

| TIME  | REF | ROUTINE COMMAND | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES                        |
|-------|-----|-----------------|--------|-------------|-----|---|--------------------------------------|
| T-225 | 235 | (Continued)     |        |             |     | Start Stage II missile hydraulic pump.  |                                      |
|       |     |                 |        |             |     | Discontinue monitoring of the missile Stage II hydraulic reservoir level for 10 sec minimum.  |                                      |
| T-224 |     |                 |        | LCS         | 184 | Raise counterweight lifting rod.  |                                      |
| T-215 |     |                 |        | PLPS        | 224 | (Prior to incorporation of TCTO 31X3-10-11-613)<br>Close Stage I lox umbilical drain valves.  | Stage I lox fill line disconnected.  |
|       |     |                 |        |             |     | (Prior to incorporation of TCTO 31X3-10-11-613)<br>Close Stage II lox umbilical drain valves. | Stage II lox fill line disconnected. |
|       |     |                 |        |             |     | (Prior to incorporation of TCTO 31X3-10-11-613)<br>Close Stage I lox umbilical purge valves.  | Stage I lox fill line disconnected.  |
|       |     |                 |        |             |     | (Prior to incorporation of TCTO 31X3-10-11-613)<br>Close Stage II lox umbilical purge valves. | Stage II lox fill line disconnected. |
| T-214 |     |                 |        | LCS         | 184 | Open lower shelter door.  | Upper shelter door 30 degrees open.  |
| T-209 |     |                 |        | LCS         | 184 | Release wire rope lock.   | Counterweight raised off support.    |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 17 of 39)

Changed 18 December 1963 TOCN-1 (DEN-5)

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| TIME  | REF | ROUTINE COMMAND   | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES   |
|-------|-----|---|--------|-------------|-----|---|---|
| T-204 |     |   |        | LCS         | 184 | Insert counterweight cylinder (fork).   |   |
| T-198 |     |   |        | LCS         | 184 | Release counterweights to drive base locks.   |   |
| T-197 | 290 | (Prior to incorporation of TCTO 31X3-10-11-613) Umbilicals disconnected (C).      | PLPS   |             |     |   | Lox lines disconnected.                                 |
| T-195 | 304 | (Prior to incorporation of TCTO 31X3-10-11-613) Retract support mechanisms (C).   | LS     | LS          |     | Provide retract support mechanisms prerequisite.  | Propellant fill lines disconnected (item 290 received). |
|       |     |   |        | LCS         |     | Retract Stage I lox line (1ELL) support mechanism.<br>Retract Stage II lox line (3BLL) support mechanism. |   |
| T-195 | 312 | (Prior to incorporation of TCTO 31X3-10-11-613) Crib umbilicals disconnected (C). | LS     | CCC         |     | CRIB UMB DISC indicator white on LCC.   | Item 290 received.                                      |

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Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 17A of 39)

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Section III

Changed 18 December 1963 TOCN-1 (DEN-5)

| TIME  | REF | ROUTINE COMMAND  | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES  |
|-------|-----|--|--------|-------------|-----|--|--|
| T-190 | 318 | (Prior to incorporation of TCTO 31X3-10-11-613) Check umbilicals disconnected (M). | LS     | PLPS        |     | Check item 290 initiated.<br><br>Check Stage I/II missile fuel storage valves open.<br><br>Discontinue monitoring of helium tanks above minimum pressures. | Not in exercise mode.  |
| T-185 |     |  |        | LCS         | 304 | Retract launcher platform locks.<br><br>Turn off launcher platform oil pressure.<br><br>Raise launcher platform.   | Shelter doors opened, crib leveled and locked, counterweight cylinder locks inserted, counterweight support retracted, and umbilical support mechanisms retracted.<br><br>Launcher platform locks retracted.<br><br>Launcher platform locks retracted. |
| T-160 | 328 | Pressurize fuel tanks (M)  | LS     |             |     |  |  |

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Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 17B of 39)

T.O. 21-SM68-1

Section III

| TIME  | REF | ROUTINE COMMAND                  | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES  |
|-------|-----|----------------------------------|--------|-------------|-----|---|--|
| T-160 | 328 | (Continued)                      |        | PLPS        |     | Close Stage II fuel tank vent and relief valves.<br><br>Open Stage I/II fuel secondary pressure regulators.<br><br>Close Stage I/II lox tank vent valves (two solenoids each vent valve). | Stage I/II lox line end valves and lox topping end valves closed.  |
| T-160 |     |                                  |        | PLPS        | 328 | Turn off lox vent exhaust blower.<br><br>De-energize Stage I/II lox tank vent valve, force close solenoids, and disable force close solenoid control circuit.                             | Stage I/II lox tank vent and relief valves closed.<br><br>Stage I/II lox tank vent and relief valves closed. |
| T-160 |     |                                  |        | GGG         | 192 | Ant raise pushbutton indicator green on MGC.<br><br>Initiate level function if required.  | Antenna fully raised.<br><br>Antenna fully raised and blast detected.  |
| T-100 | 344 | Pressurize Stage II lox tank (M) | LS     | PLPS        |     | Open Stage II lox secondary pressure regulator.   |  |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 18 of 39)

