

I M M E D I A T E A C T I O N S U M M A R Y

2109B, 2113B

Product Support Plan

<u>ITEM</u>	<u>PAGE</u>
● 2109B, 2113B shipping in September.	7
● New power supply has board level repair. Exchange assemblies and Product Support Package (PSP), must be ordered into FSI to support this product.	15-17
● RPL now fully utilized.	1
● High reliability has increased PM interval to 6 months.	8
● Virtually all "A" products are "B" compatible.	Attached

I N T E R - O F F I C E S E R V I C E M E M O

File No. 21MXE.090.21MXE-0977-01

TO: MAILS

FROM: DATA SYSTEMS DIVISION TECHNICAL MARKETING

SUBJECT: 21MX E-SERIES COMPUTER SUPPORT PLAN.
 COVERS 2109B/2113B AND UPDATES 2109A/2113A.

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David Aune/cq

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HEWLETT  PACKARD

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I. PRODUCT DEFINITION

A. General Description

The 2109B and 2113B computers are two new versions of the 21MX E-Series computers. The 2109B and 2113B maintain instruction compatibility and speed with their "A" predecessors. The "B" version computers have been physically modified to accomodate a newly designed power supply. However, they will retain external dimension compatibility with the "A" computers. For hardware compatibility see attached Product Compatibility Guide.

B. Product Features (New for the 2109B and 2113B)

1. RPL

The enhanced power supply allows full use of the Remote Program Load (RPL) feature for the first time. As a result, RPL has been slightly modified from that used on the "A" computer to make it more useful.

The RPL modification is given below:

The current definition of RPL is as follows:

DESCRIPTOR BLOCK SWITCH	8	7	6	5	4	3	2	1	(CLOSED =
CORRESPONDING S-REG BIT	15	14	10	9	8	7	6	0	

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2. Power Supply

The power supply used in the 2109B and 2113B is the same utilized in the 12979B and 12990B. This supply has been designed with service as a prime consideration. Modularity has been incorporated to make troubleshooting simple and straightforward. This concept allows the power supply to offer itself to the customer as a low cost, high reliability product both in parts and service.

Securing of the supply in the computer mainframe is accomplished by slide retainers mounted on the front of the supply and two screws in the rear. This facilitates fast and easy removal of the supply from the computer without removal of the computer from the rack. Quick connect-disconnect sockets are used as cable terminators, thus eliminating the time consuming task of disconnecting all wires between the crossover board and the power supply.

"OFF", "ON", "LOCK", and "OPERATE" controls are mounted on the power supply behind the front panel. One slide switch determines LOCK/OPERATE mode and one rocker switch determines the OFF/ON mode. The rocker switch, in series with the A.C. input line, also performs the function of a circuit breaker in the event a supply configured for 115V operation is plugged into 230V. Reset is no longer necessary because it is performed automatically on power up. Standby mode is eliminated to reduce circuit complexity and increase reliability.

3. Battery Backup

The "B" supply power fail systems (12991B/12944B) utilize sealed lead-acid batteries and a constant voltage battery charger. The power fail system is installed by removing the jumper board from the supply and installing two additional boards (5061-1348, 5061-1349) as well as the battery pack.

The new lead-acid battery system features quick charge up time and eliminates the periodic discharging of the battery pack that is associated with nickel cadmium batteries. Another feature is that the computer cannot be operated with the power fail boards installed and batteries disconnected. This prevents accidentally operating the computer with the batteries turned off. This feature can be defeated to facilitate servicing by placing a special plug on the battery connector. This plug (part 12991-60002) is included in the power fail package.

A spring loaded switch on the battery pack is manually pushed to check battery condition. An LED located next to the switch will light when the switch is depressed if the batteries are sufficiently charged to maintain memory.

4. Front Panel

Front panel modifications on the 2109B and the 2113B consist of the addition of two hinges attaching the bottom of the front panel firmly to the computer. This allows the front panel to be opened downward to provide easy and unobstructed access to the memory card cage and the power supply. A keylock is installed providing the operator with a means to physically lock the front panel, disallowing unauthorized access to the memory card cage and controls mounted on the power supply. Since all controls are behind the front panel, the keylock has no electrical function. Front panel retaining screws have been eliminated, creating a more aesthetically appealing design.

II. PHYSICAL DESCRIPTION AND SPECIFICATIONS

A. Physical Characteristics

Width: 16-3/4 inches (42.55 cm) behind rack mount;
9 inches (48.26 cm) front panel width on sides.

Depth: 23-1/2 inches (59.69 cm); 23 inches (58.42 cm)
behind rack mounting ears.

	HP 2109B ~~~~~	HP2113B ~~~~~
Height	8-3/4 in. (22.23 cm)	12-1/2 in. (31.69 cm)
Weight	45 pounds (20.41 kg)	65 pounds (29.48 kg)

B. Electrical Characteristics

Line Voltage: 88-132 VAC/176-264 VAC

Line Frequency: 47.5 to 66 Hz

C. Power Supply (2109B, 2113B)

	HP 2109B ~~~~~	HP2113B ~~~~~
Power (max.)	770W	770W

Sustains computer over a line loss of 8mS when operating at normal 110/220V ac.

Output Protection: All voltages protected from overvoltage and overcurrent conditions.

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Thermal Sensing: Monitors internal temperature and automatically shuts down when computer temperature exceeds 212 degrees F plus or minus 6 degrees F max.

VOLTAGE -----	MAXIMUM CURRENT -----	REGULATION -----
+5CPU	50 AMPS	5%
-2V	6 AMPS	10%
+12V (I/O)	2.5 AMPS	5%
-12V (I/O)	2 AMPS	5%
+5MEM	4.5 AMPS	5%
+12MEM	2 AMPS	3%
-12MEM	.25 AMPS	Unregulated
+28	.25 AMPS	Unregulated

D. Environmental Limitations

Operating Temperature: 32 degrees to 131 degrees F
(0 degrees to 55 degrees C)

Storage Temperature: -40 degrees to 167 degrees F
(-40 degrees to 75 degrees C)

Relative Humidity: 20% to 95% at 104 degrees F
(40 degrees C), no condensation.

