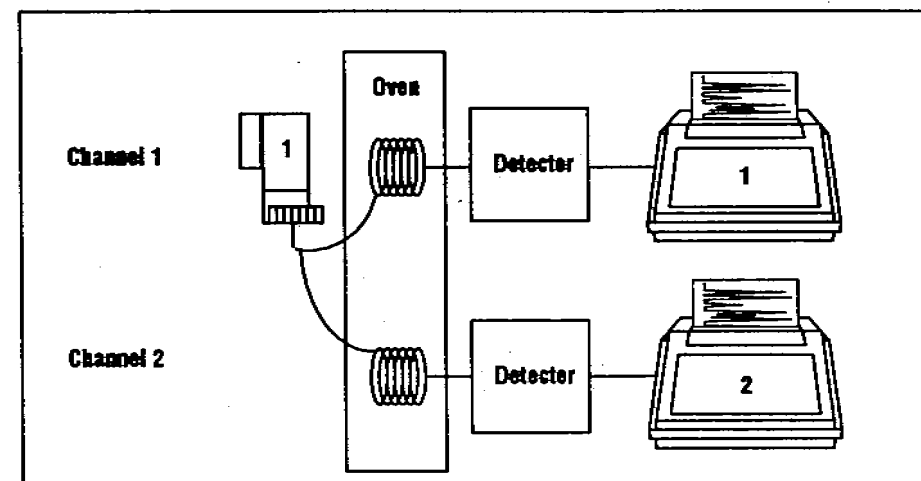
- Screw the three standoffs (part number 18597-20710) into the injector mounting bracket. Use the holes identified in the illustration. If you do not use the correct holes, the tray will not be able to deliver sample vials to the injector.
- Tighten the standoffs with a 3/8-in. crescent wrench.



### CAUTION

If you start the sequence from the terminal associated with the smaller number of runs, the excess runs will not be performed.

The following illustration shows splitting a sample and using two columns and two detectors to analyze it. The signal from each detector goes to a different terminal. The terminals must be synchronized so that they start at the same time.



### CAUTION

In the simultaneous injection mode, an error will result if the two auto sequences call for the same bottle for the same injection. In this case the error message

**\*\*\* ERROR \*\*\* AUTO SEQ BOTTLE CONFLICT**  
will be printed, and the auto sequence aborted.

For more information regarding the use of SYNC, consult the "HP 5880A Instrument Manual."

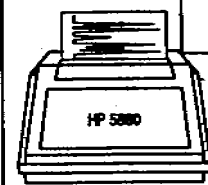
### Example 1: Single Injector with a Tray

This example illustrates how to do a sequence of runs using the tray and the front injector.

The following terminal display shows editing five parameters of the auto sequence table. These parameters tell the GC that:

- The injector is mounted over a packed or capillary inlet.
- The injection volume is 1/10th of the syringe volume.
- Each sample vial is analyzed three times.
- The six sample vials are in tray positions 20 through 25.

```
EDIT AUTO SEQ 0, 0
EDIT AUTO SEQ 4, 1
EDIT AUTO SEQ 7, 3
EDIT AUTO SEQ 8, 20
EDIT AUTO SEQ 9, 25
LIST AUTO SEQ
INJECTOR 1:
0. MODE (0-NORMAL, 1-ON COLUMN) = 0
1. PRE-INJECTION SAMPLE WASHES = 2
2. VISCOSITY = 0
3. SAMPLE PUMPS = 4
4. SAMPLE VOLUME = 1
5. POST-INJECTION SOLVENT A WASHES = 2
6. POST-INJECTION SOLVENT B WASHES = 2
7. INJECTIONS PER BOTTLE = 3
8. FIRST BOTTLE = 20
9. LAST BOTTLE = 25
```

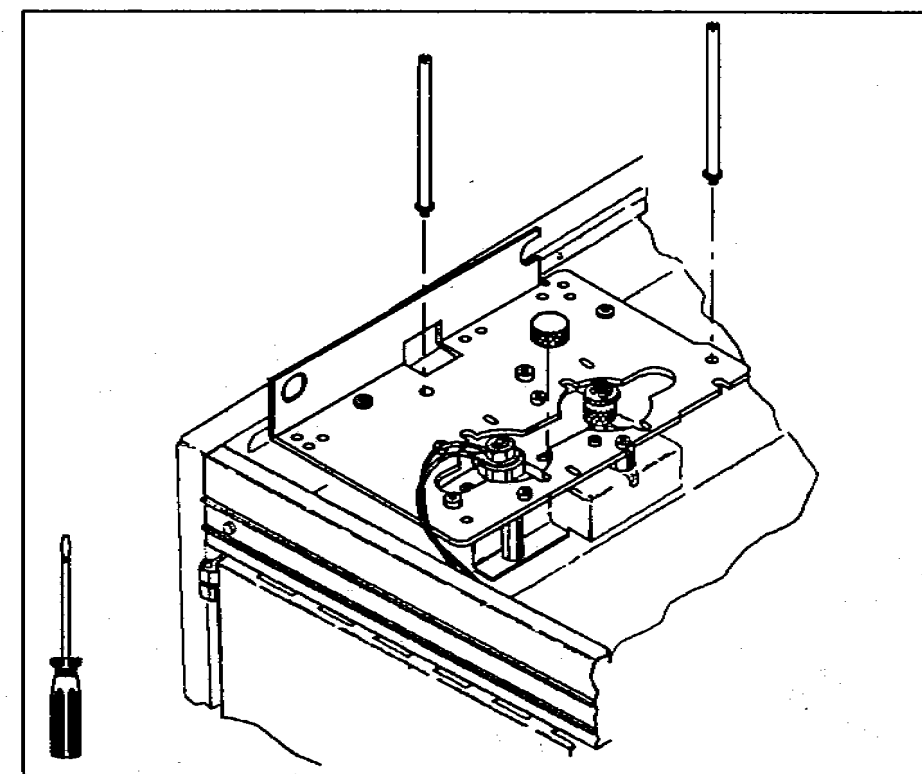


### 6. Attach the Dummy Septum Nuts and the Mounting Posts

- a. Screw on dummy septum nuts (part number 18597-20580) over the inlets that are not being used with the automatic sampler.
- b. Screw each mounting post clockwise into the threaded holes of the bracket. Tighten the posts with a flathead screwdriver.

If you are installing the tray bracket, continue on the next page.

If you are not installing the tray bracket, turn to page 15.



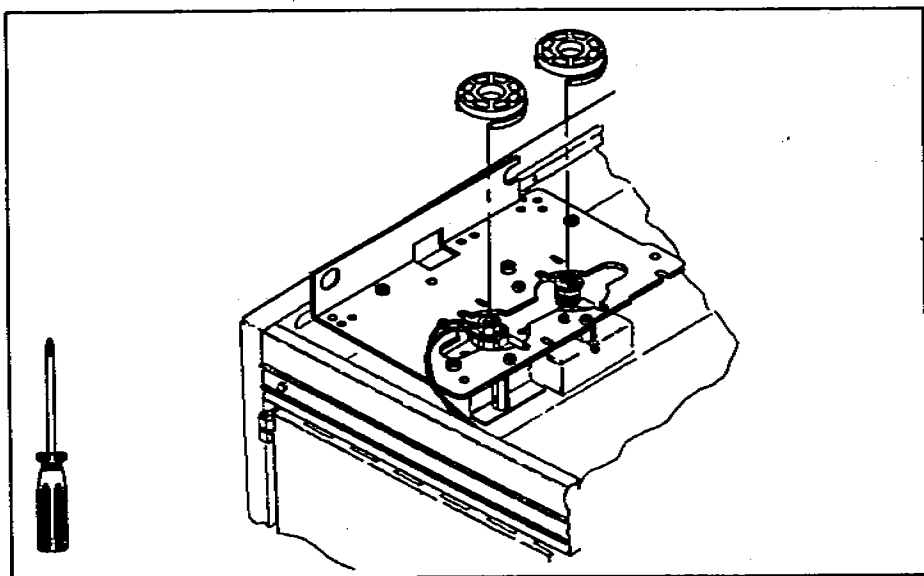
## 5. Align the Bracket

- a. Attach new septum nuts (part number 19243-60500) on the **packed** and **on-column inlets** that are being used with the automatic sampler. Do not place septum nuts on the inlets that are not being used.

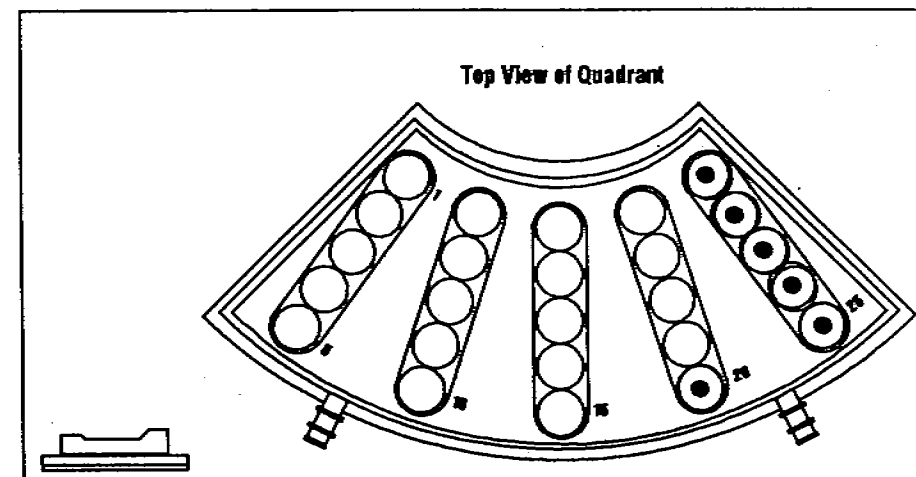
If the GC has a **capillary inlet**, route the gas lines on the inlet nut over the mounting bracket. Push the inlet nut down and turn it clockwise. Tighten it with the inlet wrench.

The gas lines must not interfere with the feet of the injector. Small white circles on the bracket show where the injector feet touch the bracket. If necessary, gently bend the gas lines so they do not cross the white circles.

- b. Place the plastic alignment tool(s), honeycomb side up, over the inlet(s) of your GC. Move the bracket until both alignment tools fit flush on the bracket. If you cannot make them fit flush by moving the bracket, you may have to adjust the position of the inlets.
- c. Tighten the four screws that hold down the bracket with a no. 2 point Pozidriv. Remove and save the alignment tools for future adjustments.



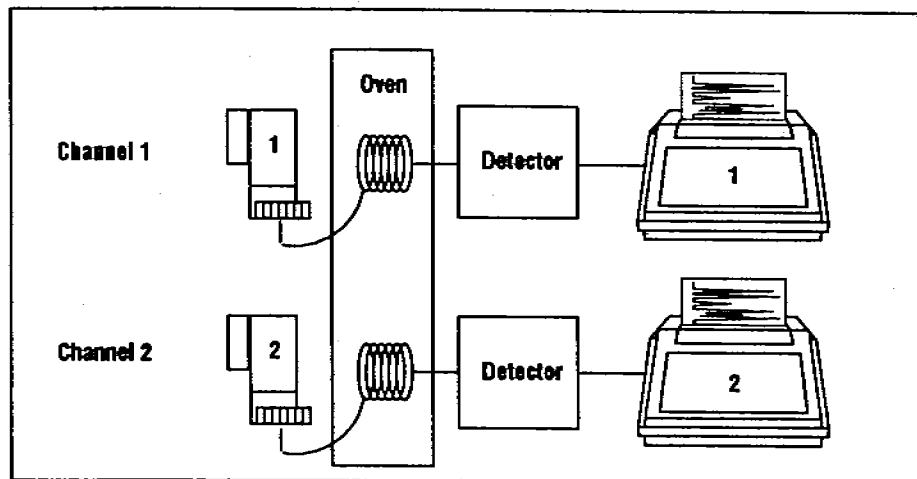
Load the six sample bottles into the tray positions 20 through 25. The instrument will make 18 runs (three runs for each of the six vials).



Start the sequence by pressing **START** **AUTO SEQ** **ENTER**.

## Example 2: Two Injectors with a Tray

In this example the instrument is used as two isothermal GCs (both channels of a dual channel instrument are used to analyze samples asynchronously; both channels have different start times and durations). This mode of operation is only practical if the oven is run isothermally. The following illustration represents the asynchronous configuration.



This requires the SYNC mode to be turned OFF on both terminals. Press



The sequence for the front injector requires the same run parameters as in the first example, except each vial is run only once (one injection per vial). From the terminal controlling the front injector, edit INJECTIONS PER BOTTLE to "1."

Enter the necessary changes to the rear injector on the terminal for channel 2. The sample vials for the rear injector are in tray positions 5 through 15.

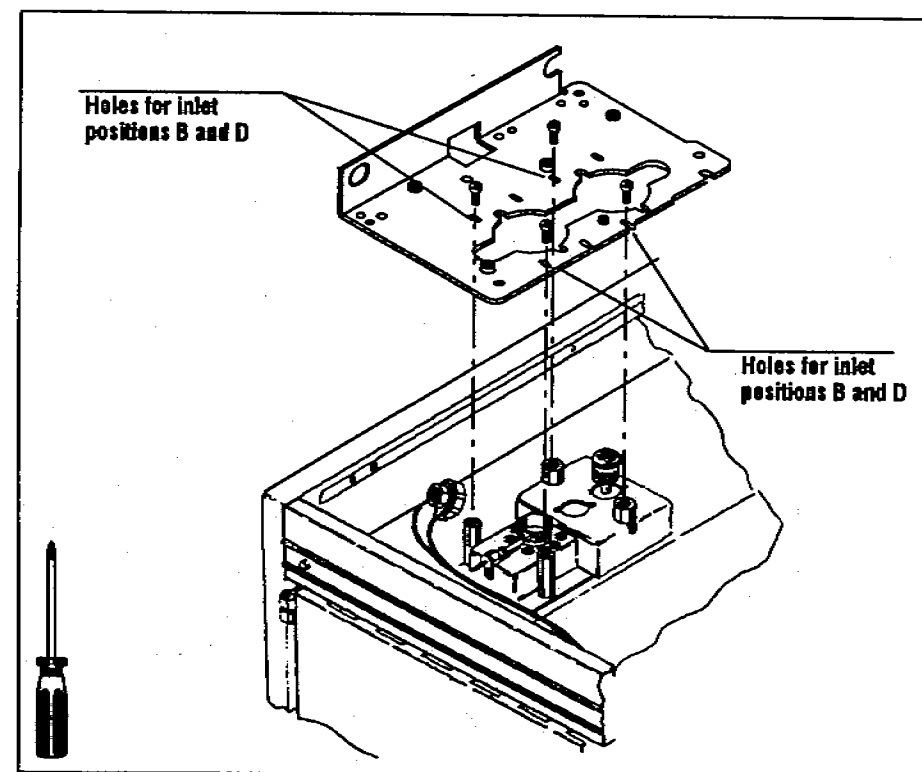
## 4. Place the Bracket

- a. Place the bracket on top of the standoffs.

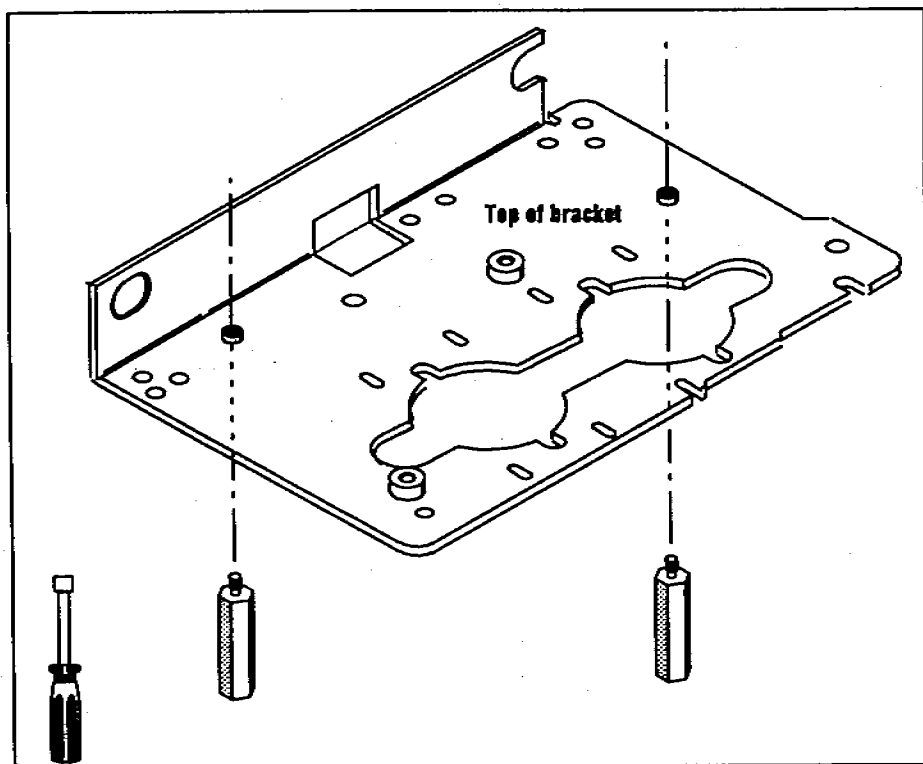
The injector mounting bracket enables you to mount two injectors over nonadjacent inlets—either A and C positions or B and D positions. Decide which positions you need.

- b. Line up the top of the standoffs with the slots on the bracket. Screw the pan-head screws into the threaded holes of the standoffs. Do not tighten the screws until step 5.

When installing the bracket over the A and C positions, use only three screws.



- c. Screw two brass-colored standoffs (part number 18597-20755) onto the bottom of the mounting bracket to act as support legs. The holes have silver-colored pems (small threaded washers) on the top of the bracket. Tighten the standoffs with a 1/4-in. nut driver.



The following illustration shows the editing commands and the auto sequence tables for both injectors.

EDIT AUTO SEQ 7, 1

LIST AUTO SEQ

INJECTOR 1:

0. MODE (0=NORMAL, 1=ON COLUMN) = 0
1. PRE-INJECTION SAMPLE WASHES = 2
2. VISCOSITY = 0
3. SAMPLE PUMPS = 4
4. SAMPLE VOLUME = 1
5. POST-INJECTION SOLVENT A WASHES = 2
6. POST-INJECTION SOLVENT B WASHES = 2
7. INJECTIONS PER BOTTLE = 1
8. FIRST BOTTLE = 20
9. LAST BOTTLE = 25



EDIT AUTO SEQ 7, 1

EDIT AUTO SEQ 8, 5

EDIT AUTO SEQ 9, 15

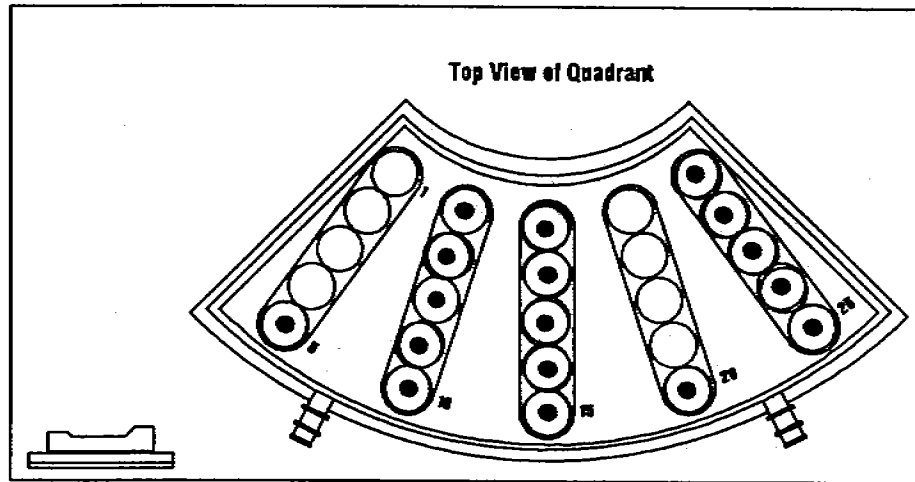
LIST AUTO SEQ

INJECTOR 2:

0. MODE (0=NORMAL, 1=ON COLUMN) = 0
1. PRE-INJECTION SAMPLE WASHES = 2
2. VISCOSITY = 0
3. SAMPLE PUMPS = 4
4. SAMPLE VOLUME = 1
5. POST-INJECTION SOLVENT A WASHES = 2
6. POST-INJECTION SOLVENT B WASHES = 2
7. INJECTIONS PER BOTTLE = 1
8. FIRST BOTTLE = 5
9. LAST BOTTLE = 15



Load the seventeen sample bottles into the tray positions 5 through 15 and 20 through 25. The instrument will make 17 runs (one run for each vial).



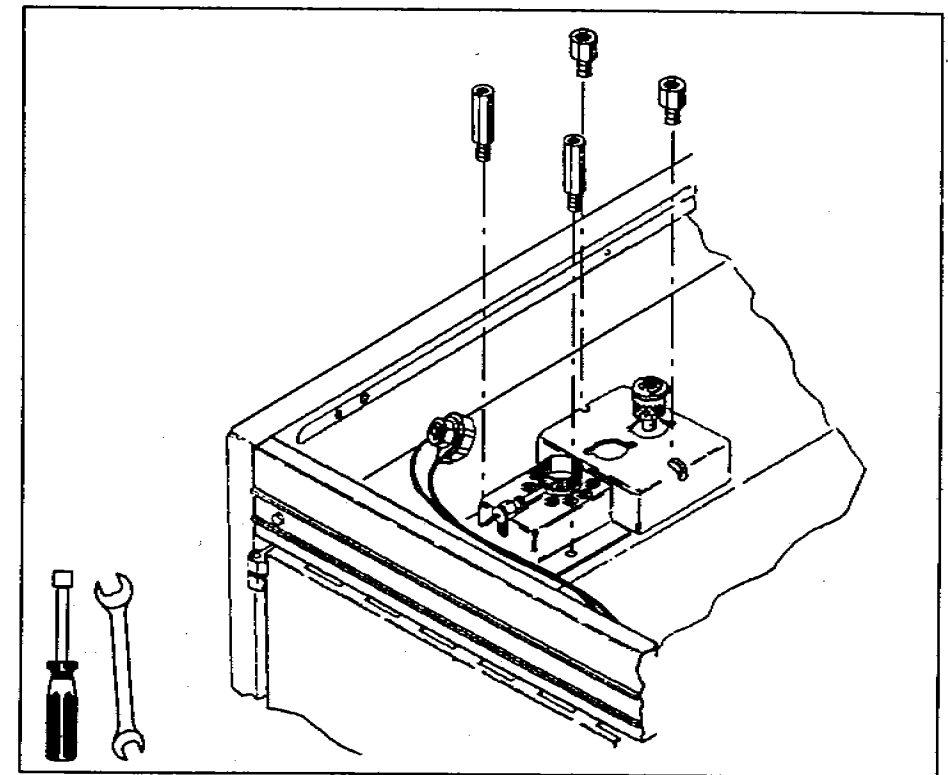
Start the sequence for the front injector from the terminal controlling the front injector by pressing



Start the sequence for the front injector from the terminal controlling the front injector by pressing the same keys.

b. Replace the screws with the appropriate size standoffs.

- For **capillary inlets**, use two steel standoffs (part number 18597-20520) to support the injector bracket. Tighten them with a 1/4-in. nut driver.
- For **packed inlets**, use two small standoffs (part number 18597-20745) to support the injector bracket. Tighten them with a 3/8-in. crescent wrench.
- When there is **no inlet** in a position, remove the small piece of sheet metal that covers the position and replace it with the piece of sheet metal (part number 18597-00245) and two steel standoffs (part number 18597-20520).

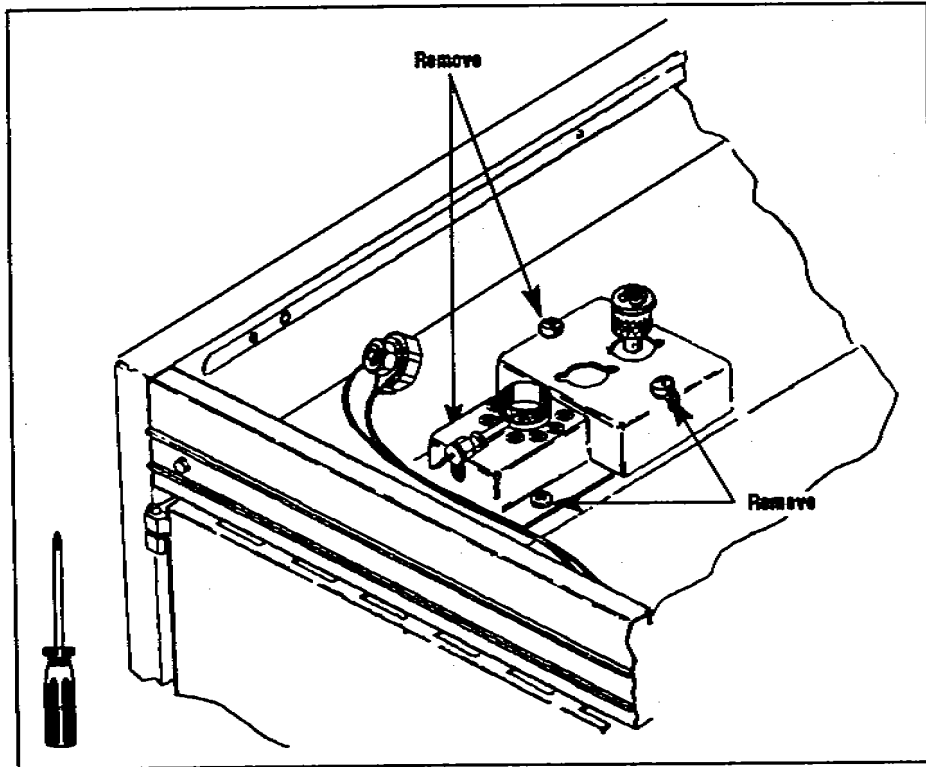


Save any standoffs you do not use for future adjustments or different configurations.

### 3. Attach the Injector Bracket Supports

The injector bracket is supported by standoffs (small hexagonal posts). Where you attach these standoffs depends on the type and position of the inlet. The illustrations in this section show a capillary inlet in the B position and a packed inlet in the D position.

- a. Remove the screws that hold down the inlets with a no. 2 point Pozidriv.



## Error Messages

Depending on circumstances, the HP 5880A may print an error message on its terminal to indicate a fault condition or certain occurrences in communications. The following is a list of these messages and a brief definition of their meaning:

\*\*\* ERROR \*\*\* CHANNEL 2 (or 1) NOT INSTALLED

- The START or STOP button on injector 2 (or 1) has been pushed, but no channel 2 (or 1) has been configured in the instrument (no integrator/plotter 2 or 1).

\*\*\* ERROR \*\*\*AUTO SEQ BOTTLE CONFLICT

- The instrument is running two sequences in simultaneous injection mode, and the two sequences have called for the same bottle.

\*\*\* ERROR \*\*\*TRAY NOT INSTALLED

- The START AUTO SEQ command cannot be used without the tray module installed. If no tray is installed, single samples may be run by using the [ START [inj#] AUTO SEQ - ] command.

\*\*\* ERROR \*\*\*INJECTOR 1 (or 2)NOT INSTALLED

- A START 1 (or 3) AUTO SEQ command has been attempted either with no injector on channel 1, or with the power controller turned off.

\*\*\* ERROR \*\*\* TRAY MISSING BOTTLE (#)

- The auto sequence calls for a bottle (#) in the tray, but there is none in the requested position.



\*\*\* ERROR \*\*\* INVALID BOTTLE IN INJECTOR 1

- The tray arm is attempting to deliver a bottle to an injector that currently contains a bottle.

\*\*\* ERROR \*\*\* TRAY FAILURE

- Turn to chapter 5, "Troubleshooting", in the operating manual to troubleshoot the problem.

\*\*\* ERROR \*\*\* INVALID BOTTLE IN TRAY POSITION (#)

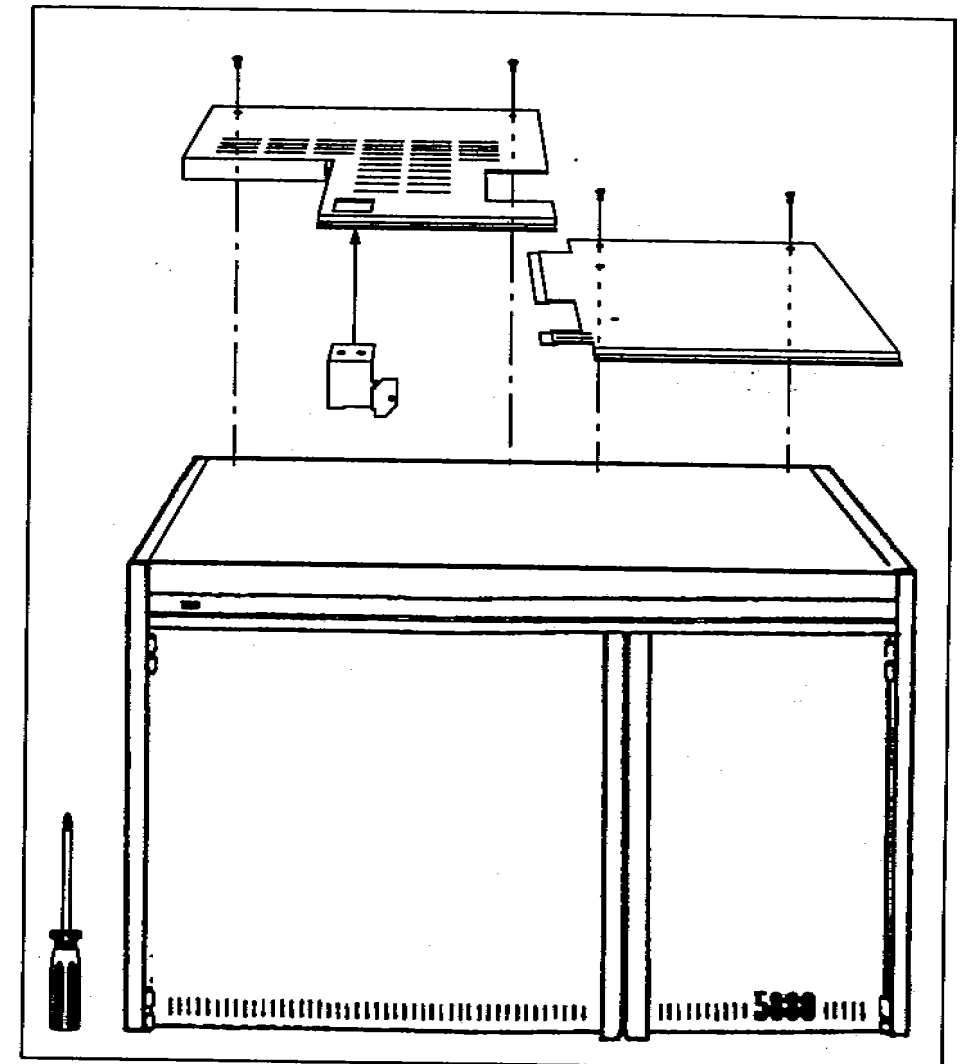
- The tray arm is attempting to move a bottle from the injector back to a tray position that currently contains a bottle.

\*\*\* ERROR \*\*\* INJECTOR 1 (or 2) FAILURE

- Turn to chapter 5, "Troubleshooting", in the operating manual to troubleshoot the problem.

## 2. Install the New Top Cover

- Install the right cover (part number 19324-00070) with two pan-head screws.
- If the GC has a capillary inlet light(s), remove the light and attach it to the new lamp holder (part number 19321-00080). Disconnect wires and route them through the tie wraps where necessary.
- Attach the lamp holder and the left cover (part number 19321-00010) with two pan-head screws.



**WARNING**

TURN THE POWER SWITCH ON THE GC TO "OFF" AND DISCONNECT THE POWER CORD BEFORE INSTALLING THE AUTOMATIC SAMPLER BOARD IN THE GC. ALLOW THE INLETS AND OVEN TO COOL BEFORE INSTALLING THE INJECTOR MOUNTING BRACKET. THE METAL SURFACES OF THE GC ARE VERY HOT AND COULD BURN YOUR SKIN.

**CAUTION**

Turning off the power immediately erases data stored in the instrument's memory. To save this data, list the set points and programmed events by pressing [LIST][ENTER]. Reenter the data when you have completed the installation.

**1. Remove the Existing Top Cover, Side Panel, and Septum Nuts.**

- a. Using a no. 2 point Pozidriv, remove the top cover and left side panel of the GC.
- b. Remove the septum nuts on the packed and on-column inlets.
- c. For capillary inlets, loosen the inlet nut with the inlet wrench. Turn the nut counterclockwise until it is off the threads and lift it out of the way.

**CAUTION**

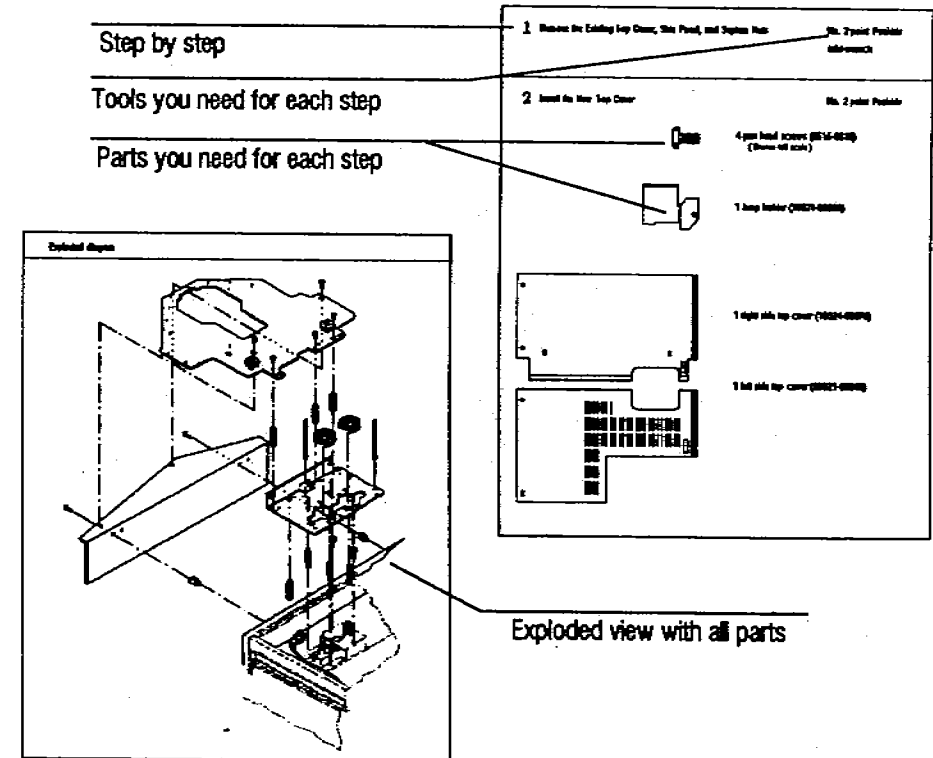
Turn off the gas flows before you remove the inlet nut to avoid damaging the packing in the inlet liner. Avoid contaminating the inlet while it is uncovered. The braze joints that hold the gas lines to the inlet are fragile.

# Installing the Brackets

Pull out the yellow worksheet from the center of this link manual. Use this worksheet to organize the hardware and tools for each step. Full-scale drawings of the screws help identify which ones you need for each step. If you do not use the worksheet for this complex task, you may not be able to complete the installation successfully.

The necessary hardware is packaged in several locations. The injector bracket is packaged with the controller module, the tray bracket is packaged with the tray module, and the top cover is packaged with the electronic materials.

If any of the hardware is missing, contact your HP representative.



## Before You Start

This "link" manual contains information specific to using the automatic sampler with an HP 5880A Gas Chromatograph (GC). Refer to the HP 7673 Automatic Sampler Operating Manual (part number 07673-60995) for general operating information, including: mounting an injector, selecting consumables, or calculating the maximum number of samples you can run.

This link manual contains the following information:

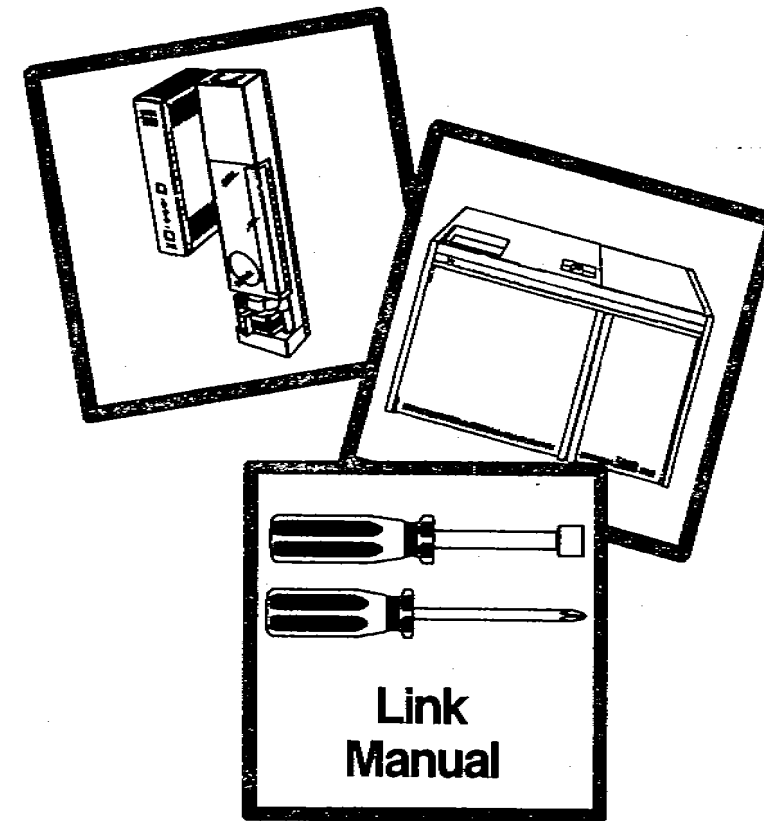
- Instructions for installing the mounting brackets for the HP 18593B Injector Module and HP18596B Tray Module on an HP 5880A GC. Turn to page 3.
- Instructions for installing the necessary electrical components (printed circuit board and EPROMs) on an HP 5880A GC. Turn to page 16.  
Before you begin check to see that you ordered the correct option. The following table shows what features each option supports and the associated part numbers.

Option number	19321A	19321B	19321C
Supported features	ALS, Loop, D/A, Valve Driver, EFC, NP, FPD, External Input (A/D), and SCC	ALS, Loop, D/A, Valve Driver, EFC, and DCI	ALS, Loop, D/A, Valve Driver, SCC, and DCI
Old EPROMs	1818-3119 1818-3120	1818-3121 1818-3122	19335-80010 19335-80015
New EPROMs	19300-80070 19300-80080	19300-80090 19300-80100	19300-80110 19300-80120

- Sample diagrams for connecting the cables for the automatic sampler to an HP 5880A GC. Turn to page 20.
- General operating instructions for using the automatic sampler with the HP 5880A GC. Turn to page 21.
- Common error messages. Turn to page 35.

