

Development Tool Product List (4-bit)

KLCS-870(1/2)

| Target MCU | | | Language Tools | | | Test Tools(RTE System) | | | Accessories | | | | | Notes |
|----------------|---------------|---------------|--|--|--|--|-----------------------------|---------------|-------------------|---------------------------------|---------------------|-----------------------|-------------------|-------|
| Product Name | OTP | Package | Assembler | C-Like Compiler (#1) | C Compiler (#1) | Debugger | Controller | Emulation Pod | MCU Probe (#3,#4) | Shape-Conversion Adapter(#3,#4) | QFP Adapter (#3,#4) | OTP/MCU Mount Adapter | OTP Write Adapter | |
| KMP87C408LM | KMP87P808LM | SOP28 | SW87AE0-ZZE [MS-DOS version] SW87AS0-TPE [UNIX version] | SW87LE0-ZZE [MS-DOS version] SW87LS0-TPE [UNIX version] | SW87CE0-ZZE [MS-DOS version] SW87LS0-TPE [UNIX version] | SW87DE1-ZZE [MS-DOS version] **SW87DW9-ZZE [MS-Windows version] | BMI022R0B [RTE model 10] | BM87C408M0A | (PN100003) | (AS-DIP.6-028-S008-1(#5)) | - | - | BMI1116 | |
| KMP87C408LN | KMP87P808LN | SDIP28 | | | | | | | | BMI1122 | | | | |
| KMP87C408M | KMP87P808M | SOP28 | | | | | | | | BMI1116 | | | | |
| KMP87C408N | KMP87P809M | SDIP28 | | | | | | | | BMI1122 | | | | |
| ** KMP87C409M | KMP87P809M | SOP28 | | | | | | | | BMI1116 | | | | |
| ** KMP87C409N | KMP87P809N | SDIP28 | | | | | | | | BMI1122 | | | | |
| KMP87C444N | KMP87P844N | SDIP42 | | | | | | | | BMI1108 | | | | |
| KMP87C446N | KMP87PH46N | | | | | | | | | BMI1193 | | | | |
| KMP87C447LU | KMP87PH47LU | QFP44(10×10) | | | | | | | | BMI194B | | | | |
| KMP87C447U | KMP87PH47U | QFP64(14×14) | | | | | | | | BMI173 | | | | |
| KMP87C800DF | KMP87PH00DF | | | | | | | | | BMI137 | | | | |
| KMP87C800F | KMP87PH00F | QFP64(14×20) | | | | | | | | BMI136 | | | | |
| KMP87C800N | KMP87PH00N | SDIP64 | | | | | | | | BMI194B | | | | |
| KMP87C807U | KMP87PH47U | QFP44(10×10) | | | | | | | | BMI1116 | | | | |
| KMP87C808LM | KMP87P808LM | SOP28 | | | | | | | | BMI1122 | | | | |
| KMP87C808LN | KMP87P808LN | SDIP28 | | | | | | | | BMI1116 | | | | |
| KMP87C808M | KMP87P808M | SOP28 | | | | | | | | BMI1122 | | | | |
| KMP87C808N | KMP87P808N | SDIP28 | | | | | | | | BMI1116 | | | | |
| ** KMP87C809M | KMP87P809M | SOP28 | | | | | | | | BMI1122 | | | | |
| ** KMP87C809N | KMP87P809N | SDIP28 | | | | | | | | BMI1199 | | | | |
| KMP87C814F | KMP87PM14F | QFP64(14×20) | | | | | | | | BMI198 | | | | |
| KMP87C814N | KMP87PM14N | SDIP64 | | | | | | | | BMI137 | | | | |
| KMP87C840F | KMP87PH40AF | QFP64(14×20) | | | | | | | | BMI136 | | | | |
| KMP87C840N | KMP87PH40AN | SDIP64 | | | | | | | | BMI137 | | | | |
| ** KMP87C840IF | KMP87PH40AF | QFP64(14×20) | | | | | | | | BMI136 | | | | |
| ** KMP87C840IN | KMP87PH40AN | SDIP64 | | | | | | | | BMI137 | | | | |
| KMP87C841F | KMP87PM41F | QFP64(14×20) | | | | | | | | BMI136 | | | | |
| KMP87C841N | KMP87PM41N | SDIP64 | | | | | | | | BMI121 | | | | |
| KMP87C841U | KMP87PM41U | QFP64(10×10) | | | | | | | | BMI1108 | | | | |