Ventilation: Intake, left-hand side; exhaust,
right-hand side.

	HP 2109B ~~~~~	HP 2113B ~~~~~
Airflow (Cu. Meters/min)	6.63	9.23
(Cu. ft/min)	200	280
Heat Dissipation		
(Kcal/hr max)	538	538
(BTU/hr max)	2138	2138

Altitude: Transportable to 40,000 feet (12.17km) for non
operating condition and to 15,000 feet (4.57 km) for
operating condition.

Vibration and Shock: Type tested to qualify for normal
shipping and handling shock and vibration.

Vibration: 0.012 inch (0.3 mm) p-p, 10-55 Hz, 3-axis.

Shock: 30g, 11 ms, 1/2 sine wave, 3-axis.

Contact factory for review of any application regarding
operation under continuous vibration.

E. Power Fail

Interrupt Priority: Highest priority interrupt.

Power Failure: Detects power failure and generates an interrupt to user-written power failure routine.

Power Fail Recovery System: Available as an accessory.

Power Restart: Detects resumption of power and enables an interrupt to user-written automatic restart program which has been protected in memory by the sustaining battery.

Power Control: Monitors battery charge status during line failure.

Charge Unit: Constant voltage charger with 2 Amps max charging current.

Sustaining Battery: Sealed Lead Acid
Capacity - 12944B: 5 ampere - hours
12991B: 10 ampere - hours

F. Central Processing Unit

Same as that used in the 2109A and 2113A with update added to allow full utilization of RPL (see section I-B).

G. Initial Binary Loaders

ROM resident; capacity of four 64-word programs callable from operator panel. Computer can be configured for automatic boot up. (See RPL description)

The 2109B and 2113B will be shipped with two Binary Loader ROMs installed, i.e.:

- a. Paper Tape (1816-0420.)
- b. 7900/7905 Disc (1816-0869)

Note: All loader ROM's are now socketed.

H. ROM Diagnostics

Automatic tests of CPU and memory operating condition. Executed on cold power-up and whenever operator panel IBL/TEST is pressed.

I. Input/Output

Interrupt Structure: Multilevel vectored priority.
Interrupt: Priority determined by location.

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I/O SYSTEM SIZE -----	HP 2109B -----	HP 2113B -----
Std I/O Channels	9	14

J. Current Used By Memory Accessories And I/O

ACCESSORY NO. -----	SUPPLY VOLTAGE			
	+5V ---	+12V ----	-12V ----	-2V ---
12892B	2.0A	----	----	0.05A
12897B	3.3A	----	----	0.05A
12909B	1.2A	0.5A	0.3A	0.04A
12979B	2.0A	----	----	1.35A
12990B	----	----	----	----
12994A	0.5A	----	----	----
12998A	0.5A	----	----	----
13187B	0.6A	----	----	----
13197A	3.7A	----	----	0.15A
13304A	1.8A	----	----	----
13305A	3.9A	----	----	----
13306A	1.8A	----	----	----
LOADER ROM'S	0.15A			
12741A	.85	----	----	----
12747A	0.85	----	----	----
2102B	1.2A	----	----	----
2102C	3.29A	----	----	----
2102E	2.56A	----	----	----
12780A	0.72A	----	----	----
12779A	0.52A	----	----	----
12992 (EA)	.15A	----	----	----
13047A	7.39A (Fully loaded)			

NOTE: +30 VDC I/O is available on the E-Series computer if a customer-supplied 1 AMP fuse is installed in location A6F2 on the Motherboard of the power supply.

K. Memory

The 2109B and 2113B use the same direct memory access system (DCPC) and the same memory systems as the 2109A and 2113A. Consult the attached compatibility guide.

L. I/O Compatibility

All 21MX E-Series I/O system conventions (I/O addressing, data transfers, interrupt system control, and control signals) are compatible with 21MX computers. While most

currently supported hardware I/O interfaces of the 21MX are expected to work properly on the computer, a new supported list of I/O interfaces has been generated. See attached Product Compatibility Guide for those products tested with the 21MX E-Series computer. Only those listed are warranted as compatible. Due to the nature of E-Series control processor the 5 I/O time periods (T2-T6) are not guaranteed to be of equal length.

M. Microprogrammed Block I/O

All 21MX E-Series computers offer microprogrammed block I/O capability. This includes several new signal lines on the I/O backplane for use by special hardware interface cards. Custom user-written microprograms may then transfer blocks of buffered data between I/O and memory in a semisynchronous manner at up to 1.5M words/sec. This capability is not as flexible as hardware DCPC but does permit high bandwidth for some applications and may become a low-cost limited capability alternative to the hardware port controller channels.

III. MARKETING DATA

A. Sales Forecast

The 2109B will replace the 2109A, and the 2113B will replace the 2113A in sales.

Initial Sales Forecast

	SEPT	OCT	NOV	DEC	JAN	FEB	TOTAL
	----	---	---	---	---	---	-----
2109B	32	34	39	40	41	46	232
2113B	115	129	133	159	171	170	877

B. Availability

Customer shipments are scheduled to begin from Data Systems Division in September.

IV. MAINTENANCE STRATEGY

A. Installation

The 21MX E-Series Computer, by itself, is a component product and is to be installed by HP only when the customer orders installation on a time and material basis. For installation policy on systems and subsystems, refer to Installation Matrix.

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B. Warranty

Standard warranty for products shipped from Data Systems Division is 90 days.

C. Projected Failure Calculations for the "B" Power Supply

PART NUMBER	DESCRIPTION	MTBF (HOURS)	%FAILURE RATE*
5061-1344	Inverter Board	324,844	1.3
5061-1345	Control Board	76,005	5.5
5061-1347	Preregulator Control Bd.	125,959	3.3
5061-1351	Jumper Board	610,650	0.7
5061-1371	Mother Board	113,718	3.7
TOTAL			22.7

*NOTE: % Failure Rate = $\frac{1}{\text{MTBF}/4160}$ (~1 failure/4 years)

D. Preventive Maintenance

Refer to the respective HP computer product Installation and Service Manual for preventive maintenance procedures. Note that due to greater reliability, PM intervals have been lengthened to 6 months.

