

## DCS: UH-1H Self-Study Guide v0.5 [13.04.2013]

Before Starting Engine	1	Close Cockpit Doors	RCTRL+C
	2	Overhead switches and Circuit Breakers – Set as follows:	
	2a	DC Circuit Breakers – In, except for armament and special equipment	
	2b	DOME LT Switch – As required	
	2c	EXT LTS Switches – Set as follows:	
	2c1	ANTI COLL: ON  <b>Additional Information:</b> Anti-collision light will turn on once battery switch is in the ON position.	RSHIFT+L
	2c2	POSITION Lights Switches – As required: • Night: STEADY or FLASH • Day: OFF	
	2d	Provide Electrical Power to the Aircraft	
	2d1	AC Power Control Panel → AC Voltmeter Selector Switch: AC Phase  <b>Additional Information:</b> AC power (115 VAC, three-phase, 400 Hz) is supplied by two inverters: the main inverter and spare inverter. The inverters are identical, and either is capable of supplying the power required for operation of the AC-operated equipment. The AC voltmeter indicates inverter (main or spare) voltage output. The position of the AC Voltmeter Selector Switch determines which of the three phases' (AB, AC, BC) voltage is displayed on the AC voltmeter. <b>TODO: Why is AC phase selected during startup?</b>	LSHIFT+R
	2d2	AC Power Control Panel → INVTR Switch: OFF  <b>Additional Information:</b> Using the inverter switch the main or spare inverter can be energized. In the OFF position, both inverters are off and no AC power is generated.	LSHIFT+I
	2d3	DC Power Control Panel → Main Generator Switch: ON and cover down  <b>Additional Information:</b> With the cover in the closed position the Main Gen switch can only be in the On position as it is physically forced forward by the cover. The switch can only be selected to the off or Reset positions with the cover open, when the cover is then closed the switch will always return to the On position. The Hoist Cable Cut (not yet implemented) and the Weapon Jettison switch (not yet implemented) operate in the same way.	LSHIFT+Q LSHIFT+L
	2d4	DC Power Control Panel → DC Voltmeter Selector Switch: ESS BUS  <b>Additional Information:</b> DC power can be supplied by four DC power sources: battery, main generator, starter/generator, external power receptacle/GPU. The DC voltmeter indicates DC voltage output. The position of the DC Voltmeter Selector Switch determines the voltage to be displayed on the DC voltmeter: • BAT (Battery, 24V) • MAIN GEN (Main Generator, 30V/300A) • STBY GEN (Standby Generator) • ESS BUS • NON-ESS BUS	LSHIFT+H
	2d5	DC Power Control Panel → NON-ESS BUS Switch – As required  <b>Additional Information:</b> Devices that are not required for the safety of flight are connected to the non-essential bus. When the non-essential bus switch is in the default "NORMAL ON" position, the non-essential bus can only receive power from the main generator. In the event of a main generator failure, the non-essential bus is automatically de-energized. This default setting can be overridden by setting the switch in the "MANUAL ON" position where the non-essential bus can also receive power from the standby generator, when the main generator is offline.	LSHIFT+C
	2d6	STARTER GEN Switch: START  <b>Additional Information:</b> Using the starter-generator switch the function of the starter-generator can be set: In the START position the starter-generator acts as a starter, in the STBY GEN position the starter-generator acts as a generator (the standby generator).	LSHIFT+X
	2d7	DC Power Control Panel → BAT Switch: ON	LSHIFT+P

