

TO: Distribution
FROM: P. Roach
DATE: March 20, 1972
SUBJECT: BOS Runcom Files

This memo obsoletes MOSN-198.

This MOSN documents the various runcom files used by BOS in the normal running of Multics. Once started, these runcoms will continue running unless stopped by the operator (either a boot of BOS or hitting the request button). The various options are invoked by using processor switches (switches 6 through 17 are reserved for use by the BOS runcoms). These runcoms are used to insure as fast crash recovery as possible by eliminating much of the typing that the operator must do. If the operator wishes to restart a particular runcom from a point within it, he may use the "RUNCOM SKIP name" BOS command to skip lines in the runcom until he reaches the point at which he wishes to start where he then types "GO".

This memo is divided into three parts. The first part is a brief explanation of each of the runcoms. The second part is a list of the processor switches as they are currently being used in the control of these runcoms. The third part is a printout of all of the runcoms as they are currently.

The operator should study the actual runcoms (part 3) so that he fully understands their flow. Should problems result during the running of these runcoms, he should be able to continue to the next phase easily.

I. Runcom Descriptions

MULTICS

This runcom prints appropriate entries in the configuration deck (CPU, MEM, CLOK, DRUM, D170, D270, SCHD, SST, THRS, TCD and DEBG cards). It then boots Multics (from tape 3). Upon return if switch 6 is set, the runcom STOPI which will leave the operator at BOS command level is called. Otherwise the runcom CRASH is invoked unless the system was shutdown. (Note: If the Salvager was not run before, the ERROR runcom is called instead of booting Multics.)

CRASH

This runcom calls "BLAST CRASH" to write a message on all users' consoles and then calls MDUMP to do the dumping, unless switch 7 was set. If switch 7 was set, the runcom will bypass the dump and drop into the ESD. If ESD fails, EDUMP is called to take a dump.

MDUMP

This runcom is the master dump runcom. It first takes a standard online dump (for the bootload CPU if running with both processors). It then tests switch 8 and, if it is on, calls the runcom TWOCPU to continue dumping for the second processor. If switch 8 is not on, it tests switch 9 and, if it is on, calls TDUMP to take a tape dump. This option is used when the operator does not want to take a disk dump (there are already too many dumps waiting to be processed or the system crashed before the dump could be taken from the dump partition). If switch 9 is not on, switch 10 is tested. This switch will cause the runcom STOP2 to be called to allow the operator to set the FDUMP number before an FDUMP is taken. Otherwise, FDUMP is called to take a dump to disk (DSU 170's). If the FDUMP fails, TDUMP is called automatically to take a dump on tape. If the FDUMP is successful, switch 11 is tested and, if it is on, IDUMP is called to take a dump of the initializer on tape. After that, ESD is invoked and, if it fails, EDUMP is called to take an ESD dump. If all goes well, the RECOVER runcom is called to do the salvaging and then call the MULTICS runcom.

TWOCPU

This runcom dumps online the segments used for analysis of two processor crashes and then duplicates the MDUMP runcom from after the test of switch 8.

I. Runcom Descriptions

TDUMP

This runcom is used if the operator does not wish to dump to disk or the FDUMP has failed. It instructs the operator to type the "PROC ALL" dump request with appropriate comments. After the dump is complete, it tests switch 11 to determine whether or not to call IDUMP. If not, an ESD is done and, if it fails, EDUMP is called. If the ESD does not fail, RECOVER is called.

IDUMP

This runcom takes a dump of the initializer's process on tape 1 and then does an ESD. If the ESD fails, EDUMP is called. Otherwise, RECOVER is invoked to run the salvager.

EDUMP

This runcom dumps the segments necessary to analyze ESD failures and then calls RECOVER to run the salvager.

RECOVER

This runcom tests switch 12 and, if it is on, calls STOP3 to allow the operator to do restores before salvaging. If switch 12 is not on and either there was a shutdown or completed emergency shutdown, the runcom FSALV is called to simulate a fast salvager. Otherwise, the command SALV is issued to boot the salvager tape. If an active salvager is run and there were fatal errors, the salvager is rebooted for a second (regular) run. After the completion of the salvager(s), switches 7 and 9 are tested. If either of these were on (meaning that the FDUMP was skipped), the runcom exits to BOS command level to allow the operator to reset the FDUMP number or whatever he may wish.