E. Mean Time To Repair

		Theoretical MTTR	*Historical MTTR
CPU Board	5061-1341	1	3.0
MPT	12892-60003	3/4	2.3
Memory Controller	02102-60001	1	2.3
DCPC	12897-60004	3/4	3.2
Firmware Accessory Bd.	5061-1339	3/4	---
Mem. Expansion Module	12731-60001	3/4	---
Power Supply (all assemblies)	N/A	1	---

*NOTE: Based on 21MX M-Series Computers Repair Orders.

F. Backup Support

Technical Marketing Services will provide hardware support for the 2109B and 2113B and associated products.

G. Special Considerations (Power Supply)

The Mother Board (P/N 5061-1371) will not be replaced at the customer's site. If the problem is traced to the Mother Board, it will be replaced intact along with associated sheet metal (Frame Assembly: P/N 5061-1387). The faulty assembly will then be brought back

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to the field office. Since only the Mother Board will be returned to the field, the mother board should then be removed from the assembly and returned via "Blue Stripe". A loss of all associated sheet metal could result if the entire unit is returned on the "Blue Stripe" program.

H. Cost of Ownership (BMMC)

1. 21MX E-Series CPU's

Product #	Description	List Price	BMMC
2109B	Computer, 8-3/4	\$ 5850.00	\$ 50.00
2113B	Computer, 12-1/4"	6850.00	50.00

2. Memory Systems

Product #	Description	List Price	BMMC
2102B	Memory Controller	\$ 600.00	\$ 7.00
2102C	Fault Control	600.00	7.00
2102E	Memory Controller	600.00	7.00
12747A	High Performance		
	Memory Controller	6400.00	26.00
12766A	128K Byte Memory		
	Module	3500.00	22.00
12766B	64K Byte Memory		
	Package	6400.00	36.00
12766C	128K Byte Memory		
	Package	9300.00	50.00
12767A	192K Byte Memory		
	Package	4500.00	28.00
12767B	64K Byte Hi Perform.		
	Package	8400.00	48.00
12767C	128K Byte Hi Perform.		
	Package	12300.00	68.00
12779A	192K Byte Hi Perform.		
	Package	3500.00	16.00
12780A	128K Check Bit Array		
	Assembly	6500.00	28.00
12783A	256K Check Bit Array		
	Assembly	9000.00	50.00
12783B	128K Byte Mem. with		
	Fault Control	15000.00	76.00
12783C	256K Byte Mem. with		
	Fault Control	29000.00	140.00
12783D	512K Byte Mem. with		
	Fault Control	51200.00	244.00

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12898A	DCPC for I/O Ext.	350.00	11.00
12998A	16K Byte Memory Module	750.00	4.00
13187B	32K Byte Memory Module	1600.00	7.00

3. Optional Accessories and Upgrades

Product #	Description	List Price	BMMC
12731A	Memory Expansion Mod	\$ 1000.00	\$ 6.00
12777A	Priority Jumper	60.00	0.00
12892B	Memory Protect	500.00	9.00
12897B	Dual Channel Port Controller	750.00	8.00
12903B	Rack Slides for 2108/ 09A/09B, 12990A/90B	150.00	0.00
12903C	Rack Slides for 2112/ 13A/13B	150.00	0.00
12909B	Programmable ROM Writer	700.00	9.00
12944B	Power Fail Recovery System for 2109B	600.00	5.00
12991B	Power Fail Recovery System for 2113B	600.00	5.00
12992A	7900/01/2883 Disc Loader	100.00	1.00
12992B	7905/7920 Disc Loader Rom	100.00	0.00
12992C	2644/45 Cartridge Tape Loader	100.00	0.00
12992D	7970 Mag Tape Loader	100.00	0.00
12992E	9885 Floppy Disc Loader	100.00	0.00
13304A	Firmware Accessory Board (FAB)	300.00	3.00
13305A	Dynamic Mapping System	1650.00	17.00
13306A	Fast Fortran Package	650.00	5.00
13307A	Dynamic Mapping Inst.	500.00	2.00
13047A	2K User Control Store	550.00	5.00
13197A	Writeable Control Store	2000.00	12.00

D. Extenders

Product #	Description	List Price	BMMC
12781A	Dual CPU Kit	\$ 700.00	\$ 0.00
12979B	I/O Extender	4500.00	12.00
12990B	Memory Extender	3500.00	6.00

V. CUSTOMER ENGINEERING SUPPORT INFORMATION

A. Board and Component Repair

1. Modular level replacement will be utilized for:

- a. Power Supply
 - ~CONTROL BOARD
 - ~INVERTER BOARD
 - ~PREREGULATOR CONTROL BOARD
 - ~JUMPER BOARD
 - ~MOTHER BOARD
- b. CPU and Accessories
 - ~CPU Assemblies-CPU Board, Backplanes, Crossover Board, and Front Panel.
 - ~Memory Modules- All memory modules are set up on board exchange but may be serviced to component level if desired.
 - ~Accessories- Other than those listed below under component level replacement.

2. Component level replacement will be utilized for:

- a. Power Supply
 - ~PREREGULATOR TRANSISTOR
 - ~+12 HYBRID VOLTAGE REGULATOR
 - ~-12 VOLT DARLINGTON REGULATOR
- b. CPU Board and Accessories
 - ~Memory Modules

The 16K, 32K, and 128K Byte and 64K Memory Modules can be troubleshoot to the component level. The troubleshooting procedure is covered in the 21MX E-Series Computer Installation and Service Manual, 02109-90002.
 - ~Fast Fortran Package, 13306A, Firmware Dynamic Mapping System, 13305A.