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# HEWLETT-PACKARD



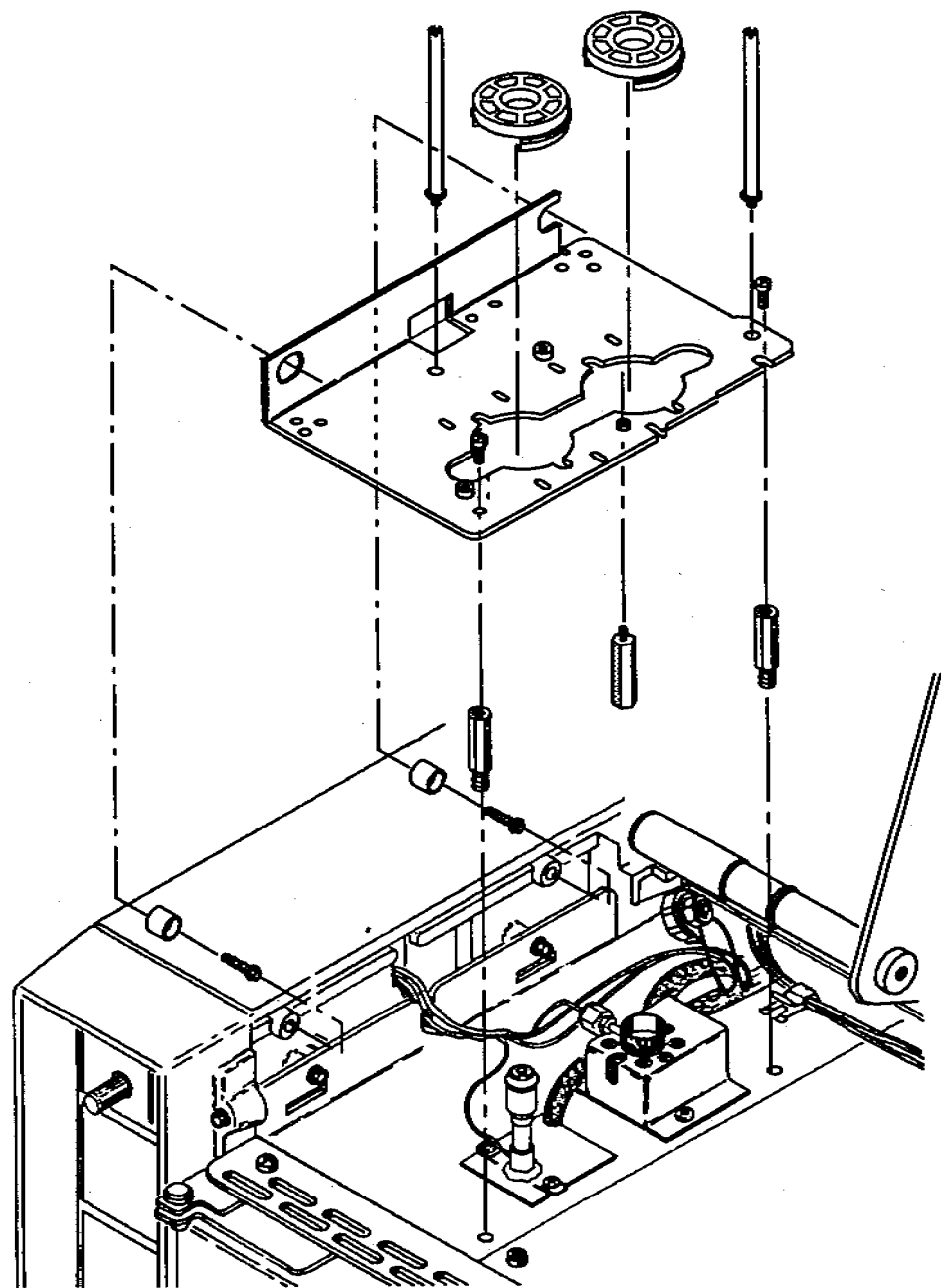
## HP 7673 Automatic Sampler Installing and Operating the Injector and Tray on HP 5880A GCs



Manual Part No.  
07673-90235

Printed In U.S.A.  
April 1990

Exploded diagram



**1** Attach the Bracket Supports

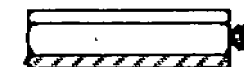
1/4-in. nut driver



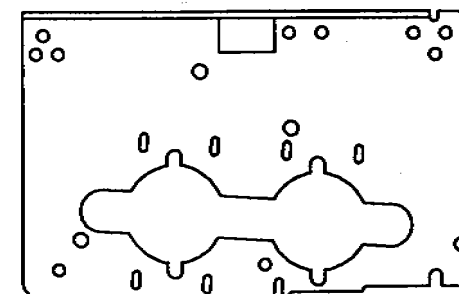
2 injector bracket bushings (18597-20735)  
( Drawn full scale )



2 self-tapping screws (0624-0546)  
( Drawn full scale )



3 standoffs (18597-20520)  
( Drawn full scale )



1 injector bracket (18957-00175)

**2** Detach the Inlet Nut

inlet wrench

**3** Place the Bracket



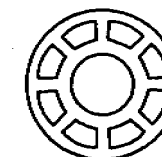
2 pan head screws (0515-0915)  
( Drawn full scale )

**4** Attach the Inlet Nut

inlet wrench

**5** Align the Bracket

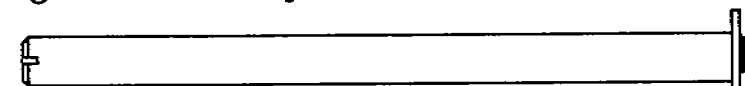
No. 2 Point Pozidriv



2 alignment tools (18597-40030)

**6** Attach the Mounting Posts

flathead screwdriver



2 injector mounting posts (07673-20865)  
( Drawn full scale )

This worksheet is for installing the mounting bracket for the HP 18953B Injector Module to an HP 5890A or HP 5890 SERIES II Gas Chromatograph.

### 3. Place the Bracket

- a. Hold the bracket with the bend on the left side and slide it onto the cylinders that you attached to the side wall in step 1. Allow the bracket to rest on top of the standoffs.

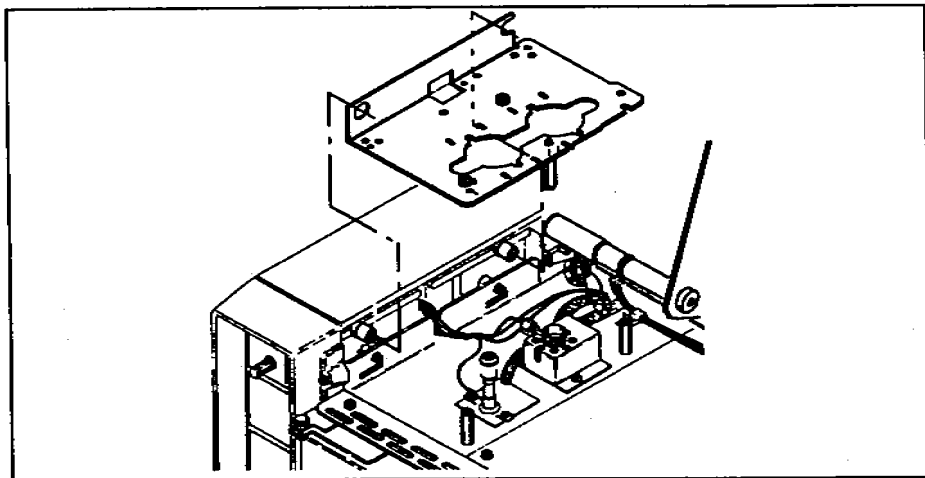


Figure 5. Placing the mounting bracket on the GC.

- b. Line up the top of the standoffs with the hole and slot on the bracket. Screw the pan head screws into the threaded holes of the standoffs. Do not tighten the screws until step 5.

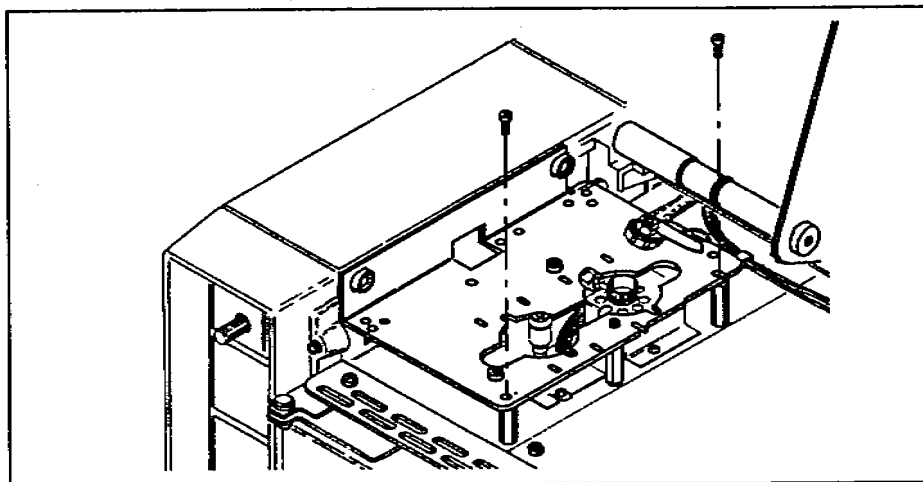


Figure 6. Start the pan head screws into the standoffs.

### 4. Attach the Inlet Nut (Read only if the GC has a split/splitless injection port. If not, skip to step 5.)

- a. Route the gas lines on the inlet nut over the mounting bracket. For most configurations, the gas lines should be routed over the front or rear of the bracket.

The gas lines must not interfere with the feet of the injector. Small white circles on the bracket show where the injector feet touch the bracket. If necessary, gently bend the gas lines so they do not cross the white circles.

- b. Push the inlet nut down and turn it clockwise. Tighten it with the inlet wrench.

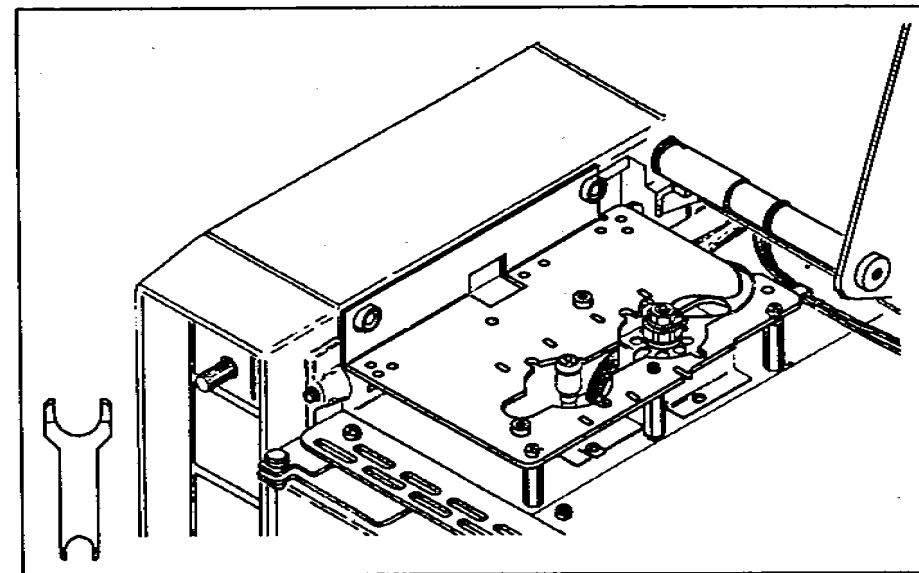


Figure 7. Route the gas lines over the bracket and reattach the inlet nut.



## 5. Align the Bracket

- a. Place the plastic alignment tool(s), honeycombed side up, over the inlet(s) of your GC. Move the bracket until both alignment tools fit flush on the bracket. If you cannot make them fit flush by moving the bracket, you may have to adjust the position of the inlets.
- b. Tighten the two screws that hold down the bracket with a No. 2 point Pozidriv. Remove and save the bracket alignment tools for future adjustments.

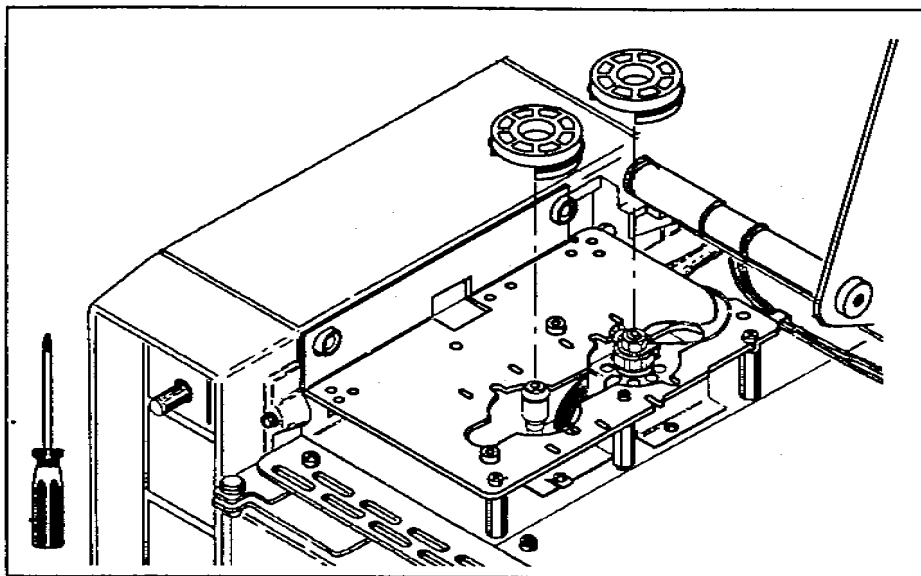
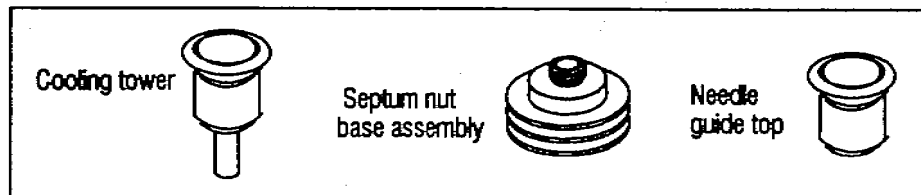


Figure 8. Align the bracket and tighten the screws.

If you have an **on-column inlet** on an HP 5890A with a cooling tower (Part No. 19245-20540), replace the cooling tower with a septum nut base assembly (Part No. 19245-80520). Save the cooling tower to realign the bracket. If you have an **HP 5890 SERIES II cool on-column inlet**, remove the needle guide top (Part No. 19245-20670). Save the needle guide top to realign the bracket.



- ## 2. Detach the Inlet Nut
- (Read only if the GC has a split/splitless injection port. If not, skip to step 3.)

For a **split/splitless inlet**, route the gas lines over the bracket. If you do not, you cannot replace the inlet liner without removing the bracket.

### CAUTION

Turn off the gas flows before you remove the inlet nut or you may damage the packing in the inlet liner. Avoid contaminating the inlet while it is uncovered.

- a. Loosen the inlet nut with the inlet wrench. Turn the nut counterclockwise until it is off the threads and lift it out of the way. The braze joints that hold the gas lines to the inlet are fragile.

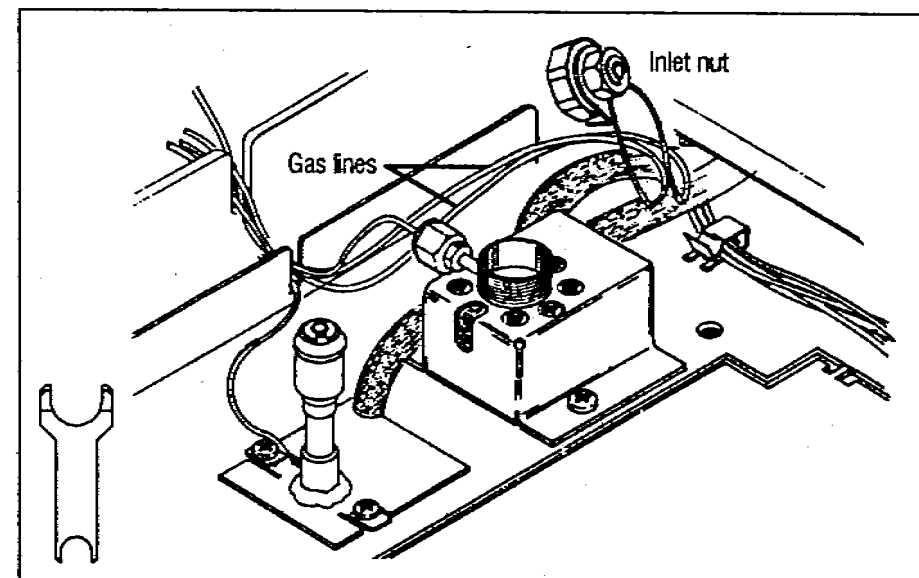


Figure 4. Detach the inlet nut and lift it out of the way.

- e. Screw one standoff onto the bottom of the mounting bracket to act as a support leg. The hole has a silver-colored pem (small threaded washer) on the top, right-hand side of the bracket. Tighten the standoff with a 1/4-in. nut driver.

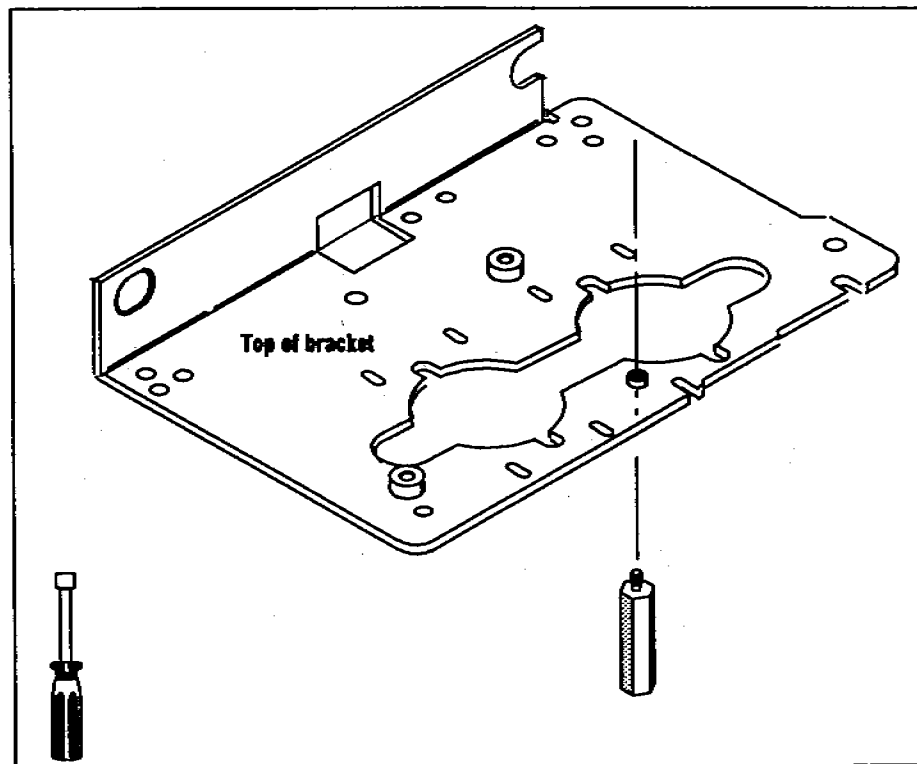


Figure 3. Attach the standoff to the bottom of the mounting bracket.

If a purged packed inlet is installed on the GC, this standoff could interfere with the heat sink (metal fins) around the inlet. If necessary, use only the left-hand side of the heat sink.

If HP 5890 SERIES II cool on-column inlets are installed in both the front and rear positions of the GC, do not install this standoff. Without this standoff, the stability of an injector in the rear position may be affected.

## 6. Attach the Mounting Posts

- a. Screw each mounting post clockwise into the threaded holes of the bracket. Tighten the posts with a flathead screwdriver.

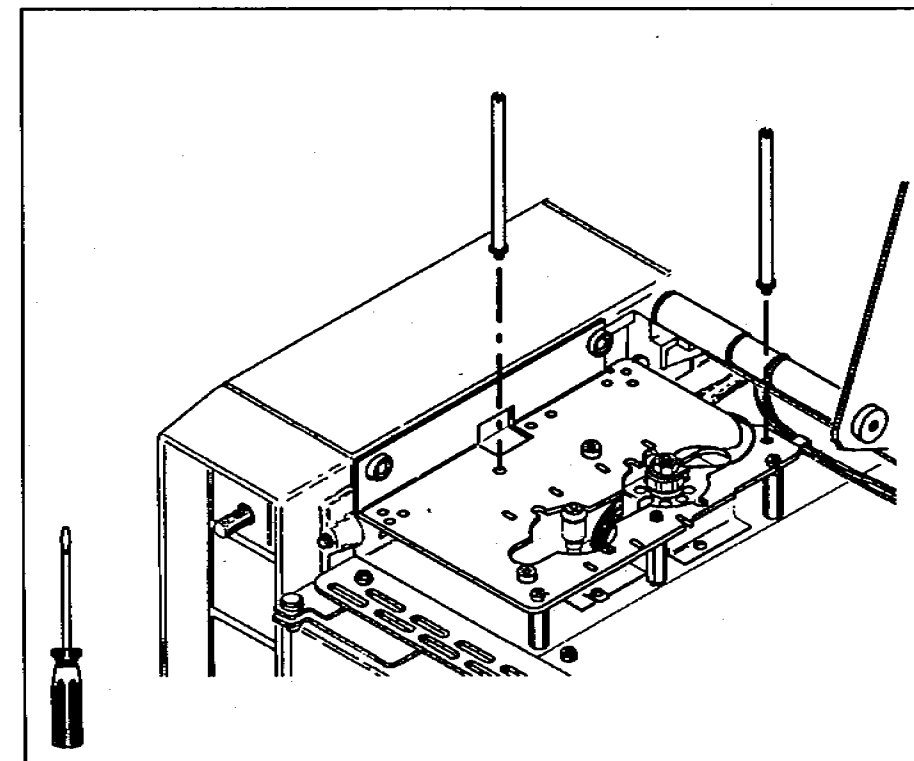


Figure 9. Attach the mounting posts.

## Checking Your Work

Double-check the following:

- If the GC has a split/splitless injection port, check the inlet nut.
- If the GC has an on-column injection port, be sure that you have replaced the cooling tower with the septum nut base assembly.
- If gas lines are routed over the bracket, be sure the lines are not near the white circles.
- Check that the following are tight:
  - Self-tapping screws.
  - Pan head screws.
  - Injector mounting posts.

If you are installing a tray, install the tray bracket before mounting the injector.

For detailed information on mounting and connecting the injector, see chapter 1 of your operating manual "Setting Up."

- d. Screw two of the standoffs (small hexagonal posts) into the threaded holes located near the inlets. Tighten them with a 1/4-in. nut driver.

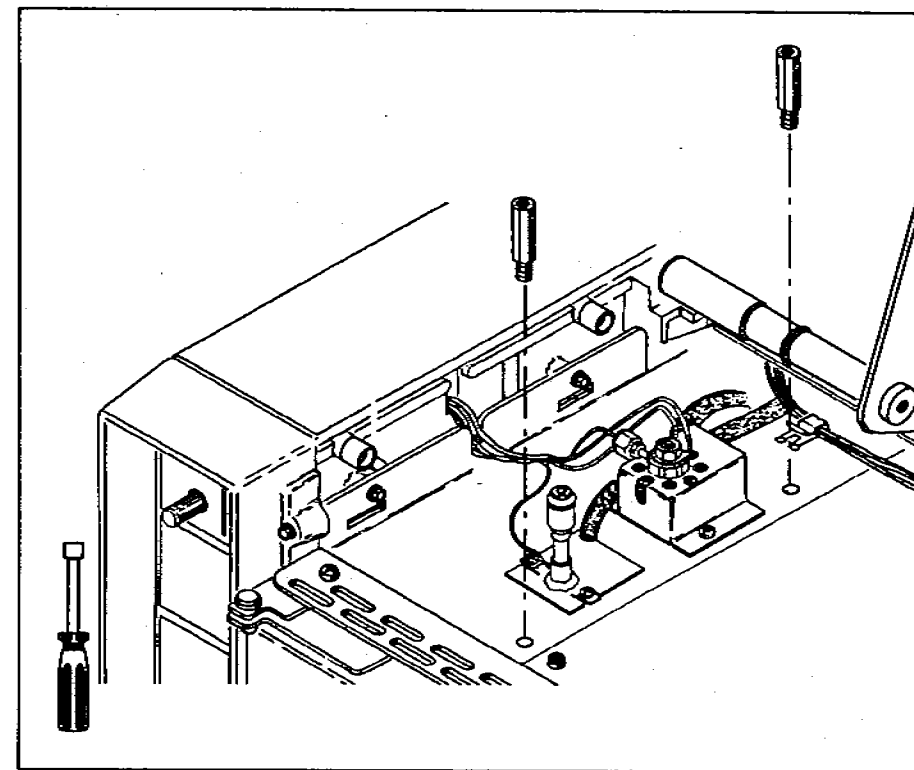


Figure 2. Attach the standoffs near the inlets.

If the rear inlet is an HP 5890 SERIES II cool on-column inlet (Accessory Kit 19245B or 19245C) on an HP 5890A GC, use a short standoff in the rear position (Part No. 19245-20760). This standoff is packaged with the accessory kit.

## 1. Attach the Injector Bracket Supports

- Remove the port pan by inserting a finger into the U-shaped cut on the panel and pulling up.
- Lift up the right-hand side of the top cover.
- Using a 1/4-in. nut driver and the two self-tapping screws, attach the two small cylinders onto the left side wall of the chromatograph.

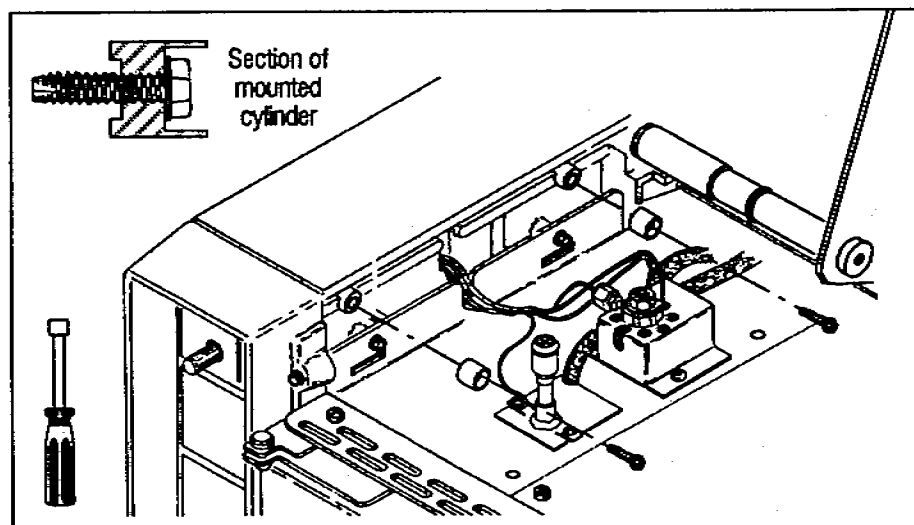


Figure 1. Attach the cylinders to the side of the GC.

## Connecting to HP 5890 GCs

The type of data-handling device and communications configuration that you use determines how you connect the automatic sampler to the HP 5890 GCs. This section contains some general information and two examples of cabling for the instrument network (INET).

For cabling the automatic sampler to data-handling devices, see the link manual for the specific device or system.

For detailed information on cabling to the HP 5890 SERIES II Gas Chromatograph, see the Site Prep/Installation Manual (Part No. 05890-90280).

### Signal Cable Connections

INET and REMOTE cable connections are located under the right top panel of the HP 5890. Other connections, such as the RS-232-C connector, are found on the back.

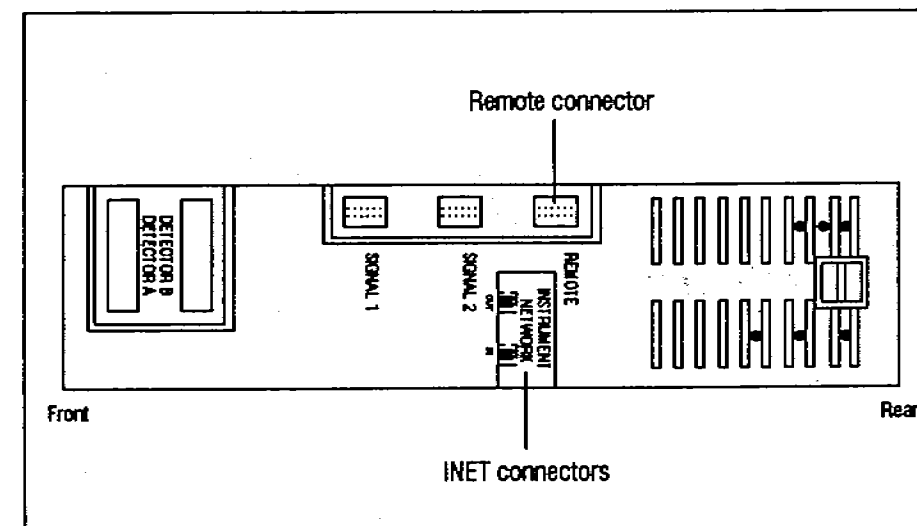


Figure 10. Signal cable connections.

## Instrument Network (INET)

The following diagrams show two INET configurations for connecting the automatic sampler to an HP 5890.

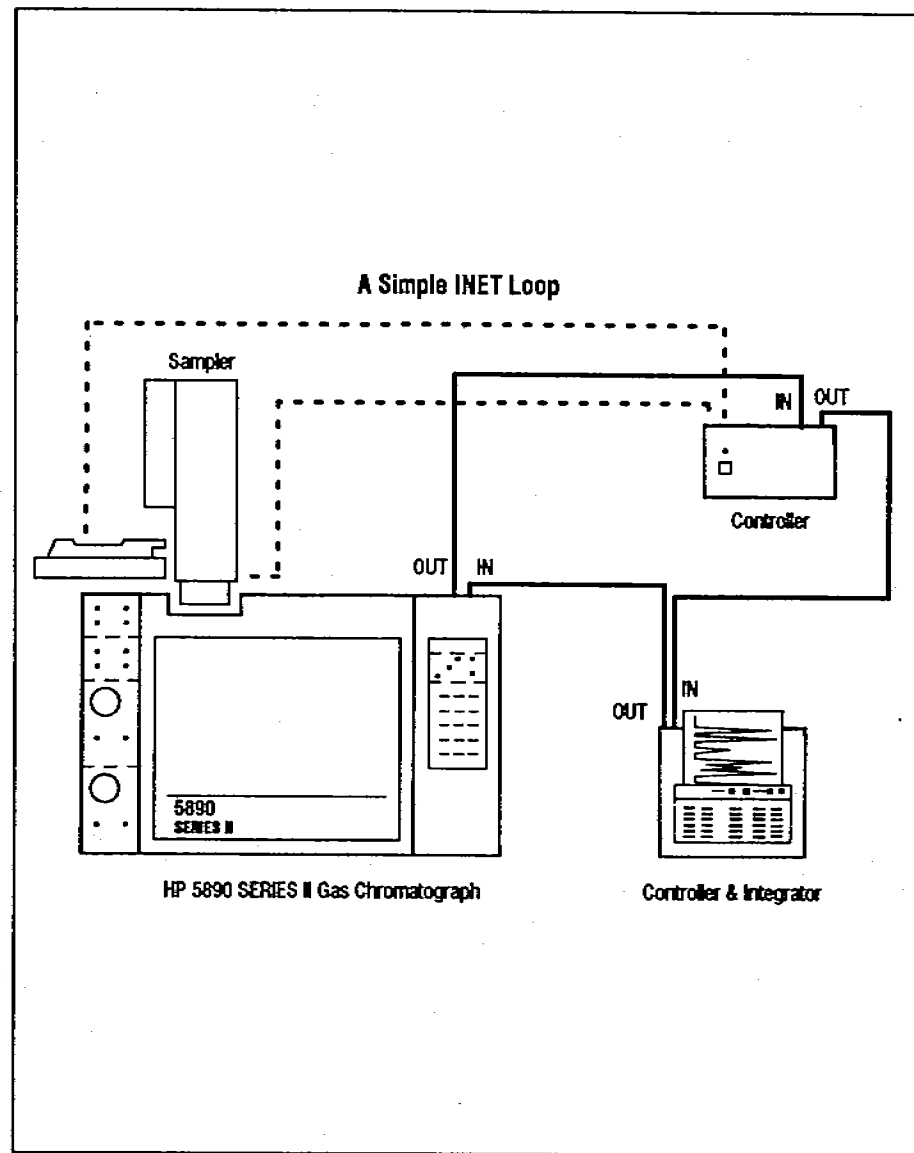


Figure 11. Cable connections for a system using INET.

## Installing the Injector Bracket

Pull out the yellow worksheet from the center of this link manual. Organize the hardware and tools for each step. Full-scale drawings of the screws help identify which ones you need for each step. If any of the hardware is missing, contact your HP representative.

**Step by step**

**Parts you need for each step**

**Tools you need for each step**

<b>1</b> Attach the Bracket Support	24x4, stainless steel
	2 Injector bracket bushings (8857-2673) (None left over)
	2 Self-tapping screws (824-824) (None left over)
	5 Washers (8857-2682) (None left over)
	1 Injector bracket (8857-4817)
<b>2</b> Attach the Inlet Filter	inlet filter
<b>3</b> Place the Bracket	2 pin head screws (8216-8216) (None left over)
<b>4</b> Attach the Inlet Filter	inlet filter
<b>5</b> Align the Bracket	No. 27 Flat Pliers 2 alignment tools (8257-4828)
<b>6</b> Attach the Mounting Post	inlet screwdriver 2 injector mounting posts (8273-2686) (None left over)

**Exploded view with all parts**

## Before You Start

This manual contains the following information:

- Instructions for installing the mounting bracket for the HP 18593B Injector Module.
- Sample diagrams for connecting the cables for the automatic sampler to the HP 5890 Gas Chromatographs (GCs).

Before installing the injector mounting bracket on an HP 5890A, you must first install the split top cover for the HP 5890 SERIES II Gas Chromatograph.

### WARNING

Allow the inlets and oven to cool before installing the injector mounting bracket. The metal surfaces of the GC are very hot and could burn your skin. If you have a split/splitless injection port, you could damage the column.

After you have completed the installation, place this link manual in the binder of your operating manual for the HP 7673 Automatic Sampler (Part No. 07673-60995) after the tab for appendix C "Link Manuals."

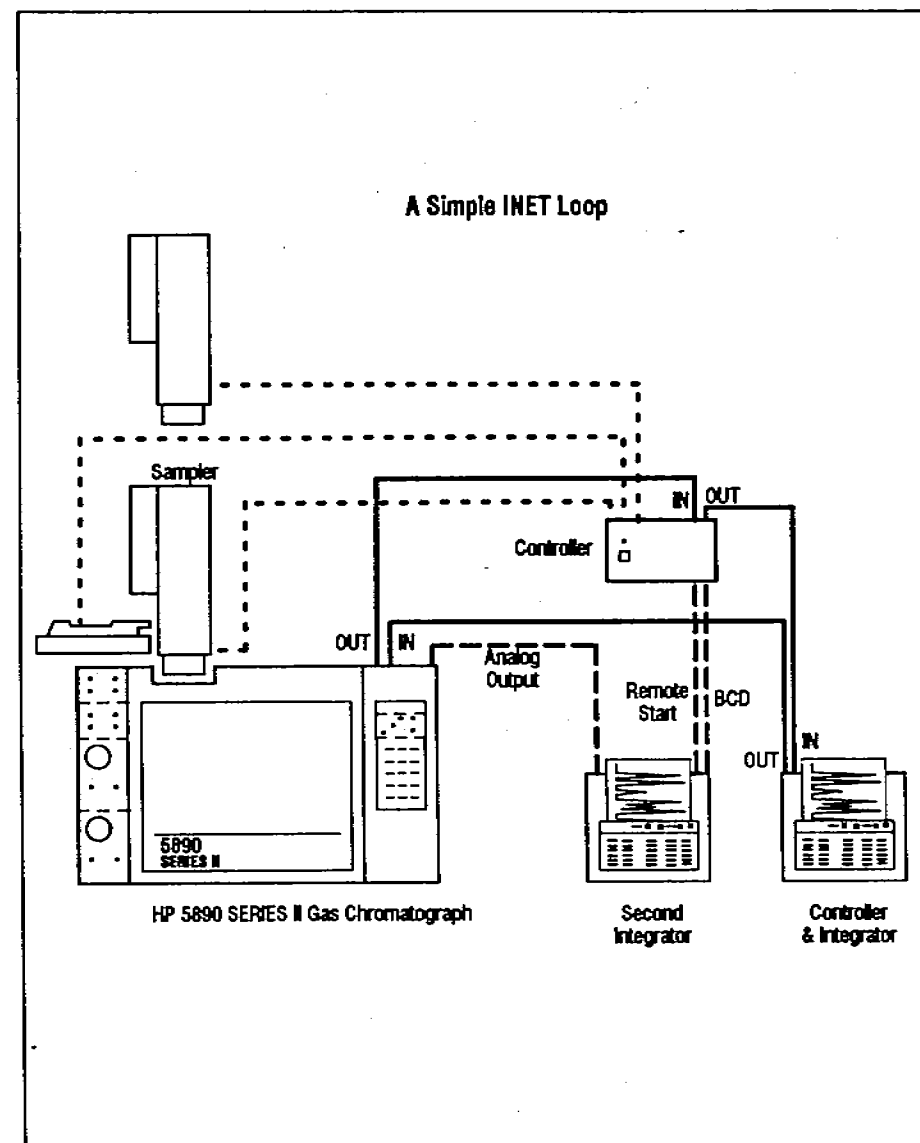
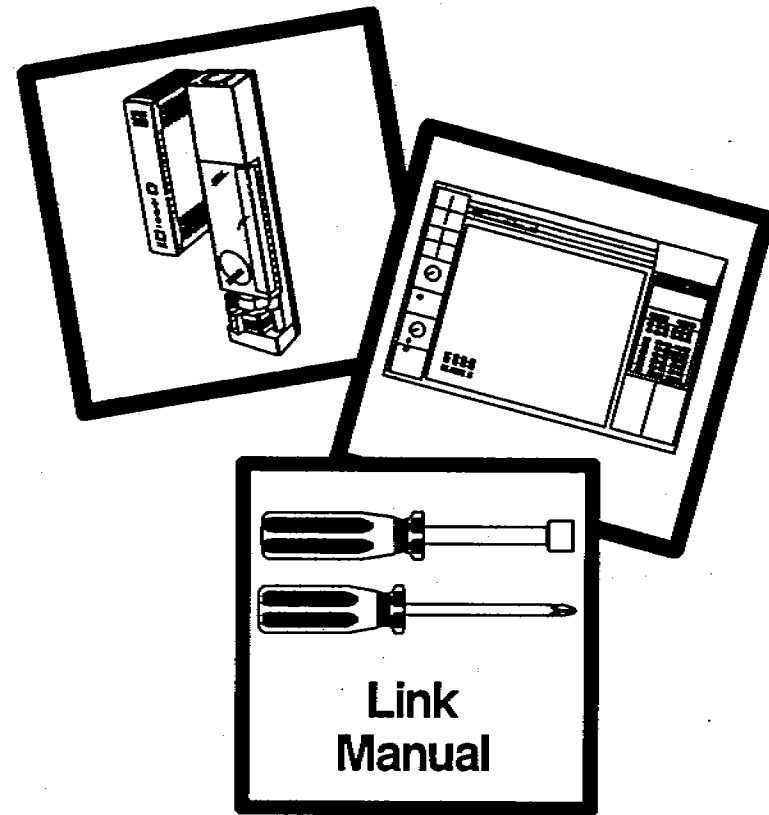


Figure 12. Cable connections for a dual injector system using INET.