| KMP87C844N | KMP87P844N | SDIP42 | | | | | | | | BMI193 | | | | |
| KMP87C846N | KMP87PH46N | | | | | | | | | BMI194B | | | | |
| KMP87C847LU | KMP87PH47LU | QFP44(10×10) | | | | | | | | BMI1120 | | | | |
| KMP87C847U | KMP87PH47U | QFP80(14×20) | | | | | | | | BMI138 | | | | |
| ** KMP87C847IU | KMP87PH47IU | | | | | | | | | BMI183A | | | | |
| ** KMP87C874F | KMP87PM74F | QFP80(14×20) | | | | | | | | BMI136 | | | | |
| KMP87CC20F | KMP87PH20F | | | | | | | | | BMI137 | | | | |
| KMP87CC31N | KMP87PM36N | SDIP42 | | | | | | | | BMI136 | | | | |
| KMP87CC40F | KMP87PH40AF | QFP64(14×20) | | | | | | | | BMI121 | | | | |
| KMP87CC40N | KMP87PH40AN | SDIP64 | | | | | | | | BMI188 | | | | |
| KMP87CC41F | KMP87PM41F | QFP64(14×20) | | | | | | | | BMI173 | | | | |
| KMP87CC41N | KMP87PM41N | SDIP64 | BMI137 | | | | | | | | | | | |
| KMP87CC41U | KMP87PM41U | QFP64(10×10) | BMI173 | | | | | | | | | | | |
| KMP87CC78F | KMP87PM78F | QFP100(14×20) | BMI136 | | | | | | | | | | | |
| KMP87CH00DF | KMP87PH00DF | QFP64(14×14) | BMI198 | | | | | | | | | | | |
| KMP87CH00F | KMP87PH00F | QFP64(14×20) | BMI199 | | | | | | | | | | | |
| KMP87CH00LF | KMP87PH00LF | QFP64(14×14) | BMI138 | | | | | | | | | | | |
| KMP87CH00N | KMP87PH00N | SDIP64 | BMI1105 | | | | | | | | | | | |
| KMP87CH14N | KMP87PM14N | SDIP64 | BMI117 | | | | | | | | | | | |
| KMP87CH14F | KMP87PM14F | QFP64(14×20) | BMI183A | | | | | | | | | | | |
| KMP87CH20F | KMP87PH20F | QFP80(14×20) | BMI137 | | | | | | | | | | | |
| KMP87CH21DF | KMP87PP21DF | QFP80(12×12) | BMI1117 | | | | | | | | | | | |
| KMP87CH21F | KMP87PP21F | QFP80(14×20) | BMI137 | | | | | | | | | | | |
| KMP87CH29U | KMP87PM29U | QFP64(10×10) | BMI137 | | | | | | | | | | | |
| KMP87CH31N | KMP87PM36N | SDIP42 | BMI136 | | | | | | | | | | | |
| KMP87CH34BN | KMP87PM34AN | | BMI136 | | | | | | | | | | | |
| KMP87CH36N | KMP87PM36N | SDIP42 | BMI137 | | | | | | | | | | | |
| KMP87CH40F | KMP87PH40AF | QFP64(14×20) | BMI136 | | | | | | | | | | | |
| ** KMP87CH40IF | KMP87PH40AF | QFP64(14×20) | BMI136 | | | | | | | | | | | |
| ** KMP87CH40IN | KMP87PH40AN | SDIP64 | BMI137 | | | | | | | | | | | |
| KMP87CH40KF | - | QFP64(14×20) | BMI136 | | | | | | | | | | | |
| KMP87CH40N | KMP87PH40AN | SDIP64 | BMI136 | | | | | | | | | | | |
| KMP87CH41F | KMP87PM41F | QFP64(14×20) | BMI137 | | | | | | | | | | | |
| KMP87CH41N | KMP87PM41N | SDIP64 | BMI136 | | | | | | | | | | | |
| KMP87CH41U | KMP87PM41U | QFP64(10×10) | BMI121 | | | | | | | | | | | |
| KMP87CH46N | KMP87PH46N | SDIP42 | BMI193 | | | | | | | | | | | |
| KMP87CH47LU | KMP87PH47LU | QFP44(10×10) | BMI194B | | | | | | | | | | | |
| KMP87CH47U | KMP87PH47U | | BMI1117 | | | | | | | | | | | |
| ** KMP87CH47IU | KMP87PH47IU | QFP64(10×10) | BMI1104 | | | | | | | | | | | |
| KMP87CH48U | KMP87PH48U | QFP64(10×10) | BMI150B | | | | | | | | | | | |
| ** KMP87CH53F | ** KMP87PM53F | QFP80(14×20) | | | | | | | | | | | | |
| KMP87CH70BF | KMP87PM70F | QFP80(14×20) | | | | | | | | | | | | |

