SECTION VI

OPERATING LIMITATIONS

6-1. SCOPE.

6-2. This section describes procedural limitations to pre-launch, launch, and post-launch operations as imposed by equipment design. The equipment design limitations make it mandatory in some areas to adhere strictly to prescribed procedures, while in other areas certain deviations are permissible in view of the flexibility of design. In future issues of this manual, the scope of this section will be enlarged as information becomes available.

6-3. WEATHER LIMITATIONS.

6-4. Launcher system operation should not be attempted under any of the following weather conditions due to launcher limitations:

a. Launcher platform motion with wind in excess of 60 MPH at 10 feet above ground level for an EWO launch. For peacetime exercises, maximum allowable wind velocity is 50 MPH including a maximum gust factor of 20 MPH.

b. Opening of missile silo doors with ice in excess of 2 feet thick on doors.

c. Opening of missile silo doors with snow in excess of 15 feet deep on doors.

6-5. Launcher system operation may be erratic if exercise is attempted under conditions beyond the following design requirements:

a. Rain in excess of 5 inches per hour.

b. Rain in excess of 3 inches per hour with wind in excess of 40 MPH at 10 feet above ground level.

c. Temperature in excess of 125°F (in silo).

d. Temperature below -35°F (in silo).

WARNING

Prior to lowering of launcher during winter months after extended periods of an up and locked condition, all excessive ice and snow must be removed from the flame deflector area, corner lock area, and closure door areas.

6-6. POWER HOUSE.

6-7. ONE GENERATOR OPERATION.

6-8. In the event there is only one operational generator available for an EWO launch, coordination is essential between the EPPT and MLO before starting or ending a function to insure the following:

a. Starting amperage within operating limits.

b. Isolation of non-essential operating equipment from the system.

6-9. DIESEL FUEL OIL SUPPLY.

6-10. Due to the configuration of the fuel oil storage tanks, it is mandatory that a minimum of 5000 gallons of fuel oil be maintained in one of the tanks to assure a successful EWO launch.

6-11. ICE BANKS.

6-12. If water chillers cannot maintain the desired temperature, the ice banks will supplement for a period of approximately 12 hours of continuous operation.

6-13. COUNTDOWN LIMITATIONS.

6-14. FIRST HOLD PERIOD.

6-15. The permissible duration of the first hold period is primarily determined by time requirements of lox boil-off and lox handling facilities. The design limit of one hour for the maximum hold makes allowance for lox recycle and for variations in the time elapsed since the last refilling of the lox storage tank. It has been determined that after loading and unloading lox, and after a one-hour delay, there is still enough lox available for reloading and for a successful launch even if 10 days have elapsed since the los storage tank was last refilled. Therefore, extensions beyond the one-hour time limit for the first hold are permissible under favorable circumstances.

6-16. Figure 6-1 presents chart-form data for computing maximum hold time for the first hold. Plots are provided for hold times with and without recycle. In this case, lox and nitrogen remaining in the storage facilities are the primary limiting factors. The sample shown depicts a condition where 10 days have elapsed since the storage facilitess were last refilled. Entering this 10-day figure in the chart results in approximately 170 minutes of hold time available and still retains the recycle capability. In this case, lox is the limiting factor. The sample alos shows that if recycle was not required, the hold could be extented to 210 minutes. In this case, nitrogen is the limiting factor.

6-17. SECOND HOLD PERIOD.

6-18. The second hold period is limited to a much shorter time delay than the first hold. In this case, the missile is above ground without air conditioning or lox topping and the missile lox tanks are pressurized. This hold period has been given a maximum time limit of 30 seconds, is based on a reliability confidence factor of the particular missile being launched, and is related to the net positive suction head pressure available at the Stage II lox pump when the Stage II engine is fired. Any delay in pressing LAUNCH from green to white, at the moment LAUNCH indicates green, tends to decrease this confidence factor by causing a possible decrease of net positive suction head pressure at Stage II lox turbine pumps. This delay could cause cavitation of the turbine when the engine is fired.

6-19. If the launcher is not up and locked within 30 seconds after T-41, an automatic shutdown will occur.

