

IBM Mobile Systems

S82G-1501-01

**Hardware Maintenance Manual
Volume 1: Laptop, Notebook, Portable
and ThinkPad Computers**

May 1995

This Manual Supports:

Laptop L40SX	(8543)
Laptop CL57	(8554)
Notebook N45SL	(2614)
Notebook N51XX	(8551)
Portable P70/P75	(8573)
ThinkPad 300	(2615)
ThinkPad 350	(2618)
ThinkPad 500	(2603)
ThinkPad 510	(2604)
ThinkPad 710T	(2523)
Expansion Unit	(3550)
Dock Station I	(3545)
Dock Station II	(3546)

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Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 489.

Second Edition (May 1995)

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About This Manual

This manual contains service and reference information for IBM* Laptop, Notebook, Portable, and ThinkPad Computer products. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively.

The manual is divided into sections as follows:

- The Introduction section provides general information, guidelines, and safety information required to service computers.
- The majority of the manual consists of product-specific sections that include service, reference, and product-specific parts information.
- The Common Devices Checkout section contains information for testing optional attachable devices common to the products in this manual.
- The Common Parts Listing section contains parts listings for parts and tools common to the products in this manual.
- The Miscellaneous section contains acronyms, abbreviations, terms, and a telephone number listing.

Important

This manual is intended for trained servicers who are familiar with IBM mobile products. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively.

Before servicing an IBM mobile product, be sure to review the safety information under “Safety Notices (Multi-lingual Translations)” on page 7 and “Safety Information” on page 14.

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Related Publications

The following publications are available for IBM mobile products. For more information, contact IBM or your IBM Authorized Dealer.

Publication	Part, Form Number
Mobile Systems HMM Volume 2: Thinkpad Computers	30H2357, S82G-1502-03
Model L40 SX (8543) HMR	15F2267, S15F2267
Model L40 SX (8543) HMS	15F2266, S15F2266
Model N45SL (2614) HMR	42G0485, S42G0485
Model N45SL (2614) HMS	42G0486, S42G0486
Model N51 SX/SLC (8551) HMR	04G5111, S04G5111
Model N51 SX/SLC (8551) HMS	04G5112, S04G5112
Model CL57 SX (8554) HMR	10G4419, S10G4419
Model CL57 SX (8554) HMS	10G4420, S10G4420
Model P70 386 (8573) HMR	64F3994, S64F3994
Model P70 386 (8573) HMS	15F2198, S15F2198
Model P75 486 (8573) HMR	84F8525, S84F8525
Model P75 486 (8573) HMS	84F7593, S84F7593
ThinkPad 350/350C (2618), PS/Note 425/425C HMS	A211000, GA211000
Expansion Unit (3550-001) HMR	42G2335, S42G2335
Expansion Unit (3550-001) HMS	42G2336, S42G2336
Expansion Unit (3550-002) HMR	42G2331, S42G2331
Expansion Unit (3550-002) HMS	42G2332, S42G2332
PS/2 FaxConcentrator/A HMR Supplement	15F2662, S15F2662
PS/2 FaxConcentrator/A HMS Supplement	84F8541, S84F8541
PS/2 Comm. Cartridge I HMR	10G5992, S10G5992
PS/2 Comm. Cartridge I HMS	10G5993, S10G5993
PS/2 Comm. Cartridge II HML (N51SX)	04G5109, S04G5109
PS/2 Comm. Cartridge II HML (CL57SX)	10G4421, S10G4421
PS/2 Data/Fax Modem HML	04G5110, S04G5110
IBM High Speed Internal, PCMCIA Data/Fax Modems	61G1556, S61G1556

Obsolete Publications

This manual obsoletes the following publication:

Publication	Part, Form Number
IBM Laptop, Notebook, and Portable Computers Vol. 1	82G1501, S82G1501

Related Diskettes

The following diskettes are available for IBM mobile products. For more information, contact IBM or your IBM Authorized Dealer.

Diskette	Part, Form Number
Model L40 SX (8543) Reference Diskette	10G5991, S10G5991
Model N45SL (2614) Advanced Diagnostics	42G0495, S42G0495
Model N51 SX/SLC (8551) Reference and Diagnostic Package	04G5117, S04G5117
Model CL57 SX (8554) Reference Diskette	10G4422, S10G4422
Model P70 386 (8573) Reference Diskette	84F8535, S84F8535
Model P75 486 (8573) Reference Diskette	A380102, SA380102
ThinkPad Hardware Maintenance Diskette	82G3891, S82G3891

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Portable Computer Descriptions

All models in the following table have VGA video. Models N51, CL57, P70/75, and Thinkpads 700x and 720x are Micro Channel* systems. All others are AT* bus systems.

Model	Type	Processor	Memory	Hrd Dsk
Model L40SX	8543-044	386SX-20	2M/18M	60M
Model N45 SL	2614-065	386SL-25	2M/8M	80M
	2614-067	386SL-25	2M/8M	120M
Model N51 SLC	8551-025	386SLC-16	2M/10M	80M
Model N51 SX	8551-033	386SX-16	2M/10M	40M
Model CL57 SX	8554-045	386SX-20	2M/16M	80M
Model P70 386	8573-031	80386-16	2M/8M	30M
	8573-061	80386-20	2M/8M	60M
	8573-121	80386-20	2M/8M	120M
Model P75 486	8573-161	80486-33	8M/16M	160M
	8573-401	80486-33	8M/16M	400M
ThinkPad 300	2615-065	386SL-25	4M/12M	80M
	2615-067	386SL-25	4M/12M	120M
ThinkPad 340	2610	486SLC2-50	4M/12M	125M
ThinkPad 350	2618-AOE	486SL-25	4M/20M	85M
	2618-JOA	486SL-25	4M/20M	125M
	2618-LOA	486SL-25	4M/20M	250M
ThinkPad 350C	2618-NOA	486SL-25	4M/20M	125M
	2618-POA	486SL-25	4M/20M	250M
ThinkPad 355	2619	486SX-33	4M/16M	125M
ThinkPad 355C	2619	486SX-33	4M/16M	125M
	2619	486SX-33	4M/16M	250M
ThinkPad 355Cs	2619	486SX-33	2M/16M	170M
	2619	486SX-33	2M/16M	250M
ThinkPad 360	2620	486SX-33	4M/16M	170M
	2620	486SX-33	4M/16M	340M
ThinkPad 360C	2620	486SX-33	4M/16M	170M
	2620	486SX-33	4M/16M	340M
ThinkPad 360Cs	2620	486SX-33	4M/16M	170M
	2620	486SX-33	4M/16M	340M
ThinkPad 360Ce	2620	486DX2-50/25	4M/16M	170M
	2620	486DX2-50/25	4M/16M	340M
	2620	486DX2-50/25	4M/16M	540M
ThinkPad 360Cse	2620	486DX2-50/25	4M/16M	170M
	2620	486DX2-50/25	4M/16M	340M
	2620	486DX2-50/25	4M/16M	540M
ThinkPad 360P	2620	486SX-33	4M/16M	170M
	2620	486SX-33	4M/16M	340M
ThinkPad 370C	9545	486DX4-75/25	4M/32M	340M
	9545	486DX4-75/25	4M/32M	540M
	9545	486DX4-75/33	4M/32M	810M
ThinkPad 500	2603-081	486SLC2-50/25	4M/12M	80M
	2603-171	486SLC2-50/25	4M/12M	170M
ThinkPad 510	2604	486BLC2-50/25	4M/20M	200M
ThinkPad 700	9552-300	486SLC-25	4M/16M	80M
	9552-301	486SLC-25	4M/16M	120M
ThinkPad 700C	9552-30B	486SLC-25	4M/16M	120M

C	Color	T	Tablet
M	Megabyte	TPF	ThinkPad File
P	Pen		

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Model	Type	Processor	Memory	Hrd Dsk
ThinkPad 701C	2630	486DX2-25/50	4M/32M	360MB
	2630	486DX2-25/50	4M/32M	540MB
	2630	486DX4-25/75	8M/32M	360MB
	2630	486DX4-25/75	8M/32M	540MB
ThinkPad 701Cs	2630	486DX2-25/50	4M/32M	360MB
	2630	486DX2-25/50	4M/32M	540MB
	2630	486DX4-25/75	8M/32M	360MB
ThinkPad 710T	2630	486DX4-25/75	8M/32M	540MB
	2523-09Y	486SLC2-25	4M/12M	TPF
	2523-302	486SLC2-25	4M/12M	60M
ThinkPad 720	2523-303	486SLC2-25	4M/12M	60M
	9552-307	486SLC-25/50	4M/16M	120M
	9552-308	486SLC-25/50	4M/16M	160M
ThinkPad 720C	9552-30J	486SLC-25/50	4M/16M	160M
ThinkPad 730T	2524	486SLC2-25	4M/12M	0M
	2524	486SLC2-25	4M/12M	60M
ThinkPad 750	9545-006	486SL-33	4M/20M	170M
	9545-008	486SL-33	4M/20M	340M
ThinkPad 750C	9545-306	486SL-33	4M/20M	170M
	9545-308	486SL-33	4M/20M	340M
ThinkPad 750Ce	9545	P24S-50/25	4M/20M	340M
ThinkPad 750Cs	9545	486SL-33	4M/20M	170M
	9545	486SL-33	4M/20M	340M
ThinkPad 750P	9545-40C	486SL-33	4M/20M	170M
	9545-40E	486SL-33	4M/20M	340M
ThinkPad 755C	9545	486DX4-50/25	4M/32M	170M
	9545	486DX4-50/25	4M/32M	340M
	9545	486DX4-50/25	4M/32M	540M
	9545	486DX4-75/25	4M/32M	170M
	9545	486DX4-75/25	4M/32M	340M
	9545	486DX4-75/25	4M/32M	540M
ThinkPad 755CD	9545	486DX4-100/33	8M/32M	540M
	9545	486DX4-100/33	8M/32M	810M
ThinkPad 755CDV	9545	486DX4-100/33	8M/32M	540M
	9545	486DX4-100/33	8M/32M	810M
ThinkPad 755Ce	9545	486DX4-100/33	8M/32M	340M
	9545	486DX4-100/33	8M/32M	540M
	9545	486DX4-100/33	8M/32M	810M
ThinkPad 755Cs	9545	486DX4-50/25	8M/32M	170M
	9545	486DX4-50/25	8M/32M	340M
	9545	486DX4-50/25	8M/32M	540M
	9545	486DX4-75/25	8M/32M	170M
	9545	486DX4-75/25	8M/32M	340M
	9545	486DX4-75/25	8M/32M	540M
ThinkPad 755Cse	9545	486DX4-100/33	8M/32M	340M
	9545	486DX4-100/33	8M/32M	540M
	9545	486DX4-100/33	8M/32M	810M
ThinkPad 755CV	9545	486DX4-100/33	8M/32M	540M
	9545	486DX4-100/33	8M/32M	810M
ThinkPad 755CV	9545	486DX4-100/33	8M/32M	540M
	9545	486DX4-100/33	8M/32M	810M

C Color
M Megabyte
P Pen
T Tablet
TPF ThinkPad File

Important Service Information

Important

Diskette fixes are customer installable. The diskette fixes are located on the PC Company Bulletin Board Service (BBS). The direct phone line for modem connection is 919-557-0001 or tieline 255-0001.

Advise customers to contact the PC Company HelpCenter at 800-772-2227 if they need assistance in obtaining or installing any diskette fixes.

Customers in Canada should call IBM HelpPC at 800-565-3344 for assistance or down-load information. The Canadian BBS phone numbers are:

Montreal	514-938-3022
Toronto	905-316-4255
Vancouver	604-664-6464
Winnipeg	204-934-2735

FRU Replacement Strategy

Before Replacing Parts

Ensure that all diskette fixes are installed prior to replacing any FRUs listed in this manual.

Use the following strategy to prevent unnecessary FRU replacement and service expense:

- If you are instructed to replace a FRU and that does not correct the problem, reinstall the original FRU before you continue.
- Some computers have both a processor board and a system board. If you are instructed to replace either the processor board or the system board, and the first board that you replaced does not correct the problem, reinstall the original board, then replace the other (processor or system) board.
- If an adapter or device consists of more than one FRU, an error code might be caused by any of the FRUs. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change. Replace only the FRU that changed the symptoms.

Warning: A customized setup configuration (other than default settings) might exist on the computer you are servicing. Running Automatic Configuration might alter those settings. Note the current configuration settings (using the View Configuration option) and verify that the settings are in place when service is complete.

The advanced diagnostic tests are intended to test *only* IBM products. Non-IBM products or modified options can give false errors and invalid responses.

Hard Disk Drive Replacement Strategy

Always try to run a low-level format before replacing a hard disk drive.

Warning: The drive startup sequence in the computer you are servicing might have been changed. Be extremely careful during write operations such as copying, saving, or formatting. Data or programs can be overwritten if you select an incorrect drive.

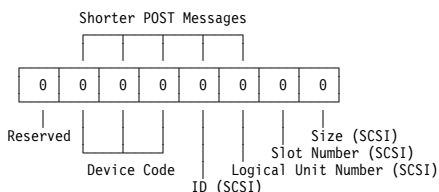
How to Use Error Messages

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. The cause of the first error code can result in false error codes being displayed. If no error code is displayed, see if the error symptom is listed in the Symptom-to-FRU Index for the computer you are servicing.

How to Read POST Error Messages

POST error messages are displayed on the screen as three, four, five, or eight digits. The error messages that can be displayed as shorter POST messages are highlighted in this index. Some digits will represent different information for SCSI errors versus non-SCSI errors.

The following example shows which digits display the shorter POST error messages and also defines the SCSI information in an eight-digit error message.



All SCSI devices are set to a different SCSI ID. Duplicate SCSI ID settings can generate a false error message. Use the SCSI ID to determine whether the error message is coming from an internal or an external device.

Drive and Diskette Compatibility Matrix

The following table provides identification information for diskettes and diskette drives.

Diskette Drive	Identifying Mark
3.5-Inch - 1.44MB	1.44 on the eject button
3.5-Inch - 2.88MB	2.88 on the eject button

The following table provides compatibility information for 3.5-inch diskettes and 3.5-inch diskette drives.

Diskette Capacity	1.44MB Drive	2.88MB Drive
1.0MB	Read/Write	Read/Write
2.0MB	Read/Write	Read/Write
4.0MB	Not Compatible	Read/Write

The following table provides identification information for 5.25-inch diskette drives.

Diskette Drive	Identifying Mark
5.25-Inch - 360KB (External)	Asterisk on bezel
5.25-Inch - 1.2MB (Internal)	1.2 on the eject button

The following table provides compatibility information for 5.25-inch diskettes and 5.25-inch diskette drives.

Diskette Capacity	360KB Drive	1.2MB Drive
360KB	Read/Write	Read/Write
1.2MB	Not Compatible	Read/Write

Note: A 360KB diskette written to or formatted on a 1.2MB drive can be read reliably only on a 1.2MB drive.

Safety Notices (Multi-lingual Translations)

In this manual, safety notices appear in English with a page number reference to the appropriate multi-lingual, translated safety notice found in this section.

The following safety notices are provided in English, French, German, Italian, and Spanish languages.

Safety Notice 1

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

Avant de remettre l'ordinateur sous tension apres remplacement d'une unite en clientele, verifiez que tous les ressorts, vis et autres pieces sont bien en place et bien fixes. Pour ce faire, secouez l'unite et assurez-vous qu'aucun bruit suspect ne se produit. Des pieces metalliques ou des copeaux de metal pourraient causer un court-circuit.

Bevor nach einem FRU-Austausch der Computer wieder angeschlossen wird, muB sichergestellt werden, daB keine Schrauben, Federn oder andere Kleinteile fehlen oder im Gehause vergessen wurden. Der Computer muB geschuttelt und auf Klappergerausche gepruft werden. Metallteile oder-splitter können Kurzschlusse erzeugen.

Prima di accendere l'elaboratore dopo che stata effettuata la sostituzione di una FRU, accertarsi che tutte le viti, le molle e tutte le altri parti di piccole dimensioni siano nella corretta posizione e non siano sparse all'interno dell'elaboratore. Verificare ciò scuotendo l'elaboratore e prestando attenzione ad eventuali rumori; eventuali parti o pezzetti metallici possono provocare scosse elettriche.

Antes de encender el sistema despues de sustituir una FRU, compruebe que todos los tornillos, muelles y demás piezas pequeñas se encuentran en su sitio y no se encuentran sueltas dentro del sistema. Compruebelo agitando el sistema y escuchando los posibles ruidos que provocarían. Las piezas metálicas pueden causar cortocircuitos electricos.

Safety Notice 2

Some standby batteries contain a small amount of nickel and cadmium. Do not disassemble it, recharge it, throw it into fire or water, or short-circuit it. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing when replacing the RTC or backup battery. Use of an incorrect battery can result in ignition or explosion of the battery.

Certaines batteries de secours contiennent du nickel et du cadmium. Ne les démontez pas, ne les rechargez pas, ne les exposez ni au feu ni à l'eau. Ne les mettez pas en court-circuit. Pour les mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la pile de sauvegarde ou celle de l'horloge temps réel, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. Une batterie ou une pile inappropriée risque de prendre feu ou d'exploser.

Einige Hilfsbatterien enthalten geringe Mengen Nickel und Cadmium. Sie dürfen nicht zerlegt, wiederaufgeladen, Feuer oder Wasser ausgesetzt, oder kurzgeschlossen werden. Die Batterien müssen vorschriftsmäßig entsorgt werden. Beim Ersetzen von RTC oder der Sicherungsbatterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

Alcune batterie di riserva contengono una piccola quantità di nichel e cadmio. Non smontarle, ricaricarle, gettarle nel fuoco o nell'acqua o cortocircuitarle. Smaltirle secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). Quando si sostituisce la batteria dell'RTC (real time clock) o la batteria di supporto, utilizzare soltanto i tipi inseriti nell'appropriato Catalogo parti. L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

Algunas baterías de reserva contienen una pequeña cantidad de níquel y cadmio. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las cortocircuite. Desechelas tal como dispone la normativa local. Utilice sólo baterías que se encuentren en la lista de piezas para sustituir la batería de reserva o RTC. La utilización de una batería no apropiada puede provocar la ignición o explosión de la misma.

Safety Notice 3

The battery pack contains small amounts of nickel. Do not disassemble it, throw it into fire or water, or short-circuit it. Dispose of the battery pack as required by local ordinances or regulations. Use only the battery in the appropriate parts listing when replacing the battery pack. Use of an incorrect battery can result in ignition or explosion of the battery.

La batterie contient du nickel. Ne la démontez pas, ne l'exposez ni au feu ni à l'eau. Ne la mettez pas en court-circuit. Pour la mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la batterie, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquates. En effet, une batterie inappropriée risque de prendre feu ou d'exploser.

Auch Akkus enthalten geringe Mengen von Nickel. Sie dürfen nicht zerlegt, wiederaufgeladen, Feuer oder Wasser ausgesetzt, oder kurzgeschlossen werden. Die Batterien müssen vorschriftsmäßig entsorgt werden. Beim Ersetzen von RTC oder der Sicherungsbatterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

La batteria contiene piccole quantità di nichel. Non smontarla, gettarla nel fuoco o nell'acqua né cortocircuitarla. Smaltirla secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). Quando si sostituisce la batteria, utilizzare soltanto i tipi inseriti nell'appropriato Catalogo parti. L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

Las baterías contienen pequeñas cantidades de níquel. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las cortocircuite. Desechelas tal como dispone la normativa local. Utilice sólo baterías que se encuentren en la lista de piezas al sustituir la batería. La utilización de una batería no apropiada puede provocar la ignición o explosión de la misma.

Safety Notice 4

The lithium battery can cause a fire, explosion, or severe burn. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100 degrees C (212 degrees F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. Use of an incorrect battery can result in ignition or explosion of the battery. Replacement batteries can be ordered from IBM or IBM Authorized Dealers.

La pile de sauvegarde contient du lithium. Elle présente des risques d'incendie, d'explosion ou de brûlures graves. Ne la rechargez pas, ne retirez pas son connecteur polarisé et ne la démontez pas. Ne l'exposez pas à une température supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser. Les piles de rechange peuvent être obtenues auprès d'IBM ou d'un distributeur agréé IBM.

Die Sicherungsbatterie ist eine Lithiumbatterie. Sie kann sich entzünden, explodieren oder schwere Verbrennungen hervorrufen. Batterien dieses Typs dürfen nicht aufgeladen, zerlegt, über 100 C erhitzt, verbrannt, deren Polkappen abgenommen oder deren Inhalt mit Wasser in Verbindung gebracht werden. Die Batterien müssen vorschriftsmäßig entsorgt werden. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen. Austauschbatterien können bei IBM oder IBM Vertragspartnern bestellt werden.

La batteria di supporto è una batteria al litio e può incendiarsi, esplodere o procurare gravi ustioni. Evitare di ricaricarla, smontarne il connettore polarizzato, smontarla, riscaldarla ad una temperatura superiore ai 100 gradi centigradi, incendiarla o gettarla in acqua. Smaltirla secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa. Le batterie possono essere ordinate ai rivenditori autorizzati IBM o all'IBM.

La batería de repuesto es una batería de litio y puede provocar incendios, explosiones o quemaduras graves. No la recargue, ni quite el conector polarizado, ni la desmonte, ni caliente por encima de los 100°C (212°F), ni la incinere ni exponga el contenido de sus celdas al agua. Desechela tal como dispone la normativa local.

Safety Notice 5

If the LCD breaks and the fluid from inside the LCD gets into your eyes or on your hands, immediately wash the affected areas with water for at least 15 minutes. Seek medical care if any symptoms from the fluid are present after washing.

Si le panneau d'affichage à cristaux liquides se brise et que vous recevez dans les yeux ou sur les mains une partie du fluide, rincez-les abondamment pendant au moins quinze minutes. Consultez un medecin si des symptomes persistent apres le lavage.

Wenn die LCD-Anzeige zerbrechen sollte und die darin enthaltene Flüssigkeit mit Augen oder Händen in Berührung kommt, sofort mindestens 15 Minuten lang die betroffenen Körperstellen mit Wasser abwaschen. Sollten danach noch durch die LCD-Flüssigkeit hervorgerufene Symptome auftreten sollte ein Arzt aufgesucht werden.

In caso l'LCD si dovesse rompere ed il liquido in esso contenuto entrasse in contatto con gli occhi o le mani, lavare immediatamente le parti interessate con acqua corrente per almeno 15 minuti; poi consultare un medico se i sintomi dovessero permanere.

Si la LCD se rompe y el fluido de su interior entra en contacto con sus ojos o sus manos, lave inmediatamente las áreas afectadas con agua durante 15 minutos como minimo. Obtenga atención medica si se presenta algún sintoma del fluido despues de lavarse.

Safety Notice 6

To avoid shock, do not remove the plastic cover that surrounds the lower portion of the inverter card.

Afin d'viter tout risque de choc lectrique, ne retirez pas le cache en plastique prot geant la partie inf rieure de la carte d'alimentation.

Aus Sicherheitsgr nden die Kunststoffabdeckung, die den unteren Teil der Spannungswandlerplatine umgibt, nicht entfernen.

Per evitare scosse elettriche, non rimuovere la copertura in plastica che avvolge la parte inferiore della scheda invertitore.

Para evitar descargas, no quite la cubierta de pl stico que rodea la parte baja de la tarjeta invertida.

Safety Notice 7

Though main batteries have low voltage, a shorted or grounded battery can produce enough current to burn combustible materials or personnel.

Bien que le voltage des batteries principales soit peu eleve, le court-circuit ou la mise à la masse d'une batterie peut produire suffisamment de courant pour brûler des materiaux combustibles ou causer des brûlures corporelles graves.

Obwohl Hauptbatterien eine niedrige Spannung haben, können sie doch bei Kurzschluß oder Erdung genug Strom erzeugen, um brennbare Materialien zu entzünden oder Verletzungen bei Personen hervorzurufen.

Sebbene le batterie di alimentazione siano a basso voltaggio, una batteria in corto circuito o a massa può fornire corrente sufficiente da bruciare materiali combustibili o provocare ustioni ai tecnici di manutenzione.

Aunque las baterías principales tienen un voltaje bajo, una batería cortocircuitada o con contacto a tierra puede producir la corriente suficiente como para quemar material combustible o provocar quemaduras en el personal.

Safety Notice 8

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

Avant de retirer une unite remplaçable en clientele, mettez le systeme hors tension, debranchez tous les cordons d'alimentation des socles de prise de courant, retirez la batterie et deconnectez tous les cordons d'interface.

Die Stromzufuhr muB abgeschaltet, alle Stromkabel aus der Steckdose gezogen, der Akku entfernt und alle Verbindungskabel abgenommen sein, bevor eine FRU entfernt wird.

Prima di rimuovere qualsiasi FRU, spegnere il sistema, scollegare dalle prese elettriche tutti i cavi di alimentazione, rimuovere la batteria e poi scollegare i cavi di interconnessione.

Antes de quitar una FRU, apague el sistema, desenchufe todos los cables de las tomas de corriente electrica, quite la batería y, a continuación, desconecte cualquier cable de conexión entre dispositivos.

Safety Information

The following section contains the safety information that you need to be familiar with before servicing an IBM mobile computer.

General Safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
 1. Ensure you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

Remember: A metal object is a conductor of electricity.

- Wear safety glasses when you are:
 - Hammering
 - Drilling
 - Soldering
 - Cutting wire
 - Attaching springs
 - Using solvents
 - Working in any other conditions that might be hazardous to your eyes

- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Electrical Safety

Observe the following rules when working on electrical equipment.

Important

Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
 - Performing a mechanical inspection
 - Working near power supplies
 - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
 - Ensure that another person, familiar with the power-off controls, is near you.

Remember: Another person must be there to switch off the power, if necessary.
 - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you might prevent a current from passing through your body.
 - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.

- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
 - Power supply units
 - Pumps
 - Blowers and fans
 - Motor generators

and similar units. (This practice ensures correct grounding of the units.)

- If an electrical accident occurs:
 - **Use caution; do not become a victim yourself.**
 - **Switch off power.**
 - **Send another person to get medical aid.**

Safety Inspection Guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
 - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
 - b. The power cord should be the appropriate type as specified in the parts listings.
 - c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling Electrostatic Discharge-Sensitive Devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

Note: The use of a grounding system is desirable but not required to protect against ESD damage.
















- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated computer. You can use coax or connector-outside shells on these computers.
- Use the round ground-prong of the AC plug on AC-operated computers.

Grounding Requirements

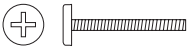














Electrical grounding of the PS/2 computer is required for operator safety and correct computer function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Screw Size Chart



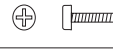












Use the chart below to match the size and shape of the screws used in the computer you are servicing.

A		Silver
B		Black
C		Silver
D		Brass
E		Black
F		Black
G		Black
H		Brass
J		Silver
K		Brass
L		Silver
M		Silver
N		Silver
P		Black
Q		Brass

Screw Size Chart (continued): Use the chart below to match the size and shape of the screws used in the computer you are servicing.

R		Brass
S		Black
T		Brass
U		Black
V		Brass
W		Black
X		Black
Y		Brass
Z		Brass
AA		Black
BB		Brass
CC		Brass
DD		Black
EE		Black
FF		Silver

Screw Size Chart (continued): Use the chart below to match the size and shape of the screws used in the computer you are servicing.

GG		Silver
HH		Brass
JJ		Silver
KK		Black
LL		Brass
MM		Brass
NN		Silver
PP		Brass
QQ		Brass
RR		Brass
SS		Brass
TT		Black
UU		Black
WW		Silver
XX		Black

Model L40 SX (8543)

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General Checkout

001

DOES THE POWER SOURCE APPEAR TO BE OK?

Yes No

002

Go to "Power Systems Checkout" on page 27.

003

- Power-off the computer and all external devices.
- Insert the backup copy of the Advanced Diagnostics diskette into the diskette drive.
- Power-on the computer and check for the following responses:
 1. All icons on the system-status display appear once for about 1 second.
Note: Some icons remain on after 1 second.
 2. Memory counts.
 3. One or two short beeps
 4. The Speaker icon starts blinking and continues blinking until any key is pressed.
 5. The IBM Logo is displayed on the screen.

DID YOU RECEIVE THE CORRECT RESPONSES?

Yes No

004

Go to "Symptom-to-FRU Index" on page 32.

005

- Advance to the Main Menu.
- Press **Ctrl+A**, then type **0** to run the tests.

DID YOU RECEIVE AN ERROR MESSAGE OR ERROR CODE?

Yes No

006

The diagnostic tests have completed without detecting an error.

007

Go to "Symptom-to-FRU Index" on page 32.

Memory Checkout

Notes:

1. Power-off the computer before removing or replacing any parts.
2. Run AUTOMATIC CONFIGURATION after removing or replacing memory modules. (If you have to run configuration with your own diskette, be sure the customer has all the correct option diskettes available.)
3. Disregard 164 Memory-Size Errors.
(Model L40 does not work with the combination of two 4MB memory modules installed.)

001

- Remove the memory module kits in connectors 1 and 2 if installed. Note which memory module kit is in connector 1.
- Run the memory tests.
Use the RUN TESTS ONE TIME option.

DID THE MEMORY TESTS END WITHOUT AN ERROR?

Yes No

002

Replace the system board.

003

DID YOU REMOVE THE MEMORY MODULE KIT IN CONNECTOR 1?

Yes No

004

Go to Step 007.

005

- Reinstall the memory module in connector 1.
- Run the memory test.
Use the RUN TESTS ONE TIME option.

DID THE MEMORY TESTS END WITHOUT AN ERROR?

Yes No

006

Replace the memory module in connector 1.
If that does not correct the problem, replace the system board.

007

(Step **007** continues)

(CONTINUED)

007 (continued)

DID YOU REMOVE THE MEMORY MODULE KIT IN CONNECTOR 2?

Yes No

008

Go to Step 011.

009

- Reinstall the memory module in connector 2.
- Run the memory test.
Use the RUN TESTS ONE TIME option.

DID THE MEMORY TESTS END WITHOUT AN ERROR?

Yes No

010

Replace the memory module in connector 2.
If that does not correct the problem, replace the system board.

011

Check if the actual memory size of the memory module is different from the displayed memory size on the screen. If the problem occurs intermittently, run the memory tests multiple times to have an error log.

Power Systems Checkout

Note

One or all of the batteries can discharge if there is a short circuit in the computer.

1. Replace the failing FRU if the power supply problem is caused by a short circuit.
2. Determine if one (or all) of the batteries have become discharged. Replace a discharged battery with a known-good spare (or recharge the main or standby battery.)

The test procedures for each power supply are found on the following pages.

- “Testing the AC Adapter” on page 29.
- “Testing the Rechargeable Battery” on page 29.
- “Testing the Backup Battery” on page 30.
- “Testing the Standby Battery” on page 30.
- “Testing the Quick Charger” on page 31.

None of the above? Follow the steps below.

001

DID THE PROBLEM OCCUR ONLY WHEN USING THE AC ADAPTER?

Yes No

002

Go to Step 004.

003

Go to “Testing the AC Adapter” on page 29. If that does not correct the problem, replace the system board.

004

DID THE PROBLEM OCCUR ONLY WHEN USING THE BATTERY?

Yes No

005

Go to Step 011 on page 28.

006

DOES A FULLY-CHARGED BATTERY DISCHARGE QUICKLY?

Yes No

007

Go to Step 010 on page 28.

(CONTINUED)

008

- Run advanced diagnostics for all devices using the AC adapter. Use the 'RUN TEST ONE TIME' option.

DID ALL THE TESTS END WITHOUT AN ERROR?

Yes No

009

Follow the instructions on the screen.
If the instructions do not appear or do not correct the problem, replace the system board.

010

Go to "Testing the Rechargeable Battery" on page 29. If that does not correct the problem, replace the system board.

011

- Remove the following if installed:
 - Rechargeable battery
 - Standby battery
 - Backup battery
 - Memory module kits in connectors 1 and 2
 - Internal Data/Fax Modem adapter
 - Serial adapter
 - Numeric keypad
 - TrackPoint
 - Mouse
 - External keyboard
 - External CRT display
 - Cables to the hard disk drive
 - Cables to the diskette drive
 - Power cable to the LCD
 - Signal cables to the LCD

- Connect the AC adapter and power-on the computer.

DID YOU HEAR ONE LONG OR TWO SHORT BEEPS?

Yes No

012

Replace the system-status display to verify the fix. If the problem still remains, put back the original system-status display, then replace the system board.

013

- Suspect one of the options or devices. Reinstall each of the options or devices to the computer one at a time, and power-on the computer to see if the original problem occurs.

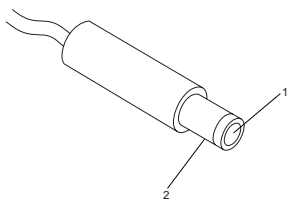
(Step **013** continues)

013 (continued)

- Replace the last installed option or device when the problem occurs.

Testing the AC Adapter

1. If a noise can be heard from the AC adapter when it is plugged into line voltage, replace the AC adapter.
If a noise still comes from the AC adapter, suspect the computer.
If not, the AC adapter has a problem. Replace the AC adapter with the original one, then go to the next step.
2. Measure the output voltage at the plug of the AC adapter cable.

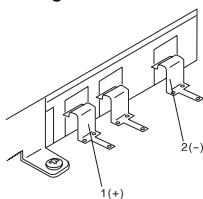


Pin	Voltage (V dc)
1	+14.3 to +15.8
2	Ground

If the voltage is not correct, replace the AC adapter.

Testing the Rechargeable Battery

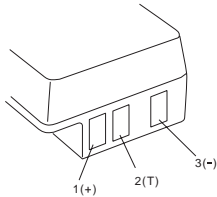
1. Remove the keyboard.
2. Set the rechargeable battery in place without connecting any external power devices.
3. Measure the voltage between terminals 1 (+) and 2 (-) and note the voltage.



4. Using the AC adapter, apply external power to the computer. Make sure that a charge arrow appears in the system-status display.
5. Measure the voltage again between terminals 1 (+) and 2 (-).

If the voltage is not greater than the one measured in Step 3, replace the AC adapter. If the voltage is greater than the one measured in Step 3, go to the next step.

- Remove the rechargeable battery from the computer.
- Measure the voltage at the battery terminals.



Pin	Voltage (V dc)
1	+8.5 to +12.6
3	Ground

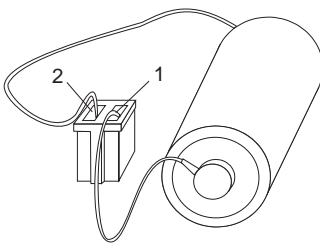
If the voltage is not correct, the rechargeable battery is discharged or defective. If the voltage is correct, go to the next step.

- Using a low-power ohm meter, measure the resistance at the battery terminals between 2 (T) and 3 (-). The resistance must be 4 kilohms to 30 kilohms.

If the resistance is out of range, replace the rechargeable battery.

Testing the Backup Battery

- Remove the keyboard and the top cover.
- Measure the voltage at the connectors of the backup battery.



Pin	Voltage (V dc)
1	+2.8 to +3.2
2	Ground

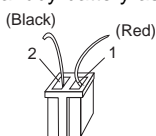
If the voltage is not correct, the backup battery is discharged by a short circuit or is defective.

Testing the Standby Battery

Note: The charging time required is 48 hours.

- Remove the keyboard and the top cover.
- Connect the AC adapter to the computer.

3. Disconnect the standby battery connector from the system board and measure the voltage at the connector of the standby battery as shown.

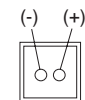


Pin	Voltage (V dc)
1	+3.0 to +4.5
2	Ground

If the voltage is correct, perform the failing operation with a fully-charged standby battery to isolate the problem.

If the voltage is not correct, continue.

4. Measure the output voltage at the connector on the system board.



(Top View)

If the voltage is higher than measured in Step 3, the standby battery is discharged or is defective.

If the voltage is the same as measured in Step 3 or less than +3.0 V dc, replace the standby battery. If the problem remains, replace the system board.

Testing the Quick Charger: If a noise can be heard from the operating quick charger, replace it.

1. Perform steps 6 through 8 on page 30 of the "Testing the Rechargeable Battery" to verify the rechargeable battery for correct operation.
2. Plug the quick charger into an electrical outlet.
If the amber power indicator does not turn on, replace the quick charger.
3. Install the rechargeable battery.
If the green charging indicator is not blinking, replace the quick charger.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists symptoms and errors and the possible causes. The most likely cause is listed first.

If the computer displays an error message, first replace FRUs listed in the error message. An *X* in an error message can be any number.

Note: If you have an IBM device with its own service manual or a device not supported by the advanced diagnostics tests, refer to the manual for that device.

Symptom/Error	FRU/Action
One or more keys do not work. (See "External Keyboard/Auxiliary Input Device Checkout" on page 465 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Keyboard 2. System Board
No beep and a blank or unreadable display during POST. (See "Power Systems Checkout" on page 27 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Any options or devices 3. Power source when failing 4. Speaker
No beep with a normal display during POST.	<ol style="list-style-type: none"> 1. Speaker 2. System Board
Continuous beep	<ol style="list-style-type: none"> 1. System Board 2. Any options or devices
Repeating short beeps. (See "External Keyboard/Auxiliary Input Device Checkout" on page 465 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Keyboard
Dew Point or Temperature icon appears with one long and one short beep.	<ol style="list-style-type: none"> 1. System Board 2. Power source when failing
One long and one short beep.	<ol style="list-style-type: none"> 1. System Board 2. Power source when failing
One long and two short beeps.	<ol style="list-style-type: none"> 1. System Board 2. Power source when failing
One short beep and a blank, unreadable, or flashing display with no external display attached.	<ol style="list-style-type: none"> 1. Display (LCD) 2. System Board 3. Power source when failing
One short beep and Diskette Prompt or a program load from the hard disk drive or unable to read diskette(s).	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board 3. Diskette Drive Cable

Symptom/Error	FRU/Action
Two short beeps and a blank display.	<ol style="list-style-type: none"> 1. System Board 2. Any options or devices
External display problems. (See "External Display Self-Test" on page 464 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. System Board
Incorrect memory size during POST. (See "Memory Checkout" on page 25 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Memory Module Kits
Computer hang-up or intermittent hang-up.	<ol style="list-style-type: none"> 1. System Board 2. Hard Disk Drive 3. Math Coprocessor 4. Replace the last device being tested <p>(See "Undetermined Problem" on page 36.)</p>
Computer does not suspend or resume. (Check the Suspend icon to make sure of the failure.)	<ol style="list-style-type: none"> 1. System Board 2. System-Status Display Assembly 3. Any options or devices
Computer does not power off.	<ol style="list-style-type: none"> 1. System-Status Display Assembly 2. System Board
Real-time clock inaccurate.	<ol style="list-style-type: none"> 1. System Board
Printer problems.	<ol style="list-style-type: none"> 1. See "Printer Checkout" on page 468.
Serial or parallel port device problems.	<ol style="list-style-type: none"> 1. Device 2. Cable 3. System Board
ICON is incorrectly blinking or stays on.	<ol style="list-style-type: none"> 1. System Board 2. Related Device
ICON incorrectly remains off, but diagnostics runs without an error.	<ol style="list-style-type: none"> 1. System Board 2. Related Device 3. System-Status Display Assembly
Internal Data/Fax Modem does not communicate with a remote modem or a fax. (See "Fax/Modem Checkout" on page 466 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Internal Data/Fax Modem <p>(Make sure <i>Data/Fax Modem power</i> option is set to on in the Set Features program.)</p>
101, 103, 107, 111	<ol style="list-style-type: none"> 1. System Board 2. Hard Disk Drive 3. Diskette Drive 4. Any attached devices
109, 110, 121 (See "Memory Checkout" on page 25 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Memory Module Kits 2. System Board

Symptom/Error	FRU/Action
122, 124	<ol style="list-style-type: none"> System Board Auxiliary Input Device Keyboard
123	<ol style="list-style-type: none"> Hard Disk Drive System Board Hard Disk Drive Cable
141	<ol style="list-style-type: none"> System-Status Display Assembly System Board
149	<ol style="list-style-type: none"> System Board Hard Disk Drive Hard Disk Drive Cable
161	<ol style="list-style-type: none"> Run Automatic Configuration Backup Battery System Board
162	<ol style="list-style-type: none"> Run Automatic Configuration, then check the installed devices using the View configuration utility. System Board Diskette Drive Hard Disk Drive Math Coprocessor Diskette Drive Cable Hard Disk Drive Cable
163	<ol style="list-style-type: none"> Time and Date Set? System Board
164 (See "Memory Checkout" on page 25 before replacing any FRUs.)	<ol style="list-style-type: none"> Run Automatic Configuration Memory Module Kits System Board
199	<ol style="list-style-type: none"> See "Checking Installed Devices" on page 37.
1XX (not listed above)	<ol style="list-style-type: none"> System Board
211 (on POST)	<ol style="list-style-type: none"> System Board Memory Module Kits
221 (on POST)	<ol style="list-style-type: none"> System Board
204, 214, 224, 240	<ol style="list-style-type: none"> System Board Memory Module Kits
25X	<ol style="list-style-type: none"> System Board
2XX (not listed above) (See "Memory Checkout" on page 25 before replacing any FRUs.)	<ol style="list-style-type: none"> Memory Module Kits System Board

Symptom/Error	FRU/Action
301, 302	<ol style="list-style-type: none"> 1. System Board 2. Keyboard
303	<ol style="list-style-type: none"> 1. System Board 2. Numeric Keypad 3. Keyboard
304, 305 (See "External Keyboard/Auxiliary Input Device Checkout" on page 465 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Keyboard 2. System Board 3. Numeric Keypad
306, 310	<ol style="list-style-type: none"> 1. System Board
308	<ol style="list-style-type: none"> 1. Numeric Keypad
3XX (not listed above) (See "External Keyboard/Auxiliary Input Device Checkout" on page 465 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Auxiliary input device 3. Keyboard
602, 653, 654	<ol style="list-style-type: none"> 1. Defective diskette 2. Diskette Drive 3. System Board
655, 660, 661	<ol style="list-style-type: none"> 1. System Board
6XX (not listed above)	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board 3. Diskette Drive Cable
7XX	<ol style="list-style-type: none"> 1. Math Coprocessor 2. System Board (IBM does not supply a math coprocessor)
9XX	<ol style="list-style-type: none"> 1. System Board 2. Any parallel Device 3. Communication Cable
1107	<ol style="list-style-type: none"> 1. Communication Cable
11XX	<ol style="list-style-type: none"> 1. System Board 2. Any serial adapter 3. Communication Cable
1207	<ol style="list-style-type: none"> 1. Communication Cable
12XX	<ol style="list-style-type: none"> 1. Any serial adapter 2. System Board 3. Any serial device 4. Communication Cable
1705 to 1707, 1709, 1711, 1718 to 1720, 1730, 1732	<ol style="list-style-type: none"> 1. Hard Disk Drive (Reformatting the hard disk can recover from the problem.)

Symptom/Error	FRU/Action
17XX (not listed above)	<ol style="list-style-type: none"> 1. Hard Disk Drive 2. System Board 3. Hard Disk Drive Cable
24XX	<ol style="list-style-type: none"> 1. System Board
5001 to 5016	<ol style="list-style-type: none"> 1. System Board
5017 to 502X	<ol style="list-style-type: none"> 1. System Board 2. LCD Display Assembly
503X	<ol style="list-style-type: none"> 1. External CRT Display 2. System Board
8601, 8602	<ol style="list-style-type: none"> 1. Pointing Device 2. System Board 3. Numeric Keypad
8604	<ol style="list-style-type: none"> 1. System Board
86XX (not listed above)	<ol style="list-style-type: none"> 1. System Board 2. Pointing Device 3. Numeric Keypad
101XX (See "Fax/Modem Checkout" on page 466 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Internal Data/Fax Modem 2. System Board 3. Any serial device
102XX	<ol style="list-style-type: none"> 1. System-Status Display Assembly 2. System Board 3. Related device

Undetermined Problem

You are here because the diagnostics tests did not identify the failing FRU.

Check the power supply in use (see "Power Systems Checkout" on page 27). If the power systems are operating correctly, return here and continue with the following procedure.

1. Power-off the computer and remove the battery packs from the computer.
2. Remove or disconnect one of the following devices or adapter (do not isolate FRUs that are known to be good).
 - a. Non-IBM devices
 - b. Modem, printer, mouse, or other external device
 - c. IC DRAM card
 - d. Hard disk drive (fixed disk drive) or diskette drive
 - e. Any adapter and device.
3. Power-on the computer and start the system program.
4. If the symptom remains, repeat steps 2 and 3 until you find the failing FRU or until all FRUs have been removed.
5. If all of the FRUs listed have been removed and the problem remains, replace the system board.

Related Service Procedures

Checking Installed Devices

The Installed Devices List shows the presence of devices in the computer. If an adapter or device is missing from the list, you might have one of the following conditions.

- An adapter or device is defective.
- The device missing from the list is an unrecognizable drive or adapter.
- The device missing from the list requires an additional diskette. (See the device service manual.)
- A power supply voltage is incorrect (see "Power Systems Checkout" on page 27).

If the adapter is on the list, run the adapter diagnostics tests. If the list contains an adapter or device that is not installed, go to "Undetermined Problem" on page 36.

Power-on Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

How to Run Advanced Diagnostics

1. Power-off the computer.
2. Insert the backup copy of the Reference Diskette into the diskette drive.
3. Power-on the computer.
4. Advance to the Main Menu.
5. Press **Ctrl+A** to run the System Checkout.

Product Overview

The following table provides a brief overview of the computer features.

Feature	Description
Processor (MHz)	386SX 20-Mhz
Bus Architecture	AT Bus
Memory (Standard)	2MB
Memory (Maximum)	18MB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	60MB

FRU Removals and Replacements

Follow the numerical sequence in the FRU removal sequence list and the exploded view to remove or disconnect parts in the correct order. The letters in parentheses in the list indicate screw types. See the "Screw Size Chart" on page 19 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

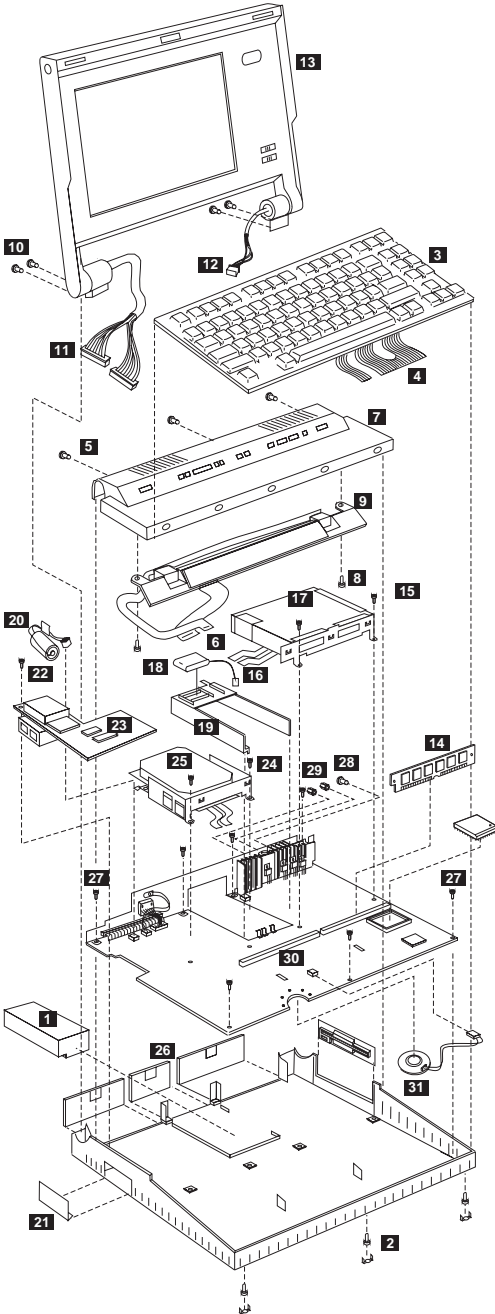
Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

- 1 Battery Pack**
- 2 Three Screw Covers and Three Screws (C)**
- 3 Loosen Keyboard Assembly**
(Raise front until it clears case.)
- 4 Two Ribbon Cables and Keyboard**
(Slide keyboard forward and flip it over in front of computer.)
- 5 Three Top Cover Screws (C)**
(Inside right and left rear access doors along top edge)
- 6 Two Status Display Ribbon Cables**
- 7 Top Cover**
(Use small screwdriver to release latch on left side, if necessary.)
- 8 Two Status Display Screws (F)**
(One on each end)
- 9 Status Display Assembly**
(contains on/off and power saver switches)
- 10 Four Hinge Screws (C)**
(Two on each end, inside two rear access doors)
- 11 Left Hinge Cables**
- 12 Right Hinge Cables**
- 13 LCD Assembly**
- 14 Memory Modules**
(Do not install two 4MB memory module kits. Install a 2MB memory module kit in connector 1 and a 4MB or 8MB memory module kit in connector 2.)
- 15 Two Screws (F)**
(At front edge of diskette drive)

- 16** **Two Diskette Drive Ribbon Cables**
- 17** **Diskette Drive and Drive Mounting Bracket**
- 18** **Standby Battery**
- 19** **Battery Shield**
- 20** **Backup Battery**
- 21** **Adapter Bezel**
- 22** **One Screw (F)**
(In corner of serial/modem card)
- 23** **Serial/Modem Card**
- 24** **Two Screws (F)**
(At front edge of hard disk drive)
- 25** **Two Ribbon Cables and Hard Disk Drive**
(Have customer backup all information on hard disk drive before removal.)
- 26** **External Adapter and Battery Doors**
- 27** **Eight System Board Screws (F)**
- 28** **One Screw (C)**
(Inside right-rear access door)
- 29** **Two Threaded Hex Spacers**
(Inside right-rear access door)
- Remaining System Board Cables**
- 30** **System Board**
(When replacing system board, install old memory module kits and math coprocessor on new system board. Run Automatic Configuration using customer's backup Reference Diskette.)
- 31** **Speaker**

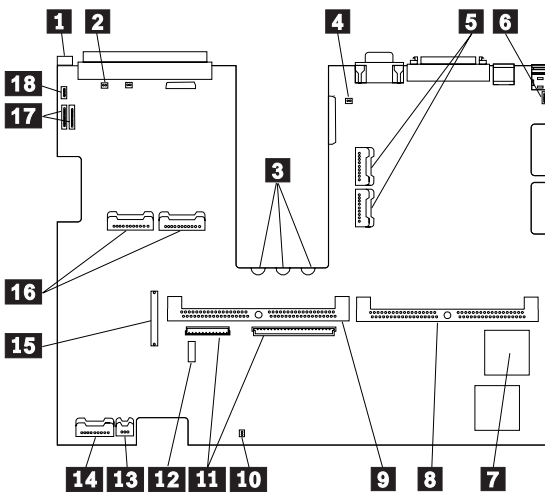
Model L40 Exploded View



Locations

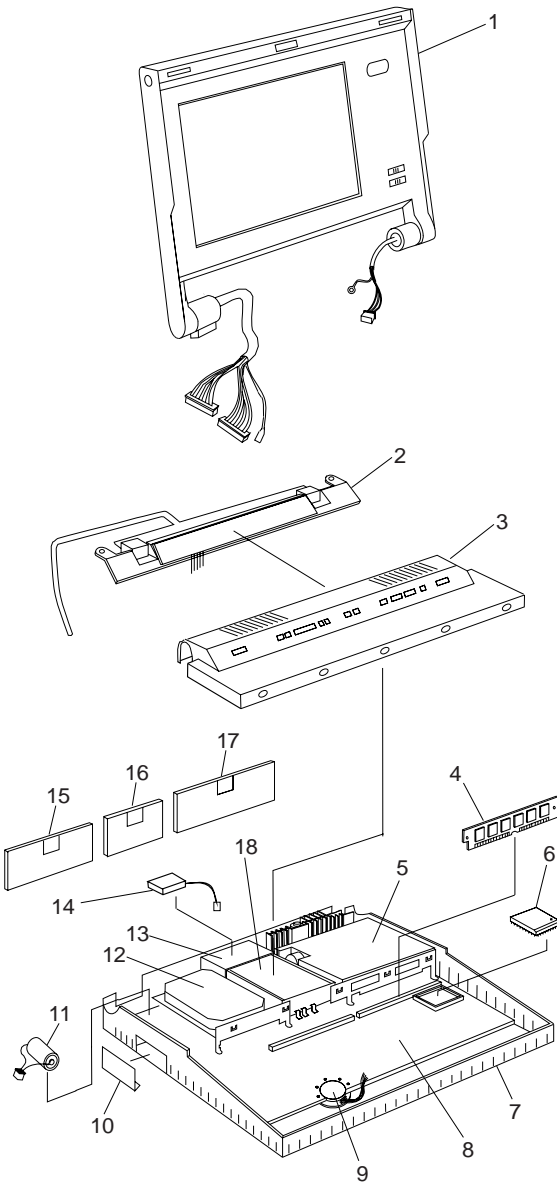
System Board

- 1** Suspend/Resume Switch
- 2** Backup Battery Connector
- 3** Battery Contacts
- 4** Standby-Battery Connector
- 5** Diskette-Drive Connectors
- 6** Display Power Connector
- 7** Math Coprocessor Connector
- 8** Memory-Module Connector 1
- 9** Memory-Module Connector 2
- 10** Speaker Connector
- 11** Keyboard Connectors
- 12** Password-Override Connector
- 13** Switch-Assembly Connector
- 14** System-Status Display Connector
- 15** Option Connector
- 16** Hard-Disk Drive Connectors
- 17** Display Signal Connectors
- 18** Suspend/Resume Switch Connector



(Top View)

Parts Listing



System Unit

Index

1	Display Assembly (LCD)	95F4878
2	System-Status Display Assembly	79F0991
3	Top Cover	79F3893
4	2MB Memory Module Kit	79F1002
4	4MB Memory Module Kit	79F1003
4	8MB Memory Module Kit	79F1004
6	80387SX** Math Coprocessor	79F1006
7	Bottom Cover	79F3884
8	System Board	95F4879
	System Board (with attached speaker)	8123176
9	Speaker	79F0989
	Speaker (for p/n 8123176)	79F0989
10	Bezel, Blank	79F3888
10	Bezel, Modem	79F3889
10	Bezel, Serial Adapter	79F3868
11	Backup Battery, Lithium	79F0986
13	Shield, Battery	79F3891
14	Standby Battery	79F0992
15	Door, Bus Connector	79F3886
16	Door, Battery	79F3887
17	Door, I/O Connector	79F3885
18	Rechargeable Battery	79F0994
18	Rechargeable Battery (Switzerland only)	79F3881
	System Board Fuse Card	95F6731
	Miscellaneous Kit (screws, rubber bumpers, and bottom cover caps)	79F3894

DASD

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5	Diskette Drive	79F0983
	Cable, Diskette Drive	79F0987
	Bezel, Diskette Drive	79F3892
12	60MB Hard Disk Drive	79F1009
	80MB Hard Disk Drive	95F4714
	Cable, Hard Disk Drive	79F0988

** 80387SX is a trademark of the Intel Corporation.

Options and Adapters

2MB Memory Module (80ns)	79F1002
4MB Memory Module (80ns)	79F1003
5.25-inch Drive Adapter/A (360KB/1.2MB)	15F7996
6154 Real-Time Coprocessor (128KB)	60X8192
6166 Real-Time Coprocessor (512KB)	76X1013
8MB Memory Module (80ns)	79F1004
8MB Memory Module Kit (80ns)	64F3607
80386 Memory Expansion Adapter	72X6671
AC Adapter	79F0993
ActionMedia II Display Adapter	69F9731
ActionMedia II Capture Option	69F9735
ActionMedia II Video Cable	69F9737
ActionMedia II Audio/Video Capture Cable	69F9736
ActionMedia II Display CD-ROM Cable	69F9747
Carrying Case	79F3869
Communication Cable (for 79F0996)	94X1540
Data/Fax Modem (U.S., Canada only)	79F0996
Diskette Drive Bus Adapter	72X8524
Enhanced 5250 Emulation Adapter	64G3956
External Diskette Drive Adapter	72X6757
Game Control Adapter	8529151
PC Network Adapter	8286171
PC Network Adapter II	72X8105
PC Network Baseband Adapter	72X8101
PhoneCommunicator Adapter	33F4846
PhoneCommunicator Cable (Black-L)	57F1261
PhoneCommunicator Cable (Black-S)	57F1262
PhoneCommunicator Cable (Beige-L)	57F1263
PhoneCommunicator Cable (Beige-S)	57F1264
Printer Cable	8529214
Quick Charger	79F0995
Realtime Interface Coprocessor 6-Port V.35	72F0164
Screen Reader Adapter	33F4842
Screen Reader Keypad	1393515
Screen Reader Keypad Cable	72X8537
SCSI Adapter/A (with Cache)	85F0063
SCSI Adapter/A (without Cache)	85F0002
SCSI Cable (internal)	64F4127
SDLC Adapter	8286099
Serial Adapter	79F0998
Serial Adapter Cable	8286170
Serial Adapter Connector	8286194
Serial/Parallel Adapter	8286147
SpeechViewer Adapter	15F8511
Strap	07G1449
Token-Ring 16/4 Adapter	93F0334
Token-Ring Adapter	16F0463
Token-Ring Adapter (with RPL Module)	83X7839

Keyboard

Arabic	1396825
Belgian	1396812
Canadian French	1396810
Danish	1396813
Dutch	1396817
French	1396814
German	1396815
Greek	1396826
Hebrew	1396827
Icelandic	1396828
Italian	1396816
Norwegian	1396818
Portuguese	1396819
Spanish	1396820
Spanish Speaking	1396811
Swedish/Finish	1396821
Swiss/French	1396822
Swiss/German	1396823
Turkish	1396829
U.K. English	1396824
U.S. English	1396181

Numeric Keypad and Mouse

U.S.	1396182
Arabic	1396806
Canadian French	1396800
French	1396801
German	1396802
Greek	1396807
Italian	1396803
Spanish	1396804
Swedish/Finland	1396805
Swiss/French	1396809
Swiss/German	1396808
Trackpoint (Model L40 SX)	1397090

Model N45SL (2614)

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General Checkout

Note: The hardware configuration in the Setup program is the responsibility of the customer. However, some settings can cause symptoms of a hardware failure to appear during operation or diagnostic checkout. Setup affects power management, parallel and serial ports, disk drive operation, operating speed, boot source, and memory configuration. Refer to the *Guide to Operations* for information about Setup.

001

HAS A REST/RESUME PROBLEM BEEN REPORTED?

Yes No

002

Go to Step 010 on page 49.

003

1. Power-on the computer.
2. Make sure the power button is set up for REST/RESUME in Setup configuration.
3. Press the power button to put the computer into REST.

Note: LCD display and backlight off, all LEDs off (except charge indicator when AC is connected and battery pack is installed).

DID THE COMPUTER REST?

Yes No

004

Do the following:

- Replace the system board.
- If that does not solve the problem, replace the DC/DC board.
- If the problem remains, replace the top cabinet assembly.

005

Press the power button to bring the computer out of REST.

DID THE COMPUTER FAIL TO RESUME?

Yes No

006

Go to Step 010 on page 49.

007

(Step **007** continues)

007 (continued)

Check backup battery connections and voltage (+5 V dc).

ARE THE BACKUP BATTERY AND BATTERY CONNECTIONS OK?

Yes No

008

Replace the battery and verify operation.

009

Do the following:

- Replace the system board.
- If that does not solve the problem, replace the DC/DC board.
- If the problem remains, replace the top cabinet assembly.

010

1. Connect the AC adapter to the computer and to the AC supply.
2. Make sure there is no diskette in the diskette drive.
3. Disconnect any peripherals from the computer.
4. Power-on the computer.

IS THE POWER LED LIT?

Yes No

011

Go to Step 029 on page 51.

012

IS THE POWER LED AMBER?

Yes No

013

IS THE POWER LED GREEN?

Yes No

014

Replace the top cabinet. If that does not solve the problem, replace the system board.

015

Replace FRUs in the following order:

- AC Adapter
 - DC/DC Board
 - System Board
 - Top Cabinet
-

(CONTINUED)

016

IS THE CHARGE LED LIT?

Yes No

017

Replace FRUs in the following order:

- AC Adapter
- Battery Pack
- Battery Contact Cable Assembly
- Top Cabinet

018

IS THE CHARGE LED RED?

Yes No

019

DOES THE LCD DISPLAY TURN ON?

Yes No

020

Adjust the brightness and contrast controls. If this does not correct the problem, return to Step 001.

021

DOES THE COMPUTER BOOT FROM THE HARD DRIVE?

Yes No

022

If you receive a POST error, go to the Symptom-to-FRU index. If you do not receive a POST error, go to "Undetermined Problem" on page 62.

023

IS THE BACKLIGHT ON?

Yes No

024

Go to Step 029 on page 51.

025

(Step **025** continues)

025 (continued)

IS THE DISPLAY READABLE?

Yes No

026

Go to Step 029.

027

If you receive a POST error, go to the Symptom-to-FRU index. If you do not receive a POST error, go to "Undetermined Problem" on page 62.

028

Replace the battery contact cable assembly. If this does not correct the problem, replace the battery pack.

029

1. Disconnect the computer from AC power.
2. Remove the battery pack.
3. Open the computer and look for damaged or unconnected cables.

ARE THE CABLES OK?

Yes No

030

Reconnect or replace the cables, then close the computer. Verify operation.

031

- Close the computer and install a freshly charged battery pack. Power-on the computer.

DO ANY LEDS LIGHT?

Yes No

032

Replace FRUs in the following order:

- Top Cabinet
- DC/DC Board
- System Board

033

DOES THE LCD BACKLIGHT LIGHT?

Yes No

034

(Step **034** continues)

(CONTINUED)

034 (continued)

Replace FRUs in the following order:

- DC/DC Board
- System Board
- LCD Display Panel

035

DOES THE COMPUTER ATTEMPT TO AUTOBOOT?

Yes No

036

Replace FRUs in the following order:

- Suspected Drive
- System Board

037

IS THE OPERATING SYSTEM PROMPT LEGIBLE?

Yes No

038

Replace FRUs in the following order:

- Top Cabinet Assembly
- System Board

039

Replace the system board.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists the symptoms and errors and the possible causes. The most likely cause is listed first.

Note: Perform the FRU replacement or actions in the sequence shown in the FRU/Action columns. If a FRU did not solve the problem, put the original part back in the computer. Do not replace a non-defective part.

This index can also be used to help you decide which FRUs to have available when servicing a computer.

Note

For IBM devices not supported by the N45 diagnostics, see the manual for that device.

Symptom/Error	FRU/Action
No access to A or C drive after POST.	1. Ensure boot sequence is not set to "Monitor."
"CHECKSUM ERROR! Bad image file. ERROR occurred while reading file."	1. Advanced Diagnostics diskette
"Device error during erasing process."	1. System Board
"Device error during programming process."	1. DC-to-DC board 2. System Board
"DISK ERROR: Bad disk controller!"	1. Check disk drive cable connection. 2. Diskette Drive Cable
"DISK ERROR: Cannot reset drive!"	1. Verify drive installation. 2. Diskette Drive 3. System Board
"DISK ERROR: CRC error!"	1. Diskette 2. Diskette Drive Cable 3. Run Advanced Diagnostics to test drive. 4. Diskette Drive 5. System Board
"DISK ERROR: Data Corrected!"	1. If this message occurs regularly, see "DISK ERROR: CRC error!"

Symptom/Error	FRU/Action
"DISK ERROR: Disk not bootable!"	<ol style="list-style-type: none"> 1. Use a bootable diskette. 2. For a hard disk, reinstall the operating system. 3. Back up the hard disk, if possible, and run PREP to reinitialize the disk (see "Running PREP" on page 64). Reformat disk and install operating system. 4. Hard Disk Drive
"DISK ERROR: DMA overrun!"	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board
"DISK ERROR: Drive not ready!"	<ol style="list-style-type: none"> 1. Remove and reinsert diskette. 2. Verify the correct drive was specified. 3. Diskette Drive
"DISK ERROR: Invalid address mark!"	<ol style="list-style-type: none"> 1. If the problem is a diskette: <ol style="list-style-type: none"> a. Copy any readable files to another diskette and reformat faulty diskette. If bad sectors are reported, discard the faulty diskette. b. Diskette c. Diskette Drive 2. If the problem is a hard disk: <ol style="list-style-type: none"> a. Back up the hard disk, if possible, and run PREP to reinitialize the disk (see "Running PREP" on page 64). Reformat disk and install operating system. b. Hard Disk Drive

Symptom/Error	FRU/Action
<p>"DISK ERROR: Invalid data read!"</p>	<ol style="list-style-type: none"> 1. If the problem is a diskette: <ol style="list-style-type: none"> a. Copy any readable files to another diskette and reformat faulty diskette. If bad sectors are reported, discard the faulty diskette. b. Diskette c. Diskette Drive 2. If the problem is a hard disk: <ol style="list-style-type: none"> a. Back up the hard disk, if possible, and run PREP to reinitialize the disk (see "Running PREP" on page 64). Reformat disk and install operating system. b. Hard Disk Drive
<p>"DISK ERROR: Must run SETUP to boot from Winchester!"</p>	<ol style="list-style-type: none"> 1. Run Setup program to specify correct hard disk drive type. 2. System Board
<p>"DISK ERROR: No bootable partitions"</p>	<ol style="list-style-type: none"> 1. Retry the boot command syntax and verify a valid partition is selected using the DOS "FDISK" command. 2. Format partition and install operating system using the DOS "FORMAT" command.

Symptom/Error	FRU/Action
"DISK ERROR: Sector not found!"	<ol style="list-style-type: none"> 1. If the problem is a diskette: <ol style="list-style-type: none"> a. Copy any readable files to another diskette and reformat faulty diskette. If bad sectors are reported, discard the faulty diskette. b. Diskette c. Diskette Drive 2. If the problem is a hard disk: <ol style="list-style-type: none"> a. Back up the hard disk, if possible, and run PREP to reinitialize the disk (see "Running PREP" on page 64). Reformat disk and install operating system. b. Hard Disk Drive
"DISK ERROR: Seek failure!"	<ol style="list-style-type: none"> 1. Copy any readable files to another diskette and format the faulty diskette. 2. If bad sectors are reported, discard the faulty diskette. 3. Diskette 4. Diskette Drive 5. System Board
"ERROR: Bad configuration information found in CMOS!"	<ol style="list-style-type: none"> 1. Run Setup program to reconfigure. 2. Backup Battery 3. System Board
"ERROR: Base memory size error: SETUP: XXXK ACTUAL: XXXK!"	<ol style="list-style-type: none"> 1. Run Setup program to verify correct base memory size. 2. Run the Advanced Diagnostics Memory Test to check base memory. 3. System Board
"ERROR: Can't locate input file."	<ol style="list-style-type: none"> 1. Correct Advanced Diagnostics diskette? 2. Advanced Diagnostics diskette
"ERROR: CMOS memory failure!"	<ol style="list-style-type: none"> 1. Run Setup program to verify configuration. 2. System Board
"ERROR: CPU failure!"	<ol style="list-style-type: none"> 1. System Board

Symptom/Error	FRU/Action
"ERROR: Divide by zero!"	<ol style="list-style-type: none"> 1. Try another copy of the software, or have the customer contact the software manufacturer or dealer and report the problem. Unless this message occurs during the power-up sequence, the problem is with the software. 2. Power-off computer, wait 15 seconds, then power-on computer. If the message reappears, replace system board.
"ERROR: Extended memory size error! SETUP: XXXK ACTUAL: XXXXK"	<ol style="list-style-type: none"> 1. Run Setup program to verify the extended RAM memory size matches the memory installed. 2. Check the memory module installation. 3. Run Advanced Diagnostics to test extended memory. If you cannot boot the computer, replace the system board and try again. If the tests identify an expansion memory module, replace it. If the tests identify a problem in the base memory, replace the system board.
"ERROR: File too long for program buffers."	<ol style="list-style-type: none"> 1. Correct Advanced Diagnostics diskette? 2. Advanced Diagnostics diskette
"ERROR: File too long for ROM size."	<ol style="list-style-type: none"> 1. Correct Advanced Diagnostics diskette? 2. Advanced Diagnostics diskette
"ERROR: File too short to fill ROM."	<ol style="list-style-type: none"> 1. Correct Advanced Diagnostics diskette? 2. Advanced Diagnostics diskette

Symptom/Error	FRU/Action
"ERROR: Invalid command!"	<ol style="list-style-type: none"> 1. Retry the command. 2. Try another copy of the software or have the customer contact the software manufacturer or dealer and report the problem. 3. System Board
"ERROR: Keyboard not responding or not connected!"	<ol style="list-style-type: none"> 1. Check keyboard connections. 2. Keyboard 3. System Board
"ERROR: Memory parity failure!"	<ol style="list-style-type: none"> 1. Run Advanced Diagnostics Memory Test to check base and extended memory. 2. Memory Module 3. System Board
"ERROR occurred while reading Boot Sector."	<ol style="list-style-type: none"> 1. Advanced Diagnostics diskette
"ERROR occurred while reading FAT table."	<ol style="list-style-type: none"> 1. Advanced Diagnostics diskette
"ERROR occurred while reading root directory."	<ol style="list-style-type: none"> 1. Advanced Diagnostics diskette
"ERROR: Please replace the backup battery!"	<ol style="list-style-type: none"> 1. If backup battery was recently replaced, run Setup program to configure computer. 2. Backup Battery 3. System Board
"Error programming FLASH Device. Retrying."	<ol style="list-style-type: none"> 1. System Board
"ERROR: RAM failure! Address: XXXX"	<ol style="list-style-type: none"> 1. Inspect memory modules for proper installation. 2. Swap the installed memory modules with known good modules. 3. Memory Board 4. System Board
"ERROR: RAM failure! SIMM module: XXXX"	<ol style="list-style-type: none"> 1. Inspect the memory modules for proper installation. 2. Swap the installed memory modules with known good modules. 3. Memory Board 4. System Board

Symptom/Error	FRU/Action
"ERROR: ROM checksum failure!"	1. Power-off computer, wait 15 seconds, then power-on computer. If the message reappears, replace system board.
"ERROR: System control processor failure!"	1. Power-off computer, wait 15 seconds, then power-on computer. If message reappears, replace system board.
"ERROR: The image file is not for this machine."	1. Correct Advanced Diagnostics diskette? 2. Advanced Diagnostics diskette
"ERROR: Timer interrupt failure!"	1. Power-off computer, wait 15 seconds, then power-on computer. If message reappears, replace system board.
"ERROR: Wild Hardware Interrupt."	1. Power-off computer, wait 15 seconds, then power-on computer. Rerun the program. 2. If message reoccurs at the same place during operation of a program, it is probably software related. Have the customer contact the software manufacturer or dealer to report problem. 3. System Board
"Fatal Error; Cannot Continue!"	1. Refer to first error message and follow instructions to resolve the problem.
"File not found, try another diskette."	1. Try another Advanced Diagnostics diskette.
"FLASH Device failure! Device content has been corrupted."	1. System Board
"High ROM Checksum Error! Flash ROM needs to be reprogrammed"	1. BIOS within the Flash ROM is corrupt. The NEWBIOS command will automatically be executed. See "Updating Flash Memory" on page 65.

Symptom/Error	FRU/Action
"Low ROM Checksum Error! Flash ROM needs to be reprogrammed"	<ol style="list-style-type: none"> 1. See "Updating Flash Memory" on page 65.
"Non-maskable interrupt received!"	<ol style="list-style-type: none"> 1. If a software problem is suspected, have the customer contact the software manufacturer or dealer and report the problem. 2. Run Advanced Diagnostics. 3. AC Adapter
"No system"	<ol style="list-style-type: none"> 1. Install the operating system. Refer to the operating system documentation for instructions. 2. Retry the boot command syntax and verify a valid drive was selected.
"Not a bootable partition"	<ol style="list-style-type: none"> 1. Retry the boot command syntax and make certain a valid partition was selected. 2. Back up the hard disk, if possible, and run PREP to reinitialize the disk (see "Running PREP" on page 64). Reformat disk and install operating system. 3. Hard Disk Drive
"Overflow!"	<ol style="list-style-type: none"> 1. Power-off computer, wait 15 seconds, then power-on computer. If message reappears during power up, replace system board. 2. If a software problem is suspected, try another copy of the program, or have the customer contact the software manufacturer or dealer and report the problem.

Symptom/Error	FRU/Action
"Password Security Violation: System Shutdown"	<ol style="list-style-type: none"> 1. Power-off computer, wait 15 seconds, then power-on the computer. 2. Retry the password. If password is unknown, clear the password (see "Power-on Password" on page 63).
"Program verify failure."	1. System Board
"Remove diskette and insert again, otherwise reboot."	<ol style="list-style-type: none"> 1. Try another Advanced Diagnostics diskette. 2. System Board
"Retries exhausted, please remove diskette."	<ol style="list-style-type: none"> 1. Try another Advanced Diagnostics diskette. 2. System Board
"Slush BIOS Checksum Error!"	1. System Board
"Slush RAM Data Error!"	1. System Board
"Slush Video Checksum Error!"	1. System Board
"Wild Interrupt!"	<ol style="list-style-type: none"> 1. Power-off computer, wait 15 seconds, then power-on computer. Rerun the program. 2. If the message reoccurs at the same place during the operation of a program, it is probably software related. Have the customer contact the software manufacturer or dealer to report problem. 3. If the message reoccurs randomly, run Advanced Diagnostics. Replace any faulty assemblies.

Undetermined Problem

You are here because the diagnostics tests did not identify the failing FRU.

1. Power-off the computer and remove the battery packs from the computer.
2. Remove or disconnect one of the following devices or adapter (do not isolate FRUs that are known to be good).
 - a. Non-IBM devices
 - b. Modem, printer, mouse, or other external device
 - c. IC DRAM card
 - d. Hard disk drive (fixed disk drive) or diskette drive
 - e. Any adapter and device.
3. Power-on the computer and start the system program.
4. If the symptom remains, repeat steps 2 and 3 until you find the failing FRU or until all FRUs have been removed.
5. If all of the FRUs listed have been removed and the problem remains, replace the system board.

Related Service Procedures

This section provides related service information on the following:









"Power-on Password"
"Status Indicators"
"How to Run Advanced Diagnostics"
"Running PREP" on page 64
"Updating Flash Memory" on page 65

Power-on Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

Status Indicators

Light	Status Indicated
	Hard disk drive is active
	Diskette drive is active
	Keyboard is in Caps Lock mode
	Keyboard is in Num Lock mode
	Imbedded keypad is locked on
	Keyboard is in Scroll Lock mode
	<p>Amber Computer is operating from AC power</p> <p>Green Computer is operating from battery power</p> <p>Red (flashing) Battery pack is almost discharged</p> <p>Red (steady) Battery pack is completely discharged</p>
	<p>Green Battery pack is fully charged and being trickle charged</p> <p>Amber Battery pack is being fast charged</p> <p>Red Problem in the battery circuit</p> <p>Off Computer is operating from AC with no battery pack installed</p>

How to Run Advanced Diagnostics

1. Power-off the computer.
2. Insert the Advanced Diagnostics Diskette into the diskette drive.
3. Power-on the computer.

4. Press **Ctrl+Alt+Ins** to start the Monitor program.
5. In the Monitor program, type BF and press **Enter** to boot from the diskette drive.
6. Follow the Advanced Diagnostics menus to test the computer. (Press **F1** for help.)

Running PREP

The PREP utility initializes and prepares the hard disk surface for storage of data. It performs a low level format then checks for bad sectors. If any bad sectors are found, they are marked in a way that prevents data from being stored in them.

There are two situations when PREP is used:

1. To prepare the hard disk surface for formatting when installing a new hard disk drive.
2. To exclude sectors of the hard disk that have become unusable, indicated by intermittent or continuous hard disk drive read failures.

Warning: PREP erases all data on the hard disk. If possible, back up the data on the hard disk to diskettes before running PREP.

To run PREP:

1. Boot the Advanced Diagnostics diskette.
2. Press the right arrow key to select the "Run Tests" menu.
3. Press the down arrow key to select "Advanced Utilities" from the menu and press **Enter**.
4. Select "PREP" and press **Enter**.

PREP displays its version number, a list of informational messages, and then asks if you want to proceed.

Do you want to proceed with PREP (Y/N)?

Press **N** if you want to cancel PREP and return to the DOS command line. Press **Y** to continue with PREP.

PREP asks for the hard disk drive unit number (drive C = 0 and D = 1).

Hard disk drive unit number (0 - 7):

Enter the drive number. You will then be offered one more chance to cancel PREP. PREP will prompt you to press **P** to continue. Pressing any other key will cancel PREP and return you to the DOS prompt.

PREP first scans the hard disk for bad sectors that have previously been marked. It displays the message:

Scanning for previous bad sectors...

PREP then performs a low level format of the hard disk surface. It display the message:

Initializing the disk...

PREP will then write data to each sector of the hard disk and read this data back to verify each sector. This is repeated four times. PREP displays the message:

Verify: pass n, Cylinder xxx

Where *n* is the number of the current pass (1-4) and *xxx* is the current cylinder under test.

If any bad sectors are found, PREP marks them to prevent them from being used when the hard disk is formatted.

After the hard disk is verified, PREP displays the message:

Operation complete, press any key to exit to monitor

The hard disk is now ready to be formatted and have an operating system loaded onto it.

Updating Flash Memory

Note on Updating Flash Memory

Perform this NEWBIOS function only while operating on AC power.

Reprogramming Flash BIOS: To reprogram the Flash ROM, do the following.

1. Access the Monitor program with the **Ctrl+Alt+Ins** key combination.
2. Insert the Advanced Diagnostics diskette in the diskette drive.
3. Type NEWBIOS, then press **Enter**.

The NEWBIOS function tests the size of the file, the computer type, and the checksum of the file. After the tests complete successfully, the Flash ROM is reprogrammed. The following prompt appears:

*Programming success. Press **Enter** to reboot system...*

In order for the computer to read the new code, the computer must be rebooted. Press **Enter** to reboot the computer.

If the NEWBIOS function fails and displays any error messages, power-off computer, wait 15 seconds, then power-on computer. If the Flash ROM is corrupt, the computer will initiate the NEWBIOS function automatically.

Product Overview

The following table provides a brief overview of the computer features.