** : Under Development
 * : Samples available
 #1 : Compiler includes assembler system
 #2 : The seventh letter of the product name for the real-time OS is either 0, 1, 2, A or C.
 0 : Object code - 1copy
 1 : Object code - 1000copies
 2 : Object code can be freely copied.
 A : Source code - 1 copy; object code - 1 copy
 C : Source code - 1 copy; object code can be freely copied.

#3 : The product name in () is a spare part and is available separately. There is one of each emulation pod and emulator.
 #4 : MCU probes and shape-conversion adapters whose product numbers start with PN12 include a QFP adapter.
 #5 : Emulation Technology (ET) product supplied by Micron(contact: +81-33317-9911)
 #6 : Supplied by Yamaichi Denki. (contact: +81-33778-6122)

① : When connecting to the target MCU with a probe, mount a connector on the target MCU or use a PN120003 shape-conversion adapter.

• System names and product names listed are generally registered trademarks of their respective manufacturers.
 • Software is always supplied in the latest version.
 • Before purchasing, please confirm the type number, product name etc. with Toshiba or its distributor.

MS-DOS version
 • This version operates on an IBM PC or compatible that has MS-DOS installed. It also operates on a MS-Windows DOS-compatible box.
 Assemblers and compilers whose product name has A, C or L as the sixth character require an I386 CPU or higher processor and 4MB or more of memory.
 • The symbolic and source level debuggers require the I286 CPU or higher processor and 2MB or more of EMS memory.
 MS-Windows version
 • Versions whose product name has W as the sixth character will run on an IBM PC or compatible that has MS-Windows 3.1 installed. They will also run number MS-Windows 95.
 • Versions whose product name has N as the sixth character will run on an IBM PC or compatible that has MS-Windows NT or MS-Windows 95 installed.
 UNIX version
 • Products whose product name has S as the sixth character will run on a Sun OS system.
 • Products whose product name has T as the sixth character will run on a Solaris 2.4 system.

Development Tool Product List (8-bit)

■ KLCS-870(2/2)

