ENGINEERING CHANGE ORDER Center for Astrophysics & Space Astronomy University of Colorado, Boulder				**ECO No.** COS-070 Date 6 February 2002 Sheet 1 of 3
Drawing/Document Title	Drwg/Doc No.	Revision Letter Current	 New	Special Distribution
OP-01	COS-01-0001	16	17	
				Stop Production Now ❑ Yes ❑ No

Description of Change:

1. **Page 11 (Rev. 16), Sec. 1.3.3: Replace the opening paragraph with the following text, which reflects the decision to fly a 225-type gating in the slot for the G185M.**

The COS NUV channel covers the wavelength range 1700 – 3200 Å at moderate spectral resolution. The NUV channel is fundamentally a Czerny-Turner design, fed by a mirror (NCM1) mounted on the OSM1. The NCM1 corrects the input beam for spherical aberration, magnifies it by a factor of ~4, and directs it to a collimating optic, NCM2. The collimated beam is then directed to one of several gratings mounted in the Optics Select Mechanism 2 (OSM2). The OSM2 contains several flat, first-order gratings and a mirror (TA1). Three medium-dispersion gratings, G185M, G225M, and G285M, deliver resolutions R ≥ 16,000 over the wavelength range 1700 – 3200 Å. The dispersed light from the gratings is imaged onto a CsTe MAMA detector by three camera optics (NCM3a, b, c). The spectra appear as three non-contiguous ~35-40Å stripes on the MAMA detector, allowing ~105-120Å wavelength coverage per exposure. The gratings can be scanned with slight rotations of the OSM2 to cover the entire NUV wavelength band. The NCM3a,b,c mirrors are spaced such that three exposures will produce a continuous spectrum from the beginning of the short wavelength stripe in the first exposure to the end of the long wavelength stripe in the third exposure. In other words, two intermediate grating settings will cover the wavelength gap between the stripes in the first exposure, as depicted in Fig. 1.3-5.

2. **Page 16 (Rev. 16), Sec. 1.3.3: Replace Table 1.3-3 with the following table, which reflects the**

Reason for Change: Updates to COS operations in OP-01.	Disposition/Effectivity				
	To Comply With ECO				
	Use As Is				
	Rework To ECO				
	Scrap And Rebuild				
	Record change Only				
	Other (See Above)				

Prepared By:	Jon Morse	Date	6 Feb 2002	CCB Required	❑Approved
Approved By:		Date		❑Yes ❑No	❑NotApproved
Approved By:		Date			Immediate
Approved By:		Date		❑Class I	Incorporation
Approved By:		Date		❑Class II	❑Yes ❑No
Approved By:		Date		Completion	
Project Mgr:		Date		Date	

decision to fly a 225-type grating in the G185M slot. (Table notes are unchanged.)

Grating	Nominal Wavelength Range[a]	λ Coverage per Exposure	Dispersion (Å/pixel)	Resolving Power ($R = \lambda/\Delta\lambda$)[b]
G185M	1700 – 2100 Å	3 × 35 Å	~0.0342	16,000 – 20,000
G225M	2100 – 2500 Å	3 × 35 Å	~0.0342	20,000 – 24,000
G285M	2500 – 3200 Å	3 × 41 Å	~0.0400	20,000 – 24,000
G230L	1700 – 3200 Å	(1 or 2) × 398 Å	~0.3887	1550 – 2900

3. **Page 16 (Rev. 16), Sec. 1.3.4:** Towards the bottom of the first paragraph of this section, replace R ≥ 20,000 with R ~ 20,000.

4. **Page 39 (Rev. 16), Sec. 2.1.4: Replace Table 2.1-2 with the following. (Table notes are unchanged.)**

Optic	Central λ* (Å)	Observed Wavelengths (Å)
G185M	1786	1670-1705, 1769-1804, 1868-1903
	1817	1701-1736, 1800-1835, 1899-1934
	1835	1719-1754, 1818-1853, 1916-1951
	1850	**1734-1769, 1833-1868, 1931-1966 ****
	1864	1748-1783, 1847-1882, 1945-1980
	1882	1766-1801, 1864-1899, 1963-1998
	1890	1774-1809, 1872-1907, 1971-2006
	1900	**1783-1818, 1882-1917, 1981-2016**
	1913	1796-1831, 1895-1930, 1993-2028
	1921	**1804-1839, 1903-1938, 2002-2037**
	1941	1825-1860, 1924-1959, 2023-2058
	1953	**1837-1872, 1936-1971, 2034-2069**
	1971	1854-1889, 1953-1988, 2052-2087
	1986	1870-1905, 1969-2004, 2068-2103
	2010	1894-1929, 1993-2028, 2092-2127
G225M	2186	2070-2105, 2169-2204, 2268-2303
	2217	2101-2136, 2200-2235, 2299-2334
	2233	**2117-2152, 2215-2250, 2314-2349**
	2250	2134-2169, 2233-2268, 2332-2367 **
	2268	2152-2187, 2251-2286, 2350-2385