# HEWLETT-PACKARD



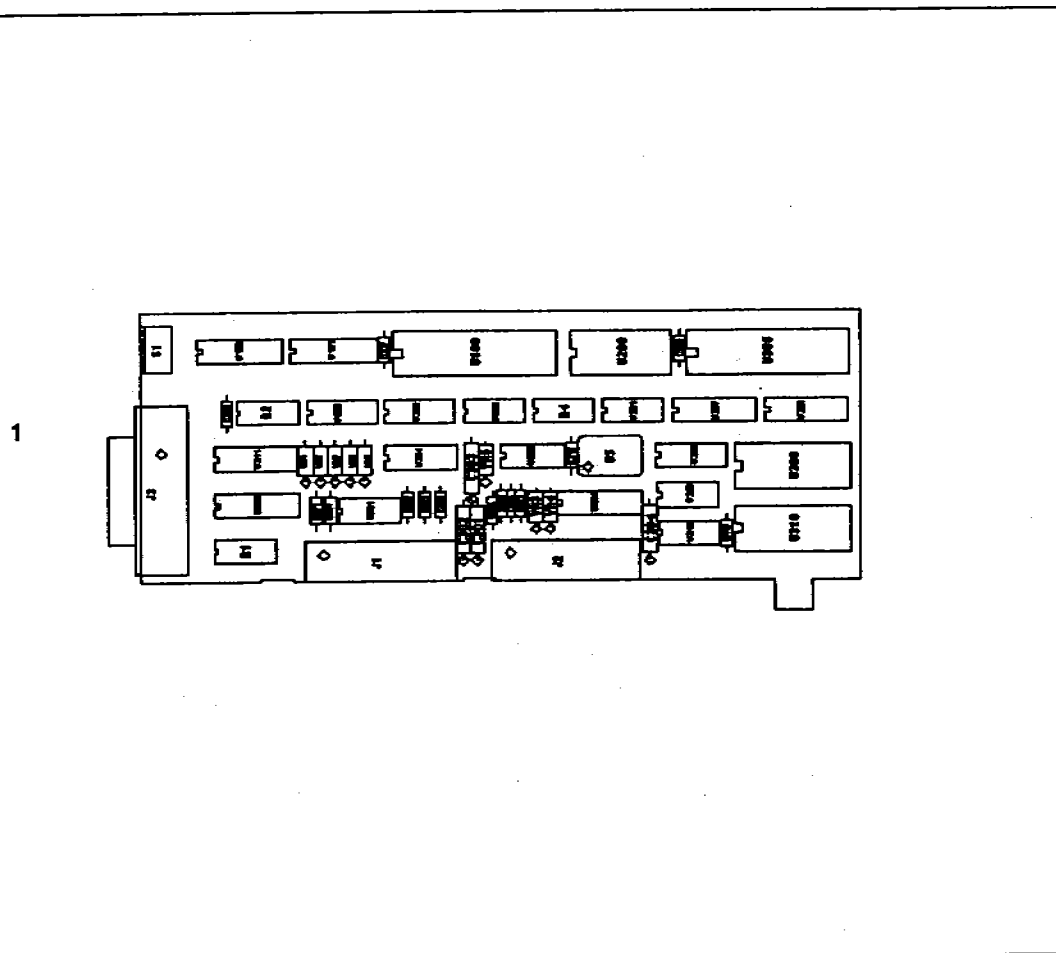
## HP 7673 Automatic Sampler Installing the Injector Bracket and Cables to 5890 GCs



Manual Part No.  
07673-90195

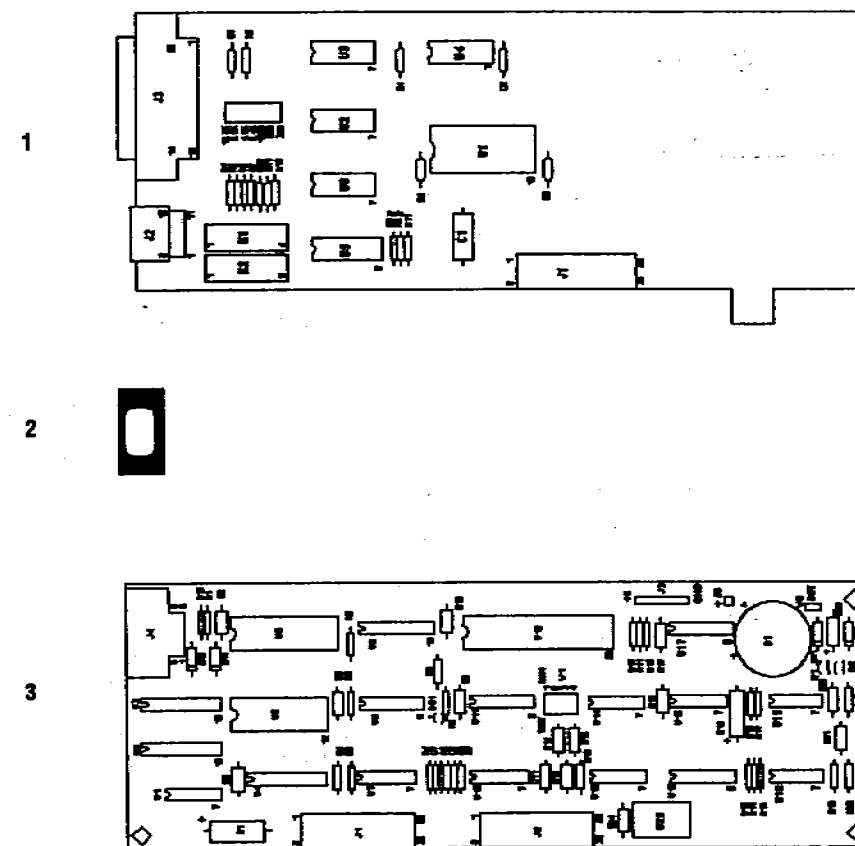
Printed in U.S.A.  
October 1989

## Contents for Accessory Kits HP 18599H



Item	Description	Part No.	QTY
1	Controller/HP-IB Board	18594-60110	1
	HP-IB Cable	8120-4654	1
	M3 Screws	0515-0912	6
	T#6 Washers	2190-0065	6
	Bezel, Blank	18594-00115	2
	Bezel, Blank	18594-00116	2

## Contents for Accessory Kits HP 18599R and 18599S



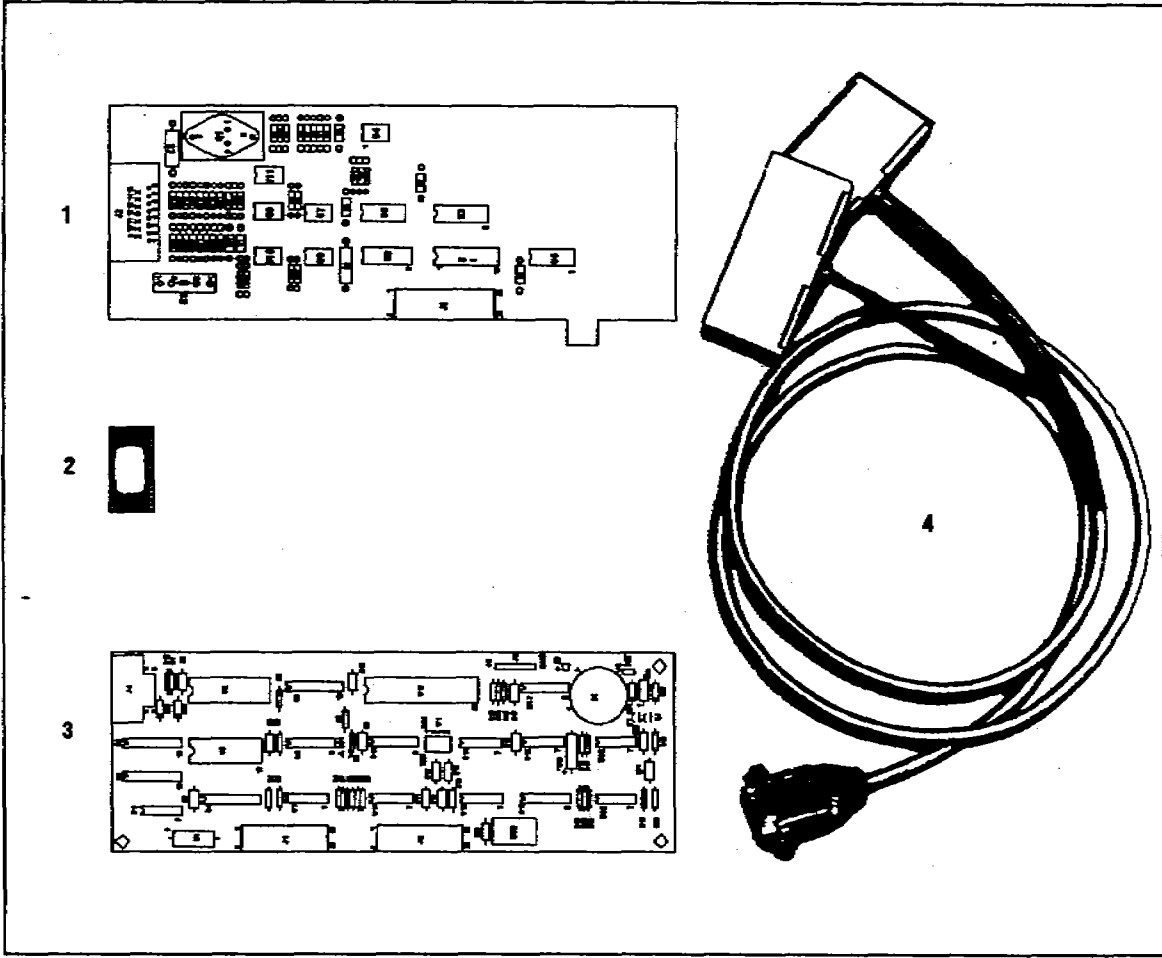
Item	Description	Part No.	QTY
1	RS-232-C Board	18594-60080	1
2	Controller EPROM	18594-8NNNN	1*
3	Controller Board	18594-60060	1**
	RS-232-C Manual	18594-90300	1

\* Included in HP 18599R kit only. NNNN indicates the last four digits of the part number for most recent EPROM.

\*\* Included in HP 18599S kit only.



Contents for Accessory Kits 18599L and 18599M

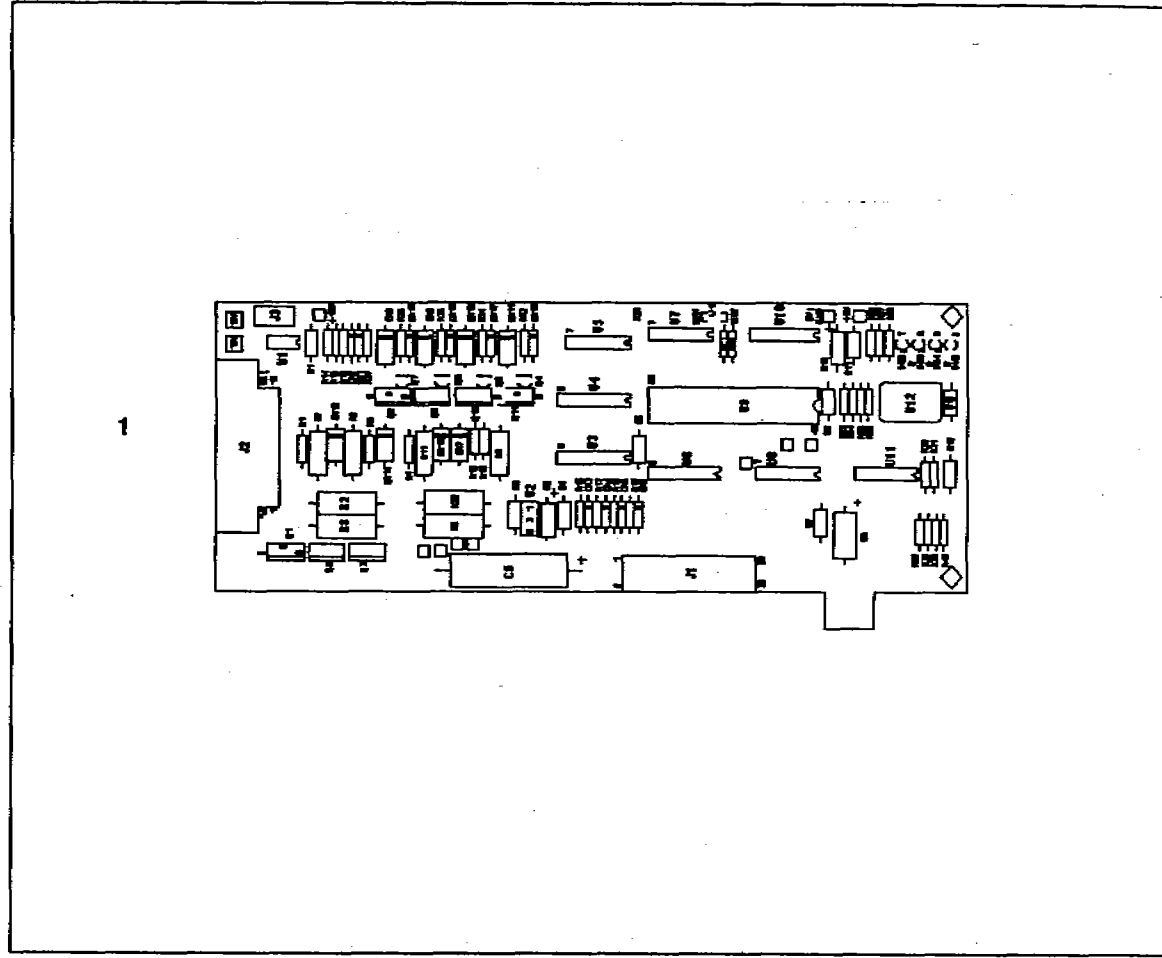


Item	Description	Part No.	QTY
1	Loop Board	18594-60090	1
2	Controller EPROM	18594-8NNNN	1*
3	Loop "Y" Cable	18594-60650	1
4	Controller Board	18594-60060	1**

\* Included in 18599L kit only. NNNN indicates the last four digits of the part number for most recent EPROM.

\*\* Included in 18599M kit only.

Contents for Accessory Kit HP 18596A



Item	Description	Part No.	QTY
1	Tray Logic Board	18594-60075	1

## HP-IB Board

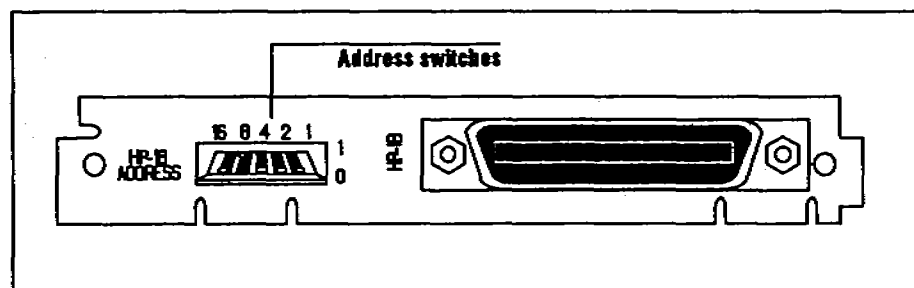
The controller/HP-IB board contains a control section and a communications section. It is used to control the injector(s), the tray, and other devices attached to the controller.

The board communicates with HP ChemStations via an HP-IB cable. It communicates with HP 3350 Lab Automation Systems (A series only) via an RS-232-C Interface Board in the COMM slot and an RS-232-C cable to an HP 35900B Dual Channel Interface.

This section includes information for configuring the board with either a ChemStation or Lab Automation System, for connecting the cables, and for interpreting the turn-on behavior of the controller when the HP-IB board is installed.

### Configuring the Board

The following illustration shows the location of the address switches on the controller/HP-IB board. Configure the board for either a ChemStation or a Lab Automation System with the following instructions. Be sure to properly ground yourself to eliminate any static discharge problems.



### For Use With an HP ChemStation (HP-UX Series)

Set the HP-IB address switches on the rear panel as shown in the following illustration. The address should be unique for each instrument.

In the illustration the example switches on the right are set to address 8. This is the usual address for the first automatic sampler connected to a ChemStation. For an additional automatic sampler, choose any unused address.

The illustration shows the rear panel of the HP-IB board with five address switches. The switches are labeled '16', '8', '4', '2', and '1' from left to right. The switch labeled '8' is currently set to the '8' position, while the others are set to their respective positions.

<ul style="list-style-type: none"> <li>• Select an address from 1 to 29</li> <li>• Must be different than all other instrument HP-IB addresses.</li> </ul>	
Address	Switches
0	00000
1	00001
2	00010
3	00011
4	00100
5	00101
6	00110
7	00111
8	01000
9	01001
10	01010
11	01011
12	01100
13	01101
14	01110
15	01111
16	10000
17	10001
18	10010
19	10011
20	10100
21	10101
22	10110
23	10111
24	11000
25	11001
26	11010
27	11011
28	11100
29	11101

Turn back to page 6 and install the HP-IB board.

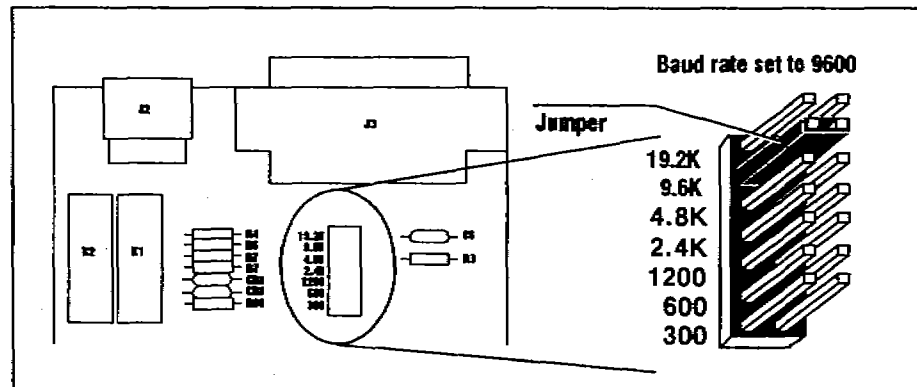
- Remove the plastic cap from the connector on the back of the Controller/HP-IB board. Save it for later use.
- Install the controller/HP-IB board in the CONTROLLER slot.

## For Use With an HP 3350 Lab Automation System (A series only)

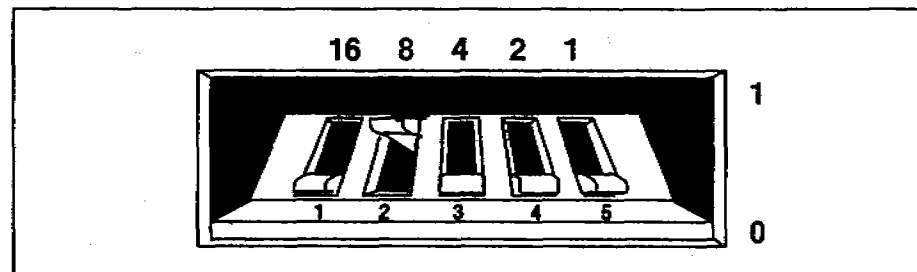
When configuring for use with a Lab Automation System, you must configure the HP-IB and RS-232-C boards.

This configuration requires an HP 35900B Dual Channel Interface. The model designation is on the Serial Number plate on the rear panel.

1. Locate the W1 BAUD RATE jumper on the RS-232-C board (part number 18594-60080). Set the jumper to 9.6K as shown in the following illustration.



2. Set the HP-IB address switches on the rear of the HP-IB board to address 8 as shown in the following illustration.



Turn back to page 6 and install both boards in the controller.

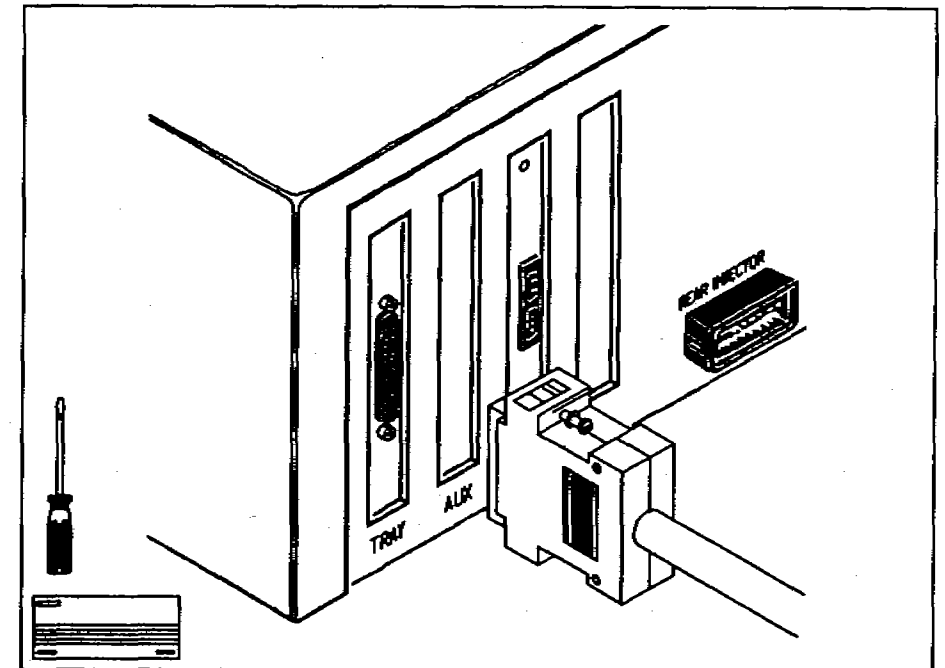
- Install the RS-232-C Interface board in the COMM slot and the HP-IB board in the CONTROLLER slot. Leave the plastic cap on the HP-IB connector.

If any of the following are true, the controller board is not compatible with the tray board. Contact you HP representative to order the necessary part.

- The CONTROLLER slot has a board in it with no connectors on the bezel (i.e., a flat metal plate). The part number for this board is 18594-60020. Look on the lower right-hand corner of the board.
- There is an EPROM on the controller board and its part number is 18594-80010.

## Connecting Cables

1. Plug the tray cable into the connector of the tray board in the left-hand slot on the back panel of the controller.
2. Secure the plug to the connector with a small flathead screwdriver.



## Tray Board

The following instructions include checking the configuration of the controller board and connecting the tray cable.

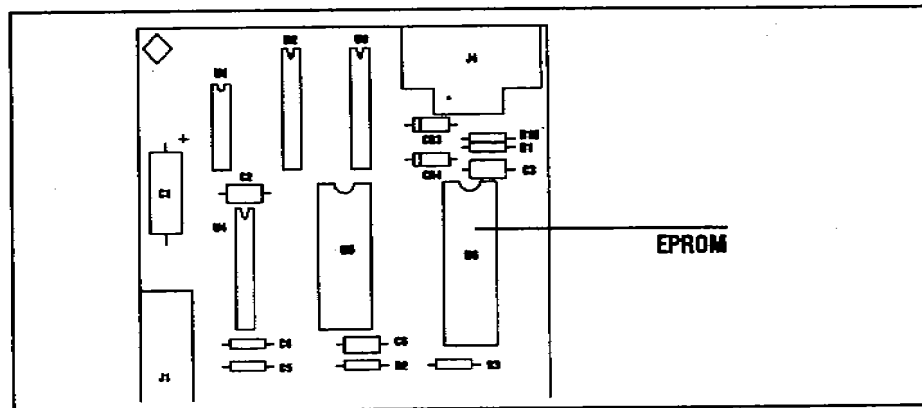
For information on mounting and operating the tray, see the automatic sampler operating manual. For A modules, see part number 07673-60990. For B modules, see part number 07673-60995.

### Checking the Configuration

The tray board you received with this accessory must be able to communicate with the controller board. There are a few cases where the controller board must be modified.

Locate the board in the slot labeled CONTROLLER. If any of the following are true, turn back to page 6 and continue installing the tray board.

- There is a U6 EPROM on the controller board and it has a part number whose last four digits are greater than 010 (i.e., a part number greater than 18594-80010).
- A controller/HP-IB board is in the CONTROLLER slot. A picture of the board is on page 8.
- A 5880A communication board is in the CONTROLLER slot. A picture of the board is on page 8.

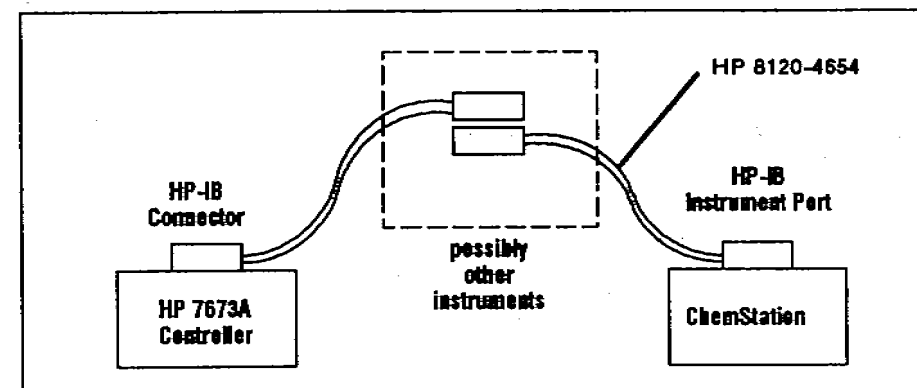


## Connecting Cables

### With HP ChemStations (HP-UX Series)

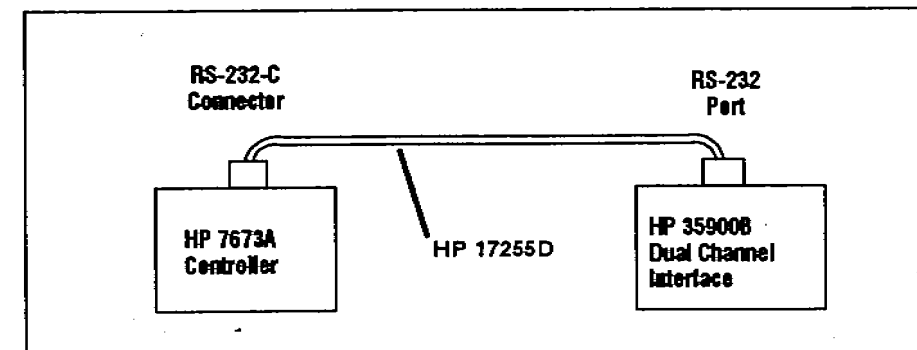
1. Connect an HP 8120-4654 (or equivalent) HP-IB cable from the connector on the back of the board to either an instrument HP-IB port on the ChemStation or an HP-IB connector on a cable that eventually reaches a ChemStation instrument port.

DO NOT connect the cable to an HP-IB ChemStation disk or printer port.



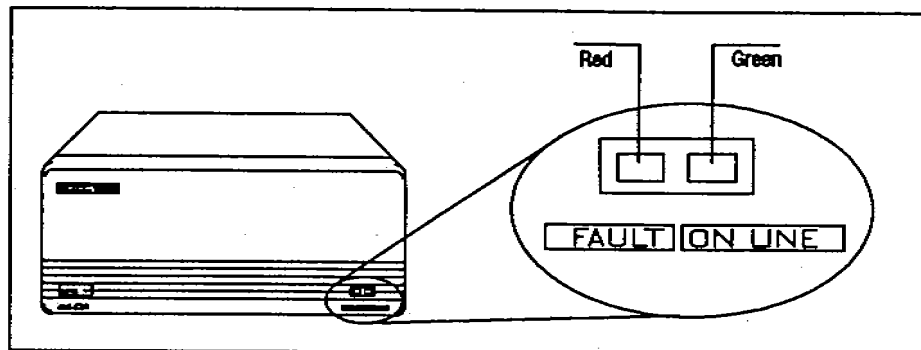
### With HP 3350 Lab Automation Systems

Connect an HP 17255D (or equivalent) RS-232-C cable from the connector on the RS-232-C Interface Board to an instrument port on the rear panel of an HP 35900A Dual Channel Interface.



## Turn-on Behavior

When you turn on an automatic sampler containing a controller/HP-IB board, the fault lights (i.e., LEDs) on the front panel remain on until initialization is complete. It may take from one to ten seconds, depending on what other boards are installed.



During initialization, the controller runs a series of internal diagnostics. If a problem is found, initialization stops and the red fault light flashes a diagnostic code. Possible codes are:

- 2 flashes—defective RAM on the controller/HP-IB board
- 3 flashes—defective ROM on the controller/HP-IB board
- 4 flashes—defective RAM on a bar code reader board
- 5 flashes—defective ROM on a bar code reader board
- 6 flashes—bar code reader cable not attached
- 7 flashes—bar code reader configuration switch set to TEST

The red fault light also flashes to indicate problems with the tray board. If the tray board is installed but the cable is not attached, the red light turns on and remains on. This prevents seeing any of the diagnostic flashes from the controller/HP-IB board.

## 4. Attach the Top Plate and Top Cover

- a. Slip on the metal top plate.

For an **A module**, complete this step.

- b. Screw on the five screws with a No. 2 Point Posidriv.

For a **B module**, complete these steps.

- b. Screw on the four corners screws with a No. 2 Point Posidriv.

- c. Tighten the screws of the bezels with a No. 1 Point Posidriv.

For a **both modules**, complete these steps.

- d. Slip on the controller top cover.

- e. Screw on the two screws with a No. 1 Point Posidriv.



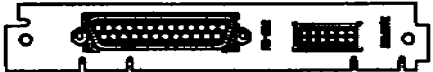

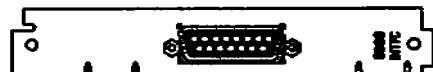



## 5. Connect Any Cables

For instructions, turn to the page for the board you are adding.

For the tray board, turn to page 11.

For the controller/HP-IB board, turn to page 15.

For the Loop board, turn to page 21.

Board Name / Part Number	Connectors	Controller Slot
Tray Board 18594-60075		TRAY
Controller/HP-IB Board 18594-60110		CONTROLLER
RS-232-C Board 18594-60080		COMM
Loop Board 18594-60090		COMM
5880A Communications Board 18594-60050		CONTROLLER
Bar Code Reader Board 18594-60100		AUX
INET Board 18594-60030		COMM
TTL Board 18594-60040		AUX

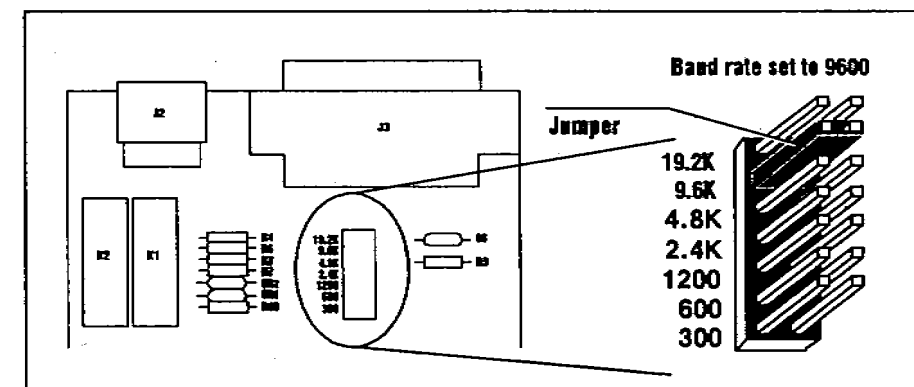
## RS-232-C Board

This section includes information for configuring the board. Be sure to properly ground yourself to eliminate any static discharge problems.

For initial operation information, see section 2 of the "HP 7673 Automatic Sampler with RS-232-C Serial Interface Manual" (part number 18594-90300).

### Configuring the Board

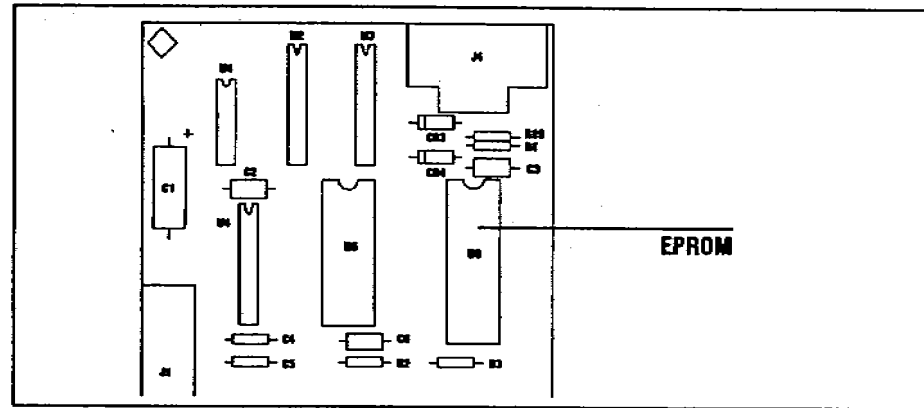
1. Locate the W1 BAUD RATE jumper on the RS-232-C board (part number 18594-60080). Set the jumper to a baud rate that is supported by your computer (i.e., 300, 600, 1200, 2400, 4800, 9600 or 19200 baud).



In general, higher baud rates will result in faster communication and shorter delay times, but sometimes running at very high baud rates could make it difficult for your computer to keep up with transmission from the HP 7673. Some experimentation may be necessary.

For more information on baud rate selection, see section 3 of the "HP 7673 Automatic Sampler with RS-232-C Serial Interface Manual" (part number 18594-90300).

- If you are using kit number 18599R, go to step two.
  - If you are using kit number 18599S, go to step three.
2. Locate the board in the slot labeled CONTROLLER. There is an EPROM on this board with the part number written on it. Without removing the board find the part number on the EPROM. The part number should look like 18594-80NNN.

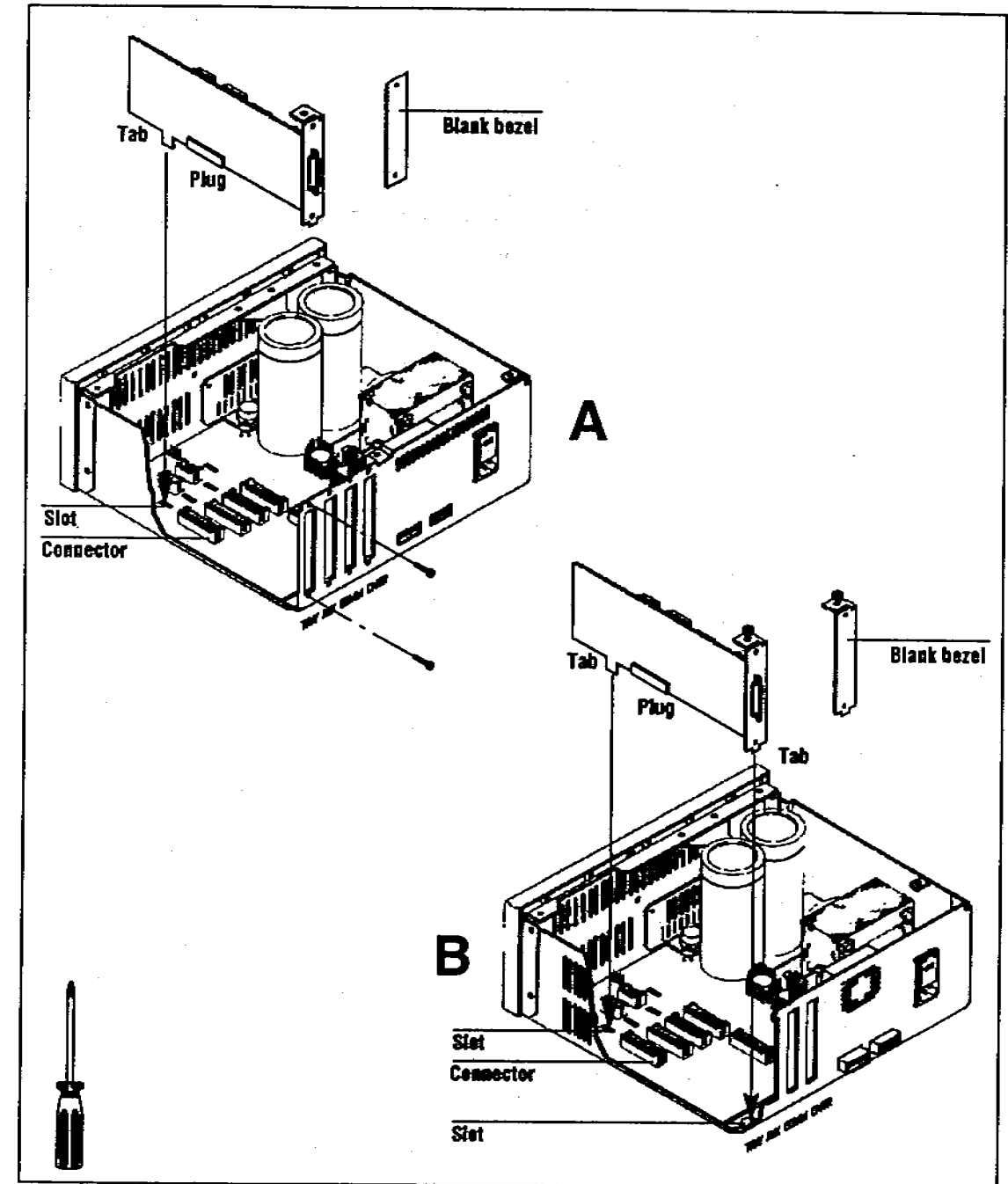


IF NNN is greater than or equal to 120, turn back to page 6, remove any board or blank bezel from the COMM slot, and install the RS-232-C board in the COMM slot.

IF NNN is less than 120, remove the board in the CONTROLLER slot and lay it on a flat surface.

- a. Note the orientation of the EPROM currently installed. Remove the installed EPROM.
  - b. Install the new EPROM (18594-8NNNN) provided in the kit.
  - c. Re-install the board into the CONTROLLER slot.
  - d. Turn back to page 6, remove any board or blank bezel from the COMM slot, and install the RS-232-C board in the COMM slot.
3. Remove the board in the CONTROLLER slot. Install the controller board (18594-60060) provided in the kit in the CONTROLLER slot.

Turn back to page 6, remove any board or blank bezel from the COMM slot, and install the RS-232-C board in the COMM slot.



### 3. Configure the Board(s)

For instructions, turn to the page for the option board you are adding.

For the tray board, turn to page 10.

For the controller/HP-IB board, turn to page 12.

For the RS-232-C board, turn to page 17.

For the loop board, turn to page 19.

### 3. Install the Board(s)

- a. Determine in which slot the option board belongs from the table on page 8. If there is a board or blank bezel (i.e., metal plate or cover) in the slot, remove it.
- b. Line up the tab and plug(s) on the bottom edge of the board with the slot and connector(s) on the base of the controller. Press the board gently into place.
- c. Be sure the board is seated correctly at two points:
  - The tab of the board is in the slot.
  - The plug(s) is firmly seated in the connector(s).

For an A module, also complete this step.

- d. Using a No. 1 Point Pozidriv, attach the boards bezel to the back of the controller with two screws.

For a B module, also complete this step.

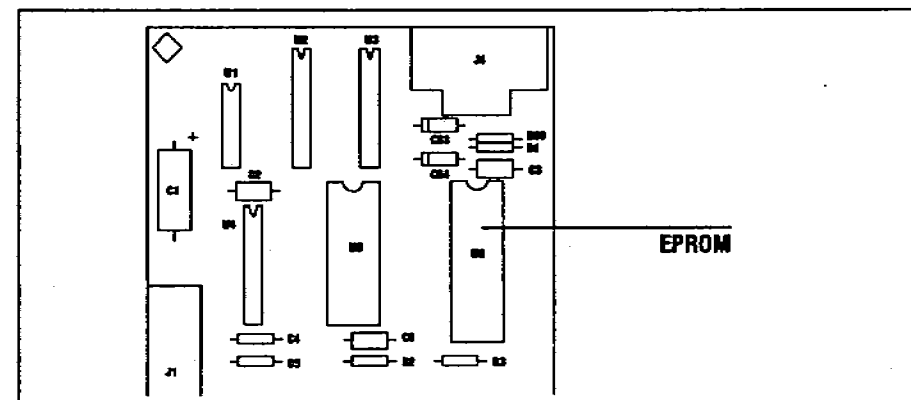
- d. To be sure the front bezel tab is seated, wiggle the bezel back and forth with the tip of your fingers while pressing down on the board.

## Loop Board

This section includes information for configuring the board, connecting cables, and setting run parameters. Be sure to properly ground yourself to eliminate any static discharge problems.