| Target MCU | | | Language Tools | | | Test Tools(RTE System) | | | Accessories | | | | | Notes |
|---------------|--------------|---------------|--|--|--|--|-----------------------------|---------------|-------------------|---------------------------------|---------------------|-----------------------|-------------------|--------|
| Product Name | OTP | Package | Assembler | C-Like Compiler (#1) | C Compiler (#1) | Debugger | Controller | Emulation Pod | MCU Probe (#3,#4) | Shape-Conversion Adapter(#3,#4) | QFP Adapter (#3,#4) | OTP/MCU Mount Adapter | OTP Write Adapter | |
| **KMP87CH74F | KMP87PM74F | QFP80(14×20) | SW87AE0-ZZE [MS-DOS version] SW87AS0-TPE [UNIX version] | SW87LE0-ZZE [MS-DOS version] SW87LS0-TPE [UNIX version] | SW87CE0-ZZE [MS-DOS version] SW87CS0-TPE [UNIX version] | SW87DE1-ZZE [MS-DOS version] **SW87DW9-ZZE [MS-Windows version] | BM1022R9B [RTE model 10] | BM87CM75F0A | PN120004 | - | PN210001 | PN210002 | BM11120 | |
| **KMP87CH75F | KMP87PM75F | QFP100(14×20) | | | | | | BM87CM78F0A | PN120005 | | (PN210004) | PN210005A | BM11124 | |
| KMP87CH78F | KMP87PM78F | QFP100(14×20) | | | | | | BM87CM14N0A | - | | - | - | BM1188 | |
| KMP87CK14F | KMP87PM14F | QFP64(14×20) | | | | | | BM87CM14N0A | - | | PN120007 | PN210010 | PN210011A | BM1199 |
| KMP87CK14N | KMP87PM14N | SDIP64 | | | | | | BM87CH20F0B | PN120004 | | - | - | BM1198 | |
| KMP87CK20AF | KMP87PM20F | QFP80(14×20) | | | | | | BM87CM29U0A | PN120022 | | PN210001 | PN210002 | BM1138 | |
| KMP87CK29U | KMP87PM29U | QFP64(10×10) | | | | | | BM87CM34N0A | - | | PN210031 | PN210033 | BM11117 | |
| KMP87CK34BN | KMP87PM34AN | SDIP42 | | | | | | BM87CM37N0A | PN110005 | | (PN200006) | - | BM1183A | |
| KMP87CK36N | KMP87PM36N | | | | | | | BM87CK40N0B | PN120014 | | PN210010 | PN210011A | BM1137 | |
| KMP87CK40F | KMP87PM40AF | QFP64(14×20) | | | | | | PN110005 | - | | - | BM1136 | | |
| KMP87CK40N | KMP87PM40AN | SDIP64 | | | | | | PN120014 | PN210010 | | PN210011A | BM1137 | | |
| KMP87CK41F | KMP87PM41F | QFP64(14×20) | | | | | | BM87CM41N0A | PN110005 | | - | BM1136 | | |
| KMP87CK41N | KMP87PM41N | SDIP64 | | | | | | PN120035 | PN210031 | | PN210033 | BM11121 | | |
| KMP87CK41U | KMP87PM41U | QFP64(10×10) | | | | | | BM87CM43N0A | PN100002 | | (PN200001) | - | BM1163 | |
| KMP87CK43N | KMP87PM43N | SDIP42 | | | | | | BM87CM78F0A | PN120005 | | (PN210034) | PN210005A | BM1188 | |
| KMP87CK78F | KMP87PM78F | QFP100(14×20) | | | | | | BM87CM14N0A | - | | PN120007 | PN210010 | PN210011A | BM1199 |
| KMP87CM14F | KMP87PM14F | QFP64(14×20) | | | | | | BM87CH20F0B | PN120004 | | - | - | BM1198 | |
| KMP87CM14N | KMP87PM14N | SDIP64 | | | | | | BM87CH20F0B | PN120004 | | PN210001 | PN210002 | BM1138 | |
| KMP87CM20AF | KMP87PM20F | QFP80(14×20) | | | | | | BM87CP23F0A | PN120006A | | PN210007 | PN210008 | BM1105 | |
| KMP87CM21DF | KMP87PP21DF | QFP80(12×12) | | | | | | PN120004 | PN210001 | | PN210002 | BM1104 | | |
| KMP87CM21F | KMP87PP21F | QFP80(14×20) | | | | | | PN120005 | (PN210004) | | PN210005A | BM1185A | | |
| KMP87CM23F | KMP87PP23F | QFP100(14×20) | | | | | | BM87CP24F0A | PN120013 | | (PN210022) | PN210023 | BM11127 | |