Feature	Description
Processor (MHz)	386SL 25-Mhz
Bus Architecture	AT Bus
Memory (Standard)	2MB
Memory (Maximum)	8MB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	120MB

FRU Removals and Replacements

Follow the numerical sequence in the FRU removal sequence list and the exploded view to remove or disconnect parts in the correct order. The letters in parentheses in the list indicate screw types. See the “Screw Size Chart” on page 19 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

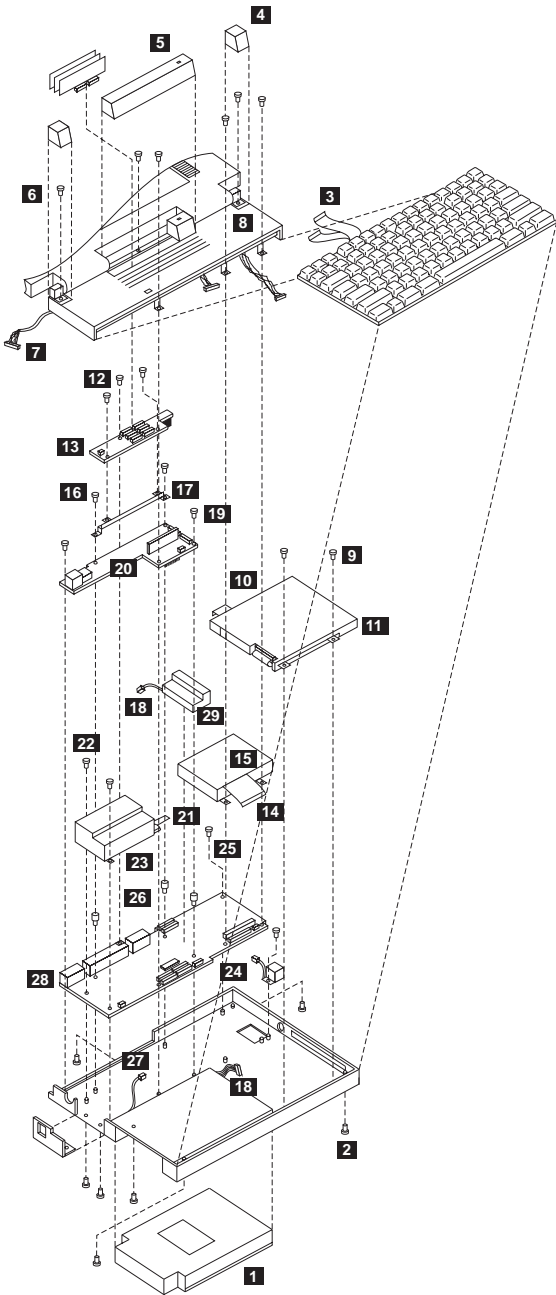
Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

- 1 Battery Pack**
- 2 Three Screws (1-G, 2-J)**
(Two on bottom of cabinet near front, one inside battery compartment)
Loosen Keyboard
- 3 Two Ribbon Cables and Remove Keyboard**
- 4 Hinge Covers**
(Apply pressure to hinge cover sides and pull up.)
- 5 Memory Module Cover**
(Gently pry from rear.)
- 6 Three Screws (1-J, 2-WW)**
(One screw at each hinge and one at back edge under memory module cover.)
- 7 Three LCD Assembly Cables**
(These cables attach to underside of LCD assembly. Observe cable routing and place cables in same position when replacing top cover.)
- 8 Three Screws and LCD Assembly**
(Top cover is part of LCD assembly. Only part of LCD is shown. Long silver screws are located at front edge of LCD assembly.)
- 9 Two Screws (J)**
(At front edge of diskette drive)
- 10 Diskette Drive Ribbon Cable**
- 11 Diskette Drive**
- 12 Three Screws (J)**
(Move shielding aside. Do not crease shielding.)

- 13** **Memory Module Expansion Card**
- 14** **Hard Disk Drive Ribbon Cable**
- 15** **Hard Disk Drive**
(One screw on cabinet bottom holds hard disk drive in place. Have customer backup hard disk drive before removing drive. Run Prep after installing new hard disk drive.)
- 16** **Two Screws (J)**
(At each end of memory module support bracket)
- 17** **Memory Module Support Bracket**
- 18** **Backup Battery, Battery Compartment Cables**
(Look for **18** twice in illustration.)
- 19** **Two Screws (J)**
(At each end of DC to DC PCB Assembly)
- 20** **DC to DC PCB Assembly**
(Lift front to unplug assembly from system board. Be careful not to damage or lose shielding.)
- 21** **Modem Ribbon Cable**
- 22** **Three Modem Housing Screws (J)**
(Front right screw holds a black grounding cable down.)
- 23** **Modem Housing Assembly**
- 24** **Mouse Cable**
- 25** **One System Board Screw (J)**
- 26** **Three System Board Threaded Hex Spacers**
- 27** **Cable**
- 28** **System Board**
(Transfer math coprocessor (if installed) to new system board.)
- 29** **Backup Battery**

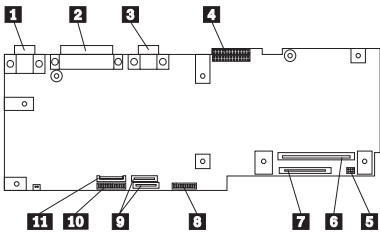
Model N45 Exploded View



Locations

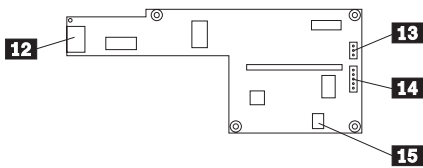
System Board

- 1** External Display Connector
- 2** Parallel Connector
- 3** Serial Connector
- 4** Memory Adapter Card Connector
- 5** Auxiliary Device Connector
- 6** Hard Disk Drive Connector
- 7** Diskette Drive Connector
- 8** Status Light Panel Connector
- 9** Keyboard Connectors
- 10** LCD Connector
- 11** Modem Connector Jack



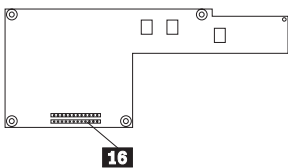
DC to DC Board (Top)

- 12** AC Adapter Connector
- 13** Backup Battery Connector
- 14** Battery Pack Connector
- 15** Battery Status Indicator Connector

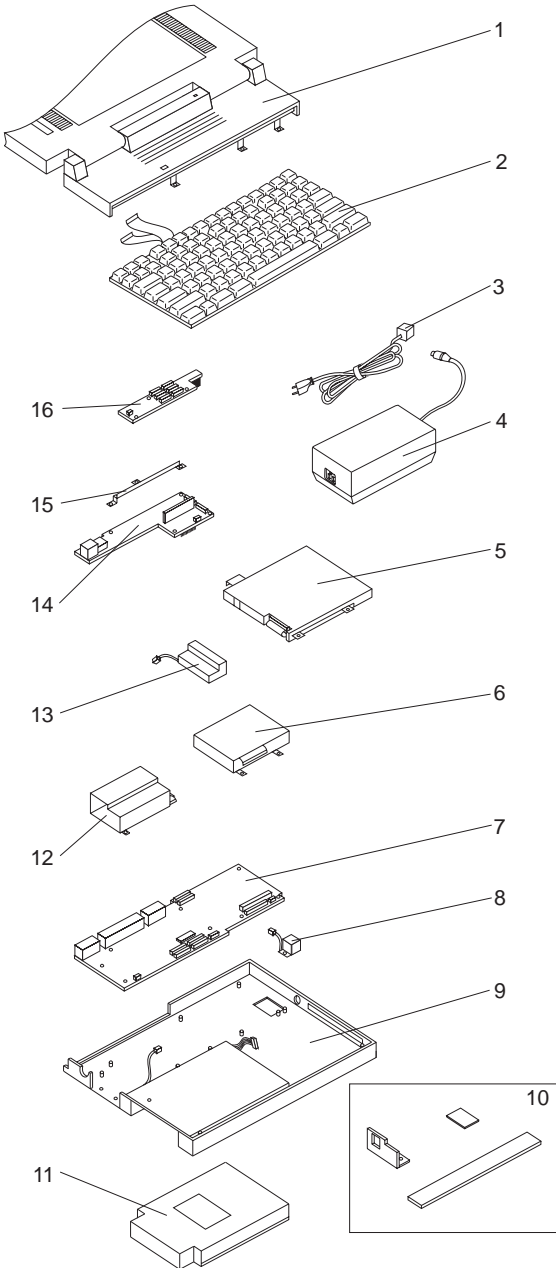


DC to DC Board (Bottom)

- 16** System Board Connector



Parts Listing



System Unit

Index

1	Top Cabinet Assembly	92F8858
	French	92F8839
	German	92F8837
	Italian	92F8845
	Spanish	92F8838
	U.K. English	92F8836
	U.S. English	92F8835
3	Power Cord, US	6952301
3	Power Cord, UK	14F0033
3	Power Cord, Switzerland	14F0051
3	Power Cord, Europe	13F9979
7	System Board	92F8827
8	PS/2 Mouse Board	92F8833
9	Bottom Cover Assembly	92F8819
10	Parts Package, Cover (Left/right LCD hinge covers, memory expansion cover, memory cover, modem door door, coprocessor door, rear I/O cover, modem cover plug, modem door, coprocessor door, black lid switch knob)	92F8825
	Battery Pack	92F8840
13	Backup Battery	92F8834
	Battery Contact Assembly	92F8841
14	DC to DC PCB Assembly	92F8820
	Speaker	33G9475
	Parts Package, Screws (3-2.5x4; 3-2.5x12; 2-2.6x6 (tap); 3-2.6x6; 5-2x6 (tap); 3-2.5x4; 11-2.5x6)	92F8824

DASD

5	Diskette Drive	92F8821
6	80MB Hard Disk Drive	92F8822
6	120MB Hard Disk Drive	33G6366

Options and Adapters

4	AC Adapter	92F8832
	Modem, 2400 BPS, US	92F8846
12	Modem Housing Assembly	92F8826
	Fax/Modem, US	92F8896
	Fax/Modem, Worldwide	92F6293
	Fax/Modem DAA Adapter, US	92F8847
	Fax/Modem DAA Adapter, UK	92F8848
	Fax/Modem DAA Adapter, Danish	92F8849
	Fax/Modem DAA Adapter, French	92F8850
	Fax/Modem DAA Adapter, German	92F8851
	Fax/Modem DAA Adapter, Italian	92F8852
	Fax/Modem DAA Adapter, Norwegian	92F8853
	Fax/Modem DAA Adapter, Spanish	92F8854
	Fax/Modem DAA Adapter, Swedish	92F8855
	Fax/Modem DAA Adapter, Swiss	92F8856
16	Expansion Memory Module	92F8823
15	Memory Module Support (part of P/N 92F8823)	

Model N51 (8551)

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General Checkout

The diagnostic tests are intended to test *only* IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid computer responses.

001

DOES THE PROBLEM APPEAR TO BE A POWER SUPPLY FAILURE?

Yes No

002

Go to Step 006.

003

DO ALL SYSTEM-STATUS INDICATORS REMAIN OFF?

Yes No

004

Go to Step 006.

005

Go to "Power Systems Checkout" on page 78.

006

- Power-off the computer and all external devices.
- Check all cables and power cords.
- Make sure no diskette is in the drive.
- Power-on all external devices.
- Power-on the computer and check for the following responses:
 1. All system-status indicators appear once for about 1 second.

Note: Some indicators remain on and others go off after 1 second.
 2. Memory test (the number increases.)
 3. One or two short beeps.

DID YOU RECEIVE THE RESPONSES LISTED ABOVE?

Yes No

007

1. If the memory count is incorrect, go to "Memory Checkout" on page 77.
2. Go to "Symptom-to-FRU Index" on page 87. If that does not correct the problem, go to "Undetermined Problem" on page 94.

008

– Press **Ctrl+Alt+Del**. When the cursor moves to the upper right, press **Ctrl+Alt+Ins** to start the system program. If the IBM logo screen does not appear, insert the backup Reference Diskette into the diskette drive and repeat this step.

1. If you are not at the Main Menu, follow the instructions on the screen to advance to the Main Menu.

If you cannot advance to the Main Menu, go to “Symptom-to-FRU Index” on page 87.

- or -

If that does not correct the problem, go to “Undetermined Problem” on page 94.

Notes:

- a. If the computer has an incorrect keyboard or numeric keypad response, go to “External Keyboard/Auxiliary Input Device Checkout” on page 465.
- b. If the printer has incorrect responses, go to “Printer Checkout” on page 468.
- c. If the external display has problems such as jittering, rolling, shifting, or being out-of-focus, go to “External Display Self-Test” on page 464.

2. Press **Ctrl+A** and run the system checkout.

IS THE LIST OF INSTALLED DEVICES CORRECT?

Yes No

009

Go to “Checking Installed Devices” on page 95.

010

– Run the diagnostic tests.

DID THE TEST IDENTIFY A FAILURE?

Note: If the test stops and you cannot continue, replace the last device tested.

- or -

If any POST error code appears, go to “Symptom-to-FRU Index” on page 87.

Yes No

011

You might have an intermittent problem:

- Check for damaged cables and connectors.
- Reseat all adapters, drives, and modules.

(Step **011** continues)

(CONTINUED)

011 (continued)

- Start an error log and run the tests multiple times.
- Check the power supply in use when the error is reported (see “Power Systems Checkout” on page 78).
- Check “Symptom-to-FRU Index” on page 87. If this does not fix the problem, go to “Undetermined Problem” on page 94.

012

Go to “Symptom-to-FRU Index” on page 87.

Memory Checkout

Customer diagnostics can eliminate defective memory so no memory error code appears at power-on reset. After you replace a defective memory module kit, run **5**.

Automatic configuration or the new memory will not be recognized. (If you have to run configuration with your own diskette, be sure the customer has all the correct option diskettes available.) Power-off the computer before removing or replacing parts.

001

- Remove the memory module kit in the connector if installed.
- Run the memory tests.
Use the RUN TESTS ONE TIME option.

DID THE MEMORY TESTS END WITHOUT AN ERROR?

Yes No

002

Replace the system board.

003

DID YOU REMOVE THE MEMORY MODULE KIT IN THE CONNECTOR?

Yes No

004

Go to Step 007.

005

- Reinstall the memory module kit in the connector and run **5. Automatic configuration**.
- Run the memory test.
Use the RUN TESTS ONE TIME option.

DID THE MEMORY TESTS END WITHOUT AN ERROR?

Yes No

006

Replace the memory module kit in the connector. If that does not correct the problem, replace the system board.

007

If the problem occurs intermittently, run the memory tests multiple times to have an error log.

Power Systems Checkout

Note

One or all of the batteries can discharge if there is a short circuit in the computer.

1. Replace the failing FRU if the power supply problem is caused by a short circuit.
2. Determine if one (or all) of the batteries have become discharged. Replace a discharged battery with a known-good spare.

The test procedures for each power supply are found on the following pages.

“Testing the AC Adapter” on page 81.

“Testing the Battery Pack” on page 82.

“Testing the Backup Battery” on page 83.

“Testing the Standby Battery” on page 83.

“Testing the Quick Charger” on page 84.

“Testing the Car Battery Adapter” on page 85.

“Testing the Voltage Converter” on page 85.

None of the above? Follow the steps below.

001

DID THE PROBLEM OCCUR ONLY WHEN USING THE AC ADAPTER?

Yes No

002

Go to Step 004.

003

Go to “Testing the AC Adapter” on page 81. If “Testing the AC Adapter” does not correct the problem, replace the voltage converter.

004

DID THE PROBLEM OCCUR ONLY WHEN USING THE CAR BATTERY ADAPTER?

Yes No

005

Go to Step 007.

006

Go to “Testing the Car Battery Adapter” on page 85.

007

(Step **007** continues)

007 (continued)

DID THE PROBLEM OCCUR ONLY WHEN USING THE BATTERY?

Yes No

008

Go to Step 014.

009

DOES A FULLY-CHARGED BATTERY DISCHARGE QUICKLY?

Yes No

010

Go to Step 013.

011

– Run advanced diagnostics for all devices using the AC adapter. Use the 'RUN TEST ONE TIME' option.

DID ALL THE TESTS END WITHOUT AN ERROR?

Yes No

012

Follow the instructions on the screen.

If the instructions do not appear or do not correct the problem, replace the system board.

013

Go to "Testing the Battery Pack" on page 82.

If "Testing the Battery Pack" does not correct the problem, go to "Testing the Voltage Converter" on page 85.

014

- Unplug the AC adapter if used.
- Remove the bottom cover and disconnect the flat cable from connector CN6 on the voltage converter. (See page 86 for the connector location.)
- Check that the resistance at connector CN5 is greater than 5 ohms between pins 7 and 1, and also between 7 and 3.

IS THE RESISTANCE CORRECT?

Yes No

015

Go to Step 017 on page 80.

016

Go to "Testing the Voltage Converter" on page 85. If "Testing the Voltage Converter" does not correct the problem, go to Step 017 on page 80.

(CONTINUED)

017

– Remove the following if installed:

- Battery pack
- Standby battery
- Backup battery
- Memory module kit
- Internal Data/Fax modem
- Serial adapter
- Numeric keypad
- Mouse
- External display
- Hard disk drive
- Diskette drive
- LCD inverter cable
- LCD panel cable.

– Make sure the voltage converter is correctly installed.

– Plug in the AC adapter and power-on the computer.

DID YOU HEAR ONE LONG OR TWO SHORT BEEPS?

Yes No

018

Replace the following FRUs one at a time until the problem is corrected.

- Voltage converter
- I/O panel assembly
- System board

019

Replace the voltage converter to verify the fix. If the problem still remains, do the following.

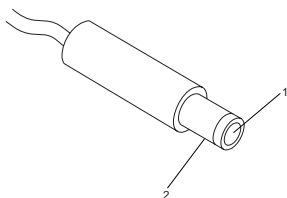
- Suspect one of the options or devices. Reinstall each of the options or devices to the computer one at a time, and power-on the computer to see if the original problem occurs.
 - Replace the last installed option or device when the problem occurs.
-

Testing the AC Adapter: If the Power-On indicator is not on, check the power cord of the AC adapter for proper installation and continuity.

1. If any noise can be heard from the AC adapter when it is plugged into line voltage, replace the AC adapter with a new one.

If no noise can be heard from the adapter, go to Step 3.

2. If the noise still comes from the new AC adapter, suspect the computer. Replace the AC adapter with the original one, then go to the next step. If no noise comes from the new adapter, the original adapter has the problem.
3. Unplug the AC adapter cable from the computer and measure the output voltage at the plug of the AC adapter cable.



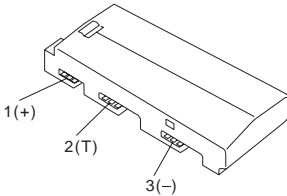
Pin	Voltage (V dc)
1	+19.0 to +21.0
2	Ground

- If the voltage is not correct:
 1. Unplug the AC adapter from the ac power outlet and leave it for a few minutes.
 2. Plug the AC adapter into the ac outlet.
 3. Measure the output voltage of the AC adapter.
 4. If the voltage is still not correct, replace the AC adapter.
- If the voltage is OK, plug the cable into the computer and try the failing operation again.

If the problem still remains, replace the voltage converter. If the problem disappeared, suspect the installation and continuity of the AC adapter cable.

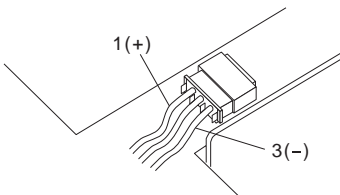
Testing the Battery Pack

1. Place the computer bottom-side up.
2. Remove the battery pack and measure the voltage at the battery terminals between 1 (+) and 3 (-).



Pin	Voltage (V dc)
1	+8.5 to +18.0
2	Thermal Detection
3	Ground

- If the voltage is less than +8.5 V dc, the battery pack is discharged or defective.
 - If the voltage is more than +8.5 V dc, go to the next step.
3. Using a low-power ohm meter, measure the resistance at the battery terminals between 2 (T) and 3 (-). The resistance must be 4 kilohms to 30 kilohms. If the resistance is out of range, replace the battery pack.
 4. Remove the bottom cover and set the battery pack in place without connecting any external power devices.
 5. Measure the voltage at the connector between terminals 1 (+) and 3 (-) on the voltage converter and note the voltage.

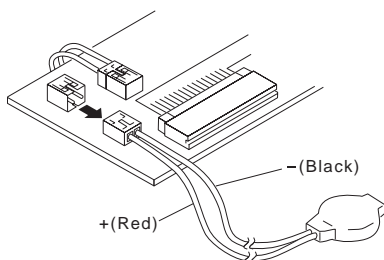


6. Using the AC adapter, apply external power to the computer.
Warning: Be careful not to cause a short circuit while doing the following steps. The charging circuit is active even if the computer power switch is set to off.
7. Measure the voltage again between terminals 1 (+) and 3 (-).
 - If the voltage is not greater than that measured in Step 5, replace the AC adapter, then go to the next step.
 - If the voltage is greater than that measured in Step 5, the battery pack is good.

- Repeat Steps 6 and 7 using a new AC adapter. If the voltage is still not greater than that measured in Step 5, replace the voltage converter.

Testing the Backup Battery

1. Place the computer bottom-side up.
2. Remove the bottom cover.
3. Disconnect the battery connector from the voltage converter.
4. Measure the voltage of the backup battery.

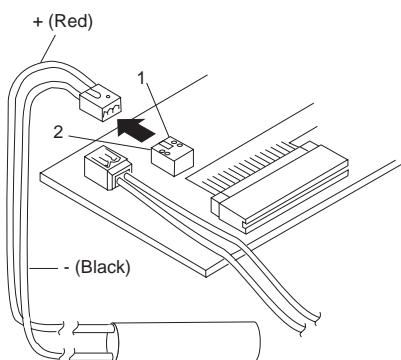


Wire	Voltage (V dc)
Red	+2.5 to +3.7
Black	Ground

If the voltage is correct, replace the system board. If it is not, the backup battery is discharged by a short circuit or is defective.

Testing the Standby Battery

1. Place the computer bottom-side up.
2. Remove the battery pack from the computer and remove the bottom cover.
3. Disconnect the battery connector from the voltage converter.
4. Plug the AC adapter into the computer and power-on the computer.
5. Measure the output voltage at the connector on the voltage converter.



Pin	Voltage (V dc)
1	+4
3	Ground

- If the voltage is less than +4 V dc, replace the voltage converter.
 - If the voltage is greater than +4 V dc, go to the next step.
6. Power-off the computer.
 7. Reconnect the standby battery to the voltage converter.
 8. Power-on the computer and leave it approximately 30 minutes to allow the standby battery to be charged.
 9. Power-off the computer again and disconnect the standby battery.
 10. Measure the voltage of the standby battery.
 - If the voltage is less than 3.5 V dc, replace the standby battery.
 - If the voltage is greater than 3.5 V dc, replace the voltage converter.

Testing the Quick Charger: If an unusual noise can be heard from the operating quick charger, replace it.

1. Perform steps 1 through 3 on page 82 of the "Testing the Battery Pack" to verify the battery pack is operating correctly.
2. Connect the power cord to the quick charger and the other end to the electrical outlet. Ensure that the power indicator turns on.

If the power indicator does not turn on, check the power cord of the quick charger for proper installation and continuity. If this does not correct the problem, replace the quick charger.

3. Install the battery pack.

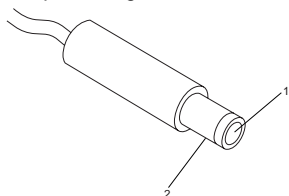
If the charging indicator does not start blinking, replace the quick charger.

Testing the Car Battery Adapter: If an output voltage from a cigarette lighter socket is less than 10.5 V dc, the power-on indicator on the car battery adapter blinks and a noise can be heard continuously. The battery of the car is defective.

1. Unplug the car battery adapter from the computer if connected.
2. Plug the car battery adapter into the cigarette lighter socket.

Note: If the adapter is already plugged in, be sure to unplug the adapter from the cigarette lighter socket, then plug it into the socket again.

3. Measure the output voltage of the car battery adapter.



Pin	Voltage (V dc)
1	+19.0 to +21.0
2	Ground

If the voltage is correct and the power-on indicator on the car battery adapter is on steady, the car battery adapter is working correctly.

If the voltage is out of range, do one of the following.

- Try the above test procedures in another car if available.
- Replace the car battery adapter if the computer works with the AC adapter and does not work with the car battery adapter.

Testing the Voltage Converter: Use the following procedure to isolate the voltage converter from the problem.

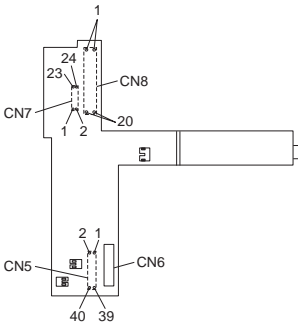
Note: If the problem occurs only when using the computer with a good battery pack, replace the voltage converter.

1. Power-off the computer.
2. Power-off all attached devices and disconnect them from the computer.
3. Unplug the AC adapter from the computer.
4. Remove the battery pack and the bottom cover.
5. Disconnect the standby-battery connector and the flexible cable from connector CN6 on the voltage converter.
6. Power-off the computer.
7. Plug the AC adapter into the computer.

Important

The computer goes into suspend mode in about 20 seconds after plugging in the AC adapter. The following procedure must be performed during this period. If the computer is already in suspend mode, unplug the AC adapter and plug it in again to reactivate it.

8. Check the voltages of the voltage converter using the following table.



Connector	Pin	Signal	V dc Min.	V dc Max.
CN5	1	VCCA	+4.9	+5.3
	3	VCCB	+4.7	+5.3
	7, 8	GND	—	—
	9, 10	GND	—	—
	13	+20 V dc	+19.0	+21.0
	21	POWER_GD	+4.0	+5.3
	32	POWER_ON#	0	+0.5
CN7	2	VCCG	+4.7	+5.3
	23, 24	GND	—	—

- If all the voltages are correct, the voltage converter is good.
- If +20 V dc is not correct, check the output voltage of the AC adapter (see “Testing the AC Adapter” on page 81). If the voltage is correct, replace the voltage converter.
- If any of the measured voltages except +20 V dc is not correct, replace the following FRUs one at a time to correct the problem.
 1. Voltage converter
 2. System board
 3. I/O panel assembly

Note: Reconnect the standby-battery connector and the flexible cable that were removed in Step 5 on page 85 before leaving this procedure.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with "General Checkout" on page 74. This index also can be used to help you decide which FRUs to have available when servicing a computer.

If you are unable to correct the problem using this index, go to "Undetermined Problem" on page 94.

IMPORTANT:

1. If you have both an error message and an incorrect audio response, diagnose the error message first.
2. If you cannot run the advanced diagnostics tests, but did receive a POST error message, diagnose the POST error message.
3. If you did not receive an error message, look for a description of your error symptoms in the first part of this index.
4. Check all power supply voltages before you replace the system board. (See "Power Systems Checkout" on page 78.)
5. If an error message is not listed, there is a device installed that requires an additional diskette or service manual. Refer to the diskette or service manual for that device.

How to Read POST Error Messages

POST error messages are displayed on the screen as 3, 4, 5, or 8 digits. The error messages that can be displayed as shorter POST messages are highlighted in this Symptom-to-FRU Index.

In the following index, an X in an error message can be any number.

Numeric Error Codes

Symptom/Error	FRU/Action
00010200, 00010300, 00010400, 00010700	1. System Board
00010800	1. System Board 2. Communications Cartridge
00011000 (See "Memory Checkout" on page 77 before replacing any FRUs.)	1. Memory Module Kit 2. System Board
000113XX	1. System Board 2. Communications Cartridge 3. Any Drive

Symptom/Error	FRU/Action
000114XX	1. Communications Cartridge
000118XX	1. Memory Module Kit
00016100	1. See “Testing the Battery Pack” on page 82. 2. System Board 3. Voltage Converter
00016300, 00016400, 00016500, 00016900 (If setting configuration does not solve the problem, see “Checking Installed Devices” on page 95.)	1. Set Configuration 2. System Board 3. Communications Cartridge 4. Hard Disk Drive 5. Memory Module Kit
000166XX	1. Communications Cartridge
000171XX, 000172XX	1. System Board
00017300	1. See “Testing the Battery Pack” on page 82. 2. System Board 3. Voltage Converter
00017400 (If Automatic Configuration does not solve the problem, run Advanced Diagnostics.)	1. Set Configuration
00019000, 000191XX	1. System Board
00019200	1. Lid Switch 2. Keyboard Control Card 3. System Board
00019300	1. System Board
000199XX	1. System Board
0001XXXX (not listed above)	1. System Board 2. Communications Cartridge 3. I/O Panel Assembly
0002XXXX (See “Memory Checkout” on page 77 before replacing any FRUs.)	1. Memory Module Kit 2. System Board
00030100, 00030500 (Always power-on the computer before external any external device.)	1. Keyboard Control Card 2. System Board 3. Keyboard 4. Numeric Keypad
00030200, 00030300, 00030400	1. System Board 2. Keyboard Control Card 3. Keyboard or Numeric Keypad

Symptom/Error	FRU/Action
00030600	<ol style="list-style-type: none"> 1. Keyboard or Numeric Keypad 2. Auxiliary Input Device 3. Keyboard Control Card 4. System Board 5. I/O Panel Assembly
0004XXXX	<ol style="list-style-type: none"> 1. System Board 2. Any Parallel Device 3. Communication Cable 4. I/O Panel Assembly
000601XX	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board 3. Diskette Drive Cable
000602XX	<ol style="list-style-type: none"> 1. Defective Diskette
000655XX, 000662XX 000670XX to 000675XX	<ol style="list-style-type: none"> 1. System Board 2. Diskette Drive 3. Diskette Drive Cable
0006XXXX (Unsupported drive or cable)	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board 3. Diskette Drive Cable
0011XX00	<ol style="list-style-type: none"> 1. System Board 2. Any Serial Device 3. Communication Cable 4. I/O Panel Assembly
0014XXXX (See "Printer Checkout" on page 468 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Printer 2. System Board
0024XX00	<ol style="list-style-type: none"> 1. System Board
005002XX, 005006XX, 005008XX, 005041XX	<ol style="list-style-type: none"> 1. System Board 2. External Display 3. I/O Panel Assembly
005004XX, 005010XX, 005030XX to 005032XX, 005051XX to 005062XX	<ol style="list-style-type: none"> 1. System Board 2. LCD Panel 3. LCD Inverter 4. LCD Cable
005009XX, 005040XX	<ol style="list-style-type: none"> 1. External Display 2. System Board 3. I/O Panel Assembly
00860100, 00860200	<ol style="list-style-type: none"> 1. Pointing Device (Mouse) 2. System Board 3. Numeric Keypad 4. I/O Panel Assembly
0086XX00	<ol style="list-style-type: none"> 1. System Board 2. Pointing Device (Mouse) 3. Numeric Keypad 4. I/O Panel Assembly
010103XX to 010110XX, 010116XX to 010153XX, 010171XX, 0101XXXX	<ol style="list-style-type: none"> 1. See "Fax/Modem Checkout" on page 466.

Symptom/Error	FRU/Action
010436XX	<ol style="list-style-type: none"> 1. System Board 2. Hard Disk Drive 3. Hard Disk Drive Cable
0104XXXX	<ol style="list-style-type: none"> 1. Hard Disk Drive 2. System Board 3. Hard Disk Drive Cable
0130XXXX	<ol style="list-style-type: none"> 1. I/O Panel Assembly 2. System Board 3. Keyboard Control Card
0137XXXX	<ol style="list-style-type: none"> 1. Any Serial Adapter 2. System Board 3. Voltage Converter 4. Any Serial Device 5. Communication Cable
0166XXXX, 0167XXXX	<ol style="list-style-type: none"> 1. Adapter in Communications Cartridge 2. Communications Cartridge
I9990301 (Startup drive not found.)	<ol style="list-style-type: none"> 1. Start the backup copy of the Reference Diskette and check if the startup sequence is correct. <ol style="list-style-type: none"> a. Select Set features from the Main Menu. b. Select Set startup sequence. c. Check the list of devices on the screen.
I9990302 (Operating system not found.)	<ol style="list-style-type: none"> 1. Make sure that an operating system is installed. 2. Hard Disk Drive 3. System Board 4. Hard Disk Drive Cable
I998XXXX, I9990303 (See "Hard Disk Partition" on page 96 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Restore the system programs onto the system partition. 2. Set configuration 3. Hard Disk Drive 4. System Board 5. Hard Disk Drive Cable

Beep Symptoms

Symptom/Error	FRU/Action
Continuous beep.	1. System Board
Repeating short beeps. (See "External Keyboard/Auxiliary Input Device Checkout" on page 465 before replacing any FRUs.)	1. Keyboard 2. Keyboard Control Card 3. System Board
One long and one short beep.	1. System Board
One long and two short beeps.	1. System Board
One short beep and a blank, unreadable, or flashing display with no external display attached.	1. LCD Panel 2. LCD Inverter 3. System Board 4. LCD Cable
One short beep and Diskette Prompt or a program load from the hard disk or unable to read diskette.	1. Diskette Drive 2. System Board 3. Diskette Drive Cable
Two short beeps and a blank display.	1. System Board

Miscellaneous Symptoms

Symptom/Error	FRU/Action
No beep and a blank or unreadable display during POST. (See "Power Systems Checkout" on page 78 before replacing any FRUs.)	1. System Board 2. Any option or device 3. Power source when failing 4. Voltage Converter 5. Speaker
No beep with a blinking cursor.	1. System Board 2. Communications Cartridge
No beep with a normal display during POST.	1. Speaker 2. I/O Panel Assembly 3. System Board 4. Keyboard Control Card
No beep and the computer hangs after displaying memory count.	1. System Board 2. Communications Cartridge 3. Hard Disk Drive
LCD too dark, unable to adjust contrast or brightness.	1. LCD Inverter 2. LCD Panel 3. System Board
LCD unreadable or distorted. (If an external display is OK, replace system board last.)	1. LCD Panel 2. System board 3. LCD Inverter 4. LCD Cable

Symptom/Error	FRU/Action
LCD cannot be turned on or off.	<ol style="list-style-type: none"> 1. LCD Inverter 2. System Board 3. LCD Cable
Blank screen, or extra horizontal or vertical line(s) displayed on upper or lower half of the LCD.	<ol style="list-style-type: none"> 1. LCD Panel 2. System Board 3. LCD Cable
Computer status indicator is incorrectly blinking or stays on.	<ol style="list-style-type: none"> 1. System Board 2. Related Device
Computer status indicator stays off, but the POST ends without an error.	<ol style="list-style-type: none"> 1. I/O Panel Assembly 2. System Board 3. Related Device
Suspend light comes on after POST. an error.	<ol style="list-style-type: none"> 1. Reseat voltage regulator cables 2. Voltage Regulator
Reference Diskette does not work. (Try another Reference Diskette or any bootable diskette before replacing FRUs. Ensure all correct level drivers are loaded.)	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board 3. Diskette Drive Cable 4. Reference Diskette
Keyboard does not work.	<ol style="list-style-type: none"> 1. Keyboard Control Card 2. Numeric Keypad 3. System Board
One or more keys do not work. (See "External Keyboard/Auxiliary Input Device Checkout" on page 465 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Keyboard 2. Numeric Keypad if installed 3. Keyboard Control Card
External display problems. (See "External Display Self-Test" on page 464 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. System Board 3. I/O Panel Assembly
Incorrect memory size during POST. (See "Memory Checkout" on page 77 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Memory Module Kit
Computer hang or Intermittent hang. (See "Undetermined Problem" on page 94 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Hard Disk Drive Cable 3. Hard Disk Drive 4. Replace the last device being tested 5. Voltage Converter
The computer goes into suspend mode after the POST.	<ol style="list-style-type: none"> 1. System Board 2. Voltage Converter 3. Lid Switch 4. Keyboard Control Card

Symptom/Error	FRU/Action
The computer does not suspend or resume.	<ol style="list-style-type: none"> 1. System Board 2. Voltage Converter 3. Lid Switch 4. Keyboard Control Card
The computer does not power off.	<ol style="list-style-type: none"> 1. Voltage Converter 2. System Board 3. I/O Panel Assembly
Real-time clock inaccurate. (See "Testing the Battery Pack" on page 82 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Backup Battery 2. System Board
Printer problems.	<ol style="list-style-type: none"> 1. See "Printer Checkout" on page 468.
Serial or parallel port device problems.	<ol style="list-style-type: none"> 1. Device 2. Cable 3. System Board 4. Serial Adapter 5. I/O Panel Assembly
Internal Data/Fax modem does not communicate with a remote modem or a fax.	<ol style="list-style-type: none"> 1. See "Fax/Modem Checkout" on page 466.

Undetermined Problem

You are here because the diagnostics tests did not identify the failing FRU.

Check the power supply in use (see "Power Systems Checkout" on page 78). If the power supply is operating correctly, return here and continue with the following procedure.

1. Power-off the computer.
2. Remove or disconnect one of the following devices or adapter: (Do not isolate FRUs that are known to be good.)
 - a. Non-IBM devices
 - b. Modem, printer, mouse, or other external device
 - c. Memory module kit
 - d. Hard disk drive (fixed disk drive)
 - e. Communications cartridge
 - f. Any adapter and device
3. Power-on the computer and start the system program.
4. Press **Ctrl+A** to run the system checkout. Do not configure the computer. If diagnostics cannot be loaded from the hard disk, try and load them from the Reference Diskette. Test only those adapters and devices still attached to the computer.
5. If the symptom remains, repeat steps 1 through 3 until you find the failing FRU or until all FRUs have been removed.
6. If all of the FRUs listed have been removed and the problem remains, replace the system board.

Related Service Procedures

This section provides related service information on the following:

"Checking Installed Devices"
"Power-on Password" on page 96
"How to Run the Advanced Diagnostics" on page 96
"Hard Disk Partition" on page 96
"Restoring the Partition" on page 97
"Setting System Configuration" on page 97

Checking Installed Devices

The Installed Devices List shows the presence of devices in the computer. If an adapter or device is missing from the list, you might have one of the following conditions.

Warning: A customized setup configuration (other than default settings) might exist on the computer you are servicing. Running Automatic Configuration can alter those settings. Note the current configuration settings (using the **1. View configuration**) and verify that the same settings are in place when service is completed.

- The protected partition on the hard disk or the Reference Diskette you are using does not contain the code required to support that device.
- An adapter or device is defective.
- The device missing from the list is an unrecognizable drive or adapter.
- The device missing from the list requires an additional diskette.
- A power supply voltage is incorrect (see "Power Systems Checkout" on page 78).

If the adapter is on the list, run the adapter diagnostics tests. If the list contains an adapter or device that is not installed, go to "Undetermined Problem" on page 94.

Power-on Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

To reactivate the password, start the system programs, select **Set features** from the Main Menu, then select **Set password and unattended start mode**, and follow the instructions on the screen.

How to Run the Advanced Diagnostics

1. Power-on the computer.
2. When the cursor moves to the upper right, press **Ctrl+Alt+Ins** to start the system program. If the IBM logo does not appear, insert the backup copy of the Reference Diskette into the diskette drive, press **Ctrl+Alt+Del**, then repeat this step.
3. Advance to the Main Menu.
4. Press **Ctrl+A** to run the system checkout.

Hard Disk Partition

A protected partition on the hard disk contains the system configuration data set, system setup programs, and customer and advanced diagnostics. To load system setup and diagnostic programs from this partition, press and hold **Ctrl+Alt+Del**. Release the keys. When the cursor moves to the upper right corner of the display, press and hold **Ctrl+Alt+Ins**. Release the keys.

Restoring the Partition

If a computer or hard disk problem prevents system setup or diagnostic programs from being loaded from the protected partition, load and run the programs from the Reference Diskette. If no errors are found, restore the programs to the protected partition on the hard disk using the following procedure.

1. Start the computer with the customer's backup copy of the Reference Diskette installed.

Note: The languages of the Reference Diskette and the computer must match.

2. Select **2. Backup/Restore system programs** from the Main Menu.
3. Select **3. Restore the system partition** to load the system setup and utility programs, and the customer and advanced diagnostic programs onto the system partition of the hard disk.

If this does not correct the problem, use the backup copy of the Reference Diskette to format the hard disk and then restore the programs to the protected partition. If the problem remains, return to the **I998XXXX, I9990303** error code (on page 90 in the Symptom-to-FRU index).

Note: After the programs have been restored, the Insert-Diskette icon appears, unless an operating system is present.

Setting System Configuration

If you configure the computer using **4. Set configuration** from the Reference Diskette, make sure the languages of the Reference Diskette and the computer match.

Product Overview (N51 SX)

The following table provides a brief overview of the computer features.

Feature	Description
Processor (MHz)	386SX 16-Mhz
Bus Architecture	Micro Channel
Memory (Standard)	2MB
Memory (Maximum)	10MB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	40MB, 2.5-inch

Product Overview (N51 SLC)

The following table provides a brief overview of the computer features.

Feature	Description
Processor (MHz)	386SLC 16-Mhz
Bus Architecture	Micro Channel
Memory (Standard)	2MB
Memory (Maximum)	10MB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	80MB, 2.5-inch

FRU Removals and Replacements

Follow the numerical sequence in the FRU removal sequence list and the exploded view to remove or disconnect parts in the correct order. The letters in parentheses in the list indicate screw types. See the “Screw Size Chart” on page 19 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

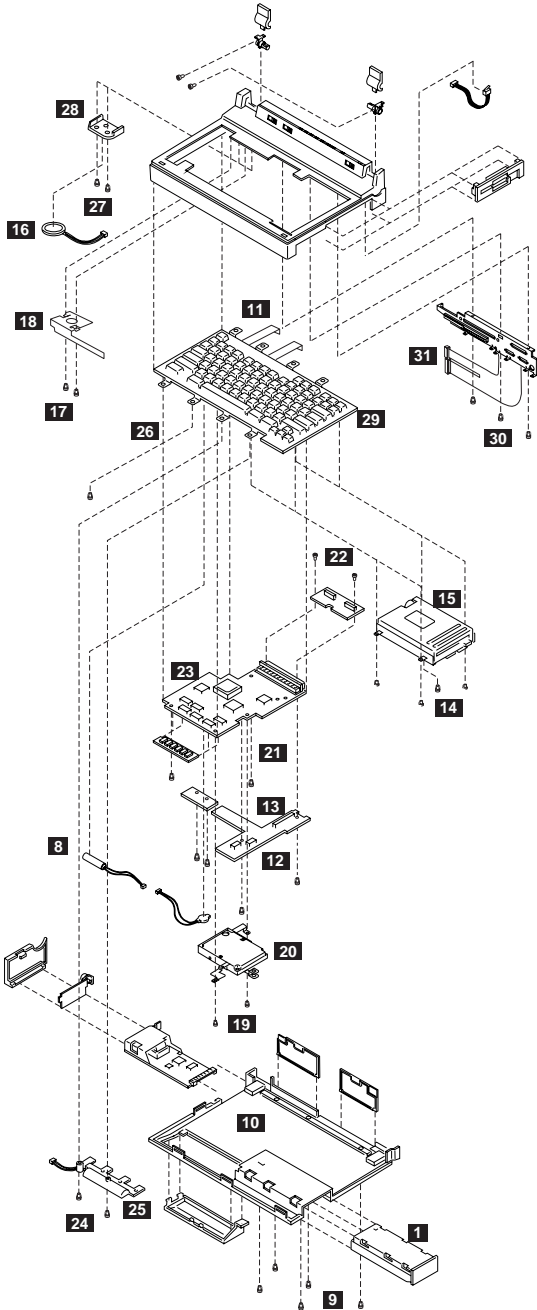
Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

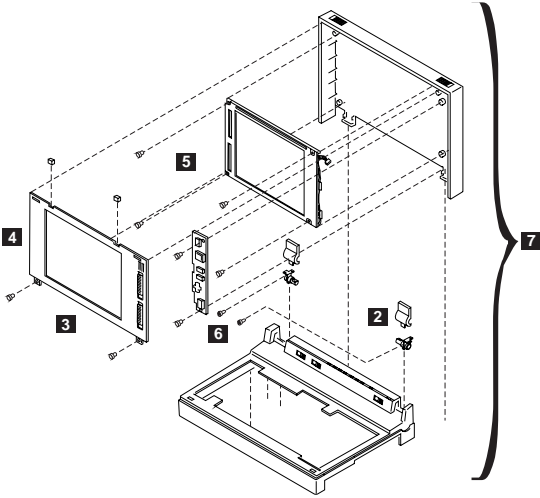
- 1 Battery Pack**
- 2 LCD Hinge Covers**
(Press down on the hinge cover and slide it forward until the tabs clear the bezel.)
- 3 Two Screws (T) with Flat Washers**
(At bottom of bezel plate)
- 4 Screen Bezel Plate**
- 5 Four Screws (2-T, 2-H)**
(At display corners)
Upper Right Screen Cable
Left Center Screen Cable
Lower Right Screen Cable
- 6 Two Hinge Screws (V) with Flat Washers**
(One on each hinge)
- 7 Screen Sub-Assembly**
- 8 Backup and Standby Batteries**
(When installing backup battery, align wires with edge of voltage converter. Ensure wires do not extend beyond edge of voltage converter or they might be damaged when you replace bottom cover.)
- 9 Five Screws (4-E, 1-V)**
(On bottom cover)
- 10 Bottom Cover**
Ribbon Cable from Diskette Drive
Battery Cable
Voltage Converter Cable
- 11 Keyboard Cables**

- 12** **Three Voltage Converter Screws (2-H, 1-T)**
- 13** **Voltage Converter**
(Voltage converter consists of three boards. Gently lift voltage converter up to unplug two connectors from system board.)
- 14** **Four Diskette Drive Cables**
(These cables are very fragile. Be very careful when disconnecting them.)
- Four Diskette Drive Screws (H)**
- 15** **Diskette Drive**
- 16** **Speaker**
- 17** **Two Battery Bracket Screws (B)**
- 18** **Battery Bracket**
- 19** **Two Hard Disk Drive Cables**
(These cables are very fragile. Be very careful when disconnecting them.)
- Two Hard Disk Drive Screws (H)**
- 20** **Hard Disk Drive**
(Have customer backup all information on hard disk drive before removal. When replacing hard disk drive, use customer's backup Reference Diskette to restore system partition.)
- 21** **Upper Left System Board Cable**
Six System Board Screws (2-L, 4-H)
Lower Left System Board Cable
Upper Left System Board Cable
Upper Right System Board Cable
Two Cables, System Board Top Edge
- 22** **Two Screws (T) and Keyboard Control Card**
(When replacing keyboard control card, make sure that switch setting on card is correct for type of keyboard used.)
- 23** **System Board**
(Run Automatic Configuration and set time and date.)
- 24** **Two Battery Connector Card Screws (H)**
- 25** **Battery Connector Card**
- 26** **Six Keyboard Screws (H)**
(Four front and two rear keyboard assembly screws. Two rear screws are located in line with two battery connector card screws.)
- 27** **Two Speaker Bracket Screws (B)**
- 28** **Speaker Bracket**
- 29** **Keyboard Assembly**
- 30** **Three PC Board Screws (H)**
- 31** **Rear Panel PC Board**

Model N51 Exploded View



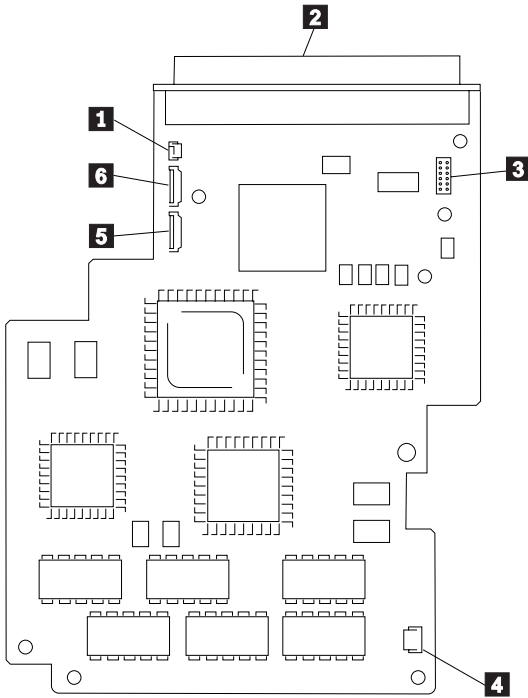
Model N51 Exploded View (continued)



Locations

System Board (Top View)

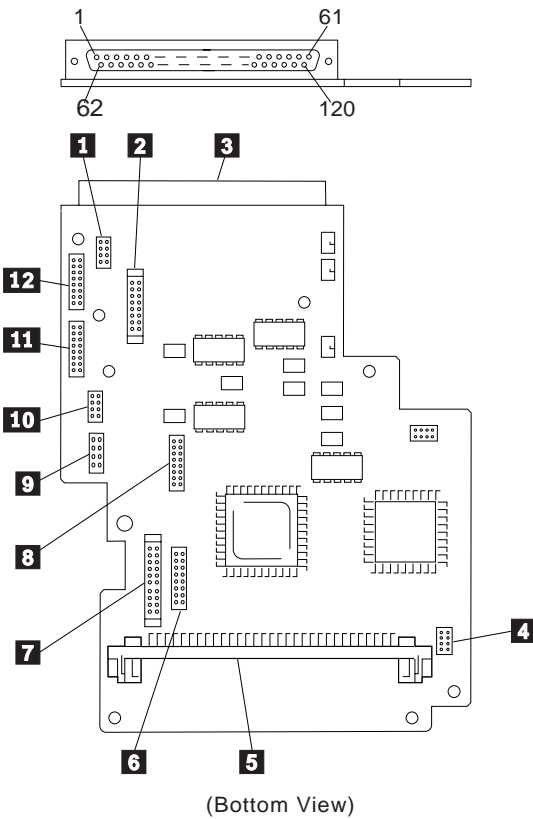
- 1** LCD Interface Connector
- 2** System-Expansion Port (120-pin)
- 3** Keyboard-Control Card Connector
- 4** Battery Presence Switch
- 5** LCD Interface Connector
- 6** LCD Interface Connector



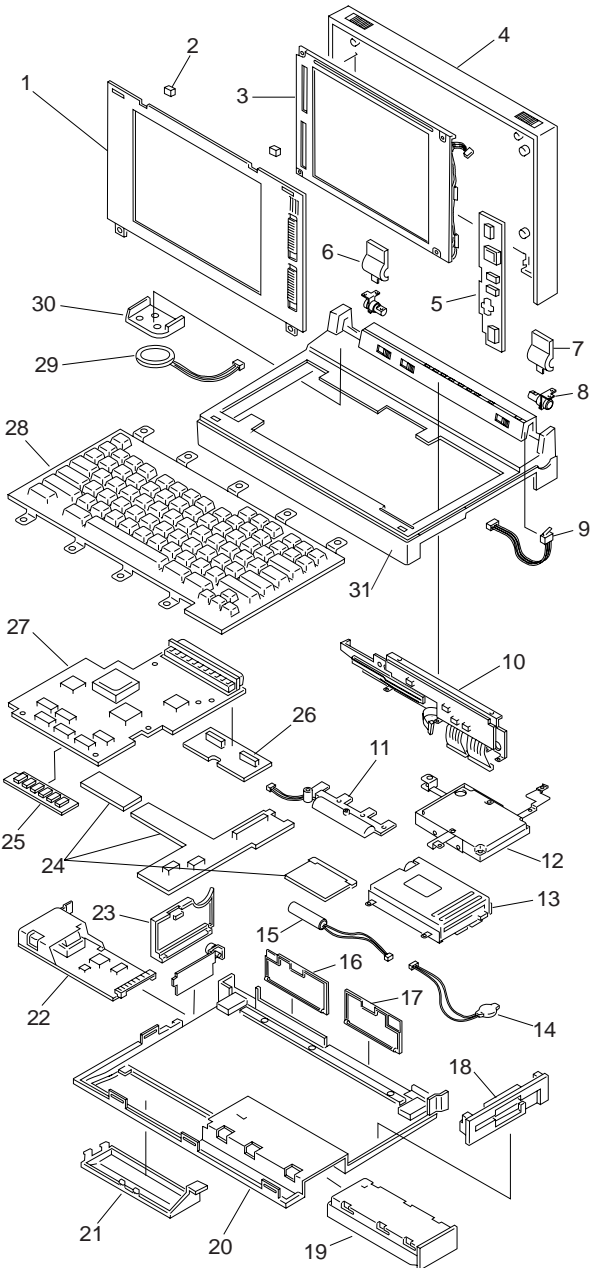
(Top View)

System Board (Bottom View)

- 1** I/O Panel Connector
- 2** Voltage Converter Connector
- 3** System Expansion Port (120-pin)
- 4** Password-Override Connector
- 5** Memory-Module Kit Connector
- 6** Hard-Disk Drive Connector
- 7** Voltage Converter Connector
- 8** Hard-Disk Drive Connector
- 9** Diskette-Drive Connector
- 10** Diskette-Drive Connector
- 11** I/O Panel Connector
- 12** I/O Panel Connector



Parts Listing



System Unit

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1	LCD Bezel, N51 SX (Includes contrast and brightness slides)	07G1741
	LCD Bezel, N51 SX (Japan only)	07G1842
1	LCD Bezel, N51 SLC	35G3229
	LCD Bezel, N51 SLC (Japan only)	35G3230
2	Bumper, Rubber	07G1742
3	LCD Panel	07G1737
	Cable, LCD	07G1739
4	LCD Rear Cover, N51 SX	07G1740
	LCD Rear Cover, N51 SX (Japan only)	07G1841
4	LCD Rear Cover, N51 SLC	35G3231
	LCD Rear Cover, N51 SLC (Japan only)	35G3232
5	Inverter, LCD	07G1738
6	LCD Hinge Cover, Left	07G1745
7	LCD Hinge Cover, Right	07G1744
8	LCD Hinge, Right/Left	07G1210
	LCD Cover Kit	35G3335
	Left/right latch cover release, 2 latchsprings	
9	Lid Switch with Holder	07G1211
10	I/O Panel Assembly	07G1216
11	Terminal Assembly, Battery	07G1223
14	Backup Battery, Lithium	07G1225
	Holder, Backup Battery	07G1736
15	Standby Battery	07G1240
	Standby Battery, Benelux	07G1503
	Standby Battery, Switzerland	07G1241
16	Door, Bus Connector	07G1212
	Door, Bus Connector	07G1954
17	Door, I/O Connector	07G1213
18	Bezel, Diskette Drive	07G1227
19	Battery Pack, Nickel-Cadmium	07G1242
	Sweden	07G1194
	Benelux	07G1497
	Switzerland	07G1243
19	Battery Pack, Nickel-Hydride	07G1244
	Sweden	07G1195
	Benelux	07G1500
	Switzerland	07G1245
20	Bottom Cover	07G1209
21	Cover, Memory-Module Kit	07G1222
22	Communication Adapters:	
	Serial Adapter	79F6840
	Data/Fax Modem Adapter	53G7772
	U.S., Canada only	
	Data/Fax Modem Adapter	94X2506
	Japan only	
	High-Speed Data/Fax Modem	42G2592
	U.S., Canada only	
	Telephone Cable	94X1540
23	Door, Option Slot	07G1214
24	Voltage Converter	07G1219
	Holder, Voltage Converter	07G1221
25	2MB Memory Module Kit	07G1879
	4MB Memory Module Kit	07G1880
	8MB Memory Module Kit	07G1881
26	Card, Keyboard Control, N51 SX	07G1218
26	Card, Keyboard Control, N51 SLC	35G3239
	Supporter, Keyboard Control Card	07G1220

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27	System Board, N51 SX	07G1876
	System Board, N51 SX (Japan only)	07G1877
27	System Board, N51 SLC	06G9902
	System Board, N51 SLC (Japan only)	06G9903
28	Keyboard (see Keyboards)	
29	Speaker	07G1229
30	Holder, Speaker	07G1734
	Holder, Cable Assembly	07G1761
	Bracket and Guide, Option Slot	07G1215
31	Cover, Keyboard	07G1208
	Miscellaneous Kit	07G1743
	Leg Kit	07G1209
	2 Legs (one left, one right)	
	2 Springs (one left, one right)	
	Screw Kit (230 screws)	07G1835
	10-1.6mm x 4; 10-2mm x 5;	
	10-2.5mm x 3 black; 10-2.5mm x 4 black;	
	10-2.5mm x 8 black; 100-2.5mm x 5;	
	10-2.5mm x 4&washer; 10-2.5mm x 6&washer;	
	10-2.5mm x 12&washer; 10-3mm x 4;	
	10-2mm x 4; 10-4-40 x 5 stud;	
	10-4-40 x 4.8 stud	

DASD

Index

12	40MB Hard Disk Drive	95F4707
12	80MB Hard Disk Drive	95F4708
	Cable, Hard Disk Drive	07G1226
13	Diskette Drive Assembly	06G9865
	Cable, Diskette Drive	07G1228

Options and Adapters

5.25-inch Drive Adapter/A (360KB/1.2MB)	15F7996
80386 Memory Expansion Adapter	72X6671
AC Adapter	07G1851
AC Adapter (U.S., Canada, and Latin America)	07G1246
AC Adapter (Japan, 2-pin)	07G1248
AC Adapter (Japan, 3-pin)	07G1771
Car Battery Adapter	07G1190
Car Battery Adapter for European countries	06G9878
Cartridge, External Power Pack	07G1541
Communications Cartridge	07G2581
Communications Cartridge	07G3999
Data/Fax Modem Adapter (U.S./Canada only)	53G7772
Diskette Drive Bus Adapter	72X8524
External Diskette Drive Adapter	72X6757
External Power Pack	07G1540
for Sweden	07G1544
for Benelux	07G1546
for Switzerland	07G1542
External Storage Device Cable	23F3230
FaxConcentrator Adapter/A	94X2540
FaxConcentrator Adapter/A Cable	94X2527
Game Control Adapter	8529151
Memory Expansion Kit (for 72X6671)	72X6672
Miniature Mouse	95F5723
Quick Charger	07G1854
Quick Charger (U.S., Canada, Latin America)	07G1247
Quick Charger (Japan, 2-pin)	07G1249
Quick Charger (Japan, 3-pin)	07G1774
SCSI Fast Adapter (16 Bit AT)	92F0330
SCSI External Cable (for 92F0330)	32G4089
SCSI Internal Cable (for 92F0330)	37G0084
SCSI Adapter/A (with Cache)	85F0063
SCSI Adapter/A (without Cache)	85F0002
SCSI Cable (internal)	64F4127
Serial Adapter	79F6840
Strap	07G1449
Terminator, Inline (space permitting)	92F0142

Keyboards

Arabic	07G2954
Belgian	07G1482
Canadian French	07G1490
Danish	07G1483
Dutch	07G1484
French	07G1167
German	07G1168
Greek	07G2957
Hebrew	07G2956
Icelandic	07G2955
Italian	07G1169
Japan	07G1481
Norwegian	07G1485
Portuguese	07G1489
Spanish	07G1480
Spanish Speaking	07G1491
Swedish/Finnish	07G1486
Swiss/French	07G1487
Swiss/German	07G1488
Turkish	07G2953
U.K. English	07G1166
U.S. English	07G1735

Numeric Keypad (N51 SX)

Arabic	95F6877
Belgian	95F5741
Canadian French	95F5466
Danish	95F5467
Dutch	95F5467
French	95F6313
German	95F6314
Greek	95F5467
Hebrew	95F5741
Icelandic	95F5467
Italian	95F6316
Japan	79F6401
Norwegian	95F5467
Portuguese	95F5741
Spanish	95F6315
Spanish Speaking	95F6315
Swedish/Finnish	95F5468
Swiss/French	95F5711
Swiss/German	95F5715
Turkish	95F5467
U.K. English	95F5741
U.S. English	95F5741

Model CL57 (8554)

General Checkout	112
Memory Checkout	115
Power Systems Checkout	117
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General Checkout

001

DOES THE PROBLEM APPEAR TO BE A POWER SUPPLY FAILURE?

Yes No

002

Go to Step 006.

003

DO ALL SYSTEM-STATUS INDICATORS REMAIN OFF?

Yes No

004

Go to Step 006.

005

- Make sure the power control switch at the rear of the computer is set to ON.
 - Go to “Power Systems Checkout” on page 117.
-

006

- Power-off the computer and all external devices.
- Check all cables and power cords.
- Make sure no diskette is in the drive.
- Power-on all external devices.
- Power-on the computer and check for the following responses:
 1. All system-status indicators appear once for about 1 second.

Note: Some indicators remain on and others go off after 1 second.
 2. Memory test (the number increases.)
 3. Audible responses:
One short beep
- or -
Two short beeps.

DID YOU RECEIVE THE RESPONSES LISTED ABOVE?

Yes No

007

Go to Step 013 on page 114.

008

- Press **Ctrl+Alt+Del**. When the cursor moves to the upper right, press **Ctrl+Alt+Ins** to start the system program.

If the IBM logo screen does not appear, insert the backup Reference Diskette into the diskette drive and repeat this step.

1. If you are not at the Main Menu, follow the instructions on the screen to advance to the Main Menu.

If you cannot advance to the Main Menu, go to "Symptom-to-FRU Index" on page 122.

- or -

If that does not correct the problem, go to "Undetermined Problem" on page 130.

Notes:

- a. If the computer has an incorrect keyboard or numeric keypad response, go to "External Keyboard/Auxiliary Input Device Checkout" on page 465.
 - b. If the printer has incorrect responses, go to "Printer Checkout" on page 468.
 - c. If the external CRT display has problems such as jittering, rolling, shifting, or being out-of-focus, go to "External Display Self-Test" on page 464.
2. Press **Ctrl+A** and run the system checkout.

IS THE LIST OF INSTALLED DEVICES CORRECT?

Yes No

009

Go to "Checking Installed Devices" on page 131.

010

– Run the diagnostic tests.

DID THE TEST IDENTIFY A FAILURE?

Note: If the test stops and you cannot continue, replace the last device tested.

- or -

If any POST error code appears, go to "Symptom-to-FRU Index" on page 122.

Yes No

011

You might have an intermittent problem:

- Check for damaged cables and connectors.
- Reseat all adapters, drives, and modules.
- Start an error log and run the tests multiple times.

(Step 011 continues)

(CONTINUED)

011 (continued)

- Check the power supply in use when the error is reported (see “Power Systems Checkout” on page 117).
- Check “Symptom-to-FRU Index” on page 122. If this did not fix the problem, go to “Undetermined Problem” on page 130.

012

Go to “Symptom-to-FRU Index” on page 122.

013

DID NOTHING APPEAR ON THE SCREEN?

Yes No

014

- If all system-status indicators do not appear for about 1 second, go to Step 016 under “Power Systems Checkout” on page 117.
- If the memory count is incorrect, go to “Memory Checkout” on page 115.
- Go to “Symptom-to-FRU Index” on page 122. If that does not correct the problem, go to “Undetermined Problem” on page 130.

015

Go to “Symptom-to-FRU Index” on page 122.

- or -

If that does not correct the problem, go to “Undetermined Problem” on page 130.

Memory Checkout

Customer diagnostics can eliminate defective memory so no memory error code appears at power-on reset. After you replace a defective memory module on the system board or IC DRAM card, run **Automatic Configuration**. Otherwise, the new memory will not be recognized. (If you have to run configuration with your own diskette, be sure the customer has all the correct option diskettes available.) Power-off the computer before removing or replacing parts.

001

- Remove all IC DRAM cards from the slots if installed.
- Run the memory tests.
Use the RUN TESTS ONE TIME option.

DID THE MEMORY TESTS END WITHOUT AN ERROR?

Yes No

002

Replace the memory module on the system board.

003

DID YOU REMOVE THE IC DRAM CARD FROM SLOT 1?

Yes No

004

Go to Step 007.

005

- Reinstall the IC DRAM card into slot 1 and run **Automatic Configuration**.
- Run the memory test.
Use the RUN TESTS ONE TIME option.

DID THE MEMORY TESTS END WITHOUT AN ERROR?

Yes No

006

Replace the IC DRAM card in slot 1.
If that does not correct the problem, replace the system board.

007

DID YOU REMOVE THE IC DRAM CARD FROM SLOT 1?

Yes No

008

(Step **008** continues)

(CONTINUED)

008 (continued)
Go to Step 011.

009

- Reinstall the IC DRAM card into slot 2 and run **Automatic Configuration**.
- Run the memory test.
Use the RUN TESTS ONE TIME option.

DID THE MEMORY TESTS END WITHOUT AN ERROR?

Yes No

010

Replace the IC DRAM card in slot 2.
If that does not correct the problem, replace the system board.

011

If the problem occurs intermittently, run the memory tests multiple times to have an error log.

Power Systems Checkout

Note

One or all of the batteries can discharge if there is a short circuit in the computer.

1. Replace the failing FRU if the power supply problem is caused by a short circuit.
2. Determine if one (or all) of the batteries have become discharged. Replace a discharged battery with a known-good spare.
3. Observe the Battery ID indicators or swap the two battery packs to determine which one has become discharged.

The test procedures for each power supply are found on the following pages.

“Testing the AC Adapter” on page 120.

“Testing the Battery Pack” on page 121.

“Testing the Backup Battery” on page 121.

None of the above? Follow the steps below.

001

DID THE PROBLEM OCCUR ONLY WHEN USING THE AC ADAPTER?

Yes No

002

Go to Step 004.

003

Go to “Testing the AC Adapter” on page 120. If that does not correct the problem, replace the voltage converter.

004

DID THE PROBLEM OCCUR ONLY ON BATTERY POWERED OPERATION?

Yes No

005

Go to Step 007 on page 118.

006

- Make sure the battery packs are fully charged.
 - Go to “Testing the Battery Pack” on page 121 and check the battery packs. If that does not correct the problem, replace the voltage converter.
-

007

(Step **007** continues)

(CONTINUED)

007 (continued)

DO ALL SYSTEM STATUS INDICATORS REMAIN OFF AFTER POWER ON?

Yes No

008

Go to Step 016 on page 119.

009

– Remove the following if installed:

- Battery packs
- Backup battery
- IC DRAM card
- Internal Data/Fax modem
- Serial adapter
- Numeric keypad
- Math coprocessor
- Mouse
- External display

– Go to Step 010.

010

– Plug in the AC adapter and power-on the computer.

DOES ANY INDICATOR REMAIN ON?

Yes No

011

– Power-off the computer and remove the following.

- Hard disk drive
- Diskette drive
- LCD cables
- Keyboard flexible cables

– Power-on the computer again.

– Go to Step 013.

012

Suspect one of the options or devices.

- Reinstall each of the options or devices to the computer one at a time, and power-on the computer to see if the original problem occurs.
 - Replace the last installed option or device when the problem occurs.
-

013

(Step **013** continues)

013 (continued)

DOES ANY INDICATOR REMAIN ON?

Yes No

014

- Replace the following FRUs one at a time until the problem is corrected.
 - Indicator card
 - System board
 - Voltage converter

015

Suspect one of the devices.

- Reinstall each of the devices to the computer one at a time, and power-on the computer to see if the original problem occurs.
- Replace the last installed device when the problem occurs.

016

- Observe the system-status indicators for about 1 second after power on.

System-Status Indicator	Condition A	Condition B
Power-On	Off	On
Suspend Mode	Off	On
Scroll Lock	On	Off
Caps Lock	On	Off
Numeric Lock	On	Off
Diskette Drive	On	Off
Hard Disk Drive	On	Off
Battery ID 2	Off	On
Battery Status 2	Off	On
Battery ID 1	Off	On
Battery Status 1	Off	On
Carrier Detect	–	–

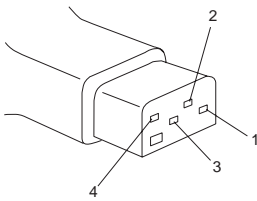
If the status lights match either condition A or B, replace the voltage converter. If the status lights are different from condition A or B, or replacing the voltage converter does not correct the problem, go to “Undetermined Problem” on page 130.

Testing the AC Adapter: If the Power-On indicator is not on, check the power cord of the AC adapter for proper installation and continuity.

1. If any noise can be heard from the AC adapter when it is plugged into line voltage, replace the AC adapter with a new one.

If no noise can be heard from the adapter, go to Step 3.

2. If the noise still comes from the new AC adapter, suspect the computer. Replace the AC adapter with the original one, then go to the next step. If no noise comes from the new adapter, the original adapter has the problem.
3. Unplug the AC adapter cable from the computer and measure the output voltages at the plug of the AC adapter cable. Connect the minus lead of the volt-ohm meter to pin 3 during the measurement.



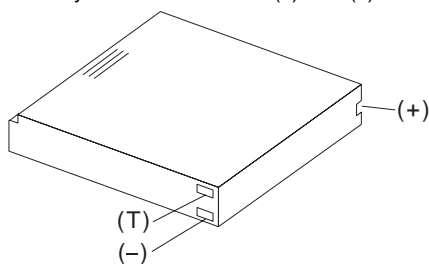
Pin	Voltage (V dc)
1	+18 to +22
2	+17 to +21
3	GND
4	Communication GND

- If the voltages are not correct:
 1. Unplug the AC adapter from the ac power outlet and leave it for a few minutes.
 2. Plug the AC adapter into the ac outlet.
 3. Measure the output voltages of the AC adapter.
 4. If the voltages are still not correct, replace the AC adapter.
- If the voltages are OK, plug the cable into the computer and try the failing operation again.

If the problem still remains, replace the voltage converter. If the problem disappeared, suspect the installation and continuity of the AC adapter cable.

Testing the Battery Pack

1. Remove each battery pack and measure the voltage at the battery terminals between (+) and (-).



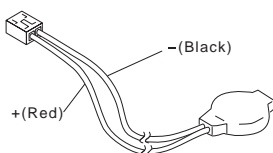
Terminal	Voltage (V dc)
(+)	+12 to +18
(T)	Thermal Detection
(-)	Ground

- If the voltage is less than +12 V dc, the battery pack is discharged or defective.
 - If the voltage is more than +12 V dc, go to the next step.
2. Using a low-power ohm meter, measure the resistance at the battery terminals between (T) and (-). The resistance must be 500 ohms to 20 kilohms.

If the resistance is out of range, replace the battery pack.

Testing the Backup Battery

1. Remove the keyboard and the top cover.
2. Disconnect the battery connector from the system board.
3. Measure the voltage of the backup battery.



Wire	Voltage (V dc)
Red	+2.5 to +3.7
Black	Ground

If the voltage is correct, replace the system board. If it is not, the backup battery is discharged by a short circuit or is defective.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with "General Checkout" on page 112. This index also can be used to help you decide which FRUs to have available when servicing a computer.

If you are unable to correct the problem using this index, go to "Undetermined Problem" on page 130.

IMPORTANT:

1. If you have both an error message and an incorrect audio response, diagnose the error message first.
2. If you cannot run the advanced diagnostics tests, but did receive a POST error message, diagnose the POST error message.
3. If you did not receive an error message, look for a description of your error symptoms in the first part of this index.
4. Check all power supply voltages before you replace the system board. (See "Power Systems Checkout" on page 117.)
5. If an error message is not listed, there is a device installed that requires an additional diskette or service manual. Refer to the diskette or service manual for that device.

How to Read POST Error Messages

POST error messages are displayed on the screen as 3, 4, 5, or 8 digits. The error messages that can be displayed as shorter POST messages are highlighted in this Symptom-to-FRU Index.

In the following index, an X in an error message can be any number.

Numeric Error Codes

Symptom/Error	FRU/Action
00010200, 00010300, 00010400, 00010700	1. System Board
00010800	1. System Board 2. Communications Cartridge
00011000 (See "Memory Checkout" on page 115 before replacing any FRUs.)	1. IC DRAM Card or Memory Module 2. System Board
000110XX	1. IC DRAM Card or Memory Module 2. System Board
000113XX	1. System Board 2. Communications Cartridge 3. Any Drive
000114XX	1. Communications Cartridge
000118XX	1. IC DRAM Card or Memory Module 2. System Board
00016100	1. See "Testing the Backup Battery" on page 121. 2. System Board 3. Voltage Converter
00016300, 00016400, 00016500, 00016900 (If setting configuration does not solve the problem, see "Checking Installed Devices" on page 131.)	1. Set Configuration 2. System Board 3. Communications Cartridge 4. Hard Disk Drive 5. IC DRAM Card 6. Memory Module
000166XX	1. Communications Cartridge
000171XX	1. See "Testing the Backup Battery" on page 121. 2. System Board
000172XX	1. System Board
00017300	1. See "Testing the Backup Battery" on page 121. 2. System Board 3. Voltage Converter

Symptom/Error	FRU/Action
00017400 (If Automatic Configuration does not solve the problem, run Advanced Diagnostics.)	<ol style="list-style-type: none"> 1. Set Configuration 2. System Board 3. Math Coprocessor
00019000, 000191XX	<ol style="list-style-type: none"> 1. System Board
00019200	<ol style="list-style-type: none"> 1. Lid Switch 2. Keyboard Control Card 3. System Board
00019300	<ol style="list-style-type: none"> 1. System Board
000199XX	<ol style="list-style-type: none"> 1. System Board
0001XXXX (not listed above)	<ol style="list-style-type: none"> 1. System Board 2. Communications Cartridge 3. Indicator Card
0002XXXX (See "Memory Checkout" on page 115 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. IC DRAM Card or Memory Module 2. System Board
00030100, 00030500	<ol style="list-style-type: none"> 1. Keyboard Control Card 2. System Board 3. Keyboard or Numeric Keypad
00030200, 00030300, 00030400	<ol style="list-style-type: none"> 1. System Board 2. Keyboard Control Card 3. Keyboard or Numeric Keypad
00030600	<ol style="list-style-type: none"> 1. Keyboard or Numeric Keypad 2. Auxiliary Input Device 3. Keyboard Control Card 4. System Board 5. I/O Panel Assembly
0004XXXX	<ol style="list-style-type: none"> 1. System Board 2. Any Parallel Device 3. Communication Cable 4. I/O Panel Assembly
000601XX	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board 3. Diskette Drive Cable
000602XX	<ol style="list-style-type: none"> 1. Defective Diskette
000655XX, 000662XX 000670XX to 000675XX	<ol style="list-style-type: none"> 1. System Board 2. Diskette Drive 3. Diskette Drive Cable
0006XXXX Unsupported drive or cable.	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board 3. Diskette Drive Cable
000720XX	<ol style="list-style-type: none"> 1. System Board 2. Math Coprocessor
0007XXXX	<ol style="list-style-type: none"> 1. Math Coprocessor 2. System Board

Symptom/Error	FRU/Action
0011XX00	<ol style="list-style-type: none"> 1. System Board 2. Serial Connector 3. Any Serial Device 4. Communication Cable
0014XXXX (See "Printer Checkout" on page 468 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Printer 2. System Board
0024XX00	<ol style="list-style-type: none"> 1. Display Control Card 2. Voltage Converter
005002XX, 005006XX, 005008XX	<ol style="list-style-type: none"> 1. Display Control Card 2. Voltage Converter 3. External Display 4. I/O Panel Assembly
005004XX, 005010XX, 005032XX	<ol style="list-style-type: none"> 1. Display Control Card 2. LCD Panel 3. LCD Cable
005009XX	<ol style="list-style-type: none"> 1. External Display 2. Display Control Card 3. I/O Panel Assembly
00860100, 00860200 00861700, 00861800	<ol style="list-style-type: none"> 1. Mouse or Trackball 2. System Board 3. Numeric Keypad 4. I/O Panel Assembly
0086XX00	<ol style="list-style-type: none"> 1. System Board 2. Mouse or Trackball 3. Numeric Keypad 4. I/O Panel Assembly
0101XXXX	<ol style="list-style-type: none"> 1. See "Fax/Modem Checkout" on page 466.
010436XX	<ol style="list-style-type: none"> 1. System Board 2. Hard Disk Drive 3. Hard Disk Drive Cable
0104XXXX	<ol style="list-style-type: none"> 1. Hard Disk Drive 2. System Board 3. Hard Disk Drive Cable
0130XXXX	<ol style="list-style-type: none"> 1. Indicator Card 2. System Board 3. Keyboard Control Card
0137XXXX	<ol style="list-style-type: none"> 1. Serial Adapter 2. System Board 3. Communication Adapter Holder 4. Any Serial Device 5. Communication Cable
0166XXXX, 0167XXXX	<ol style="list-style-type: none"> 1. Adapter in Communications Cartridge 2. Communications Cartridge

Symptom/Error	FRU/Action
<p>I9990301 (Startup drive not found.)</p>	<ol style="list-style-type: none"> 1. Start the backup copy of the Reference Diskette and verify if the startup sequence is correct. <ol style="list-style-type: none"> a. Select Set features from the Main Menu. b. Select Set startup sequence. c. Check the list of devices on the screen.
<p>I9990302 (Operating system not found.)</p>	<ol style="list-style-type: none"> 1. Make sure that an operating system is installed. 2. Hard Disk Drive 3. System Board 4. Hard Disk Drive Cable
<p>I998XXXX, I9990303 (See "Hard Disk Partition" on page 132 before replacing any FRUs.)</p>	<ol style="list-style-type: none"> 1. Restore the system programs onto the system partition. 2. Set configuration 3. Hard Disk Drive 4. System Board 5. Hard Disk Drive Cable

Beep Symptoms

Symptom/Error	FRU/Action
Continuous beep.	1. System Board
Repeating short beeps. (See "External Keyboard/Auxiliary Input Device Checkout" on page 465 before replacing any FRUs.)	1. Keyboard 2. Keyboard Control Card 3. System Board
One long and one short beep.	1. System Board
One long and two short beeps.	1. Display Control Card 2. System Board
One short beep and a blank, unreadable, or flashing display with no external display attached. (See "CL57 LCD FRU Replacement Notice" on page 133 before replacing any FRUs.)	1. LCD Panel 2. Display Control Card 3. System Board 4. LCD Cable
One short beep and Diskette Prompt or a program load from the hard disk or unable to read diskette.	1. Diskette Drive 2. System Board 3. Diskette Drive Cable
Two short beeps and a blank display.	1. System Board

Miscellaneous Symptoms

Note: A *no beep* symptom can be caused by incorrect volume setting of the speaker. Set the speaker volume to its maximum position.