| TIME  | REF | ROUTINE COMMAND                 | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES                                       |
|-------|-----|---------------------------------|--------|-------------|-----|--|---|
| T-100 | 352 | Activate batteries (m)          | LS     |             |     |  | System not in exercise mode.                        |
|       |     |                                 |        | ES          |     | Start missile 400 CPS inverter.                                    |   |
|       |     |                                 |        |             |     | Activate inverter and hydraulic pump batteries.                    |   |
| T-80  | 360 | Pressurize Stage I lox tank (M) | LS     |             |     |  |   |
|       |     |                                 |        | PLPS        | 360 | Open Stage I lox secondary pressure regulator.                     |   |
|       |     |                                 |        | ES          |     | De-energize missile inverter output transfer relay.                | Item 352 received.                                  |
|       |     |                                 |        | TCS         |     | Lock up target selection.  |   |
|       |     |                                 |        |             |     | Change select TARGET number indication from green to white on LCC. |   |
|       |     |                                 |        | FCS         |     | Reset missile programmer.  |   |
| T-78  | 368 | Missile tanks pressurized (C)   | PLPS   |             |     |  | Stage I/II fuel, lox, and helium tanks pressurized. |
|       |     |                                 |        | CCC         |     | White MISSILE TANKS PRESS'D white on LCC.                          |   |
| T-70  |     |                                 |        | LCS         | 304 | Insert launcher platform vertical load locks.                      | Platform fully raised.                              |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 19 of 39)

| TIME | REF | ROUTINE COMMAND                | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES   |
|------|-----|--------------------------------|--------|-------------|-----|--|---|
| T-70 |     | (Continued)                    |        |             |     | Turn on launcher platform oil pressure.            | Platform fully raised.  |
|      |     |                                |        |             |     | Extend flame deflector extension.                  | Platform fully raised.  |
| T-65 |     |                                |        | LCS         | 304 | Insert launcher platform lateral load locks.       | Vertical load locks inserted.                                     |
| T-60 |     |                                |        | LCS         | 304 | Shut off launcher platform drive.                  | Load locks inserted and flame deflector extended.                 |
| T-55 | 432 | Launcher up and locked (c)     | LCS    |             |     |  | Launcher platform fully up and locked.                            |
|      |     |                                |        | LS          |     | Provide ready to launch prerequisite.              |   |
|      |     |                                |        | LCS         |     | Charge umbilical tower accumulator.                |   |
|      |     |                                |        |             |     | Open water supply valve.                           | Flame deflector and engine compartment water spray valves closed. |
|      |     |                                |        | LCS         |     | Replace LCS go signal with launcher ready to fire. | Launcher platform fully up and locked.                            |
| T-55 | 436 | Launcher raising completed (c) | LS     |             |     |  | Item 432 received.  |
|      |     |                                |        | CCC         |     | Provide launcher lowering prerequisite.            |   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 20 of 39)

| TIME                | REF | ROUTINE COMMAND                     | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES  |
|---------------------|-----|-------------------------------------|--------|-------------|-----|--|--|
| T-41<br>+ 30<br>sec | 440 | Check launcher up and<br>locked (M) | LS     | LCS         | 440 | Check item 432 initiated   | T-41 and 30 second<br>time delay elapsed.  |
| T-41                | 448 | Check missile tanks<br>pressurized  | LS     | FCS         |     | Unfreeze FCS go status<br>Check gyro temperatures<br>Check gyro spin motors<br>operating.<br>Check programmer reset<br>Check missile 25 VDC. |  |
| T-41                |     |                                     |        | GGs         | 192 | Provide missile ready<br>prerequisite.   | Antenna level function<br>complete (if run).   |
| Second<br>hold      | 456 | Ready to launch (C)                 | LS     | CCC         |     | LAUNCH indicator green<br>on LCC.  | Launcher up and lock-<br>ed (item 432), missile/<br>facility go, item 548<br>(GGs operating) not<br>present, second timing<br>sequence completed and<br>ground guidance ready. |
|                     |     |                                     |        | TDB         |     | Stop countdown timer<br>clock at second hold<br>position.<br>Start digital hold time<br>indicator.   |  |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 21 of 39)