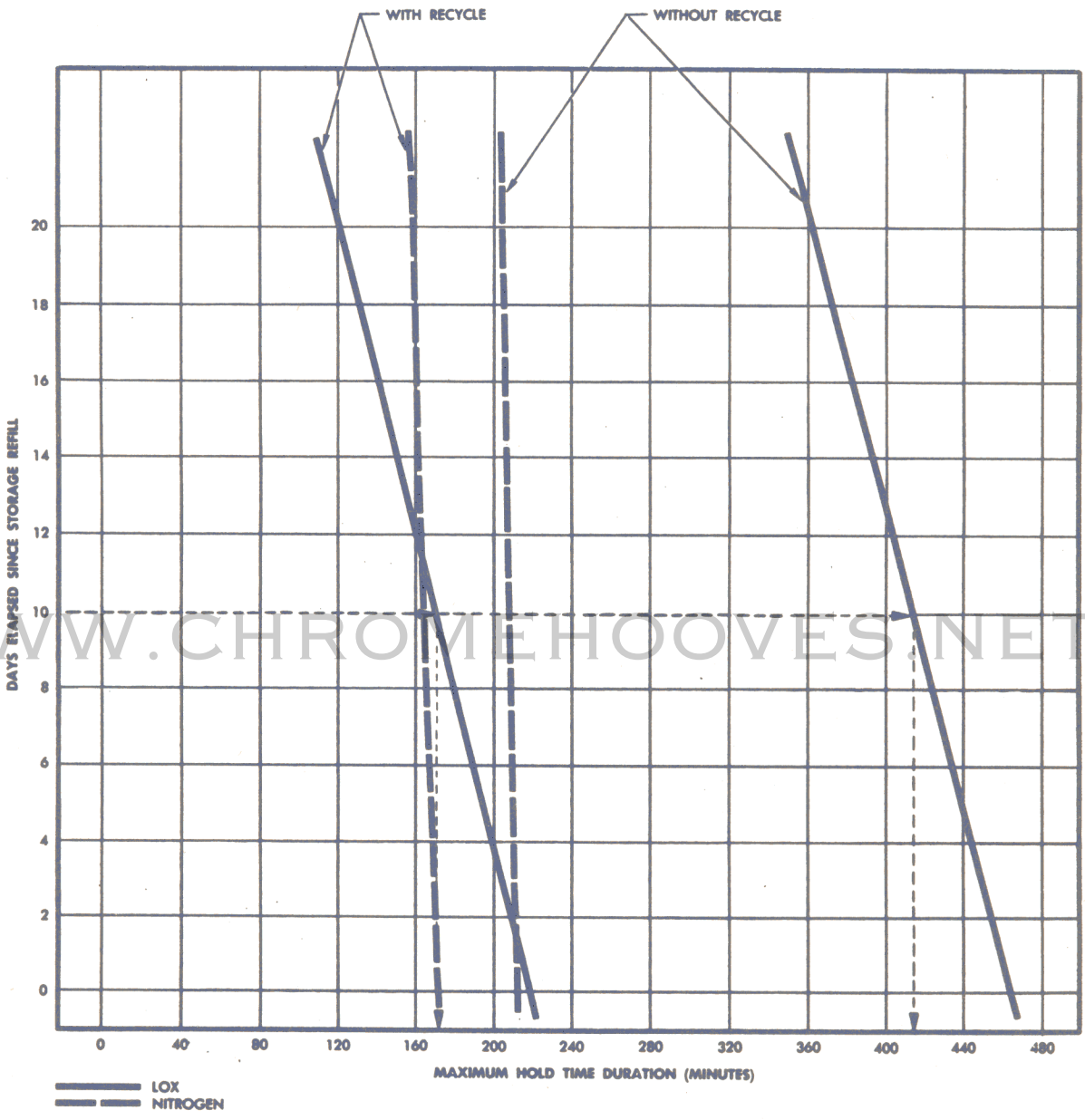


Figure 6-1. Maximum Allowable Hold Time, First Hold

6-20. LAUNCH PLATFORM RAISING AND LOWERING.

Note

All T times referenced in this section are approximate times.

6-21. If RAISE LAUNCHER or LOWER LAUNCHER pushbutton on launch control console (LCC) is pressed for one of the three launchers, the two remaining launchers of the complex are disabled; that is, neither one can be raised or lowered until re-enabled by an automatically sequenced signal.

6-22. Therefore when launch countdown is initiated simultaneously on all three launchers and carried through the load propellants phase to the first hold, only one of the three launchers can enter the raise launcher phase. After RAISE LAUNCHER pushbutton is pressed for the first launcher, the second launcher can enter the raise launcher phase only after a minimum first hold period of 450 to 480 seconds. First hold varies depending on the length of time the missile being launched remains in second hold. The third launcher will be held in first hold for an additional minimum period of 450 to 480 seconds before entering the raise launcher phase.