Symptom/Error	FRU/Action
A <i>no beep</i> and a blank or unreadable display during POST. (See "Power Systems Checkout" on page 117 before replacing any FRUs.)	1. System Board 2. Voltage Converter 3. Communications Cartridge 4. Hard Disk Drive 5. Display Control Card 6. Any options 7. Power source when failing
A <i>no beep</i> with a blinking cursor.	1. System Board 2. Display Control Card 3. Communications Cartridge
A <i>no beep</i> with a normal display during POST.	1. Speaker 2. Indicator Card 3. System Board 4. Keyboard Control Card

Symptom/Error	FRU/Action
A <i>no beep</i> and the computer hangs after displaying memory count.	<ol style="list-style-type: none"> 1. System Board 2. Communications Cartridge 3. Hard Disk Drive
LCD too dark, unable to adjust contrast or brightness. (See "CL57 LCD FRU Replacement Notice" on page 133 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. LCD Panel 2. Regulator 3. Voltage Converter
LCD unreadable or illegible. (See "CL57 LCD FRU Replacement Notice" on page 133 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. LCD Panel 2. Display Control Card 3. LCD Cable
Missing or discolored dots on the LCD panel.	<ol style="list-style-type: none"> 1. See "CL57 LCD FRU Replacement Notice" on page 133.
Unable to turn the LCD on and off.	<ol style="list-style-type: none"> 1. Regulator 2. Voltage Converter 3. LCD Cable
Blank screen, or extra horizontal or vertical line(s) displayed on upper or lower half of the LCD. (See "CL57 LCD FRU Replacement Notice" on page 133 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. LCD Panel 2. Display Control Card 3. LCD Cable
Four battery indicators are blinking. <ul style="list-style-type: none"> Battery ID 1 Battery Status 1 Battery ID 2 Battery Status 2 	<ol style="list-style-type: none"> 1. Voltage Converter 2. System Board
System status indicator is incorrectly blinking or stays on.	<ol style="list-style-type: none"> 1. Related Device 2. System Board 3. Indicator Card
System status indicator stays off, but the POST ends without an error.	<ol style="list-style-type: none"> 1. Indicator Card 2. System Board 3. Related Device
Reference Diskette does not work. (Try another Reference Diskette or any bootable diskette before replacing FRUs. Ensure all correct level drivers are loaded.)	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board 3. Diskette Drive Cable 4. Reference Diskette

Symptom/Error	FRU/Action
Keyboard does not work.	<ol style="list-style-type: none"> 1. Keyboard Control Card 2. Keyboard Cable 3. Numeric Keypad if used 4. System Board
One or more keys do not work. (See "External Keyboard/Auxiliary Input Device Checkout" on page 465 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Keyboard 2. Numeric Keypad 3. Keyboard Control Card
External display problems. (See "External Display Self-Test" on page 464 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. Display Control Card
Incorrect memory size during POST. (See "Memory Checkout" on page 115 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Memory Module 3. IC DRAM Card
Computer hang or Intermittent hang. (See "Undetermined Problem" on page 130 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Hard Disk Drive Cable 3. Hard Disk Drive 4. Replace the last device being tested 5. Display Control Card 6. Memory Module 7. IC DRAM Card 8. Voltage Converter
The computer goes into suspend mode after the POST.	<ol style="list-style-type: none"> 1. System Board 2. Voltage Converter 3. Lid Switch 4. Keyboard Control Card
The computer does not suspend or resume.	<ol style="list-style-type: none"> 1. System Board 2. Voltage Converter 3. Lid Switch 4. Keyboard Control Card
The computer does not power off.	<ol style="list-style-type: none"> 1. Voltage Converter 2. System Board 3. Indicator Card
Real-time clock inaccurate. (See "Testing the Backup Battery" on page 121 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Backup Battery 2. System Board
Printer problems.	<ol style="list-style-type: none"> 1. See "Printer Checkout" on page 468.

Symptom/Error	FRU/Action
Serial or parallel port device problems.	<ol style="list-style-type: none"> 1. Device 2. Cable 3. System Board 4. Serial Adapter (if attached) 5. I/O Panel Assembly
Internal Data/Fax modem does not communicate with a remote modem or a fax.	<ol style="list-style-type: none"> 1. See "Fax/Modem Checkout" on page 466.

Undetermined Problem

You are here because the diagnostics tests did not identify the failing FRU.

Check the power supply in use (see "Power Systems Checkout" on page 117). If the power supply is operating correctly, return here and continue with the following procedure.

1. Power-off the computer and remove the battery packs from the computer.
2. Remove or disconnect one of the following devices or adapter (do not isolate FRUs that are known to be good).
 - a. Non-IBM devices
 - b. Modem, printer, mouse, or other external device
 - c. IC DRAM card
 - d. Hard disk drive (fixed disk drive) or diskette drive
 - e. Communications cartridge
 - f. Any adapter and device
3. Power-on the computer and start the system program.
4. Press **Ctrl+A** to run the system checkout. Do not configure the computer. If diagnostics cannot be loaded from the hard disk, try and load them from the Reference Diskette. Test only those adapters and devices still attached to the computer.
5. If the symptom remains, repeat steps 1 through 3 until you find the failing FRU or until all FRUs have been removed.
6. If all of the FRUs listed have been removed and the problem remains, replace the system board.

Related Service Procedures

This section provides related service information on the following:

"Checking Installed Devices"
"Power-on Password" on page 132
"How to Run the Advanced Diagnostics" on page 132
"Hard Disk Partition" on page 132
"Restoring the Partition" on page 133
"CL57 LCD FRU Replacement Notice" on page 133

Checking Installed Devices

The Installed Devices List shows the presence of devices in the computer. If an adapter or device is missing from the list, you might have one of the following conditions.

Warning: A customized setup configuration (other than default settings) might exist on the computer you are servicing. Running Automatic Configuration can alter those settings. Note the current configuration settings (using the **View configuration**) and verify that the same settings are in place when service is complete.

- The protected partition on the hard disk or the Reference Diskette you are using does not contain the code required to support that device.
- An adapter or device is defective.
- The device missing from the list is an unrecognizable drive or adapter.
- The device missing from the list requires an additional diskette.
- A power supply voltage is incorrect (see "Power Systems Checkout" on page 117).

If the adapter is on the list, run the adapter diagnostics tests. If the list contains an adapter or device that is not installed, go to "Undetermined Problem" on page 130.

Power-on Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

How to Run the Advanced Diagnostics

1. Power-on the computer.
2. When the cursor moves to the upper right, press **Ctrl+Alt+Ins** to start the system program. If the IBM logo does not appear, insert the backup copy of the Reference Diskette into the diskette drive, press **Ctrl+Alt+Del**, then repeat this step.
3. Advance to the Main Menu.
4. Press **Ctrl+A** to run the system checkout.

Hard Disk Partition

A protected partition on the hard disk contains the system configuration data set, system setup programs, and customer and advanced diagnostics. System setup and diagnostic programs can be loaded from this partition by pressing and holding **Ctrl+Alt+Del** and, as soon as the cursor moves to the upper right corner of the display, pressing and holding **Ctrl+Alt+Ins**.

Restoring the Partition

If a computer or hard disk problem prevents system setup or diagnostic programs from being loaded from the protected partition, load and run the programs from the Reference Diskette. If no errors are found, restore the programs to the protected partition on the hard disk using the following procedure.

1. Start the computer with the customer's backup copy of the Reference Diskette installed.
2. Select the **Backup/Restore system programs** from the Main Menu.
3. Select the **Restore the system partition** to load the system setup and utility programs, and the customer and advanced diagnostics programs onto the system partition of the hard disk.

If this does not correct the problem, use the backup copy of the Reference Diskette to format the hard disk and then restore the programs to the protected partition. If the problem remains, return to the **1998XXXX, 19990303** error code (on page 126 in the Symptom-to-FRU index).

Note: After the programs have been restored, the Diskette and F1 prompts appear, unless an operating system is present.

CL57 LCD FRU Replacement Notice

If missing or discolored dots appear on the LCD, carefully read the following note to determine whether you should replace the LCD.

Important

The LCD for the Model CL57 contains over 921 000 thin film transistors (TFTs). A small number of missing, discolored or lighted dots (on all the time) is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of dots satisfies either of the following conditions:

- The number of missing or discolored dots in any colored back ground, except black, is 14 or more.
- The number of lighted dots in a black background is 7 or more.

Product Overview

The following table provides a brief overview of the computer features.

Feature	Description
Processor (MHz)	386SX 20 MHz
Bus Architecture	Micro Channel
Memory (Standard)	2MB
Memory (Maximum)	16MB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	80MB

FRU Removals and Replacements

Follow the numerical sequence in the FRU removal sequence list and the exploded view to remove or disconnect parts in the correct order. The letters in parentheses in the list indicate screw types. See the “Screw Size Chart” on page 19 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

1 Battery Cover

2 Battery Pack

3 Hinge Covers

4 Six Screws (4-EE, 2-C)

(One at each bottom corner and two through extensions at bottom of LCD)

5 LCD Rear Cover

(To separate panel from rear cover, place screwdriver in small slit in bottom front of LCD panel and release latch.)

Two Cables from LCD Assembly

6 Four Screws (LL)

(Two on each side)

LCD Assembly

7 Bend Back Thirteen LCD Panel Tabs

Four LCD Panel Screws (MM)

(From back of panel)

8 Separate LCD Panel and LCD Bezel

9 Three Bottom Cover Screws (LL)

(At bottom-front)

10 Keyboard Frame

11 Two Screws (MM)

(At rear of keyboard)

12 Loosen Keyboard

13 Four Screws (MM)

(Look for **13** four times in illustration.)

14 Loosen Top Cover

15 Two Ribbon Cables

Keyboard

(Keyboard can be removed without removing top cover. However, keyboard cables cannot be reconnected with top cover installed.)

Trackball Cable

(At right-rear of keyboard)

16 Indicator Card Cable

Top Cover

(See step **14**. Ensure that keyboard is removed before removing top cover.)

17 Two Trackball Assembly Screws (LL)

18 Trackball Assembly

19 Speaker Cable

20 Four Screws (LL)

(Two indicator card screws from rear and two speaker retainer bracket screws from bottom)

21 Indicator Card

(When replacing indicator card, ensure that speaker volume switch and power-on switch fit into their respective slots in top cover.)

22 Speaker

23 Two Diskette Drive Ribbon Cables

24 Four Diskette Drive Screws (LL)

Micro Switch Cable

25 Diskette Drive and Mounting Bracket

26 Two Hard Disk Drive Ribbon Cables

27 Four Hard Disk Drive Screws (LL)

28 Hard Disk Drive and Mounting Bracket

(Have customer backup all information on hard disk drive before removal. When replacing hard disk drive, use customer's backup Reference Diskette to restore system partition.)

29 Backup Battery

30 Keyboard Control Card Ribbon Cable

Three Keyboard Control Card Screws (NN)

31 Keyboard Control Card

32 Display Control Card Ribbon Cable

(Press and hold metal clips on each side of cable connector.)

33 Two Display Control Card Screws (LL)

34 Display Control Card

35 Two Hinge Support Screws (LL)

(On hinge support)

36 Six Screws (4-PP, 2-QQ) and Hinge Assemblies

(Three screws on each side)

37 Loosen Hinge Support

Two Regulator Card Cables

38 Three Regulator Card Screws (LL)

39 Regulator Card

40 Two I/O Connector Ribbon Cables

41 Two Threaded Spacers

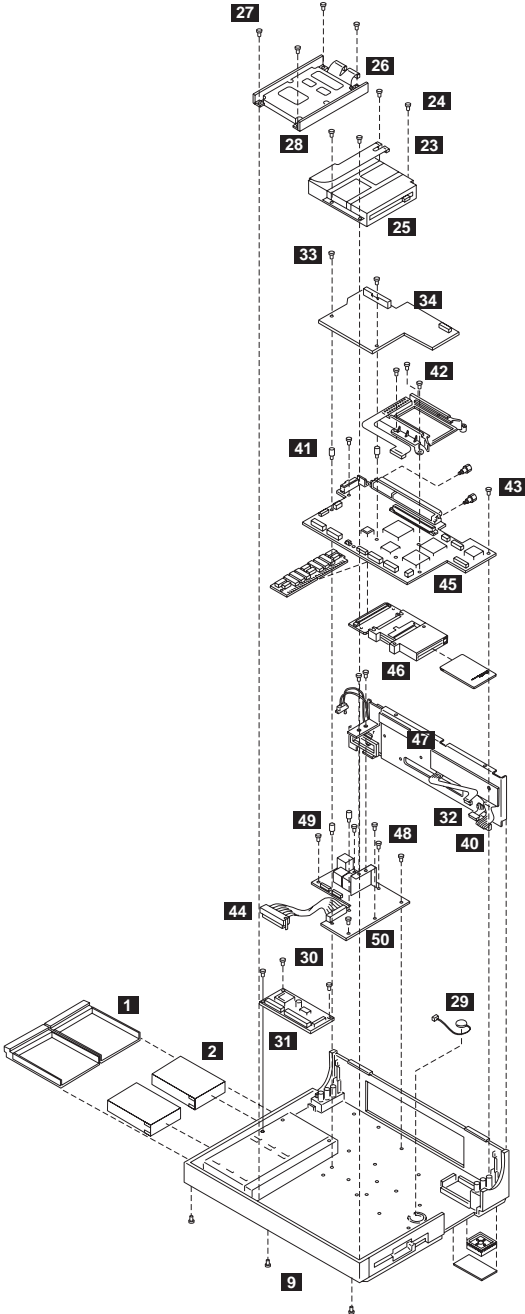
42 Three Modem Guide Screws (V)

43 Two Threaded Hex Spacers

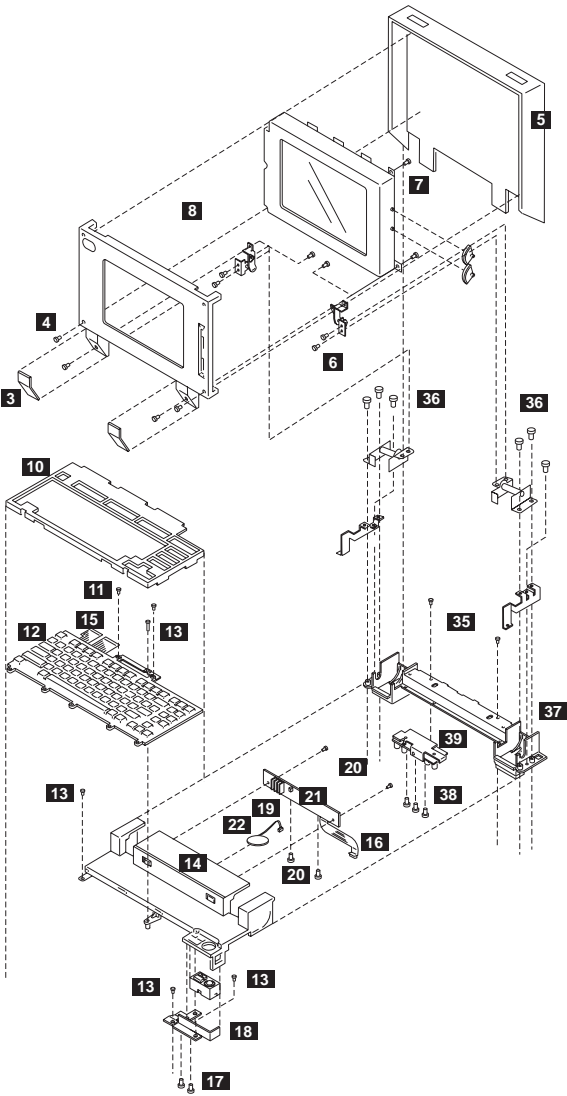
(At each end of system board)

- 44 Voltage Converter Cable**
- 45 System Board Cable (upper left)**
- System Board and Mounting Bracket**
(When installing system board, ensure that power control switch on I/O panel is set to On. Also, run Automatic Configuration and set time and date. Transfer math coprocessor (if installed) to new system board.)
- IC DRAM Card Connector**
(Connected under system board.)
- 46 Two I/O Connector Screws (LL)**
- 47 I/O Connectors and Cover**
- 48 Six Voltage Converter Card Screws (SS)**
- 49 Two Threaded Spacers**
(On voltage converter card)
- Battery Cable**
- 50 Voltage Converter Card**
(Be careful to use correct screws to replace voltage converter. Bottom cover can be cracked.)

Model CL57 Exploded View



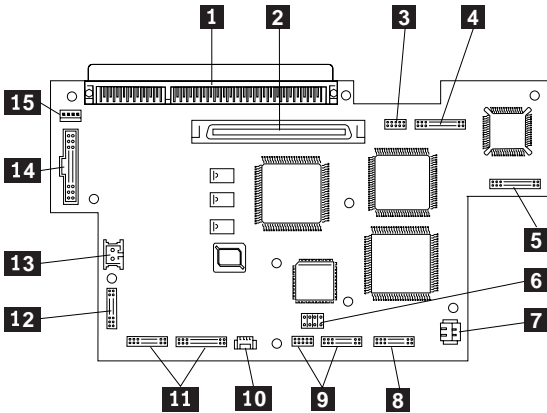
Model CL57 Exploded View (continued)



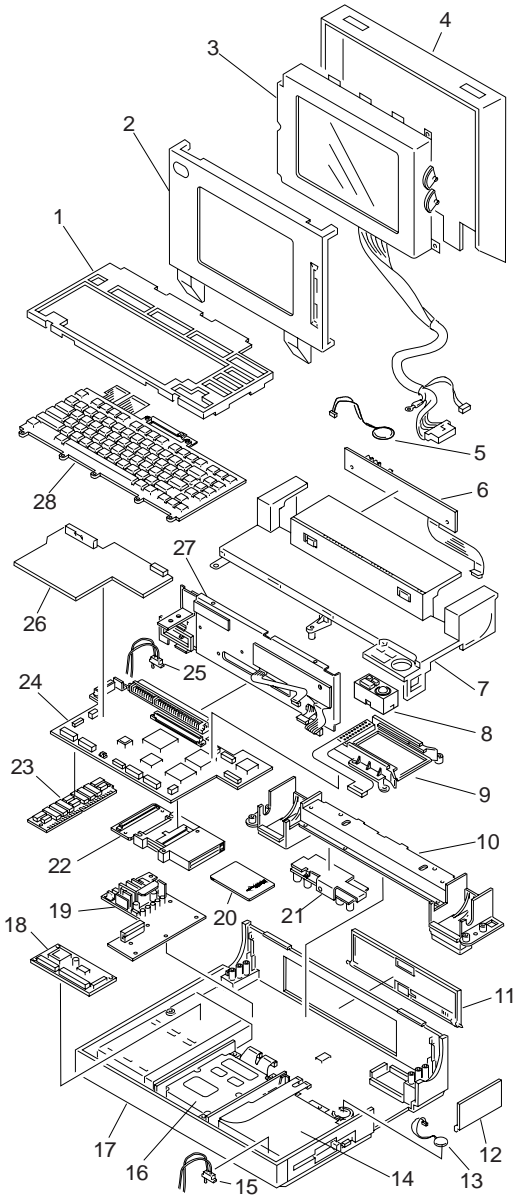
Locations

System Board

- 1** System Expansion Connector (150-pin)
- 2** Display Control Card
- 3** Serial Connector
- 4** I/O Panel (Parallel/External Input)
- 5** Indicator Card
- 6** Password-Override Connector
- 7** Backup Battery
- 8** Communication Interface (Modem/Serial)
- 9** Diskette Drive
- 10** Thermal Sensor
- 11** Hard Disk Drive
- 12** Trackball/Keyboard Card Connector
- 13** Dew Point Sensor
- 14** Voltage Converter
- 15** Voltage Converter



Parts Listing



System Unit

Index

1	Frame, Keyboard	07G1393
2	Bezel, LCD	07G1391
3	LCD Panel	48G9999
4	Cover, LCD Rear	07G1392
	Cable, LCD	07G1384
5	Speaker	07G1229
6	Indicator Card	07G1375
	Support, Indicator Card	07G1398
7	Top Cover	07G1390
8	Trackball Assembly	1397752
9	Guide, Modem	07G1378
	Bracket, Modem	07G1408
10	Hinge, Support	07G1407
	Hinge, Left	07G1403
	Hinge, Right	07G1404
11	Cover, I/O Connectors	07G1394
12	Cover, Option Slot	07G1395
	Cover, Math Coprocessor	07G1429
13	Backup Battery, Lithium	35G2282
14	Diskette Drive Assembly	72X6074
	Bracket, Diskette Drive	07G1405
	Cable, Diskette Drive	07G1379
15	Lid Switch	07G1386
16	Hard Disk Drive, 80MB	95F4708
	Bracket, Hard Disk Drive	07G1406
	Cable, Hard Disk Drive	07G1380
17	Bottom Cover	07G1389
18	Keyboard Control Card	1397751
19	Voltage Converter	07G1373
20	2MB IC DRAM Card	07G1414
	4MB IC DRAM Card	07G1415
	8MB IC DRAM Card	07G1416
21	Regulator	06G9536
22	Connector, IC DRAM Card	07G1377
23	Memory Module Kit, System Board	07G1879
24	System Board	07G1371
	Note: On system board EC level C81806A, J2 and J12 have been removed, and the cable between J2 and Voltage Converter (index 19) is not used.	
	System Board Dew Sensor	35G2319
25	Switch, Communications Cartridge	07G1385
26	Display Control Card	07G1372
27	I/O Panel Assembly	07G1374
	Bracket, Connector	07G1402
	(includes slide and connector screws)	
	Serial Connector Assembly	07G1426
28	Keyboard (see Keyboards)	
	Battery Pack, Rechargeable, HHR140A	07G1413
	For Benelux	06G8433
	For Nordic countries	06G8434
	For Switzerland	06G8432
	Battery Pack, Rechargeable, HHR150A	06G9259
	For Switzerland	06G9264
	Holder, Battery Pack	07G1376
	Sensor, Thermal	07G1387
	Slide, Brightness/Contrast	07G1399
	Slide, Power Switch	07G1400
	Slide, Volume Control	07G1401

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Foot, Left	07G1396
Foot, Right	07G1397
Cable, 50-Pin (voltage converter to system board)	07G1382
Cable, 4-Pin (voltage converter to system board)	07G1383
Communications Adapters:	
Serial Adapter	79F6840
Data/Fax Modem Adapter (U.S., Canada only)	53G7772
High-Speed Data/Fax Modem (U.S., Canada only)	92F0288
Telephone Cable	94X1540
Miscellaneous Kit	07G1409
Miscellaneous Kit, LCD	07G1410
Screw Kit	07G1411

Options and Adapters

AC Adapter, CVCC, World Trade for Japan	06G8457 06G8462
for U.S./Canada	06G8452
AC Adapter, CT for Japan	35G2285
for U.S./Canada	07G1412
Communications Cartridge	07G3999
External Battery Pack	34G9869
Battery Pack Cable (for 34G9869)	34G9870
FaxConcentrator Adapter/A	94X2540
FaxConcentrator Adapter/A Cable	94X2527
Miniature Mouse	95F5723
Strap	07G1449
Trackball Cable	07G1381

Keyboards

French	1397927
German	1397926
Italian	1397928
Japanese	1398299
Spanish	1397929
U.K. English	1397925
U.S. English	1397750
Cable, Keyboard	07G1381

Numeric Keypad

French	95F6313
German	95F6314
Italian	95F6316
Spanish	95F6315
U.K. English	95F5741
U.S. English	95F5741

Model P70 and P75 (8573)

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General Checkout

001

- Power-off the computer and all external devices.
- Check all cables and power cords.
- Make sure there are no diskettes in the drives.
- Power-on all external devices.
- Power-on the computer.

ARE ANY EXTERNAL DEVICES ATTACHED TO THE SYSTEM UNIT?

Yes No

002

Go to Step 005.

003

DID THE POWER-GOOD LIGHT ON ALL OF THE EXTERNAL DEVICES COME ON?

Yes No

004

Go to the external devices service pamphlet.

005

DID YOU RECEIVE A POST ERROR CODE?

Yes No

006

Continue with Step 014 on page 147.

007

IS THE FIRST POST ERROR CODE WITHIN THE RANGE OF 02080000 190I TO 02410000 190I?

Yes No

008

Continue with Step 014 on page 147.

009

- Start the Reference Diskette and verify that the “Enable” and “Disable” settings are correct. (For more information, go to “Enable and Disable Settings” on page 158.)
- If you get a warning message to instruct you to “Keep” and “Remove” setting, follow the instructions on the screen before continuing.

(Step **009** continues)

009 (continued)

DID YOU HAVE TO CORRECT ANY OF THE SETTINGS?

Yes No

010

- Go to "Symptom-to-FRU Index" on page 151.
- Before replacing any SCSI devices, verify that there are no duplicate SCSI ID settings.

011

- Remove the Reference Diskette and restart the computer.

DID THE ERROR REMAIN?

Yes No

012

- If you suspect another problem, or wish to run System Checkout, continue with Step 014.

013

Go to "Symptom-to-FRU Index" on page 151.

014

- Insert your Reference Diskette.
- Press **Ctrl+Alt+Del** and check for the following responses:
 1. One or two short beeps.
 2. IBM logo screen appears.

DID YOU RECEIVE THE RESPONSES LISTED ABOVE?

Yes No

015

- Go to "Symptom-to-FRU Index" on page 151. If that does not correct the problem, go to "Undetermined Problem" on page 156.

016

- Advance to the Main Menu.
- Press **Ctrl+A** and run System Checkout.

Notes:

1. If the computer has incorrect keyboard responses, go to "External Keyboard/Auxiliary Input Device Checkout" on page 465.
2. If the printer has incorrect responses, go to "Printer Checkout" on page 468.
3. If the external display has problems such as jittering, rolling, shifting, or being out-of-focus, go to "External Display Self-Test" on page 464.

(CONTINUED)

4. A minimum of 512KB of memory must be active to load the diagnostic tests.

IS THE LIST OF INSTALLED DEVICES CORRECT?

Yes No

017

Go to "Checking Installed Devices" on page 157.

018

- Run the diagnostic tests. (See "How to Run Advanced Diagnostics" on page 158.)

Note: If the test stops and you cannot continue, replace the last device being tested.

DID THE TESTS IDENTIFY A FAILURE?

Yes No

019

Go to Step 021.

020

Follow the action described on the screen. If that does not correct the problem go to "Symptom-to-FRU Index" on page 151.

021

DID YOU RECEIVE A POST ERROR CODE?

Yes No

022

You might have an intermittent problem.

- Check for damaged cables and connectors.
- Reseat all adapters, drives, and modules.
- Check the system unit fan for proper operation.
- Start an error log and run the tests multiple times.
- Go to "Undetermined Problem" on page 156

023

Go to "Symptom-to-FRU Index" on page 151.

If that does not correct the problem, go to "Undetermined Problem" on page 156.

Memory Checkout

Power-off the computer before removing or replacing parts.

4MB memory modules installed in slots 2 or 4 must be FRU number 79F3234.

00011000 indicates a system board parity check error.

Remove all memory module kits except the one in position 1. If the problem remains, replace the kit in position 1. If the kit does not solve the problem, replace the system board.

If the problem disappears after removing the memory module kits (you should still have a kit in position 1), install the kits, one at a time, until the problem returns. Replace the kit that caused the problem to return. If the kit does not solve the problem, replace the system board.

00011100 indicates a memory expansion adapter parity check error.

Remove the memory expansion adapters from the expansion slots one at a time until you no longer get a 111 error. (If all of the adapters have been removed and you still have a 111 error, replace the system board.)

Remove the memory expansion kits from the adapter that was removed last. Install the kits one at a time until the failure returns. Replace the kit that caused the error to return; if that does not solve the problem, replace the adapter.

00021500, 00021600 indicates a failing system board memory module kit.

If the error message does not indicate the location of the failing kit, follow the procedure for a 00011000 error, described above.

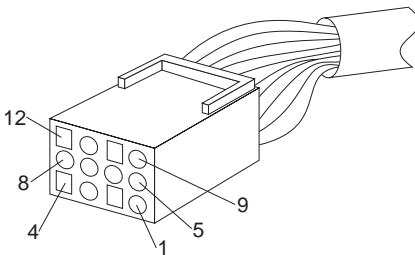
Power Systems Checkout

To check the power supply voltages, do the following:

Note: If you cannot power-on the computer, a motor-start jumper might be installed on the hard disk drive. Remove the motor-start jumper.

1. Power-off the computer.
2. Unplug the two power-supply connectors.
3. Power-on the computer and check for the voltages listed below.
 - If the voltages are not correct, check the power cord for continuity.
 - If the power cord is good, replace the power supply.

Vdc Minimum	Vdc Maximum	Ground (-) Pin	Positive (+) Pin
+4.8	+5.2	6, 7, or 8	3, 4, or 5
+11.5	+12.6	6, 7, or 8	2
-11.0	-12.9	6, 7, or 8	1



System Unit Fan: A non-functioning fan can cause heat to build up resulting in intermittent problems.

If the fan is not running, replace the power supply.

Symptom-to-FRU Index

Error symptoms and the FRUs that might be responsible for the failure are listed in the "Symptom-To-FRU index." The most-likely failing FRU is listed first.

If the computer displays an error message and gives an incorrect audio response, start with the FRUs listed for that error message. An X in an error message can be any number.

Notes:

1. Before replacing any SCSI devices, verify that there are no duplicate SCSI ID settings.
2. If you are unable to find an error message, you have an IBM device with its own service manual or a device not supported by the advanced diagnostic tests. Refer to the manual for that device.

Important

SLOT 1 designates the logical position for the SCSI adapter built into the system board which controls the internal and external SCSI devices.

If you are instructed to replace the SCSI adapter in slot 1, replace the system board.

Note: The system board for the Model P75 486 consists of two FRUs. If you are instructed to replace the system board, exchange the system board first. If that does not correct the problem, reinstall the original system board, then exchange the processor card.

Symptom/Error	FRU/Action
Reference Diskette does not work. (Try another Reference Diskette or any bootable diskette before replacing FRUs. Ensure all correct level drivers are loaded.)	<ol style="list-style-type: none">1. Diskette Drive2. System Board3. Diskette Drive Cable4. Reference Diskette
Reference Diskette does not work. (Try another Reference Diskette or any bootable diskette before replacing FRUs. Ensure all correct level drivers are loaded.)	<ol style="list-style-type: none">1. Diskette Drive2. System Board3. Diskette Drive Cable4. Reference Diskette
One or more keys do not work	<ol style="list-style-type: none">1. Keyboard2. Keyboard Cable3. System Board
Changing colors	<ol style="list-style-type: none">1. External Display2. Plasma Display Card

Symptom/Error	FRU/Action
Power-good light does not light - fan does not run (see "Undetermined Problem" on page 156).	<ol style="list-style-type: none"> Power Supply System Board Any device or adapter
No beep and the computer is otherwise functional.	<ol style="list-style-type: none"> Speaker Assembly System Board
No beep and nonfunctional computer. (See "Undetermined Problem" on page 156 before replacing any FRUs.)	<ol style="list-style-type: none"> System Board Power Supply
Continuous beep	<ol style="list-style-type: none"> Power Supply System Board
Repeating short beeps	<ol style="list-style-type: none"> Power Supply System Board Keyboard (stuck key)
One long and one short beep	<ol style="list-style-type: none"> Display Option Adapter (if installed) System Board Power Supply
One long and two short beeps	<ol style="list-style-type: none"> Plasma Display Card System Board Power Supply Display Option Adapter
One short beep and a blank or unreadable display with no external display	<ol style="list-style-type: none"> Plasma Display Assembly Plasma Display Cables Plasma Display Card System Board
One short beep and diskette prompt or a program loads from the fixed disk drive	<ol style="list-style-type: none"> Diskette Drive System Board Power Supply
LED for fixed disk drive stays on.	<ol style="list-style-type: none"> Fixed Disk Drive System Board Power Supply
LED for fixed disk drive not working, but computer is completely functional.	<ol style="list-style-type: none"> LED Assembly System Board
SCSI ID of the internal fixed disk drive cannot be set correctly	<ol style="list-style-type: none"> Set Configuration Internal SCSI Fixed Disk Drive SCSI ID Switch
000110XX (See "Memory Checkout" on page 149 before replacing any FRUs.)	<ol style="list-style-type: none"> System Board Memory Module System Board
000111XX (See "Memory Checkout" on page 149 before replacing any FRUs.)	<ol style="list-style-type: none"> Memory Expansion Kit Memory Expansion Adapter
000112XX, 000113XX	<ol style="list-style-type: none"> Any Adapter System Board

Symptom/Error	FRU/Action
000161XX	1. Battery
000162XX (Verify the "enable," "disable" settings are correct before replacing any FRUs.)	1. Any Device
000163XX, 000164XX, 000165XX (See "Checking Installed Devices" on page 157 for more information.)	1. Set Configuration 2. System Board
000166XX	1. Any Adapter
000194XX	1. System Board 2. Memory Module
0001XXXX (not listed above)	1. System Board
000201XX	1. System Board Memory Module or Memory Expansion Adapter or Memory Expansion Kit 2. System Board
20X (slot 0)	1. System Board Memory Module 2. System Board
20X (slot 1 - 4)	1. Adapter Memory 2. Memory Adapter
000211XX, 000215XX, 000216XX, 000221XX (See "Memory Checkout" on page 149 before replacing any FRUs.)	1. System Board Memory Module 2. System Board
000225XX	1. System Board Memory Module 2. System Board
000301XX, 000302XX	1. Keyboard 2. Keyboard Cable 3. System Board
000303XX	1. System Board 2. Keyboard 3. Keyboard Cable
000304XX	1. System Board 2. Keyboard
000305XX	1. Keyboard Cable
000401XX	1. System Board
000602XX	1. Defective Diskette
0006XXXX	1. Diskette Drive 2. System Board 3. Power Supply 4. Diskette-Drive Cable
0007XXXX	1. Processor Board 2. System Board

Symptom/Error	FRU/Action
001102XX, 001106XX	<ol style="list-style-type: none"> 1. System Board 2. Any Serial Device
001107XX	<ol style="list-style-type: none"> 1. Communications Cable 2. System Board
001108XX, 001109XX	<ol style="list-style-type: none"> 1. System Board 2. Serial Device
0011XXXX (not listed above)	<ol style="list-style-type: none"> 1. System Board
001202XX, 001206XX	<ol style="list-style-type: none"> 1. Dual Async Adapter/A
001207XX	<ol style="list-style-type: none"> 1. Communications Cable 2. Dual Async Adapter/A
001208XX, 001209XX	<ol style="list-style-type: none"> 1. Serial Device
0012XXXX (not listed above)	<ol style="list-style-type: none"> 1. Dual Async Adapter/A 2. System Board
0014XXXX (See "Printer Checkout" on page 468 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Printer 2. System Board
004611XX, 004630XX	<ol style="list-style-type: none"> 1. Multiport/2 Interface Board 2. Multiport/2 Adapter
004612XX, 004613XX, 004640XX, 004641XX	<ol style="list-style-type: none"> 1. Memory Module 2. Multiport/2 Adapter
004650XX	<ol style="list-style-type: none"> 1. Multiport Interface Cable
0046XXXX	<ol style="list-style-type: none"> 1. Multiport/2 Adapter 2. Interface Board 3. Memory Module
008601XX, 008602XX	<ol style="list-style-type: none"> 1. Pointing Device
008603XX	<ol style="list-style-type: none"> 1. System Board
008604XX	<ol style="list-style-type: none"> 1. System Board 2. Pointing Device
0096XXXX	<ol style="list-style-type: none"> 1. SCSI Adapter (with cache) 2. Any SCSI Device 3. System Board
010007XX	<ol style="list-style-type: none"> 1. Communications Cable 2. Multiprotocol Adapter/A
0100XXXX (not listed above)	<ol style="list-style-type: none"> 1. Multiprotocol Adapter/A 2. System Board
010102XX, 010106XX, 010108XX	<ol style="list-style-type: none"> 1. Modem Adapter/A
0010109XX	<ol style="list-style-type: none"> 1. Serial Device

Symptom/Error	FRU/Action
0101XXXX (not listed above)	<ol style="list-style-type: none"> 1. Modem Adapter/A 2. System Board
0112XXXX <i>(SLOT 1 designates the logical position for the SCSI adapter built into the system board which controls the internal and external SCSI devices. To replace the SCSI adapter in slot 1, replace the system board.)</i>	<ol style="list-style-type: none"> 1. SCSI Adapter (without cache) 2. SCSI Device
000107XX	<ol style="list-style-type: none"> 1. 5.25 inch External Diskette Drive 2. 5.25 inch External Diskette Drive Adapter/A
012102XX, 012106XX, 012108XX	<ol style="list-style-type: none"> 1. 300/1200/2400 Modem Adapter/A
012109XX	<ol style="list-style-type: none"> 1. Serial Device
0121XXXX (not listed above)	<ol style="list-style-type: none"> 1. 300/1200/2400 Modem Adapter/A 2. System Board
012901XX, 012902XX, 012903XX	<ol style="list-style-type: none"> 1. Processor Card 2. System Board
014710XX	<ol style="list-style-type: none"> 1. Plasma Display Card 2. Display Option Adapter
014711XX	<ol style="list-style-type: none"> 1. Plasma Display Card 2. Display Option Adapter
0147XXXX	<ol style="list-style-type: none"> 1. Plasma Display Card 2. Display Option Adapter 3. System Board 4. Processor Card
01490XXX, 01491XXX, 01492XXX	<ol style="list-style-type: none"> 1. Plasma Display Card 2. System Board 3. Plasma Display Assembly
014932XX	<ol style="list-style-type: none"> 1. External Display 2. Plasma Display Card
014952XX	<ol style="list-style-type: none"> 1. Plasma Display Assembly 2. Plasma Display Card 3. System Board
016500XX	<ol style="list-style-type: none"> 1. 6157 Tape Attachment Adapter
016520XX	<ol style="list-style-type: none"> 1. 6157 Streaming Tape Drive
016540XX	<ol style="list-style-type: none"> 1. 6157 Streaming Tape Drive 2. 6157 Tape Attachment Adapter

Symptom/Error	FRU/Action
0166XXXX, 0167XXXX	<ol style="list-style-type: none"> 1. Token-Ring Network Adapter/A 2. System Board
0208XXXX (Verify that there are no duplicate SCSI ID settings.)	<ol style="list-style-type: none"> 1. Any SCSI Device
0210XXXX (If the failing device is an external device, go to the external devices service pamphlet.)	<ol style="list-style-type: none"> 1. SCSI Fixed Disk Drive 2. SCSI Adapter 3. SCSI Cable 4. SCSI ID Switch (internal SCSI fixed disk drive only)
0215XXXX (If the failing device is an external device, go to the external device service pamphlet.)	<ol style="list-style-type: none"> 1. SCSI CD-ROM Drive 2. SCSI Adapter

Undetermined Problem

1. Power-off the computer.
2. Remove or disconnect one of the following adapters or devices.
 - Non-IBM devices
 - Any external device (modem, printer, mouse, or external display)
 - Any adapter
 - Fixed disk or diskette drive
 - Memory module kits.
3. Power-on the computer.
4. If the symptom remains, repeat steps 1, 2, and 3 until you find the failing adapter or device.
5. If all adapters and devices have been removed and the problem persists, check the power supply voltages. If the voltages are correct, replace the system board. If the voltages are not correct, replace the power supply. If the symptom remains, reinstall the original system board and replace the processor card.

Related Service Procedures

This section provides related service information on the following:

"Checking Installed Devices"
"SCSI Devices"
"Enable and Disable Settings" on page 158
"How to Run Advanced Diagnostics" on page 158
"Power-on Password" on page 159

Checking Installed Devices

If an adapter or device is missing from the list, you might have one of the following conditions:

- Your Reference Diskette does not contain the module of code required to support that device.
- The missing device is a 5.25-Inch 360KB or 1.2MB External Diskette Drive adapter, or another unrecognizable adapter.
- The missing device is defective.
- An adapter or system board is defective.

Run **Automatic Configuration** (see "Automatic Configuration" before continuing) and determine which type of device, SCSI or non-SCSI, is missing from the Installed Devices List, in Advanced Diagnostics, then continue with the following steps. (If SCSI and non-SCSI devices both are missing, go to "Undetermined Problem" on page 156.)

SCSI Devices

Important

SLOT 1 designates the logical position for the SCSI adapter built into the system board which controls the internal and external SCSI devices.

If you are instructed to replace the SCSI adapter in slot 1, replace the system board.

The adapter supporting the missing device might be defective. If more than one SCSI adapter is installed, isolate adapters in the option slots one by one, then suspect the system board.

1. Power-off the computer and disconnect all cables attached to the system board and the SCSI adapter.
2. Terminate the adapter, as required.
3. Power-on the computer and run **Automatic Configuration**. If the adapter is not on the Installed Devices List, in Advanced Diagnostics, the adapter or the system board is defective. If the adapter is on the list, run the adapter diagnostic tests.

4. If the adapter fails the tests, replace it or the system board (SLOT 1). If the adapter passes the tests, a different adapter might be defective.
5. Reconnect the cables to the SCSI adapter or system board, then terminate the adapter, as required.
6. Go to "Undetermined Problem" on page 156 to find the problem.

Enable and Disable Settings

To verify that the "Enable" and "Disable" settings are correct, select **Set and View SCSI Device Configuration** from the **Set Configuration** menu, and determine if there are any "Presence Error Reporting" devices listed. The settings must be as follows:

- Devices connected to the computer must be set to "Enabled."
- Devices listed but not connected must be set to "Disabled."

Change the settings by pressing **F5**, then save them by pressing **F10**.

Non-SCSI Devices: The missing device is defective.

If that does not correct the problem, go to "Undetermined Problem" on page 156.

Note: If the number of diskette drives shown on the list is incorrect, an error can occur during the tests. Restart the computer and verify that the drive information on the **Set Configuration** menu is correct, then continue testing.

How to Run Advanced Diagnostics

1. Power-off the computer.
2. Insert the Reference Diskette into drive A.
3. Power-on the computer.
4. Advance to the Main Menu.
5. Press **Ctrl+A** to run the System Checkout.

Power-on Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

Product Overview (P70)

The following table provides a brief overview of the computer features.

Feature	Description
Processor (MHz)	386 20-Mhz
Bus Architecture	Micro Channel
Memory (Standard)	2MB
Memory (Maximum)	8MB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	30MB 60MB 120MB

Product Overview (P75)

The following table provides a brief overview of the computer features.

Feature	Description
Processor (MHz)	486 33-MHz
Bus Architecture	Micro Channel
Memory (Standard)	8MB
Memory (Maximum)	16MB
Video	XGA
Diskette Drive	3.5-inch
Hard Drive	160MB 400MB

FRU Removals and Replacements

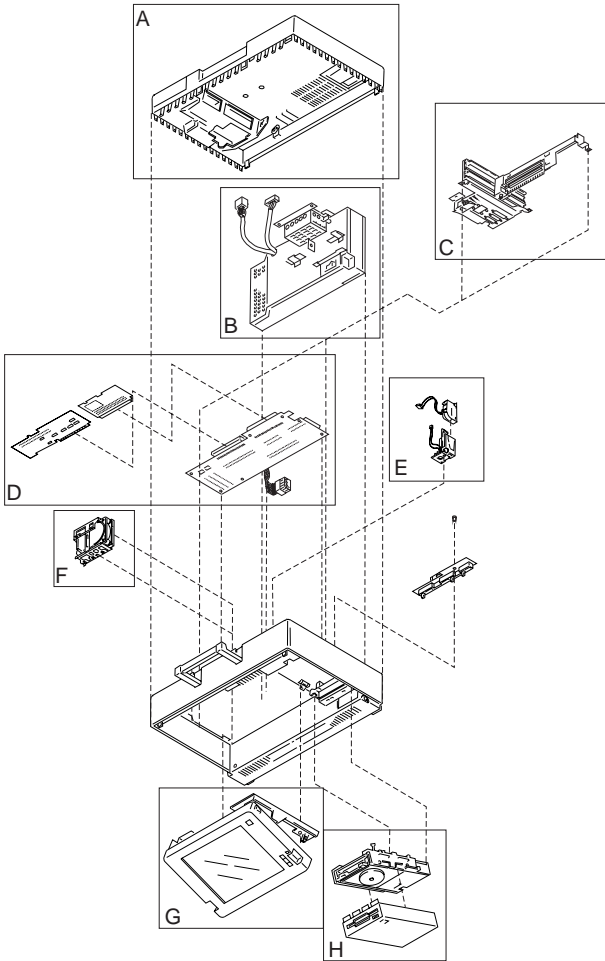
Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

Safety Notice 1: Translation on page 7

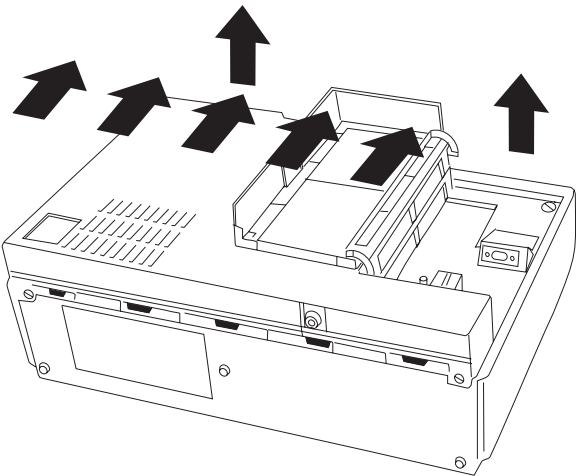
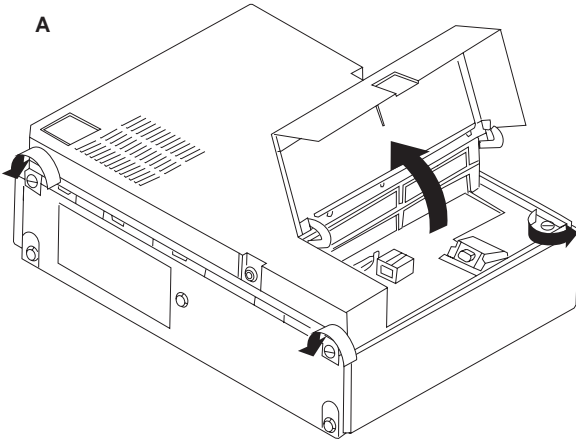
Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

Use the figure below to locate the FRU you want to remove. Refer to the following pages for additional information.

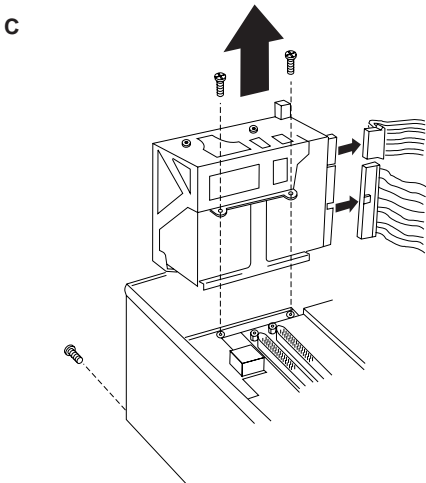
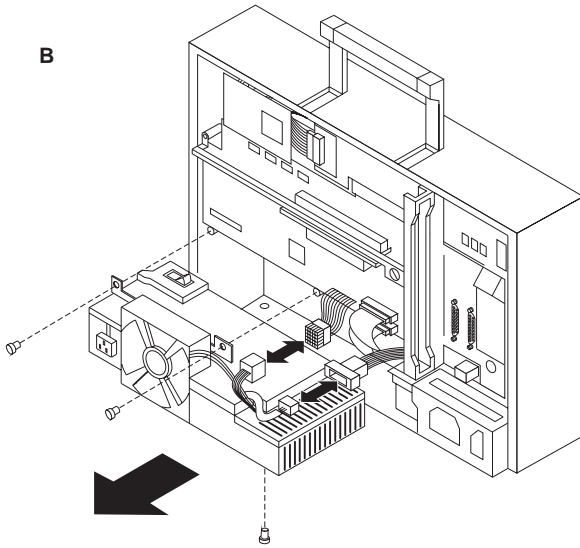


Model P70/P75 Exploded View (continued)

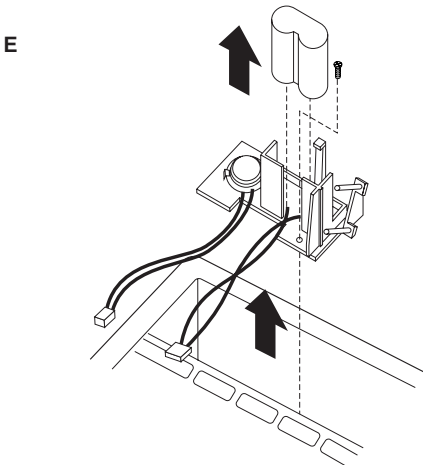
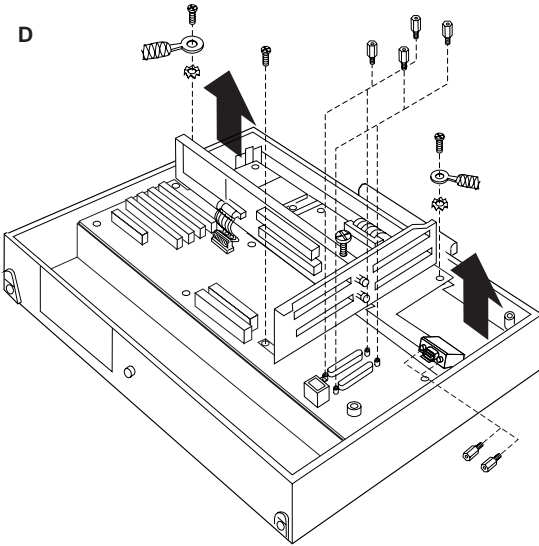
A



Model P70/P75 Exploded View (continued)

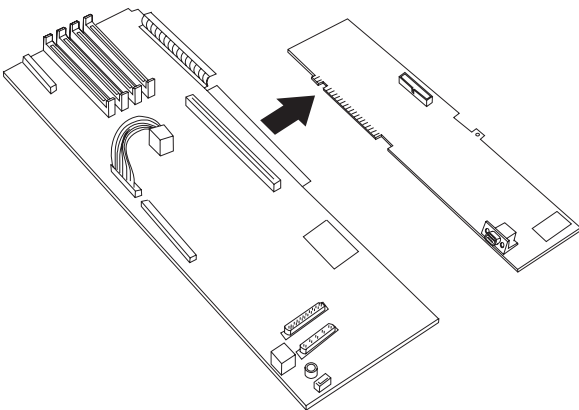
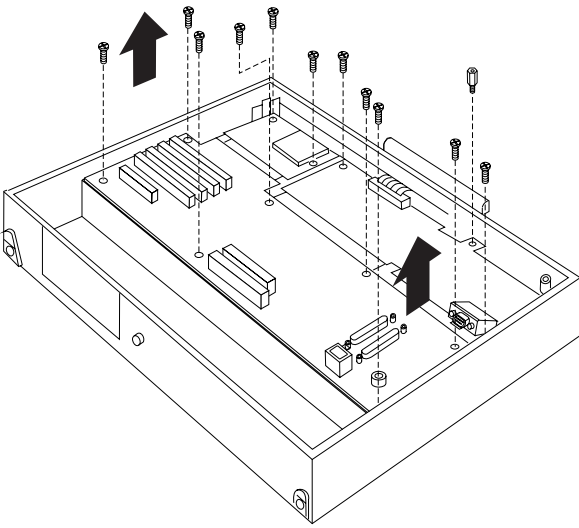


Model P70/P75 Exploded View (continued)



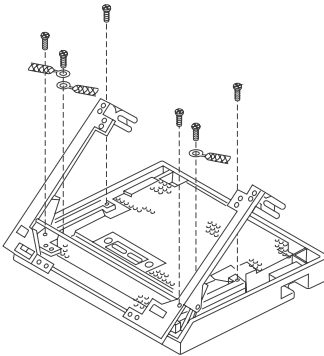
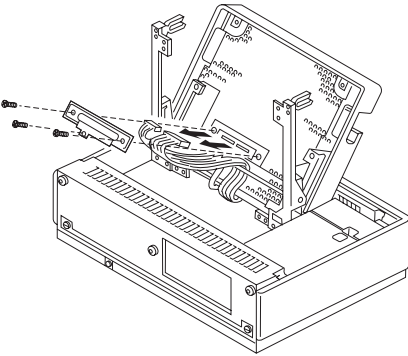
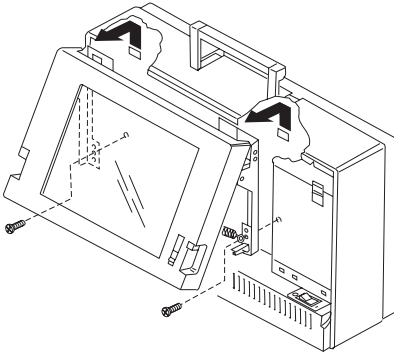
Model P70/P75 Exploded View (continued)

F



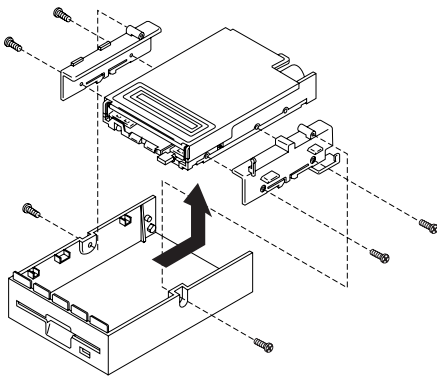
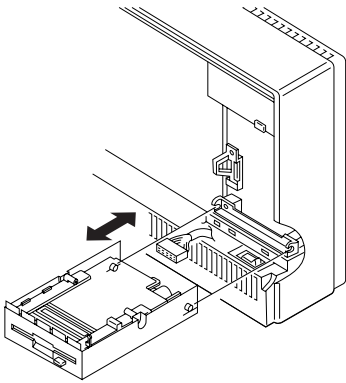
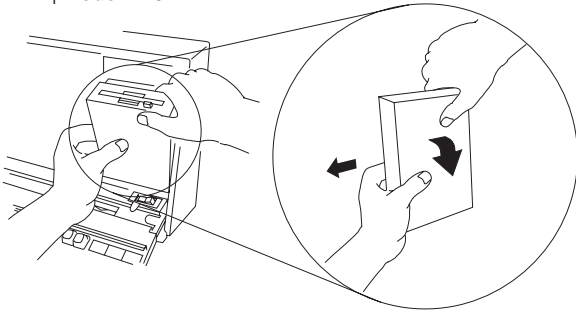
Model P70/P75 Exploded View (continued)

G



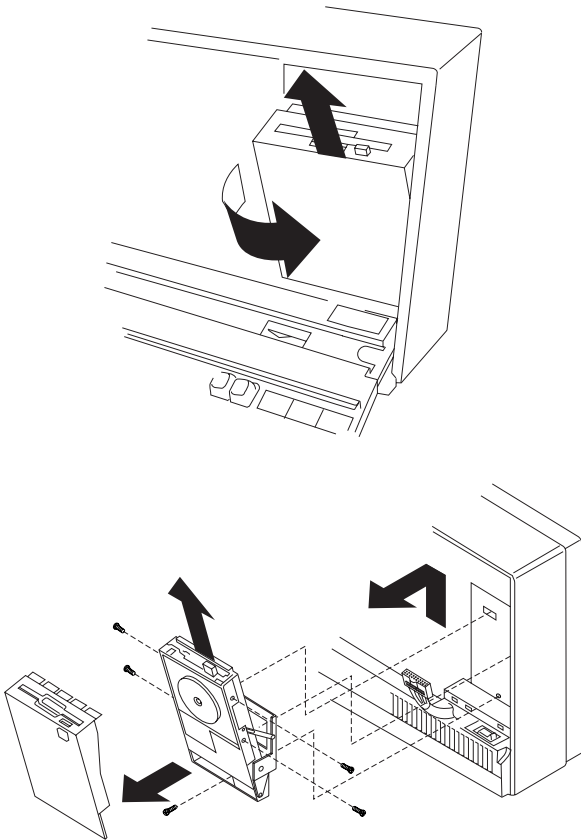
Model P70/P75 Exploded View (continued)

H, Model P75



Model P70/P75 Exploded View (continued)

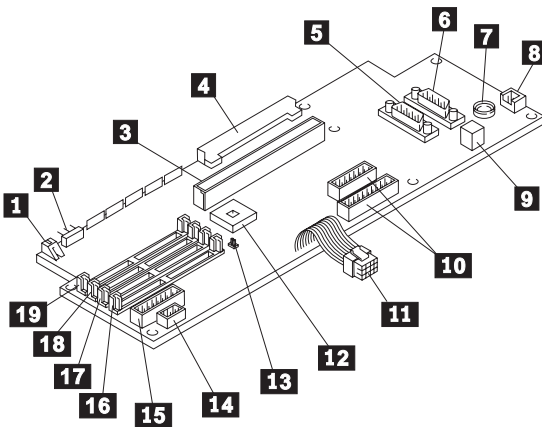
H₂ Model P70



Locations

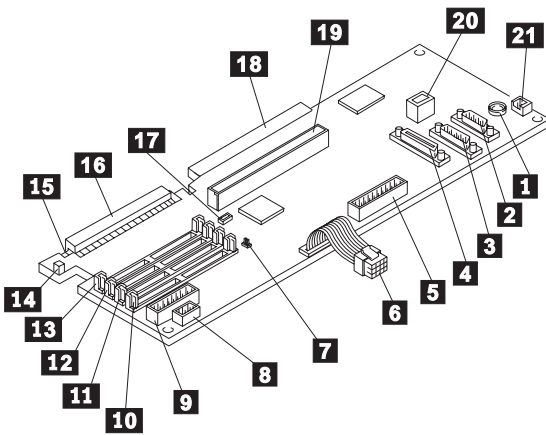
System Board (P70)

- 1** Speaker Connector
- 2** Battery Connector
- 3** Expansion Connector
- 4** Plasma-Display-Adapter Connector
- 5** Parallel-Port Connector
- 6** Serial-Port Connector
- 7** Pointing-Device Connector
- 8** Keyboard Connector
- 9** External Diskette-Drive Connector
- 10** Hard-Disk-Drive Connector
- 11** Power-Supply Connector
- 12** 80387 Math Coprocessor Connector
- 13** Password-Override Connector
- 14** Indicator Connector
- 15** Diskette-Drive Connector
- 16** Memory-Module Connector 4 (MEM 4)
- 17** Memory-Module Connector 3 (MEM 3)
- 18** Memory-Module Connector 2 (MEM 2)
- 19** Memory-Module Connector 1 (MEM 1)

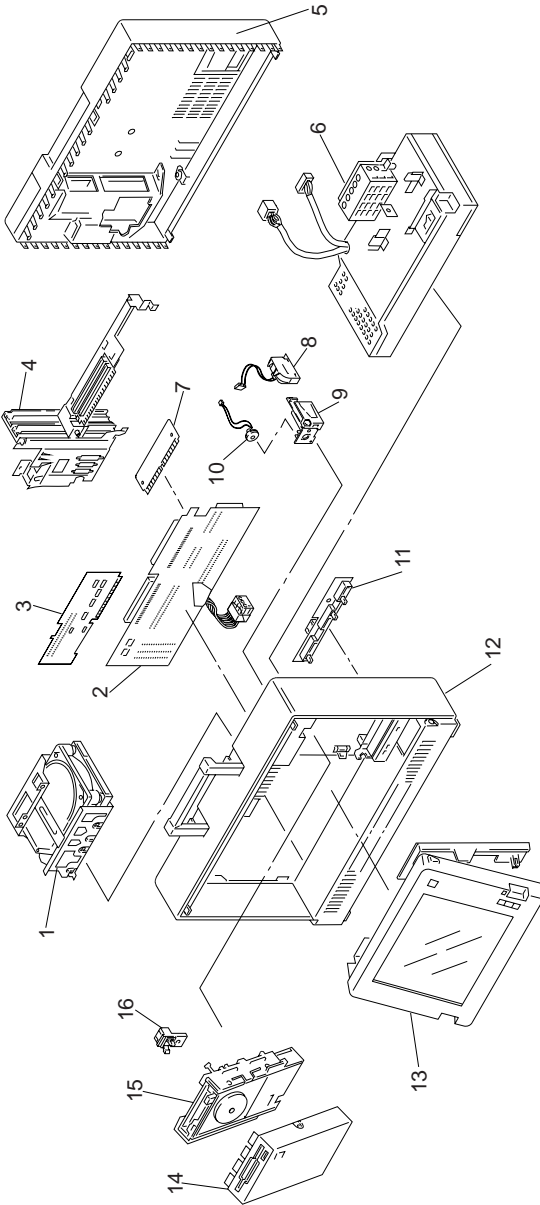


System Board (P75)

- 1** Pointing-Device Port Connector
- 2** Serial-Port Connector
- 3** Parallel-Port Connector
- 4** SCSI-Port Connector
- 5** Hard-Disk-Drive Connector
- 6** Power-Supply Connector
- 7** Password-Override Connector
- 8** Indicator Connector
- 9** Diskette-Drive Connector
- 10** Memory-Module Connector 4 (MEM 4)
- 11** Memory-Module Connector 3 (MEM 3)
- 12** Memory-Module Connector 2 (MEM 2)
- 13** Memory-Module Connector 1 (MEM 1)
- 14** Speaker Connector
- 15** Battery Connector
- 16** Processor-Card Connector
- 17** Expansion Connector, small
- 18** Plasma Display Card Connector
- 19** Expansion Connector, large
- 20** External Storage-Device Connector
- 21** Keyboard Connector



Parts Listing (P70)



System (P70, All Serial Numbers)

Index

1	See DASD	
7	2MB Memory Module	92F0104
	4MB Parity Memory-Module Kit (70ns)	79F3234
8	Battery	72X8498
9	Holder, Battery/Speaker	65X1571
10	Speaker	65X1319
	80387 Math Coprocessor, 16 MHz	72X6673
	80387 Math Coprocessor, 20 MHz	90X7393
11	LED Assembly	65X1569
13	Plasma Display Assembly (see page 177)	38F4737
	Bracket, Bus Interface	6279235
	Cable, Keyboard	65X1576
	Cable, Plasma Display Signal	65X1574
	Name Plate, Model P70	65X1528
	Copper Tape Kit (for ECA 104)	07G1680
	Shipping Carton (U.S. and Canada)	23F3196
	Shipping Carton (other countries)	23F3195
	Rear Door	65X1583
	Screws (four each)	23F2741
	6/32 x 1/4, 3 x 5 mm,	
	3 x 8 mm, mm 3 x 10, 3 x 12 mm,	
	3.5 x 6 mm, 4 x 4 mm, 4 x 8 mm,	
	4 x 9 mm, 4 x 10 mm	

System (P70, Serial Number xxxx49999 and earlier)

Index

2	System Board (031, 16 MHz)	38F5969
2	System Board (061, 121, 20 MHz)	65X1564
3	Plasma Display Adapter (see page 177)	38F4686
	Cable, Plasma Display Power (see page 177)	38F5939
4	Bus Interface Assembly	65X1567
	Bus Interface Card	79F3197
5	Cover, Rear	65X1582
6	Power Supply (see page 177)	38F4734
12	Cover, Main (8573-031, 23 prefix) (R)	38F7821
12	Cover, Main (8573-031, 99 prefix) (R)	38F8947
12	Cover, Main (8573-061, 23 prefix) (R)	65X1577
12	Cover, Main (8573-061, 99 prefix) (R)	23F3206
12	Cover, Main (8573-121, 23 prefix) (R)	23F3018
12	Cover, Main (8573-121, 99 prefix) (R)	23F3207
	Cover, PDP Connector	65X1558
14	Cover, Diskette Drive	79F3239
	Cover, Hard Disk Drive	65X1563
	Tilt Assembly, Diskette Drive	65X1559
	Display Tilt	65X1579

System (P70, Serial Number xxxx50001 or later)

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2	System Board (031, 16 MHz)	56F9084
2	System Board (061, 121, 20 MHz)	56F9085
3	Plasma Display Adapter (see page 177)	59F9083
	Cable, Plasma Display Power	56F9087
4	Bus Interface Assembly	56F9101
	Bus Interface Card	79F3197
	Cover, PDP Connector	56F9102
	Cover, Hard Disk Drive	56F9089
	Cover, Rear	56F9096
	Tilt Assembly, Diskette Drive	56F9097
	Display Tilt	56F9100
12	Cover, Main (8573-031, 23 prefix) (R)	56F9090
12	Cover, Main (8573-031, 99 prefix) (R)	56F9091
12	Cover, Main (8573-061, 23 prefix) (R)	56F9092
12	Cover, Main (8573-061, 99 prefix) (R)	56F9093
12	Cover, Main (8573-121, 23 prefix) (R)	56F9094
12	Cover, Main (8573-121, 99 prefix) (R)	56F9095
14	Cover, Diskette Drive	56F9088
16	Catch, Diskette Drive	23F2742

DASD (P70 386)

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1	30MB Hard Disk Drive (ESDI) (Includes ESDI hard disk controller)	6128287
1	60MB Hard Disk Drive (ESDI) (Includes ESDI hard disk controller)	6128294
1	120MB Hard Disk Drive (ESDI) (Includes ESDI hard disk controller)	6128291
15	1.44MB Diskette Drive	38F5936
	Cable, Diskette Drive	65X1572
	Cable, Hard Disk	64F8799

Options and Adapters (P70)

2MB Memory Module	07G1879
2-8MB 80386 Memory Expansion Adapter	90X9556
2MB Memory Module (85ns) (for 90X9556)	92F0104
300/1200 Modem Adapter/A	34F0006
Communications Cable (for 34F0006)	8285985
300/1200/2400 Modem Adapter/A	65X1253
Communications Cable (for 65X1253)	94X1540
36/38 Emulation Adapter	69X6294
5.25-inch Drive Adapter/A (360KB/1.2MB)	15F7996
80386 Memory Expansion Adapter	72X6671
Memory Expansion Kit (for 72X6671)	72X6672
80387 Coprocessor, 16MHz	72X6673
80387 Coprocessor, 20MHz	90X7393
Diskette Drive Bus Adapter	72X8524
External Diskette Drive Adapter	72X6757
FaxConcentrator Adapter/A	94X2540
FaxConcentrator Adapter/A Cable	94X2527
High Speed Communications Coprocessor	04G5827
Leased Line Modem	26F0724
Multiprotocol Adapter/A	85F0004
Realtime Interface Coprocessor 6-Port V.35	72F0164
Realtime Interface Coprocessor Multiport/2	09F1888
4-port RS232-C Elec Intfc Brd (for 09F1888)	09F1957
8-port RS232-C Elec Intfc Brd (for 09F1888)	91F7974
512KB Memory Module Pkg (for 09F1888)	16F2267
Multiport Interface Cable (for 09F1888)	00F5524
S/370 Channel Emulator Adapter/A	06F3160
SCSI Adapter/A (with Cache)	85F0063
Terminator, External (for 85F0063)	33F8464
Terminator, Internal (for 85F0063)	92F0057
SCSI Adapter/A (without Cache)	85F0002
SCSI Cable (internal)	64F4127
SCSI Fast Adapter (16 Bit AT)	92F0330
SCSI External Cable (for 92F0330)	32G4089
SCSI Internal Cable (for 92F0330)	37G0084
SDLC Adapter	8286099
Terminator, Inline (space permitting)	92F0142
Token-Ring 16/4 Adapter/A	93F0331
Token-Ring 16/4 Adapter	93F0334
Token-Ring Adapter/A	25F7540
RPL Module (for 25F7540)	83X9180
X.25 Interface Coprocessor	44F7123

Keyboard and Mouse (P70 386)

Belgian	65X1598
Canadian French	65F0000
Danish	65X1601
Dutch	65X1602
French	65X1603
German	65X1604
Italian	65X1605
Latin Spanish	65X1606
Norwegian	65X1607
Portuguese	65X1608
Spanish	65X1609
Swedish	65X1610
Swiss/French/German	65X1611
U.K. English	65X1612
U.S. English	65X1537
Turkish	65X1613
Greek	65X1614
Hebrew	65X1615
Arabic	65X1616
Keyboard Cable	64F9998
Mouse	61X8923

IMPORTANT: (See ECA 014)

Some early P70 386 computers require concurrent replacement of the plasma display assembly, plasma display adapter, power supply, or plasma display power cable. Follow the instructions below to determine the proper parts to be replaced. Do not use any part numbers other than the ones listed.

Instructions:

Step 1: Check the serial number of the system unit. The serial number is under the left corner of the plasma display panel.

**Is the serial number (S/N)
between 230000001 and 230004000 or
between 231000001 and 231001000 ?**

Yes: Go to step 2.

No: Replace the failing part.

Step 2: Check the FRU number of the plasma display assembly. The FRU number is on the back of the plasma display panel.

or

Check the color of the power supply cable from the power supply assembly to the plasma display assembly.

Is the FRU number of the plasma display assembly 38F4737 ?

or

Is the color of the power supply cable GRAY?

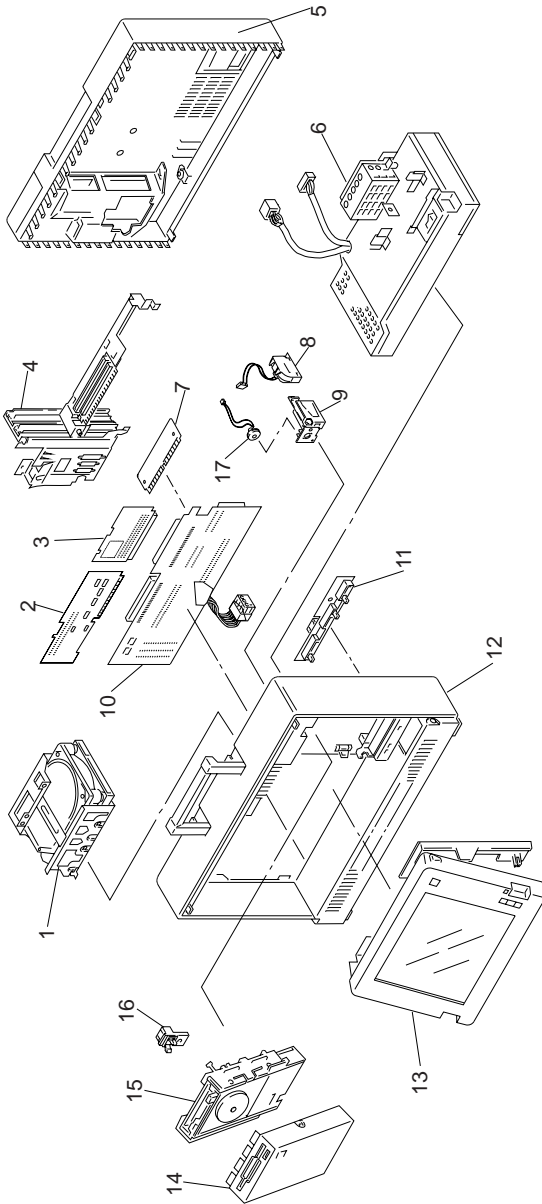
Yes: Replace the failing part.

No: Replace all parts in Table 1 at the same time.

Part Name	Part Number
Plasma Display Assembly	38F4737
Plasma Display Adapter	38F4686
Power Supply	38F4734
Plasma Display Power Cable	38F5939

Table 1. Parts for Concurrent Replacement

Parts Listing (P75)



System Unit (P75 486)

Index

1	See DASD	
	Bracket, Bus Interface	6279235
2	Plasma Display Adapter	78F9897
3	Processor Card, (80486 33MHz)	64F8789
	Screw-kit	64F9989
4	Bus Interface, 4-slot	64F9977
	Bus Interface Cable	78F9893
	Cable Set, Ground	64F9990
	Cable, Plasma-Display Power (with cable tie)	64F9973
	Cable, Plasma-Display Signal (with cable tie)	64F9974
5	Cover, Rear	64F9984
	Security Key/Lock	64F9991
	Display Tilt	56F9100
6	Power Assembly	64F8798
7	2MB Memory Module Kit (70ns)	92F0102
7	4MB Memory Module Kit (70ns)	92F0105
	4MB Parity Memory-Module Kit (70ns)	79F3234
8	Battery	64F9987
9	Holder, without Speaker/Battery	64F9986
10	System Board (161, 401, 33Mhz)	78F9896
11	LED Assembly	65X1569
	Name Plate, System Unit	64F9988
	Name Plate, Keyboard	65X1549
	Connector, Plasma Display	56F9102
	Cover, Connector	64F9978
12	Cover, Main (Model 161)	
	S/N 99xxxxx	64F9980
	S/N 23xxxxx	64F9981
12	Cover, Main (Model 401)	
	S/N 99xxxxx	64F9982
	S/N 23xxxxx	64F9983
13	Plasma Display Assembly	64F9985
14	Cover, Diskette Drive	56F9088
	Bracket, Fixed Disk Drive	64F9979
16	Catch, Diskette Drive	23F2742
17	Speaker	78F9921
	Tilt Assembly, Diskette Drive	56F9097
	Shipping Carton Box	
	S/N 99xxxxx	64F9996
	S/N 23xxxxx	64F9997

DASD (P75 486)

Index

1	160MB Fixed Disk	56F8851
	SCSI ID Switch for 160MB	79F3218
1	400MB Fixed Disk	85F0012
	SCSI ID Switch for 400MB	79F3219
	Cable, Fixed-Disk Power	64F9971
	Cable, Fixed-Disk Signal	64F9976
15	3.5-Inch Diskette Drive	38F5936
15	3.5-Inch Diskette Drive (with 4MB Sensor)	38F5936

Options and Adapters (P75 486)

300/1200 Modem Adapter/A	34F0006
300/1200/2400 Modem Adapter/A	65X1253
Communications Cable (for 65X1253)	94X1540
36/38 Emulation Adapter	69X6294
5.25-inch Drive Adapter/A (360KB/1.2MB)	15F7996
6157 Tape Adapter	37F6718
Diskette Drive Bus Adapter	72X8524
External Diskette Drive Adapter	72X6757
FaxConcentrator Adapter/A	94X2540
FaxConcentrator Adapter/A Cable	94X2527
High Speed Communications Coprocessor	04G5827
Internal Tape Backup Unit	87F9787
Formatted Blank Tape (for 87F9787)	30F5277
Leased Line Modem	26F0724
Multiprotocol Adapter/A	85F0004
Realtime Interface Coprocessor 6-Port V.35	72F0164
Realtime Interface Coprocessor Multiport/2	09F1888
4-port RS232-C Elec Intfc Brd (for 09F1888)	09F1957
8-port RS232-C Elec Intfc Brd (for 91F1888)	91F7974
Multiport Interface Cable (for 09F1888)	00F5524
512KB Memory Module Pkg (for 09F1888)	16F2267
S/370 Channel Emulator Adapter/A	06F3160
Screen Reader Keypad	1393515
Screen Reader Keypad Cable	72X8537
SCSI Adapter/A (with Cache)	85F0063
Terminator, External (for 85F0063)	33F8464
Terminator, Internal (for 85F0063)	92F0057
SCSI Adapter/A (without Cache)	85F0002
SCSI Cable (internal)	64F4127
SCSI Fast Adapter (16 Bit AT)	92F0330
SCSI External Cable (for 92F0330)	32G4089
SCSI Internal Cable (for 92F0330)	37G0084
Tape Cover Plate	87F9767
Terminator, Inline (space permitting)	92F0142
Token-Ring 16/4 Adapter/A	93F0331
Token-Ring Adapter/A	25F7540
RPL Module (for 25F7540)	83X9180
X.25 Interface Coprocessor	44F7123

Keyboard and Mouse (P75 486)

Belgian	65X1598
Canadian French	65F0000
Danish	65X1601
Dutch	65X1602
French	65X1603
German	65X1604
Italian	65X1605
Latin Spanish	65X1606
Norwegian	65X1607
Portuguese	65X1608
Spanish	65X1609
Swedish	65X1610
Swiss/French/German	65X1611
U.K. English	65X1612
U.S. English	65X1537
Turkish	65X1613
Greek	65X1614
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ThinkPad 300 (2615)

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General Checkout

Important

The diagnostic tests are intended to test *only* IBM products. Non-IBM products, prototype card, or modified options can give false errors and invalid computer responses.

1. Power-off the computer and all external devices.
2. Insert the Advanced Diagnostics diskette into the diskette drive.
3. Power-on all external devices, then power-on the computer.
4. Press **Ctrl+Alt+Ins** to start the Monitor program.
5. At the Monitor-program prompt, type **BF** then press **Enter**.
6. Follow the instructions on the screen and run the diagnostics tests. For information on how to disable a password, see "Power-On Password" on page 194.

Note: Press **F1** to access the help screens.

7. If you receive an error or message, find your symptom below, then go to the appropriate page.

Symptom	Go to ...
Numeric Error Code	"Symptom-to-FRU Index" on page 185
Error Messages	"Miscellaneous Symptoms" on page 190

Note

For information about how to run diagnostics, passwords, and various other tests, go to "Related Service Procedures" on page 193.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this index to help you decide which FRUs to have available when servicing the computer.

Note

For IBM devices not supported by the ThinkPad 300 diagnostic code, refer to the manual for that device.

Numeric Error Codes

Symptom/Error	FRU/Action
200006 - Hard Drive Error	<ol style="list-style-type: none">1. Check drive cable connection.2. Boot the computer from the diskette drive, back up the hard drive, then prep and format the hard drive.3. Replace hard drive.4. Replace video/power board.
200007 - Hard Drive Error	<ol style="list-style-type: none">1. Check drive cable connection.2. Boot the computer from the diskette drive, back up the hard drive, then prep and format the hard drive.3. Replace hard drive.4. Replace video/power board.
200008 - Hard Drive Error	<ol style="list-style-type: none">1. Check drive cable connection.2. Replace hard drive.3. Replace video/power board.
200009 - Hard Drive Error	<ol style="list-style-type: none">1. Check drive cable connection.2. Reinstall the operating system on the hard disk.3. Boot the computer from the diskette drive, back up the hard drive, then prep and format the hard drive.

Symptom/Error	FRU/Action
200102 - Diskette Error	<ol style="list-style-type: none"> 1. Make sure diskette is properly formatted and inserted. 2. Try a different diskette. 3. Check all cable connections. 4. Replace diskette drive. 5. Replace video/power board.
200103 - Diskette Error	<ol style="list-style-type: none"> 1. Make sure diskette is properly formatted and inserted. 2. Try a different diskette. 3. Check all cable connections. 4. Replace diskette drive. 5. Replace video/power board.
200104 - Diskette Error	<ol style="list-style-type: none"> 1. Remove any non-system diskettes when powering on the computer. 2. Make sure diskette has a bootable operating system on it.
200105 - Diskette Error	<ol style="list-style-type: none"> 1. Reformat the diskette. 2. Replace the diskette. 3. Replace video/power board.
200110 - Floppy Drive Error	<ol style="list-style-type: none"> 1. Make sure diskette is fully inserted into the drive. 2. Make sure diskette is formatted. 3. Try a different diskette. 4. Replace diskette drive. 5. Replace video/power board.
200112 - Floppy Drive Error	<ol style="list-style-type: none"> 1. Check drive cable connection. 2. Replace diskette drive. 3. Replace video/power board. 4. Replace system board.
200113 - Floppy Drive Error	<ol style="list-style-type: none"> 1. Check drive cable connection. 2. Replace diskette drive. 3. Replace video/power board. 4. Replace system board.