~The above mentioned firmware will be mounted on IC sockets on the Firmware Accessory Board (P/N 5061-1339). The troubleshooting procedure will be to sequentially replace the RCM chips while using the appropriate checkout diagnostics or system program for verification.
 - ~The 13305A, 13305-90001, and 13306A, 13306-90001, Service and Installation Manuals cover the troubleshooting procedure for the firmware.
 - ~Front Panel

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B. Diagnostics and Manuals

1. Diagnostic Manuals:

HP H/N

- | | |
|--|-------------|
| a. Configurator Diagnostic Manual | 02100-90157 |
| b. Semi-Conductor Memory Diagnostic Manual | 24395-90001 |
| c. Memory Expansion Module Diagnostic | 12929-90003 |
| d. Fast Fortran Diagnostic Manual | 12977-90002 |
| e. See Note 2 | |

2. Diagnostics

Refer to table A-1 attached.

3. Reference, Service and Installation Manuals

- | | |
|--|-------------|
| a. 21MX E-Series Computer Operating and Reference Manual | 02109-90014 |
| b. 21MX E-Series Computer Installation and Service Manual | 02109-90015 |
| c. 21MX E-Series Computer Microprogramming Reference Manual | 02109-90004 |
| d. 21MX E-Series Computer Microprogramming Pocket Guide | 02109-90008 |
| e. HP 12979B Input/Output Extender Operating and Reference Manual | 12979-90014 |
| f. HP 12979B Input/Output Extender Installation and Service Manual | 12979-90016 |

NOTE 2: All the Diagnostics mentioned above as well as all supported diagnostics are now available on 2644/2645/2648 cartridge, disc, and mag tape. See Table II for part #'s as well as detailed list of diagnostics.

- | | |
|--|-------------|
| g. 12990B Memory Extender Installation and Service Manual | 12990-90007 |
| h. 12897B Dual-Channel Port Controller Installation Manual | 12897-90005 |
| i. 12903B Slide Mounting Kit Installation Instructions (for 2109/12979/12990) | 12903-90002 |
| j. 12903C Slide Mounting Kit Installation Instructions (for 2113) | 12903-90003 |
| k. 12944B Power Fail Recovery System Installation Manual (for HP 2109) | 12944-90005 |
| l. 12991B Power Fail Recovery System Installation Manual (for HP 2113/12990) | 12991-90004 |
| m. 21MX/21MX E-Series Computer I/O Interfacing Guide | 02109-90006 |
| n. 2102A/B Memory Controller Installation Manual | 02102-90005 |
| o. Standard Performance Memory Module Installation Manual (12998A, 13187A/B, 12747A) | 13187-90004 |

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p.	HP 2102E High Performance Memory Controller Installation Manual	12741-90001
q.	HP 12741A a6K High Performance Memory Module Installation Manual	12741-90001
r.	13197A Writeable Control Store Reference Manual	13197-90005
s.	13047A User Control Store Kit Installation and Service Manual	13047-90001
t.	2000 Systems Diagnostic Configuration Reference Manual	02100-90157
u.	HP 2102C Fault Control Memory Controller Installation and Service Manual	02102-90011
v.	Fault Control Memory Check Bit Array Installation Manual (12779A, 12780A)	12779-90001
w.	12892B Memory Protect Installation Manual	12892-90007
x.	21MX E-Series Computer Engineering Supplement Package	02109-90007
y.	13304A Firmware Accessory Board (FAB) Installation and Service Manual	13304-90001
z.	13305A Dynamic Mapping System (DMS) Installation and Service Manual	13305-90001
aa.	13306A Fast Fortran Package (FFP) Installation and Service Manual	13306-90001
bb.	13197A Writeable Control Store Reference Manual	13197-90005
cc.	13047A User Control Store Kit Installation and Service Manual	13047-90001
dd.	2000 Systems Diagnostic Configuration Reference Manual	02100-90157

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C. Recommended Spares (CE or Customer Support)

LEVEL 1: A set of all Level 1 assemblies will support 90% of all failures.

LEVEL 2: A set of all level 2 assemblies will support all failures. There should be at least one level 2 set per office.

The number of units per kit is indicated in the appropriate "LEVEL" column.

1. New and Exchange Assemblies

Supported Product	Description	New P/N	List Price	Exch. P/N	Exch. Price	LEVEL 1	LEVEL 2
12731A	Memory Expansion Mod.	12731-60001	\$1000.	12731-69001	\$ 260.	1	1
12747A	128K Byte Memory Module	12747-60001	\$6000.	12747-69001	\$ 530.	1	1
12779A	128K Byte Check Bit Array	12779-60001	\$3500.	12779-69001	\$ 460.	0	0*
12780A	256K Byte Check Bit Array	12780-60001	\$6500.	12780-69001	\$ 590.	0	0*
12892A	Memory Protect	12892-60003	\$ 500.	12892-69003	\$ 250.	1	1
12897A	Dual Channel Port Controller	12987-60004	\$ 750.	12897-69003	\$ 275.	1	1
**12944B/ 12991B	Pwr. Supply Battery Charge Bd.	5061-1348	\$ 200.	5061-1378	\$ 106.	1	1
**12944B/ 12991B	Pwr. Supply Backup Board	5061-1349	\$ 293.	5061-1379	\$ 116.	1	1
12998A	16K Byte Memory Module	5060-8359	\$ 750.	5060-8373	\$ 300.	1	1
13187B	32K Byte Memory Module	5061-1332	\$1600.	5061-1337	\$ 350.	1	1

*Error correction will enable normal computer operation under most 12779A, 12780A failures. 12779A and 12780A boards are checked at PM and replacements ordered if necessary.