	<p><b>Additional Information:</b> When the battery switch is in the OFF position, the battery is isolated from the system. In the ON position the battery supplies power and is simultaneously charged by the generator.</p>	
3	<p>Low RPM Audio Warning Switch: OFF</p> <p><b>Note:</b> The Low RPM Audio switch is spring loaded to the 'Audio' position and electrically held in the 'Off' position. The Audio switch should automatically move to the 'Audio' position when either, DC power is removed, or the N2 is increased to operating limits. Normally during a start the first thing that will happen is the pilot will turn the Batt switch to 'On' and then immediately turn the Audio switch to 'Off' to cancel the Audio which will be blaring loudly in the 'Audio' position, because there was previously no DC power. Following the start, as the throttle is wound up, the Audio switch will automatically return to the 'Audio' position as N2 increases to operating limits. I am uncertain of the exact N2 RPM at which this occurs, but it must be about 6400 N2 as the Audio should activate at 6100-6300 N2.</p>	
4	<p>Ground Power Unit – Connect for GPU start → External Power Caution Light should be illuminated</p>	
5	Fire Warning Indicator Light: TEST	RCTRL+T
6	Center pedestal switches – Set as follows:	
6a	<p>Avionics equipment – Off; set as desired</p> <p><b>Additional information:</b> You can request startup from ATC here:</p> <ol style="list-style-type: none"> <li>1. C-1611/AIC Signal Distribution Panel → Interphone Selector Switch: 3 (VHF)</li> <li>2. Power on VHF-AM radio (labeled "VHF COMM")</li> <li>3. Tune VHF-AM radio to ATC frequency</li> <li>4. Broadcast on VHF AM: Pilot's radio trigger RADIO (RALT+#)</li> <li>5. Main → ATCs... (F5) → &lt;AIRFIELD&gt; (FX) → Request startup (F3)</li> </ol>	
6b	External stores jettison handle – Check safe tied	
6c1	DISP Control Panel → Check ARM/STBY/SAFE Switch: SAFE	RALT+RSHIFT+L
6c2	DISP Control Panel → Check Jettison Switch: Down and covered	LALT+J
6d	<p>Engine Control Panel → Governor Switch: AUTO → Check GOV EMER caution light out</p>	G
6e	DE-ICE Switch: OFF	I
6f	Fuel Switches – Set as follows:	
6f1	<p>Engine Control Panel → Main Fuel Switch: ON → Check three Boost Pump caution lights out: LEFT FUEL BOOST, RIGHT FUEL BOOST, ENG FUEL PUMP</p>	F
6f2	Engine Control Panel → All other Fuel Switches: OFF	
6g	<p>Caution Lights Panel → Reset/Test Switch: TEST → All caution lights should illuminate</p>	LALT+R
6h	Caution Lights Panel → Reset/Test Switch: RESET	R
6i	<p>Misc Control Panel → HYD CONT Switch: ON</p> <p><b>Additional Information:</b> The hydraulic system is used to minimize the force required by the pilot to move the cyclic, collective and pedal controls. When the hydraulic control switch is in the ON position, pressure is supplied to the servo system.</p>	LALT+I
6j	<p>Misc Control Panel → FORCE TRIM Switch: ON</p> <p><b>Additional Information:</b> The Force Trim ON/OFF Switch turns the force trim system on or off. The system has two functions:</p> <ul style="list-style-type: none"> <li>• It provides artificial feel into the systems by incorporating a magnetic brake and force gradient in the cyclic and directional control systems. Force centering devices are incorporated in the cyclic controls and directional pedal controls. These devices are installed between the cyclic stick and the hydraulic servo cylinders, and between the anti-torque pedals and the hydraulic servo cylinder.</li> <li>• It provides a means to trim the controls by neutralizing the forces on the controls at a</li> </ul>	LALT+U

		particular point in their travel. Depressing the cyclic stick force trim switch will cause the magnetic brake and force gradient to be repositioned to correspond to the positions of the cyclic stick and pedals thus providing trim.	
	6k	Misc Control Panel → Chip Detector System Switch: BOTH  <b>Additional Information:</b> The magnetic chip detector system provides early warning of an impending engine failure and thus greatly reduces the cost of engine overhaul. The system consists of magnetic inserts that are installed in the drain plugs of the transmission sump, 42 degree gearbox and 90 degree gearbox. The plugs magnetically attract ferromagnetic particles (mostly iron chips). Over a period of time engine wear and tear causes small metal chips to break loose from engine parts and circulate in engine oil. When sufficient metal particles collect on the plugs, they bridge the gap in the plugs between the detector's electrodes and close an electrical circuit in series with the CHIP DETECTOR caution light. It illuminates indicating presence of metal chips. In case of chip detection, use the Chip Detector Switch to determine the trouble area. Set it to XMSN first, then to TAIL ROTOR. The CHIP DET caution light will remain on when a contaminated component is selected and go out if the non-contaminated component is selected.	LALT+G
	7a	Flight controls: Check freedom of movement through full travel	
	7b	Flight controls: Center cyclic and pedals	
	7c	Flight controls: Collective pitch full down	Num–
	8	Altimeters – Set to field elevation	
	8a	Pilot – Altimeter Pressure decrease	RCTRL+B
	8b	Pilot – Altimeter Pressure increase	RSHIFT+B
	8c	Copilot – Altimeter Pressure decrease	LCTRL+B
	8d	Copilot – Altimeter Pressure increase	LSHIFT+B
Starting Engine	1	Ignition Key Lock Switch: ON (Not yet implemented)	
	2	Throttle: IDLE  <b>Note:</b> In reality the throttle is positioned as near as possible (on decrease side) to the engine idle stop. The engine idle stop is not modelled in the simulation.	PageDown
	3	Engine Start Switch: PRESS and HOLD; note the time / start clock <ul style="list-style-type: none"> <li>10% N1: Check minimum 14 VDC</li> <li>15% N1: If main rotor not turning, abort start.</li> <li>40% N1 / after 40s: Engine Start Switch: RELEASE → Note increase in voltmeter.</li> </ul> Note DC Voltmeter indication. Battery starts can be made when voltages less than 24V are indicated, provided the voltage is not below 14V when cranking through 10% N1 speed. Voltage increases as N1 gains speed.  <b>Note:</b> <ul style="list-style-type: none"> <li>As N1 passes 10%, DC voltage should recover to at least 14 VDC to ensure there is enough power to abort the start in an emergency. [Maintenance Test Flight checklist TM 55-1520-242-MTF - Starting Engine Checklist Item 17b] In DCS:UH-1H the DC voltage recovers to 15 VDC by 10% N1 during start.</li> <li>In reality the engine start button is the "engine idle stop release" button and does not have engine start functionality.</li> </ul>	HOME
	4	Throttle: Slowly advance past the engine idle stop to the engine idle position. Manually check the engine idle stop by attempting to close the throttle (Not yet implemented)	
	5	N1 68-72%: Hold a very slight pressure against the engine idle stop during the check. A slight rise in N1 may be anticipated after releasing pressure on throttle.  <b>Note:</b> With throttle at idle, N1 (Gas Producer) should stabilize between 68% - 72% to be serviceable, preferably 70% when adjusted correctly. [Maintenance Test Flight checklist TM 55-1520-242-MTF - Starting Engine Checks - Step 26]	
	6	AC Power Control Panel → INVTR Switch: MAIN ON	LSHIFT+U

