C-Compiler

C COMPILER

USER'S GUIDE

Copyright 1983 Microware Systems Corporation, All Rights Reserved. Reproduction of this document, in part or whole, by any means, electrical or otherwise, is prohibited, except by written permission from Microware Systems Corporation.

The information contained herein is believed to be accurate as of the date of publication, however, Microware will not be liable for any damages, including indirect or consequential, from use of the OS-9 operating system or reliance on the accuracy of this documentation. The information contained herein is subject to change without notice.

Revision D
Publication date: August, 1983

Acknowledgements

The OS-9 C Compiler was written by James McCosh with OS-9 implementation assistance from Larry Crane and Kim Kempf. The Relocatable Assembler, Linker, and Profiler were written by Larry Crane and Kim Kempf. This manual was edited by Wes Camden and Ken Kaplan.

MICROWARE C COMPILER USER'S GUIDE
Table of Contents

CHAPTER 1 - THE C COMPILER SYSTEM

Introduction 1-1
The Language Implementation 1-2
  Differences From The K & R Specification 1-2
Enhancements And Extensions 1-3
  The "Direct" Storage Class 1-3
  Imbedded Assembly Language 1-4
  Control Character Escape Sequences 1-4
Implementation-Dependent Characteristics 1-5
  Data Representation and Storage 1-5
  Register Variables 1-5
  Access to Command Line Parameters 1-6
System Calls and The Standard Library 1-7
Run-Time Arithmetic Error Handling 1-8
Achieving Maximum Program Performance 1-9
  Programming Considerations 1-9
  The Optimizer Pass 1-9
  The Profiler 1-9
C Compiler Component Files and File Usage 1-10
Running the Compiler 1-11
Compiler Option Flags 1-13

CHAPTER 2 - CHARACTERISTICS OF COMPILED PROGRAMS

The Object Code Module 2-1
Memory Management 2-4
  C Program Memory Map 2-4
  Compile Time Memory Allocation 2-6

CHAPTER 3 - SYSTEM CALLS

System Calls 3-1

CHAPTER 4 - STANDARD LIBRARY

Standard Library 4-1

APPENDIX A - COMPILER ERROR MESSAGES A-1

APPENDIX B - COMPILER PHASE COMMAND LINES B-1

APPENDIX C - INTERFACING TO BASIC09 C-1

APPENDIX D - THE RELOCATING MACRO ASSEMBLER D-1

abort 3-2
abs 3-3
access 3-4
atof 4-3
atoi 4-3
atol 4-3
calloc 4-17
chain 3-5
chdir 3-6
chmod 3-7
chown 3-8
chxdir 3-6
clearerr 4-5
close 3-9
crc 3-10
creat 3-11
defdrive 3-12
dup 3-13
exit 3-14
fclose 4-4
fdopen 4-7
feof 4-5
ferror 4-5
fflush 4-4
fgets 4-13
fileno 4-5
findnstr 4-6
findstr 4-6
fopen 4-7
fprintf 4-19
fputs 4-23
fread 4-9
free 4-17
freemem 3-40
freopen 4-7
fscanf 4-25
fseek 4-10
ftell 4-10
fwrite 4-9
getc 4-11
getchar 4-11
getime 3-35
getpid 3-15
gets 4-13
getstat 3-16
getuid 3-18
getw 4-11
ibrk 3-33
index 4-30
intercept 3-19
isalnum 4-14
isalpha 4-14
isascii 4-14
iscntrl 4-14
isdigit 4-14
islower 4-14
isprint 4-14
ispunct 4-14
isspace 4-14
isupper 4-14
kill 3-21
l3tol 4-15
longjmp 4-16
lseek 3-22
ltol3 4-15
malloc 4-17
mknod 3-23
mktemp 4-18
modlink 3-24
modload 3-24
munlink 3-25
open 3-28
os9fork 3-29
pause 3-30
prerr 3-31
printf 4-19
putc 4-22
putchar 4-22
puts 4-23
putw 4-22
qsort 4-24
read 3-32
readln 3-32
rewind 4-10
rindex 4-30
sbrk 3-33
scanf 4-25
setbuff 4-27
setime 3-35
setjmp 4-16
setpr 3-34
setstat 3-37
setuid 3-36
signal 3-38
sleep 4-28
sprintf 4-19
sscanf 4-25
stacksize 3-39
strcat 4-29
strcmp 4-29
strcpy 4-30
strhcpy 4-30
strlen 4-30
strncat 4-29
strncpy 4-30
system 4-31
toascii 4-32
tolower 4-32
toupper 4-32
tsleep 3-42
ungetc 4-32
unlink 3-43
wait 3-44
write 3-45
writeln 3-45
_exit 3-13
_os9 3-25
_strass 4-41
_tolower 4-32
_toupper 4-32