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13304A	Firmware Accessory Board	5061- 1339	\$ 300.	5061- 1370	\$ 130.	0	1
13304A	FAB-CPU Inter- connect	5060- 8344	\$.30.	N/A	N/A	0	1
2102B	Standard Perform. Mem. Cntr.	02102- 60001	\$ 600.	02102- 69001	\$ 275.	1	1
2102C	Fault Cntr. Memory Controller	02102- 60003	\$ 600.	02102- 69003	\$ 365.	1	1
2102E	High Perform. Mem. Cntr.	02102- 60002	\$ 600.	02102- 69002	\$ 300.	1	1
**2109B/ 2113B	2109B/2113B CPU Assembly	5061- 1341 (rev C)	\$2220.	5061- 1390	\$ 350.	1	1
2109A/ 2113A	2109A/ 2113A CPU Assembly	5061- 1341	\$2220.	5061- 1369	\$ 350.	1	1
2108A/ 2109A	2108A/ 2109A Power Supply	02108- 60023	\$2735.	02108- 60036	\$ 200.	1	1
2112A/ 2113A	2112A/ 2113A Power Supply	02112- 60006	\$3278.	02112- 69006	\$ 425.	1	1
2108A/ 2109A	Battery Control I	5060- 8347	\$ 175.	N/A	N/A	1	1
2108A/ 2109A	Battery Control II	5060- 8353	\$ 140.	N/A	N/A	1	1
2108A/ 2109A	Battery Output	5060- 8346	\$ 295.	5060- 8376	\$ 200.	1	1
2112A/ 2113A	2112A/2113A Battery Board	02112- 60003	\$ 240.	02112- 69003	\$ 100.	1	1
2108A/ 2109A	Rear Panel Assembly	02108- 60028	\$ 213.	N/A	N/A	0	1
2112A/ 2113A	Rear Panel Assembly	02112- 60009	\$ 380.	N/A	N/A	0	1
2109B/ 2113B	Front Panel	5061- 1343	\$ 584.	5061- 1372	\$ 250.	0	1

21MX-E SERIES COMPUTER SUPPORT PLAN

2109A/B	Crossover	5060-	\$ 75.	N/A	N/A	0	1
2113A/B	Board	8345					
**2109B/	Pwr. Supply	5061-	\$ 215.	5061-	\$ 120.	1	1
2113B	Inverter	1344		1375			
	Board						
**2109B/	Pwr. Supply	5061-	\$ 217.	5061-	\$ 120.	1	1
2113B	Control	1345		1376			
	Board						
**2109B/	Pwr. Supply	5061-	\$ 176.	5061-	\$ 105.	1	1
2113B	Prereg.	1347		1377			
	Control Bd.						
**2109B/	Pwr. Supply	5061-	\$ 108.	N/A	N/A	0	1
2113B	Jumper	1351					
	Board						
**2109B/	Pwr. Supply	5061-	\$ 36.	N/A	N/A	0	1
2113B	Status	1352					
	Board						
**2109B/	Pwr. Supply	5061-	\$ 800.	5061-	\$ 200.	1	1
2113B	Mother	1371		1380			
	Board						
2109A/B	2109A/B I/O	02108-	\$ 175.	N/A	N/A	0	1
	Backplane	60007					
2109A/B	2109A/B	5061-	\$ 195.	N/A	N/A	0	1
	Memory	1382					
	Backplane						
2113A/B	2113A/B	5061-	\$ 243	N/A	N/A	0	1
	Memory	1383					
	Backplane						
2113A/E	2113A/B I/O	02112-	\$ 246.	N/A	N/A	0	1
	Backplane	60021					

**New boards for "B" Computer. Should be ordered into FSI. Coordinate power supply board quantities with use in 12979B.

21MX-E SERIES COMPUTER SUPPORT PLAN

2. Product Support Packages (PSP). Level 1 and Level 2 defined as before.

a. 21MX-E - 02109-67001 for "A" and "B" version computers consists of the following set of LEVEL 2 components.

PRODUCT SUPPORTED	DESCRIPTION	PART NUMBER	LIST PRICE	LEVEL 1	LEVEL 2
	Resistor network	1810-0080	\$ 1.25	0	2
	Resistor network	1810-0297	4.50	0	2
	IC SN7400N	1820-0054	1.00	0	2
	IC SN7404N	1820-0174	1.00	0	2
	IC SN7408N	1820-0511	1.15	0	2
FRONT	IC SN7432N	1820-0661	1.00	0	2
PANEL	IC SN74LS74N	1820-1112	1.75	0	2
(5061-	IC SN74LS14N	1820-1416	4.50	0	2
1343)	IC SN74273N	1820-1461	3.10	0	2
	IC SN745241N	1820-1624	6.25	0	2
	IC SN745240N	1820-1633	11.00	0	2
	IC SN745374N	1820-1677	9.00	0	2
	LED - VISIBLE	1990-0529	2.80	0	5
2109A/13A	"A" MNL - OP & REF	02109-90001	8.00	0	1
2109A/13A	"A" MNL - INS & SERV	02109-90002	15.00	0	1
13304A	MNL - FAB INSTALL	13304-90001	1.50	0	1
2109B/13B	"B" MNL - OP & REF	02109-90014	8.00	0	1
2109B/13B	"B" MNL - INS & SERV	02109-90015	15.00	0	1
	IC 21MX-E FFP	5090-0569	110.00	0	1
	IC 21MX-E FFP	5090-0570	110.00	0	1
	IC 21MX-E FFP	5090-0571	110.00	0	1
FAST	IC 21MX-E FFP	13306-80001	100.00	0	1
FORTTRAN	IC 21MX-E FFP	13306-80012	100.00	0	1
PACKAGE	IC 21MX-E FFP	13306-80003	100.00	0	1
(ROMS)	IC 21MX-3 FFP	13306-80004	100.00	0	1
	IC 21MX-E FFP	13306-80005	100.00	0	1
	IC 21MX-E FFP	13306-80006	100.00	0	1
DYNAMIC	IC 21MX-E DMI	13307-80011	100.00	0	1
MAPPING	IC 21MX-E DMI	13307-80012	100.00	0	1
INSTRUCTION	IC 21MX-E DMI	13307-80013	100.00	0	1
ROMS (Also	IC 21MX-E DMI	13307-80014	100.00	0	1
used in	IC 21MX-E DMI	13307-80015	100.00	0	1
13305&13307)	IC 21MX-E DMI	13307-80016	100.00	0	1
2109A/B &	DG- 21MX FFP	12977-16004	25.00	0	1
2113A/B	DG- 21MX FFP	12977-16005	25.00	0	1
	MOD- FFP 21MX	12977-90002	1.00	0	1

b. 21MX-E "B" Power Supply 02109-67002 for "B" version computer only consists of the following set of LEVEL 2 components. These are new parts and should be ordered to support the 2109B and 2113B. Coordinate quantities with use in 12979B.