6-23. If, during simultaneous propellant loading on all three launchers, a malfunction imposes an extended first hold on any one of the three launchers, the raise launcher phase on one of the two remaining launchers can be initiated immediately after termination of the load propellants phase. The raise launcher phase on the second remaining launcher can be started 450 seconds thereafter. If the malfunction on the first launcher is eliminated in less than 900 seconds, this launcher will have to remain in the hold position until 900 seconds have elapsed. However, the minimum total period of launching all three missiles will remain the same.

6-24. If lower launcher phase is initiated, after firing the first of three missiles, the raise launcher capability of the other two launchers is disabled until the lowering of the empty launcher is complete. This delays initiation of the raise launcher phase for the next missile by approximately 11 minutes beyond the normal delay.

6-25. If lower launcher phase on the first launcher is not initiated prior to T+170 the raising of the two remaining launchers is enabled, provided both have gone through the load propellants phase.

6-26. If shutdown occurs between first hold and second hold, the launcher is lowered automatically. If launcher is up and locked and shutdown occurs between second hold and prior to lift off (explosive bolts not fired) the LOWER LAUNCHER pushbutton must be pressed to transfer the shutdown signal to the launcher control system to lower the launcher.

6-27. If shutdown occurs after the Stage I engine has been fired but prior to missile in flight, the engine compartment water spray signal is generated. This signal will be interrupted to turn off the water spray upon receipt of start LOWER LAUNCHER command from the LCC or the water spray will be turned off automatically at T+303 signal from the launch sequencer.

6-28. LAUNCHER PLATFORM OPERATING WEIGHT LIMITS.

6-29. The following is a summary of launcher platform gross weight conditions. If these maximum weight limits are exceeded, operation of the launcher platform is considered unsafe.

a. Raising launcher platform with lox or dual propellant loads between 70,000 and 160,000 pounds.

Note

Step b does not apply after incorporation of CSE equipment.

b. Raising launcher platform with fuel load only.

c. Lowering launcher platform with lox or dual propellant loads between 140,000 and 160,000 pounds. Under emergency conditions only, the launcher platform may be lowered with either lox only or dual propellant load conditions, and total weight in the range from 20,000 to 140,000 pounds.

Note

Step d does not apply after incorporation of CSE equipment.

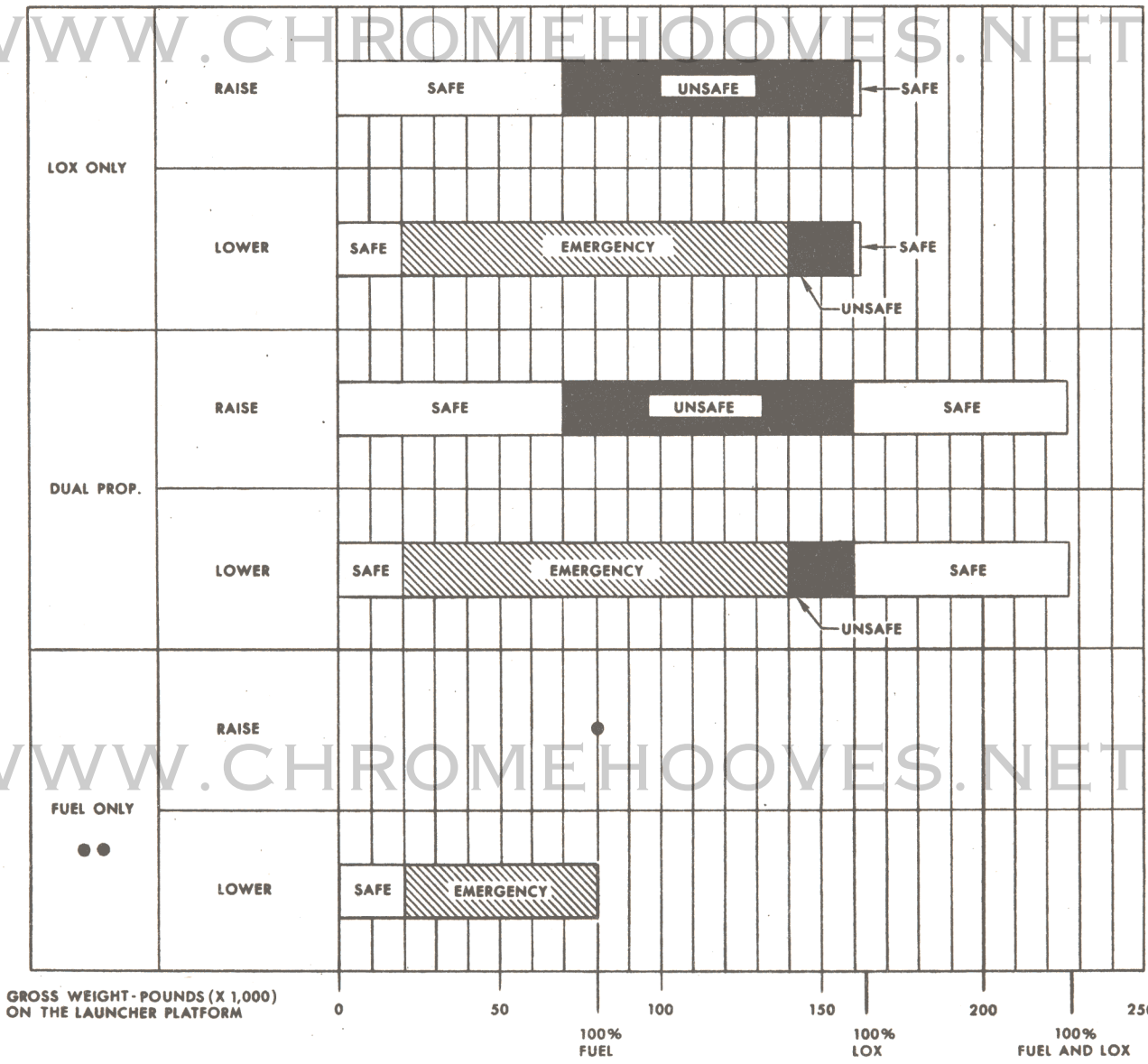
d. Under emergency condition only, the launcher platform may be lowered within th 20,000 to 140,000 pound range for fuel load condition.