FSALV

This runcom can be called by the RECOVER runcom if a shutdown has taken place or an emergency shutdown has completed (SHUT = 4). It first tests the shutdown state to insure that it is "4" and then patches the shutdown state to "7" to indicate a completed salvager. If the shutdown state was not "4", the ERROR runcom is called.

I. Runcom Descriptions

ERROR

This runcom is called whenever a logical error is detected in the running of the BOS runcoms. It just prints a comment to that effect and ends. The operator should correct the error and then restart the appropriate runcom (usually RECOVER).

STOP1

This runcom is called after returning to BOS if switch 6 was set. It just leaves the operator at BOS command level.

STOP2

This runcom is called if switch 10 is set before taking a FDUMP. It allows the operator to correct the FDUMP number and it takes the FDUMP. If the FDUMP fails, TDUMP is called. Otherwise, ESD is called and if it fails, EDUMP is called. If the ESD does not fail, RECOVER is invoked to run the salvager.

STOP3

This runcom is called before salvaging if switch 12 is on. It allows the operator to do any restores or reconfiguration which might be necessary. When he is done, he types "RECOVER" to do the salvaging (after turning switch 12 off).

II. Summary of Switches for Controlling BOS Runcoms.

The following is a summary of the actions controlled by the processor switches as used by the BOS runcoms. These switches should be set as soon as it is determined that the action resulting from the setting of the switches is desired the next time the BOS runcoms are entered. For example switch 8 should be set when adding the second processor and switch 12 should be set after receiving a fatal disk/drum error. The switches should be reset when Multics is next booted.

switch	usage
6 (004000)	To avoid calling the "CRASH" runcom when entering BOS other than via a shutdown.
7 (002000)	To skip taking a dump and go directly to the ESD. (It will also cause a stop after salvaging to allow correcting the FDUMP number.)
8 (001000)	To indicate that two processors are being used and that a online dump of the non-bootload CPU is to be taken.
9 (000400)	To skip the dump to disk (FDUMP) and call TDUMP (for a tape dump) automatically. (It will also cause a stop after salvaging to allow correcting the FDUMP number.)
10 (000200)	To stop before the dump to disk to allow correcting the FDUMP number. (Used if Multics was booted before the FDUMP number could be corrected at one of the other stops.)
11 (000100)	To take a (tape) dump of the initializer's process.
12 (000040)	To stop before salvaging to allow restores or reconfiguration.

III. BOS Runcoms as of 03/16/72

MULTICS

```

RUNCOM LOAD MULTICS * R. ROACH - 03/16/72
QUIET
WRITE MULTICS
CONFIG P CPU MEM CLOK DRUM D170 D270 SCHED SST THRS TCD DEBG
IF SHUT EQ 7 BOOT * BOOT MULTICS IF FAST SALV WORKED
IF SHUT EQ 13 BOOT * BOOT MULTICS IF ACTIVE SALV WORKED
IF SHUT EQ 16 BOOT * BOOT MULTICS IF REGULAR SALV WITH ERRORS
IF SHUT EQ 17 BOOT * BOOT MULTICS IF REGULAR SALV WORKED
IF SHUT EQ 22 BOOT * BOOT MULTICS IF LONG SALV WITH ERRORS
IF SHUT EQ 23 BOOT * BOOT MULTICS IF LONG SALV WORKED
IF SWITCH 004000000000 EQ 004000000000 STOP1 * SWITCH 6
IF SHUT NEQ 4 CRASH * CRASH UNLESS NORMAL SHUTDOWN
RUNCOM END * MULTICS

```

CRASH

```

RUNCOM LOAD CRASH * R. ROACH - 02/08/72 - FOR 16.0 AND ABOVE
QUIET
WRITE UPDATE THE RECORDER, CALL JORDAN/ROACH IF FROM 0900 TO 2400
BLAST CRASH * SEND OUT WARNING TO USERS
IF SWITCH 002000000000 NEQ 002000000000 MDUMP * SWITCH 7
WRITE ESD
ESD
IF SHUT EQ 3 RECOVER * IF ESD WORKED, RECOVER MULTICS
IF SHUT EQ 4 RECOVER * IF ESD WORKED, RECOVER MULTICS
EDUMP * OTHERWISE, TAKE ESD DUMP
RUNCOM END * CRASH