21MX-E SERIES COMPUTER SUPPORT PLAN

VOLTAGE REGLTR	1813-0093	18.00	1	1
TRANSISTOR 2N6053	1853-0351	7.50	1	1
TRANSISTOR 2N6251	1854-0718	17.00	2	2
ON-OFF SWITCH	3105-0079	34.00	1	1
SCREWHOLDER PHIL/POZ	8710-0945	9.00	0	1
GUIDE - PC	5040-0170	0.80	0	4
EXTENDER BOARD	5060-0049	13.00	0	2
ASSY-LCPS JUMPER	5061-1351	125.00	1	1
ASSY-FRAME	5061-1387	715.00	0	1

c. 21MX AND 21MX-E COMPUTERS. Service kit 02108-67001 consists of the following set of Level 2 components.

CNTNR PLASTIC	1540-0392	5.00	0	1
CNTNR PLASTIC	1540-0393	5.00	0	1
IC ROM 4X256	1816-0857	100.00	0	1
IC ROM 4X256	1816-0863	100.00	0	1
IC ROM TTL 1024	1816-0869	100.00	0	1
IC MEMORY	1816-0962	100.00	0	1
IC SN7474N	1820-0077	1.50	0	1
IC MC3001P	1820-0141	1.50	0	2
IC MC3003P	1820-0205	2.15	0	2
IC SN74H00N	1820-0370	1.20	0	2
IC SN74H04N	1820-0424	1.50	0	2
IC SN7413N	1820-0537	1.95	0	2
IC SN7416N	1820-0577	1.50	0	2
IC 9308PC	1820-0742	6.00	0	2
IC HP147A	1820-0755	21.00	0	2
IC HP147B	1820-0756	18.00	0	2
IC SN74S133N	1820-1130	1.50	0	2
XSTR 2N2222ATO18	1854-0477	.90	0	1
DIODE LIGHT EMIT	1990-0325	1.50	0	5
FUSE 5A NB	2110-0010	.50	0	5
FUSE 6A NB	2110-0056	.35	0	5
CAP-FUSEHOLDER	2110-0465	1.45	0	2
FUSEHOLDER-BODY	2110-0470	2.25	0	2
CNDCT FM PD FIRM	4208-0150	3.40	0	2
CASE- CARRYING	9211-2277	250.00	0	1
FM ENVELOPE LRG	9222-0536	2.25	0	10
FM ENVELOPE SM	9222-0538	1.75	0	4
SWITCH BTN MINT	5040-6076	1.00	0	2
SWITCH BTN GRAY	5040-6077	1.00	0	2
4K RAM-18PIN CER	5080-9781	32.00	0	5
4K RAM-22PIN HR	5080-9785	30.00	0	5
SPRING CONTACT	02108-00014	2.90	0	2
RETAINER-SWITCH	02108-40002	0.60	0	2
MNL-21MX OPS	02108-90006	10.00	0	1
DG- CONFG	24296-60001	25.00	0	1
MULT DG #1	24396-12001	25.00	0	1
MULT DG #2	24396-12002	25.00	0	1
MULT DG #3	24396-12003	25.00	0	1
DG LIBR-CRTG #1	24396-13301	50.00	0	1
DG LIBR-CRTG #2	24396-13302	50.00	0	2
DG LIBR-CRTG #3	24396-13303	50.00	0	1

21MX-E SERIES COMPUTER SUPPORT PLAN

DG LIBR-CRTG #4	24396-13304	50.00	0	1
DG LIBR-CRTG #5	24396-13305	50.00	0	1
DG LIBR-CRTG #6	24396-13306	50.00	0	1
DG LIBR-CRTG #7	24396-13307	50.00	0	1
DG LIBR-CRTG #8	24396-13308	50.00	0	1
DG LIBR-CRTG #9	24396-13309	50.00	0	1
DG LIBR-CRTG #10	24396-13310	50.00	0	1
MOD KIT VOL 1	24396-14001	136.00	0	1
MOD KIT VOL 2	24396-14002	127.00	0	1
MOD KIT VOL 3	24396-14003	140.00	0	1
MOD KIT VOL 4	24396-14004	162.00	0	1

- d. 2109A-Service kit 2108-67002. Not necessary if a complete set of level 1 boards from section V.C-1 is on hand.

Battery Control I	5060-8347	175.00	1	1
Battery Control II	5060-8353	140.00	1	1

21MX-E SERIES COMPUTER SUPPORT PLAN

3. Miscellaneous Parts

DESCRIPTION	PART NUMBER	LIST PRICE	LEVEL 2	LEVEL 1
-----	-----	-----	-----	-----
2644/45 CARTRIDGE TAPE ROM	1816-0857	100.00	0	1
7970 MAG TAPE ROM	1816-0859	100.00	0	1
7900/01,2883 DISC ROM	1816-0863	100.00	0	1
7905 DISC ROM	1816-0869	100.00	0	1
9885 FLEXIBLE DISC ROM	13307-80011	100.00	0	1
9885 FLEXIBLE DISC ROM	13307-80012	100.00	0	1