### Configuring the Board

- If you are using kit number 18599L, go to step one.
  - If you are using kit number 18599M, go to step two.
1. Locate the board in the slot labeled CONTROLLER. There is an EPROM on this board with the part number written on it. Without removing the board find the part number on the EPROM. The part number should look like 18594-80NNN.



IF NNN is greater than or equal to 120, turn back to page 6 to complete the following:

- a. Remove any board or blank bezel from the COMM slot.
- b. Install the loop board in the COMM slot.

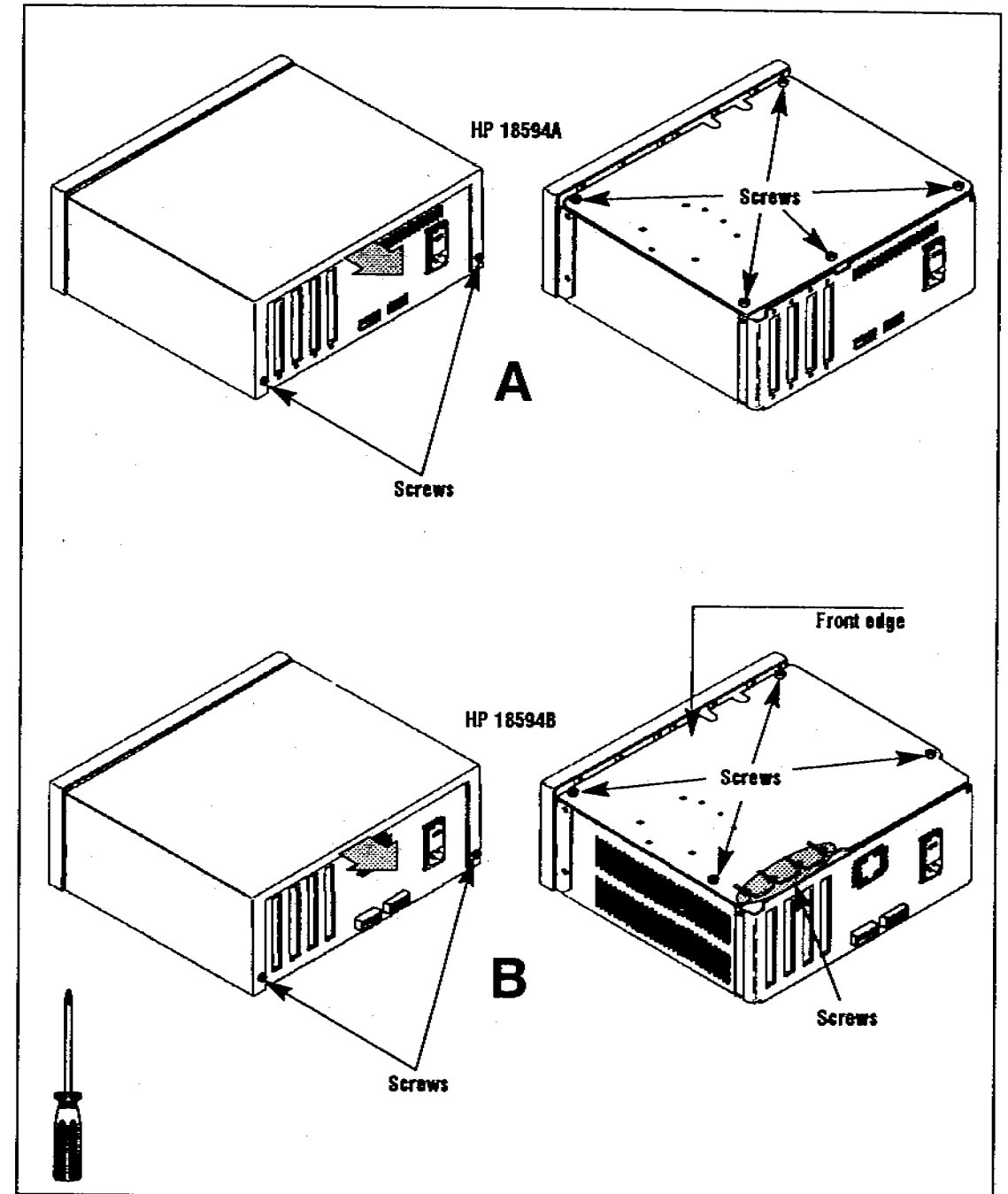


IF NNN is less than 120, remove the board in the CONTROLLER slot and lay it on a flat surface.

- a. Note the orientation of the EPROM currently installed. Remove the installed EPROM.
  - b. Install the new EPROM (18594-8NNNN) provided in the kit.
  - c. Re-install the board into the CONTROLLER slot.
  - d. Turn back to page 6 to complete the following:
    - Remove any board or blank bezel from the COMM slot.
    - Install the loop board in the COMM slot.
2. Remove the board in the CONTROLLER slot. Install the controller board (18594-60060) provided in the kit in the CONTROLLER slot.

Turn back to page 6 and install the board in the controller to complete the following:

- a. Remove any board or blank bezel from the COMM slot.
- b. Install the loop board in the COMM slot.



## 1. Remove the Top Cover

This task is completed the same way for either an A module or a B module. See the illustrations on the page 5.

- a. Remove the controller top cover by removing two screws located on the rear edge of the plastic top cover with a No. 1 Point Pozidriv.

## 2. Remove the Top Plate

For an **A module**, complete these steps.

- a. Remove the five screws of the top plate with a No. 2 Point Pozidriv.
- b. Lift off the top plate.

For a **B module**, complete these steps.

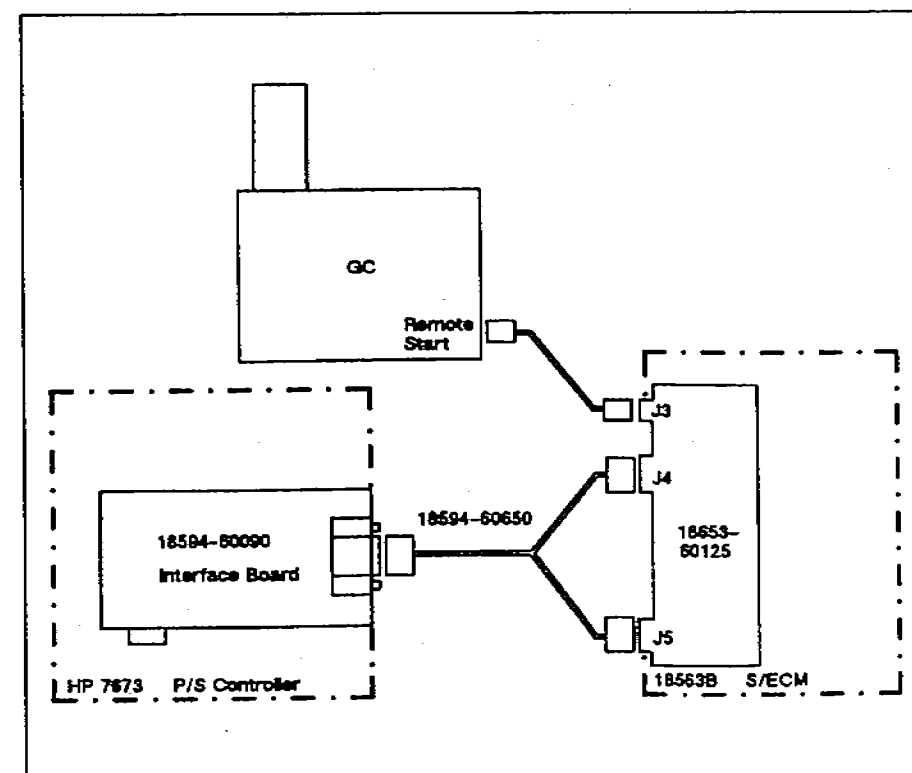
- a. Remove the four screws at the corners of the top plate with a No. 2 Point Pozidriv.
- b. Loosen the four screws that hold the boards and bezels to the metal top plate with a No. 1 Point Pozidriv.
- c. Remove the top plate by lifting the front edge and sliding it toward the front of the controller.

## Connecting Cables

A single "Y" cable (18594-60650) is used to connect the HP 7673 Automatic Sampler to the 18653B S/ECM.

1. Connect the 15-pin connector to the loop board in the controller and secure it with the screws.
2. Plug the two plugs of the Y end of the cable into J4 and J5 on the HP 18653B S/ECM box. These connectors are keyed to define their proper locations.

J3 on the 18653B is used to connect remote start signals between the gas chromatograph and the 18653B.



## Operation

The Loop Board provides communication between the Lab Automation System (HP 3350A and HP 3357A) and the HP 7673 Automatic Sampler.

Communication is limited to passing the **next bottle number** to the automatic sampler. All other parameters need to be entered via the control switches on the front panel of the HP 18593B Injector Module. For more information on the control switches, see chapter 4 "Standalone Control" in the operating manual (part number 07673-60995).

Valid bottle numbers with the tray installed are 01-00 (where 00 is interpreted as 100). Valid bottle numbers when the tray is **NOT** installed are 01-03. Once a valid bottle number is sent to the automatic sampler, the sampler will begin its pre-run sequence. When an injection occurs, a start signal is sent from the automatic sampler to the S/ECM which starts the A/D and the gas chromatograph.

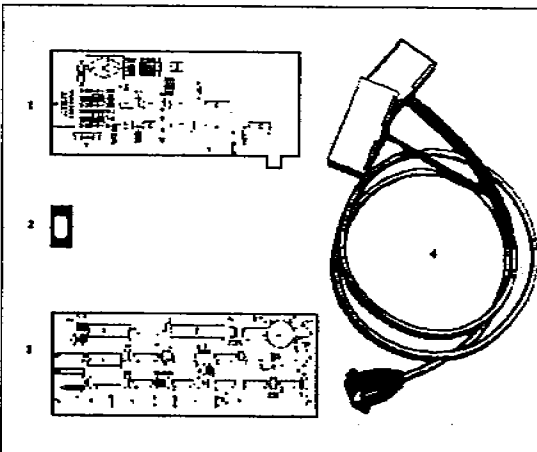
Once the data system determines that a run has finished and the next one should be started, it sends the next bottle number to the automatic sampler indicating that a new run is being initiated.

## Installing a Board

Pull out the yellow worksheet from the center of this link manual. Find the content list for the accessory you ordered. Check the hardware you received against the list of hardware on the yellow worksheet. If any of the hardware is missing, contact your HP representative.

You need a No. 1 Point Pozidriv and a No. 2 Point Posidriv to complete these instructions.

Contents for Accessory Kits 18593L and 18593M



Item	Description	Part No.	QTY
1	Loop Board	18594-0029	1
2	Connector EPROM	18594-8000M	1*
3	Loop "T" Cable	18594-0803	1
4	Connector Board	18594-0808	1**

\* Included in 18593L kit only.  
\*\* Included in 18593M kit only.

## Before You Start

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This link manual describes how to install and configure the printed-circuit board associated with the option you ordered into either an HP 18594A or HP 18594B Controller Module.

Before you start, do the following:

- Turn off the power of the controller and disconnect the power cord.
- Check the warranty identification label on the back of the controller to determine whether you have an **A module** (i.e., Model# HP 18594A) or a **B module** (i.e., Model# HP 18594B).

### WARNING

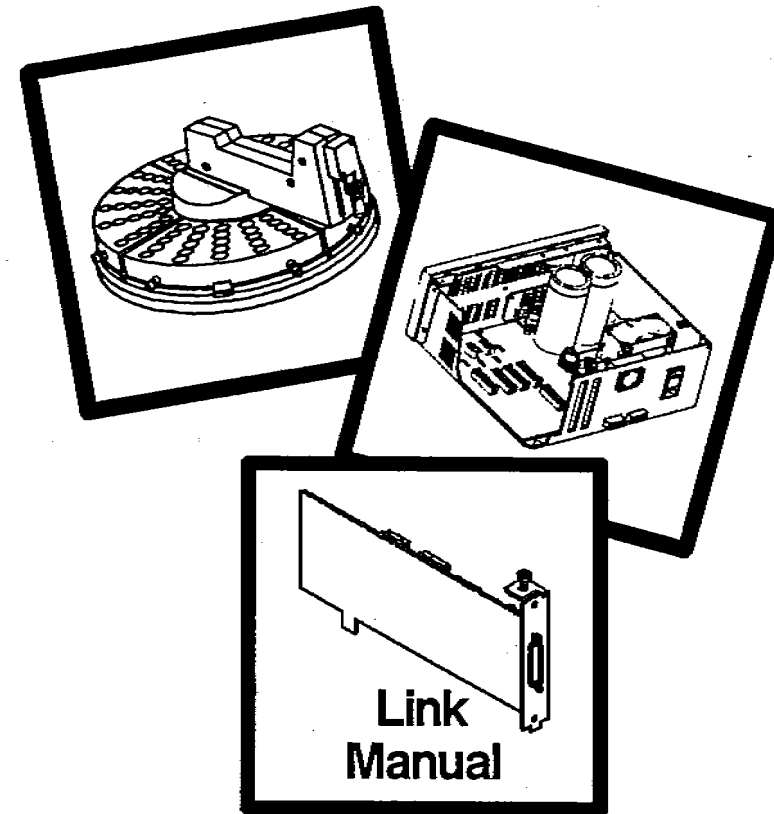
HAZARDOUS VOLTAGES ARE PRESENT IN THIS INSTRUMENT WHEN THE POWER CORD IS CONNECTED. AVOID ANY DANGEROUS SHOCK HAZARD BY DISCONNECTING THE CORD BEFORE REMOVING THE CONTROLLER LID.

### CAUTION

This procedure requires protection against electrostatic discharge. Use a static control wrist strap (i.e., part number 9300-0969 for large wrist strap or part number 9300-0970 for small) connected to a ground. If you do not use static protection, you may damage the electronics of the board or controller.

After you have completed the installation, place this link manual in the binder of your operating manual for the HP 7673 Automatic Sampler (part number 07673-60995) after the tab for appendix C "Link Manuals."

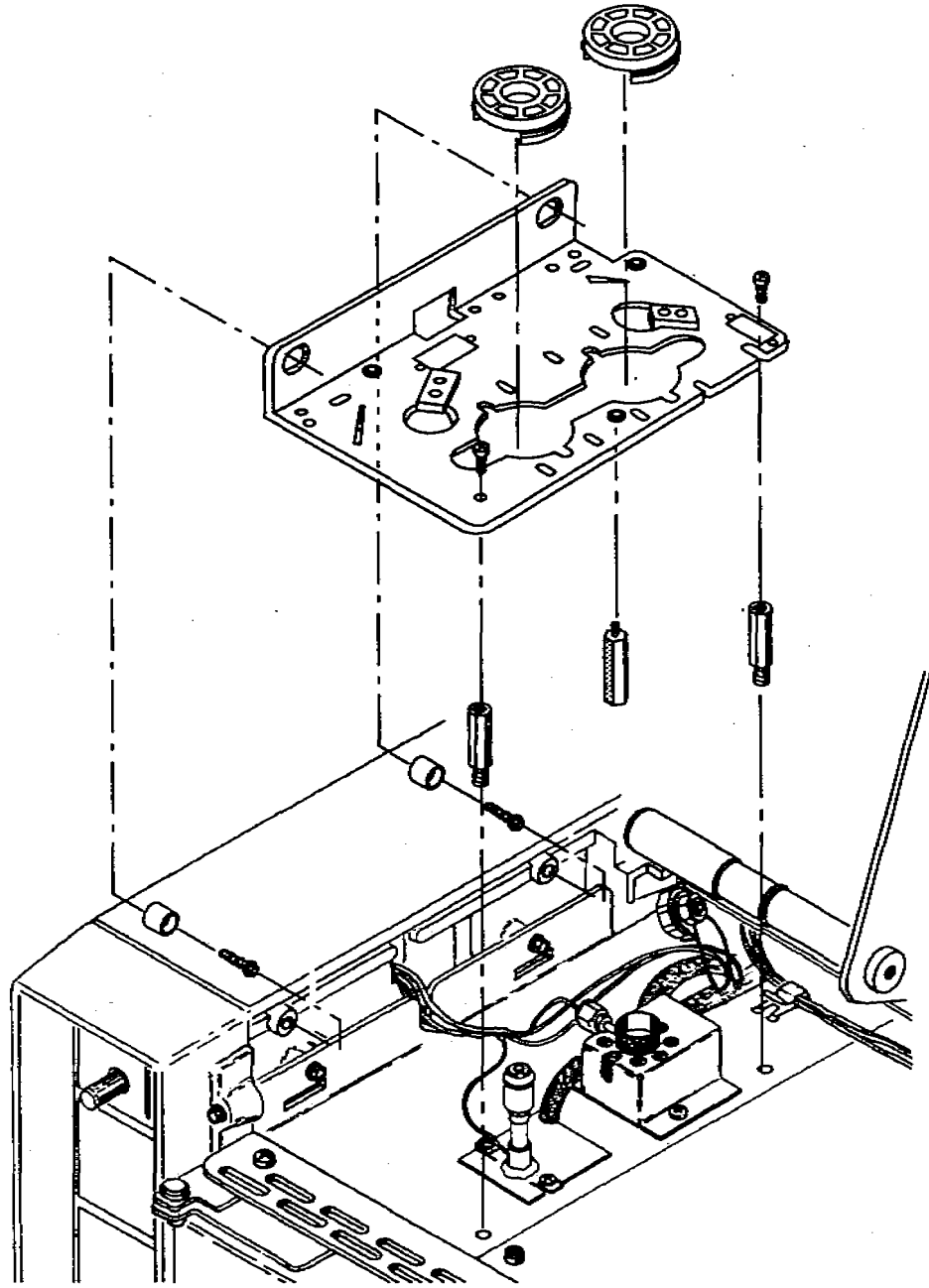
# HEWLETT-PACKARD



## HP 7673 Automatic Sampler Installing Option Boards



Exploded diagram

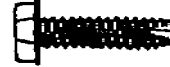


**1** Attach the Bracket Supports

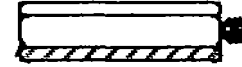
1/4-in. nut driver



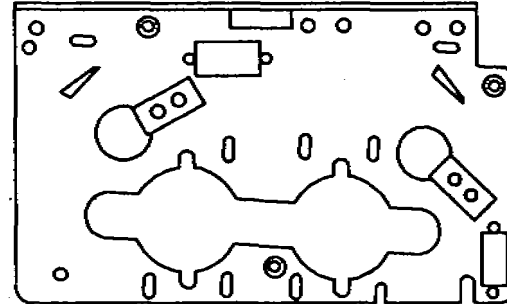
2 injector bracket bushings (18597-20735)  
( Drawn full scale )



2 self-tapping screws (0624-0546)  
( Drawn full scale )



3 standoffs (18597-20520)  
( Drawn full scale )



1 injector bracket (18597-00205)

**2** Detach the Inlet Nut

inlet wrench

**3** Place the Bracket



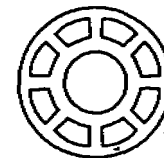
2 pan head screws (0515-0915)  
( Drawn full scale )

**4** Attach the Inlet Nut

inlet wrench

**5** Align the Bracket

no. 2 point Pozidriv screwdriver



2 alignment tools (18597-40030)

This worksheet is for installing the upgrade injector bracket to  
an HP 5890A or HP 5890 SERIES II Gas Chromatograph.

**4. Attach the Inlet Nut** (Read only if the GC has a split/splitless inlet.  
If not, skip to step 5.)

- a. Route the gas lines on the inlet nut over the mounting bracket. For most configurations, the gas lines should be routed over the front or right-rear corner of the bracket.

The gas lines must not interfere with the mounting of the injector. If necessary, gently bend the gas lines.

- b. Push the inlet nut down and turn it clockwise. Tighten it with the inlet wrench.

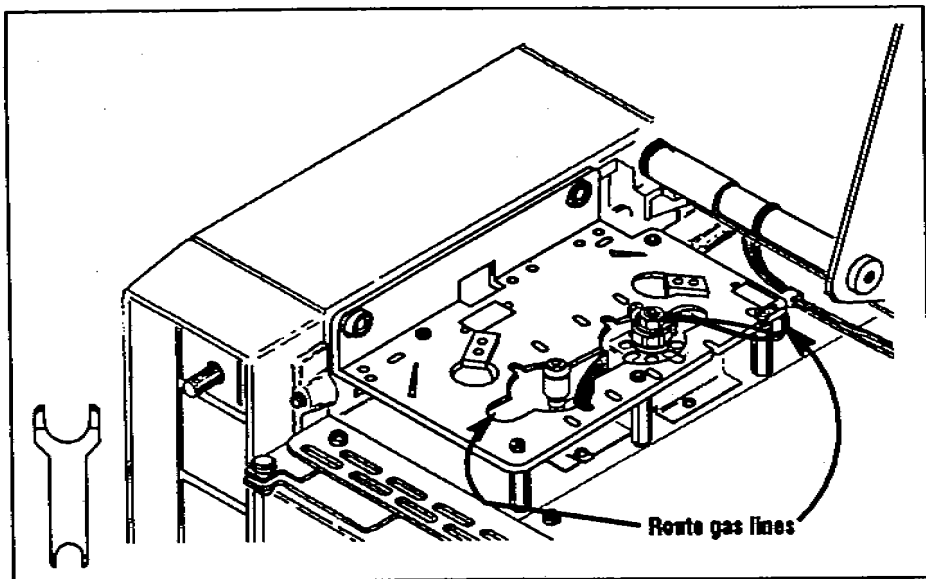


Figure 7. Route the gas lines over the bracket and reattach the inlet nut.

**5. Align the Bracket**

- a. Place the plastic alignment tool(s), honeycombed side up, over the inlet(s) of your GC. Move the bracket until both alignment tools fit flush on the bracket. If you cannot make them fit flush by moving the bracket, you may have to adjust the position of the inlets.
- b. Tighten the two screws that hold down the bracket with a no. 2 point Pozidriv screwdriver. Remove and save the bracket alignment tools for future adjustments.

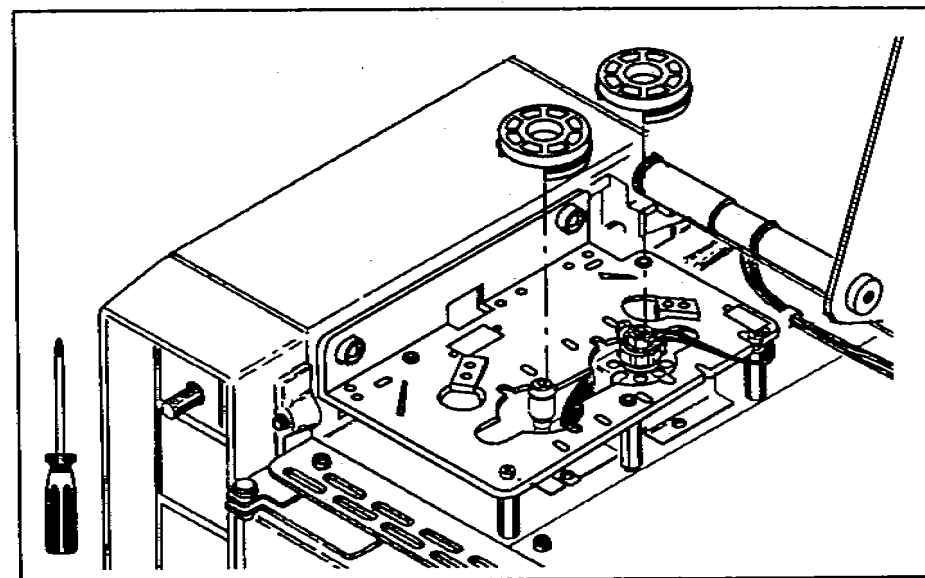


Figure 8. Align the bracket and tighten the screws.

**6. Check Your Work**

Turn to page 16 and check your work.



## Installing on HP 5880A GCs

This section reviews the steps for installing the upgrade injector bracket and shows an exploded view. For detailed instructions, refer to the link manual "Installing and Operating the Injector and Tray on HP 5880A GCs" (part number 07673-90235). Some of the parts are packaged with the upgrade bracket and the rest with the HP 5880A injector/tray mounting hardware (part number 18597-60675).

The exploded view on the next page shows the bracket being installed over positions B and D.

Complete the following steps to install the upgrade injector bracket.

1. Remove the existing injector bracket and bracket supports.
2. Replace the pan head screws that hold the inlets to the GC top cover with the appropriate standoffs (small hexagonal posts).
  - For a **packed inlet**, use the small standoffs.
  - For a **capillary inlet**, use the large standoffs.
  - For a position without an inlet, attach the piece of sheet metal and two large standoffs.
3. Attach two large standoffs to the bottom of the bracket.
4. Place the bracket.
5. Align the bracket.
6. The next step is to install the tray bracket.

### 3. Place the Bracket

- a. Hold the bracket with the bend on the left side and slide it onto the cylinders that you attached to the side wall in step 1. Allow the bracket to rest on top of the standoffs.

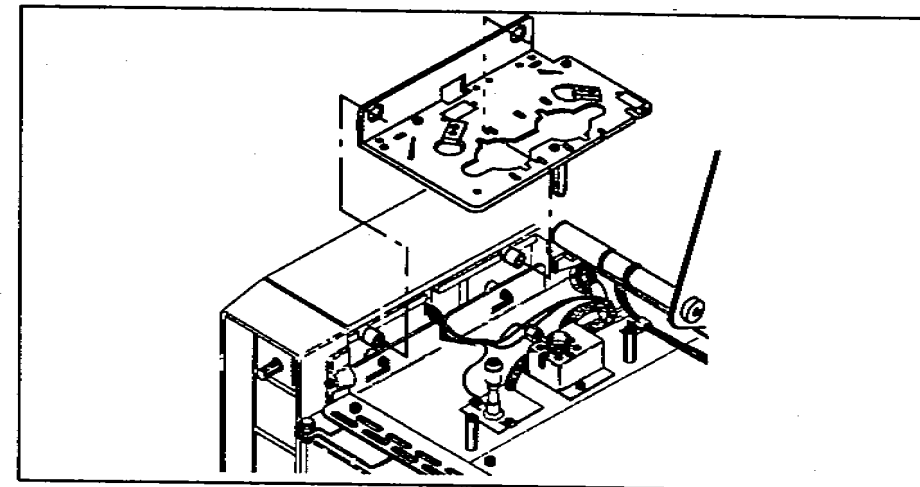


Figure 5. Placing the mounting bracket on the GC.

- b. Line up the top of the standoffs with the hole and slot on the bracket. Screw the pan head screws into the threaded holes of the standoffs. Do not tighten the screws until step 5.

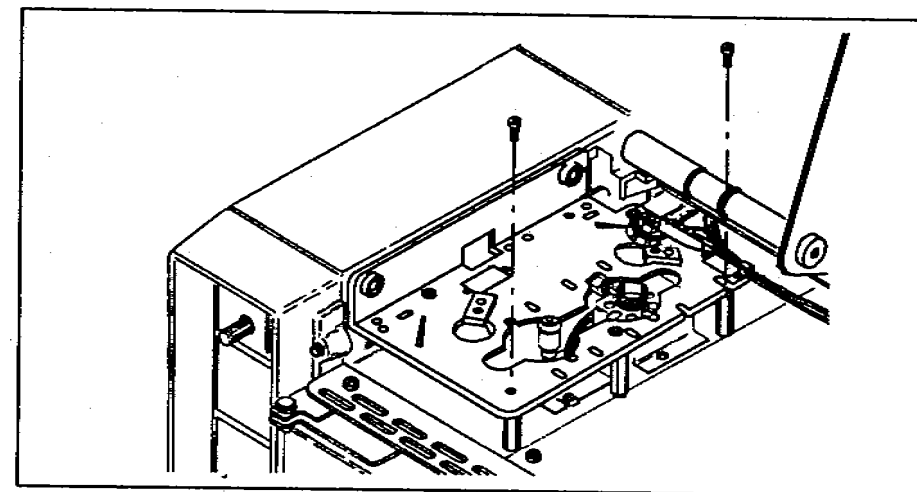


Figure 6. Start the pan head screws into the standoffs.

2. Detach the Inlet Nut (Read only if the GC has a split/splitless inlet. If not, skip to step 3.)

For a **split/splitless inlet**, route the gas lines over the bracket. If you do not, you cannot replace the inlet liner without removing the bracket.

**CAUTION**

Turn off the gas flows before you remove the inlet nut or you may damage the packing in the inlet liner. Avoid contaminating the inlet while it is uncovered.

- a. Loosen the inlet nut with the inlet wrench. Turn the nut counterclockwise until it is off the threads and lift it out of the way. The braze joints that hold the gas lines to the inlet are fragile.

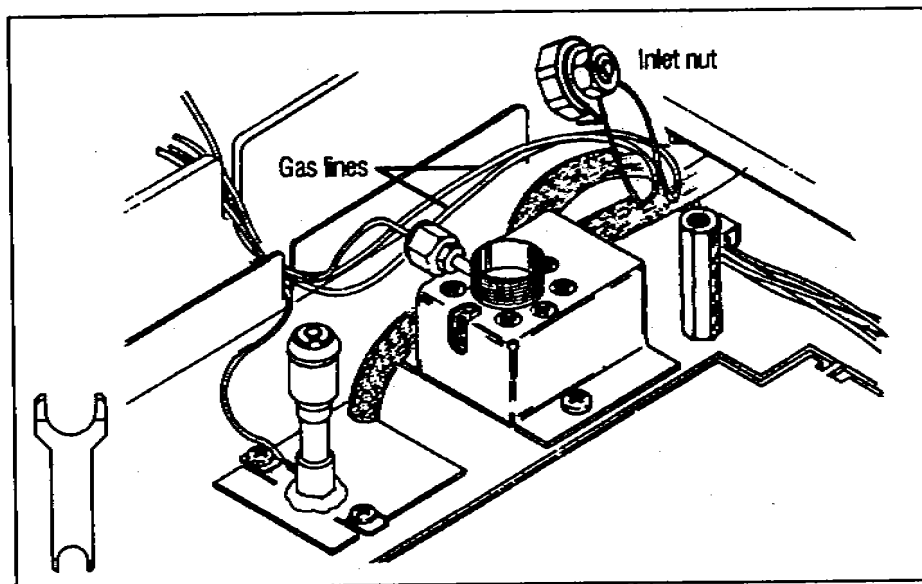


Figure 4. Detach the inlet nut and lift it out of the way.

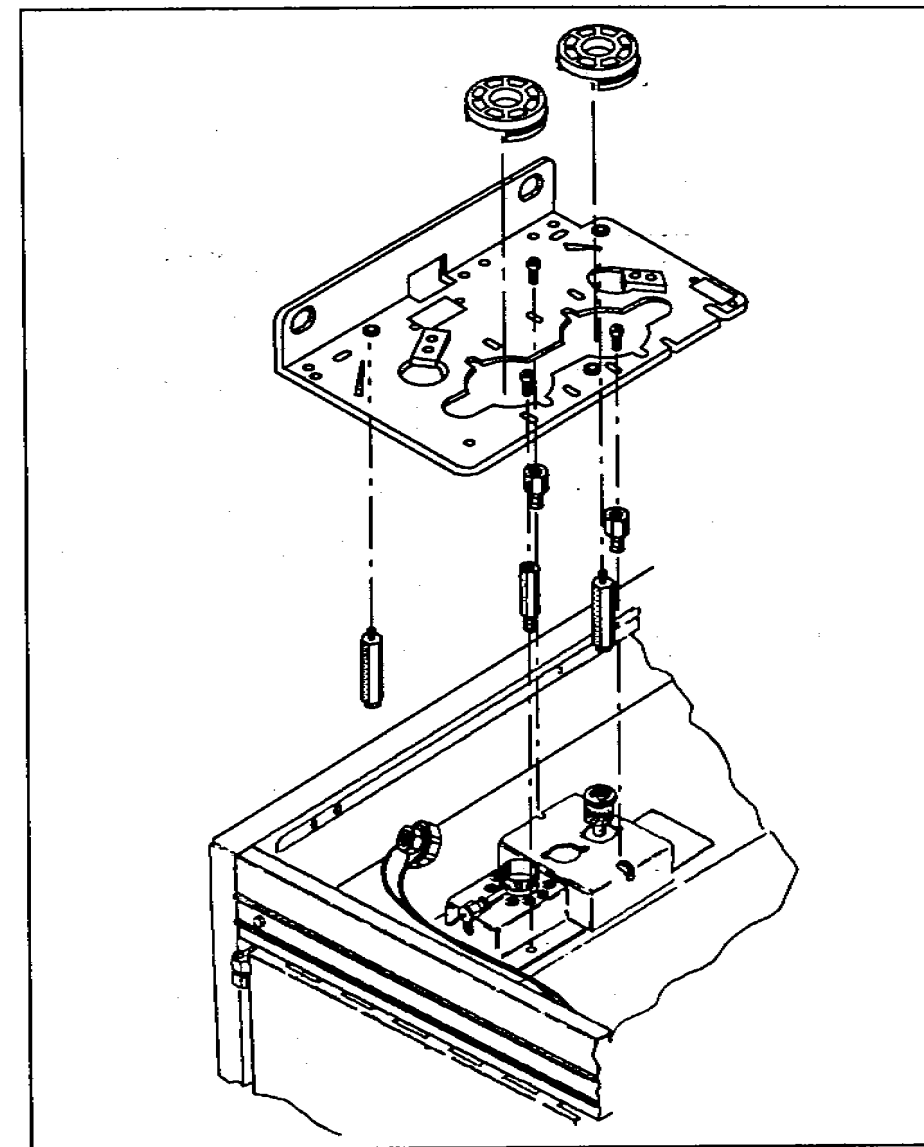


Figure 9. Installing the upgrade bracket on an HP 5880A GC.

## Installing on HP 5710/30/90 GCs

This section reviews the steps for installing the upgrade injector bracket and shows an exploded view. For detailed instructions, refer to the link manual "Installing and Connecting the Injector and Tray on HP 5710/30/90 GCs" (part number 07673-90225).

You can mount only one injector on an HP 5710/30/90. To mount the injector over the front inlet (i.e., in the A position), install the bracket over the rear set of threaded holes. To mount the injector over the rear inlet (i.e., in the B position), install the bracket over the front set of threaded holes.

Complete the following steps to install the upgrade injector bracket.

1. Remove the existing bracket and replace the GC top cover.
2. Attach the plugs and septum nut.
3. Attach the appropriate standoffs (small hexagonal posts).
  - For a **packed inlet**, use the medium-sized standoffs to support the tray, but do not use any standoffs to support the injector bracket. The injector can only be used with a packed port in the B position.
  - For a **capillary inlet**, use the largest standoffs to support the tray and the smallest standoffs to support the injector bracket.
4. Attach the injector bracket.
5. Align the bracket.
6. The next step is to install the tray bracket.

- e. Screw one standoff onto the bottom of the mounting bracket to act as a support leg. The hole has a silver-colored perm (small threaded washer) on the top, right-hand side of the bracket. Tighten the standoff with a 1/4-in. nut driver.

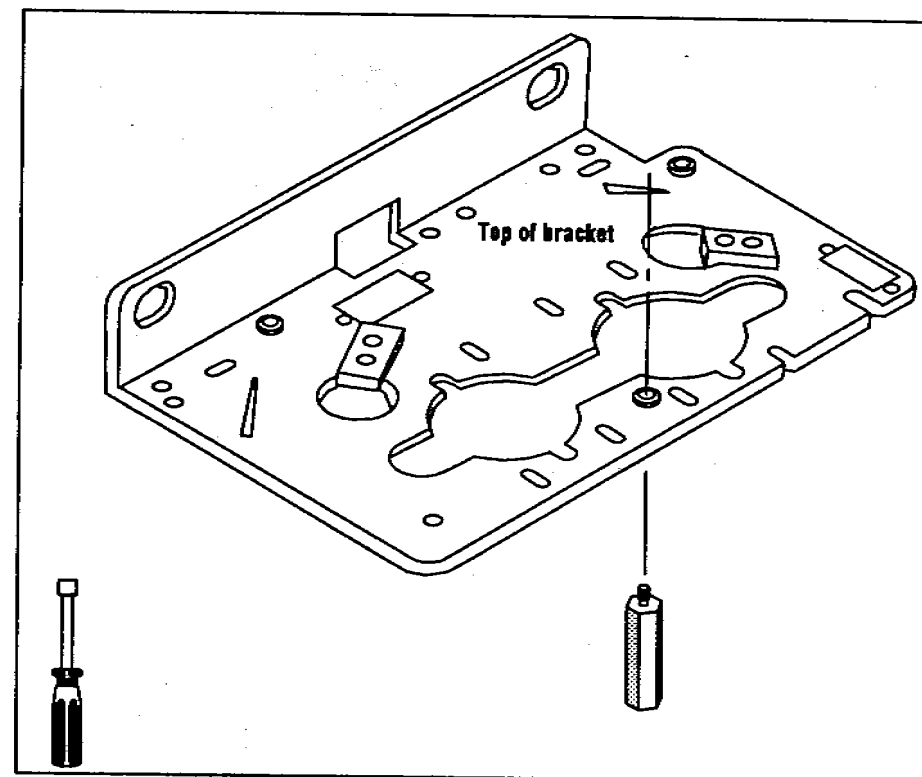


Figure 3. Attach the standoff to the bottom of the mounting bracket.

If a **purged packed inlet** is installed on the GC, this standoff could interfere with the heat sink (metal fins) around the inlet. If necessary, use only the left-hand side of the heat sink.

If **HP 5890 SERIES II cool on-column inlets** are installed in both the front and rear positions of the GC, do not install this standoff. Without this standoff, the stability of an injector in the rear position may be affected.

- d. Screw two of the standoffs (small hexagonal posts) into the threaded holes located near the inlets. Tighten them with a 1/4-in. nut driver.

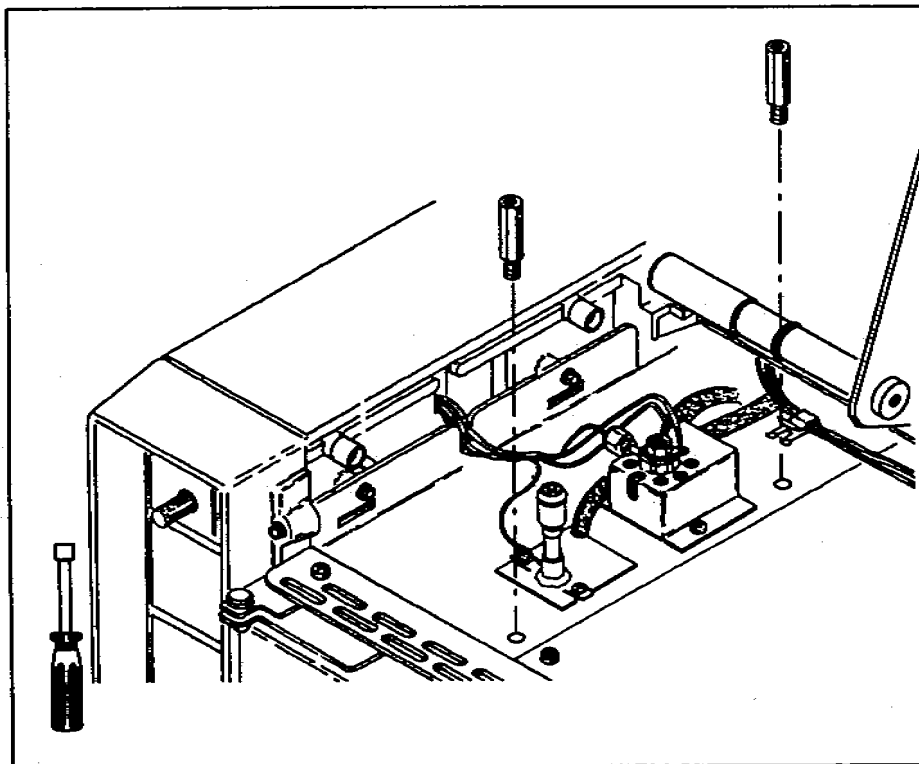


Figure 2. Attach the standoffs near the inlets.