```

RECOVER

```

RUNCOM LOAD RECOVER * R. ROACH - 03/16/72
QUIET
WRITE RECOVER
IF SWITCH 000040000000 EQ 000040000000 STOP3 * SWITCH 12
IF SHUT EQ 4 FSALV * IF SHUTDOWN COMPLETE, SIMULATE FAST SALV.
PATCH * THESE 3 CARDS ARE A TEMP FIX UNTIL ACTIVE SALV WORKS
SET D270 0 31 0 * FOR NOW, INSURE REGULAR SALVAGER RUNS
QUIT * END OF TEMP FIX
WRITE SALV
SALV
IF SHUT EQ 12 WRITE READY SALV TAPE FOR ANOTHER RUN
IF SHUT EQ 12 SALV * RERUN SALV IF FATAL ACTIVE SALV ERRORS
IF SWITCH 002400000000 EQ 000000000000 MULTICS * SWITCHES 7 OR 9
WRITE STOP DUE TO SWITCH 7 OR 9, EXITING FROM THE RUNCOMS
RUNCOM END * RECOVER

```

III. BOS Runcoms as of 03/16/72

MDUMP

```
RUNCOM LOAD MDUMP * R. ROACH - 03/16/72
QUIET
WRITE MDUMP
DUMP * ONLINE DUMP
REG * ONLINE DUMP FOR BOOTLOAD CPU
CONFIG * CONFIGURATION DECK
SEG 7 * SST
SEG 46 * II
STACK 57 * PDS/PDF FOR BOOTLOAD CPU
STACK 61 * PRDS FOR BOOTLOAD CPU
SEG 74 * TC DATA
QUIT * END OF ONLINE DUMP FOR BOOTLOAD CPU
IF SWITCH 001000000000 EQ 001000000000 TWOCPU * SWITCH 8
IF SWITCH 000400000000 EQ 000400000000 TDUMP * SWITCH 9
IF SWITCH 000200000000 EQ 000200000000 STOP2 * SWITCH 10
WRITE FDUMP
FDUMP * DUMP ON TO D170'S
IF FDUMP NEQ 3 TDUMP * IF FDUMP FAILS, TAKE TAPE DUMP
IF SWITCH 000100000000 EQ 000100000000 IDUMP * SWITCH 11
WRITE ESD
ESD
IF SHUT EQ 3 RECOVER * IF ESD WORKED, RECOVER MULTICS
IF SHUT EQ 4 RECOVER * IF ESD WORKED, RECOVER MULTICS
EDUMP * OTHERWISE, TAKE ESD DUMP
RUNCOM END * MDUMP
```

FSALV

```
RUNCOM LOAD FSALV * R. ROACH - 03/16/72
QUIET
WRITE FSALV - SIMULATE FAST SALVAGER
IF SHUT EQ 0 ERROR * ERROR IF NOT A COMPLETE SHUTDOWN
IF SHUT EQ 1 ERROR * ERROR IF NOT A COMPLETE SHUTDOWN
IF SHUT EQ 2 ERROR * ERROR IF NOT A COMPLETE SHUTDOWN
IF SHUT EQ 3 ERROR * ERROR IF NOT A COMPLETE SHUTDOWN
PATCH
SET D270 0 31 7 * SIMULATE COMPLETION OF FAST SALV
QUIT
MULTICS
RUNCOM END * FSALV
```

III. BOS Runcoms as of 03/16/72

TWOCPU

```
RUNCOM LOAD TWOCPU * R. ROACH - 02/08/72 - FOR 16.0 AND ABOVE
WRITE TWOCPU DUMP
QUIET OFF
DUMP * ONLINE DUMP FOR NON-BOOTLOAD CPU
TTY * TYPE DBR XXXXXX, WHERE XXXXXX IS 6 DIGIT DBR FROM NON-BOOTLOAD CPU
QUIET
REG * ONLINE DUMP FOR NON-BOOTLOAD CPU
STACK 57 * PDF/PDS FOR NON-BOOTLOAD CPU
STACK 61 * PRDS FOR NON-BOOTLOAD CPU
SEG 64 * SCAS
SEG 65 * SCS
QUIT
IF SWITCH 000400000000 EQ 000400000000 TDUMP * SWITCH 9
IF SWITCH 000200000000 EQ 000200000000 STOP2 * SWITCH 10
WRITE FDUMP
FDUMP * DUMP ON TO D170S
IF FDUMP NEQ 3 TDUMP * IF FDUMP FAILS, TAKE TAPE DUMP
IF SWITCH 000100000000 EQ 000100000000 IDUMP * SWITCH 11
WRITE ESD
ESD
IF SHUT EQ 3 RECOVER * IF ESD WORKED, RECOVER MULTICS
IF SHUT EQ 4 RECOVER * IF ESD WORKED, RECOVER MULTICS
EDUMP * OTHERWISE, TAKE ESD DUMP
RUNCOM END * TWOCPU
```