Table A-1. Diagnostic Reference Table for HP 24396A-F Products

DSN	DESIGNATION	REQ MEM SIZ	SINGLE FILE PAPER TAPE			MULTIPLE FILES						MANUAL VO.													
			BINARY	D.C.	MANUAL	PAPER TAPE BINARIES D.C.		2644.45 CARTRIDGE BINARIES D.C.		DISC/MAG TAPE BINARIES D.C.															
000200	DIAGNOSTIC CONFIGURATOR	4K	24296-60001	1627	02100-90157	24296-60001	1627	THE DIAGNOSTIC CONFIGURATOR IS THE FIRST FILE ON EVERY CARTRIDGE TAPE, DISC AND MAG TAPE.																	
101100	MEMORY REFERENCE INSTRUCTION GROUP	4K	24315-16001	1624	02100-90218	24396-12001	1644																		
101001	ALTER SKIP INSTRUCTION GROUP	4K	24316-16001	1431	02100-90211																				
101002	SHIFT ROTATE INSTRUCTION GROUP	4K	24317-16001	1431	02100-90212																				
102200	CORE MEMORY (2100 16.15-14)	4K	24323-16001	1624	02100-90219																				
102104	SEMICONDUCTOR MEMORY (21MX)	4K	24395-16001	1644	24395-90001																				
101004	EAU INSTRUCTION GROUP	4K	24319-16001	1431	02100-90214	24396-12002	1710																		
101207	FLOATING POINT INSTRUCTION GROUP	4K	24320-16001	1551	24320-90001																				
102001	MEMORY PROTECT (2116 15 14)	4K	24324-16001	1431	02100-90220																				
102002	MEMORY PARITY CHECK (2116 15 14)	4K	24325-16001	1431	02100-90221																				
102305	MEM PROT. PARITY ERROR (2100/21MX)	4K	12892-16001	1705	12892-90005																				
101206	POWER FAIL AUTO RESTART	4K	24321-16001	1635	02100-90216	24396-12003	1726																		
101003	INPUT OUTPUT INSTRUCTION GROUP	4K	24318-16001	1431	02100-90213																				
143100	GENERAL PURPOSE REGISTER	4K	24391-16001	1726	24391-90001																				
101105	DIRECT MEMORY ACCESS (2114/15 16)	4K	24322-16001	1502	02100-90217																				
101220	DIRECT MEMORY ACCESS (2100/21MX)	4K	24322-16002	1705	24322-90002																				
101011	EXT. INSTR. GROUP (INDEX)	4K	12943-16002	1432	12943-90004	24396-13302	1728																		
101112	EXT. INSTR. GROUP (WORD,BYTE,BIT)	4K	12943-16001	1728	12943-90004																				
101110	2100 FAST FORTRAN PACKAGE	4K	12907-16003	1632	12907-90003																				
101113	21MX FAST FORTRAN PACKAGE 1	4K	12977-16004	1632	12977-90002																				
101114	21MX FAST FORTRAN PACKAGE 2	4K	12977-16005	1632	12977-90002																				
101016	2000 ACCESS COM PROCESSOR F.2100	8K	13206-16001	1526	13206-90003																				
101117	2000 ACCESS COM PROCESSOR F.21MX	8K	13207-16001	1632	13207-90003																				
102003	MEMORY EXPANSION UNIT	16K	12929-16001	1506	12929-90003																				
102006	SEMICOND MEMORY, MICROCODED F.21MX	4K	24395-16002	1644	24395-90003																				
103201	TIME BASE GENERATOR	4K	12539-16001	1706	12539-90011											24396-13303	1728								
143020	I/O CHANNEL OR 12979 EXTENDER	4K	12979-16001	1436	12979-90010																				
103115	12936 PRIVILEGED INTERRUPT	4K	12936-16001	1643	12936-90003																				
103105	12908-12978 WCS 256 W.	4K	12908-16001	1502	12908-90013																				
103023	13197 WCS 1024 W.	4K	13197-16002	1640	13197-90002	24396-13304	1628																		
103207	12889 HARDWIRED SERIAL INTERFACE	4K	24335-16001	1717	02100-90169																				
103122	59310 INTERF. BUS INTERFACE	4K	59310-16001	1728	59310-90061																				
103003	12587 ASYN. DATA SET INTERF.	8K	12587-16001	1552	12587-90013																				
103010	12920 ASYN. MULTIPLEXER (DATA)	4K	12920-16001	1444	12920-90009	24396-13305	1628																		
103011	12920 ASYN. MULTIPLEXER (CNTL)	4K	12920-16002	1444	12920-90009																				
103012	12621 SYNC. DATA SET (RECEIVE)	4K	12621-16001	1532	12621-90008																				
103013	12622 SYNC. DATA SET (SEND)	4K	12622-16001	1532	12622-90008																				
103116	12967 SYNC. INTERFACE	4K	12967-16001	1438	12967-90001	24396-13306	1643																		
103017	12966 ASYN. DATA SET	8K	12966-16001	1519	12966-90004																				
103121	12968 ASYN. COMM. INTERFACE	4K	12968-16001	1602	12968-90003																				
104000	2600 KEYBOARD DISPLAY TERMINAL	4K	24200-16002	1615	24200-90002																				
104003	TELEPRINTER	4K	12531-16001	1509	12531-90042	24396-13307	1633																		
144105	2762A,B TERMINAL (TERMINET)	8K	02762-16001	1546	02762-90035																				
104007	2615 VIDEO TERMINAL	4K	24351-16001	1347	02615-90002																				
104011	2640 INTERACTIVE TERMINAL	8K	02640-16001	1502	02640-90020																				
104012	2644 MINI DATA STATION (NON CTU)	8K	02644-16001	1542	02644-90012	24396-13308	1710																		
104013	2644 MINI DATA STATION (CTU ONLY)	8K	02644-16002	1542	02644-90012																				
104017	92900 TERMINAL SUBSYS (3070,40280)	8K	92900-16001	1643	92900-90003																				
105000	2610/14 LINE PRINTER	4K	24366-16001	1451	24366-90001																				
105101	2767 LINE PRINTER	4K	12984-16001	1611	12984-90005	24396-13309	1725																		
105102	2607 LINE PRINTER	4K	24340-16001	1446	12987-90004																				
145103	2613/17/18 LINE PRINTER	4K	02618-16001	1633	02618-90006																				
105104	9866 LINE PRINTER	4K	12996-16001	1541	12996-90001																				
112100	9-TRACK MAG TAPE (7970, 13181 3)	8K	13181-16001	1629	13181-90095	24396-13310	1628																		
112102	7-9 TRACK MAG TAPE (13184 INTF)	8K	13184-16001	1629	13184-90008																				
111001	DISC FILE (2883)	8K	12965-16001	1451	12965-90009																				
111104	12732 FLEXIBLE DISC SUBSYSTEM	8K	12732-16003	1708	12732-90003																				
111202	7900 01 CARTRIDGE DISC	8K	12960-16001	1644	12960-90003	24396-13309	1725																		
111303	7905 20 CARTRIDGE DISC	16K	12962-16001	1701	12962-90001																				
146200	PAPER TAPE READER-PUNCH	4K	12597-16001	1725	12597-90031																				
107000	DIG. PLOTTER INTERFACE (CALCOMP)	4K	12560-16001	1540	12560-90029																				
113100	2892 CARD READER	4K	12924-16001	1537	12924-90006	24396-13309	1725																		
113001	2894 CARD READER PUNCH	6K	12989-16001	1614	12989-90001																				
113003	7261 CARD READER	4K	07261-16005	1546	07261-90005																				
010000	DIAGNOSTIC CROSS LINK	4K	24296-16003	1627	02100-90157																				
011000	7900/05/20 DISC INITIALIZATION	4K	24296-16002	1627	02100-90157																				