Symptom/Error	FRU/Action
200301 - Memory Error	<ol style="list-style-type: none"> 1. Power-off computer, wait 15 seconds, then power-on. 2. If the message reappears, replace system board.
200302 - Memory Error	<ol style="list-style-type: none"> 1. Power-off computer, wait 15 seconds, then power-on. 2. If the message reappears, replace system board.
200303 - Memory Error	<ol style="list-style-type: none"> 1. Power-off computer, wait 15 seconds, then power-on. 2. Perform BIOS update. See "BIOS Update Procedure" on page 195. 3. Replace system board.
200304 - Memory Error	<ol style="list-style-type: none"> 1. Replace system board.
200305 - Memory Error	<ol style="list-style-type: none"> 1. Perform BIOS update. See "BIOS Update Procedure" on page 195. 2. Replace system board.
200307 - Memory Error	<ol style="list-style-type: none"> 1. Charge battery, re-enter configuration data in Setup, power-off computer, then power-on. 2. Replace backup battery. 3. Replace system board.
200308 - Memory Error	<ol style="list-style-type: none"> 1. Make sure memory modules are properly seated in their sockets. 2. Use Setup to confirm that the hardware configuration is correct. 3. Run Advanced Diagnostics to determine what hardware is failing. 4. Replace memory modules if errors are above 2MB. 5. Replace system board if errors are below 2MB or if replacing memory modules did not help.

Symptom/Error	FRU/Action
<p>200351 - PMI Error An SVGA monitor is required to run the application that is to be resumed.</p>	<ol style="list-style-type: none"> 1. This message appears if an SVGA monitor was attached when the system entered suspend mode, but it was not found when the system resumed. 2. Attach an SVGA monitor before resuming.
<p>200352 or 200353 - PMI Error</p>	<ol style="list-style-type: none"> 1. Retry the operation after the computer is finished accessing the diskette drive.
<p>200354 - PMI Error</p>	<ol style="list-style-type: none"> 1. Insert the diskette that was in the computer when it was rested.
<p>200355 - PMI Error</p>	<ol style="list-style-type: none"> 1. Retry the operation after modem or serial port activity is finished. 2. Replace system board.
<p>200402, 200403, 200404, 200405 - Memory Error</p>	<ol style="list-style-type: none"> 1. Power-off computer, wait 15 seconds, then power-on. 2. Replace system board.
<p>200453 or 200459 - Configuration Error This message is normal after backup battery replacement.</p>	<ol style="list-style-type: none"> 1. Use the Setup program to reconfigure. 2. Replace backup battery. 3. Replace system board.

Symptom/Error	FRU/Action
200456 - Configuration Error	<ol style="list-style-type: none"> 1. Use the Setup program to verify extended RAM memory size matches memory installed. 2. Ensure memory module is proper installed. 3. Use Advanced Diagnostics to test extended memory. If you cannot boot computer, replace system board and retry. <ul style="list-style-type: none"> • If the tests identify an expansion memory module (memory above 2MB), replace it. • If the tests identify a problem in the memory below 2MB, replace system board.
200458 - Configuration Error	<ol style="list-style-type: none"> 1. Use Setup program to reconfigure. 2. Make sure the drive is bootable. 3. Replace hard drive. 4. Replace system board.
200552 - Error	<ol style="list-style-type: none"> 1. Verify keyboard is properly connected. 2. Replace keyboard. 3. Replace system board.
200553 - Error	<ol style="list-style-type: none"> 1. Recharge the battery pack. 2. Replace battery pack. 3. Replace video/power board.
200554 - Error	<ol style="list-style-type: none"> 1. Replace battery pack. 2. Replace video/power board.
200555 - Error	<ol style="list-style-type: none"> 1. Reboot computer and enter the correct password.

Symptom/Error	FRU/Action
200556 or 200557 - Error	<ol style="list-style-type: none"> 1. Try another copy of the software, or have the customer contact the software manufacturer or dealer and report the problem. 2. Power-off computer, wait 15 seconds, then power-on. If the message reappears, replace system board.
200558 - Error	<ol style="list-style-type: none"> 1. Try another copy of the software, or have the customer contact the software manufacturer or dealer and report the problem. 2. Power-off computer, make sure all external cable connections are secure, wait 15 seconds, and then power-on. If the message reappears, replace system board.

Miscellaneous Symptoms

Symptom/Error	FRU/Action
AC Adapter connected, no charge light	<ol style="list-style-type: none"> 1. Replace AC Adapter 2. Battery pack 3. Video/power board
Red Charge LED	<ol style="list-style-type: none"> 1. Replace battery 2. Video/power board
No display and no status icons	<ol style="list-style-type: none"> 1. System board 2. Video/power board
Display blank, any status icon on	<ol style="list-style-type: none"> 1. Top cabinet/LCD 2. Video/power board
Rest/Resume problem	<ol style="list-style-type: none"> 1. Check setup 2. Backup battery 3. System board 4. Video/power board
Won't boot from diskette	<ol style="list-style-type: none"> 1. Check setup 2. Diskette drive 3. Video/power board
Won't boot from hard disk	<ol style="list-style-type: none"> 1. Check Setup 2. Hard disk 3. Video/power board
Time/Date problems	<ol style="list-style-type: none"> 1. Backup battery 2. System board
LCD not readable	<ol style="list-style-type: none"> 1. Top cabinet/LCD 2. Video/power board

Symptom/Error	FRU/Action
No backlight	<ol style="list-style-type: none"> 1. Top cabinet/LCD 2. Video/power board
"No system"	<ol style="list-style-type: none"> 1. Install the operating system. Refer to operating system documentation. 2. Re-enter the boot command syntax and make certain a valid drive was selected.
"Non-maskable interrupt received!"	<ol style="list-style-type: none"> 1. If a software problem is suspected, have the customer contact the software manufacturer or dealer and report the problem. 2. Use the Advanced Diagnostics to test the computer. 3. Replace AC adapter.
"Retries exhausted, Please remove diskette"	<ol style="list-style-type: none"> 1. Power-off computer, then try reprogramming with another Advanced Diagnostics diskette. 2. Replace system board.
"Error programming FLASH Device. Retrying" The Flash ROM is not accepting data.	<ol style="list-style-type: none"> 1. Replace system board.
"Device failure! Device content has been corrupted"	<ol style="list-style-type: none"> 1. Replace system board.
"Remove floppy and re-insert to try again, else reboot"	<ol style="list-style-type: none"> 1. Follow the instructions listed. If this does not work, power-off computer, wait 15 seconds, then power-on. Try reprogramming with another Advanced Diagnostics diskette. 2. Replace system board.
"Device error during erasing process"	<ol style="list-style-type: none"> 1. Replace system board.
"Device error during programming process"	<ol style="list-style-type: none"> 1. Replace DC-to-DC board. 2. Replace system board.
"Program verify failure"	<ol style="list-style-type: none"> 1. Replace system board.
















Failed Device to FRU Index

Whenever a diagnostic test fails, an error message is displayed indicating what device failed. The following table cross references a failed device message to the failing FRU.

Diagnostic Message	FRU
CPU	1. Main Board
Real Time Clock	1. Main Board
Math Coprocessor	1. Math Coprocessor 2. Main Board
DMA Controller	1. Main Board
Speaker	1. Bottom Cabinet Assy
Flash ROM	1. Main Board
Interrupt Controller	1. Main Board
Interval Timer Circuit	1. Main Board
System Control Processor	1. Main Board
COM1 Serial Port	1. Main Board
COM2 Serial Port	1. Main Board
Parallel Port (378H)	1. Main Board
Parallel Port (278H)	1. Main Board
CPU Crystal	1. Main Board
Interval Timer Crystal	1. Main Board
Interrupt Control Circuit	1. Main Board
PS/2 Mouse Circuit	1. Main Board
Video Controller	1. Video Board
Video Memory	1. Video Board
Hard Drive Controller (0)	1. Hard Drive 2. Video Board
Hard Drive (0)	1. Hard Drive 2. Video Board
Floppy Drive Controller	1. Video Board
Floppy Drive	1. Diskette Drive
Parity	1. Main Board
Cache Circuitry	1. Main Board
Cache Data RAM	1. Main Board
Cache Tag RAM	1. Main Board
Base Memory	1. Main Board
Extended Memory	1. Memory Module 2. Main Board
Configuration RAM	1. Main Board
Modem	1. Modem 2. Video Board

Related Service Procedures

Status Indicators

Light	State	Status Indicated
	Green	Battery pack is full.
	Amber	Battery pack is being fast charged.
	Amber (flashing)	Battery pack temperature is out of operational range.
	Red	Problem in battery circuit.
	Off	Computer is operating from battery pack. Battery pack is removed from computer. Computer is off. Computer is using external power (car battery or AC power).
	On	Computer is attached to AC power
	On	Standby mode is active
	On	Computer is operating from battery
	On	Hard disk drive is active
	On	Diskette drive is active
	On	Port replicator is attached
	On	External video is enabled
	On	Modem is enabled
	On	LAN controller is enabled
	On	Speaker is enabled
	On	Keyboard is in Num Lock mode
	On	Keyboard is in Caps Lock mode
	On	Keyboard is in Scroll Lock mode
	On	Imbedded keypad is locked on

Power-On Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

How to Run Advanced Diagnostics

1. Power-off the computer and all external devices.
2. Insert the Advanced Diagnostics diskette into diskette drive.
3. Power-on all external devices, then power-on the computer.
4. Press **Ctrl+Alt+Ins** to start the Monitor program.
5. At the Monitor-program prompt, type **BF** then press **Enter**.
6. Follow the instructions on the screen and run the diagnostics tests.

Note: Press **F1** to access the help screens.

Using the Advanced Utilities

To use the advanced utilities, select Advanced Utilities from the Run Tests menu. Use the arrow keys to move the highlight to the proper utility. Instructions are provided on the screens when the utilities are selected.

Read LAN ID

Select this field to read the current LAN ID number that is programmed into the main board.

Set LAN ID

Select this field to program a new LAN ID number into the main board.

Set EEPROM

Select this field to program the EEPROM. It allows you to set LCD display type (monochrome or color) and enable or disable the LAN option, if installed.

PREP — Hard Disk Low Level Format

The PREP utility initializes and prepares the hard disk surface for the storage of data. It performs a low-level format, then checks for bad sectors. If any bad sectors are found, they are marked in a way that prevents data from being stored in them.

There are two situations where PREP is used.

- To prepare the hard disk drive surface for formatting when installing a new hard disk drive.
- To exclude sectors of the hard disk that have become unusable, indicated by intermittent or continuous hard disk drive read failures.

Warning

PREP erases all data on the hard disk. If at all possible, always back up the data on the hard disk to diskettes before running PREP.

BIOS Update Procedure

Use this procedure to reprogram the computer's BIOS. The computer contains the latest version of BIOS available when manufactured, but later revisions might be available. There are two reasons for replacing the BIOS.

1. To have a more recent version of BIOS that adds features that enhance the computer's performance.
2. To reinstall the BIOS on a computer in which the BIOS has become corrupt.

After you select this option, the current BIOS version will be displayed. You will be asked if you want to overwrite the current BIOS version. If you answer Yes, the computer will look for the BIOS image file on drive A and install it.

Note: Always operate the computer on AC power when updating the BIOS.

Product Overview

The following table provides a brief overview of the system features.

Feature	Description
Processor (MHz)	386SL 25-MHz
Bus Architecture	AT Bus
Memory (Standard)	4MB
Memory (Maximum)	12MB
CMOS RAM	256KB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	80MB 120MB

FRU Removals and Replacements

Follow the numerical sequence in the FRU removal sequence list and in the exploded view to remove or disconnect parts in the correct order. The letters in parentheses in the list indicate screw types. See the "Screw Size Chart" on page 19 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

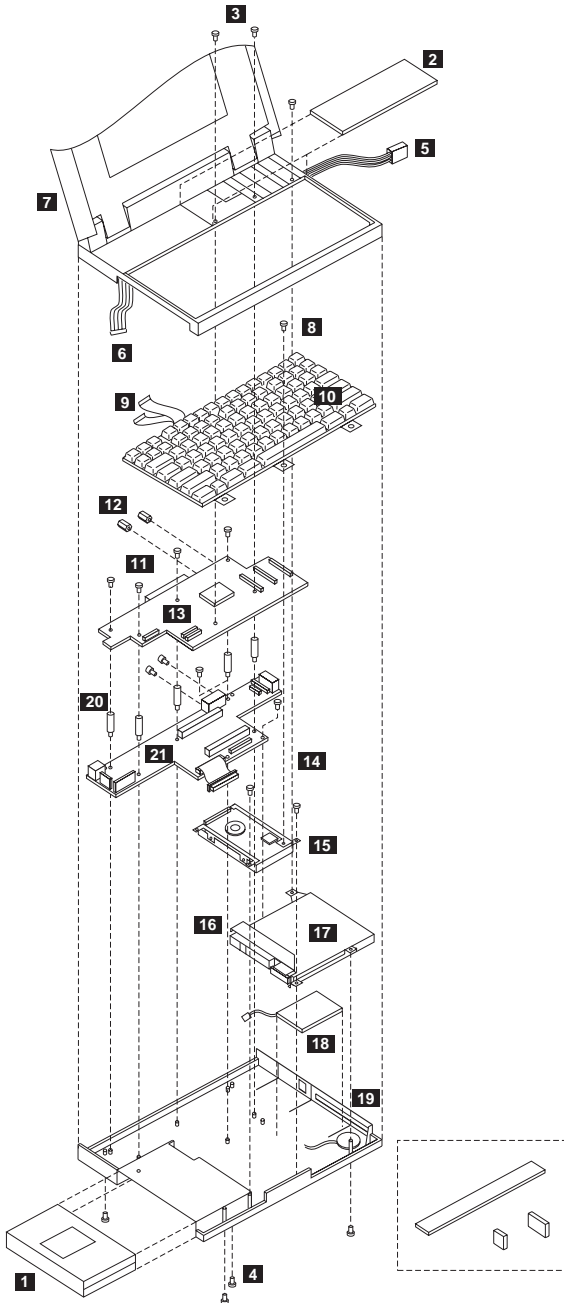
Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

- 1 Battery Pack**
- 2 Coprocessor Cover**
- 3 Three Top Cover Screws (1-B, 2-TT)**
(At rear of keyboard)
- 4 Five Bottom Cover Screws (4-B, 1-UU)**
(One is inside battery compartment)
- 5 LCD Cable**
- 6 LCD Ribbon Cable**
- 7 LCD Assembly**
- 8 One Keyboard Screw (D)**
(At front of keyboard)
- 9 Two Ribbon Cables**
- 10 Keyboard Assembly**
- 11 Four System Board Screws (D)**
- 12 Two Threaded Hex Spacers**
(At rear of system board)
- 13 System Board**
- 14 Three Hard Disk Drive Screws (D)**
- 15 Hard Disk Drive and Mounting Brackets**
(Have customer backup all information before replacing drive. Do not replace the hard drive if the computer is operating or is in suspend mode. Restore drive system information using the customer's backup copy of the system programs.)

- 16** Diskette Drive Ribbon Cable
- 17** Diskette Drive
- 18** Backup Battery
- 19** Speaker
- 20** Five Threaded Spacers
- 21** Video/Power Board

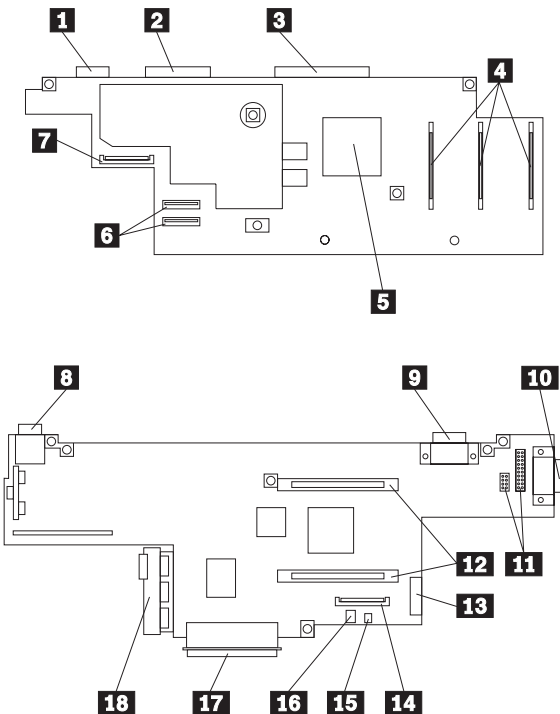
Exploded View



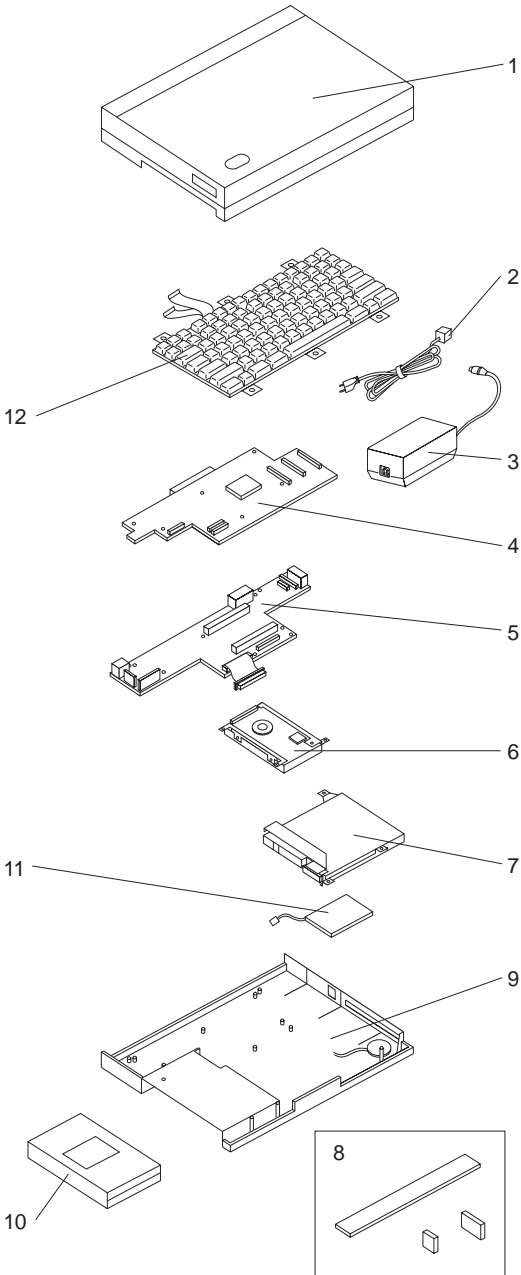
Locations

System Board

- 1** Serial Connector
- 2** Parallel Connector
- 3** Port Replicator Connector
- 4** Memory Module Connectors
- 5** Math Coprocessor Connector
- 6** Keyboard Connector
- 7** Status Light Panel Connector
- 8** AC Adapter Connector
- 9** External Display Connector
- 10** LAN Connector
- 11** LCD Connectors
- 12** System Board Connectors
- 13** Modem Connector
- 14** Diskette Connector
- 15** Speaker Connector
- 16** Backup Battery Connector
- 17** Hard Disk Drive Connector
- 18** Battery Contacts



Parts Listing



System Unit (300)

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1	Top Cover Assembly, Monochrome	33G9301
1	Top Cover Assembly, Color	33G9320
2	Power Cord, US	6952301
2	Power Cord, UK	14F0033
2	Power Cord, Switzerland	14F0051
2	Power Cord, Europe	13F9979
3	A.C. Power Cube	33G6490
4	System Board, Monochrome (US)	33G9297
4	System Board, Color (US)	33G9487
4	System Board, Monochrome (Europe)	33G9488
4	System Board, Color (Europe)	33G9489
	2MB Memory Module	33G9310
	8MB Memory Module	33G9311
5	Video/Power Board	33G9296
8	Parts Pack, Cover	33G9302
9	Bottom Cover Assembly	33G9305
10	Battery Pack	33G9298
11	Backup Battery	33G9295
	Speaker	33G9475
	Parts Package, Screws	33G9303
	Parts Package, Covers	33G9302
12	See Keyboards (300)	

DASD (300)

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6	80MB Hard Disk Drive	33G9306
6	120MB Hard Disk Drive	33G9307
7	Diskette Drive	33G9304

Options and Adapters (300)

AC Adapter, Power Cube	33G6490
Charging Cradle	33G9312
NiMH Battery	33G9298
Port Replicator (standard)	33G9313
Ethernet Adapter (thin)	33G9308
Ethernet Adapter (twisted pair)	33G9309
Modem, 2400 BPS, US	92F8846
Fax/Modem, US	92F8896
Fax/Modem, Worldwide	33G6293
Fax/Modem DAA Adapter, US	92F8847
Fax/Modem DAA Adapter, UK	92F8848
Fax/Modem DAA Adapter, Danish	92F8849
Fax/Modem DAA Adapter, French	92F8850
Fax/Modem DAA Adapter, German	92F8851
Fax/Modem DAA Adapter, Italian	92F8852
Fax/Modem DAA Adapter, Norwegian	92F8853
Fax/Modem DAA Adapter, Spanish	92F8854
Fax/Modem DAA Adapter, Swedish	92F8855
Fax/Modem DAA Adapter, Swiss	92F8856
Fax/Modem DAA Adapter, Australia	33G9284
Fax/Modem DAA Adapter, New Zealand	33G9387
Fax/Modem DAA Adapter, Latin America	92F9288
BIOS Update Diskette	33G9490

Keyboards (300)

Belgian	33G9423
Canadian	33G9422
Danish	33G9424
Dutch	33G9425
French	33G9324
German	33G9317
Italian	33G9318
Latin America Spanish	33G9431
Norwegian	33G9426
Portuguese	33G9427
Spanish	33G9319
Swedish/Finnish	33G9428
Swiss	33G9430
U.K. English	33G9316
U.S. English	33G9315
Numeric Keypad	33G9314

Tools

Tri-Connector Wrap Plug	72X8546
PC Test Card	35G4703
Audio Wrap Cable	66G5180
Screwdriver Kit	95F3598

ThinkPad 350, PS/Note 425 (2618)

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General Checkout

The diagnostic tests are intended to test *only* IBM products. Non-IBM products, prototype card, or modified options can give false errors and invalid computer responses.

Warning: Drives in the computer that you are servicing might have been rearranged or the drive startup sequence might have been altered. Be extremely careful during write operations such as copying, saving, or formatting. Data or programs can be written over if you select an incorrect drive.

1. Power-off the computer and all external devices.
2. Check all cables and power cords for correct connection.
3. Insert the Advanced Diagnostics diskette into the diskette drive.
4. Power-on all external devices.
5. Power-on the computer and check for one short beep at the end of POST with a clear and readable diagnostics menu displayed. If you did not get the correct responses, go to "Symptom-to-FRU Index" on page 211.
6. Run the advanced diagnostics tests. For information on how to disable the password, see "Power-On Password" on page 216.
7. Find your symptom below, then go to the appropriate page. Otherwise, see "Symptom-to-FRU Index" on page 211, then go to "Undetermined Problems" on page 214.

Symptom	Go to ...
Error Code or Message	"Symptom-to-FRU Index" on page 211
Configuration Problem	"Checking the Installed Devices List" on page 218
Power Problem	"Power Systems Checkout" on page 209
Memory Problem	"Memory Checkout" on page 207
TrackPoint II Problem	"TrackPoint II Checkout" on page 470

Note

For information about how to run diagnostics, error messages, passwords, and various other tests and service checks, go to "Related Service Procedures" on page 215.

Memory Checkout

001

- Power-off (O) the computer and wait 10 seconds.
- Reseat the memory module.
- Insert the Advanced Diagnostics diskette into the diskette drive.
- Power-on (I) the computer.
- Make a note of any error code you receive.

DID YOU RECEIVE A 20X XXXXXXXX XXXXXXXX OR 02XX POST ERROR OR FAILURE SYMPTOM?

Yes No

002

Go to Step 006.

003

IS A MEMORY MODULE INSTALLED?

Yes No

004

Replace the system board. Press **Fn** and **F1** to set the time and date to remove any 16X errors.

005

Replace the memory module kit.

If the error remains, replace the system board. Press **Fn** and **F1** to set the time and date and remove the 16X errors.

006

(From step 002)

- If you need to bypass an error, press **Esc** or **F1**.
- If you cannot continue, you might have a keyboard problem; go to “Symptom-to-FRU Index” on page 211.

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

007

You might have a diskette drive problem; go to “Symptom-to-FRU Index” on page 211.

008

- Press **0 (SYSTEM CHECKOUT)**, then press **Enter**.
- Follow the screen instructions.

Note: Ignore a **199** error.

- Press **0 (RUN TESTS ONE TIME)**, then press **Enter**.
(Step **008** continues)

(CONTINUED)

008 (continued)

– Press **2 (MEMORY)**, then press **Enter**.

DID YOU RECEIVE A 2XX ERROR OR FAILURE SYMPTOM?

Yes No

009

Go to Step 011.

010

Go to Step 003 on page 207.

011

(From step 009)

DID THE SYSTEM CHECKOUT MENU APPEAR AT THE END OF THE TEST?

Yes No

012

You might have a power source problem; go to “Power Systems Checkout” on page 209.

013

The Advanced Diagnostics tests finished without detecting a failure. If you suspect an intermittent problem, start an error log. If you need instructions, refer to “Error Log” on page 217.

Power Systems Checkout

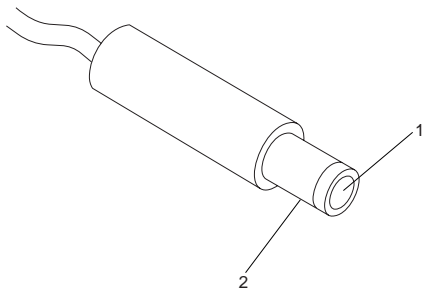
To check the system power, do the following.

1. Power-off the computer.
2. Remove the battery from the computer.
3. Check the battery voltage. The voltage should read 9 to 12 V dc across the negative and positive contacts (the two contacts farthest apart).

If the voltages **are not** correct, try recharging the battery pack.

If the voltages **are** correct, continue with the next step to test the AC adapter voltage.

4. Unplug the AC adapter from the computer.
5. Measure the voltage at the points shown.



V dc	+ Lead	- Lead
+13.5 to +15	2	1

If the voltage **is not** correct, replace the AC adapter.

If the voltage **is** correct, go to "Undetermined Problems" on page 214.

Standby Battery Check: To check the standby battery voltage, measure across the two contacts. The voltage should read 3.5 to 4.5 V dc.

If the voltage **is not** correct, replace the battery.

RTC Battery Check: To check the backup battery voltage, measure across the two contacts. The voltage should read 2.5 to 3.5 V dc.

If the voltage **is not** correct, replace the battery.

Power Management Features

Press **Fn + F1** to select the Configuration Utility. The Power Management Features can be accessed from this menu. Press **F1** for additional online help.

Important

Before using the power saving features, be sure to read and observe the following precautions:

- If you enter Suspend mode with a diskette inserted in the diskette drive, the same diskette must be installed in the drive before attempting to resume normal operation.
- If you enter Suspend mode with a PCMCIA** card inserted in the PCMCIA slot, the same PCMCIA card must be installed in the slot before attempting to resume normal operation.
- If the computer is connected to a Local Area Network (LAN) that periodically polls for station activity, the LAN-connection might be terminated while the computer is in Suspend mode. Any further attempt to access the network results in a brief delay and the computer appears to hang (up to 1 minute, depending on the network). After the delay, an error is displayed. Follow the instructions on the screen to restore normal operation.
- Any software program that was running over the LAN is not re-entered when you resume normal operation from Suspend mode.

** Trademark of the Personal Computer Memory Card International Association.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this index to help you decide which FRUs to have available when servicing the computer.

In the following error codes, *X* can be any number.

Note

For IBM devices not supported by the ThinkPad 350 and 350C diagnostic code, refer to the manual for that device.

Numeric Error Codes

Symptom/Error	FRU/Action
02X, 101, 107	<ol style="list-style-type: none">BatteryAC AdapterMemory OptionSystem Board
111	<ol style="list-style-type: none">Memory Option
117	<ol style="list-style-type: none">System BoardHard Disk Drive
118	<ol style="list-style-type: none">I/O CardSystem Board
126	<ol style="list-style-type: none">System Board (Press FN and F1 to set the time and date.)
161, 163	<ol style="list-style-type: none">Set Configuration (Press FN and F1 to set the time and date.)BatterySystem Board
162 (Check the Installed Devices list for a missing device.)	<ol style="list-style-type: none">Any Missing DeviceSystem Board
16X	<ol style="list-style-type: none">Set Configuration (Press FN and F1 to set the time and date.)BatterySystem Board
1XX (not listed above)	<ol style="list-style-type: none">System Board
2XX	<ol style="list-style-type: none">Memory OptionSystem Board
3XX (Before replacing FRUs, power-off computer and all external devices, then power-on computer first.)	<ol style="list-style-type: none">KeyboardPointing DeviceNumeric KeypadExternal KeyboardSystem Board

Symptom/Error	FRU/Action
602, 608, 614, 652	<ol style="list-style-type: none"> 1. Diskette 2. Diskette Drive 3. Diskette Drive Cable 4. System Board
613, 630	<ol style="list-style-type: none"> 1. System Board
6XX (not listed above)	<ol style="list-style-type: none"> 1. Diskette Drive 2. Diskette Drive Cable 3. System Board
09XX, 10XX	<ol style="list-style-type: none"> 1. Any External Parallel Device 2. System Board
1101, 1142, 1201, 1242	<ol style="list-style-type: none"> 1. System Board 2. Modem 3. Any Serial Device
1180, 1181, 1280, 1281	<ol style="list-style-type: none"> 1. Internal Modem 2. System Board
11XX, 12XX (not listed above)	<ol style="list-style-type: none"> 1. Set Configuration 2. System Board 3. Modem 4. Serial Device
17XX	<ol style="list-style-type: none"> 1. Hard Disk 2. Hard Disk Cable 3. System Board
24XX (For external displays, see "External Display Self-Test" on page 464 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. External Display Power Cord 3. Backlight Lamp Assembly 4. LCD Assembly 5. System Board 6. Inverter Card
8000	<ol style="list-style-type: none"> 1. Set Configuration 2. PCMCIA Card 3. System Board
8603	<ol style="list-style-type: none"> 1. System Board
86XX (not listed above)	<ol style="list-style-type: none"> 1. Pointing Device 2. Keyboard 3. Numeric Keypad 4. System Board

Beep Symptoms

Symptom/Error	FRU/Action
One short beep with display problem. (For external displays, see "External Display Self-Test" on page 464 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. External Display Power Cord 3. Backlight Lamp Assembly 4. LCD Assembly 5. System Board 6. Inverter Card

Symptom/Error	FRU/Action
One long and multiple short beeps. (For external displays, see "External Display Self-Test" on page 464 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. External Display Power Cord 3. Backlight Lamp Assembly 4. LCD Assembly 5. System Board 6. Inverter Card
Multiple short beeps. (For external displays, see "External Display Self-Test" on page 464 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. External Display Power Cord 3. Backlight Lamp Assembly 4. LCD Assembly 5. System Board 6. Inverter Card
Continuous beeps. (See "Power Systems Checkout" on page 209 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Memory Option
Display problems	<ol style="list-style-type: none"> 1. External Display, if installed 2. External Display Power Cord 3. LCD Assembly
LCD contrast not adjustable	<ol style="list-style-type: none"> 1. LCD Assembly 2. System Board
Keyboard problems	<ol style="list-style-type: none"> 1. Keyboard
Keypad problems	<ol style="list-style-type: none"> 1. Reseat Cables 2. Keypad 3. Keyboard 4. System Board
External keyboard problems	<ol style="list-style-type: none"> 1. Reseat Cables 2. Keyboard 3. System Board
Printer problems	<ol style="list-style-type: none"> 1. Printer 2. Keyboard 3. System Board

Miscellaneous Symptoms

Symptom/Error	FRU/Action
Blank screen (See "Power Systems Checkout" on page 209 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Battery 2. AC Adapter 3. Memory Option 4. System Board
Diagnostic tests hang	<ol style="list-style-type: none"> 1. Battery 2. AC Adapter 3. Memory Option 4. System Board
Blinking cursor only	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board
Diskette drive bypassed	<ol style="list-style-type: none"> 1. Diskette Drive

Symptom/Error	FRU/Action
Can't read diskette	1. Diskette Drive
Hard disk problem	1. Hard Disk
Printer problem	1. Check Configuration 2. Parallel Port 3. System Board
Communication or plotter problem	1. Check Configuration 2. Serial Port 3. PCMCIA Device 4. System Board

Undetermined Problems

If you have not already done so, go to "Power Systems Checkout" on page 209 and check the AC adapter and battery voltages.

If the AC adapter and battery voltages are correct and the problem remains, do the following.








1. Power-off the computer.
2. Remove or disconnect one of the following devices:
 - Any external devices or cables
 - Any PCMCIA device
3. Power-on the computer.
4. If the symptom remains, repeat steps 1, 2, and 3 until you find the failing adapter or device.
5. If this does not solve the problem, replace the system board.

Related Service Procedures

This section provides information on the following:

"Status Indicators"
"PC Test Card LED"
"Power-On Password" on page 216
"Power-On Self Test (POST)" on page 216
"Advanced Diagnostics Diskette" on page 216
"Loading the Diagnostics Diskette" on page 216
"How to Run the Diagnostics" on page 217
"Formatting the Hard Disk Drive" on page 217
"Error Log" on page 217
"Checking the Installed Devices List" on page 218

Status Indicators

Light	Status Indicated
	On Computer using AC power in suspend or active mode. Computer using battery pack and not in suspend mode. Off Computer using battery pack and in standby mode.
	On Computer is using AC power source and battery is being charged. Off Computer is using AC power source and no battery pack is installed. Computer is using AC power source and battery pack is fully charged. Computer is using battery pack. Computer is off.
	Hard disk drive is active
	Keyboard is in Num Lock mode
	Keyboard is in Caps Lock mode
	Keyboard is in Scroll Lock mode
	Diskette drive is active

Battery status can also be checked from the Configuration Utility main menu.

PC Test Card LED

The green LED on the PC test card lights when the PCMCIA test is running. If the LED does not go on, check that the card is installed correctly by reseating the card. If

it still does not light after reseating, try using another slot for the test. If the LED still does not go on and the test fails, replace the FRU shown in the diagnostic error code.

Power-On Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

Power-On Self Test (POST)

Each time you power-on the computer, POST is initiated. The POST takes up to 90 seconds to complete, depending on the options installed.

The POST checks the following: system board, memory, display, keyboard, diskette drive, hard disk drive, parallel port, and serial port.

To start the POST, power-on the computer. The following will happen:

1. You will hear one short beep when the POST successfully ends.
If the POST cannot be completed successfully, an error message appears on the display accompanied by the Configuration Utility box requesting the user to press the **Esc** or **Enter** key. When the **Esc** key is pressed, the computer bypasses the error and attempts to complete the POST. If the **Enter** key is pressed, the Configuration Utility is shown. The user can then try to correct the error. If a critical error is encountered, the POST is halted.
2. The computer attempts to load the operating system as customized. If an operating system is not found, a graphic message (icon) is displayed requesting the user to insert a diskette into the diskette drive and press the **F1 (RESUME = "F1" KEY)** key to resume operation.

Advanced Diagnostics Diskette

The Advanced Diagnostics diskette contains diagnostic and utility programs. *The diskette is intended to test only IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid computer responses.*

Loading the Diagnostics Diskette

To load the diagnostics diskette, insert the Advanced Diagnostics diskette into the diskette drive and power-on the computer.

How to Run the Diagnostics

To access diagnostic tests from the SELECT AN OPTION Menu, do the following.

1. Select **0 (SYSTEM CHECKOUT)**, then press **Enter**.
2. At the Installed Devices menu, press **(Y)**, then press **Enter**.
3. The **SYSTEM CHECKOUT** menu is then displayed.
4. Select **0** or **1** from the **SYSTEM CHECKOUT** menu.
5. Select the devices to be tested.

Formatting the Hard Disk Drive

Hard disk drives normally contain tracks in excess of their stated capacity to allow for defective tracks. The user is notified by a diagnostic message when the defect limit has been reached and service is recommended.

The Advanced Diagnostics Format program is different from the operating system format program. Before the customer can transfer information from the backup diskettes to the hard disk drive, the hard disk drive must be formatted using the operating system format program. Have the customer refer to the operating system manual for a description of the hard disk preparation commands.

Warning: All data on the selected hard disk drive will be destroyed during a format operation or surface analysis.

After formatting the hard disk drive, copy the System files from the Diagnostics diskette to the hard disk drive.

Error Log

Use the following steps to create an error log, run the diagnostic tests, and automatically record any error messages in an error log. This procedure is normally used to diagnose an intermittent problem.

Note: The errors must be logged to a diskette drive or to a printer. If recording errors on a diskette, use a copy of the Advanced Diagnostics diskette that is not write-protected. **Do not run any diskette tests when logging to a diskette drive. Do not run a parallel port test when logging to a printer.**

Creating the Error Log

1. Insert the Advanced Diagnostics diskette into the diskette drive.
2. Press **0 (SYSTEM CHECKOUT)**, then **Enter**.
3. Depending on the options installed in the computer, questions about attached devices might appear on the display. Answer as required; then press **Enter**.
4. Press **Y** or **N (IS THE LIST CORRECT (Y/N)?)**, then **Enter**.
5. Press **2 (LOG UTILITIES)**, then **Enter**.
6. Press **0 (START ERROR LOG)**, then **Enter**.

7. Press **0** or **1 (LOG TO DISKETTE, OR PRINTER (0/1)?)**, then **Enter**.
8. If you are logging to diskette, press **A (ENTER THE DRIVE ID FOR ERROR LOG?)**, then **Enter**.
9. Press **9 (END LOG UTILITIES)**, then **Enter**.

Starting the Test

1. Press **1 (RUN TESTS MULTIPLE TIMES)**, then **Enter**.
2. Select the device you suspect has a failure, then press **Enter**.
3. Select the number of times the test is to be run, then press **Enter**.
4. Press **N (WAIT EACH TIME AN ERROR OCCURS (Y/N)?)**, then **Enter**.
5. Follow any instructions on the display and select all available tests.

Note: Do not press any keys during the keyboard test.

6. To end (**RUN TEST CONTINUOUSLY**), press and hold the **Ctrl** key; then press the **Pause** key. The computer will complete testing and return to the Installed Devices menu.

Display the Error Log

1. Depending on the options installed in the computer, questions about attached devices will appear on the display. Answer as required; then press **Enter**.
2. Press **Y** or **N (IS THE LIST CORRECT (Y/N)?)**, then **Enter**.
3. Press **2 (LOG UTILITIES)**, then **Enter**.
4. Press **2 (DISPLAY LOG)**, then **Enter**.
5. Press **A (ENTER THE DRIVE ID FOR ERROR LOG?)**, then **Enter**.
6. If no errors occurred, the Log Utilities menu appears. If errors are displayed, go to "Symptom-to-FRU Index" on page 211.

Checking the Installed Devices List

If an adapter or device is missing from the Installed Devices list and you are able to add it to the list, do so and continue with the diagnostic tests.

If an adapter or device is missing from the installed devices list and you cannot add it to the list, you might have one of the following conditions:

- The diagnostic code for the missing device is not on your Advanced Diagnostics diskette.
- The missing device is a 5.25-Inch External Diskette Drive Adapter, or another unrecognizable adapter.
- The missing device is defective.
- The bus adapter is defective.
- The adapter or device is not an IBM product.

If the number of drives installed in the computer differs from the number shown in the installed devices list, an error can occur during the diagnostic tests. Restart the computer and correct the drive information in the Set Configuration menu before running the diagnostic tests.

Warning: A customized setup configuration (other than default settings) might exist on the computer you are servicing. Running Automatic Configuration can alter those settings. Note the current configuration settings (using the View Configuration option) and verify that the settings are in place when service is complete.

Product Overview

The following table provides a brief overview of the system features.

Feature	Description
Processor (MHz)	486SL 25-MHz
Bus Architecture	AT Bus
Memory (Standard)	4MB
Memory (Maximum)	20MB
CMOS RAM	256KB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	<ul style="list-style-type: none">• 85MB, 2.5-inch• 125MB, 2.5-inch• 250MB, 2.5-inch
PCMCIA	Type-I or Type-II
Keyboard	TrackPoint II

Notes:

1. The Power Switch is located inside the rear I/O door.
2. The Suspend/Resume button is located at the rear of the keyboard on the status indicator light cover.

FRU Removals and Replacements

Follow the numerical sequence in the FRU removal sequence list and the exploded view to remove or disconnect parts in the correct order. The letters in parentheses in the list indicate screw types. See the “Screw Size Chart” on page 19 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

1 Battery Compartment Door

2 Battery Pack

Note: If you are not removing other batteries or the LCD assembly, go to step 18.

3 Open Accessory Door

(Use a coin)

4 RTC Battery

5 Standby Battery

6 Two Hinge Covers

(Open the LCD display completely to the flat position. Use a small screwdriver to gently press the cover latch through the slot while lifting the cover.)

7 Four Hinge Screws (D)

8 Two LCD Bezel Screws (GG)

9 LCD Bezel

(Only remove brightness/contrast slides from the bezel to replace them. They are easily damaged. Move the slides to the lowest position before reattaching the slides.)

10 Four Backlight Lamp Screws (GG)

11 Backlight Lamp (Mono only)

(If tape is present, remove and save tape.) Lamp is fragile, handle only at the ends.

12 Four LCD Screws (GG)

LCD Cable (upper-right)

13 LCD Display

14 Left Hinge Cable

15 Right Hinge Cable

16 LCD Assembly

17 Inverter Card

(If tape is present, remove and save tape.)

18 Two Rear I/O Panel Screws (GG)

(Inside rear access door at opposite ends of the panel)

19 Separate Bottom Cover

(The bottom cover is held to the keyboard cover with eight hidden latches, two on each side and four at the front. Use a screwdriver in the slots at both sides of the bottom cover while lifting up on keyboard cover. Then use a screwdriver along the front of the bottom cover.)

20 Three Keyboard Cables from System Board (upper-right)

(Release cable by pulling the slide at each side.)

21 Cable

(From upper-right of keyboard)

22 Keyboard Cover

23 Eight Keyboard Screws (WW)

24 Keyboard

25 Diskette Drive Cable

(Release cable by pulling the slide at each side.)

26 Two Diskette Drive Screws (HH)

27 Diskette Drive

28 Two Ribbon Cables

(Release cable by pulling the slide at each side.)

29 Hard Disk Drive

30 Three I/O Card Ribbon Cables

(Release cable by pulling the slide at each side.)

31 Speaker Cable

32 System Board

33 Modem Card

34 Speaker

(Gently pry the snaps apart to release the speaker.)

35 Six Threaded Hex Spacers

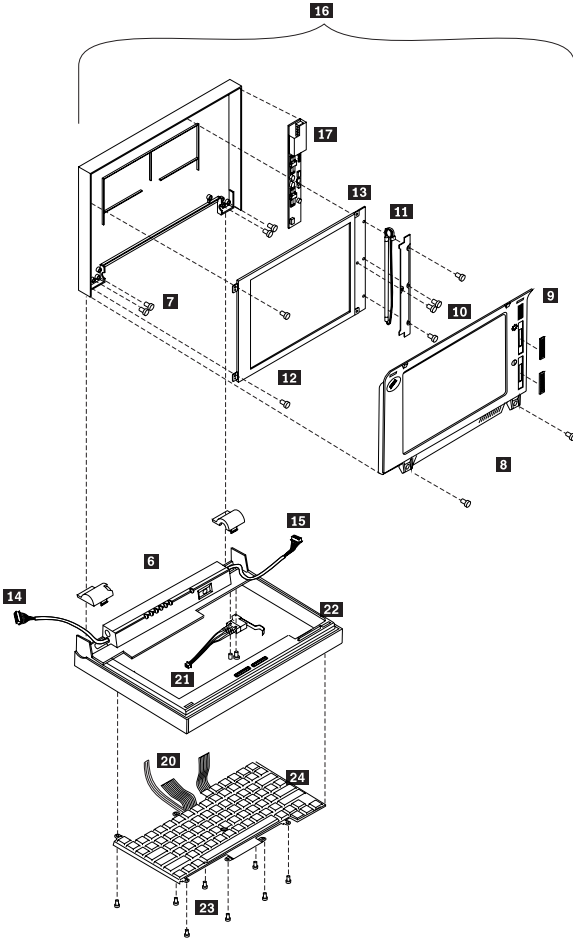
(From I/O Card)

36 One Screw (KK)

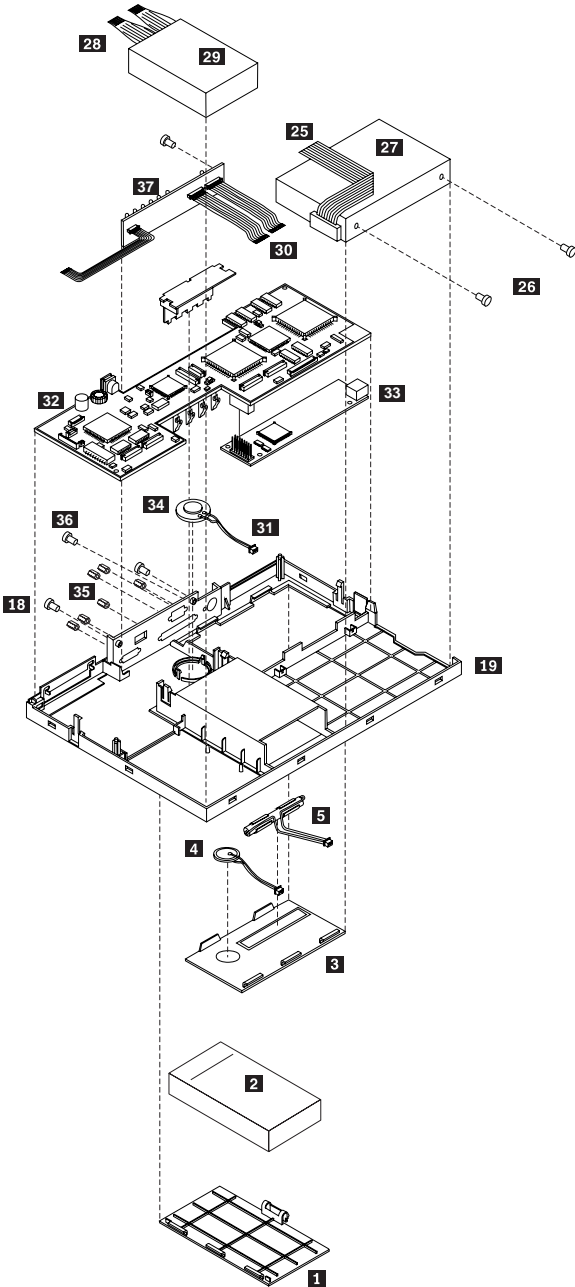
(Inside rear access door at top-center of I/O panel)

37 I/O Card

ThinkPad 350 Exploded View



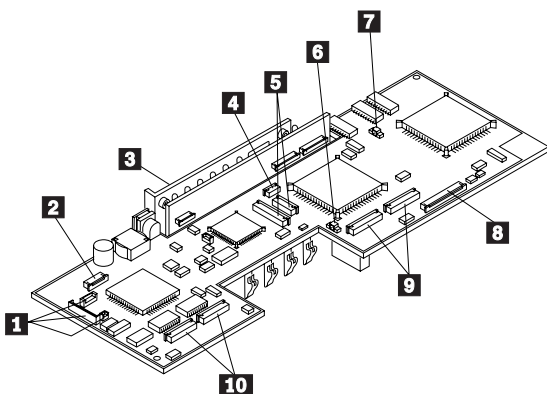
ThinkPad 350 Exploded View (continued)



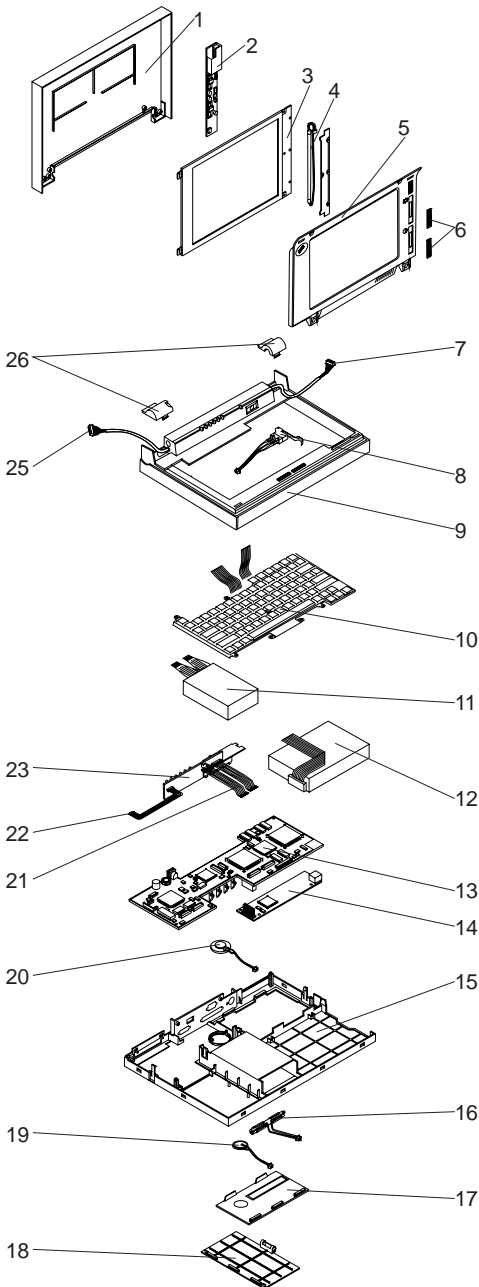
Locations

System Board

- 1** LCD Connector
- 2** VGA Connector
- 3** I/O Card Connector
- 4** RTC Battery Connector
- 5** Keyboard Connector
- 6** Speaker Connector
- 7** Lid Switch Cable Connector
- 8** Diskette Drive Connector
- 9** Hard Disk Drive Connector
- 10** Lid Switch Connector



Parts Listing



System Unit

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1	Top Cover Assembly (350, 425)	60G0351
	Top Cover Assembly (350C, 425C)	60G0352
2	Inverter Card (350, 425)	60G1743
	Inverter Card (350C, 425C)	60G1744
3	LCD Display (425 - E18, E26, E35)	33G4488
	LCD Display (350, all other 425)	60G1745
	LCD Display and Backlight (350C, 425C)	60G1887
4	Backlight Lamp (350)	60G1746
5	LCD Bezel (350, 425)	60G0353
	LCD Bezel (350C, 425C)	60G0354
6	Bright/Contrast Slides (350)	60G1727
	Bright/Contrast Slides (425)	33G4200
	Bright/Contrast Slides (350C, 425C)	60G0195
7	Right Hinge Assembly (350, 425)	60G0209
	Right Hinge Assembly (350C, 425C)	60G0344
8	Lid Switch	60G0358
9	Keyboard Cover	60G0348
10	See Keyboards	
11	80MB Hard Disk Drive	60G1806
	120MB Hard Disk Drive	60G1807
	170MB Hard Disk Drive	84G1201
	252MB Hard Disk Drive	60G1809
	Hard Disk Drive Cable	33G4163
12	Diskette Drive	60G1792
	Diskette Drive Cable	59G7550
13	System Boards with Flash	
	System Board (350, 425)	73G2495
	System Board (350C, 425C)	73G2497
	System Board (425)	73G2496
	System Board (425C)	73G2498
13	System Boards without Flash	
	System Board (350, 425)	10H3981
	System Board (350C, 425C)	10H3983
	System Board (425)	10H3982
	System Board (425C)	10H3984
	4MB Memory Module	79F1003
	(350/350C does not support 16MB memory modules)	
15	Bottom Cover (350x, 425x)	60G0345
	Bottom Cover (425x, no PCMCIA)	60G1916
16	Standby Battery	59G7591
17	Accessory Door	60G0288
18	Battery Pack Compartment Door	60G0349
19	RTC battery	59G7581
	Battery Pads	92G9418
20	Speaker Assembly	33G4418
21	I/O Cables	33G4176
22	VGA Cable	33G4175
23	I/O Card	60G1924
23	I/O Card (425)	33G6008
25	Left Hinge Assembly (350, 425)	60G0186
25	Left Hinge Assembly (350C, 425C)	60G0208
26	Left Hinge Cover	60G0346
26	Right Hinge Cover	60G0347
	TrackPoint Caps	60G1712
	Miscellaneous Fastener Kit	60G1907
	AC Adapter and Power Supply	33G9616
	US/Canada Only (wallmount)	60G1684
	US/Canada Only (425)	33G9657
	World-Wide	33G6022

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NiCd Battery Pack	33G6023
NiMh Battery Pack	60G1791
Battery Terminal Cover	33G4177
Feet Kit	60G1906
I/O Door	60G0350
Modem Port Cover	60G0357
Communications Adapter Cable	8529274
Car Adapter	92F0094

Modems

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14 Modem Card	33G6010
(Models N82, S82, W82, and E82 only)	
Modem Card, 2400 Data/9600 Send-DCA	
France	60G1826
Germany	60G1814
Italy	60G1828
Mexico/Latin America	60G1812
Netherlands	60G1816
UK	60G1834
US/Canada	60G1810
Modem Card, 9600 Data/Fax DCA	
Belgium	60G1823
Denmark	60G1837
Finland	60G1720
France	60G1827
Germany	60G1815
Italy	60G1829
Mexico/Latin America	60G1813
Netherlands	60G1817
Norway	60G1825
Spain	60G1831
Sweden	60G1819
Switzerland	60G1821
US/Canada	60G1811
UK	60G1835
DAA Low Speed	
France	73G2406
Germany	73G2361
Italy	73G2408
Netherlands	73G2363
UK	73G2362
DAA High Speed	
France	73G2407
Germany	73G2364
Italy	73G2409
Netherlands, Denmark, Sweden, Spain, Finland, Switzerland, Belgium, Norway	73G2366
UK	73G2365

Keyboards

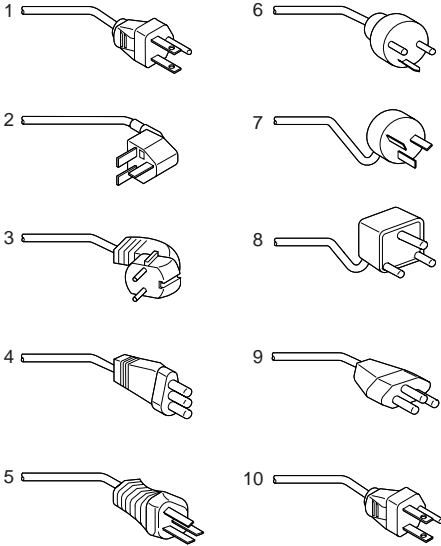
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10	Belgium/Dutch	60G0265
	Belgium/French	60G1800
	Canadian French	60G1798
	Denmark	60G0258
	Finland	60G0230
	French	60G1796
	German	60G1797
	Hebrew	60G1716
	Italian	60G1795
	Latin American	60G1799
	Netherlands	60G0272
	Norway	60G0237
	Portuguese	60G0223
	Spanish	60G1794
	Swedish	60G1801
	Swiss/French	60G0251
	Swiss/German	60G0279
	UK	60G1793
	US/Canada/Australia	60G1653

Tools

Tri-Connector Wrap Plug	72X8546
PC Test Card	35G4703
Audio Wrap Cable	66G5180
Screwdriver Kit	95F3598

Power Cords



Warning: Use the power cord certified for your country.

1	Colombia, U.S., Venezuela Japan, 2-pin Japan, 3-pin	13F9959 6454377 65F0031
2	Hong Kong, Singapore, U.K.	14F0033
3	France, Germany, Spain France, Germany, Spain (425x)	13F9979 13F9978
4	Italy Italy (425x)	14F0069 14F0068
5	Australia, New Zealand Australia (425x)	13F9940 13F9939
6	Denmark	13F9997
7	Israel	14F0087
8	Bangladesh, Pakistan, Sri Lanka, South Africa Portugal, Finland, Norway, (425x) Sweden, Belgium, Netherlands	14F0015 13F9979
9	Switzerland	14F0051
10	Thailand U.K. (425x)	1838574 14F0032

ThinkPad 500 (2603)

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General Checkout

Important

An external diskette drive must be attached to the computer to run the diagnostics program from a diskette. If an external diskette drive **is not** attached to the computer, do the following.

1. Run the POST (Power-On Self Test).
 2. If you receive an error, go to "Symptom-to-FRU Index" on page 237.
 3. If you suspect an undetermined problem, go to "Undetermined Problems" on page 239.
-
1. Power-off the computer and all external devices.
 2. Check all cables and power cords for correct connection.
 3. Insert the Advanced Diagnostics diskette into the diskette drive.
 4. Power-on all external devices.
 5. Power-on the computer and check for one short beep at the end of POST with a clear and readable diagnostics menu displayed. If you did not get the correct responses, go to "Symptom-to-FRU Index" on page 237.
 6. Run the advanced diagnostics tests. For information on how to disable the password, see "Power-On Password" on page 240.
 7. Find your symptom below, then go to the appropriate page. Otherwise, see "Symptom-to-FRU Index" on page 237, then go to "Undetermined Problems" on page 239.

Symptom	Go to ...
Error Code or Message	"Symptom-to-FRU Index" on page 237
Configuration Problem	"Checking the Installed Devices List" on page 241
Power Problem	"Power Systems Checkout" on page 235
Memory Problem	"Memory Checkout" on page 233
TrackPoint II Problem	"TrackPoint II Checkout" on page 470

Note

For information about how to run diagnostics, error messages, passwords, and various other tests and service checks, go to "Related Service Procedures" on page 240.

Memory Checkout

001

- Power-off (O) the computer and wait 10 seconds.
- Reseat the memory module.
- Insert the Advanced Diagnostics diskette into the diskette drive.
- Power-on (I) the computer.
- Make a note of any error code you receive.

DID YOU RECEIVE A 20X XXXXXXXX XXXXXXXX OR 02XX POST ERROR OR FAILURE SYMPTOM?

Yes No

002

Go to Step 006.

003

IS A MEMORY MODULE INSTALLED?

Yes No

004

Replace the system board. Press **Fn** and **F1** to set the time and date to remove the 16X errors.

005

Replace the memory module kit.

If the error remains, replace the system board. Press **Fn** and **F1** to set the time and date and remove the 16X errors.

006

(From step 002)

- If you need to bypass an error, press **Esc** or **F1**.
- If you cannot continue, you might have a keyboard problem; go to “Symptom-to-FRU Index” on page 237.

(CONTINUED)

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

007

You may have a diskette drive problem; go to "Symptom-to-FRU Index" on page 237.

008

- Press **0 (SYSTEM CHECKOUT)**, then press **Enter**.
- Follow the screen instructions.

Note: Ignore a **199** error.

- Press **0 (RUN TESTS ONE TIME)**, then press **Enter**.
- Press **2 (MEMORY)**, then press **Enter**.

DID YOU RECEIVE A 2XX ERROR OR FAILURE SYMPTOM?

Yes No

009

Go to Step 011.

010

Go to Step 003 on page 233.

011

(From step 009)

DID THE SYSTEM CHECKOUT MENU APPEAR AT THE END OF TEST?

Yes No

012

You may have a power source problem; go to "Power Systems Checkout" on page 235.

013

The Advanced Diagnostics tests finished without detecting a failure. If you suspect an intermittent problem, start an error log. If you need instructions, go to "Error Log" on page 243.

Power Systems Checkout

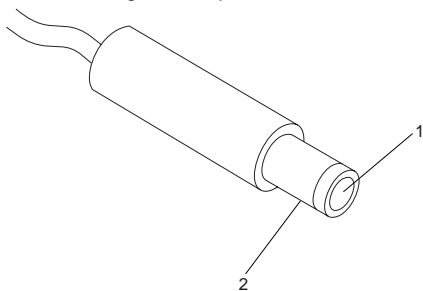
To check the system power, do the following.

1. Power-off the computer.
2. Remove the battery from the computer.
3. Check the battery voltage. The voltage should be 10.8 V dc.

If the voltages **are not** correct, try recharging the battery pack.

If the voltages **are** correct, continue with the next step to test the AC adapter voltage.

4. Unplug the AC adapter from the computer.
5. Measure the voltage at the points shown.



V dc	+ Lead	- Lead
+16.3	2	1

If the voltage **is not** correct, replace the AC adapter.

If the voltage **is** correct, go to "Undetermined Problems" on page 239.

Power Management Features

Press **Func+F3** to select Power Management setup (any time after the computer is powered-on).

Important

Before using the power saving features, be sure to read and observe the following precautions:

- If you enter Suspend or Hibernate mode with a diskette inserted in the diskette drive, the same diskette must be installed in the drive before attempting to resume normal operation.
- If you enter Suspend or Hibernate mode with a PCMCIA card inserted in the PCMCIA slot, the same PCMCIA card must be installed in the slot before attempting to resume normal operation.

Hibernate mode does not save/restore the status of PCMCIA cards. When you resume normal operation from Hibernate mode, the PCMCIA card is no longer configured and will not be recognized by the computer.

- If the computer is connected to a Local Area Network (LAN) that periodically polls for station activity, the LAN-connection may be terminated while the computer is in Suspend or Hibernate mode. Any further attempt to access the network results in a brief delay and the computer appears to hang (up to 1 minute, depending on the network). After the delay, an error is displayed. Follow the instructions on the screen to restore normal operation.
- Any software program that was running over the LAN is not re-entered when you resume normal operation from Hibernate or Suspend modes.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this index to help you decide which FRUs to have available when servicing the computer.

In the following error codes, *X* can be any number.

Note

For IBM devices not supported by the ThinkPad diagnostic code, refer to the manual for that device.

Numeric Error Codes

Symptom/Error	FRU/Action
02X, 101, 107	<ol style="list-style-type: none">BatteryAC AdapterMemory OptionSystem Board
102, 103, 104, 106, 108, 109, 190 (Press Func and F1 to set the time and date and remove any 16X errors.)	<ol style="list-style-type: none">System Board
111	<ol style="list-style-type: none">Memory Option
161, 163	<ol style="list-style-type: none">Set ConfigurationBatterySystem Board
162	<ol style="list-style-type: none">Any Device (Check the installed devices list for a missing device.)System Board
1XX (not listed above)	<ol style="list-style-type: none">System Board
2XX	<ol style="list-style-type: none">Memory Option
3XX	<ol style="list-style-type: none">KeyboardSystem Board
6XX	<ol style="list-style-type: none">Diskette DriveSystem Board
9XX, 10XX	<ol style="list-style-type: none">Any External Parallel DeviceSystem Board
11XX, 12XX	<ol style="list-style-type: none">Any External Serial DevicePCMCIA DeviceSystem Board
17XX	<ol style="list-style-type: none">Hard DiskSystem Board
24XX	<ol style="list-style-type: none">DisplaySystem Board

Symptom/Error	FRU/Action
86XX	<ol style="list-style-type: none"> 1. Keyboard 2. System Board

Beep Symptoms

Symptom/Error	FRU/Action
One long and one short beep	<ol style="list-style-type: none"> 1. Memory Option
Two long beeps, 3 short beeps, and a blank screen	<ol style="list-style-type: none"> 1. External Display, if installed 2. External Display Power Cord 3. LCD Assembly 4. System Board
Multiple short beeps	<ol style="list-style-type: none"> 1. Keyboard (stuck key)
One short beep with a display problem. (For external displays, see "External Display Self-Test" on page 464 before replacing FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. Display Power Cord 3. LCD Assembly
One long and multiple short beeps	<ol style="list-style-type: none"> 1. External Display, if installed 2. External Display Power Cord 3. LCD Assembly

Miscellaneous Symptoms

Symptom/Error	FRU/Action
Blank screen	<ol style="list-style-type: none"> 1. Battery 2. AC Adapter 3. Memory Option 4. System Board
Display problems	<ol style="list-style-type: none"> 1. External Display, if installed 2. External Display Power Cord 3. LCD Assembly
LCD contrast not adjustable	<ol style="list-style-type: none"> 1. LCD Assembly 2. System Board
Keyboard problems	<ol style="list-style-type: none"> 1. Reseat cables 2. Keyboard 3. System Board
Mouse problems	<ol style="list-style-type: none"> 1. Reseat cable 2. Mouse 3. System Board
Diagnostic tests hang	<ol style="list-style-type: none"> 1. Battery 2. AC Adapter 3. Memory Option 4. System Board
Blinking cursor only	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board

Symptom/Error	FRU/Action
No beep or continuous beeps. (See "Power Systems Checkout" on page 235 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Memory Option
Diskette drive bypassed	<ol style="list-style-type: none"> 1. Reseat DASD/Serial Cable 2. Diskette Drive
Can't read diskette	<ol style="list-style-type: none"> 1. Diskette Drive
Hard disk problem	<ol style="list-style-type: none"> 1. Hard Disk
Printer problem	<ol style="list-style-type: none"> 1. Check Configuration 2. Parallel Port 3. System Board
Communication or plotter problem	<ol style="list-style-type: none"> 1. Check Configuration 2. Serial Port 3. PCMCIA Device 4. System Board

Undetermined Problems

If you have not already done so, go to "Power Systems Checkout" on page 235 and check the AC adapter and battery voltages.

If the AC adapter and battery voltages are correct and the problem remains, do the following.










1. Power-off the computer.
2. Remove or disconnect one of the following devices:
 - Any external devices or cables
 - Any PCMCIA device
3. Power-on the computer.
4. If the symptom remains, repeat steps 1, 2, and 3 until you find the failing adapter or device.
5. If this does not solve the problem, replace the system board.

Related Service Procedures

This section provides information on the following:

"Status Indicators"
"PC Test Card LED"
"Power-On Password"
"Checking the Installed Devices List" on page 241
"Power-On Self Test (POST)" on page 241
"Advanced Diagnostics Diskette" on page 242
"Loading the Diagnostics Diskette" on page 242
"Formatting the Hard Disk Drive" on page 242
"Error Log" on page 243
"Setup Options" on page 244
"Starting Setup" on page 244
"Utilities" on page 245

Status Indicators

Light	Status Indicated
	Battery almost discharged
	Battery is charging (this indicator is on whenever the AC adapter is connected to the computer)
	Computer is powered-on
	Computer is in suspend mode
	Hard disk drive is active
	Diskette drive is active
	Keyboard is in Num Lock mode
	Keyboard is in Caps Lock mode
	Keyboard is in Scroll Lock mode

PC Test Card LED

The green LED on the PC test card lights when the PCMCIA test is running. If the LED does not go on, check that the card is installed correctly by reseating the card. If it still does not light after reseating, try using another slot for the test. If the LED still does not go on and the test fails, replace the FRU shown in the diagnostic error code.

Power-On Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

Checking the Installed Devices List

If an adapter or device is missing from the Installed Devices list and you are able to add it to the list, do so and continue with the diagnostic tests.

If an adapter or device is missing from the installed devices list and you cannot add it to the list, you might have one of the following conditions:

- The diagnostic code for the missing device is not on your Advanced Diagnostics diskette.
- The missing device is a 5.25-Inch External Diskette Drive Adapter, or another unrecognizable adapter.
- The missing device is defective.
- The bus adapter is defective.
- The adapter or device is not an IBM product.

If the number of drives installed in the computer differs from the number shown in the installed devices list, an error can occur during the diagnostic tests. Restart the computer and correct the drive information in the Set Configuration menu before running the diagnostic tests.

Power-On Self Test (POST)

Each time you power-on the computer, the POST is initiated. The POST takes up to 15 seconds to complete, depending on the options installed.

The POST checks the following: system board, memory, display, keyboard, diskette drive, hard disk drive, parallel port, and serial port.

To start the POST, power-on the computer.

1. You will hear one short beep when the POST successfully ends.

If the POST cannot be completed successfully, an error message appears on the display accompanied by the Configuration Utility box requesting the user to press the **Esc** or **Enter** key. If the **Esc** key is pressed, the computer bypasses the error and attempts to complete the POST. If the **Enter** key is pressed, the Configuration Utility is shown. The user can then try to correct the error. If a critical error is encountered, the POST is halted.

2. The computer attempts to load the operating system as customized.

Advanced Diagnostics Diskette

The Advanced Diagnostics diskette contains diagnostic and utility programs. *The diskette is intended to test only IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid computer responses.*

Loading the Diagnostics Diskette

To load the diagnostics diskette, insert the Advanced Diagnostics diskette into the diskette drive and power-on the computer.

Accessing the Diagnostic Tests: To access diagnostic tests from the SELECT AN OPTION Menu, do the following.

1. Select **0 (SYSTEM CHECKOUT)**, then press **Enter**.
2. At the Installed Devices menu, press **(Y)**, then press **Enter**.
3. The **SYSTEM CHECKOUT** menu is then displayed.
4. Select **0** or **1** from the **SYSTEM CHECKOUT** menu.
5. Select the device to be tested.

Formatting the Hard Disk Drive

Hard disk drives normally contain tracks in excess of their stated capacity to allow for defective tracks. The user is notified by a diagnostic message when the defect limit has been reached and service is recommended.

The Advanced Diagnostics Format program is different from the operating system format program. Before the customer can transfer information from the backup diskettes to the hard disk drive, the hard disk drive must be formatted using the operating system format program. Have the customer refer to the operating system manual for a description of the hard disk preparation commands.

Warning: All data on the selected hard disk drive will be destroyed during a format operation or surface analysis.

After formatting the hard disk drive, copy the System files from the Diagnostics diskette to the hard disk drive.

Restoring the TP500 Subdirectory: The TP500 subdirectory on the Diagnostics diskette and hard disk drive contains the following:

- Installation utilities
- Introductory program
- Other utilities
- OS/2 PCMCIA drivers

If the hard disk drive is reformatted or the files in the TP500 subdirectory on the hard disk drive are corrupted, copy the TP500 subdirectory on the Diagnostics diskette to the hard disk drive. To create a TP500 subdirectory on the hard disk drive and copy the files, do the following:

Important

The following is required to complete this procedure:

- DOS or OS/2 must be installed on the hard disk drive.
- An external diskette drive must be attached to the computer.

1. Power-on the computer.
2. At the DOS prompt, type
md c:\TP500
then press **Enter**. A TP500 subdirectory is created on the hard disk drive.
3. Insert the Diagnostics diskette into the diskette drive.
4. Type
copy a:\TP500*.* c:\TP500*.*
then press **Enter**. The files are copied from the TP500 subdirectory on the Diagnostics diskette to the TP500 subdirectory on the C drive.

Error Log

Use the following steps to create an error log, run the diagnostic tests, and automatically record any error messages in an error log. This procedure is normally used to diagnose an intermittent problem.

Note: The errors must be logged to a diskette drive or to a printer. If recording errors on a diskette, use a copy of the Advanced Diagnostics diskette that is not write-protected. **Do not run any diskette tests when logging to a diskette drive. Do not run a parallel port test when logging to a printer.**

Creating the Error Log

1. Insert the Advanced Diagnostics diskette into the diskette drive.
2. Press **0 (SYSTEM CHECKOUT)**, then **Enter**.
3. Depending on the options installed in the computer, questions about attached devices may appear on the display. Answer as required; then press **Enter**.
4. Press **Y** or **N (IS THE LIST CORRECT (Y/N)?)**, then **Enter**.
5. Press **2 (LOG UTILITIES)**, then **Enter**.
6. Press **0 (START ERROR LOG)**, then **Enter**.
7. Press **0** or **1 (LOG TO DISKETTE, OR PRINTER (0/1)?)**, then **Enter**.
8. If you are logging to diskette, press **A (ENTER THE DRIVE ID FOR ERROR LOG?)**, then **Enter**.
9. Press **9 (END LOG UTILITIES)**, then **Enter**.

Starting the Test

1. Press **1 (RUN TESTS MULTIPLE TIMES)**, then **Enter**.
2. Select the device you suspect has a failure, then press **Enter**.
3. Select the number of times the test is to be run; then press **Enter**.
4. Press **N (WAIT EACH TIME AN ERROR OCCURS (Y/N)?)**, then **Enter**.
5. Follow any instructions on the display and select all available tests.

Note: Do not press any keys during the keyboard test.

6. To end (**RUN TEST CONTINUOUSLY**), press and hold the **Ctrl** key; then press the **Pause** key. The computer will complete testing and return to the Installed Devices menu.

Display the Error Log

1. Depending on the options installed in the computer, questions about attached devices will appear on the display. Answer as required; then press **Enter**.
2. Press **Y** or **N (IS THE LIST CORRECT (Y/N)?)**, then **Enter**.
3. Press **2 (LOG UTILITIES)**, then **Enter**.
4. Press **2 (DISPLAY LOG)**, then **Enter**.
5. Press **A (ENTER THE DRIVE ID FOR ERROR LOG?)**, then **Enter**.
6. If no errors occurred, the Log Utilities menu appears. If errors are displayed, go to "Symptom-to-FRU Index" on page 237.

Setup Options

The computer has two setup options that allow you to specify how the computer operates. The System Parameters (**Ctrl+Alt+F3**) provides access to the power management parameters and the following system elements.

- Time
- Date
- Password
- Diskette drive
- Hard disk drive
- Cache
- Parallel port

Starting Setup

Press the key combination for the setup program you want to start.

Key Combination	Setup Program
Ctrl+Alt+F3	System Parameters setup. (Must be started at the DOS prompt.)
Func+F3	Power Management setup (can be started at any time after the computer is powered-on). This is page 2 of System Parameters.

Press **Esc** to exit.

Utilities

The system is configured with several utility programs. These programs provide added function that enhance the usability of the system. It is recommended that you backup these programs to prevent loss of data. Use the INTRO program shipped with the computer to backup the utilities. The utility programs are:

- SIMUL** Allows you to enable/disable simultaneous display on both the LCD and external monitor.
- Note:** The computer **will not** enter Suspend/Resume while in the Simultaneous mode. You must exit Simultaneous mode before Suspend/Resume is allowed. Also, the Func + F7 function is not recognized until you exit the Simultaneous mode.
- EPP2** Provides Enhanced Parallel Port Utility. This utility needs to be added to the AUTOEXEC.BAT and CONFIG.SYS if the option attached to the parallel port supports the enhanced parallel port mode.
- PHDISK** Prepares the hard disk drive for the hibernation feature, including formatting and the marking of defective areas. A partition is reserved on the hard disk drive to save data before the computer enters Hibernation mode.
- Warning:** Running this utility causes loss of data on the hard disk drive. It is important that the customer backup all data prior to using this utility.

Important

Run the PHDISK utility if you change the operating environment, reformat the hard disk drive, or add additional memory.

PCMCIA Drivers

IBM22SS01.SYS and PCMCIA.SYS provides the ability to use PCMCIA cards in an OS/2* environment.

* Trademark of the IBM Corporation.

Product Overview

The following table provides a brief overview of the system features.

Feature	Description
Processor (MHz)	486SLC2 50/25-MHz
Bus Architecture	AT Bus
Memory (Standard)	4MB
Memory (Maximum)	12MB
CMOS RAM	256KB
Video	VGA
Diskette Drive	3.5-inch
Hard Drive	85MB, 2.5-inch 170MB, 2.5-inch
Audio Subsystem	Yes (Standard)
PCMCIA	One Type-II slot
Keyboard	TrackPoint II

Note: An external diskette drive and cable are provided with this model.

FRU Removals and Replacements

Follow the numerical sequence in the FRU removal sequence list and the exploded view to remove or disconnect parts in the correct order. The letters in parentheses in the list indicate screw types. See the “Screw Size Chart” on page 19 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

Note: Be sure the LED cable is not in the battery compartment or over the keyboard supports.

1 Battery Pack

2 Lift Keyboard (Pry up front of keyboard with a small plastic screwdriver.)

3 Three Ribbon Cables

Remove Keyboard

Remove Hard Disk Drive Ribbon Cable (Use caution; the cable pins can scratch the LCD.)

4 Fourteen Bottom Cover Screws (6-G, 2-DD, 6-EE) (2-G screws near mouse buttons)
(1-D screw in center)
(1-D screw near power button icon)
(6-EE screws around bottom cover perimeter)

5 Bottom Cover

6 Ribbon Cable

(Open the IC DRAM cover on the bottom. From the bottom, keep pressure on the system board while removing the cable.)

(If replacing the hard disk drive or bottom cover, remove the 4-G screws near FCC notice. Caution; copper flakes easily from the screws.)

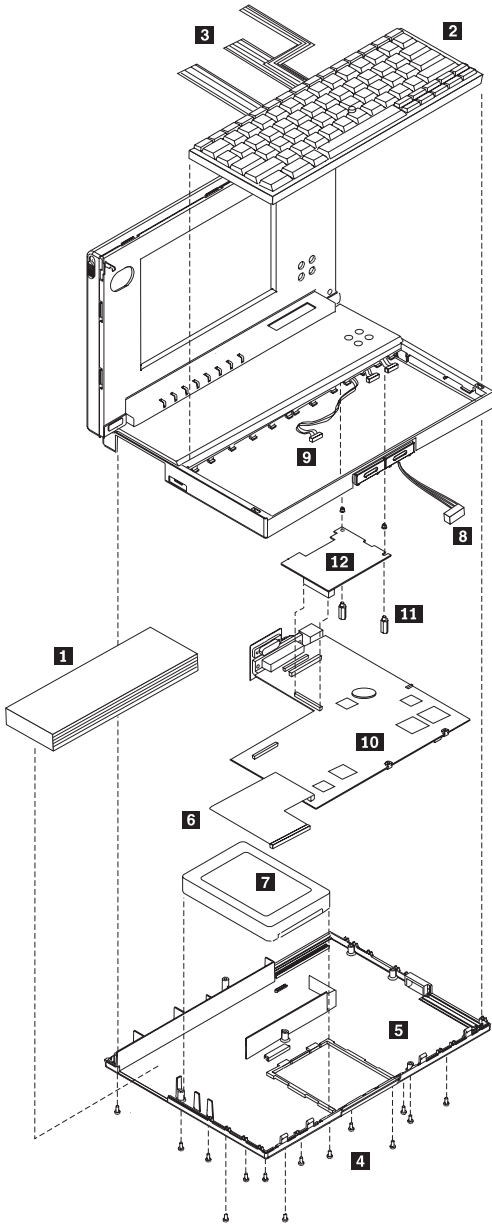
7 Hard Disk Drive

8 Mouse Button Cable (Pull connector, not the cable.)

9 Three Cables

- 10** **System Board** (Note plastic screw inserts location.)
- 11** **Two Threaded Spacers** (In power card)
- 12** **Power Card** (Note washer placement.)