Changed 18 December 1963 TOCN-1 (DEN-5)

| TIME   | REF | ROUTINE COMMAND             | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES                  |
|--------|-----|-----------------------------|--------|-------------|-----|--|--------------------------------|
| T-39.9 | 464 | Start firing sequence.      | LCC    |             |     |  | LAUNCH pushbutton pressed.     |
|        |     |                             |        | LS          |     | Start third timing sequence.   | Ready to launch.               |
| T-39.9 | 470 | Firing sequence started.    | LCC    |             |     |  |                                |
|        |     |                             |        | PLPS        | 470 | Momentarily monitor for Stage I/II fuel, lox, and helium tanks pressure. |                                |
| T-39.9 | 472 | Firing sequence started (C) | LS     |             |     |  | Third timing sequence started. |
|        |     |                             |        | CCC         |     | LAUNCH indicator white on LCC.   |                                |
|        |     |                             |        | TCS         |     | Provide target select prerequisite.                                      |                                |
|        |     |                             |        | TDB         |     | Re-start countdown timer clock.  |                                |
|        |     |                             |        |             |     | Stop digital hold time indicator and reset to zero.                      |                                |
|        |     |                             |        | ECS         |     | Arm Stage II airborne sequencer. Open OSBVAP. Close GGVP.                |                                |
|        |     |                             |        | FCS         |     | Freeze FCS go status.  |                                |

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Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 22 of 39)

T.O. 21-SM68-1

Section III



| TIME   | REF | ROUTINE COMMAND                  | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES   |
|--------|-----|----------------------------------|--------|-------------|-----|--|---|
| T-39.9 | 480 | Transfer Power (M)               | LS     | ES          |     | Transfer missile inverter to battery.<br>Transfer Stage II missile hydraulic pump to battery.<br>Remove ground power from missile battery heater control circuits. | Third timing sequence started and system not in exercise mode.<br>Missile inverter battery voltage present.<br>Missile hydraulic battery voltage present. |
| T-39.9 | 484 | Target select (C)                | TCS    | GGC         |     | Select designated target program for computer.<br>SELECT TARGET push-button indicator green on MGC.  | Item 472 received.<br>Target designated by computer.  |
| T-39.9 | 488 | Missile X ready (1, 2, or 3) (C) | CCC    | GGC         | 488 | SELECT LAUNCHER push-button indicator white on MGC.<br>MISSILE READY indicator white on MGC.   | Item 472 received.<br>SELECT TARGET push-button indicator green, SELECT LAUNCHER push-button indicator white.   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 23 of 39)

| TIME   | REF | ROUTINE COMMAND            | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES  |
|--------|-----|----------------------------|--------|-------------|-----|---|--|
| T-39.9 |     |                            |        | GCS         | 488 | Press ACQ MISSILE push-button indicator on MGC (manual).<br><br>SELECT LAUNCHER push-button indicator green on MGC.<br><br>ACQ MISSILE pushbutton indicator white on MGC.   | MISSILE READY indicator white.<br><br>ACQ MISSILE push-button indicator pressed and acquisition in progress.<br><br>Antenna in position and AFC started. |
| T-35   | 504 | Bleed Stage I lox tank (M) | LS     | PLPS        |     | (Prior to incorporation of TCTO 31X3-10-11-617)<br>Open intermittent service pressure regulating valve (FCV-513).<br><br>(After incorporation of TCTO 31X3-10-11-617)<br>Open intermittent service pressure regulating valve (FCV-513) and lock<br>PLPS GO. | Item 472 received.   |
|        |     |                            |        | ECS         |     | De-energize GGVPV open Solenoid.<br><br>Energize GGVPV close solenoid.  |  |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 24 of 39)

Changed 18 December 1963 TOCN-1 (DEN-5)

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| TIME | REF | ROUTINE COMMAND | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES |
|------|-----|-----------------|--------|-------------|-----|---|---------------|
| T-35 | 504 | (Continued)     | ECS    |             | 488 | Energize (open) Stage I<br>lox tank bleed valve<br>pilot valve (1 and 2)<br>OSBVPV.<br><br>Energize (open) gas<br>generator oxidizer<br>purge valve (GGOPV).<br><br>Energize (open) ATPA<br>fuel discharge<br>bleed valve (FDBVAP). |               |