| **KMP87CM24F | **KMP87PP24F | QFP100(14×14) | | | | | | BM87CM29U0A | PN120022 | | (PN210031) | PN210033 | BM11117 | |
| **KMP87CM29U | KMP87PM29U | QFP64(10×10) | | | | | | BM87CM34N0A | - | | - | - | BM1183A | |
| **KMP87CM34BN | KMP87PM34AN | SDIP42 | | | | | | BM87CM37N0A | PN110005 | | (PN200006) | - | BM11112 | |
| KMP87CM36N | KMP87PM36N | | | | | | | BM87CS38N0A | PN100002 | | (PN200001) | - | BM11118 | |
| KMP87CM38N | KMP87PS38N | SDIP64 | | | | | | BM87CS39N0A | PN110005 | | - | PN210010 | PN210011A | BM1137 |
| KMP87CM39N | KMP87PS39N | SDIP64 | | | | | | PN120014 | PN210010 | | PN210011A | BM1136 | | |
| KMP87CM40AF | KMP87PM40AF | QFP64(14×20) | | | | | | BM87CK40N0B | PN110005 | | - | - | BM1136 | |
| KMP87CM40AN | KMP87PM40AN | SDIP64 | | | | | | PN120014 | PN210010 | | PN210011A | BM1137 | | |
| KMP87CM41F | KMP87PM41F | QFP64(14×20) | | | | | | BM87CM41N0A | PN110005 | | - | - | BM1136 | |
| KMP87CM41N | KMP87PM41N | SDIP64 | | | | | | PN120035 | PN210031 | | PN210033 | BM11121 | | |
| KMP87CM41U | KMP87PM41U | QFP64(10×10) | | | | | | BM87CM43N0A | PN100002 | | (PN200001) | - | BM1163 | |
| KMP87CM43N | KMP87PM43N | SDIP42 | | | | | | BM87CS39N0A | PN110005 | | - | - | BM1118 | |
| **KMP87CM45N | KMP87PS39N | SDIP64 | | | | | | BM87CS39N0A | PN110005 | | - | - | BM1118 | |
| **KMP87CM53F | **KMP87PM53F | QFP80(14×20) | | | | | | BM87CM53F0A | PN120004 | | (PN210001) | PN210002 | BM1104 | |
| KMP87CM64F | KMP87PS64F | QFP100(14×20) | | | | | | BM87CS64F0A | PN120005 | | (PN210004) | PN210005A | BM1185A | |
| KMP87CM70BF | KMP87PM70F | QFP80(14×20) | | | | | | BM87CK70F0B | PN120004 | | PN210001 | PN210002 | BM1150B | |
| KMP87CM71F | KMP87PS71F | | | | | | | BM11107 | | | | | | |
| **KMP87CM75F | KMP87PM75F | QFP100(14×20) | | | | | | BM87CM75F0A | PN120005 | | (PN210004) | PN210005A | BM11124 | |
| KMP87CM78F | KMP87PM78F | | BM1188 | | | | | | | | | | | |
| KMP87CN71F | KMP87PS71F | QFP80(14×20) | BM87CK70F0B | PN120004 | PN210001 | PN210002 | BM11107 | | | | | | | |
| KMP87CP23F | KMP87PP23F | QFP100(14×20) | BM87CM78F0A | PN120005 | (PN210004) | PN210005A | BM1188 | | | | | | | |
| KMP87CP38N | KMP87PS38N | SDIP42 | BM87CK70F0B | PN120004 | PN210001 | PN210002 | BM11107 | | | | | | | |
| KMP87CP39N | KMP87PS39N | SDIP64 | BM87CP23F0A | PN120005 | (PN210004) | PN210005A | BM1185A | | | | | | | |
| KMP87CP64F | KMP87PS64F | QFP100(14×20) | BM87CS38N0A | PN100002 | (PN200001) | - | BM1112 | | | | | | | |
| KMP87CP71F | KMP87PS71F | QFP80(14×20) | BM87CS39N0A | PN110005 | - | - | BM1118 | | | | | | | |
| KMP87CS38N | KMP87PS38N | SDIP42 | BM87CS64F0A | PN120005 | PN210004 | PN210005A | BM1185A | | | | | | | |
| KMP87CS39N | KMP87PS39N | SDIP64 | BM87CK70F0B | PN120004 | PN210001 | PN210002 | BM11107 | | | | | | | |
| KMP87CS64F | KMP87PS64F | QFP100(14×20) | BM87CS38N0A | PN100002 | (PN200001) | - | BM1112 | | | | | | | |
| KMP87CS68DF | KMP87PS68DF | QFP80(12×12) | BM87CS39N0A | PN110005 | - | - | BM1118 | | | | | | | |
| KMP87CS71F | KMP87PS71F | QFP80(14×20) | BM87CS64F0A | PN120005 | PN210004 | PN210005A | BM1185A | | | | | | | |
| | | | BM87CM53F0A | PN120006A | PN210007 | PN210008 | BM1105 | | | | | | | |
| | | | BM87CK70F0B | PN120004 | PN210001 | PN210002 | BM11107 | | | | | | | |