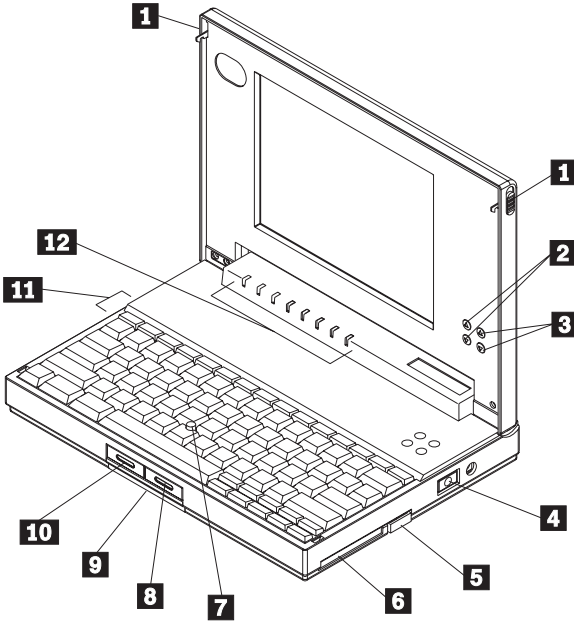
ThinkPad 500 Exploded View



Locations

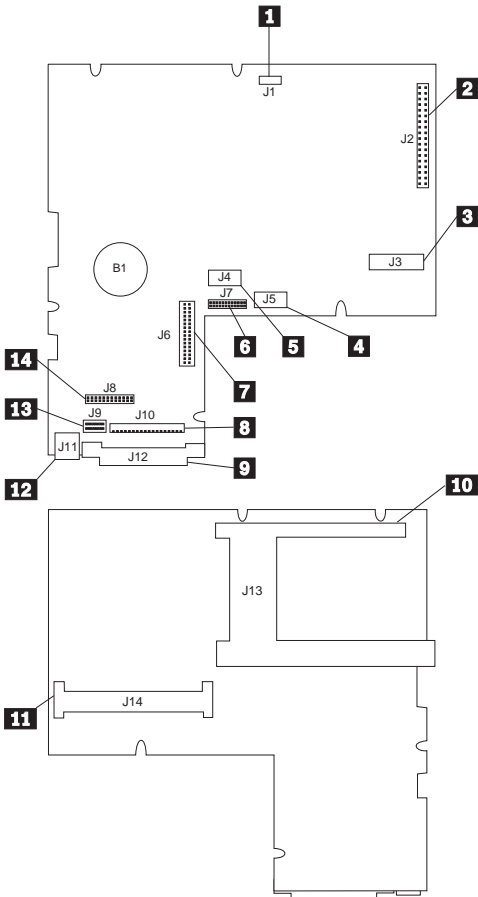
Front View

- 1** Top Cover Release Latches
- 2** Contrast Control Buttons
- 3** Brightness Control Buttons
- 4** On/Off Button
- 5** PCMCIA Eject Button
- 6** PCMCIA Slot
- 7** Pointing Stick
- 8** Right Button (pointing stick)
- 9** Memory Card Access Panel
- 10** Left Button (pointing stick)
- 11** Battery
- 12** Status Indicator LEDs

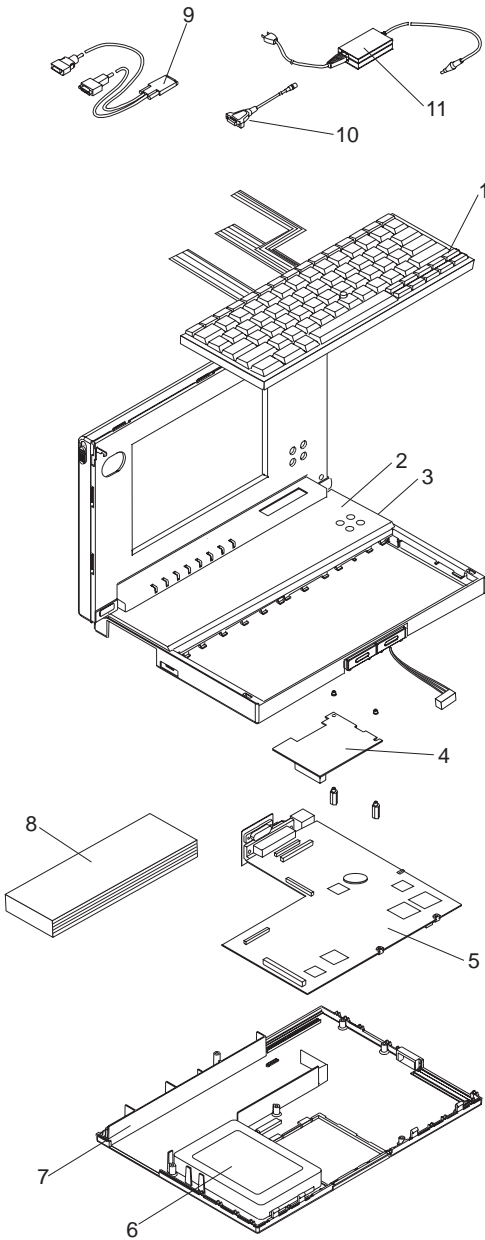


System Board

- 1** Pointing Device Connector
- 2** Hard Disk Drive Connector
- 3** Keyboard Connector
- 4** Sense Connector
- 5** Wobble Connector
- 6** LED Connector
- 7** Power Card Connector
- 8** LCD Data Connector
- 9** Parallel Port Connector
- 10** PCMCIA Connector
- 11** IC DRAM Card Socket
- 12** External Display Connector
- 13** LCD Power Connector
- 14** Diskette Drive/Serial Port Connector



Parts Listing



Important

IBM ThinkPad 500 (2603) Models 081 and 171 are obsolete. The following FRU numbers are being discontinued:

System Board	52G7290
Power Card	59G7922
Base Cover Assembly	59G7921
AC Adapter	59G7923
SLA Self-Charging Battery	59G7924
SLA Rechargeable Battery	59G7946

If you encounter a ThinkPad 500 (2603) Model 081 or 171, please call 1-800-426-7244 for upgrade instructions.

System Unit

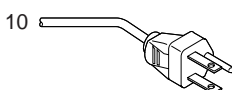
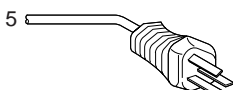
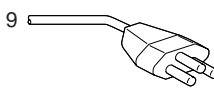
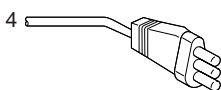
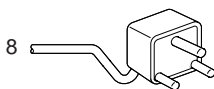
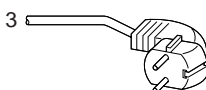
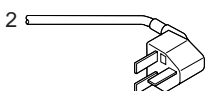
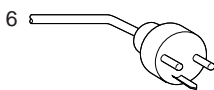
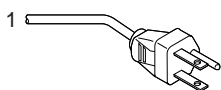
Index

1	Keyboard Assembly	59G7920
2	LCD Assembly	59G7919
3	Power Button	59G7937
4	Power Card	59G7993
5	System Board	65G8741
	System Board Bracket	59G7951
6	85MB Hard Disk	59G7915
	170MB Hard Disk	59G7917
7	Base Cover Assembly (R)	59G7995
	Connector Door	59G7936
8	NiMH Rechargeable Battery	59G7976
9	Diskette Drive/Serial Cable (External)	59G7925
	Diskette Drive/Serial Cable (Internal)	59G7952
	Hard Disk Cable (Internal)	59G7927
10	Video Cable	59G7926
11	AC Adapter	59G7991
	4MB IC DRAM	8189098
	8MB IC DRAM	8189099
	External Diskette Drive	59G7918

Tools and Miscellaneous

Tri-Connector Wrap Plug	72X8546
PC Test Card	35G4703
Audio Wrap Cable	66G5180
Screwdriver Kit	95F3598
Screw Pack	59G7944
(screws, standoff, studs, and inserts)	

Power Cords



Warning: Use the power cord certified for your country.

Index

1	Colombia, U.S., Venezuela	13F9959
	Japan, 2-pin	6454377
	Japan, 3-pin	65F0031
2	Hong Kong, Singapore, U.K.	14F0033
3	France, Germany, Spain	13F9979
4	Italy	14F0069
5	Australia, New Zealand	13F9940
6	Denmark	13F9997
7	Israel	14F0087
8	Bangladesh, Pakistan, Sri Lanka, South Africa	14F0015
9	Switzerland	14F0051
10	Thailand	1838574

ThinkPad 510 (2604)

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General Checkout

Important

The Advanced Diagnostics program is shipped on the hard disk drive. An external diskette drive must be attached to the computer to run the diagnostics program from a diskette. The Advanced Diagnostics diskette, part number S83G8095, contains the same Advanced Diagnostics program shipped on the hard disk drive. If the diagnostics **are not** on the hard disk drive and an external diskette drive **is not** attached to the computer, do the following.

1. Run the POST (Power-On Self Test).
2. If you receive an error, go to "Symptom-to-FRU Index" on page 264.
3. If you suspect an undetermined problem, go to "Undetermined Problems" on page 267.

1. Power-off the computer and all external devices.
2. Check all cables and power cords for correct connection.
3. If you are going to run the advanced diagnostics from the diskette drive; insert the Advanced Diagnostics diskette into the diskette drive, then continue with step 4

If you are going to run advanced diagnostics from the hard disk drive, go to step 6.

4. Power-on all external devices.
5. Power-on the computer and check for one short beep at the end of POST with a clear and readable diagnostics menu displayed.

If you did not get the correct responses, go to "Symptom-to-FRU Index" on page 264.

If you received the correct responses, go to step 12 on page 259.

6. Power-on all external devices.
7. Power-on the computer and check for one short beep at the end of POST with a clear and readable diagnostics menu displayed. If you did not get the correct responses, go to "Symptom-to-FRU Index" on page 264.

Note: The following two steps are important because they prevent programs which might affect the diagnostic tests from being loaded into memory.

8. When the message **Starting PC DOS** appears, press **F5**.
9. When the DOS prompt appears, type

```
cd c:\thinkpad\diags
```

10. Press **Enter**.
11. Type
command
12. Press **Enter** to start the advanced diagnostics; then, continue with the next step.
13. Run the advanced diagnostics tests. For information on how to disable the password, see "Power-On Password Override" on page 268.
14. Find your symptom below, then go to the appropriate page. Otherwise, see "Symptom-to-FRU Index" on page 264, then go to "Undetermined Problems" on page 267.

Symptom	Go to ...
Error Code or Message	"Symptom-to-FRU Index" on page 264
Configuration Problem	"Checking the Installed Devices List" on page 269
Power Problem	"Power Systems Checkout" on page 262
Memory Problem	"Memory Checkout" on page 260
TrackPoint II Problem	"TrackPoint II Checkout" on page 470

Note

For information about diagnostics, error messages, passwords, and other tests and service checks, go to "Related Service Procedures" on page 268.

Memory Checkout

001

- Always start with “General Checkout” on page 258.
- Power-off (O) the computer and wait 10 seconds.
- Reseat the DRAM card.
- Run the advanced diagnostics; if necessary refer to “Loading the Diagnostics” on page 270.
- Make a note of any error code you receive.

DID YOU RECEIVE A 20X XXXXXXXX XXXXXXXX OR 02XX POST ERROR OR FAILURE SYMPTOM?

Yes No

002

Go to Step 006.

003

IS A DRAM CARD INSTALLED?

Yes No

004

Replace the system board. Press **Ctrl+Alt+F3** to set the time and date to remove the 16X errors.

005

Replace the DRAM card.

If the error remains, replace the system board. Press **Ctrl+Alt+F3** after POST to set the time and date and remove the 16X errors.

006

(From step 002)

- If you need to bypass an error, press **Esc** or **F1**.
- If you cannot continue, you might have a keyboard problem; go to “Symptom-to-FRU Index” on page 264.

DID THE ADVANCED DIAGNOSTICS MENU APPEAR?

Yes No

007

You might have a diskette drive problem; go to "Symptom-to-FRU Index" on page 264.

008

- Press **0 (SYSTEM CHECKOUT)**, then press **Enter**.
- Follow the screen instructions.

Note: Ignore a **199** error.

- Press **0 (RUN TESTS ONE TIME)**, then press **Enter**.
- Press **2 (MEMORY)**, then press **Enter**.

DID YOU RECEIVE A 2XX ERROR OR FAILURE SYMPTOM?

Yes No

009

Go to Step 011.

010

Go to Step 003 on page 260.

011

(From step 009)

DID THE SYSTEM CHECKOUT MENU APPEAR AT THE END OF TEST?

Yes No

012

You might have a power source problem; go to "Power Systems Checkout" on page 262.

013

The advanced diagnostics tests finished without detecting a failure. If you suspect an intermittent problem, start an error log. If you need instructions, refer to "Error Log" on page 271.

Power Systems Checkout

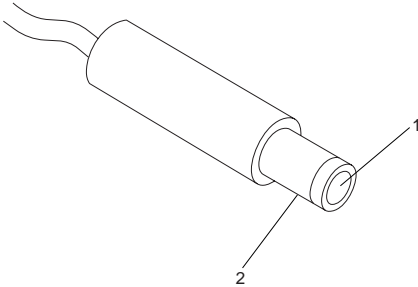
To check the system power, do the following.

1. Power-off the computer.
2. Remove the battery from the computer.
3. Check the battery voltage. The voltage should be a minimum of 10.8 V dc.

If the voltage **is not** correct, try recharging the battery pack.

If the voltage **is** correct, continue with the next step to test the AC adapter voltage.

4. Unplug the AC adapter from the computer.
5. Measure the voltage at the points shown.



V dc	+ Lead	- Lead
+16.6	2	1

If the voltage **is not** correct, replace the AC adapter.

If the voltage **is** correct, go to "Undetermined Problems" on page 267.

Power Management Features

Press **Func+F3** to select Power Management setup (any time after the computer is powered-on).

Important

Before using the power saving features, be sure to read and observe the following precautions:

- If you enter Suspend or Hibernate mode with a diskette inserted in the diskette drive, the same diskette must be installed in the drive before attempting to resume normal operation.
- If you enter Suspend or Hibernate mode with a PCMCIA card inserted in the PCMCIA slot, the same PCMCIA card must be installed in the slot before attempting to resume normal operation.

Hibernate mode does not save/restore the status of PCMCIA cards. When you resume normal operation from Hibernate mode, the PCMCIA card is no longer configured and will not be recognized by the computer.

- If the computer is connected to a Local Area Network (LAN) that periodically polls for station activity, the LAN-connection might be terminated while the computer is in Suspend or Hibernate mode. Any further attempt to access the network results in a brief delay and the computer appears to hang (up to 1 minute, depending on the network). After the delay, an error is displayed. Follow the instructions on the screen to restore normal operation.
- Any software program that was running over the LAN is not re-entered when you resume normal operation from Hibernate or Suspend modes.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this index to help you decide which FRUs to have available when servicing the computer.

In the following error codes, *X* can be any number.

Note

For IBM devices not supported by the ThinkPad diagnostic code, refer to the manual for that device.

Numeric Error Codes

Symptom/Error	FRU/Action
02X, 101, 107	<ol style="list-style-type: none">BatteryAC AdapterDRAM CardSystem Board
102, 103, 104, 106, 108, 109, 190 (Press Ctrl+Alt+F3 to set the time and date and remove any 16X errors.)	<ol style="list-style-type: none">System Board
111	<ol style="list-style-type: none">DRAM Card
161, 163 (Press Ctrl+Alt+F3 to set the time and date and remove any 16X errors.)	<ol style="list-style-type: none">Set ConfigurationBatterySystem Board
162	<ol style="list-style-type: none">Any Device (Check the installed devices list for a missing device.)System Board
1XX (not listed above)	<ol style="list-style-type: none">System Board
2XX	<ol style="list-style-type: none">DRAM Card
3XX	<ol style="list-style-type: none">KeyboardSystem Board
6XX	<ol style="list-style-type: none">Diskette DriveSystem Board
9XX, 10XX	<ol style="list-style-type: none">ThinkPad MultiPortAny External Parallel DeviceSystem Board
11XX, 12XX	<ol style="list-style-type: none">ThinkPad MultiPortAny External Serial DevicePCMCIA DeviceSystem Board
17XX	<ol style="list-style-type: none">Hard Disk DriveSystem Board

Symptom/Error	FRU/Action
24XX	<ol style="list-style-type: none"> 1. ThinkPad MultiPort 2. LCD/External Display 3. System Board
80XX	<ol style="list-style-type: none"> 1. System Board
86XX	<ol style="list-style-type: none"> 1. Keyboard 2. System Board

Beep Symptoms

Symptom/Error	FRU/Action
No beep or continuous beeps (See "Power Systems Checkout" on page 262 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. DRAM Card
One long and one short beep	<ol style="list-style-type: none"> 1. DRAM Card
Two long beeps, 3 short beeps, and a blank screen	<ol style="list-style-type: none"> 1. External Display, if installed 2. External Display Power Cord 3. LCD Assembly 4. System Board
One long beep, 3 long beeps, 3 long beeps and a blank screen	<ol style="list-style-type: none"> 1. External Display, if installed 2. External Display Power Cord 3. LCD Assembly 4. System Board
Multiple short beeps	<ol style="list-style-type: none"> 1. Keyboard (stuck key)
One short beep with a display problem (For external displays, see "External Display Self-Test" on page 464 before replacing FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. Display Power Cord 3. LCD Assembly
One long and multiple short beeps	<ol style="list-style-type: none"> 1. External Display, if installed 2. External Display Power Cord 3. LCD Assembly

Miscellaneous Symptoms

Symptom/Error	FRU/Action
Blank screen	<ol style="list-style-type: none"> 1. Battery 2. AC Adapter 3. DRAM Card 4. System Board

Symptom/Error	FRU/Action
Display problems (For external displays, see "External Display Self-Test" on page 464 before replacing FRUs.)	<ol style="list-style-type: none"> 1. External Display, if installed 2. External Display Power Cord 3. LCD Assembly 4. System Board
LCD contrast not adjustable	<ol style="list-style-type: none"> 1. LCD Assembly 2. System Board
Keyboard problems	<ol style="list-style-type: none"> 1. Reseat cables 2. Keyboard 3. System Board
Mouse problems	<ol style="list-style-type: none"> 1. Reseat cable 2. Mouse 3. System Board
Diagnostic tests hang	<ol style="list-style-type: none"> 1. Battery 2. AC Adapter 3. DRAM Card 4. System Board
Blinking cursor only	<ol style="list-style-type: none"> 1. Diskette Drive 2. System Board
Diskette drive bypassed	<ol style="list-style-type: none"> 1. Reseat DASD/Serial Cable 2. ThinkPad MultiPort 3. Diskette Drive
Cannot read diskette	<ol style="list-style-type: none"> 1. Diskette Drive 2. Diskette Drive Cable 3. Diskette 4. System Board
Hard disk drive problem	<ol style="list-style-type: none"> 1. Hard Disk Drive 2. Hard Disk Drive Cable 3. System Board
Printer problem	<ol style="list-style-type: none"> 1. Check Configuration 2. ThinkPad MultiPort 3. Parallel Port 4. System Board
Communication or plotter problem	<ol style="list-style-type: none"> 1. Check Configuration 2. ThinkPad MultiPort 3. Serial Port 4. PCMCIA Device 5. System Board

Undetermined Problems

If you have not already done so, go to “Power Systems Checkout” on page 262 and check the AC adapter and battery voltages.

If the AC adapter and battery voltages are correct and the problem remains, do the following.









1. Power-off the computer.
2. Remove or disconnect one of the following devices:
 - Any external device or cable
 - Any PCMCIA device
3. Power-on the computer.
4. If the symptom remains, repeat steps 1, 2, and 3 until you find the failing adapter or device.
5. If the problem remains, replace the Power Card.
6. If this does not solve the problem, replace the system board.

Related Service Procedures

This section provides information on the following:

"Status Indicators"
"PCMCIA Test Card"
"Power-On Password Override"
"Checking the Installed Devices List" on page 269
"Power-On Self Test (POST)" on page 269
"Advanced Diagnostics Diskette" on page 270
"Loading the Diagnostics" on page 270
"Formatting the Hard Disk Drive" on page 271
"Restoring the TP 510 System Files" on page 271
"Error Log" on page 271
"Setup Options" on page 273
"Starting Setup" on page 273
"Utilities" on page 273

Status Indicators

Light	Status Indicated
	Battery needs charging
	Battery is charging
	Computer is powered-on
	Computer is in suspend mode
	Hard disk drive is active
	Diskette drive is active
	Keyboard is in Num Lock mode
	Keyboard is in Caps Lock mode
	Keyboard is in Scroll Lock mode

PCMCIA Test Card

The green LED on the PCMCIA test card lights when the PCMCIA test is running. If the LED does not go on, check that the card is installed correctly by reseating the card. (For the docking station, if it still does not light after reseating, try using another slot for the test.) If the LED still does not go on and the test fails, replace the FRU shown in the diagnostic error code.

Power-On Password Override

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

Checking the Installed Devices List

If an adapter or device is missing from the Installed Devices list and you are able to add it to the list, do so and continue with the diagnostic tests.

If an adapter or device is missing from the installed devices list and you cannot add it to the list, you might have one of the following conditions:

- The diagnostic code for the missing device is not on your Advanced Diagnostics diskette.
- The missing device is a 3.5-Inch External Diskette Drive Adapter, or another unrecognizable adapter.
- The missing device is defective.
- The adapter or device is not an IBM product.

If the number of drives installed in the computer differs from the number shown in the installed devices list, an error can occur during the diagnostic tests. Restart the computer and correct the drive information in the Set Configuration menu before running the diagnostic tests.

Power-On Self Test (POST)

Each time you power-on the computer, the POST is initiated. The POST takes up to 15 seconds to complete, depending on the options installed.

The POST checks the following: system board, memory, display, keyboard, hard disk drive, parallel port, and serial port.

To start the POST, power-on the computer. You hear one short beep when the POST successfully ends.

If the POST cannot be completed successfully, an invalid configuration error message appears. If **F1** is pressed, the system bypasses the error and attempts to complete POST. Press **F1** to continue or Press **F2** to go to Setup.

Advanced Diagnostics Diskette

The Advanced Diagnostics diskette contains diagnostic programs. *The diskette is intended to test only IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid computer responses.*

Loading the Diagnostics

To start advanced diagnostics from the Advanced Diagnostics diskette, do the following.

1. Insert the Advanced Diagnostics diskette into the diskette drive.
2. Power-on all external devices.
3. Power-on the computer. (The advanced diagnostics program will load from the diskette drive.)

To start advanced diagnostics from the hard disk drive, do the following.

1. Power-on all external devices.
2. Power-on the computer.

Note: Some programs cause the diagnostic tests to give inaccurate results. The following steps prevent these programs from being loaded into memory while starting the advanced diagnostics.

3. When the message **Starting PC DOS** appears, press **F5**.
4. When the DOS prompt appears, type
`cd c:\thinkpad\diags`
5. Press **Enter**.
6. Type
command
7. Press **Enter** to start the advanced diagnostics program.

Accessing the Diagnostic Tests: To access diagnostic tests from the SELECT AN OPTION Menu, do the following.

1. Select **0 (SYSTEM CHECKOUT)**, then press **Enter**.
2. At the Installed Devices menu, press (**Y**), then press **Enter**.
3. The **SYSTEM CHECKOUT** menu is then displayed.
4. Select **0** or **1** from the **SYSTEM CHECKOUT** menu.
5. Select the device to be tested.

Formatting the Hard Disk Drive

Hard disk drives normally contain tracks in excess of their stated capacity to allow for defective tracks. The user is notified by a diagnostic message when the defect limit has been reached and service is recommended.

The Advanced Diagnostics Format program is different from the operating system format program.

Warning

All data on the selected hard disk drive is destroyed during a format operation or surface analysis.

Before the customer can transfer information from the backup diskettes to the hard disk drive, the hard disk drive must be formatted using the operating system format program. Have the customer refer to the operating system manual for a description of the hard disk preparation commands.

After formatting the hard disk drive, copy the System files from the Advanced Diagnostics diskette to the hard disk drive.

Restoring the TP 510 System Files

The subdirectory C:\THINKPAD\DIAGS on the hard disk drive contains the ThinkPad 510 Diagnostics programs.

If the hard disk drive is reformatted or the files in the subdirectory on the hard disk drive are corrupted, use the Advanced Diagnostics diskette to restore the diagnostic programs.

Important

The following is required to complete this procedure:

- DOS must be installed on the hard disk drive.
- An external diskette drive must be attached to the computer.

1. Power-on the computer; then, insert the Advanced Diagnostics diskette.
2. At the DOS prompt, type
A:UINSTALL
then press **Enter**.
3. Select **Install ThinkPad 510 Diagnostics** from the menu. The files are copied from the diskette to the THINKPAD\DIAGS subdirectory on drive C.

Error Log

Use the following steps to create an error log, run the diagnostic tests, and automatically record any error

messages in an error log. This procedure is normally used to diagnose an intermittent problem.

Note: The errors must be logged to a diskette drive or to a printer. If recording errors on a diskette, use a copy of the Advanced Diagnostics diskette that is not write-protected. **Do not run any diskette tests when logging to a diskette drive. Do not run a parallel port test when logging to a printer.**

Creating the Error Log

1. Insert the Advanced Diagnostics diskette into the diskette drive.
2. Press **0 (SYSTEM CHECKOUT)**, then press **Enter**.
3. Depending on the options installed in the computer, questions about attached devices might appear on the display. Answer as required; then press **Enter**.
4. Press **Y** or **N (IS THE LIST CORRECT (Y/N)?)**, then press **Enter**.
5. Press **2 (LOG UTILITIES)**, then press **Enter**.
6. Press **0 (START ERROR LOG)**, then press **Enter**.
7. Press **0** or **1 (LOG TO DISKETTE, OR PRINTER (0/1)?)**, then press **Enter**.
8. If you are logging to diskette, press **A (ENTER THE DRIVE ID FOR ERROR LOG?)**, then press **Enter**.
9. Press **9 (END LOG UTILITIES)**, then press **Enter**.

Starting the Test

1. Press **1 (RUN TESTS MULTIPLE TIMES)**, then press **Enter**.
2. Select the device you suspect has a failure, then press **Enter**.
3. Select the number of times to run the test; then press **Enter**.
4. Press **N (WAIT EACH TIME AN ERROR OCCURS (Y/N)?)**, then press **Enter**.
5. Follow any instructions on the display and select all available tests.

Note: Do not press any keys during the keyboard test.

6. To end (**RUN TEST CONTINUOUSLY**), press and hold **Ctrl**; then press **Pause**. The computer completes testing and returns to the Installed Devices menu.

Displaying the Error Log

1. Depending on the options installed in the computer, questions about attached devices might appear on the display. Answer as required; then press **Enter**.
2. Press **Y** or **N (IS THE LIST CORRECT (Y/N)?)**, then press **Enter**.
3. Press **2 (LOG UTILITIES)**, then press **Enter**.
4. Press **2 (DISPLAY LOG)**, then press **Enter**.

5. Press **A (ENTER THE DRIVE ID FOR ERROR LOG?)**, then press **Enter**.
6. If no errors occurred, the Log Utilities menu appears. If errors are displayed, go to "Symptom-to-FRU Index" on page 264.

Setup Options

The computer has two setup options that allow you to specify how the computer operates. The System Parameters (**Ctrl+Alt+F3** from the DOS prompt or the Diagnostic Menu) provide access to the power management parameters and the following system elements.

- Time
- Date
- Password
- Personalization
- Diskette drive
- Hard disk drive
- Cache
- Parallel port
- ISO Monitor
- Clock Multiplier

Starting Setup

Press the key combination for the setup program you want to start.

Key Combination	Setup Program
Ctrl+Alt+F3	System Parameters setup. (Must be started at the DOS prompt or the Diagnostic Menu.)
Func+F3	Power Management setup (can be started at any time after the computer is powered-on). This is page 2 of System Parameters.

Press **Esc** to display the Exit Menu.

Utilities

The system is configured with several utility programs. These programs provide added function that enhances the usability of the system. These programs should be backed up to prevent loss of data. Use the Diskette factory in Microsoft Windows to make a backup copy of the Advanced Diagnostics diskette. The utility programs are:

SIMUL Allows you to enable/disable simultaneous display on both the LCD and external monitor.

Note: The computer **does not** enter Suspend/Resume while in the Simultaneous mode. You must exit Simultaneous mode before

Suspend/Resume is allowed. Also, the Func + F7 function is not recognized until you exit the Simultaneous mode.

EPP2 Provides Enhanced Parallel Port Utility. This utility needs to be added to the AUTOEXEC.BAT and CONFIG.SYS if the option attached to the parallel port supports the enhanced parallel port mode.

PHDISK Prepares the hard disk drive for the hibernation feature, including formatting and the marking of defective areas. A partition is reserved on the hard disk drive to save data before the computer enters Hibernation mode.

Warning: Running this utility causes loss of data on the hard disk drive. It is important that the customer backup all data prior to using this utility.

Important

Run the PHDISK utility if you change the operating environment, reformat the hard disk drive, or add additional memory.

PCMCIA Drivers

IBM2SS01.SYS and PCMCIA.SYS provide the ability to use PCMCIA cards in an OS/2* environment.

* Trademark of the IBM Corporation.

Product Overview

The following table provides a brief overview of the system features.

Feature	Description
Processor (MHz)	486BL2-50 25/50-Mhz
Bus Architecture	AT Bus
Memory (Standard)	4MB
Memory (Maximum)	20MB
CMOS RAM	256 bytes
Video	VGA (with 1MB VRAM)
Diskette Drive	3.5-inch
Hard Drive	200MB, 2.5-inch
Audio Subsystem	Yes (Standard AT Audio)
PCMCIA	One Type-II slot
Keyboard	TrackPoint II
ThinkPad MultiPort	Provides connections for the following options: External Keyboard External Mouse External Diskette Drive External Display External Serial Device External Parallel Device

Note: An external diskette drive and cable are provided with this model.

FRU Removals and Replacements

Follow the list below for the sequential removal of FRUs. See the illustration on “ThinkPad 510 Exploded View” on page 278 for locations and identification of FRUs. The letters in parentheses in the list indicate screw types. See “Bottom Cover Screws” on page 279 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

1 Remove Battery Pack

2 Lift Keyboard

(Tabs located along the inside front edge of the keyboard hold the keyboard in the bottom cover. Insert a small screwdriver at 2A and 2B, between the front of the keyboard and the bottom cover. Gently pry the bottom cover away from the keyboard to release the keyboard.)

3 Disconnect Three Ribbon Cables

Remove Keyboard

CAUTION:

Be careful not to scratch the LEDs or LCD display when removing the keyboard

(If you are removing the system board, disconnect all flat cables. Slide each connector latch retainer away from the base to release each cable.)

4 Disconnect Hard Disk Drive Ribbon Cable

(Disconnect the cable at the system board connector.)

5 Remove Bottom Cover Screws

See “Bottom Cover Screws” on page 279.

(2-G screws near mouse buttons)

(1-EE screw in center)

(2-DD screws between the right mouse button and the PCMCIA slot)

(5-EE screws around bottom cover perimeter)

6 Remove Bottom Cover (with Hard Disk Drive and Cable Attached)

CAUTION:

When removing the bottom cover, be careful not to damage the PCMCIA test card.

(Slide the bottom cover past the PCMCIA eject button as you lift the cover off.)

(If you are not removing the hard disk drive, go to step 9.)

7 Disconnect Hard Disk Drive Ribbon Cable

(Disconnect the cable from the hard disk drive.)

8 Remove the Hard Disk Drive

(4-G screws near FCC notice)

9 Lift System Board

(Gently lift the system board and turn it over. Be careful not to lose the two plastic system board inserts.)

10 Disconnect Pointing Device Cable

11 Disconnect LCD Display Cable

12 Disconnect Parallel Port Cable

(In metal frame on system board rear)

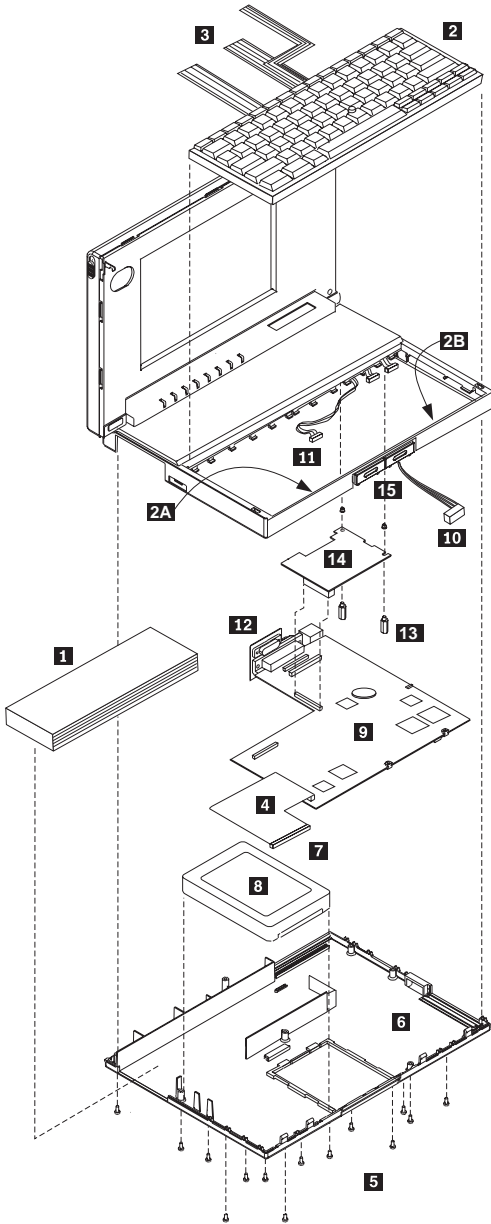
Power Switch Assembly, see “Parts Listing” on page 282.

13 Remove Two Threaded Power Card Spacers

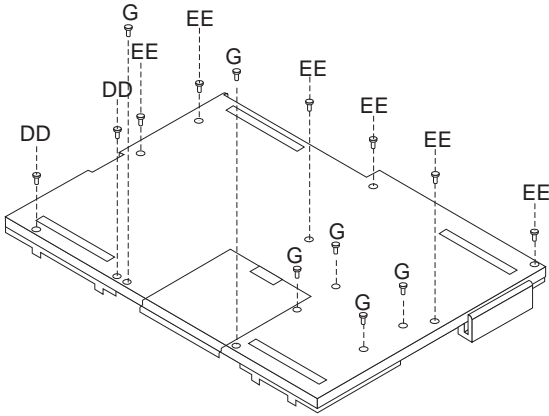
14 Remove Power Card



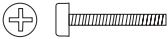
15 Remove Mouse Buttons

ThinkPad 510 Exploded View



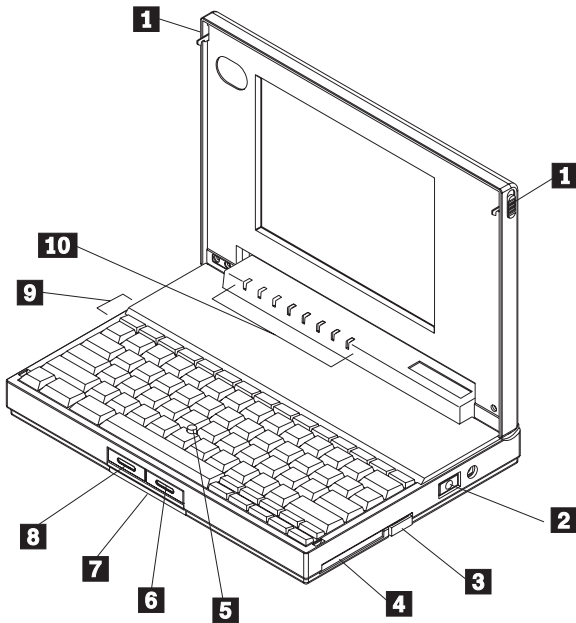
Bottom Cover Screws



G		Black
DD		Black
EE		Black

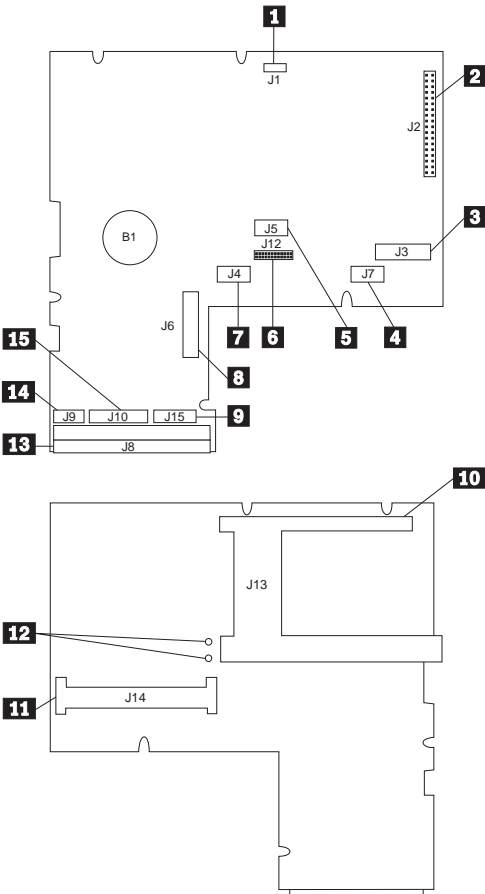
Locations

- 1** Top Cover Release Latches
- 2** On/Off Switch
- 3** PCMCIA Eject Button
- 4** PCMCIA Slot
- 5** TrackPoint II
- 6** Right Button (pointing stick)
- 7** Memory Card Access Panel
- 8** Left Button (pointing stick)
- 9** Battery
- 10** Status Indicator LEDs

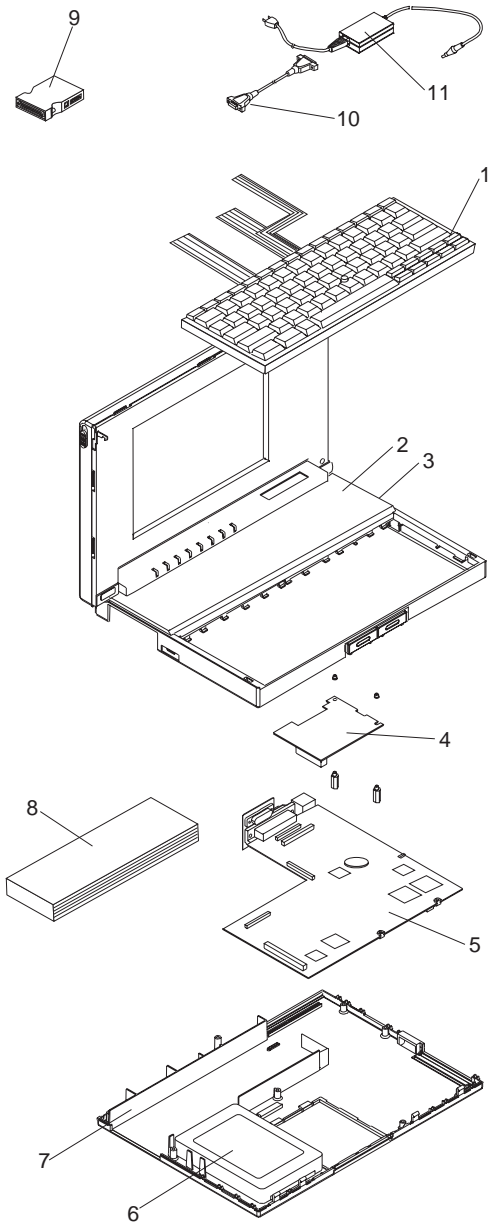


System Board Connectors

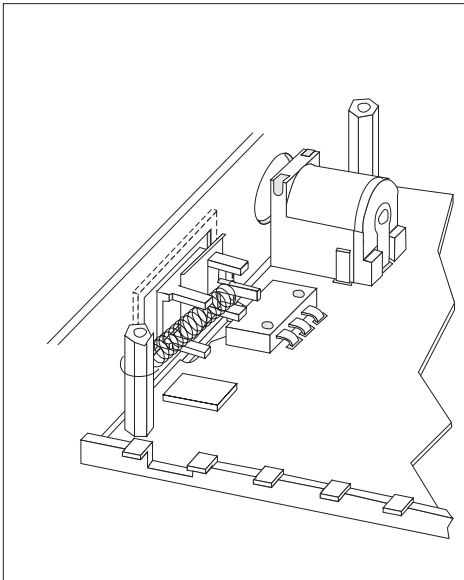
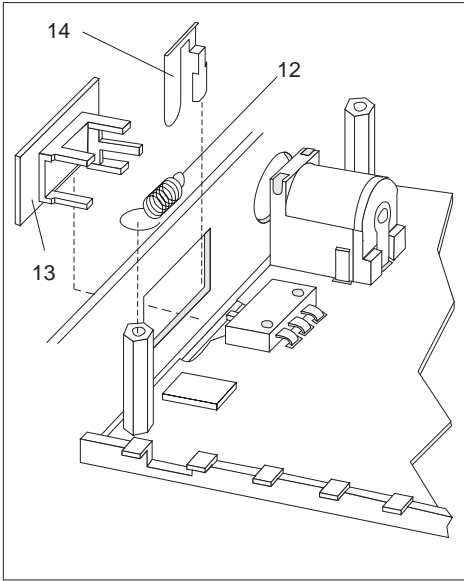
- 1** Pointing device connector
- 2** Hard disk drive connector
- 3** Keyboard connector
- 4** LED connector
- 5** Keyboard connector
- 6** Parallel port connector
- 7** Keyboard connector
- 8** Power card connector
- 9** LCD color connector
- 10** PCMCIA connector
- 11** IC DRAM card connector
- 12** PAD1 and PAD2
- 13** Multiport replicator connector
- 14** LCD power connector
- 15** LCD data connector



Parts Listing



Parts Listing (continued)



ThinkPad 510 System Unit FRUs

Index

1	Keyboard Assembly (US English)	73G3394
	TrackPoint II Cap Set	73G3463
2	Color LCD Assembly	73G3387
3	Power Switch Assembly (See Index numbers 12, 13 and 14.)	
4	Power Card	73G3465
5	System Board	88G1121
	System Board Bracket	73G3391
6	200MB Hard Disk	73G3443
7	Base Cover Assembly	73G3395
	Connector Door	73G3420
8	Rechargeable Battery	73G3417
9	ThinkPad MultiPort	73G3388
10	Diskette Drive Cable (External)	73G3422
	Parallel Port Cable (Internal)	73G3421
	Hard Disk Cable (Internal)	59G7927
11	AC Adapter	73G3411
12	Power Switch Spring	73G3449
13	Power Switch Slide	73G3385
14	Power Switch Clip	73G3448
	4MB IC DRAM	8189098
	8MB IC DRAM	8189099
	16MB IC DRAM	19H8061
	External Diskette Drive	59G7918
	Screw Pack	73G3445
	1 mouse/hard disk drive screw	
	1 system board insert screw	
	1 bottom cover screw	
	1 power card standoff	
	1 parallel stud	
	1 plastic system board insert	

ThinkPad 710T (2523)

General Checkout	286
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General Checkout

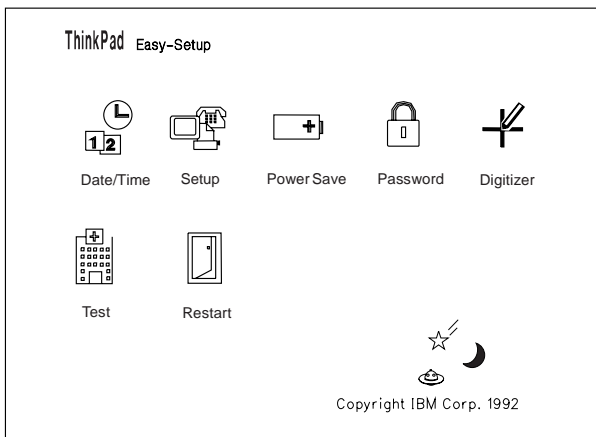
The diagnostic tests are intended to test *only* IBM products. Non-IBM products or modified options can give false errors and invalid responses.

001

- Power-off the computer and all external devices.
- Check that all the cables and the power cord are properly connected.
- Power-on the computer while holding the Suspend/Resume switch in the On position. Check for the following responses:
 - The power on indicator lights. The Suspend/Resume indicator works as the power on indicator when the power switch is pressed.
 - One long beep sounds.
 - Memory test begins (memory size appears on the top-left corner of the screen) and the **Easy-Setup** screen or **Password Menu** screen appears.

Note: If the Resume/Suspend Switch is not held in the On position when the computer is powered-on, the user defined screen appears.

DID EITHER THE EASY-SETUP OR PASSWORD MENU SCREEN APPEAR?



Yes **No**

002

Go to Step 004 on page 287.

003

- Enter the password on **Password Menu** screen, if it appeared.

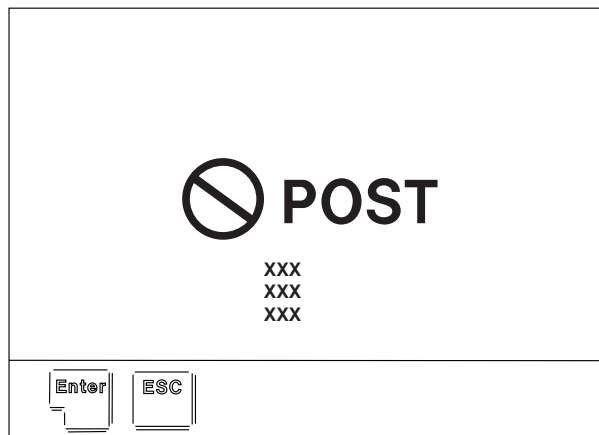
(Step **003** continues)

003 (continued)

- Select **Test** on the **Easy-Setup** screen and go to Step 007 on page 288.
-

004

DID THE FOLLOWING SCREEN APPEAR?



Yes **No**

005

- Note the symptom. If the power does not come on completely, go to “Power Systems Checkout” on page 290 and follow the procedure. If the power is on, but the expected screen does not appear, go to “Symptom-to-FRU Index” on page 296.

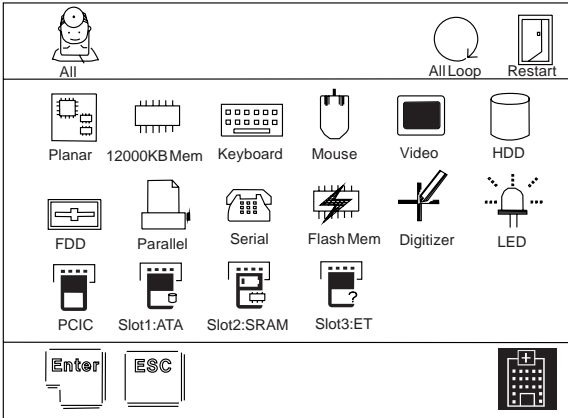
006

- Note all error codes on the screen. Go to “Symptom-to-FRU Index” on page 296 and find the error code and follow the instruction. If the problem remains, go to “Undetermined Problems” on page 301.
-

(CONTINUED)

007

DID THE TEST MENU APPEAR?



Yes No

008

- Go to "Symptom-to-FRU Index" on page 296 and find the error code or the symptom and follow the instructions. If the problem remains, go to "Undetermined Problems" on page 301.

009

IS THE DISPLAYED CONFIGURATION CORRECT WITH THE INSTALLED DEVICES?

Note: Installed devices are displayed in a dark shade, devices not installed are displayed in a gray shade.

Yes No

010

- Go to "Checking the Installed Devices List" on page 302.

011

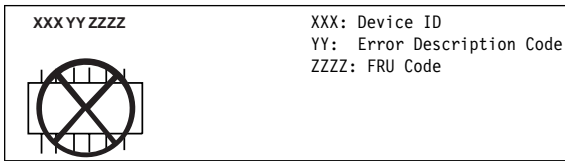
- Select **All** on the **Test Menu** and go to Step 012 on page 289. (Diagnostic test will run on all devices displayed in a dark shade.)
-

012

DID THE TESTS FIND A DEVICE ERROR?

A device error is displayed with an X over the device. The device ID (XXX), an error description code (YY), and FRU code (ZZZZ) are displayed.

For example:



Note: If the test stops or hangs when the test is running, replace the last device that was tested.

Yes No

013

The error was not detected by the test:

- Check that the cables and connectors are not damaged.
- Reconnect all adapters, drives, and modules, then test the computer several times. An **All Loop** option is available for looping all the tests. To exit from the looping, select the test icon on the right, bottom corner of the screen at the time of between each test.
- If no error is detected, go to “Symptom-to-FRU Index” on page 296 and use the user reported symptom.
- If any errors are detected, go to “FRU Codes” on page 298.

014

– Note the error codes shown on the screen and go to “FRU Codes” on page 298 and replace the appropriate FRU.

Memory Checkout

Note: Before removing a SIMM card, power-off the computer.

Error code **110** indicates that a parity check error on the system board was detected. The error is caused by the SIMM card or the system board.

To isolate the FRUs, remove the SIMM card and run the memory test again.

- If an error occurs without the SIMM card, replace the system board.
- Otherwise, replace the SIMM card.

Note: The system board contains the first 4MB of the memory.

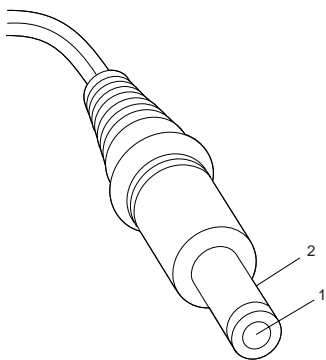
Power Systems Checkout

To verify the symptom of the problem, power-on the computer using each of the power sources available. If you suspect a power problem, see the appropriate power supply check listed below.

"AC Adapter Test" on page 291
"Battery Pack Test" on page 292
"Backup Battery Test" on page 293
"Quick Charger Test" on page 293
"Car Battery Adapter Test" on page 294
"Short Circuit Test" on page 301

AC Adapter Test

1. Unplug the AC adapter from the power outlet and the computer.
2. Inspect the AC adapter for any signs of overheating or damage.
3. Inspect the AC adapter power cord for cuts or damage. Replace the power cord, if necessary.
4. Plug the power cord into a power outlet. Listen for any sound that might indicate defective operation.
5. Measure the output voltage at the AC adapter plug.

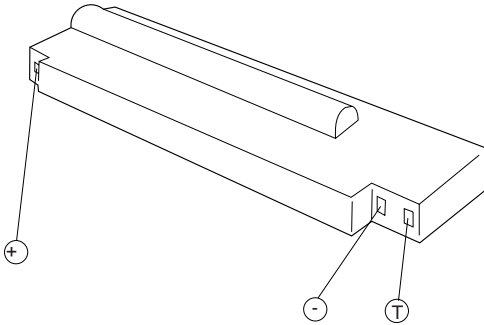


Pin	Voltage (V dc)
1	+19 to +21
2	Ground (sleeve)

- If the voltage is incorrect, but not 0, replace the AC adapter.
- If the voltage is 0, check the power cord and the power outlet.
- If the power cord and power outlet are OK, replace the AC adapter.
- If the voltage is correct, suspect a short circuit or a failure in the computer. Go to “Short Circuit Test” on page 301.

Battery Pack Test

1. Remove the battery pack.
2. Measure the voltage at the battery contacts as shown below.



Contacts	Voltage (V dc)
+	+9.0 to +12.6
-	Ground

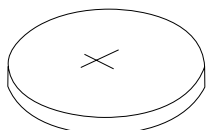
- If the voltage is not correct, charge the battery.
- If the voltage is not correct after being charged, replace the battery.
- If the voltage is correct, suspect a short circuit or failure in the computer. Go to the "Short Circuit Test" on page 301.

Use the following procedure to check if the thermal protection has tripped.

1. Measure the resistance with an ohmmeter between the **T** and **-** contacts.
2. The resistance should not be open (infinity). The thermal protection is detected when the temperature exceeds 70°C to 80°C (158°F to 176°F). Wait until the battery temperature becomes normal, then verify the resistance at the battery terminals. If it is open, replace the battery.

Backup Battery Test

1. Remove the backup battery.
2. Measure the voltage on the battery as shown below.



Pole	Voltage (V dc)
+	+2.8 to +3.2
-	Ground

If the voltage is not correct, replace the backup battery.

If the voltage is correct, a short circuit or a failure in the system board has occurred. Replace the system board.

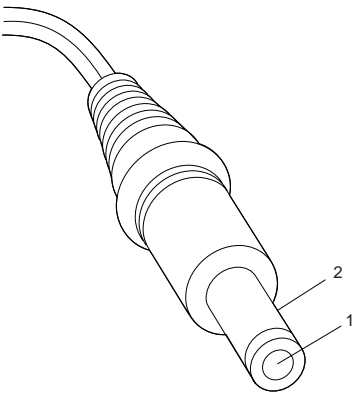
Quick Charger Test

1. Make sure the AC adapter works correctly by using the "AC Adapter Test" on page 291.
2. Verify the battery pack is not thermal protected by using the procedure on "Battery Pack Test" on page 292.
3. Plug the quick charger to the AC adapter. The charger power indicator should turn on.
4. Install the battery pack, the charging indicator should start blinking.
5. Within 3.0 hours, the battery pack (not exhausted, standard size) will be fully charged and the charging indicator changes from blinking to constant on.

If the charger does not work as stated above, replace the quick charger.

Car Battery Adapter Test

1. Unplug the car adapter from the computer and the cigarette socket.
2. Measure the cigarette socket voltage. It should be between 9.0 V dc and 18.0 V dc.
3. Plug the adapter into the car socket. Measure the output voltage of the adapter.



Pin	Voltage (V dc)
1	+19 to +21
2	Ground (sleeve)

- If the voltage is incorrect, but not 0, replace the car battery adapter.
- If the voltage is 0, check that the adapter connector has good contact with cigarette socket. If the connection is good, replace the adapter.
- If the voltage is correct, and the computer operates with the AC Adapter, replace the car battery adapter.
- If the voltage is correct, and the computer fails with AC adapter also, perform the AC Adapter Test procedure.

Power Management System

The power management system controls the power applied to the computer, the modem card, and the printer by using the setup Program's **Power Save** menu. This system reduces the power drain on the battery when the computer power is on, but not actively being used.

Suspend and Resume Modes: The suspend and resume modes are unique methods to minimize the use of power from the battery. When the computer enters suspend mode, one beep sounds and the Suspend/Resume indicator glows a steady orange. All tasks are stopped and their present states are stored in memory to save power.

When the computer returns to resume mode, the computer restores the same states as when it entered suspend mode. One beep sounds and the indicator glows a steady green when the resume operation is completed.

- The computer enters suspend mode when:
 - A battery-low condition is detected
 - The Suspend/Resume switch is activated
 - When the computer is not actively used (Auto suspend)
 - The suspend function does not occur when a device is connected to AT Bus, or a modem card is inserted in the IC Card slots.
- The computer returns to resume mode when the Suspend/Resume switch is switched on. While in the resume state, the indicator blinks.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists the symptoms and errors and the possible causes. The most likely cause is listed first. Use this index to help you decide which FRUs to have available when servicing a computer.

For errors indicated by the diagnostic tests, see “FRU Codes” on page 298. If the symptom is not listed, go to “Undetermined Problems” on page 301.

In the following error codes, **X** can be any number.

Note

For IBM devices not supported by ThinkPad 710T diagnostic code, refer to the manual for that device.

Numeric Error Codes

Symptom / Error	FRU / Action
10X	1. System Board
110 (Check “Memory Checkout” on page 290 before changing any device.)	1. SIMM Card 2. System Board
111	1. Option Bus 2. System Board
161	1. Refer to “Backup Battery Test” on page 293. 2. System Board
162 (See “Checking the Installed Devices List” on page 302 before changing any FRU.)	1. Check Device Configuration 2. System Board 3. Diskette Drive Assembly 4. Hard Disk Drive Assembly 5. Diskette Drive Cable 6. Hard Disk Drive Cable 7. Modem Card
163	1. Set Time and Date. 2. System Board
164 (See “Memory Checkout” on page 290 before changing any FRU.)	1. Check Device Configuration. 2. SIMM Card 3. System Board
199	1. Refer to “Checking the Installed Devices List” on page 302.
1XX	1. System Board
20X	1. System Board 2. SIMM Card

Symptom / Error	FRU / Action
21X	<ol style="list-style-type: none"> 1. SIMM Card 2. System board
2XX (See "Memory Checkout" on page 290 before changing any FRU.)	<ol style="list-style-type: none"> 1. System Board 2. SIMM Card
301, 31X	<ol style="list-style-type: none"> 1. System Board 2. Keyboard
304, 305	<ol style="list-style-type: none"> 1. System Board 2. Mouse
308	<ol style="list-style-type: none"> 1. System Board
3XX	<ol style="list-style-type: none"> 1. Keyboard 2. Mouse 3. System Board
601, 6XX (Go to the "External Diskette Drive Test" on page 464 before changing any FRU.)	<ol style="list-style-type: none"> 1. System Board 2. Diskette Drive Assembly 3. Diskette Drive Cable
602	<ol style="list-style-type: none"> 1. Diskette Drive Assembly
9XX	<ol style="list-style-type: none"> 1. System Board 2. Parallel Device
11XX	<ol style="list-style-type: none"> 1. System Board 2. Serial Device
12XX	<ol style="list-style-type: none"> 1. System Board 2. Serial Device 3. Communication Cable
17XX	<ol style="list-style-type: none"> 1. Disk Drive Assembly 2. System Board
24XX	<ol style="list-style-type: none"> 1. System Board 2. LCD Assembly
5001 – 5016	<ol style="list-style-type: none"> 1. System Board 2. LCD Assembly
5017 – 5020	<ol style="list-style-type: none"> 1. LCD Assembly 2. System Board
8601, 8603	<ol style="list-style-type: none"> 1. System Board 2. Mouse
86XX	<ol style="list-style-type: none"> 1. Mouse 2. System Board
101XX	<ol style="list-style-type: none"> 1. Modem Card 2. System Board
102XX	<ol style="list-style-type: none"> 1. LED Card 2. System Board 3. Related Devices
I9990305	<ol style="list-style-type: none"> 1. Operating System 2. OS device

FRU Codes

If an error is detected by the diagnostic tests, a *four-digit* FRU code is displayed. The FRU code indicates two suspected FRUs.

Replace the FRU that is indicated by the *two leftmost digits*, then replace the FRU indicated by the *two rightmost digits*. No FRU is assigned to code 00. If only one FRU is suspected, the other FRU code is filled with 00.

Use the "External Diskette Drive Test" on page 464 to isolate diskette problems to a FRU.

If the problem still remains and the system board has not been replaced, replace the system board.

FRU Code	FRU
10	System Board
20	Memory (See "Memory Checkout" on page 290.)
30	Keyboard
31	Numeric Keypad
32	Keyboard, External
33	Mouse
35	Digitizer
36	LCD/Digitizer
40	LCD Assembly
41	External CRT
50	External Diskette Drive
55	Hard Disk Drive
60	System Board
65	IC Card Memory
68	TPF Card
70	System Board, (Printer)
71	System Board, (Printer control)
80	LED Card
82	Switch Card Assembly
85	System Board, (Speaker)
86	DC-DC Card

Beep Symptoms

Symptom / Error	FRU / Action
Continuous beep.	1. System Board
One beep and a blank, unreadable, or flashing LCD.	1. LCD Assembly 2. System Board 3. SIMM Card 4. DC/DC Card
One beep, and the message "Boot source (TPF) cannot be found."	1. TPF (in Slot 1) 2. System Board (TPF Controller)
One beep, and the message "Unable to access boot source."	1. TPF (in Slot 1) 2. System Board (TPF Controller)
One long, two short beeps and a blank or unreadable LCD.	1. System Board 2. LCD Assembly
One long beep followed by four short beeps each time you press the power on/off button.	1. Connect an AC adapter or install a fully charged battery. Computer cannot power-on due to low battery voltage.
One beep every second.	1. Connect AC adapter or install fully charged battery (allow computer to complete shutdown before changing the battery). Computer is shutting down due to low battery voltage.
Two short beeps.	1. POST error. See "Symptom-to-FRU Index" on page 296.
Three short beeps.	1. Move computer to a cooler environment. Battery or computer high temperature threshold has been exceeded.
Four short beeps every five seconds and a blank LCD.	1. System Board 2. SIMM Card 3. Modem Card

Miscellaneous Symptoms

Symptom / Error	FRU / Action
No beep, Power-on LED not lit, and a blank LCD during POST. (See "Power Systems Checkout" on page 290 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. DC/DC Card 3. Power source when failing
No beep, Power-on LED lit, and a blank LCD during POST. (See "Power Systems Checkout" on page 290 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. System Board 2. Modem Card
No beep during POST but computer runs OK.	<ol style="list-style-type: none"> 1. System Board (Speaker)
LCD screen unreadable or characters missing pels.	<ol style="list-style-type: none"> 1. LCD Assembly 2. System Board
One or more keys do not work.	<ol style="list-style-type: none"> 1. Keyboard 2. System Board
Computer does not respond to Pen input.	<ol style="list-style-type: none"> 1. Pen 2. LCD Assembly 3. System Board
LCD backlight not functioning.	<ol style="list-style-type: none"> 1. Inverter Card 2. LCD Assembly 3. Switch and LED Card 4. System Board
LCD backlight intensity not adjustable.	<ol style="list-style-type: none"> 1. LCD Assembly 2. Switch and LED Card 3. System Board
LCD contrast not adjustable.	<ol style="list-style-type: none"> 1. LCD Assembly 2. System Board 3. Switch and LED Card
System hang or intermittent hang. (See "Undetermined Problems" on page 301 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Press Reset Button 2. System Board 3. Operating System
The computer does not suspend or resume.	<ol style="list-style-type: none"> 1. System Board
The computer does not power off.	<ol style="list-style-type: none"> 1. Press Reset Button 2. System Board
Real-time clock inaccurate.	<ol style="list-style-type: none"> 1. Backup Battery 2. System Board
Printer problems. (See "Printer Checkout" on page 468.)	<ol style="list-style-type: none"> 1. System Board 2. Parallel Port Device Cable
Serial or parallel port device problems.	<ol style="list-style-type: none"> 1. Device 2. Device Cable 3. System Board
LED incorrectly remains off, but computer runs OK.	<ol style="list-style-type: none"> 1. Switch and LED Card 2. System Board

Symptom / Error	FRU / Action
Internal modem card does not communicate with a modem or FAX.	<ol style="list-style-type: none"> 1. Verify that the setup data defined by the communication software is suitable for the communication. 2. Modem Card

If the problem remains, see “Undetermined Problems.”

Undetermined Problems

1. Power-off the computer.
2. Remove or disconnect one of the following devices:
 - Any external device or cables (including the keyboard)
 - Internal modem card
3. Power-on computer power and run diagnostic tests.
4. If the symptom remains, repeat steps 1, 2, and 3 until you find the failing adapter or device.
5. If all devices are disconnected and the symptom remains, go to “Power Systems Checkout” on page 290. If this does not solve the problem, replace the system board.
6. If an intermittent problem remains after replacement of the FRUs, consider external electrical noise that can have an effect on the computer. Check that the EMC contacts on the system board are not broken. The contacts are fragile and can be easily damaged.

Short Circuit Test

1. Visually check the cables, wires, and connectors for any short circuits, open wires, and damage. If a short circuit or burned parts are found, replace the parts.
2. Disconnect, then reconnect all the external devices from the computer one by one and see if the same symptom appears. If you find that an external device has a problem, follow the maintenance procedure for that device.
3. If the same symptom remains with no external devices connected, the problem is in the computer. Isolate the failing component in the computer by changing the FRUs one by one until you find the problem. Replace the DC/DC card and the system board first.
If the symptom is that the battery becomes low on power quickly, and all the tests run without detecting any errors, replace the battery pack first.

Related Service Procedures

This section provides information on the following:

"Power-On Password"
"Reset Button"
"Checking the Installed Devices List"
"ThinkPad File (TPF) Card"
"IC Card Controller"

Power-On Password

Important

This information is not available in this HMM online format. See your IBM Servicer or IBM Authorized Dealer for this procedure.

Reset Button

The reset button is used when the computer will not power-off or there is a system hang. The reset button resets the power supply regardless of the status of the microcode.

Checking the Installed Devices List

If a device is installed but the icon appears in gray shade rather than dark shade on the **Test Menu**, it means that the device is defective. Make sure that the device is connected properly. If the symptom continues, replace the device or the system board.

FDD, Parallel, and Serial icons are always displayed in dark shade. That is, these icons represent adapters on the system board and do not represent external devices.

ThinkPad File (TPF) Card

The TPF card is functionally equivalent to a hard-disk drive. However, the TPF card utilizes flash-memory for data storage. The TPF is rugged, noiseless, and uses very little power.

IC Card Controller

The IC Card controller is integrated on the system board and can accommodate one IC card (HDD model) or three cards (TPF model) at the same time. The slots conform to the PCMCIA Type-2 and JEIDA V4.1.

Product Overview

The following table provides a brief overview of the system features.

Feature	Description
Processor (MHz)	486SLC2 25-MHz
Bus Architecture	AT Bus
Memory (Standard)	4MB RAM
Memory (Maximum)	12MB RAM
VGA Video	640 x 480 resolution Support for 16 concurrent gray scales
Hard Drive	60MB (HDD model) ThinkPad file card (TPF model)

FRU Removals and Replacements

Follow the numerical sequence in the FRU removal sequence list and in the exploded view to remove or disconnect parts in the correct order. The letters in parentheses in the list indicate screw types. See the “Screw Size Chart” on page 19 to match the letters to the correct screw type and size before replacing each screw.

Safety Notice 8: Translation on page 13

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

Safety Notice 1: Translation on page 7

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

1 Battery Pack

(To replace the backup battery, use a coin to open the backup battery door on the bottom cover. Reset configuration after replacing the backup battery.)

2 Four Bottom Cover Screws (2-B, 2-W)

(At each corner)

3 Top Cover Assembly

4 One Bottom Cover Screw (X)

(At center)

5 LCD and Digitizer Cables

6 LCD Assembly and Shield Cover Assembly

7 Switch and LED Card

8 Four Shield Cover Screws (Z)

(At corners of shield cover)

Separate LCD assembly and shield cover

(Perform digitizer calibration if the LCD assembly is replaced.)

9 Standby Battery

10 System Power Cable

11 Seven System Board Screws (Y)

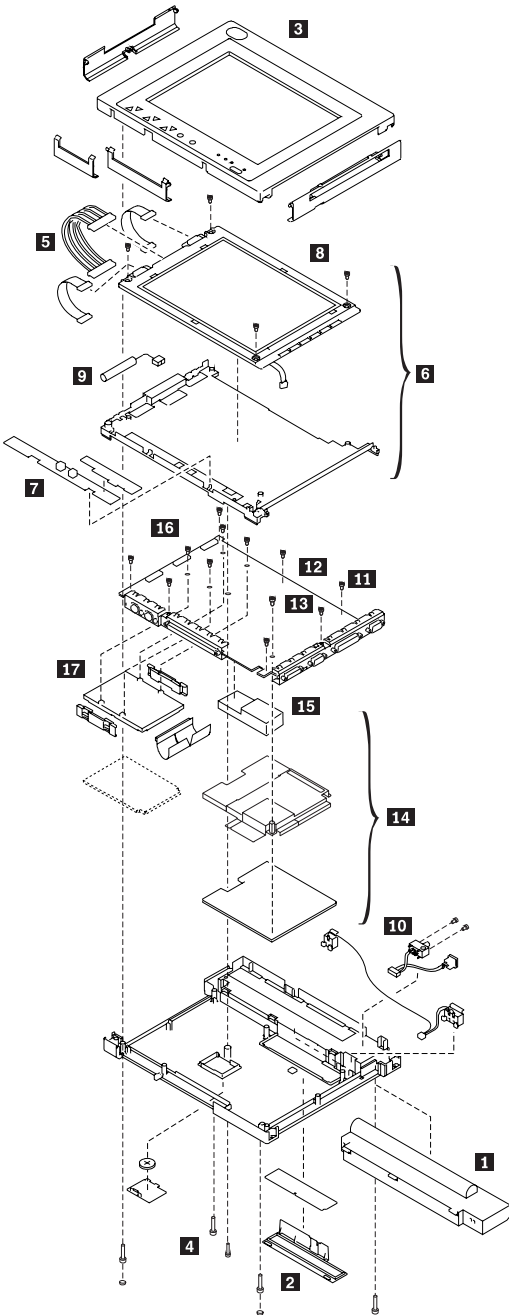
12 System Board

(Remove the backup battery, sub battery, DC/DC card and inverter card, and the hard disk drive from

the old system board and install them on the new one. Check that the IC card bracket is in place before tightening the board screws. Perform digitizer calibration for the new system board.)

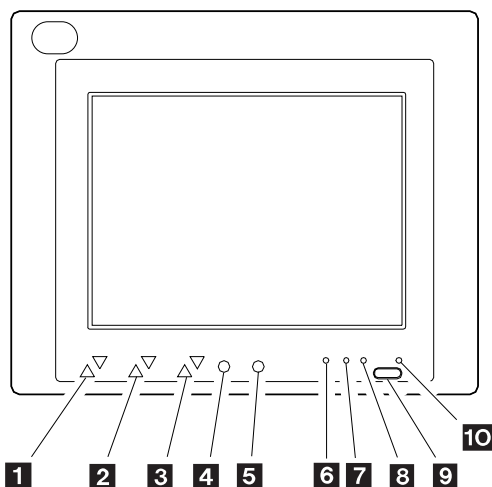
- 13** One Screw (Y)
- 14** Shield Kit and DC/DC Card
- 15** Inverter Card
- 16** Four Screws (T)
(In system board holding hard disk drive)
- 17** Hard Disk Drive

ThinkPad 710T Exploded View



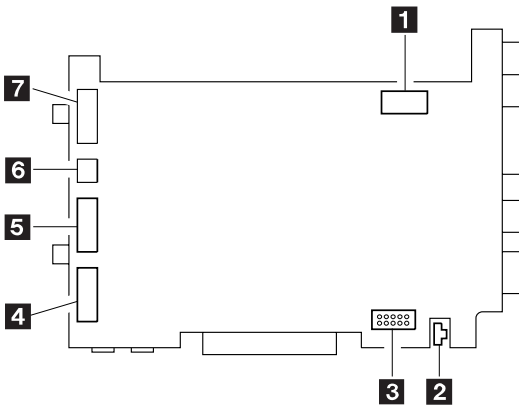
Locations

System Top View



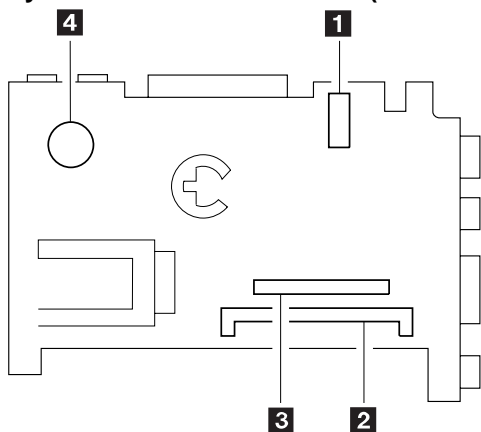
- 1** Speaker Volume Control Buttons
- 2** Contrast Control Buttons
- 3** Brightness Control Buttons
- 4** Backlight ON/OFF Switch
- 5** Reverse Video Switch
- 6** Hard Disk Drive Indicator (HDD model)
- 7** Battery Status Indicator
- 8** Battery Charge Indicator
- 9** Suspend/Resume Switch
- 10** Suspend/Resume Indicator

System Board Connector (Top View)



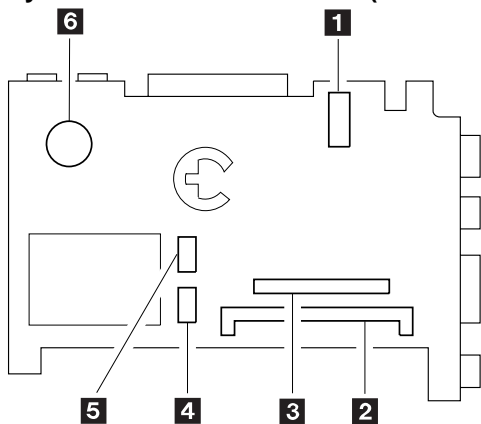
- 1** Power Switch Cable Connector
- 2** LCD Power Connector
- 3** Switch and LED Card Connector
- 4** Digitizer Cable Connector
- 5** LCD Cable Connector
- 6** Sub Battery Connector
- 7** Digitizer Cable Connector

System Board Bottom View (TPF Model)



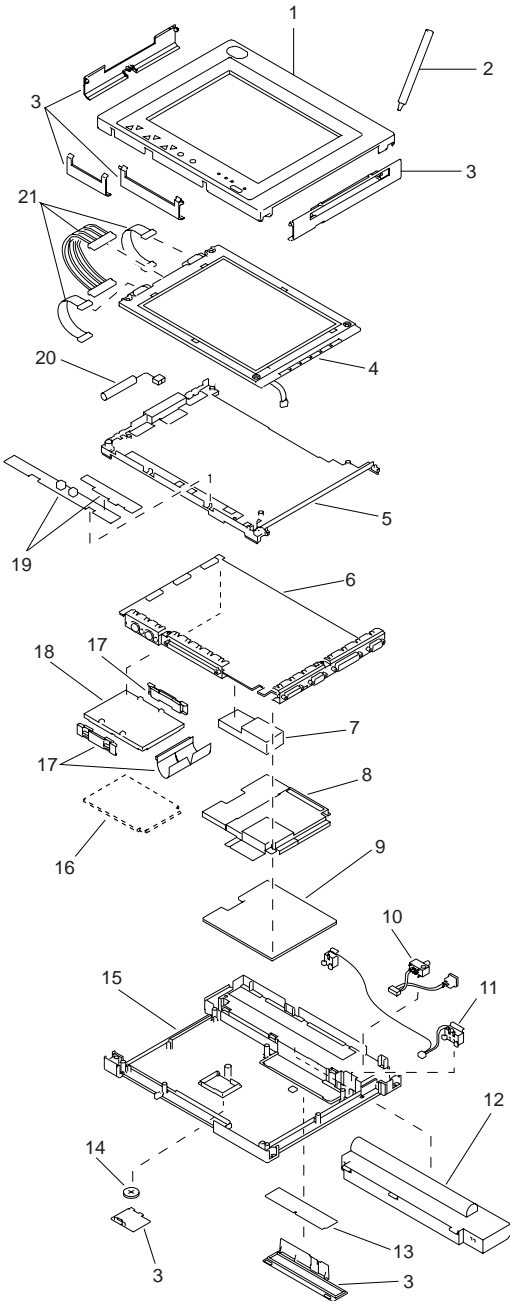
- 1** Inverter Card Connector
- 2** SIMM Card Connector
- 3** DC/DC Card Connector
- 4** Speaker

System Board Bottom View (HDD Model)



- 1** Inverter Card Connector
- 2** SIMM Card Connector
- 3** DC/DC Card Connector
- 4** HDD Connector
- 5** HDD Connector
- 6** Speaker

Parts Listing



System Unit

Index

1	Top Cover Assembly (TPF Model)	53G7099
	Top Cover (HDD Model)	53G7100
2	Pen Assembly	53G7115
3	Cover Group	53G7098
4	LCD Unit assembly	48G9685
	(Includes 3 cables from index 18)	
5	Shield Cover	53G7101
6	System Board (TPF Model)	53G6963
	System Board (HDD Model)	53G6964
7	Inverter Card	53G7142
8	Miscellaneous Kit (See page 313)	53G6954
9	DC/DC Card	53G6965
10	Switch Cable Assembly	53G6966
11	Battery Terminal Assembly	53G6967
12	Battery Pack, Standard Size	
	U.S., Canada, LA, AG, AP, Spain, and Portugal	48G9775
	Switzerland	48G9776
	Norway, Sweden, Finland	48G9777
	EMEA Others	48G9778
	Benelux	48G9800
	Japan	53G7143
12	Battery Pack, Half Size	
	U.S., Canada, LA, AG, AP, Spain, and Portugal	53G7104
	Switzerland	53G7105
	Norway, Sweden, Finland	53G7106
	EMEA Others	53G7108
	Benelux	53G7107
	Japan	53G7110
13	SIMM 2MB	79F1002
	SIMM 4MB	79F1003
	SIMM 8MB	79F1004
14	Backup Battery	53G7114
15	Bottom Cover	53G7102

- 16 TPF 5MB, Non pre-loaded 48G9899
 TPF 10MB, Non pre-loaded 48G9900
 TPF 15MB, Non pre-loaded 49G0000
 TPF, Pre-loaded (See the table below.)

TPF P/N	10MB PenDOS**	15MB PenDOS	15MB PenPoint**
U.S. English	53G7152	53G7151	53G7153
U.K. English	53G7155	53G7154	53G7156
French	53G7158	53G7157	53G7159
German	53G7161	53G7160	53G7162
Italian	53G7164	53G7163	53G7165
Spanish	53G7167	53G7166	53G7168
Japanese	53G7170	53G7169	53G7171

- 17 Miscellaneous Kit, Hard Disk Drive 48G9780
 18 Hard Disk Drive, 60MB 53G6962
 19 Switch and LED Card 48G9684
 20 Sub Battery (Except countries below) 53G7092
 For Switzerland 53G7093
 For Benelux 53G7094
 For Japan 48G9814
 21 LCD/ Digitizer Cable 48G9686

External FRUs

- External Diskette Drive (without cable) 48G9896
 External Diskette Drive Cable 48G9897
 Quick Charger 48G9820
 Car Adapter
 U.S./Canada/LA/Japan 07G1190
 EMEA 35G3304
 AC Adapter 07G1246
 AP/EMEA 07G1851
 Japan (2-Pin) 07G1248

** PenPoint is a trademark of the GO Corporation.

** PenDOS is a trademark of the Communications Intelligence Corporation.

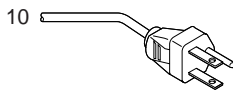
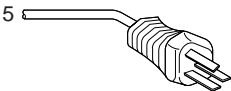
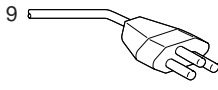
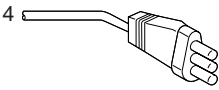
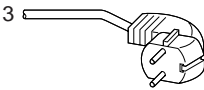
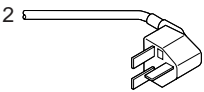
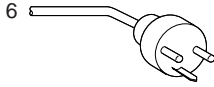
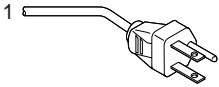
Tools and Miscellaneous

No special tools are needed to service the computer.

The following lists the miscellaneous parts kits.
(Numbers in parentheses show quantity)

Screw kit	53G7113
LCD screw (10)	
System board and DC/DC screw (10)	
Bottom cover screw long (10)	
Bottom cover screw short (10)	
Bus connector stud (10)	
Connector stud screw (10)	
Keyboard, Mouse screw (10)	
FDD screw (10)	
HDD bracket screw (10)	
System board bracket screw (10)	
Knob Sheet	53G7103
Knob sheet assembly (1) (Screen control button top)	
Label Group	53G6952
Serial No. label, blank (1)	
Artwork blank (1)	
Information label, H (1)	
Information label, H for Japan (1)	
Information label, T (1)	
Information label, T for Japan (1)	
Battery CSU label (1)	
Bracket Kit	53G6953
I/O bracket assembly (1)	
AT BUS,KBD/mouse bracket (1)	
IC card bracket (1)	
HDD bracket (1)	
Miscellaneous Kit	53G6954
Battery knob (1)	
Screw cap (1)	
Front foot (1)	
Rear foot (1)	
DC/DC shield (1)	
Tri-Connector Wrap Plug	72X8546
PC Test Card	35G4703
Audio Wrap Cable	66G5180
Screwdriver Kit	95F3598

Power Cords



Warning: Use only the power cord certified for your country.