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Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 24A of 39)

| TIME | REF | ROUTINE COMMAND        | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES  |
|------|-----|------------------------|--------|-------------|-----|--|--|
| T-35 | 504 | (Continued)            |        |             |     | Energize (open) gas generator valve fuel bleed valve (GGVFBV). |  |
|      |     |                        |        |             |     | Remove arm Stage II airborne sequencer signal.                 |  |
| T-35 | 512 | Transfer DC bus (M)    | LS     |             |     |  | System not in exercise mode.                                 |
|      |     |                        |        | ES          |     | Transfer missile DC buses to inverter battery.                 |  |
|      |     |                        |        |             |     | Arm explosive bolt firing circuits.                            |  |
| T-35 | 520 | Power transferred (C)  | ES     |             |     |  | Power transfer completed.                                    |
|      |     |                        |        | CCC         |     | POWER TRANSFERRED indicator white on LCC.                      |  |
| T-30 |     |                        |        | LCS         | 304 | Pre-fill engine and spray lines.                               |  |
| T-25 | 536 | Guidance locked on (C) | GG5    |             |     |  | Missile acquired in frequency, range, azimuth and elevation. |
|      |     |                        |        | CCC         |     | GUIDANCE LOCKED ON indicator white on LCC.                     |  |
| T-25 | 544 | Enable loop check (C)  | CCC    |             |     |  | Item 536 received.   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 25 of 39)

| TIME | REF | ROUTINE COMMAND          | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES  |
|------|-----|--------------------------|--------|-------------|-----|---|--|
| T-25 | 544 | (Continued)              |        | FCS         |     | Prepare for RGS/FCS loop check.   |  |
|      |     |                          |        | CCC         |     | Provide initiate loop check prerequisite.   |  |
| T-25 | 548 | GGG Operating (C)        | CCC    | LS          |     |   | Item 536 received.<br><br>Note<br>LS monitors item 548 as interlock to prevent generation of enable launcher signal until T + 170. |
| T-25 | 560 | Initiate loop check (C)  | CCC    | GGG         |     | Initiate guidance commands for loop check: Stage I = pitch up yaw right 2°; Stage II = pitch up yaw right 1.12° verniers = hard over (pitch and yaw). | Item 544 received.   |
| T-18 | 600 | Loop check complete (C)  | FCS    | CCC         |     | LOOP CHECK COMPL indicator white on LCC.  | RGS/FCS loop check completed satisfactorily.   |
| T-18 | 608 | Completed loop check (C) | CCC    | GGG         |     | Computer commences guidance program.  | Item 600 received.   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 26 of 39)

| TIME | REF | ROUTINE COMMAND                | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES                        |
|------|-----|--------------------------------|--------|-------------|-----|---|--------------------------------------|
| T-18 | 608 | (Continued)                    |        |             |     | Turn ACQ MISSILE push-button indicator green on MGC.  | Computer commenced guidance program. |
| T-5  | 568 | Shut off missile nitrogen. (M) | LS     |             |     |   | Item 472 received.                   |
|      |     |                                |        | PLPS        |     | Close Stage I/II missile pneumatic nitrogen supply valves.  |                                      |
| T-5  | 576 | Prepare to fire (M)            | LS     |             |     |   |                                      |
|      |     |                                |        | LCS         |     | Shut off hydraulic lines to umbilical tower accumulator.  |                                      |
|      |     |                                |        |             |     | Check umbilical tower hydraulic accumulator changed and the main water supply valve open. (if above not accomplished, punch out fault on tape.) |                                      |
| T-5  | 584 | Check power transferred. (M)   | LS     |             |     |   | System not in exercise mode.         |
|      |     |                                |        | ES          |     | Check item 520 initiated.   |                                      |
|      |     |                                |        |             |     | Check for AC power transferred.   |                                      |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 27 of 39)

| TIME | REF | ROUTINE COMMAND                | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES |
|------|-----|--------------------------------|--------|-------------|-----|--|---------------|
| T-5  | 584 | (Continued)                    |        |             |     | Discontinue monitoring of Stage I/II missile hydraulic reservoir levels. |               |
| T-1  | 624 | Check loop check complete. (M) | LS     |             |     |  |               |
|      |     |                                |        | TCS         |     | Unfreeze target go status.   |               |
|      |     |                                |        | CCC         |     | Provide check ready to guide prerequisites.                              |               |
|      |     |                                |        | RVS         |     | Unfreeze RVS go status.  |               |
|      |     |                                |        |             |     | Check R/V battery temperature (Mark 3 R/V).                              |               |
|      |     |                                |        |             |     | Check arming and fuzing continuity (Mark 3 R/V).                         |               |
|      |     |                                |        |             |     | Check R/V fuze setting.  |               |
|      |     |                                |        |             |     | Check arming and fuzing safety monitor (mark 4 R/V).                     |               |
|      |     |                                |        |             |     | Check warhead safety monitor (mark 4 R/V).                               |               |
|      |     |                                |        | FCS         |     | Unfreeze FCS go status.  |               |
|      |     |                                |        |             |     | Check item 600 initiated.  |               |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 28 of 39)