TDUMP

```
RUNCOM LOAD TDUMP * R. ROACH - 02/08/72 - FOR 16.0 AND ABOVE
QUIET
WRITE TDUMP - MOUNT DUMP TAPE ON DRIVE 1
WRITE TYPE 'PROC ALL *' ERF NO., TAPE NO., COMMENTS
DUMP
TAPE 1
TTY * TYPE 'PROC ALL *' ERF NO., TAPE NO., COMMENTS
EOF
QUIT
IF SWITCH 000100000000 EQ 000100000000 IDUMP * SWITCH 11
WRITE ESD
ESD
IF SHUT EQ 3 RECOVER * IF ESD WORKED, RECOVER MULTICS
IF SHUT EQ 4 RECOVER * IF ESD WORKED, RECOVER MULTICS
EDUMP * OTHERWISE, TAKE ESD DUMP
RUNCOM END * TDUMP
```


III. BOS Runcoms as of 03/16/72

IDUMP

```
RUNCOM LOAD IDUMP * R. ROACH - 03/16/72
QUIET
WRITE IDUMP - MOUNT DUMP TAPE FOR INITIALIZER DUMP ON DRIVE 1
DUMP * TAKE INITIALIZER DUMP
TAPE 1
DBR 105024 * SET INITIALIZERS DBR
DUMP W * INITIALIZER DUMP
EOF
QUIT
WRITE ESD
ESD
IF SHUT EQ 3 RECOVER * IF ESD WORKED, RECOVER MULTICS
IF SHUT EQ 4 RECOVER * IF ESD WORKED, RECOVER MULTICS
EDUMP * OTHERWISE, TAKE ESD DUMP
RUNCOM END * IDUMP
```

EDUMP

```
RUNCOM LOAD EDUMP * R. ROACH - 02/08/72 - FOR 16.0 AND ABOVE
QUIET
WRITE EDUMP
DUMP * TAKE DUMP OF ESD FAILURE
REG * ESD FAILURE DUMP - LEAVE IN NIMS BIN WITH COMMENTS
SEG 2 * MAILBOX
SEG 4 * DRUM MAILBOX
SEG 7 * SST
SEG 11 * ESD
SEG 12 * ESD.LINK
SEG 13 * DSU170 SEG
SEG 14 * DSU270 SEG
SEG 15 * MINI-GIM DATA
SEG 46 * II
STACK 57 * PDF/PDS
STACK 61 * PRDS
STACK 66 * SHUTDOWN STACK
SEG 74 * TC DATA
QUIT
RECOVER
RUNCOM END * EDUMP
```

III. BOS Runcoms as of 03/16/72

ERROR

RUNCOM LOAD ERROR * R. ROACH - 02/08/72
QUIET
WRITE ERROR - A LOGICAL ERROR HAS OCCURED IN THE RUNNING OF THE BOS RUNCOM'S.
RUNCOM END * ERROR

STOP1

RUNCOM LOAD STOP1 * R. ROACH - 07/26/71
QUIET OFF
* STOP DUE TO SWITCH 6, TYPE 'CRASH' TO INVOKE CRASH PROCEDURES
RUNCOM END * STOP 1

STOP2

RUNCOM LOAD STOP2 * R. ROACH - 02/08/72 - FOR 16.0 AND ABOVE
QUIET
WRITE STOP TO CORRECT FDUMP NUMBER - SWITCH 10
WRITE TYPE 'FDUMP XXX' WHERE XXX IS THE ERF. NO. OF THE DUMP TO BE TAKEN
TTY
WRITE FDUMP
FDUMP
IF FDUMP NEQ 3 TDUMP * IF FDUMP FAILS, TAKE TAPE DUMP
WRITE ESD
ESD
IF SHUT EQ 3 RECOVER * IF ESD WORKED, RECOVER MULTICS
IF SHUT EQ 4 RECOVER * IF ESD WORKED, RECOVER MULTICS
EDUMP * OTHERWISE, TAKE ESD DUMP
RUNCOM END * STOP2

STOP3

RUNCOM LOAD STOP3 * R. ROACH - 07/26/71
QUIET OFF
* STOP BEFORE SALVAGING TO ALLOW RESTORES * SWITCH 12
* WHEN DONE, RESET SWITCH 12 (000040) AND TYPE 'RECOVER'
RUNCOM END * STOP3