Index

1	Colombia, U.S., Venezuela	13F9959
	Japan, 2-pin	6454377
	Japan, 3-pin	65F0031
2	Hong Kong, Singapore, U.K.	14F0033
3	France, Germany, Spain	13F9979
4	Italy	14F0069
5	Australia, New Zealand	13F9940
6	Denmark	13F9997
7	Israel	14F0087
8	Bangladesh, Pakistan, Sri Lanka, South Africa	14F0015
9	Switzerland	14F0051
10	Thailand	1838574

Expansion Unit (3550)

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General Checkout (3550-001)

The diagnostic tests are intended to test *only* IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid system responses.

Overall Procedures

1. Test the computer alone, to make sure there is not a problem with the computer before testing it with the 3550 Expansion Unit. If there is a problem with the computer, solve it first. Then, test the computer with the 3550 Expansion Unit.
2. Have the external keyboard, mouse, parallel, and serial devices connected to the computer and test the computer. If no problem exists, connect them to the 3550 Expansion Unit and test the 3550 Expansion Unit with the computer installed.
3. When testing the 3550 Expansion Unit, use the Diagnostic Diskette supplied with the 3550 Expansion Unit.
 - a. Because the serial and parallel ports on the computer are covered by the 3550 Expansion Unit, when the computer is installed on the 3550 Expansion Unit, answer "No" when you are asked if a wrap plug is used.
 - b. Test the status indicators on the 3550 Expansion Unit by using the system status indicator test of the computer. The corresponding indicators on the 3550 Expansion Unit turn on and off in the test, except for the power-on indicator. This power-on indicator does not turn off due to hardware restriction.
4. If the user did not bring the computer with the 3550 Expansion Unit, use a properly working computer with the 3550 Expansion Unit.
5. If the diagnostics of the following SCSI devices fail or stop, suspect that the diagnostic programs are down level before replacing SCSI devices.
 - SCSI Tape Drive
(error code = 0211XXXX)
 - SCSI CD-ROM Drive
(error code = 0215XXXX)
 - SCSI Rewritable Optical Drive
(error code = 0217XXXX)

To continue the diagnostics of other devices, remove these SCSI devices from the installed device list before starting diagnostics.

Important

- When the Problem Determination Procedure in the operation manual that is supplied with the adapter or device says "Have the system unit serviced," the system unit stands for the computer and this 3550

Expansion Unit.

- If the Reference Diskette or Diagnostic Diskette is shipped with this 3550 Expansion Unit, always use the corresponding version (or later) of the diskette for operation.

001

- Power-off the 3550 Expansion Unit and all external devices.
- Remove the computer from the 3550 Expansion Unit.
- Have the external keyboard, mouse, parallel and serial devices connected to the computer.
- Diagnose and resolve any computer problems first.

DID THE TEST COMPLETE WITHOUT ANY ERRORS?

Yes No

002

Diagnose and resolve any computer problems first.

003

- Disconnect the external keyboard, mouse, parallel and serial devices from the computer and reconnect them to the 3550 Expansion Unit.
- Install the computer on the 3550 Expansion Unit again and make sure that the computer is firmly connected.
- Check all cables and power cords.

Notes:

1. The mouse or other pointing devices do not work if connected to the keyboard connector.
2. The mouse or other pointing devices do not work if connected to the mouse connector on the numeric keypad.
3. The computer keyboard does not work if an external keyboard is connected to the 3550 Expansion Unit.

- Power-on all external devices.
- Power-on the 3550 Expansion Unit.
- Watch the screen for a power-on self test (POST) error code.

Write down all error codes that are displayed. (You can press **Pause** when an error code occurs to hold the code on the screen. Press **F1** to continue.)

If the test stops and you cannot continue, go to "Symptom-to-FRU Index" on page 329.

ARE THERE ANY EXTERNAL DEVICES ATTACHED TO THE EXPANSION UNIT?

Yes No

004

(Step **004** continues)

(CONTINUED)

004 (continued)
Go to Step 007.

005

DID THE POWER-GOOD LIGHT FOR ALL OF THE EXTERNAL DEVICES COME ON?

Yes No

006

See the failing external device manual.

007

DID YOU RECEIVE A POST ERROR CODE?

Yes No

008

Go to Step 016 on page 319.

009

IS THE FIRST POST ERROR CODE WITHIN THE RANGE OF 02080000 190I TO 02470000 190I?

IMPORTANT: If your error code is not in the range or if it is not followed by a 190I, answer *NO*.

Yes No

010

Go to Step 016 on page 319.

011

– Restart the system program from:

- The system partition on the hard disk of the computer.
- The Reference Diskette or the backup copy of the system partition.

– Ensure that the **Enable** and **Disable** settings are correct. If you receive a warning on the screen concerning the “Keep” and “Remove” setting, follow the instructions on the screen before continuing.

DID YOU HAVE TO CORRECT ANY OF THE ENABLE AND DISABLE SETTINGS?

Yes No

012

Go to “Symptom-to-FRU Index” on page 329. Before replacing any SCSI device, check that there are no duplicate SCSI ID settings.

013

(Step **013** continues)

013 (continued)

- Restart the computer.

DO YOU STILL HAVE THE POST ERROR?

Yes **No**

014

To run system checkout, or if you suspect another problem, go to Step 016.

015

Go to “Symptom-to-FRU Index” on page 329.

016

- Set the volume control switch to maximum.
- Press and hold **Ctrl+Alt**, then press **Delete** to restart the computer. Release the keys. Closely watch the flashing cursor in the top-left corner of the screen, press and hold **Ctrl+Alt**, then press **Insert**. You must do this while the cursor is at the top-right corner of the screen. Release the keys.
- Check for the following responses:
 - One or two short beeps
 - Readable instructions or the Main Menu

DID YOU RECEIVE BOTH RESPONSES?

Yes **No**

017

Go to the “Symptom-to-FRU Index” on page 329.

- or -

If the problem is not corrected, go to “Undetermined Problem” on page 333.

018

- If you are not at the Main Menu, follow the instructions on the screen to advance to the Main Menu.
- If you cannot advance to the Main Menu, go to “Undetermined Problem” on page 333.
- Press **Ctrl+A** and run the system checkout.

Notes:

1. If the external keyboard has incorrect keyboard responses, see “External Keyboard/Auxiliary Input Device Checkout” on page 465.
2. If the printer has incorrect printer responses, see “Printer Checkout” on page 468.
3. If the image on the external display is out of focus, jittering, rolling, changing colors, or has unreadable characters, see “External Display Self-Test” on page 464.

(Step **018** continues)

(CONTINUED)

018 (continued)

IS THE LIST OF INSTALLED DEVICES CORRECT?

Yes No

019

Go to "Checking the Installed Devices List" on page 334.

If the problem is not corrected, go to "Undetermined Problem" on page 333.

020

– Run the advanced diagnostics tests.

DID THE TESTS IDENTIFY A FAILURE?

Notes:

1. If the test stops and you cannot continue, replace the last device being tested.
2. The following table describes the slot information displayed on the screen. This information is also displayed during the test of the 3550 Expansion Unit when the test is successfully completed. "n" can be any number greater than "2."

Slot Number	Identified Device
n	IBM 3550 Expansion Unit
n+1	Built-in SCSI
n+2	Upper slot
n+3	Lower slot

Yes No

021

Go to Step 023.

022

Follow the action described on the screen. If the problem is not corrected, go to the "Symptom-to-FRU Index" on page 329.

023

DID THE POST END WITHOUT AN ERROR?

Yes No

024

If you noticed an error symptom or if you received any POST error codes when the computer was powered-on, go to "Symptom-to-FRU Index" on page 329.

- or -

If the problem is not corrected, go to "Undetermined Problem" on page 333.

You may have an intermittent problem:

- Check for damaged cables or connectors.
- Reseat all adapters and devices in the 3550 Expansion Unit, and external devices.
- Check the power supply fan in the 3550 Expansion Unit and make sure it is working properly.
- Check the power supply voltages (see “Power Systems Checkout” on page 327).
- Start an error log and run the tests several times.

If you did not find a problem, go to “Undetermined Problem” on page 333.

General Checkout (3550-002)

Overall Procedures

1. Test the computer alone, to make sure there is not a problem with the computer before testing it with the 3550 Expansion Unit. If there is a problem with the computer, solve it by referring to the information supplied with the computer, then test the computer with the 3550 Expansion Unit.
2. Have the external keyboard, mouse, parallel and serial devices connected to the computer and test the computer. If no problem exists, connect them to the 3550 Expansion Unit and test the 3550 Expansion Unit with the computer installed.
3. When testing the 3550 Expansion Unit, use the Diagnostic Diskette supplied with the 3550 Expansion Unit.
 - a. Because the serial and parallel ports on the computer are covered by the 3550 Expansion Unit when the computer is installed on the 3550 Expansion Unit, answer "No" when you are asked if a wrap plug is used.
 - b. Test the status indicators on the 3550 Expansion Unit by using the system status indicator test of the computer. The corresponding indicators on the 3550 Expansion Unit turn on and off in the test, except for the power-on indicator. This power-on indicator does not turn off due to hardware restriction.
4. If the user did not bring the computer with the 3550 Expansion Unit, use a properly working computer with the 3550 Expansion Unit.
5. If the docking station serial number is below 97-C0001, and the computer has intermittent problems that seem to go away when the computer is reseated in the docking station, install the cover kit (part number 66G9433).

Note: To check if the cover kit has already been installed, look at the plug toward the left side of the docking station (this plug connects to the AC adapter port at the left-rear of the computer). If the plug has a one-eighth inch deep shoulder, the cover kit has already been installed. If the plug has a one-quarter inch deep shoulder, the cover kit has not yet been installed.

6. If the diagnostics of the following SCSI devices fail or stop, suspect that the diagnostic programs are down level before replacing SCSI devices.
 - SCSI Tape Drive
(error code = 0211XXXX)
 - SCSI CD-ROM Drive
(error code = 0215XXXX)

- SCSI Rewritable Optical Drive
(error code = 0217XXXX)

To continue the diagnostics of other devices, remove these SCSI devices from the installed device list before starting diagnostics.

Important: When the Problem Determination Procedure in the operation manual that is supplied with the adapter or device says “Have the system unit serviced”, the system unit stands for the computer and this 3550 Expansion Unit.

001

- Power-off the 3550 Expansion Unit and all external devices.
- Remove the computer from the 3550 Expansion Unit.
- Diagnose the computer problem first.

DID THE TEST COMPLETE WITHOUT ANY ERRORS?

Yes No

002

Have the computer serviced.

003

- Install the computer on the 3550 Expansion Unit again and make sure that the computer is firmly connected.
- Check all cables and power cords.

Notes:

1. The mouse or other pointing devices do not work if connected to the keyboard connector.
2. The mouse or other pointing devices do not work if connected to the mouse connector on the numeric keypad.
3. The computer keyboard does not work if an external keyboard is connected to the 3550 Expansion Unit.

- Power-on all external devices.
- Power-on the 3550 Expansion Unit.
- Watch the screen for a power-on self test (POST) error code.

Write down all error codes that are displayed. (You can press **Pause** when an error code occurs to hold the code on the screen. Press **F1** to continue.)

If the test stops and you cannot continue, go to “Symptom-to-FRU Index” on page 329.

ARE THERE ANY EXTERNAL DEVICES ATTACHED TO THE EXPANSION UNIT?

Yes No

004

(Step **004** continues)

(CONTINUED)

004 (continued)
Go to Step 007.

005

DID THE POWER-GOOD LIGHT FOR ALL OF THE EXTERNAL DEVICES COME ON?

Yes No

006

See the failing external device manual.

007

DID YOU RECEIVE A POST ERROR CODE?

Yes No

008

Go to Step 016 on page 325.

009

IS THE FIRST POST ERROR CODE WITHIN THE RANGE OF 02080000 190I TO 02470000 190I?

IMPORTANT: If your error code is not in the range or if it is not followed by a 190I, answer *NO*.

Yes No

010

Go to Step 016 on page 325.

011

– Restart the system program from:

- The system partition on the hard disk of the computer.
- The Reference Diskette or the backup copy of the system partition.

– Ensure that the **Enable** and **Disable** settings are correct. If you receive a warning on the screen concerning the “Keep” and “Remove” setting, follow the instructions on the screen before continuing.

DID YOU HAVE TO CORRECT ANY OF THE ENABLE AND DISABLE SETTINGS?

Yes No

012

Go to “Symptom-to-FRU Index” on page 329. Before replacing any SCSI device, check that there are no duplicate SCSI ID settings.

013

(Step **013** continues)

013 (continued)

- Restart the computer.

DO YOU STILL HAVE THE POST ERROR?

Yes **No**

014

To run system checkout, or if you suspect another problem, go to Step 016.

015

Go to “Symptom-to-FRU Index” on page 329.

016

- Set the volume control switch to maximum.
- Power-off, then power-on the 3550 Expansion Unit. Closely watch the flashing cursor in the top-right corner of the screen, press and hold **Ctrl+Alt**, then press **Insert**. You must do this while the cursor is at the top-right corner of the screen. Release the keys.
- Check for the following responses:
 - One or two short beeps
 - Readable instructions or the Main Menu

DID YOU RECEIVE BOTH RESPONSES?

Yes **No**

017

Go to the “Symptom-to-FRU Index” on page 329.

- or -

If the problem is not corrected, go to “Undetermined Problem” on page 333.

018

- If you are not at the Main Menu, follow the instructions on the screen to advance to the Main Menu.
- If you cannot advance to the Main Menu, go to “Undetermined Problem” on page 333.
- Press **Ctrl+A** and run the system checkout.

Notes:

1. If the external keyboard has incorrect keyboard responses, see “External Keyboard/Auxiliary Input Device Checkout” on page 465.
2. If the printer has incorrect printer responses, see “Printer Checkout” on page 468.
3. If the image on the external display is out of focus, jittering, rolling, or has unreadable characters, see “External Display Self-Test” on page 464.

(Step **018** continues)

(CONTINUED)

018 (continued)

IS THE LIST OF INSTALLED DEVICES CORRECT?

Yes No

019

Go to "Checking the Installed Devices List" on page 334.

If the problem is not corrected, go to "Undetermined Problem" on page 333.

020

– Run the advanced diagnostics tests.

DID THE TESTS IDENTIFY A FAILURE?

Notes:

1. If the test stops and you cannot continue, replace the last device being tested.
2. The following table describes the slot information displayed on the screen. This information is also displayed during the test of the 3550 Expansion Unit when the test is successfully completed. "n" can be any number.

Slot Number	Identified Device
n	IBM 3550 Expansion Unit
n+1	Built-in SCSI
n+2	Upper slot
n+3	Lower slot

Yes No

021

Go to Step 023.

022

Follow the action described on the screen. If the problem is not corrected, go to the "Symptom-to-FRU Index" on page 329.

023

DID THE POST END WITHOUT AN ERROR?

Yes No

024

If you noticed an error symptom or if you received any POST error codes when the computer powered-on, go to "Symptom-to-FRU Index" on page 329.

- or -

If the problem is not corrected, go to "Undetermined Problem" on page 333.

You may have an intermittent problem:

- Check for damaged cables or connectors.
 - Reseat all adapters and devices in the 3550 Expansion Unit.
 - Start an error log and run the tests several times.
 - Check the power supply fan in the 3550 Expansion Unit and make sure it is working properly.
 - Check the power supply voltages (see “Power Systems Checkout”).
-

Power Systems Checkout

If the “power good” light is not on and if the power-supply fan is not running, check the power cord for continuity and proper installation.

If the power cord is not the problem, either the power supply is defective or another component is defective and is causing the power supply to shut off. To verify that the power supply is operating correctly, do the following:

1. Power-off the 3550 Expansion Unit and disconnect the 3550 Expansion Unit power cord.
2. Remove all power supply connectors (power supply connector P1, P2 and drive connector 1) from the system board of the 3550 Expansion Unit and SCSI device.
3. On power supply connector P2, short-circuit pin 4 to pin 6 and short-circuit pin 7 to 8.
4. Connect the 3550 Expansion Unit power cord.
5. Check the power supply voltages using the figures on the next page.

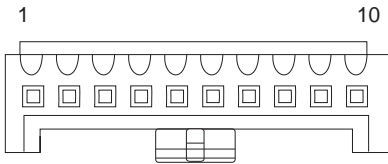
Drive Connector 1

Pin	Signal	V dc Min.	V dc Max.
1	+12 volts	+11.52	+12.6
2, 3	Ground		
4	+5 volts	+4.8	+5.25

If any of the voltages are not correct, replace the power supply.

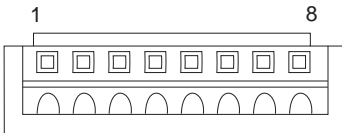
If all voltages are correct, the power supply is working properly. Another 3550 Expansion Unit component might be causing the power supply to shut off. Return to the procedure that sent you here and continue. (If you have completed that procedure, go to "Undetermined Problem" on page 333.)

Power Supply Connector P1



Pin	Signal	V dc Min.	V dc Max.
1, 2, 3, 4	+5 volts	+4.8	+5.25
5, 6, 7, 8, 10	Ground		
9	+20 volts	+19.0	+21.0

Power Supply Connector P2



Pin	Signal	V dc Min.	V dc Max.
1, 2	+12 volts	+11.52	+12.6
3	Power Good	+4.0	+5.25
4	On/Off Signal		
5	-12 volts	-10.92	-13.2
6, 7	Ground		
8	Global Signal		

Symptom-to-FRU Index

The Symptom-to-FRU Index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with "General Checkout (3550-001)" on page 316 or "General Checkout (3550-002)" on page 322. This index also can be used to help you decide which FRUs to have available when servicing the 3550 Expansion Unit.

If you cannot correct the problem using this index, go to "Undetermined Problem" on page 333.

IMPORTANT:

1. Before replacing any SCSI devices, verify that there are no duplicate SCSI ID settings.
2. If you have both an error message and an incorrect audio response, diagnose the error message first.
3. If you cannot run the advanced diagnostic tests, but did receive a POST error message, diagnose the POST error message.
4. If you did not receive an error message, look for a description of your error symptoms in the first part of this index.
5. Check all power supply voltages before you replace the system board of the 3550 Expansion Unit. (See "Power Systems Checkout" on page 327.)
6. If an error message is not listed, there is a device installed that requires an additional diskette or service manual. Refer to the diskette or the service manual for that device.

In the following index, X in an error message can be any number.

Numeric Error Codes

Symptom/Error	FRU/Action
000113XX	<ol style="list-style-type: none">1. Any Adapter2. System Board of 3550 Expansion Unit3. Any Drive
000114XX	<ol style="list-style-type: none">1. Any Adapter
00016300, 00016400, 00016500 (If setting configuration does not solve the problem, see "Checking the Installed Devices List" on page 334.)	<ol style="list-style-type: none">1. Set Configuration/Features2. System Board of 3550 Expansion Unit
000166XX	<ol style="list-style-type: none">1. Any Adapter

Symptom/Error	FRU/Action
00017400 (If Automatic Configuration does not solve the problem, run Advanced Diagnostics.)	<ol style="list-style-type: none"> 1. Set Configuration/Features 2. Any Device 3. System Board of 3550 Expansion Unit
0001XXXX (not listed above)	<ol style="list-style-type: none"> 1. System Board of 3550 Expansion Unit 2. Any Adapter
00030700	<ol style="list-style-type: none"> 1. External Keyboard 2. Keyboard Cable
00030X00 (not listed above)	<ol style="list-style-type: none"> 1. Keyboard 2. System Board of 3550 Expansion Unit 3. Keyboard Cable
000401XX	<ol style="list-style-type: none"> 1. System Board of 3550 Expansion Unit
00110200, 00110600	<ol style="list-style-type: none"> 1. System Board of 3550 Expansion Unit 2. Any Serial Device
00110700	<ol style="list-style-type: none"> 1. Communication Cable 2. System Board of 3550 Expansion Unit
0011XX00 (not listed above) Check the power supply voltages before replacing the system board of the 3550 Expansion Unit. (See "Power Systems Checkout" on page 327.)	<ol style="list-style-type: none"> 1. System Board of 3550 Expansion Unit
00120700	<ol style="list-style-type: none"> 1. Communication Cable 2. Dual Async Adapter/A
0012XX00 (not listed above)	<ol style="list-style-type: none"> 1. Dual Async Adapter/A 2. System Board of 3550 Expansion Unit 3. Any Serial Device
0014XX00 (See "Printer Checkout" on page 468 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. Printer 2. System Board of 3550 Expansion Unit
00186XXX	<ol style="list-style-type: none"> 1. Set Configuration/Features 2. Backup Battery
0018XXXX (not listed above)	<ol style="list-style-type: none"> 1. System Board of 3550 Expansion Unit
00240100 (See "External Display Self-Test" on page 464 before replacing any FRUs.)	<ol style="list-style-type: none"> 1. External Display 2. System Board of 3550 Expansion Unit

Symptom/Error	FRU/Action
00241000	1. System Board of 3550 Expansion Unit
00860100, 00860200	1. Pointing Device 2. System Board of 3550 Expansion Unit
00860300	1. System Board of 3550 Expansion Unit
00860400	1. System Board of 3550 Expansion Unit 2. Pointing Device (Mouse)
0106XXXX	1. Ethernet Network Adapter/A 2. System Board of 3550 Expansion Unit
0137XXXX	1. System Board of 3550 Expansion Unit
016500XX	1. 6157 Tape Attachment Adapter
016520XX	1. 6157 Streaming Tape Drive
016540XX	1. 6157 Streaming Tape Drive 2. 6157 Tape Attachment Adapter
0166XXXX, 0167XXXX (For diagnostic information, refer to the Token-Ring Network Adapter/A service information.)	1. Token-Ring Network Adapter/A 2. System Board of 3550 Expansion Unit
0210XXXA (60MB) 0210XXXB (80MB) 0210XXXC (120MB) 0210XXXD (160MB) 0210XXXE (320MB) 0210XXXF (400MB) 0210XXG (40MB) 0210XXXH (1GB) 0210XXXI (108MB) 0210XXJ (216MB) 0210XXU (Size undetermined) (If the failing device is an external device, go to the external devices service pamphlet.)	1. SCSI Hard Disk Drive 2. System Board of 3550 Expansion Unit 3. SCSI Adapter (if used) 4. SCSI Cable
0211XXXX (If the failing device is an external device, go to the external devices service pamphlet.)	1. SCSI Tape Drive 2. System Board of 3550 Expansion Unit 3. SCSI Adapter (if used) 4. SCSI Cable

Symptom/Error	FRU/Action
0215XXXX (If the failing device is an external device, go to the external devices service pamphlet.)	<ol style="list-style-type: none"> 1. SCSI CD-ROM Drive 2. System Board of 3550 Expansion Unit 3. SCSI Adapter (if used) 4. SCSI Cable
0217XXXX (If the failing device is an external device, go to the external devices service pamphlet.)	<ol style="list-style-type: none"> 1. SCSI Rewritable Optical Drive 2. System Board of 3550 Expansion Unit 3. SCSI Adapter (if used) 4. SCSI Cable
0260XXXX	<ol style="list-style-type: none"> 1. System Board of 3550 Expansion Unit 2. Any SCSI Device
1998009X	<ol style="list-style-type: none"> 1. Restore System Partition

Miscellaneous Symptoms

Symptom/Error	FRU/Action
Program-load error during remote IPL from the file service. Displayed on upper or lower half of the LCD.	<ol style="list-style-type: none"> 1. Network Adapter
External display screen changes colors.	<ol style="list-style-type: none"> 1. External Display 2. Docking Frame
One or more keys do not work on the external keyboard but the 3550 Expansion Unit is otherwise functional. (See "External Keyboard/Auxiliary Input Device Checkout" on page 465.)	<ol style="list-style-type: none"> 1. External Keyboard 2. Keyboard Cable 3. System Board of 3550 Expansion Unit
Power-good light does not turn on and fan runs.	<ol style="list-style-type: none"> 1. System Board of 3550 Expansion Unit 2. Power Supply
Power-good light does not turn on, fan does not run, and 3550 Expansion Unit is not functional. (See "Undetermined Problem" on page 333.)	<ol style="list-style-type: none"> 1. Power Supply 2. System Board of 3550 Expansion Unit
Intermittent Failures. (See "Undetermined Problem" on page 333.)	<ol style="list-style-type: none"> 1. Power Supply 2. System Board of 3550 Expansion Unit 3. Any Device or Adapter
3550 Expansion Unit cannot be powered-off.	<ol style="list-style-type: none"> 1. System Board of 3550 Expansion Unit 2. Power Supply
LED for hard disk drive stays on.	<ol style="list-style-type: none"> 1. SCSI Hard Disk Drive 2. System Board of 3550 Expansion Unit

Symptom/Error	FRU/Action
LED for hard disk drive is not working, but the 3550 Expansion Unit is completely functional.	1. System Board of 3550 Expansion Unit

Undetermined Problem

Use the following procedure when the diagnostic tests do not identify the failing adapter or device.

Check the power supply (see "Power Systems Checkout" on page 327). If the power supply is operating correctly, return here and continue with the following procedure.

1. Power-off the 3550 Expansion Unit.
2. Remove or disconnect one of the following adapters or devices. (Do not isolate adapters or devices that are known to be good.)
 - a. Non-IBM devices
 - b. Modem, printer, mouse, external keyboard, external display, numeric keypad, or other external devices
 - c. Any adapter
 - d. SCSI device
3. Power-on the 3550 Expansion Unit and reconfigure the system.
4. Run system checkout (see Step 016 on page 319). If diagnostic tests cannot be loaded from the computer hard disk drive, load and run the tests from the Reference Diskette. Test only those adapters and devices still attached to the 3550 Expansion Unit.
5. If the symptom remains, repeat steps 1 through 4 until you find the failing adapter or device.
6. If the problem remains, replace the system board of the 3550 Expansion Unit.

Related Service Procedures

This section provides related service information on the following:

"Checking the Installed Devices List"
"Automatic Configuration" on page 335
"Missing SCSI Device" on page 335
"Missing Non-SCSI device" on page 335

Checking the Installed Devices List

At the start of the customer or advanced diagnostic tests, the installed devices list is displayed. Normally, all the adapters and devices that are installed are listed.

- If the list contains an adapter or device that is not installed, go to "Undetermined Problem" on page 333.
- If an adapter or device is missing from the list, you have one of the following conditions:
 - The system partition on the computer hard disk drive (fixed disk drive) or the Reference Diskette you are using does not contain the code (contained on an option diskette) required to support the device.

Copy the option diskette of the missing device to the system partition of the computer hard disk drive or to the Reference Diskette.
 - The SCSI interface on the system board of the 3550 Expansion Unit might have failed.
 - An unrecognizable device or adapter is installed.
 - The device missing from the list requires an additional diskette. (See the device service manual.)
 - The device missing from the list is defective.
 - An adapter is defective.
 - A power supply voltage is not correct (see "Power Systems Checkout" on page 327).

If the adapter is on the list, run the adapter diagnostic tests.

Automatic Configuration

Warning: A customized setup configuration (other than the default settings) might have been set on the computer you are servicing. Running Automatic Configuration might alter those settings. Note the current configuration settings (using the **View configuration** or **Set and view SCSI device configuration** option) and verify that the same settings are in place when service is completed.

Missing SCSI Device

The 3550 Expansion Unit features a built-in SCSI controller.

The built-in SCSI controller supporting the missing device might be defective.

1. Power-off the 3550 Expansion Unit and disconnect all internal and external SCSI devices from the 3550 Expansion Unit.

Warning: See “Automatic Configuration” before continuing.

2. Power-on the 3550 Expansion Unit and run Automatic Configuration.
 - If the built-in SCSI controller is not on the Installed Device List in advanced diagnostics, replace the system board of the 3550 Expansion Unit.
3. Reconnect the devices to the 3550 Expansion Unit.

Note: The built-in SCSI controller includes an active terminator. This terminator automatically works when an external SCSI device is attached.

4. Go to “Undetermined Problem” on page 333.

Missing Non-SCSI device

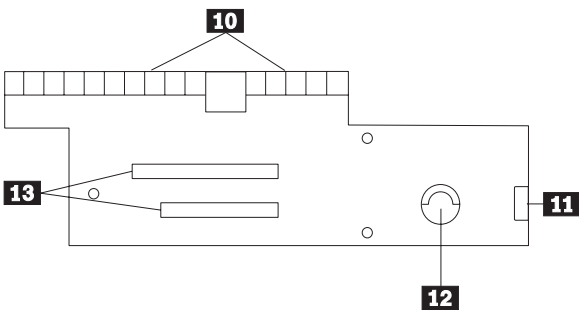
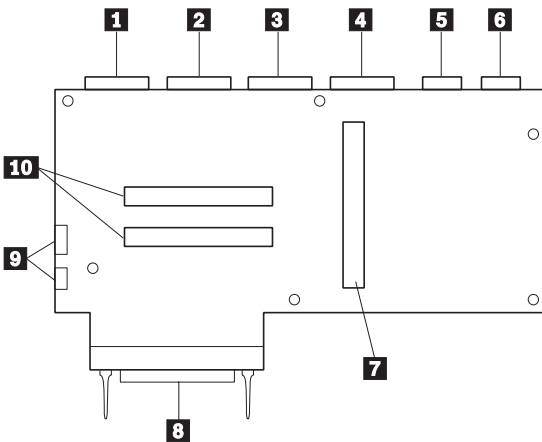
If a non-SCSI device is missing from the list, replace the missing device.

If more than one non-SCSI device is missing, isolate them one at a time until you find the device causing the failure.

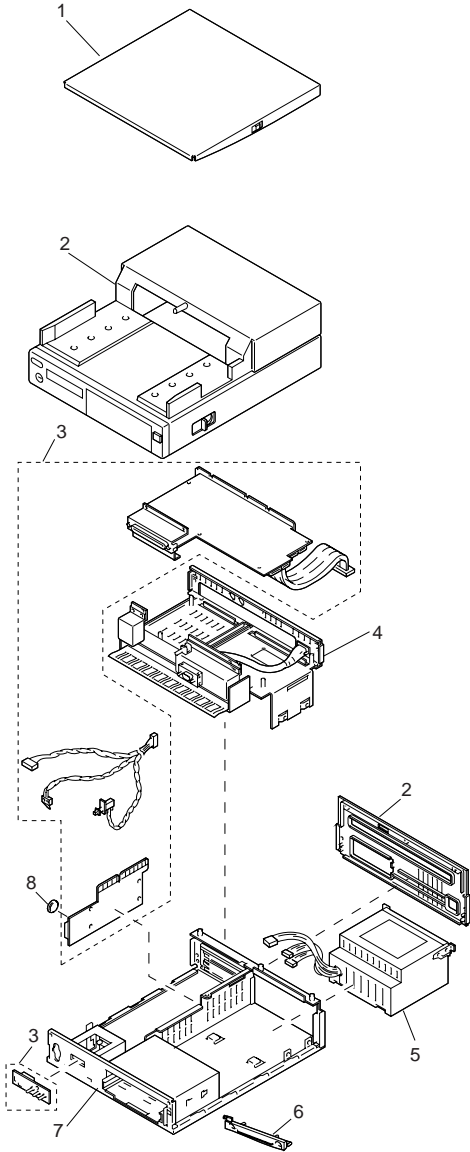
Locations

System Board

- 1** External SCSI Connector
- 2** Serial Connector
- 3** Parallel Connector
- 4** Pointing Device Connector
- 5** Keyboard Connector
- 6** 120-Pin Connector
- 7** System Board-Sub Connector
- 8** Power Supply Connectors
- 9** Internal SCSI Cable Connector
- 10** System Board-Main Interface
- 11** Wire Assembly Connector
- 12** Backup Battery
- 13** 16-Bit Expansion Slots



Parts Listing



Index 3550 Expansion Unit

1	Display Stand	49G2664
2	Main Cover (Model 001)	49G2673
	Front Panel ASM	
	Rear Panel	
	Left and Right Side Guide ASM	
	Release Mechanism	
	Key Lock w/ bracket	66G6001
	Docking Cover	
2	Main Cover (Model 002)	66G9940
	Front Panel ASM	
	Rear Panel	
	Left and Right Side Guide ASM	
	Release Mechanism	
	Key Lock w/ bracket	66G6001
	Docking Cover	
3	System Board (Model 001)	49G2662
	System Board-Main	66G6006
	System Board-Sub	66G6004
	Board ASM, LED	66G6002
	Wire ASM LED/Power/Micro Sensor	66G6003
	Device Cable, Internal SCSI 50 pin	66G6005
3	System Board (Model 002)	66G9941
	System Board-Main	66G6011
	System Board-Sub	66G6009
	Board ASM, LED	66G6007
	Wire ASM, LED/Power/Micro Sensor	66G6008
	Device Cable, Internal SCSI 50 pin	66G6010
4	Docking Frame (Model 001)	49G2659
	Cable ASM, VGA	
4	Docking Frame (Model 002)	49G2666
	Power Switch Control Actuator	
	Cable ASM, VGA	
5	Power Supply (Model 001)	49G2663
5	Power Supply (Model 002)	49G2668
6	Attachment Plate	49G2660
7	Base Frame	49G2658
	Left and Right Rails	
	Cover, LED Board	
	Guide, Card	
	Guide, Adapter Bracket	
	Slider, Stopper Lock	
	Spring, Slider	
	Two Thumb Screws	
	Four Foot Rubbers	
8	Backup Battery, Lithium	49G2661
	Miscellaneous Parts	49G2665
	320MB Hard Disk Drive (Option)	85F0011
	400MB Hard Disk Drive (Option)	85F0012

Note: When installing the 320MB or 400MB hard disk drive in a 3550 Expansion Unit, use the hard disk drive slide assembly (FRU 85F0035) supplied with the option.

Dock I (3545)

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General Preparation

1. Check that the computer is correctly docked (connected) to the Dock I.
2. If possible, make sure that there are no hardware conflicts settings, such as interrupt levels, memory address, DMA channel, and I/O address.
3. Check that the SCSI ID is set correctly.
4. Test and correct any computer problem before you test it with the Dock I. Use the computer documentation to resolve any computer problems.
5. Test the computer with the external keyboard, external display, mouse, and parallel and serial device connectors. (Use the keyboard/mouse connector to test the external keyboard and mouse.) If no problems are found, connect the external keyboard, mouse, parallel and serial devices to the Dock I, then connect the Dock I to the computer and test it.
6. If external devices are attached to the Dock I, such as an audio amplifier, check the device by referring to the manual shipped with the device.
7. When the release/lock lever is opened with the computer docked on the Dock I and power is on, a warning is indicated by a warning beep and a LED message. If either do not work, the problem is in the LED or the warning system.
8. If the user did not bring the computer with the Dock I when service is needed, use a computer that works correctly with the Dock I.
9. If a beep sounds when the computer is docked to the Dock I, make sure that the following are correct.
 - The release/lock lever is not open.
 - The computer is not in suspend mode while docked to the Dock I.

If the beep sounds during normal operation, dock the Dock I to another computer and do the same operation again. If the beep sounds, suspect a problem with the Dock I.

General Checkout

001

- Power-off the computer and all external devices.
- Remove the computer from the Dock I.
- Connect the external keyboard, mouse, parallel and serial devices to the computer, if used. (Use the keyboard/mouse connector for testing the external keyboard and mouse.)
- Diagnose and resolve any computer problems first.

DID THE TEST COMPLETE WITHOUT ANY ERRORS?

Yes No

002

Diagnose and resolve any computer problems first.

003

- Install the computer on the Dock I. Make sure that the computer is firmly connected.
- Check all cables and power cords.
- Check the fan in the power supply in the Dock I and make sure it is working correctly.

Notes:

1. The mouse or other pointing devices do not work if they are connected to the keyboard/numeric keypad connector.
 2. The mouse or other pointing devices do not work if they are connected to the mouse connector on the numeric keypad that is connected to the Dock I.
 3. The computer keyboard does not work when an external keyboard is connected to the Dock I.
- Reinstall all external devices.
 - Power-on all external devices.
 - Press and hold **F1**, then power-on the computer. (Hold **F1** until the Easy-Setup screen or an error message appears.)
- Note:** If the warning beep sounds for the correct operation, go to “Symptom-to-FRU Index” on page 351.
- Write down all post error codes that are displayed. (Press the Pause key when an error code appears to keep the screen from scrolling. Press **F1** to continue.)
- If the POST stops and you cannot continue, go to “Symptom-to-FRU Index” on page 351.
- (Step **003** continues)

(CONTINUED)

003 (continued)

ARE THERE ANY EXTERNAL DEVICES ATTACHED TO THE DOCK I?

Yes No

004

Go to Step 007.

005

DID THE POWER-GOOD LIGHT FOR ALL OF THE EXTERNAL DEVICES POWER ON?

Yes No

006

See the manual for the failing device.

007

DID YOU RECEIVE A POST ERROR CODE?

Yes No

008

If you cannot check the error code:

- Press and hold **F1**, then power-on the computer. (Hold **F1** until the Easy-Setup screen or an error message appears.)
- Write down all post error codes that are displayed. (Press the Pause key when an error code appears to keep the screen from scrolling. Press **F1** to continue.)

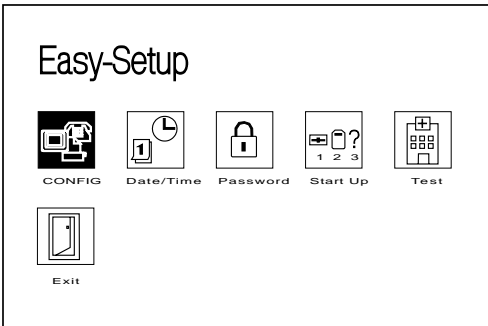
To run system checkout, or if you suspect another problem, go to Step 010 on page 343.

009

Go to "Symptom-to-FRU Index" on page 351.

010

DID THE EASY-SETUP SCREEN APPEAR?



Yes No

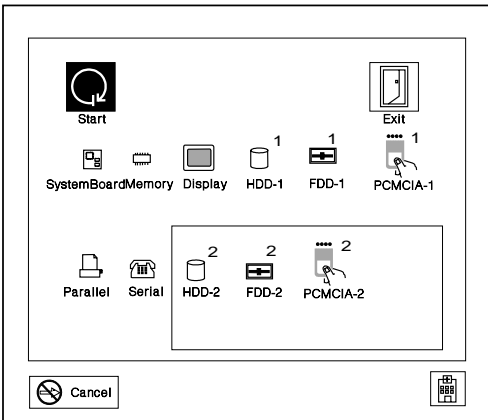
011

The system might have hung during the running of the POST. Note the symptoms and go to "Symptom-to-FRU Index" on page 351.

012

– Select **Test** and press Enter.

DID THE ADVANCED DIAGNOSTIC SCREEN APPEAR?



Yes No

013

- If the keyboard does not work, go to "External Keyboard/Auxiliary Input Device Checkout" on page 465.
- Otherwise, go to "Symptom-to-FRU Index" on page 351.

014

(Step 014 continues)

(CONTINUED)

014 (continued)

IS THE CONFIGURATION THE SAME AS THE INSTALLED DEVICES?

Yes No

015

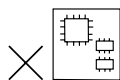
- Go to “Checking the Installed Devices List” on page 358.

016

- Select **Start** and press Enter.
Diagnostic tests will run on all available devices.

If the test find any device errors, the errors are displayed with an X beside the device name.

For example:



SystemBoard

DEV 001
ERR 02
FRU 0010

DEV: Device ID
ERR: Error Description Code
FRU: FRU Code

Note: If the test stops or hangs during the test, replace the last device that was tested.

DID THE TESTS FIND A DEVICE ERROR?

Yes No

017

- The error was not detected by the basic test. Go to Step 019.

018

- Note the error codes and go to “FRU Codes” on page 356 and replace the appropriate FRUs.

019

- Go to the advanced diagnostic screen by pressing **Ctrl+A**, and run the following tests.
 - Diskette drive test (use a blank diskette).
 - Serial port test (with the wrap plug).
Note: Install the wrap plug on the serial port of the Dock I.
 - Parallel port test (with the wrap plug).
Note: Install the wrap plug on the parallel port of the Dock I.
 - Keyboard test (see “How to Run the Keyboard Test” on page 360).

(Step **019** continues)

019 (continued)

DID THE ADVANCED DIAGNOSTICS FIND AN ERROR?

Yes No

020

The problem was not detected by the diagnostics
Check that the cables and connectors are not
damaged.

If a SCSI device is not installed, start at Step 4.

If a SCSI device is installed, do the following:

1. Check that the total number of the attached SCSI devices are less than five.
2. Check that the total length of the attached SCSI cables is less than 3 m (118 in.).
3. Check that the SCSI terminator is correctly installed.

If the problems still remain, run the SCSI test.
(See "SCSI Diagnostics (Dock I)" on
page 362.)

4. Reconnect all adapters, drives, and devices,
then test the system several times. A **Loop
Test** option is available for running all the tests.
(See "How to Run the Loop Test" on
page 360.)

After stopping the loop test, check that the error
log appears in the error list. (See "Error Log"
on page 362.)

If no errors were detected, go to "Undetermined
Problem" on page 357 and use the user
reported symptom.

If any errors are detected, go to "Numeric Error
Codes" on page 352.

021

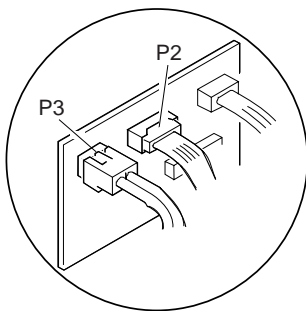
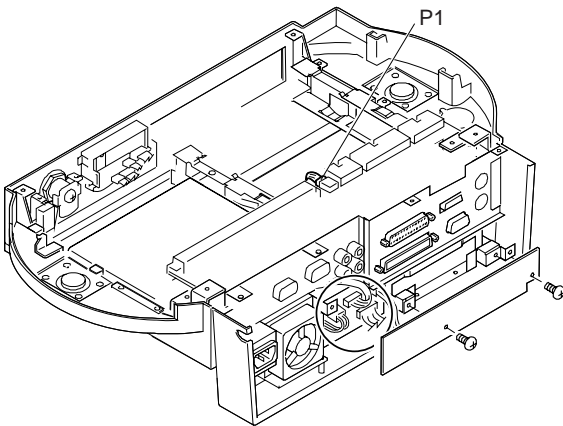
Note the error code and go to "FRU Codes" on page 356
and replace the appropriate FRUs. If the problem remains
after all repair actions are taken, go to "Undetermined
Problem" on page 357.

Power Systems Checkout

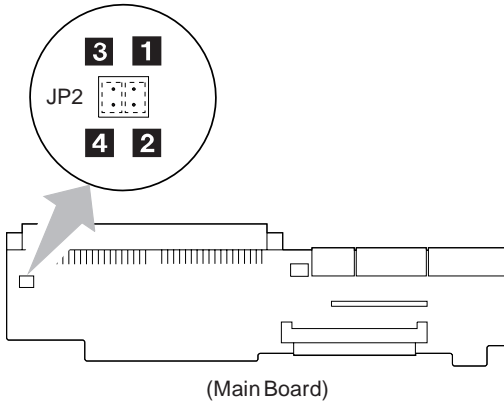
If the “power good” light is not on and the power supply fan is not turning, check the power cord for continuity and correct installation.

If the power cord is not the problem, either the power supply is defective, or another component is defective causing the power supply to shut off. To verify that the power supply is operating correctly, do the following:

1. Power-off the computer and disconnect the Dock I power cord.
2. Remove all internal and external devices, and the computer from the Dock I.
3. Remove power supply connector P3 from the I/O card and the SCSI power supply connector from the SCSI device.



4. Install jumpers between pins 1 and 2, and pins 3 and 4 of JP2 on the main board of the Dock I.



5. Connect the Dock I power cord.
6. Check the power supply voltages on connector P3 using Table 4 on page 349, then check that the fan is turning. If the voltage is not correct or the fan is not turning, replace the power supply.
7. Disconnect the Dock I power cord.
8. Remove the jumpers installed in Step 4.
9. Remove power supply connector P1 from the main board and P2 from the I/O card.
10. Install jumpers between pins 2 and 6, and pins 8 and 9 of connector P2 of the power supply.
11. Connect the Dock I power cord.
12. Check the power supply voltages on connectors P1, P2, and the SCSI power supply connector using Table 1 and Table 3 on page 348, then check that the fan is turning.

If any of the voltages are not correct, replace the power supply.

If all voltages are correct, the power supply is working correctly. Other Dock I parts can cause the power supply to shut off. Return to the procedure that sent you here and continue. (If you have completed that procedure, go to "Undetermined Problem" on page 357.)

Power Supply Connector P1

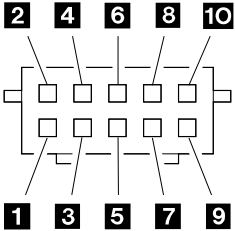


Table 2. Power Supply Connector P1

Pin	Signal	V dc Min.	V dc Max.
1, 2, 3	+5 volts	+4.8	+5.25
4, 5	Ground	–	–
6	–12 volts	–11.46	–13.2
7	Ground	–	–
8	+12 volts	+11.46	+12.6
9	–5 volts	–4.53	–5.5
10	Ground	–	–

Power Supply Connector P2

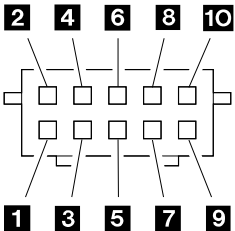


Table 3. Power Supply Connector P2

Pin	Signal	V dc Min.	V dc Max.
1	Power on	–	–
2	System on	+4.0	+5.25
3	VCC	–	–
4	Mode control	–	–
5	+5 volts	+4.8	+5.25
6, 8	Ground	–	–
7	+12 volts	+11.46	+12.6
9	Docked	–	–
10	NC	–	–

Power Supply Connector P3

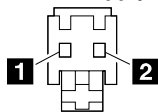


Table 4. Power Supply Connector P3

Pin	Signal	V dc Min.	V dc Max.
1	CVCC	+19	+21
2	Ground	–	–

SCSI Power Supply Connector

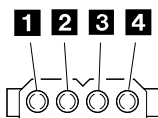


Table 5. SCSI Power Supply Connector

Pin	Signal	V dc Min.	V dc Max.
1	+12 volts	+11.46	+12.6
2, 3	Ground	–	–
4	+5 volts	+4.8	+5.25

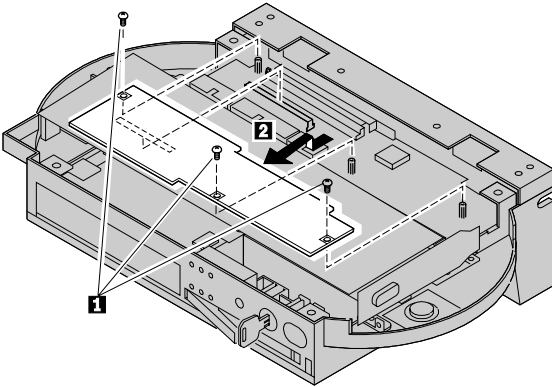
Display Problems (AD/VC Adapter)

The IBM ThinkPad Analog-to-Digital Converter Adapter (AD/VC adapter) is one of the options for the Dock I. With the IBM PS/2^{*} ActionMedia II Display Adapter (ActionMedia II adapter), the AD/VC adapter enables the computer to run multimedia applications.

When the AD/VC adapter is installed in the Dock I, and a display problem occurs, before you start to isolate any problem; switch off the computer, remove the Dock I from the computer, and check that the computer works correctly.

Information is now displayed on the LCD screen using the computer's video control function, not the AD/VC adapter. If the computer works correctly, make sure that the ActionMedia II Adapter is installed in the 16-bit AT bus connector of the Dock I. Then reinstall the computer onto the Dock I. If there is still a problem, go to "Display Symptoms (AD/VC Adapter)" on page 355.

The following figure shows the how to remove the AD/VC adapter from the Dock I.



* Trademark of the IBM Corporation.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists error symptoms and possible causes. The most likely cause is listed first.

Note: Replace the FRUs one at a time in the sequence shown in the FRUs of the Dock I and Sequence of Action column. If a replaced part did not resolve the problem, put the original part back in the Dock I. Do not replace non-defective parts.

Always begin with “General Checkout” on page 341. This index also can be used to help you decide which FRUs to have available when servicing the Dock I.

Numeric error codes show the errors detected in the POST or system operation. In the following error codes, X can be any number.

FRU codes are used for errors detected by diagnostic tests. If no error codes are available, use narrative symptoms.

If the symptom is not listed or you cannot correct the problem using this index, go to “Undetermined Problem” on page 357.

IMPORTANT:


1. Before replacing any SCSI device, verify that there are no duplicate SCSI ID settings.
2. Make sure that there are no conflicts of hardware settings, such as, interrupt level, memory address, DMA channel, and I/O address.
3. If you have both an error message and an incorrect audio response, diagnose the error message first.
4. If you cannot run the advanced diagnostic tests, but did receive a POST error message, diagnose the POST error message.
5. If you did not receive an error message, look for a description of your error symptoms in the first part of this index.
6. Check all power supply voltages before you replace the main board, I/O card, and audio card of the Dock I. (See “Power Systems Checkout” on page 346.)

Numeric Error Codes

Symptom/Error	FRU/Action
10X, 11X	<ol style="list-style-type: none"> 1. Adapter in slot (if used) 2. I/O card 3. Main board
195 (The computer was docked to the Dock I while in hibernation mode.)	<ol style="list-style-type: none"> 1. Do the following steps. <ol style="list-style-type: none"> a. Power-off and undock the system. b. Power-on and shut down the system. c. Power-off and dock the system.
1XX	<ol style="list-style-type: none"> 1. See the Symptom-to-FRU Index for the computer you are servicing. 2. See "Undetermined Problem" on page 357.
2XX	<ol style="list-style-type: none"> 1. See the Symptom-to-FRU Index for the computer you are servicing. 2. Main board 3. IC DRAM card
3XX	<ol style="list-style-type: none"> 1. See "External Keyboard/Auxiliary Input Device Checkout" on page 465.
6XX	<ol style="list-style-type: none"> 1. Before changing any devices, run the diagnostic tests. 2. FDD external attachment kit 3. Diskette drive assembly 4. I/O card
11XX, 12XX	<ol style="list-style-type: none"> 1. Serial devices 2. Communication cable 3. I/O card
17XX	<ol style="list-style-type: none"> 1. Hard disk drive (2.5-inch ThinkPad hard disk drive) 2. HDD installation kit 3. Main board
24XX	<ol style="list-style-type: none"> 1. Main board 2. I/O card

Symptom/Error	FRU/Action
860X	<ol style="list-style-type: none"> Mouse External keyboard I/O card
104XXXX XXX 209XXXX XXX 210XXXX XXX 211XXXX XXX 212XXXX XXX 213XXXX XXX 214XXXX XXX 215XXXX XXX 216XXXX XXX 217XXXX XXX	<ol style="list-style-type: none"> Go to “SCSI Diagnostics (Dock I)” on page 362.
I9990301, I9990302 I9990305	<ol style="list-style-type: none"> See the Symptom-to-FRU Index for the computer you are servicing.
Not shown above	<ol style="list-style-type: none"> See the Symptom-to-FRU Index for the computer you are servicing. See “Undetermined Problem” on page 357.

Miscellaneous Symptoms

Symptom/Error	FRU/Action
Program-load error during remote IPL from the file servicer.	<ol style="list-style-type: none"> Network Adapter
External display screen changes colors.	<ol style="list-style-type: none"> Go to “External Display Self-Test” on page 464.
One or more keys do not work on the external keyboard, but the Dock I is otherwise functional.	<ol style="list-style-type: none"> Go to “External Keyboard/Auxiliary Input Device Checkout” on page 465.
Computer does not work, power-good light does not turn on, but the fan runs.	<ol style="list-style-type: none"> See “Undetermined Problem” on page 357.
Power-good light does not turn on, fan does not run, and the computer is not functional.	<ol style="list-style-type: none"> See “Undetermined Problem” on page 357.
Although the computer is powered-off, the fan of the Dock I power supply is running.	<ol style="list-style-type: none"> The fan is working correctly. To stop the fan, set the key lock to the external left position ( 2).

Symptom/Error	FRU/Action
Computer is functional, fan runs, but power-good light does not turn on.	<ol style="list-style-type: none"> 1. LED Assembly 2. I/O Card 3. Go to "Power Systems Checkout" on page 346.
Intermittent failures.	<ol style="list-style-type: none"> 1. Do the loop test. (See "How to Run the Loop Test" on page 360.)
Cannot turn off Dock I.	<ol style="list-style-type: none"> 1. I/O Card 2. Main Board
The LED (Dock I) for the hard disk drive stays on.	<ol style="list-style-type: none"> 1. 2.5-inch Hard Disk Drive 2. The HDD Installation Kit
LED (Dock I) for the hard disk drive is not working, but the Dock I is functional.	<ol style="list-style-type: none"> 1. Check LED Assembly Cable 2. LED Assembly 3. Main Board 4. I/O Card <p>Note: While related to the SCSI hard disk installed in the Dock I, the LED for the hard disk drive does not work when you access the SCSI hard disk.</p>
The beep sounds continuously.	<ol style="list-style-type: none"> 1. Before replacing any devices, check that the release/lock lever is opened. 2. Security Feature Group 3. Main Board
The HDD-2 is not recognized and no error codes appear on the screen. (The password of the HDD-2 is still set.)	<ol style="list-style-type: none"> 1. Remove the hard disk password for the ThinkPad hard disk as follows: <ol style="list-style-type: none"> a. Install the second hard disk drive in the computer. b. Remove the hard disk password. <p>Note: The HDD-2 icon means the 2.5-inch ThinkPad hard disk drive installed in the Dock I.</p>

Display Symptoms (AD/VC Adapter)

Symptom	FRU/Action
<p>The LCD screen is blue.</p> <p>Note: Make sure all cables are firmly plugged into their respective connectors.</p>	<ol style="list-style-type: none"> 1. Video Connector 2. AD/VC Adapter 3. I/O Card 4. Main Board
<p>The LCD screen gradually becomes white after the computer is turned on.</p>	<ol style="list-style-type: none"> 1. AD/VC adapter 2. I/O Card 3. Main Board
<p>A white line extends across the screen.</p> <p>Note: Check the following:</p> <ol style="list-style-type: none"> 1. Remove the computer from the Dock I and verify correct operation of the computer. 2. Reinstall the computer onto the Dock I and run the Automatic Configuration. 	<ol style="list-style-type: none"> 1. AD/VC Adapter 2. I/O Card 3. Main Board
<p>A particular color (red, green, or blue) appears considerably more than any other two colors, even after the <i>Color Adjustment</i> is made.</p> <p>Note: Make sure the video connector is correctly connected.</p>	<ol style="list-style-type: none"> 1. AD/VC Adapter 2. Video Connector 3. Main Board
<p>No motion video appears in the window for motion video.</p>	<ol style="list-style-type: none"> 1. AD/VC Adapter 2. I/O Card 3. Main Board 4. ActionMedia II Adapter <p>Note: If color for motion video is correct, suspect that the AD/VC adapter, the I/O card, or the main board is defective. If color is not correct, suspect the ActionMedia II adapter or its application program.</p>

FRU Codes

If an error is detected by the diagnostic tests, a *four-digit* FRU code is displayed. Two suspected FRU codes are shown. The two *leftmost digits* indicate the first FRU code. The following table shows the FRU codes and their FRUs. The most probable failing FRU is shown first. Always start with the first FRU then continue down the list. The two *rightmost digits* indicate the net FRU code. Do these FRU replacements in the same way as with the first FRU codes.

Undock the computer from the Dock I to check that the FRU code appears with the computer only. If a FRU code appears, replace the FRU by following the instructions in the Symptom-to-FRU Index for the computer being serviced. Then dock the computer on the Dock I to check if any FRU codes appear. Use the table below.

FRU Code	FRUs of the Dock I
10	<ol style="list-style-type: none">1. Main board2. I/O card
15	<ol style="list-style-type: none">1. Audio card2. I/O card
30	Reserved
32	<ol style="list-style-type: none">1. See "External Keyboard/Auxiliary Input Device Checkout" on page 465.2. Main board3. I/O card
33	<ol style="list-style-type: none">1. External mouse2. Main board3. I/O card
45	<ol style="list-style-type: none">1. See "External Display Self-Test" on page 464.
51	<ol style="list-style-type: none">1. Diskette drive (FDD-2)2. Main board3. I/O card
56	<ol style="list-style-type: none">1. Diskette drive (FDD-2)2. Main board3. I/O card
61	<ol style="list-style-type: none">1. Hard disk drive (HDD-2)2. Main board3. HDD installation kit
80	Reserved
90	Reserved

If the problem remains after the FRUs are replaced, go to "Undetermined Problem" on page 357.

Undetermined Problem

Use the following procedure when the diagnostic tests do not identify the failing adapter or device.

Check that all cables, wires, and connectors are connected so that they do not cause a short circuit. If any problems are found, reconnect or replace them.

Check the power supply for correct operation (see "Power Systems Checkout" on page 346). If the power supply is operating correctly, return here and continue with the following procedures.

1. Power-off the computer.
2. Remove or disconnect one at a time the following adapters or devices from the Dock I. (Do not isolate adapters or devices that are known to be good.)
 - a. Non-IBM devices.
 - b. A modem, printer, mouse, external keyboard, external display, external diskette drive, numeric keypad, or other external devices.
 - c. Any adapter.
Note: Removing an adapter or device might cause configuration errors. Ignore error code 174.
 - d. SCSI device.
 - e. Hard disk drive.
3. Power-on the system and check if the problem has changed.
4. If the symptom remains, repeat Steps 1 through 3 until you find the failing adapter or device, or until all adapters or devices have been removed.
5. If all adapters or devices have been removed and the problem remains, replace the following Dock I FRUs one at a time.

Note: If a replaced part did not resolve the problem, put the original part back in the Dock I. Do not replace non-defective parts.

- a. I/O card
- b. Main board
- c. Dock I audio card

If the problem goes away when you remove an adapter, but replacing the adapter does not correct the problem, replace the main board of the Dock I.

Related Service Procedures







This section provides related service information on the following:

"Status Indicators"
"Checking the Installed Devices List"
"Security" on page 359
"How to Run the Diagnostics" on page 359
"SCSI Diagnostics (Dock I)" on page 362
"Selecting a SCSI Device Test" on page 364

Important

When the Problem Determination Procedure in the operation manual that is supplied with the adapter or device says "Have the system unit serviced," this means the computer and the Dock I.

Status Indicators

Light	Status Indicated
	Computer is docked in Dock I
	Computer is powered-on
	Hard disk drive is active
	Diskette drive is active
	PC Card is inserted
	Warning light

Checking the Installed Devices List

The HDD-1 or FDD-1 represents the **first** drive in the system configuration, respectively. Similarly, the HDD-2 or FDD-2 represents the **second** drive, usually attached through a Dock I.

Notes:

1. Neither the Dock I nor the adapters and SCSI devices installed in the Dock I appear as icons on the screen.
2. HDD-1 and HDD-2 icons are for the 2.5-inch ThinkPad hard disk drive.

If the devices are installed, but the icon appears in a gray shade rather than a dark shade on the basic diagnostic screen, it means that the devices are defective. Power-off the computer and make sure that the devices are correctly connected. If the symptom still remains after the computer is powered-on, replace the devices or the main board of the Dock I.

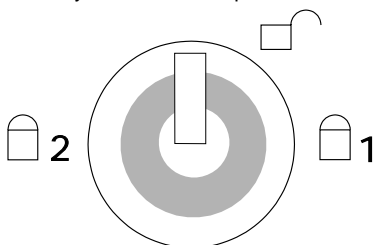
Security




The Dock I has two features to secure it from being used by unauthorized persons.

Security Lock: The security lock is located on the left side of the Dock I front panel, and can be unlocked with the security lock key. This security lock provides the following protection:

- **Cover Lock** prevents unauthorized access to the devices and options inside the Dock I.
- **Computer Lock** protects from unauthorized removal of the computer.
- **Key Controlled Power** prevents unauthorized use of the Dock I or unauthorized access to the data stored on the internal SCSI device through the external SCSI connector by securing the power.

The key lock has three positions.



Icon	Cover Lock	Computer Lock	Power Secured	Key
 1	Lock	Lock	No	Removable
 2	Unlock	Unlock	No	Not Removable
 3	Lock	Lock	Yes	Removable

Security Hook: The hook for a security chain or cable is located on the rear of the Dock I. The diameter of the hook is 4 mm (0.15 in.) or less. Attach a chain or similar item through the hook and secure the Dock I to a desk or similar stable item.

How to Run the Diagnostics

Use either the TrackPoint II or the cursor move keys to interact with the tests. The **Enter** key works the same as selecting the OK icon to reply OK.

1. Press and hold F1, then power-on the computer. Hold F1 until the Easy-setup screen appears.
2. Select **Test** and press Enter. The basic diagnostic screen appears.
3. Select a device and press Enter to run the test.
4. The test progress screen appears.

5. **OK** appears when the test ends without any errors.

Advanced Diagnostic Tests

1. Go to the advanced diagnostic screen by pressing **Ctrl+A** on the basic diagnostic screen.
2. Select **Tool** to install the tools.
3. Select a device, press the spacebar, and install the tool. Multiple devices can be selected by repeating this step.
A ✓ mark appears for the selected device.
4. Select **OK** and press Enter if the selection is OK.
5. Select a device and press Enter to start the tests.

How to Run All Tests: In the advanced diagnostic screen, select **Test All** to test all devices.

How to Run the Loop Test

1. Go to the advanced diagnostic screen by pressing **Ctrl+A** on the basic diagnostic screen.
2. Select the **Looptest** icon and press Enter or click the click button.
3. Select a device and press the spacebar. A ✓ mark appears for the selected device.
4. If the selection is OK, select **OK** and press Enter to start the loop test.
5. To exit the loop test, press and hold **Ctrl+Pause** until the interrupt is accepted by the test program. A beep sounds when the interrupt is accepted. The test loop stops at the end of the current test.

How to Run the Keyboard Test

1. Power-off the computer.
2. Remove the external keyboard, if one is attached.
3. Press and hold F1 key, then power-on the computer. Hold F1 until the Easy-Setup screen appears.
4. Select **Test** and press Enter. The basic diagnostic screen appears.
5. Press **Ctrl+A** to go to advanced diagnostic screen.
6. Press **Ctrl+K**. A keyboard picture appears on the screen.
7. By pressing a key, the mark appears or disappears on the corresponding key position on the screen. Repeat this step for any keys that need to be tested.
8. To exit the test, press **Esc** or select the cancel icon.

How to Run the Audio Test

1. Power-off the computer.
2. Insert the maintenance diskette into diskette drive **A** and power-on power.
3. Select the Audio Diagnostics from the main menu.
4. Select **Tests** from the menu bar and press Enter.
5. Select **All tests** from the pull-down menu and press Enter.

Run options are set to test once and stop on error as defaults. Other options can be selected by the pull-down menu of **Setting-up**.

6. Follow the instructions that appear on the screen to proceed with the tests.
7. If the tests end without detecting any error, the "All tests passed OK" message appears.
8. If an error is detected, the FRU code and error description message appear. Go to "FRU Codes" on page 356 and replace the FRU.
9. To exit the test screen, press Esc.

Notes:

- a. If an instruction to plug the external loop cable appears, connect it between the microphone/line jack of the computer and the headphone jack of the Dock I.
- b. If an instruction to plug the headphone appears, connect it to the headphone jack of the Dock I.
- c. **Volume Control Test** does not work when the computer is docked to the Dock I.

PC Test Card LED: The green LED on the PC test card lights when the PCMCIA test is running. If the LED does not go on, check that the card is installed correctly by reseating the card. If it still does not light after reseating, try using another slot for the test. If the LED still does not go on and the test fails, replace the FRU shown in the diagnostic error code.

Diagnostic Error Indications: If an error is detected, the following appears:

- Large **X** on the left-side of the device icon.
- Device ID (three digits).
- Error code (two digits).
- FRU code (four digits).

The FRU code represents two FRUs. The leftmost two digits indicates the higher priority of replacement.

The device ID and error codes are used to indicate the detail portion of the FRU which caused the error.

Errors During the POST: If the POST detects an error, a three- to eight-digit error code is displayed.

Memory Errors: If the POST detects a memory error in the first 640KB of system memory, all of the first 2MB of memory is de-allocated and the test continues with the second 640KB of the second 2MB of memory. If the total amount of error free memory becomes less than 2MB, a 2XX POST error occurs and the system stops. All of the 20MB (maximum) memory is used as system memory. The memory write and read test proceeds through the IC

DRAM memory. When the POST memory test has completed, the usable memory size is compared with the configuration data and if a mismatch is detected, a 2XX error code occurs. The user can continue with system operation by pressing F1 and call for service at a later time.

The memory sizes that are de-allocated because of the POST process is kept by the hibernation or suspend functions. To test this memory, it must be re-configured as part of the original memory size. The memory re-configuring is done by turning power-off and on.

De-allocation support is done only by the POST for memory errors. All unrecoverable memory errors that occur during normal operation cause an interrupt to the operating system.

Error Log: Diagnostic errors are printed on the printer that is attached to parallel port when the error is detected. The error is also logged in the system memory.

Use the following procedure to display the errors.

1. End the test, if it is running.
2. Press **Ctrl+A** to select the advanced diagnostic mode.
3. Press **Ctrl+E**.
4. The error log appears.
5. To exit the screen, select the cancel icon or press Esc.

The error log is not saved when system power is turned off.

SCSI Diagnostics (Dock I)

The SCSI diagnostics help you troubleshoot SCSI adapter and device problems through a series of menus. The diagnostics are provided on the Dock I Option Diskette.

Some SCSI devices might be shipped with diagnostics. However, you must use the option diskette shipped with Dock I to test the SCSI controller and SCSI devices.

Notes:

1. In the diagnostics, the built-in SCSI controller is regarded as an adapter. If the diagnostics detect any adapter problems, replace the main board of the Dock I.
2. If the SCSI devices are not connected to the Dock I, the built-in SCSI controller is disabled. You cannot run the SCSI diagnostics.

The procedures in Figure 1 on page 363 summarizes the major steps.

- Start the utility program.
- Select the SCSI adapter to be scanned.
- Select the SCSI device to be tested.
- Select a test option from the SCSI fixed/removal drive menu. The options are:
 - Adapter Diagnostics
 - Send Device Diagnostics
 - Test Unit Ready
 - Read Test
 - Read/Write Test (if you have a fixed disk drive)
 - Low-Level-Format Drive.

Figure 1. SCSI Diagnostics Utility Program Procedure

After SCSI Installation: Run the diagnostics after you have completed your SCSI device installation to verify that the installation works correctly. Do the following:

1. Power-off the computer and external SCSI devices. Insert the Dock I Option Diskette into drive A.
2. Power-on all attached external SCSI devices, then power-on the computer.
3. In the main menu, select **Diagnostics**, then select **Test SCSI subsystem**.
4. The following screen appears.

Note: In this screen, SCSI controller of the Dock I, appears as Adapter 0.

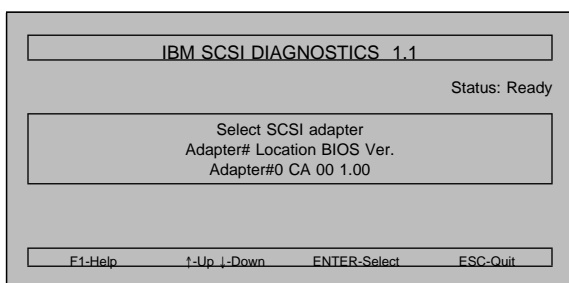


Figure 2. Select SCSI Adapter Screen

Note: If the following screen appears instead of the one in Figure 2, check that the SCSI devices are correctly installed. If the problem still occurs, the main board has a failure. Ignore the actions in this screen message.

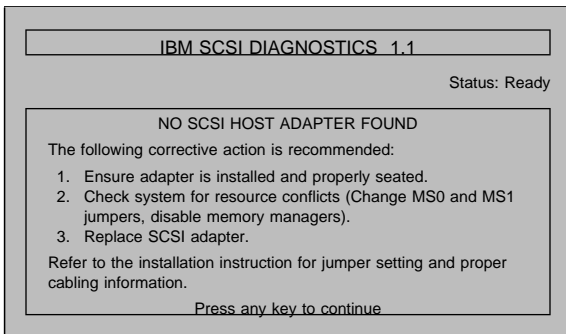


Figure 3. Error Message Screen

5. Press **Enter**.
6. After the following message appears:

SCANNING SCSI BUS FOR DEVICES

The screen changes to:

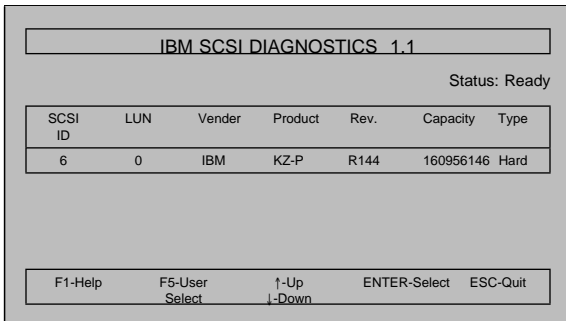


Figure 4. SCSI Device Type Selection Screen

Continue with the following.

Selecting a SCSI Device Test

The first SCSI device in the list with the lowest SCSI ID is highlighted.

1. Select the device to test with the cursor and press **Enter**.
 - **Adapter Diagnostics:** Three pass/fail tests are run on the built-in SCSI controller to check Read Only Memory (ROM), Random Access Memory (RAM), and the SCSI data bus.
 - **Device diagnostics:** This function issues the Device Diagnostic command to the selected device. If the device is a removable media, you are instructed to insert the media. If the command completes successfully, the selected devices are installed and are functioning correctly.

- **Test Unit Ready:** This command is issued to each device to check that the device is online and ready to accept commands.
 - **Get Device Status:** If an error occurs in the Test Unit Ready, Read, or Read/Write tests, run “Get Device Status” to isolate the failure problem causing the error.
 - **Read Test:** This test issues Read commands to read all data from the beginning to the end of the drive to verify that the drive reads the data correctly.
 - **Read/Write Test:** This test issues Write commands, then reads the data back and compares the write and read data to verify that the drive is operating correctly. This test destroys all data test on the drive.
 - **Low-Level Format Drive:** This test performs a low-level format; all existing data is destroyed. It is not necessary to run this test unless your SCSI drive was used previously in another configuration. This test does not have to be run on a new drive.
2. To select a test option, type the number in the Enter Selection field and press **Enter**.

Product Overview

The following table provides a brief overview of the Dock I features.

Feature	Description
Security	<ul style="list-style-type: none">• Security lock• Security hook
Main Board	<ul style="list-style-type: none">• AT full size slot (98-pin)• Audio• Stereo speakers• Headphone jack• Speaker-in jacks• Audio-out jacks• SCSI Subsystem• Storage device connectors• ThinkPad hard disk connector• Internal small computer system interface (SCSI) device connector• External display connector• Video-in connector
I/O Card	<ul style="list-style-type: none">• Docking connector (240-pin)• External SCSI connector• FDD connector• Parallel connector• Serial connector• Keyboard or numeric keypad connector• Mouse connector
Power supply	<ul style="list-style-type: none">• 70-watt• Automatically switches to 100–125 V ac or 200–240 V ac, 50 or 60 Hz

FRU Removals and Replacements

This section contains information on removals and replacements, and locations.

- The arrows in the removals and replacements show the direction of movement to remove a field replaceable unit (FRU), or to turn a screw to release the FRU. The arrows are marked in numeric order to show the correct sequence of removal.
- When other FRUs must be removed before removing the failing FRU, they are listed at the top of the page. Go to the removal procedure for each FRU listed, remove the FRU, and then continue with the removal of the failing FRU.
- To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See “Locations” for internal cable connections and arrangement information.

CAUTION:

Before removing any FRU, power-off the Dock I, remove the computer, unplug all power cords from electrical outlets, then disconnect any interconnecting cables.

CAUTION:

In the U.K., by law, the telephone cable must be connected after or disconnected before the power cord.

Warning: The main board, adapters, and circuit boards on the drives are sensitive to, and can be damaged by, electrostatic discharge. Establish personal grounding by touching a ground point with one hand before touching these units.

Note: An electrostatic discharge (ESD) strap must be used to establish personal grounding.

Important

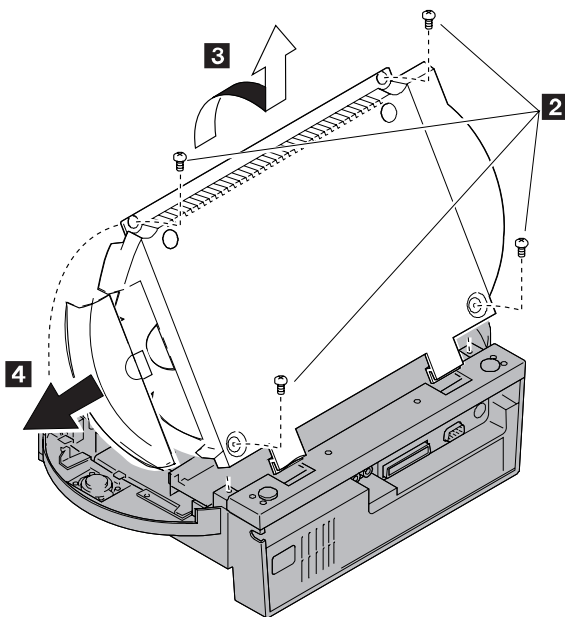
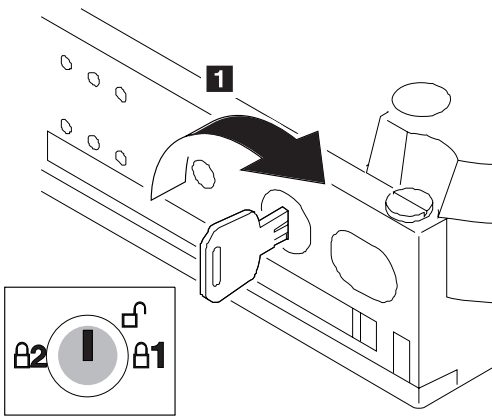
See the “Screw Size Chart” on page 19 to match the letters to the correct screw type and size before replacing each screw.

1010 Bottom Cover

- 1 2 3

1020 Video Cable Cover

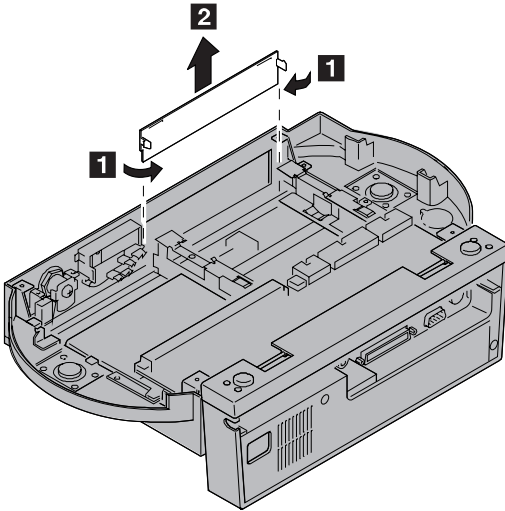
- 1 2 3 4



Step	Color and type (quantity)	Length
2	Black screw (4)	7 mm (0.28 in.)
Note: Make sure you use the correct screw.		

1030 Blank Bezel

- Bottom Cover (1010)



Note: When you install the blank bezel, set the edge of the bezel into the groove of the Dock I. Then put the latch of the bezel into the Dock I catch.

1040 LED Assembly

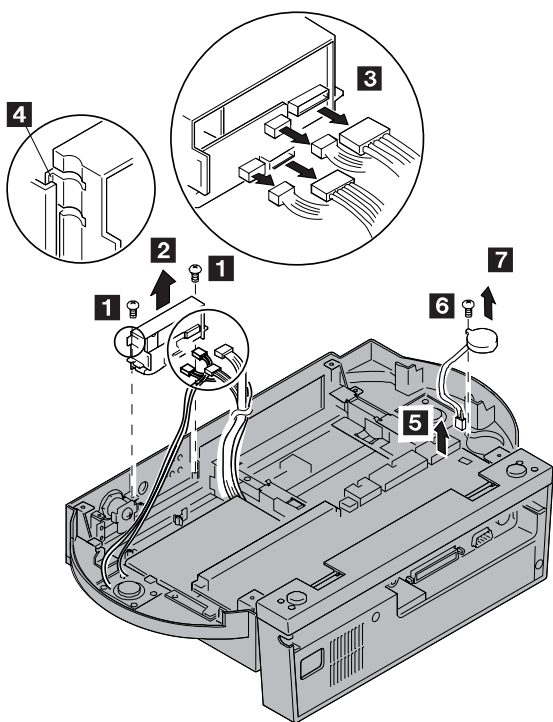
- Bottom Cover (1010)
- **1 2 3**

Note: When you install the LED assembly in the Dock I:

1. Put the edge of the LED assembly into the groove.
2. Put the status indicators and headphone jack into the each hole.
3. Hook the **4** to the guide.
4. Reinstall the two screws.

1050 Buzzer

- Bottom Cover (1010)
- **5 6 7**



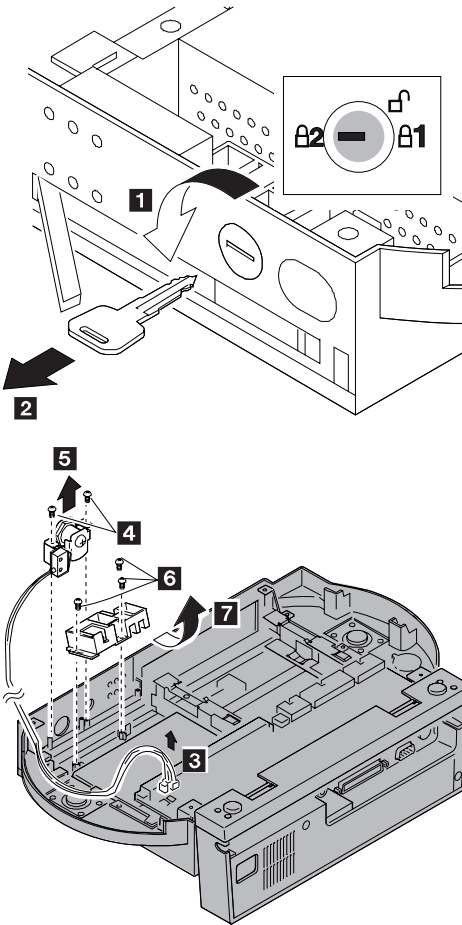
Step	Color and type (quantity)	Length
1	White self tapping for plastics (2) Diameter: 2 mm (0.08 in.)	8 mm (0.31 in.)
6	White screw (1)	5 mm (0.20 in.)
Note: Make sure you use the correct screw.		