| TIME | REF | ROUTINE COMMAND          | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES      |
|------|-----|--------------------------|--------|-------------|-----|--|--------------------|
| T-1  | 624 | (Continued)              |        |             |     | Check gyro temperatures.<br>Check gyro spin motors operating.<br>Check engine nulls.<br>Reset missile programmer.<br>Check missile 25 VDC. |                    |
| T-1  | 632 | Check ready to guide (M) | CCC    | GGG         |     | Check that computer has commenced guidance program.  | Item 624 received. |
| T-0  | 640 | Firing engines (M)       | LS     | FCS         |     | Freeze FCS go status.<br>Uncage displacement gyros.  |                    |
|      |     |                          |        | RVS         |     | Freeze RVS go status.  |                    |
|      |     |                          |        | PLPS        |     | Close helium transfer valve. Close FCV 601/602 and FCV 610.<br>Close intermittent service pressure regulating valve (FCV 513).             |                    |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 29 of 39)



| TIME | REF | ROUTINE COMMAND          | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES                |
|------|-----|--------------------------|--------|-------------|-----|---|------------------------------|
| T-0  |     | (Continued)              |        | LS          |     | Interrupt energize RGS signal.  |                              |
|      |     |                          |        | CCC         |     | Provide completed launch exercise prerequisite.                           |                              |
| T-0  |     |                          |        | TCS         | 640 | Freeze target go status.  |                              |
| T-0  | 648 | Fire Stage I engines (M) | LS     |             |     |   | System not in exercise mode. |
|      |     |                          |        | ECS         |     | Remove ground supplied power to Stage II TPA heaters.                     |                              |
|      |     |                          |        |             |     | De-energize (close) Stage I lox bleed valve pilot valve (1 and 2) OSBVPV. |                              |
|      |     |                          |        |             |     | De-energize (close) ATPA fuel discharge bleed valve (FDBVAP).             |                              |
|      |     |                          |        |             |     | De-energize (close) gas generator valve fuel bleed valve (GGVFBV).        |                              |
|      |     |                          |        |             |     | De-energize Stage I TPA heaters.  |                              |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 30 of 39)

| TIME | REF | ROUTINE COMMAND | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES  |
|------|-----|-----------------|--------|-------------|-----|---|--|
| T-0  |     | (Continued)     |        |             |     | Energize Stage I thrust chamber igniters. (TCIGN).                  | Power is sensed on GGVPV closed solenoid.                                      |
|      |     |                 |        | LS          |     | Energize (open) TPA starter valve (TPAXV).                          | Power is supplied to TCIGNS.   |
|      |     |                 |        |             |     | Provide internal signal to back up LCS go.                          |  |
| T-0  |     |                 |        | ECS         | 648 | De-energize gas generator valve pilot valve close solenoid (GGVPV). | Both TCV 65 percent open (TCV switches actuated).                              |
|      |     |                 |        |             |     | Energize Stage I gas generator igniters (GGIGN).                    | Both TCV 65 percent open (TCV switches actuated).                              |
|      |     |                 |        |             |     | Energize GGVPV open solenoid.                                       | Both TCV 65 percent open (TCV switches actuated).                              |
|      |     |                 |        |             |     | Close TPA starter valve (TPAXV).                                    | Either GGV 30 percent open (GGV switches actuated).                            |
|      |     |                 |        |             |     | De-energize thrust chamber igniters (TCIGN).                        | Either GGV 30 percent open (GGV switches actuated).                            |
|      |     |                 |        |             |     | De-energize (close) gas generator oxidizer de-energize GGVPV.       | Either GGV 30 percent open (GGV switches actuated) either GGV 30 percent open. |
|      |     |                 |        |             |     | Open solenoid.  | (GGV switches actuated).   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 31 of 39)

| TIME | REF | ROUTINE COMMAND           | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES  |
|------|-----|---------------------------|--------|-------------|-----|---|--|
| T-0  |     | (Continued)               |        |             |     | De-energize Stage I gas generator igniters (GGIGN). | Either GGV 30 percent open (GGV switches actuated).  |
| T+2  | 656 | Start Missile release (C) | ECS    |             |     |   | Both thrust chambers up to 440 PSIG (thrust chamber pressure switches actuated for 50 milliseconds). |
| T+4  |     |                           |        | ES          | 656 | Fire missile support explosive bolts.               | Item 512 received and approximately two seconds time delay 656 received.                             |
|      |     |                           |        |             |     | Fire umbilical tower explosive bolts.               | Item 512 received and approximately two seconds time delay expired after item 656 received.          |
| T+4  | 660 | Fire bolts (C)            | ES     | LS          |     | Inhibit automatic shut-down generation.             | Item 656 generated.  |
| T+4  | 664 | Lift off (C)              | ES     | CCC         |     | LIFT OFF indicator white on LCC.                    | Item 656 received and missile support bolts fired.   |
|      |     |                           |        | LS          | 644 | Provide enable launcher raising prerequisite.       |  |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 32 of 39)