Table A-2. Diagnostic Reference Table for Part no. 24998-14002

DSN	DESIGNATION*	REQ MEM SIZ	SINGLE FILE PAPER TAPE			MULTIPLE FILES	
			BINARY	D.C.	MANUAL	2645 CARTRIDGE BINARIES	D.C.
000200	DIAGNOSTIC CONFIGURATOR	4K	24296-60001	1627	02100-90157	THE DIAGNOSTIC CONFIGURATOR IS THE FIRST FILE ON EVERY CARTRIDGE TAPE.	
101100	MEMORY REFERENCE INSTRUCTION GROUP	4K	24315-16001	1624	02100-90218	24998-13301	1728
101001	ALTER SKIP INSTRUCTION GROUP	4K	24316-16001	1431	02100-90211		
101002	SHIFT ROTATE INSTRUCTION GROUP	4K	24317-16001	1431	02100-90212		
102104	SEMICONDUCTOR MEMORY (21MX)	4K	24395-16001	1644	24395-90001		
101004	EAU INSTRUCTION GROUP	4K	24319-16001	1431	02100-90214		
101207	FLOATING POINT INSTRUCTION GROUP	4K	24320-16001	1551	24320-90001		
102305	MEM PROT/PARITY ERROR (2100/21MX)	4K	12892-16001	1705	12892-90005		
101206	POWER FAIL AUTO RESTART	4K	24321-16001	1635	02100-90216		
101003	INPUT OUTPUT INSTRUCTION GROUP	4K	24318-16001	1431	02100-90213		
143100	GENERAL PURPOSE REGISTER	4K	24391-16001	1726	24391-90001		
101220	DIRECT MEMORY ACCESS (2100/21MX)	4K	24322-16002	1705	24322-90002		
101011	EXT. INSTR. GROUP (INDEX)	4K	12943-16002	1432	12943-90004		
101112	EXT. INSTR. GROUP (WORD,BYTE,BIT)	4K	12943-16001	1728	12943-90004		
101113	21MX FAST FORTRAN PACKAGE 1	4K	12977-16004	1632	12977-90002	24998-13302	1728
101114	21MX FAST FORTRAN PACKAGE 2	4K	12977-16005	1632	12977-90002		
102003	MEMORY EXPANSION UNIT	16K	12929-16001	1506	12929-90003		
102006	SEMICOND MEMORY, MICROCODED F.21MX	4K	24395-16002	1644	24395-90003		
103201	TIME BASE GENERATOR	4K	12539-16001	1706	12539-90011		
143020	I/O CHANNEL OR 12979 EXTENDER	4K	12979-16001	1436	12979-90010		
103023	13197 WCS 1024 W.	4K	13197-16002	1640	13197-90002		
103207	12889 HARDWIRED SERIAL INTERFACE	4K	24335-16001	1717	02100-90169		
103122	59310 INTERF. BUS INTERFACE	4K	59310-16001	1728	59310-90061		
103010	12920 ASYN. MULTIPLEXER (DATA)	4K	12920-16001	1444	12920-90009		
103011	12920 ASYN. MULTIPLEXER (CNTL)	4K	12920-16002	1444	12920-90009	24998-13303	1710
103012	12621 SYNC. DATA SET (RECEIVE)	4K	12621-16001	1532	12621-90008		
103013	12622 SYNC. DATA SET (SEND)	4K	12622-16001	1532	12622-90008		
103116	12967 SYNC. INTERFACE	4K	12967-16001	1438	12967-90001		
103017	12966 ASYN. DATA SET	8K	12966-16001	1519	12966-90004		
104003	TELEPRINTER	4K	12531-16001	1509	12531-90042		
144105	2762A/B TERMINAL (TERMINET)	8K	02762-16001	1546	02762-90035		
104011	2640 INTERACTIVE TERMINAL	8K	02640-16001	1502	02640-90020	24998-13304	1710
104017	92900 TERMINAL SUBSYS (3070,40280)	8K	92900-16001	1643	92900-90003		
105102	2607 LINE PRINTER	4K	24340-16001	1446	12987-90004		
145103	2613/17/18 LINE PRINTER	4K	02618-16001	1633	02618-90006		
105104	9866 LINE PRINTER	4K	12996-16001	1541	12996-90001		
112100	9-TRACK MAG TAPE (7970, 13181/3)	8K	13181-16001	1629	13181-90095	24998-13305	1725
111104	12732 FLEXIBLE DISC SUBSYSTEM	8K	12732-16003	1708	12732-90003		
111202	7900/01 CARTRIDGE DISC	8K	12960-16001	1644	12960-90003		
111303	7905/20 CARTRIDGE DISC	16K	12962-16001	1701	12962-90001	24998-13305	1725
146200	PAPER TAPE READER-PUNCH	4K	12597-16001	1725	12597-90031		
113100	2892 CARD READER	4K	12924-16001	1537	12924-90006		
113003	7261 CARD READER	4K	07261-16005	1546	07261-90005		
010000	DIAGNOSTIC CROSS LINK	4K	24296-16003	1627	02100-90157		
011000	7900/05/20 DISC INITIALIZATION	4K	24296-16002	1627	02100-90157		

Note: Part no. 24998-14002 consists of the 5 cartridge tapes 24998-13301, 24998-13302, 24998-13303, 24998-13304, and 24998-13305 plus all manuals listed in the table.

*The diagnostics and control programs listed in this reference table are stored on the appropriate media in the sequence specified by the table. This does not imply that a specific system delivered to a user is compatible with all the hardware listed in this table.