		<p><b>Note:</b> The copilot attitude indicator should be caged and held momentarily as inverter power is applied. This allows the system to power up without jolting or unnecessarily stressing the moving parts. The cage function acts like a clutch and allows the internal gyro to spin up without having to drive the instrument.</p> <p><b>Additional Information:</b> The inverter switch is normally in the MAIN ON position to energize the main inverter. In the event of a main inverter failure the switch can be positioned to SPARE ON to energize the spare inverter. <b>TODO: INVTR CONT circuit breaker does not work</b></p>												
	7	Check Engine and Transmission Oil Pressures: <ul style="list-style-type: none"><li>• Engine Oil Pressure: Check 25 PSI minimum</li><li>• Engine Oil Temperature: Check for rising indication</li><li>• XMSN Oil Pressure: Check 30 PSI minimum</li><li>• XMSN Oil Temperature: Check for rising indication</li><li>• Fuel Pressure: Check 5 PSI minimum</li></ul>												
	8	GPU – Disconnect → External Power Caution Light should be out												
Engine Runup	1	Avionics – On (monitor loadmeter)												
	1a	AN/ARN-82 VHF Navigation Set → Power Switch: PWR	LALT+LSHIFT+2											
	1b	AN/ARC-134 VHF Radio Set → Power Switch: PWR	LCTRL+LSHIFT+9											
	1c	AN/ARC-51BX UHF Radio Set → Function Select Switch: T/R	LCTRL+LSHIFT+2											
	1d	C-1611/AIC Signal Distribution Panel → Interphone Selector Switch: 3 (VHF)  <b>Note:</b> Position 3 (VHF) will allow communication with ATC. To communicate with wingmen, select position 2 (UHF).	RCTRL+RSHIFT+Z											
	1e	AN/ARC-131 FM Radio Set → Mode Control Switch: T/R	RCTRL+RALT+2											
	1f	AN/ARN-83 ADF Set → Mode Selector Switch: ADF	LCTRL+LALT+^											
	2	DC Power Control Panel → STARTER GEN Switch: STBY GEN	LSHIFT+X											
	3	Systems – Check as follows:												
	3a	Fuel												
	3b	Engine												
	3c	Transmission												
	3d	Electrical <ul style="list-style-type: none"><li>• AC Voltage: Check each phase for 115 ± 3V (112 – 118V)</li><li>• DC Voltage: 27 - 28.5V</li></ul> <p><b>Additional Information:</b> The DC Voltmeter indicates standby generator voltage when the main generator is off. Dependence of generator voltage on temperature is modelled in DCS: UH-1H:</p> <table><thead><tr><th>Temperature</th><th>Main Gen Voltage</th><th>Stby Gen Voltage</th></tr></thead><tbody><tr><td>≥ 26°C</td><td>27.0 VDC</td><td>26.0 VDC</td></tr><tr><td>0 to 26°C</td><td>28.0 VDC</td><td>27.0 VDC</td></tr><tr><td>≤ 0°C</td><td>28.5 VDC</td><td>27.5 VDC</td></tr></tbody></table> <p>Standby generator voltage is 1 VDC lower than the main generator voltage to ensure that the standby generator does not override the main generator when both are on. [Maintenance Test Flight checklist TM 55-1520-242-MTF - Engine Runup Check - Step 13]</p>	Temperature	Main Gen Voltage	Stby Gen Voltage	≥ 26°C	27.0 VDC	26.0 VDC	0 to 26°C	28.0 VDC	27.0 VDC	≤ 0°C	28.5 VDC	27.5 VDC
Temperature	Main Gen Voltage	Stby Gen Voltage												
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≤ 0°C	28.5 VDC	27.5 VDC												
4	Run up engine to normal power (Increase throttle all the way to the left) <ul style="list-style-type: none"><li>• N2 (Engine RPM): 6600</li><li>• NR (Rotor RPM): 320</li></ul> → As throttle is increased, the Low RPM Audio and Warning Light should be off at 6100 - 6300 RPM	PageUp												