| TIME | REF | ROUTINE COMMAND          | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES  |
|------|-----|--------------------------|--------|-------------|-----|---|--|
| T+4  | 672 | Missile launched (C)     | CCC    | GGs         |     | LIFT OFF indicator white on MGC.  | Item 664 received.   |
| T+7  | 680 | Check lift off (M)       | LS     | ES          |     | Check item 664 initiated.<br>Interrupt item 660.  |  |
| T+10 |     |                          |        | GGs         | 672 | Press GUID IN PROGRESS pushbutton indicator on MGC (Manual).<br>GUID IN PROGRESS pushbutton indicator green on MGC. | LIFT OFF WHITE on LCC and missile actually in flight (determined from TV monitor).<br>GUID IN PROGRESS pushbutton indicator pressed. |
| T+10 | 696 | Guidance in progress (C) | GGs    | CCC         |     | Provide missile in flight and raise/lower launcher interlock prerequisite.  | Guid IN PROGRESS pushbutton indicator pressed.   |
| T+10 | 704 | Missile in flight (C)    | CCC    | LS<br>PLPS  |     | Item 725 locked out until T+170.<br>Close 750 PSI nitrogen supply valve.  | Item 696 received.   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 33 of 39)

| TIME  | REF | ROUTINE COMMAND                       | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES   |
|-------|-----|---------------------------------------|--------|-------------|-----|---|---|
| T+10  | 712 | Ready to lower (C)                    | LS     |             |     |   | Launcher lowering enabled from the CCC (item 436) and launch sequence generates enable lowering signal. |
|       |     |                                       |        | CCC         |     | LOWER LAUNCHER indicator green on 1CC   |   |
| T+170 | 725 | Enable alternate launcher raising (C) | LS     |             |     |   |   |
|       |     |                                       |        | CCC         |     | Enable ready to raise on other two missiles of the complex.                                       |   |
| T+XXX |     |                                       |        | GGG         | 696 | END OF GUID indicator white on MGC.   | Guidance satisfactorily completed and 1BDA printed out.   |
|       |     |                                       |        |             |     | Press RECYCLE pushbutton indicator on MGC. (Manual)   | END OF GUID indicator white.  |
|       |     |                                       |        |             |     | RECYCLE pushbutton indicator white on MGC.  | RECYCLE pushbutton indicator pressed.   |
|       |     |                                       |        |             |     | Drop out launcher and target selections. GGS recycles to prepare for acquisition of next missile. |   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 34 of 39)

| TIME  | REF | ROUTINE COMMAND               | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES   |
|-------|-----|-------------------------------|--------|-------------|-----|--|---|
| T+XXX |     | (Continued)                   |        |             |     | RECYCLE pushbutton indicator not lighted on MGC.   | Recycle complete.   |
| T+1HR |     |                               |        | PLPS        | 224 | Close lox return line vent valve.<br><br>Close lox drain line vent valve.<br><br>Open lox drain blanket valve. | Drain line not above minimum vent pressure<br><br>Drain line not above minimum vent pressure<br><br>Lox return line vent and drain line vent valves closed. |
| T+2HR |     |                               |        | PLPS        | 224 | Close Stage I/II Lox line vent valves.<br><br>Open lox line blanket valve                                      | Stage I/II fill lines not above minimum vent pressure.<br><br>Stage I/II lox line vent valves closed.   |
| H+0   | 800 | Start launcher lowering       | LCC    |             |     |  | Lower launcher PB actuated.   |
| H+0   | 808 | Launcher lowering started (C) | LS     | LS          |     | Provide lower launcher prerequisite.   |   |
|       |     |                               |        | CCG         |     | Turn on white lower launcher light on LC.  | Ready to lower (item 712) and start launcher lowering (item 800).   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 35 of 39)

| TIME  | REF | ROUTINE COMMAND               | SOURCE | DESTINATION | REF | SUB-COMMAND                                   | PREREQUISITES  |
|-------|-----|-------------------------------|--------|-------------|-----|---|--|
| H+0   |     | (Continued)                   |        |             |     | Disable ready to lower on other launchers.    |  |
| H+0   | 816 | Launcher lowering started (C) | LS     |             |     | Disable ready to raise on other launchers.    | Ready to lower (item 712) and start launcher lowering (item 800). fire Stage I engines (item 648). |
|       |     |                               |        | LCS         |     | Open flame deflector cooling spray valve.     |  |
|       |     |                               |        |             |     | Position umbilical tower.                     |  |
|       |     |                               |        |             |     | Position lower tower umbilical mechanism.     |  |
| H+91  |     |                               |        | LCS         | 816 | Close water supply valve.                     |  |
| H+101 |     |                               |        | LCS         | 816 | Retract flame deflector extension.            | Engine compartment water spray valve closed.   |
|       |     |                               |        |             |     | Retract launcher platform lateral load locks. | Engine compartment water spray valve closed.   |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 36 of 39)