TERMS AND CONDITIONS OF SALE AND LICENSE OF RADIO SHACK COMPUTER EQUIPMENT AND SOFTWARE PURCHASED FROM A RADIO SHACK COMPANY-OWNED COMPUTER CENTER, RETAIL STORE OR FROM A RADIO SHACK FRANCHISEE OR DEALER AT ITS AUTHORIZED LOCATION

LIMITED WARRANTY

I. CUSTOMER OBLIGATIONS

A. CUSTOMER assumes full responsibility that this Radio Shack computer hardware purchased (the "Equipment"), and any copies of Radio Shack software included with the Equipment or licensed separately (the "Software") meets the specifications, capacity, capabilities, versatility, and other requirements of CUSTOMER.

B. CUSTOMER assumes full responsibility for the condition and effectiveness of the operating environment in which the Equipment and Software are to function, and for its installation.

II. RADIO SHACK LIMITED WARRANTIES AND CONDITIONS OF SALE

A. For a period of ninety (90) calendar days from the date of the Radio Shack sales document received upon purchase of the Equipment, RADIO SHACK warrants to the original CUSTOMER that the Equipment and the medium upon which the Software is stored is free from manufacturing defects. THIS WARRANTY IS ONLY APPLICABLE TO PURCHASES OF RADIO SHACK EQUIPMENT BY THE ORIGINAL CUSTOMER FROM RADIO SHACK COMPANY-OWNED COMPUTER CENTERS, RETAIL STORES AND FROM RADIO SHACK FRANCHISEES AND DEALERS AT ITS AUTHORIZED LOCATION. The warranty is void if the Equipment's case or cabinet has been opened, or if the Equipment or Software has been subjected to improper or abnormal use. If a manufacturing defect is discovered during the stated warranty period, the defective Equipment must be returned to a Radio Shack Computer Center, a Radio Shack retail store, participating Radio Shack franchisee or Radio Shack dealer for repair, along with a copy of the sales document or lease agreement. The original CUSTOMER'S sole and exclusive remedy in the event of a defect is limited to the correction of the defect by repair, replacement, or refund of the purchase price, at RADIO SHACK'S election and sole expense. RADIO SHACK has no obligation to replace or repair expendable items.

B. RADIO SHACK makes no warranty as to the design, capability, capacity, or suitability for use of the Software, except as provided in this paragraph. Software is licensed on an "AS IS" basis, without warranty. The original CUSTOMER'S exclusive remedy, in the event of a Software manufacturing defect, is its repair or replacement within thirty (30) calendar days of the date of the Radio Shack sales document received upon license of the Software. The defective Software shall be returned to a Radio Shack Computer Center, a Radio Shack retail store, participating Radio Shack franchisee or Radio Shack dealer along with the sales document.

C. Except as provided herein no employee, agent, franchisee, dealer or other person is authorized to give any warranties of any nature on behalf of RADIO SHACK.

D. Except as provided herein, **RADIO SHACK MAKES NO WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

E. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation(s) may not apply to CUSTOMER.