If the rear inlet is an HP 5890 SERIES II cool on-column inlet (Accessory Kit 19245B or 19245C) on an HP 5890A GC, use a short standoff in the rear position (part number 19245-20760). This standoff is packaged with the accessory kit.

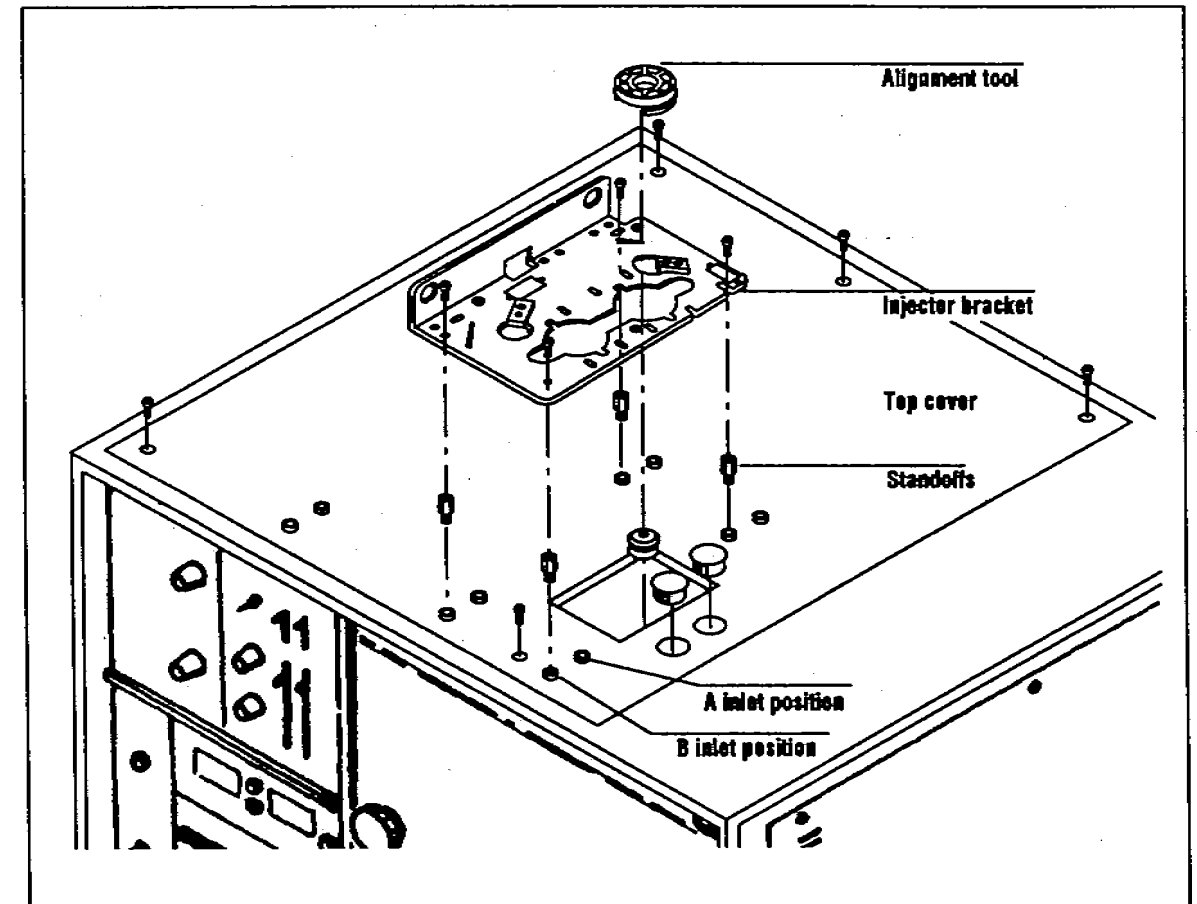


Figure 10. Installing the upgrade bracket on an HP 5710/30/90 GC.

## Checking Your Work

Double-check the following:

- If the GC has a split/splitless inlet, check the inlet nut.
- If the GC has an on-column inlet, be sure you have the correct inlet top—either the cooling tower or the septum nut base assembly with the needle guide top.
- If gas lines are routed over the bracket, be sure the lines are placed according to figure 7 on page 10.
- Check that the following are tight:
  - Self-tapping screws.
  - Pan head screws.

The next step is to install the tray bracket. Refer to "Installing the Tray Bracket on 5890 GCs" (part number 07673-90205).

### 1. Attach the Injector Bracket Supports

If installing on an HP 5890A GC, you must first install the HP 5890 SERIES II split top cover. You must also remove the existing injector bracket and supports.

- a. Remove the port pan of the split top cover by inserting a finger into the U-shaped cut on the panel and pulling up.
- b. Lift up the right-hand side of the top cover.
- c. Using a 1/4-in. nut driver and the two self-tapping screws, attach the two small cylinders onto the left side wall of the chromatograph.

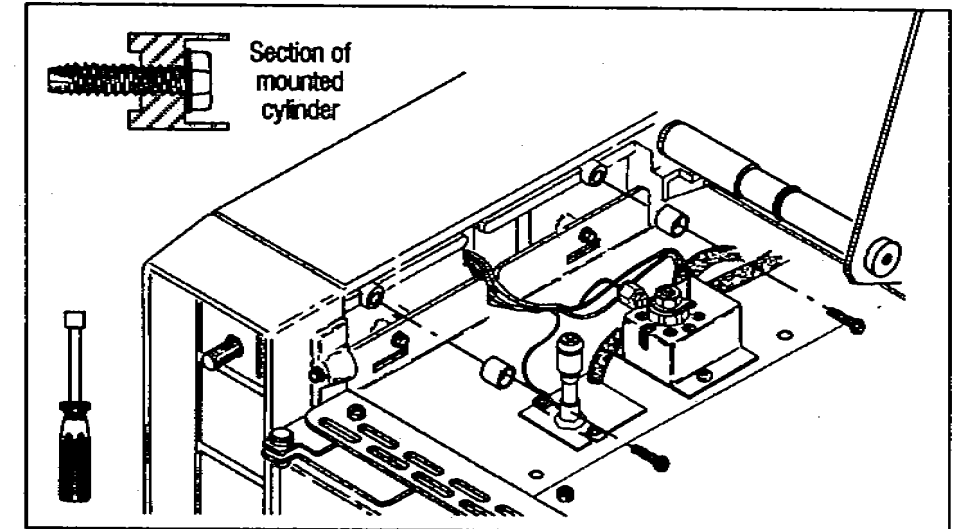
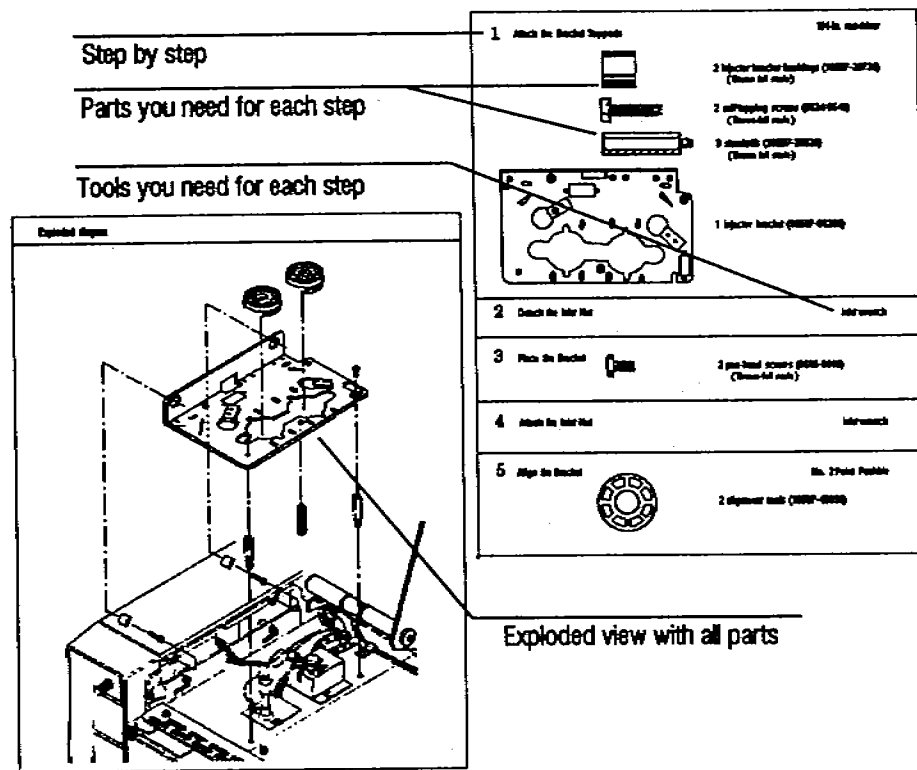


Figure 1. Attach the cylinders to the side of the GC.

## Installing on HP 5890 GCs

Pull out the yellow worksheet from the center of this link manual. Organize the hardware and tools for each step. Full-scale drawings of the screws help identify which ones you need for each step. If any of the hardware is missing, contact your HP representative.



3. Install the upgrade injector bracket. Instructions are in this link manual.
  - For an HP 5890A or SERIES II GC, turn to page 4.
  - For an HP 5880A GC, turn to page 12.
  - For an HP 5710/30/90 GC, turn to page 14.
4. Install the tray bracket. Instructions are packaged with the tray bracket.

## Before You Start

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The upgrade injector bracket enables you to install an HP 18596B Tray Module to deliver sample bottles to one or two HP 18593A Injector Modules.

### WARNING

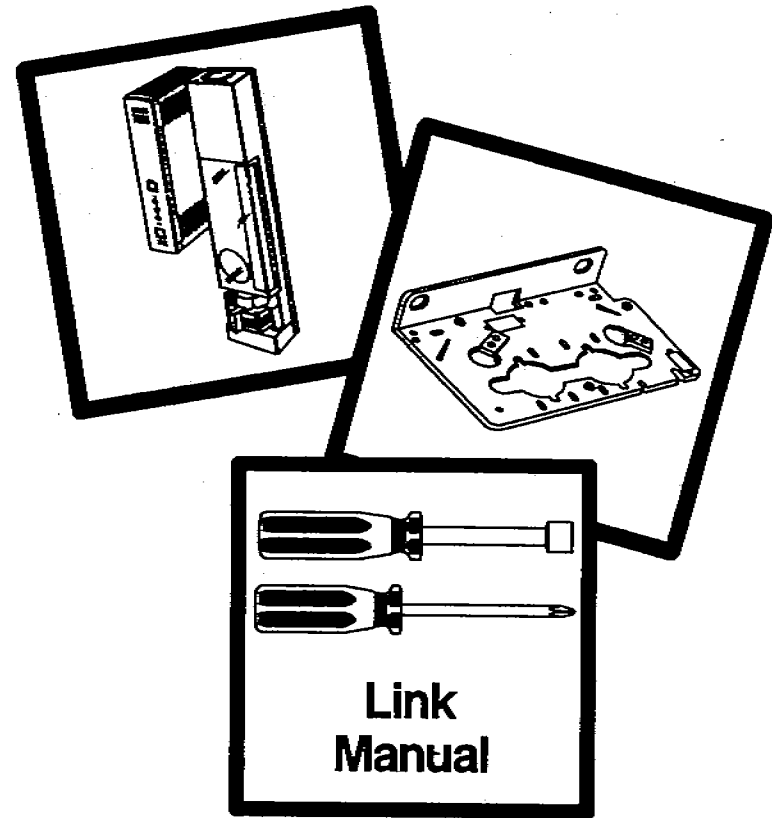
**ALLOW THE INLETS AND OVEN TO COOL BEFORE INSTALLING THE UPGRADE INJECTOR BRACKET. THE METAL SURFACES OF THE GC ARE VERY HOT AND COULD BURN YOUR SKIN. IF YOU HAVE A SPLIT/SPLITLESS INLET, YOU COULD DAMAGE THE COLUMN.**

In order to install the tray, you must:

1. Remove the existing injector bracket.
2. Install any necessary upgrades to your gas chromatograph (GC).
  - Before installing the upgrade injector bracket on an HP 5890 SERIES II GC with a serial number less than 2938Axxxx, you must first install the new left side panel (part number 18597-60705).
  - Before installing the upgrade injector bracket on an HP 5890A, you must first install the split top cover (part number 07673-61065) and the left side panel (part number 18597-60705).
  - Before installing the upgrade injector bracket on an HP 5710/30/90 GC, you must replace the GC's top cover with the new top cover.



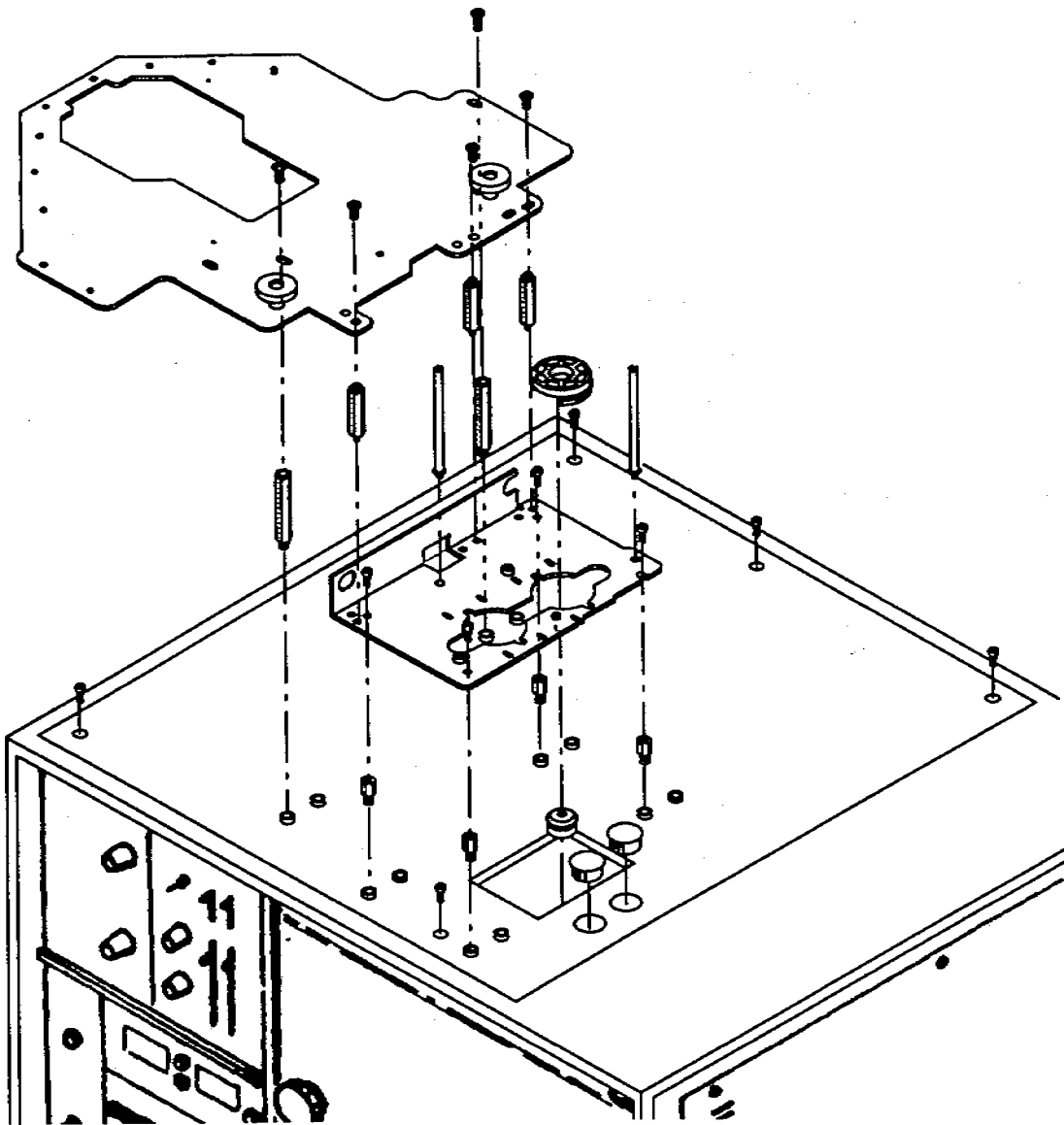
# HEWLETT-PACKARD



## HP 7673 Automatic Sampler Installing the Upgrade Injector Bracket



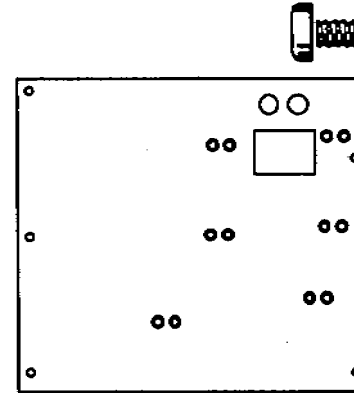
Exploded diagram



1 Replace the GC Top Cover

No. 2 point Pozidriv

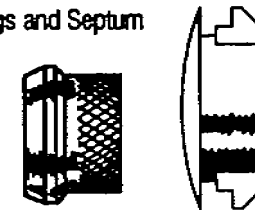
5 pan head screws (2510-0099)  
(drawn full scale)



1 top cover (18597-00185)

2 Attach the Plugs and Septum

2 plugs (6960-0085)  
(drawn full scale)



1 septum nut (18597-20670)  
(Drawn full scale)

3 Attach the Bracket Supports

1/4-in. nut driver

4 standoffs (18597-20660)  
(drawn full scale)



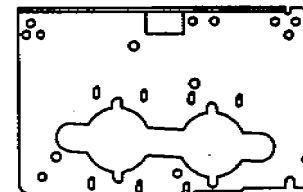
2 standoffs (18597-20650)  
(drawn full scale)

2 Standoffs (18597-20640) with packed inlet  
(Drawn full scale)

4 Attach the Injector Bracket

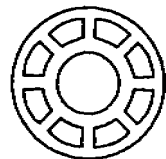
No. 2 point Pozidriv

4 pan head screws (2510-0099)  
(drawn full scale)



1 injector bracket (18957-00175)

5 Align the Bracket



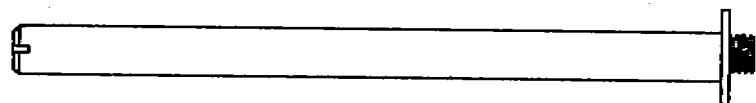
No. 2 point Pozidriv

2 alignment tools (18597-40030)

6 Attach the Mounting Posts

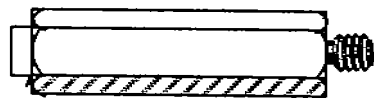
Flat head screwdriver

2 mounting posts (07673-61035)



7 Attach the Tray Standoffs

3/8-in. Crescent wrench



3 standoffs (18597-20710)  
(drawn full scale)

8 Attach the Tray Bracket

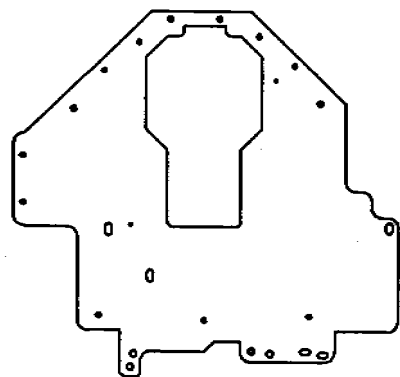
No. 2 point Pozidriv

1 tray bracket (18597-60515)

3 pan head screws (0515-0915)  
(drawn full scale)

1 pan head screw (2510-0099)  
(drawn full scale)

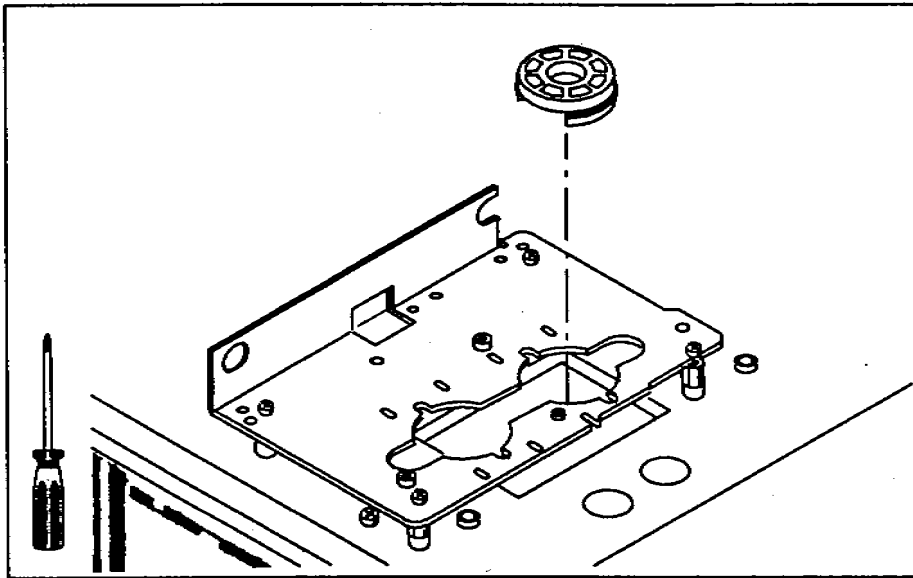
1 flat head screw (2510-0121)  
(drawn full scale)



This worksheet is for installing the mounting brackets for the HP 18593B Injector Module and the HP 18596B Tray Module to an HP 5710/30/90 Gas Chromatograph.

## 5. Align the Bracket

- a. Place the plastic alignment tool, honeycombed side up, over the inlet of your GC. Move the bracket until the alignment tool fits flush on the bracket. If you cannot make it fit flush by moving the bracket, you may have to adjust the position of the inlet.
- b. Tighten the four screws that hold down the bracket with a no. 2 point Pozidriv. Remove and save the bracket alignment tool for future adjustments.

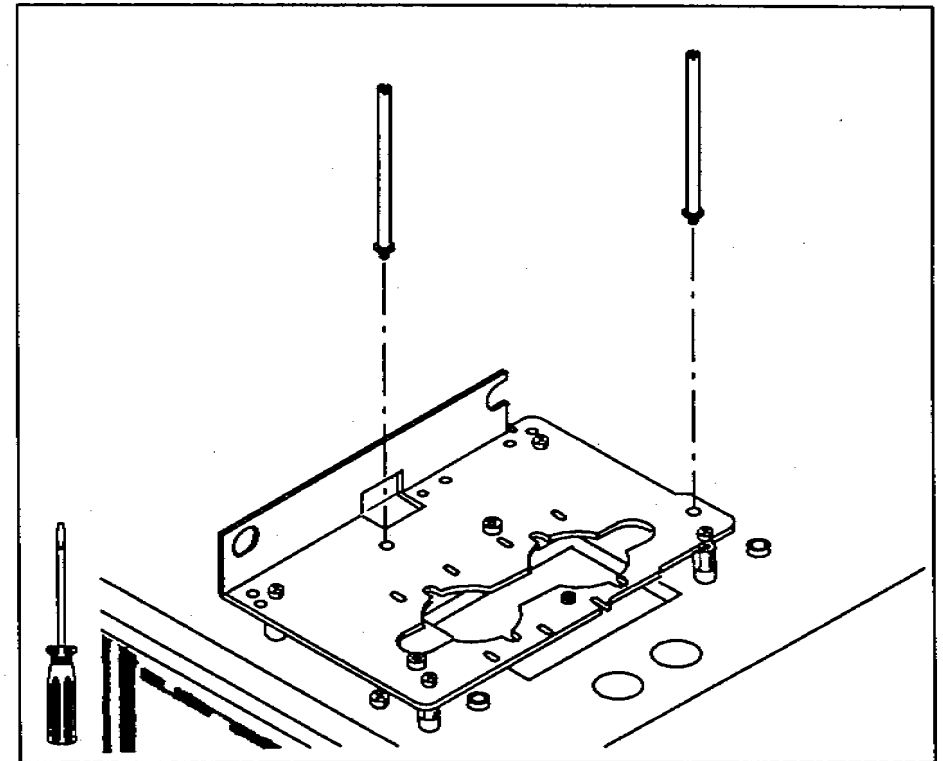


## 6. Attach the Mounting Posts

- a. Screw each mounting post clockwise into the threaded holes of the bracket. Tighten the posts with a flathead screwdriver.

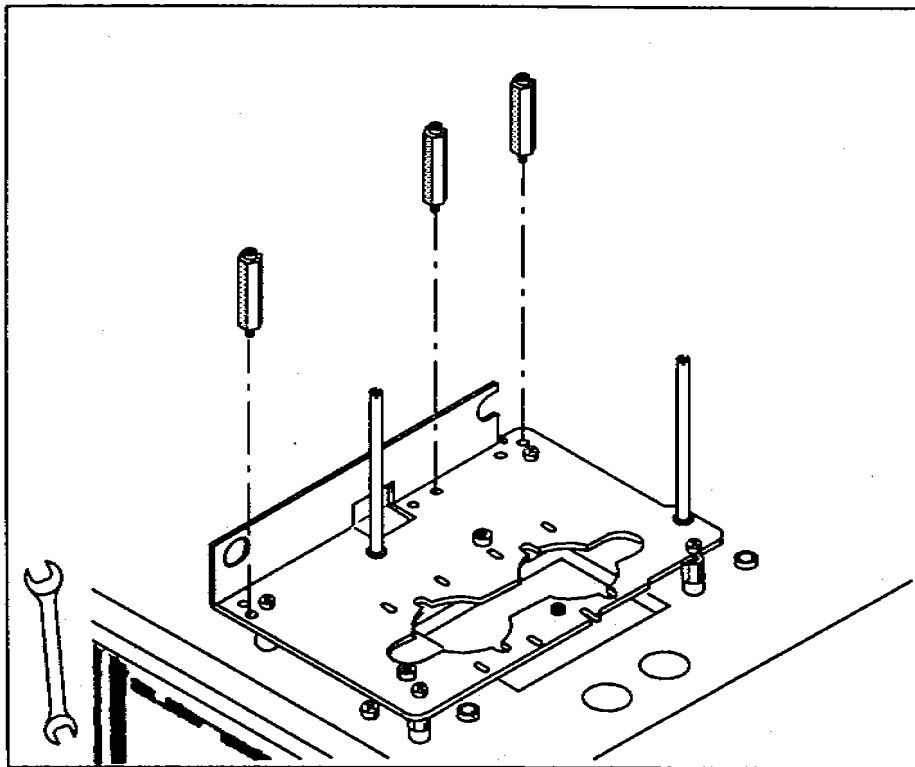
If you are installing the tray bracket, continue on the next page.

If you are not installing the tray bracket, turn to page 12.



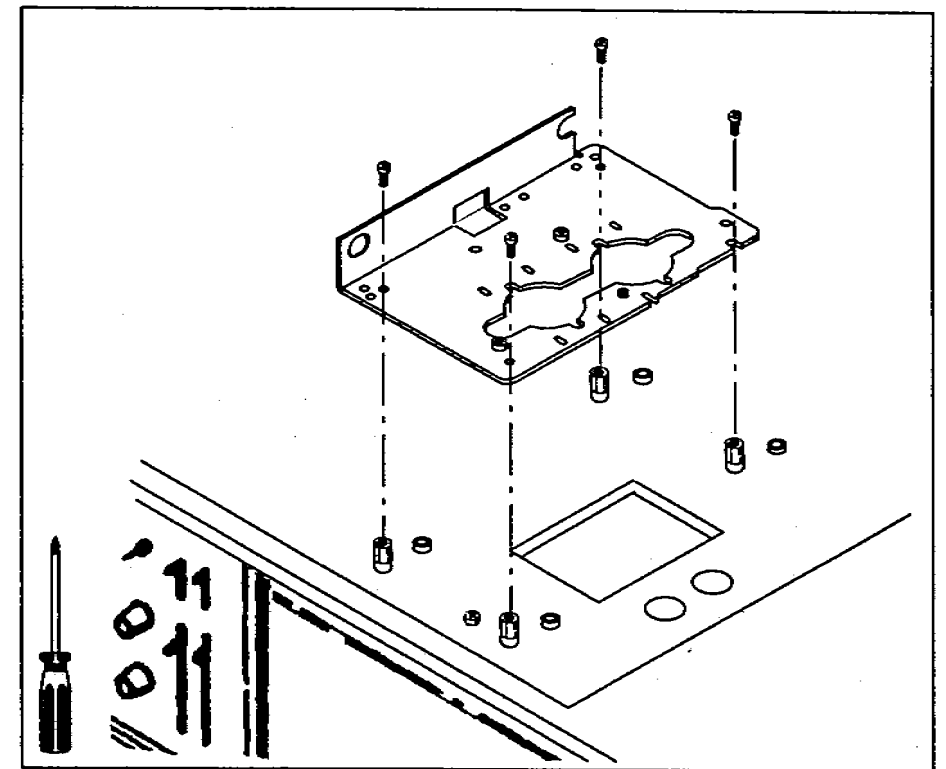
## 7. Attach the Tray Standoffs

- a. Screw the three standoffs (hexagonal posts) into the injector mounting bracket. Use the holes identified in the illustration. If you do not use the correct holes, the tray will not be able to deliver sample vials to the injector.
- b. Tighten the standoffs with a 3/8-in. crescent wrench.



## 4. Attach the Injector Bracket

- a. Hold the bracket with the bend on the left side. Allow the bracket to rest on top of the threaded washers or standoffs.
- b. Line up the top of the threaded washers or standoffs with the holes on the bracket. Screw the pan head screws (English thread) into the threaded holes of the standoffs.

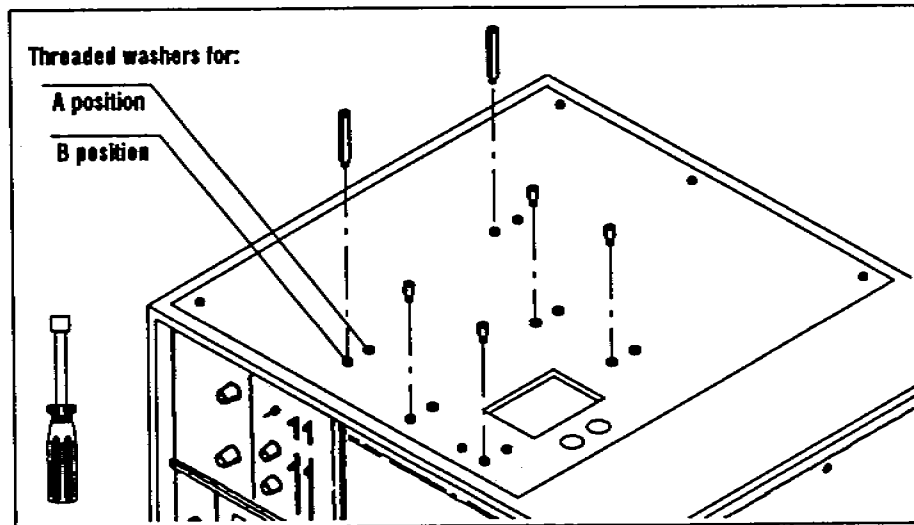


### 3. Attach the Bracket Supports

The injector and tray brackets are supported by standoffs (small hexagonal posts) that screw into threaded washers attached to the top cover. Which threaded washers you use depends on the type and position of the inlet.

- For a **packed inlet** use the two medium-sized standoffs (part number 18597-20640) to support the tray, but do not use any standoffs to support the injector bracket. The injector can be used with a packed port in the B position, but not with one in the A position.
  - For a **capillary inlet** use the two largest standoffs (part number 18597-20650) to support the tray and the two smallest standoffs (part number 18597-20660) to support the injector bracket.
  - For an inlet in the **A position** attach any standoffs to the rear set of threaded washers.
  - For an inlet in the **B position** attach any standoffs to the front set of threaded washers.
- a. Attach the necessary standoffs to the threaded washers on the top cover that you installed in step 1.
  - b. Tighten the standoffs with a 1/4-in. nut driver.

Save any standoffs you do not use for future adjustments or for different configurations.

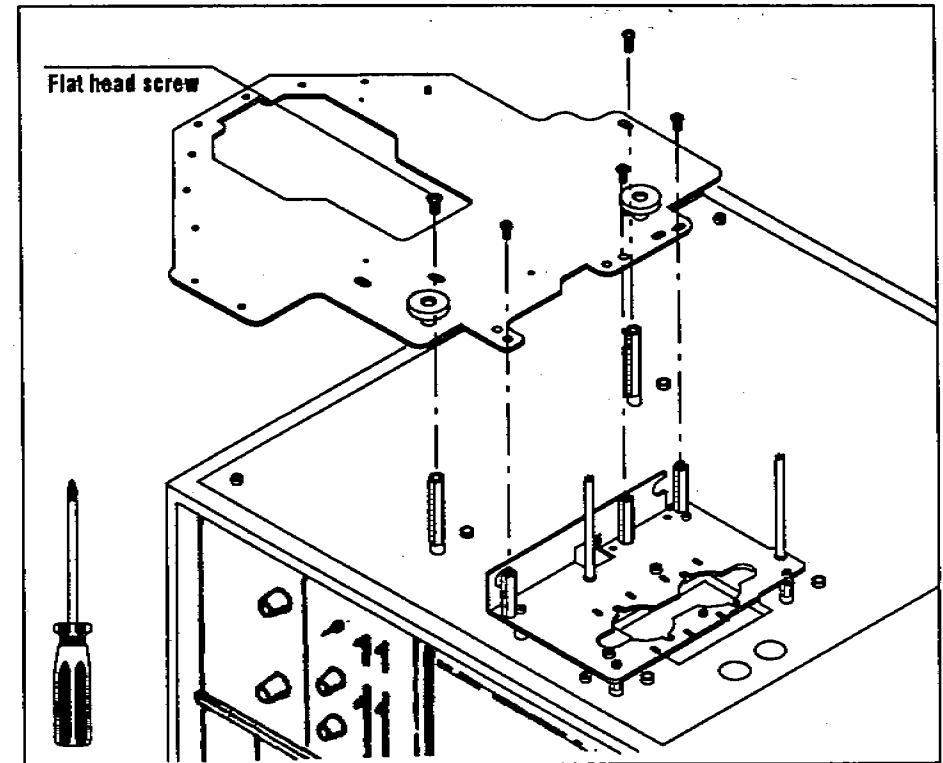


### 8. Attach the Tray Bracket

- a. Place the tray bracket on the five standoffs installed in steps 3 and 7.

If the top of the standoffs do not line up with the holes labeled with the letter A, check the location of the standoffs against the figure on page 10.

- b. Using a no. 2 point Pozidriv, screw in the three pan head screws (metric thread) through the holes labeled A and into the standoffs.
- c. Line up the hole on the far side of the tray bracket (labeled 5700) with the threaded hole of the rear standoff. Screw one pan head screw (English thread) into the mounting support with a no. 2 point Pozidriv.
- d. Line up the hole on the near side of the tray bracket (labeled 5700) with the threaded hole of the front standoff. Screw one flat head screw (English thread) into the mounting support with a no. 2 point Pozidriv.



## Checking Your Work

Double-check the following:

- The new septum nut is properly installed.
- The three screws that attach the tray bracket to the standoffs on the injector bracket must go through the holes labeled A on the tray bracket.
- The flat head screw for attaching the tray bracket is in the correct position. See page 11.
- All screws and standoffs are tight.

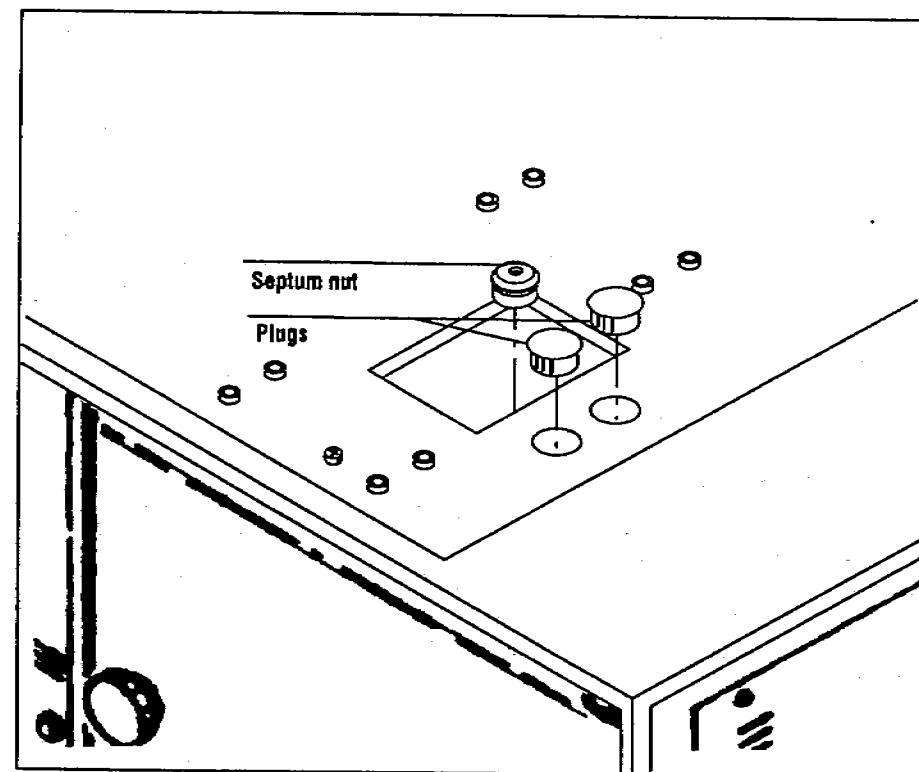
For detailed information on mounting and connecting the injector and tray, see chapter 1, "Setting Up", in your operating manual.

After you have completed the installation, place this link manual in the binder of your operating manual for the HP 7673 Automatic Sampler (part number 07673-60995) after the tab for appendix C "Link Manuals."

## 2. Attach the Plugs and Septum Nut

With the HP 5710/30/90 GC, the automatic sampler is limited to delivering sample to one inlet and cannot be used with an on-column inlet.

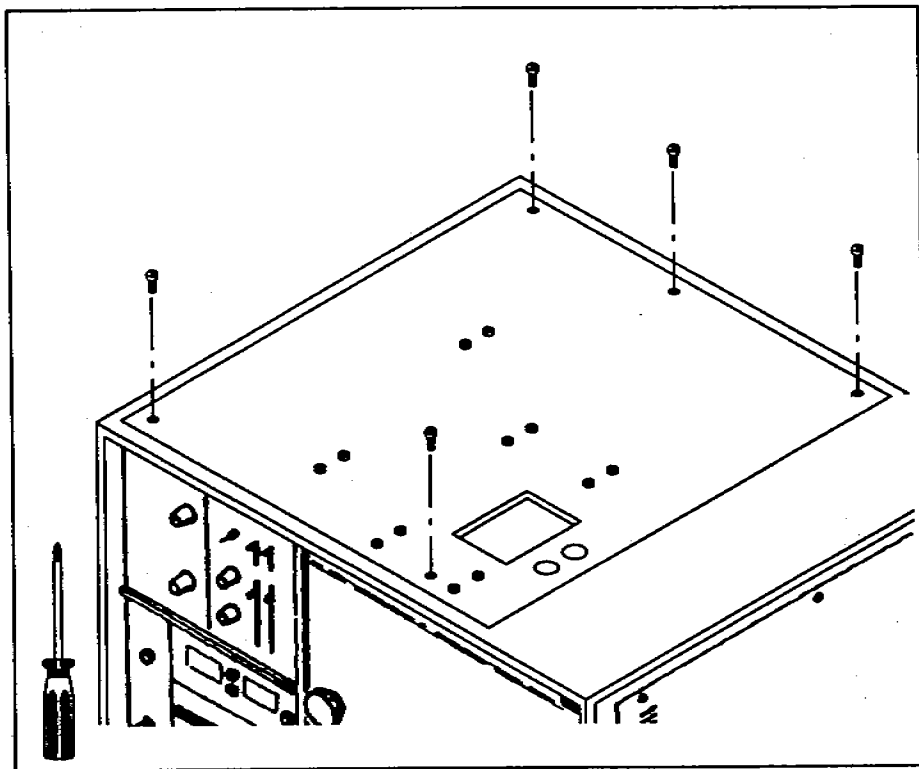
- a. There are two holes on the right-hand side of the top cover for an on-column capillary inlet. Cover one or both holes with the plastic plugs.
- b. Replace the existing septum nut with the one supplied in this kit.