| TIME  | REF | ROUTINE COMMAND | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES                  |
|-------|-----|-----------------|--------|-------------|-----|--|--------------------------------|
| H+117 |     |                 |        | LCS         | 816 | Drive launcher platform up.                                    | Lateral load locks retracted.  |
| H+122 |     |                 |        | LCS         | 816 | Retract vertical load locks.                                   | Launcher platform driven up.   |
| H+132 |     |                 |        | LCS         | 816 | Turn off launcher platform oil pressure.                       | Vertical load locks retracted. |
|       |     |                 |        |             |     | Lower launcher platform.                                       | Vertical load locks retracted. |
| H+252 |     |                 |        | LCS         | 816 | Pressurize rod end lifting cylinder.                           |                                |
| H+253 |     |                 |        | LCS         | 816 | Turn on launcher platform oil pressure.                        | Launcher platform lowered.     |
|       |     |                 |        |             |     | Shut off launcher platform drive.                              | Launcher platform lowered.     |
|       |     |                 |        |             |     | Close lower shelter door.                                      | Launcher platform lowered.     |
|       |     |                 |        |             |     | Extend Stage I lox vent duct (1C1LV) support mechanism.        | Launcher platform lowered.     |
| H+253 |     |                 |        |             |     | Extend Stage II lox vent duct NO. 1 (2B1LV) support mechanism. | Launcher platform lowered.     |
|       |     |                 |        |             |     | Extend Stage II lox vent duct NO. 2 (2B2LV) support mechanism. | Launcher platform lowered.     |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 37 of 39)



| TIME  | REF | ROUTINE COMMAND | SOURCE | DESTINATION | REF | SUB-COMMAND                                     | PREREQUISITES                                 |
|-------|-----|-----------------|--------|-------------|-----|---|---|
| H+254 |     |                 |        | LCS         | 816 | Open engine compartment water spray valve.      | Water supply valve closed.                    |
|       |     |                 |        |             |     | Insert counterweight to drive base lock.        |   |
|       |     |                 |        |             |     | Close wire rope locks.                          | Counterweight on support.                     |
| H+274 |     |                 |        | LCS         | 816 | Lower counterweight to seat counterweight.      |   |
| H+276 |     |                 |        | LCS         | 816 | Energize cylinder to introduce slack in cables. |   |
| H+281 |     |                 |        | LCS         | 816 | Close upper shelter door.                       | Lower shelter door closed.                    |
| H+289 |     |                 |        | LCS         | 816 | Retract forward spring capsule locks.           |   |
| H+289 |     |                 |        | LCS         | 816 | Retract rear drive base to silo locks.          |   |
| H+294 |     |                 |        | LCS         | 816 | Release cable equalizer.                        | Counterweight support lowered.                |
|       |     |                 |        |             |     | Retract horizontal and vertical crib locks.     | Counterweight support lowered.                |
| H+324 |     |                 |        | LCS         | 816 | Retract oblique crib locks.                     | Horizontal and vertical crib locks retracted. |

Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 38 of 39)

| TIME  | REF | ROUTINE COMMAND               | SOURCE | DESTINATION | REF | SUB-COMMAND                                    | PREREQUISITES   |
|-------|-----|-------------------------------|--------|-------------|-----|--|---|
| H+344 | 918 | Shelter doors closed (C)      | LCS    |             |     |  | Shelter doors closed and crib fully shock mounted.      |
|       |     |                               |        | LS          |     | Provide launch sequence complete prerequisite. |   |
|       |     |                               |        | LCS         |     | Shut off power pack pump motors.               |   |
| H+344 | 919 | Launch sequence complete (C). | LS     |             |     |  | Item 918 received subsequent to generation of item 808. |
|       |     |                               |        | ES          |     | Turn off operating power to the AOE.           | Item 664 initiated and shutdown signal not received.    |

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Figure 3-33. Launch Countdown System Functions (Operational Bases) (Sheet 39 of 39)

| TIME | REF | ROUTINE COMMAND   | SOURCE | DESTINATION | REF | SUB-COMMAND                           | PREREQUISITES                                   |
|------|-----|---|--------|-------------|-----|---------------------------------------|---|
|      |     | Note<br>All T times listed in this procedure are approximate times. (M) denotes a momentary signal and (C) denotes a continuous signal. |        |             |     |                                       |   |
| TSI  | 001 |   | LCC    |             |     |                                       | Press PROPELLANTS push-button indicator on LCC. |
|      |     |   |        | LS          |     | Start first timing sequence.          | Missile/facility go and item 016 not generated. |
| TSI  | 008 | Launch sequence started (M)   | LS     |             |     |                                       | First timing sequence started.                  |
|      |     |   |        | ES          |     | Energize 28 VDC operating bus to AOE. |   |
|      |     |   |        |             |     | Energize 60 CPS bus to AOE.           |   |
|      |     |   |        |             |     | Start ground 400 CPS motor-generator. |   |
|      |     |   |        |             |     | Start ground inverter start unit.     |   |
|      |     |   |        |             |     | Start missile air conditioning unit.  |   |