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	2283	2167-2202, 2266-2301, 2364-2399
	2306	2190-2225, 2288-2323, 2387-2422
	2325	**2208-2243, 2307-2342, 2406-2441**
	2339	2223-2258, 2322-2357, 2421-2456
	2357	2241-2276, 2340-2375, 2439-2474
	2373	**2256-2291, 2355-2390, 2454-2489**
	2390	2274-2309, 2373-2408, 2472-2507
	2410	2294-2329, 2393-2428, 2492-2527
G285M	2617	2480-2521, 2596-2637, 2711-2752
	2637	**2500-2541, 2616-2657, 2731-2772**
	2657	2520-2561, 2636-2677, 2751-2792
	2676	2539-2580, 2655-2696, 2770-2811
	2695	**2558-2599, 2674-2715, 2789-2830**
	2709	2572-2613, 2688-2729, 2803-2844
	2719	**2582-2623, 2698-2739, 2813-2854**
	2739	2602-2643, 2718-2763, 2837-2878
	2850	2714-2755, 2829-2870, 2945-2986 **
	2952	**2815-2856, 2931-2972, 3046-3087**
	2979	2842-2883, 2958-2999, 3073-3114
	2996	2859-2900, 2975-3016, 3090-3131
	3018	2881-2922, 2997-3038, 3112-3153
	3035	2898-2939, 3014-3055, 3129-3170
	3057	2920-2961, 3036-3077, 3151-3192
	3074	**2937-2978, 3053-3094, 3168-3209**
	3094	2957-2998, 3073-3114, 3188-3229
G230L	**2635**	**2435 – 2834**
	3000	**1700 – 2100, 2800 – 3200**
	3360	**2059 – 2458**
TA1	**Faint target**	**~1700-3200**
	Bright target	**~1700-3200 (order sorter reflection)**

5. **Page 44 (Rev. 16), Sec. 2.1.5.3: In the second sentence, change "1820" to "1850".**

6. **Page 87 (Rev. 16), Sec. 4.1.5: First sentence, change "There are four…" to "There are five…"**

7. **Page 88 (Rev. 16), Sec. 4.1.5: Item 1) should read:**

HV Overcurrent Protection - The most basic defense mechanism of the FUV detector is the HV overcurrent shutdown procedure, which runs in the DCE software, and is described for the FUV detector in Sec. 4.1.4.4. This autonomous operation will protect the detector from HV breakdown due to an over-light condition.

8. Page 88 (Rev. 16), Sec. 4.1.5: Item 2) should read:
Global Rate Monitoring - As discussed in Section 4.1.4.5, the FUV detector DCE flight software monitors the global event rate for each of the two detector segments. If the total count rate on either segment exceeds a commandable threshold, the HV to that segment will go to FUVHVLow. The CS flight software will also close the external shutter and turn off the lamps in response to this event.

9. Page 88 (Rev. 16), Sec. 4.1.5: Concatenate the current item 4) onto the end of item 3). Then add the following sentence to the end of the expanded item 3):
The CS flight software response to a local rate check failure is to close the external shutter and turn off the calibration lamps.

10. Page 88 (Rev. 16), Sec. 4.1.5: Insert a new item 4) that reads:
TDF Monitoring - The fourth level of protection is provided by monitoring the Take Data Flag (TDF) during an exposure. If the TDF flag is dropped (due to loss of lock, for example), the CS flight software will command the external shutter closed.

[Item 5) remains unchanged.]

11. Page 89 (Rev. 16), Sec. 4.1.5: After the last paragraph of this section, add the following note:
After a BOP event occurs, there is nothing to prevent further commanding from re-opening the shutter or turning the lamps back on. However, the STScI command instructions will always perform a local rate check on the active detector immediately after opening the shutter or turning on a lamp.

12. Page 102 (Rev. 16), Sec. 4.2.3.8: At the end of both items 1) and 2), add the sentence:
The CS flight software will also close the external shutter and turn off the lamps in response to this event.

13. Page 102 (Rev. 16), Sec. 4.2.3.8: Make the following two corrections to item 3):
First sentence should read: "The third level of protection is Local Rate Checking, which takes…"
Then add "and turning off the calibration lamps." **after** "…closing the external shutter".

14. Page 103 (Rev. 16), Sec. 4.2.3.8: In item 4):
Add "and turn off the calibration lamps." **after** "… external shutter closed".

15. Page 103 (Rev. 16), Sec. 4.2.3.8: After item 5), add a new sentence:

After a BOP event occurs, there is nothing to prevent further commanding from re-opening the shutter or turning the lamps back on. However, the STScI command instructions will always perform a local rate check on the active detector immediately after opening the shutter or turning on a lamp.

16. Page 52 (Rev. 16), Sec. 2.2.1: Add the following text to the end of the paragraph on "Multiple Power Settings":

In general, the MEDIUM current setting should be used as the default value for the wavelength calibration (Pt-Ne) lamps for normal wavelength calibration exposures. For aperture location calibrations during target acquisition (see Sec. 5.2), the LOW current setting will be the default. The HIGH current setting is for contingency in case lamp output decreases over time (true for both Pt-Ne and deuterium lamps). For normal flat-field calibration exposures with a deuterium lamp, the LOW current setting should be the default. (These default settings will be tested and verified during ground calibration.)