## 1. Replace the GC Top Cover

To replace the top cover, you may have to remove hardware that is attached to the existing top cover (e.g., the inlet control module).

- a. Using a no. 2 point Pozidriv, remove the 5 screws that hold on the top cover of the GC.
- b. Lift off the existing top cover.
- c. Position the new top cover.
- d. Using a no. 2 point Pozidriv, attach the top cover with 5 screws (English thread).

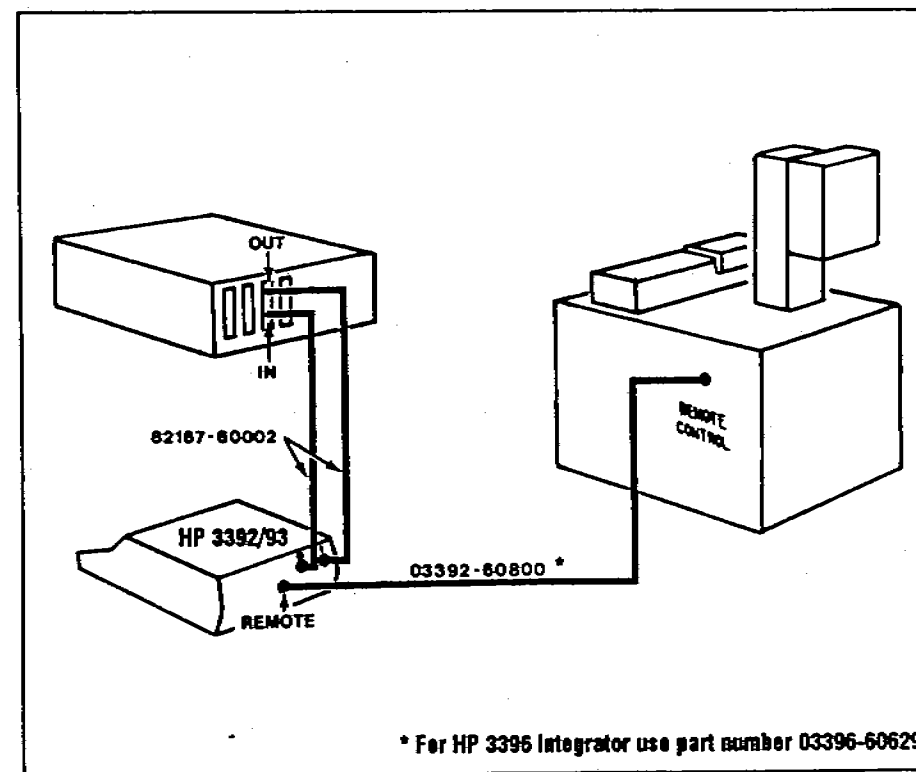


## Connecting the Cables

The type of data-handling device and communications configuration that you use determines how you connect the automatic sampler to the HP 5710/30/90 GCs. This section contains diagrams for controlling with the instrument network (INET) or with stand-alone control.

### Instrument Network (INET)

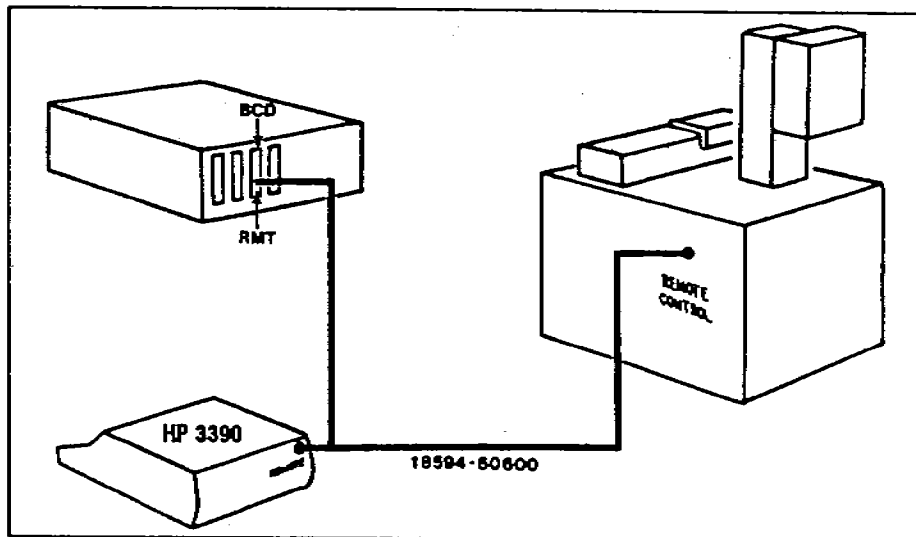
Connect the INET cables between the INET board in the controller and the integrator. Connect the remote start/stop cable between the integrator and the GC.



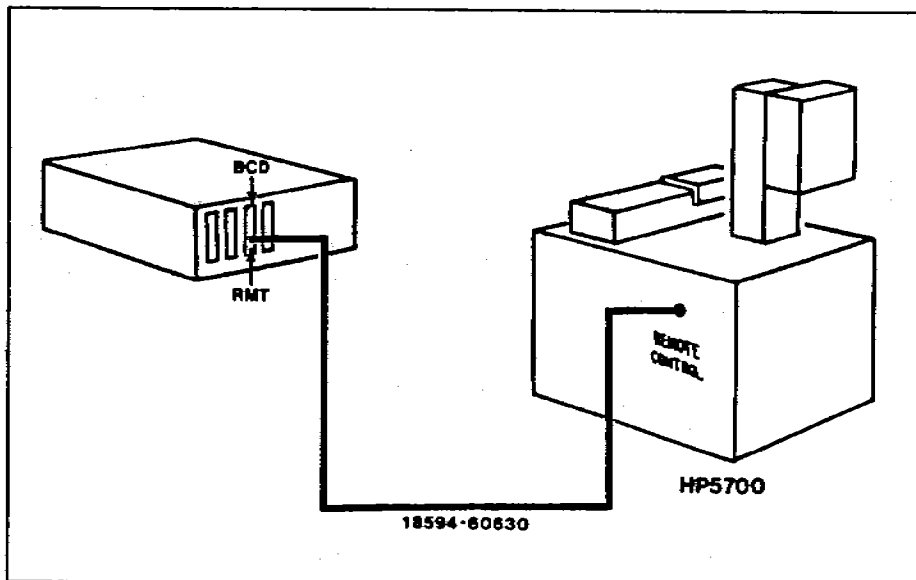


### Stand-alone Control with a Remote Start/Stop Signal

Connect the remote start/stop cable between a chart recorder or integrator and the GC with a "Y" cable.



Without a chart recorder, connect a cable between the controller and the GC.



## Installing the Brackets

Your special hardware kit contains all of the hardware you need to install the new top cover, the injector bracket, and the tray bracket for the automatic sampler, except for the brackets. Find the injector bracket in the controller box and the tray bracket in the tray box.

Pull out the yellow worksheet from the center of this link manual. Organize the hardware and tools for each step. Full-scale drawings of the screws help identify which ones you need for each step. If any of the hardware is missing, contact your HP representative.

Step by step

Parts you need for each step

Tools you need for each step

Exploded view with all parts

1	Attach the GC Top Cover	No. 2 Phillips 4 pan head screws (2570-0000) (shown full scale)	1 top cover (2887-0000)
2	Attach the Plug-in Injector	2 slugs (2550-0000) (shown full scale) 1 screw nut (2857-2827) (shown full scale)	
3	Attach the Bracket Supports	4 screws (2570-0000) (shown full scale) 2 screws (2570-0000) (shown full scale) 2 screws (2857-2800) with partial tabs (shown full scale)	
4	Attach the Injector Bracket	No. 2 Phillips 4 pan head screws (2570-0000) (shown full scale)	1 injector bracket (2857-0007)

## Before You Start

This manual contains the following information:

- Instructions for installing the new top cover on an HP 5710/30/90 Gas Chromatograph (GC).
- Instructions for installing the mounting brackets for the HP 18593B Injector Module and HP18596B Tray Module on an HP 5710/30/90 GC.
- Sample diagrams for connecting the cables for the automatic sampler to an HP 5710/30/90 GC.

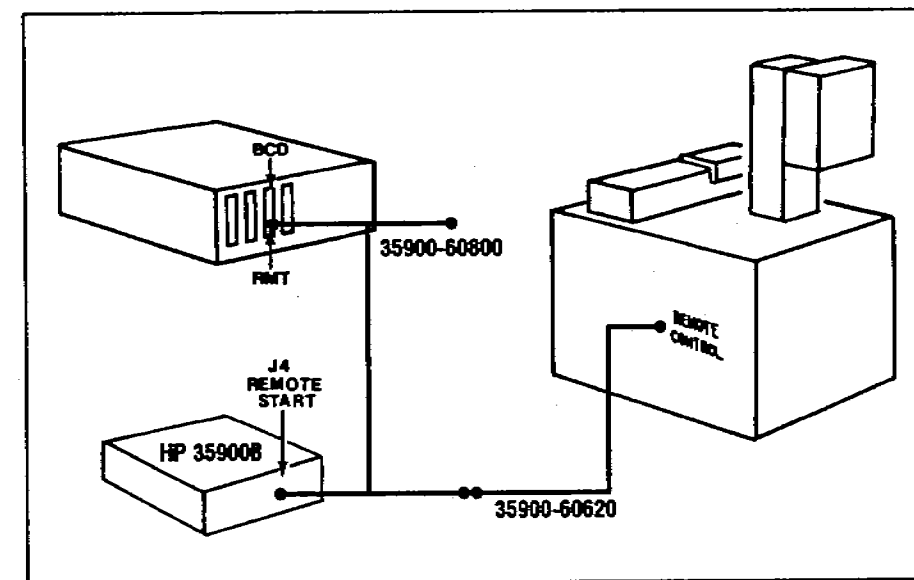
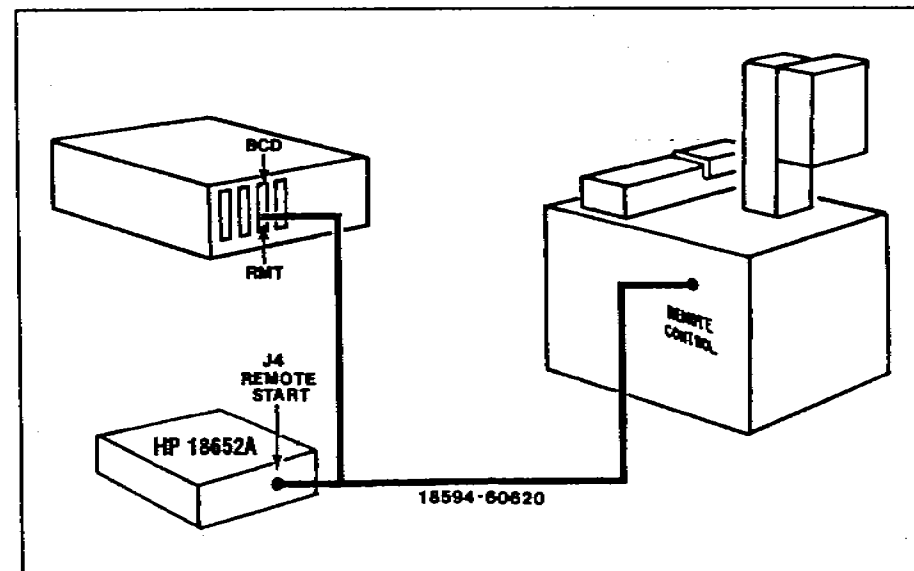
You can mount only one injector on an HP 5710/30/90. To mount the injector over the front inlet (i.e., in the A position), install the bracket over the rear set of threaded holes. To mount the injector over the rear inlet (i.e., in the B position), install the bracket over the front set of threaded holes.

To change the position of the injector, you must change the position of the mounting bracket.

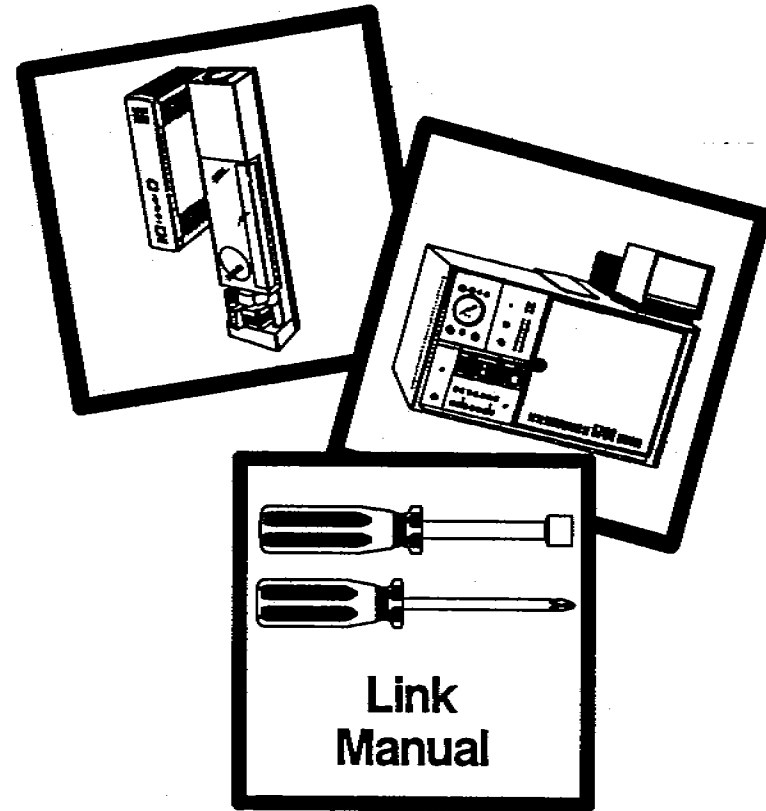
### WARNING

ALLOW THE INLETS AND OVEN TO COOL BEFORE INSTALLING THE NEW TOP COVER AND INJECTOR MOUNTING BRACKET. THE METAL SURFACES OF THE GC ARE VERY HOT AND COULD BURN YOUR SKIN.

With an A/D converter, connect the three instruments with the appropriate cable or cables. The following illustrations show two examples.



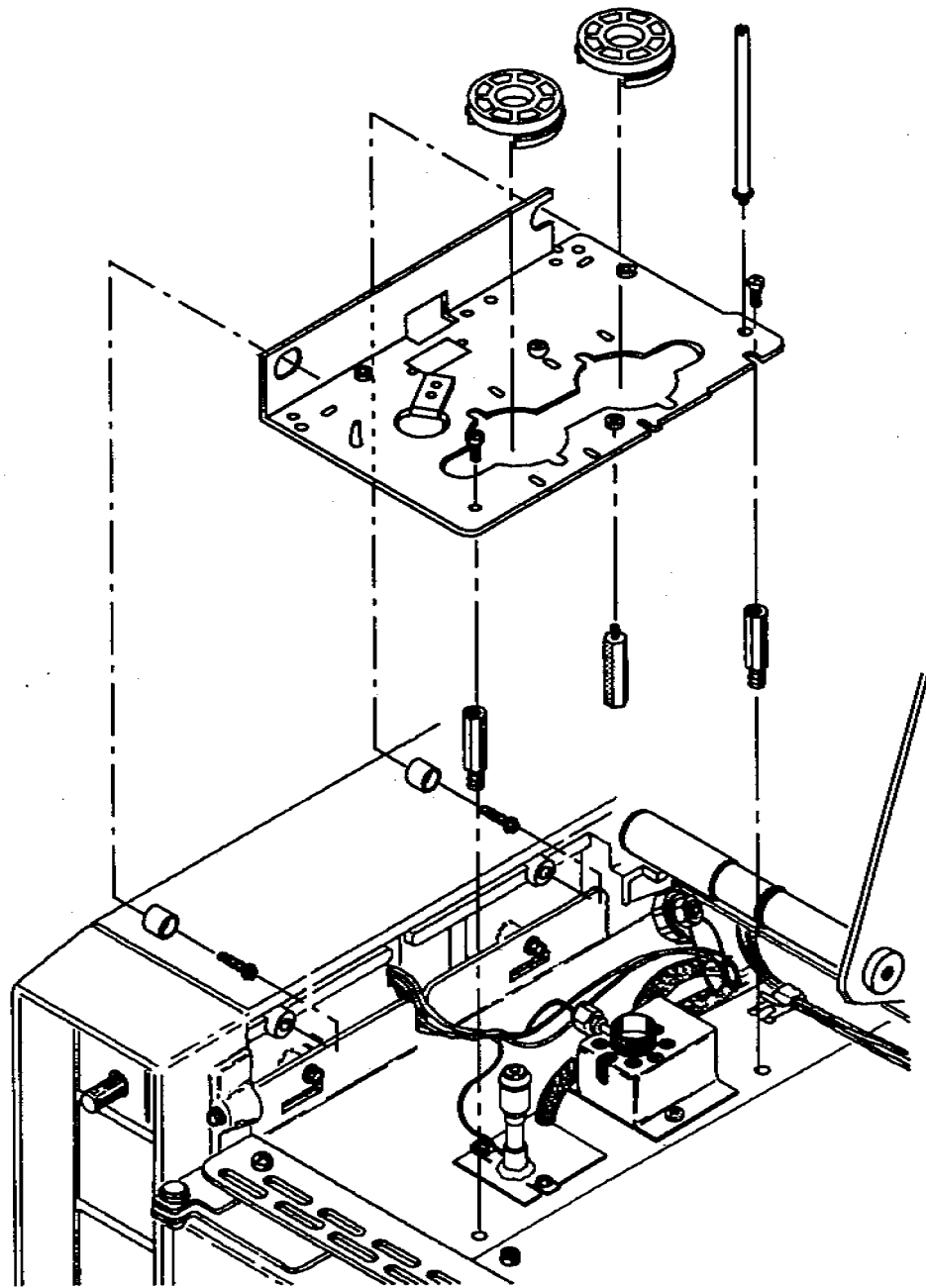
# HEWLETT-PACKARD



## **HP 7673 Automatic Sampler** **Installing and Connecting the Injector** **and Tray on HP 5710/30/90 GCs**



Exploded diagram

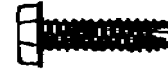


**1** Attach the Bracket Supports

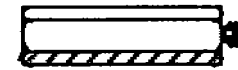
1/4-in. nut driver



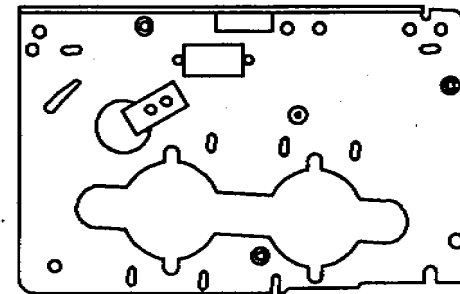
2 injector bracket bushings (18597-20735)  
(Drawn full scale)



2 self-tapping screws (0624-0546)  
(Drawn full scale)



3 standoffs (18597-20520)  
(Drawn full scale)



1 injector bracket (18597-00205)

**2** Detach the Inlet Nut

inlet wrench

**3** Place the Bracket

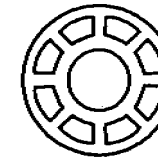


2 pan head screws (0515-0915)  
(Drawn full scale)

**4** Attach the Inlet Nut

inlet wrench

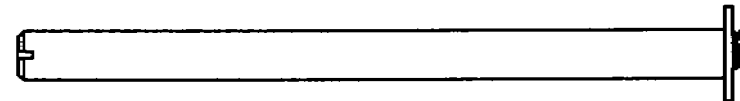
**5** Align the Bracket



No. 2 Point Pozidriv  
2 alignment tools (18597-40030)

**6** Attach the Mounting Post

flathead screwdriver



1 injector mounting post (07673-20865)  
(Drawn full scale)

This worksheet is for installing the hybrid injector bracket to  
an HP 5890A or HP 5890 SERIES II Gas Chromatograph.

## 5. Align the Bracket

- a. Place the plastic alignment tool(s), honeycombed side up, over the inlet(s) of your GC. Move the bracket until both alignment tools fit flush on the bracket. If you cannot make them fit flush by moving the bracket, you may have to adjust the position of the inlets.
- b. Tighten the two screws that hold down the bracket with a No. 2 point Pozidriv. Remove and save the bracket alignment tools for future adjustments.

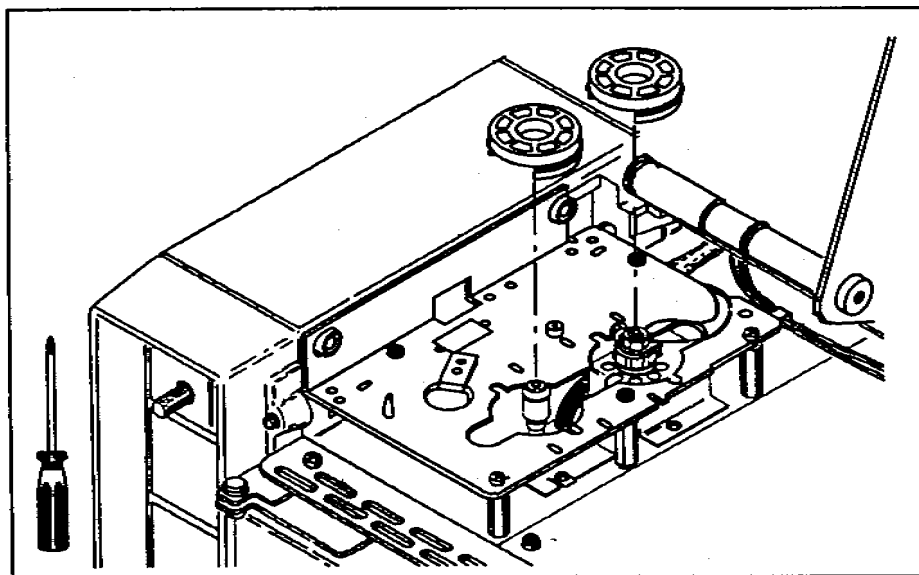


Figure 8. Align the bracket and tighten the screws.

The A and B injector modules need different parts when mounting over a cool on-column inlet.

The A module needs the cooling tower or needle guide top to be in place.

The B module needs the following:

To mount over an **HP 5890A on-column inlet**, replace the cooling tower (part number 19245-20540) with a septum nut base assembly (part number 19245-80520). Save the cooling tower to realign the bracket.

To mount over an **HP 5890 SERIES II cool on-column inlet**, remove the needle guide top (part number 19245-20670). Save the needle guide top to realign the bracket.

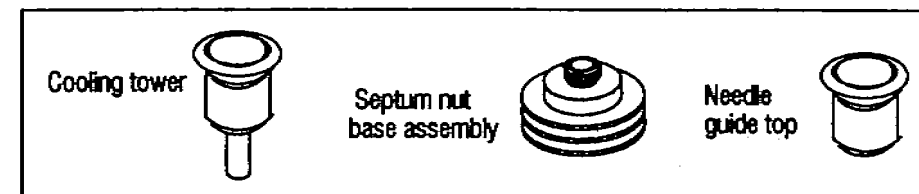


Figure 9. Attach the mounting post.

## Installing on HP 5880A GCs

This section reviews the steps for installing the injector bracket and shows an exploded view. For detailed instructions, refer to the link manual "Installing and Operating the Injector and Tray on HP 5880A GCs" (part number 07673-90235). The parts are packaged with the HP 5880A injector/tray mounting hardware (part number 18597-60675)

You can mount two injectors on an HP 5880A GC in positions A and C or B and D. To mount the injector over positions A and C, align the bracket over these positions. The exploded view on the next page shows the bracket being installed over positions B and D.

Complete the following steps to install the hybrid injector bracket.

1. Remove the existing injector bracket and supports.
2. Attach the appropriate standoffs (small hexagonal posts) next to the inlets.
  - For a **packed inlet**, replace the pan head screws with the small standoffs.
  - For a **capillary inlet**, replace the pan head screws with the large standoffs.
  - For a position without an inlet, attach the piece of sheet metal and two large standoffs.
3. Place the bracket.
4. Align the bracket.
5. Attach the mounting post.

4. Attach the Inlet Nut (Read only if the GC has a split/splitless inlet. If not, skip to step 5.)

- a. Route the gas lines on the inlet nut over the mounting bracket. For most configurations, the gas lines should be routed over the front or rear of the bracket.

The gas lines must not interfere with the feet of the injector. Small white circles on the bracket show where the injector feet touch the bracket. If necessary, gently bend the gas lines so they do not cross the white circles.

- b. Push the inlet nut down and turn it clockwise. Tighten it with the inlet wrench.

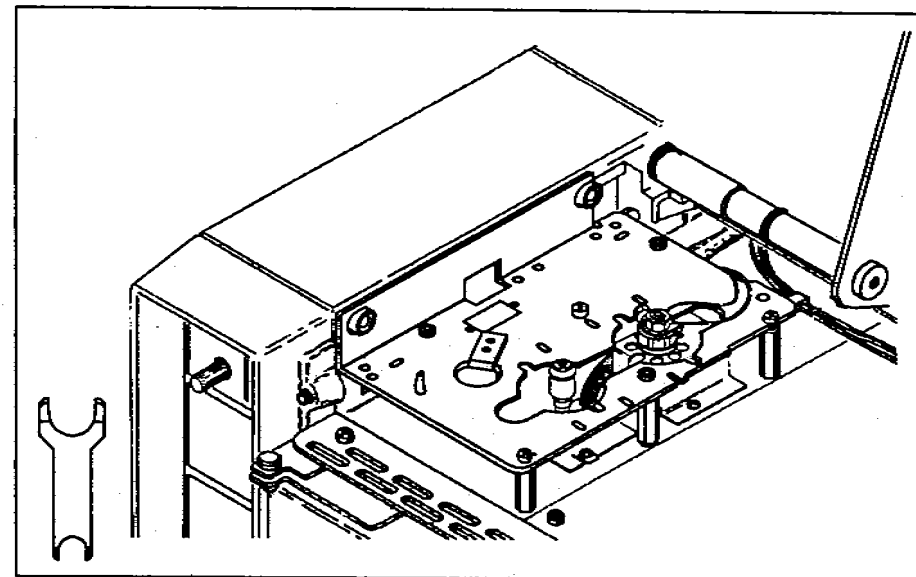


Figure 7. Route the gas lines over the bracket and reattach the inlet nut.

### 3. Place the Bracket

- a. Hold the bracket with the bend on the left side and slide it onto the cylinders that you attached to the side wall in step 1. Allow the bracket to rest on top of the standoffs.

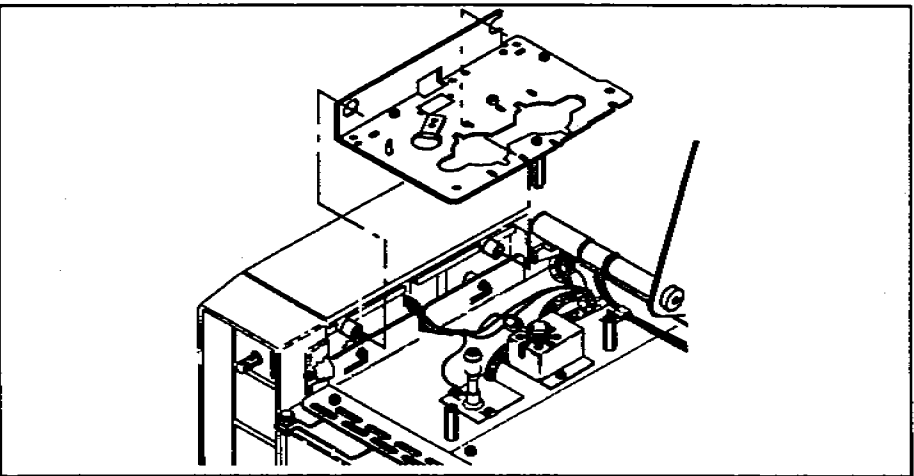


Figure 5. Placing the mounting bracket on the GC.

- b. Line up the top of the standoffs with the hole and slot on the bracket. Screw the pan head screws into the threaded holes of the standoffs. Do not tighten the screws until step 5.

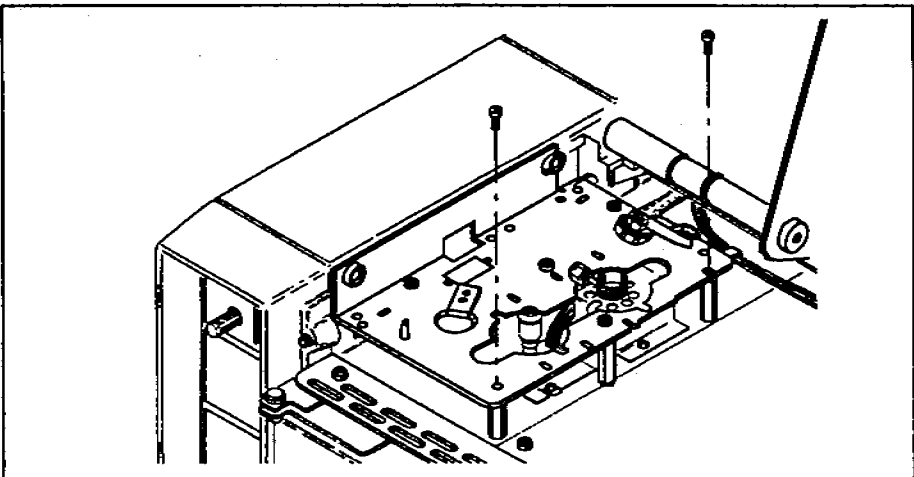


Figure 6. Start the pan head screws into the standoffs.

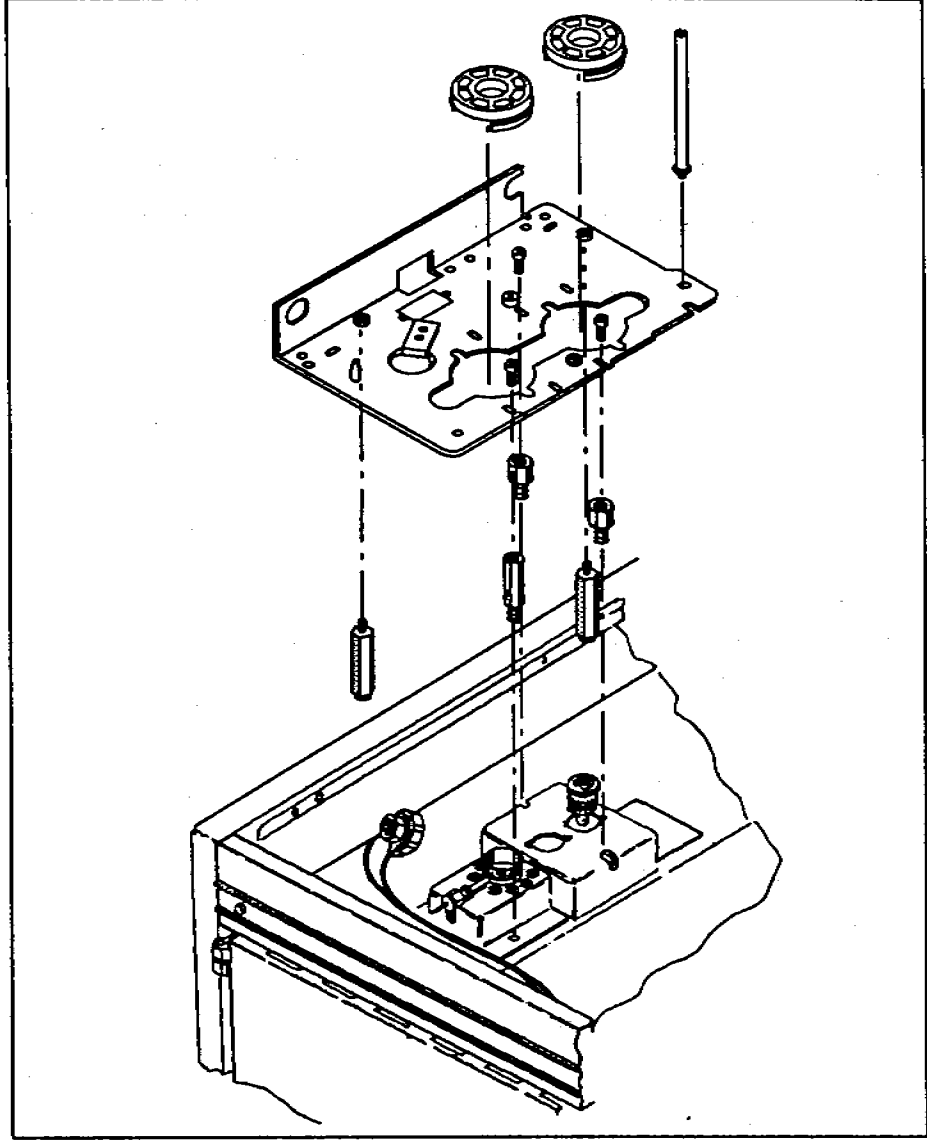


Figure 10. Installing the hybrid bracket on an HP 5880A GC.



## Installing on HP 5710/30/90 GCs

This section reviews the steps for installing the injector bracket and shows an exploded view. For detailed instructions, refer to the link manual "Installing and Connecting the Injector and Tray on HP 5710/30/90 GCs" (part number 07673-90225).

You can mount only one injector on an HP 5710/30/90. To mount the injector over the front inlet (i.e., in the A position), install the bracket over the rear set of threaded holes. To mount the injector over the rear inlet (i.e., in the B position), install the bracket over the front set of threaded holes.

Complete the following steps to install the hybrid injector bracket.

1. Remove the existing injector bracket.
2. Replace the GC top cover and attach the plugs and septum nut.
3. Attach the appropriate standoffs (small hexagonal posts).
  - For a **packed inlet**, use the medium-sized standoffs to support the tray, but do not use any standoffs to support the injector bracket. The injector can only be used with a packed port in the B position.
  - For a **capillary inlet**, use the largest standoffs to support the tray and the smallest standoffs to support the injector bracket.
4. Attach the injector bracket.
5. Align the bracket.
6. Attach the mounting post. There is only one mounting post.

2. Detach the Inlet Nut (Read only if the GC has a split/splitless inlet. If not, skip to step 3.)

For a **split/splitless inlet**, route the gas lines over the bracket. If you do not, you cannot replace the inlet liner without removing the bracket.

### CAUTION

Turn off the gas flows before you remove the inlet nut or you may damage the packing in the inlet liner. Avoid contaminating the inlet while it is uncovered.

- a. Loosen the inlet nut with the inlet wrench. Turn the nut counterclockwise until it is off the threads and lift it out of the way. The braze joints that hold the gas lines to the inlet are fragile.

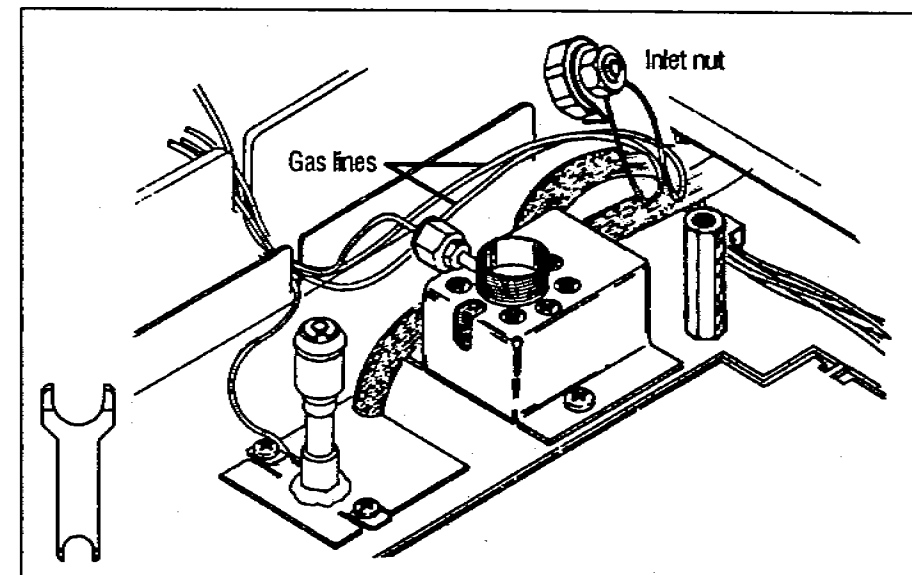


Figure 4. Detach the inlet nut and lift it out of the way.

- e. Screw one standoff onto the bottom of the mounting bracket to act as a support leg. The hole has a silver-colored pem (small threaded washer) on the top, right-hand side of the bracket. Tighten the standoff with a 1/4-in. nut driver.

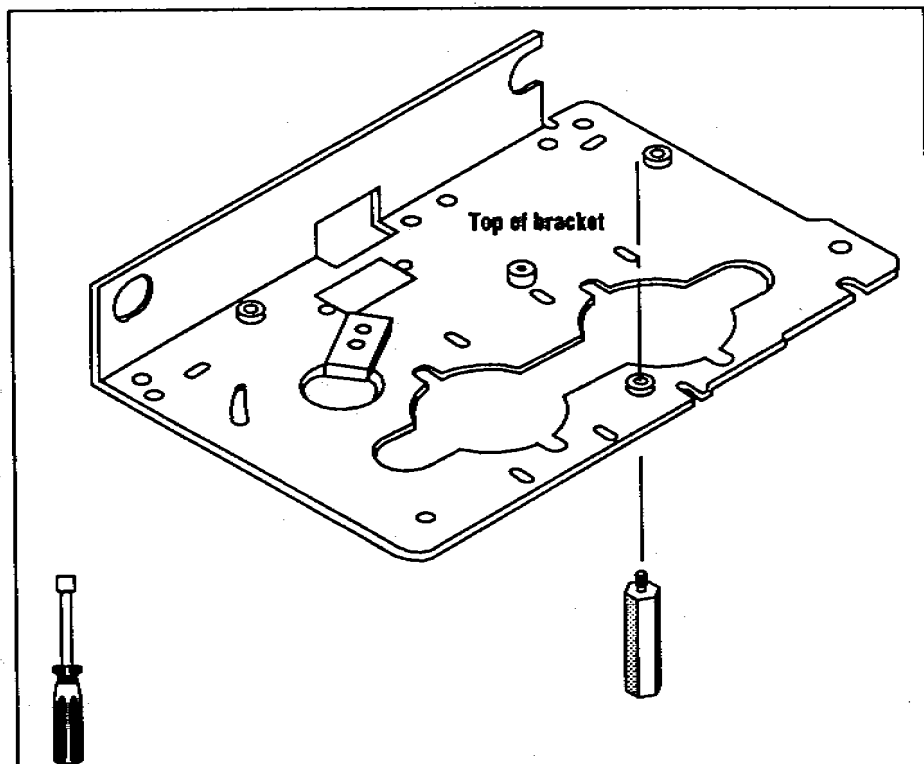


Figure 3. Attach the standoff to the bottom of the mounting bracket.

If a purged packed inlet is installed on the GC, this standoff could interfere with the heat sink (metal fins) around the inlet. If necessary, use only the left-hand side of the heat sink.

If HP 5890 SERIES II cool on-column inlets are installed in both the front and rear positions of the GC, do not install this standoff. Without this standoff, the stability of an injector in the rear position may be affected.