■ TLCS-870/X

| Target MCU | | | Language Tools | | | Test Tools(RTE System) | | | Accessories | | | | | Notes |
|--------------|--------------|--------------|--|--|--|-------------------------------------|-----------------------------|---------------|------------------|---------------------------------|--------------------|-----------------------|-------------------|-------|
| Product Name | OTP | Package | Assembler | C-Like Compiler (#1) | C Compiler (#1) | Debugger | Controller | Emulation Pod | MCU Probe(#3,#4) | Shape-Conversion Adapter(#3,#4) | QFP Adapter(#3,#4) | OTP/MCU Mount Adapter | OTP Write Adapter | |
| **TMP88C060F | - | QFP80(12×12) | SW88AE0-ZZE [MS-DOS version] SW88AS0-TPE [UNIX version] | SW88LE0-ZZE [MS-DOS version] SW88LS0-TPE [UNIX version] | SW88CE0-ZZE [MS-DOS version] **SW88CS0-TPE [UNIX version] | SW88DW9-ZZE [MS-Windows version] | BM1055R0A [RTE model 25] | BM88C060F0A | PN120006A | - | (PN210007) | PN210008 | - | |
| TMP88CK48F | TMP88PS49F | QFP64(14×20) | | | | | | PN120014 | PN210010 | | PN210011A | BM11111A | | |
| TMP88CK48N | TMP88PS49N | SDIP64 | | | | | | PN110005 | - | | - | BM1110A | | |
| TMP88CK49F | TMP88PS49F | QFP64(14×20) | | | | | | PN120014 | PN210010 | | PN210011A | BM11111A | | |
| TMP88CK49N | TMP88PS49N | SDIP64 | | | | | | PN110005 | - | | - | BM1110A | | |
| TMP88CM48F | TMP88PS49F | QFP64(14×20) | | | | | | PN120014 | PN210010 | | PN210011A | BM11111A | | |
| TMP88CM48N | TMP88PS49N | SDIP64 | | | | | | PN110005 | - | | - | BM1110A | | |
| TMP88CM49F | TMP88PS49F | QFP64(14×20) | | | | | | PN120014 | PN210010 | | PN210011A | BM11111A | | |
| TMP88CM49N | TMP88PS49N | SDIP64 | | | | | | PN110005 | - | | - | BM1110A | | |
| **TMP88CU74F | **TMP88PU74F | QFP80(14×20) | | | | | | **BM88CU74F0A | PN120004 | | (PN210001) | PN210002 | BM11131 | |
| **TMP88EH80F | **TMP88WH80F | QFP64(14×20) | **BM88EH80F0A | PN120014 | (PN210010) | PN210011A | **BM11119 | | | | | | | |

** : Under development
 ★ : Samples available
 + : This product is covered by the BULL CP8 proprietary patent, US patent No. 4,382,279.
 #1: Compiler includes assembler system
 #2: The seventh letter of the product name for the real-time OS is either 0, 1, 2, A or C.
 0: Object code - 1copy
 1: Object code - 1000copies
 2: Object code can be freely copied.
 A: Source code - 1 copy; object code - 1 copy
 C: Source code - 1 copy; object code can be freely copied.

#3: The product name in () is a spare part and is available separately. There is one of each emulation pod and emulator.
 #4: MCU probes and shape-conversion adapters whose product numbers start with PN12 include a QFP adapter.
 #5: Emulation Technology (ET) product supplied by Micron(contact:+81-33317-9911)
 #6: Supplied by Yamaichi Denki.
 (contact: +81-33778-6122)

①: When connecting to the target MCU with a probe, mount a connector on the target MCU or use a PN120003 shape-conversion adapter.

• System names and product names listed are generally registered trademarks of their respective manufacturers.
 • Software is always supplied in the latest version.
 • Before purchasing, please confirm the type number, product name etc. with Toshiba or its distributor.

MS-DOS version
 • This version operates on an IBM PC or compatible that has MS-DOS installed. It also operates on a MS-Windows DOS-compatible box.
 Assemblers and compilers whose product name has A,C or L as the sixth character require an I386 CPU or higher processor and 4MB or more of memory.
 • The symbolic and source level debuggers require the I286 CPU or higher processor and 2MB or more of EMS memory.
 MS-Windows version
 • Versions whose product name has W as the sixth character will run on an IBM PC or compatible that has MS-Windows 3.1 installed. They will also run number MS-Windows 95.
 • Versions whose product name has N as the sixth character will run on an IBM PC or compatible that has MS-Windows NT or MS-Windows 95 installed.
 UNIX version
 • Products whose product name has S as the sixth character will run on a Sun OS system.
 • Products whose product name has T as the sixth character will run on a Solaris 2.4 system.