Figure 3-34. Launch Countdown System Functions (VAFB) (Sheet 1 of 44)

| TIME | REF | ROUTINE COMMAND | SOURCE | DESTINATION | REF | SUB-COMMAND  | PREREQUISITES                          |
|------|-----|-----------------|--------|-------------|-----|--|--|
| TSI  |     | (Continued)     |        |             |     | Energize missile 28 VDC buses.   | 28 VDC operating bus to AOE energized. |
|      |     |                 |        |             |     | Apply standby power to the AOE.  |  |
|      |     |                 |        |             |     | Energize missile battery heater control circuits.                                |  |
|      |     |                 |        | ECS         |     | Energize ECS AOE.  |  |
|      |     |                 |        |             |     | Energize (1), (2), and (3) TPA heater switches and apply (3) TPA heater preheat. |  |
|      |     |                 |        | ECS         | 008 | Reset Stage II airborne sequencer.   |  |
|      |     |                 |        | SECE        |     | Energize SECE.   |  |
|      |     |                 |        | RVS         |     | Energize re-entry vehicle battery heaters (mark 3 R/V only).                     |  |
|      |     |                 |        |             |     | Freeze RVS go status.  |  |
|      |     |                 |        | FCS         |     | Freeze FCS go status.  |  |

Figure 3-34. Launch Countdown System Functions (VAFB) (Sheet 2 of 44)

| TIME | REF | ROUTINE COMMAND                | SOURCE | DESTINATION | REF  | SUB-COMMAND | PREREQUISITES  |  |
|------|-----|--------------------------------|--------|-------------|------|-------------|--|--|
| TSI  | 016 | Launch sequencer operating (C) | LS     |             |      |             | First timing sequence started and 28 VDC operating bus to AOE energized. |  |
|      |     |                                |        |             | TDB  |             |  | Start countdown timer clock.           |
|      |     |                                |        |             | CCC  |             |  | LOAD PROPELLANTS on L.C.               |
|      |     |                                |        |             |      |             |  | Disable manual missile facility no go. |
|      |     |                                |        |             | LS   |             |  | Inhibit exercise mode initiation.      |
| TSI  | 024 | Start power pack (M)           | LS     |             |      |             | First timing sequence started.   |  |
|      |     |                                |        |             | LCS  |             |  | Start launcher hydraulic.              |
|      |     |                                |        |             | LCS  | 024         |  | Power pack pump motors.                |
| TSI  | 032 | Energize RGS (C)               | LS     |             |      |             | First timing sequence started.   |  |
|      |     |                                |        |             | RGS  |             |  | Energize GMTS.                         |
|      |     |                                |        |             | GMTS |             |  | Energize MGS.                          |

Figure 3-34. Launch Countdown System Functions (VAFB) (Sheet 3 of 44)

| TIME | REF | ROUTINE COMMAND               | SOURCE | DESTINATION | REF | SUB-COMMAND   | PREREQUISITES  |
|------|-----|-------------------------------|--------|-------------|-----|---|--|
| TSI  | 040 | Countdown started (C).        | CCC    |             |     |   | Item 016 received.   |
|      |     |                               |        | GGG         |     | START CD indicator white on MGC.                        |  |
| TSI  |     |                               |        | GGG         | 040 | Press POWER ON push-button indicator on MGC (Manual).   | START CD white.  |
|      |     |                               |        |             |     | POWER ON pushbutton indicator white on MGC.             | POWER ON pushbutton indicator pressed.   |
| TSI  | 052 | Start propellant loading (C). | ES     |             |     |   | Item 008 received, 28 VDC operating power on AOE buses and missile air conditioning unit on. |
|      |     |                               |        | PLPS        |     | Energize 750 PSI pneumatic supply valve (FCV 508) open. |  |
|      |     |                               |        |             |     | Close Stage I/II fuel pressure regulators.              |  |
|      |     |                               |        | PLPS        | 052 | Open Stage I/II fuel tank vent and relief valves.       |  |
|      |     |                               |        |             |     | Close Stage I/II lox tank desiccant breather valves.    |  |
|      |     |                               |        |             |     | Close missile blanketing nitrogen supply valve.         |  |

Figure 3-34. Launch Countdown System Functions (VAFB) (Sheet 4 of 44)