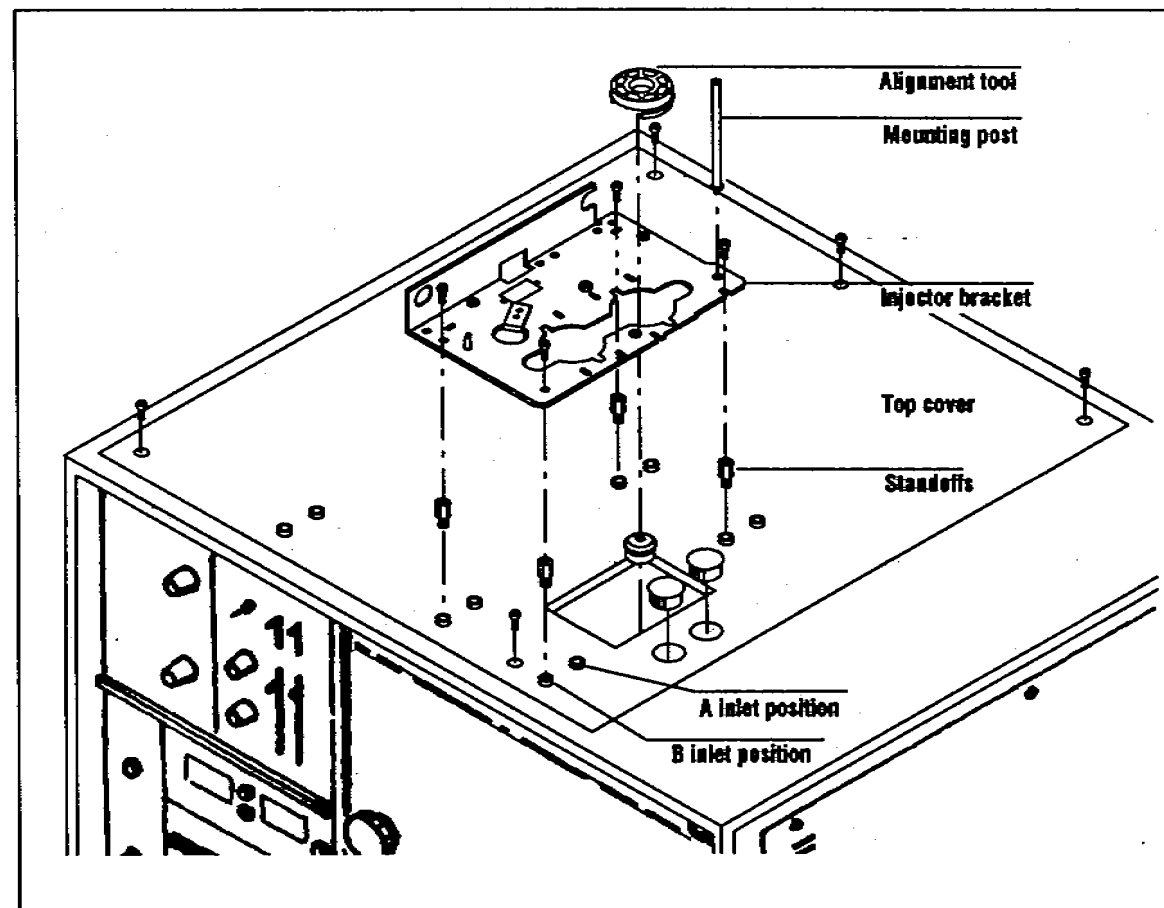


Figure 11. Installing the hybrid bracket on an HP 5710/30/90 GC.

## Connecting the Adapter Cable

The following diagram illustrates how to attach the adapter cable required to connect an HP 18593B Injector Module to an HP 18594A Controller Module.

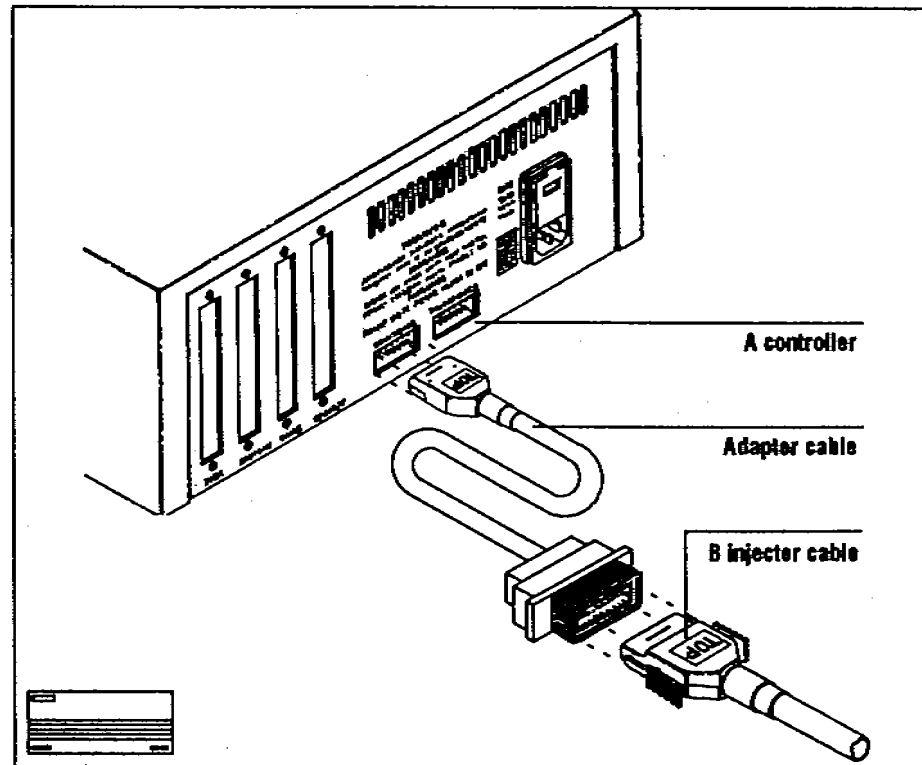


Figure 12. Connecting the adaptor cable.

- d. Screw two of the standoffs (small hexagonal posts) into the threaded holes located near the inlets. Tighten them with a 1/4-in. nut driver.

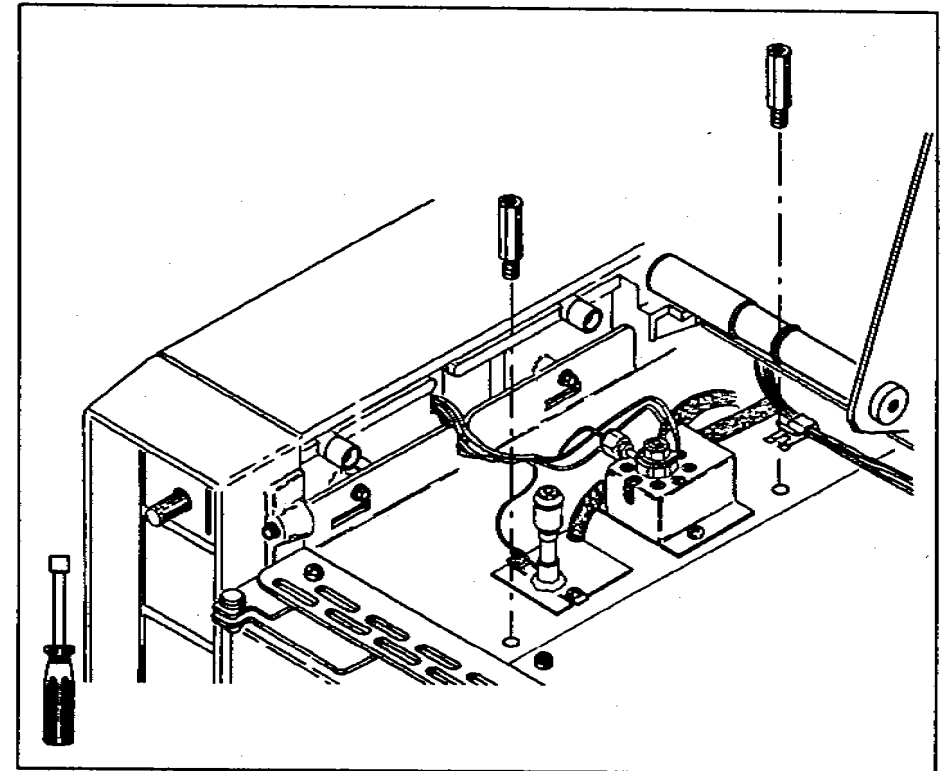


Figure 2. Attach the standoffs near the inlets.

If the rear inlet is an HP 5890 SERIES II cool on-column inlet (Accessory Kit 19245B or 19245C) on an HP 5890A GC, use a short standoff in the rear position (part number 19245-20760). This standoff is packaged with the accessory kit.

## 1. Attach the Injector Bracket Supports

If installing on an HP 5890A GC, you must first install the necessary upgrades listed on page 2.

- Remove the port pan by inserting a finger into the U-shaped cut on the panel and pulling up.
- Lift up the right-hand side of the top cover.
- Using a 1/4-in. nut driver and the two self-tapping screws, attach the two small cylinders onto the left side wall of the chromatograph.

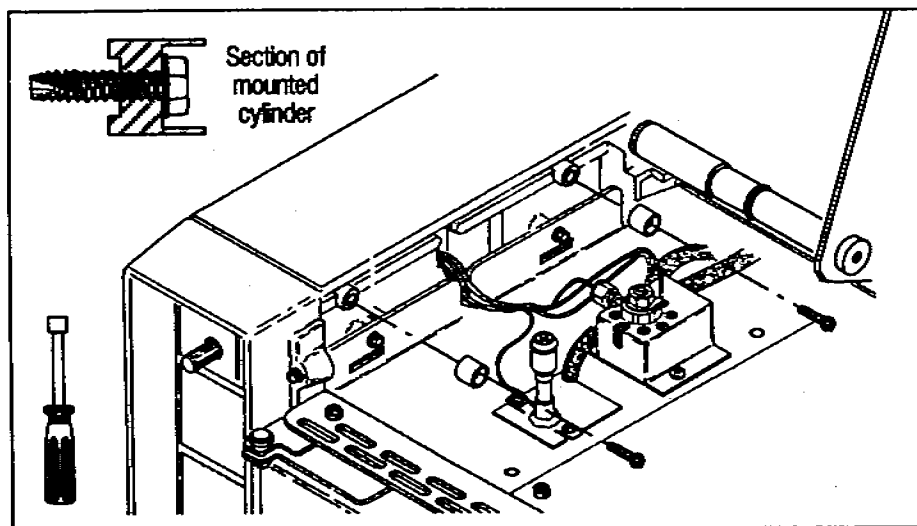


Figure 1. Attach the cylinders to the side of the GC.

## Checking Your Work

Double-check the following:

- If the GC has a split/splitless inlet, check the inlet nut.
- If the GC has an on-column inlet, be sure that you have the correct inlet top: either the cooling tower or the septum nut base assembly, with or without the needle guide top.
- Check that the following are tight:
  - Self-tapping screws.
  - Pan head screws.
  - Injector mounting posts.

If you are installing a tray, install the tray bracket before mounting the injector. Instructions for installing the tray bracket are packaged with the tray.

## Installing on HP 5890 GCs

Pull out the yellow worksheet from the center of this link manual. Organize the hardware and tools for each step. Full-scale drawings of the screws help identify which ones you need for each step. If any of the hardware is missing, contact your HP representative.








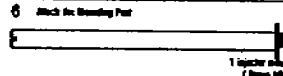

Step by step

Parts you need for each step

Tools you need for each step

Exploded diagram

Exploded view with all parts

1	Attach the Backer Support	HP Part number
		2 injector backer bushings (0007-0070) (Insert all sides)
		2 self-tapping screws (0024-0040) (Insert all sides)
		3 washers (0007-0020) (Insert all sides)
		1 injector backer (0007-0070)
		
2	Attach the Inter Bar	Information
3	Place the Backer	2 pin head screws (0024-0040) (Insert all sides)
4	Attach the Inter Bar	Information
5	Align the Backer	No. 2 Pinset Pusher
		2 alignment tabs (0007-0000)
		
6	Attach the Banding Pin	Retract screwdriver
		1 injector mounting post (0007-0000) (Insert all sides)
		

## Before You Start

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The hybrid injector bracket enables you to mount an HP 18593A Injector Module over the front inlet and/or an HP 18593B Injector Module over the rear inlet of your gas chromatograph.

To install the hybrid bracket, remove the existing bracket and bracket supports.

- For an **HP 5890A** or **SERIES II GC**, you can mount both injectors at the same time. Turn to page 3.

Before installing the hybrid injector bracket on an HP 5890A, you must first install the split top cover for the HP 5890 SERIES II GC.

If your automatic sampler includes a tray, you must install the new tray bracket onto the existing tray bracket supports (often called side rails). Directions for installation are packaged with the new tray bracket.

- For an **HP 5880A GC**, you can mount both injectors over inlets in positions A and C or B and D. Turn to page 12.
- For an **HP 5710/30/90 GC**, you can mount only one injector at a time. Turn to page 14.
- To attach the **adapter cable** required to connect an HP 18593B Injector Module to an HP 18594A Controller Module, turn to page 16.

### WARNING

**ALLOW THE INLETS AND OVEN TO COOL BEFORE INSTALLING THE HYBRID INJECTOR MOUNTING BRACKET. THE METAL SURFACES OF THE GC ARE VERY HOT AND COULD BURN YOUR SKIN. IF YOU HAVE A SPLIT/SPLITLESS INLET, YOU COULD DAMAGE THE COLUMN.**

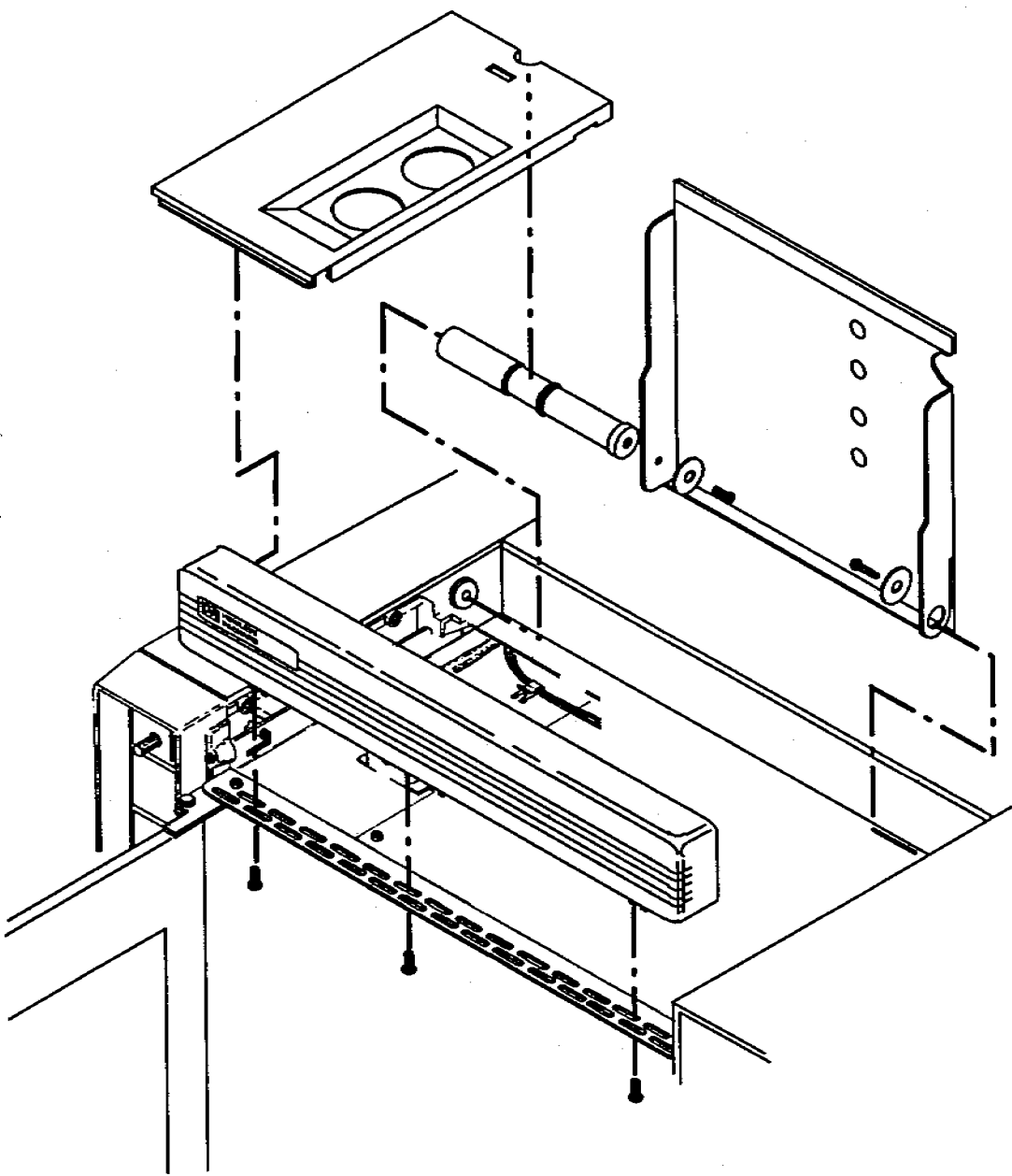
# HEWLETT-PACKARD



## HP 7673 Automatic Sampler Installing the Hybrid Injector Bracket



Exploded diagram

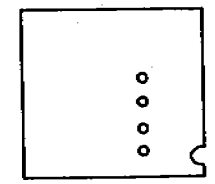


**1** Remove the 5890A Top Cover 1/4-in. nut driver

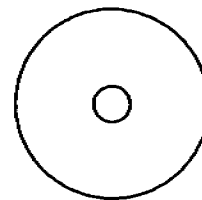
**2** Assemble the New Top Cover No. 2 Point Pozidriv



1 lid shaft (05890-20780)  
1 right side of top cover (05890-00402)

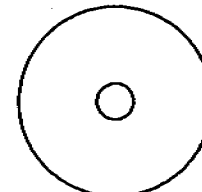


1 flat washer (3050-1178)  
(Drawn full scale)



1 pan head screw (0515-0904)  
(Drawn full scale)

**3** Attach the New Top Cover 1/4-in. nut driver

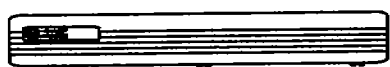


1 flat washer (3050-1178)



1 self-tapping screw (0624-0665)  
(Drawn full scale)

**4** Attach the New Front Panel Bezel No. 2 Point Pozidriv

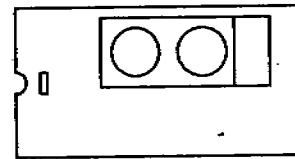


1 front panel bezel (05890-40242)



3 pan head screws (0515-0910)  
(Drawn full scale)

**5** Snap on the New Port Pan 1 port pan (5890-40072)



1 port pan (5890-40072)



This worksheet is for installing the HP 5890 SERIES II  
top cover to your HP 5890A Gas Chromatograph.

## 2. Assemble the New Top Cover

- a. Using a No. 2 Point Pozidriv, a flat washer, and the largest pan head screw, attach the cylindrical lid shaft to the right-hand section of the new top cover.

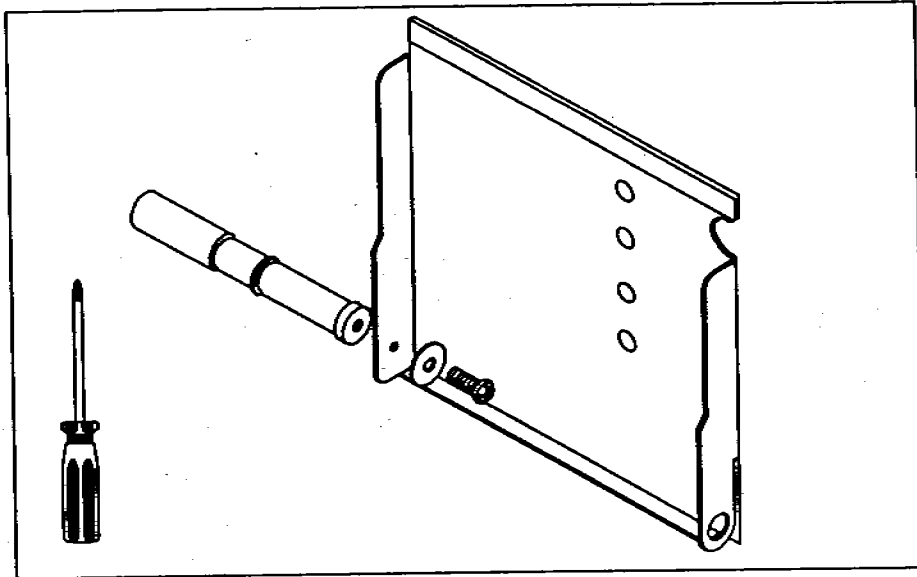


Figure 4. Assembling the new top cover.

## 3. Attach the New Cover

- a. Place the cupped end of the lid shaft over the knob on the left-hand side of the GC.

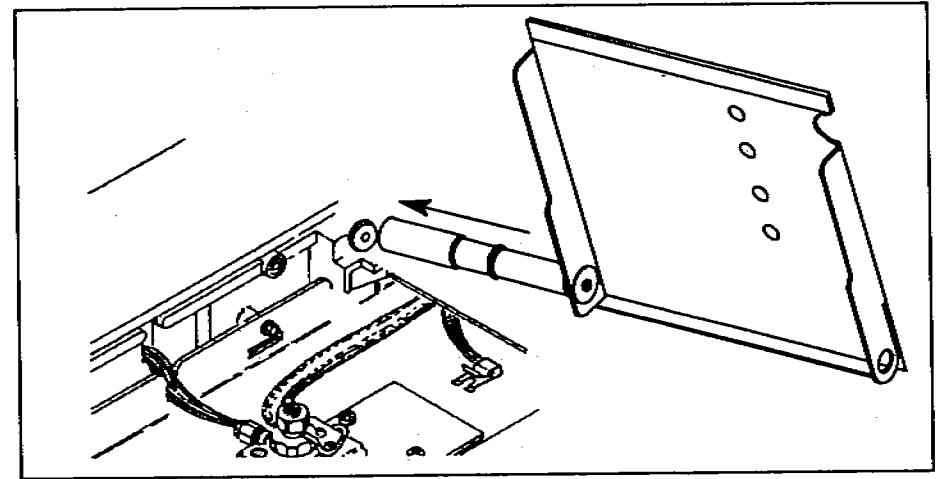


Figure 5. The left-hand side of the hinge.

- b. Push the hole on the right-hand side of the top cover over the knob on the right-hand side of the GC.
- c. Using a 1/4-in. nut driver, a flat washer, and a self-tapping screw, secure the top cover to the right-hand side of the GC. If the GC has a grounding wire, attach it to the threaded post with the lock washer and nut that you removed in step 1.

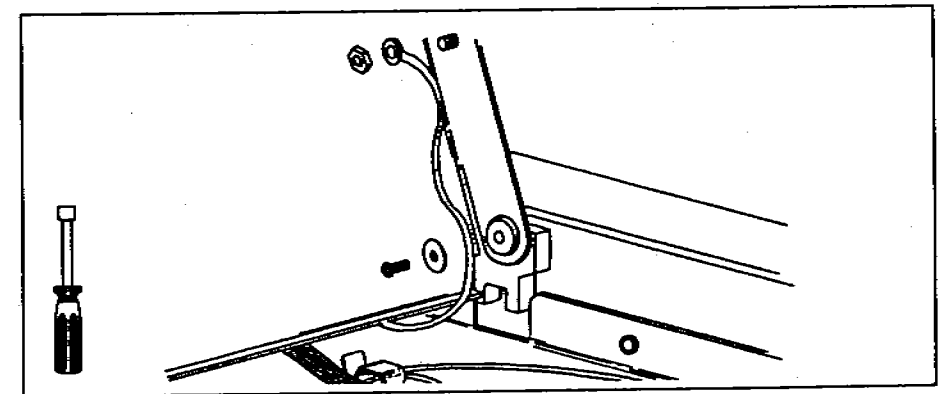


Figure-6. Attaching the right-hand side of the hinge.

#### 4. Attach the New Front Panel Bezel

- a. Open the oven door and place the front panel bezel (or grill) on the top front edge of the GC.
- b. Start each of the three pan head screws from below with your fingers. Tighten each screw with a No. 2 Point Pozidriv.

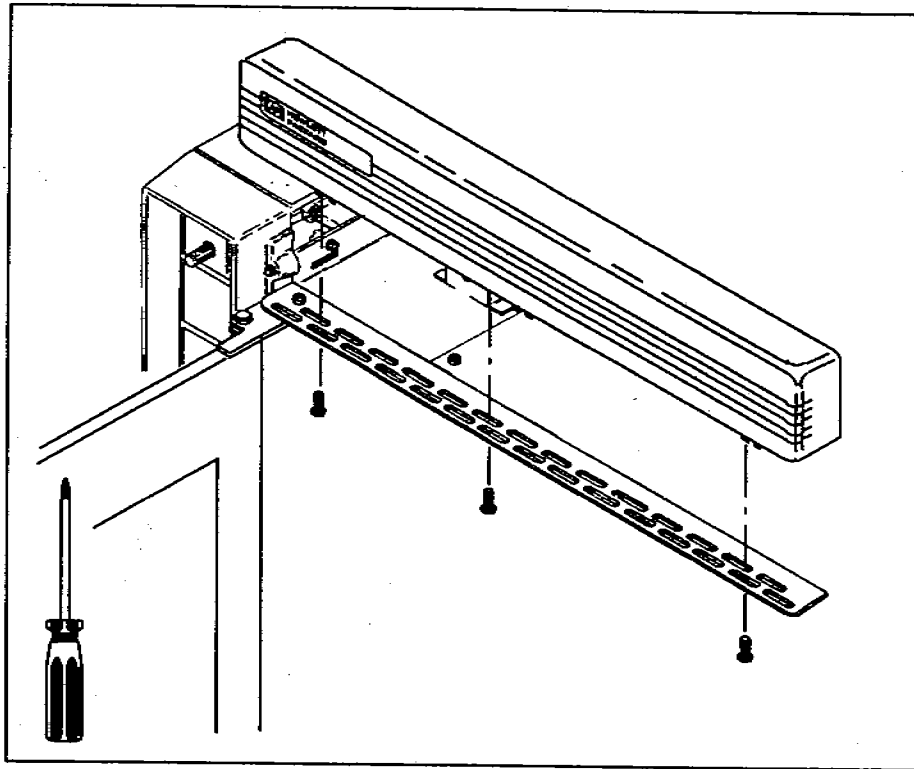


Figure 7. Attaching the front grill.

- b. Using a 1/4-in. nut driver, remove the screws and washers that make up the hinge of the top cover. If the GC has a grounding wire, disconnect it by removing the nut and lock washer with a 9/32-in. nut driver.

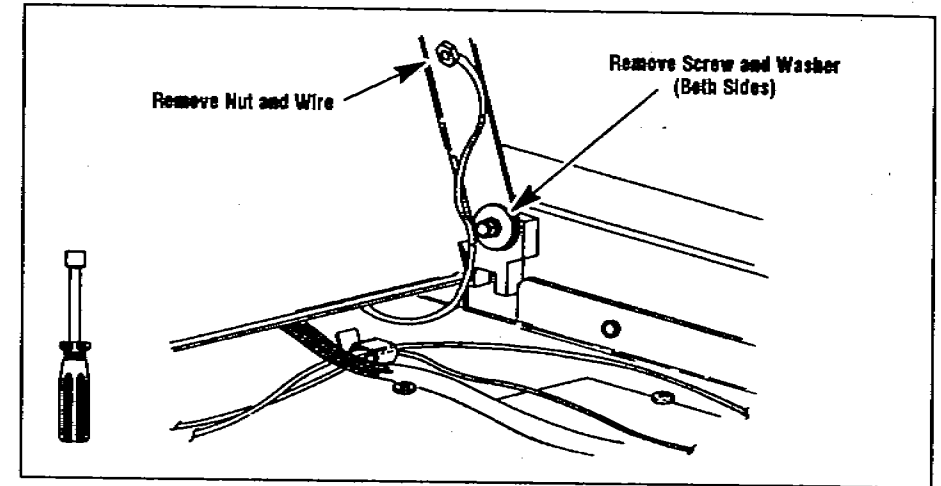


Figure 2. Dismantling the hinge of the top cover.

- c. Remove the top cover by pushing one of the metal tabs over the knob with your thumb.

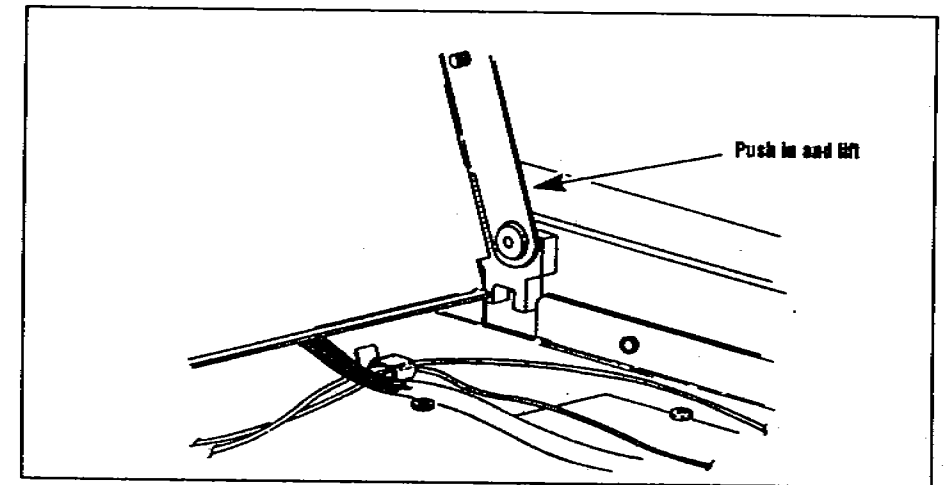


Figure 3. Dismantling the hinge of the top cover.

## 1. Remove the 5890A Top Cover

- a. Remove the injection port pan from the top cover by pushing in the sides and lifting up. The next two paragraphs describe one method.

Using the thumbs of both hands, push to the left and lift the left-hand side of the port pan. The left-hand side should pop out of the top cover.

Next, pull up on the right-hand side with your fingers. The right-hand side should pop out of the top cover. Lift the port pan off the top cover.

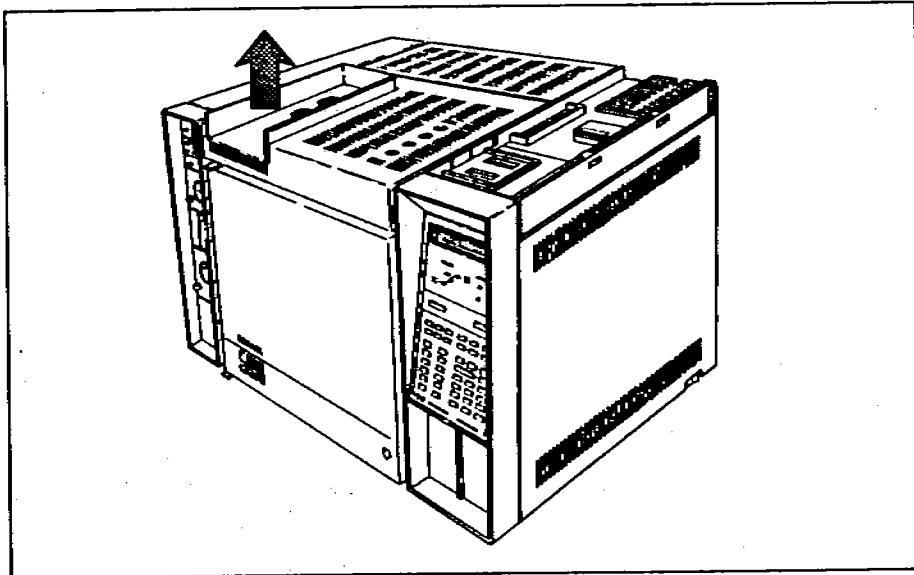


Figure 1. Pop out the injection port pan.

## 5. Snap on the New Port Pan (Only if you are not installing an injector at this time.)

- a. Close the oven door and lower the right-hand side of the top cover.
- b. Place the front edge of the port pan on the front bezel. Push the back edge with the U-shaped notch down until the port pan snaps into place.

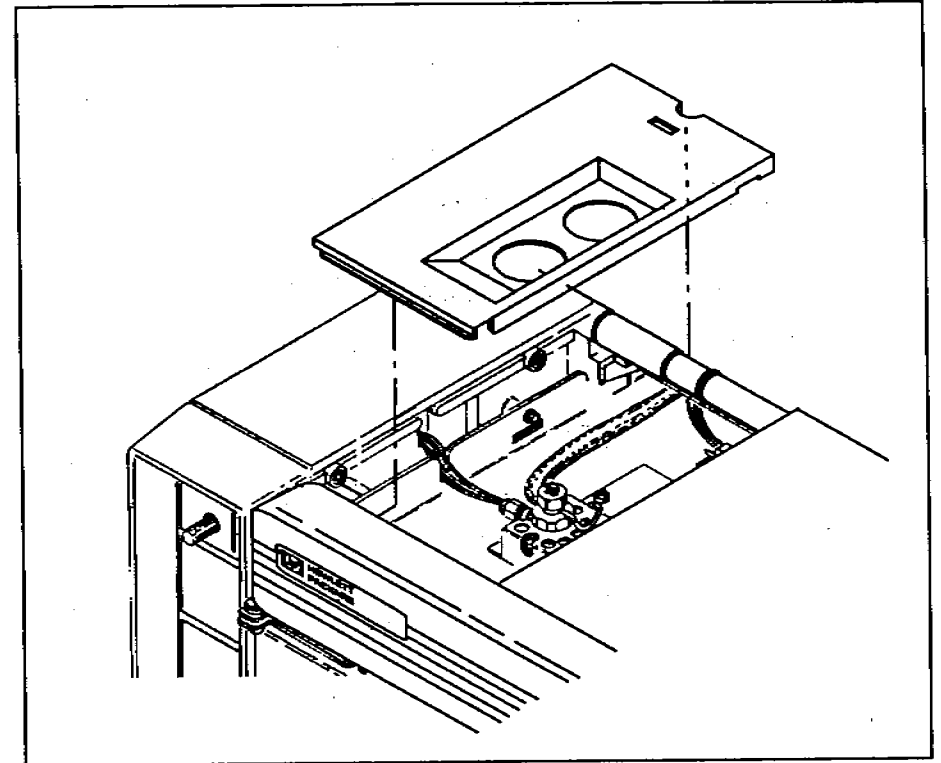


Figure 8. Attaching the new port pan.

## Checking Your Work

Double-check the following:

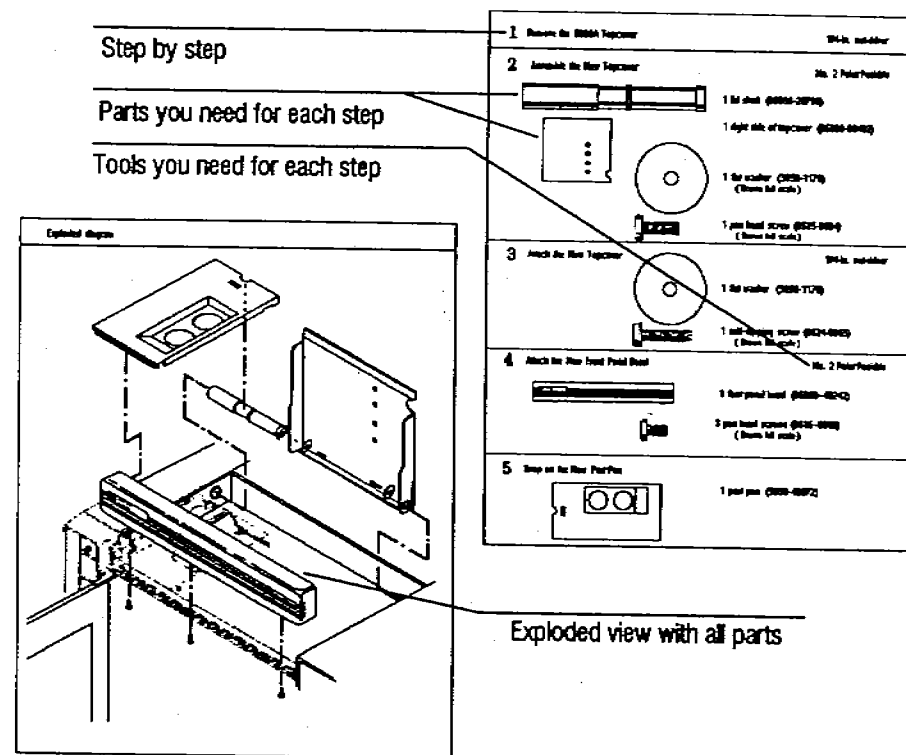
- Be sure that all the screws are tight.
- Be sure the edge of the top cover is flush with the front grill. If it is not flush, go back to step 4.

Next, install the left side panel of the HP 5890 SERIES II Gas Chromatograph. The instructions are packaged with the left side panel.

If you have already installed the left side panel, install the injector mounting bracket. The instructions are packaged with the controller.

## Installing the Split Top Cover

Pull out the yellow worksheet from the center of this link manual. Organize the hardware and tools for each step. Full-scale drawings of the screws help identify which ones you need for each step. If any of the hardware is missing, contact your HP representative.



## Before You Start

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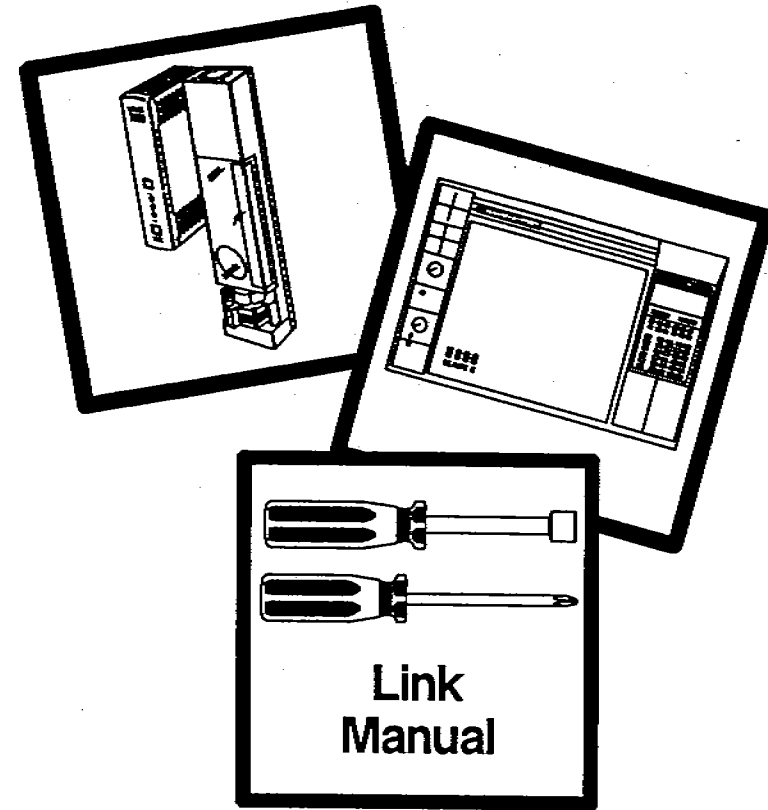
You must upgrade the top cover of an HP 5890A Gas Chromatograph (GC) with the split top cover of the HP 5890 SERIES II GC before installing the mounting bracket for the HP 18593B Injector Module. The SERIES II design enables you to open and close the top cover while the injector mounting bracket is installed.

### WARNING

Before installation, turn off the oven and allow to cool. You must open the oven door to complete step 4.

After you have completed the installation, place this manual in the binder of your operating manual for the HP 7673 Automatic Sampler (Part No. 07673-60995) after the tab for appendix C "Link Manuals."

# HEWLETT-PACKARD



## HP 7673 Automatic Sampler Installing the HP 5890 SERIES II Split Top Cover



## 2. Attach the New Left Side Panel

- a. Place the new left side panel on the GC and slide it forward. Be sure the front edge is seated. Be sure the gas lines are not in the way.
- b. Using a No. 2 Point Pozidriv, screw the two pan head screws into the side of the GC.