III. LIMITATION OF LIABILITY

A. EXCEPT AS PROVIDED HEREIN, RADIO SHACK SHALL HAVE NO LIABILITY OR RESPONSIBILITY TO CUSTOMER OR ANY OTHER PERSON OR ENTITY WITH RESPECT TO ANY LIABILITY, LOSS OR DAMAGE CAUSED OR ALLEGED TO BE CAUSED DIRECTLY OR INDIRECTLY BY "EQUIPMENT" OR "SOFTWARE" SOLD, LEASED, LICENSED OR FURNISHED BY RADIO SHACK, INCLUDING, BUT NOT LIMITED TO, ANY INTERRUPTION OF SERVICE, LOSS OF BUSINESS OR ANTICIPATORY PROFITS OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OR OPERATION OF THE "EQUIPMENT" OR "SOFTWARE". IN NO EVENT SHALL RADIO SHACK BE LIABLE FOR LOSS OF PROFITS, OR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY BREACH OF THIS WARRANTY OR IN ANY MANNER ARISING OUT OF OR CONNECTED WITH THE SALE, LEASE, LICENSE, USE OR ANTICIPATED USE OF THE "EQUIPMENT" OR "SOFTWARE".

continued

NOTWITHSTANDING THE ABOVE LIMITATIONS AND WARRANTIES, RADIO SHACK'S LIABILITY HEREUNDER FOR DAMAGES INCURRED BY CUSTOMER OR OTHERS SHALL NOT EXCEED THE AMOUNT PAID BY CUSTOMER FOR THE PARTICULAR "EQUIPMENT" OR "SOFTWARE" INVOLVED.

B. RADIO SHACK shall not be liable for any damages caused by delay in delivering or furnishing Equipment and/or Software.

C. No action arising out of any claimed breach of this Warranty or transactions under this Warranty may be brought more than two (2) years after the cause of action has accrued or more than four (4) years after the date of the Radio Shack sales document for the Equipment or Software, whichever first occurs.

D. Some states do not allow the limitation or exclusion of incidental or consequential damages, so the above limitation(s) or exclusion(s) may not apply to CUSTOMER.

IV. RADIO SHACK SOFTWARE LICENSE

RADIO SHACK grants to CUSTOMER a non-exclusive, paid-up license to use the RADIO SHACK Software on **one** computer, subject to the following provisions:

A. Except as otherwise provided in this Software License, applicable copyright laws shall apply to the Software.

B. Title to the medium on which the Software is recorded (cassette and/or diskette) or stored (ROM) is transferred to CUSTOMER, but not title to the Software.

C. CUSTOMER may use Software on one host computer and access that Software through one or more terminals if the Software permits this function.

D. CUSTOMER shall not use, make, manufacture, or reproduce copies of Software except for use on **one** computer and as is specifically provided in this Software License. Customer is expressly prohibited from disassembling the Software.

E. CUSTOMER is permitted to make additional copies of the Software **only** for backup or archival purposes or if additional copies are required in the operation of **one** computer with the Software, but only to the extent the Software allows a backup copy to be made. However, for TRSDOS Software, CUSTOMER is permitted to make a limited number of additional copies for CUSTOMER'S own use.

F. CUSTOMER may resell or distribute unmodified copies of the Software provided CUSTOMER has purchased one copy of the Software for each one sold or distributed. The provisions of this Software License shall also be applicable to third parties receiving copies of the Software from CUSTOMER.

G. All copyright notices shall be retained on all copies of the Software.

V. APPLICABILITY OF WARRANTY

A. The terms and conditions of this Warranty are applicable as between RADIO SHACK and CUSTOMER to either a sale of the Equipment and/or Software License to CUSTOMER or to a transaction whereby RADIO SHACK sells or conveys such Equipment to a third party for lease to CUSTOMER.

B. The limitations of liability and Warranty provisions herein shall inure to the benefit of RADIO SHACK, the author, owner and/or licensor of the Software and any manufacturer of the Equipment sold by RADIO SHACK.

VI. STATE LAW RIGHTS

The warranties granted herein give the **original** CUSTOMER specific legal rights, and the **original** CUSTOMER may have other rights which vary from state to state.

RADIO SHACK, A DIVISION OF TANDY CORPORATION

U.S.A.: FORT WORTH, TEXAS 76102
CANADA: BARRIE, ONTARIO L4M 4W5

TANDY CORPORATION

AUSTRALIA	BELGIUM	U. K.
91 KURRAJONG ROAD MOUNT DRUITT, N.S.W. 2770	PARC INDUSTRIEL DE NANINNE 5140 NANINNE	BILSTON ROAD WEDNESBURY WEST MIDLANDS WS10 7JN

10/83-TM

Printed in U.S.A.