1060 Key Lock Assembly

- Bottom Cover (1010)
- **1 2 3 4 5**

1070 Security Feature

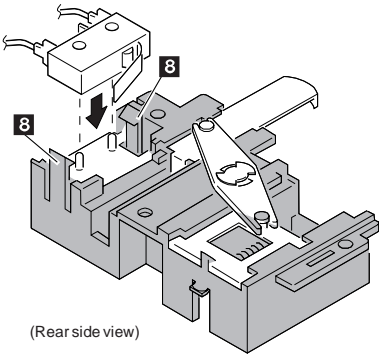
- Bottom Cover (1010)
- LED Assembly (1040)
- Open the release/lock lever of the Dock I by setting the key to the center position (🔑) and moving the slide-knob to the right.
- **1 2 3 4 5 6 7**



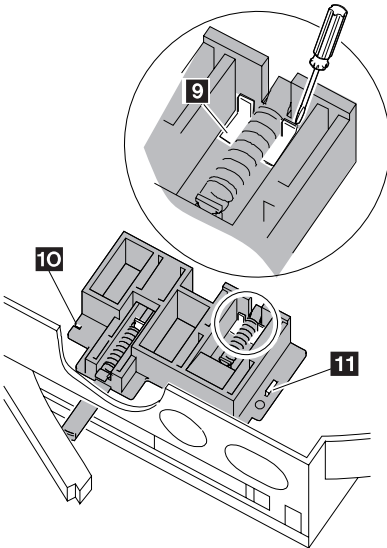
Step	Color, type, quantity	Length
4	Black self tap screw (2)	8 mm (0.31 in.)
6	White self tap screw (3)	5 mm (0.20 in.)
Note: Make sure you use the correct screw.		

To install the Dock I security feature, do the following.

1. Fasten the microswitch with the latches **8**.
2. Assemble the three highlighted parts as shown.

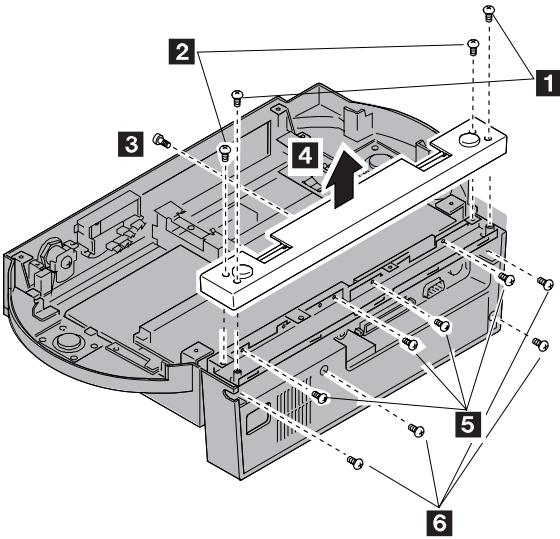


3. Set **9**, **10**, and **11** of the Dock I into the security feature as shown.
4. Reinstall the three screws.



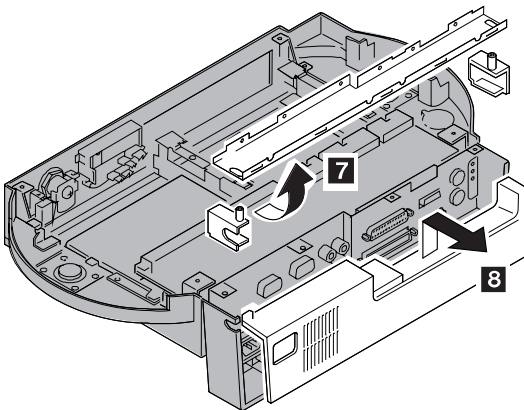
1080 Main Board

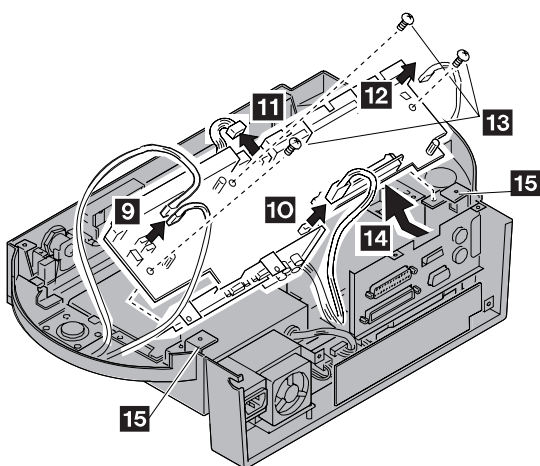
- Bottom Cover (1010)



Step	Color and type (quantity)	Length
1	Black self tap screw (2)	8 mm (0.31 in.)
2	Black screw (2)	5 mm (0.20 in.)
3	White screw (1)	5 mm (0.20 in.)
5	White screw (4)	5 mm (0.20 in.)
6	Black screw (4)	5 mm (0.20 in.)

Note: Make sure you use the correct screw.





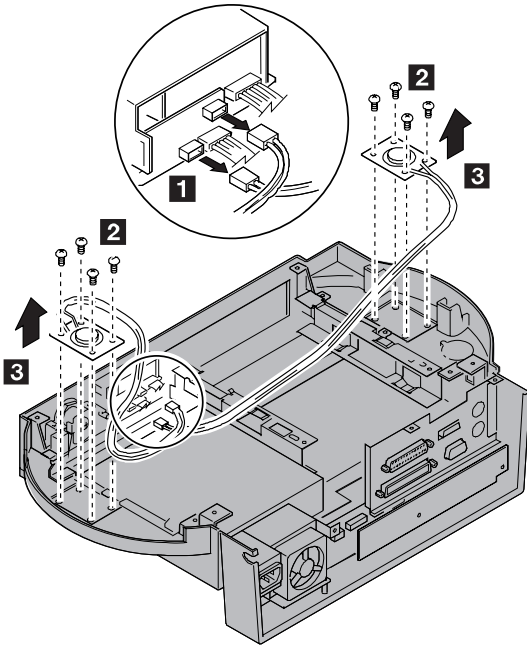
- 9** Disconnect the three connectors.
- 10** Disconnect the audio card interface connector.
- 11** Disconnect the power supply connector P1.
- 12** Disconnect the buzzer connector.
- 13** Remove the three screws.
- 14** Disconnect the I/O card interface connector and remove the main board.

Warning: When you remove the main board, be careful not to damage the main board with the screw brackets **15**.

Step	Color and type (quantity)	Length
13	White screw (3)	5 mm (0.20 in.)
Note: Make sure you use the correct screw.		

1090 Speaker

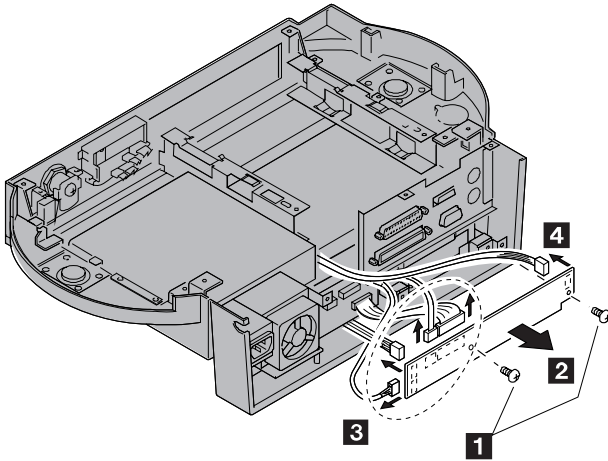
- Bottom Cover (1010)
- Main Board (1080)



Step	Color and type (quantity)	Length
2	White self tap screw (8)	6 mm (0.24 in.)
Note: Make sure you use the correct screw.		

1100 Audio Card

- Bottom Cover (1010)
- Main Board (1080)



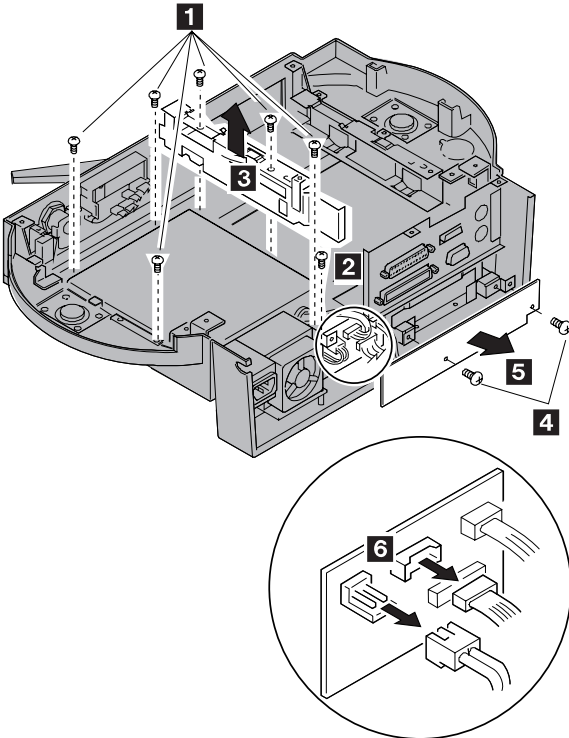
Note:

- 3** When you remove the four connectors, note the location of each connector.

Step	Color and type (quantity)	Length
1	White screw (2)	5 mm (0.20 in.)
Note: Make sure you use the correct screw.		

1110 Power Supply Unit

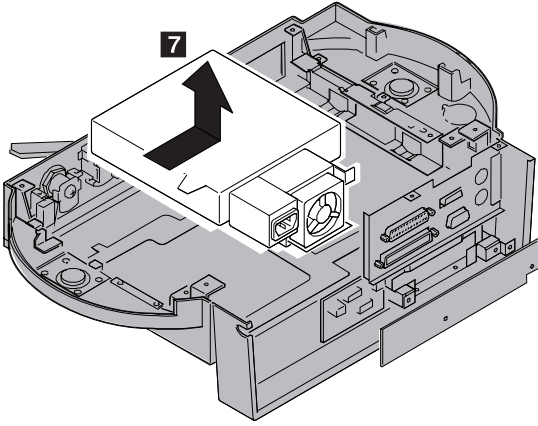
- Bottom Cover (1010)
- Main Board (1080)
- Open the release/lock lever



Warning: When doing sequence **5**, remove the audio card only enough to disconnect the power supply connectors under the card. Do not pull the card out because there are three more cables connected to the card.

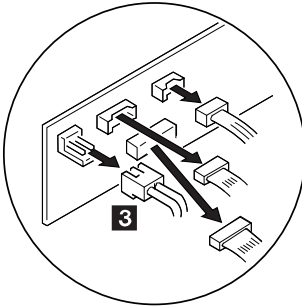
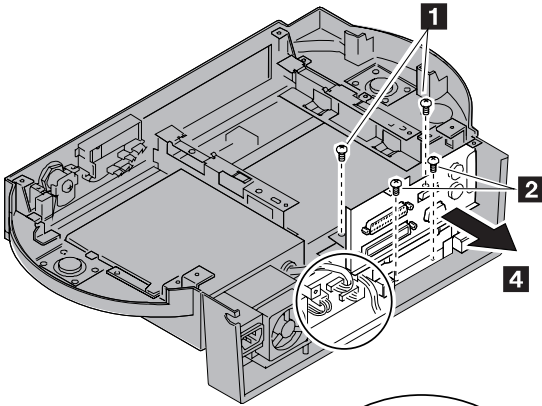
Step	Color and type (quantity)	Length
1	White screw (6)	5 mm (0.20 in.)
2	Black self tap screw (1)	8 mm (0.31 in.)
4	White screw (2)	5 mm (0.20 in.)

Note: Make sure you use the correct screw.



1120 I/O Card

- Bottom Cover (1010)
- Main Board (1080)
- Audio Card (1100)

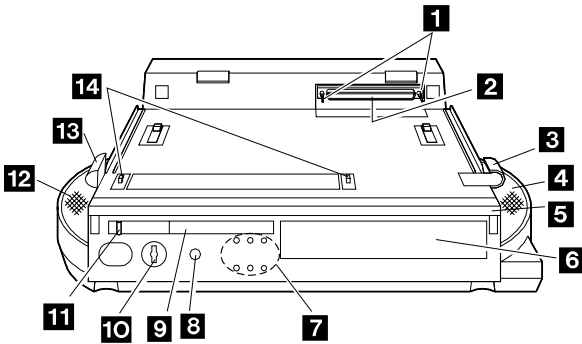


Step	Color and type (quantity)	Length
1	White screw (2)	5 mm (0.20 in.)
2	White self tap screw (2)	5 mm (0.20 in.)
Note: Make sure you use the correct screw.		

Locations

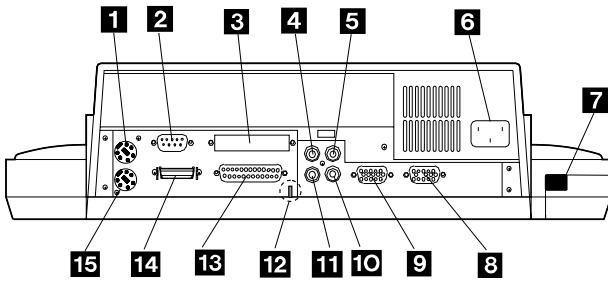
Front View

- 1** Guide Pins
- 2** Docking Connector (240-pin)
- 3** Lever Cover
- 4** Right Speaker
- 5** Handle
- 6** Blank Bezel
- 7** Status Indicator
- 8** Headphone Jack
- 9** Release/Lock Lever
- 10** Security Lock
- 11** Slide-Knob
- 12** Left Speaker
- 13** Docking Knob
- 14** Hooks



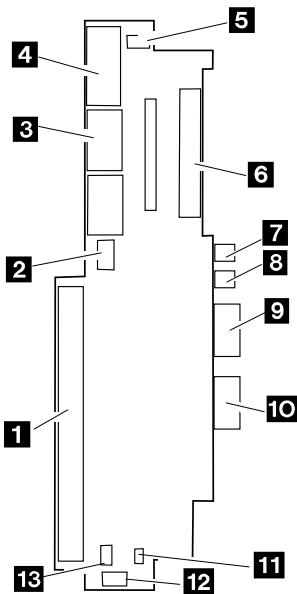
Rear View

- 1** Mouse/Pointing Device Connector
- 2** Serial Connector
- 3** External SCSI Connector
- 4** Audio-Out-Left Jack
- 5** Speaker-In-Left Jack
- 6** Power Cord Connector
- 7** Cable Opening
- 8** Video-in Connector
- 9** External Display Connector
- 10** Speaker-In-Right Jack
- 11** Audio-Out-Right Jack
- 12** Security Hook
- 13** Parallel Connector
- 14** External Diskette Drive Connector
- 15** Keyboard/Numeric keypad Connector



Main Board

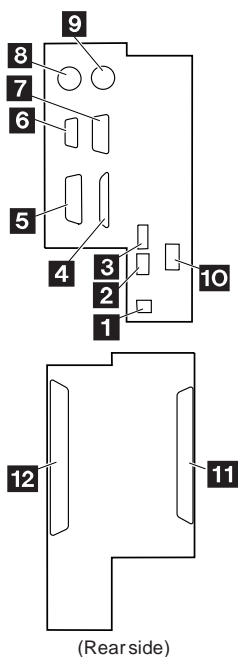
- 1** AT Slot (98-pin)
- 2** Power Unit Connector
- 3** Internal SCSI Connector
- 4** Internal Hard Disk Drive Connector
- 5** Buzzer Connector
- 6** I/O Card Interface
- 7** Audio-Out Jack
- 8** Speaker-In Jack
- 9** External Display Connector
- 10** Video-In Connector
- 11** Security Feature Microswitch Interface (CN 22)
- 12** LED Cable Connector
- 13** Key Lock Assy. Microswitch Interface (CN 21)



Note: Switch 1, switch 4, and all 4- and 8-position DIP switches have no effect on system operation. The settings for other switches can be found in the *User's Guide*.

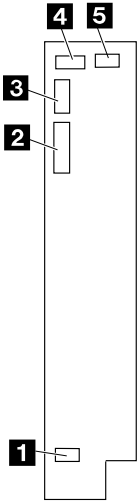
I/O Card

- 1** Power Supply Connector P3
- 2** Power Supply Connector P2
- 3** Audio Card Interface
- 4** External SCSI Connector
- 5** Parallel Connector
- 6** External Diskette Drive Connector (26-pin)
- 7** Serial Connector
- 8** Keyboard/Numeric Keypad Connector
- 9** Mouse/Pointing Device Connector
- 10** Audio Card Interface
- 11** Main Board Interface
- 12** Docking Connector (240-pin)



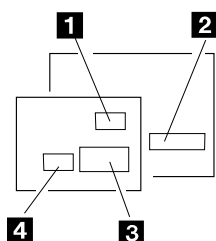
Audio Card

- 1** LED Assembly Cable Connector
- 2** I/O Card Cable Connector
- 3** Audio Cable Connector
- 4** Main Board Cable Connector
- 5** I/O Card Cable Connector



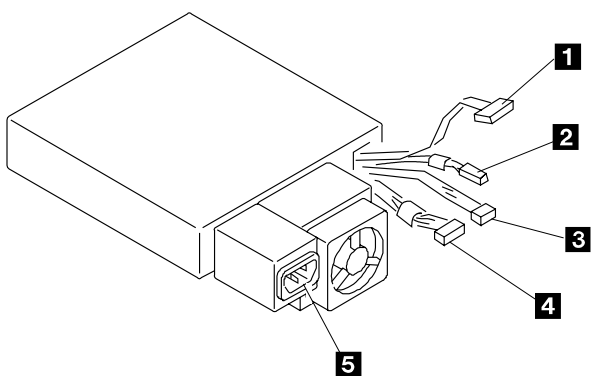
LED Assembly

- 1** Speaker Connector (Left)
- 2** Main Board Cable Connector
- 3** Audio Card Cable Connector
- 4** Speaker Connector (Right)

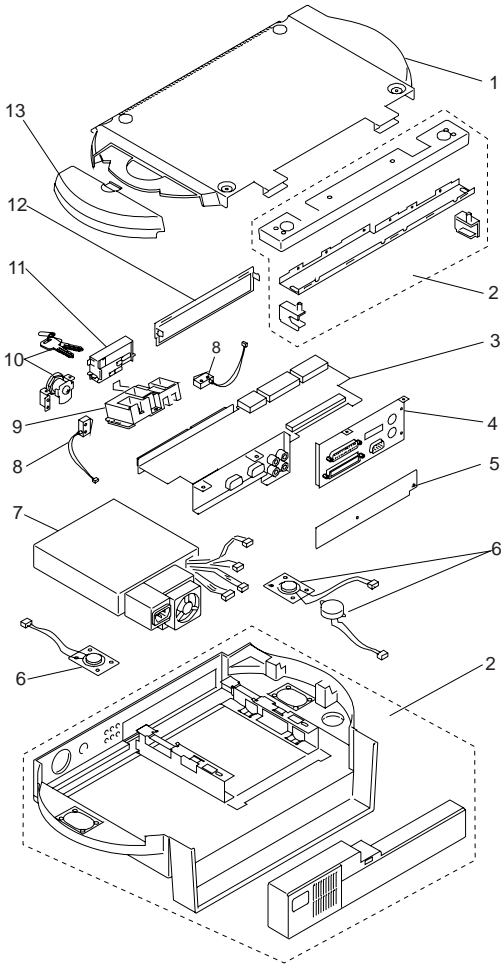


Power Supply

- 1** SCSI Power Supply Connector (4-pin)
- 2** Power Supply Connector P3 (2-pin)
- 3** Power Supply Connector P1 (10-pin)
- 4** Power Supply Connector P2 (10-pin)
- 5** Power Cord Connector



Parts Listing



Dock I Unit

Index

1	Bottom Cover	66G3555
	For Germany (mica gray)	66G3556
2	Main Cabinet	66G3560
	Main Cover	
	Main Chassis	
	Handle	
	Rear Cover	
	Bottom Cover	
	Main Cabinet	
	Main Cabinet For Germany (mica gray)	66G3561
3	Main Board	66G3557
4	I/O Card	66G3571
5	Audio Card	66G3588
6	Speaker Right/Left, Buzzer	66G3570
7	Power Supply Unit	66G3559
8	Micro Switch Group	66G3562
9	Security Feature Group	66G3569
	For Germany (mica gray)	66G3572
10	Key Lock Assembly	66G3563
11	LED Assembly	66G3568
12	Blank Bezel	66G3564
	For Germany (mica gray)	66G3565
13	Audio Cable Cover	66G3566
	For Germany (mica gray)	66G3567
	Cable Group	66G3572
	Miscellaneous Kit	66G3573
	Black: 5mm (12), 6mm self-tapping (8)	
	8mm self-tapping (8), 5mm slotted (4)	
	brass: 5mm (1), 8mm (1), 8mm self-tapping (3)	
	6mm hex stud (2), 25mm wire router w/ screw loop	

Options and Adapters

3278/3279 Emulation Adapter	53F6424
Enhanced 5250 Emulation Adapter	30F5384
PC Network Adapter	8286171
PC Network Adapter Cable	8286172
PC Network Adapter II	72X8105
PC Network Baseband Adapter	72X8101
SDLC Adapter	8286099
Communication Adapter Cable	8529274
Serial/Parallel Adapter	8286147
Printer Cable	8529214
Serial Adapter Cable	8286170
Serial Adapter Connector	8286194
Token Ring Adapter	16F0463
Token Ring Adapter with RIPL	83X7839
Token Ring 16/4 Adapter	93F0334
Token Ring RIPL (module, for 93F0334)	25F8887
Action Media II Display Adapter	69F9731
Action Media II Capture Option	69F9735
Action Media II Video Cable	69F9737
Action Media II Audio/Video Capture Cable	69F9736
Action Media II Display CD-ROM Cable	69F9747
LAN Adapter for Ethernet	92F0045
Video Connector/Cable	66F3583
AD/VC Adapter	66G3581

SCSI Hard Disk Drive

80MB Drive	56F8854
108MB Drive	95F4748
216MB Drive	95F4749
160MB Drive	56F8851
320MB Drive	85F0011
400MB Drive	85F0012
1GB Drive (half-high)	92F0089
Terminator, In-line (for 320/400MB)	92F0142

Keyboard Cable and Mouse

Keyboard Cable	72X8537
Mouse	61X8923
Mouse Ball and Pop-Off Retainer	33F8461
Mouse Ball and Twist-Off Retainer	33F8462
Miniature Mouse	95F5723

Dock 1 Options

Port Replicator Model I	66G3574
Port Replicator Model II	66G3575
Display Stand (black)	66G3584
Internal CD-ROM Installation Kit	66G3577
For Germany (mica gray)	66G3578
Audio Cable	66G3518
ThinkPad Hard Disk Installation Kit	66G3576
Internal SCSI Cable	66G3579
SCSI Hard Disk Tray	66G3580
ThinkPad Hard Disk Drive (170 MB)	66G5066
For Germany (mica gray)	66G5085
ThinkPad Hard Disk Drive (340 MB)	66G5068
For Germany (mica gray)	66G5087
Diskette Drive	66G5060
Diskette Drive Attachment Kit	66G5069

Numeric Keypad

Belgian	95F5741
Canadian French	95F5466
Danish	95F5467
Dutch	95F5467
French	95F6313
German	95F6314
Greek	95F5467
Hebrew	95F5741
Icelandic	95F5467
Italian	95F6316
Norwegian	95F5467
Spanish	95F6315
Spanish Speaking	95F6315
Swedish/Finish	95F5468
Swiss/French	95F5711
Swiss/German	95F5715
Turkish	95F5467
U.K. English	95F5741
U.S. English	95F5741

Dock II (3546)

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General Checkout

The IBM* ThinkPad* Dock II (hereinafter referred to as the *Dock II*) expands the capability of the IBM ThinkPad 360, 750, and 755 notebooks (hereinafter referred to as the *computer*), using the IBM AT* Bus architecture.

The diagnostic tests are intended to test *only* IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid system responses.

Warning

- Drives in the computer that you are servicing might have been rearranged or the drive startup sequence might have been altered. Be extremely careful during write operations such as copying, saving, or formatting. Data or programs can be written over if you select an incorrect drive.
- Only certified and trained personnel should service the computer.
- The parts exchange form or parts return form attached to the FRU to be returned must describe the following:
 - Name and phone number of servicer (in print).
 - Date serviced.
 - Date failed.
 - Date purchased.
 - Failure symptoms, error codes, and beep symptoms.
 - Procedure index and page number on which the symptom or error code is described.
 - The failing FRU name and part number.
 - Machine type, model number, and serial number.
 - Customer name and address

Checkout Guide: During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer.

The following list provides some common items that are not covered under warranty and some symptoms that may indicate the system was subjected to stresses beyond normal use.

The following are not covered under warranty:

- LCD panel cracked by applying excessive force or being dropped
- Scratched (cosmetic) parts
- Cracked or broken plastic parts, latches, or connectors caused by excessive force
- Damage caused by liquid spilled into the system
- Damage caused by improperly inserting a PCMCIA card or installation of a incompatible card
- Damage due to foreign material in the FDD or FDD bay

If the following symptoms are present, they may indicate damage caused by non-warranted activity:

- Missing parts may be a symptom of unauthorized service or modification.
- HDD spindles become noisy if subjected to high levels of force or being dropped
- I9990303 errors may be caused by exposure to extreme magnetic fields

Overall Procedure

1. Check that the computer is correctly docked to Dock II.
2. If possible, make sure that there are no hardware setting conflicts, such as in interrupt levels, memory addresses, DMA channels, and I/O addresses.
3. Check that the SCSI ID is set correctly.
4. Test and correct any computer problem before you test it with Dock II. Use the computer documentation to resolve any computer problems.
5. Test the computer with the external keyboard, external display, mouse, and parallel and serial device connectors. (Use the keyboard/mouse connector to test the external keyboard and mouse.) If no problems are found, connect the external keyboard, mouse, parallel and serial devices to Dock II, then connect Dock II to the computer and test it.
6. If external devices are attached to Dock II, such as an audio amplifier, check the device by referring to the manual shipped with the device.
7. If the user did not bring the computer with Dock II when service is needed, use a computer that works correctly with Dock II.

How to Diagnose Combined FRUs: If an adapter or device consists of more than one FRU, an error code can be caused by any of the FRUs. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptom changes.

(CONTINUED)

How to Use Error Messages: The error messages caused by Dock II, the attached computer, and the attached devices are displayed on the LCD of the attached computer or on the external display. Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. The cause of the first error code can result in false error codes being displayed. If the error code is displayed, see the “Symptom-to-FRU Index” on page 416.

Important: When the Problem Determination Procedure in the operation manual that is supplied with the adapter or device says “Have the system unit serviced”, this means the computer and Dock II.

001

- Turn off the computer and all external devices.
- Remove the computer from Dock II.
- Connect the external keyboard, mouse, parallel and serial devices to the computer, if used. (Use the keyboard/mouse connector for testing the external keyboard and mouse.)
- Diagnose all computer problems first (see the computer *Hardware Maintenance Service* manual).

DID THE TEST COMPLETE WITHOUT ANY ERROR?

Yes No

002

Have the computer serviced.

003

- Install the computer on Dock II. Make sure that the computer is firmly connected.
- Check all cables and power cords.
- Check the fan in the power supply in Dock II and make sure it is working correctly.

Notes:

1. The mouse or some other pointing device do not work if they are connected to the keyboard/numeric keypad connector.
 2. The mouse or some other pointing device do not work if they are connected to the mouse connector on the numeric keypad that is connected to Dock II.
 3. The computer keyboard does not work when an external keyboard is connected to Dock II.
- Reinstall all external devices.
 - Turn on all external devices.
- (Step **003** continues)

003 (continued)

- Press and hold **F1**, then turn on the computer. (Hold **F1** until the **Easy-Setup** screen or an error message appears.) See “How To Run the Diagnostics” on page 405.

Note: If a warning beep sounds for the correct operation, go to the “Symptom-to-FRU Index” on page 416.

- Write down all post error codes that are displayed. (Press the **Pause** key when an error code appears to keep the screen from scrolling. Press **F1** to continue.)

If the POST stops and you cannot continue, go to “Symptom-to-FRU Index” on page 416.

ARE THERE ANY EXTERNAL DEVICES ATTACHED TO THE DOCK II?

Yes No

004

Go to Step 007.

005

DID THE POWER-GOOD LIGHT FOR ALL OF THE EXTERNAL DEVICES TURN ON?

Yes No

006

See the manual for the failing device.

007

DID YOU RECEIVE A POST ERROR CODE?

Yes No

008

If you cannot check the error code:

- Press and hold **F1**, then turn on the computer. (Hold **F1** until the **Easy-Setup** screen or an error message appears.)
- Write down all post error codes that are displayed. (Press the **Pause** key when an error code appears to keep the screen from scrolling. Press **F1** to continue.)

To run system checkout, or if you suspect another problem, go to Step 010.

009

Go to “Symptom-to-FRU Index” on page 416.

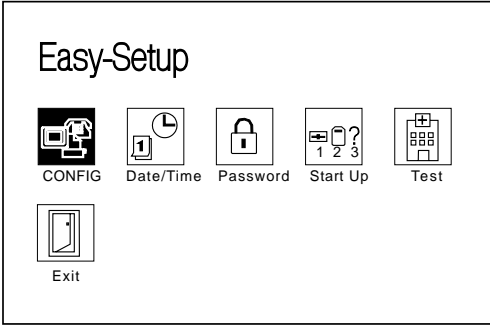
010

(Step **010** continues)

(CONTINUED)

010 (continued)

DID THE EASY-SETUP SCREEN APPEAR?



Yes **No**

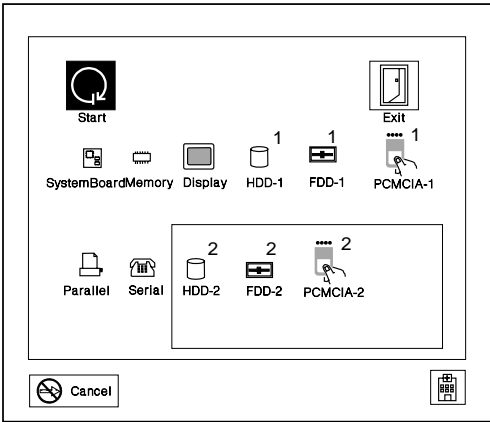
011

The system may have hung during the running of the POST. Note the symptoms and go to "Symptom-to-FRU Index" on page 416.

012

– Select **Test** and press **Enter**.

DID THE DIAGNOSTIC SCREEN APPEAR?



Yes **No**

013

- If the keyboard does not work, go to "External Keyboard" on page 404.
- Otherwise, go to "Symptom-to-FRU Index" on page 416.

014

(Step **014** continues)

014 (continued)

IS THE CONFIGURATION THE SAME AS THE INSTALLED DEVICES?

Yes No

015

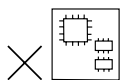
- Go to “Checking the Installed Devices” on page 397.

016

- Select **Start** and press **Enter**.
Diagnostic tests will run on all available devices.

If the test finds a device error, the error is displayed with an X beside the device name.

For example:



SystemBoard

DEV 001
ERR 02
FRU 0010

DEV: Device ID
ERR: Error Description Code
FRU: FRU Code

Note: If the test stops or hangs during the test, replace the last device that was tested.

DID THE TESTS FIND A DEVICE ERROR?

Yes No

017

- The error was not detected by the basic test. Go to Step 019.

018

- Note the error codes and go to “FRU Codes” on page 419 and replace the appropriate FRUs.

019

- Go to the advanced diagnostic screen by pressing **Ctrl+A**, and run the following tests.
 - Diskette drive test (use a blank diskette).
 - Serial port test (with the wrap plug).
Note: Install the wrap plug on the serial port of Dock II.
 - Parallel port test (with the wrap plug).
Note: Install the wrap plug on the parallel port of Dock II.
 - PCMCIA-2 test (with the PC test card).
Note: Install the PC Test Cards into the PCMCIA slot of Dock II.

(Step 019 continues)

(CONTINUED)

019 (continued)

- Keyboard test (see “How to Run the Keyboard Test” on page 407).

DID THE ADVANCED DIAGNOSTICS FIND AN ERROR?

Yes **No**

020

The problem was not detected by the diagnostics. Check that the cables and connectors are not damaged.

If a SCSI device is not installed, start at Step 3.

If a SCSI device is installed, do the following:

1. Check that the total number of the attached SCSI devices is less than eight.
2. Check that the SCSI terminator is correctly installed.

If the problems still remain, run the SCSI test. (See “Running Diagnostics” on page 410.)

3. Reconnect all adapters, drives, and devices, then test the system several times. A **Loop Test** option is available for running all the tests. (See “How to Run the Loop Test” on page 407.)

After stopping the loop test, check that the error log appears in the error list. (See “Error Log” on page 409.)

If no errors were detected, go to “Undetermined Problems” on page 421 and use the user reported symptom.

If any errors are detected, go to “Numeric Error Codes” on page 418.

021

Note the error code and go to “FRU Codes” on page 419 and replace the appropriate FRUs. If the problem remains after all repair actions are taken, go to “Undetermined Problems” on page 421.

Checking the Installed Devices

The HDD-1 or FDD-1 represents the **first** drive in the system configuration, respectively. Similarly, the HDD-2 or FDD-2 represents the **second** drive, usually attached through a Dock II.

Notes:

1. Neither the Dock II nor the adapters and SCSI devices installed in the Dock II appear as icons on the screen.
2. HDD-1 and HDD-2 icons are for the 2.5-inch ThinkPad hard disk drive.

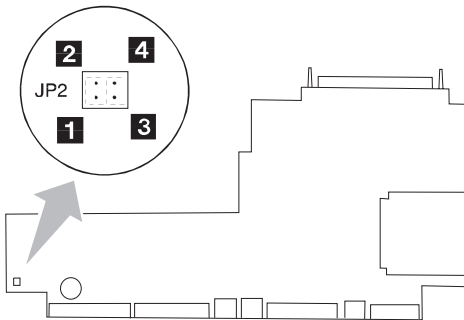
If the devices are installed, but the icon appears in a gray shade rather than a dark shade on the basic diagnostic screen, it means that the devices are defective. Turn off the computer and make sure that the devices are correctly connected. If the symptom still remains after the computer is turned on, replace the devices or the main card of Dock II.

Power Supply

If the power-on indicator is not on and the power supply fan is not turning, check the power cord for continuity and correct installation.

If the power cord is not the problem, either the power supply is defective, or another component is defective causing the power supply to cut off. To verify that the power supply is operating correctly, do the following:

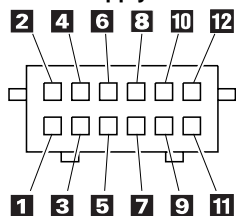
1. Turn off the computer and disconnect the Dock II power cord.
2. Remove all internal and external devices, and the computer from the Dock II.
3. Remove the power supply connector CN26 from the main card (refer to "Main Card" on page 453) and CN56 from the riser card (refer to "Riser Card" on page 455).
4. Remove the SCSI power supply connector from the SCSI device.
5. Install jumpers between pins 1 and 2, and pins 3 and 4 of JP2 on the main card.



6. Connect the Dock II power cord.
7. Check the power supply voltages on the CN26, CN56, and SCSI connectors by referring to the respective voltage tables. Then, check that the fan is turning. If the voltage is not correct or the fan is not turning, replace the power supply.
8. Connect the Dock II power cord.

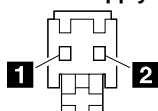
If any of the voltages are not correct, replace the power supply. If replacing the power supply does not correct the problem, then replace the main card.

Power Supply Connector CN25



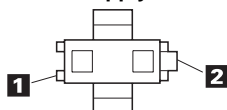
Pin	Signal	V dc Min.	V dc Max.
1	+5 volts	+4.75	+5.25
2	Ground	–	–
3	+12 volts	+11.4	+12.6
4	Ground	–	–
5	Sub+5 volts	+4.75	+5.25
6	System On	–	–
7	Power On	–	–
8	Mode Control	–	–
9	Security	–	–
10	Ground	–	–
11	Sub+12 volts	+11.4	+12.6
12	NC	–	–

Power Supply Connector CN26



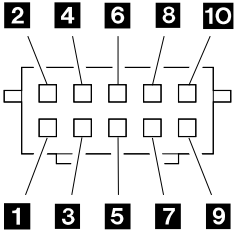
Pin	Signal	V dc Min.	V dc Max.
1	CVCC	+19	+21
2	Ground	–	–

Power Supply Connector-Reserved



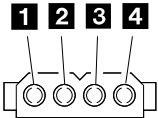
Pin	Signal	V dc Min.	V dc Max.
1	CVCC	+19	+21
2	Ground	–	–

Power Supply Connector CN56



Pin	Signal	V dc Min.	V dc Max.
1, 2, 3	+5 volts	+4.75	+5.25
4, 5	Ground	–	–
6	+12 volts	+11.4	+12.6
7	Ground	–	–
8	–12 volts	–11.4	–13.2
9	–5 volts	–4.53	–5.5
10	Ground	–	–

SCSI Power Supply Connector



Pin	Signal	V dc Min.	V dc Max.
1	+12 volts	+11.46	+12.6
2, 3	Ground	–	–
4	+5 volts	+4.758	+5.25

Printer

Test the printer by connecting it to the computer before testing it on Dock II.

1. Make sure the printer is correctly connected and the power is turned on.
2. Run the printer self-test.

If the printer self-test does not run correctly, the problem is in the printer. Refer to the printer service manual.

If the printer self-test runs correctly, connect a wrap plug on the parallel connector on the rear of Dock II and run the advanced diagnostic tests to determine the failing FRU.

If the advanced diagnostic tests (with the wrap plug connected) did not detect a failure, replace the printer cable.

If the problem is not corrected, do one of the following:

- If the printer is attached to the parallel connector of Dock II, replace the main card of Dock II.
- If the printer is attached to the parallel connector on the adapter, replace the FRUs in the following order one at a time until the problem is corrected:

Note: If the replaced parts did not resolve the problem, put the original parts back in the Dock II. Do not replace non-defective parts.

1. Adapter
2. Main card of Dock II

External Display

If the screen is rolling, replace the external display.

If the problem is not corrected, replace FRUs in the following order one at a time until the problem is corrected:

Note: If the replaced parts did not resolve the problem, put the original parts back in the Dock II. Do not replace non-defective parts.

- If the external display is attached to Dock II:
 - Main card of Dock II
- If the external display is attached to the display adapter:
 1. Display adapter
 2. Main card of Dock II
 3. Riser card

If the screen is not rolling, do the following to run the display self-test:

1. Turn off Dock II and the external display.
2. Disconnect the external display signal cable from Dock II.
3. Turn on the external display.
4. Turn the contrast control to its maximum position.
5. Turn the brightness control to its center detent position.

Check for the following conditions:

- The screen should be white or light gray, with a black margin as described below:
 - 2–20 mm (0.08–0.79 in.) wide on one or both sides
 - 2–50 mm (0.08–1.97 in.) wide on the top, bottom, or both sides
 - For other test patterns, see the appropriate display manual.
- The screen contrast and brightness controls should vary the intensity of the screen.

If the external display does not meet these specifications, replace the external display.

If the external display meets these specifications, replace FRUs in the following order one at a time until the problem is corrected.

Note: If the replaced parts did not resolve the problem, put the original parts back in the Dock II. Do not replace non-defective parts.

If the external display is attached to Dock II:

1. Main card of Dock II
2. External display

If the external display is attached to the display adapter:

1. Display adapter
2. Main card of Dock II
3. Riser card
4. External display

External Keyboard

Notes

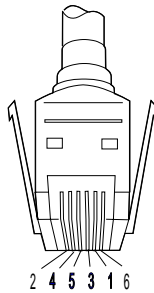
If a mouse or other pointing device is attached, remove it and see if the error symptom goes away. If the symptom goes away, the mouse or other pointing device is defective.

The computer keyboard does not work when an external keyboard is connected.

001

- Turn off the computer.
- Disconnect the keyboard cable from the external keyboard.
- Turn on the computer and check the keyboard cable connector for the following voltages. All voltages have a $\pm 5\%$ voltage tolerance.

Pin	Voltage (V dc)
1	+ 5 . 0
2	Not Used
3	Ground
4	+ 5 . 0
5	+ 5 . 0
6	Not Used



ARE ALL VOLTAGES CORRECT?

Yes No

002

Replacing the following FRUs one at a time until the problem is corrected.

Note: If the replaced parts did not resolve the problem, put the original parts back in the Dock II. Do not replace non-defective parts.

1. Keyboard cable
2. Main card of Dock II

003

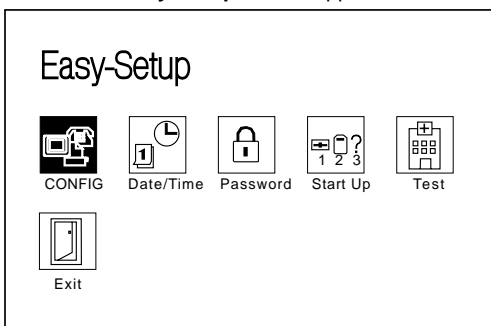
Replace the external keyboard.

How To Run the Diagnostics

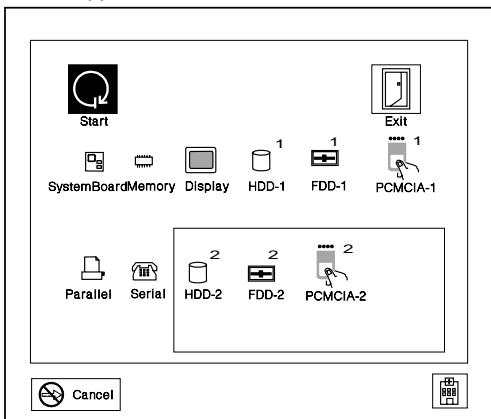
Do the following to run the diagnostic tests.

Either the TrackPoint II or the cursor move keys can be used to interact with the tests. The Enter key works the same as selecting the OK icon to reply OK.

1. Press and hold **F1**, then turn on the computer. Hold **F1** until the **Easy-Setup** screen appears.

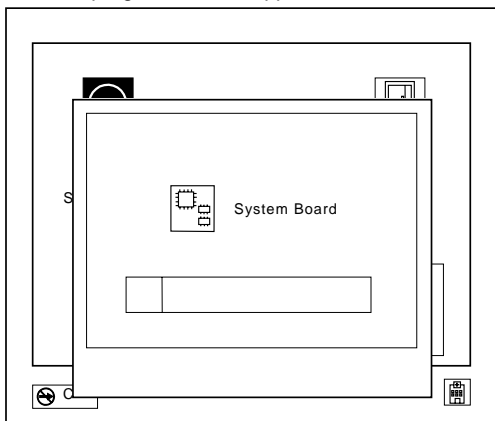


2. Select **Test** and press **Enter**. The basic diagnostic screen appears.



3. Select a device and press **Enter** to run the test.

- The test progress screen appears.

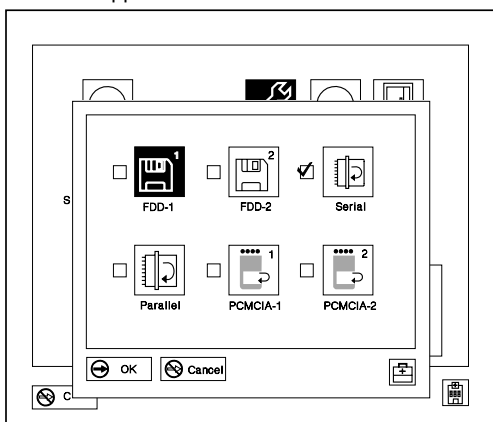


- OK** appears when the test ends without any errors.

Advanced Diagnostic Tests

- Go to the advanced diagnostic screen by pressing **Ctrl+A** on the basic diagnostic screen.
- Select **Tool** to install the tools.
- Select a device, press the **Spacebar**, and install the tool. Multiple devices can be selected by repeating this step.

A \checkmark mark appears for the selected device.



- Select **OK** and press **Enter** if the selection is OK.
- Select a device and press **Enter** to start the tests.

How to Run All Tests: In the advanced diagnostic screen, select **Test All** to test all devices.

How to Run the Loop Test

1. Go to the advanced diagnostic screen by pressing **Ctrl+A** on the basic diagnostic screen.
2. Select the **Looptest** icon and press **Enter** or click the click button.
3. Select a device and press the **Spacebar**. A \checkmark mark appears for the selected device.
4. If the selection is OK, select **OK** and press **Enter** to start the loop test.
5. To exit the loop test, press and hold **Ctrl+Pause** until the interrupt is accepted by the test program. A beep sounds when the interrupt is accepted. The test loop stops at the end of the current test.

How to Run the Keyboard Test: Use the following procedure to run the keyboard key test.

1. Turn off the computer.
2. Remove the external keyboard, if one is attached.
3. Press and hold **F1** key, then turn on the computer. Hold **F1** until the **Easy-Setup** screen appears.
4. Select **Test** and press **Enter**. The basic diagnostic screen appears.
5. Press **Ctrl+A** to go to advanced diagnostic screen.
6. Press **Ctrl+K** (a keyboard graphic appears on the screen).
7. By pressing a key, the mark appears or disappears on the corresponding key position on the screen. Repeat this step for any keys that need to be tested.
8. To exit the test, press **Esc** or select the cancel icon.

How to Run the Audio Test: Use the following procedure to run the audio tests.

1. Turn off the computer.
2. Insert the maintenance diskette into diskette drive **A** and turn on power.
3. Select the Audio Diagnostics from the main menu.
4. Select **Tests** from the menu bar and press **Enter**.
5. Select **All tests** from the pull-down menu and press **Enter**.

Run options are set to test once and stop on error as defaults. Other options can be selected by the pull-down menu of **Setting-up**.

6. Follow the instructions that appear on the screen to proceed with the tests.
7. If the tests end without detecting any error, the "All tests passed OK" message appears.
8. If an error is detected, the FRU code and error description message appear. Go to "FRU Codes" on page 419 and replace the FRU.

- To exit the test screen, press **Esc**.

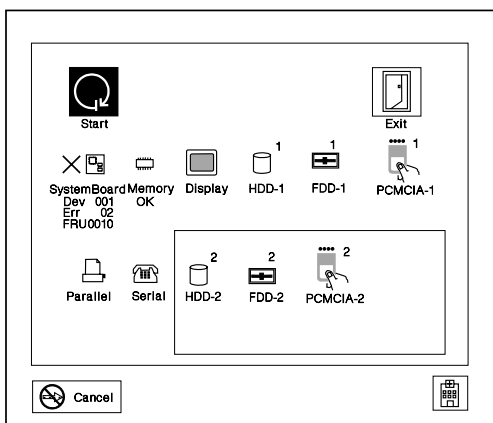
Notes:

- If an instruction to plug the external loop cable appears, connect it between the microphone/line jack of the computer and the headphone jack of Dock II.
- If an instruction to plug the headphone appears, connect it to the headphone jack of Dock II.
- Volume Control Test** does not work when the computer is docked to Dock II.

PC Test Card LED: The green LED on the PC test card lights when the PCMCIA test is running. If the LED does not go on, check that the card is installed correctly by reseating the card. If it still does not light after reseating, try using another slot for the test. If the LED still does not go on and the test fails, replace the FRU shown in the diagnostic error code.

Diagnostic Error Indications: If an error is detected, the following appears:

- Large **X** on the left-side of the device icon.
- Device ID (three digits).
- Error code (two digits).
- FRU code (four digits).



The FRU code represents two FRUs. The leftmost two digits indicates the higher priority of replacement.

The device ID and error codes are used to indicate the detail portion of the FRU which caused the error.

Errors during the POST: If the POST detects an error, a three- to eight-digit error code is displayed.

Memory Errors: If the POST detects a memory error in the first 640KB of system memory, all of the first bank memory is de-allocated and the test continues with the second 640KB of the second bank memory. If the total amount of error free memory becomes less than 2MB, a 2XX POST error occurs and the system stops. All of the remaining memory is used as system memory. When the POST memory test has completed, the usable memory size is compared with the configuration data and if a mismatch is detected, a 2XX error code occurs. The user can continue with system operation by pressing F1 and call for service at a later time.

The memory sizes that are de-allocated because of the POST process is kept by the hibernation or suspend functions. To test this memory, it must be re-configured as part of the original memory size. The memory re-configuring is done by turning power off and on.

De-allocation support is done only by the POST for memory errors. All unrecoverable memory errors that occur during normal operation cause an interrupt to the operating system.

Error Log: Diagnostic errors are printed on the printer that is attached to parallel port when the error is detected. The error is also logged in the system memory.

Use the following procedure to display the errors.

1. End the test, if it is running.
2. Press **Ctrl+A** to select the advanced diagnostic mode.
3. Press **Ctrl+E**.
4. The error log appears.
5. To exit the screen, select the cancel icon or press **Esc**.

The error log is not saved when system power is turned off.

Running Diagnostics

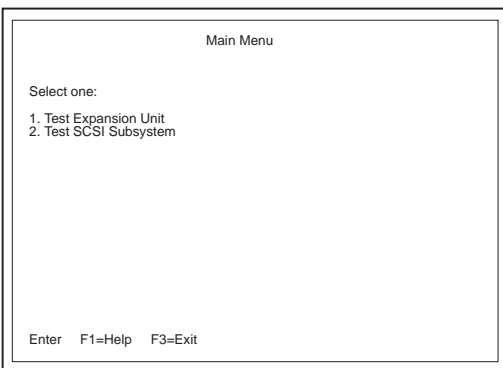
The Dock II Options Diskette helps you troubleshoot expansion unit, SCSI adapter, and SCSI device problems through a series of menus.

Run the diagnostics after you have completed the installation of your Dock II and SCSI devices to verify that these devices work correctly. Do the following:

1. Turn off the computer, the Dock II, and external SCSI devices.
2. Insert the Option Diskette into drive A.
3. Turn on all attached external SCSI devices, the computer, then the Dock II.
4. The **Logo Screen** appears.



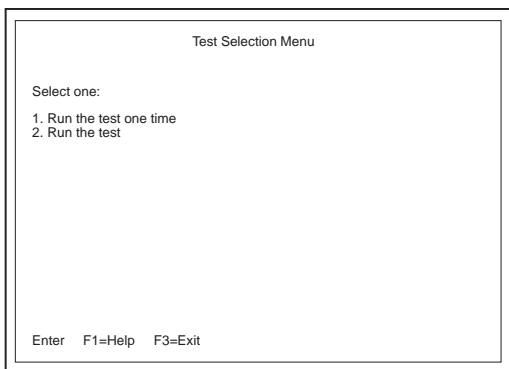
5. After a few seconds the **Main Menu** appears.



6. Select a device for testing and go to the respective section.

Testing the Expansion Unit

1. The **Test Selection Menu** appears when you select **Test Expansion Unit** on the **Main Menu**.

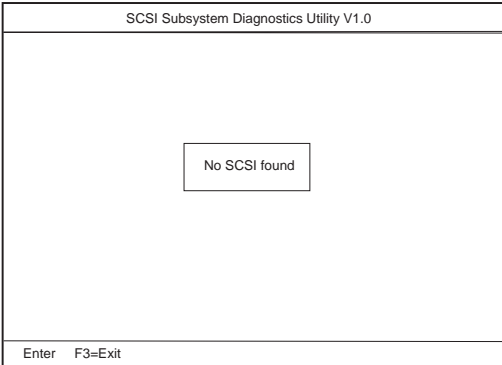


2. Select an item on the screen and follow the instructions that appear on the screen.

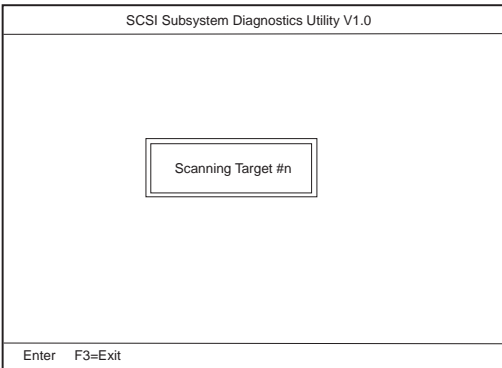
Testing the SCSI Subsystem

Note: If a SCSI adapter is installed in an ISA slot, remove it before running the SCSI diagnostic program.

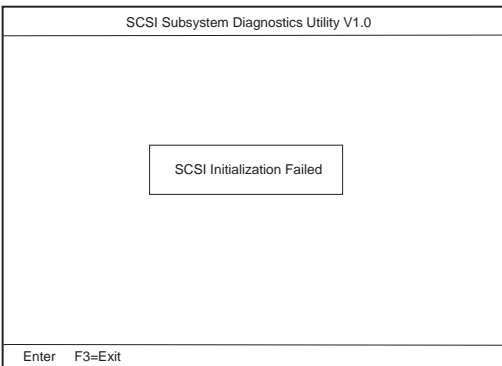
1. When you select **Test SCSI Subsystem** on the **Main Menu**, the diagnostics program checks the system configuration for SCSI devices and displays the following if no SCSI controller is found.



If a SCSI controller is found, the computer goes on to initialize the SCSI devices and displays the following.



2. If the initialization fails, the following screen appears.



3. If the initialization ends successfully, the following screen appears. Select an item.

The screenshot shows a terminal window titled "SCSI Subsystem Diagnostics Utility V1.0". In the center, there is a box with the text "Select one" followed by two numbered options: "1. Run the tests one time" and "2. Run the tests continuously". At the bottom of the window, it says "Enter F3=Exit".

4. The **SCSI Devices Test Menu** appears. Select one of the devices.

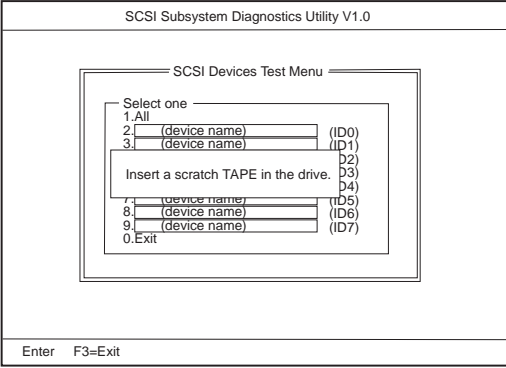
The screenshot shows a terminal window titled "SCSI Subsystem Diagnostics Utility V1.0". Inside, there is a box titled "SCSI Devices Test Menu". Below the title, it says "Select one" followed by a list of options: "1.All", "2.(device name) (ID0)", "3.(device name) (ID1)", "4.(device name) (ID2)", "5.(device name) (ID3)", "6.(device name) (ID4)", "7.(device name) (ID5)", "8.(device name) (ID6)", "9.(device name) (ID7)", and "0.Exit". At the bottom of the window, it says "Enter F3=Exit".

The device name may be any of the following:

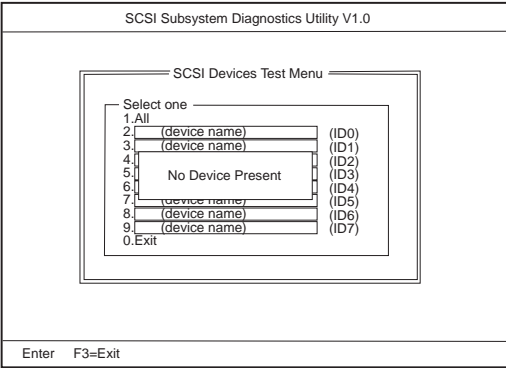
- SCSI Hard Disk
- SCSI Tape Drive
- SCSI CD-ROM
- SCSI Optical Drive
- or No Device

The SCSI controller of Dock II appears as ID7 on the screen.

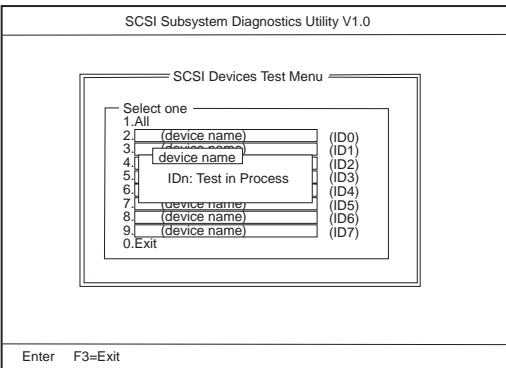
5. If a SCSI device exists and a test media is required to test the SCSI device, the following pop-up menu appears (shows the case of a SCSI tape drive).



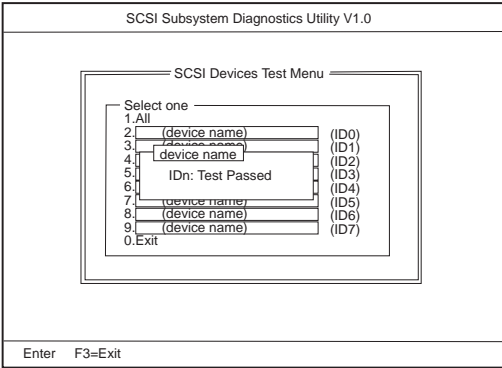
6. Insert the requested media and wait for approximately 30 seconds until the media is loaded.
7. Press any key. If no SCSI devices are found, a pop-up menu appears.



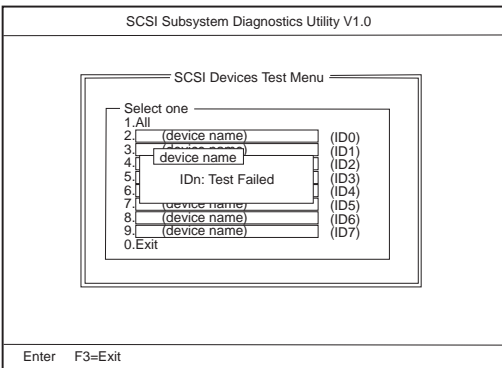
8. The test begins and the following pop-up menu appears.



9. If the test is successful, the following appears.



10. If the test is unsuccessful, the following appears.



Symptom-to-FRU Index

The Symptom-to-FRU Index lists error symptoms and possible causes. The most likely cause is listed first.

Note: Replace the FRUs one at a time in the sequence shown in the FRUs of the Dock II Sequence of Action column. If a replaced part did not resolve the problem, put the original part back in the Dock II. Do not replace non-defective parts.

Always begin with "General Checkout" on page 390. This index also can be used to help you decide which FRUs to have available when servicing the Dock II.

Numeric error codes show the errors detected in the POST or system operation. **X**, when included in the error code, can be any number.

FRU codes are used for errors detected by diagnostic tests.

If no error codes are available, use narrative symptoms.

If the symptom is not listed or you cannot correct the problem using this index, go to "Undetermined Problems" on page 421.

If you cannot correct the problem using this index, go to "Undetermined Problems" on page 421.

IMPORTANT:

1. Before replacing any SCSI device, verify that there are no duplicate SCSI ID settings.
2. Make sure that there are no conflicts of hardware settings, such as, interrupt level, memory address, DMA channel, and I/O address.
3. If you have both an error message and an incorrect audio response, diagnose the error message first.
4. If you cannot run the advanced diagnostic tests, but did receive a POST error message, diagnose the POST error message.
5. If you did not receive an error message, look for a description of your error symptoms in the first part of this index.
6. Check all power supply voltages before you replace the main card, riser card, and audio card of the Dock II. (See "Power Supply" on page 398.)

Miscellaneous Symptoms

Symptom/Error	FRU/Action
Program-load error during remote IPL from the file servicer.	Network Adapter
External display screen changes colors.	Go to “External Display” on page 402.
One or more keys do not work on the external keyboard, but the Dock II is otherwise functional.	Go to “External Keyboard” on page 404.
Computer does not work, the power-on indicator does not turn on, but the fan runs.	See “Undetermined Problems” on page 421.
Power-good light does not turn on, fan does not run, and the computer is not functional.	See “Undetermined Problems” on page 421.
Although the computer is turned off, the fan of the Dock II power supply is running.	The fan is working correctly. To stop the fan, set the key lock to the external left position.
Computer is functional and the fan runs, but the power on indicator does not turn on.	<ol style="list-style-type: none"> LCD Circuit Board Group Riser card Go to “Power Supply” on page 398.
Intermittent failures.	Do the loop test. (See “How to Run the Loop Test” on page 407.)
The power of Dock II cannot be turned off.	<ol style="list-style-type: none"> Riser card Main card
LCD (Dock II) for the hard disk drive stays on.	<ol style="list-style-type: none"> 2.5-inch hard disk drive HDD installation kit
LCD (Dock II) for the hard disk drive is not working, but the Dock II is functional.	<ol style="list-style-type: none"> Check the LCD Circuit Board Group LCD Circuit Board Group Main card Riser card
Beep sounds continuously.	<ol style="list-style-type: none"> Before replacing any devices, check that the release/lock lever is opened. Security feature group Main card

Symptom/Error	FRU/Action
The HDD-2 is not recognized and no error codes appear on the screen. (The password of the HDD-2 is still set.)	<ol style="list-style-type: none"> 1. Remove the hard disk password for the ThinkPad hard disk as follows: <ol style="list-style-type: none"> a. Install the second hard disk drive on the computer. b. Remove the hard disk password.
Note: The HDD-2 icon indicates that the 2.5-inch ThinkPad hard disk drive is installed in Dock II.	

Numeric Error Codes

Symptom/Error	FRU/Action
10X, 11X	<ol style="list-style-type: none"> 1. Adapter in slot (if used) 2. Riser card 3. Main card
195 (The computer was docked to the Dock II while in hibernation mode.)	<ol style="list-style-type: none"> 1. Do the following steps. <ol style="list-style-type: none"> a. Turn off and undock the system. b. Turn on and shut down the system. c. Turn off and dock the system.
1XX	See the Symptom-to-FRU Index for the computer you are servicing. If the problem remains, go to “Undetermined Problems” on page 421.
2XX	<ol style="list-style-type: none"> 1. See the Symptom-to-FRU Index for the computer you are servicing. 2. Main card 3. IC DRAM card or DIMM card
3XX	See “External Keyboard” on page 404.

Symptom/Error	FRU/Action
6XX	<ol style="list-style-type: none"> 1. Before changing any devices, run the diagnostic test. (See the "How To Run the Diagnostics" on page 405.) 2. FDD external attachment kit 3. Diskette drive assembly 4. Riser card
11XX, 12XX	<ol style="list-style-type: none"> 1. Serial devices 2. Communication cable 3. Riser card
17XX	<ol style="list-style-type: none"> 1. Hard disk drive (2.5-inch ThinkPad hard disk drive) 2. HDD installation kit 3. Main card
24XX	<ol style="list-style-type: none"> 1. Main card 2. Riser card
860X	<ol style="list-style-type: none"> 1. Mouse 2. External keyboard 3. Riser card
19990301, 19990302 19990305	See the Hardware Maintenance Manual of the computer.
Not shown above	<ol style="list-style-type: none"> 1. See the <i>Hardware Maintenance Manual of the computer.</i> 2. See "Undetermined Problems" on page 421.

FRU Codes

If an error is detected by the diagnostic tests, a four-digit FRU code is displayed. Two suspected FRU codes are shown. The two leftmost digits indicate the first FRU code. The following table shows the FRU codes and their FRUs. The most probable failing FRU is shown first.

Note: Replace the FRUs one at a time in the sequence shown in the FRUs of the Dock II column. If a replaced part did not resolve the problem, put the original part back in the Dock II. Do not replace non-defective parts.

Always start with the first FRU then continue down the list. The two rightmost digits indicate the net FRU code. Do these FRU replacements in the same way as with the first FRU codes.

Undock the computer from the Dock II to check that the FRU code appears with the computer only. If a FRU code appears, replace the FRU indicated in the

Symptom-to-FRU Index for the computer you are servicing. Then dock the computer on the Dock II to check if any FRU codes appear. Use the table below.

FRU Code	FRU/Action
10	<ol style="list-style-type: none"> 1. Main card 2. Riser card
15	<ol style="list-style-type: none"> 1. Audio card 2. Riser card
30	Reserved
32	<ol style="list-style-type: none"> 1. See “External Keyboard” on page 404. 2. Main card 3. Riser card
33	<ol style="list-style-type: none"> 1. External mouse 2. Main card 3. Riser card
45	See “External Display” on page 402.
51	<ol style="list-style-type: none"> 1. Diskette drive (FDD-2) 2. Main card 3. Riser card
56	<ol style="list-style-type: none"> 1. Diskette drive (FDD-2) 2. Main card 3. Riser card
61	<ol style="list-style-type: none"> 1. Hard disk drive (HDD-2) 2. Main card 3. HDD installation kit
70	Main card
80	Reserved
90	Reserved

If the problem remains after the FRUs are replaced, go to “Undetermined Problems” on page 421.

Undetermined Problems

Use the following procedure when the diagnostic tests do not identify the failing adapter or device.

Check that all cables, wires, and connectors are connected so that they do not cause a short circuit. If any problems are found, reconnect or replace them.

Check the power supply for correct operation (see "Power Supply" on page 398). If the power supply is operating correctly, return here and continue with the following procedures.

1. Turn off the computer.
2. Remove or disconnect one at a time the following adapters or devices from Dock II. (Do not isolate adapters or devices that are known to be good.)
 - a. Non-IBM devices.
 - b. A modem, printer, mouse, external keyboard, external display, external diskette drive, numeric keypad, or other external devices.
 - c. Any adapter.
Note: Removing an adapter or device may cause configuration errors. Ignore error code 174.
 - d. SCSI device.
 - e. Hard disk drive.
3. Turn on the system and check if the problem has changed.
4. If the symptom remains, repeat Steps 1 through 3 until you find the failing adapter or device, or until all adapters or devices have been removed.
5. If all adapters or devices have been removed and the problem remains, replace the following Dock II FRUs one at a time.

Note: If a replaced part did not resolve the problem, put the original part back in the Dock II. Do not replace non-defective parts.

- a. Riser card
- b. Main card
- c. Dock II audio card

If the problem goes away when you remove an adapter, but replacing the adapter does not correct the problem, replace the main card of Dock II.

Product Overview

The features of the Dock II are:

- Security
 - Security lock
 - Security hole
- Main Card
 - SCSI Subsystem
 - SCSI devices
 - Terminators
 - Audio Jacks
 - Stereo speakers
 - Headphone jack
 - Speaker-in jacks
 - Audio-out jacks
 - PCMCIA slots
 - External display connector
 - Docking connector
 - External SCSI connector
 - FDD connector
 - Parallel connector
 - Serial connector
 - Keyboard/numeric keypad connector
 - Mouse/pointing device connector
- Riser Card
 - AT slot
 - Storage device connectors
 - Internal hard disk connector
 - Internal SCSI device connector
- Power Supply

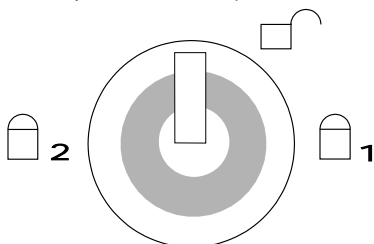
Security

The Dock II has two features to secure it from being used by unauthorized persons.

Security Lock: The security lock is located on the left panel of the Dock II and can be unlocked with the security lock key. This security lock provides the following protection:

- **Cover Lock** prevents unauthorized access to the devices and options inside the Dock II.
- **Computer Lock** protects from unauthorized removal of the computer.
- **Key Controlled Power** prevents unauthorized use of the Dock II or unauthorized access to the data stored on the internal SCSI device through the external SCSI connector by securing the power.

The key lock has three positions.



Icon	Cover Lock	Computer Lock	Power Secured	Key
	Lock	Lock	No	Removable
	Unlock	Unlock	No	Not Removable
	Lock	Lock	Yes	Removable

Security Hole: A hole for the Kensington** lock is located at the rear of the Dock II. The cable on the Kensington lock is looped around a stable chair or a similar item and the Kensington lock is attached to the hole at the rear of the Dock II. This prevents the Dock II to be carried away by an unauthorized person.

Main Card

SCSI Subsystem: The Dock II supports the SCSI controller and BIOS which has functions similar to the Adaptec AHA-1530P** Adapter. The Dock II also supports the IBM SCSI device for PS/2*.

SCSI Devices: The SCSI controller on the main card supports up to seven SCSI devices (includes internal and external). Two of the seven devices can be installed inside the Dock II.

Terminators: The terminator requirements for SCSI devices are:

- The last device in an external SCSI chain must have the terminator installed. Some devices may require more than one terminator.
- All other external SCSI devices must have the terminators removed.
- The internal SCSI device must have the terminator installed.

The location and appearance of the terminators may vary from device to device. An identification label or tag (usually "T-RES") is attached to each terminator for easy identification.

The Dock II has an active terminator which terminates the external SCSI connector automatically.

Audio Jacks: The Dock II has three audio sources, a CD-ROM audio, a speaker-in, and a computer audio. These three sources are mixed and sent to the audio out jack or are amplified and sent to the speaker or the headphone jacks.

Stereo speakers: The Dock II provides a pair of stereo speakers.

Headphone jack: A headphone jack is provided for connecting a headphone cable.

Speaker-in jacks: Speaker-in jacks are for the audio cable that is connected to the line-out of the AT sound adapter through the Dock II stereo speakers.

Audio-out jacks: Audio-out jacks are for an external audio device, such as a speaker system (through the amplifier).

PCMCIA slots: Two PCMCIA slots are available for inserting different kinds of PCMCIA cards.

External Display Connector: This connector, on the rear of the Dock II, is a 15-pin, D-shell connector. The external display connector is the connector for the display signal cable of the external display.

Docking Connector: This 240-pin connector is the expansion interface connector for notebook PCs and has the capabilities to support the following features:

- AT-bus signals (excluding power voltages; 5 V, -5 V, 12 V, -12 V)
- Analog video interface
- Serial connector signals
- Parallel connector signals
- Keyboard and mouse signals
- IDE hard disk drive signals
- LED control signals
- Audio (CRT, TFT, Color LCD) signals
- Audio signals
- FDD signals
- PCIC control signals
- Power control signals
- Power voltages

External SCSI Connector: The external SCSI connector is a 50-pin, external device connector and is for external SCSI devices. A maximum of seven SCSI devices (both internal and external) are supported.

FDD Connector: This connector is a 26-pin, D-shell connector and is for the FDD External Attachment Kit. Users can attach the diskette drive that was removed from the computer to the Dock II with this kit.

Parallel Connector: The parallel connector allows the attachment of devices that accept eight bits of parallel data at standard transistor-transistor logic (TTL) levels. The connector is a 25-pin, D-shell connector and is primarily for printers. However, the connector can be used as a general input/output connector for any device or application that matches its input/output capabilities. The signal from the parallel port of the computer is replicated to the parallel connector of Dock II.

Serial Connector: This connector is a fully programmable serial connector that supports asynchronous communications. The 9-pin, D-shell connector provides the signals to drive a serial (or EIA-232D) device. The signal from the serial port of the computer is replicated to the serial connector of Dock II.

Keyboard/Numeric Keypad Connector: This 6-pin connector on the rear of the Dock II allows the attachment of a keyboard. The keyboard/numeric keypad connector is marked with a small keyboard symbol. The numeric keypad is attached to this keyboard/numeric keypad connector.

Mouse/Pointing Device Connector: This 6-pin connector on the rear of the Dock II allows the attachment of a pointing device (mouse). The mouse/pointing device connector is marked with a small mouse symbol.

Note: A mouse or pointing device will not work if either is connected to the mouse connector of the numeric keypad.

Riser Card

AT Slots: Two full-size AT slots (98-pin) allow the attachment of option cards.

Storage Device Connectors: These connectors are for the internal storage options. Any two of the following devices are supported as storage options.

- Internal hard disk drive
- Internal SCSI device (1-inch height)
- Internal SCSI device (half height)

Internal Hard Disk Connector: The internal hard disk drive connector is a 60-pin connector for the ThinkPad hard disk or for the IDE hard disk.

Internal SCSI Device Connectors: The SCSI device connector is a 50-pin, SCSI interface connector which transfers system data to and from the SCSI device. This connector is for the cable of an internal SCSI device.

Power Supply

The power supply switches automatically to either the 100–125 V ac or the 200–240 V ac voltage range when the power cord is plugged into a power outlet. The power supply converts ac voltage to dc voltage to supply the Dock II and the computer with the correct operating voltages.

Specifications

Physical Characteristics

Depth	400 mm (15.7 in.)
Width	380 mm (15.0 in.)
Height	Front: 67 mm (2.6 in.) Rear: 124 mm (4.8 in.)
Weight	7.7 kg (17.0 lb)

Electrical Characteristics

- **Heat output**
 - Base Configuration: 181 BTUs/hour
 - Maximum Configuration: 498 BTUs/hour
- **Input Voltage-Sine Wave Input (50 or 60 Hz)**
 - Low Range:
 - Minimum: 100 V ac
 - Maximum: 125 V ac
 - High Range:
 - Minimum: 200 V ac
 - Maximum: 240 V ac
- **Input kilovolt-Amperes (k·VA) (approximately)**
 - Configuration as shipped from IBM: 0.053 k·VA
 - Maximum configuration: 0.105 k·VA

Environmental Requirements

- **Operating Environment:**
 - Temperature: 5° to 35°C (41° to 95°F)
 - Relative Humidity: 8% to 95% (non-condensing)
 - Maximum wet bulb temperature: 29.4°C (85°F)
- **Non-operating Environment:**
 - Temperature: 5° to 43°C (41° to 109°F)
 - Relative Humidity: 8% to 95% (non-condensing)
 - Maximum Wet Bulb: 29.4°C (85°F)
- **Storage**
 - Temperature: -20° to 60°C (-4° to 140°F)
 - Relative Humidity: 5% to 95% (non-condensing)
 - Maximum Wet Bulb: 29.4°C (85°F)
- **Maximum altitude:** 2435 m (8000 ft)

Audio-Circuit Specifications

- **Speaker-In to Audio-Out**
 - Output (mV rms): 190 to 270
 - S/N ratio (dB): >48
 - Total Harmonic Distortion (THD) (%): <1
- **Speaker-In to Headphone Jack**
 - Output (mV): >1
 - S/N ratio (dB): >50
 - Total Harmonic Distortion (THD) (%): <1
- **Speaker-In to Embedded Speaker**
 - Output (W): >2
 - S/N ratio (dB): >45
 - Total Harmonic Distortion (THD) (%): <2

FRU Removals and Replacements

This section contains information on removals and replacements, and locations.

- The arrows in the removals and replacements show the direction of movement to remove a field replaceable unit (FRU), or to turn a screw to release the FRU. The arrows are marked in numeric order to show the correct sequence of removal.
- When other FRUs must be removed before removing the failing FRU, they are listed at the top of the page. Go to the removal procedure for each FRU listed, remove the FRU, and then continue with the removal of the failing FRU.
- To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See “Locations” on page 450 for internal cable connections and arrangement information.

CAUTION:

Before removing any FRU, turn off Dock II, remove the computer, unplug all power cords from electrical outlets, then disconnect any interconnecting cables.

CAUTION:

In the U.K., by law, the telephone cable must be connected after or disconnected before the power cord.

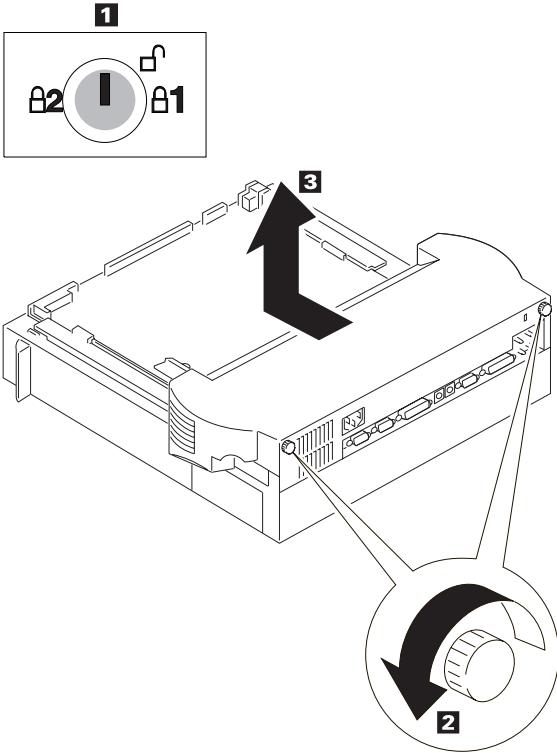
Warning: The main board, adapters, and circuit boards on the drives are sensitive to, and can be damaged by, electrostatic discharge. Establish personal grounding by touching a ground point with one hand before touching these units.

Note: An electrostatic discharge (ESD) strap must be used to establish personal grounding.

1010 Main Cabinet Group

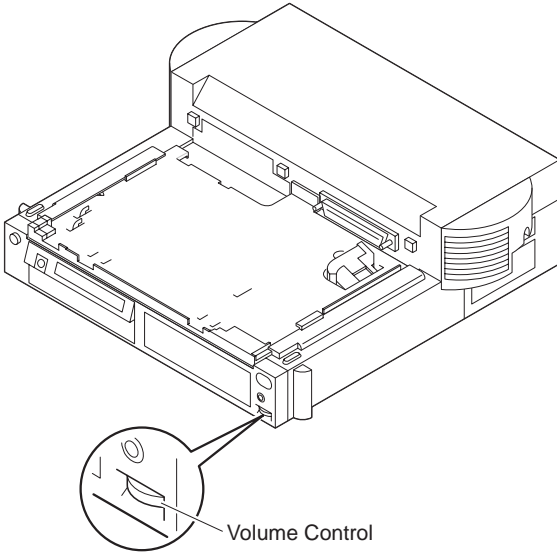
Removal

- Make sure the security key is in the vertical position **1**.
- **2** **3**



Caution

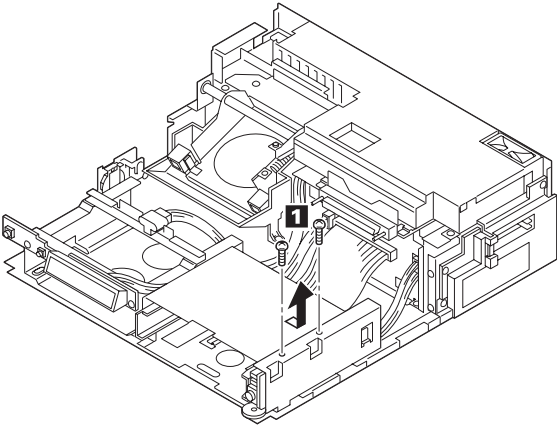
Be careful not to damage the volume control knob when removing the main cabinet group.