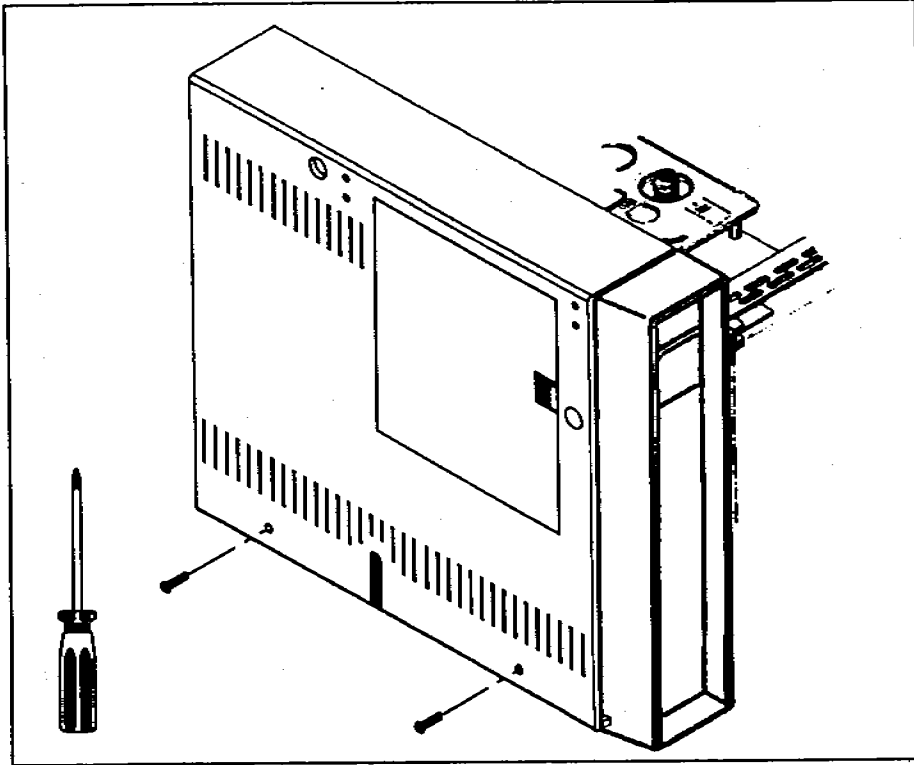


Figure 3. Attaching the new left side panel.

## Checking Your Work

Double-check the following:

- Be sure the front edge of the left side panel is seated into the GC.
- Be sure all screws are tight.

Next, install the split top cover for the HP 5890 SERIES II Gas Chromatograph. The instructions are packaged with the split top cover.

If the split top cover is already installed, install the injector mounting bracket. The instructions are with the mounting hardware that is packaged with the controller.

After you have completed the installation, place this link manual in the binder of your operating manual for the HP 7673 Automatic Sampler (Part No. 07673-60995) after the tab for appendix C "Link Manuals."



## Installing the Left Side Panel

### 1. Remove the Old Left Side Panel

- a. Using a No. 2 Point Pozidriv, remove the two pan head screws that hold the existing left side panel onto the left side of the GC.
- b. Lift off the old left side panel.

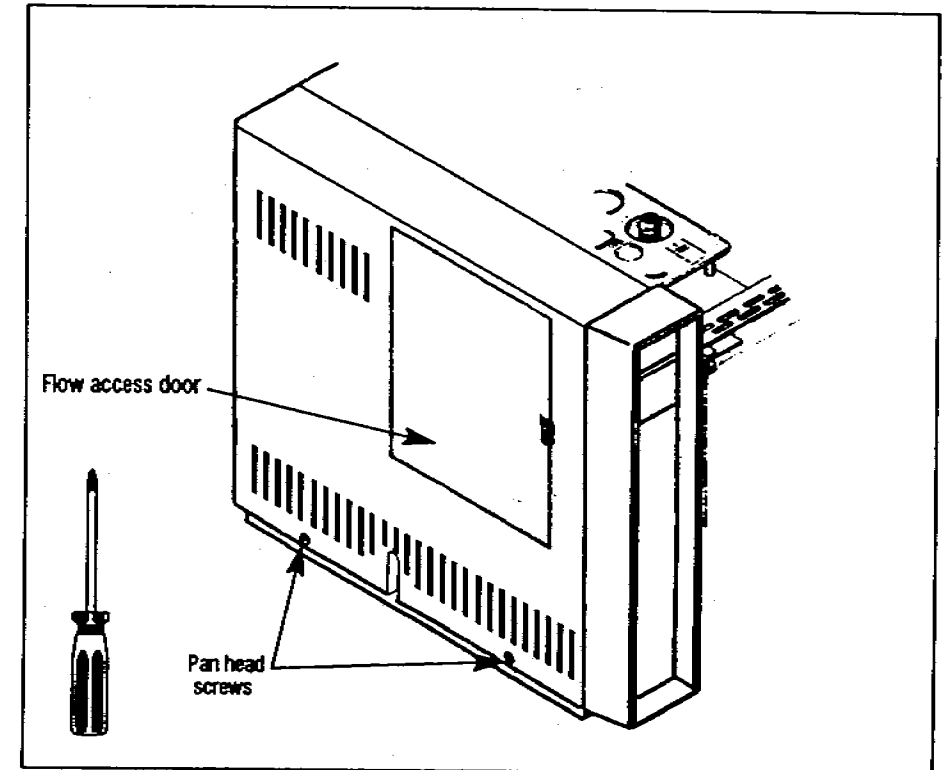


Figure 2. Removing the old left side panel.

## Before You Start

You must upgrade the left side panel of the HP 5890A Gas Chromatograph (GC) before installing the mounting bracket for the HP 18596B Tray Module.

Figure 1 lists the hardware and tools that you need to complete the installation. If any of the hardware is missing, contact your HP representative.

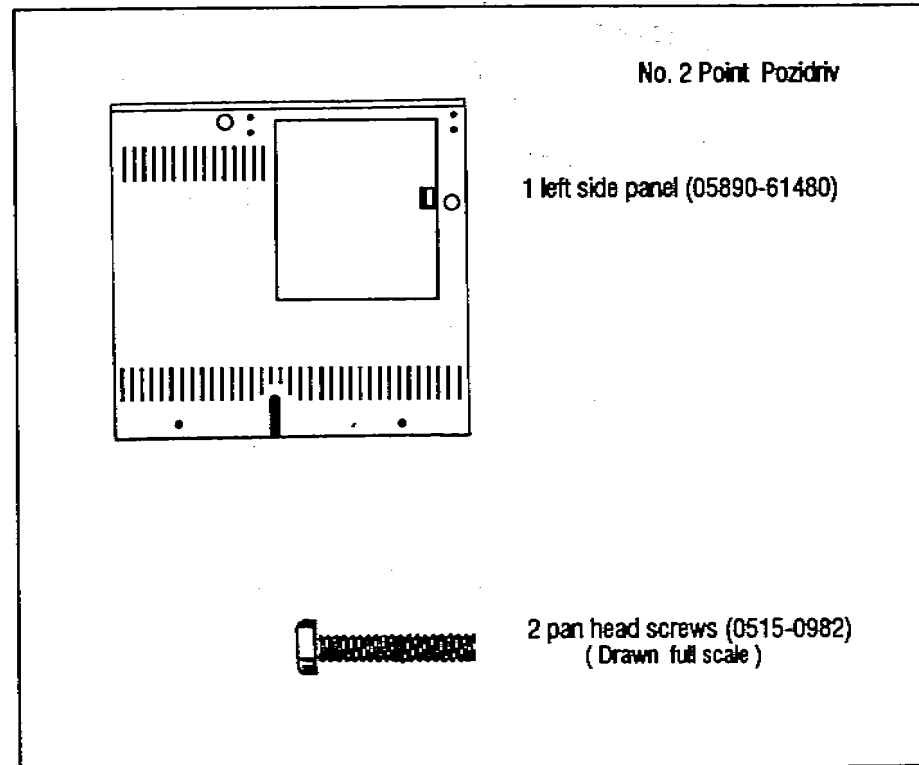
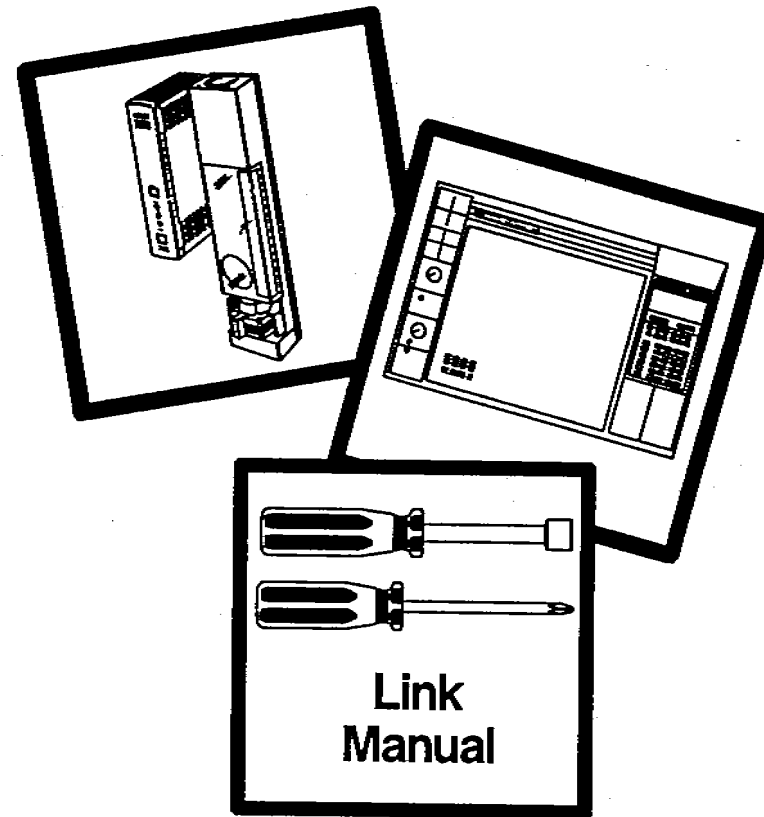


Figure 1. Parts list.

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## HP 7673 Automatic Sampler Installing the HP 5890 SERIES II Left Side Panel



## Sample Vials and Caps



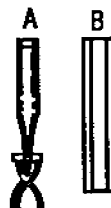
11-mm crimp top, 2-ml glass sample vials.

100	clear without caps	5180-4197
500	clear with caps & box	5061-3350
500	amber without caps	5061-3369
500	amber with caps & box	5061-3348



11-mm crimp top, 100-µl glass sample microvials.

12	clear	5080-8779
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11-mm wide opening crimp top, 2-ml sample vials. Can be used with glass microvial inserts

100	clear, with inserts	5181-1269
100	clear, without inserts	5181-3375
100	amber, without inserts	5181-3376
100	microvial inserts (A)	5181-1270
500	limited vol. inserts (B)	5181-3377



11-mm crimp caps with Teflon-coated, 5.58-mm. red/orange septa

100	aluminum metal	5181-1210
100	blue metal	5181-1215
100	green metal	5181-1216
100	red metal	5181-1217

## Sample Vials and Caps with Injector Only

The following sample vials and caps should not be used with a tray.

11-mm id crimp top, 100-µl glass-lined polystyrene sample microvials

100	clear	9301-0977
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11-mm id crimp top, 100-µl polystyrene (all plastic) sample microvials

1000	clear	9301-0978
------	-------	-----------

Polyethylene snap caps, includes red/orange septa

100		5181-1259
-----	--	-----------

2-ml screw cap, glass sample vials

100	clear	9301-1128
-----	-------	-----------

Screw caps without septa


100		9301-1131
-----	--	-----------

Red/orange septa for snap caps or screw caps

100		9301-1130
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**Solvent and Waste Bottles**



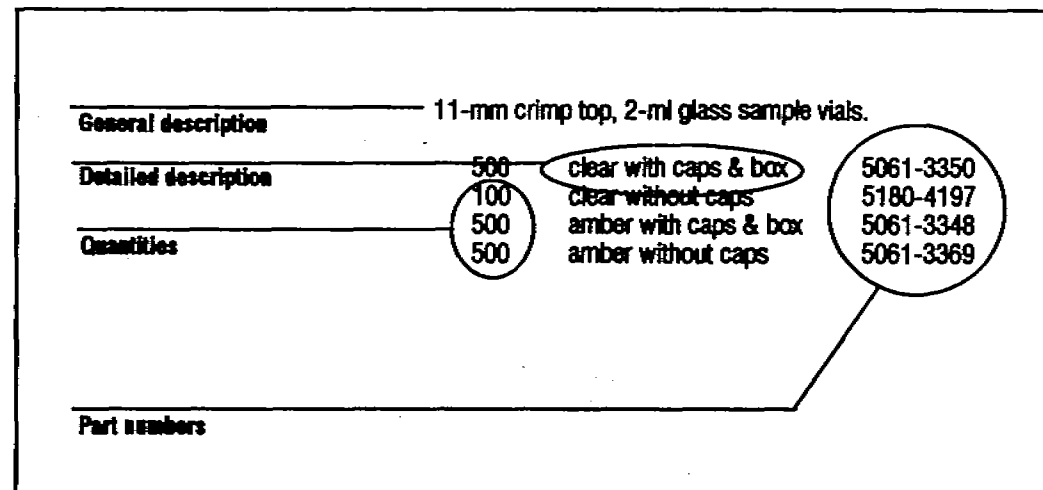
4-ml solvent or wash bottle with screw cap		
144	clear	9301-0723
Diffusion caps		
12		07673-40180
Septa for 4-ml bottles		
144		9301-1031

**HP Recommended Supplies**

This section contains a list of supplies available from Hewlett-Packard's Analytical Direct.

Selecting and ordering the correct consumables like sample vials, syringes, and septa are an important part of operating the HP 7673 Automatic Sampler. By using Hewlett-Packard recommended supplies, you can help maintain the reliability of the automatic sampler. For more information, see the current issue of the *Chromatography Users Catalog*.

The following example illustrates the organization of the information.



## Inlet Liners

You must use the correct inlet liner or insert with the automatic sampler. If you do not, you may introduce peak area discrimination problems into the analysis.

With split or splitless inlets, you may try these liners:

- 4-mm, borosilicate glass liner with glass wool plug (part number 19251-60540)
- 4-mm silanized, borosilicate glass liner with single taper and silanized glass wool plug (part number 5062-3587)

With splitless inlets, you may also try these liners:

- 4-mm silanized, borosilicate glass liner with a double taper (part number 5181-3315)
- 4-mm silanized, borosilicate glass liner with single taper (part number 5181-3316)

The single taper liners with or without the glass wool plug are possible choices for many environmental analyses. The single taper liner without the glass wool plug is usually better when the analytes tend to degrade in the inlet.

The flow inverter liner (part number 18740-60840) and the quartz splitless liner (part number 18740-80220) are not recommended for use with the automatic sampler.

Practically every sample contains nonvolatile material that accumulates and partially pyrolyzes in the liner. Periodically, the liner must be replaced or cleaned and deactivated.

## Syringes



23 gauge syringe for inlets other than on-column

1	10- $\mu$ l, fixed needle	9301-0713
6	10- $\mu$ l, fixed needle	9301-0725
1	5- $\mu$ l, fixed needle	9301-0892

23/26 tapered needle syringe for general purpose and on-column inlets

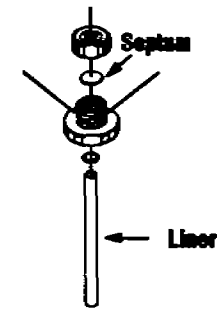
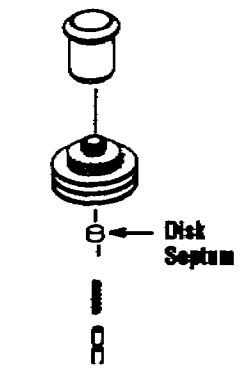
1	10- $\mu$ l, fixed needle	5181-1267
6	10- $\mu$ l, fixed needle	5181-3360
1	5- $\mu$ l, fixed needle	5181-1273
1	10- $\mu$ l, removable needle	5181-3321
1	5- $\mu$ l, removable needle	5181-1265

### Replacement Needles

23/26 tapered replacement needles for syringes, part number 5181-3321 or 5181-1265

3	5181-3319
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## Inlet Septa

 <p>Split/Splitless Inlet</p>	<p>11-mm low bleed septa for all packed and split/splitless injection, with HP 5890 SERIES II, maximum temperature 350°C</p>	25	red, solid	5181-1263
	<p>11-mm low bleed septa for all packed and split/splitless injection, with HP 5890A, 5880A, or 5710/20/30/90A, maximum temperature 350°C</p>	24	gray, solid	5080-8896
 <p>Cool On-Column Inlet</p>	<p>11-mm septa for use with GC/Mass Spectrometer, maximum temperature 350°C</p>	25	red, solid	9301-1263
	<p>5-mm disk septa for cool on-column injection with HP 5890 SERIES II, maximum temperature 350°C</p>	25	red, with hole	5181-1260
		25	red, solid	5181-1261

### CAUTION

The 9.5-mm red low bleed septa are not recommended for use with the HP 7673 Automatic Sampler. The smaller septa tend to need more frequent replacement.

## Inlet Septa

Inlet septa should last at least 200 injections before there is any sign of leakage. The following factors impact the life expectancy of septa.

- Syringe selection, installation, and condition.
- Septum size, type, and installation.
- Injector mounting bracket alignment.
- Inlet temperature.

Change septa at the end of the day's work. It takes several hours for the gas flow to sweep out any contaminants introduced to the inlet and for the flow rate to equilibrate.

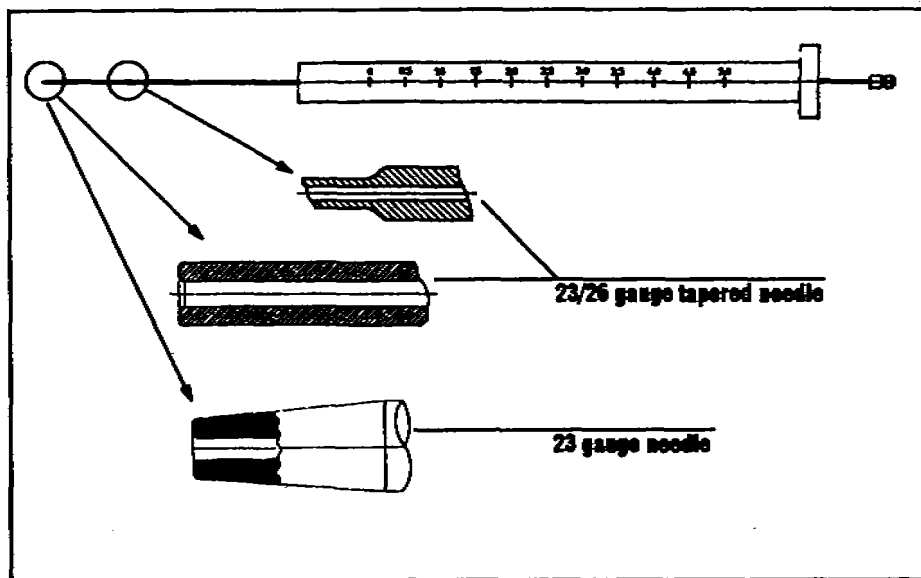
Select the proper septa diameter for your GC from the following diagram.

Gas Chromatograph	Type of Inlet	
	Packed / Split / Splitless	On-Column
HP 5890	11-mm	5-mm
HP 5880A	11-mm	5-mm
HP 5700 series	9.5-mm	

Septa are made from materials that give off volatiles especially in heated inlets. If not swept away in a septum purge design, these volatiles may interfere with the analysis. The following list of inlet septa may help you select the correct type.

- Red: Recommended general purpose septa good for inlet temperatures  $\leq 350^\circ\text{C}$ .
- Gray: General purpose septa good for inlet temperatures  $\leq 350^\circ\text{C}$ .

The following diagram illustrates the shapes of the two fixed needles.



Injection volumes vary with the sample volume parameter set on the controlling device, the size of the syringe, and whether the injector is set up for nanoliter injection (HP 18599N Nanoliter Adapter).

The following table lists the approximate injection volumes available with the automatic sampler.

Sample Volume Setting	Syringe Size	Standard Injection		Nanoliter Injection	
		5 $\mu$ l	10 $\mu$ l	5 $\mu$ l	10 $\mu$ l
1		0.5	1.0	0.1	0.2
2		1.0	2.0	0.5	1.0
3		1.5	3.0	1.0	2.0
4		2.0	4.0	1.5	3.0
5		2.5	5.0	2.0	4.0

## Inlet Liners

4-mm id silanized, borosilicate glass liner (A) with double taper for use with splitless inlets. The nominal liner volume is 800  $\mu$ l.

1 5181-3315

4-mm id borosilicate glass liner (B) with silanized glass wool plug for use with split/splitless inlets. The nominal liner volume is 1000  $\mu$ l.

1 19251-60540

4-mm id borosilicate glass liner (C) with one tapered end for use with split/splitless inlets.

1 w/silanized glass wool plug 5062-3587  
1 without glass wool plug 5181-3316

Glass liner (D) for use with an HP 5890A or HP 5710/20/30/90A packed column inlets, with or without septum purge

25 5080-8732

Liners for use with an HP 5880A packed column inlets


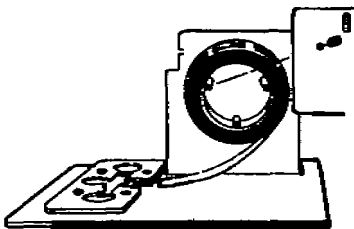

1 standard 19359-20550  
1 adapt to 1/4-in. metal 18745-80010  
1 adapt to 1/8-in. metal 18709-80030  
25 glass inlet liner 5080-8732

Inserts for cool on-column inlets using HP 5890 SERIES II 530- $\mu$  columns

1 for standard column 19245-20580



## Bar Code Supplies

**18587A Bar Code Reader Labels**

Numbered	
1 to 1,000	5958-9450
1,001 to 2,000	5958-9441
2,001 to 3,000	5958-9442
3,001 to 4,000	5958-9443
4,001 to 5,000	5958-9444
5,001 to 6,000	5958-9445
6,001 to 7,000	5958-9446
7,001 to 8,000	5958-9447
8,001 to 9,000	5958-9448

Label applicator	18587-60560
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Label locator for	
capped vials	18587-00120
uncapped vials	18587-00130

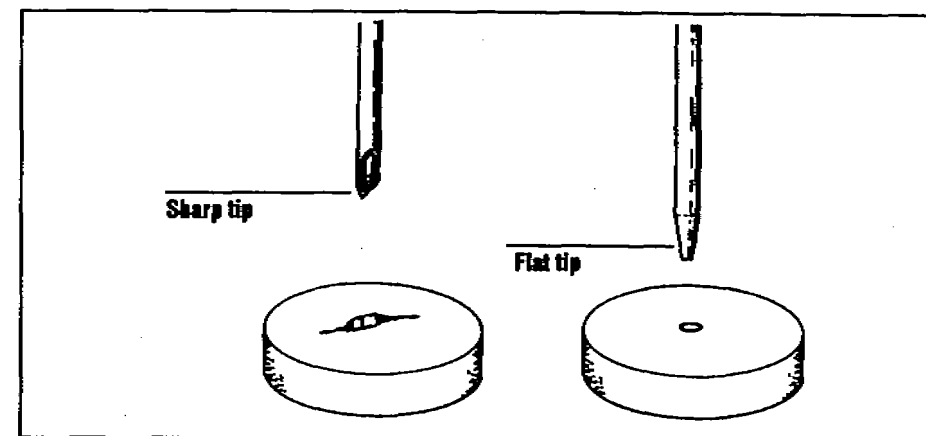
Test vial	18587-60540
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## Syringes

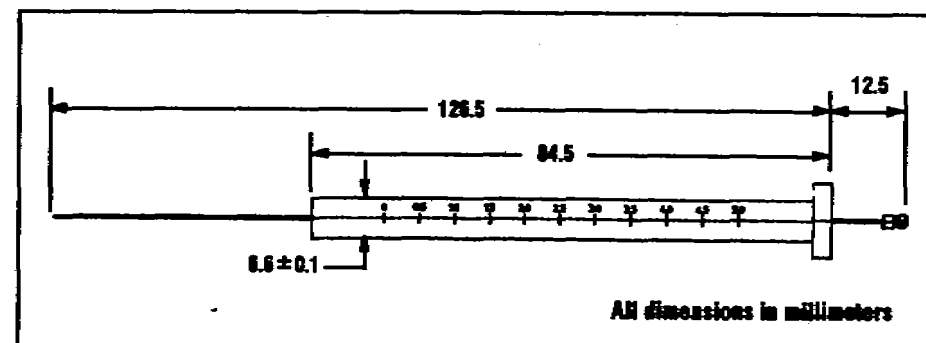
Fixed and removable needle syringes are available to use with the automatic sampler.

- 23 gauge needle used with packed, purged-packed, and split/splitless inlets.
- 23/26 gauge tapered needle used with on-column inlets. This syringe can be used as a general purpose syringe with all inlets.

The syringe needle must have a flat tip. Do not use sharp-tipped needles (e.g., point style 2). When used with the automatic sampler, these needles tear the inlet septum causing leaks. Also, sharp-tipped needles wipe off on the septum as they exit resulting in a large solvent tail on the chromatogram.



The following diagram illustrates some of the critical syringe dimensions. These dimensions do not make up a complete set of specifications. Some of the dimensions are too difficult to measure without special instruments.

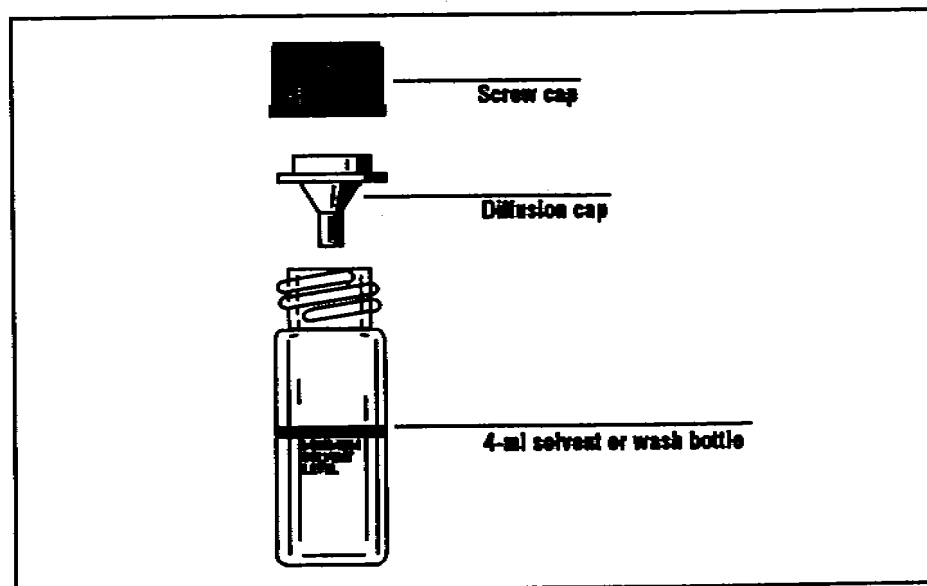


## Solvent and Waste Bottles

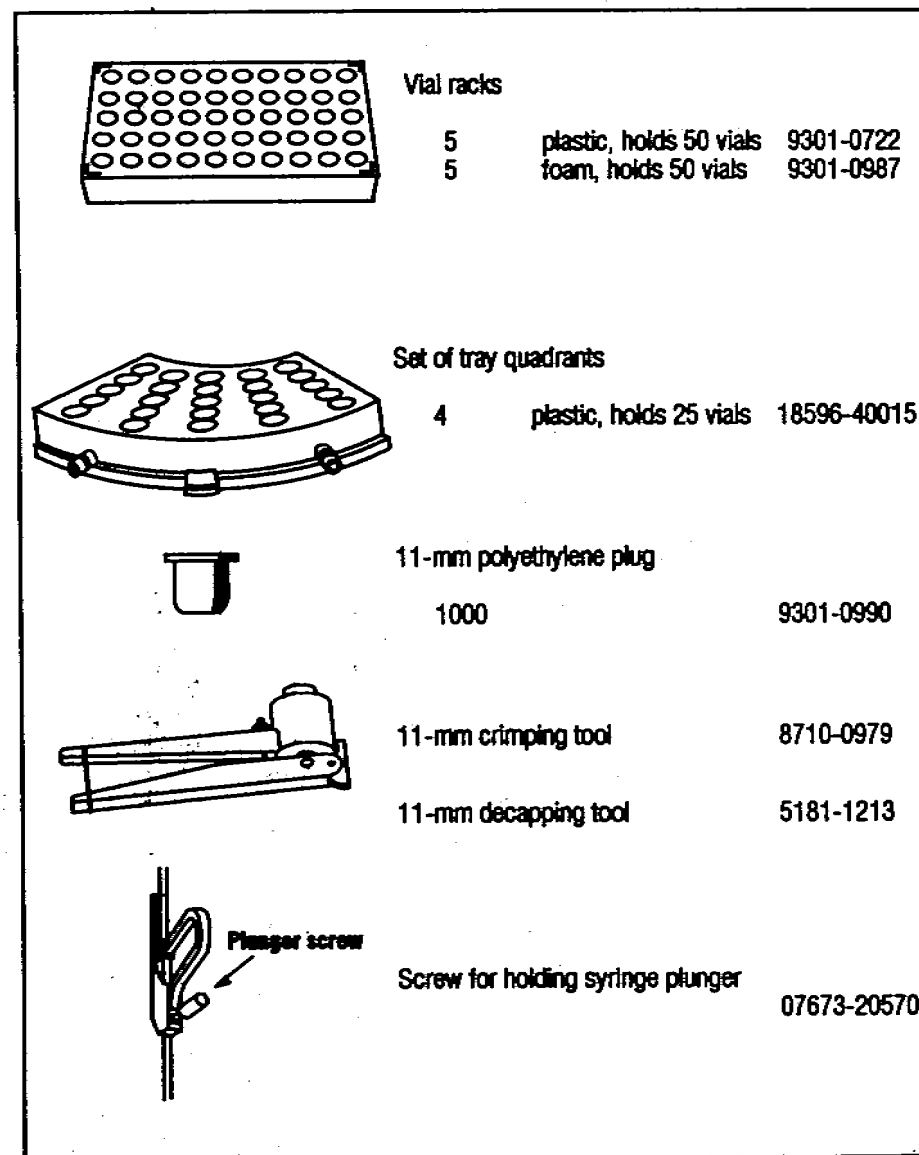
4-ml bottles are placed in the injector turret to hold solvents used for washing the syringe between samples and to hold the solvent and sample rinses. During a solvent wash, the syringe needle cannot reach the last 2.5 ml in the bottle. For more information, see "Filling and Placing the Bottles" on page 3-17.

You can use diffusion caps or septa on these bottles to reduce evaporation and diffusion of your solvents and waste. HP recommends diffusion caps over septa for two reasons.

- The diffusion cap allows multiple entrances into a bottle without contaminating the liquid inside the bottle with small pieces of septum material.
- For many common solvents, the rate of diffusion out of the bottle is less with a diffusion cap than with a septum that has been punctured with a standard syringe needle.



## Miscellaneous



Parts for HP 5890 SERIES II cool on-column inlet

Needle guide top	19245-20670
Septum nut base assembly	19245-80520
Spring	19245-60760

Injection port nut for HP 5880A

1	19243-60500
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Mounting post

1	07673-61035
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Parking or support rod for use with HP 5890 SERIES II GCs with S/N greater than 3033A32100

1	05890-61525
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Nanoliter adapter

1	HP 18599N
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Basic Supplies Kit

6	10- $\mu$ l 23/26 tapered syringes
144	4-ml solvent/wash bottles with caps
144	diffusion caps
1000	2-ml sample vials with crimp caps
5	vial racks
144	11-mm septa

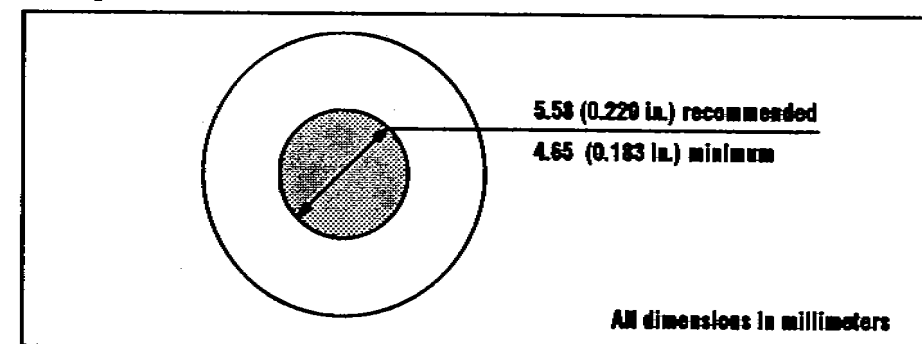
Once the vial septum is punctured by the syringe needle, the sample may interact with the septum material and affect the analysis. There are three types of septum used in vial caps. Each has a different resistance to interaction with solvents.

- Red/orange: Made from natural rubber and coated with Teflon® on the sample side. A general purpose rubber formulation intended primarily for aqueous liquid fill products with a pH range 4.0-7.5. Least resistant to solvents after puncture.
- Red: Made from silicone rubber coated with Teflon® on both sides. A high quality, low extractable silicone rubber intended for applications requiring resistance to high extremes of heat. Somewhat resistant to solvents after puncture. Slightly poorer resealing characteristics when application calls for multiple injections from the same vial.
- Black: Made from Viton®. Most resistant to solvents.

**CAUTION**

**Black septa made from Viton® are not recommended for use with the HP 18593A and B Injector Modules. Using Viton® may cause a syringe error.**

The following diagram illustrates the recommended and minimum diameter for vial septa.



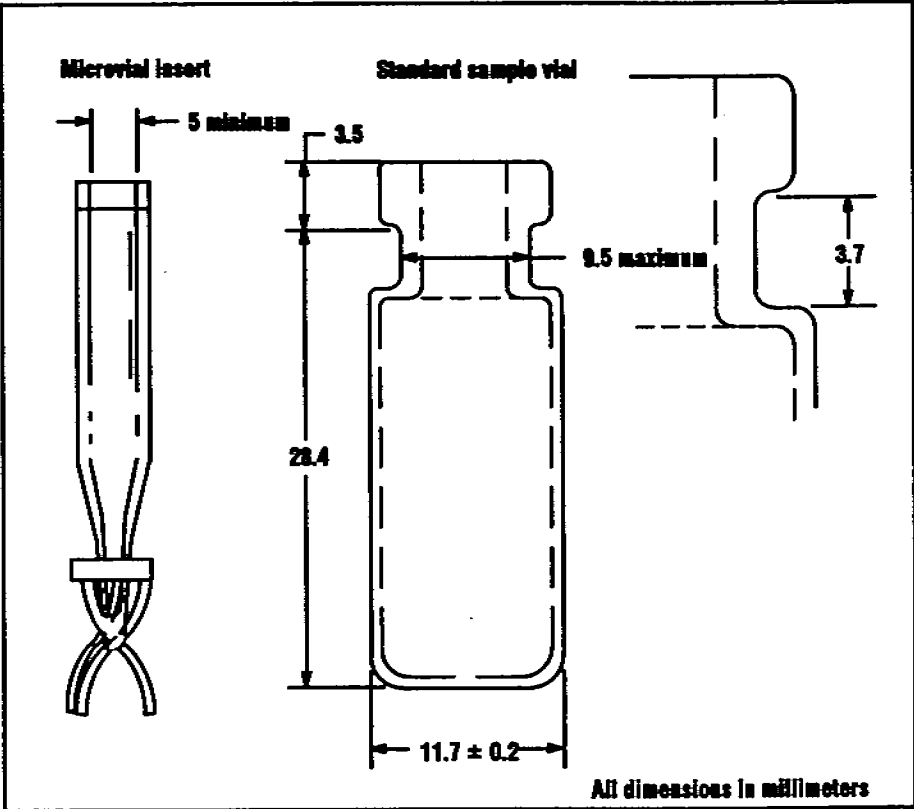
If you are loading vials directly into the injector turret, you can use 2-ml sample vials with screw caps. Do not use screw cap vials with the tray.

Use amber glass vials for light-sensitive samples.

# Sample Vials and Caps

To maintain the tray gripper's reliability, you must use glass vials which meet HP specifications. Service calls and repairs found to be due to vials that do not meet these specifications are not covered under either warranty or service contract.

The following diagram illustrates most of the critical dimensions for the sample vials and microvial inserts. These dimensions do not make up a complete set of specifications. Some of the dimensions are too difficult to measure without special instruments.



## Selecting Consumables

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This section contains information to help you select consumables to use with the HP 7673 Automatic Sampler. Some critical dimensions are provided for sample vials, syringes, and septa. If you are using consumables that do not have these dimensions, the reliability of the automatic sampler may be affected.

# Introduction

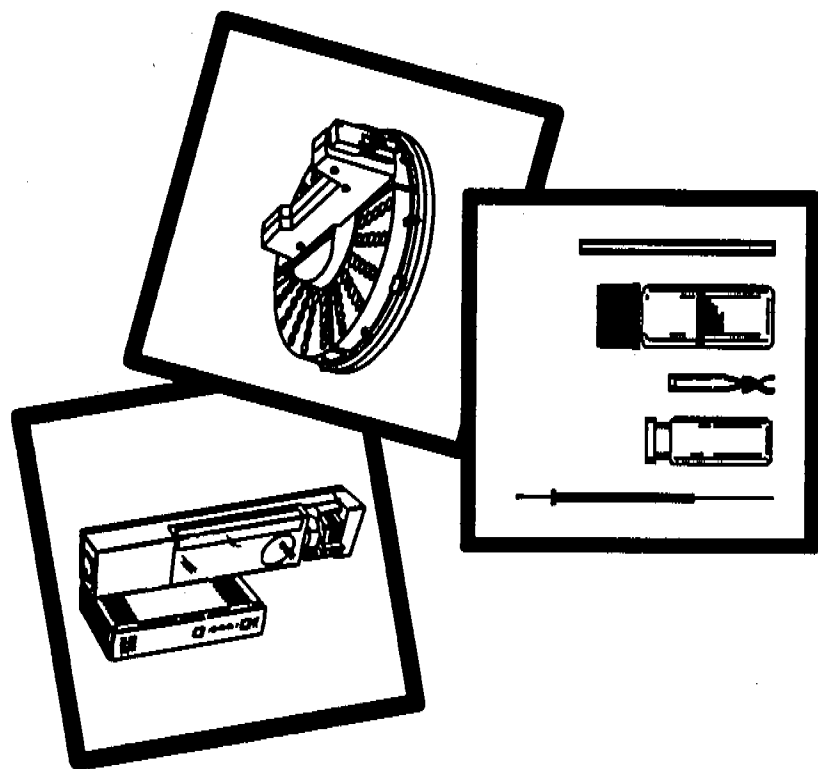
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This is an integral part of the HP 7673 Automatic Sampler Operating Manual (part number 07673-60995). It is designed to be updated on a regular basis and kept in the manual's binder after the chapter tab for appendix A, "Consumables."

This booklet contains basic information on how to select and order consumables for the automatic sampler. It is divided into two parts.

- Detailed information to help you select the appropriate consumables for the HP 7673. This section is divided into five parts.
  - Sample vials and caps.
  - Solvent and waste bottles.
  - Syringes.
  - Inlet septa.
  - Inlet liners.
- A list of Hewlett-Packard supplies recommended for the HP 7673 and available from Analytical Direct.

# HEWLETT-PACKARD



## HP 7673 Automatic Sampler Appendix A: Consumables