6-30. All possible missile propellant loadings and the safety features for raising and lowering the launcher platform are shown in figure 6-2.

WARNING

Those conditions marked EMERGENCY ONLY (figure 6-2) produce high motor pressures. Insure that the condition is an actual emergency before operating with these loadings. Do not operate launcher platform in the area marked UNSAFE.

6-31. Weight will be determined by the length of time a missile is maintained in a HOLD condition. If missile contains lox only, maximum hold time is 45 minutes. If this time is exceeded missile must be held until the overall weight is reduced to 70,000 pounds or less. Since there is no way to actually determine a weight of 70,000 pounds, the missile should be held until all lox has boiled off. If missile contains dual propellants, maximum hold time is 8 hours. If this time is exceeded, all lox must be boiled off before lowering launcher platform. Since it is impossible to determine exactly what weight of lox is aboard the missile, a complete unloading if lox must be performed before lowering launcher platform.



Note

● UNSAFE TO RAISE LAUNCHER PLATFORM WITH FUEL ONLY LOAD

●● DOES NOT APPLY AFTER INCORPORATION OF TCTO 35M3-2-4-529

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Figure 6-2. Launcher Platform Operating Weight Limits

CAUTION

For a topside hold exceeding one hour, the inclined locks must be checked to verify that lock drift has not exceeded one-half inch. If this drift value has been exceeded, the lox load must be dumped or allowed to boil off prior to lowering of the launcher platform. With fuel load only remaining, lowering will be accomplished under emergency conditions. This check is required to preclude excessive movement of the crib with possible attendant damage to launcher platform and facility equipment.

6-32. TARGET SELECTION.

6-33. Target selection cannot be changed after T-80 during the countdown. Therefore, it is recommended that all target selection be completed prior to initiation of the raise launcher phase.

6-34. GGS MALFUNCTION OR NOT-READY.

6-35. GGS malfunction, or not-ready, does not immediately affect the ability to initiate 2 countdown. However, launch countdown cannot proceed beyond the second hold until the guidance malfunction is corrected, or unless handover has been initiated. A GGS not-ready indication after pressing of the LAUNCH pushbutton automatically initiates 2 shutdown.

6-36. HANDOVER OR SHUTDOWN.

6-37. The decision as to whether shutdown or handover action is to be initiated depends on the particular countdown phase at which GGS malfunction occurs, on the time delay required for establishing backup guidance availability, and on the average time delay to be allotted to verbal communication via voice link with the backup GGS. As a general limitation, it has been established that no handover procedures should be attempted on any launcher which has advanced past the first hold stage of its countdown when GGS malfunction occurs.

6-38. RADAR SURVEILLANCE SYSTEM.

6-39. System and component climatic and environment limitations for the radar surveillance system anti-intrusion equipment operations are as follows:

a.	Ambient operating temperatures	-40 to +140 degrees F (-40 to +60 degrees C)
b.	Humidity	Refer to Military Standard
c.	Barometric pressure (in operation)	As prevelant from sea level to 6000 feet (altitude)
d.	Wind loading	52 knots with ice, 75 knots without ice
e.	Ice loading	2 inches of ice, measured radially