1020 Audio Card

Removal

- Main Cabinet Group (1010)
- Remove all cables from the connectors on the audio card. (Refer to "Audio Card" on page 454 for the location of these connectors.)
- **1**

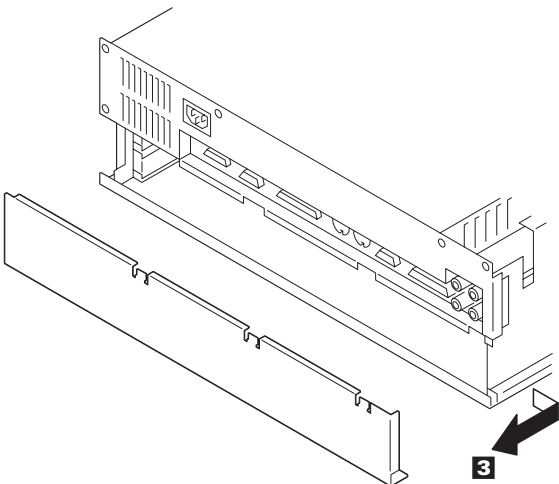
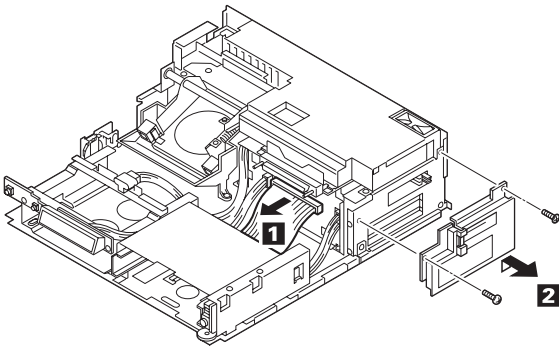


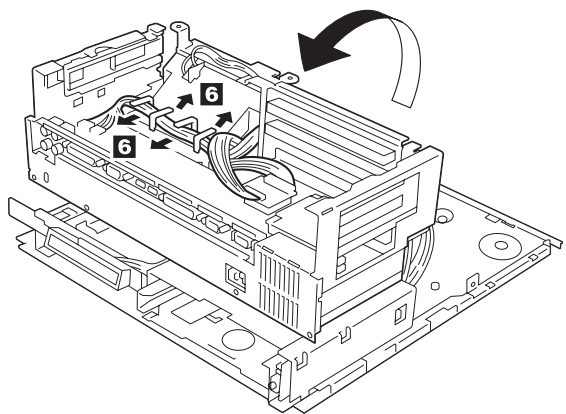
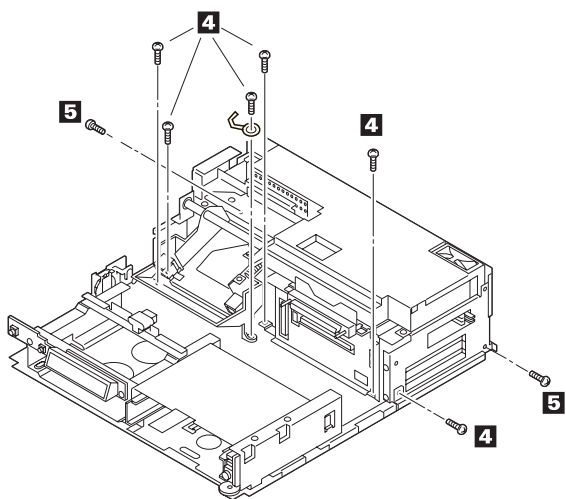
Step	Color and type (quantity)	Length
1	Pan head screw (2) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)

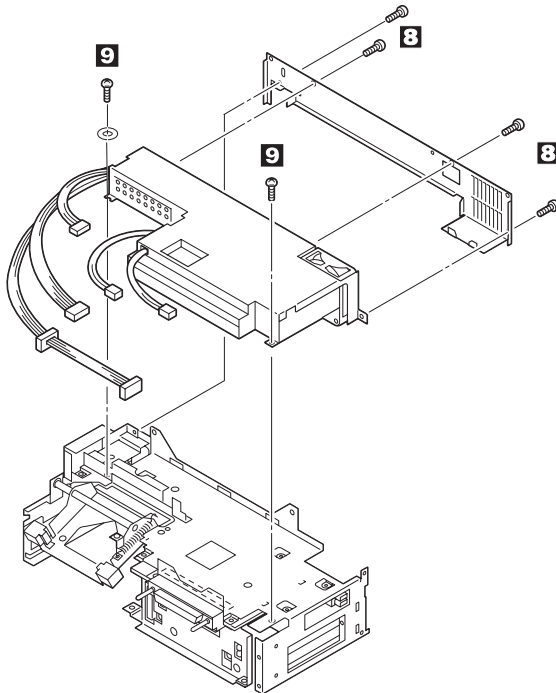
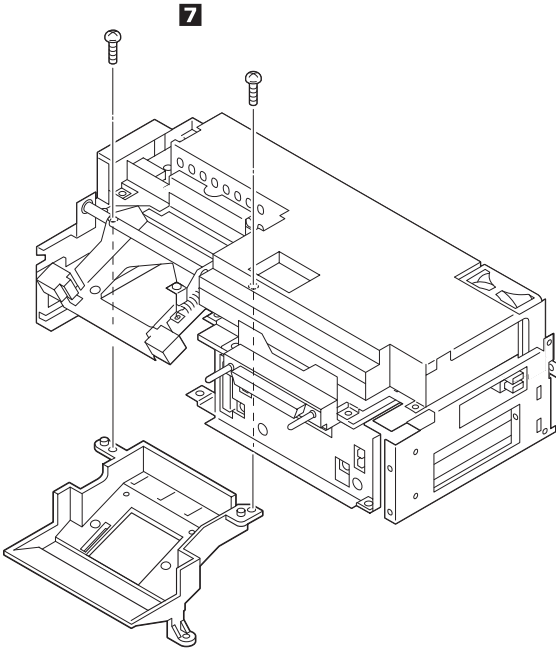
1030 Power Supply Unit

Removal

- Main Cabinet Group (1010)
- Remove all cables from the connectors on the riser card. (Refer to "Riser Card" on page 455 for the location of these connectors.)
- Remove all cables from the connectors on the main card. (Refer to "Main Card" on page 453 for the location of these connectors.)
- **1 2 3 4 5**
- Lift up and turn over the power supply assembly then release the cables on the rear of the rack **6**.
- Remove all remaining cables from the connectors on the main card.
- Turn the power supply assembly to the upright position.
- **7 8 9** (Do not forget to install the washer on the left screw at replacement in step **9**.)





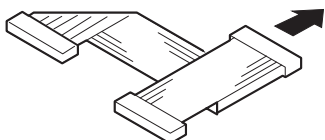


Step	Color and type (quantity)	Length
2	Pan head screw (1) Diameter: 3 mm (0.12 in.)	8 mm (0.31 in.)
	Flat head screw (1) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)
4	Pan head screw (6) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)
5	Pan head screw (2) Diameter: 3 mm (0.12 in.)	4 mm (0.16 in.)
7	Binding head tapping screw (2) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)
8	Black binding head machine screw (4) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)
9	Pan head screw (2) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)

Replacement

Note

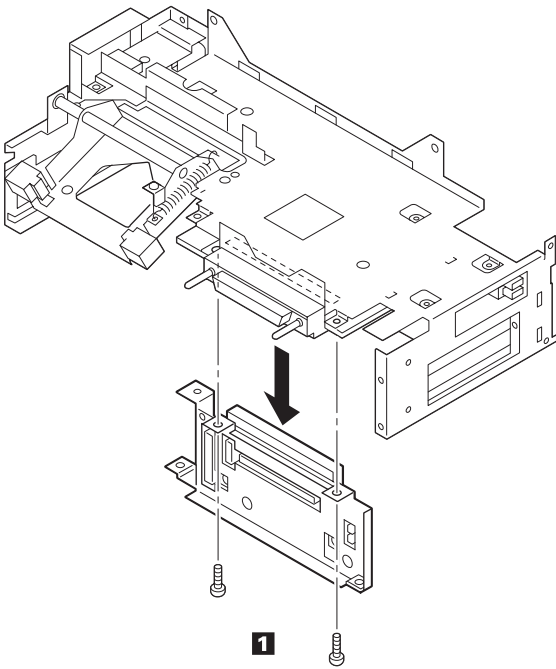
The intersecting end of the SCSI cable should be inserted into the connector on the riser card. See **1**.



1040 Riser Card

Removal

- Main Cabinet Group (1010)
- Audio Card (1020)
- Power Supply Unit (1030)
- Remove all cables from the connectors on the riser card. (Refer to "Riser Card" on page 455 for the location of these connectors.)
- **1**



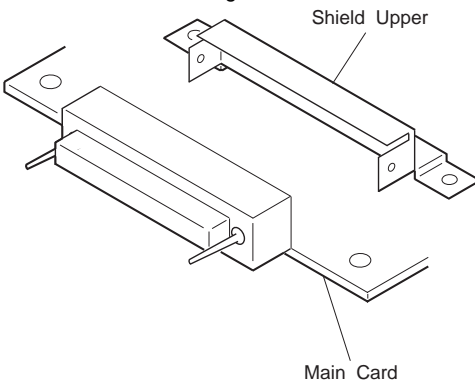
Step	Color and type (quantity)	Length
1	Binding head screw (2) Diameter: 3 mm (0.12 in.)	8 mm (0.24 in.)

1050 Main Card

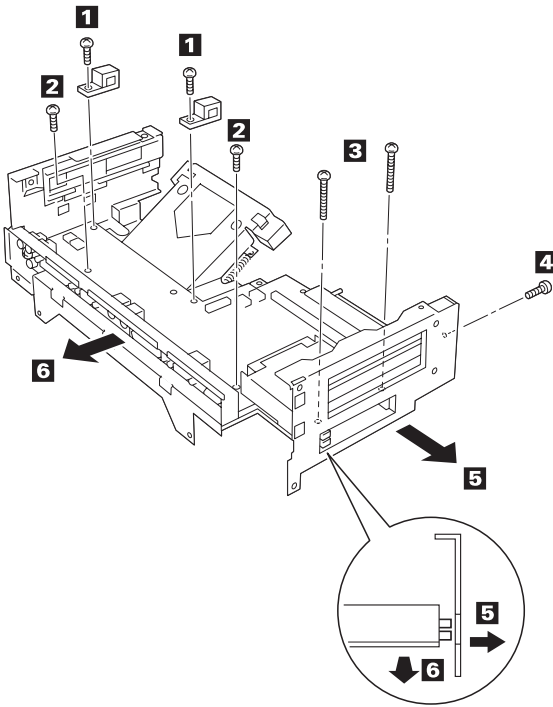
Removal

Note

Do not forget to put back the shield upper to the main card when reassembling the unit.



- Main Cabinet Group (1010)
- Audio Card (1020)
- Power Supply Unit (1030)
- Riser Card (1040)
- Remove all cables from the connectors on the main card. (Refer to "Main Card" on page 453 for the location of these connectors.)
- **1 2 3 4** (upside down view)
- Remove the Guide AT after doing **4**.
- Widen the end of the main chassis where the PCMCIA slot is located **5** and pull out the main card from the main chassis **6**.

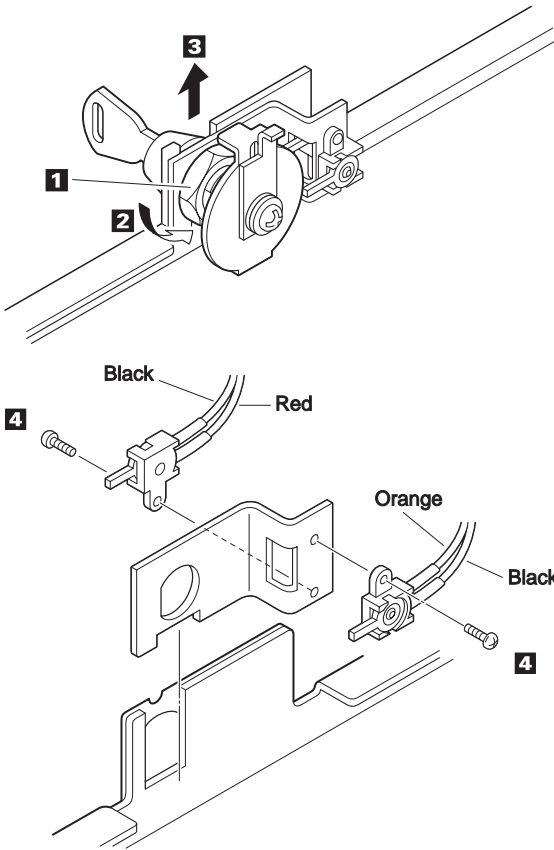


Step	Color and type (quantity)	Length
1	Binding head screw (2) Diameter: 3 mm (0.12 in.)	8 mm (0.24 in.)
2	Pan head screw (2) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)
3	Pan head machine screw (2) Diameter: 2 mm (0.08 in.)	20 mm (0.79 in.)
4	Pan head screw (1) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)

1060 Keylock Assembly

Removal

- Main Cabinet Group (1010)
- Loosen the ring **1**
- **2 3 4**

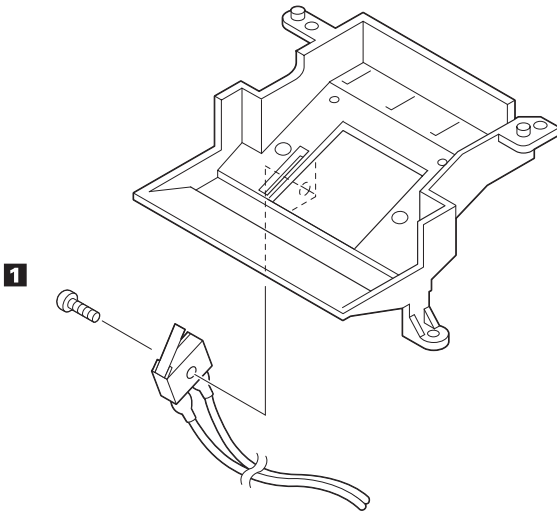


Step	Color and type (quantity)	Length
4	Pan head machine screw (2) Diameter: 2.3 mm (0.09 in.)	4 mm (0.16 in.)

1070 Micro Switch Group

Removal

- Main Cabinet Group (1010)
- Power Supply Unit (1030) (**1** **2** **3** **4** **5** **6**)
- Keylock Assembly (1060)
- **1**

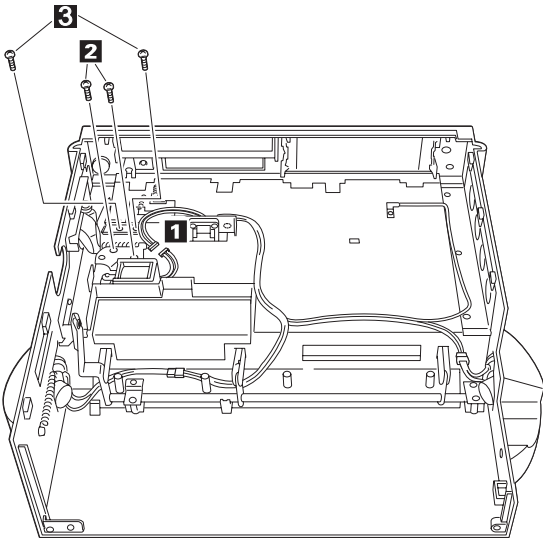


Step	Color and type (quantity)	Length
1	Binding head tapping screw (1) Diameter: 2.3 mm (0.09 in.)	10 mm (0.39 in.)

1080 Solenoid Group

Removal

- Main Cabinet Group (1010)
- Tray Unit Group (1090)
- **1 2 3**

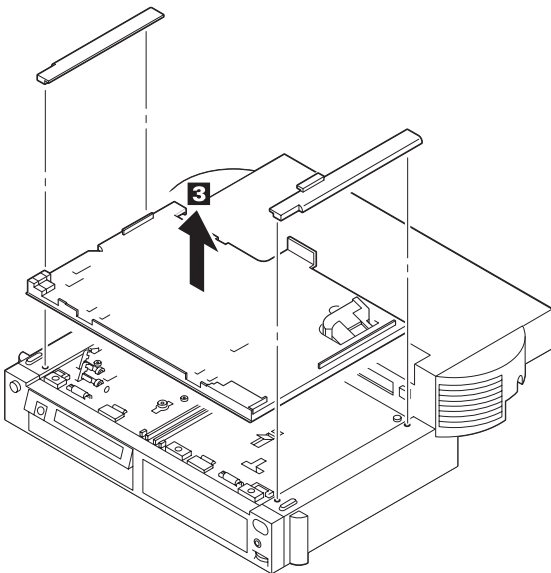
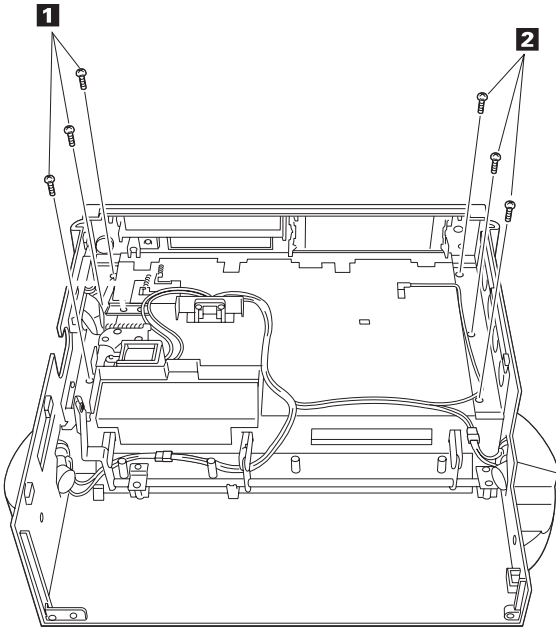


Step	Color and type (quantity)	Length
2	Binding head tapping screw (2) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)
3	Binding head tapping screw (2) Diameter: 3 mm (0.12 in.)	8 mm (0.31 in.)

1090 Tray Unit Group

Removal

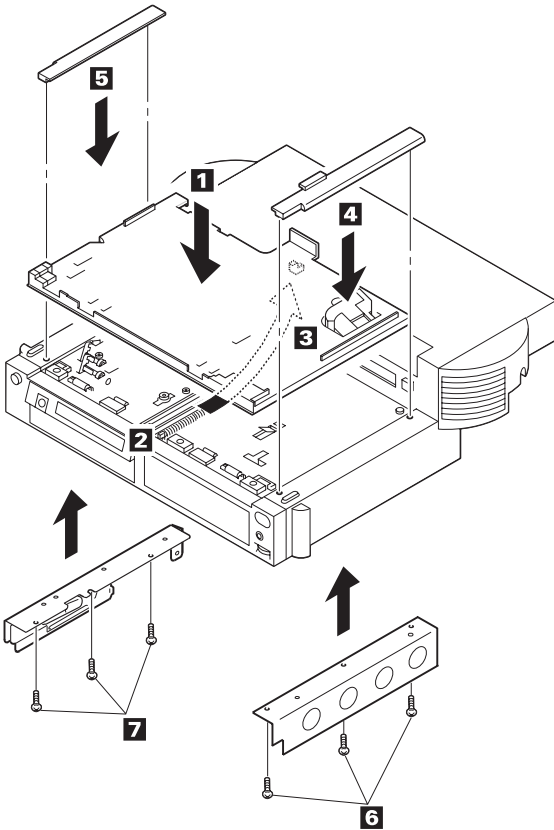
- Main Cabinet Group (1010)
- **1** **2** **3**



Step	Color and type (quantity)	Length
1	Binding head tapping screw (3) Diameter: 3 mm (0.12 in.)	8 mm (0.31 in.)
2	Binding head tapping screw (3) Diameter: 3 mm (0.12 in.)	8 mm (0.31 in.)

Replacement

- **5 7 2 3 1 4 6**
- Main Cabinet Group (1010)

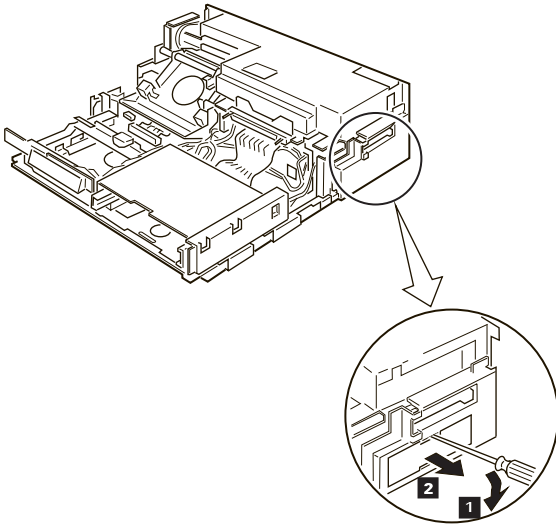


Step	Color and type (quantity)	Length
6	Binding head tapping screw (3) Diameter: 3 mm (0.12 in.)	8 mm (0.31 in.)
7	Binding head tapping screw (3) Diameter: 3 mm (0.12 in.)	8 mm (0.31 in.)

1100 Blank Cover Group

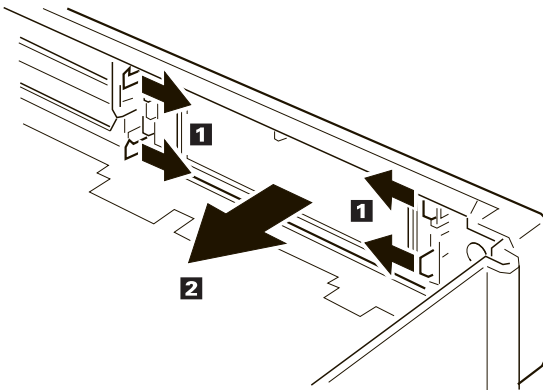
Removal for AT Card Cover

- **1 2**



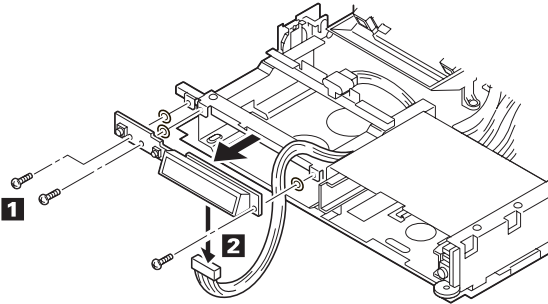
Removal for 1-inch Height and Half Height

- Main Cabinet Group (1010)
- **1 2**



Removal for LCD Circuit Board Group

- Main Cabinet Group (1010)
- **1** **2**

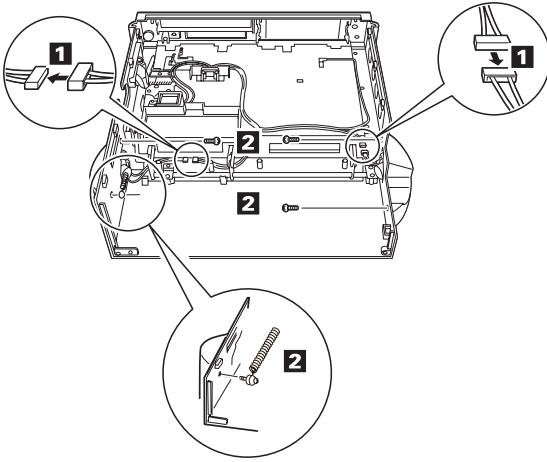


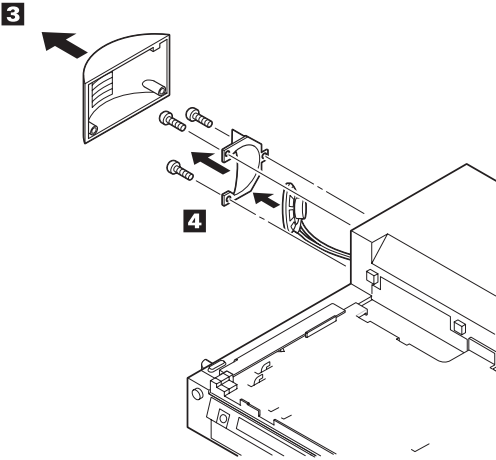
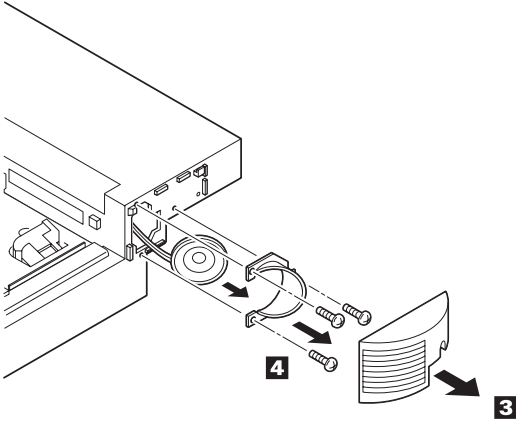
Step	Color and type (quantity)	Length
1	Binding head screw with washer (3) Diameter: 3 mm (0.12 in.)	6 mm (0.24 in.)

1110 Speaker and Speaker Cover Group

Removal

- Main Cabinet Group (1010)
- **1 2 3 4**





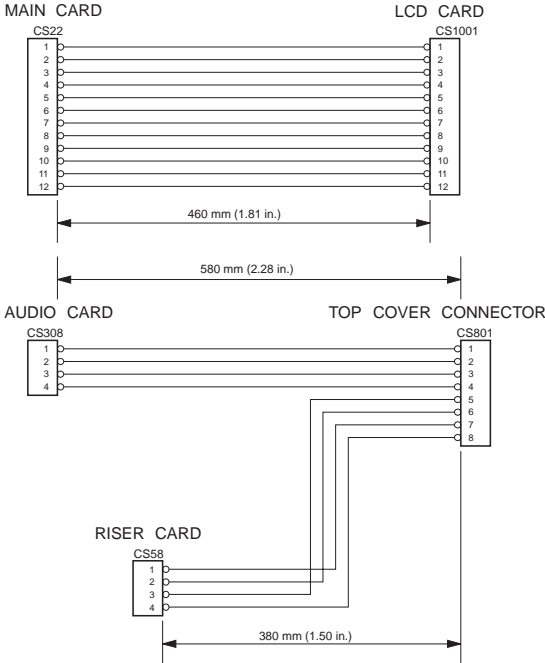
Step	Color and type (quantity)	Length
2	Binding head tapping screw (4) Diameter: 3 mm (0.12 in.)	12 mm (0.47 in.)
4	Binding head tapping screw (6) Diameter: 2.6 mm (0.10 in.)	8 mm (0.31 in.)

1120 Cable Group

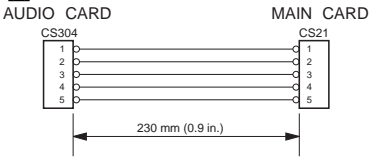
Removal

- Main Cabinet Group (1010)

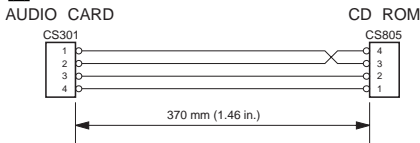
1



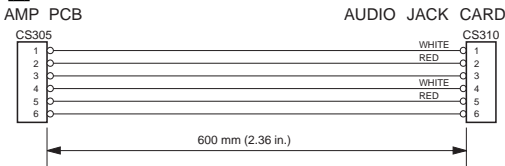
2



3



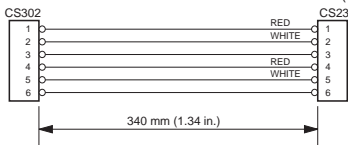
4



5

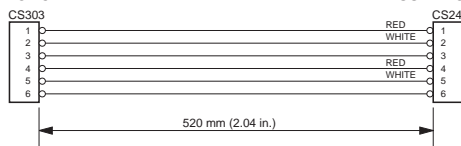
AUDIO CARD

MAIN CARD (A4 NOTE)

**6**

AUDIO CARD

SUB NOTE

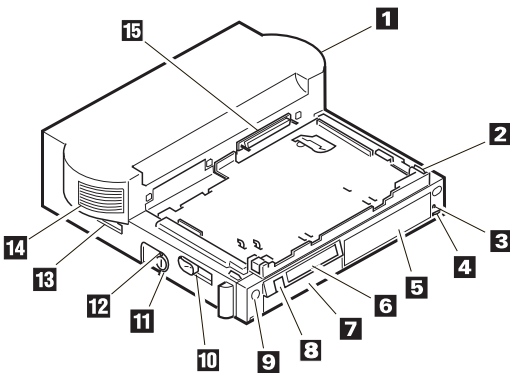


Item	Pins	Length	Ends
1	12	460 mm (1.81 in.)	CS22 - CS1001 (Main Card) (LCD Card)
	4/8	580 mm (2.28 in.)	CS308 - CS801 (Audio Card) (Top Cover Conn.)
		380 mm (1.50 in.)	CS58 - CS801 (Riser Card) (Top Cover Conn.)
2	5	230 mm (0.90 in.)	CS304 - CS21 (Audio Card) (Main Card)
3	4	370 mm (1.46 in.)	CS301 - CS805 (Audio Card) (CD-ROM)
4	6	600 mm (2.36 in.)	CS305 - CS310 (Audio Card) (Audio Jack)
5	6	340 mm (1.34 in.)	CS302 - CS23 (Audio Card) (Main Card)
6	6	520 mm (2.04 in.)	CS303 - CS24 (Audio Card) (Reserved)

Locations

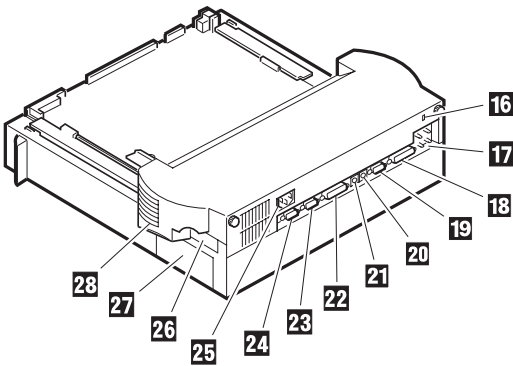
Front View

- 1** Main Cabinet Group
- 2** Tray Unit
- 3** Headphone Jack
- 4** Volume Control
- 5** Half-height Drive
- 6** Status Indicator
- 7** 1-inch-high Drive
- 8** Power Switch
- 9** Eject Switch
- 10** Eject Lever
- 11** Security Lock
- 12** Unlatch Hole
- 13** Reserved (Always keep this lever to the rear)
- 14** Left Speaker
- 15** Notebook Connector (male-type, 240-pin)

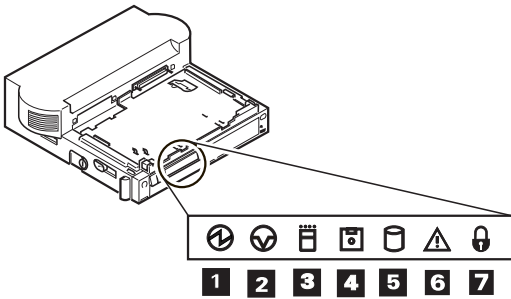


Rear View

- 16** Security hole
- 17** Audio-in and Audio-out
- 18** Parallel Connector (25-pin)
- 19** Serial Connector (9-pin)
- 20** Mouse/Pointing Device Connector (6-pin)
- 21** Keyboard/Numeric Keypad Connector
- 22** External SCSI Connector
- 23** External Display Connector (15-pin)
- 24** External Diskette Drive Connector (26-pin)
- 25** Power Cord Connector
- 26** PCMCIA Slots
- 27** ISA Slots
- 28** Right Speaker



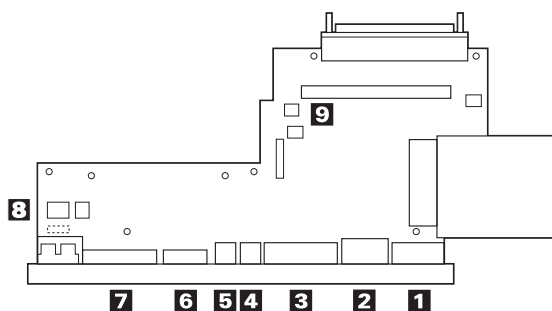
System Status Indicators



- | | | |
|----------|--|-----------------------|
| 1 | | Docked |
| 2 | | Power On |
| 3 | | Suspend Status |
| 3 | | PCMCIA In-use |
| 4 | | Diskette Drive In-use |
| 5 | | Hard Disk In-use |
| 6 | | Warning |
| 7 | | Security Key |

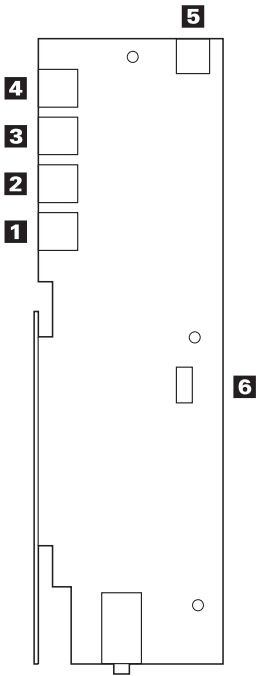
Main Card

- 1** External Diskette Drive Connector (26-pin)
- 2** External Display Connector (15-pin)
- 3** External SCSI Connector
- 4** Keyboard/Numeric Keyboard Connector
- 5** Mouse/Pointing Device Connector (6-pin)
- 6** Serial Connector (9-pin)
- 7** Parallel Connector (25-pin)
- 8** Power Supply Connector (CN25)
- 9** Power Supply Connector (CN26)



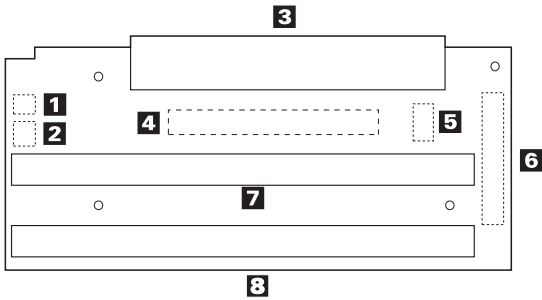
Audio Card

- 1** CD-ROM Audio Connector (CN301)
- 2** Audio Jack Connector (CN305)
- 3** Main Card Connector (CN302)
- 4** Connector (Reserved) (CN303)
- 5** Main Card Connector (CN304)
- 6** Top Cover Connector (CN308)



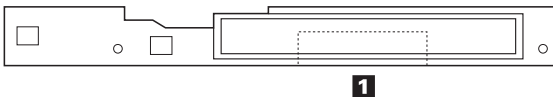
Riser Card

- 1** Sensor Connector (CN57)
- 2** Top Cover Connector (CN58)
- 3** Main Card Connector (CN50)
- 4** Internal SCSI Connector (CN55)
- 5** Power Supply Connector (CN56)
- 6** Internal IDE Connector (CN53)
- 7** AT Slot 1
- 8** AT Slot 2



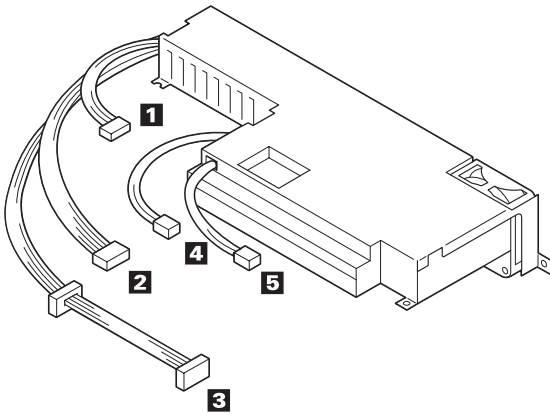
LCD Circuit Board Group

- 1** Main Card Connector (CN1001)

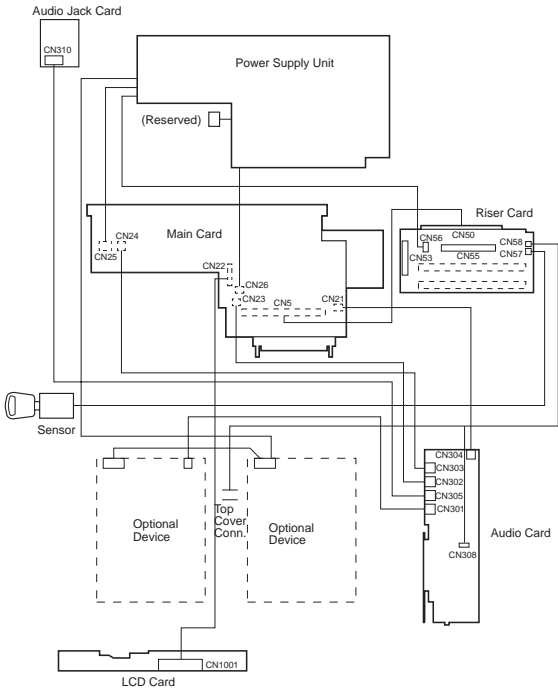


Power Supply

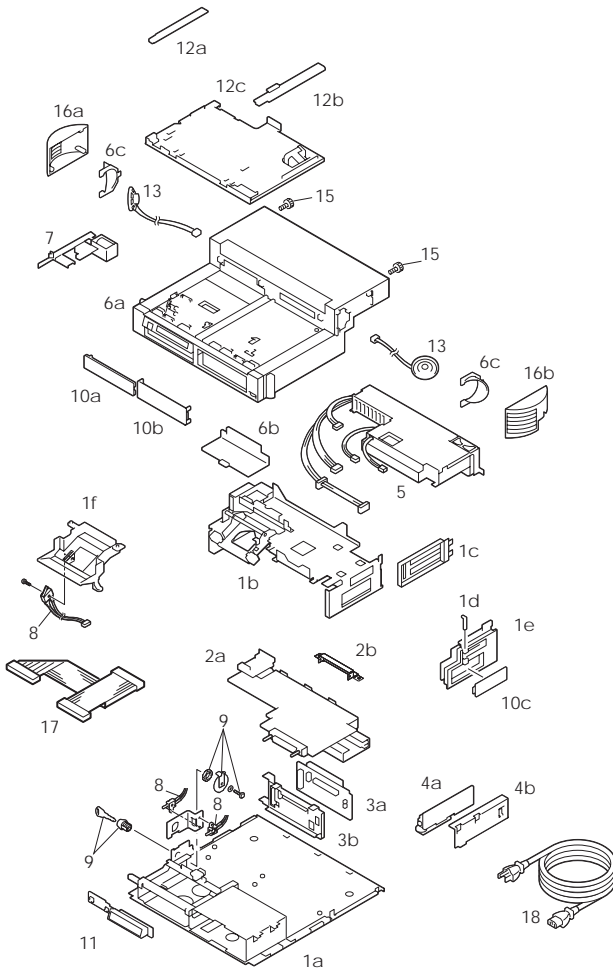
- 1** Power Supply Connector (CN25)
- 2** Power Supply Connector (CN56)
- 3** SCSI Power Supply Connector (4-pin)
- 4** Power Supply Connector (reserved)
- 5** Power Supply Connector (CN26)



Cabling



Parts Listing



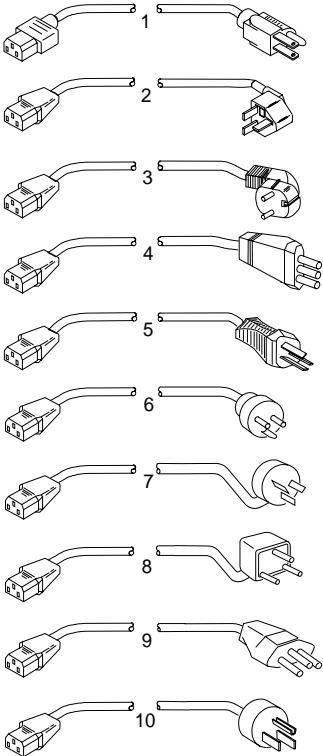
Parts

1	Bottom Cover Assembly	84G3613
	a. Bottom Cover Subassembly	
	b. Main Chassis Assembly	
	c. Bracket AT	
	d. PCMCIA Security Bar	
	e. Side Panel	
	f. Cover 160P-L	
2	Main Card Assembly	84G3614
	a. Main Card Subassembly	
	b. Shield Upper	
3	Riser Card Assembly	84G3615
	a. Riser Card	
	b. Bracket	
4	Audio Card Assembly	84G3616
	a. Audio Card	
	b. Bracket	
5	Power Supply Unit	84G3618
6	Main Cabinet Group	84G3619
	a. Main Cabinet	
	b. Cover 160-Pin	
	c. Bracket Speaker-Left/Right	
7	Solenoid Assembly	84G3620
8	Micro Switch Group	84G3621
9	Keylock Assembly (w/keys)	84G3622
10	Blank Cover Group	84G3623
	a. Blank Bezel for 1 Inch Height	
	b. Blank Bezel for Half Height	
	c. Blank Cover for AT Card	
11	LCD Circuit Board Group	84G3626
12	Tray Unit Group	84G3627
	a. Tray Guide-Left	
	b. Tray Guide-Right	
	c. Tray Assembly	
13	Speaker Group (w/cables)	84G3628
14	Cable Group	84G3629
	Connection Cable 1 (Main-LCD)	
	Connection Cable 1 (Aud./Aud./Riser-Interposer)	
	Connection Cable 2 (Aud.-Main)	
	Connection Cable 3 (Aud.-CD ROM)	
	Connection Cable 4 (Aud.-Audio)	
	Connection Cable 5 (Aud.-Main)	
	Connection Cable 6 (Aud.-Main)	
15	Misc. Kit (Screws and Clamps)	84G3630
16	Speaker Cover Group	84G3633
	a. Speaker Cover Left	
	b. Speaker Cover Right	
17	SCSI Device Cable	84G5253
17	IDE Device Cable	66G3576
18	Power Cord. See page 460.	

Options

Tape Drive Kit	84G1290
Bracket and Bezel	84G1291
Shelf	84G3631
Tray Cover	84G3632

Power Cords



Index

Note: Use the power cord certified for your country.

1	Colombia, U.S., Venezuela	13F9959
	Japan, 3-pin	65F0031
2	Hong Kong, Singapore, U.K.	14F0033
3	France, Germany, Spain	13F9979
4	Italy	14F0069
5	Australia, New Zealand	13F9940
6	Denmark	13F9997
7	Israel	14F0087
8	Bangladesh, Pakistan, Sri Lanka, South Africa	14F0015
9	Switzerland	14F0051
10	Thailand	1838574

Special Tools

The following special tools are required to service the Dock II.

Volt-Ohm Meter

A meter similar to the Triplet Model 310¹.

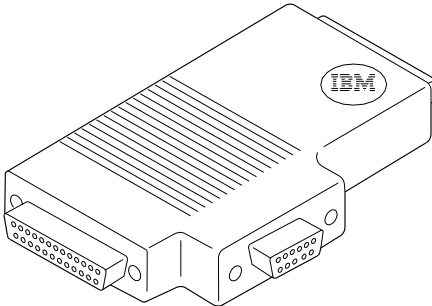
Screwdriver Kit

Use small screwdrivers (IBM part 95F3598) when removing and replacing FRUs.

Wrap Plug

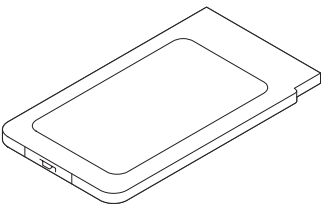
The tri-connector wrap plug (IBM part 72X8546) is used during advanced diagnostic tests of:

- Serial Connectors
- Parallel Connectors



PC Test Card

The PC test card (IBM part 35G4680) is used during advanced diagnostic tests of the PCMCIA slots.



¹ Manufactured by Triplet Corporation, Bluffton, Ohio 45817, U.S.A.

Common Devices Checkout

External Diskette Drive Test	464
External Display Self-Test	464
External Keyboard/Auxiliary Input Device Checkout	465
Fax/Modem Checkout	466
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Port Replicator Checkout	469
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External Diskette Drive Test

Use the following procedure to isolate the diskette problem to a controller, drive or diskette. A scratch, write-enabled 2HD diskette is required.

1. Select the icon **FDD** on the **TEST MENU**. By doing this, the controller test and the drive read/write test run. If the controller test detects an error, FRU code 10 appears. In this case, replace the system board.
2. If the controller test run without errors, follow the instructions on the screen and insert a scratch diskette.
3. If the drive test detects an error, FRU code 50 appears. If the diskette media are known to be good, replace the drive or the drive cable.

External Display Self-Test

If the display problem occurs only when using an external display, use the following instructions to correct the problem.

Note: Before you replace a display, check the following list to see if it is connected correctly.

- 8506 and 8508 displays must be connected to an Image Adapter/A or an Image-I Adapter/A.
- 63XX and 85XX systems support either 63XX or 85XX displays.
- 85XX systems with an XGA-2 adapter support 95XX displays.
- 95XX systems support either 63XX, 85XX, or 95XX displays.
- ThinkPad models support either 85XX or 95XX displays.

If the screen is rolling, replace the display assembly. If that does not correct the problem, replace FRUs in the following order until the problem goes away:

1. Video card
2. Display adapter (any type)
3. System board
4. Bus adapter (if used)

If the screen is not rolling, run the display self-test as follows:

1. Power-off the computer and display.
2. Disconnect the display signal cable.
3. Power-on the display.
4. Set the contrast to its maximum position.
5. Set the brightness control to the center detent position.

Check for the following conditions:

- You should be able to vary the screen intensity by adjusting the contrast and brightness controls.
- The screen should be white or light gray, with a black margin (test margin) on the screen.

Note: The location of the test margin varies with the type of display. The test margin might be on the top, bottom, or one or both sides.

If you do not see a test margin on the screen, replace the display. If there is a test margin on the screen, replace the system board.

Note: On ThinkPad Models 700, 700C, 720C, 720C, do the following:

1. Video card
2. System board

External Keyboard/Auxiliary Input Device Checkout

The following auxiliary input devices may be available for IBM ThinkPad models.

- Numeric keypad
- Mouse (PS/2 compatible)
- External keyboard (with Keyboard/Miniature Mouse cable)
- If you suspect a problem with any of the auxiliary input devices (listed above), replace the device. If the problem is not corrected, replace the following FRUs one at a time to correct the problem.
 - Keyboard control card
 - System board
- If the computer receives an incorrect keyboard response, remove other external devices, check the keyboard connections, and recheck the keyboard responses. If the problem remains, replace the following FRUs one at a time to correct the problem.
 - Keyboard
 - Keyboard control card
 - System board
- If a 000**30100** error message appears, power-off the computer and the external devices. Then power-on the computer before you power-on the external devices.

Fax/Modem Checkout

001

- Power-off the computer.
- Ensure that the modem is installed correctly.
- If the modem never worked in customer mode, ensure that all drivers are loaded correctly onto the computer.
- Ensure that the communication program is supported on the computer.
- Ensure that the public switch telephone network (PSTN) cable and the data access arrangement (DAA) cable, if installed, are connected correctly.

If you need to correct one of the above conditions, do so now; then continue.

Note: PCMCIA cards can be inserted and removed while the system is powered on.

- Power-on the system.
- Insert the IBM Data/FAX Modem diskette into the default diskette drive.
- If you are servicing a High Speed Internal Data/Fax Modem (Models FC3632 and FC3650), at the DOS prompt (for example, A:\), type **IBMDIAG**; then press **Enter**.
- If you are servicing a PCMCIA Data/FAX Modem (Models FC3634 and FC3635), at the DOS prompt (for example, A:\), type **ESTDIAG**; then press **Enter**.
- Follow the instructions on the screen. (If you need help, press **F1**.)

DID THE DIAGNOSTIC TESTS DETECT AN ERROR?

Yes No

002

The diagnostic tests have completed successfully. If you suspect a problem, go to Step 004.

003

Go to the Symptom-to-FRU Index for the computer you are servicing.

004

- Check the PSTN cable and the DAA cable, if installed, for continuity.

IS THE CABLE(S) GOOD?

Yes No

005

Replace the defective cable(s).

006

(Step **006** continues)

006 (continued)

– Have the customer transmit a call.

WAS THE CALL TRANSMITTED SUCCESSFULLY?

Yes No

007

Go to Step 011.

008

– Have the customer receive an incoming call on the modem.

WAS THE INCOMING CALL RECEIVED?

Yes No

009

Go to Step 014.

010

The diagnostic tests have completed successfully. If you still suspect a problem that is not software related, replace the External DAA; then replace the modem.

011

– Have the customer transmit a call at a lower speed.

WAS THE CALL TRANSMITTED SUCCESSFULLY?

Yes No

012

If installed, replace the external DAA. If you do not have an external DAA installed, or replacing the external DAA does not correct the problem, replace the modem.

013

Have the telephone line checked.

014

– Have the customer receive an incoming call on the modem at a lower speed.

WAS THE INCOMING CALL RECEIVED?

Yes No

015

If installed, replace the external DAA. If you do not have an external DAA installed, or replacing the external DAA does not correct the problem, replace the modem.

(CONTINUED)

016

Have the telephone line checked.

Printer Checkout

1. Make sure the printer is correctly connected and is powered-on.
2. Run the printer self-test.

If the printer self-test does not run correctly, the problem is in the printer. Refer to the printer service manual.

If the printer self-test runs correctly, do the following.

1. Verify the port settings in configuration.
2. Install a wrap plug on the port (indicated in configuration) and run the advanced diagnostic tests.
3. If the advanced diagnostic tests (with the wrap plug installed) do not detect a failure, replace the printer cable.
If the problem is not corrected, replace the system board.

Port Replicator Checkout

Use the following procedure to isolate a port replicator problem. A port replicator attaches to the system expansion connector at the rear of the computer.

1. Power-off the computer.
2. Remove the failing devices from the replicator.
3. Unplug the AC adapter from the replicator, if attached.
4. Remove the port replicator from the computer.
5. Reconnect the failing device directly to the computer. (If another device occupies the connector, remove it first.)
6. Go to General Checkout and follow that procedure.
7. If the advanced diagnostic device test does not find an error, suspect a problem with the port replicator or the system expansion bus.
8. Power-off the computer and reconnect the port replicator.
9. Power-on the computer and run the following advanced diagnostic tests:
 - Serial port test with the wrap plug installed on the replicator.
 - Parallel port test with the wrap plug installed on the replicator.
 - PCMCIA-2 test with the PC test card installed.
 - FDD-2 (FDD-1 if no drive is installed in the computer) drive test on the failing device.
10. If diagnostic errors appear, replace the replicator or diskette drive attachment unit.

If the problem remains after the replacement, replace the system board.
11. If power problems appear only when using the replicator, replace the replicator.

If power shut downs occur intermittently when using PCMCIA-2 devices via a port replicator, suspect an over-current problem. Some PCMCIA devices use more power; if the maximum usage of each device occurs simultaneously, the total current will exceed the limit, thereby causing a power shut down. Isolate this problem by removing one of the devices, and use the computer under the same condition, and see whether a power shut down occurs. Do this procedure for all devices then determine the cause. Customer purchase of the larger AC adapter (50W, optional) is recommended, if it is not yet in use.

TrackPoint II Checkout

- If the TrackPoint II does not work, check the configuration. If the configuration of the TrackPoint II is set to **Disabled** or **Off**, change it to **Enable** or **On**.

If the problem remains, continue.

Note: TrackPoint II automatically compensates to adjust the pointer sensor. This causes the pointer to move slightly on the screen and then stop. Pointer movement might occur when a slight, steady pressure is applied to the TrackPoint II pointer when the computer is powered-on or running, or when exceeded temperature range requires re-adjustment.

- If the cursor floats or moves erratically, power-off and disconnect the mouse. Power-on the computer. If the problem goes away, replace the mouse. If the problem remains, replace the keyboard.
- For click button or pointing stick problems:
 1. Go to the Easy-Setup screen.
 2. Select an item with the pointing stick.
 3. Press either left or right click button.
 4. Verify that both buttons work correctly.

If the pointing stick or the click button does not work, do the following.

1. Reseat the keyboard cables.
2. Replace the keyboard.
3. Replace the interposer card (355x, 360x, 750x, 755x).
4. Replace keyboard control card (720).
5. Replace the system board.

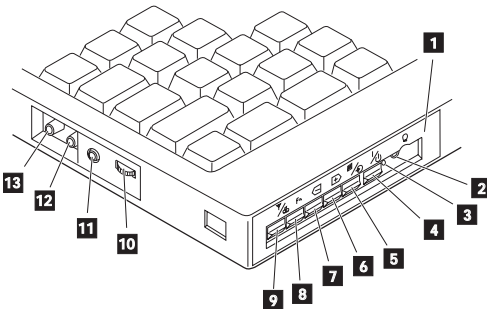
TV Tuner






The TV Tuner Pack (hereafter called TV Tuner) is an option for watching TV programs or videos on the IBM TFT color notebook computer. The computer changes to TV reception when the removable diskette drive is replaced with the TV Tuner.






The TV screen and normal computer display are easily switched by using the Hot key on the front panel of the TV Tuner.

Identifying Names and Functions

The following figure and table show the names and functions of each part of the TV Tuner.








Icons	Functions
1 Front Panel	Used to change the TV channels, switch TV mode to computer mode, and operate most functions of the TV Tuner.
2 Headphone Jack 	Connects the headphones.
3 Power Indicator	Shows the TV Tuner is powered on.
4 Power Switch 	Powered on and off the TV Tuner.
5 Hot Key 	Switches between the TV screen and computer screen.
6 Up Switch 	Increases the value such as the channel number.
7 Down Switch 	Decreases the value such as the channel number.

Icons	Functions
8 Function Key Fn	Enters the mode to change the value of each function, such as TV channel or color contrast. (See "Using the Function Key" on page 473.)
9 TV/EXT Switch 	Switches the TV mode or external video mode.
10 Volume Knob 	Controls the speaker volume.
11 Audio-In Jack 	Connects the audio-in connector of the AV cable.
12 Video-In Jack 	Connects video-in connector of the AV cable.
13 RF Connector 	Connects the active antenna unit or antenna cable.

Using the Front Panel

















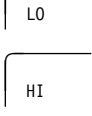


The following table shows how to operate all functions of the TV Tuner with the controls on the front panel.



Key	Function
Power 	Turns on the TV Tuner. This key is used only when the computer is turned on.
Hot Key 	Switches computer display and TV screen.
Up 	Increases the value of parameters, Channel Number, Color, Tint, Brightness, Contrast, Auto Tuning Sensitivity, On-screen Message Selection.
Down 	Decreases the value of parameters, Channel Number, Color, Tint, Brightness, Contrast, Auto Tuning Sensitivity, On-screen Message Selection.
Function Fn	Selects a function mode to adjust each function parameter. (See "Using the Function Key" on page 473.)

Key	Function
TV/Ext 	Switches the displayed video source between the receiving TV broadcast program and external devices such as VCR, video camera recorder, laser disk, and so on.

Using the Function Key: Each time you press the Function key (F_N), one of the following messages (called *On-Screen Message*) appears at the top left corner of the LCD.

The changed values are automatically saved when you return to the "TV Channel" On-Screen message. The values are not saved when you power-off the TV Tuner without returning to this message.

Message on LCD	Parameter
	TV Channel By using  and  , you can select the channels from 2 to 69.
	Color Adjustment By pressing and holding  or  , you can change the color.
	TINT Adjustment By pressing and holding  or  , you can change the tint.
	Bright Adjustment By pressing and holding  or  , you can change the brightness.
	Contrast Adjustment By pressing and holding  or  , you can change the contrast.
	(No function) Reserved.
	Auto Tune Sensitivity Selection LO: Means the sensitivity of the TV is low. In this mode, the TV Tuner receives strong TV signals only. To set LO, press  . HI: Means the sensitivity of the TV is high (factory default). In this mode, the TV Tuner receives weak and strong TV signals. To set HI, press  .


Message on LCD	Parameter
D3S	Time On-Screen Message appears D3S: On-Screen Message appears for 3 seconds. To set D3S, press  .
DON	DON: On-Screen Message always appears. To set DON press  .

Power-on the TV Tuner: Use the ThinkPad Features program or PS2.EXE. to power-on the TV Tuner; then power-on the internal device in the diskette drive compartment. If power for the internal device is turned off when the TV Tuner is set up, nothing appears on the LCD display. Turn on power for the TV Tuner again.

- If you are using DOS, do one of the following:
 - Power-on the computer and type PS2 from the command prompt to start the ThinkPad Features program.
Select **Set Power Features** from the ThinkPad Features menu; then put a check mark at **Internal Serial Port (or Diskette Drive Compartment)** under the **Power for devices**. If you need help, press **F1** to display the help menu.
 - Type PS2 MODEM ON (or PS2 DDC ON) from the command prompt; press the Enter key to set the power ON.
- If you are using OS/2* or Microsoft Windows**, do the following:
 1. Power-on the computer and start the ThinkPad Features program.
 2. Select the **Power** icon; then move the pointer to **Internal Serial Port (or Diskette Drive Compartment)** under the **Power for devices** and click the button to check mark it.
 3. Press the **OK** button.

Troubleshooting

The following table shows what to do to solve problems when the TV Tuner does not work correctly.

Problem	Probable Cause
<p>The TV Tuner does not operate. (No picture or sound)</p>	<ul style="list-style-type: none"> • Computer is not powered on. • Computer is in suspend mode. • Volume control of the TV Tuner or computer is not adjusted correctly. • The power for the TV Tuner is not supplied. (See "Power-on the TV Tuner" on page 474.) • The wall outlet from the outdoor antenna is not active. • The video or antenna cable is not connected correctly. • Antenna elements of the active antenna unit are not adjusted. • The batteries in the active antenna unit are not inserted correctly. • The batteries in the active antenna unit are depleted. • The TV Tuner is not set up correctly. • You cannot watch TV or videos on the external display. • LO is set for the auto tune sensitivity selection. (See page 473.)
<p>No color.</p>	<ul style="list-style-type: none"> • The program is not in color.
<p>Snow and noise only.</p>	<ul style="list-style-type: none"> • Switch the TV/EXT () button.
<p>Pictures are out of shape, or have double images.</p>	<p>For TV:</p> <ul style="list-style-type: none"> • The channel is not tuned correctly. • Adjust the antenna. <p>For VCR:</p> <ul style="list-style-type: none"> • Change the tracking adjustment.
<p>Dotted lines or stripes.</p>	<ul style="list-style-type: none"> • Usually caused by interference from neon signs, hair dryers, and so on. Move the computer to avoid the interference.
<p>Picture control are not saved.</p>	<ul style="list-style-type: none"> • Do not power-off the TV Tuner when adjusting functions such as picture control, color, tint, brightness, or contrast.
<p>Channel number is always displayed or is not displayed.</p>	<p>Select your favorite mode for the on-screen message. (See page 473.)</p>

Common Parts Listing

This section contains FRUs common to most IBM portable, laptop, and notebook computers.

External Diskette Drives

5.25-Inch Diskette Drive:	
360KB External (4869-001)	72X6759
360KB External (4869-501)	72X6768
1.2MB External (4869-002)	15X7993
1.2MB External (4869-502)	15X7994
5.25-Inch Drive Adapter	72X6757
5.25-Inch Drive Adapter/A	15F7996
5.25-Inch External Diskette Drive Cable (from system board to adapter)	27F4211
Diskette Drive Bus Adapter	72X8524

CD-ROM Drives

Enhanced Internal CD-ROM II Drive (Eject button below slot)	61G1901
Internal CD-ROM I Drive (Eject button above slot)	81F7930
Terminator Kit (for 81F7930)	59F3530
Cleaning Kit (for 81F7930) (Disks, CD Caddy)	59F3562
Internal CD-ROM II Drive (Eject button below slot)	92F0084
Terminator Kit (for 92F0084)	92F0082
Media Kit (for 92F0084) (No cleaning necessary, Test Disk, CD Caddy)	31F4232
Signal Cable	34F0043
Power Cable	72X8521
Remote ID Switch Cable (3510)	92F0086
Audio Card, Cable, Screws (3510)	92F0085
CD Caddy	22F9419
Rail Kit (3510)	34F0041
Headphones	53F3610

SCSI Adapters, Terminators, Cables

SCSI Adapter/A (without Cache)	85F0002
SCSI Internal Cable	64F4127
SCSI Adapter/A (with Cache)	85F0063
Terminator, External (for 85F0063)	33F8464
Terminator, Internal (for 85F0063)	34F0025
Terminator, Internal (for 85F0002)	57F2870
SCSI Fast Adapter (16 bit)	92F0330
SCSI External Cable (for 92F0330)	32G4089
SCSI Internal Cable (for 92F0330)	32G0084
Terminator, Inline (space permitting)	92F0412

Rewritable Optical Drives

3.5-Inch Rewritable Optical Drive	92F0167
Rewritable Optical Cartridge	38F8647
Rewritable Optical Cartridge (5 Pack)	38F8646
Drive Mounting Slide (for 92F0167)	85F0022
Tray with Bezel (for 92F0167)	85F0021
Objective Lens Cleaner (for 92F0167)	38F8681
Prism Lens Cleaner (for 92F0167)	38F8682
3.5-Inch Enhanced Rewritable Optical Drive	92F0167
Mounting Tray	92F0269
Mounting Tray/Bezel (Model 3510)	92F0268

External Keyboard/Mouse

Keyboard Cable	72X8537
Mouse	61X8923
Mouse Ball and Pop-Off Retainer	33F8461
Mouse Ball and Twist-Off Retainer	33F8462
Mouse (New Style)	33G5420
Mouse Retainer Ring	33G5417
Miniature Mouse	95F5723

Enhanced Keyboards (101/102 Key)

Country	
Arabic	1391490
Belgian	1391414
Canadian French	1392011
Cyrillic	1393866
Danish	1391407
Dutch	1391511
French	1391402
German	1391403
Greek	1393285
Hebrew	1391408
Italian	1393395
Latin American Spanish	1392015
Norwegian	1391409
Portuguese	1391410
Russian/Cyrillic	1395622
Spanish	1391405
Swedish/Finnish	1391411
Swiss	1391412
Swiss/French	1395881
Swiss/German	1395882
Turkish	1393286
U.K. English	1391406
U.S. English (E/ME/A use only)	1396790
U.S. English	1392090
Yugoslavian	1393669

Optional Enhanced Keyboards (101/102 Key)

with PS/2 Style Cable	59G7980
with AT Style Cable	59G7981
with 25mm PS/2 Trackball	59G7982
with 25mm Serial Trackball	59G9757

Keybutton Kits (101/102 Key)

Keybutton Kits (R), Belgian	1392033
Keybutton Kits (R), Canadian French	1392032
Keybutton Kits (R), Danish	1392026
Keybutton Kits (R), Dutch	1392034
Keybutton Kits (R), French	6447047
Keybutton Kits (R), German	6447048
Keybutton Kits (R), Italian	6447049
Keybutton Kits (R), Norwegian	1392028
Keybutton Kits (R), Portuguese	1392029
Keybutton Kits (R), Spanish	6447050
Keybutton Kits (R), Spanish / Latin	1392035
Keybutton Kits (R), Swedish	1392030
Keybutton Kits (R), Swiss / French / German	1392031
Keybutton Kits (R), U.K. English	6447046
Keybutton Kits, U.S. English	6447045

Japanese Keyboard Type 2 (106 Key, DBCS Support)

Japanese Keyboard	94X1110
Keyboard Cable	94X1147

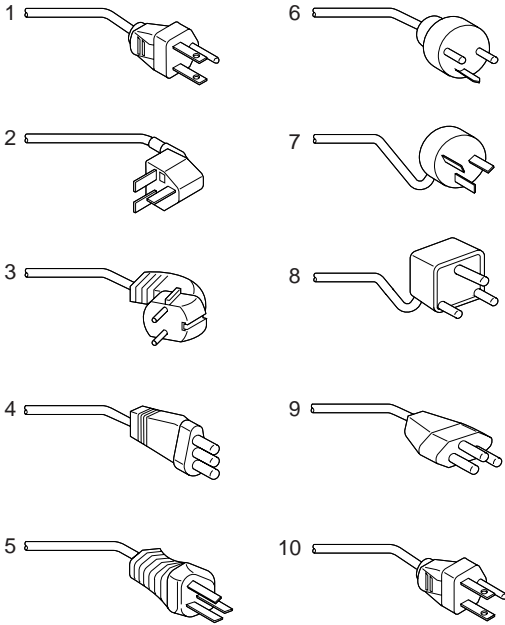
Space-Saving Keyboards (84/85 Key)

Country	
Canadian French	1396046
Spanish/Latin	1396047
U.S. English	1393290
Cable Assembly, External	1393082

Tools and Miscellaneous

Audio Wrap Cable	66G5180
Ethernet BNC T-Connector	84F8207
Ethernet BNC 50-ohm Terminator (2 required)	85F0037
Grounding Wire Set	38F4684
Keyboard Key Cap Removal Tool	6110464
PC Test Card	33G4703
Screwdriver Kit	95F3598
SCSI Terminator (any SCSI device, space permitting)	92F0142
SCSI Terminator Kit (R-PAC Terminator Modules (3) for 40, 60, 80, 120, and 160MB SCSI Hard Disk Drives)	92F0143
Wrap Plug Ethernet D-Shell	85F0036
Wrap Plug, Tri-Connector	72X8546
Wrap Plug (6157 Tape Attachment Adapter/A)	4178459
Wrap Plug (Token-Ring Network Adapter/A)	6165899
Plastic Envelope (For Wrap Plug)	6138013

Display Power Cords



Index Country

1	Colombia, U.S., Venezuela	6952300
	Colombia, U.S., Venezuela	62X1045
2	Hong Kong, Singapore, U.K.	14F0033
3	France, Germany, Spain	13F9979
4	Italy, Chile	14F0069
5	Australia, New Zealand, New Guinea, Papua	13F9940
6	Denmark	13F9997
7	Israel	14F0087
8	Bangladesh, Pakistan, South Africa, Sri Lanka	14F0015
9	Switzerland	14F0051
10	Thailand	1838574
	Japan	79F2755

Element Exchange Displays

8503 12-Inch Monochrome Display

110/120 V ac	68X3045
220/240 V ac (No. Hemisphere)	68X3046
220/240 V ac (So. Hemisphere)	72X7878
Tilt/Swivel Stand	68X3061

8504 12-Inch Monochrome Display

110/120 or 220/240 V ac (Universal)	44F9807
220/240 V ac (No. Hemisphere)	44F9808
220/240 V ac (So. Hemisphere)	44F9809
Tilt/Swivel Stand	44F9820

8506 17-Inch Monochrome Display (with Tilt/Swivel Stand)

110/125 V ac (US/Canada)	39F8087
110/125 or 200/240 V ac (No. Hemisphere)	39F8091
110/125 or 220/240 V ac (So. Hemisphere)	39F8089

8507 19-Inch Monochrome Display

110/120 or 220/240 V ac (Universal Model)	6247808
110/125 or 200/240 V ac (No. Hemisphere)	6247843
110/125 or 220/240 V ac (So. Hemisphere)	6247842

8508 19-Inch Monochrome Display

110/125 V ac (US/Canada)	6247883
110/125 or 200/240 V ac (No. Hemisphere)	6247840
110/125 or 220/240 V ac (So. Hemisphere)	39F8068

8512 14-Inch Color Display

110/120 V ac (US/Canada)	61R8924
220/240 V ac (No. Hemisphere)	61X8928
220/240 V ac (So. Hemisphere)	61X8927
Tilt/Swivel Stand	61X8925

8513 12-Inch Color Display

110/120 V ac	68X3088
220/240 V ac (No. Hemisphere)	72X7870
220/240 V ac (So. Hemisphere)	72X7877
Tilt/Swivel Stand	68X3061

8514 16-Inch Color Display

110/120 V ac	75X5945
220/240 V ac (No. Hemisphere)	75X5946
220/240 V ac (So. Hemisphere)	75X5947
Tilt/Swivel Stand	75X5907

8515 14-Inch Color Display

90/137 V ac	07G4759
220/240 V ac (No. Hemisphere)	34G6628
220/240 V ac (Equatorial)	07G4762
220/240 V ac (So. Hemisphere)	07G4763
Tilt/Swivel Stand	38F3909

8516 Color Touch Display

110/120 V ac	44F9759
220/240 V ac (No. Hemisphere)	70F9129
220/240 V ac (So. Hemisphere)	70F9111

Miscellaneous Information

Acronyms, Abbreviations and Terms

Term	Information
ACPA/A	Audio Capture and Playback Adapter
ADP	Automatic Data Processing
Alt	Alternate
ANSI	American National Standards Institute
ARTIC	A Real Time Interface Coprocessor
ASCII	American National Standard Code for Interface Interchange
AT	Advanced Technology (as in AT Bus)
AVC	Audio Video Connection
BIOS	Basic Input/Output System (Controls System Resources)
bps	Bits Per Second
BPS	Bytes Per Second
CCITT	The International Telephone and Telegraph Consultative Committee
CCS	Common Command Set
CCSB	Common Complete Status Block
CD	Compact Disc
CD-ROM	CD Read Only Memory (stores data/audio)
CE	Customer Engineer or Service Representative
CRC	Cyclic Redundancy Check
CRT	Cathode Ray Tube
CSD	Corrective Service Diskette
CGA	Color Graphics Adapter (See EGA, VGA, XGA)
CCSB	Configuration Control Sub Board)
CRC	Cyclic Redundancy Check
CRT	Cathode Ray Tube
CSA	Canadian Standards Association
CSD	Corrective Service Diskette
DASD	Direct Access Storage Device (hard disk, diskette)
DMA	Direct Memory Access
DRAM	Dynamic Random Access Memory
DTI	Display Technology Inc.
ECA	Engineering Change Announcement
ECC	Error Correction Code
EGA	Enhanced Graphics Adapter
ESD	Electrostatic Discharge
ESDI	Enhanced Small Device Interface
EEPROM	Electrically Erasable Programmable Read Only Memory
EWS	Energy Work Station
FRU	Field Replaceable Unit (replaceable part)
GPIB	General Purpose Interface Bus (IEEE 348)
GSA	General Services Administration
Ht	Height
IDE	Integrated Drive Electronics
IC	Integrated Circuit
IEEE	Institute of Electrical and Electronics Engineers
IEC	International Electrotechnical Commission
IML	Initial Machine Load
IPL	Initial Program Load
ISO	International Organization for Standardization

Term	Information
ISDN	Integrated-Services Digital Network
LAN	Local Area Network
LBA	Local Block Address
LTB	Local Transfer Bus
LUN	Logical Unit Number (as in SCSI)
MAP	Maintenance Analysis Procedure
MCGA	Modified Color Graphics Adapter (320 x 200 x 256)
MCA	Micro Channel Architecture (bus structure)
MHz	Mega hertz (millions of cycles per second)
MIDI	Musical Instrument Digital Interface
MM	Multimedia
N/A	Not Available or Not Applicable
NDD	National Distribution Division
NMI	Non-Maskable Interrupt
NSC	National Support Center
NVRAM	Non Volatile Random Access Memory
OEM	Original Equipment Manufacturer
PCMCIA	Personal Computer Memory Card International Association
POS	Programmable Option Select
PUN	Physical Unit Number (as in SCSI)
RAID	Redundant Array of Inexpensive Disks (disk array models)
RAM	Random Access Memory (read/write)
RGB	Red Green Blue (is in monitors)
ROM	Read Only Memory
SASD	Sequential Access Storage Device (Tape)
SCB	Subsystem Control Block
SRAM	Static Random Access Memory
SCSI	Small Computer Systems Interface
SCSI ID	SCSI Identification Number (assigned device number)
SPD	Software Product Description
SR	Service Representative
T/A	NDD Technical Advisor (See your Marketing Representative)
TDD	Telecommunications Device for the Deaf
TFT	Thin Film Transistor
TPF	ThinkPad File
UL	Underwriters Laboratory
VCA	Video Capture Adapter
VESA	Video Electronics Standards Association
VGA	Video Graphics Array (640x480x16)
VPD	Vital Product Data
VRAM	Video Random Access Memory
WORM	Write Once, Read Many Media
XGA	Extended Graphics Array (1024 x 768 x 256)
Y/C	Luminance/Chrominance Signal (Pertains to Video)

Problem Determination Tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Failure symptom
 - What, when, where, single, or multiple systems?
 - Is the failure repeatable?
 - Has this configuration ever worked?
 - If it has been working, what changes were made prior to it failing?
- Reference Diskette Version
 - Type and revision level
- Hardware configuration
 - Print out (print screen) configuration from system partition or Reference Diskette currently being used.
- Operating system software
 - Type and revision level
 - OS/2 SYSLEVEL Command
- Software setup (appropriate to the software)
- CONFIG.SYS
- STARTUP.CMD
- AUTOEXEC.BAT

Important

To eliminate confusion, identical systems are considered *identical* only if they:

1. Are the exact machine type and models
2. Have the same adapters/attachments in the same locations
3. Have the same address jumpers/terminators/cabling
4. Have the same software versions and levels
5. Have the same Partition/Reference Diskette (version)
6. Have the same configuration options set in the system
7. Have the same setup for the operation system control files (Config.Sys, Autoexec.bat, Startup.Cmd., etc.)

Comparing the configuration and software set-up (Config.sys, etc.) between “working and non-working” systems will often lead to problem resolution.

Phone Numbers, U.S. and Canada

Before you place a call to the Support Center, refer to "Problem Determination Tips" on page 485.

Authorized Dealers or Servicers

Number	Information
919-517-0001	Bulletin Board Service - PC Company
800-937-3737	IBM Business Partner Education
800-426-2472	IBM Customer Engineer Technical Support
800-426-7763	IBM National Support Center
800-IBM-DEAL	IBM PartnerLink Technical Support
303-924-4015	IBM Part Number ID and Look Up
800-237-5511	IBM Software Defect Support (CSDs)
800-327-5711	IBM Software Ordering (publications)
800-426-1484	IBM Supplies Technical Hotline
800-759-7483	IBM Warranty Claims Center
800-342-6672	OS/2 Replacement Diskettes (problems during new system installation)

U.S. Customers and Helpware Subscribers

Number	Information
919-517-0001	Bulletin Board Service - PC Company
800-426-8322	Customer Education Business Unit
800-999-0052	Customized Operational Services
407-982-6408	Developers Assistance (HW & SW)
800-964-8523	End User Support
800-772-2227	HelpCenter* and HelpLearn* Customer Satisfaction Center
800-426-4238	HelpCenter* (TDD/ASCII)
800-742-2493	IBM Anti-Virus Services
800-447-4700	IBM Authorized Dealer Referrals
800-426-4238	IBM Customer Satisfaction Center (TDD/ASCII)
800-426-2468	IBM Dealer Referral (typewriters/printers)
800-426-2468	IBM Direct (supplies, education)
800-282-0226	IBM Field Television Network
800-426-3333	IBM Information Referral Service
800-IBM-SERV	IBM Service
800-426-7282	IBM Technical Manuals
800-426-9402 (Ext. 150)	Multimedia Information Center
800-241-1620	Multimedia Support
800-742-2493	Multivendor Consulting
800-342-6672	OS/2 Information Line
800-237-5511	OS/2 Support Center
800-237-5511	OS/2 Support Line

U.S. Customers and Helpware Subscribers

Number	Information
303-924-4125	Parts Information
800-284-5933	Prodigy**
914-962-0310	Prodigy User Questions
800-237-4824	PS/2 Trade-In Program
	PS/2 Loan for Learning
	PS/2 Lease from IBM Credit
800-742-2943	Solution Validation Lab
800-547-1283	Technical Coordinator Program
	SystemXtra* for Personal Systems
	LAN Automated Distribution/2
	OS/2 Bulletin Board
	OS/2 Application Assistance Center
800-426-2622	Technical Services, Boca Raton (fee)
606-323-3000	Technical Support (typewriters/printers)
800-551-2832	Technical Solutions Magazine

IBM Canada Customer and Servicer Support

Number	Information
800-387-8343	Ambra Customer Support
800-668-5682	Ambra Business Partner Warranty Support
800-387-8343	Ambra Business Partner Parts/Warranty Claims
905-316-7952	Ambra Bulletin Board
800-661-PSMT	Business Partner Marketing Support
905-316-5556	Business Partner Marketing Support - Toronto
514-938-6048	Business Partner Marketing Support - French
800-465-6600	Customer Relations
905-316-6666	Customer Relations - Toronto
800-465-6666	Customer Service Dispatch
800-263-2769	Customer Service Parts
800-465-2222	Customer Support Center (ISC)
416-443-5701	Customer Service Repair Centre
800-465-7999	HelpClub* Registration
800-465-7999	IBM Direct
905-513-3367	IBM Certification Administrator
905-316-2683	IBM Certification Coordinator Mail to: IBM Certification 50 Acadia Drive Markham, Ontario L3R 0B3
800-465-3299	IBM HelpFax
905-316-3299	IBM HelpFax - Toronto
800-565-3344	IBM HelpPC
800-268-3100	IBM Information Network Support
905-474-6666	IBM Information Network Support - Toronto

IBM Canada Customer and Servicer Support

Number	Information
800-663-7662	Lexmark Product Information
800-263-2769	Parts Orders, Exchange or Emergency
416-443-5808 (Fax)	Parts Regular Orders, Exchange
416-443-5755	Parts Orders, Inquiries
514-938-3022	PC Co Bulletin Board - Montreal
905-316-4255	PC Co Bulletin Board - Toronto
604-664-6464	PC Co Bulletin Board - Vancouver
204-934-2735	PC Co Bulletin Board - Winnipeg
800-661-7768	PS Marketing Support (PSMT)
800-465-1234	Publications Ordering
416-513-3360	Service Announcement, HMS Manuals
416-513-3372 (Fax)	Service Announcement, HMS Manuals
905-316-4148	Service Management Support topw.
905-316-4100 (Fax)	Service Management Support
905-316-4150	Service Manager
905-316-4100 (Fax)	Service Manager
905-316-4872	Service Quality Programs
905-316-4100 (Fax)	Service Quality Programs
800-661-2131	Skill Dynamics* (Education)
800-387-8483	PS/1 Warranty Service, Business Partner (DOAs)
800-565-3344	PS/1 Warranty Service, Customer Helpline
416-443-5835 (Fax)	Warranty Claim Fulfillment
905-316-2445	Warranty Claim Reimbursement
905-316-3515 (Fax)	Warranty Claim Reimbursement
416-443-5778	Warranty Claim Parts Inquiry
800-505-1855	Warranty Provider Support Hotline
416-946-1333	Warranty Provider Support - Toronto
800-267-7472	Warranty Service, ThinkPad

We Want Your Comments!

Every effort has been made to provide complete and accurate technical information in this manual. However, if you find missing or inaccurate information, please fax any comments, corrections, or suggestions to 919-543-8167 (U.S.A.). Thank you.

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SystemXtra	ThinkPad
TrackPoint	XGA

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Windows	Microsoft Corporation



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